

The Saltonstall-Kennedy Grant Program: **Fisheries Research and Development**



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DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service



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U.S. DEPARTMENT OF COMMERCE

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I. INTRODUCTION

This report to Congress on the Saltonstall-Kennedy (S-K) Grant Program, administered by the National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, covers fiscal year (FY) 2004. The report contains information on the S-K Program regarding its legislative authority, the application solicitation and grant selection process, recipients, and funding information.

Appendix I contains addresses of NMFS Headquarters and Regional Offices from which information regarding the S-K Program may be obtained. Appendix II contains the list of applications accepted in response to the solicitation for the FY 2004 S-K Grant Program, under the NOAA omnibus notice published in the *Federal Register* on June 30, 2003. However, due to an insufficient funding allocation for FY 2004, the competitive program was canceled. The listed applications were not further considered, and were returned to the applicants.

This report is submitted pursuant to the S-K Act, as amended, which requires that the following information be submitted annually to Congress:

1. The fisheries development goals and funding priorities for a national program of research and development for the next fiscal year (Page 2).
2. A description of all pending fisheries research and development projects (Page 5).
3. A list of those applications approved and disapproved and the total amount of grants made (not provided, since the FY 2004 Grant Program was canceled; the list of applications accepted under the program is in Appendix II).
4. A statement of the extent to which available funds were not obligated or expended by the Secretary for grants (Page 3).
5. An assessment of each project completed in the preceding fiscal year regarding the extent to which objectives of the project were attained and the project contributed to fishery development (Page 39).

II. BACKGROUND

The S-K Act, as amended (15 U.S.C. 713c-3), established a fund (known as the S-K fund) that the Secretary of Commerce uses to provide grants or cooperative agreements for fisheries research and development projects. Under this authority, grants and cooperative agreements are made annually on a competitive basis (subject to funding) to assist in carrying out projects related to U.S. commercial and recreational fisheries.

The S-K Grant Program funding priorities are consistent with the goals and objectives of the NOAA and NMFS Strategic Plans and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The objective of the S-K Grant Program is to address the needs of fishing communities (as defined in the Magnuson-Stevens Act) in optimizing economic benefits within the context of rebuilding and maintaining sustainable fisheries, and in dealing with the impacts of conservation and management measures.

Proposals received in response to a solicitation are evaluated for merit by appropriate private and public sector experts and for usefulness by representatives of various fisheries constituencies. Proposals are ranked by their average scores. After proposals have been evaluated and ranked, recommendations for funding are developed and submitted to the Assistant Administrator for Fisheries, who determines the projects to be funded.

In addition, 15 U.S.C. 713c-3(d) authorizes the Secretary of Commerce to carry out a national program of research and development (National Program) to address aspects of U.S. fisheries that are not adequately addressed by projects assisted under the Grant Program. In FY 2004, NMFS is using the National Program authority to amend an existing grant to the Gulf and South Atlantic Fisheries Foundation, Inc., to provide an additional \$250,000 to continue work to educate high-risk consumers about *Vibrio vulnificus* in raw molluscan shellfish. A summary of this project is included in Section IV. of this document.

For FY 2005, NMFS does not plan to conduct the National Program, because its priority is to make funds available under the competitive Grant Program (if sufficient funds are allocated). Therefore, NMFS has not developed funding priorities for the National Program.

The Consolidated Appropriations Act, 2004 (Pub. Law 108-199) directed \$17 million of S-K funds noncompetitively to specified recipients. NMFS is providing these funds as unconditional awards for no specified purpose. Therefore, these funds will not be monitored under the S-K Program and are not further addressed in this report. The recipients and amounts are:

Alaska Fisheries Marketing Board--\$10 million
Gulf and South Atlantic Fisheries Foundation, Inc.--\$2 million
South Carolina Seafood Alliance--\$2 million
Oregon Trawl Commission--\$1.5 million
Oregon State University Seafood Laboratory--\$1.5 million

The S-K fund is capitalized through annual transfers by the Secretary of Agriculture to the Secretary of Commerce of amounts equal to 30 percent of the gross receipts collected under the customs laws on imports of fish and fish products. Table 1 indicates the total duties collected on fishery products; the total receipts in the S-K fund for FY 2004; the amount appropriated to offset some of NOAA's costs related to operations, research, and facilities (ORF); and the amount allocated for the S-K Program, including the competitive Grant Program, the National Program, and program administrative costs, including monitoring of ongoing awards.

Table 1. S-K Funding for FY 2004 (\$ in millions)

Funding Item	Amount
Total Duties Collected on Fishery Products	\$265.75
Total S-K Transfer	79.72
ORF Offset	(62.00)
S-K Allocation	17.72
Carryover*	0.03
Total	17.75
Unconditional Awards to Specified Recipients**	(17.00)
Total Available for S-K Program	0.75
S-K Program Obligations/Commitments	
FY 2004 Grant Program	0
National Program***	0.25
Program Administration	0.50
Estimated Unobligated Balance	0
Total	0.75

*Includes unanticipated prior year recoveries as well as unobligated funds.

**Alaska Fisheries Marketing Board, \$10 million; Gulf and South Atlantic Fisheries Foundation, Inc., \$2 million; South Carolina Seafood Alliance, \$2 million; Oregon Trawl Commission, \$1.5 million; Oregon State University Seafood Laboratory, \$1.5 million; not part of the S-K Program.

***For shellfish safety education for at-risk consumers.

Table 2 indicates the recent funding history of the S-K Program.

Table 2. S-K Funding, 1994–2004 (\$ in millions)

Fiscal Year	Total Duties	Total S-K Transfer	ORF Offset	Available S-K Allocation	Allocation as % of Transfer
1994	215.89	61.94	54.80	7.14	11.53
1995	242.98	64.77	55.50	9.27	14.31
1996	221.27	72.89	63.00	9.89	13.57
1997	221.27	66.38	66.00	0.38	0.57
1998	219.11	65.73	62.38	3.35	5.10
1999	221.42	66.43	63.38	3.05	4.59
2000	233.07	69.92	68.00	1.92	2.75
2001	242.76	72.83	68.00	4.83	6.73
2002	263.77	79.13	68.00	11.13	14.07
2003	250.75	75.22	65.00	.22*	0.29
2004	265.75	79.72	62.00	.72**	0.90

*Another \$10 million was allocated, but directed to the Alaska Fisheries Marketing Board, outside of the S-K Program.

**Another \$17 million was allocated, but directed to the Alaska Fisheries Marketing Board, Gulf and South Atlantic Fisheries Foundation, Inc., South Carolina Seafood Alliance, Oregon Trawl Commission, and Oregon State University Seafood Laboratory, outside of the S-K Program.

III. PENDING GRANT PROGRAM PROJECTS

This section contains a description of all pending (ongoing) projects under the S-K Grant Program, along with the name of the grantee, grant number, project title, federal funding level, recipient funding level (i.e., cost share), and the NMFS contact, addresses of whom are in Appendix I. The projects are listed by grantee within each subject area.

FISHERIES UTILIZATION

Grantee: University of Alaska, Fairbanks, Alaska
Grant No.: NA16FD2387 *NMFS Contact:* F/AKR
Project Title: Utilizing Bycatch: Developing Products from Arrowtooth Flounder and Other Economic Discards
Funding: *Federal:* \$78,636 *Recipient:* \$16,545

Description: To develop a mince/washed mince/surimi from arrowtooth flounder that will have textural properties similar to beef sausages for use in food service products. Specific objectives include determining processing protocols that will produce a texture acceptable for food service application; evaluating the need for additives to achieve the appropriate texture, color, and flavor; determining frozen shelf life of finished products; testing the product in a food service operation; and conducting a marketing and economic analysis of the process.

Grantee: University of Alaska, Fairbanks, Alaska
Grant No.: NA06FD0172 *NMFS Contact:* F/AKR
Project Title: Utilization Options for Bitter Crab
Funding: *Federal:* \$76,669 *Recipient:* \$16,111

Description: To (1) identify the chemical compound(s) responsible for the flavor found in bitter crab and develop a bitterness scale for product evaluation; (2) develop processing methods that can be used prior to cooking, during cooking, or during cooling and/or subsequent handling to eliminate, reduce, or mask bitter flavors; and (3) develop a secondary product from picked crab meat should results from earlier tests be only partially successful.

Grantee: Kake Foods, Inc., Kake, Alaska
Grant No.: NA03NMF4270111 *NMFS Contact:* F/AKR
Project Title: Economic and Resource Full Utilization of the Seafood Processing Waste Stream: Discards, Underutilized Species, Byproducts and Carcasses through Conversion into High Value Organic Composts on an Industrial Scale Operation
Funding: *Federal:* \$180,634 *Recipient:* \$180,633

Description: To develop usable products from economic discards (defined in the Magnuson Stevens Act as “fish which are the target of a fishery, but which are not retained because they are of undesirable size, sex, or quality, or for other economic reasons”), underutilized species, and byproducts of processing.

Grantee: Copper River Watershed Project, Cordova, Alaska
Grant No.: NA03NMF4270108 *NMFS Contact:* F/AKR
Project Title: Designing a Fish By-Product Utilization Project for Cordova’s Fishing Industry
Funding: *Federal:* \$83,012 *Recipient:* \$64,000

Description: To design a pilot waste processing project involving Cordova's fish processing plants and fish waste planning team members, by conducting primary market research and crafting an operations plan for operating fish by-product processing machinery on a demonstration project basis.

Grantee: Cornell University, Ithaca, New York
Grant No.: NA16FD2389 *NMFS Contact:* F/AKR
Project Title: Optimizing the Utilization of Pollock Byproducts Focusing on Skin, Bones, Scales, and Viscera
Funding: *Federal:* \$150,613 *Recipient:* \$49,648

Description: To better utilize the pollock harvest in Alaska, using Dutch Harbor as a model, in order to increase the economic return on the fishery and increase the total amount of fish material that is beneficially used. The major expected impact of this project is to provide fish processors in Alaska with a set of alternative value-added products that can use parts of the pollock not currently used. This should have a number of benefits, including increased yield from harvest, increased economic return to the fishers and fish processors, less environmental damage, and a favorable impact on our balance of trade.

Grantee: University of Washington, Seattle, Washington
Grant No.: NA03NMF4270156 *NMFS Contact:* F/NWR
Project Title: Potential for Sustainable Expansion of the Dogfish (*Squalus acanthias*) Fishery in the Northeast Pacific
Funding: *Federal:* \$157,431 *Recipient:* \$25,958

Description: To provide basic data on stock structure, stock assessment, and socioeconomic issues for an expanded, sustainable international fishery on dogfish in the NE Pacific Ocean. The project will identify self recruiting stocks of dogfish on the West Coast using genetic markers, compare population parameters along a latitudinal gradient and determine appropriate socioeconomic indicators of the existing fishery.

Grantee: University of Maine, Orono, Maine
Grant No.: NA03NMF4270124 *NMFS Contact:* F/NER
Project Title: Recovery of Value from Crustacean Waste: Production and Assessment of an Improved Chitosan-based Heavy Metal Adsorbent
Funding: *Federal:* \$57,772 *Recipient:* \$9,218

Description: To create an effective metal adsorbent material from modified chitosan derived from crustacean shell waste. This high value product will have improved uptake, specificity for toxic heavy metals, and flow characteristics compared to other chitosan-based adsorbents as well as other commonly used, commercially available sorbent materials.

Grantee: University of Maine, Orono, Maine
Grant No.: NA16FD2298 *NMFS Contact:* F/NER
Project Title: Optimizing Crustacean Resources with the Development of Extruded Snacks from Processing Byproducts and Green Crab
Funding: *Federal:* \$79,735 *Recipient:* \$55,225

Description: To investigate the use of lobster, shrimp, and crab processing waste and the currently non-commercialized green crab in the production of a co-extruded snack food. Millions of pounds of byproduct are generated by crustacean processors annually. Crustacean processing byproduct (CPB) of rock crab and lobsters, which consists of shell and unpicked meat, is currently of low commercial value. Green crab is a marine nuisance species that has become increasingly pervasive in the nearshore areas of the North Atlantic. The crab is edible, but picking out its small amount of meat is tedious; therefore, green crab has little commercial value. The investigators' previous research indicates that both wet and dried CPB could be successfully extruded. This research will further investigate the feasibility of using lobster, shrimp, and rock crab, and will incorporate green crab into existing studies being conducted on

the utilization of CPB as a primary ingredient in the production of a tasty and nutritious high-value snack food product.

Grantee: University of Michigan, Ann Arbor, Michigan
Grant No.: NA03NMF4270149 *NMFS Contact:* F/NER
Project Title: Gear, Product, and Market Development for the Underutilized, Yet Burgeoning Populations of Freshwater Cod (*Lota lota*) in the Great Lakes
Funding: *Federal:* \$120,284 *Recipient:* \$29,791

Description: To: (1) develop gear that will more efficiently harvest live burbot and reduce bycatch; (2) determine methods to handle and preserve fish for product research and testing; and (3) develop fish products for public consumption and test them using established markets and marketing strategies.

Grantee: National Fisheries Institute, Inc., Arlington, Virginia
Grant No.: NA03NMF4270275 *NMFS Contact:* F/NER
Project Title: Development of the “Chub” Mackerel Fishery, an Underutilized Species
Funding: *Federal:* \$117,410 *Recipient:* \$28,840

Description: To develop a fishery for chub mackerel (*Scomber japonicus*). This proposal will: (1) test a dual-boat towing configuration to achieve the increased towing speeds necessary for efficient capture of the fish; (2) evaluate the availability of this fish during the summer season; and (3) record information on catch and discard of non-target species to identify unwanted impacts on other commercially, recreationally, or environmentally sensitive species.

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA16FD2299 *NMFS Contact:* F/NER
Project Title: Bioconversion of Squid Processing Waste for the Production of Specialty Aquaculture Feed Ingredients
Funding: *Federal:* \$108,848 *Recipient:* \$25,644

Description: To utilize squid processing waste and finfish waste as needed through bioconversion into fish feed ingredients for target fish species of commercial importance and indigenous to the Northeast. Squid protein is known to have properties of growth promotion, better digestibility, feed attractant, and increased survival rate. Squid or squid–fish hydrolysates produced under optimum conditions will be formulated as a complete or partial replacement of fish meal and tested for their feed quality on starter and juvenile Atlantic salmon and summer

flounder. This study will help the regional fishing and marine aquaculture industries by developing an environment-friendly waste conversion technology for better utilization of pollution-causing solid waste.

Grantee: Louisiana State University Agricultural Center, Baton Rouge, Louisiana
Grant No.: NA03NMF4270092 *NMFS Contact:* F/SER
Project Title: Purification of Lysozyme from Shell Liquor of Eastern Oysters (*Crassostrea virginica*) and Potential Commercial Use
Funding: *Federal:* \$117,437 *Recipient:* \$28,613

Description: To purify lysozyme from oyster shell liquor obtained from oyster processors in spring, summer, fall, and winter. The lysozyme yield in mg. protein/liter of shell liquor will be determined for each season. The minimum concentration of lysozyme inhibiting the growth of bacteria responsible for food poisoning and food spoilage will be measured using protocols of the National Committee for Clinical Laboratory Standards. The allergenicity of oyster lysozyme will be determined by western blotting, enzyme-linked immunosorbent assay (ELISA), and passive cutaneous anaphylaxis test.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

Grantee: Bristol Bay Economic Development Corporation, Dillingham, Alaska
Grant No.: NA03NMF4270110 *NMFS Contact:* F/AKR
Project Title: Community Impact Analysis of Alternatives to Restructure the Bristol Bay Salmon Fishery
Funding: *Federal:* \$144,276 *Recipient:* \$38,759

Description: To assess the community level economic impacts of various options for restructuring the Bristol Bay salmon fishery. Primarily the focus will be on fishery socioeconomics, but the project will also assess impacts of buyback programs as part of the study.

Grantee: University of Alaska, Fairbanks, Alaska
Grant No.: NA06FD0171 *NMFS Contact:* F/AKR
Project Title: Population Structure of Rougheye, Shortraker, and Northern Rockfish Based on Analysis of Mitochondrial DNA Variation and Microsatellites: Completion
Funding: *Federal:* \$135,466 *Recipient:* \$28,624

Description: To combine the use of mitochondrial DNA (mtDNA) and microsatellite variation to characterize additional collections of rougheye and northern rockfish and complete analyses of shortraker rockfish. With S-K funding (in part), the researcher has developed PCR-based techniques for analysis of variation in rockfish mtDNA. Preliminary analysis of North Pacific rougheye revealed strong genetic heterogeneity among collections of fish in the Gulf of Alaska and Aleutian Islands. These differences indicate a population structure that most likely results from reproductive isolation. In contrast, a cursory examination of shortraker rockfish revealed little variation and, hence, no basis for making conclusions. Preliminary analysis of mtDNA and microsatellites from northern rockfish show variation, but sample sizes are too small to infer population structure. Population structure is often revealed from patterns of genetic variation. To accomplish this, the investigators have developed primers to amplify rockfish mtDNA regions that they have not analyzed and have developed primers to analyze variation at available microsatellite loci. An increased number of collections and individuals and the addition of microsatellite analysis will provide improved information that should more clearly delineate the nature of stock structure of these rockfish species in the Gulf of Alaska and Aleutian Islands.

Grantee: University of California, Santa Cruz, California
Grant No.: NA03NMF4270155 *NMFS Contact:* F/SWR
Project Title: Measuring Impacts on Fishing Communities: A Framework for Integrated Socioeconomic Assessment
Funding: *Federal:* \$149,987 *Recipient:* \$24,998

Description: To conduct a two-part study using the combined approaches of fisheries sociology and economics to: (1) conduct ethnographic interviews and small surveys and archival research to estimate an input-output (I/O) matrix for the Moss Landing fishing community, compute community-specific multipliers, and compare the community-level and county-level I/O data and multipliers, as well as the tradeoffs of these two approaches; and (2) using this information, work with the Moss Landing community to develop and analyze scenarios that reflect alternative definitions of community and potential management actions, to determine and compare their potential socioeconomic impacts on the community.

Grantee: University of Massachusetts, Dartmouth, North Dartmouth, Massachusetts
Grant No.: NA03NMF4270265 *NMFS Contact:* F/NER
Project Title: Full-time Employment and Income in New Bedford Before and After Days at Sea
Funding: *Federal:* \$79,128 *Recipient:* \$20,201

Description: To estimate full time employment and income for 1994 and 2002 and annual and hourly income for 2002, using available data, such as settlement sheets; and to survey boat owners, captains, and crew members for these data. The project will also suggest methods to collect these data in other ports and to use these data in models for estimating social and economic effects.

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA03NMF4270181 *NMFS Contact:* F/NER
Project Title: An Economic Analysis of an Alternative Atlantic Sea Scallop Management: Harvesters Cooperatives and Scallop Enhancement
Funding: *Federal:* \$109,894 *Recipient:* \$29,690

Description: To estimate the demand function, harvesting cost, and growth functions for wild scallop and enhanced scallop stocks. Using these estimations, the researchers will develop a bioeconomic simulation model for status quo management and cooperative management to calculate and compare their net benefits (costs).

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA03NMF4270146 *NMFS Contact:* F/NER
Project Title: A Compliance Diagnostic for the Northeast Groundfish Fishery
Funding: *Federal:* \$50,052 *Recipient:* \$15,258

Description: To survey groundfish fishermen and analyze the data to reveal salient linkages between the procedures used for establishing and implementing policy, and fishermen's compliance decisions.

Grantee: Massachusetts Fishermen's Partnership, Inc., Gloucester, Massachusetts
Grant No.: NA16FD2302 *NMFS Contact:* F/NER
Project Title: Institutionalizing Social Science Data Collection: A Pilot Project
Funding: *Federal:* \$136,250 *Recipient:* \$17,900

Description: To bring fishermen, researchers, community members, educators, and coastal managers together on panels that will work together to develop a process for the ongoing collection of social science information pertinent to both fisheries management and coping with change. Such a process, if successful, will provide NMFS with a model to meet Sustainable Fisheries Act requirements of National Standard 8.

Grantee: University of Maryland Center for Environmental Science, Cambridge, Maryland
Grant No.: NA16FD2290 *NMFS Contact:* F/NER
Project Title: Use of Otolith Microconstituent Analysis to Characterize Atlantic Bluefin Tuna Stock Structure
Funding: *Federal:* \$173,406 *Recipient:* \$24,025

Description: To addresses whether otolith microconstituent analysis can resolve Atlantic bluefin tuna stock structure issues. Scientific evidence has been insufficient to support stock structure assumptions in the management of Atlantic bluefin tuna. Through past S-K support, the investigators have developed otolith microconstituent analysis as a means to resolve stock structure. Early results have indicated that otolith elemental fingerprints are significantly different between bluefin tuna nurseries, but insufficiently distinct to allow precise study of mixing rates. This project will develop methods to allow measurement of a broader suite of elements in the core region of otoliths than is possible through current otolith microconstituent methodologies. Specifically, this project will develop and apply coupled methods—otolith micro-milling and preconcentration/separation methods—which should allow measurement of transition metals in the core regions of otoliths from adult bluefin tuna.

Grantee: University of Maryland, Cambridge, Maryland
Grant No.: NA96FD0071 *NMFS Contact:* F/NER
Project Title: Test of Two Stock Hypotheses for Atlantic Bluefin Tuna Using Otolith Elemental Fingerprints
Funding: *Federal:* \$88,374 *Recipient:* \$22,207

Description: To determine the spatial and temporal stability of elemental fingerprints classified for Mediterranean and western Atlantic bluefin tuna nurseries, using results from a previous S-K project on otolith microconstituent analysis. Juvenile otoliths collected over two years and among several sites within each nursery will be analyzed. Inductively coupled plasma mass

spectrometry will also be evaluated to determine the elemental fingerprints associated with the first year of life.

Grantee: University of Maryland, Cambridge, Maryland
Grant No.: NA96FD0073 *NMFS Contact:* F/NER
Project Title: Recruitment Dynamics of Northern Shrimp (*Pandalus borealis*)
Funding: *Federal:* \$92,789 *Recipient:* \$21,871

Description: To investigate the influence of physical factors, excluding temperature, on northern shrimp recruitment. The match-mismatch hypothesis in relation to shrimp recruitment will also be investigated. A stock-recruitment model, incorporating the effects of significant environmental and ecological variables, will be developed. In addition, potential overfishing definitions of northern shrimp, with explicit consideration of the impact of environmental and ecological variation, will be explored.

Grantee: University of Maryland, Cambridge, Maryland
Grant No.: NA96FD0076 *NMFS Contact:* F/NER
Project Title: Density-Dependent Growth and Reproduction of Chesapeake Bay Striped Bass
Funding: *Federal:* \$88,702 *Recipient:* \$23,404

Description: To estimate the age and year class-specific growth rates of Chesapeake Bay striped bass juveniles, pre-migrant sub-adults, and migratory females. Evidence for density dependence in growth will also be examined. Fecundity and age at first maturation for females of year classes varying in initial abundance will be estimated, and the density effects on these rates will be tested. Finally, the importance of these density-dependent effects in calculating biological reference points and overfishing thresholds will be evaluated.

Grantee: Virginia Institute of Marine Science, Gloucester Point, Virginia
Grant No.: NA17FD2365 *NMFS Contact:* F/NER
Project Title: A Delineation of Winter Nursery Grounds, Migratory Patterns, and Critical Habitat of Juvenile Sandbar Sharks, *Carcharhinus plumbeus*, in the Western Atlantic Ocean
Funding: *Federal:* \$186,939 *Recipient:* \$86,983

Description: To provide fisheries-independent assessment of the relative abundance, species, size, and sex composition of Virginia sharks so that the current population status of individual shark species may be compared with historical trends. Another goal of this project is to provide a

close characterization of the seasonal and geographical extent of the sandbar shark pupping and nursery grounds within Virginia waters. Included in this study are tagging and telemetry studies to define the wintering areas of juvenile and adult sandbar sharks while they are away from Virginia waters and to determine sources of mortality within their wintering grounds. This information is critical to the management of sharks found within Northwest Atlantic waters.

Grantee: Virginia Institute of Marine Science, Gloucester Point, Virginia
Grant No.: NA16FD2294 *NMFS Contact:* F/NER
Project Title: Population Structure Analysis of Atlantic Bluefin Tuna Using Hypervariable, Nuclear DNA Markers
Funding: *Federal:* \$126,793 *Recipient:* \$23,445

Description: To critically examine population structure of the Atlantic bluefin tuna. Through an ongoing Saltonstall-Kennedy award, the investigator has developed a suite of hypervariable, nuclear-DNA markers that reveal considerable genetic variation within the Atlantic bluefin tuna. The investigator will use these genetic tools to screen biologically meaningful collections of young bluefin collected from the western and eastern North Atlantic Ocean to determine if there is significant spatial or temporal partitioning of genetic variation among collections. Hypotheses of stock structure of the Atlantic bluefin tuna will be tested. The investigators also will use these markers to screen bluefin taken in the central North Atlantic.

Grantee: Gulf & South Atlantic Fisheries Foundation, Inc., Tampa, Florida
Grant No.: NA17FD2367 *NMFS Contact:* F/SER
Project Title: Development of a Vessel Buyout Business Plan for the Southeastern U.S. Commercial Shark Fishery
Funding: *Federal:* \$366,560 *Recipient:* \$43,999

Description: To involve industry representatives to work along with Gulf & South Atlantic Fisheries Foundation, Inc., project staff and sub-contracted experts to draft a Preliminary Commercial Shark Fishery Vessel Buyout Business Plan. This will be followed by integrated research involving field data collection, processing, and analysis to evaluate the technical, financial, socioeconomic, and management feasibility of the preliminary plan as well as different commercial shark fishing vessel buyout options. The results of this multi-disciplinary study will then be used to develop and refine the Final Commercial Shark Fishery Vessel Buyout Business Plan that would be acceptable to the majority of those engaged in the industry, the Gulf of Mexico and the South Atlantic Fishery Management Councils, and NMFS.

Grantee: Florida State University, Tampa, Florida
Grant No.: NA03NMF4270086 *NMFS Contact:* F/SER
Project Title: Incorporating Fisher Behavior into Management Models: A Case Study of the Reef Fish Fishery of the Eastern Gulf of Mexico
Funding: *Federal:* \$210,425 *Recipient:* \$37,319

Description: To characterize fisher behavior using data from the National Marine Fisheries Service logbooks and the Florida Marine Research Institute trip tickets for grouper-snapper fishers operating in the eastern Gulf of Mexico. All data will be kept confidential. The intent is simply to produce a predictive model of fisher behavior in response to fishery regulations, particularly spatially explicit regulations including marine protected areas. Results will be integrated with a stage-based life history model of groupers being developed by one of the investigators.

Grantee: Texas A&M Research Foundation, College Station, Texas
Grant No.: NA03NMF4270091 *NMFS Contact:* F/SER
Project Title: Characterization of Atlantic Bluefin Tuna Stock Structure Using Stable 13C and 18O Isotopes in Otolith
Funding: *Federal:* \$112,779 *Recipient:* \$19,946

Description: To quantify stable d13C and d18O isotopes in otoliths of Atlantic bluefin tuna to predict nursery origin and use these natural markers to estimate mixing rates of sub-adult and adult bluefin tuna. Past research by this group supported by Saltonstall-Kennedy grants has developed and evaluated protocols for quantifying trace element chemistry to delineate stocks of Atlantic bluefin tuna from western or eastern nurseries. This project will take the next logical step, and integrate stable d13C and d18O isotopes into our current evaluation of population connectivity. The aim of the proposed study is to: (1) assess the utility of stable d13C and d18O isotopes as a tool to examine stock structure; and (2) estimate mixing rates of Atlantic bluefin tuna between eastern and western nurseries.

FISHERIES BYCATCH

Grantee: William E. Donaldson, Dublin, New Hampshire
Grant No.: NA16FD2388 *NMFS Contact:* F/AKR
Project Title: Development of a Field Techniques Manual for the Collection of Data on King Crabs, *Lithodes* and *Paralithodes*
Funding: *Federal:* \$29,800 *Recipient:* \$7,055

Description: To develop a manual of field sampling techniques for *Lithodes* and *Paralithodes* king crabs for use by biological agencies and fishery observers, thereby allowing standardization of data collected and improved fisheries management. After this project is completed, research and management agencies and shellfish observers will have an objective and descriptive field manual of techniques for data collection on king crabs in Alaskan waters, and the fishing industry will be able to avail itself of the same techniques and instructions. This project has the potential to significantly and directly benefit the Alaskan crab fishing community and groundfish fisheries that are affected by bycatch caps.



King crab circa 1967, DOC/NOAA Photo Library

Grantee: Washington Department of Fish and Wildlife, Olympia, Washington
Grant No.: NA03NMF4270133 *NMFS Contact:* F/NWR
Project Title: Evaluate Selective Fishing Methods
Funding: *Federal:* \$174,370 *Recipient:* \$35,910

Description: To evaluate and compare selective fishing methods for coho salmon in an estuarine environment (Willapa Bay, Washington). The objectives include: (1) compare the number of and condition of coho caught in tangle nets and conventional gill nets; (2) estimate and compare the immediate and long-term survival of hatchery coho salmon caught in the tangle net and conventional gill net and hook and line gear; (3) enumerate the immediate mortality of untargeted animals caught in the tangle net, conventional gill net and hook and line; (4) estimate the egg to

fry mortality of hatchery coho released from the tangle net, gill net, and hook and line and that return to the hatchery; and (5) estimate hooking mortality rate for hatchery coho captured in an estuary.

Grantee: Pacific Whiting Conservation Cooperative, Seattle, Washington

Grant No.: NA16FD2447 *NMFS Contact:* F/NWR

Project Title: A Project to Evaluate the Influence of Oceanographic Variables on Non-Target Species of Bycatch in the At-Sea Pacific Whiting Fishery

Funding: *Federal:* \$17,022 *Recipient:* \$11,000

Description: To equip fishing vessels with conductivity, temperature, and depth (CTD) meters to collect physical oceanographic data. Annually, six vessels operate in the at-sea catch processor fleet in the Pacific whiting fishery. These vessels have 100% observer coverage, and every haul is sampled for species composition. On each vessel a CTD meter will be deployed on the net and data recorded for each haul. The data will be downloaded daily to a computer for storage. A database for analysis will be constructed using the physical oceanographic data collected, along with observer data on catch composition. Two forms of statistical analysis will be utilized --- factorial analysis and principal components analysis. An analysis will also be conducted in which water mass characteristics and bycatch will be examined in a spatial construct. If a significant quantifiable relationship is found between physical oceanographic parameters and bycatch, then a bycatch warning program will be written to analyze CTD data during daily downloads to provide an alert to vessel masters.

Grantee: University of Hawaii, Kaneohe, Hawaii

Grant No.: NA03NMF4270187 *NMFS Contact:* F/PIR

Project Title: Broadband Sonar Identification of Hawaiian Bottom Fish Species

Funding: *Federal:* \$128,155 *Recipient:* \$14,240

Description: To obtain critical information that will allow for the design and fabrication of a prototype broadband sonar that may be used to identify and monitor bottom fish species from the surface. Specifically, to develop a management tool to monitor the state of overfished areas set aside as a reserve and monitor critical fishing areas for conservation and management.

Grantee: The Regents of the University of California, Santa Cruz, California
Grant No.: NA03NMF4270098 *NMFS Contact:* F/SWR
Project Title: Pilot Project: Testing the Feasibility of Pot Gear to Catch Petrale Sole and Reduce Rockfish Bycatch
Funding: *Federal:* \$117,400 *Recipient:* \$35,282

Description: To determine appropriate bait for petrale sole by returning live fish to the laboratory facility and introducing different types of fish, mollusks and crustacea. The investigators will then work with expert fishermen and gear designers to develop up to four trap designs for initial testing on petrale sole. The most effective design will be more thoroughly tested for its effectiveness in catching petrale and minimizing bycatch of overfished species of rockfish.

Grantee: Pflieger Institute of Environmental Research, Oceanside, California
Grant No.: NA16FD2470 *NMFS Contact:* F/SWR
Project Title: Can Leatherback Sea Turtle Bycatch Be Reduced in the Swordfish Longline Fishery by Modifying Fishing Methods?
Funding: *Federal:* \$105,518 *Recipient:* \$25,168

Description: To use pop-up satellite tags to map the habitat use of swordfish and leatherback turtles to search for regions in time and space where the overlap between the species is minimal. This will indicate if and how modifications to fishing methods can be used to reduce bycatch. The project will be conducted with fishermen and will be implemented such that the same methods are applicable for use by fishermen in other fisheries or regions.



Leatherback turtle, DOC/NOAA Photo Library

Grantee: Massachusetts Division of Marine Fisheries, Boston, Massachusetts
Grant No.: NA03NMF4270139 *NMFS Contact:* F/NER
Project Title: Further Testing of Cod Avoiding Trawl Net Designs
Funding: *Federal:* \$318,760 *Recipient:* \$44,085

Description: To further verify the effectiveness of two cod-avoiding trawl net designs, the so-called “Ribas” and “Topless” trawls, using larger versions of the designs and including night-time testing.

Grantee: New England Aquarium Corporation, Boston, Massachusetts
Grant No.: NA03NMF4270126 *NMFS Contact:* F/NER
Project Title: Juvenile Bycatch and Survival Assessment of Spiny Dogfish (*Squalus acanthias*) in a Western Atlantic Trawl Fishery
Funding: *Federal:* \$169,580 *Recipient:* \$28,147

Description: To conduct the first survivability study on elasmobranchs and more specifically, *Squalus acanthias*, that includes stress measurements. In addition, investigate short term and long term survivorship following trawl exposure and discard.

Grantee: Manomet, Inc., Manomet, Massachusetts
Grant No.: NA03NMF4270208 *NMFS Contact:* F/NER
Project Title: Relating Fish Shape to Mesh Size: How Morphometric Variability Affects Trawl Net Selectivity in the Gulf of Maine
Funding: *Federal:* \$92,776 *Recipient:* \$18,877

Description: To collect morphometric measurements of key groundfish species during standard fishing operations on commercial fishing vessels in the Gulf of Maine. Variability of body measurements for each length class of fish will be calculated. A simple model will be formulated to estimate the mesh size and configuration through which commercial fish species of any size will be most likely to escape. The model will enable managers and the fishing industry to predict potential retention rates of major commercial fish species for a range of mesh sizes and configurations.

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA03NMF4270107 *NMFS Contact:* F/NER
Project Title: Development of a Southern New England Working Group: Focus on Bycatch and Gear Conservation Engineering
Funding: *Federal:* \$52,912 *Recipient:* \$8,043

Description: To share knowledge and skills of fishermen and gear researchers for the development of collaborative efforts in conservation gear engineering projects.

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA16FD2293 *NMFS Contact:* F/NER
Project Title: Effects of Increasing Mesh Size in the Multispecies Fisheries of New England Waters: Applied Research and Outreach
Funding: *Federal:* \$128,750 *Recipient:* \$34,570

Description: To conduct mesh size selectivity studies aboard a large, commercial fishing vessel and integrate the results of the study into yield-per-recruit (YPR) and spawning-stock biomass-per-recruit (SSBPR) models evaluating the effects of incrementally increasing mesh sizes. Specifically, the investigators will: (1) conduct mesh selectivity studies using an alternative tow method aboard commercial fishing vessels; (2) conduct selectivity analyses on resulting data and generate selectivity curves for each species by mesh size and shape; (3) conduct YPR and SSBPR analyses and generate isopleth diagrams; and (4) present results of analyses to resource managers and fishermen in various fora and prepare a report and article for fisheries stakeholders.

Grantee: Massachusetts Division of Marine Fisheries, Boston, Massachusetts
Grant No.: NA16FD2297 *NMFS Contact:* F/NER
Project Title: Reducing Blue Shark Bycatch in Pelagic Longline Fisheries
Funding: *Federal:* \$53,050 *Recipient:* \$8,311

Description: To gain knowledge of blue shark behavior toward a variety of baits, both natural and artificial, to learn which bait characteristics are distasteful to that species. During 10 sea trials offshore, blue sharks will be presented with a series of natural and artificial baits. Shark responses will be recorded, and comparisons will be made between reactions to artificial baits and control baits that are widely used by pelagic longliners for tunas and swordfish. A wide variety of artificial baits will be developed.

Grantee: University of North Florida, Jacksonville, Florida
Grant No.: NA03NMF4270084 *NMFS Contact:* F/SER
Project Title: The Effectiveness of Bycatch Reduction Devices on Crab Pots on Reducing Capture and Mortality of Diamondback Terrapins and Enhancing Capture of Blue Crabs
Funding: *Federal:* \$51,733 *Recipient:* \$9,512

Description: To study the effects of Bycatch Reduction Devices (BRDs), 15 standard crab pots will be equipped with wire rectangle BRDs (4.5 cm x 12.0 cm) attached to the inside openings of all entrance funnels. Another 15 pots without BRDs will be used as controls. Pots will be deployed in tidal creeks in rows with alternating pot treatments no more than 20 m apart. All pots will be baited with fish and checked daily. The 30 pots will be fished for 10-day periods in two different counties during the month of May in each year, for a total of 4 counties. All terrapins will be sexed, measured, weighed, microchipped, and released. Crabs will be sexed and carapace length, height, and width measured. One crab trapper from each county will be selected to assist with the project, to suggest appropriate placement of the pots, and to help set and collect the pots. As incentives, the trapper will be given a \$200.00 stipend and all legal-sized crabs caught during the project.

PRODUCT QUALITY AND SAFETY

Grantee: Kenai Peninsula Borough, Soldotna, Alaska
Grant No.: NA03NMF4270109 *NMFS Contact:* F/AKR
Project Title: Cook Inlet Sockeye Salmon Branding Program
Funding: *Federal:* \$399,659 *Recipient:* \$75,672

Description: To create a sustainable fishery for the Cook Inlet fishing community by establishing a quality certification program to produce high quality Cook Inlet Sockeye salmon for marketing under a branded label, thereby re-establishing a demand for Alaska salmon that will command a premium price. This will benefit fisherman and processors alike.

Grantee: Pacific Shellfish Institute, Olympia, Washington
Grant No.: NA03NMF4270186 *NMFS Contact:* F/NWR
Project Title: Risk Management of a New U.S. Oyster Disease Threat
Funding: *Federal:* \$76,791 *Recipient:* \$14,732

Description: To ensure the continued ability of West Coast shellfish seed procurers to export seed free of Denman Island disease, a disease found in oysters caused by a parasite. Denman Island disease was found in oysters for the first time in Washington State in 2002. The disease

has the highest international alert status (must be reported to OIE by U.S. Department of Agriculture). Through background research, the investigators will conduct a risk assessment and management process, produce a report, and gather input on the report at a two day conference. The project will critically evaluate whether the status of the disease as internationally reportable is justified, provide a systematic analysis of disease transfer, and support the sustainability of a healthy shellfish resource.

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA16FD2301 *NMFS Contact:* F/NER
Project Title: Quality and Safety Assessment of Commercially Produced Tasteless Smoked Seafood Products
Funding: *Federal:* \$98,948 *Recipient:* \$28,969

Description: To evaluate commercially processed tasteless smoked seafood products and compare their overall quality to similarly stored untreated product. The controversy surrounding this product/process within the fishing industry raises issues that require investigation to verify or refute claims. Indicators of quality, safety, color, microbial growth, and sensory attributes will be studied over storage periods. Three species, treated and untreated, will be stored on ice, in refrigeration with no ice, and at room temperature. Samples will be collected over the storage period to obtain a full range of quality. Expert sensory assessment will be completed, and all results will be analyzed.

Grantee: Louisiana State University, New Orleans, Louisiana
Grant No.: NA03NMF4270085 *NMFS Contact:* F/SER
Project Title: Anti-*V. vulnificus* Oyster Defensin: Its Synthesis and Use to Reduce the *V. vulnificus* Load in Oysters That Are to Be Eaten Raw
Funding: *Federal:* \$190,189 *Recipient:* \$94,029

Description: To synthesize and study the effects of anti-*V. vulnificus* oyster defensins (AVVOD). Acetic acid extracts of the oyster (*Crassostrea virginica*) were shown to inactivate the Gram-negative pathogen *Vibrio vulnificus*. These extracts contained at least two heat-stable peptides considered to be AVVOD. A seasonal relationship appears to exist where AVVOD is induced in oysters when Gulf waters are warm and the *V. vulnificus* populations in such waters are dense. In contrast, when Gulf waters are cool and unfavorable for *V. vulnificus* growth, AVVOD levels in the oyster tissue are low or absent, suggesting that AVVOD may be a means of protection against tissue invasion by *V. vulnificus*. We have shown that the *V. vulnificus* load in oysters can be reduced after exposure to AVVOD and subsequent refrigeration.

Grantee: South Carolina Department of Natural Resources, Charleston, South Carolina
Grant No.: NA03NMF4270090 *NMFS Contact:* F/SER
Project Title: Evaluation of Ecological and Commercial Impact of White Spot Syndrome Virus (WSSV) Infection in the White Shrimp, *Litopenaeus setiferus*, and the Blue Crab, *Callinectes sapidus*, in Southeastern United States Using an Immunoassay Technique
Funding: *Federal:* \$175,631 *Recipient:* \$24,884

Description: To evaluate the potential impact of WSSV in reproductive stocks of the white shrimp, *L. setiferus*, and blue crab, *C. sapidus*, using an immunoassay technique to detect infection. Sensitivity of this technique will be assessed. Recently funded S-K work confirmed the presence of WSSV in South Atlantic stocks of *L. setiferus* and in brown shrimp, *Farfantepenaeus aztecus*; however, the extent of infection is not known. Published reports have indicated that stress due to spawning increased shrimps' susceptibility to viral infection, hence reproductive populations will be the subjects of this study. Participation of shrimpers in disease diagnosis is a major component of this project. Information generated will provide a crucial foundation for disease risk assessment and risk management practices as well as development of regional management protocols.

Grantee: University of North Carolina, Charlotte, North Carolina
Grant No.: NA17FD2364 *NMFS Contact:* F/SER
Project Title: The Role of the *rpoS* Gene in Virulence of *Vibrio vulnificus*.
Funding: *Federal:* \$87,725 *Recipient:* \$14,265

Description: To characterize the conditions necessary for induction of *rpoS*, a gene involved in disease production by *V. vulnificus*. The goal is to develop conditions for oyster maintenance that would minimize the ability of *V. vulnificus* to initiate human infection. Project stages include: (1) isolating the *rpoS* gene and constructing an *rpoS* mutant of *V. vulnificus*; (2) phenotypically characterizing the *rpoS* mutant as to virulence, stress adaptation, quorum sensing, and resistance to human serum; and (3) developing conditions under which the expression of *rpoS* is minimal, thus providing conditions under which oysters could be maintained to minimize the infectivity of *V. vulnificus*.

Grantee: University of Florida, Gainesville, Florida
Grant No.: NA03NMF4270088 *NMFS Contact:* F/SER
Project Title: Effect of High Pressure Treatment on Omega-3 Fatty Acids in Fish Muscle
Funding: *Federal:* \$51,759 *Recipient:* \$16,273

Description: To evaluate the effect of high pressure treatment on the lipid fraction of fish muscle and on the activities of endogenous muscle pro- and antioxidants. The effect of high-pressure

treatment will be evaluated by comparing the fatty acid profile of treated and untreated sample (intact muscle and extracted lipids), as well as comparing the pro- and antioxidant capacity of soluble muscle compounds before and after treatment. Thiobarbituric acid and lipid hydroperoxides will be used as indexes of oxidation. A storage study will be carried out to examine the stability of high-pressure treated samples during refrigerated and frozen storage.

Grantee: Virginia Institute of Marine Science, Gloucester Point, Virginia
Grant No.: NA17FD2366 *NMFS Contact:* F/SER
Project Title: Epidemiology Studies on Spiny Lobsters, *Panulirus argus*, Infected with a Pathogenic Herpes-like Virus
Funding: *Federal:* \$183,444 *Recipient:* \$36,823

Description: To clarify the threat of an emerging viral pathogen to the spiny lobster fishery in Florida by: (1) documenting the current distribution and prevalence of the disease in lobsters in important nursery habitats in south Florida; (2) determining how the pathogen is transmitted and documenting mortality rates in lobsters exposed to the virus; (3) describing the pathology of lobsters infected with the virus; and (4) developing diagnostic immuno-probes for field identification of infected lobsters, especially during early stages of the disease. Preliminary studies indicate that this virus is widespread, infectious, and lethal. Given that fishermen hold large numbers of juvenile lobsters and use them as “live bait” (social attractants), there is marked potential for the virus to spread throughout the region.

AQUACULTURE

Grantee: Cook Inlet Aquaculture Association, Kenai, Alaska
Grant No.: NA16FD2386 *NMFS Contact:* F/AKR
Project Title: Evaluation of the Cook Inlet Regional Salmon Enhancement Plan 1981-2000
Funding: *Federal:* \$112,878 *Recipient:* \$50,969

Description: To evaluate salmon enhancement as a method to alleviate harvest pressure on wild salmon and still provide an economically viable fishery to the communities that depend on the salmon resource. Recent low returns and declining commercial fishing values are placing greater demand on wild salmon stocks. The current salmon enhancement plan was written in 1981 and detailed enhancement strategies through a 20-year period ending in 2000. This project will use this outdated plan as a guide to evaluate the past and current status of enhancement in the Cook Inlet watershed. This information will be disseminated to various local interest groups, tribal organizations, and federal/state agencies. Feedback from these groups will be compiled into a final document to provide recommendations and strategies for the future of salmon enhancement within the Cook Inlet watershed.

Grantee: University of Washington, Seattle, Washington
Grant No.: NA03NMF4270112 *NMFS Contact:* F/NWR
Project Title: Restoration and Aquaculture of Northern Abalone (*Haliotis kamtschatkana*) in Washington State: Status of the Resource, Population Genetics, Habitat and Culture of Captive Abalone
Funding: *Federal:* \$274,418 *Recipient:* \$80,776

Description: To: (1) quantify adult and juvenile northern abalone densities and characterize abalone habitat at 8-12 sites in the San Juan Islands; (2) analyze abalone genetic variation and effective population size for use in species management and enhancement efforts; (3) develop captive breeding and rearing protocols for pinto abalone aquaculture development; (4) develop rearing method for enhancement; (5) quantify behavioral differences in juvenile abalone reared in “natural habitats” versus those reared using conventional methods; and (6) convene a workshop to engage the public in abalone restoration.

Grantee: Black Pearls, Inc., Holualoa, Hawaii
Grant No.: NA16FD2642 *NMFS Contact:* F/PIR
Project Title: Relief for Hawaii's Bottomfish: Solutions through Aquaculture
Funding: *Federal:* \$159,040 *Recipient:* \$17,850

Description: To address captive rearing and grow-out of three species of economically important deepwater snappers in Hawaii: *Pristipomoides filamentosus*, *Etelis carbunculus*, and *Aprion virescens*. Broodstock will be held at the Natural Energy Laboratory of Hawaii Authority (NELHA), where photoperiod and water temperature can be finely controlled. Attempts will be made to obtain maturation and spawning naturally and through hormone treatments during natural spawning periods. In addition, efforts will be made to stimulate out-of-season reproduction by manipulating photoperiod with artificial lights and by manipulating water temperature with cold deep seawater available at NELHA. New species of live feeds (ciliates and copepod nauplii) and rotifers will be tested as first feeds for larvae, in conjunction with a range of microalgal feeds and commercially available booster diets. These live feeds will be used along with brine shrimp to rear the larvae after first feeding following established practices for other tropical marine species. Net pen rearing trials will be carried out using resulting fry. If sufficient fingerlings can be reproduced, then fry will be used to stock an offshore sea cage.

Grantee: Black Pearls, Inc., Holualoa, Hawaii
Grant No.: NA06FD0303 *NMFS Contact:* F/PIR
Project Title: Re-Training of Hawaiian Micronesian Fisherfolk as Pearl Culture Seeding Technicians
Funding: *Federal:* \$97,903 *Recipient:* \$29,880

Description: To provide basic training in all aspects of oyster biology and pearl farm husbandry and seeding of mabe pearls. Trainee technicians will be contracted to BPOM. Black Pearls, Inc., will provide the basic training, and a master seeding technician then will provide an intensive training course at the BPOM farm site, including one-on-one supervision of seeding. Results of seeding trials will be used to select the two most promising candidates for further training. These candidates then will continue on-the-job training at the BPOM farm site and assist in maintenance and conditioning of the oysters for a second set of seeding trials. Mabe and round pearls will be harvested to evaluate shape, color, and nacre quality.

Grantee: University of Arizona, Tucson, Arizona
Grant No.: NA03NMF4270131 *NMFS Contact:* F/PIR
Project Title: Specific Pathogen-Free (SPF) Marine Shrimp Culture on Guam
Funding: *Federal:* \$80,135 *Recipient:* \$24,125

Description: To revitalize the aquaculture center on Guam by establishing stocks of specific pathogen-free (SPF) marine shrimp. During the last few years, the shrimp culture on Guam has suffered from viral disease and also from low growth rate, thought to have resulted from in-breeding depression. This proposed project involves establishing biosecurity protocols for the Guam hatchery, stocking with SPF broodstocks to increase genetic diversity, and providing training to Guam participants in shrimp disease, biosecurity, and best management practices. These will allow the Guam hatchery to produce SPF postlarvae for local farmers and for export.

Grantee: Pisces Molecular LLC, Boulder, Colorado
Grant No.: NA03NMF4270132 *NMFS Contact:* F/NER
Project Title: Development of a Reverse Genetics System to Produce Live, Attenuated Infectious Salmon Anemia Virus (ISAV) Vaccine Candidates
Funding: *Federal:* \$252,834 *Recipient:* \$33,129

Description: To develop a reverse genetics system for reconstituting ISAV particles from laboratory constructed plasmid molecules and to demonstrate the ability to produce attenuated virion particles which will be compelling candidates for a live attenuated ISAV vaccine.

Grantee: Micro Technologies, Inc., Richmond, Maine
Grant No.: NA03NMF4270118 *NMFS Contact:* F/NER
Project Title: Environmental Monitoring for Infectious Salmon Anemia Virus (ISAV) in and around Atlantic Salmon Marine Aquaculture Sites
Funding: *Federal:* \$134,019 *Recipient:* \$20,876

Description: To develop an environmental monitoring model for the detection and quantification of ISAV; determine how long ISAV stays viable outside of the host; offer an early detection management tool for ISAV to salmon farmers; provide insight into the epizootiology of ISAV; and to serve as a testing model for new and emerging aquatic animal pathogens.

Grantee: Atlantic Salmon Federation, Inc., Calais, Maine
Grant No.: NA03NMF4270184 *NMFS Contact:* F/NER
Project Title: Tracking Experimentally Released Escaped Farmed Salmon in the Bay of Fundy Region to Determine Recapture Feasibility and Potential Interactions with Wild Atlantic Salmon
Funding: *Federal:* \$227,020 *Recipient:* \$46,500

Description: To conduct experimental releases of farmed salmon fitted with sonic tags; monitor dispersal rates and distances from controlled release points; and monitor movements into wild Atlantic salmon rivers in the region.

Grantee: Maine BioTek, Inc., Winterport, Maine
Grant No.: NA03NMF4270119 *NMFS Contact:* F/NER
Project Title: Whole Killed ISA Virus Vaccine
Funding: *Federal:* \$157,591 *Recipient:* \$31,326

Description: To refine a prototype ISA virus vaccine with respect to virus inactivation, dose, and heterologous protection. The project will also define the role of the humoral immune response in virus clearance from ISA virus-infected Atlantic salmon. The study will enhance the preparation of an efficacious whole killed vaccine by identifying the optimal vaccine formulation required for a robust immune response.

Grantee: MER Assessment Corporation, Brunswick, Maine
Grant No.: NA03NMF4270151 *NMFS Contact:* F/NER
Project Title: Evaluation of LiftUp System in the Mitigation of Environmental and Fish Disease Impacts in Net-Pen Aquaculture
Funding: *Federal:* \$110,704 *Recipient:* \$54,742

Description: To determine the level of environmental and fish health benefits and cost-effectiveness of LiftUp use in marine net-pen aquaculture.

Grantee: University of Southern Maine, Portland, Maine
Grant No.: NA03NMF4270123 *NMFS Contact:* F/NER
Project Title: Atlantic Salmon Aquaculture Considering Endangered Status of Atlantic Salmon and Clean Water Act
Funding: *Federal:* \$76,204 *Recipient:* \$13,413

Description: To publish guides to be used during preliminary discussions with stakeholders (e.g., "How Does the ESA Apply to Aquaculture Operations in Maine?" and "How Does the Clean Water Act Apply to Aquaculture Operations in Maine?"). Identify ESA and Clean Water Act (CWA) enforcement impacts on Maine Atlantic salmon aquaculture operations; provide aquaculture operators with information on achieving compliance with ESA and CWA; and facilitate communication between non-governmental organizations and aquaculture operators as part of overall efforts to reduce litigation.

Grantee: Capricorn Products, Incorporated, Scarborough, Maine
Grant No.: NA03NMF4270174 *NMFS Contact:* F/NER
Project Title: Development of Three Rapid, Sensitive, Reproducible Blood Tests for the Detection of Infectious Salmon Anemia Virus
Funding: *Federal:* \$333,748 *Recipient:* \$57,275

Description: To develop three assay formats for the detection of ISAV for the aquaculture industry. These assays are designed to accommodate both laboratory and pen-side testing. The tests offer improved sensitivity, speed, and reproducibility over currently used assays.

Grantee: University of Maryland Biotechnology Institute, Baltimore, Maryland
Grant No.: NA03NMF4270153 *NMFS Contact:* F/NER
Project Title: Ensuring Biosecurity in the Atlantic Salmon Farming Industry through a Novel Approach to Inducing Sterility: Disrupting Establishment of the GnRH System
Funding: *Federal:* \$159,484 *Recipient:* \$58,321

Description: To develop a simple and generic treatment for inducing sterility in Atlantic salmon, based on altering the migration pattern of gonadotropin-releasing hormone (GnRH) neurons during early development by exposing fish to GABA, a naturally occurring neurotransmitter in fish and other vertebrates.

Grantee: University of Maryland Biotechnology Institute, Baltimore, Maryland
Grant No.: NA03NMF4270150 *NMFS Contact:* F/NER
Project Title: Ultrasound Mediated Delivery of Vaccines for Aquaculture
Funding: *Federal:* \$150,079 *Recipient:* \$54,724

Description: To develop an ultrasound protocol for non-invasive, mass vaccination of Atlantic salmon against ISA virus using a whole-killed viral vaccine.

Grantee: Advanced BioNutrition Corporation, Columbia, Maryland
Grant No.: NA03NMF4270163 *NMFS Contact:* F/NER
Project Title: Novel Oral Vaccine for Infectious Salmon Anemia
Funding: *Federal:* \$190,400 *Recipient:* \$56,290

Description: To develop and test methods for producing an orally active ISA vaccine built upon multifunctional display of antigens on an IPNV virus-like particle platform. The project will include design, implementation, and testing of the dual functionality of the vaccine to deliver effective control of both ISA and IPN at a low cost.



Atlantic salmon

Grantee: New England Aquarium Corporation, Boston, Massachusetts
Grant No.: NA03NMF4270121 *NMFS Contact:* F/NER
Project Title: The Use of Acoustic Conditioning to Reduce the Impact of Escapement in Atlantic Salmon Net Pen Aquaculture
Funding: *Federal:* \$128,845 *Recipient:* \$23,081

Description: To reduce the impact of aquaculture escapees on native populations by developing a methodology to recapture the escapees through acoustic conditioning and enticement into a fish trap.

Grantee: University of New Hampshire, Durham, New Hampshire
Grant No.: NA03NMF4270183 *NMFS Contact:* F/NER
Project Title: Engineering Design and Analysis for More Secure Salmon Net Pen Systems
Funding: *Federal:* \$472,662 *Recipient:* \$61,648

Description: To work at Heritage Salmon's 20-cage site in Broad Cove near Eastport, Maine, to evaluate the structural integrity of the system for offshore application. To perform the analysis, computer models calibrated with field measurements will be used to provide mooring and cage stress and reliability analysis to minimize the escapement of the contained salmon in an offshore application.

Grantee: University of New Hampshire, Durham, New Hampshire
Grant No.: NA16FD2296 *NMFS Contact:* F/NER
Project Title: Development of Sea Urchin Hatchery System for Aquaculture
Funding: *Federal:* \$116,377 *Recipient:* \$24,436

Description: To refine and test a cost-effective hatchery system for green sea urchins that includes larval cultivation, cage grow-out of juvenile urchins, and procedures for maximizing survival of out-planted urchins for sea ranching and reseeding of overfished beds.

Grantee: Great Bay Aquaculture, LLC, Portsmouth, New Hampshire
Grant No.: NA03NMF4270114 *NMFS Contact:* F/NER
Project Title: Development of Disease Free Cod Broodstock and Juveniles for Cage Culture
Funding: *Federal:* \$289,774 *Recipient:* \$80,747

Description: To produce a commercial number of disease free cod juveniles for stocking into commercial cage sites, providing diversification opportunity to salmon growers; and to establish the foundation of a breeding program for Atlantic cod, ensuring future competitiveness within the global market.

Grantee: University of Maine, Orono, Maine
Grant No.: NA03NMF4270167 *NMFS Contact:* F/NER
Project Title: Demonstration of Sustainable Cod Farming from Egg to Grow-out in Maine
Funding: *Federal:* \$358,022 *Recipient:* \$187,883

Description: To assess the economics of Atlantic cod production in net pens in Maine and to establish a disease-free industry source of Atlantic cod eggs.

Grantee: Woods Hole Oceanographic Institution, Woods Hole, Massachusetts
Grant No.: NA16FD2291 *NMFS Contact:* F/NER
Project Title: Open-Ocean Aquaculture: Economic Measures for Mitigating Risk and Encouraging Development
Funding: *Federal:* \$107,257 *Recipient:* \$46,501

Description: To identify and characterize institutions and public policies appropriate for reducing the costs of risks and uncertainty that preclude the emergence and development of an open-ocean aquaculture industry. Specifically, the investigators will: (1) identify specific sources of risk and uncertainty associated with open-ocean aquaculture development; (2) estimate the levels of those risks that are quantifiable; (3) describe uncertainties for which risks cannot be estimated; (4) estimate the expected net economic benefits from aquaculture operations under risk and uncertainty to firms and market sectors, and develop estimates of potential industry investment levels; (5) identify institutions or specific policy instruments for managing risk and uncertainty; and (6) present findings to industry, natural resource management agencies, and the public.

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA16FD2292 *NMFS Contact:* F/NER
Project Title: Off-shore Aquaculture: Stress Reduction and Performance of Flatfish
Funding: *Federal:* \$72,793 *Recipient:* \$11,064

Description: To support offshore industry development by improving culture technology that affects the health and survival of cultured marine flatfish. The investigators have already demonstrated that transportation causes stress, as evidenced by disturbances in blood glucose and ion levels. The investigators also tested three anesthetics and developed one protocol using light anesthesia that prevents some of the stress-induced changes in blood chemistry. This project will provide optimized protocols by determining which works best to protect larvae and juveniles from stressed-induced reduction in growth and survival. Success will be measured by improved performance of flatfish in off-shore aquaculture.

Grantee: Texas A&M Research Foundation, College Station, Texas
Grant No.: NA16FD2295 *NMFS Contact:* F/NER
Project Title: Estimation of Wave Conditions Influencing Distribution of Fish-farm Wastes and Structural Integrity of Aquaculture Units
Funding: *Federal:* \$145,059 *Recipient:* \$28,768

Description: To develop appropriate wave modeling methodology and determine wave conditions in four bays in Maine for aquaculture applications. A dynamic wave environment enhances the dispersal of net-pen wastes. However, it also causes damage to fish farms, allowing escape of aquacultured fish. This project will use field data and models to estimate the frequency of various wave conditions in Maine.

Grantee: Florida Fish and Wildlife Conservation Commission, Port Charlotte, Florida
Grant No.: NA03NMF4270093 *NMFS Contact:* F/SER
Project Title: Restoration of Bay Scallop (*Argopecten irradians*) Populations on the West Coast of Florida
Funding: *Federal:* \$251,979 *Recipient:* \$44,361

Description: To continue successful bay scallop population restoration efforts along the Florida west coast between Anclote and Crystal River, which, so far, have resulted in a two-order-of-magnitude increase in scallop abundance in that area. Scallops will be collected, spawned in the laboratory, and the resultant offspring planted in protective cages in each area from which the parental stock was harvested. Separately, as part of a continuing State-funded monitoring program, changes in recruitment and adult abundance in the target area will be monitored to assess the success of those efforts. The recently initiated scallop restoration program in Sarasota Bay will be continued, in an effort to expand the range of viable local populations that comprise

the bay scallop metapopulation in the eastern Gulf of Mexico. Parental stock will be collected from Sarasota Bay or the geographically closest population (because scallops are extremely rare in Sarasota Bay) and cultured in the laboratory, and the resultant broodstock will be planted in protective cages at three sites in Sarasota Bay. Additional scallops will be free-planted in those same seagrass beds. Survival, growth, and reproductive development will be closely monitored for each planting treatment, including biochemical assessment of the health of eggs produced by scallops under each treatment. Potential offspring harvested from recruit collectors will be tested for relatedness using a variety of genetic techniques. A hydrodynamic model will be used to determine sites least likely to be exposed to red tide and to predict the dispersal of larvae from those sites. Results will be disseminated via local public meetings, reports to NOAA/NMFS, and publications in international peer-reviewed journals.

Grantee: Florida Marine Research Institute, St. Petersburg, Florida
Grant No.: NA17FD2368 *NMFS Contact:* F/SER
Project Title: Bay Scallop (*Argopecten irradians*) Population Restoration on the West Coast of Florida
Funding: *Federal:* \$206,753 *Recipient:* \$41,798

Description: To: (1) continue the successful bay scallop population restoration efforts along the Florida west coast between Anclote and Crystal River; and (2) continue the recently initiated scallop restoration program in Sarasota Bay, in an effort to expand the range of viable local populations that comprise the bay scallop metapopulation in the eastern Gulf of Mexico. The investigators will collect parental stock from the target site (Sarasota Bay or the geographically closest population because scallops are extremely rare in Sarasota Bay), culture them in the laboratory, and plant the resultant broodstock in protective cages at three sites in Sarasota Bay. Additional scallops will be free-planted in those same seagrass beds. Survival, growth, and reproductive development will be closely monitored for each planting treatment, including a biochemical assessment of the health of eggs produced by scallops under each planting regime. Potential offspring harvested from recruit collectors will be tested for relatedness using mitochondrial DNA.

Grantee: University of West Florida, Pensacola, Florida
Grant No.: NA03NMF4270089 *NMFS Contact:* F/SER
Project Title: Evaluation of Ciliate Protozoans as a First Food for Red Snapper, *Lutjanus campechanus*, Larvae
Funding: *Federal:* \$87,151 *Recipient:* \$14,426

Description: To isolate microzooplankton protozoans from Gulf of Mexico waters and establish culture techniques. The species most practical to culture will be offered as a first food to red snapper larvae, and the fish survival and growth compared to that obtained using only copepod

nauplii. Microzooplankton enrichments will be evaluated as a less intensive alternative to culturing, and assessed for larval survival and any prey preference by snapper larvae among microzooplankton organisms.

Grantee: University of Georgia Research Foundation, Inc., Athens, Georgia
Grant No.: NA03NMF4270087 *NMFS Contact:* F/SER
Project Title: Examination of Coastal Aquaculture Effluent and Receiving Water Quality throughout the Tidal Cycle
Funding: *Federal:* \$94,094 *Recipient:* \$10,470

Description: To examine water quality of the receiving water and effluent at five commercial marine aquaculture facilities throughout several tidal cycles, and estimate effluent dilution factors. Selected facilities will have outfall locations ranging from the inter-coastal waterway to small tidal creek tributaries. Study results should suggest the relative magnitude of the need to consider receiving water changes throughout the tidal cycle and effluent changes throughout the daily cycle as part of best management practices. Tidal cycles will be monitored during periods of high discharge (i.e., late season and harvest). At each facility, samples will be collected throughout the tidal cycle, at both the outfall and in the receiving water prior to effluent discharge. Analyses will include suspended solids, turbidity, total nitrogen, total ammonia nitrogen, biochemical oxygen demand, and chlorophyll. Data sondes will concurrently measure dissolved oxygen, pH, salinity, and temperature, in the receiving water and effluent. Semi-continuous measurements with an area velocity meter will monitor effluent volume throughout the tidal cycle. Dye will be used to determine effluent dilution during periods representing an average to lower than average tidal height.

Grantee: North Carolina State University, Raleigh, North Carolina
Grant No.: NA17FD2369 *NMFS Contact:* F/SER
Project Title: Temperature Effects on Sex Determination in Flounder: Timing, Latitudinal Variation and Controlled Breeding in Mariculture
Funding: *Federal:* \$81,895 *Recipient:* \$71,103

Description: To provide information and technologies for generating predictable sex ratios in flounder restocking efforts, and for producing monosex stocks of faster-growing females for mariculture. The investigators already have: (1) characterized the timing of sexual differentiation in southern and summer flounder; (2) demonstrated strong temperature effects on sex determination in southern flounder; and (3) developed effective methods for producing gynogenetic XX flounder larvae. This project will: (1) determine the timing of sex determination and the size at which rearing temperature can no longer affect sex; (2) test for latitudinal variation in temperature effects on sex determination in different populations of both

southern (NC v. TX) and summer flounder (NH v. NC); and (3) produce gynogenetic monosex stocks for production of only the larger growing females in mariculture.

Grantee: University of Puerto Rico, Mayaguez, Puerto Rico
Grant No.: NA17FD2370 *NMFS Contact:* F/SER
Project Title: Offshore Cage Culture: Environmental Impact and Perceptions by Local Fishing Community
Funding: *Federal:* \$363,357 *Recipient:* \$67,152

Description: To address technical, social, and legal aspects of offshore cage culture, including the environmental impact, perceptions by the fishing industry, and administrative and public policies. This information will be used to develop best management practices.

Grantee: Texas Agricultural Experiment Station, College Station, Texas
Grant No.: NA17FD2371 *NMFS Contact:* F/SER
Project Title: Development of DNA Microsatellites for Genetic Applications in Cobia (*Rachycentron canadum*)
Funding: *Federal:* \$120,627 *Recipient:* \$40,542

Description: To develop 25-30 polymorphic microsatellite DNA markers that are specific for cobia and that can be utilized in forensic, quantitative genetic (broodstock enhancement), and stock-structure applications. Optimization of experimental conditions for assay of the microsatellites is a key experimental objective. Effective distribution/dissemination of project results is another key objective.

IV. PENDING NATIONAL PROGRAM PROJECTS

This section contains a description of all pending (ongoing) projects under the S-K National Program, along with project number, project title, federal funding level, and the NMFS contact.

PRODUCT QUALITY AND SAFETY

Grantee: University of California, Davis, California
Grant No.: NA03NMF4270161 *NMFS Contact:* F/SWR
Project Title: Minimizing the Risk of Viral Hemorrhagic Septicemia Virus (VHSV) in Pacific Sardines for Export
Funding: *Federal:* \$96,750 *Recipient:* \$23,354

Description: To minimize the risk of VHSV in Pacific sardines by: (1) assessing spatial and temporal distribution of the virus in sardine populations, tissue concentrations of virus, and potential disease impacts on the population; (2) determining the effects of temperature on the replication and transmission of the virus in sardines; and (3) evaluating freezing and thawing regimes on virus concentrations in sardine tissues.

Grantee: Gulf and South Atlantic Fisheries Foundation, Inc., Tampa, Florida
Grant No.: NA03NMF4270393 *NMFS Contact:* F/SER
Project Title: At-Risk *Vibrio vulnificus* Educational Program Targeting the Medical/Professional Community
Funding: *Federal:* \$473,800* *Recipient:* \$0

Description: To evaluate the success or failure of past at-risk consumer education efforts and programs so that appropriate strategies, programs, and educational materials aimed at reducing *V. vulnificus*- related illnesses among the at-risk segment of the population can be identified. The target audience is the *V. vulnificus* at-risk segment and the medical and health care professionals who diagnose and provide medical advice to such patients and clients.

*\$250,000 provided in FY 2004; grant amended accordingly

V. COMPLETED GRANT PROGRAM PROJECTS

This section contains an assessment of each S-K Grant Program project completed during the period June 1, 2003, to May 31, 2004, regarding the extent to which the objectives of the project were attained and the project contributed to fishery development. The projects are listed by grantee within each subject area, along with the grant number, project title, federal funding level, recipient funding level (i.e., cost share), and NMFS contact.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

Grantee: Bigelow Laboratory for Ocean Sciences, Lincoln, Maine
Grant No.: NA16FD2300 *NMFS Contact:* F/NER
Project Title: Developing Stock Assessment Methods for the New England Deep Sea Red Crab Fishery
Funding: *Federal:* \$85,302 *Recipient:* \$9,555

Assessment: The purpose was to gather necessary demographic information on New England deep-sea red crab toward the development of a stock assessment program that involves harvesters. No fishery-independent demographic data have been collected on this crab for nearly three decades, despite the fact that there is an active fishery along the southern New England continental shelf break. The objectives were to: (1) employ trawl- and camera-based sampling methodology established by a 1974 NMFS red crab survey to determine whether abundance, size structure, and sex composition of the population has changed significantly at the same sites sampled in 1974; (2) conduct sea sampling to better evaluate the spatial correlation between fishery-dependent data (catch per unit effort, catch per unit area) and fishery-independent estimates of abundance (trawl - camera data) for both harvestable and sub-harvestable crabs; (3) conduct tagging to obtain much-needed information on red crab growth rates and movement; and (4) employ three stock assessment modeling approaches of different complexities (size-structured yield-per-recruit model, production model, and size-structured simulation model) to evaluate the dynamics of the red crab stock, estimate current status of the fishery, and evaluate alternative management strategies.

The researchers have successfully adapted a benthic sled system for camera surveys. After initial debugging, the system works well and has generated the first population density estimates of red crab in 30 years. Both otter and beam trawl were tested as a means to collect data on crab size, sex, and reproductive status; as in the earlier survey, the otter trawl was found to be more efficient. Together, the camera and net trawl data are providing demographic data very consistent with the earlier survey. Preliminary data suggest that overall population densities are higher than those observed in 1974, but the proportion of harvestable crabs (>114mm carapace length) is less than in 1974. In a June to August comparison of the same sites, an increase in the

number of small crabs was found at most sites, which may have resulted from an up-slope migration. The ability to survey depths beyond 500 fathoms has been limited by limited wire capacity on-board. To date, some 5,000 crabs have been tagged; returns have been arriving, and the researchers await enough returns over a long enough period to detect growth. Sampling of the commercial catch was conducted during two cruises in the first summer by one of the scientific staff. With Northeast Consortium support, future cruises will gain greater geographic coverage by recruiting one of the fishing crew to subsample the catch throughout the fishing season. Progress has been made on three stock assessment modeling approaches. The full parameterization of these models awaits additional survey and growth data. They are implemented as an Excel spread sheet that is available from the researchers on request and will be easy for the user to update, as data become available. The fishery is now under a federal fishery management plan. Although S-K support has terminated for this project, the Northeast Consortium has provided funding for the next two years.

Grantee: Rhode Island Lobstermen's Association, Wakefield, Rhode Island
Grant No.: NA96FD0074 *NMFS Contact:* F/NER
Project Title: Tagging Study to Improve Biological Information Concerning the Overfished Status of the American Lobster
Funding: *Federal:* \$70,508 *Recipient:* \$37,500

Assessment: The objective was to enhance data collection for American lobster stock assessment purposes. An industry-conducted lobster tagging/v-notching study managed by the Rhode Island Lobstermen's Association (RILA) and the University of Rhode Island (URI) took place from April 2000 to July 2001 in Narragansett Bay and Rhode Island Sound. A concurrent tagging/v-notching program, the North Cape Restoration Project, began in July 2000 and continues to date. To avoid an overabundance to tags, tagging associated with this project was done in conjunction with the existing RILA project. This program was originally established to provide an opportunity to compile information that is critical to determining reliable estimates of egg production in these areas. Due to the incorporation of the new project, information will also be collected to determine survival rates and population abundance of the v-notched lobsters. The information collected by this expanded tagging program is expected to be available for the next Stock Assessment Workshop/Stock Assessment Review Committee. Information from these tags continues to be compiled by URI as recaptures from the program continue to be received. In addition to egg production and survival estimates, data were also used to create GIS maps to show different aspects of lobster behavior, densities and movement.

Grantee: University of South Carolina, Columbia, South Carolina
Grant No.: NA97FD0064 *NMFS Contact:* F/SER
Project Title: Spatial and Temporal Analyses of Genetic Variability in Bigeye and Yellowfin Tuna Larvae
Funding: *Federal:* \$80,000 *Recipient:* \$13,120

Assessment: The objective was to assess samples of larval tuna obtained from the Gulf of Guinea, off the west coast of Africa, for genetic variation at both mitochondrial and nuclear DNA loci. The first phase of this study was conducted. Bigeye and yellowfin tuna larvae were sampled. DNA isolations from larval specimens were successfully initiated using the Chelex-resin method. Nuclear markers included both restriction fragment length polymorphisms (RFLP) and microsatellite loci. Using primers specific to the control region, approximately 340 bp of DNA sequence were characterized for 38 yellowfin tuna from Ecuador and for 26 yellowfin from the Gulf of Mexico and the East Coast of Florida. The principal investigator transferred to Texas A&M and work was completed under NOAA Award NA07FD0553. The research provided evidence of subpopulation, but no stock difference.

Grantee: Texas A&M Research Foundation, College Station, Texas
Grant No.: NA07FD0553 *NMFS Contact:* F/SER
Project Title: Spatial and Temporal Analysis of Genetic Variability in Bigeye and Yellowfin Tuna Larvae
Funding: *Federal:* \$45,113 *Recipient:* \$6,857

Assessment: The objective was to assess samples of larval tuna obtained from the Gulf of Guinea, off the west coast of Africa, for genetic variation at both mitochondrial and nuclear DNA loci. To accomplish the objective, three sets of hypotheses were tested:

1. Whether no significant differences in allele frequency occur among replicate samples collected in different locations within the same period.
2. Whether early stages and adult surveys contain no differences in allele frequency.
3. Whether allele frequency distribution is temporally stable.

Project goals were obtained. Four microsatellite loci and a segment of the mitochondrial control region were used to test the hypothesis of panmixia, and to examine whether variance in reproductive success could be detected in bigeye and yellowfin tuna. Very significant amounts of genetic variation were found at both mtDNA and microsatellite loci in both juvenile (Gulf of Guinea) and adult (Gulf of Mexico) yellowfin tuna samples. The research provided evidence of subpopulation, but no stock difference.

FISHERIES BYCATCH

Grantee: University of Alaska, Fairbanks, Alaska
Grant No.: NA76FD0037 *NMFS Contact:* F/AKR
Project Title: Quantitative Evaluation of Species-Specific Flatfish Behavior: Basis for Bycatch Reduction and Selective Trawl Development
Funding: *Federal:* \$62,076 *Recipient:* \$12,415

Assessment: The objective was to analyze existing videotapes of fish capture archived at the University of Alaska Fishery Industrial Technology Center, to quantify species-specific flatfish behavior. Archived tapes were reviewed for usable fish behavior segments, and the usable segments were edited and cataloged. The species in the edited videotapes were identified and analyzed for species-specific behavioral attributes in close proximity to trawl gear. Measurements taken included size of fish (length and width), height above bottom, intercept (distance from trawl), behavior activity in front of trawl (herding, burst swimming, center converging), and type of entry into trawl net. Identified species included halibut, rock sole, butter sole, arrowtooth flounder, and flathead sole. The information obtained provided a more comprehensive understanding of how individual flatfish species are captured and how the capture process can be adapted to separate flatfish species.

Grantee: Micronesian Fisheries Authority, Federated States of Micronesia
Grant No.: NA16FD2643 *NMFS Contact:* F/PIR
Project Title: Education and Training to Reduce Adverse Interactions between Commercial Fishing Operations and Marine Turtles in the EEZ of the FSM
Funding: *Federal:* \$59,005 *Recipient:* \$8,511

Assessment: The objective was to create, adapt, or refine existing materials, including, but not limited to, identification sheets, instructions for release of captured turtles, correct tagging methods, and appropriate data collection forms for specific use in the Federated States of Micronesia (FSM). The project was aimed at providing the National Ocean Resources Management Authority (NORMA) and the tuna longline industry in FSM with a broader understanding of how to handle sea turtle interactions at sea, and to lay the foundation for future management activities, should such actions be required. Within this context, the project had three objectives: (1) expand the activities of the NORMA fisheries observer program by improving the capabilities of NORMA local staff and observers in recognizing, handling, and reporting interactions between sea turtles and commercial tuna fisheries in FSM; (2) familiarize commercial tuna longline fishing operations in FSM with techniques of handling sea turtles caught incidentally to fishing activities, and provide appropriate instructions on how to address specific sea turtle interaction situations; and (3) integrate the topic of sea turtle interactions with tuna longline fishing operations into the NORMA's ongoing management program. The project

provided education for NORMA staff and the fishing industry as the first steps to be taken in heightening overall awareness of sea turtle-tuna longline fishery interaction. Relevant training and educational materials were produced by the project for use by NORMA and the longline fishing industry, and numerous workshops and informational meetings were held over the period from late January to April 2003. The project succeeded in fully accomplishing the first two stated goals, but it was not completely determined if the third goal had been accomplished at the project's conclusion.

Grantee: New England Aquarium Corporation, Boston, Massachusetts
Grant No.: NA86FD0108 *NMFS Contact:* F/NER
Project Title: Increasing Survival of Juvenile Atlantic Cod (*Gadus morhua*) and Haddock (*Melanogrammus aeglefinus*) in the Northwest Atlantic Demersal Longline Fishery
Funding: *Federal:* \$163,244 *Recipient:* \$122,634

Assessment: The objective was to build upon the selectivity work already conducted and investigate how different hauling strategies might affect wound size and juvenile groundfish survivability. Longline fishing practices use static components that minimally impact the substrate, especially compared to mobile fishing gear such as otter trawls. However, the catch is usually removed from the hook by force: the fish is held in place with a gaff braced against two parallel steel cylinders placed vertically on the gunwale, allowing the hydraulic hauler to pull the hook through the fish's flesh. This process can inflict severe injury to the fish. In order to minimize these injuries an alternate protocol was investigated. Using a two handed flip over the barb of circle hooks produced a single hole in the oral cavity of the fish. When this flip method was compared to the snub procedure, no difference in survival after 72 hours was observed in sublegal-sized cod (*Gadus morhua*) bycatch. Biochemical data that were gathered on a similar subset of these fish suggested that the protocols chosen to judge survival may have added a level of stress that could have confounded the results. Statistical significance could be obtained at the $\alpha = 0.1$ level when additional snub fish from a related study were added to these figures.

Grantee: Massachusetts Division of Marine Fisheries, Boston, Massachusetts
Grant No.: NA96FD0072 *NMFS Contact:* F/NER
Project Title: Developing a Low Impact Sea Scallop Dredge
Funding: *Federal:* \$35,388 *Recipient:* \$10,994

Assessment: The objective was to verify whether bay scallops and sea scallops respond to certain acoustic stimuli, and ascertain if a dredge could be developed that would take advantage of this behavior. The sea floor habitat impact of "New Bedford"- style dredges fishing for sea scallops *Placopecten magellanicus* is generally presumed to be high, especially in sand and gravel

substrates. At the same time, sea scallops are highly prized as food, providing ex-vessel income that typically exceeds \$70 million per year to the Commonwealth of Massachusetts alone. The researchers sought to develop a dredge with lower impact to habitat that maintains current catch rates. Bay scallops *Argopecten irradians* were observed swimming up into the water column following the passage of a boat with an outboard engine. Bay scallops and sea scallops were exposed to frequencies selected from engine noise recordings, recordings of engines and the original engine. This testing resulted in less reaction than historically viewed; subsequent efforts with DC electric pulses showed some indication of future research direction.

Grantee: New England Aquarium Corp., Boston, Massachusetts
Grant No.: NA06FD0177 *NMFS Contact:* F/NER
Project Title: Increasing Juvenile Cod Bycatch Survival in a Northwest Atlantic Longline Fishery
Funding: *Federal:* \$99,457 *Recipient:* \$88,307

Assessment: The objectives were to: (1) augment the survival data already collected on juvenile cod bycatch caught by demersal longlines, (2) quantify mitigated survival of juvenile cod bycatch when treated by immersion in solutions of potassium chloride, (3) quantify the degree of physiological stress experienced by juvenile cod bycatch through the analysis of biological parameters in the blood, and (4) continue to solicit advice from longline fishermen relative to increasing the survival of groundfish discards. Longline fishing practices often remove bycatch from the hook by force: the fish is held in place with a gaff braced against two parallel steel cylinders placed vertically on the gunwale, allowing the hydraulic winch to pull the hook through the fish's flesh. This process can inflict severe injury to the fish and affect survival. In previous studies, fish dehooked by force were also found to have low serum levels of potassium ion. In this study, the importance of the potassium ion concentration in the blood was examined. Normal seawater enriched with granular potassium chloride was tested for its mitigating effect on survival. When the survival of snubbed sub-legal sized Atlantic cod (*Gadus morhua*) treated with potassium ion was compared to untreated fish, no difference was found after 72 hours. Biochemical data gathered on a subset of similar fish were analogous to previous studies.

Grantee: Manomet, Inc., Manomet, Massachusetts
Grant No.: NA06FD0183 *NMFS Contact:* F/NER
Project Title: Development of Cod Excluder Devices for Northwest Atlantic Trawl Fisheries
Funding: *Federal:* \$71,500 *Recipient:* \$40,600

Assessment: The objective was to test the effectiveness of a new bycatch reduction device (Ex-It) in reducing the inadvertent catch of undersized and juvenile cod, while retaining other fish of a marketable size. Research conducted in the Gulf of Maine demonstrated major improvements in

size and species selectivity of standard groundfish nets with use of the Ex-It device. This was particularly evident for cod, where the modified net was shown to retain 95 percent of marketable fish with only 28 percent retention of fish below (marginally) minimum landing size. Selectivity analysis showed the L50 (length at 50 percent retention probability) to be very close to the minimum landing size for cod, and further work on alternative bar spacings could improve the match between L50 and L25, depending on management requirements. Overall, the device showed significant potential for improving the selectivity for cod and significantly reducing bycatch and discard. The results also showed potential for improving selectivity in directed monkfish fisheries. However, as constructed and tested in the Gulf of Maine, the device resulted in a substantial reduction in retention of marketable fish within the groundfish complex, most noticeably haddock and flatfish species. The issue of poor flatfish retention was already known from previous work in other fisheries, and is an issue where there is an economic necessity (either perceived or otherwise) to retain all marketable fish in a mixed assemblage. In fisheries where one species is of a particular concern (e.g., cod in the Gulf of Maine), and fishing may be closed unless bycatch is reduced, the Ex-It may still have significant application, but the general feeling among the fishing industry is that the reduction in revenue would make its use impractical. Other issues concern the cost of the stainless steel device, which typically is more than \$5,000 (although this could certainly be reduced by use of different materials), and its initial rigging, which tends to be problematic. The researchers had the benefit of preliminary flume tank trials, and had the designer of the Ex-It construct the experimental nets. They also had access to underwater video cameras to assist with initial rigging. However, in a commercial setting, fishermen would not have such luxuries. If rigged incorrectly, the device would simply become an expensive addition to an ineffective net. While the researchers acknowledged certain significant advantages of the Ex-It and recognized its potential as a size-selective device in single-species-directed fisheries, they concluded that its use in the Gulf of Maine groundfish fishery is, at present, impractical from a regulatory and economic perspective.

PRODUCT QUALITY AND SAFETY

Grantee: PacMar, Inc., Honolulu, Hawaii

Grant No.: NA16FD2472 *NMFS Contact:* F/PIR

Project Title: Verification of a HACCP System for the Control of Histamine for the Fresh Tuna Industry

Funding: *Federal:* \$199,143 *Recipient:* \$22,238

Assessment: The objective was to verify the efficacy of Hazard Analysis Critical Control Point (HACCP)-based on-board fish handling procedures used by Hawaii longline vessels in controlling histamine formation and accumulation in susceptible pelagic fish species. A HACCP-based approach for controlling histamine formation in fish caught in the Hawaii tuna longline fishery was studied. Specifically, 231 fish were monitored using temperature data

loggers to record fish temperature profiles after capture and handling on-board. After unloading, each fish underwent sensory evaluation for decomposition and was tested for histamine content. Chilling rates were analyzed and compared to critical time and temperature limits recommended for histamine control by the U.S. Food and Drug Administration (≤ 50 deg. F in ≤ 6 hours and ≤ 40 deg. F in ≤ 24 hours after death). While some of the fish exceeded these time and temperature critical limits, not one of the fish exceeded the histamine defect action limit of 50 ppm. The results from this study suggest that the recommended critical limits for chilling rates for histamine-forming fish species may be extended using standard on-board handling procedures in the Hawaii longline tuna fishery in the central North Pacific without significantly jeopardizing seafood safety, when coupled with sensory evaluation of 100 percent of the catch.

Grantee: Virginia Institute of Marine Science, Gloucester Point, Virginia
Grant No.: NA96FD0075 *NMFS Contact:* F/NER
Project Title: Influence of Host Genetic Origin and Geographic Location on QPX Disease in Hard Clams (*Mercenaria mercenaria*)
Funding: *Federal:* \$212,998 *Recipient:* \$68,120

Assessment: The objective was to examine variation in the expression and pathogenicity of QPX (Quahog Parasite Unknown) disease in relation to genetic origin and geographic location of hard clams. Epizootics of QPX, a protistan pathogen of hard clams, *Mercenaria mercenaria*, have occurred in maritime Canada and Massachusetts, New York, New Jersey, and Virginia. Although it has been found in wild hard clam populations, the parasite has most seriously affected cultured hard clams, suggesting that aquaculture practices may promote or predispose clams to the disease. For instance, certain clam strains may have heightened disease susceptibility, thereby increasing disease risks. In this investigation, five clam strains, originating from hatcheries in Massachusetts, New Jersey, Virginia, South Carolina, and Florida were produced at a single hatchery and evaluated during a three-year period for growth, survival and QPX susceptibility at three regionally distinct QPX enzootic sites (Massachusetts, New Jersey, and Virginia). Severe winter-associated clam losses occurred at the Massachusetts site, precluding completion of the study at that location. At both the New Jersey and Virginia sites, the South Carolina and Florida clam stocks exhibited significantly higher QPX prevalences and lower survival than the New Jersey and Massachusetts clam stocks; while clams from Virginia had QPX prevalences and survival rates that were intermediate to the more “northern” and “southern” clam stocks. These results suggest that genotype-environment interactions are key determinants of QPX disease.

AQUACULTURE

Grantee: Taylor Resources, Inc., Shelton, Washington
Grant No.: NA06FD0231 *NMFS Contact:* F/NWR
Project Title: Rock Scallop Culture in the Off-Shore Environment
Funding: *Federal:* \$91,179 *Recipient:* \$54,938

Assessment: The objective was to develop technology and methodology to culture the rock scallop to maturity and commercial harvest in high-energy, off-shore environments in an ecological and economically viable and cost-effective manner. Commercial purple-hinged rock scallop (*Crassadoma giganteus*) culture was conducted on a single, ballasted Ocean Spar aquaculture platform, modified for growing scallops in an offshore environment. The site selected for the spar was approximately 2 km offshore of Neah Bay, Washington, in an area characterized by strong currents, high ocean swell conditions, and frequent wind and storm related weather, particularly during the winter months. The aquaculture spar system, modified for growing scallops attached to fiberglass panels, was designed, constructed and deployed by Ocean Spar Systems (Bainbridge, Washington) in waters approximately 120 feet deep in the open Pacific Ocean. Rock scallops produced by Taylor Resources, Inc. (Shelton, Washington) were attached to panels in July 2001 and grown to near market size, in part on the offshore growing platform and also at a control site in Neah Bay. Engineering problems associated with deployment of the spar and its operation, including the failure of its mooring system, prevented a full term growth trial for scallops attached to panels on the spar at the offshore site. Scallops grown on panels at the control site, however, demonstrated excellent growth, attaining a mean shell length of 61 mm after 16 months. The project demonstrated that rock scallops could be cost effectively glued to panels using cyanoacrylate adhesives and grown to near market size in a Pacific coast near-shore environment. Limited growth trials of scallops in the spar system demonstrated equivalent growth to scallops maintained at the control site. Valuable information was gained and recommendations made regarding the logistical considerations necessary to grow shellfish in the offshore marine environment of the northeast Pacific Ocean, relating mainly to working in an open marine environment characterized by high current and ocean swell conditions.

Grantee: Regents of the University of California, Davis, California
Grant No.: NA96FD0206 *NMFS Contact:* F/SWR
Project Title: Life History of an Exotic Sabellid Polychaete Pest in Cultured Abalone in California
Funding: *Federal:* \$112,064 *Recipient:* \$25,945

Assessment: The overall objective was to describe the life history of the sabellid fan worm, which infests cultured abalone, in an effort to assist in its eradication from farms and to predict its invasive potential if established in the wild. Life stages and reproductive ability at

temperatures experienced in California were identified, and studies were conducted to determine if the sabellid is capable of self and/or cross fertilization. The researchers also surveyed several sites to see if the worm has been introduced into field locations via out planting of juvenile abalone. Prior to completion of the project, the Principal Investigator moved from the University of California, Davis, to the University of Washington and transferred the project with her. The NMFS Southwest Region closed the subject grant upon transfer to the University of Washington. Accomplishments at that time included determining that the sabellid is a functional hermaphrodite whose reproduction is directly temperature-dependent. The researchers found that reproduction occurs at all temperatures observed in California and fecundity is inversely related to temperature. No evidence of establishment of the sabellid in the wild was observed in field studies.

Grantee: University of Rhode Island, Kingston, Rhode Island
Grant No.: NA06FD0181 *NMFS Contact:* F/NER
Project Title: Stress and Performance of Finfish in Open-Ocean Aquaculture
Funding: *Federal:* \$69,979 *Recipient:* \$13,548

Assessment: The project goal was to support the development of an offshore aquaculture industry by improving culture technology that affects the health and survival of cultured marine flatfish. The overarching concept was that stress reduces performance. The effects of handling, crowding, and transportation on summer flounder were studied by measuring three levels of the stress response: neuroendocrine (cortisol), metabolic (glucose), and physiological (high salinity tolerance). It was determined that crowding and transportation cause stress and that it takes at least one day for fish to recover. Growers are urged not to crowd flounder on consecutive days. Importantly, the anesthetic MS-222, but not 2-Phenoxyethanol or Eugenol (clove oil), was found to protect summer flounder from the stress response and the resulting impaired ability to perform in an additional challenge of high salinity. It is recommended that summer flounder be anesthetized in 25 ppm buffered MS-222 when transported for even 1 hour and in 75 ppm buffered MS-222 when crowded for various hatchery procedures. These protocols should improve health and survival of cultured marine flatfish in the developing offshore aquaculture industry.

VI. COMPLETED NATIONAL PROGRAM PROJECTS

This section contains an assessment of each S-K National Program project completed during the period June 1, 2003, to May 31, 2004, regarding the extent to which the objectives of the project were attained and the project contributed to fishery development. The projects are listed by subject area, along with the project number, project title, federal funding level, and NMFS contact.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

Project No.: 97-AK-01 *NMFS Contact:* F/AKR
Project Title: ADF&G/NMFS Bottom Trawl Calibration Study
Funding: *Federal:* \$134,800

Assessment: The objective was to conduct an experiment to detect fishing power differences between the net and vessel configuration used by NMFS during their Gulf of Alaska (GOA) triennial groundfish surveys and the net and vessel configuration used by the Alaska Department of Fish and Game (ADF&G) during their annual GOA crab survey. The results of this experiment allowed NMFS and ADF&G to augment each survey by allowing direct comparisons of the respective databases. The progress made in this study contributed to the enhanced management of important groundfish species such as walleye pollock, Pacific cod, and many flatfish species.

Project No.: 97-AK-03 *NMFS Contact:* F/AKR
Project Title: Development of an Experimental Approach to Testing the Efficacy of Steller Sea Lion Fishery Exclusion Zones
Funding: *Federal:* \$24,900

Assessment: The objective was to develop an experimental design for the evaluation of Steller sea lion fishery exclusion zones, which, when implemented, would increase the likelihood of recovery of threatened Steller sea lion populations in Alaska and reduce the conflicts between the fishing industry and the Steller sea lion recovery program. A workshop was convened at the National Marine Mammal Laboratory, Alaska Fisheries Science Center (AFSC), National Marine Fisheries Service, in May 1997. The objectives of the workshop were to (1) present a panel of non-NMFS scientific experts with a review of Steller sea lion population dynamics and foraging ecology, current state and federal protective measures, and relevant fisheries; and (2) provide the panel an opportunity to formulate and propose an experimental design to test the efficacy of no-

trawl fishery exclusion zones, which were established in 1991-93. Fishery exclusion zones of 10-20 nautical mile (nm) radius were established around sea lion rookeries west of 150 deg. W longitude as a means of “buffering” sea lions from possible fishery-caused localized depletion of prey stocks. Stellar sea lion population declines have continued since establishment of the zones and the western stock was listed as “endangered” under the ESA in June 1997. Some analyses suggest that sea lion populations at rookeries with seasonally larger, 20 nm zones may be more stable than those with 10 nm zones year-round. Unfortunately, it has been difficult to determine if no-trawl zones are indeed having a beneficial effect on the sea lion population because zone design and placement is not conducive to evaluation by traditional experimental methods. A report was prepared that presented the recommendations of the panel and summarized workshop presentations. AFSC staff then began work to develop specific experimental designs based on the panel recommendations.

Project No.: 97-AK-06 *NMFS Contact:* F/AKR
Project Title: Individual Fishing Quota/Community Development Quota (IFQ/CDQ) Program
 Research Support
Funding: *Federal:* \$50,000

Assessment: The objective was to improve the automated systems that control permit issuance and transfer and management of fishery landings under IFQ/CDQ, to increase the efficiency of information retrieval at the required level of detail. The NMFS Alaska Region (AKR) awarded a contract to the State of Alaska, Commercial Fisheries Entry Commission (CFEC). AKR staff met with CFEC professional research economists and analysts to review NMFS’ database design and available data. CFEC then worked to design and develop reports to meet AKR’s initial data needs to support evaluation of effects of the IFQ Program over time. Due to State of Alaska funding caps and severe and unanticipated staffing problems at CFEC, the performance period of the contract was extended three times, at no additional cost, to a final delivery date of September 30, 2002. Contract work was performed during Fiscal Years 1997 through 2000. Completed work was outstanding in both quality and quantity. However, CFEC continued to experience spending ceilings and staffing shortages, and eventually notified AKR that it was unable to continue planned work. Remaining funds (over \$14,000) were deobligated from the CFEC contract in September 2001. The work products that were completed in part supported a national evaluation of IFQ-type fisheries management, and many continue to be an integral part of IFQ Program information routinely used by NMFS and provided to the public.

Project No.: 03-NENP-01 *NMFS Contact:* F/NER
Project Title: Northeast Multispecies Fishery Research
Funding: *Federal:* \$2,500,000

Assessment: The objective was to promote the rebuilding of the Northeast multispecies fishery by obtaining better and more complete data on the catch of overfished fish stocks, discarded finfish, total catch, fishing effort, and incidental takes of protected species (marine mammals, sea turtles, and sea birds). The research was conducted through the placement of contracted fishery observers on board vessels in sufficient numbers to ensure credible scientific observations needed to rebuild the fishery to its long term potential yield. The project was completed and funds expended in FY 2003, providing over 2,100 observer days at sea. These funds supported NMFS to meet the court-mandated coverage for the Northeast Multispecies Fishery, providing high quality fisheries-dependent data to science and management. The data collected by these observers have all been edited and audited and are available for analyses vital to the management of our fishery resources. These trips also provided economic data from the fleet, which will be used to evaluate social and economic impacts of management actions.

Project No.: 97-SE-21 *NMFS Contact:* F/SER
Project Title: Red Drum (*Sciaenops ocellatus*) Mark/Recapture and Age Composition Studies in the Northern Gulf of Mexico
Funding: *Federal:* \$195,000

Assessment: The objective was to assess the status and determine the age structure of red drum stocks in the northern Gulf of Mexico, to improve red drum fishery management, and to optimize commercial and recreational utilization of the resource. The proven and accepted estimation technique of mark and recapture was used to assess the current size of the adult stock. However, unlike a similar, highly successful mark/recapture project in the 1980s, this project was not fully successful. The project was plagued by hypoxic waters, failures of the contracted vessel, and funding interruptions. As a result, the recovery part of the mark/recapture effort was successful in only a portion of the range of the experiment. The project was generally successful in the area east of the Mississippi river, and unsuccessful to the west. Data from the successful portion, including new age composition information, were supplied for the red drum stock assessment, and reported to the Gulf of Mexico Fishery Management Council.

AQUACULTURE

Project No.: 96-SE-GA *NMFS Contact:* F/SER
Project Title: Penaeid Aquaculture
Funding: *Federal:* \$35,000

Assessment: The objective of this project was to participate in a Shrimp Virus Work Group formed by the U.S. Joint Subcommittee on Aquaculture (JSA) and, in coordination with other members of the workgroup, to produce a report summarizing potential exposures to and effects of viruses on shrimp, especially in wild populations. Worldwide, including in the United States, shrimp aquaculture has suffered substantial economic losses due to pathogenic viruses. Although these viruses pose no threat to human health, the threat to shrimp aquaculture and concerns for wild shrimp populations, and other species that depend on them, prompted action by the JSA. The Shrimp Virus Work Group held a workshop in June 1996 in Galveston, Texas, co-sponsored by the National Marine Fisheries Service, the U.S. Environmental Protection Agency's Gulf of Mexico Program, and the Cooperative State Research/ Education and Extension Service and the Agricultural Research Service, both of the U.S. Department of Agriculture. The workshop was also supported by the Gulf States Marine Fisheries Commission. The activity resulted in a 1997 JSA report entitled, "An Evaluation of Potential Shrimp Virus Impacts on Cultured Shrimp and Wild Populations in the Gulf of Mexico and Southeastern U.S. Atlantic Coastal Waters."

Project No.: 96-SE-ML *NMFS Contact:* F/SER
Project Title: Evaluation of Baseline Aquaculture Permitting Protocols
Funding: *Federal:* \$20,000

Assessment: The objective was to research, codify, and determine the feasibility of base guidelines for streamlining the aquaculture permitting process. Information on presently utilized aquaculture permitting procedures was collected from the Atlantic and Gulf coastal state agencies, compiled, and analyzed. However, a planned workshop of aquaculture regulatory personnel from state and federal agencies, with the goal of developing approaches to a more streamlined and efficient permitting process, did not occur.

APPENDIX I

**ADDRESSES OF
NATIONAL MARINE FISHERIES SERVICE OFFICES**

Information regarding the Saltonstall-Kennedy Grant Program may be obtained from the following offices of the National Marine Fisheries Service:

**Alicia L. Jarboe, National Marine Fisheries Service (F/MB5)
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APPENDIX II

FY 2004 S-K APPLICATIONS*

*Once the FY 2004 S-K allocation was determined, since it was insufficient for the competitive program, the program was canceled and the following applications were returned to applicants without further consideration.

CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2004

<u>Program Office</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
AK	1. 04-AKR-001	Development of a Field Identification Manual and Reference Collection for Alaskan Crabs.	William E. Donaldson Kodiak, AK	\$43,950	\$11,360
	2. 04-AKR-002	The Cook Inlet Regional Salmon Enhancement Plan 2005-2025	Cook Inlet Aquaculture Association Kenai, AK	\$123,199	\$49,139
	3. 04-AKR-004	Alaska Quality Seafood TM Expands Program Reach	Alaska Manufacturers Association Anchorage, AK	\$296,562	\$37,126
	4. 04-AKR-005	Alaska Quality Seafood TM Expands To Include Crab and Halibut	Alaska Manufacturers Association Anchorage, AK	\$86,975	\$12,593
	5. 04-AKR-006	Cook Inlet Sockeye Salmon Branding Program	Cook Inlet Salmon Brand, Inc Soldotna, AK	\$561,325	\$94,255
	6. 04-AKR-007	Kodiak Pink and Coho Salmon Marketing Project Year II	Kodiak Chamber of Commerce Kodiak, AK	\$491,423	\$74,570
	7. 04-AKR-008	Community Concerns in a Changing Salmon Industry: An Analysis of Responses to Prospective Fishery Restructuring in Bristol Bay, Alaska	Karen Hebert Anchorage, AK	\$36,510	\$12,170
	8. 04-AKR-009	Dynamics of Alaska Salmon Fisheries Management: An Experimental Economics Approach	University of Alaska, Anchorage Anchorage, AK	\$93,264	\$43,406
	9. 04-AKR-010	Dried Fish Products for Human Consumption	University of Alaska, Fairbanks Fairbanks, AK	\$154,919	\$17,255
Total for AK Region:				\$1,888,127	\$351,874
NERO	1. 04-NER-001	Field-Based Nurseries for Hatchery-Reared American Lobster Postlarvae: Effects of Development Stage, Stocking Density, Subtidal Location, and Other Factors on Growth and Survival	Downeast Institute for Applied Marine Research & Education Beals, ME	\$216,705	\$114,823
	2. 04-NER-002	Use of Cetylpyridinium Chloride (CPC) to Inhibit Listeria in Seafood	University of Rhode Island Kingston, RI	\$96,448	\$19,808
	3. 04-NER-003	Zap Buoy and Zap Link Systems Eliminate Vertical Lines in the Water Column, and Reduce Whale Entanglements	Newport Distribution, LLC Washington, DC	\$289,350	\$81,900
	4. 04-NER-004	Analysis of Economic Discards for Optimum Utilization of Harvested Resources	Francis X. McQuade South Orleans, MA	\$51,998	\$6,427
	5. 04-NER-005	Technologies to Produce Fish Oil Emulsions with Enhanced Oxidative Stability for Utilization in Foods	University of Massachusetts Amherst, MA	\$143,975	\$29,054

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<u>Program Office</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
NERO	6. 04-NER-007	Design and Test of a Haddock Trawl for New England Multispecies Fisheries	University of New Hampshire Durham, NH	\$145,554	\$24,453
	7. 04-NER-008	Trophic Portfolios in Commercial Fishing: A Finance-based Approach to Ecosystem Management with an Application to Northeast United States Fisheries	Duke University Durham, NC	\$189,048	\$44,268
	8. 04-NER-009	Development of a Small Vessel Scallop Trawl	Philip Averill Bristol, ME	\$70,850	\$8,650
	9. 04-NER-011	Reduction of Cod in the Directed Haddock Bottom Trawl Fishery	University of Rhode Island Kingston, RI	\$437,926	\$63,650
	10. 04-NER-012	Squid Jigging as Bycatch Reduction Method and Habitat Protection	Deloris of Wanchese Inc. Wanchese, NC	\$163,500	\$123,000
	11. 04-NER-013	Improving Atlantic Cod Farming by Establishing Superior Broodstock	Marine Biological Laboratory Woods Hole, MA	\$463,109	\$136,965
	12. 04-NER-014	Promoting Marketability of Regional Fisheries Products While Building Public Awareness of Fisheries and Habitat Restoration Through an Innovative Outreach Mechanism: The R.I. Seafood Cookbook	Coecology Institute Wakefield, RI	\$54,065	\$14,600
	13. 04-NER-015	Evaluation of Improved Containment technology for Atlantic Salmon Marine Net Pens in Maine	Maine Aquaculture Association Hallowell, ME	\$727,044	\$218,575
	14. 04-NER-016	Evaluation of New Technology to Verify Net Integrity in Marine Net Pen Aquaculture	Maine Aquaculture Association Hallowell, ME	\$245,221	\$118,895
	15. 04-NER-017	Evaluation of Improved Inventory Methods for Aquaculture Hatcheries	Maine Aquaculture Association Hallowell, ME	\$223,477	\$50,739
	16. 04-NER-018	Marine Resource Endowment and Geographic Concentration in New England Seafood Industries	Woods Hole Oceanographic Institution Woods Hole, MA	\$121,436	\$51,500
	17. 04-NER-019	Development of Economically & Environmentally Sustainable Offshore Mussel Aquaculture in Southern New England	University of Rhode Island Kingston, RI	\$177,182	\$45,814
	18. 04-NER-020	Evaluating Size and Bag Limits in the Summer Flounder Recreational Fishery	Fisheries Conservation Trust New Gretna, NJ	\$130,980	\$15,504
	19. 04-NER-021	Refocusing the American Lobster Stock Enhancement Program: A Field Test of New Rearing Methods	New England Aquarium Corporation Boston, MA	\$218,939	\$107,484
	20. 04-NER-022	Examining the Impact Different Aquaculture Netting has on the Visual Discrimination Capabilities of Marine Mammals	New England Aquarium Corporation Boston, MA	\$148,181	\$62,816

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<u>Program Office</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
NERO	21. 04-NER-023	Feasibility Study for the Re-establishment of Clam Beds Using the Early Release/Saturation Spanning Process	Long Islanders for Environment Mattituck, NY	\$71,200	\$13,000
	22. 04-NER-024	Put and Take Scallop Fisheries in the Peconic Bay	Peconic Bay Scallops LLC Shirley, NY	\$152,000	\$89,638
	23. 04-NER-025	Mycobacteriosis Infection in Striped Bass, <i>Morone saxatilis</i> , in New York Waters	Cornell University Ithaca, NY	\$199,644	\$114,339
	24. 04-NER-027	Molecular Evaluation of the Introgression of Aquacultured Clam Stocks into Wild Populations: Implications for Disease Management Strategies and Preservation of Germplasm Diversity	Virginia Institute of Marine Science Gloucester Point, VA	\$185,414	\$32,149
	25. 04-NER-028	Spatial Distribution of the QPX Pathogen in Sediment and Water Samples and Transmission Dynamics from an Infected Source Population of Hard Clams, <i>Mercenaria mercenaria</i>	Virginia Institute of Marine Science Gloucester Point, VA	\$259,873	\$46,994
	26. 04-NER-029	Developing the Best Outreach Message for Consumers on the Safe Handling and Utilization of Seafood and Seafood Products	University of Delaware Newark, DE	\$73,358	\$9,095
	27. 04-NER-030	Extraction of Fish Oil from Fish Processing Waste and Production of High Value, High Purity Omega-3 Oils	CF Technologies Hyde Park, MA	\$246,495	\$177,897
	28. 04-NER-031	Development of Squid Hydrolysate-based Microdiets for Larval and Juvenile Fish	University of Rhode Island Kingston, RI	\$135,623	\$23,865
	29. 04-NER-032	Assessment of Spatial and Temporal Patterns of Shell Disease in the American Lobster (<i>Homarus americanus</i>)	University of Maine Orono, ME	\$186,905	\$32,894
	30. 04-NER-033	Market Interactions Between Emerging Aquaculture Species and the New England Groundfish fishery	University of Rhode Island Kingston, RI	\$129,438	\$68,482
	31. 04-NER-034	Maine Lobster Socio-Economic Survey	Maine Department of Marine Resources Augusta, ME	\$69,501	\$11,120
	32. 04-NER-035	The Effects of Temperature on the Infection of Hard Clams (<i>Mercenaria mercenaria</i>) by the Protistian Organism, Quahog Parasite Unknown	Marine Biological Laboratory Woods Hole, MA	\$296,518	\$82,413
	33. 04-NER-036	A Hatchery System for the Green Sea Urchin for Aquaculture and Stock Enhancement in the Gulf of Maine	University of New Hampshire Durham, NH	\$281,728	\$91,996
	34. 04-NER-037	Identification and Use of Sex Attractants (Pheromones) for Improving Shellfish Aquaculture Production by Monitoring and Controlling Predatory Crab Populations	University of Connecticut, Storrs Storrs, CT	\$307,466	\$90,720

CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2004

<u>Program Office</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
NERO	35. 04-NER-038	Optimization of an Extruded Jerky-type Snack from Salmon Processing Byproducts	University of Maine Orono, ME	\$80,672	\$24,541
	36. 04-NER-040	Development of the "Red" Shrimp Fishery, and Underutilized Species	National Fisheries Institute, Inc. Arlington, VA	\$166,282	\$35,658
	37. 04-NER-041	The Role of Sea Lice in the Persistence and Transmission of Infectious Salmon Anemia Virus in the Marine Environment	Micro Technologies, Inc. Richmond, ME	\$125,633	\$24,030
	38. 04-NER-042	The Control of Aquatic Nuisance Species in Marine Aquacultural Operations	University of Connecticut Storrs, CT	\$284,578	\$37,241
	39. 04-NER-043	Assessment of the Potential for Introduction of Harmful Algal Bloom (HAB) Species via Shellfish Transport	University of Connecticut Storrs, CT	\$296,921	\$46,177
	40. 04-NER-044	Development of a Recombinant Vaccine for Infectious Salmon Anemia Virus (ISAV)	University of Maryland Biotechnology Institute Baltimore, MD	\$223,250	\$28,876
	41. 04-NER-045	Aquaculture Knowledge Environment	Center for Resource Economics Washington, DC	\$300,000	\$300,000
Total for NERO Region:				\$8,387,487	\$2,720,050
NWRO	1. 04-NWR-001	The Effect on Long Term Harvest of Exploitation Rate Estimation Error that Results from Mark Selective Salmon Fisheries	Skagit System Cooperative LaConner, WA	\$17,682	\$2,000
	2. 04-NWR-002	Sources, Transmission and Prevention of Denman Island Disease	Pacific Shellfish Institute Olympia, WA	\$286,668	\$73,278
	3. 04-NWR-003	Environmental and Technical Assessment of Alternative Shellfish Production Methods	Pacific Shellfish Institute Olympia, WA	\$198,391	\$33,774
	4. 04-NWR-004	Artificial Reef Effects of Marine FinFish Net Pens	Cypress Island, Inc. Anacortes, WA	\$143,044	\$31,237
	5. 04-NWR-005	An Activated Algal Biofiltration System for Marine Aquaculture Applications	Washington State University Pullman, WA	\$95,646	\$12,640
	6. 04-NWR-006	Sensory Detection of Spoilage As a Control of Clostridium botulinum Hazard in Refrigerated Crabmeat Packed in Sealed Containers	Oregon State University Astoria, OR	\$201,895	\$50,800
	7. 04-NWR-007	Salmon Marketing Program Expansion	Columbia River Intertribal Fish Commission Portland, OR	\$297,096	\$56,564

CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2004

<u>Program Office</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
NWRO	8. 04-NWR-008	Promote Off Boat Fish Sales of North Pacific Wild-Caught Salmon and Other Seafood Items, Including Underutilized Species(Such As Chum Salmon).	Fish Sales Marketing Association Seattle, WA	\$59,334	\$8,665
	9. 04-NWR-009	Promoting Sustainable Seafood: West Coast Direct Marketing Connections Project	Ecotrust Portland, OR	\$177,500	\$22,000
	10. 04-NWR-010	Evaluate Selective Fishing Gear	Washington Department of Fish and Wildlife Olympia, WA	\$254,343	\$47,800
	11.	Rock Scallop Culture in the Off-Shore Environment	Taylor Resources, Inc. Shelton, WA	\$91,179	\$0
Total for NWRO Region				\$1,822,778	\$338,758
PIRO	1. 04-PI-14209	Investigation and Strategic Planning for the Development of a Guam Domestic Fishery Operation	Guam Economic Development and Commerce Authority Tamuning, GU	\$80,000	\$18,837
	2. 04-PI-14210	Development of a Multi-Virus Resistant Shrimp Strain	University of Hawaii Honolulu, HI	\$168,152	\$38,460
	3. 04-PI-14211	Integrating Small Scale Mariculture Models into Community-Based Fisheries Management Plans and MPAs in the Republic of the Marshall Islands (RMI).	University of Hawaii Honolulu, HI	\$132,745	\$33,600
	4. 04-PI-14212	Small-scale Squid Fishery Feasibility Study	Richard Seidler Saipan, MP	\$75,000	\$50,000
	5. 04-PI-14213	Fisheries Extension Through Pacific Regional Marine Debris or Ghostnet Mitigation	University of Hawaii Honolulu, HI	\$59,661	\$10,359
Total for PIRO Region:				\$515,558	\$151,256
SE	1. 04-SER-001	Demonstration Research and Development Project to Strengthen and Develop the Sustainability of the Fishing Industry in the U.S. Virgin Islands	Fishermen's United Services Cooperative of St. Croix St. Croix, VI	\$398,070	\$600,000
	2. 04-SER-002	Comparison of Bycatch of Drift vs. Anchored American Shad Gillnets	South Carolina Department of Natural Resources Charleston, SC	\$120,824	\$41,354
	3. 04-SER-003	Culturing Shrimps for Bait in Floating Cages	Duke University Durham, NC	\$199,727	\$43,146
	4. 04-SER-004	Mud Minnow Fundulus grandis Culture and Marketing Project	Putnam County Palatka, FL	\$158,424	\$39,736

CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2004

<u>Program Office</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>	
SE	5.	04-SER-005	Development of Atlantic Croaker Micropongius undulatus Aquaculture to Reduce Fishing Pressure on Their Natural Populations	University of Texas at Austin Austin, TX	\$449,089	\$50,906
	6.	04-SER-006	Advanced Hatchery; Technology for Fingering; Production of Cobia; (Rachycentron canadum) for Offshore Aquaculture.	University of Miami Miami, FL	\$386,155	\$99,999
	7.	04-SER-008	Engineering Design and Evaluation of Semi-/Continuous Culture Techniques for Brachionus rotundiformis to Support Marine Aquaculture Hatchery Development.	Louisiana State University Baton Rouge, LA	\$196,575	\$44,529
	8.	04-SER-009	RDIF as a Platform for Open Ocean Aquaculture Operations	CDI Marine Company Jacksonville, FL	\$269,967	\$54,318
	9.	04-SER-010	Purification of Collagen, Squalamine, and Aminosterols from Warm Water Shark for Biomedical Applications	Louisiana State University Baton Rouge, LA	\$171,350	\$21,664
	10.	04-SER-011	Reduction of Fishing Effort and Revision of Fishing Regulations in the U.S.V.I.	Virgin Islands Department of Planning and Natural Resources St Thomas, VI	\$462,077	\$0
	11.	04-SER-012	Cultured Cobia as a Tool for Life History Studies and Potential Stock Enhancement Projects	Virginia Institute of Marine Science Gloucester Point, VA	\$182,074	\$32,890
	12.	04-SER-013	Genetic Population Structure of Cobia (Rachycentron canadum)	Virginia Institute of Marine Science Gloucester Point, VA	\$169,495	\$30,889
	13.	04-SER-014	The Effects of Intertidal Culture on Growth, Survival, Disease and Stress Tolerance in Selected Strains of the Easter Oyster, Crassostrea virginica	Virginia Institute of Marine Science Gloucester Point, VA	\$231,046	\$41,997
	14.	04-SER-015	Seasonal Changes in the Corticosteroid Stress Response in the Atlantic Sharpnose Shark (Rhizoprionodo terraenovae): Potential Impact on Post-Release Survival and Reproductive Success	University of Texas at Austin Austin, TX	\$95,589	\$17,018
	15.	04-SER-016	Genetics of Major Histocompatibility Complex (MHC) Class I and Class II Loci in Gulf Red Snapper and Red Drum	Texas Agricultural Experiment Station College Station, TX	\$101,731	\$25,165
	16.	04-SER-018	Treatment Causing Loss of Virulence in Vibrio vulnificus in Oysters	University of North Carolina Charlotte Charlotte, NC	\$293,369	\$101,272
	17.	04-SER-019	Genetic Assessment of Survival and Performance of Hatchery Red Drum (Sciaenops Ocellatus) in Texas Bays and Estuaries	Texas A&M Research Foundation College Station, TX	\$212,187	\$169,994

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<u>Program Office</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
SE	18. 04-SER-020	Texas Oyster Marketing Campaign: Empowering Producers and Educating Buyers	Texas Department of Agriculture Austin, TX	\$200,000	\$64,567
	19. 04-SER-021	Validating a Lease-Site Selection Model for Marine Aquaculture	Florida Fish and Wildlife Conservation Commission St. Petersburg, FL	\$100,641	\$27,676
	20. 04-SER-022	Location and Retrieval of Derelict Crab Traps in the Offshore Waters of the Mississippi Sound	Mississippi Department of Marine Resources Biloxi, MS	\$90,000	\$10,000
	21. 04-SER-023	Development of Viable Coastal Aquaculture Industry for Cobia (<i>Rachycentron canadum</i>)	Virginia Polytechnic Institute and State University Blacksburg, VA	\$343,068	\$100,568
Total for SE Region:				\$4,831,458	\$1,617,688
SW	1. 04-SWR-001	Evaluating Sources of Spatial Variation in the Concentration of the Marine Biotoxin Domoic Acid in Recreationally and Commercially Important Species	University of California, Santa Barbara Santa Barbara, CA	\$126,736	\$15,900
	2. 04-SWR-002	Evaluation of the Pacific Groundfish Buyback Program	University of California Oakland, CA	\$408,436	\$84,516
	3. 04-SWR-003	Collaborative Fish Habitat Identification for Rockfishes, Greenling, and Cabezon in Untrawlable, Nearshore Fishing Grounds of the Pacific Northwest	Regents of the University of California Oakland, CA	\$498,992	\$83,206
	4. 04-SWR-004	Documenting Change in Fishing Communities: A Collaborative Social Science Approach	University of California, Santa Cruz Santa Cruz, CA	\$201,477	\$30,161
	5. 04-SWR-005	Elucidating <i>Streptococcus iniae</i> Virulence Mechanisms and Development of a Live-Attenuated Vaccine to Protect Fish in Intensive Aquaculture Operations	University of California, San Diego La Jolla, CA	\$261,364	\$43,096
	6. 04-SWR-006	Development of Hatchery Technologies for Fingerling Production of California Yellowtail (<i>Seriola lalandi</i>) and Yellowfin Tuna (<i>Thunnus alalunga</i>)	Hubbs - Sea World Research Institute San Diego, CA	\$355,535	\$217,700
	7. 04-SWR-007	Analysis and Outreach: The Economic Contribution of the Private Boat Recreational Fishery for HMS Species on the Pacific Coast	Fisheries Conservation Trust New Gretna, NJ	\$146,460	\$16,300
Total for SW Region:				\$1,999,000	\$490,879
Grand Total:				\$19,444,408	\$5,670,505