University of Massachusetts Dartmouth

Department of Fisheries Oceanography

MEASURING THE PERFORMANCE OF THE NORTHEASTERN UNITED STATES RESEARCH SET ASIDE PROGRAMS

A Thesis in

Marine Science and Technology

by

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ABSTRACT

Measuring the Performance of the Northeastern United States Research Set Aside Programs

by Erin Kathleen Adams

Research Set-Asides (RSA) are competitive grant programs in the Northeast U.S. that fund high priority fisheries research supplemental to U.S. state or federal funding. Principal investigators are awarded a portion of the fishing quota and form partnerships with members of the fishing industry. There are RSA programs for the Scallop, Mid-Atlantic, monkfish, and herring fisheries. To evaluate these programs, highlighting the relationships between fishery managers, researchers, and industry members, I designed four performance measures: 1.) success in fulfilling research priorities, 2.) scientific contributions 3.) fisheries management contributions, and 4.) promotion of stewardship and governance in the fishing industry. For the first three measures, RSA funded publications, fishery management documents, and projects final reports were reviewed. For the fourth measure, I interviewed sixty stakeholders and distributed a written survey to 1,113 RSA fishery permit holders. Between 2000 and 2009, the Scallop, Mid-Atlantic, Monkfish, and Herring RSAs funded and completed 42, 14, 8, and 1 priority research projects, respectively. These RSA programs produced 30 scientific publications, which were cited 237 times, presented results at scientific meetings 76 times, and funded nine graduate students. RSA projects were presented to fisheries managers 56 times and data were used in management 45 times. The Scallop, Mid-Atlantic, and Monkfish RSA programs worked cooperatively with 293 fishing vessels, and 86, 78, and 68 percent, respectively, of industry members surveyed in these fisheries were in support of RSA funded fisheries research. Scallops had the greatest impacts per project for all four performance measures. Efficient organization and sufficient incentives lead to successful high impact RSA programs.

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1. INTRODUCTION

1.1 History of Cooperative Research in the United States

Cooperative research between government agencies and fishermen began in the United States in the late 1800's with Spencer F. Baird, who was the first Commissioner of Fish and Fisheries for the United States Fish Commission, the predecessor of NOAA Fisheries. Before the US Fish Commission built the *R/V Fish Hawk* and *R/V Albatross* in 1880, Baird chartered local fishing vessels to conduct his initial research on declining fish stocks off of Cape Cod, Massachusetts (Smithsonian 2014). Fisheries research increased over the next century and cooperative research between commercial fisheries and scientists was prevalent throughout the mid-1900s (NRC 2004, Read and Hartley 2006, Hartley and Robertson 2006). A shift in fisheries research occurred with the passing of the Magnuson-Stevens Fisheries Conservation Act in 1976 when the federal government assumed management within the 200 mile Exclusive Economic Zone and created eight regional Fishery Management Councils (NEFSC 2011).

Expanded research capacity and increased fisheries regulation created a gap in trust between scientists, fishermen, and fishery managers (Dobbs 2000, NRC 2004, Read and Hartley 2006, Hartley and Robertson 2009). This disconnect between the fishing industry and fisheries scientists and managers resulted from "increasingly sophisticated but less transparent stock assessment methods and models, ever-tightening regulatory constraints on fishing, and progressively severe costs felt through the northeast coastal and fishing communities" (Hartley and Robertson 2006). Communication failures among Councils, NOAA Fisheries, and the fishing community led to increased tension and adversarial relationships (Kaplan and McCay 2003). Fishermen and others in the fishing industry were also skeptical about the ability of assessment scientists to estimate fish populations as forecasts did not match fishermen's daily

observations. Such mistrust of science weakened the perceived legitimacy of the federal government's management, which encouraged evasion of management measures and increased the potential of higher enforcement costs (Johnson and van Densen 2007).

As a result of increased federal government investment in fisheries management, cooperative research declined in the 1970s, which added to the disconnect between fishery managers and fishermen (Hartley and Robertson 2009). Partly due to the increased tension, NOAA Fisheries re-emphasized cooperative research in the late 1990's hoping to improve the relationship between the fishing industry and fisheries science while collecting high quality data (NRC 2004). In 2001, Congress supplied funds to NOAA fisheries to develop a national cooperative research program (NOAA 2011), and the 2007 Magnuson-Stevens Reauthorization Act called for the establishment of cooperative research and management programs to be "implemented on a regional basis and . . . developed and conducted through partnerships among Federal, State, and Tribal managers and scientists, fishing industry participants, and educational institutions" (U.S. Public Law 109-479, Title II, §318).

In 1999, NOAA Fisheries initiated the Northeast Cooperative Research Program (NCRP) to formalize and expand cooperative research among New England's commercial fishing industry, marine scientists, and fishery management communities in order to collect data for fisheries management. Projects of the NCRP include cod tagging, industry-based surveys, study fleets in Georges Bank, the Gulf of Maine, and Southern New England, and the Research Set Aside programs (NOAA 2014).

From 2000 to 2010, more than 250 cooperative research projects were funded with a value over US $70,000,000 and involved more than 1,000 stakeholders in the New England and Georges Bank area (Feeney et al 2010). Interest and opportunities in cooperative research in the Northeast involved almost all important fish and shellfish species, in addition to habitat studies,

and conservation engineering (Sissenwine 2001, Hartley and Robertson 2006). Organizations at the forefront of this cooperative research effort included NCRP, the Northeast Consortium based at the University of New Hampshire, the School for Marine Science and Technology at the University of Massachusetts Dartmouth (SMAST), and the Commercial Fisheries Research Foundation (Feeney et al 2010). Involvement from fishermen in research ranged from volunteering their time and vessels to active participation in all aspects of the research from design to dissemination of the results (NRC 2004). During this time, 80% of surveyed active fishermen viewed cooperative research as important; however, most fishermen surveyed did not think that cooperative research goals were achievable (Hartley and Robertson 2009).

1.2 RSA as Industry Funded Cooperative Research

The general aim of the Research Set Aside (RSA) is to increase knowledge of our nation's fisheries, to enhance information for management of fisheries, and to foster collaborations among marine fisheries interests (NOAA 2014). RSA's are considered cooperative research programs as fishermen are required to be actively involved in the funding through harvesting the quota and participation in the research projects (Meredith et al 2010).

The RSA program first developed in the Atlantic sea scallop industry in 2000. Between 2000 and 2009, the RSA program expanded to the monkfish, Atlantic sea herring, and nine Mid-Atlantic fisheries (summer flounder, scup, black sea bass, tilefish, *Illex* squid, *Loligo* squid, butterfish, Atlantic mackerel, and bluefish). Each year, the councils set aside a portion of quota to fund research projects through a competitive granting process. Successful RSA research proposals are awarded quota (pounds of fish or days-at sea). The principal investigator (PI) must contract with fishermen who harvest the awarded quota and pay the PI directly for the research or purchase quota through an auction. The fishermen receive an extra opportunity to fish and keep any additional profit earned but may also suffer a loss in profit if the landings price drops. No

federal funds are used in RSA research. Between 2000 and 2009, eighty-seven RSA projects involving nearly 300 fishing vessels and sixteen different research institutions received an estimated total value of $45,617,461. Of that total estimated value, $12,893,826 was directed towards research and the remainder was retained by fishing industry member participants in the RSA programs (NOAA 2013).

1.3 Evaluation for Effective Cooperative Fisheries Research

Cooperative research may provide useful scientific research while improving the working relationship between fishermen and scientists (Kitts et al. 2006, Karp et al. 2001, Johnson and Van Densen 2007). The RSA is unique as it requires fishermen and scientists to: 1.) conceptualize and develop research ideas and project proposals, 2.) develop an economically balanced contract to raise the funds and 3.) execute the research. An evaluation of the RSA serves to describe the program's performance including the scientific, managerial, and social impacts of the funded research.

In 2009, members of NCRP, NOAA Fisheries, the Mid-Atlantic RSA committee, MAFMC and NEFMC members and staff, and RSA stakeholders conducted a programmatic review of the RSA programs in a two day workshop. The reviewers identified the challenges facing the RSA program with the purpose of providing "guidance on optimizing existing RSA programs and to establish best practices for developing new RSA programs" (Meredith et al. 2010). Issues included the administrative burden to both federal and state agencies due to the complexity of grant and exempted fishing permitting processes, the challenges of turning fish into funding, and enforcement and monitoring performance. Suggestions for improved RSA administration included the allowance for no cost contract options and joint agreements, and the establishment of multi-year RSA research priorities, competitions, and programmatic National Environmental Protection Act (NEPA) reviews to streamline the award cycle. The Review also

recommended introducing a third party entity to set up an account to raise funds a year prior to research that would decrease the uncertainty and conflict of raising the money during the same year as research. Suggestions to improve enforcement included additional reporting requirements with Vessel Monitoring Systems (VMS), designated ports and times for offloading of RSA quota, and increased background checks and criminal repercussions for violations.

As a result of the review, recommendations for programmatic improvements culminated in beneficial regulation changes including an annual set aside in pounds rather than a combination of DAS and pounds, as well as, multiyear awards in the scallop RSA. The suggestion for rolling over unused Monkfish RSA DAS was approved in 2010, and no cost extensions were also permitted.

This thesis expanded on the NOAA Fisheries 2009 RSA Programmatic Review and evaluated the four programs in the Northeast, United States through four performance measures using eleven metrics. The results of this evaluation will provide a baseline of the RSA's overall performance and the RSA's contribution to fisheries science, management, and improved collaboration among stakeholders.

2. THESIS RESEARCH GOAL

The goal of this thesis was to evaluate the performance of the Sea Scallop, Monkfish, Mid-Atlantic and Herring RSA programs individually as well as assessing the overall performance. To ensure only completed projects were evaluated, I considered the years 2000 to 2009. Additional information on regulations and other program developments since 2009 have been included when appropriate.

The performance measures were based on the objectives in the fishery management plans (FMP) for each of the fisheries (Table 1). These performance measures were used to test the hypotheses that RSA programs have 1.) met the stated research priorities of the fishery management councils, 2.) produced peer reviewed scientific data, 3.) impacted fisheries management, and 4.) increased governance and stewardship among the fishing industry.

3. DESCRIPTION OF THE RSA PROGRAMS

3.1 Scallop RSA

In 1997, low prices and low catch rates created a crisis for the sea scallop industry prompting fishermen to petition for an experimental fishery to determine the abundance and distribution of sea scallops in Closed Area II, an area closed to fishing in 1994. Fishermen and scientists expected an abundance of scallops in this historical fishing area. Working in collaboration with the scallop industry and the Northeast Fisheries Science Center (NEFSC), a research proposal from SMAST was approved by NOAA Fisheries to conduct a dredge survey in Closed Area II during 1998 and 1999. The exempted fishing permit (EFP) through the Georges Bank Sea Scallop Exemption Fishery authorized each vessel to land 10,000 pounds of scallops to offset research expenses (NRC 2004, Berstein 2000). As a result of the research, a large number of scallops in Closed Area II were documented, and the area was re-opened to limited commercial scallop fishing. The program continued in late 1999 with the Virginia Institute of Marine Science (VIMS) dredge survey. Both the SMAST and VIMS surveys led to the eventual development of rotational area management in the scallop fishery (Berstein 2000).

The success of the scallop resource funding research culminated in the Scallop RSA through the sea scallop FMP Framework Adjustment 11 in 1999. One percent, roughly 95,000 pounds, of the sea scallop quota was set aside from the Nantucket Lightship Closed Area, Closed Area I, and the entire open area (Federal Register 65 FR 00-22203, Stokesbury 2002, DuPaul 2002, Stokesbury et al. 2004). The priorities of the sea scallop RSA were to “conduct research in gear development for bycatch reduction, habitat impact, rotational fishing strategies, size selectivity, and incidental mortality of scallops and other species” as well as “encourage industry participation by compensating the vessels for potential decreased efficiency and increased cost when participating in a research program” (NOAA 1999).

The regulations for the scallop RSA changed several times through the programs first ten years. Amendment 10 in 2004 increased the amount set aside from one percent to two percent of closed area quota and open area days-at-sea (DAS). Most recently, Amendment 15 changed the DAS allocation to an annual poundage of 1.25 million pounds and authorized multi-year awards (Federal Registry 50 CFR 648.56).

From 2000 to 2009, the value of the scallop quota set aside was an estimated $31,281,759. Of the total estimated amount, $6,607,125 funding 48 research projects in gear conservation, scallop biology and habitat, and resource surveys to determine harvest levels in rotational management strategies and for use in stock assessments. The remainder of the funds raised through the set aside ($24,674,634) went to the fishing industry for compensation (Figure 1).

3.2 Mid-Atlantic RSA

The Mid-Atlantic RSA started shortly after the scallop RSA with the first three projects funded in 2002 through FMP Framework Adjustment 1 for squid, mackerel, butterfish, summer flounder, scup, black sea bass, bluefish, and tilefish (NOAA 2001).

The Mid-Atlantic RSA's original objective was to fund data to broaden the scientific base upon which fisheries management decisions were made. Secondarily, the mechanism of the RSAs encouraged collaboration among the fisheries, research institutions, and fishery managers (NOAA 2001) (Table 1). The Mid-Atlantic is the only RSA program with a dedicated committee comprised of MAFMC members who determine RSA research priorities based on recommendations from NOAA Fisheries and MAFMC staff. The other RSA programs are driven by the New England Fishery Management Council's plan development teams, fishery advisory groups, and species oversight committees.

Unlike other RSA programs, researchers in the Mid-Atlantic can utilize multiple species' RSA quotas to raise sufficient research funds. For example, in low valued fisheries such as squid, a researcher may not be able to raise sufficient funds for research solely through the sale of squid RSA quota. To aid in raising funds, a researcher can apply for up to 25% of a species such as black sea bass or summer flounder, both with higher economic value.

Also unique to the Mid-Atlantic RSA was the use of an auction to raise research funds through the sale of quota. Because many of the Mid-Atlantic projects require a high volume of fish to meet research budget needs, PIs found it difficult to contract enough boats to catch awarded quota. In response, The National Fisheries Institute –Scientific Monitoring Committee (NFI-SMC), a non-profit fishing industry organization dedicated to improving the science needed to manage fisheries stocks, created the auction in 2002 to aid in raising research funds for RSA projects (NFI-SMC 2011). The auction is neither affiliated nor sanctioned by NOAA Fisheries and is open to all dues-paying members of the NFI-SMC. From 2002 to 2009, 26 research projects were awarded through the Mid-Atlantic RSA, totaling $9,126,325; $4,665,056 for research and $4,485,194 for compensation (NOAA 2014).

3.3 Monkfish RSA

In 2006, the Monkfish RSA was implemented through FMP Amendment 2. Monkfish are managed jointly by the New England and Mid-Atlantic Fishery Management Councils. The programs original objectives were to "gather much needed scientific information in areas of monkfish biology, fishery impacts on essential fish habitat, and bycatch for effective management of the fishery" and to "work cooperatively with the industry to improve cost effectiveness, success, and acceptance" (Table 1).

The Monkfish RSA is similar to the scallop and Mid-Atlantic programs, except researchers are awarded days at sea (DAS) rather than pounds of fish. Five hundred DAS are set

aside annually for research, and any unassigned DAS may be reallocated for other monkfish research activities outside the RSA program.

To raise funds for research, PIs sell their DAS at a set rate to fishermen interested in extra fishing opportunities. The majority of monkfish industry RSA participant's fish with gillnets instead of trawls and include both inshore and offshore fishermen. Early participation in the program was low due to the high cost of a Monkfish RSA DAS. Interest in the RSA grew when the price decreased from $800 to $500 per DAS and when EFPs were issued to participants allowing them to land amounts of fish above their normal possession limits to offset the cost of the DAS. Recently, the cost per Monkfish RSA DAS has increased slightly. To aid in flexibility in the RSA program, Amendment 5 passed in April 2010 allowing unused RSA days to rollover to the following year (FR Doc No: 2010-5601).

In 2012, an Endangered Species Act listing of Atlantic sturgeon imposed a minimum fishing depth of 50 fathoms or more to reduce sturgeon interaction. However, further research showed higher sturgeon numbers than originally estimated removing the fishing depth limitation (Kocik et al 2013, FR Doc No: 2013-12866). From 2006 to 2009, 12 projects were funded through the monkfish RSA at a total estimated value of $4,542,777 with $1,379,080 used to fund research (NOAA 2011).

3.4 Herring

Amendment 1 of the Herring FMP implemented a set aside between 0-3% of the total herring quota in 2006. Herring RSA projects "must enhance understanding of the fishery resource and/or contribute to the body of information which management decisions are made" (NOAA 2006).

The herring fishery is separated into four different areas named 1A, 1B, 2, and 3. Fishing in each of the areas occurs until 95% of the area total quota has been caught with the remaining

5% set aside for incidental catch. The Herring RSA program takes an additional 0-3% off the total area quota. For example, if the Council sets aside 3% of the Area 1A quota to support research, then Area 1A would close when 92% of the quota was caught.

There has been only one herring RSA project funded in 2008 and 2009 to the Gulf of Maine Research Institute entitled "Effects of Fishing on Herring Aggregations," with an estimated total value of $666,600. Of the total, $242,565 was used in research and $424,035 was for compensation. Due to low commercial fishery quotas of herring, the RSA program was suspended from 2010 to 2013. However, just over seven million pounds were set aside for the 2014-2015 herring catch specifications, and one project was awarded.

4. HOW THE RSA WORKS

4.1 RSA Administration

The RSA programs are administered federally by the NOAA Fisheries Northeast Cooperative Research Program (NCRP). The NCRP oversees the RSA competitive grants process for all four programs and receives progress and final reports (NOAA 2012).

4.2 How Projects are Chosen

The Northeast and Mid-Atlantic RSA programs are grants. A grant is a federal process defined as a "transfer of money, property, services, or anything of value to a recipient to accomplish a public purpose through support or stimulation that is authorized by federal statute" (NOAA 2011). As federal grants, the RSA programs must follow legal process as defined by the Office of Management and Budget, before approval and disbursement of awarded quota. On average, an award cycle takes 180 days from the publication of the Request for Proposals (RFP) to award notification (Meredith et al., 2010) (Appendix K and L).

Depending on the fishery, Council staff, RSA species oversight committees, and plan development teams recommend RSA research priorities. Once the Mid-Atlantic and New England Fishery Management Councils approve the priorities, RFP's are published in the federal registry.

After the RFP closing date, two separate reviews are conducted. First, three subject matter experts review and score the proposal's technical merits. The reviewers are determined by members of the RSA program and the Councils' staff. Reviewers are chosen from NOAA science centers, state fishery management agencies, industry members, and academia (Karp 2014, Appendix M).

The proposals are also subjected to a management review. This is conducted by a contingent of management experts familiar with the respective fisheries FMP and science or management issues. The management review objectives are to assure that the selected projects are relevant and applicable to current data and management needs.

All review comments are confidential. The management review panel generally does not have access to the technical scores, as they are encouraged to focus only on the management value or scientific contribution that the proposed study would make toward management issues in that fishery. A new review panel is assembled for each award cycle. The review panel does not score the proposals but compiles comments for the Science Director of the Northeast Fisheries Science Center, who makes the final decision (Karp 2014).

In previous years, the reviews occurred sequentially, but because the results of the technical and management reviews are no longer dependent on each other, the process changed to simultaneous reviews to improve efficiency of the award process. This part of the process now takes about 30 days (Appendix M).

Peer technical reviews for the Mid-Atlantic proposals follow the same procedure as the other RSA programs, however, the RSA Committee originally comprised of members of the MAFMC perform the management review. As a result of the 2009 Programmatic Review of the Mid-Atlantic RSA, members of the Mid-Atlantic Science and Statistical Committee joined the RSA committee in 2012 to ensure the scientific application of awarded research.

After the reviews, successful proposals go to the grants management division and to the staff of federal acquisitions law division of NOAA. A lawyer assigned to the RSA reads through the RFP to make sure that the proposals are legally correct and logical and that the rationale for choosing one project over another is legitimate.

A National Environmental Policy Act (NEPA) review follows to determine if the proposal violates the Endangered Species Act, Marine Mammal Protection Act, or if it has an effect on habitat and other protected species. This review is based on the completed NEPA questionnaire that researchers are required to submit with their research proposals.

Simultaneously, NOAA's Program Planning Implementation (PPI) department compares the proposed research with existing research to avoid duplication. Administrators at the NEFSC inform PPI throughout the review process.

If the project passes the above steps, the NEFSC and researchers may negotiate revisions of budget and project scope to fully utilize the resource available and/or highlight one aspect of research over another. Titles of successful proposals are then made public.

If federal regulations requires it, NOAA Fisheries issues an exempted fishing permit (EFP) a letter of acknowledgement, or a letter of authorization that allows a party to engage in fishing or scientific research activities otherwise prohibited by the Magnuson-Stevens Fisheries Management and Conservation Act or other fisheries regulations (50 CFR§600.475). The NOAA Fisheries Regional Administrator may require industry-funded observer coverage for these permits (NOAA 2014).

In the Mid-Atlantic RSA, the NEPA, Essential Fish Habitat, and Endangered Species Act reviews for most RSA projects are incorporated into the annual management plan specifications that dictate yearly fish quotas. By doing so, most EFPs can be issued within a few days of the grant award. However, in some cases, if the management specifications are not completed by the start of the fishing year, the EFP will be delayed (Meredith et al 2010).

NOAA allows an option for no-cost project extensions, and if approved, can extend the research project for an additional year, although all compensation must occur during the award

year with two exceptions. Monkfish RSA DAS can rollover to the next year and Scallop RSA compensation pounds can be harvested through May 31st of the next fishing year.

Awards require a semi-annual report and a final report submitted to RSA staff at the NEFSC. A NEFSC staff member, ideally the person that reviewed the project proposal, reviews the reports and determines if they completed work as proposed. The final reports are eventually made available to the public on the NEFSC Cooperative Research website.

The NEFMC established a Research Steering Committee (RSC) in 1998 to guide and review research funded through the NCRP, the RSA, the Northeast Consortium, and other cooperative research, but no RSA projects were reviewed by the RSC between 2000 and 2005 (NEFMC 2005). The RSC stated that while it assumed responsibility to review research by the NOAA NCRP and the Northeast Consortium, the workload required to review the RSA programs was too large (NEFMC 2007). It was not until June 2012, that the RSC agreed to a "fast track" the review of Coonamessett Farm's final report of "Scallop Meat Weights and Bycatch of Groundfish Species for Optimizing the Scallop Industry" to ensure the study's incorporation into a scallop Framework 24 (NEFMC 2012).

4.3 The RSA Funding Process: How Pounds are Turned into Dollars

No money earned from RSA quota landings passes through NOAA Fisheries. The RFPs estimate price per pound for species, and NOAA Fisheries limits the number of vessels working on one project to fifty. No regulations dictate the creation of financial contracts between researchers and industry. As a result, business arrangements differ between projects and programs depending on negotiations between the researcher and industry participants. In both scallop and monkfish RSAs, some research groups ask for a certain dollar amount per pound of scallop or days at sea, while other institutions ask for a percentage of landings value that can

range anywhere from 20-45% of the catch. The Mid-Atlantic RSA raises the majority of funds through the annual NFI-SMC auction.

Fishermen and researchers both face risk as fish prices change over the following six months to two years between proposal submission and the compensation trips. If contracts specify a percentage agreement and fish prices drop or the fish are not caught, both the researcher and fishermen suffer budget shortfalls and may have to cover losses themselves. If the contract specifies a set amount per pound to be paid to the researcher by the fishermen, the fishermen accepts the possibility that if sufficient funds aren't raised, they may still be responsible for payment to the researcher. The researcher also faces the risk of not meeting budget needs if they are unable to secure fishermen to harvest their RSA quota or if the contracted fishermen do not fulfill the contract. Alternatively, if fish prices rise, depending on the contract, some institutions may keep the additional funds to hedge against potential future losses, and fishermen also receive greater compensation.

The risk of not raising sufficient funds deters some universities and institutions from applying for RSA grants. Institutions that are able to compensate for the inherent risk of RSA funding may benefit from reduced competition and receive greater awards over multiple years. In the scallop RSA, for instance, the 48 projects from 2000 to 2009 were awarded to seven different institutions (Figure 4). Of the 26 Mid-Atlantic and 12 Monkfish RSA projects, awards were received by seven and four different institutions, respectively (Figure 5 and 6).

4.3.1 The Mid-Atlantic RSA Auction

The Mid-Atlantic RSA fisheries are managed with input and output controls, including annual landing limits either by total area or by state, minimum fish sizes, bag limits, fishing seasons, gear restrictions, permit requirements, and other provisions to prevent overfishing and ensure sustainability of the fisheries. The summer flounder, black sea bass, scup, and bluefish fisheries are cooperatively managed by the Atlantic States Marine Fisheries Commission and MAFMC through state-by-state quotas for both the recreational and commercial fisheries. Atlantic mackerel, butterfish, and *Illex* and *Loligo* squid are managed through a single FMP by the MAFMC. The FMP for tilefish was created in 2001 and included total allowable landings through a limited entry program. An Individual Transferable Quota (ITQ) system was implemented in the tilefish fishery in 2009, the only individual quota system among the Mid-Atlantic RSA species. As of 2014, no tilefish quota has been set aside for research.

Sea scallops are managed through assigned trips for specific pounds in rotational areas and limited DAS in open areas. Scallop RSA quota is valuable to fishermen because it allows permit holders to take additional fishing trips. Scallop prices are high, which adds to the value of the scallop RSA quota (Figure 2). The nine Mid-Atlantic RSA species sell for lower ex-vessel prices than sea scallops.

Mid Atlantic RSA PI's found it difficult to convert sufficient pounds of fish into dollars to meet research budgets. The Mid-Atlantic RSA fisheries are comprised of smaller vessels than the scallop RSA fishery and a large amount of effort was needed on behalf of the researcher to contract with enough fishermen to harvest awarded quota. To aid in fundraising for RSA research, the NFI-SMC developed an auction in 2002. This auction makes the RSA quota available to a larger number of vessels than the researcher may have had access to. PI's determine how much of their awarded quota to make available for the auction. Recreational for-hire and

commercial fishermen are able to participate in the auction through payment of an annual membership fee to the NFI-SMC.

The RSA auction is held annually and starting bid price depends upon the average price from previous years and the value that covers research costs. The auction breaks down its recreational and commercial quota in agreement with the FMP. For example, in the summer flounder fishery, if the quota allocates 60% of the summer flounder for the commercial sector and 40% to the recreational sector then the pounds of summer flounder available for auction are split 60:40. The recreational and commercial auctions are separate, and any recreational poundage not bid on rolls over to the commercial sector. Each of the species are broken into separate lots varying from 1,000 to 50,000 pounds depending on the species. Participants bid for price in pound either in person or over the phone. The highest bidder receives the lot. Unused pounds revert to the fishery. Twelve percent of the funds raised through the Mid-Atlantic RSA Auction are withheld to pay for the administration (See Auction rules, APPENDIX O).

By winning a bid, the fishermen pay for the ability to fish above their regular possession limits and outside seasonal closures and other regulations. Fishermen only profit when their selling price surpasses that of their bid and fishing costs combined. There were instances in the auction where final bids were higher than the average annual price per pound of a species. For example, in 2012, the average winning bid price at the auction for commercial black sea bass was $5.17, but the annual average price per pound that year was $2.66 (Figure 1 and Table 11). Much of the value comes from specialty buyers when market demands drive up the selling price during fishery closures.

Responsibility falls on the fisherman for payment with a successful bid. From 2002 to 2013, fishermen with successful bids were required to pay 25% of their bid by May 30th, 50% by September 30th, and 100% by December 15th of that calendar year (Appendix O). In January

2014, the payment schedule changed and successful bidders were required to pay 25% of their entire bid on the day of the auction. Fifty percent of the entire bid was due July 1st and in full by December 1st.

Payment on *Loligo* squid bids depended on a fishery closure. If the *Loligo* fishery closure lasts five weeks or more, the successful highest bidder is responsible for their entire bid price. A closure of four weeks calls for 75% of bid, three weeks 50%, and two weeks for 25% of the price. Any *Loligo* closure less than two weeks means the winning bidder only pays for the amount of squid they harvest, if any.

Fishermen are required to call in to either the state or federal fisheries management offices to report when they will be fishing RSA quota and when and where they will land their catch. This information allows management to record what RSA quotas are used and informs fisheries enforcement, who perform routine inspections. The majority of fishermen that bid at the RSA auction are from Long Island, New York because of low state fish quotas. The RSA auction provided a way for fishermen to turn discards into landings. However, because fishermen are using an exempted fishing permit, there are concerns that a lack of enforcement enables fishermen to falsify their catch records if their RSA trips are not inspected.

5. PERFORMANCE MEASURE ONE: SUCCESS IN FULFILLING PRIORITIES

5.1 Methods and Data

Metrics to test the first performance measure of the RSA's success in fulfilling priorities were: 1.) Did each awarded project's research objectives comply with priorities stated in the annual request for proposal (RFP) announcement? 2.) Was the research completed as proposed? 3.) Did the researcher submit a final report?, and 4.)Was the final report reviewed?

For metric one, lists of research priorities were compiled from the annual funding announcements for each RSA program from 2000 to 2009 through an online document search of the Federal Register for the official annual RFP announcements. These lists were compared to research objectives stated in the RSA project final reports accessed through the NCRP cooperative research website to determine if awarded research met RFP priorities.

For metric two, I analyzed all available final reports for completion of proposed work. Final reports were the primary source of research details for each of the RSA projects. A Freedom of Information Act (FOIA) request for all RSA proposals from 2000 to 2009 was submitted in the winter of 2012, however, the proposals were not received because of a combination of high cost and length of estimated time it would take FOIA to process the request. The information provided in the RSA project final reports was deemed sufficient to determine if research was altered from the methodology of what was proposed. Written statements from the final reports about altered methodology from the proposal were compiled and tallied with particular attention being paid to projects that faced complications in funding and permitting (Table 2).

The third metric accounted for the presence or absence of a final report on the NCRP website. As a final report provided information on the projects methodology and final results, the lack of such a document decreased the impact of that RSA funded research (Table 2).

A second FOIA request for the NEFSC reviews of progress and final reports was received for the fourth and final metric used for measuring how the RSA projects fulfilled their research priorities. FOIA regulations stated that only the reviews for the six most recent years were required to be reported. While reviews for all 87 projects were requested from 2000 to 2009, only 40 final report reviews and five progress report reviews were released of the 53 projects from 2006 to 2009. The absent reviews were due to "missing documents or because the comments were not kept or had insignificant response from the reviewer" (FOIA 2012). The reviews varied from one lined acceptance of the report to detailed documents that were multiple pages long. Due to the variability between the methods of review, only the number of reviews available for each program was tallied (Table 2).

5.2 Results

Eighty final reports available on the NCRP website were reviewed. Seven project final reports were not available on the website and were not evaluated. Four projects provided one report for multiple year awards and one project's report submission date preceded its approval date indicating an error.

In total, eighteen projects from all four RSA programs had problems either with fundraising or with permitting delays. Fourteen of those 18 projects were unable to complete proposed research or incurred a change in research plans because of complications in turning the RSA quota into research funding (Table 2). Four projects in the Mid-Atlantic RSA were discontinued before raising any funds or conducting research.

5.2.1 Success in Fulfilling Priorities: Scallops

Each scallop project from 2000 to 2009 was categorized by research type by the NCRP. Most focused on stock monitoring through industry based surveys and conservation engineering

research (Figure 7 and Figure 10). Other research included reductions of groundfish bycatch in the scallop fishery, scallop habitat, and resource health. All projects awarded from 2000 to 2009 met at least one of the priorities in the RFP and twenty-one were high priority research (Appendix E). Two final reports were missing from the NEFSC website and were not analyzed. (Table 2).

Of the 48 scallop projects awarded from 2000 to 2009, six reported complications with either permitting or funding. Two of the six projects had to change research plans due to permitting issues and two projects (8%) stated a delay in completing work because the projects were unable to raise sufficient funding for proposed research (Table 2). Each of the projects that faced financial and permitting difficulties were listed and all details pertaining to altered methodology was included. The following examples are of projects that altered their research from what was originally proposed as stated in the final report.

In 2000, the project entitled "Dredge Modifications to reduce Incidental Groundfish Catches in the Northwest Atlantic Sea Scallop Fishery" had difficulty completing proposed research. The final report stated that a "high degree of inflexibility in the regulatory and management process" forced the researchers to alter their experimental design, however, there was little information describing the changes. The delay did not affect their ability to raise funding. The proposed research budget was $42,900 and the project raised $52,395 for research from the sale of scallops. The project spent $30,618 during the initial research period and the excess funds were used during the project extension of November 30, 2002.

An example of financial hardship in the scallop RSA occurred in the 2002 project "Examination of the Sea Scallop, *Placopecten magellanicus*, Recruitment in Closed and Open Areas of Georges Bank". Due to low scallop landing prices compared to the federally required rate of $4.50 per pound in the RFP, several of the captains/owners gave up a portion of their share

to pay for the research and the crew. The final report did not mention an inability to complete proposed research.

In the 2007 scallop project "Adaptive Characterization of Scallop Populations Using High Resolution Optical Imaging: Phase 2" stated a delay in reaching the third objective of building a stereo camera system due to falling $90,000 short in project funding due to low catch rates and price. The project expected to raise $446,963 but only raised $355,055. The project was awarded an RSA grant over multiple years and at the time of writing the final report stated that the stereo camera system was completed.

In 2008, the final report for the project "Developing Tools to Evaluate Spawning and Fertilization Dynamics of the Giant Sea Scallop, *Placopecten magellanicus*" stated a delay in the start of research as funds had to be raised. The project was awarded in 2008, but research did not begin until spring 2009. Despite this delay, the research was completed.

Permitting problems affected the research design for the 2008 project entitled "Observing Behavior of Loggerhead Sea Turtles, *Caretta caretta*, on Foraging Grounds off the Mid-Atlantic United States Using a Remotely Operated Vehicle (ROV)" as vessels were unable to move in and out of scallop access areas without an Exempted Fishing Permit. The researcher was unable to collect the proposed data of scallop dredge interaction with sea turtles in the closed areas because of the delay in permitting.

5.2.2 Success in Fulfilling Priorities: Mid-Atlantic

Research in the Mid-Atlantic shifted from funding only gear conservation engineering projects in 2002 to funding only stock monitoring in 2009 (Figure 8), and overall, most of the Mid-Atlantic RSA funding went to "stock monitoring" research (Figure 11). All projects that were awarded through the Mid-Atlantic RSA complied with RSA research priorities stated in the RFP and 23 of the 26 Mid-Atlantic projects had final reports (Appendix E).The Mid-Atlantic

research priorities were not ranked. Of the 14 projects awarded from 2006 to 2009, there were nine final review reports and two progress reports available from the FOIA request (Table 2).

During the programs first eight years, nine (35%) of the projects were either withdrawn or could not meet proposed research objectives. Difficulties in raising sufficient funds or with exempted fishing permitting was evident in six of the nine projects, and four of the nine projects were withdrawn before the end of the grant period (Table 2).

In 2002, the project entitled "Testing and Further Development of Scup-Excluding Net Modifications" was awarded 118,000 pounds of scup and 40,000 pounds of *Loligo* but was withdrawn. Also in 2002, the "Pilot Study to Collect Black Sea Bass Catch and Discard Data in NJ/NY's Winter Ports and Charter Boat Fishery" was awarded 10,000 pounds of black sea bass but was withdrawn. No explanation was given for why either project was withdrawn and no project code was assigned.

Two projects in 2003 were withdrawn before any funds were raised. One entitled "Effect of Vent Size on Sex ratios of Black Sea Bass Retained in the Coastal Pot Fishery" had difficulties receiving a state scientific collection permit and had insufficient time to conduct the project. None of the 25,000 pounds of black sea bass were landed or sold.

The second project, "A Bycatch Characterization and reduction of bycatch from the directed scup bottom trawl Northern-Inshore Scup Fishery" was withdrawn because the price of scup during the summer months was insufficient to cover the research costs. A request to terminate the project was submitted and accepted by NOAA Fisheries. No project codes or final reports were available for the two withdrawn 2003 projects.

A 2003 project titled "Gear Modification to Reduce Scup Bycatch in the Directed *Loligo* Fishery" was not able to raise the anticipated amount of money because the *Loligo* squid fishery did not close in 2003. The final report stated that "without a closure, the research set-aside of squid

received to support the project was not worth enough money for the fishermen to harvest." The initial proposed research was to further study a mesh modification that reduced the capture of scup. Due to financial problems, the project modified its research to study existing gear that increased the retention of *Loligo* squid while still reducing scup bycatch. The project also evaluated the bycatch of scup in an area that was closed to the *Loligo* fishery. The final report stated that the research was altered from what was proposed but the research was completed.

Also in 2003, the project "Effects of Increasing Mesh Size in the Summer Flounder Fishery in Southern New England Inshore Rhode Island Waters" reported that a total of 39 days were projected to complete the project and compensation fishing, however, 59 days were required and the two fishing vessels participating were unable to harvest 16,327 pounds due to lack of fish in the project area. The fish that were caught were sold at a higher than anticipated price due to market demand, and the research was completed.

A 2004 project entitled "Evaluating the Effect of Vent Size and Shape on Black Sea Bass Behavior and Escapement from Pot Gear" mentioned a delay in the start of research from June 2004 to August 20, 2004 because the EFP was not issued in time. This delay shortened the research season because the black sea bass fishery did not operate in the winter. Issues with the renewal of the EFP also delayed the following year's research causing the researcher to miss the spring/early summer fishery. This project received permission by NOAA Fisheries to postpone the project and complete the research in the following year.

The 2006 project "An Evaluation of Size Selectivity and Relative Efficiency of Black Sea Bass, *Centropristis striata*, Habitat Pots equipped with Large Mesh Panels" was unable to complete the full sample objectives due to the lack of fish in the study areas. The low abundance of black sea bass meant that the fishermen were unable to harvest the full quota and fell below the

proposed budget. The project was awarded a one year extension but due to the funding shortfall, completing the research in the second year was difficult.

Sufficient funds could not be raised in the 2007 project titled "Bycatch reduction and gear development in the Mid-Atlantic: Evaluation of optimal codend mesh size in the *Loligo* fishery." In the final report, the original proposal requested an estimated $378,673 for research through 40,358 pounds of black sea bass, 163,633 pounds of summer flounder, 331,000 pounds of *Loligo* squid, and 269,305 pounds of scup. When the project was funded the poundage was 40,358 pounds black sea bass, zero pounds of summer flounder, 98,419 pounds of scup, and 650,251 pounds of *Loligo* squid. In addition, due to a delay in the approval of the Exempted Fishing Permit, the primary squid fishing season was lost resulting in low value squid catches. The project was not completed as proposed.

5.2.3 Success in Fulfilling Priorities: Monkfish

The projects awarded in the Monkfish RSA were pertinent to RFP priorities and included research on age and growth, discard mortality, resource dynamics. The majority of funding was directed towards tagging studies (Figure 9 and Figure 12).

Of the twelve research projects awarded in the 2006 to 2009 Monkfish RSA, there were five final report reviews available through the FOIA request. Two progress report reviews were provided. Two of the twelve projects stated an inability to complete proposed research due to funding issues (17%). Links to two of the twelve final reports were not available on the NCRP website (Table 2).

Through final report review, the 2008 project "An Evaluation of the Effects of Gillnet Alterations on Selectivity and Relative Efficiency in the Monkfish Fishery" was unable to complete its proposed research. Difficulties due to the timing of funding and an unexpected rise

in fuel prices that was not accounted for in the original budget were the reasons stated in the final report.

In 2008, the project "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" reported that the first phase of research failed because fishermen did not buy enough DAS. The final report stated that fishermen did not want to participate in the research because of "dissatisfaction and frustration with equipment and software".

5.2.4 Success in Fulfilling Priorities: Herring

The project funded through the 2008 and 2009 Herring RSA entitled "Effects of Fishing on Herring Aggregations" fulfilled the primary research priority to "define localized depletion of herring on a spatial and temporal scale; further develop hydro-acoustic surveys to provide an independent means to estimate stock sizes and/or define localized depletion" and the report review was available through the FOIA request (Table 2). The scope of the work shifted from its original objective to an evaluation of the use of available acoustic gear on commercial fishing boats for assessing the possible impacts of paired mid-water trawling on herring aggregations because of funding issues. The project was only able to harvest 71% of the 3,300 mt RSA quota awarded.

5.3 Discussion

Overall, all the projects funded from 2000 to 2009 applied to priorities listed in the request for proposals; however, research priority lists for some years were quite extensive and covered a wide variety of research topics. The scallop RSA awarded 23 projects that were considered high priority, but priority lists in the monkfish and Mid-Atlantic RFPs were not ranked during the study period.

All programs encountered problems. Issues with funding and permitting were more prevalent and obstructive to research in the Mid-Atlantic, Monkfish, and Herring RSA programs than in the Scallop RSA. In some instances the funding schedule did not match with the research schedule which caused delays, and in other instances, the funding could not be raised due to lack of fish, low landing price, or unwilling fishermen participants. As a result of funding difficulties and permitting, some researchers needed to modify their research from what was proposed in order to complete their projects, whereas other researchers were unable to overcome funding difficulties and had to terminate or postpone their research plans (Table 2). Each RSA fishery was different and of different value (Figure 1). Varying amounts of effort was required to raise sufficient funds for research.

In some instances, projects and fishermen received a windfall from the RSA quota harvest. For example, in 2008, the project the "Assessment of Sea Scallop Distribution and Abundance in Federal Waters of the Gulf of Maine" made a request to the NEFSC for an additional 20 DAS as scallop prices appeared to be too low to meet budget needs. The request was granted and the project ended up raising an additional $9,169 from scallop RSA quota harvest due to higher landing prices and received permission from NOAA to use that extra funding within the project.

The RSA programs face unique funding that can make successful research difficult. At a minimum, if a fishery has enough biomass to set aside a portion, then the RSA can continue. For example, the herring quota was cut in 2009 and managers thought that there were insufficient quota available to set aside and suspended the RSA from 2010 to 2013.

The bycatch biomass must also be at a level to allow for RSA fishermen to fully land their awarded quota. Georges Bank yellowtail flounder in the scallop RSA, river herring caps in

the Atlantic Herring fishery, and sturgeon in the monkfish RSA, are all examples of bycatch limiting the research set aside target fisheries.

Depending on the fishery, having too large of a quota is also a problem in the RSA mechanism. There must be a demand for the catch so the fishermen have an incentive to pay to fish RSA quota. If a fish stock is thriving and at level where fishermen are unable to catch their normal full-priced allocation, there may be little incentive for those fishermen to put in effort and fish for RSA quota at a lower profit (i.e Mackerel RSA). If the value of the RSA quota is high, as in the scallop industry, there is a greater incentive for participating in compensation fishing. The value of the species is a large factor in project success since fundraising is necessary to conduct research. The monetary incentive for participation in the RSA is also important. The auction in the Mid-Atlantic provides a solution for turning large amounts of fish into money, but in return may not connect industry members, scientists, and fishery managers in RSA research.

A review of project budgets would aid in gaining a greater understanding of how the RSA projects funded their research. While some final reports included final budgets, it was not a requirement in reports from 2000 to 2009 and review of project budgets could not be included in this evaluation. Final budgets are now required in reports and a closer analysis of project budgets should be possible in future evaluations.

6. PERFORMANCE MEASURES TWO: SCIENTIFIC CONTRIBUTIONS

6.1 Methods and Data

The underlying objective of the RSA programs was to fund scientific research for additional fisheries data. Four metrics used to determine the scientific contributions of the RSA programs were: 1.) the numbers of peer reviewed journal articles and 2.) citations of those publications, 3.) the number presentations at scientific conferences, and 4.) the number of students supported through RSA funding (Table 3).

A list of peer reviewed publications was compiled though an online search using Google Scholar, from the written final reports, and from the interviews with the PI's. Publications that acknowledged receiving funding from the RSA were included in the list. The number of citations of each publication was determined through an online search of Google Scholar, the Web of Science Journal database, and fisheries management documents. Research findings presented at scientific meetings and contributions to undergraduate and graduate student's research were collected from the final reports. In February 2014, I sent all PI's and primary fishery managers a copy of the list of RSA funded peer reviewed publications for verification.

6.2 Results

6.2.1 Scientific Contributions: Scallops

Of the four RSA programs, the Scallop RSA contributed nineteen peer reviewed publications which were cited 207 times (Table 3).

From the 46 final reports that were available on the NCRP Cooperative Research website, five graduate students were funded through Scallop RSA projects. Scallop RSA results have been presented at 56 scientific conferences and 43 NEFMC or MAFMC meetings (Table 3, Appendix H).

The majority of scallop RSA funds have financed three large scale independent resource surveys: the SMAST video survey, the VIMS dredge survey, and Arnie's Fisheries' HABCAM survey. All three surveys aid in the rotational management of the sea scallop fishery through data presented annually to the scallop plan development team. Results from the SMAST video survey were the first independent data to be incorporated in the scallop stock assessment (SAW 39, SAW 45, and SAW 50). Arnie's Fisheries HABCAM IV mapping camera system were presented to SARC/SAW 50, and the technology has been adopted by the Northeast Fisheries Science Center in their scallop stock assessment efforts in 2012.

6.2.2 Scientific Contributions: Mid-Atlantic

In the Mid-Atlantic RSA projects, there were nine peer reviewed publications, which were cited 26 times. One graduate student was funded through the Mid-Atlantic RSA, and results were presented at nine scientific meetings and thirteen MAFMC and NEFSC meetings. (Table 3, Appendix H).

The Northeast Area Monitoring and Assessment Program (NEAMAP) first received RSA funding in 2008. NEAMAP began a spring/fall time series and was funded until 2014. Work completed by NEAMAP that was provided and incorporated into past assessments included predator diet data for Atlantic Menhaden, abundance data for the Endangered Species Act listing of Atlantic Sturgeon, and data on abundance, distribution, length, sex maturity, and age data for different species including *Loligo* squid, river herring, summer flounder, and winter flounder. Other data that was provided but not incorporated due to a short time series included abundance, distribution, and length on Atlantic sea scallops, the skate complex, with additional data on sex, maturity, and/or age collected for black drum, bluefish, scup, spiny dogfish, and weakfish (Appendix O).

The University of Rhode Island (URI) scup survey was first awarded an RSA in 2004 and was the longest running Mid-Atlantic RSA project during the 2002 to 2009 research time frame. Through funding from NOAA Fisheries in 2011, this URI project conducted a comprehensive analysis of the RSA scup survey and a panel of four stock assessment scientists met in April of that year to peer review the work. As a result, the review group concluded that the data could be incorporated into the scup stock assessment to complement to the existing trawl survey (pers. Comm. L.Skrobe 2012).

6.2.3 Scientific Contributions: Monkfish

Two peer reviewed publications from the RSA funded large monkfish biology projects by the University of Maryland Eastern Shore (UMES) were reviewed and incorporated into management by the SARC 50 in 2010 (APPENDIX H).

Monkfish RSA projects have supported three graduate students at UMES and SMAST and three undergraduate students at UMES. Findings of Monkfish RSA research were shared at eleven scientific meetings. There was no mention of presentations to fisheries managers in the project's final reports (Table 3).

6.2.4 Scientific Contributions: Herring

The herring RSA produced one peer reviewed scientific article published in the ICES Journal of Marine Science. Researchers also presented their RSA results at the Acoustic Society of America national conference in 2011, but no students were funded through the RSA grant (Table 3, Appendix H).

6.3 Discussion

Criteria for "best available science" includes well stated questions and well-designed research, from which the results are analyzed logically, documented clearly, and subject to peer review (Sullivan et al. 2006). Peer reviewed literature is considered the best scientific information as it has the greatest future impact on fisheries management and policy. In total, 31 peer reviewed publications were produced from research funded through all RSA programs from 2000 to 2009. As of June 2014, these 31 publications were cited 354 times.

Using RSA funds to support student research contributes to science through both the research they conduct while working on the RSA project, as well as, through the scientific training they receive that can be applied to future projects. RSA funds supported the research of nine undergraduate and graduate students.

In addition to scientific publications, conferences are a primary way where data can be shared with the scientific community. As stated in the final reports, RSA funded research results were presented at 77 scientific meetings.

Institutions vary on how much their researchers should publish through peer reviewed articles, if they are required to publish at all. By incorporating both performance measures on scientific and management contributions of the RSA, a fuller picture is generated of how much impact the RSA has had from 2000 to 2009.

7. PERFORMANCE MEASURE THREE: MANAGEMENT CONTRIBUTIONS

7.1 Methods and Data

The RSA programs were created based on fishing management plans so management impacts are a key indicator of performance. Data were compiled for all projects from 2000 to 2009 through an extensive search of management actions by the Northeast and Mid-Atlantic management councils, meeting summaries, and interviews with fishery managers and PIs (Table 4, Appendix K). These data were grouped into the number of times RSA projects were presented to management and the number of times the data from these projects were used for management.

7.2 Results

7.2.1 Management Contributions: Scallops

The Scallop RSA program had a large impact on management during its first ten years primarily through gear conservation research and industry based resource surveys. Data from 32 RSA projects contributed to fisheries management. One of the first projects funded through the RSA, conservation engineering work on scallop dredge ring size by the Virginia Institute of Marine Science, resulted in a fleet wide gear regulation requiring all scallop dredges to have a minimum of four inch rings (Sea Scallop Amendment 10). Further gear conservation work by Coonamessett Farms resulted in the development of turtle chains and the turtle deflector dredge (TDD) to reduce interactions and fatalities of sea turtles by the scallop fishery. Scallop vessels fishing from May 1 to October 31 each year west of 71° longitude are now required to use the TDD (Sea Scallop Framework 23).

The scallop abundance and biomass data from SMAST video surveys have been used in updates to the Atlantic Sea Scallop Fisheries Management Plan since 1999 including NEFMC Frameworks 12 (1999), 13 (2000), 16/39 (2004), 19 (2007), 21 (2009), Amendments 10 (2004),

11 (2007), 13 (Groundfish 2004), the Stock Assessment and Fishery Evaluation Report (2000, 2009), and the NMFS, 32nd (SAW 2001), 39th (SAW 2004), 45th (SAW 2007) and 50th Northeast Regional Stock Assessment Workshop (SAW 2010).

In the general category scallop fleet, a project funded through the 2006 Scallop RSA conducted by Maggie Raymond and GMRI showed that finfish bycatch was low resulting in the opening of the Great South Channel Exemption Area to scalloping by the general category scallop fleet (pers. Comm. Maggie Raymond) (Appendix I).

7.2.2 Management Contributions: Mid-Atlantic

Mid-Atlantic RSA projects from 2002 to 2009 focused on gear conservation and resource surveys (Figures 9 and 12). Data from Mid-Atlantic RSA research were used in management eleven times.

A number of these gear conservation projects, focusing on black sea bass and scup traps vent sizes and shapes were reviewed through a gear conservation workshop (Meredith et al., 2010). These projects included "Size Selectivity of Inshore New England Fish Pots for Black Sea Bass and Scup as a Function of Escape Vent Size" by the University of Rhode Island and Rhode Island Sea Grant, "Discard Reduction in the Black Sea Bass Trap Fishery" and "Habitat Trap Fishery: The Effect of Circle and Square Escape Vents" by the Virginia Institute of Marine Science, "Evaluation of the Effects of Vent Size and Shape on Black Sea Bass Behavior and Escapement from Pot Gear" by the Cornell Cooperative Extension of Suffolk County Marine Program. The projects aided management actions on escape vents (Meredith et al. 2010).

NEAMAPs contributions to management included the data that was incorporated into stock assessments as listed in the scientific contributions (Section 6.2.2). Results from NEAMAP have impacted state regulations for scup in New York and for summer flounder in New York and

Virginia. The Rhode Island Ocean Special Area Management Plan has also requested data for use in project collaborations (Appendix O).

Through their RSA funded research, Cornell Cooperative Extension verified the summer flounder discard mortality. The New York State Department of Environmental Conservation used these results on summer flounder discard mortality to allow for a weekly trip or quota limit rather than a weekly limit.

7.2.3 Management Contributions: Monkfish

Monkfish are a data poor species, and Monkfish RSA research focused on life history and tagging studies for stock structure, indirectly applying to fisheries management. However, the life history of large monkfish was further defined and incorporated into the 50th stock assessment review committee (NEFSC 2010). Tagging efforts to define the northern and southern monkfish stocks and verify aging methods are ongoing projects that have potential to impact future monkfish management (Figures 9 and 11, Appendix I).

7.2.4 Management Contributions: Herring

Data from the Herring RSA have not been used in stock assessments or fisheries management (Appendix I).

7.3 Discussion

Overall, the scallop RSA contributed the most to fisheries management. Thirty-two Scallop RSA funded projects have been applied to management over the course of the program's first ten years. Results from the eleven Mid-Atlantic projects and two monkfish projects also contributed directly to fisheries management.

The involvement of PI's in fisheries management may facilitate the integration of RSA research results into fisheries management. The more fisheries managers and scientists interact, the more the groups can communicate data results. For example, the Scallop RSA had both the most contributions to management of the four RSA programs, and the highest percentage of PI's involved in fisheries management. The researchers at SMAST, Coonamessett Farms, VIMS, HABCAM, and GMRI were all involved in fisheries management either through the Plan Development Team, advisory panels, or participation in fishery council meetings.

8. PERFORMANCE MEASURE FOUR: STEWARDSHIP AND GOVERNANCE OF THE FISHING INDUSTRY

8.1 Methods and Data

The original RSA objectives stated in the scallop, Mid-Atlantic, monkfish, and herring FMPs include language encouraging industry participation and collaboration in the research (Table 1). Cooperation was not emphasized at the beginning of the RSA, but has grown in importance as the programs have developed. As the RSA is funded through a portion of the fish quota that would otherwise be harvested by permit holders, the RSA's impact on stakeholder's sense of stewardship and governance is an important element in a program evaluation. Stewardship is defined as the "degree to which participants use the resource in a careful and responsible way" (Clay et al., 2010), and governance is defined as the "degree to which stakeholders participate in the process of decision-making and implementation, the transparency and legitimacy of that process, the effectiveness and complexity of regulations, and the degree of adaptability/flexibility of the management process" (Clay et al., 2010).

8.1.1 Survey of Principal Investigators, Fishery Managers, and Fishermen

A survey was distributed three times to scallop, monkfish, and Mid-Atlantic RSA fishery permit holders. The first distribution was to Mid-Atlantic RSA auction participants (Riverhead, NY, January 20, 2012). This survey was conducted in person and collected on site with respondents receiving a free coffee mug as an incentive for filling out the survey. There were 80 boat owners present and 29 call-in participants. Surveys were distributed to those on the phone by mail. All responses were confidential unless the respondent wished to provide their name for further contact and information.

The second distribution was mailed to 700 scallop and monkfish permit holders in the northeast on March 6, 2012. The mailing included a stamped return envelope and a requested return date before April 10, 2012.

The third distribution was extended beyond RSA auction participants to prevent bias. Out of the 1,966 mid-Atlantic permit holders, 304 were randomly selected. The mailing was sent on March 27, 2012 with a requested to return by April 28, 2012. As an incentive, respondents for the scallop/monkfish and mid-Atlantic mailed surveys were entered in a random drawing for $250. All statistics were determined through IBM SPSS Statistics version 20 software.

8.1.2 Stakeholder Interviews

Stakeholder interviews were designed to provide a second tier of information of how the RSA mechanism worked for fishery managers, industry members, and researchers (Appendix B-D). Contact information for PI's and participating vessels were found in the RSA grant award documents. Using "purposive sampling" where each interviewee was selected for their experience working first hand with the RSA programs; fishery managers, PI's, and fishermen were selected. PI's were also asked to identify vessel owners and captains who participated in their RSA projects if none where mentioned in the final report. Those named were interviewed and asked to provide the contact information for other fishermen who participated in RSA projects. Each interview was transcribed and four focal questions were asked 1.) if they thought that industry should fund fisheries research, 2.) what was the greatest benefit of the RSA, 3.) what was the most negative aspect of the RSA, and 4.) what change in the RSA would most benefit your involvement? (Tables 6-9). Interviews were terminated when an overall sense of the meaning of a concept, theme, or process was reached and when little was learned from subsequent interviews (Schutt 2010).

8.2 Results

8.2.1 General Survey Results

There were 65 respondents (60%) to the 2012 RSA auction, 104 respondents (15%) to the scallop/monkfish survey, and 41 respondents (13%) to the third randomly distributed Mid-Atlantic survey, with duplicate responses deleted (Figure 3).

The intention of the mailed survey was to determine the RSA permit holder's familiarity with the RSA, attendance at fishery management meetings, their incentive for participating in the RSA, and the role the RSA had in their understanding and participation in fisheries management. Two questions in the survey asked 1) if participating in an RSA project raised their awareness of fisheries management and 2) if participating made them more active in fisheries management. Scallop RSA participants felt that their awareness of fisheries management increased after participating in research (χ^2=28.59, p=<0.01, df=4) (Table 10).

Respondents from the auction (78%) and scallop (86%) and monkfish (68%) strongly felt that the fishing industry should set aside quota to help fund fisheries research (Auction, χ^2=48.34, p=<0.01, df=4; Scallopχ^2=40.62, p=<0.01, df=4; Monkfish χ^2=23.32, p=<0.01, df=4). Respondents from the Mid-Atlantic were divided in their support for setting aside quota to help fund fisheries research (χ^2=5.71, p=0.222, df=4) (Table 10).

8.2.2 Scallop and Monkfish Mailed Survey

In the scallop and monkfish mailed survey, 42 of the respondents identified themselves as scallop fishermen, 38 as monk-fishermen, and the rest were comprised primarily of trawlers, small mesh fishermen, and lobstermen. Fifty-six percent of all respondents who were familiar with RSA project were satisfied with the research (χ^2=27.77, p=<0.01, df=4).

Seventy-four percent of scallop fishermen surveyed were satisfied with scallop RSA research, while there was 44% satisfaction from monkfish fishermen (Scallop χ^2=20.85, p=<0.01, df=4; Monkfish χ^2=13.63, p=<0.01, df=4) (Table 10).

8.2.3 Mid-Atlantic Auction Survey

When asked to rank their satisfaction with research funded through the RSA, 46% of respondents were unsure indicating a need for further outreach efforts (χ^2=39.89, p=<0.01, df=4).

8.2.4 Mid-Atlantic Mailed Survey

In the mailed Mid-Atlantic survey, 83% of respondents were not familiar with the RSA, (χ^2=12.05, p=<0.01, df=1). Seventy-four percent of respondents who were familiar with RSA research were unsure of their overall satisfaction with the RSA (χ^2=36, p=<0.01, df=4).

8.2.5 Stakeholder Interviews

Sixty interviews were conducted with 17 fishery managers, 25 industry members, and 18 scientists that had experience with the RSA programs. Forty-seven of the 50 stakeholders stated that the fishing industry should fund fisheries research, but only partially. They felt that industry should only fund research that improves the management of their resource.

Each of those interviewed were asked the greatest and least beneficial aspect of the RSA. The greatest benefit of the RSA in the Scallop, Mid-Atlantic, and Monkfish RSA Programs was that the research funded provided information for fisheries management. The second greatest benefit was increased industry cooperation in research. The single comment on the herring program discussed the potential for future research (Table 6).

The VIMS and SMAST surveys were considered the most beneficial projects funded through the Scallop RSA and NEAMAP, the largest funded project in the Mid-Atlantic RSA, was

stated as the most beneficial project of the Mid-Atlantic program. However, there was concern from all interviewed that the RSA was not the correct funding mechanism for long term surveys and the programs should have more stable funding. It was announced in 2014, that NEAMAP would receive federal funding and would not rely on RSA funds for the 2015 fishing year.

The least beneficial aspect of the RSA varied. In the Scallop RSA, the respondents thought that the industry had little input on what research was funded. In the Mid-Atlantic and Herring fisheries, the uncertainty of funds and difficulty in turning fish into funds were the most negative aspect. Animosity between participants and non-participants was the most negative aspect in the Monkfish RSA program.

A fourth question asked the interviewees what change in the RSA would most benefit their involvement in the programs. The responses to this question were different in each stakeholder group (Table 7,8,9). The scallop industry wanted more industry input on what projects were funded and greater transparency. In the Mid-Atlantic, monkfish, and herring RSA's PIs made the suggestion of raising the money prior to awarding projects to reduce uncertainty.

8.2.6 Fishermen Incentives to Participate in the RSA

In the written surveys, respondents were asked to rank five different incentives for their participation in the RSA.

- Opportunity to catch more fish
- Desire to conduct independent (non-federal) research
- Desire to aid in the collection of more fisheries data
- Interest in a specific research project
- Desire to participate more in fisheries management

The results of the surveys, ranked in order of most common answer to least common answer, indicated that the overall main incentive was the opportunity to catch more fish. The second most common incentive was the ability to conduct independent, non-federal science (χ^2=27.62, p=<0.01df=4).

Through the interviews, the top consideration was financial incentive followed by the desire to conduct independent (non-federal) research. Industry members also stated that participating in industry based research provided a "second opinion" to compare to the fisheries data collected by NOAA.

There was no significant difference in incentives between fishermen who supported research funded through the fishery and fishermen that did not, for the scallop and monkfish surveys.

In the 2012 Mid-Atlantic auction there were two groups of respondents; those that supported fishery funded research and those that did not, although both groups were participating in the RSA program. Those in favor of supporting research through the fishery were interested in the opportunity to catch more fish. Interest in aiding in the collection of more fisheries data was the least chosen incentive (χ^2=17.71, p=<0.01, df=4). Those opposed to funding research but were participating at the auction anyway wanted to catch more fish, to participate more in fisheries management, and aid in collection of more fisheries data. There was little interest in conducting independent (non-federal) research (χ^2=32.85, p=<0.01, df=4).

There was a slightly significant result from the Mid-Atlantic mailed survey where the main incentive for fishermen who did not support funding fisheries research was the opportunity to catch more fish (χ^2=10.44, p=0.03, df=4). There was no increase in stewardship or governance as the respondents did not want to provide funding for RSA research, but they were interested in participating in the RSA for the chance to increase their catch and earning potential.

All fourteen scallop industry members interviewed responded "no" when asked if they factored RSA pounds into their business plans. All scallop owners mentioned that an extra RSA compensation trip was always nice to receive, but they did not consider that part of their income. This was not the case for smaller boat owners in less lucrative fisheries. In the Mid-Atlantic, fishermen bought fish lots from the RSA Auction to optimize their potential bycatch they or provide additional fishing opportunities in the commercial and for-hire fisheries. Most of the value of the Mid-Atlantic RSA quota was realized when the various fisheries closed and the RSA quota holders were able to sell their catch for a higher price due to their exempted fishing permits.

In the monkfish RSA, the sentiment "taking our fish and then making us pay for it" was brought up by both participants and non-participants. The biggest incentive for participation in the monkfish RSA was the opportunity to fish more. When asked how it would affect their business if their RSA program ended, only one monkfish industry member mentioned that they would go out of business, indicating a dependence on the extra fishing opportunities available through the RSA.

Tied into the increased revenue that participants in the RSA receive, jealousy and the presence of tension between fishermen that participated in the RSA and those that did not participate was mentioned as a negative aspect in the Scallop, Monkfish and Mid-Atlantic RSA programs. Industry participants of the RSA pay for and receive extra fishing opportunities that regular permit holders do not have.

There was a level of compensation fishing that occurred in all of the programs where fishermen are given the opportunity to fish RSA poundage and pay the researcher, but not necessarily participate in the research. The amount of compensation fishing depended on the level of fundraising needed for research. Researchers expressed that compensation fishing was a way for them to share extra poundage with the fishing fleet and invest in future relationships with a

broader group of fishing industry members. While a decoupling of research and fund raising occurred to a degree in all of the programs, it occurred to a larger extent in the Mid-Atlantic RSA program due to the annual RSA auction.

The interviews focused on RSA participants, but there were six fishermen interviewed, two monk-fishermen, two scallopers, and two small mesh fishermen, who were not participants in the RSA. The two scallop fishermen expressed interest in participating in the program, but stated that they felt it was difficult to get involved with the research and that the RSA was a "closed society". The small mesh fishermen were unsure of how to connect with researchers or were told that their vessels were not suitable for the research. The monkfishermen both stated dislike of the RSA program because they felt the increased effort negatively affected their catch levels.

8.3 Discussion

The scallop fishing industry was the most familiar, satisfied, and aware of fisheries management as a result of the RSA. There was a difference between the RSA auction participants and the mailed survey but that could be due to the difference in how the surveys were distributed (in person vs. mailed), and self-selection of respondents.

Overall, it was difficult to isolate whether or not participation in the RSA was the sole factor affecting stewardship and governance of the fishing industry in fisheries management. The mailed survey provided data on the fishing industries awareness and satisfaction and the interviews served to provide details on how the RSA has impacted participants. Most of the scallop fishermen interviewed stated that participating in the RSA lead them to be more proactive and aware of fisheries management. Other scallop fishermen stated that they were always involved and had a high level of awareness. Continued outreach about RSA research in all programs is necessary to increase awareness and provide fishermen with information on how to get involved in the RSA.

Multiple factors may influence a fishermen's involvement in research and awareness of fisheries management. Most fishermen participated in the RSA because of the extra opportunity to fish, however, there were instances in the scallop, monkfish, and Mid-Atlantic RSA programs where fishermen lost profit due to low catches but still participated in the program (refer to Section 5). This continued participation in light of loss of profits indicated that there may be more than a monetary investment in the research projects.

9. OVERALL RSA EVALUATION

9.1 Methods and Data

Four measures were used in this research to determine the overall performance of the Research Set Aside programs: 1.) success in fulfilling research priorities, 2.) scientific impact, 3.) management impact, and 4.) effect on stewardship and governance in the fishing industry.

Because of the differences among fisheries, each RSA program has its own unique characteristics. The monkfish and herring RSA are fairly localized, while the scallop and Mid-Atlantic fisheries span the eastern coast. However, scallops have roughly 350 limited access and 400 general category permitted vessels in one fishery compared to the Mid-Atlantic program which involves close to two thousand permitted vessels in nine RSA fisheries.

In order to compare the different programs to each other, I created metrics for each measure. I gave each metric a maximum value of one if the project satisfied that metric. In total there were eleven metrics applied to each of the 87 RSA projects funded from 2000 to 2009 (Tables 2-5). If the RSA project satisfied the metric, it received a score of one. If every project awarded satisfied the metric the maximum expected value for that metric would be reached. For example, the maximum expected value for the "submission of final report" metric in the scallop RSA was 48 because there were 48 projects. In a case where the number exceeded the maximum expected value that metric was given a score equal to the maximum expected value (Tables 3 and table 5). For example, for the scientific contributions performance measure, there were 207 citations of the 19 publications in the Scallop RSA. Two hundred and seven exceeded the maximum expected value of 48 and so the citations metric for the scallop program received a score of 48. The scores for each performance measure were summed and divided by the expected maximum value for each program. The resultant ratio acts as the Impact Factor illustrating, on a scale from zero to one, how much impact the program had.

9.2 Results

For the first performance measure there were three metrics 1.) submission of a final report, 2.) completion of research, and 3.) if the final report was reviewed. Scallops had the most impact with 0.74, herring were second with 0.67, monkfish were third with 0.64, and the Mid-Atlantic program was fourth with an impact factor of 0.59 (Table 2).

The second performance measure used the metrics 1.) number of publications, 2.) citations from those publications, 3.) presentations at scientific meetings, and 4.) the number of students funded through the research to determine the scientific contributions of the RSA programs. Scallops had the most impact with 0.63, herring was second with 0.50, the Mid-Atlantic was third with 0.43, and monkfish was fourth with an impact factor of 0.42 (Table 3).

The third performance measure used the two metrics of 1.) how many RSA projects presented data at management meetings and 2.) how many projects contributed to management. Scallops had the greatest impact with 0.78, the Mid-Atlantic was second with 0.46, monkfish had an impact factor of 0.08, and the herring RSA had zero impact on management (Table 4).

Finally, the fourth performance measure asked how the RSA affected stewardship and governance in the RSA through the metrics 1.) the number of fishing vessels involved in either research or compensation fishing and 2.) the percentage of industry members in support of funding fisheries research from the surveys. Scallops again had the greatest impact with 0.93. The Mid-Atlantic had an impact factor of 0.89, and the monkfish program had an impact factor of 0.84. Data for the herring RSA was limited as no herring industry members participated in the survey, however, the number of vessels that participated in research was listed in the project's final report (Table 5).

The impact factors for all four performance measures were tallied for each RSA program. The maximum impact score for each factor was one and the highest overall impact factor score

for each RSA program was four when tallied. The overall impact factor score was then divided by four. An overall impact factor score of one would indicate that every project in that program completely fulfilled each metric. Overall, out of a possible high score of 1.00, the Scallop RSA had the greatest impact with 0.77, Mid-Atlantic 0.59, Monkfish 0.50, and the Herring RSA program had an impact factor of 0.39.

Each of the eleven metrics in this research were treated equally. Some of the metrics may be a better indicator of program success versus another, however, none were weighted.

10. CONCLUSION

10.1 Success of the RSA

According to our measures designed to estimate RSA program impact, the Scallop, Mid-Atlantic, and Monkfish RSA programs were successful from 2000 to 2009 but level of impact varied between programs.

The Scallop RSA was the most successful of the four programs. Ninety-two percent of Scallop RSA projects were completed as proposed, and contributed to science (19 publications) and management (32 references to projects in management plans). The majority of scallop fishermen interviewed and surveyed were supportive of funding scientific research through the fishery and were familiar with the RSA research. This success is reflected in the score of 0.77 out of a possible score of 1.00 in the impact factor.

In the Mid-Atlantic RSA program 65% were completed as proposed and contributed to science through nine peer-reviewed publications. However, a number of projects were hampered due to funding problems, permit issues and limited outreach. The Mid-Atlantic RSA used an auction for distribution of harvestable catch and therefore auction participants were more aware of the program than auction non-participants. The Mid-Atlantic RSA program scored 0.59 out of a possible score of 1.00 in the impact factor.

In the Monkfish RSA program 83% were completed as proposed and contributed two publications on monkfish biology; this indirectly contributed to management. However it was evident through the interviews that there was tension between RSA participants and non-participants. The Monkfish RSA program scored 0.50 out of a possible score of 1.00 in the impact factor.

The Herring RSA produced one scientific publication and presented data at one scientific meeting, but did not contribute to management. The Herring RSA program scored 0.39 out of a possible score of 1.00 in the Impact Factor.

10.2 Success in Cooperative Research

In cooperative research, where fishermen, scientists, and other stakeholders work together, efficient organization and sufficient incentives separate successful from unsuccessful research projects (Hilborn 2005). Efficient organization requires active communication between all the stakeholders, clear understanding of the problem at hand, and mutual understanding of the scope of work. Sufficient incentives require "buy-in", or personal investment in the project, from all participants (Ostrom 2000).

Each of the four RSA programs had a different level of organization and degree of incentive. Scallops had the most positive impacts of all of the four RSA programs. In the beginning the incentive was the survival of the fishery and this pressure enabled the different stakeholders to organize the program into a balance of management driven research and acceptable compensation for harvest. This in turn resulted in higher landings, stable harvest and increased price for the harvest. Because of the high price of scallops, the mechanism of turning pounds into dollars to fund research took less fishing effort and increased the incentive to continue to participate resulting in the longevity of the program.

The monkfish RSA was created by the NEFMC and at first the incentives were insufficient for industry participation. However, the industry organized and through a series of discussion the incentives were balanced so that now the program enables participation from all stakeholders. Similarly the Herring RSA is re-examining the incentives to enable a program where fishermen can participate and researchers are funded sufficiently to complete their projects.

The Mid-Atlantic developed its RSA program based on the scallop RSA but the NFI-SMC industry group created an auction to distribute the RSA quota to a larger, diverse pool of fishermen. Although this was successful from 2000 to 2009, based on our measures, the incentives were not sufficient to ensure the program's longevity. There was one conviction of fraudulent reporting of RSA landings and the concern that fraudulence was wide spread combined with the RSA's insufficient contribution to fisheries management resulted in the suspension of the Mid-Atlantic RSA in 2015 (MAFMC 2014).

10.3 Recommendations

All research projects face challenges; to be successful the project should have clear objectives, an effective research plan, and sufficient resources. Cooperative research projects face the additional challenge of working with multiple stakeholders with different perspectives. RSA research projects are additionally challenging because the funds are produced from the sale of the catch; the fishermen have to agree to a reduced rate for their harvest with the surplus funds going to support the research. Based on the results the following should be considered in the creation and continuation of RSA programs:

- The fishery needs enough biomass to support an RSA program; the fishery needs to be economically viable with enough surplus to allow for a set-aside.
- Bycatch biomass must be at a sufficient level to allow for fishermen to fully land their RSA quota.
- The RSA harvest needs to be profitable for the participating fishermen while at the same time allowing for the funding of research; this is a difficult balance that needs input and agreement from all stakeholders.

- The RSA has to add to the overall profitability of the fishery; it needs to increase the allowable harvest otherwise there will be no fishery participation.
- Clear communication on all levels of the program will greatly enhance the success; including the objectives of the research, review and approval of the reward, completion of the research, and review of the final report.
- RSA researchers should be actively involved in the fisheries management process.
- Outreach to the public should be the responsibility of all stakeholders.
- Because the grant process is time consuming, multi-year projects should be considered as is being implemented in the scallop RSA.
- Maintain the flexibility of the financial contracts between the fishing industry and research agencies.
- Allow for an offset between the funding timeline and the research timeline.

These recommendations reflect, support, and build upon the recommendations from the 2009 Programmatic Review of the RSA Program. The addition of the impact factor as a measure of these programs further strengthens the ability to gauge their performance and provides a possible threshold. With federal funding for fisheries research becoming more difficult to find and sustain, using the marine resource to fund research for management is a viable option. Following these recommendations and the implementation of the impact factor as a metric should improve the success of this option.

REFERENCES

Berstein B. and S. Iudicello, 2000: National Evaluation of Cooperative Data Gathering Efforts in Fisheries. National Fisheries Conservation Center. Ojai, CA 65-77.

Clay, P.M., P. Pinto da Silva, A. Kitts. 2010: *Defining Social and Economic Performance Measures for Catch Share Systems in the Northeast U.S.* IIFET Montpellier Proceedings.

Department of Fish and Oceans Canada, 2005: Pacific Salmon Selective Fishing Program Evaluation. *http://www.dfo-mpo.gc.ca/ae-ve/evaluations/04-05/salmon-saumon-eng.htm.* Accessed Dec. 10, 2011.

Dobbs, D. 2000: *The Great Gulf: Fishermen, Scientists, and the Struggle to Revive the World's Greatest Fishery*. Island Press, Washington, DC. 256 pp.

Federal Register 65 FR 00-22203, Vol. 65, no. 169/52697 August 30, 2000. Accessed October 4, 2012.

Feeney, R.G., K.J. La Valley, M. Hall-Arber, 2010: Assessing Stakeholder Perspectives on the Impacts of a Decade of Collaborative Fisheries Research in the Gulf of Maine and Georges Bank. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science.* 2: 205-216.

Hartley, T.W. and R.A. Robertson, 2009: Cooperative Research Program Goals in New England: Perceptions of Active Commercial Fishermen. *Fisheries*. 33 (11), 551-559.

Hartley, T.W. and R.A. Robertson, 2006: Emergence of Multi-stakeholder-driven Cooperative Research in the Northwest Atlantic: The Case of the Northeast Consortium. *Marine Policy*, 30: 580-592.

Hilborn, R., J.M (Lobo) Orensanz, and Ana M. Parma. 2005: Institutions, incentives and the future of fisheries. Phil. Trans. R. Soc. B 360, 47-57.

Johnson, T.R., and W.L.T. van Densen, 2007: Benefits and Organization of Cooperative Research for Fisheries Management. *ICES Journal of Marine Science.* 64: 834-840.

Kaplan, I.M., and B.J. McCay, 2003: Cooperative Research, Co-management and the Social Dimension of Fisheries Science and Management. *Marine Policy*. 28: 257-258.

Karp, W.A., C.S. Rose, J.R. Gauvin, S.K. Gaichas, M.W. Dorn, G.D. Stauffer, 2001: Government-Industry Cooperative Fisheries Research in the North Pacific under the MSFCMA. *Marine Fisheries Review.*

Kitts, A., P. Pinto da Silva, B. Rountree, 2007: The Evolution of Collaborative Management in the Northeast USA Tilefish Fishery. *Marine Policy.* 31: 192-200.

Kocik J, C. Lipsky, T. Miller, P. Rago, G. Shepherd, 2013: An Atlantic Sturgeon Population Index for ESA Management Analysis. US Dept.of Commerce Northeast Fisheries Science Center Ref Doc. 13-06. *http://www.nefsc.noaa.gov/nefsc/publications/,* accessed May 5, 2014.

Meredith, E., C. Corbett, B. Rountree, C. Woodhead, P. Perra, R. Silva, C. Heaton., 2010: *Final Draft* "Mid-Atlantic Research Set-Aside Programmatic Review Report, June 30-July 1, 2009." Northeast Fisheries Science Center.

National Research Council, 2004: *Cooperative Research in the National Marine Fisheries Service.* The National Academies Press, Washington, DC. 132 pp.

NEFSC, 2011: Fisheries Historical Page. *http://www.nefsc.noaa.gov/history/.* March 25, 2011, accessed March 27,2011. *http://www.nefsc.noaa.gov/history/stories/legacy/legacy2.html*

NEFMC 2007: Research Steering Committee Meeting Report. NEFMC Meeting, Newport, RI, November 6-7.

NEFMC 2005: RSC Policy for incorporation of research results into the NEFMC process

NOAA Fisheries, 2014: Research Documentation Guidance

http://www.nero.noaa.gov/permits/forms/EFPLOAEEAAPossessionLOAGuidance.pdf. Accessed March 13, 2014.

NOAA Fisheries. 2011. NOAA Coastal Resource Center Definition. Available from *http://www.csc.noaa.gov/funding/_pdf/forms/Add_Expl_Defn_Tips_grants.pdf*

NOAA Fisheries, *http://www.nero.noaa.gov/StateFedOff/coopresearch/crpp.html.* April 29, 2009. Accessed Jan. 2, 2011.

NOAA Fisheries, 2006: Amendment 1 to the Herring Fishery Management Plan.

NOAA Fisheries, 2005: Framework Adjustment 2 to the Monkfish Fishery Management Plan. 43.

NOAA Fisheries, 2001: Framework Adjustment 1 to the Atlantic Mackerel, Squid, and Butterfish FMP, Summer Flounder, Scup, and Black Sea Bass FMP, Bluefish FMP, Tilefish FMP (Quota Set-Aside for Research). 1-76.

NOAA Fisheries, 1999: Framework Adjustment 11 to the Atlantic Sea Scallop Fishery Management Plan and Framework Adjustment 29 to the Northeast Multispecies Fishery Management Plan. 34 pp.

Sissenwine, M. 2001: Fisheries cooperative research: testimony of Dr. Michael Sissenwine, Director of Northeast Fisheries Science Center, National Marine Fisheries Service, National Oceanic and Atmospheric Administration, Department of Commerce before the Committee on Resources, Subcommittee on Fisheries Conservation, Wildlife and Oceans, U.S. House of Representatives, Ocean City, Maryland.

Smithsonian, 2014: Spencer Baird and Ichthyology at the Smithsonian. *http://vertebrates.si.edu/fishes/ichthyology_history/fish_commission.html*. Accessed May 5, 2014.

Stokesbury, K.D.E. 2002. Estimation of Sea Scallop Abundance in Closed Areas of Georges Bank, USA. *Transactions of the American Fisheries Society* 131:1081-1092.

Stokesbury, K.D.E., B.P. Harris, M.C. Marino II and J.I. Nogueira. 2004. Estimation of Sea Scallop Abundance Using a Video Survey in Off-shore USA Waters. *Journal of Shellfish Research* 23:33-44.

Sullivan, P.J, J.M. Acheson, P.L. Angermeier, T. Faast, J. Flemma, C.M. Jones, E.E. Knudsen, T.J. Minello, D.H. Secor, R. Wunderlich, B.A. Zanetell, 2006: Defining and Implementing Best Available Science for Fisheries and Environmental Science, Policy, and Management. American Fisheries Society, Bethesda, Maryland, and Estaurine Research Federation, Port Republic, Maryland, 30.

U.S. Public Law 109-479. 109th Congress. Magnuson-Stevens Fishery Conservation and Management Reauthorization Act of 2006. Signed into law 12 January 2007. *http://frwebgate.access.gov/cgibin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:pub1479.109.pdf.* Accessed January 16, 2012.

Wilson, J. 2010: Large and Small Coastal Sharks Collected Under the Exempted Fishing Program Managed by the Highly Migratory Species Management Division. *http://www.sefsc.noaa.gov/sedar/download/S21_DW_10_EFP_data.pdf?id=DOCUMENT.* Accessed September 20, 2013.

Table 1: Original objectives of RSA Programs: Objectives of each RSA Program (RSA) from framework adjustments (FA) and amendments (AM) to the Scallop, Mid-Atlantic, Monkfish, and Herring fishing management plans (source).

RSA	Year	Objective	Source
Scallop	2000	Encourage industry participation in these [RSA] programs by compensating the vessels for the potential decreased efficiency and increased costs when participating in a research program. Conduct research in gear development for bycatch reduction, habitat impact, rotational fishing strategies, size selectivity and incidental mortality of scallops and other species.	FA 11
Mid-Atlantic*	2002	Encourage collaborative efforts between the public, research institutions, and government in broadening the scientific base upon which management decisions are made. Facilitate the collection of data that the Council and public deem important for fishery management purposes. Create a mechanism whereby the data collected can be reviewed and certified acceptable for use by NOAA Fisheries scientists and those individuals involved in the fishery management process.	FA 1
Monkfish	2006	Gather much needed scientific information in areas of monkfish biology, fishery impacts on EFH, bycatch for effective management of the fishery. Work cooperatively with the industry to improve cost effectiveness, success and acceptance. Provide a method to streamline the experimental fishery process.	AM 2
Herring	2008	Projects funded under an RSA allocation must enhance understanding of the fishery resource and/or contribute to the body of information which management decisions are made.	AM 1

*Mid-Atlantic RSA species include summer flounder, scup, black sea bass, tilefish , *Illex* squid, *Loligo* squid, butterfish, Atlantic mackerel, and bluefish fisheries

Table 2: How RSA Research Fulfilled Priorities Metrics Summary: The number of projects awarded (#) that met research priorities (MP), the number of final reports (FR), number of projects with modified objectives (Modified) if the final report was reviewed by NEFSC (RV) and the total number of impacts (Impacts) was divided by max number of impacts (max) to determine the impact factor (IF). Bold indicates the metrics used to tally IF.

RSA	**#**	**Met Priorities**						
		MP	**FR**	**Modified**	**RV**	Impacts	Max	IF
Scal.	48	48	**46**	**2**	**16**	106	144	0.74
MA	26	26	**23**	**7**	**9**	46	78	0.59
Monk.	12	12	**10**	**2**	**5**	23	36	0.64
Herr.	1	1	**1**	**0**	**1**	2	3	0.67

Table 3: Scientific Contribution Metrics Summary: The scientific impacts from the RSA programs measured through the number of publications (P), how many times those publications were cited (C), the number of students funded through the RSA (Stu) and the number of presentations made at scientific meetings (Sci). The total number of impacts (Impacts) was divided by max number of impacts (max) to determine the impact factor (IF). Bold indicates the metrics used to tally IF. When the score of a metric exceeded the maximum score of one per project, the number used to determine the IF was indicated in parentheses.

RSA	**#**	**Scientific Contributions**						
		P	**C**	**Sci**	**Stu**	Impacts	Max	IF
Scal.	48	**19**	**207**	**56**	**5**	287 (120)	192	0.63
MA	26	**9**	**26**	**9**	**1**	45	104	0.43
Monk.	12	**2**	**4**	**11**	**3**	20	48	0.42
Herr.	1	**1**	**0**	**1**	**0**	2	4	0.50

Table 4: Management Contribution Metrics Summary: The Management impacts using the number of presentations involving RSA data to management (N), and how many projects results were used in management (used). The total number of impacts (Impacts) was divided by max number of impacts (max) to determine the impact factor (IF). Bold indicates the metrics used to tally IF.

RSA	**#**	**Management Contributions**				
		N	**Used**	Impacts	Max	IF
Scal.	48	**43**	**32**	75	96	0.78
MA	26	**13**	**11**	24	52	0.46
Monk.	12	**0**	**2**	2	24	0.08
Herr.	1	**0**	**0**	0	0	0.00

Table 5: Stewardship and Governance Metrics Summary: The impact of stewardship and governance from the RSA programs through how many fishing vessels participated in research or compensation fishing (F/V) and the percentage of fishermen that supported funding fisheries research from the mailed surveys ($). The total number of impacts (Impacts) was divided by max number of impacts (Max) to determine the impact factor (IF). Bold indicates the metrics used to tally IF. When the score of a metric exceeded the maximum score of one per project, the number used to determine the IF was indicated in parentheses.

RSA	**#**	**Stewardship and Governance**				
		F/V	**$ (%)**	Impacts	Max	IF
Scal.	48	**193**	**86**	279 (89)	96	0.93
MA	26	**49**	**78****	127 (46)	52	0.89
Monk.	12	**51**	**68**	119 (20)	24	0.84
Herr.	1	**2**	**-**	n/a	n/a	n/a

**From the Mid-Atlantic auction survey only.

Table 6: Greatest Benefit and Most Negative Aspect Summary: Summary of responses of the greatest benefit and most negative aspect of the RSA from fishing industry, researchers, and fishery managers interviewed.

Stakeholders	Greatest Benefit of RSA	Most Negative Aspect of RSA
Scallop	Better resource management Increased industry cooperation VIMS and SMAST surveys	Industry has little input on what is funded Administrative burden Waste in spending People are just involved for extra financial incentive Risky for essential surveys
Mid-Atlantic	Information for management Cooperation with Industry Fishermen have extra opportunity to fish NEAMAP Generate funds for research Haven't met potential yet	Uncertainty of funds Jealousy between participants and non-participants A lot of waste in spending Administrative Burden Auction System Cheating
Monkfish	Data for Management Buy-in from industry	Animosity between participants and non participants Uncertainty of funds Administrative Burden
Herring	Program has good potential	Difficulty turning fish into funds

Table 7: Most Beneficial Change: Fishery Managers: RSA Fishery Managers interview statement of what change in the RSA would most benefit their involvement.

RSA Fishery Managers	What Change in the RSA would most benefit your involvement?
New England	"Inclusion of budgets in final reports." "Multi-year awards."
Mid-Atlantic	"More transparent review and more direct link to objectives." "Should return to original intent of short but effective research problems and no long term projects." "Designated ports of landing and have enough people to monitor the landings." "Have Science and Statistical Committee on RSA Committee."

Table 8: Most Beneficial Change: Principal Investigators: RSA Principal Investigators (PI's) interview statement of what change in the RSA would most benefit their involvement.

RSA PI's	**What change in the RSA would most benefit your involvement?**
Scallop	"Industry needs a continued voice in the setting of priorities, the selecting of projects, and they just need to be involved in the process." "Develop a focus on peer review publications. More cooperation is true, but we also need to have scientists involved. Not science unless it is published." "A percentage needs to be applied to more novel and advanced concepts. More research and development projects."
Mid-Atlantic	"Not be a grant and harvest the fish one year before they award projects." "Get NEAMAP program out of there and have it have direct appropriation and have the set aside fund industry based research." "Sell the quota a year prior to awarding projects" "Price guarantee with the project and multi-year projects" "RSA is not suitable for NEAMAP. NOAA FISHERIES should be funding it."
Monkfish	"Keep the EFP and deal with quota versus days at sea" "Reduce the uncertainty of funding and amount of paperwork"
Herring	"Have a lag year between funding and research."

Table 9: Most Beneficial Change: Fishing Industry: RSA Industry statements from interviews on what change in the RSA would most benefit their involvement in the RSA program.

RSA Industry Members	What change in the RSA would most benefit your involvement?
Scallop	"Transparency in the award and industry input in the administration" "Industry should have more say in where our money goes." "Someone needs to weigh the science. Someone needs to look at it and say we are getting our money's worth." "The permit owners would have 100% day in where the RSA went to. Every permit holder would get a vote." "There should be a cap on how much a boat can get." "RSA projects should be granted an LOA to exempt yellowtail accountability measures." "I don't think any change would benefit my involvement. Less paperwork would benefit the scientific involvement"
Mid-Atlantic	"Simplified paperwork" "Raise the money first and then fund research" "Scrap the auction and change the set aside to an ex-vessel tax"
Monkfish	"Have greater presence of industry in management of the RSA"
Herring	n/a

Table 10: Survey Responses: Responses in percentages from the written survey mailed to the Scallop, Monkfish, and Mid-Atlantic permit holders and distributed by hand to the Mid-Atlantic Auction participants in 2012.

Question	Survey	Strongly Agree	Somewhat Agree	Unsure	Somewhat Disagree	Strongly Disagree	*p*
If you are familiar with the RSA, would you agree that you are satisfied with the research conducted through the RSA Program?	Scallop, n= 35	40	34	20	3	3	<0.01
	Monkfish, n=32	16	28	41	3	12	<0.01
	Auction, n=56	27	23	46	4	0	<0.01
	Mid Atl., n=19	0	16	74	0	10	<0.01
Participation in a RSA cooperative research project has increased your awareness of fisheries management and stock assessment.	Scallop, n=17	70	18	6	0	6	<0.01
	Monkfish, n=15	33	13	33	8	13	0.32
	Auction, n=41	15	39	24	10	12	0.02
The research conducted through the RSA is financially supported by the fishing industry. Do you agree that it is important that the fishing industry set aside quota to help fund fisheries research	Scallop, n=42	52	33	7	5	2	<0.01
	Monkfish, n=38	18	50	5	11	16	<0.01
	Auction, n=64	50	28	12	8	2	<0.01
	Mid-Atl., n=41	20	32	12	12	24	0.22

Table 11: RSA Auction Prices: Average final bid price per pound by species (USD) from the 2011-2013 NFI-SMC Mid-Atlantic RSA auction.

SPECIES	2011	2012	2013
Commercial Black Sea Bass	$4.30	$5.17	$4.91
Recreational Black Sea Bass	$3.75	$3.28	$4.10
Commercial Summer Flounder	$2.06	$1.92	$2.63
Recreational Summer Flounder	$1.71	$1.50	$1.50
Recreational Scup	$1.40	$0.24	$0.20
Commercial Scup	$0.79	$0.40	$0.11
Commercial Squid	-	$0.06	$0.21
Commercial Bluefish	$0.14	$0.04	$0.02

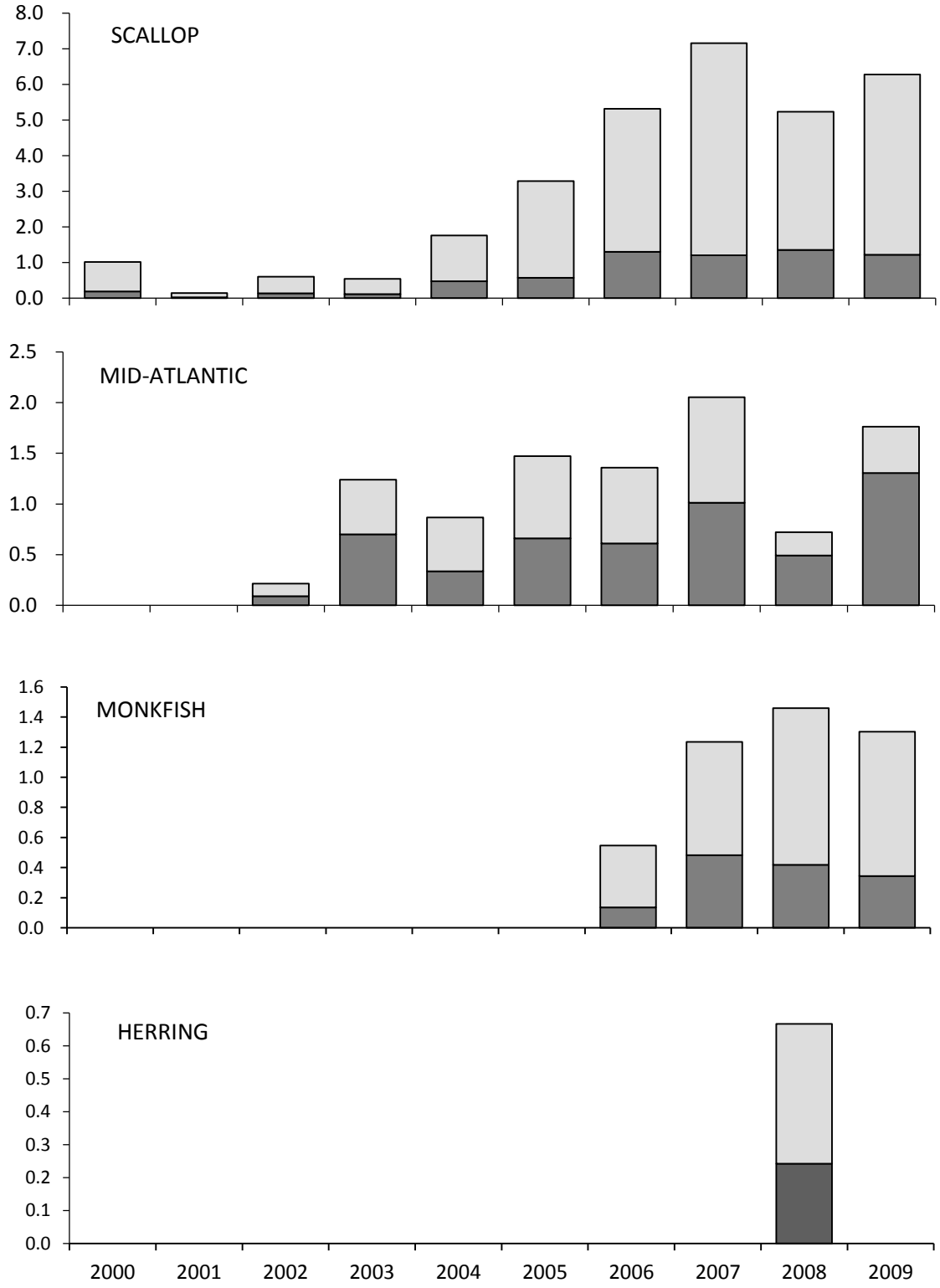


Figure 1: RSA Compensation Versus Research Value: Estimated total value per year in millions of dollars for all RSA programs from 2000-2009. The total value is broken down into the value of

compensation earned by fishermen participants (green) and the estimated total cost of research (gray). Source: NOAA Fisheries Cooperative Research Partners Program.

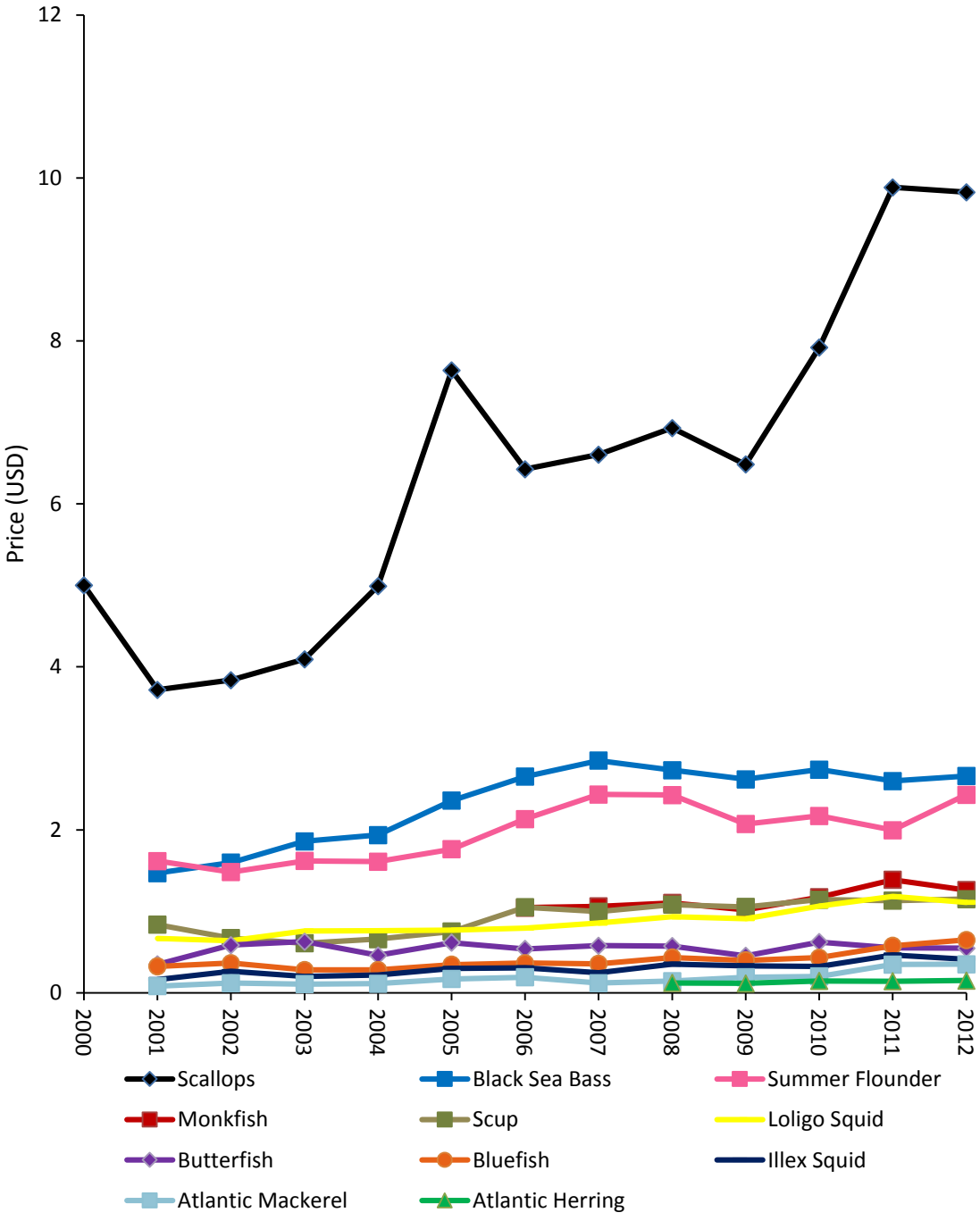


Figure 2: RSA Species Average Price Per Pound (USD) from 1975 to 2012. *Source NOAA Fisheries.*

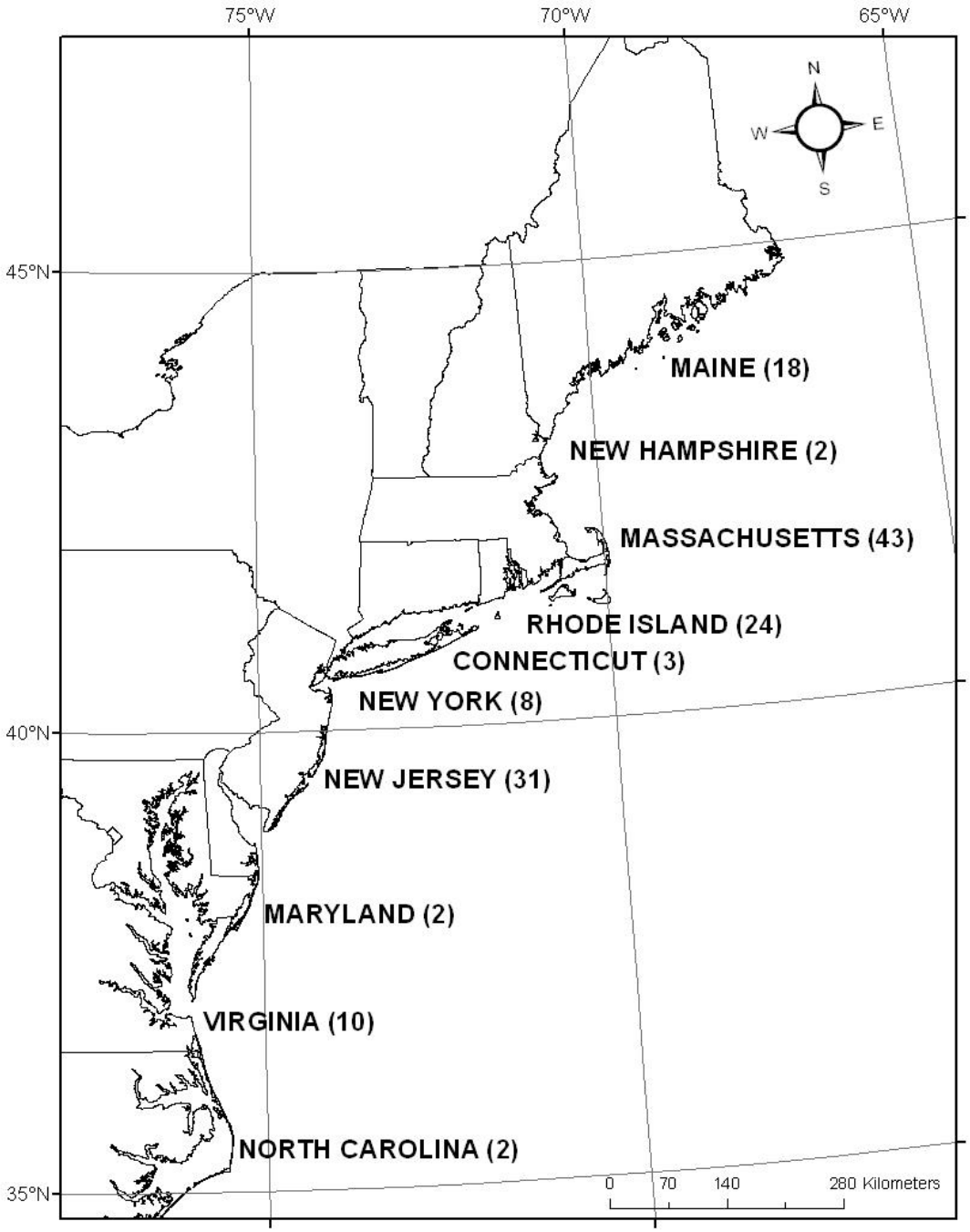


Figure 3: Survey Respondents: Distribution of 143 respondents (bold numbers) throughout the New England and mid-Atlantic states surveyed by the 2012 scallop/monkfish and mid-Atlantic RSA mailing that was sent to 700 and 304 permit holders, respectively, representing 14.2% participation.

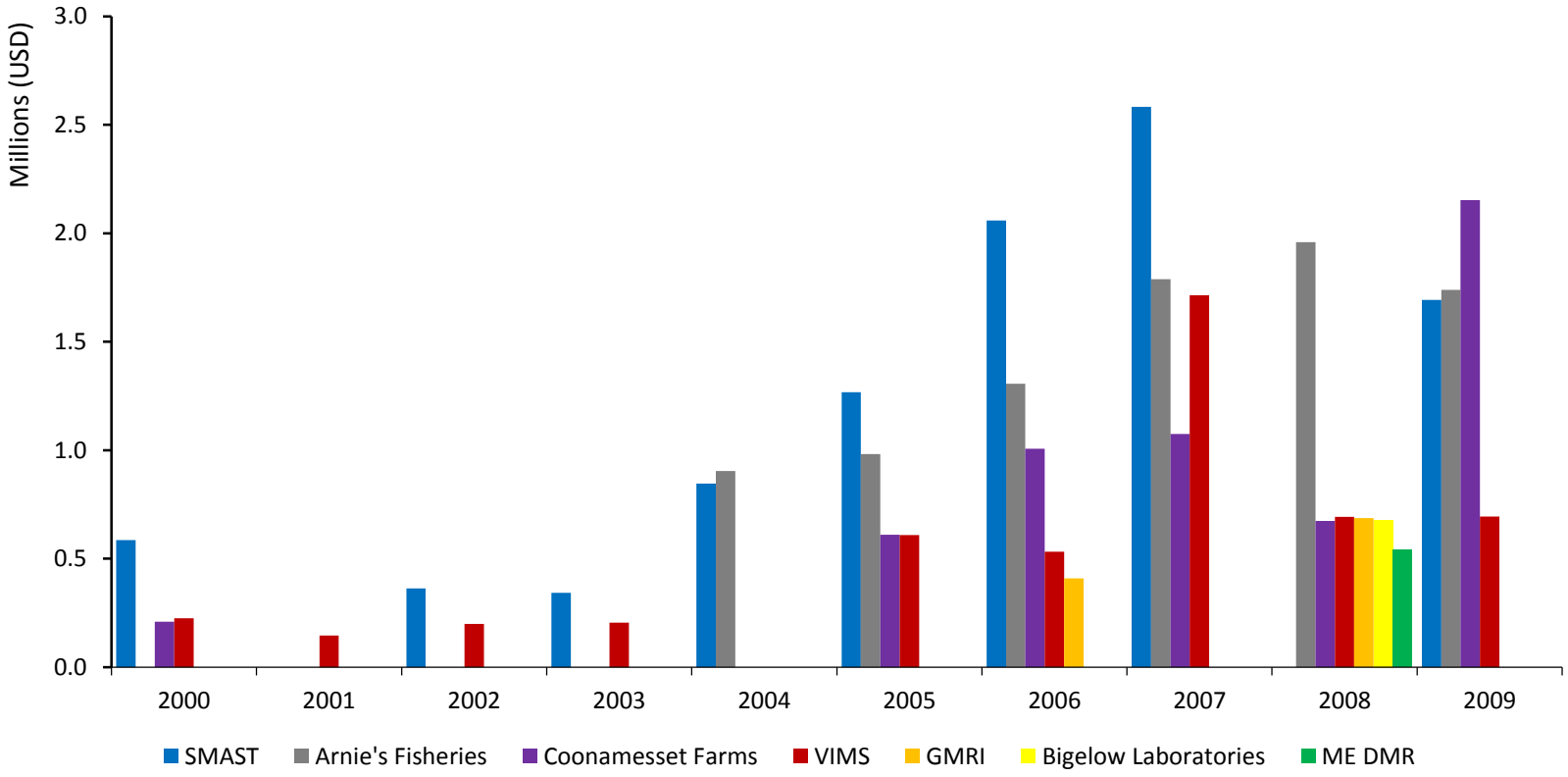


Figure 4: Scallop RSA Award Institutions from 2000-2009 and total estimated value of awards in millions of USD.

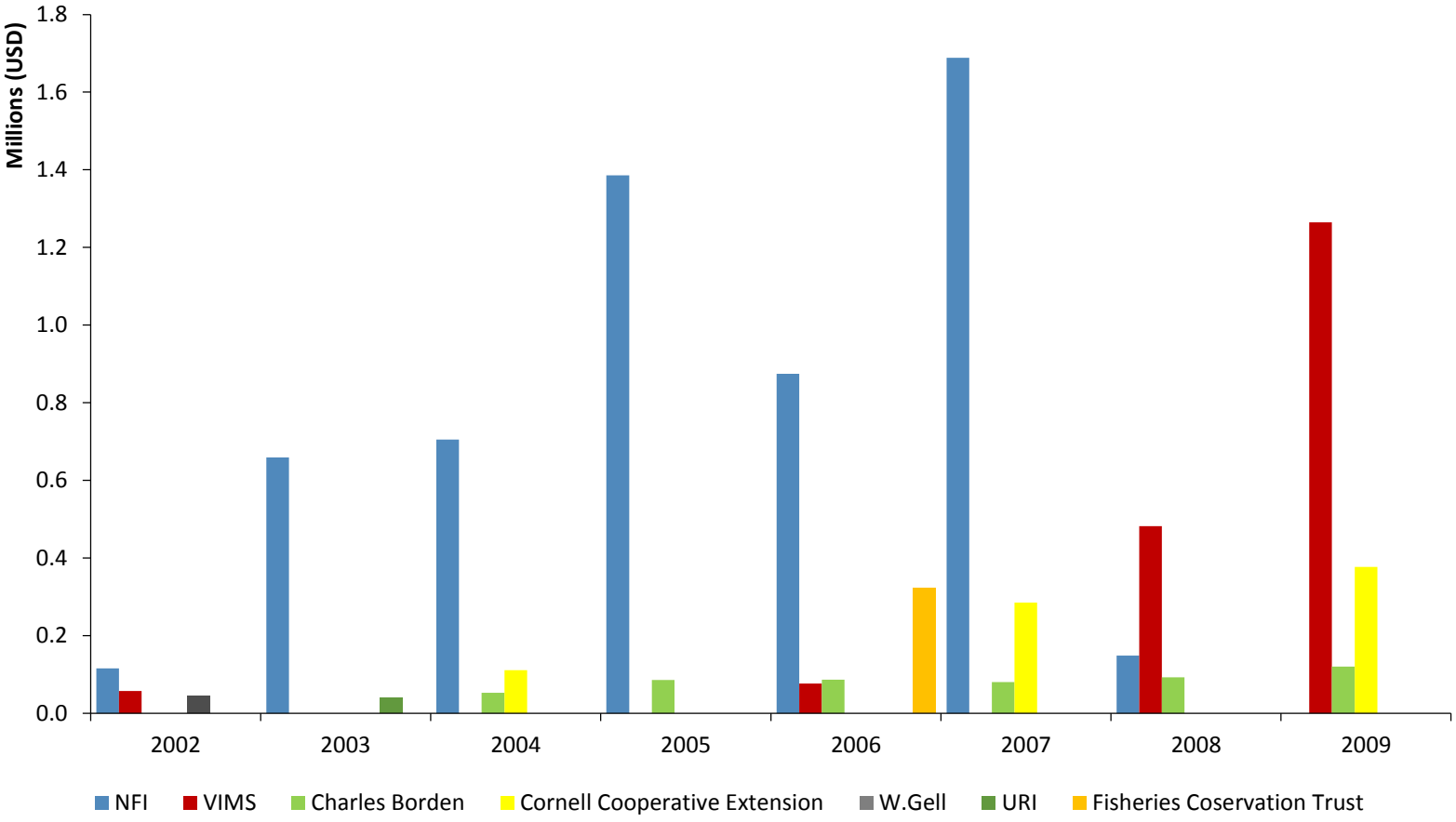


Figure 5: Mid-Atlantic RSA Award Institutions from 2002-2009 and the estimated total award amount in millions of dollars.

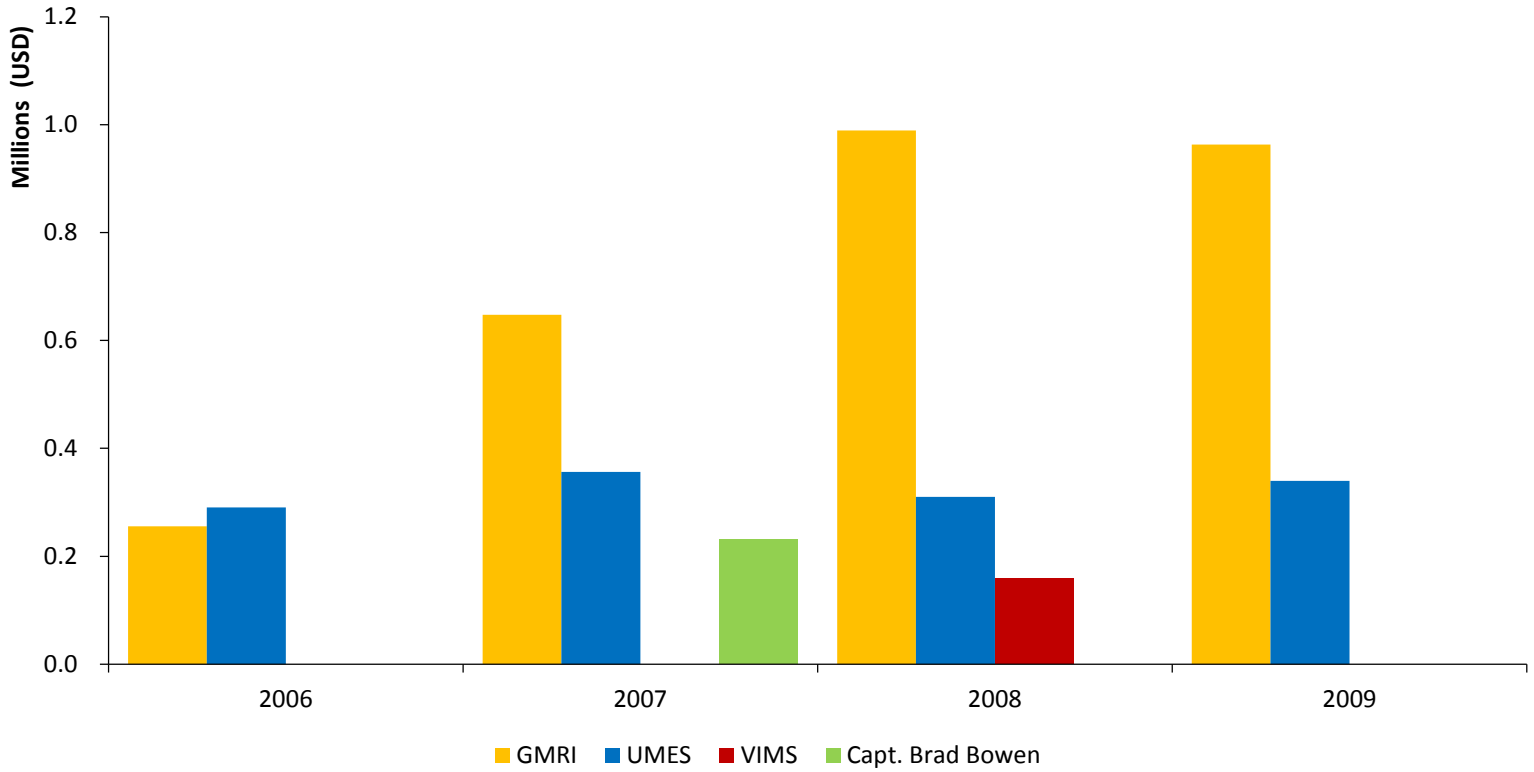


Figure 6: Monkfish RSA Award Institutions from 2006-2009. Institutions include the Gulf of Maine Research Institute (GMRI), University of Maryland Eastern Shore (UMES), Virginia Institute of Marine Science (VIMS), and Capt. Brad Bowe

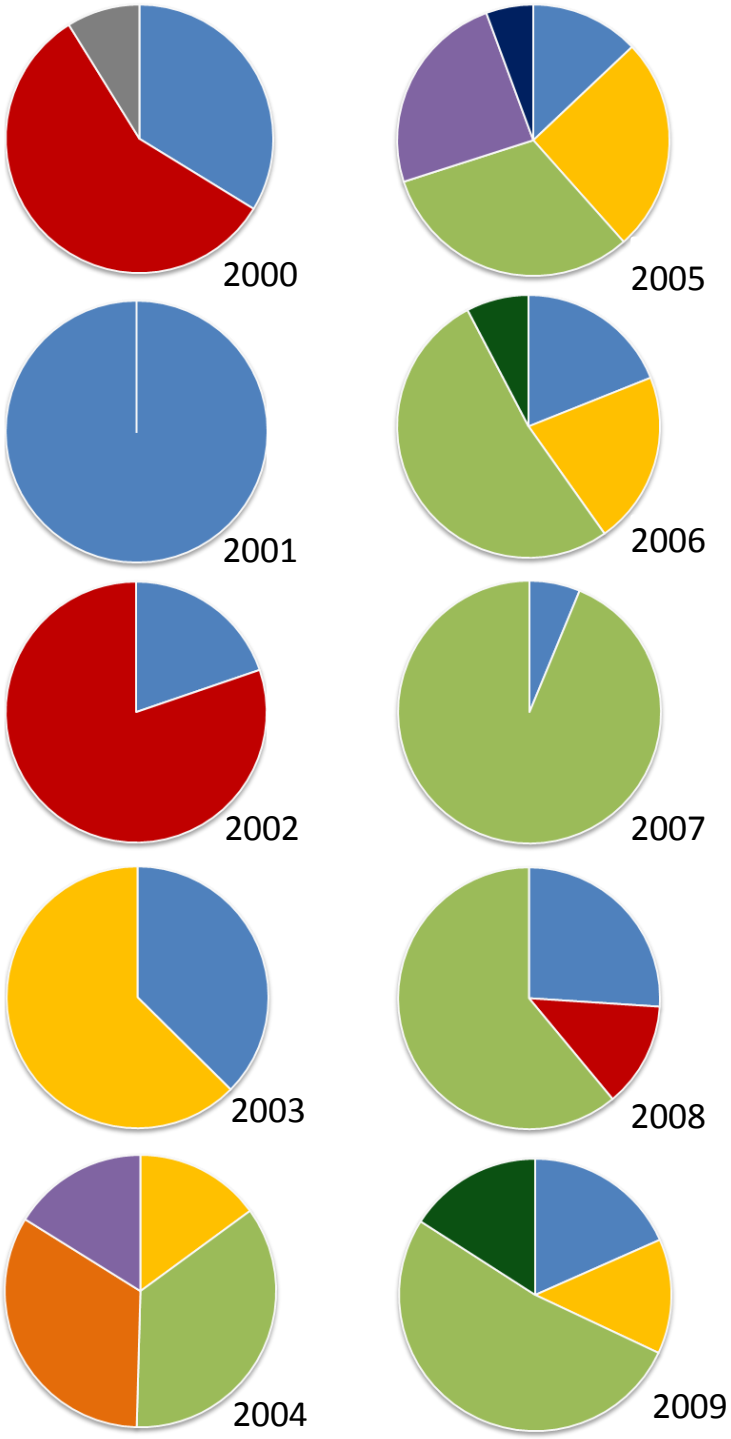


Figure 7: Scallop RSA Research Categories from 2000-2009 based on total estimated value (USD). Categories include conservation engineering , stock monitoring , fishing effects , resource health , dockside monitoring , bycatch , resource dynamics , management strategies , and habitat .

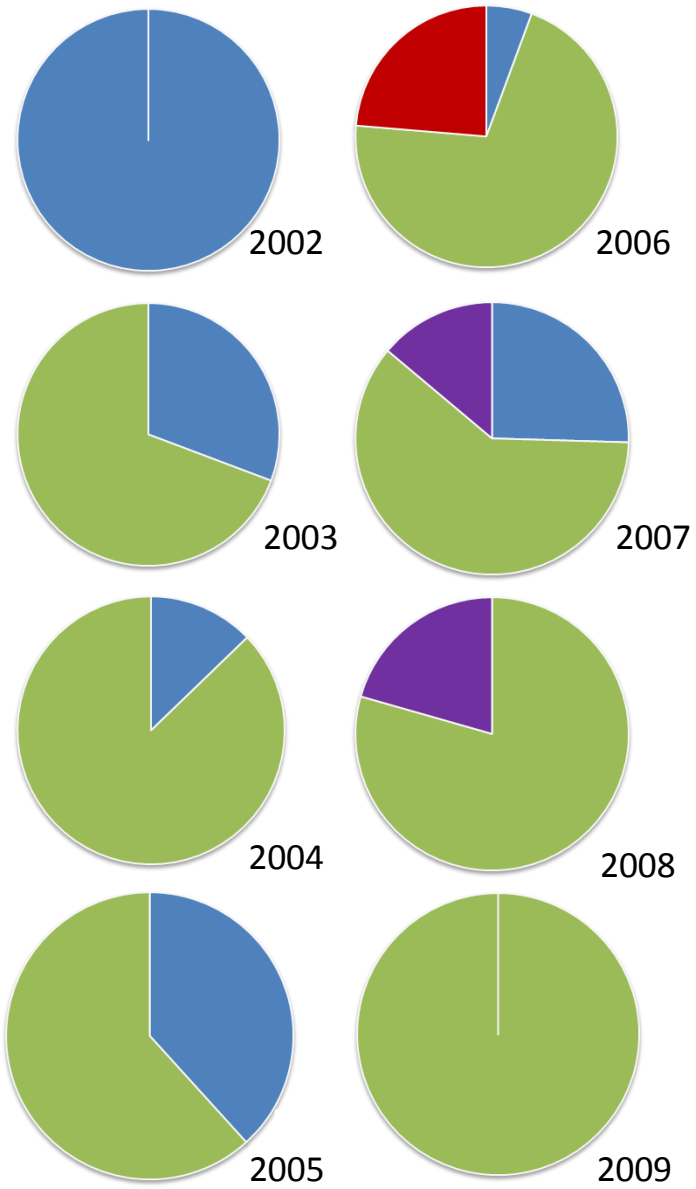


Figure 8: Mid-Atlantic RSA Research Categories from 2002-2009 based on total estimated value (USD). Category names were created by NOAA Fisheries and include conservation engineering , stock monitoring , discard mortality , and management strategies .

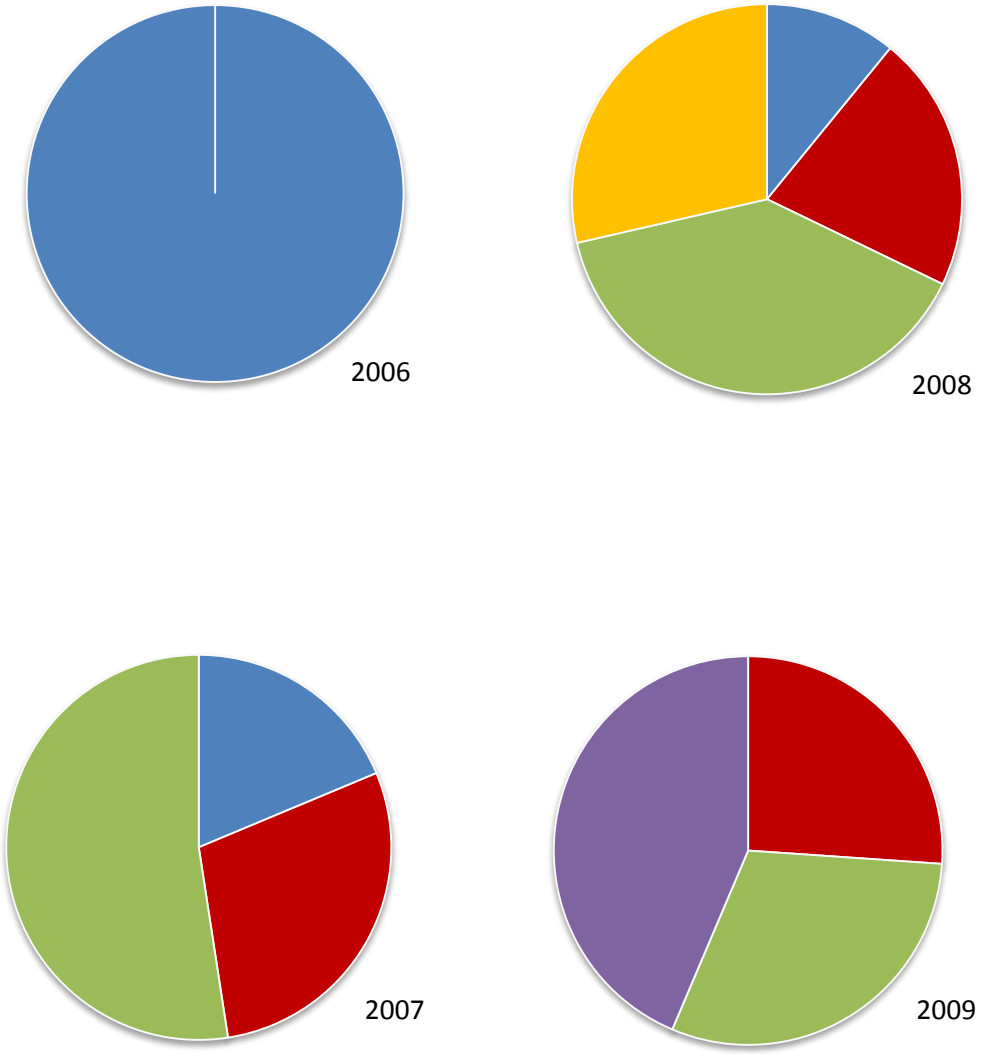


Figure 9: Monkfish RSA Awards from 2006-2009 based on total estimated value (USD). Categories were designated by NOAA Fisheries and include conservation engineering ,Tagging, resource dynamics , discard studies , and age & growth .

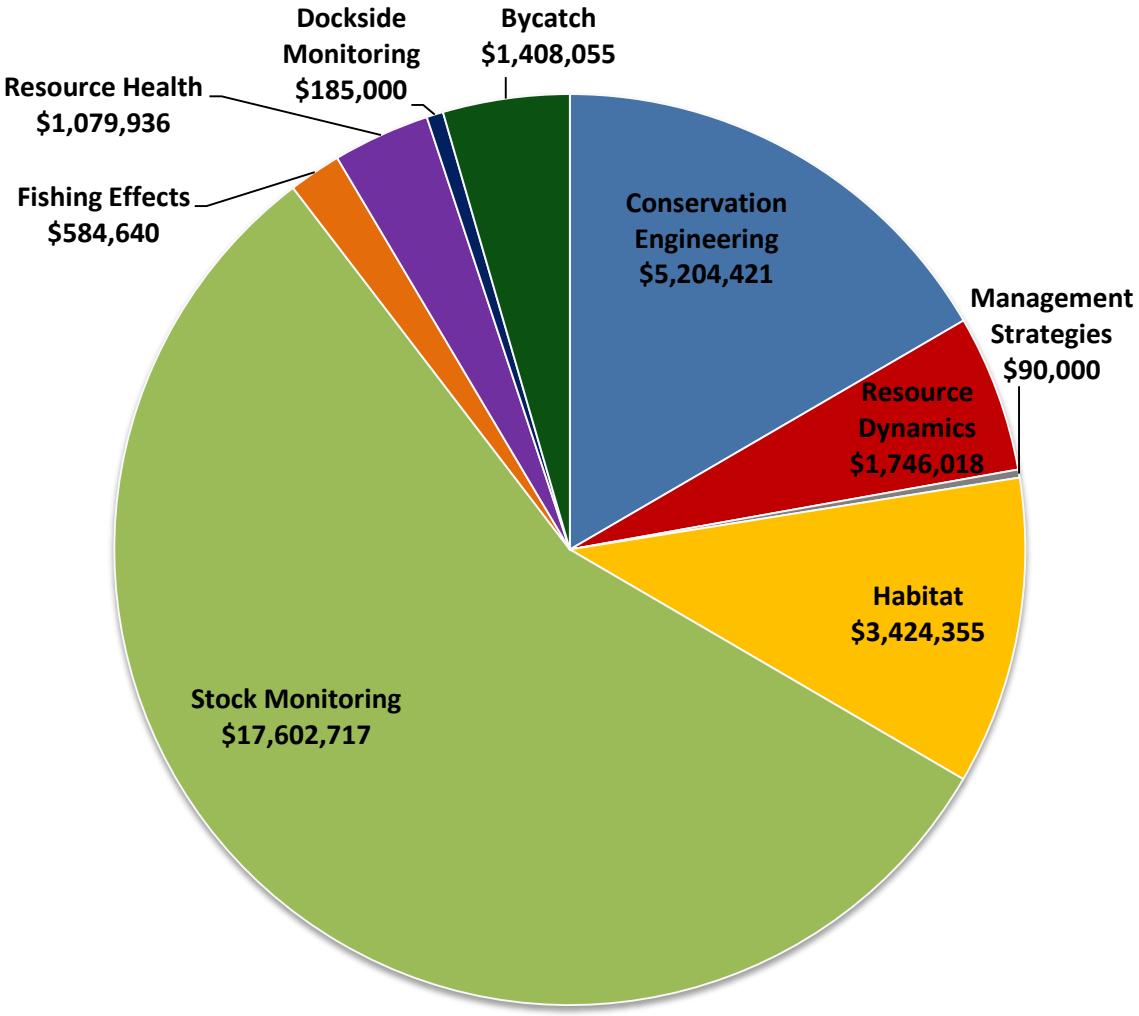


Figure 10: Total Value of Scallop RSA Project Categories from 2000-2009 (USD).

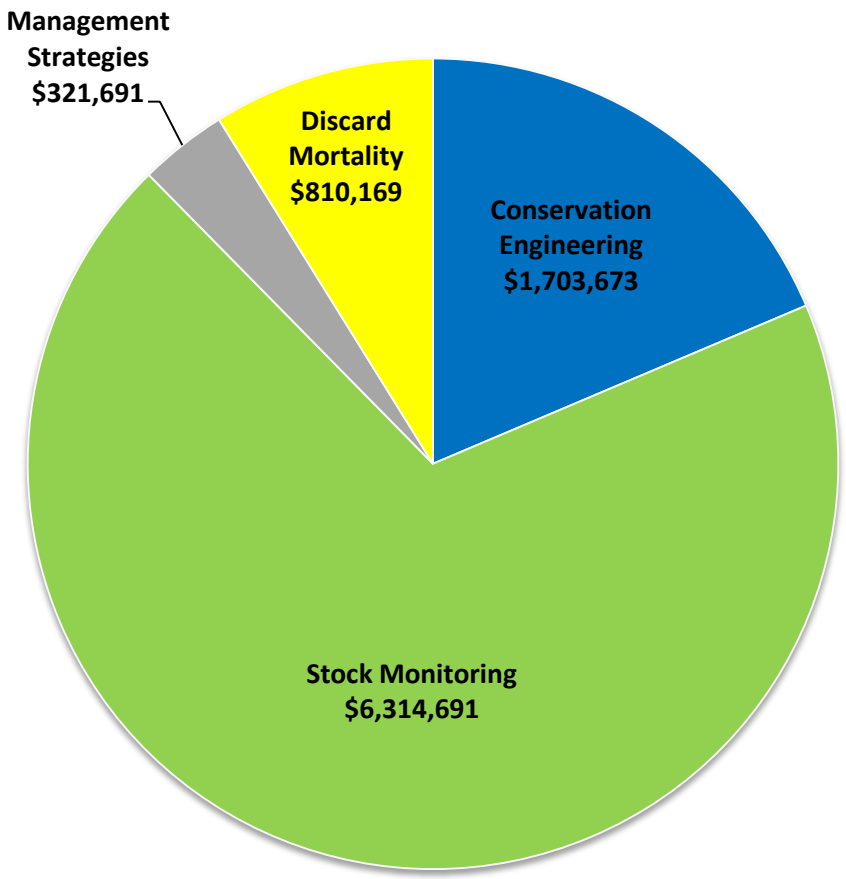


Figure 11: Total Value of Mid-Atlantic RSA Project Categories from 2002-2009 (USD).

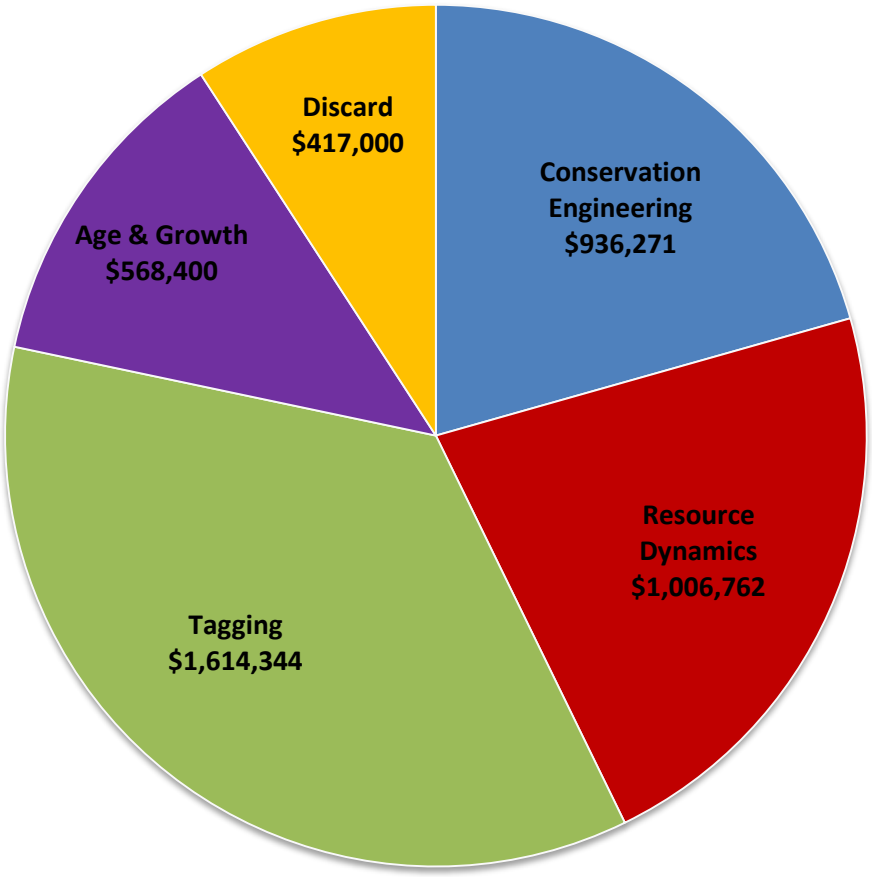


Figure 12: Total Value of Monkfish RSA Project Categories from 2006-2009 (USD).

APPENDIX A: MAILED SURVEY

This survey is part of an evaluation of the Research Set-Aside (RSA) program and is an important part of my master's thesis at the School for Marine Science and Technology-UMASS Dartmouth. The objective of this survey is to determine how the RSA has promoted fishermen participation in cooperative research, and fishery management. I also hope to determine the satisfaction of industry members with the RSA Program. Please return this survey **in person** to **or through mail** to **Erin Adams, 200 Mill Road, Suite 325, Fairhaven, MA 02719. Please contact Erin at (508) 910-6372 or erin.adams@umassd.edu if you have any questions. Thank you.**

Return this survey by April 10, 2012 for a chance to win $250

All responses are confidential.

Primary Fishery:_____

If monkfish is your primary fishery, what is your primary gear?: _____

Years of experience fishing in this fishery?:_____

Are you currently a vessel owner, captain, or crew? (circle all that apply)

Do you fish: full time/part time? (circle one)

Age:_____

How many fisheries management meetings (such as scoping meetings, Plan Development Team meetings, Council Meetings, etc) have you attended in the past two years?

0 1-3 4-6 7-9 10+

Are you familiar with the research conducted through the Research Set Aside (RSA) program?

YES NO UNSURE

If YES, which project?

_____

If you are familiar with the RSA, would you agree that you are satisfied with the research conducted through the RSA Program?:

Disagree Somewhat Disagree I'm not sure Somewhat Agree Strongly Agree

The Research Set Aside is a research program where quota is set-aside to fund fisheries research through cooperation among fishermen, scientists, and managers.

In the future, if you are given the opportunity, you would work on a RSA funded research project:

Disagree Somewhat Disagree I'm not sure Somewhat Agree Strongly Agree

Why would you or wouldn't you work on an RSA project?

_____

_____

The research conducted through the RSA is financially supported by the fishing industry. Do you agree that it the fishing industry should set aside quota to help fund fisheries research:

Disagree Somewhat Disagree I'm not sure Somewhat Agree Strongly Agree

Is there any kind of research that should not be financially supported through industry funds?_____

Please rank the following incentives for your participation in a Research Set-Aside program. (1 to 5: 1=highest priority, 5= lowest priority).

_____Desire to participate more in fisheries management
_____Desire to conduct independent (non-federal) research
_____Desire to aid in the collection of more fisheries data
_____Interest in a specific research project
_____Opportunity to catch more fish
Have you ever attended or called into the mid-Atlantic RSA auction? YES NO
Have you heard about the mid-Atlantic RSA auction? YES NO

Have you participated in an RSA funded research project? YES NO
IF NO, You are done with the survey, please skip to the comment section.

If YES, when?_____ Which fishery?_____

Which project?_____

How many RSA projects have you participated in?_____

Was there a benefit from the RSA funded research project? YES NO UNSURE
Please rank the benefit to the fishery from the RSA funded research project?
(1 to 5: 1= greatest benefit, 5=least beneficial)

___Increased collection of fisheries data
___Increased industry participation in data collection
___Increased industry participation in fishery management
___Increase trust between scientists and industry members
___Increase trust between fishery managers and industry members

Did you attend a fisheries management meeting PRIOR TO participating in the RSA research project? (Council, Plan Development Team, Science and Statistical Committee, Advisory Panel, or any fishery management meetings?)

YES NO If YES, how many?_____

Have you attended a fisheries management meeting SINCE participating in the RSA?

YES NO If YES, how many? _____

Participation in a RSA cooperative research project has increased your awareness of fisheries management and stock assessment.
Disagree Somewhat Disagree I'm not sure Somewhat Agree Strongly Agree

Participation in the RSA cooperative research project has caused you to be more active in fishery management.
Disagree Somewhat Disagree I'm not sure Somewhat Agree Strongly Agree

APPENDIX B: FISHERMEN INTERVIEW

- Have them fill out the survey if they have not done so.
- To your understanding, what is the objective of the RSA when it first started?
- Have those objectives different now?
- How did you get involved with the RSA?
- Did you know or worked with the researcher before?
- How does the RSA affect your business plans?
- How much compensation did you get from the projects? lbs or extra DAS.
- What percentage of your catch is funded through the RSA?
- Have you ever lost money due to not catching enough on RSA comp days?
- If the RSA ended, how would that affect your business?
- Do you know the results of the research you participated in?
- Of the projects that you have worked on do you know if any of that data been used in management? If so, when and how?
- How do you think the RSA has affected fishery management?
- How do you think industry can best effect fishery management?
- What do you think is the greatest value of the RSA in management of your fishery?
- Has working on the RSA affected your trust in fishery research?
- Has working on the RSA affected your trust in fishery management?
- What change to the RSA would benefit your involvement the most?
- Do you think that working in the RSA has increased your participation in management?
- Has participating in an RSA project made you more conscious of fishing responsibly?
- How important do you think it is that the fishing industry set aside TAC to help fund fisheries research?
- What is the greatest benefit of RSA overall?
- What is the most negative aspect of RSA overall?
- Why did you choose to work on the RSA project?
- What would make industry participate more in fishery research and management?
- Are you familiar with the Mid-Atlantic RSA auction?
- If so, what are your thoughts about the RSA Mid-Atlantic auction?

APPENDIX C: FISHERY MANAGER INTERVIEW.

- Name
- Contact info
- Interview date, location, time and duration.
- Was this interview recorded?
- Institution or place of employment?
- Primary fishery managed?
-
- Title?
- Job description?
- Years in management?
- Are you familiar with the RSA program? In what way?
- In your understanding, what is the objective of the RSA program when it started?
  -Has that objective changed over time?
- To your knowledge has data from an RSA project been used in fishery management?
  -If so, when and how?
- Do you have any experience with the RSA project selection process?
- Do you have any experience with the RSA evaluation process?
- What criteria do you look for in using data for fishery management?
- At which point in the management process should independent data be submitted?
- Is it more difficult to incorporate cooperative research in fishery management?
- Do you think there is any bias against cooperative research data when it comes to being used in stock assessment?
- What needs to be improved in RSA research for there to be increased integration into management?
- In your opinion what is the most successful RSA program? What is the most unsuccessful? What element attributes to that success? What the most successful attribute for a successful program? What is the most negative attribute for an unsuccessful program?
- The research conducted through the RSA is financially supported by the fishing industry. How important do you think it is that the fishing industry set aside TAC to help fund fisheries research?
- Is there any type of fishery research that industry should not fund?
- What is the greatest benefit of the RSA program?
- What is the most negative aspect of RSA program?
- General comments and what are ways to improve fishery funded research in the future?
- Are you familiar with the mid-Atlantic RSA auction?
- What is the greatest benefit from the RSA mid-Atlantic auction?
- What is the most negative aspect of the RSA auction?

APPENDIX D: PRINCIPAL INVESTIGATOR INTERVIEW

- Name
- Job title?
- Contact info
- Interview date, location, time and duration.
- Was this interview recorded?
- Institution or place of employment?
- Primary fishery researched?
- Years in research?
- In your understanding what is the objective of the RSA?
- How many proposals have you submitted to the RSA program?
- Did you work with industry members in your research?
- How do you choose which fishermen to work with on your projects? (maybe not for mid-Atlantic)
- Which boats have you worked with on your project? May I have their information to contact them for an interview? Have you worked with these fishermen on previous projects?
- Can you take me through how you work out compensation with the fishermen?
- What percentage of your research is funded through the RSA?
- How did working cooperatively on the RSA impact your research?
- Were there any negative aspects of working cooperatively?
- What do you think was the most important result of your RSA project?
- Was this result used in management?
- Would you be able to conduct this research without the RSA funds?
- What change in the program would best suit your research?
- Do you think industry should fund fisheries research?
- What type of research is best suited for fishery funded research?
- Has any of your data from an RSA project been used in management? If so, when and how?
- Where is the biggest obstacle for having your research included in fishery science?
- How do you think the RSA has affected management?
- What is the greatest benefit of RSA overall?
- What is the most negative aspect of the RSA overall?
- Do you think the RSA is a management program or a social program?
- What are ways to improve fishery funded research in the future?
- Are you familiar with the mid-Atlantic RSA auction? How so?
- If so, what are your thoughts about the RSA mid-Atlantic auction?

APPENDIX E: SCALLOP RSA PRIORITIES

PROJECT TITLE		PRIORITY
2000		
Performance Evaluation of a 4.0" Ring Scallop Dredge in the Context of Area Management Strategy for Sea Scallops	VIMS	High Priority: Sea scallop research that identify and evaluate gear to reduce groundfishbycatch and habitat impacts
Examination of Population Biology and Dynamics of the Sea Scallop in Discrete Areas of Georges Bank	UMASS / SMAST	High Priority: Sea Scallop research that provide improved information concerning scallop abundance estimates and involves evaluating the distribution, size composition, and density of scallops in the closed areas prior to the open periods
Sea Scallop Fishery Bycatch Reduction	Coonamessett Farm	High Priority: Sea scallop research that identify and evaluate gear to reduce groundfish bycatch and habitat impacts
Examination of Population Biology and Dynamics of the Sea Scallop in Discrete Areas of Georges Bank	UMASS / SMAST	High Priority: Sea Scallop research that provide improved information concerning scallop abundance estimates and involves evaluating the distribution, size composition, and density of scallops in the closed areas prior to the open periods
Performance Evaluation of a 4.0" Ring Scallop Dredge in the Context of Area Management Strategy for Sea Scallops	VIMS	High Priority: Sea scallop research that identify and evaluate gear to reduce groundfish bycatch and habitat impacts
Georges Bank Scallop Exemption Program	VIMS	High Priority: Sea Scallop research that provide improved information concerning scallop abundance estimates and involves evaluating the distribution, size composition, and density of scallops in the closed areas prior to the open periods
2001		
Evaluation of Bycatch Reduction Devices to Facilitate Summer Flounder Escapement from Scallop Trawls Closed Area Access	VIMS	High Priority: Sea scallop research that identify and evaluate gear to reduce groundfish bycatch and habitat impacts
Performance Evaluation of a 4.0" Ring Scallop Dredge in the Context of Area Management Strategy for Sea Scallops	VIMS	High Priority: Sea scallop research that identify and evaluate gear to reduce groundfish bycatch and habitat impacts
2002		
Evaluation of Gear Modifications to Reduce the Bycatch of Summer Flounder in Sea Scallop Dredges	VIMS	High Priority: Sea scallop research that identify and evaluate gear to reduce groundfish bycatch and habitat impacts

Examination of the Sea Scallop, *Placopectenmagellanicus*, Recruitment in Closed and Open Areas of Georges Bank	UMASS / SMAST	High Priority: Sea Scallop research that provide improved information concerning scallop abundance estimates and involves evaluating the distribution, size composition, and density of scallops in the closed areas prior to the open periods, and 3.) High Resolution surveys that include distribution, recruitment, mortality, and growth rate information
2003		
Industry Trials of a Modified Sea Scallop Dredge to Minimize the Catch of Sea Turtles	VIMS	High Priority: Sea scallop research that identify and evaluate gear to reduce groundfish bycatch and habitat impacts
Comparison of Habitats Supporting High and Low Sea Scallop *Plactopectenmagellanicus*Densities on Georges Bank	UMASS / SMAST	High Priority: Sea Scallop research that provide improved information concerning scallop abundance estimates and involves evaluating the distribution, size composition, and density of scallops in the closed areas prior to the open periods, and 3.) High Resolution surveys that include distribution, recruitment, mortality, and growth rate information
2004		
Examining the Effect of the 2004 Pulse Fishing Event on the Georges Bank and Closed Area Benthic Community	UMASS / SMAST	High Priority: Sea Scallop research that provide improved information concerning scallop abundance estimates and involves evaluating the distribution, size composition, and density of scallops in the closed areas prior to the open periods, and 3.) High Resolution surveys that include distribution, recruitment, mortality, and growth rate information
Development of an Interactive Video Map Detailing the Georges Bank and Mid-Atlantic Benthic Community	UMASS / SMAST	8.) Video and/or photo transects of the bottom within scallop access areas (Hudson Canyon Area, Nantucket Lightship Area, Closed Area I, Closed Area II) and within closed scallop areas (Elephant Trunk Area) and in comparable fished areas that are both subject and not subject to scallop fishing, before and after fishing commences; and 10.) Development of high resolution sediment mapping of scallop fishing areas in the Gulf of Maine, Georges Bank and Mid-Atlantic Regions using Canadian sea scallop industry mapping effort as an example process
Characterization of Scallop Abundance and Benthic Habitat Using Optical Imaging Technology	Arnie's Fisheries, Inc.	8.) Video and/or photo transects of the bottom within scallop access areas (Hudson Canyon Area, Nantucket Lightship Area, Closed Area I, Closed Area II) and within closed scallop areas (Elephant Trunk Area) and in comparable fished areas that are both subject and not subject to scallop fishing, before and after fishing commences

Preliminary Investigation of the Marine Biotoxins Along the Northwest Continental Atlantic Shelf	Arnie's Fisheries, Inc.	18.) Research on scallop biology and scallop fishery social science, including identification of potential management measures to improve benefits to the fishery and to the nation.
2005		
A Turtle Excluder Dredge for the Sea Scallop Fishery	Coonamessett Farm	3.) Sea turtle interactions
Multistage Centric Systematic Video Survey Design Verification	UMASS / SMAST	4.) Sea scallop abundance estimates
Examination of Benthic Substrates and Macro invertebrate Distributions in the western Great South Channel and Nantucket Shoals	UMASS / SMAST	6.) Other research relevant to the sea scallop fishery
An Assessment of Sea Scallop Abundance and Distribution in Selected Areas of Georges Bank and the Mid Atlantic	VIMS	4.) Sea scallop abundance estimates, 5.) distribution, size composition, and density of scallops
Continued Investigation of the Marine Biotoxins Along the Northwest Continental Atlantic Shelf	Arnie's Fisheries, Inc.	6.) Other research relevant to the sea scallop fishery
Evaluation and Demonstration of Column Based Standard Scallop Bags for Enforcement and Dockside Monitoring of Trip Limits Output Controls to Control scallop Mortality in the Sea Scallop Fishery	Coonamessett Farm	6.) Other research relevant to the sea scallop fishery
2006		
A New Dredge for the Sea Scallop Fishery	Coonamessett Farm	Gear conservation
Sea Turtle - Scallop Fishery Interaction Study	Coonamessett Farm	Turtle interactions
An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Georges Bank Area 1, Nantucket Lightship and Elephant Trunk	VIMS	Scallop abundance assessment
Examination of Benthic Substrates and Macroinvertebrate Distributions on the Northern Edge of Georges Bank	UMASS / SMAST	Habitat survey
High-Resolution Video Survey of the Habitat and Sea Scallop Resource in the Elephant Trunk Closed Area	UMASS / SMAST	High resolution industry based scallop abundance survey
Adaptive Characterization of Scallop Populations Using High resolution Optical Imaging from Tethered and Untethered Platforms	Arnie's Fisheries	High resolution industry based scallop abundance survey

Testing Bycatch in an Observer-based Experimental Scallop Fishery Outside the GOM Scallop Dredge Exemption Area and within Portions of Statistical Areas 521 and 526	Gulf of Maine Research Institute	Reduction of bycatch in scallop fishery
2007		
Characterization of Benthic Habitat and Scallop Abundance Using Optical Imaging Technology: Phase 2	Arnie's Fisheries	Priority 1.) Access area scallop resource surveys; 2.) other surveys, including areas not surveyed by the annual NOAA Fisheries survey
Developing an Improved Dredge for Standardized Surveys of the Sea Scallop Resource	Coonamessett Farm	Priority 1.) Access area scallop resource surveys; 2.) other surveys, including areas not surveyed by the annual NOAA Fisheries survey
Field Testing of a New Dredge for the Sea Scallop Fishery	Coonamessett Farm	7.) Sea turtle interaction research
Calibrating Industry Scallop Surveys with NOAA Vessel Platforms	VIMS	Priority 1.) Access area scallop resource surveys; 2.) other surveys, including areas not surveyed by the annual NOAA Fisheries survey
An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Georges Bank Area I and II, Nantucket Lightship and Elephant Trunk	VIMS	Priority 1.) Access area scallop resource surveys; 2.) other surveys, including areas not surveyed by the annual NOAA Fisheries survey
High-Resolution Video Survey of the Habitat and Sea Scallop Resource in the Elephant Trunk and Nantucket Lightship Closed Areas	UMASS / SMAST	Priority 1.) Access area scallop resource surveys; 2.) other surveys, including areas not surveyed by the annual NOAA Fisheries survey
2008		
Sea Turtle-Scallop Fishery Interaction Study	Coonamessett Farm	7.) Sea turtle/scallop fishery interaction research
Assessment of Sea Scallop Distribution and Abundance in Federal Waters of the GOM	ME DMR	2.) Other surveys, including areas not surveyed by the annual NOAA Fisheries survey
An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: George's Bank Area II and DelMaVA Closed Area	VIMS	1.) Intensive industry-based access area surveys
Developing Tools to Evaluate Spawning and Fertilization Dynamics of the Giant Sea Scallop	Bigelow Laboratory	3.) Scallop biology; 8.) Scallop stock assessment and population dynamics research
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 Area	GMRI	4.) Identification and evaluation of methods to reduce habitat impacts

Characterization of Scallop Abundance and Benthic Habitat and Acoustic Imaging Technology	Arnie's Fisheries, Inc.	1.) Intensive industry-based access area surveys
2009		
High Resolution Video Survey of the Sea Scallop Resource, Recruitment Patterns and Habitat of the Elephant Trunk and Nantucket Lightship Closed Areas	UMASS/ SMAST	Priority: 1.) An intensive industry-based survey of each of the following access areas: Elephant Trunk and Nantucket Lightship Closed Areas to be used to estimate appropriate scallop catch levels under the rotational area management program if data is available by August, 2009
Evaluation of Northwest Atlantic Ocean Continental Shelf Substrates	UMASS/ SMAST	6.) Habitat characterization research, including, but not limited to :video and/or photo transects of the bottom within scallop access areas, closed scallop areas, and in comparable fished areas that are both subject and not subject to scallop fishing, before and after scalloping commences; development of high resolution sediment mapping of scallop fishing areas using Canadian sea scallop industry mapping efforts as an example process
Testing of a Sea Scallop Dredge Dual Mesh Size Twine Top for Bycatch Reduction	Coonamessett Farm	4.) Identification and evaluation of methods to reduce groundfishbycatch (i.e., gear research).
Sea Turtle Oceanography Study	Coonamessett Farm	7.) Identification of sources of sea turtle interactions and/or identification of ways to minimize interactions with sea turtles.
Continuing the Time Series: Calibrating the NMFS Sea Scallop Survey to the R/V Sharp	VIMS	10.)Research projects that would help calibrate the transition of the Federal dredge survey, or projects that compare various survey techniques and methods that would assist with the current transition period of the Federal scallop dredge survey.
An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Nantucket Lightship Closed Area	VIMS	Priority: 1.) An intensive industry-based survey of each of the following access areas: Nantucket Lightship Closed Areas to be used to estimate appropriate scallop catch levels under the rotational area management program if data is available by August, 2009
Optical Survey of Scallop Abundance	Arnie's Fisheries, Inc.	Priority: 1.) An intensive industry-based survey of each of the following access areas: Nantucket Lightship Closed Area, Closed Area I, and Western Great South Channel to be used to estimate appropriate scallop catch levels under the rotational area management program if data is available by August, 2009

APPENDIX F: MID-ATLANTIC RSA PRIORITIES

PROJECT TITLE	GROUP	PRIORITY
	2002	
The Effect of Circle and Square Escape Vents on Discard Reduction in the Black Sea Bass Trap Fishery	VIMS	2.) Mesh and gear selectivity focusing on…e.) black sea bass mesh selectivity.
Loligo Squid Gear Modification Study	National Fisheries Institute	2.) Mesh and gear selectivity focusing on…d.) squid mesh selectivity.
Evaluation of Catch Efficiency and Size Selectivity of Inshore New England Fish Pots for Black Sea Bass and Scup as a Function of Escape Vent Size	W. Gell	2.) Mesh and gear selectivity focusing on…c.) scup mesh selectivity…e.) black sea bass mesh selectivity
	2003	
Loligo Squid: Extension of Gear Modification Study Through Scup Migratory Season	National Fisheries Institute	1.) Bycatch and discard reduction concerning: a.) Distinctions between regulatory discards and bycatch attributed to gear, including mesh selectivity and /or overall gear design in the summer flounder fishery; b.) gear modifications in the *Loligo* and scup fisheries; and other species bycatch; c.)discard studies in the Loligo and scup fisheries; and d.) better estimates of recreational discards in the summer flounder, scup, black sea bass, and bluefish fisheries
Development of a Supplemental Finfish Survey Targeting Mid-Atlantic Migratory Species	National Fisheries Institute	4.) Cooperative stock assessment surveys focusing on: a.) The use of alternative industry assessment methods to determine the abundance of Atlantic mackerel; b.) the summer flounder fishery; c.) surveys for summer flounder in areas not traditionally sampled by the North East Fisheries Science Center gear; d.) side by side comparisons for summer flounder and scup of commercial and NEFSC survey gear; e.) better survey information for bluefish movements; and g.) DNA analysis for stock descriptions of Atlantic bluefish and Atlantic mackerel.
Effects of Increasing Mesh Size in the Summer Flounder Fishery in Southern New England Inshore Rhode Island Waters	URI	Discontinued
Effect of Vent Size on Sex Ratios of Black Sea Bass Retained in the Coastal Pot Fishery	Wizard Enterprises	Discontinued

Bycatch Characterization and Reduction from Codend Mesh Size Increases in the Directed Bottom Trawl Northern-Inshore Scup Fishery	URI	1.) Bycatch and discard reduction concerning: a.) Distinctions between regulatory discards and bycatch attributed to gear, including mesh selectivity and /or overall gear design in the summer flounder fishery; b.) gear modifications in the *Loligo* and scup fisheries; and other species bycatch; c.)discard studies in the Loligo and scup fisheries; and d.) better estimates of recreational discards in the summer flounder, scup, black sea bass, and bluefish fisheries
	2004	
Fishery Independent Scup Survey of Selected Areas in Southern New England Waters	C. Borden	4.) Cooperative stock assessment surveys focusing on: a.) The use of alternative industry assessment methods to determine the abundance of Atlantic mackerel; b.) the summer flounder fishery; c.) surveys for summer flounder in areas not traditionally sampled by the North East Fisheries Science Center gear; d.) side by side comparisons for summer flounder and scup of commercial and NEFSC survey gear; e.) better survey information for bluefish movements; and g.) DNA analysis for stock descriptions of Atlantic bluefish and Atlantic mackerel.
Development of a Supplemental Finfish Survey Targeting Mid-Atlantic Migratory Species	National Fisheries Institute	4.) Cooperative stock assessment surveys focusing on: a.) The use of alternative industry assessment methods to determine the abundance of Atlantic mackerel; b.) the summer flounder fishery; c.) surveys for summer flounder in areas not traditionally sampled by the North East Fisheries Science Center gear; d.) side by side comparisons for summer flounder and scup of commercial and NEFSC survey gear; e.) better survey information for bluefish movements; and g.) DNA analysis for stock descriptions of Atlantic bluefish and Atlantic mackerel.
Evaluation of the Effect of Vent Size and Shape on Black Sea Bass Behavior and Escapement from Pot Gear	Cornell Cooperative Ext. of Suffolk County	2.) Mesh and gear selectivity focusing on: a.) the examination of summer flounder catch composition in small mesh net fisheries within the summer flounder small-mesh exemption area b.) summer flounder mesh selectivity studies; c.)scup mesh selectivity; d.)squid mesh selectivity; e.)black sea bass mesh selectivity; f.) the development of threshold triggers based on gear and fishery characteristics; g.) evaluation of various pot vent sizes and shapes for black sea bass and scup; h.) estimation of mortality of black sea bass left in pots during the closed season; and i.) mesh retention studies of 2 1.2-inch (6.35-cm), 2 3/4-inch (6.99-cm), and 3-inch (7.63-cm) mesh for butterfish.

2005		
Loligo Squid Mesh Selectivity Study to Reduce Bycatch of Juvenile *Loligo* Squid and other Species	National Fisheries Institute	1.) Bycatch and discard reduction and 2.) mesh and gear selectivity
Development of a Supplemental Finfish Survey Targeting Mid-Atlantic Migratory Species	National Fisheries Institute	4.) Cooperative stock assessment surveys
2005 Fishery Independent Survey of Selected Hard Bottom areas in Southern New England	C. Borden	4.) Cooperative stock assessment surveys
2006		
2006 Fishery Independent Survey of Selected Hard Bottom areas in Southern New England	C. Borden	5.) Cooperative stock assessment surveys
Evaluating Size and Bag Limits in the Summer Flounder Recreational Fishery	Fisheries Cons. Trust	2.) Improved recreational fishery data
Development of a Supplemental Finfish Survey Targeting Mid-Atlantic Migratory Species	National Fisheries Institute	5.) Cooperative stock assessment surveys
An Evaluation of Size Selectivity and Relative Efficiency of Black Sea Bass, *Centropristisstrata* Habitat Pots Equipped with large Mesh Panels.	VIMS	3.) Mesh and gear selectivity
2007		
Development of a Supplemental Finfish Survey Targeting Mid-Atlantic Migratory Species	National Fisheries Institute	5.) Cooperative stock assessment surveys
Bycatch Reduction and Gear Development in the Mid-Atlantic: Evaluation of Optimal Codend Mesh Size in the Loligo Fishery	National Fisheries Institute	1.) Bycatch and discard reduction and 3.) mesh and gear selectivity
Evaluation of Summer Flounder Discard Mortality in the Bottom Trawl Fishery	Cornell Cooperative Ext. of Suffolk County	1.) Bycatch and discard reduction
2007 Fishery Independent Survey of Selected Hard Bottom areas in Southern New England	C. Borden	5.) Cooperative stock assessment surveys

2008		
Discard Mortality in the Summer Flounder Fishery: A New Approach to Evaluation	National Fisheries Institute	1.) Bycatch and discard reduction
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	VIMS	4.) Cooperative stock assessment surveys
2008 Fishery Independent Scup Survey of Hard Bottom Areas in Southern New England Waters	Charles Borden and Eric Rodegast	4.) Cooperative stock assessment surveys
2009		
2009 Fishery Independent Scup Survey of Hard Bottom Areas in Southern New England Waters	Charles Borden	3.) Cooperative stock assessment surveys
Data Collection and Analysis in Support of Single and Multispecies Stock Assessments in the Northeast Area Monitoring and Assessment Program Near Shore Trawl Program	VIMS	3.) Cooperative stock assessment surveys; a.) Supplemental finfish trawl survey
Evaluation of Summer Flounder Discard Mortality in the Bottom Trawl Fishery Part II: A Study of the Offshore Winter Fishery	Cornell Cooperative Ext. of Suffolk County	1.) Estimate and verify the following components of summer flounder total annual mortality; a.) natural mortality by sex and age; b.) Commercial fisheries: i.) Landings by geographic region, ii.) Discard mortality

APPENDIX G: MONKFISH RSA PRIORITIES

PROJECT TITLE	GROUP	PRIORITY
	2006	
The Biology of Large Monkfish, *Lophius americanus*	UMD Eastern Shore	5.) Research on the biology or population structure and dynamics of monkfish
Influence of Diet on Growth and Condition of Monkfish: Towards an Ecosystem-based Understanding of Monkfish Productivity	Gulf of Maine Research Institute	5.) Research on the biology or population structure and dynamics of monkfish
	2007	
The Biology of Large Monkfish, *Lophius americanus*	UMD Eastern Shore	5.) Research on the biology or population structure and dynamics of monkfish
A Tagging Study to Assess Monkfish (*Lophius americanus*) movements and Stock Structure in the Northeastern United States	Gulf of Maine Research Institute	6.) tagging studies
Determining the Best Mesh Size for Gillnetting Monkfish, *Lophius americanus*	Capt. Brad Bowen	7.) Mesh and gear selectivity studies, including studies on gear efficiency
	2008	
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	GMRI	2.) Research concerning monkfish bycatch and discards
Movements, Growth, and Habitat Use of Monkfish Based on Archival Tagging and Otolith Elemental Analysis	GMRI	5.) Research on the biology or population structure and dynamics of monkfish 6.) Tagging studies
Influence of Climate on the Distribution and Catch Rates of Monkfish	UMD Eastern Shore	5.) Research on the biology or population structure and dynamics of monkfish 6.) Tagging studies
An Evaluation of the Effects of Gill Net Alterations on Selectivity and Relative Efficiency in the Monkfish Fishery	VIMS	7.) Mesh and gear selectivity studies, including studies on gear efficiency
	2009	
Influence of Climate on the Distribution and Catch Rates of Monkfish, *Lophius americanus*	UMD Eastern Shore	3.) Tagging and telemetry studies to investigate short- and long-term movements and habitat use.
Tagging to Assess Monkfish (*Lophius americanus)* Movements and Stock Structure in the Northeastern United States	GMRI	3.) Tagging and telemetry studies to investigate short- and long-term movements and habitat use.
A Weight of Evidence Approach for Validating Age & Growth in US Monkfish *(Lophius americanus*) Stocks	GMRI	2.) Research on monkfish life history on age and growth, longevity, reproduction, and natural mortality

APPENDIX H: RSA FUNDED PUBLICATIONS

SCALLOPS

Gedamke, T., W.D. DuPaul, and J.M. Hoenig. 2004. A spatially explicit open-ocean DeLury analysis to estimate gear efficiency in the dredge fishery for sea scallop *Placopectenmagellanicus*. North American Journal of Fisheries Management 24:335-351. (Acknowledgements cite funding from the research TAC set-aside part of the1999 Georges Bank Closed Area II Sea Scallop Exemption Program) **(22 citations)**

Gedamke, T., W.D. DuPaul, and J.M. Hoenig. 2005. Index-removal estimates of dredge efficiency for sea scallops on Georges Bank. North American Journal of Fisheries Management 25:1122-1129. (Acknowledgements cite funding from the research TAC set-aside part of the 1999 GB CAII Sea Scallop Exemption Program) **(31 citations)**

Harris, B.P. and K.D.E. Stokesbury. 2006. Shell growth of sea scallops, *Placopecten magellanicus*, in the southern and northern Great South Channel, USA. ICES Journal of Marine Science 63:811-821. (Acknowledgements cite NOAA/NA16FM24162002) **(11 citations)**

Stokesbury, K.D.E. and B.P. Harris. 2006. Impact of a limited fishery for sea scallop, *Placopecten magellanicus*, on the epibenthic community of Georges Bank closed areas. Marine Ecological Progress Series 307:85-100. (Acknowledgements cite NOAA awards: NA16FM1031, NA06FM1001, NA16FM2416, and NA04NMF4720332) **(26 citations)**

Marino, M.C. II, F. Juanes and K.D.E. Stokesbury. 2007. Effect of closed areas on populations of sea star *Asterias* spp. on Georges Bank. Marine Ecology Progress Series 347:39-49. NMFS's sea scallop research set-aside program (Acknowledgements cite NA16FM1031, NA06FM1001, NA16FM2416, and NA04NMF4720332) **(5 citations)**

Stokesbury, K.D.E., B.P. Harris, M.C. Marino II and J.I. Nogueira. 2007. Sea scallop mass mortality in the Nantucket Lightship marine protected area of Georges Bank. Marine Ecological Progress Series 349:151-158. (Acknowledgements cite NA16FM1031, NA06FM1001, NA16FM2416, NA04NMF4720332, NA04NMF4721131 and NA05NMF4540012) **(17 citations)**

Adams, C.F., B.P. Harris and K.D.E. Stokesbury. 2008. Geostatistical comparison of two independent video surveys of sea scallop abundance in the Elephant Trunk Closed Area, USA. ICES Journal of Marine Science 65:995-1003. (Acknowledgements cite NA07NMF4540031) **(9 citations)**

Rosenkrantz, G., S.M. Gallager, R. Shepard, M. Blakeslee. 2008. Development of a high-speed, megapixel benthic imaging system for coastal fisheries research in Alaska. Fisheries Research 92(2008)340-344 (From final report) (**19 citations)**

Taylor, R., N.H. Vine, A.D. York, S. Lerner, D. Hart, J. Howland, L. Prashad, L. Mayer, and S.M. Gallager. 2008. Evolution of a Benthic Imaging System from a towed camera to an automated habitat characterization system. IEEE Oceans 08. 10 pp. (From final report) (**7 citations)**

Yochum, N. and W.D. DuPaul. 2008. Size-selectivity of the northwest Atlantic sea scallop (*Placopecten magellanicus*) dredge. Journal of Shellfish Research 27(2): 265-271. (Acknowledgments cite the National Marine Fisheries Service Sea Scallop Research Set-Aside Program provided funding for this project.) **(19 citations)**

York, A.D., R. Taylor, N. Vine, S. Lerner, S. Gallager. 2008. Using a towed optical habitat mapping system to monitor the invasive *Didemnum vexillum* along the Northeast Continental Shelf. IEEE Oceans 08, 10pp. (From final report) **(2 citations)**

Marino II, M.C., F. Juanes, K.D.E. Stokesbury. 2009. Spatio-temporal variations of sea star *Asterias* spp. distributions between sea scallop *Placopecten magellanicus* beds on Georges Bank. Mar. Ecol. Prog. Ser.382: 59–68. (Acknowledgements cite awards NA16FM1031, NA06FM1001, NA16FM2416, NA04-NMF4720332, NA05NMF4721131 and NA06NMF4720097) **(1 citation)**

Rothschild, B.J., C.F. Adams, C.L. Sarro and K.D.E. Stokesbury. 2009. Exploration of variability in sea scallop shell height-meat weight relationship. ICES J. Mar. Sci. 66: 1972-1977. (Acknowledgements cite awards NA16FM1031, NA06FM1001,NA16FM2416, NA04NMF4720332, NA04NMF4721131, and NA05NMF4540012) **(1 citation)**

Harris, B.P. and K.D.E. Stokesbury 2010. The spatial structure of local surficial sediment characteristics on Georges Bank, USA. Continental Shelf Research 30(17): 1840–1853. (Acknowledgements cite awards NA09NMF4540128, NA09NMF4540047-001, NA09NMF4540129, NA05NMF4540012, NA05NMF4540013, NA05NMF4541295, NA05NMF4541290, NA06NMF4540257, NA07NMF4540031). **(22 citations)**

Smolowitz, R., H. Haas, H. O. Milliken, M. Weeks, and E. Matzen. 2010. Using sea turtle carcasses to assess the conservation potential of a turtle excluder dredge. North American Journal of Fisheries Management 30:993-100. (Pers. Comm. R. Smolowitz) **(5 citations)**

Stokesbury, K.D.E., J.D. Carey, B.P. Harris and C.E. O'Keefe. 2011. Incidental fishing mortality may be responsible for the death of ten billion juvenile sea scallops in the mid-Atlantic. Marine Ecology Progress Series 425:167-173. (Acknowledgement citeawardsNA04NMF4720332,NA04NMF4721131, NA05NMF4540012, NA06NMF4720097, NA08NMF4720554, and NA09NMF4720256) **(7 citations)**

Harris, B.P., G.W. Cowles, and K.D.E. Stokesbury. 2012. Surficial sediment stability on Georges Bank in the Great South Channel and on eastern Nantucket Shoals, Continental Shelf Research 49(2012) 65–72. (Acknowledgements cite awards NA09NMF4540129, NA05NMF4540012, NA05NMF4540013, NA05NMF4541295, NA05NMF4541290, NA06NMF4540257,NA07NMF4540031) **(3 citations)**

Smolowitz, R, H.O. Milliken, and M. Weeks. 2012. Design, evolution, and assessment of a sea turtle deflector dredge for the U.S. Northwest Atlantic sea scallop fishery: Impacts on fish bycatch, North American Journal of Fisheries Management, 32:1, 65-76. (Pers. Comm. R. Smolowitz) **(0 citations)**

Grabowski, J.H., Bachman, M., Demarest, C., Eayrs, S., Harris, B.P., Malkoski, V., Packer, D., and Stevenson, D. Assessing the Vulnerability of Marine Benthos to Fishing Gear Impacts. Reviews in Fisheries Science. In Press. (Acknowledgements cite award NA09NMF4540129) **(0 citations)**

MID-ATLANTIC

Powell, E.N., Allison J. Bonner, Bruce Miller, Eleanor A. Bochenek. 2004. Assessment of the effectiveness of scup bycatch-reduction regulations in the *Loligo* squid fishery. Journal of Environmental Management 71:155-167. (Acknowledgement cite funding from NOAA Research Set-aside Program to the National Fisheries Institute Scientific Monitoring Committee) **(14 citations)**

Bochenek, E.A., E.N. Powell, A.J. Bonner and S.E. Banta. 2005. Assessment of scup (*Stenotomous chrysops*) and black sea bass (*Centropristas striata*) discards in the directed otter trawl fisheries in the Mid-Atlantic Bight. Fishery Bulletin 103:1-14.(Pers. Comm. E. Bochenek) **(1 citation)**

Powell, E.N., A.J. Bonner, S.E. King and E.A. Bochenek. 2006. Survey augmentation using commercial vessels in the Mid-Atlantic Bight: sampling density and relative catchability. J. Applied Ichthol. 22 :471-488. (Pers. Comm. E. Bochenek) **(1 citation)**

King, S.E. and E.N. Powell. 2007. Influence of adaptive stations in a transect-based sampling design for a multispecies fish survey. Fish. Res. 86:241-261(Acknowledgements state "The MAFMC and the NMFS-NE provided funding for this project to the NFI (National Fisheries Institute)-Scientific Monitoring Committee through the Mid-Atlantic Research Set-Aside Program") **(3 citations)**

King, S.E., E.N. Powell and E.A. Bochenek. 2009. Effect of an increase in codend mesh size on discarding in the *Loligo* squid-directed fishery: a commercial-scale test. Journal of Northwest Atlantic Fisheries Science. 40:41-58(Acknowledgements state "This project was funded by a grant from the Mid-Atlantic Fishery Management Council's Research Set-Aside Program") **(2 citations)**

Bochenek, E.A., E.N. Powell, and J. DePersenaire. 2010. Evaluating catch, effort, and bag limits on summer flounder directed trips in the recreational summer flounder party boat fishery. Marine and Coastal Fisheries 2(1):412 - 423. (Acknowledgements state "This study was funded by the Mid-Atlantic Fisheries Management Council through their Research Set-Aside Program") **(2 citations)**

Powell, E.N., E.A. Bochenek and J. DePersenaire. 2010. Evaluation of bag-and-size-limit options in the management of summer flounder *Paralichthys dentatus*. Fisheries Research 105:215-227 (Acknowledgements state "This study was funded by the Mid-Atlantic Fisheries Management Council Research Set-aside Program using the donations of quota from recreational and commercial fisheries.") **(3 citations)**

Powell, E.N., E.A. Bochenek, J. DePersenaire and S. King. 2011. Injury frequency for discarded summer flounder (*Paralichthys dentatus*) in the recreational fishery of the Mid-Atlantic

Bight: Influence of landing size regulations. Pages 171-187 in Beard, T.D., Jr., R. Arlinghaus, and S.G. Sutton, editors. 2011. The angler in the environment: social, economic, biological, and ethical dimensions. Proceedings of the fifth World Recreational Fishing Conference. American Fisheries Society, Symposium 75, Bethesda, MD. (Pers. Comm.. E. Bochenek) **(0 citations)**

Bochenek, E.A., E.N. Powell, and J. DePersenaire. 2012. Recall bias and angler preferences for new approaches to bag and size limits in recreational summer flounder party boat trips. Fisheries Science 78(1):1-14. (Pers. Comm. E. Bochenek) **(0 citations)**

MONKFISH

Johnson, A.K., R. Richards, R.A., Cullen, D.W. and S. J. Sutherland. (2008). Growth, reproduction and feeding of large monkfish *Lophius americanus*. ICES Journal of Marine Science 65: 1306-1315. (Acknowledgements state: National Marine Fisheries Service Monkfish Set-Aside Program NA06NMF4540134 and NA07NMF4540022) **(4 citations)**

Johnson, A.K., Bediako B., Wirth E., 2011. Metal concentrations in monkfish, *Lophius americanus*, from the northeastern USA. Environ Monit Assess 177:385-397. ("Funding was provided by the National Marine Fisheries Service Monkfish Research Set-Aside Grant #NA06NMF4540134") **(0 citations)**

HERRING

Stockwell, J.D., Weber, T.C., Baukaus, A.J., and Jech, J. M. 2013. On the use of omnidirectional sonars and downwards-looking echo sounders to assess pelagic fish distributions during and after mid-water trawling. ICES Journal of Marine Science, 70: 196-203. (Acknowledgements state "This project was supported by the National Marine Fisheries Service Herring Research-Set-Aside Program NOAA/NA08NMF4540429") **(0 citations)**

APPENDIX I: RSA USES IN MANAGEMENT

Program	Year	Project Title	Award Number	PI	Use in Management
Scallops	2000	"Georges Bank Scallop Exemption Program"	NA16FM1029	DuPaul	SAW 39 (2004)
Scallops	2000	"Examination of Population Biology and Dynamics of the Sea Scallop in Discrete Areas of Georges Bank"	NA06FM1001	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)
Scallops	2000	"Examination of Population Biology and Dynamics of the Sea Scallop in Discrete Areas of Georges Bank"	NA16FM1031	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)
Scallops	2000	"Performance Evaluation of a 4.0 inch Ring Scallop Dredge in the Context of Area Management Strategy for Sea Scallops"	NA06FM1002	DuPaul	Gear requirement, Amendment 10 (2004)
Scallops	2000	"Performance Evaluation of a 4.0 inch Ring Scallop Dredge in the Context of Area Management Strategy for Sea Scallops"	NA16FM1030	DuPaul	Gear requirement, Amendment 10 (2004)
Scallops	2001	"Performance Evaluation of a 4.0 inch Ring Scallop Dredge in the Context of Area Management Strategy for Sea Scallops"	NA16FM1648	DuPaul	Gear requirement, Amendment 10 (2004)
Scallops	2002	"Examination of the Sea Scallop, *Placopectenmagellanicus,* Recruitment in Closed and Open Areas of Georges Bank	NA16FM2416	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)

Scallops	2003	"Industry Trials of a Modified Sea Scallop Dredge to Minimize the Catch of Sea Turtles"	NA03NMF454034	DuPaul et al.	Gear require-ment, Frame-work 23
Scallops	2003	"Comparison of Habitats Supporting High and Low Sea Scallop *Placopectenmagellanicus*Densities on Georges Bank"	NA03NMF4540260	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)
Scallops	2004	"Characterization of Scallop Abundance and Benthic Habitat Using Optical Imaging Technology"	NA05NMF4540009	Taylor and Gallagher	Presented to SARC/ SAW 50 (2010)
Scallops	2005	"Multistage Centric Systematic Video Survey Design Verification"	NA05NMF4541295	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)
Scallops	2005	"Examination of Benthic Substrates and Macroinvertebrate Distribution in the western Great South Channel and Nantucket Shoals"	NA15NMF4541290	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)
Scallops	2005	"An Assessment of Sea Scallop Abundance and Distribution in Selected Areas of Georges Bank and the Mid-Atlantic"	NA05NMF4541294	DuPaul	Annually reported to Scallop PDT
Scallops	2005	"A Turtle Excluder Dredge for the Sea Scallop Fishery"	NA05NMF4541293	Smolowitz	Gear require-ment, Frame-work 23
Scallops	2006	"Testing Bycatch in an Observer-based Experimental Scallop Fishery Outside the GOM Scallop Dredge Exemption Area and within Portions of	NA06NMF4540262	Raymond	Opening of the Great South Channel to general category scallop boats

		Statistical Areas 521 and 526"			
Scallops	2006	"Examination of Benthic Substrates and Macroinvertebrate Distribution on the Northern Edge of Georges Bank"	NA06NMF4540257	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)
Scallops	2006	"Adaptive Characterization of Scallop Populations Using High Resolution Optical Imagin from Tethered and Untethered Platforms"	NA06NMF4540264	Taylor	Presented to SARC/ SAW 50 and annually to scallop PDT
Scallops	2006	"An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Georges Bank Area I, Nantucket Lightship, and ETCA"	NA06NMF4540260	DuPaul and Rudders	Annually reported to Scallop PDT
Scallops	2006	"A New Dredge for the Sea Scallop Fishery	NA06NMF4540258	Smolowitz	Gear require-ment, Frame-work 23
Scallops	2007	"Calibrating Industry Scallop Surveys with NOAA Vessel Platforms"	NA07NMF4540027	DuPaul	Reported annually to PDT
Scallops	2007	"Characterization of Benthic Habitat and Scallop Abundance Using Optical Imaging Technology: Phase 2"	NA07NMF4540030	Howland	Presented to SARC/ SAW 50, annually presented to scallop PDT

Scallops	2007	"High Resolution Video Survey of the Habitat and Sea Scallop Resource in the Elephant Trunk Closed Area and Nantucket Lightship Closed Areas"	NA07NMF4540031	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010), annually reported to scallop PDT
Scallops	2007	"An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Georges Bank Area I, Nantucket Lightship, and Elephant Trunk"	NA07NMF4540026	DuPaul	Annually reported to Scallop PDT
Scallops	2007	"Developing an Improved Dredge for Standardized Surveys of the Sea Scallop Resource"	NA07NMF4540028	Smolowitz	Gear require--ment, Frame-work 23
Scallops	2008	"Characterization of Scallop Abundance and Benthic Habitat Using Optical Imaging Technology"	NA08NMF4540668	Taylor	presented to SARC/ SAW 50, annually presented to scallop PDT
Scallops	2008	"An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Georges Bank Area II, and DelMarva Closed Area"	NA08NMF4540665	Rudders and DuPaul	applied to rotational fishery manage-ment, presented annually to scallop PDT
Scallops	2009	"Evaluation of Northwest Atlantic Ocean Continental Shelf Substrates"	NA09NMF4540130	Harris et al.	Habitat Omnibus Amend-ment 1 and 2
Scallops	2009	"Continuing the Time Series: Calibrating the NMFS Sea Scallop Survey to the R/V Sharp	NA09NMF0132	Rudders and DuPaul	Reported to Scallop PDT

Scallops	2009	"High Resolution Video Survey of the Sea Scallop Resource, Recruitment Patterns and Habitat of the Elephant Trunk and Nantucket Lightship Closed Areas"	NA09NMF4540128	Stokesbury	Presented annually to scallop PDT
Scallops	2009	"An Assessment of Sea Scallop Abundance and Distribution in Selected Closed Areas: Nantucket Lightship Closed Area"	NA09NMF4540133	Rudders and DuPaul	Applied to rotational fishery manage-ment, presented annually to scallop PDT
Scallops	2006	"High Resolution Video Survey of the Habitat and Sea Scallop Resource in the Elephant Trunk Closed Area"	NA06NMF4540261	Stokesbury	Rotational fishery, SAW 39 (2004) 45 (2007), and 50 (2010)
Scallops	2009	"Optical Survey of Scallop Abundance"	NA09NMF4540242	Taylor	Presented annually to scallop PDT
Mid-Atlantic	2002	"Evaluation of Catch Efficiency and Size Selectivity of Inshore New England Fish Pots for Black Sea Bass and Scup as a Function of Escape Vent Size"	NA16FM2269	Skrobe	2005 Atlantic States Marine Fisheries Comm. Black Sea Bass & Scup Escape Vent Workshop 2010 RSA Program Review
Mid-Atlantic	2002	"Habitat Trap Fishery: The Effect of Circle and Square Escape Vents"	NA16FM2267	Fisher and Rudders	2007 Atlantic States Marine Fisheries Comm. Black Sea Bass & Scup Escape

					Vent Workshop 2010 RSA Programmatic Review
Mid-Atlantic	2004	"Evaluation of the Effects of Vent Size and Shape on Black Sea Bass Behavior and Escapement From Pot Gear	NA04NMF4540038	Hasbrouck and Smith	2008 Atlantic States Marine Fisheries Comm. Black Sea Bass & Scup Escape Vent Workshop 2010 RSA Review
Mid-Atlantic	2005	"2005 Fishery Independent Survey of Selected Hard Bottom Areas in Southern New England"	NA05NMF4541097	Skrobe	Part of NMFS Comprehensive Program Review
Mid-Atlantic	2006	"Discard Reduction in the Black Sea Bass Trap Fishery"	NA06NMF4540013	Fisher and Rudders	2006 Atlantic States Marine Fisheries Comm Black Sea Bass & Scup Escape Vent Workshop 2010 RSA Program Review
Mid-Atlantic	2006	"2006 Fishery Independent Survey of Selected Hard Bottom areas in Southern New England	NA06NMF4540018	Skrobe	Part of NMFS Comprehensive Program Review

Mid-Atlantic	2008	"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	NA08NMF4540428	Bonzek	*See Appendix O.
Mid-Atlantic	2008	"2008 Fishery Independent Scup Survey of Hard Bottom Areas in Southern New England Waters"	NA08NMF4540427	Skrobe	Part of NMFS Compre-hensive Program Review
Mid-Atlantic	2009	"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	NA09NMF4540005	Bonzek et al.	*See Appendix O
Mid-Atlantic	2007	"2007 Fishery Independent Survey of Selected Hard Bottom Areas in Southern New England"	NA07NMF4540016	Skrobe	Part of NMFS Compre-hensive Program Review
Mid-Atlantic	2009	"2009 Fishery Independent Scup Survey of Hard Bottom Areas in Southern New England Waters"	NA09NMF4540004	Skrobe	Part of NOAA FISH-ERIES Compre-hensive Program Review
Monkfish	2006	"The Biology of Large Monkfish, *Lophius americanus"*	NA06NMF4540134	Johnson	SARC 50
Monkfish	2007	"The Biology of Large Monkfish, *Lophius americanus"*	NA07NMF4540022	Johnson	SARC 50

APPENDIX J: OTHER RSA'S

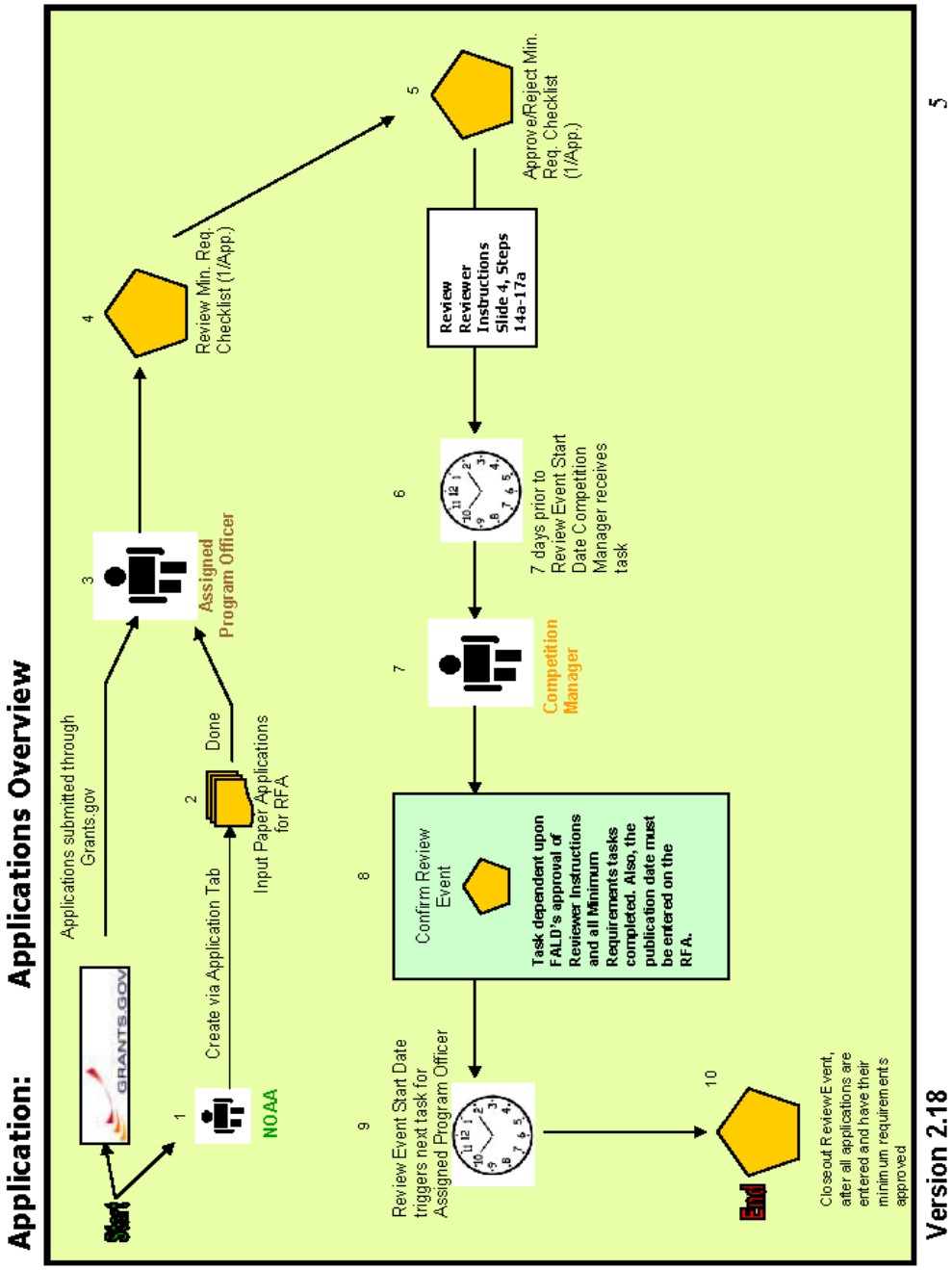
Beyond the scope of this thesis, the Atlantic States Marine Fisheries Commission's Northern Shrimp Section created an RSA for the 2012-2013 shrimp season setting aside 5.44 mt out of the roughly 625 mt TAC for both the trawl and trap fishery. Thus far, the shrimp RSA has funded test tows in the Gulf of Maine. The results of the research showed low catch rates influencing the decision to change the fishing cut off time for Maine trawlers from 11am to "sunrise to 3pm" as of January 23, 2013 (Commercial Fisheries News January 2013).

On the west coast of the United States, the North Pacific Management council has used commercial fishing boats for research since before the Magnuson-Stevens Fishery Act in 1976. Given a certain research need, the council, or an industry group may either request an Exempted Fishing Permit (EFP) or request proposals for an EFP which is bid on by fishing vessels. The approved application is then provided a sufficient quantity of catch and bycatch from the annual fish quotas to support the research (Karp et al. 2001) Other fisheries with a research set-aside include Pacific Sardine which utilizes an incidental coastal pelagic species set aside that is accessible through an EFP depending on the approval of the regional administrator. The set aside is relatively small as in 2013, the Annual Catch Target was set at 19,846 mt which included a 500 mt set aside (CSP FMP 2013).

In the southeast US, a set-aside exists in the sandbar, dusky, and blacknose shark fishery. As these sharks are prohibitive species, this exempted fishing program authorizes the landings of a certain tonnage of sharks for various research purposes and is monitored by the Highly Migratory Species Management Division (Wilson 2010).

Additionally, on the west coast of Canada, a 5% set aside from the TAC in the Selective Salmon Fishing Program funded the testing and development of more selective harvesting gear (SSFP evaluation 2010).

APPENDIX K: GRANTS PROCESS FOR PROCESSING APPLICATIONS. SOURCE: RSA PROGRAMMATIC REVIEW, MEREDITH ET AL. 2010.



APPENDIX L: SAMPLE RSA COMPETITION TIMELINE – APPLIES TO ALL RSA PROGRAMS SOURCE: RSA PROGRAMMATIC REVIEW, MEREDITH ET AL. 2010.

Scallop Research Set-Aside Program

2008 Competitive Grants Processing Requirement
180 Days from RFP closing date to grant approval ~03/24/08- 10/17/08
120 Days with Program Office (03/24/08 - 08/18/08)
60 Days with NOAA Grants (08/19/08 -10/17/08)

Timeline

RFP Publishes --February 20, 2008 (Wednesday) Application due date: 03/21/08 (Friday)

March24, 2008 (Monday) -- Clock begins.

March 28 (Friday) -- Day 5 Notify NEC/NEFMC/MAFMC of proposals received.

March 31 (Monday) -- Day 7 Distribute proposals to Division Chiefs to initiate consistency review for potential concerns.

April 3 (Thursday) -- Day 10 Distribute proposals for technical review by Scallop Committee (to include Advisory Panel) and scientists (TBD – NEFMC/MAFMC/NEC/*others*) with technical knowledge of the subject addressed.

May 5 (Monday) -- Day 40 Proposals reviews due back to SFCPO. [30 days allocated to perform review of assigned proposals.]

May 6 -May 19 --Day 53 Process receipt of reviews, developing summaries of review comments and supporting materials for Panel Review sessions. -- 7 workdays

May20- Day54 -- Distribute meeting materials to Panel participants.

Week of May 21 - May 29, 2008 -- Day 55-63 Hold Panel Meeting (location TBD).

Week of May 21 - May 29, 2008 -- Day 55-63 Hold Division consistency review meeting.

May 30 - June23, 2008 -- Day 64-87 Finalize decision memo for submission to the NEFSC Director to select proposals to be awarded 2007 research DAS. (15 workdays)

June 24 - August 18, 2008 -- Day 65-120 NEFSC to notify winners and begin negotiations to have finalized grants documentation readied for submission to NOAA Grants on/before 08/18/08 (if activities qualify for a CE); 10/20/08 (if requires preparation of an EA); or 03/20/09 (if and EIS is required).

August 19 - October 17, 2008 -- Day 121-180 NOAA Grants initiates DOC grants clearance and review procedures.

New England Fishery Management Council
50 WATER STREET | NEWBURYPORT, MASSACHUSETTS 01950 | PHONE 978 465 0492 | FAX 978 465 3116
E.F. "Terry" Stockwell III, *Chairman* | Thomas A. Nies, *Executive Director*

April 21, 2014

Dr. Kevin D. E. Stokesbury
Department of Fisheries Oceanography
School of Marine Science & Technology
University of Massachusetts, Dartmouth
200 Mill Road, Suite 300
Fairhaven, MA 02719

Dear Kevin:

Thank you for your letter to the Council dated March 24, 2014. Because the Scallop Research Set-Aside (RSA) program is a process coordinated by the New England Fishery Management Council (NEFMC) and the Northeast Fisheries Science Center (NEFSC), we felt that we could provide a more complete reply to your questions through a joint letter. The Council is directly involved in the Scallop Research Set-Side (RSA) Program at many levels, and like all fishery actions, the Council advises National Marine Fisheries Service (NMFS). NMFS is responsible for publishing the federal funding announcements and making the final determination as to what proposals are negotiated and approved. The agency solicits input and guidance from the Council at several steps in the process. The following paragraphs will provide an overall explanation of the RSA process, as well as specific comments on the reasons that your original broad-scale survey of the entire resource proposal was funded at a reduced scope.

The Scallop RSA program was formally included in the Atlantic Sea Scallop Fishery Management Plan in 1999. The program has evolved over time, but since then about 2% of the total projected scallop catch has been set-aside to fund research projects that the Council requests. At least biennially, the Council recommends the specific research priorities that should be used for the Scallop RSA funding announcement. The Scallop Plan Development Team (PDT) and Scallop Advisory Panel provide specific input about needed research priorities through the NEFMC Scallop Oversight Committee, and the Committee's recommendations are then considered and approved by the full Council. The Council's decision forms the basis for the federal funding opportunity that is published by NMFS. Researchers submit proposals for consideration in response to this announcement. Therefore, the Council is very involved in setting the overall priorities for research projects funded under this program.

The proposals that are submitted are subject to a thorough review process. The process has evolved over time to include input from both technical reviewers and fishery managers. Each proposal is reviewed by three subject matter experts that score the technical merits of the proposals. Reviewers consider several aspects of each proposal including importance and/or relevance and applicability of the proposed project, technical/scientific merit, overall qualifications of the project, project

Data provided and incorporated into past assessments

- Atlantic Menhaden- Predator diet data for inclusion in Multispecies VPA
- Atlantic Sturgeon-Abundance data for ESA listing and subsequent re-evaluation
- LoligoSquid-Abundance, distribution, and length
- River Herring (Alewife and Blueback)-Abundance, distribution, length, sex, and maturity
- Summer Flounder-Abundance and age
- Winter Flounder-Abundance, distribution, length, sex, maturity, and age

Data provided to but not incorporated into an assessment (Due to short time series, not because of data quality)

- Atlantic Sea Scallop- Abundance, distribution, and length
- Black Drum-Abundance, distribution, length, sex, maturity, and age
- Bluefish-Abundance, distribution, length, and age
- Scup-Abundance, distribution, length, sex, maturity, and age
- Skate complex (Clearnose, Little, Winter)-Abundance, distribution, and length
- Spiny Dogfish-Abundance, distribution, length, sex, maturity, and diet
- Weakfish-Abundance, distribution, length, sex, maturity, and age.

Data provided to an assessment and results currently pending

- American lobster-Abundance, distribution, length, sex, berry status and age, shell disease
- Atlantic croaker-Abundance, distribution, length, sex, maturity, and age
- Black Sea Bass-Abundance, distribution, length, sex, maturity, and age
- Butterfish-Abundance, distribution, length, sex, maturity, and age.
- Horseshoe crab- Abundance, distribution, length, sex, and maturity
- Smooth dogfish-Distribution and abundance
- Spot-Abundance, distribution, length, sex, maturity, and age
- Striped Bass-Length, sex, maturity, and age
- Summer Flounder-Abundance, distribution, length, sex, maturity, and age
- Tautog-Abundance, distribution, length, sex, and maturity

State Regulations

- Scup-State of New York
- Summer Flounder-State of New York and Virginia

Additional data requests and uses of NEAMAP data included supplying data to various groups involved with the Rhode Island Ocean SAMP(Special Area Management Plan) process, and collaborating with approximately eightother scientists/organizations to collect specimens for several projects. Additionally, a lot of data have been provided to food habits scientists around the country.

NATIONAL FISHERIES INSITIUTE–SCIENTIFIC MONITORING COMMITTEE RESEARCH SET-ASIDE 2012 AUCTION GUIDELINES, RULES AND REQUIREMENTS

1. **AUCTION DATE – The Research Set-Aside Auction will be held on January 19, 2012 at 10:00 am.** The Auction will take place at the Cornell Cooperative Extension Office in Riverhead, NY (Cornell Cooperative Extension Education Center, 423 Griffing Avenue, Suite 100, Riverhead, NY 11901-3071).

    a. Bidders must show up in person to bid. For those bidders who cannot attend in person, you will be able to call-in to the auction using the following call-in number: 1-800-791-2345 and enter the participant code 55061.

    b. Whether we have a single auction for both commercial and recreational boats or separate auctions will be determined at a later date.

    c. The auction will only be open to eligible bidders.

2. **AUCTION DUES - Any vessel or association that wants to bid on NFI-SMC RSA must financially contribute to the NFI-SMC by paying their 2012 dues by January 13, 2012.**

    a. Dues are $250 per boat.

3. **ELIGIBLE BIDDER REQUIREMENTS - Bidders should be aware that the NMFS and State Agencies do not allow recent or repeat violators of regulations to participate in EFP (Exempted Fishing Permits) or to harvest RSA.**

    a. Vessels with minor violation records or old violations, though, at the discretion of NMFS may be allowed to participate. It is the responsibility of the vessel owner to determine with NMFS whether their prior violation history precludes participation. Vessel owners with questions should contact Paul Perra, 978- 281-9300, of NMFS, to discuss this issue and to request his reviewing with NMFS Enforcement to determine whether their vessel can be issued an EFP.

    b. Vessels are responsible for any RSA landing permits required by their State. Your State fisheries agency may deny you a state exempted fishing permit if you have violations. You should contact your State fisheries agency to see whether your vessel can be issued a State exempted fishing permit.

    c. No individual with outstanding debts from previous auctions will be eligible to participate in the auction as an active bidder nor will be the recipient of RSA fish in 2012 for the 2012 fishing season. However, for those individuals with outstanding debts for the 2011 fishing year, all debts must be paid in full

by January 6, 2012 or the bidder will forfeit the right to harvest the 2012 research set-aside.

d. An individual who has not paid 2012 NFI-SMC dues by January 13, 2012 will not be eligible to participate in the auction.

4. <u>AUCTION AMOUNTS WILL BE DIVIDED BY SPECIES AND SEPARATE LOTS OF FISH</u> – The NFI-SMC RSA will be divided into various size lots for summer flounder, bluefish, scup, *Loligo* squid, butterfish, and black sea bass. These lot sizes will be determined at a later date.

a. Each lot may be auctioned by itself, one lot at a time. All individuals that contributed dues are eligible to bid on lots.

b. **The minimum pounds allowed to each boat is 3,000 pounds per species with the exception of black sea bass with 1,000 pounds.**

c. Total pounds by species available for the auction are: summer flounder 677,128; *Loligo* squid 510,815; scup 576,428; black sea bass 29,320; butterfish 33,069; and bluefish 491,672.

d. Each species will have a minimum starting bid. No bids will be accepted below this minimum. The minimum bids are **$0.05 for *Loligo* squid, $1.00 for black sea bass, $1.50 for summer flounder, $0.20 for scup, $0.05 for butterfish, and $0.05 for bluefish.**

5. **<u>PAYMENT OF AUCTION BIDS AND DEFAULTS</u> –** All bidders are responsible for the amount owed for successful bids.

a. Bidders must pay for the amount owed on successful bids for all species except Loligo squid as follows: must pay 25% of your entire bid by May 30, 2012, must pay 50% of your entire bid by September 30, 2012, and must pay in full by December 15, 2012. If a bidder fails to abide by this provision their vessel will be removed from the EFP and they will not be able to harvest research set-aside.

b. Loligo squid must be paid for if NMFS closes the Loligo fishery and the vessels have an opportunity to harvest their Loligo RSA. The amount you will have to pay is dependent upon the length of the Loligo closure for 2012. If the Loligo closure is 5 weeks or longer you are responsible for 100% of the bid. If the Loligo closure is 4 weeks long you are responsible for 75% of the bid. If the Loligo closure is 3 weeks long then you are responsible for 50% of your bid. If the Loligo closure is 2 weeks long then you are responsible for 25% of your bid . If the Loligo closure is less than 2 weeks you are not responsible for your Loligo bid, unless you actually harvested Loligo set aside, in which case you will owe for the amount that you harvested.

c. The disqualification of a successful bid and the loss of any separate lot will occur automatically and without notice if the successful, highest bidder fails to pay 25% of successful bids by May 30, 2012, to pay 50% of successful bids

by September 30, 2012, and to pay in full by December 15, 2012. NFI-SMC reserves the right to auction any of the defaulted lot of fish and the previously successful bidder will not be entitled to a refund of any portion previously paid. The defaulting bidder will be liable for all unpaid sums and reasonable attorney fees incurred in collecting overdue sums and costs if the lot is not successfully auctioned. Likewise any successful bidder who lands his lot and thereafter fails or refuses to pay any sum still owed will also be liable for all unpaid sums and reasonable attorney fees and costs incurred in collecting overdue sums.

6. **<u>INDIVIDUAL BIDDERS</u> - Vessels can bid for themselves, provided that they have paid their 2012 dues by January 13, 2012.**

   a. The proposed terms of the auction will allow an individual vessel owner to bid to obtain research set-aside (RSA) for their harvest.

7. **<u>DESIGNATED BIDDER</u> – An individual or a dock or recognized association (or cooperative) that is a member of the NFI-SMC can bid on behalf of specifically identified vessels as long as these vessels are members of the NFI-SMC.**

   a. The proposed terms of the auction will allow a cooperative, association or fish house to bid to obtain research set-aside (RSA) for their harvest.

   b. A designee such as an individual, dock, or cooperative may bid on behalf of a member boat or captain provided:

      - They provide on the date of the auction a specific list of their vessels that would participate in the RSA harvest. All vessels must have contributed their dues by January 13, 2012.
      - The vessels have agreed to offload any trip involving RSA at that specific dock and state. The vessel would not be allowed to offload RSA at another dock or state.

8. <u>AUCTION RULES</u> - Any vessel or individual that bids, receives research set-aside quota and signs this contract agrees to allow the National Marine Fisheries Service to release the information, relating to the harvest of research set-aside, to Dr. Eleanor Bochenek on a daily basis to permit the NFI-SMC to monitor the research set-aside quota.

9. <u>National Fisheries Institute</u> – Scientific Monitoring Committee reserves the right to reject any and all bids and or to reschedule the auction if issues or conflicts arise during the course of the auction, which we did not contemplate in the planning of the auction.

10. <u>Post Auction Rules</u> –

   a. The successful bid prices for each lot will not be changed for any reason during the year. Bidders will be fully responsible for the actual price bid for each lot.

b. Transfers between boats will be held to a minimum and will occur at the discretion of the NFI-SMC, Eleanor Bochenek.

If you accept the Agreement as an active participant and bidder in the 2012 Research Set – Aside Auction pursuant to the terms and conditions set forth above, please sign the original form where indicated and return it to NFI-SMC. The fully executed Agreement will be signed in my capacity as Chairman of the National Fisheries Institute – Scientific Monitoring Committee. The original will be retained by the NFI-SMC and a copy will be sent to you for your records.

Thank you for your kind attention to the above.

National Fisheries Institute – Scientific Monitoring Committee

By: _____

Daniel Cohen, Chairman

THE ABOVE IS AGREED TO AND ACCEPTED ON THIS __ DAY OF _____ 2012.

_____
(NFI-SMC Member and 2012 RSA Auction participant signature)

_____
(print name)

_____
(Boat name)