



# The Saltonstall-Kennedy Grant Program:

## Fisheries Research and Development

# REPORT 2003

August 1, 2003



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



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**U.S. DEPARTMENT OF COMMERCE**

Donald L. Evans

**National Oceanic and Atmospheric Administration**

Vice Admiral Conrad C. Lautenbacher, Jr., U.S. Navy (Ret.)  
Under Secretary of Commerce for Oceans and Atmosphere  
and NOAA Administrator

**National Marine Fisheries Service**

William T. Hogarth, Ph.D., Assistant Administrator

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## I. INTRODUCTION

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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) 2003. The report contains information on the S-K Program regarding its legislative authority, the application solicitation and grant selection process, recipients, and funding information.

The competitive S-K Grant Program was not conducted in FY 2003 due to an insufficient funding allocation (see discussion on p. 2). Instead, a notice was published in the *Federal Register* on June 30, 2003, to solicit applications to the FY 2004 S-K Grant Program. Approximately \$4.0 million will be available for grant awards in FY 2004, based on the President's budget request.

Appendix I contains addresses of NMFS Headquarters and Regional Offices from which information regarding the S-K Program may be obtained. Appendix II contains a list of applications approved for funding from the FY 2002 S-K solicitation, and Appendix III contains a list of applications disapproved. This information was not available in time for publication in the FY 2002 report to Congress.

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 (Appendices II and III)
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 that was 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 41)

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## II. BACKGROUND

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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 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 Strategic Plan 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. NMFS is funding three projects under this authority in FY 2003, as follows:

NMFS is providing \$96,750 to the University of California, Davis, for urgently needed research on viral hemorrhagic septicemia virus, a pathogen found in Pacific sardines. The Gulf and South Atlantic Fisheries Foundation, Inc. will receive \$223,800 for education efforts aimed at protecting high-risk consumers from naturally occurring bacteria associated with raw molluscan shellfish, especially *Vibrio vulnificus*. Finally, NMFS is providing \$2.5 million that was unobligated in the FY 2002 S-K Program to fund urgent research on the catch of overfished fish stocks, discarded finfish, total catch, fishing effort, and incidental takes of protected species in the Northeast multispecies fishery, using fishery observers on board vessels. This project will also satisfy court-ordered observer coverage.

For FY 2004, NMFS plans to make funds available only under the competitive Grant Program.

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 2003; 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.

As the table shows, the FY 2003 allocation was \$10.224 million. However, the Consolidated Appropriations Resolution, 2003 (Pub. Law 108-7) directed \$10 million to the Alaska Fisheries Marketing Board. This funding will not be tracked under the S-K Program. The Conference Report that accompanied the appropriations directed \$250,000 to the Gulf and South Atlantic Fisheries Foundation for consumer education efforts related to *Vibrio vulnificus*. Since only \$223,800 remained from the FY 2003 program allocation, NMFS is providing this amount to the Foundation pursuant to the Conference Report.

Most of the carryover amount shown was committed to the FY 2002 S-K Program, which was not concluded until the first quarter of FY 2003. Therefore, these funds are being obligated in FY 2003. The balance of the carryover includes \$2.5 million unobligated from the Atlantic salmon aquaculture funding priority, for which NMFS did not receive sufficient proposals with technical merit to expend the full amount. In FY 2003, NMFS is making funds available for research in the Northeast multispecies fishery, under the S-K National Program authority.

*Table 1. S-K Funding for FY 2003 (\$ in millions)*

Funding Item	Amount
Total Duties Collected on Fishery Products	\$250.75
Total S-K Transfer	75.22
ORF Offset	<u>65.00</u>
S-K Allocation	10.22
Carryover*	<u>11.17</u>
Total	21.39
Direct Payment to Alaska Fisheries Marketing Board	<u>(10.00)</u>
Total Available for S-K Program	11.39
S-K Program Obligations/Commitments	
FY 2002 Grant Program	7.62
National Program**	2.82
Program Administration	0.50
Estimated Unobligated Balance	<u>.45</u>
Total	11.39

\*Includes unanticipated prior year recoveries and FY 2002 balances obligated in FY 2003.

\*\*Includes \$2.5 million for Northeast multispecies fishery research, \$223,800 for shellfish safety education, and \$96,750 to study virus in sardines.



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

*Table 2. S-K Funding, 1993–2003 (\$ in millions)*

<b>Fiscal Year</b>	<b>Total Duties</b>	<b>Total S-K Transfer</b>	<b>ORF Offset</b>	<b>Available S-K Allocation</b>	<b>Allocation as % of Transfer</b>
1993	204.70	61.40	55.00	6.40	10.42
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

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

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### III. PENDING GRANT PROGRAM PROJECTS

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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, AK  
*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, AK  
*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, AK

*Grant No.:* NA03NMF4270111 *NMFS Contact:* F/AKR  
*Project Title:* Economic & Resource Full Utilization of the Seafood Processing Waste Stream: Discards, Underutilized Species, Byproducts & 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, AK  
*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, NY  
*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, WA  
*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, ME  
*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, ME  
*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, MI  
*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, VA  
*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, RI  
*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:* Bigelow Laboratory for Ocean Sciences, Lincoln, ME  
*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

*Description:* To: (1) employ trawl- and camera-based sampling methods to assess changes in red crab populations since the last NMFS survey in 1974; (2) evaluate the spatial correlation between fishery-dependent data and -independent estimates of abundance for red crabs; (3) obtain much-needed information on red crab growth and movement; and (4) employ three stock assessment modeling approaches to evaluate the dynamics of the red crab stock, estimate current status of the fishery, and evaluate alternative management strategies. This harvester–scientist collaboration, in which fishing vessels will be employed to conduct research, should result in data that can contribute to the development of a Federal fishery management plan for red crab.

*Grantee:* Louisiana State University Agricultural Center, Baton Rouge, LA  
*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, AK  
*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, AK  
*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 PI 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, CA  
*Grant No.:* NA03NMF427155 *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, MA  
*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, RI  
*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, RI  
*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, MA  
*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 NOAA Fisheries with a model to meet Sustainable Fisheries Act requirements of National Standard 8.

*Grantee:* University of Maryland Center for Environmental Science, Cambridge, MD  
*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 address 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, MD  
*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, MD  
*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, MD  
*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, VA  
*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, VA  
*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:* Rhode Island Lobstermen's Association, Wakefield, RI  
*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

*Description:* To enhance data collection for American lobster stock assessment purposes. Fishermen will tag and v-notch 60,000 sublegal and legal female lobsters during the year. Upon recapture, information on growth, movement, molting probability, and egg frequency will be collected. Biologists from the University of Rhode Island and the Rhode Island Department of Environmental Management will analyze the data and provide biological information to the Atlantic States Marine Fisheries Commission Lobster Technical Committee. The data will be used in the eggs per recruit model for Area 2 and may also prove useful for Areas 3 and 6.

*Grantee:* Gulf & South Atlantic Fisheries Foundation, Inc., Tampa, FL  
*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 NOAA Fisheries.

*Grantee:* Florida State University, Tampa, FL  
*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:* University of South Carolina, Columbia, SC  
*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

*Description:* To assess samples of larval tuna obtained from the Gulf of Guinea for genetic variation at both mitochondrial and nuclear DNA loci. Nuclear markers will include both restriction fragment length polymorphisms and microsatellite loci. The resulting data will be analyzed to determine if the genetic variation observed in single samples is representative of that found in the adult population. Also, samples obtained at different seasons or in successive years will be compared to determine seasonal and temporal variation. Ultimately, these results will be used to develop a monitoring scheme for the assessment of tuna reproduction in the Gulf of Guinea, off the west coast of Africa. In addition, the data will be useful for establishing monitoring schemes for other tuna spawning areas for other large pelagic fish.

*Grantee:* Texas A&M Research Foundation, College Station, TX  
*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, NH  
*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:* University of Alaska, Fairbanks, AK  
*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

*Description:* To analyze existing videotapes of fish capture archived at the University of Alaska Fishery Industrial Technology Center, to quantify species-specific flatfish behavior. This information will provide a more comprehensive understanding of how individual flatfish species are captured and how the capture process can be adapted to separate flatfish species.

*Grantee:* Washington Department of Fish and Wildlife, Olympia, WA  
*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, WA). 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, WA  
*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, HI  
*Grant No.:* NA03NMF4270187 *NMFS Contact:* F/SWR  
*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 broad-band 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, CA  
*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:* Micronesian Fisheries Authority, Federated States of Micronesia  
*Grant No.:* NA16FD2643 *NMFS Contact:* F/SWR  
*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

*Description:* 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 investigators also will convene four workshops (one in each State) to instruct fisheries observers in sea turtle identification, basic sea turtle biology, appropriate tagging and release methods, and record keeping. In addition, the investigators will prepare and arrange for production of similar material for distribution to fishing vessel operators and others within the fishing community as a whole. The investigators will convene informational meetings in each FSM State with fishing vessel operators, captains, port officials, agents, and other relevant members of the fishing community to explain the importance of reducing adverse interactions between sea turtles and commercial fishing operations. The investigators also will conduct a



workshop for members of the Maritime Surveillance Wing to sensitize them to the need for inclusion of this subject in their regular boarding and inspection procedures. Finally, the investigators will produce a final report that contains recommendations for integrating the subject into the Micronesian Fisheries Authority's ongoing work program and its relationships with the fishing community.

*Grantee:* Pflieger Institute of Environmental Research, Oceanside, CA  
*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, MA  
*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, MA  
*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, MA  
*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:* Manomet, Inc., Manomet, MA  
*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

*Description:* To test the effectiveness of a new bycatch reduction device (Ex-It) in reducing the inadvertent catch of undersized fish in the northwest Atlantic. The study will focus primarily on retention of juvenile and undersized cod. This will be an international venture involving the Manomet Center for Conservation Sciences, Massachusetts Division of Marine Fisheries, Maine Department of Marine Resources, Canadian Department of Fisheries and Oceans, commercial fishermen, and industry input from Nordurnet, Iceland. Sea trials on board chartered commercial fishing vessels will be conducted in the Gulf of Maine and in Canadian territorial waters. Selectivity parameters of trawl nets with and without the Ex-It bycatch reduction device will be determined. Trials with different grid spacings will be conducted to determine the most appropriate configuration for small-cod exclusion. Video observations will be made on the behavior of fish in the vicinity of the bycatch reduction device, and detailed behavioral analysis will be carried out. Reports and videotapes will be made available to all interested parties. Recommendations on the effectiveness of the bycatch reduction device will be made available to fisheries managers in both the USA and Canada.

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

*Description:* 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. Observations of bay scallops *in situ* have shown that they react to certain acoustic stimulation and will swim vertically off the sea bottom. The dredge would be of a type that lightly skims over the sea bottom, thus reducing impact to the benthos which would, if associated with bay scallop harvesting, include eel grass.

*Grantee:* New England Aquarium Corp., Boston, MA  
*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

*Description:* To: (1) augment the survival data already collected on juvenile cod bycatch caught by demersal longlines, (2) quantify mitigated survival of juvenile cod bycatch caught by

demersal longlines when treated by immersion in solutions of potassium chloride, (3) quantify the degree of physiological stress experienced by juvenile cod bycatch caught by demersal longlines 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.

*Grantee:* New England Aquarium Corporation, Boston, MA  
*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:* \$127,386

*Description:* To build upon the selectivity work already conducted and investigate how different hauling strategies might affect wound size and juvenile groundfish survivability. Preliminary survival statistics from current longline work suggest that survival of juvenile bycatch is correlated to hooking wound magnitude and that effective selectivity against juveniles can be accomplished using modified circle hooks.

*Grantee:* University of North Florida, Jacksonville, FL  
*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 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, AK  
*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, WA  
*Grant No.:* NA03NMF4270186 *NMFS Contact:* F/NWR  
*Project Title:* Risk Management of a New U.S. Oyster Disease Threat  
*Funding:* *Federal:* \$57,772 *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:* PacMar, Inc., Honolulu, HI  
*Grant No.:* NA16FD2472 *NMFS Contact:* F/SWR  
*Project Title:* Verification of a HACCP System for the Control of Histamine for the Fresh Tuna Industry  
*Funding:* *Federal:* \$199,143 *Recipient:* \$22,238

*Description:* To verify previous findings that supported the HACCP-based approach to controlling histamine. Specifically, this project will: (1) use temperature logger to monitor fish time and temperature profiles post-harvest; (2) sample, grade, and evaluate fish landings for odors of decomposition and histamine analysis; (3) perform histamine analysis of fish with

documented temperature histories and market sampling; and (4) conduct training workshops for fishers to understand histamine controls and the responsibility of the industry to ensure food safety and HACCP compliance.

*Grantee:* University of Rhode Island, Kingston, RI  
*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, LA  
*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, SC  
*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, NC  
*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, FL  
*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, VA  
*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, AK  
*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, WA  
*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:* Taylor Resources, Inc., Shelton, WA  
*Grant No.:* NA06FD0231 *NMFS Contact:* F/NWR  
*Project Title:* Rock Scallop Culture in the Off-Shore Environment  
*Funding:* *Federal:* \$91,179 *Recipient:* \$54,938

*Description:* 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. Researchers will test a new technology (Scallop Spar) for a range of engineering considerations including installation, submersion, towing, system integrity, and harvest functions. In addition, the disc culture surfaces will be evaluated for survival of scallops, ability to attach to the surface, growth rates, and stocking densities. A separate set of hatchery culture studies will be carried out that include broodstock collection and conditioning, spawning and larval production, and juvenile seed and grow-out methods.

*Grantee:* Black Pearls, Inc., Holualoa, HI  
*Grant No.:* NA16FD2642 *NMFS Contact:* F/SWR  
*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, HI  
*Grant No.:* NA06FD0303 *NMFS Contact:* F/SWR  
*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:* Regents of the University of California, Davis, CA  
*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

*Description:* To describe the life history of the fan worm which infests cultured abalone. All life stages and reproductive ability at temperatures experienced in California will be identified. Life stages of fan worms reared *in situ* and *in vitro* will also be identified, as will the timing of each developmental stage and the reproductive potential. Generation times at several temperatures between 9 and 23°C will be determined. Using a combination of light and electron microscopy, and fertilization experiments, it will be determined whether the sabellid is capable of self and/or cross fertilization. The potential risk associated with the release of precompetent larval and embryonic stages will also be examined. In order to assess the possibility that infested abalone may have been outplanted, the researchers will survey several outplant sites for infested abalone and other gastropods. If found, mark and recapture studies will be conducted using initially uninfested gastropods to determine rates of fan worm transmission in the field. Based on the findings, changes will be recommended in abalone husbandry methods to aid in eradication of the fan worm from aquaculture facilities and reduce its potential establishment in the wild.

*Grantee:* Pisces Molecular LLC, Boulder, CO  
*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, ME  
*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, ME  
*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.



Atlantic salmon

*Grantee:* Maine BioTek, Inc., Winterport, ME  
*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, ME  
*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, ME  
*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, ME  
*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, MD  
*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, MD  
*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, MD  
*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.

*Grantee:* New England Aquarium Corporation, Boston, MA  
*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, NH  
*Grant No.:* NA03NMF4270183 *NMFS Contact:* F/NER  
*Project Title:* Engineering Design and Analysis for More Secure Salmon Net Pen Systems  
*Funding:* *Federal:* \$491,865 *Recipient:* \$61,648

*Description:* To work at Heritage Salmon's twenty-cage site in Broad Cove near Eastport, ME, 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, NH  
*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, NH



*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 have established the foundation of a breeding program for Atlantic cod, ensuring future competitiveness within the global market.

*Grantee:* University of Maine, Orono, ME  
*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, MA  
*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, RI  
*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:* University of Rhode Island, Kingston, RI  
*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

*Description:* To characterize the dynamics of stress response, identify practices that induce stress, and develop culture technology—including use of anesthetics—to mitigate stresses of handling and transportation. The project will produce new technology that improves the health and survival of cultured flatfish. The basic rationale is that handling and transportation of cultured marine flatfish to grow-out sites stresses them and reduces their performance capacity. Performance capacity includes the ability to resist disease, maintain metabolic homeostasis, and adapt to further perturbations.

*Grantee:* Texas A&M Research Foundation, College Station, TX  
*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:* Virginia Institute of Marine Science, Gloucester Point, VA  
*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

*Description:* To examine variation in the expression and pathogenicity of QPX disease in relation to genetic origin and geographic location of hard clams. The research will focus on identifying a strain(s) of hard clams resistant to QPX disease. The main objectives of the project are to: (1) compare clam growth (size), condition, survival, and QPX prevalence and severity in five hatchery-reared strains of hard clams at three regionally separated QPX-endemic locations; (2) determine the significance of the effect of strain and region on hard clam growth, condition, survival, and QPX disease through time; and (3) determine the best strain for culture in QPX-endemic areas, and recommend strains for future efforts to enhance resistance to QPX through selective breeding.

*Grantee:* Florida Fish and Wildlife Conservation Commission, Port Charlotte, FL

*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, FL  
*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  
*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, GA

*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:* University of Arizona, Tucson, AZ  
*Grant No.:* NA03NMF4270131 *NMFS Contact:* F/SWR  
*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:* North Carolina State University, Raleigh, NC  
*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, PR  
*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, TX  
*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.



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#### IV. PENDING NATIONAL PROGRAM PROJECTS

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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.

##### MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

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

*Description:* 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 will be 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. NMFS will ensure that standardized, non-biased data are collected, and sampling protocols adhere to rigorous, peer-reviewed sampling designs. NMFS will also ensure that observers are safe, adequately trained, fairly compensated, and protected against harassment and intimidation. This project will also serve to satisfy court-ordered observer coverage in the Northeast multispecies fishery; the lack of this coverage could otherwise result in closure of the fishery.

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

*Description:* 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 will allow both NMFS and ADF&G to augment each survey by allowing direct comparisons of the respective databases. For example, being able to fully incorporate the ADF&G survey database into the annual status of stocks process would greatly enhance the 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

*Description:* To develop an experimental design for the evaluation of Steller sea lion fishery exclusion zones which, when implemented, will 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.

*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

*Description:* To improve the automated systems that control permit issuance and transfer and management of fishery landings under IFQ/CDQ. Currently, these data systems are an inefficient means of retrieving the amount and detail level of information needed for information requests and for research purposes. This project will provide contractual assistance to structure and retrieve data so as to address these information needs. Tasks include: improving system documentation; developing reports and data summaries; and increasing the variety, amount, and detail of information available through NMFS Internet sites and computer bulletin boards.

*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

*Description:* To assess the status and determine the age structure of red drum stocks in the northern Gulf of Mexico. The proven and accepted estimation technique of mark and recapture will be used to assess the current size of the adult stock. Estimates indicate that if 10,000-20,000 red drum are tagged within a relatively short time, and then approximately 50,000 fish are examined for the presence of tags, a reasonably precise estimate of the adult red drum biomass can be developed for use in quota and resource allocation decisions. The goals are to improve red drum fishery management and optimize commercial and recreational utilization of the resource.

## PRODUCT QUALITY AND SAFETY

*Grantee:* University of California, Davis, CA  
*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, FL  
*Grant No.:* NA03NMF4270393 *NMFS Contact:* F/SER  
*Project Title:* At-Risk *Vibrio vulnificus* Educational Program Targeting the Medical/Professional Community  
*Funding:* *Federal:* \$223,800 *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.

## AQUACULTURE

*Project No.:* 96-SW-01 *NMFS Contact:* F/SWR  
*Project Title:* Evaluate Ultrasound Applications in Salmonid Conservation and Aquaculture  
*Funding:* *Federal:* \$30,000

*Description:* To refine techniques for using ultrasound to determine the maturation of fish prior to artificial spawning. This will ensure that artificial spawning is performed only during periods of peak spawning potential and will optimize spawning success by minimizing handling of fish. The technology developed for this project will be applied to the captive breeding program for endangered winter run chinook salmon. In addition, the applications developed for this project will also enhance our ability to successfully rear other species of fish for aquaculture.

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

*Description:* To conduct further research on aquaculture of penaeids at the Galveston Laboratory, and to transfer resulting technology to the U.S. aquaculture industry.

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

*Description:* To research, codify, and determine feasibility of base guidelines for streamlining the aquaculture permitting process. A set of common protocols, arrived at by consensus of state and Federal regulatory units, applicable research personnel, and aquaculture operators, will be developed and evaluated for practical application. Information on presently utilized aquaculture permitting procedures will be collected and analyzed. A workshop will be held to develop a draft base permitting process.

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## V. COMPLETED GRANT PROGRAM PROJECTS

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This section contains an assessment of each S-K Grant Program project completed during the period June 1, 2002, to May 31, 2003, 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:* University of Washington, Seattle, WA  
*Grant No.:* NA96FD0055      *NMFS Contact:* F/AKR  
*Project Title:* The Effects of Fishery-Induced Directional Selection on Run Timing in Sockeye Salmon  
*Funding:*      *Federal:* \$80,903      *Recipient:* \$8,467

*Assessment:* The objectives of this project were to: (1) quantify selection pressure on run timing by comparing the temporal pattern of escapement with that of the total run (catch plus escapement) in five fishing districts for the last 35-40 years; (2) examine whether the selective pressure on run timing increases with the systems by compiling the data on total run and comparing predicted change to absolute change per system; (3) estimate the heritability of run timing within these populations; and (4) measure the potential correlated effects of selection for run timing on selection for spawning time through two related field studies. The four hypotheses tested all have been met. The researchers found that the fishery for sockeye salmon in Bristol Bay exerts a selective force on run timing due to later arriving fish having a higher probability of capture, and the harvest rates are significant enough to exert natural selection. Furthermore, there are changes in mean run timing across different sites, and selection by the fishery on run timing has correlated selective effects on spawning timing. Within the major Bristol Bay fishing districts, fish arriving earlier were more likely to escape the fishery and spawn. Interannual differences could be explained by environmental factors, and tagging studies verified that fish that pass through the fishery and arrive earlier in spawning lakes do spawn earlier.

*Grantee:* University of Delaware, Lewes, DE  
*Grant No.:* NA46FD0329      *NMFS Contact:* F/NER  
*Project Title:* Rapid Detection of Genetic Variation for Fisheries Stock Identification  
*Funding:*      *Federal:* \$91,284      *Recipient:* \$12,388

*Assessment:* The goal was to develop a simple and rapid procedure for quantifying DNA sequence variation in regions of mitochondrial and nuclear genomes in fish populations. The

objective of using this screening method was to allow efficient selection of genes for amplification and efficient selection of individuals for further examination by restriction fragment length polymorphism (RFLP) analysis or direct DNA sequencing. Denaturing gradient gel electrophoresis (DGGE) analyses generally showed negligible sequence variation in the DNA fragments examined, and the researchers determined that it was necessary to confirm these "negative" results by another more established method, i.e. PCR/RFLP. This was completed in two of the three species studied, and it corroborated the conclusions from the DGGE analysis. The researchers concluded that DGGE can provide an efficient means of detecting overall levels of genetic variability in PCR products, and is less expensive and time-consuming than the alternatives of RFLP analysis or direct sequencing.

*Grantee:* Community Economic Development Center of Southeastern Massachusetts,  
New Bedford, MA  
*Grant No.:* NA96FD0080 *NMFS Contact:* F/NER  
*Project Title:* Fishing Industry Cooperative Enterprises Co-Production Training Program  
*Funding:* *Federal:* \$103,202 *Recipient:* \$94,344

*Assessment:* The objective of the Fishing Industry Cooperative Enterprises (FICE) program was to address the issues of unemployment and underemployment through a combined aquaculture and cooperative business development training program and the establishment of a demonstration co-production greenhouse. FICE piloted the potential of offering a rewarding career alternative for fishermen who were forced to leave their sites on boats when the vessel's days-at-sea were exhausted. Four New Bedford fishing community members received a high quality comprehensive training experience and earned a Certificate in Co-Production Aquaculture and Hydroponics Technology. However, the project met many unforeseen obstacles along the way and was unsuccessful in reaching most of the objectives proposed in the original S-K grant.

*Grantee:* Virginia Institute of Marine Science, Gloucester Point, VA  
*Grant No.:* NA06FD0182 *NMFS Contact:* F/NER  
*Project Title:* Community-Based Area Management Strategies and Capacity Reduction  
Programs for the Sea Scallop Industry  
*Funding:* *Federal:* \$179,565 *Recipient:* \$76,914

*Assessment:* This study had three major objectives, to: (1) determine community and stakeholder preferences about area management strategies for the sea scallop fishery for the purpose of developing community-based, co-management strategies; (2) determine community and stakeholder preferences and support for a buyback program; and (3) develop strategies in cooperation with stakeholders that mitigate the potential negative social and economic

consequences of area management strategies and buyback programs. Despite encountering numerous problems, it was possible to determine that community-based co-management was not a highly probable approach to consider for managing this fishery, particularly relative to area management. However, that does not mean stakeholder concerns should be ignored. Research for this project also revealed that the framework of more traditional approaches used to determine the feasibility of community-based co-management needed to be modified to reflect community isolation and community dependency. In addition, this research developed some basic measures of economic diversification and dependency for the various communities examined in this study. Last, it was possible to identify community concerns and offer some recommendations to address those concerns expressed about area management and buyback programs.

*Grantee:* South Carolina Department of Natural Resources, Charleston, SC  
*Grant No.:* NA07FD0174 *NMFS Contact:* F/SER  
*Project Title:* Evaluation of an Alternative Harvesting Methodology for Horseshoe Crabs and Determination of Juvenile Life History Parameters in a Nursery Habitat  
*Funding:* *Federal:* \$52,994 *Recipient:* \$5,998

*Assessment:* The objective was to evaluate hand harvesting techniques to determine if a simple restriction on harvesting time would have a positive impact on nesting success. It was hypothesized that hand harvest of spawning animals 30 minutes after time of predicted high tide may allow most animals to successfully spawn before being harvested, without affecting harvesting totals. Juvenile horseshoe crabs in three nursery habitats were studied. An additional part of the study was to determine growth rates, survivability, age class structure, and behaviors. The methods used for the experimental harvesting were similar to that of the hand harvesters who arrive before high tide to intercept crabs before spawning. Findings suggest that waiting until after a predicted high tide to begin hand harvesting would allow females to deposit eggs. There would be sufficient quantities of animals available for harvesting after spawning occurred.

*Grantee:* Texas A&M Research Foundation, College Station, TX  
*Grant No.:* NA07FD0176 *NMFS Contact:* F/SER  
*Project Title:* Assessment of Natal Origin and Stock Structure of Atlantic Bluefin Tuna Using Otolith Elemental Fingerprints  
*Funding:* *Federal:* \$61,165 *Recipient:* \$18,334

*Assessment:* The objective was to build on two previous studies funded by the S-K Program to continue evaluating the reliability of elemental fingerprints for discriminating stocks of Atlantic bluefin tuna. Sampling efforts continued to complete the assessment of spatial and temporal stability of otolith elemental fingerprints and to quantify trace element signatures of juvenile

bluefin tuna from both the western and eastern Atlantic. The study determined the spatial and temporal stability of trace elemental fingerprints of age-0 and age-1 Atlantic bluefin tuna. Researchers also completed a procedure for isolating core material for the determination of natal origin of larger Atlantic bluefin tuna (age-2-4+).

## **FISHERIES BYCATCH**

*Grantee:* Washington Department of Fish and Wildlife, Olympia, WA  
*Grant No.:* NA06FD0278 *NMFS Contact:* F/NWR  
*Project Title:* Evaluate Tangle Nets for Selective Fishing  
*Funding:* *Federal:* \$78,377 *Recipient:* \$23,468

*Assessment:* This project attempted to evaluate the effectiveness of tangle nets for selective fishing in salmon fisheries in Washington State. The tangle net is analogous to a small meshed gill net, but rather than gilling the fish, it entangles the fish by the teeth or maxillary bones. The fish are able to continue respiring and can be released live from the net. The researchers compared catch efficiency, immediate mortality, post release mortality and capture of non-target species in each net. Results were mixed between test sites. The tangle net showed lower catch efficiency for fall chinook than the gill net, with little improvement in immediate survival. However, the tangle net was as efficient at capturing coho salmon as the gill net, and the immediate mortality and capture of bycatch were similar. Tangle nets require further testing as a live capture, selective harvest gear, but show promise for capturing salmon.

## **PRODUCT QUALITY AND SAFETY**

*Grantee:* University of Alaska, Fairbanks, AK  
*Grant No.:* NA96FD0052 *NMFS Contact:* F/AKR  
*Project Title:* Evaluation of Ozone for Ready-to-Eat Seafoods  
*Funding:* *Federal:* \$80,715 *Recipient:* \$16,143

*Assessment:* The objective of this project was to evaluate the use of ozone in seafood processing waters to establish a method for producing high quality, extended shelf life Ready-to Eat (RTE) products. Specific goals included: (1) determine ozone concentrations necessary for inactivating microbial biofilms on seafood equipment and reducing microbial counts on raw material used for ready-to-eat (RTE) production; (2) evaluate the effect of ozone on *Listeria monocytogenes* inoculated seafoods; (3) measure shelf life characteristics of ozone-treated RTE seafoods; and (4) compare ozone and chlorine treatments for RTE production in a commercial operation. Researchers found many limitations to ozone application for RTE foods. While ozone is a

potent oxidizer and can reduce bacterial levels in pure culture, it was most effectively used in this project by applying to food contact surfaces. Ozone effectively reduced bacteria on stainless steel and, to a lesser extent, on plastic cutting board material. However, applying ozone to fish fillets and roe was not an effective bacterial control method. The presence of organic material drastically reduced the effectiveness of ozone. The choice of ozone as a sanitizer is further complicated by the variability during operation and by ozone's potential health hazards. It would appear this is a difficult system to use in seafood processing plants. Therefore, ozone is recommended as a treatment for food contact surfaces, but not raw material.

*Grantee:* University of Alaska, Fairbanks, AK  
*Grant No.:* NA96FD0053 *NMFS Contact:* F/AKR  
*Project Title:* Seafood HACCP Validation Using the ATP Bioluminescent Assay  
*Funding:* *Federal:* \$63,133 *Recipient:* \$7,939

*Assessment:* The objectives of this project were to: (1) compare adenosine triphosphate (ATP) bioluminescent assays to standard aerobic plate count methods to determine surface contamination levels on processing lines, equipment surfaces, and utensils after sanitation by plant personnel; (2) compare contamination load on surfaces after different processing and sanitation shifts and correlate residual sanitizer concentration on surfaces with ATP bioluminescence levels; (3) determine if the ATP bioluminescent assay distinguishes microbial contamination of raw materials from non-microbial ATP for use as a control point at receiving; and (4) conduct in-plant workshops and demonstrations of the ATP bioluminescent assay and determine if microbial quality of raw products improves after training of plant personnel. The project goal of evaluating the practicality of the ATP bioluminescent assay as a quick, analytical measurement of sanitation effectiveness in seafood processing was met. The studies conducted in two separate plants showed differences in processing and sanitation protocols used in each facility. However, a common problem site for bacterial contamination was the use of plastic baskets for transferring salmon roe between processing stations. Greater attention to difficult-to-clean equipment such as baskets, conveyor belt links, and sponges will enhance product quality and likely increase product safety.

*Grantee:* University of Washington, Seattle, WA  
*Grant No.:* NA86FD0393 *NMFS Contact:* F/NWR  
*Project Title:* Harmful Algal Blooms and their Impacts on Shellfisheries and Finfisheries in Western Washington  
*Funding:* *Federal:* \$216,551 *Recipient:* \$38,668

*Assessment:* This project had two objectives: (1) to develop and publish a field guide to assist a broad audience in identifying marine phytoplankton; and (2) to continue field monitoring of



selected sites on the coast of Western Washington and Hood Canal (Puget Sound). A 195- page field guide was prepared by the researcher and published by BioPress Limited, Bristol, UK, entitled “A Taxonomic Guide to Some Common Marine Phytoplankton”. The field guide includes a brief description of the major taxonomic groups of phytoplankton that have harmful or potentially harmful species, photographs, descriptions and distribution records for 134 species (not all harmful), a discussion of sampling methods and sample analysis protocols, a glossary of terms and references. The guide provides individuals who have access to microscope to identify common marine phytoplankton found in temperate waters around the world. The guide is currently available for purchase.

The field monitoring was done at sites with four distinct hydrographic regimes that vary by temperature, salinity, and nutrient regimes. Potentially harmful species were found in almost all months of sampling for all sites. The open coast beaches are affected by upwelling and downwelling cycles which may bring potentially harmful cells to the coast. Puget Sound sites are more affected by local wind and tide mixing processes and breakdown of stratification. Blooms were rarely seen, which suggests that the biweekly sampling interval was too broad and sampling needed to be done more frequently to identify events that affect shellfish and finfish species.

*Grantee:* University of Massachusetts–Amherst, Amherst, MA  
*Grant No.:* NA06FD0178 *NMFS Contact:* F/NER  
*Project Title:* Improvement of Oxidative Stability of Encapsulated Fish Oil in Food Powders  
*Funding:* *Federal:* \$92,073 *Recipient:* \$33,798

*Assessment:* This project was carried out to develop the system and process for manufacturing of encapsulated fish oil powders and to investigate process and storage oxidative stability of the product when stored in different humidity environments and presence of antioxidants. Additionally, oxidation in extended storage was tested in protected environments used for products such as infant formula.

*Grantee:* University of Rhode Island, Kingston, RI  
*Grant No.:* NA06FD0179 *NMFS Contact:* F/NER  
*Project Title:* Industry Pilot to Evaluate the Ammonia Ion Selective Electrode for Use as a Simple, Rapid Determination of Seafood Quality  
*Funding:* *Federal:* \$99,265 *Recipient:* \$28,510

*Assessment:* The major project goal was to transfer ion selective electrode (ISE) technology for determining seafood quality using apparent ammonia (which was verified and validated by interlaboratory and expert sensory analyses in previous studies) to the seafood industry and

examine its use to monitor seafood quality. In partnership with Thermo Orion Corporation, a “test kit” was assembled, including the ammonia gas-sensing probe, portable pH/ISE meter, preformulated calibration standards, syringe, and adjusting solution. All participating companies in this pilot study received the test kit, on-site training, and continued assistance for the duration of the project. Five companies participated, to various levels. The industry protocol, designed for six months, was ambitious and had to be curtailed in an effort to have companies continue their participation for as long as possible. Despite several difficulties encountered during this study, valuable information was obtained. All (117) seafood samples were analyzed by the ISE method at both the company and University laboratories for apparent ammonia. Samples were also analyzed for biogenic amines and TBA (lipid oxidation marker), and 62 were sent for expert sensory assessment to NMFS in Gloucester, MA. Statistical assessment of all samples showed no significant differences ( $p>0.05$ ) between the apparent ammonia levels done by all the company and University laboratories. However, correlation to sensory assessment was low. While the sensory analysts determined that 20 samples were unacceptable, the probe indicated that only one sample had above the 20 mg/100g apparent ammonia level determined previously to be the cut-off for accepted products. Many of the samples were processed frozen fish products that could have been in storage for a long time. Since frozen products do not undergo bacterial changes, those volatile compounds measured by the ISE probe and associated with sensory attributes considered fishy, ammonia, or putrid, do not occur. However, chemical changes associated with rancidity slowly continue. The TBA analysis and sensory descriptors clearly showed that 35% of the samples that failed were due to oxidation problems--something that could not be determined by the probe. Therefore, 16-19% of the 62 samples that the panel assessed were not properly identified by the probe for pass/fail. Company evaluation of the ISE method indicated that calibration could be problematic, while sample preparation, sample assessment, and overall training were considered acceptable. Finally, the investigators should have solicited a more diversified processor group, including fresh fish processors or even retail for a better indication of the value of the ISE procedure.

The second goal of this study was to compare the quality profiles of fresh and tasteless smoked (TSS) treated Yellowfin tuna steaks. Chemical (TMA, TVB, apparent ammonia, biogenic amines), microbiological, color, and sensory profiles of treated and untreated tuna steaks were determined for steaks stored on ice and at room (21-22 °C) temperature. The TSS treated steaks showed a significantly higher ( $p<0.05$ ) microbial proliferation than the untreated at both storage temperatures. Consistent with the higher bacterial counts, apparent ammonia was significantly higher in the treated steaks during both storage conditions, and TVB was higher in the treated product held on ice. Histamine and cadavarine accumulation started earlier and reached higher levels in the untreated samples at both storage temperatures. However, the TSS were frozen until thawed for purposes of this study. The fresh product was never frozen. The frozen storage, not the TSS treatment, was most likely responsible for controlling biogenic amine formation and will be studied further. With prolonged storage, untreated steaks had significant changes for all chromaticity parameters. Overall, there were no significant changes ( $p>0.05$ ) in the color values for the treated samples at both storage temperatures. While treated samples had higher bacterial counts and ammonia and TVB levels, expert sensory evaluation indicated that the untreated

samples were rejected for decomposition sooner than TSS samples at both storage temperatures. However, the panelists indicated that they had problems identifying the typical odors normally associated with seafood quality determination and decomposition in the TSS samples. Further study is needed on both tuna and other species.

*Grantee:* University of Southern Mississippi, Hattiesburg, MS  
*Grant No.:* NA07FD0175 *NMFS Contact:* F/SER  
*Project Title:* A Histamine Dipstick Test for Spoilage in Fisheries Products  
*Funding:* *Federal:* \$57,023 *Recipient:* \$23,723

*Assessment:* The objective was to incorporate a recombinant enzyme into a second-generation histamine dipstick, which then would be compared to the standard AOAC test in a method validation study. Scombroid poisoning is a form of chemical poisoning that occurs when consumers ingest spoiled tuna and related fish. It typically is associated with high levels of histamine produced by bacterial decomposition of these fish. Because odor and appearance do not reliably indicate this type of spoilage, a simple test for histamine that can be used in widespread quality-control testing of fisheries products is needed. The investigators had previously developed such a rapid test in the form of a dipstick. Before this dipstick can be produced on a large scale in a form suitable for widespread use, the histamine-specific enzyme component needs to be produced in large quantities and optimized for the currently allowed FDA levels for histamine. However, project goals were not achieved due to lack of an abundant source of active enzyme. A dependable field test for histamine may be based on a more sensitive detection technology than the enzyme based colorimetric dipstick.

*Grantee:* North Carolina State University, Raleigh, NC  
*Grant No.:* NA67FD0500 *NMFS Contact:* F/SF2  
*Project Title:* A New Toxic Dinoflagellate Affecting Cultured and Wild Estuarine Fish—Year 2  
*Funding:* *Federal:* \$149,953 *Recipient:* \$38,932

*Assessment:* The objective was to characterize the ecological distribution, algal physiology, disease effects, and toxin of a toxic dinoflagellate discovered in the Albemarle–Pamlico Estuary. The two co-Principal Investigators pursued different aspects of the project. One investigator focused on: (1) continuing to determine the prevalence of the dinoflagellate, *Pfiesteria piscicida*, in the estuarine ecosystem, and (2) examining controlling influences of environmental variables on growth of dominant stages in the life cycle, including temperature, salinity, and nutrient levels. The other investigator primarily focused on the production of the toxin and its characterization. Research progressed to a point where no more could be done until the toxin was fully characterized. Toxin identification work is continuing under other funding mechanisms such as the Ecology and Oceanography of Harmful Algal Blooms (ECOHAB)

program.

## **AQUACULTURE**

*Grantee:* Pacific Shellfish Institute, Olympia, WA  
*Grant No.:* NA96FD0280 *NMFS Contact:* F/NWR  
*Project Title:* Probiotics to Increase Shellfish Hatchery Production  
*Funding:* *Federal:* \$99,986 *Recipient:* \$36,132

*Assessment:* The goal of this project was to test the approach of using probiotic bacteria to prevent bacterial diseases in shellfish hatcheries. The objectives were to: (1) identify and quantify probiotic activity of candidate species of bacteria; (2) confirm identity of the bacterial species; and (3) conduct laboratory tests of probiotic effectiveness to prevent bacterial disease in shellfish larva and seed. The researchers characterized both laboratory archived bacterial strains as well as 24 new isolates for probiotic activity. Significant probiotic activity was found. Characterization of 109 bacterial isolates, pathogenicity testing of a selection of the isolates, and phenotypic and phylogenetic analysis of larval oyster pathogens and related bacterial cultures were completed. To complete the third objective, three highly pathogenic isolates were confirmed and selected for both *in vitro* and *in vivo* evaluation and for challenging larval Pacific oysters and geoduck clams with and without probiotics. Several of the strong probiotic producers were pathogenic to the shellfish larvae, and others exhibited very slow growth rates. However, one probiotic candidate was found to provide partial but significant protection to larval oysters and clams challenged with pathogenic bacteria. The results indicate that successful probiotic candidates must be non-pathogenic and rapidly proliferating in order to exclude pathogens from larval cultures.

*Grantee:* Purdue University, West Lafayette, IN  
*Grant No.:* NA76FD0149 *NMFS Contact:* F/NER  
*Project Title:* Toward Sustainable Aquacultural Production Systems: Promoting Optimum Media for Nitrifying Bacteria in Recirculating Aquaculture Systems  
*Funding:* *Federal:* \$120,700 *Recipient:* \$0

*Assessment:* The objective was to evaluate the critical mineral concentrations for nitrifying bacteria in recirculating aquaculture systems. In a series of initial studies, the methods that would give precise values were defined; then, existing mineral concentrations in established systems and the ability to manipulate those values were explored. Ingredients used in experimental diets, source of water used for immersion, and concentration of feces significantly affected mineral concentrations. Several key minerals (vanadium and molybdenum) were below detectable limits. A modified mineral premix was formulated for both rainbow trout and tilapia and fed to both species. Resulting fecal material was immersed in water by methods defined in the preliminary studies and mineral concentrations determined. Using standard mineral premixes, molybdenum, iron, cobalt, copper, and zinc were not present in water after immersion

of fecal samples. Using modified mineral premixes, iron, zinc, and copper were added to the rearing water, but other critical minerals were not detected. Based on these results, critical minerals are absent from recirculating aquaculture systems, but modification of the mineral premixes can be used to add minerals.

*Grantee:* University of Texas at Austin, Austin, TX  
*Grant No.:* NA07FD0173      *NMFS Contact:* F/SER  
*Project Title:* Development of Hatchery Technologies for Snapper  
*Funding:*      *Federal:* \$169,687      *Recipient:* \$33,938

*Assessment:* The objective was to address the development of larval rearing technologies for the production of juvenile snapper for off-shore operations. The goals of the project were to: (1) diversify the number of cultured species available to the mariculturist; (2) expand the understanding of larval rearing requirements of snapper; and (3) advance commercial technologies for the production of fingerlings. Yellowtail snapper is one of several snapper species that are listed as “overfished” and it displays positive potential for development in the mariculture industry. The project examined the fatty acid requirements of yellowtail snapper larvae. No significant differences in larval growth were found among treatments fed rotifers and *Artemia* enriched with commercially available products compared to larvae fed enriched live algae. It is apparent that snapper larvae require higher levels of highly unsaturated fatty acids than other marine fish such as red drum.

*Grantee:* North Carolina State University, Raleigh, NC  
*Grant No.:* NA97FD0068      *NMFS Contact:* F/SER  
*Project Title:* Flounder Sex Determination: Biotechnology for Controlled Breeding in Fishery Enhancement and Mariculture  
*Funding:*      *Federal:* \$68,465      *Recipient:* \$48,432

*Assessment:* The objective was to develop biotechnology to enable sex control in summer (*Paralichthys dentatus*) and southern flounder (*P. lethostigma*), to benefit enhancement efforts and to improve the predictability and profitability of commercial mariculture operations. The research was accomplished and established the following: (1) the timing of sexual differentiation (precisely in southern flounder and more generally in summer flounder); (2) a strong temperature effect on sex determination in southern flounder (while female determination is maximized at intermediate temperatures, sex ratios are strongly male-skewed at high and low temperature conditions); (3) methods of chromosomal manipulation in southern flounder that effectively induce gynogenesis and production of larvae that are exclusively XX in genotype, rather than a mixture of XX or XY individuals (in permissive water temperatures, the vast majority of XX individuals should develop as females, which grow faster and much larger than

males); and (4) a biomarker for rapid and reliable assessment of sexual differentiation in flounder.

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## **VI. COMPLETED NATIONAL PROGRAM PROJECTS**

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This section contains an assessment of each S-K National Program project completed during the period June 1, 2002, to May 31, 2003, 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.:* 96-SW-02                      *NMFS Contact:* F/SWR  
*Project Title:* Develop and Test Pulsed-Power Devices  
*Funding:*        *Federal:* \$300,000

*Assessment:* The objective was to construct a pulsed-power device (PPD) that would deter California sea lions from interacting with commercial passenger fishing vessels. A contract was awarded to the Pacific States Marine Fisheries Commission to design and test the device in the field. However, due to environmental concerns and to fill some of the data gaps identified in the draft environmental assessment, a subcontract was awarded to the U.S. Navy (Marine Mammal Program) for approximately \$126,000 to test the device in a controlled laboratory setting. A behavioral response paradigm was used to measure underwater hearing thresholds in two captive California sea lions before and after exposure to underwater impulses from the PPD. Pre-exposure and post-exposure hearing thresholds were compared to determine if the subjects experienced temporary shifts in their masked hearing thresholds (MTTS). No MTTS was observed in either subject at the highest received levels. Behavioral reactions to the tests were observed in both subjects. These reactions primarily consisted of temporary avoidance of the site where exposure to the PPD impulses had previously occurred.

### **FISHERIES BYCATCH**

*Project No.:* 97-NE-13                      *NMFS Contact:* F/NER  
*Project Title:* Development of Solutions for the Problem of Entanglement of Right Whales with Fixed Fishing Gear  
*Funding:*        *Federal:* \$60,000

*Assessment:* The objective was to develop solutions to the problem of right whale entanglement with the buoy lines of fixed fishing gear. Much of the direction for this work came from a 36 member Gear Advisory Group convened in June 1997. The group consisted of commercial fishermen, gear specialists, marine mammal researchers, and state and federal representatives. Several contracts were then awarded to conduct projects in areas identified, as follows:

- The Massachusetts Department of Marine Fisheries (MADMF) conducted *in situ* observations of the configuration of gillnets and lobster gear set under a variety of conditions. Using an ROV, MADMF carried out video observations of working gear. Observations were made from 4 lobster boats from Cape Cod Bay to downeast Maine and on a gillnetter in Massachusetts Bay.
- Ohio State University conducted work to design, develop, test, and manufacture inexpensive 1100- pound- breaking-strength weak links.
- Coonemessett Farm was contracted to design modifications to “lay-down” gillnet rigging and hanging techniques, and to conduct load tests of gillnet webbing made with various twine sizes. Results were dry tested in an effort to develop a gillnet that would pose less of a threat than currently used gear.
- The University of Rhode Island performed a study leading to the estimation of tractive force for the Northern right whale, to calculate a large whale’s theoretical capacity to break free of an entanglement.

In-house activities included the design and development of underwater recording load cells capable of being set with commercial fishing gear, allowing for the measurement of loads encountered by the gear under normal fishing conditions. This ability allows for the development of reasonable criteria for establishing weak link values. Load testing equipment was purchased to allow weak links and other devices to be tested under control conditions. With baleen provided by the Smithsonian Institution, the NMFS Northeast Region’s Fisheries Engineering Group conducted tests of how knots, splices, and various types of line react when pulled through baleen. Several opportunities for testing ‘live’ baleen provided additional information.

All results were presented at Large Whale Take Reduction meetings and have influenced the development of subsequent Large Whale Take Reduction Plans. This project was very successful and provided the start for the large whale gear research program in the Northeast.

## PRODUCT QUALITY AND SAFETY

*Grantee:* Interstate Shellfish Sanitation Conference, Columbia, SC

*Grant No.:* NA97FD0087      *NMFS Contact:* F/HQ

*Project Title:* Development of a National Education Program to Influence Consumption Behavior of High-Risk Individuals Regarding Raw Molluscan Shellfish-Phase III

*Funding:*      *Federal:* \$250,000      *Recipient:* \$73,000

*Assessment:* The objective was to reduce the number of illnesses and deaths from *Vibrio vulnificus* associated with the consumption of raw oysters, by increasing awareness and preventing illness among high- risk individuals. A baseline survey was performed in core states to determine consumers' knowledge and behavior regarding raw oyster consumption. Then an educational campaign was targeted toward the at-risk population in those states. Effectiveness was evaluated at the end of the education period.



**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/CS2)  
Financial Services Division  
1315 East West Highway  
Silver Spring, Maryland 20910  
Telephone: (301) 713-2358  
Email: [alicia.jarboe@noaa.gov](mailto:alicia.jarboe@noaa.gov)**

**Kenneth L. Beal, National Marine Fisheries Service (F/NER)  
State, Federal & Constituent Programs Division  
One Blackburn Drive  
Gloucester, Massachusetts 01930  
Telephone: (978) 281-9267  
Email: [ken.beal@noaa.gov](mailto:ken.beal@noaa.gov)**

**Ellie F. Roche, National Marine Fisheries Service (F/SER)  
Cooperative Programs Division  
9721 Executive Center Drive, North  
Koger Building  
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**Patricia J. Donley, National Marine Fisheries Service (F/SWR)  
Fisheries Management Division  
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Email: [pat.donley@noaa.gov](mailto:pat.donley@noaa.gov)**

**Scott Bloom, National Marine Fisheries Service (F/PIR)  
Fisheries Management Division  
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Email: [Scott.Bloom@noaa.gov](mailto:Scott.Bloom@noaa.gov)**

**Kevin A. Ford, National Marine Fisheries Service (F/NWR)  
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7600 Sand Point Way, NE  
BIN C15700, Building 1  
Seattle, Washington 98115  
Telephone: (206) 526-6115  
Email: [kevin.ford@noaa.gov](mailto:kevin.ford@noaa.gov)**

**Barbara A. Fosburg, National Marine Fisheries Service (F/AKR)**  
**Office of Management and Information**  
**P.O. Box 21668**  
**Juneau, Alaska 99802**  
**Federal Building**  
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**Juneau, Alaska 99801**  
**Telephone: (907) 586-7273**  
**Email: [barbara.fosburg@noaa.gov](mailto:barbara.fosburg@noaa.gov)**

**APPENDIX II**

**FY 2002 S-K APPLICATIONS  
RECOMMENDED FOR FUNDING**

The first page lists the successful applications under Priority A, Atlantic Salmon Aquaculture Development Considering the Endangered Species Status of Atlantic Salmon. Since \$5 million of the expected amount was dedicated solely to projects under Priority A, these applications were considered separately in the competition from those under Priorities B-F (next three pages).

**Applications Recommended for Funding**  
**CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002A**

<u>Region</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>	
NE	1.	02-NER-002	Environmental Monitoring for Infectious Salmon Anemia Virus (ISAV) In and Around Atlantic Salmon Marine Aquaculture Sites	Micro Technologies, Inc. Richmond, ME	\$134,019	\$20,876
	2.	02-NER-004	Whole Killed ISA Virus Vaccine	Maine BioTek, Inc Winterport, ME	\$157,591	\$31,326
	3.	02-NER-021	Ensuring Biosecurity in the Atlantic Salmon Farming Industry Through a Novel Approach to Inducing Sterility: Disrupting Establishment of the GnRH System	University of Maryland Biotechnology Institute Baltimore, MD	\$159,484	\$58,321
	4.	02-NER-026	Development of Three Rapid, Sensitive Reproducible Blood Tests for the Detection of Infectious Salmon Anemia Virus	Capricorn Products, Incorporated Scarborough, ME	\$420,784	\$57,275
	5.	02-NER-029	Ultrasound Mediated Delivery of Vaccines for Aquaculture	University of Maryland Biotechnology Institute Baltimore, MD	\$150,079	\$54,724
	6.	02-NER-030	Novel Oral Vaccine for Infectious Salmon Anemia	Advanced BioNutrition Corporation Columbia, MD	\$190,400	\$56,290
	7.	02-NER-032	Evaluation of LiftUp System in the Mitigation of Environmental and Fish Disease Impacts in Net-Pen Aquaculture	MER Assessment Corporation Brunswick, ME	\$110,704	\$54,742
	8.	02-NER-036	Engineering Design and Analysis for More Secure Salmon Net Pen Systems	University of New Hampshire Durham, NH	\$491,865	\$75,814
	9.	02-NER-037	Atlantic Salmon Aquaculture Considering Endangered Status of Atlantic Salmon and Clean Water Act	University of Southern Maine Portland, ME	\$76,204	\$13,413
	10.	02-NER-039	Development of a Reverse Genetics System to Produce Live, Attenuated Infectious Salmon Anemia Virus (ISAV) Vaccine Candidates	Pisces Molecular LLC Boulder, CO	\$252,834	\$40,629
	11.	02-NER-048	The Use of Acoustic Conditioning to Reduce the Impact of Escapement in Atlantic Salmon Net Pen Aquaculture	New England Aquarium Corporation Boston, MA	\$128,845	\$23,081
	12.	02-NER-055	Tracking Experimentally Released Escaped Farmed Salmon in the Bay of Fundy Region to Determine Recapture Feasibility and Potential Interactions with Wild Atlantic Salmon	Atlantic Salmon Federation, Inc. Calais, ME	\$227,020	\$100,000
<b>Total for NE Region:</b>				<b>\$2,499,829</b>	<b>\$586,491</b>	
<b>Grand Total:</b>				<b>\$2,499,829</b>	<b>\$586,491</b>	

**Applications Recommended for Funding**  
**CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002**

<u>Region</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
AK	1. 02-AKR-003	Cook Inlet Sockeye Salmon Branding Program	Kenai Peninsula Borough Soldotna, AK	\$399,659	\$75,672
	2. 02-AKR-005	Community Impact Analysis of Alternatives to Restructure the Bristol Bay Salmon Fishery	Bristol Bay Economic Development Corporation Dillingham, AK	\$144,276	\$38,759
	3. 02-AKR-006	Designing a Fish By-Product Utilization Project for Cordova's fishing industry.	Copper River Watershed Project Cordova, AK	\$83,012	\$64,000
	4. 02-AKR-013	Economic & Resource Full Utilization of Seafood Processing Waste Stream: Discards, Underutilized Species, Byproducts & Carcasses thru Conversion to High Value Organic Composts on Industrial Scale Operation.	Kake Foods, Inc Kake, AK	\$180,634	\$180,633
<b>Total for AK Region:</b>				<b>\$807,581</b>	<b>\$359,064</b>
NE	1. 02-NER-003	A Compliance Diagnostic for the Northeast Groundfish Fishery	University of Rhode Island Kingston, RI	\$50,052	\$15,258
	2. 02-NER-008	Relating Fish Shape to Mesh Size: How Morphometric Variability Affects Trawl Net Selectivity in the Gulf of Maine	Manomet, Inc. Manomet, MA	\$92,776	\$18,877
	3. 02-NER-014	Development of the "Chub" Mackerel Fishery, an Underutilized Species	National Fisheries Institute, Inc. Arlington, VA	\$117,410	\$28,840
	4. 02-NER-015	Demonstration of Sustainable Cod Farming from Egg to Grow-out in Maine	University of Maine Orono, ME	\$358,022	\$187,883
	5. 02-NER-022	Recovery of Value from Crustacean Waste: Production and Assessment of an Improved Chitosan-based Heavy Metal Adsorbent	University of Maine Orono, ME	\$57,772	\$9,218
	6. 02-NER-023	Development of Disease Free Cod Broodstock and Juveniles for Cage Culture	Great Bay Aquaculture, LLC Portsmouth, NH	\$289,774	\$80,747
	7. 02-NER-024	Gear, Product, and Market Development for the Underutilized, Yet Burgeoning Populations of Freshwater Cod ( <i>Lota lota</i> ) in the Great Lakes	University of Michigan Ann Arbor, MI	\$120,284	\$29,791
	8. 02-NER-027	An Economic Analysis of an Alternative Atlantic Sea Scallop Management: Harvesters Cooperatives and Scallop Enhancement	University of Rhode Island Kingston, RI	\$109,894	\$29,690
	9. 02-NER-040	Further Testing of Cod Avoiding Trawl Net Designs	Massachusetts Division of Marine Fisheries Boston, MA	\$318,760	\$44,085
	10. 02-NER-045	Development of a Southern New England Working Group: Focus on Bycatch and Gear Conservation Engineering	University of Rhode Island Kingston, RI	\$52,912	\$8,043

**Applications Recommended for Funding**  
**CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002**

<u>Region</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
NE	11. 02-NER-047	Juvenile Bycatch and Survival Assessment of Spiny Dogfish ( <i>Squalus acanthias</i> ) in a Western Atlantic Trawl Fishery	New England Aquarium Corporation Boston, MA	\$169,580	\$28,147
	12. 02-NER-058	Full-time Employment and Income in New Bedford Before and After Days at Sea	University of Massachusetts, Dartmouth North Dartmouth, MA	\$79,128	\$20,201
<b>Total for NE Region:</b>				<b>\$1,816,364</b>	<b>\$500,780</b>
NW	1. 02-NWR-005	Evaluate Selective Fishing Methods	Washington Department of Fish and Wildlife Olympia, WA	\$174,370	\$35,910
	2. 02-NWR-006	Potential for Sustainable Expansion of the Dogfish ( <i>squalus acanthias</i> ) fishery in the Northeast Pacific	University of Washington Seattle, WA	\$157,431	\$25,958
	3. 02-NWR-008	Restoration and Aquaculture of Northern Abalone ( <i>Haliotis Kamtschatkana</i> ) in Washington State: Status of the Resource, Population Genetics, Habitat and Culture of Captive Abalone	University of Washington Seattle, WA	\$274,418	\$80,776
	4. 02-NWR-009	Risk Management of a New U.S. Oyster Disease Threat	Pacific Shellfish Institute Olympia, WA	\$76,791	\$14,732
<b>Total for NW Region:</b>				<b>\$683,010</b>	<b>\$157,376</b>
SE	1. 02SER004	The Effectiveness of Bycatch Reduction Devices on Crab Pots on Reducing Capture and Mortality of Diamondback Terrapins and Enhancing Capture of Blue Crabs	University of North Florida Jacksonville, FL	\$51,733	\$9,512
	2. 02SER007	Anti-V. vulnificus Oyster Defense: Its Synthesis and Use to Reduce the V. vulnificus Load in Oysters that Are to Be Eaten Raw	Louisiana State University Medical Center New Orleans, LA	\$190,189	\$98,904
	3. 02SER010	Incorporating Fisher Behavior into Management Models: A Case Study of the Reef Fish Fishery of the Eastern Gulf of Mexico	Florida State University Tallahassee, FL	\$210,425	\$37,319
	4. 02SER016	Examination of Coastal Aquaculture Effluent and Receiving Water Quality throughout the Tidal Cycle	University of Georgia Research Foundation, Inc. Athens, GA	\$94,130	\$10,470
	5. 02SER018	Effect of High Pressure Treatment on Omega-3 Fatty Acids in Fish Muscle	University of Florida Gainesville, FL	\$51,759	\$16,273
	6. 02SER019	Evaluation of Ciliate Protozoans as a First Food for Red Snapper <i>Lutjanus campechanus</i> Larvae	University of West Florida Pensacola, FL	\$87,151	\$14,426

**Applications Recommended for Funding**  
**CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002**

<u>Region</u>	<u>Proposal #</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
SE	7. 02SER021	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	South Carolina Department of Natural Resources Charleston, SC	\$175,631	\$24,884
	8. 02SER023	Characterization of Atlantic Bluefin Tuna Stock Structure Using Stable 13C & 18O Isotopes in Otolith	Texas A&M Research Foundation College Station, TX	\$112,779	\$19,946
	9. 02SER024	Purification of Lysozyme from Shell Liquor of Eastern Oysters (Crassostrea virginica) and Potential Commercial Use	Louisiana State University Agricultural Center Baton Rouge, LA	\$117,437	\$33,113
	10. 02SER031	Restoration of Bay Scallop (Argopecten irradians) Populations on the West Coast of Florida	Florida Fish and Wildlife Conservation Commission St. Petersburg, FL	\$251,979	\$44,361
<b>Total for SE Region:</b>				<b>\$1,343,213</b>	<b>\$309,208</b>
SW	1. 02-SWR-002	Measuring Impacts on Fishing Communities: A Framework for Integrated Socioeconomic Assessment	University of California, Santa Cruz Santa Cruz, CA	\$149,987	\$24,998
	2. 02-SWR-006	Pilot Project: Testing the Feasibility of Pot Gear to Catch Petral Sole and Reduce Rockfish by Catch	The Regents of the University of California Santa Cruz, CA	\$117,400	\$35,282
	3. 02-SWR-051	Specific-Pathogen-Free (SPF) Marine Shrimp Culture on Guam	University of Arizona Tucson, AZ	\$80,659	\$24,125
	4. 02-SWR-052	Broadband Sonar Identification of Hawaiian Bottom Fish Species	University of Hawaii Kaneohe, HI	\$128,155	\$14,240
<b>Total for SW Region:</b>				<b>\$476,201</b>	<b>\$98,645</b>
<b>Grand Total:</b>				<b>\$5,126,369</b>	<b>\$1,425,073</b>



**APPENDIX III**

**FY 2002 S-K APPLICATIONS  
NOT RECOMMENDED FOR FUNDING**

The first page lists the unsuccessful applications under Priority A, Atlantic Salmon Aquaculture Development Considering the Endangered Species Status of Atlantic Salmon. Since \$5 million of the expected amount was dedicated solely to projects under Priority A, these applications were considered separately in the competition from those under Priorities B-F (next five pages).

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**CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002A**


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<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funds</u>	<u>Recipient's Cost Share</u>
NE	1. Constructing a Genetic and Lipid Profile for Returning Saco River Atlantic Salmon	University of New England	\$130,534	\$49,844
	2. Evaluation of Improved Integrated Containment Technology for Atlantic Salmon Marine Net Pens in Maine	Maine Aquaculture Association	\$3,569,560	\$1,079,168
	3. An Evaluation of Improved Methods of Monitoring Sea Cage Integrity and Inventories on Atlantic Salmon Farms	Maine Aquaculture Association	\$383,016	\$88,988
	4. Bioremediation of Atlantic Salmon Hatchery Effluents	University of Southern Maine	\$162,854	\$42,098
	5. Genetic Characterization of Commercial Strains of Atlantic Salmon ( <i>Salmo salar</i> )	University of Maine	\$173,760	\$35,128
	6. The Influence of MHC Genotype on Atlantic Salmon Mortality	Purdue University	\$177,386	\$32,029
	7. Comprehensive Utilization of Processing Byproducts from Cultured Atlantic Salmon	University of Rhode Island	\$96,656	\$23,791
	8. Development and Field Trials of an Assay to Detect the Salmon-Killing Alga <i>Heterosigma akashiwo</i>	Saigene Corporation	\$231,928	\$188,924
	9. Embryonic Development of Atlantic Salmon (A Photo Essay)	Maine Department of Inland Fish & Wildlife	\$100,000	\$34,000
		<b>Total for NE Region:</b>	<b>\$5,025,694</b>	<b>\$1,573,970</b>
		<b>Grand Total:</b>	<b>\$5,025,694</b>	<b>\$1,573,970</b>

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<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funds</u>	<u>Recipient's Cost Share</u>
<b>AK</b>	1. Orca Dorsal Fin Project	Mark A. Edwards	\$23,267	\$3,173
	2. Value Added Fisheries Development	Paug-Vik, Inc., Ltd	\$439,720	\$95,665
	3. Alaska Coastal Communities Observer System / GOAC3	Gulf of Alaska Coastal Communities Coalition	\$90,400	\$13,000
	4. Fishing Capacity Reduction Under Magnuson-Stevens Act	Tanana Chiefs Conference, Inc.	\$79,738	\$22,800
	5. Utilization of Economic Discards: Developing Pure Protein Powders from By-Catch Fish.	University of Alaska, Fairbanks	\$92,142	\$17,007
	6. Rapid Ethnographic Baseline Data Collection Pilot Project	University of Rhode Island	\$89,976	\$13,676
	7. Developing Option for Processing Seafood Wastes	University of Alaska, Fairbanks	\$202,798	\$24,394
	8. General Stock Preserve Study	Cook Inlet Aquaculture Association	\$188,244	\$45,554
	9. Evaluation of stress levels and body damage to salmon sharks captured in Prince William Sound: implications for sport and commercial fisheries.	LGL Alaska Research Associates, Inc.	\$84,404	\$11,590
	10. Developing Processes and Markets for Undersized Sole and Pollock.	University of Alaska, Fairbanks	\$58,975	\$11,984
	11. Utilizing By-Catch II: Developing Processes for Improving Texture of Arrowtooth Flounder Fillets.	University of Alaska, Fairbanks	\$81,258	\$16,512
<b>Total for AK Region:</b>			<b>\$1,430,922</b>	<b>\$275,355</b>
<b>NE</b>	1. Open-Ocean Aquaculture: Applied Research in Sowing and Harvest Techniques	Seafood Divers, Inc	\$113,123	\$32,010
	2. Hooking Mortality of Summer Flounder in the Rhode Island Recreational Fishery	University of Rhode Island	\$52,410	\$17,566
	3. Environmental Monitoring for infectious Salmon Anemia Virus (ISAV) in and around Atlantic Salmon Marine Aquaculture Sites	Micro Technologies, Inc.	\$134,020	\$20,876

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**CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002**


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<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funds</u>	<u>Recipient's Cost Share</u>
NE	4. Organic Waste to Fish Food	ABRA Ltd.	\$167,550	\$37,300
	5. The Present Regulatory Structure of U.S. Marine Aquaculture: A Directory to Create Opportunity and Growth	National Fisheries Institute, Inc.	\$71,141	\$8,250
	6. Lake Whitefish Socioeconomics - A Value-Added Approach	Chippewa/Ottawa Treaty Fishery Management Authority	\$95,267	\$10,600
	7. Identifying the Causes of Groundfish Bycatch in the Gulf of Maine and Georges Bank Herring Trawl Fishery	Massachusetts Institute of Technology	\$125,000	\$16,000
	8. Winter Flounder Stock Enhancement: Double-Crested Cormorant Predation on Juvenile Fish	University of New Hampshire	\$181,868	\$29,098
	9. Hatchery Production of American Shad ( <i>Alosa sapidissima</i> ) for Stock Enhancement of New Hampshire Rivers	University of New Hampshire	\$93,788	\$10,588
	10. Development of Economically and Environmentally Sustainable Offshore Mussel Aquaculture in Southern New England	University of Rhode Island	\$252,486	\$36,680
	11. Demonstration of Cost-Effective and Environmentally-Friendly Method for Rearing Anadromous Rainbow Smelt	University of Maine	\$82,005	\$14,433
	12. Market Interactions Between Emerging Aquaculture Species and the New England Groundfish Fishery	University of Rhode Island	\$109,894	\$29,690
	13. Northeast Aquaculture Course for Regulators	Barnstable County	\$49,100	\$20,271
	14. Reduce Health Hazards from the Handling and Storage of Scombroid Fish on Fishing Vessels	Joseph W. Slavin & Associates	\$112,953	\$17,000
	15. Determination of Dietary Requirements of Juvenile Cobia ( <i>Rachycentron canadum</i> ) for Enhancement of Aquaculture Potential and Reduction of Dietary Environmental Impacts from Production Facilities	Virginia Polytechnic Institute & State University	\$111,189	\$15,327
	16. A New Role for the Commercial Fishing Fleet in Enhancing Sea Scallop Resources	Woods Hole Oceanographic Institution	\$240,986	\$26,803
	17. Comparative Growout of Scallops and Mussels in EEZ Offshore Waters and in Narragansett Bay	Woods Hole Oceanographic Institution	\$246,799	\$69,158
	18. Targeted Delivery of Probiotic Microbes to Reduce Antibiotic Use in Aquaculture	Advanced BioNutrition Corporation	\$195,103	\$42,040

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<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funds</u>	<u>Recipient's Cost Share</u>
NE	19. Incorporation of Denitrification Biofilters to Reduce Nitrogen Waste Discharge in Cold Water Recirculating Marine Aquaculture Systems	University of Maryland Biotechnology Institute	\$206,227	\$79,252
	20. "Squalus acanthias" Bycatch Mortality: Time to Recovery Following Stress Response	Trustees of Boston University	\$186,274	\$54,391
	21. A Study of Horseshoe Crab and Migratory Shorebird Interactions with the Rack and Bag Oyster Culture Operations Along the Delaware Bay	Rutgers University	\$75,199	\$17,878
	22. A Model for Measuring Local and Regional Socio-Economic Impacts of Fisheries Regulations	Maine Department of Marine Resources	\$135,869	\$30,558
	23. Community Panels for Social Science Data Collection Workshop and Second Stage	Massachusetts Fishermen's Partnership	\$156,600	\$17,488
	24. Sea Turtles and Fixed Gear: What Can You Do? -- A Workshop for Fishermen	University of Rhode Island	\$24,277	\$3,690
	25. Physiological Status of Atlantic Cod (Gadus morhua) Residing in Essential Fish Habitat or Flat Trawled Habitat	New England Aquarium Corporation	\$178,492	\$27,764
	26. Integrated marketing Research, Sensory Evaluation and Cooperative Industry Promotion of New and Promising U.S. Marine Aquaculture Products Targeted at Key Northeastern Regional Markets	University of Massachusetts - Dartmouth	\$398,385	\$63,556
27. Evaluation of the Technical Specifications of Commercially Available Gillnet Pingers	University of New Hampshire	\$34,156	\$9,765	
<b>Total for NE Region:</b>			<b>\$3,830,161</b>	<b>\$758,032</b>
NW	1. Heart Healthy Seafood Twice a Week	National Seafood Educators	\$295,253	\$32,810
	2. Decision Tools for Sustainable Communities: Linking Socioeconomics and Marine Ecosystems for West Coast Fishery Management	Ecotrust	\$275,267	\$33,628
	3. Novel Protein Recovery for Improved Yield and Funtionality, and Reduced Waste Loads	Oregon State University	\$69,421	\$16,894
	4. Utilization of Fishwaste for Organic Farming	Washington State University	\$95,119	\$16,589
	5. Activated Algal Biofiltration System for Marine Aquaculture Applications	Washington State University	\$98,955	\$12,562
<b>Total for NW Region:</b>			<b>\$834,015</b>	<b>\$112,483</b>

## CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002

<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funds</u>	<u>Recipient's Cost Share</u>
NW				
SE	1. Demonstration research and development project to strengthen and develop the fishing industry in the USVI.	Fishermen's United Services Cooperative of St. Croix	\$398,070	\$600,000
	2. Spatial Modeling for Offshore Cage Site Selection and Aquaculture Zoning in the Gulf of Mexico	Auburn University	\$195,139	\$43,963
	3. Documenting Catch Composition and Stock Assessment Parameters of the South Atlantic Commercial Rock Shrimp Fishery	Gulf & South Atlantic Fisheries Foundation	\$384,911	\$45,000
	4. Evaluation of Ciliate Protozoans as a First Food for Red Snapper <i>Lutjanus campechanus</i> Larvae	University of West Florida	\$87,151	\$14,426
	5. A Web-Based Mariculture Information System	National Fisheries Institute, Inc.	\$134,703	\$40,592
	6. Development of Novel Open Ocean Aquaculture Cages	University of Florida	\$88,393	\$9,822
	7. By-Catch Fish Culling Device "The First Mate"	Mr. Gerald W. Deshotel	\$331,296	\$36,811
	8. Blue Crab ( <i>Callinectes sapidus</i> ) Culture for Stock Enhancement in North Carolina	North Carolina Aquarium on Roanoke Island	\$47,400	\$13,150
	9. Life Histories and Habits of Non-Menhaden Baitfish in the North Central Gulf of Mexico as Indicated by Fish Health	University of Southern Mississippi	\$179,269	\$39,241
	10. Clam aquaculture leases as sources and sinks in nearshore waters	Florida Department of Agriculture and Consumer Services	\$87,000	\$11,000
	11. Benthic Habitat Mapping for Clam Aquaculture in Southwest Florida	University of South Florida	\$107,700	\$15,297
	12. Socioeconomic Impact of Fisheries Management Rules on North Carolina's Northern Commercial Fishing Communities	North Carolina Department of Environment and Natural Resources	\$147,785	\$33,035
	13. Optimization of Food Conversion & protein utilization in diets for hybrid striped bass through manipulation of macronutrients & protein sources	East Carolina University	\$104,687	\$33,962
		<b>Total for SE Region:</b>		<b>\$1,250,487</b>

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**CFDA: 11.427 - Sub Program: Competitive - RFP: FY 2002**


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<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funds</u>	<u>Recipient's Cost Share</u>
SE	14. Larval Rearing of Flounder and Sea Bass	Florida Institute of Technology	\$85,427	\$10,000
	15. Lessons Learned from Texas Shrimp Fishery's License Buyback Program	Texas Agricultural Experiment Station	\$127,194	\$47,460
	16. Over-Wintering Requirements for Red Snapper Juveniles	Auburn University	\$101,063	\$29,437
	17. Reduction of Fishing Effort and Revision of Fishing Regulations in the U.S.V.I.	Virgin Islands Division of Fish and Wildlife	\$236,803	\$0
	18. Enhancing Availability of Black Sea Bass to Consumers and Anglers. Phase 1: Refinement of Culture Technology for Production and Stocking, and Recruitment Reef Design.	South Carolina Department of Natural Resources	\$92,069	\$24,258
	19. A Program to Estimate Sea Turtle Abundance and Fishery Related Mortality Along the Northwestern Gulf of Mexico	Gulf & South Atlantic Fisheries Foundation	\$501,439	\$57,000
	20. Assessing the Feasibility of Developing Economic Data for Inclusion into Gulf Red Snapper/Red Grouper Bioeconomic Models	American Sportfishing Association	\$124,098	\$19,120
	21. Commercial Production of Bait Shrimp for the Marine Recreational Fishing Industry	Texas Agricultural Experiment Station	\$620,566	\$97,440
	22. Efficient Statistical Procedures to Evaluate Pollution Levels in Water.	University of Louisiana at Lafayette	\$106,743	\$29,473
				<b>\$4,288,906</b>
SW	1. Integrated Aquaculture of Seaweed and Fish on Molokai, Hawaii	University of Arizona	\$81,877	\$11,971
	2. Rebuilding White Abalone in Southern California: Assessment, Culture, Genetics, and Disease	California Wildlife Foundation	\$237,781	\$81,961
	3. Development of Culture Methods for the Black Abalone, Haliotis Cracherodii	Stellar Biotechnologies, Inc.	\$79,460	\$13,100
	4. Cost Effective Production of Juvenile California Halibut	University of California, Davis	\$265,784	\$83,687
	<b>Total for SW Region:</b>		<b>\$664,902</b>	<b>\$190,719</b>
		<b>Grand Total:</b>	<b>\$11,048,906</b>	<b>\$2,587,076</b>