The Saltonstall-Kennedy Grant Program: Fisheries Research and Development

REPORT
1997

August 1, 1997

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

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William M. Daley, Secretary

National Oceanic and Atmospheric Administration
D. James Baker, Under Secretary

National Marine Fisheries Service
Rolland A. Schmitten, Assistant Administrator

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I. INTRODUCTION

This report to Congress on the Saltonstall-Kennedy (S-K) Grant Program, administered by the National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, covers fiscal year (FY) 1997. The report contains information on the S-K Program regarding its legislative authority, the grant selection process, recipients, and funding information. Appendix I contains addresses of NMFS Headquarters and Regional Offices from which information regarding the S-K Program may be obtained. Appendix II contains a list of applications approved for funding from the FY 1996 S-K solicitation, and Appendix III contains a list of applications disapproved. This information was not available for publication in the FY 1996 report to Congress because funding decisions for the FY 1996 program were made in December 1996.

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

1. A description of all pending fisheries research and development projects;
2. A list of those applications approved and those disapproved and the total amount of grants made for the current fiscal year;
3. A statement of the extent to which available funds were not obligated or expended by the Secretary for grants during the current fiscal year;
4. 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; and
5. The fisheries development goals and funding priorities for a national program of research and development.

The appropriation for FY 1997 was $381,000, which was not sufficient to cover the costs of conducting an FY 1997 S-K Grant Program. Instead, a notice was published in the *Federal Register* on April 29, 1997, soliciting proposals contingent on an appropriation for FY 1998. The Administration's request for the S-K Program for FY 1998 is $4 million.

II. BACKGROUND

The S-K Act, as amended (15 U.S.C. 713c-3), provides that a fund (known as the S-K fund) will be used to provide grants for research and development projects addressed to any aspect of U.S. fisheries including, but not limited to, harvesting, processing, marketing, and associated infrastructures. 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.

Program funding priorities for the S-K Grant Program have been developed in consultation with the public, and are consistent with the goals and objectives of the NOAA Strategic Plan, which emphasizes building sustainable U.S. fisheries. The solicitation for proposals under the Grant Program, including funding priorities, application requirements, and proposal evaluation criteria, is published each year in the *Federal Register*.

Proposals received in response to the notice are evaluated by appropriate private and public sector experts for their technical merit. Comments are then solicited from representatives of various fisheries constituencies selected by the NOAA Assistant Administrator for Fisheries. These individual panelists rank proposals in terms of importance of the problem or need for funding, and provide recommendations on the level of funding. After proposals have been evaluated and ranked, recommendations for funding are developed and submitted to the Assistant Administrator, who determines the projects to be funded.

In addition, 15 U.S.C. 713c-3(d) provides authority for 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 proposals submitted under the Grant Program. In FY 1997, NMFS conducted an inhouse solicitation under the National Program for proposals dealing with priority needs that were not adequately addressed by proposals submitted under the FY 1996 Grant Program. Twenty-three projects were funded, at a total of $3.4 million, in the areas of fisheries management, bycatch, and aquaculture. FY 1996 S-K carryover funds were used for these projects. A description of each National Program project is under Section III. Pending Projects.

The S-K fund is capitalized through amounts equal to 30 percent of the gross receipts collected under the customs laws on imports of fish and fish products. The following table indicates the total duties collected on fish, the total receipts in the S-K fund for FY 1997, the amount appropriated to offset some of NOAA's costs related to operations, research and facilities (ORF), and the

amount appropriated for the S-K Program including the Grant Program, the National Program, and administrative costs.

Fiscal Year 1997
($ in millions)

Total Duties Collected on Fish	$221.3
Total S-K Transfer	66.4
ORF Offset	66.0
S-K Appropriation	0.4

(Provides funding for the competitive Grant Program, the National Program, and program administrative costs)

NOTE:

The S-K Grant Program was not conducted in FY 1997 due to the insufficient appropriation ($381,000).

III. PENDING PROJECTS

The following 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, funding levels, and the NMFS contact, addresses of whom are in Appendix I. The projects are listed by grantee within each subject area.

In addition, a description of each ongoing S-K National Program project is provided at the end of each applicable subject area section, along with the project title, funding level, and NMFS contact.

Fisheries Utilization

Grant Program

Grantee: Alaska Fisheries Development Foundation, Anchorage, AK

Grant No.: NA56FD0619 NMFS Contact: F/AKO

Project Title: Alaska Salmon: Taming the Wild Thing

Funding: Federal: $337,412 Recipient: $130,450

Description: To provide innovative product development, process evaluation, and market strategy development to achieve optimum use of the Alaska salmon resource through: (1) determination of processing, quality, and costing of intermediate and finished product manufacture; (2) formulation and processing protocol for cut, formed, and processed salmon products; and, (3) developing a strategic marketing plan and major product trials for the selected products and specific market niche(s).

Grantee: University of Alaska, Fairbanks, AK

Grant No.: NA46FD0354 NMFS Contact: F/AKO

Project Title: Utilization of Giant Grenadier (*Albatrossia pectoralis*): Abundance, Quality Factors, Product Forms and Marketing Potential

Funding: Federal: $136,497 Recipient: $0

Description: To investigate whether giant grenadier—species of groundfish that is accidentally caught and discarded as a trash fish by the Alaska groundfish trawl and longline fisheries—can be processed into useful products by: summarizing available biological and incidental catch data; measuring factors affecting the quality of the raw fish flesh; assessing the effectiveness of processing methods and methods of modifying the texture of the flesh for possible product forms; and, determining shelf life and consumer acceptance of the products.

Grantee: University of Alaska, Fairbanks, AK

Grant No.: NA76FD0034 NMFS Contact: F/AKO

Project Title: Utilization of Giant Grenadier (*Albatrossia pectoralis*) II: Production of Stabilized Mince and Development of a Promotional/Marketing Study

Funding: Federal: $ 86,543 Recipient: $17,308

Description: To develop a stabilized minced or flaked product from giant grenadier, an underutilized species. Modification to produce acceptable texture will be accomplished by removing moisture through physical means or binding moisture using food additives. Shelf life and end user evaluation of stabilized mince will follow product development. A targeted promotional effort and marketing study will introduce product forms to buyers and sellers of Alaska seafood and provide a financial feasibility study to determine economic viability of utilizing giant grenadier.

Grantee: University of Alaska, Fairbanks, AK

Grant No.: NA76FD0038 NMFS Contact: F/AKO

Project Title: Blended Seafoods: Utilizing Bycatch for New Products from Undervalued Fish

Funding: Federal: $79,920 Recipient: $15,984

Description: To develop a blended seafood product using small whitefish fillets and/or trimmings and pink or chum salmon fillets that will add value, convenience and appeal to consumers. Using surveys of institutional and retail seafood buyers, products made by varying flake size, salmon-whitefish ratios, and additives will be evaluated. Fresh and frozen shelf life, sensory profiles, and end-user analysis will complete product testing. Economic analysis will determine costs and market potential. Results will be disseminated through the Marine Advisory Program.

Grantee: Alaska Food Group, Juneau, AK

Grant No.: NA76FD0041 NMFS Contact: F/AKO

Project Title: Dried Fish Asian Market Investigation and Analysis and an Industry Demonstration Project to Produce Dried Fishery Products from Underutilized Salmon and Bycatch Species

Funding: Federal: $189,935 Recipient: $89,935

Description: To study, develop, and produce dried fish prototypes; conduct a selected international market analysis; and, provide an industry demonstration project that will produce dried, dried salted, dried seasoned, and dried smoked fishery products from underutilized Alaskan salmon and trawl-caught bycatch species.

Grantee: Oregon State University, Corvallis, OR

Grant No.: NA90AAHSK138 NMFS Contact: F/NWO

Project Title: Role of Pacific Groundfish in International Groundfish Trade - Year 2

Funding: Federal: $74,744 Recipient: $25,296

Description: To continue research to estimate existing and potential sources of world groundfish supplies, including estimates of production; determine trade flows for groundfish, including demand factors, national economic indicators, international trade factors, and characteristics of distribution networks; and, determine the role that Pacific groundfish may play in the international trade arena.

Grantee: Oregon State University, Astoria, OR

Grant No.: NA76FD0212 NMFS Contact: F/NWO

Project Title: Production of a Carnosine and Anserine-Containing Antioxidant Extract From Surimi Wash Water

Funding: Federal: $71,070 Recipient: $11,081

Description: To extract two natural antioxidants, carnosine and anserine, from surimi wash water and determine their usefulness in preventing lipid oxidation in seafood products. Researchers will evaluate microfiltration and heat coagulation processes in removing large proteins from the wash water. The extracted antioxidants will be applied to minced mackerel in an attempt to inhibit oxidative rancidity, and to red rockfish to reduce color loss.

Grantee: Milbrand Cinema, Solana Beach, CA

Grant No: NA67FD0052 NMFS Contact: F/SWO

Project Title: *Fish for Tomorrow*: An Educational Video Designed to Obtain Optimum Utilization of Harvestable Marine Resources While Continuing Economic Growth

Funding: Federal: $63,723 Recipient: $10,840

Description: To provide an instructional tool to fishermen at all levels of experience by producing an educational video to promote the importance of responsible fishing, which aids in the preservation of California's marine resources.

Grantee: Kevin G. Hart, Majuro, Marshall Islands

Grant No.: NA67FD0055 NMFS Contact: F/SWO

Project Title: Project for the Utilization of Non-Perishable Marine Resources in the Outer Atolls of the Republic of the Marshall Islands (RMI)

Funding: Federal: $37,976 Recipient: $9,600

Description: To develop new products that will utilize bycatch species and provide new industry for outer island fishermen, and to induce the government organization of RMI to participate in promoting the production and marketing of the new products.

Grantee: Rhode Island Seafood Council, Wakefield, RI

Grant No.: NA66FD0016 NMFS Contact: F/NEO

Project Title: Commercial Utilization of Atlantic Mackerel: Technology, Production and Marketing

Funding: Federal: $198,082 Recipient: $51,250

Description: To design a high-speed cutting system, adaptable to existing skinning machines, which can remove dark flesh and pin bones from Atlantic mackerel to produce boneless light meat fillet and mince blocks for further processing by industry. This is an integral step in the successful completion of a prior S-K grant to produce mackerel nuggets. The researchers will also analyze the quality parameters of fresh and frozen fillets and cryostabilization of fillets and mince blocks which are free of dark flesh. There will be commercial testing of the cutting system, as well as evaluation of the new mackerel forms. An economic analysis of production costs and a marketing analysis to assess the potential demand for these products will be completed, and a waste management plan will be developed.

Grantee: Radford University, Radford, VA

Grant No.: NA66FD0010 NMFS Contact: F/NEO

Project Title: The Arkshell Clams, *Noetia ponderosa* & *Andara ovalis* in the Oceanside Lagoon System of Virginia: A Study of Predation, Reproductive Biology, and Condition Index

Funding: Federal: $57,582 Recipient: $1,250

Description: To study the biology of the blood clams *Noetia ponderosa* and *Anadara ovalis*, which are the subject of a new fishery in Virginia. This is a continuation of an ongoing S-K study. The project includes field and laboratory predation studies, determination of condition indices throughout the year, and a detailed analysis of gametogenesis. The results of the study will be valuable in developing fishery management measures for the species.

Grantee: New England Fisheries Development Association, Boston, MA

Grant No.: NA66FD0022 NMFS Contact: F/NEO

Project Title: Overcome Barriers to Foodservice-Institutional Use of Unfamiliar Species

Funding: Federal: $79,000 Recipient: $9,000

Description: To work with foodservice professional staff to design, test, and demonstrate a comprehensive curriculum guide and a battery of teaching aids that build knowledge about and instill confidence in handling unfamiliar species. The grantee will demonstrate techniques to overcome initial resistance to unfamiliar species (due to bone structure, fat content, strong flavor, textural problems, low breading bond, high water content, and delicate flesh structure). In addition, staff training will be conducted in six locations in the Northeast to perfect the curriculum, while enhancing acceptance and use of underexploited species such as Atlantic mackerel and species that may be abundant seasonally, and which may be substituted for species that are currently over-exploited.

Grantee: Virginia Polytechnic Institute and State University, Blacksburg, VA

Grant No.: NA36FD0100-01 NMFS Contact: F/NEO

Project Title: Development of Underutilized Species: The Atlantic Mackerel Fishery

Funding: Federal: $46,335 Recipient: $29,942

Description: To provide product development work and market assessment analysis to further the ability of the U.S. Atlantic mackerel fishery to market its product, and to provide a guide for multi-disciplinary underutilized species development from "water to table." A fresh and frozen shelf-life study of Atlantic mackerel will investigate best management practices for handling Atlantic mackerel and two value-added products will also be developed.

Grantee: Puerto Rico Department of Natural and Environmental Resources, San Juan, PR

Grant No.: NA67FD0040 NMFS Contact: F/SEO

Project Title: Puerto Rico Fishery Census, 1995-96

Funding: Federal: $32,593 Recipient: $13,062

Description: To determine the total number of active commercial fishermen; to obtain information to classify each commercial fishermen as full time, part time, or helpers; to obtain information on active commercial crafts and on fishing gears; and, to determine the fishery effort. Every commercial fisherman will be identified and interviewed. Types of information the census will request include name of the fisherman, age, address, class (full time, part time, helper), number of vessels, length of vessels, and fishing category. Information will be entered into IBM-PC format using DBASE III+. Information will be analyzed and compared to the 1988 census.

Grantee: University of Massachusetts, Dartmouth, MA

Grant No.: NA76FD0108 NMFS Contact: F/NEO

Project Title: Investigate the Impact of Reduced Fresh Groundfish Supply on Processors and Wholesalers

Funding: Federal: $28,896 Recipient: $11,641

Description: To: (1) describe the current New England groundfish processing and wholesaling sectors, including the number and types of activity--primary, secondary, wholesaling, processing, transport, etc.; (2) provide an estimate of income, employment, and output of these sectors in detail and of what products are co-processed with fresh groundfish; (3) estimate the impact on the processing and wholesaling sectors of an 80% reduction in groundfishing effort phased in over a two-year period in the harvest sector; (4) identify important trade issues facing the processing and wholesaling sectors over the next ten years; and, (5) outline the outlook for processors and wholesalers of the development of international markets for underutilized New England species.

Grantee: University of Maine, Orono, ME

Grant No.: NA76FD0100 NMFS Contact: F/NEO

Project Title: Determination of Aeration Rates, End-Product Quality and Economic Analysis of In-Vessel Composting Systems for Crab Waste Products

Funding: Federal: $86,172 Recipient: $13,788

Description: To explore if crab processing waste could be economically recycled into a useful, value-added product which could be used commercially in landscaping and the nursery industry. Currently, crab processing waste is collected and hauled off-site to a landfill, a costly and environmentally unsound solution. In-vessel composting systems can overcome the problems of odor and vermin and help accelerate the breakdown of the organic components. The goal of this project is to determine the aeration rate which will accelerate the breakdown in an in-vessel system. The end-product compost will be analyzed for quality parameters, and an economic analysis will be conducted to indicate the potential practicality of the compost system for seafood processors.

Grantee: University of Massachusetts, Amherst, MA

Grant No.: NA76FD0109 NMFS Contact: F/NEO

Project Title: Commercialization of an Ultrasonic Device for Measuring Fat Content of Mackerel

Funding: Federal: $68,758 Recipient: $0

Description: To adapt an ultrasonic technique so that it can be manufactured as a commercial device which can be purchased by the fish processing industry. The device will be used as a rapid and precise method of non-destructively grading the fat content of mackerel, thereby opening up new markets for this underutilized species.

Marine Recreational Fisheries

Grant Program

Grantee: Palau Conservation Society, Koror, Palau

Grant No.: NA77FD0043 NMFS Contact: F/SWO

Project Title: Sustainable Sport Fishery Development for Palau: Demonstration Project

Funding: Federal: $103,284 Recipient: $10,000

Description: To evaluate the local sport fishery system with the involvement and assistance of the tourist sport fishermen, and to implement national and state management systems designed to support the sport fishery system. This project is the successor to an earlier S-K project which established the viability of small-scale sport fishing in Palau.

Grantee: MBC Applied Environmental Sciences, Costa Mesa, CA

Grant No.: NA76FD0050 NMFS Contact: F/SWO

Project Title: Southern California Commercial Sportfish Catch Database

Funding: Federal: $93,755 Recipient: $88,383

Description: To complete the computer entry of 29 years of California sport catch data to form a database spanning 36 years. Fishery managers, industry, researchers, and the public will have direct access to the information resource presented by this project.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA

Grant No.: NA77FD0073 NMFS Contact: F/SEO

Project Title: Analysis of the Genetic Stock Structure of the Atlantic Sailfish Using Restriction Fragment Length Polymorphism Analysis of Both Mitochondrial DNA and PCR Amplified Nuclear DNA

Funding: Federal: $62,713 Recipient: $12,859

Description: To use molecular genetic techniques to evaluate hypotheses of stock structure of the sailfish within the Atlantic Ocean.

Grantee: Florida Atlantic University, Boca Raton, FL

Grant No.: NA77FD0075 NMFS Contact: F/SEO

Project Title: Production and Testing of Immunoassay Kits for the Identification of Billfish Species

Funding: Federal: $18,000 Recipient: $1,530

Description: To produce and assemble 100 kits for in-field evaluation and identification of sailfish species, and provide these kits to NMFS scientists.

Grantee: South Carolina Department of Natural Resources, Charleston, SC

Grant No.: NA67FD0031 NMFS Contact: F/SEO

Project Title: A Cooperative Interstate Study to Evaluate Non-Reporting Rate of Recreational Anglers Who Capture Tagged Red Drum - Year 1

Funding: Federal: $88,383 Recipient: $36,979

Description: To document the non-reporting levels of anglers who capture tagged red drum in South Carolina and Georgia, and provide data useful for management of the red drum population. The resulting data can be used by the appropriate regulatory agencies (e.g., ASMFC, NMFS, and state agencies) to develop an adjustment factor for application to models evaluating fish mortality and escapement rates. The proposed study will be conducted in two estuaries in South Carolina and two in Georgia, in order to provide a sound database as well as to examine variation in reporting rate within and among states. Thus, individual correction factors can be applied for each state and/or a broad-based estimate developed and applied in modeling efforts for population dynamics of red drum in the south Atlantic region. This quantification of non-reporting for red drum should be more useful than the currently accepted (for lack of a better estimate) 50 percent non-reporting rate utilized by ASMFC.

Grantee: South Carolina Department of Natural Resources, Charleston, SC

Grant No.: NA77FD0062 NMFS Contact: F/SEO

Project Title: A Cooperative Interstate Study to Evaluate Non-reporting Level of Recreational Anglers Who Capture Tagged Red Drum - Year 2

Funding: Federal: $68,625 Recipient: $28,478

Description: To document the non-reporting level of anglers who capture tagged red drum. The resulting data can then be used by appropriate regulatory agencies to develop an adjustment factor for application to models evaluating fishing mortality and escapement rates.

Grantee: Sport Fishing Institute, Washington, DC

Grant No: NA36FD0155 NMFS Contact: F/SF

Project Title: The Effects of Fishery Regulations on Marine Recreational Fishing and the Sport Fishing Industry

Funding: Federal: $62,688 Recipient: $0

Description: To determine the impact of fisheries management alternatives on angling behavior through the use of hybrid conjoint and choice simulator models. The study will lead to a better understanding of how regulations and other factors affect fishing participation, and will allow for estimating the impacts on businesses providing goods and services to the sport fishing public.

Management Alternatives and Fisheries User Conflicts

Grant Program

Grantee: University of Alaska Fairbanks, Fairbanks, AK

Grant No.: NA76FD0032 NMFS Contact: F/AKO

Project Title: Comparison of Three Genetic Methodologies for Stock Identification of Pink, Chum, and Sockeye Salmon in the North Pacific (Phase 2)

Funding: Federal: $156,604 Recipient: $28,567

Description: To determine the relative discrimination ability of three different types of genetic data which are used or being developed for salmonid stock identification. The genetic methods to be compared are protein electrophoresis, mtDNA RFLP analysis, and single-locus micro-satellite DNA analysis. The study will compare estimates of variations within and among populations revealed by each method on collections of chum, sockeye, and both even- and odd-year pink salmon from nine populations sampled broadly across the North Pacific.

Grantee: University of Alaska, Anchorage, AK

Grant No. NA37FD0184 NMFS Contact: F/AKO

Project Title: Long-Term Effects of Limiting Access to Alaska's Sablefish and Halibut Fisheries

Funding: Federal: $318,500 Recipient: $19,532

Description: To evaluate the possible long-term consequences of adopting individual transferable quota (ITQ) management systems for the fixed-gear sablefish and halibut fisheries off Alaska. Research will focus on determining the long-term fleet configuration, distribution of the fleet and its catch, and the economic impacts resulting from this type of management system.

Grantee: University of Alaska, Fairbanks, AK

Grant No. NA36FD0178 NMFS Contact: F/AKO

Project Title: Economic Impacts of Alternative Vessel Moratorium and Gear Restrictions Management Policies in the Alaska King and Tanner Crab Fisheries

Funding: Federal: $58,428 Recipient: $53,364

Description: To assess the economic impacts of gear restriction and vessel moratorium on the Alaska king and tanner crab fisheries with regard to fulfilling management's objectives and satisfying provisions of the Magnuson Fishery Conservation and Management Act.

Grantee: University of Alaska, Fairbanks, AK

Grant No.: NA66FD0043 NMFS Contact: F/AKO

Project Title: Availability of Commercial Fish Species as Food for Marine Mammals - Year 2

Funding: Federal: $135,545 Recipient: $23,172

Description: To investigate the abundance of commercial fish species as a food supply for marine mammals using various gear types to determine distribution and abundance of juvenile and sub-adult stages of commercially and non-commercially important fishes found within foraging range of sea lion rookeries which serve as potential food for pinnipeds in the Gulf of Alaska; and, to determine inter-annual fluctuations in availability of commercially and non-commercially important demersal fishes around sea lion rookeries.

Grantee: Alaska Department of Fish & Game, Kodiak, AK

Grant No.: NA76FD0039 NMFS Contact: F/AKO

Project Title: Development of an Expert Computer-Based Imaging System to Enhance Fisheries Management of Crab and Groundfish Fisheries.

Funding: Federal: $93,695 Recipient: $13,624

Description: To adapt existing computer-based crab imaging system technology and develop new and innovative technology for use by fishers and field biologists that should lead to wiser and more profitable use of Alaska's fisheries resources, including red king crab, and commercial species of groundfish. A consortium of biologists and engineers will develop a prototype working tool for Alaska's commercial fishers. The end product will be a rugged and compact computer-based crab and groundfish identification and measuring system that should allow further utilization of the resources, reduction of bycatch, and improvement of assessment techniques.

Grantee: Washington Department of Fish and Wildlife, Olympia, WA

Grant No.: NA76FD0213 NMFS Contact: F/NWO

Project Title: Pacific Salmon Captive Broodstocks: Comparison of Reproductive Performance of Full-Siblings Reared in Fresh and Saltwater

Funding: Federal: $47,964 Recipient: $26,023

Description: To compare and analyze the effects of freshwater and saltwater captive broodstock rearing on reproductive performance of chinook salmon. Full-sibling adults and their progeny will be raised, with one-half raised in saltwater and the other half in a freshwater environment. The researchers will isolate important factors such as broodstock weight and size, progeny survival, and fertilization rates to determine optimum rearing methodology.

Grantee: Northwest Indian Fisheries Commission, Olympia, WA

Grant No.: NA56FD0578 NMFS Contact: F/NWO

Project Title: Estimation of the Stock Composition of Chum Salmon Fisheries in Puget Sound, Washington: An Improved Technical Basis for Fisheries Management - Year 2

Funding: Federal: $114,977 Recipient: $31,322

Description: To collect tissue samples from chum fisheries in central Puget Sound, Hood Canal, Port Gardner/Susan, and Skagit Bay, which will be subjected to genetics based stock identification analyses to determine stock composition. These data will aid in describing migration timing and distribution of contributing Puget Sound chum stocks, and provide improved in-season and post-season estimates of stock abundance. This study will quantify the extent to which non-local stocks contribute to each fishery.

Grantee: Northwest Indian Fisheries Commission, Olympia, WA

Grant No.: NA76FD0405 NMFS Contact: F/NWO

Project Title: Estimation of the Stock Composition of Chum Salmon Fisheries in Puget Sound, Washington: An Improved Technical Basis for Fisheries Management - Year 3

Funding: Federal: $134,856 Recipient: $33,413

Description: To collect tissue samples from chum salmon fisheries in various fisheries in Puget Sound, WA, which will be subjected to genetics based stock identification analyses to determine stock composition. These data will aid in describing migration timing and distribution of contributing Puget Sound chum stocks, and provide improved in-season and post-season estimates of stock abundance. This study will quantify the extent to which non-local stocks contribute to the terminal fisheries.

Grantee: University of Washington, Seattle, WA

Grant No.: NA76FD0299 NMFS Contact: F/NWO

Project Title: Development of a Semi-Automated Microsatellite Based Genotyping System for Kinship Analysis of Chinook Salmon

Funding: Federal: $80,145 Recipient: $11,089

Description: To develop and test a sensitive genetic tool for accurate, large scale kinship analyses of chinook salmon. This tool will permit the critical evaluation of chinook salmon restoration projects, and provide the technology needed to monitor pedigrees and avoid inbreeding in captive broodstocks. Evaluations of the system utility will be carried out at the Dungeness River Chinook Salmon Rebuilding Project.

Grantee: Hui Malama O Mo'omomi, Kaunakakai, Molokai, HI

Grant No: NA67FD0051 NMFS Contact: F/SWO

Project Title: Education in Subsistence Fishing Methods and Values: Mo'omomi Community Subsistence Fishing Area, Island of Molokai, Hawaii

Funding: Federal: $80,275 Recipient: $57,700

Description: To design and implement an education program to initiate novice fishermen in subsistence fishing methods and values and to facilitate exchange of resource knowledge between subsistence fishermen and scientifically trained fishery managers.

Grantee: University of Minnesota, Minneapolis, MN

Grant No.: NA66FD0058 NMFS Contact: F/SWO

Project Title: Investigation of Hawaiian Monk Seal, *Monachus schauinslandi*, Pelagic Habitat Use: Range and Diving Behavior

Funding: Federal: $219,610 Recipient: $11,250

Description: To investigate Hawaiian monk seal pelagic ecology and ascertain the extent of the range and diving patterns.

Grantee: The Regents of the University of California, Berkeley, California

Grant No.: NA76FD0053 NMFS Contact: F/SWO

Funding: Federal: $88,400 Recipient: $0

Project Title: Sportfish in California Waters: Seasonal and Interannual Distribution and Dependence on Oceanic Temperature

Description: To construct a database that can be used to determine the migrations and anomalies of sportfish species and determine their relationships with sea surface temperature, an objective important for fisheries management and for potential predictive models. Sportfishing logbook data for the period 1936 through 1979 will be digitized and entered into a comprehensive database which already contains sportfishing logbook data from 1980 to the present.

Grantee: Stanford University, Stanford, CA

Grant No.: NA76FD0047 NMFS Contact: F/SWO

Project Title: Molecular Genetic Analysis of Anadromous Steelhead Trout (*Oncorhynchus mykiss*) at the Southern Extent of Their Range: a Comparison of Genetic Methods

Funding: Federal: $103,821 Recipient: $29,901

Description: To conduct genetic analyses of tissues from steelhead trout. A compatible database containing the results of these different genetic analyses will allow scientists to examine the degree of stock resolution available from each technique. Correlation of data will be critical to establishing management regulations for steelhead stocks at risk and will contribute to the conservation of the species.

Grantee: University of Maine, Orono, ME

Grant No.: NA66FD0013 NMFS Contact: F/NEO

Project Title: Design Issues in a Transferable Input Management System for the New England Groundfishery

Funding: Federal: $59,343 Recipient: $9,970

Description: To apply econometric techniques for estimating production functions to NMFS data on landings and relate this to vessel or trip characteristics to address the following questions: (1) What database best measures fishing power? (2) How well do simple indices of effort measure fishing power? (3) What distortionary incentives are created by alternative indices of fishing power? (4) How can fishery management program design features (such as a transfer tax) limit distortionary incentives and deal with increased fishing power through technological change?

Grantee: University of Rhode Island, Narragansett, RI

Grant No.: NA66FD0019 NMFS Contact: F/NEO

Project Title: Seasonal Variation in Hatching and Growth of Loligo

Funding: Federal: $91,522 Recipient: $7,584

Description: To collect data from offshore and inshore sites, statistically compare sex, size, and maturity, and determine the ages of representative sub-samples from statoliths. These data will be used to develop growth models to estimate the relative importance of the various hatching groups. The results will be important for timely modifications to the fishery management plan for this species. The principal investigator has recently found that Loligo squid have a shorter life-cycle and a more variable spawning season than previously thought.

Grantee: University of Maine, Orono, ME

Grant No.: NA66FD0025 NMFS Contact: F/NEO

Project Title: Incentives for Age of Capture under Alternative ITQ Programs in the Atlantic Scallop Fishery

Funding: Federal: $48,480 Recipient: $8,145

Description: To evaluate alternative measures in an Individual Transferable Quota (ITQ) system for Atlantic scallops, especially with regard to the objective of reducing the catch of sub-optimal sized scallops. A computer model will simulate the production decisions of scallop fishermen, which will then be tested against various alternative ITQ management systems, such as traditional ITQs, bankable ITQs, transferable dynamic stock rights, area-specific ITQs, meat count/quota conversion rules, and hybrids of these systems. The analysis will include enforcement costs of the various options.

Grantee: University of Delaware, Lewes, DE

Grant No.: NA46FD0329 NMFS Contact: F/NEO

Project Title: Rapid Detection of Genetic Variation for Fisheries Stock Identification

Funding: Federal: $91,284 Recipient: $12,388

Description: To develop a simple and rapid procedure for quantifying DNA sequence variation in regions of mitochondrial and nuclear genomes. This screening method will allow for efficient selection of genes to be amplified and for efficient selection of individuals to be examined further, i.e., by RFLP analysis or direct DNA sequencing.

Grantee: Marine Biological Laboratory, Woods Hole, MA

Grant No.: NA76FD0111 NMFS Contact: F/NEO

Project Title: Determination of Spawning Success and Female Fecundity to Assess the New England Squid Fishery

Funding: Federal: $89,021 Recipient: $47,049

Description: To answer a basic biological question regarding the number of young produced by female squid. Adult *Loligo* (long-finned) squid will be caught and brought to the laboratory where spawning behavior will be observed and recorded on video-tape. The number of young per egg pod will then be determined. The results will provide direct measurements of squid fecundity, rather than relying on estimates, and this information will improve fisheries management by allowing more accurate stock descriptions.

Grantee: New York University Medical Center, Tuxedo, NY

Grant No.: NA76FD0144 NMFS Contact: F/NEO

Project Title: Mixed Stock Analysis of Wintertime Aggregations of Striped Bass along the Mid-Atlantic Coast

Funding: Federal: $80,016 Recipient: $35,901

Description: To sample wintertime aggregations of adult striped bass off the North Carolina coast, in the mouth of Delaware Bay, and along the New Jersey coast. Mitochondrial DNA and nuclear DNA genotype frequency data in a mixed stock model will be used to determine the relative contributions of the Hudson River and Chesapeake Bay stocks to these wintertime aggregations of striped bass. The results will help in the design of stock-specific management plans for Atlantic coastal striped bass.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA

Grant No.: NA76FD0146 NMFS Contact: F/NEO

Project Title: Evaluation of the Selectivity and Efficiency of Sea Scallop Trawls

Funding: Federal: $97,839 Recipient: $49,950

Description: To compare selectivity and efficiency of sea scallop dredges with scallop trawl nets as regulated by Amendment #4 to the Sea Scallop Fisheries Management Plan, and to quantify bycatch of finfish and undersized scallops (<70mm) by scallop trawls. Data on the quantity and size frequency distribution of scallops retained and discarded, finfish retained and discarded, and miscellaneous invertebrates will be obtained. Statistical treatment of catch and effort data will be used to determine and compare technical efficiency with each gear type.

Grantee: University of New Hampshire, Durham, NH

Grant No.: NA76FD0103 NMFS Contact: F/NEO

Project Title: Collaborative Decision Making Workshops

Funding: Federal: $ 25,800 Recipient: $0

Description: To provide instruction in collaborative decision making to a minimum of 200 fisheries management stakeholders from New England. Of those 200, it is hoped that within one year at least 50 will become actively involved in the fisheries management process, capitalizing on these newly learned skills.

Grantee: Gloucester Fishermen's Wives Development Programs, Inc.

Grant No.: NA76FD0112 NMFS Contact: F/NEO

Project Title: Oral History Project to Collect Traditional Ecological Knowledge (Including
Spawning Area Data) and Develop an Historical Record of Fishermen/Scientists Interactions

Funding: Federal: $54,203 Recipient: $4,750

Description: To interview fishermen to build a database of traditional spawning areas using a Geographic Information System (GIS); to secure a series of oral histories of fishermen's experiences at sea; and to document joint efforts between fishermen and scientists.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA

Grant No.: NA76FD0148 NMFS Contact: F/NEO

Project Title: Mortality and Pathophysiology Studies of Blue Crabs Infected with the Parasitic Dinoflagellate *Hematodinium perezi*

Funding: Federal: $117,868 Recipient: $13,511

Description: To examine host mortality from *Hematodinium perezi*, an internal parasite of the blue crab, and to estimate the potential loss of infected crabs to the fishery. The parasite presumably kills any blue crab that it infects; hence the pathophysiological mechanisms underlying crab mortalities will be investigated. This information may be useful for management plans in estimating the mortalities in blue crab populations.

Grantee: Dana L. Morse, Narragansett, RI

Project Title: The Effects of Bottom Ground Gear on Flatfish Catches in the Southern New England Whiting Industry

Grant No.: NA76FD0141 NMFS Contact: F/NEO

Funding: Federal: $65,339 Recipient: $2,250

Description: To make trawl fishing more selective through conservation engineering. Specific goals are to: (1) reduce the catch of flounder in whiting trawls to as low a level as possible, while retaining the ability of the gear to catch target species -- ideally, a bycatch of less than 5% of the total haul weight will be achieved; (2) provide the information from this study to the commercial industry, via popular literature, reports, conferences, etc., in order to provide alternatives to boost a troubled economic situation; and, (3) contribute to the overall understanding of the relationship between fishes and trawls, advancing the possibility of more highly selective fishing gear.

Grantee: Bio-Concept Laboratories, Inc., Salem, NH

Grant No.: NA76FD0102 NMFS Contact: F/NEO

Project Title: Bleach-Dipped Lobster Detection Technique

Funding: Federal: $ 41,179 Recipient: $9,750

Description: To refine the technique for detection of the presence of chlorine bleach on lobster swimmerettes following the illegal removal of eggs. Since the lobster resource is heavily dependent on new recruits entering the fishery, the illegal practice of "scrubbing" the eggs from "berried" females contributes to high egg mortality, and this threatens each new year class. Enforcement must have adequate tools to discourage this illegal practice. The most appropriate dye and staining technique will be determined and procedures will be established for law enforcement officers to detect and successfully prosecute lobster fishery violators who have used chlorine bleach to remove eggs from female lobsters.

Grantee: Mote Marine Laboratory, Sarasota, FL

Grant No.: NA57FD0031 NMFS Contact: F/SEO

Project Title: Reduction of Bluefin Tuna and Undersize Swordfish Bycatch in Atlantic Longline Fisheries

Funding: Federal: $128,438 Recipient: $13,804

Description: To evaluate information about depth, temperature, time, location, and other factors associated with capture of bluefin tuna, swordfish, yellowfin tuna, and other species, using hook timers and depth/time recorders on operating gear aboard commercial longliners. This information will allow fishermen to more precisely set longline gear to avoid bycatch and maximize landings of target species. A "weak link" of lighter test monofilament will also be tested to reduce giant bluefin tuna catches.

Grantee: Texas A&M Research Foundation, College Station, TX

Grant No.: NA57FD0069 NMFS Contact: F/SEO

Project Title: Genetic Studies to Determine Stock Structure of Greater Amberjack in the Gulf of Mexico and Southeastern (U.S.) Atlantic

Funding: Federal: $82,129 Recipient: $16,949

Description: To determine if discrete stocks of greater amberjack occur within or between the Gulf of Mexico and southeastern U.S. Atlantic. Restriction enzyme site variation in mtDNA will be used to: determine if significant genetic heterogeneity exists; estimate relative levels of migration/mixing; and, estimate levels of mtDNA variability on a geographic scale to define population substructuring.

Grantee: Louisiana State University, Baton Rouge, LA

Grant No.: NA57FD0070 NMFS Contact: F/SEO

Project Title: An Economic Analysis of the U.S. Shrimp Market and Impacts of Management Measures

Funding: Federal: $96,776 Recipient: $32,378

Description: To provide a current economic assessment of the U.S. shrimp fishery to be used to assess gains/losses in economic surplus from alternative management measures. A seasonal econometric model of the U.S. shrimp marketing and harvesting sector will be developed and used to analyze various regulatory options, such as closures and gear.

Grantee: Louisiana State University, Baton Rouge, LA

Grant No.: NA47FD0290 NMFS Contact: F/SEO

Project Title: Southeast Finfish Processing Activities of Federally Managed Species, Particularly Reef Fish, and Potential Impact of Regulation

Funding: Federal: $63,868 Recipient: $19,427

Description: To provide an economic analysis of the southeast finfish processing sector, specifically the reef fish fishery, to evaluate the impact of different management options. Financial and other economic data from processing operations will be collected and summarized to provide an accurate portrayal of the processing sector, on a monthly basis and by area, within the southeast region of the U.S.

Grantee: Virginia Institute of Marine Sciences, Gloucester Point, VA

Grant No.: NA67FD0038 NMFS Contact: F/SEO

Project Title: Specific Identification of Billfish Fillets Using Molecular Genetic Characters

Funding: Federal: $59,444 Recipient: $10,247

Description: To develop a molecular genetic key to the identification of billfish tissue samples that will work on market quality tissues, using techniques that can easily be employed for forensic purposes in state and Federal fisheries laboratories.

Grantee: Gulf & South Atlantic Fisheries Development Foundation, Tampa, FL

Grant No.: NA77FD0068 NMFS Contact: F/SEO

Project Title: Continuation of an Observer Program to Characterize and Compare Regional Efforts in the Directed Commercial Shark Fishery in the Eastern Gulf of Mexico and South Atlantic

Funding: Federal: $180,238 Recipient: $0

Description: To continue an important observer program that has been identified as a specific need for the better management of the shark resources of the U.S. Atlantic coast. Three observers are allocated 72 days each to monitor the shark fishing fleet in three different geographic areas which comprise the majority of the fishery landings: North Carolina, Atlantic Florida, and Gulf of Mexico Florida. Descriptive fishery statistics will be kept concerning fishing effort.

Grantee: University of South Alabama, Mobile, AL

Grant No.: NA77FD0077 NMFS Contact: F/SEO

Project Title: Monitoring the Socio-economic Impacts of Federal Regulations on Gulf of Mexico Commercial Shrimp Fishermen

Funding: Federal: $68,750 Recipient: $70,785

Description: To monitor the effects of regulations on shrimp fishermen by noting the changes in five key areas: social, economic, occupational, physical, and psychological well-being.

Grantee: University of Georgia, Athens, GA

Grant No.: NA77FD0061 NMFS Contact: F/SEO

Project Title: Assessment of Ark Populations in Whelk and Calico Scallop Fishing Grounds off the Coasts of Georgia and Florida to Determine Distribution, Abundance, and Potential Commercial Fishery Development of the Cut-Ribbed Ark (*A. floridana*) and Other Promising Ark Species

Funding: Federal: $49,521 Recipient: $23,489

Description: To determine if sufficient stocks of the cut-ribbed ark or other ark species are present in the scallop grounds off Cape Canaveral, FL or in the commercial whelk harvesting areas of Georgia.

Grantee: Texas A&M Research Foundation, College Station, TX

Grant No.: NA77FD0076 NMFS Contact: F/SEO

Project Title: Development of Microsatellite Loci for Stock Structure Study of Gulf Red Snapper

Funding: Federal: $46,389 Recipient: $13,847

Description: To develop species-specific genetic tools and background information that can be employed to address the resource-based issue of whether discrete genetic subpopulations of red snapper occur in the northern Gulf of Mexico.

Grantee: Oklahoma Department of Wildlife Conservation, Oklahoma City, OK

Grant No.: NA77FD0064 NMFS Contact: F/SEO

Project Title: Grand Lake Commercial Freshwater Mussel Stock Assessment

Funding: Federal: $33,227 Recipient: $244

Description: To quantify the freshwater mussel resource of Grand Lake. The results will provide vital baseline data for monitoring future commercial mussel harvest efforts as well as for determining the effects of the exotic zebra mussel.

Grantee: University of Georgia Research Foundation, Inc., Athens, GA

Grant No.: NA77FD0074 NMFS Contact: F/SEO

Project Title: Reproductive Parameters Needed to Evaluate Recruitment Overfishing of Spotted Seatrout in the Southeastern U.S.

Funding: Federal: $84,712 Recipient: $14,625

Description: To estimate spawning seasonality, age- and size-specific maturity, and fecundity of spotted seatrout.

Grantee: Florida Department of Environmental Protection, Tallahassee, FL

Grant No.: NA77FD0069 NMFS Contact: F/SEO

Project Title: Assessing Status and Trends of Florida's Halfbeak Fishery

Funding: Federal: $64,899 Recipient: $19,900

Description: To assess the status and trends of the halfbeak fishery based on catch rates, fishing effort, species composition, and size-structure. The secondary goal is to investigate the reproductive biology of both halfbeak species using both gonadal-somatic ratios and histological preparations of gonads.

Grantee: Skidaway Institute of Oceanography, Savannah, GA

Grant No.: NA77FD0066 NMFS Contact: F/SEO

Project Title: Use of Genetic Probes and Artificial Recruit Collectors to Monitor and Enhance the Success of Bay Scallop Reseeding Programs

Funding: Federal: $60,393 Recipient: $27,191

Description: To enhance the success of bay scallop reseedment efforts in depleted estuaries by understanding the larval ecology and improving larval recruitment of seeded populations.

Grantee: New York University Medical Center, Tuxedo, NY

Grant No.: NA77FD0071 NMFS Contact: F/SEO

Project Title: Genetic Structure, Status and Mixed Stock Analysis of Atlantic Sturgeon in the Southeastern U.S.

Funding: Federal: $175,000 Recipient: $137,336

Description: To determine how much genetic diversity is necessary for sturgeon being aquacultured (raised in captivity under "ideal" conditions) for release to increase wild stocks, and to determine which fisheries kill sturgeons either as the target species or as a bycatch species.

National Program

Project No.: 97-AK-01 NMFS Contact: F/AKO

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 National Marine Fisheries Service (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-02/NA77FD0164 NMFS Contact: F/AKO

Project Title: Monitoring and Evaluation of the Halibut and Sablefish Individual Fishing Quota (IFQ) Program

Funding: Federal: $71,820 Recipient: $4,500

Description: To correlate existing NMFS Restricted Access Management Division and Alaska Department of Fish and Game/ Commercial Fisheries Entry Commission database information to provide a detailed analysis of changes in the distribution of quota shares in the Alaska Halibut and Sablefish IFQ program to fulfill the stewardship responsibilities of NMFS and the statutory requirements of the Secretary of Commerce, and the North Pacific Fishery Management Council.

Project No.: 97-AK-03 NMFS Contact: F/AKO

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 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 conflicts between the fishing industry and the Steller sea lion recovery program.

Project No.: 97-AK-06 NMFS Contact: F/AKO

Project Title: 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. These data systems are currently not amenable to efficient retrieval of the prodigious amount and detail of information requested of the agency for research and to address information requests. 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-NW-04 NMFS Contact: F/NWO

Project Title: Pinniped-Salmonid Co-occurrence--Assessment of Potential Impacts of Pinnipeds on Salmonids in Selected Estuaries

Funding: Federal: $120,000

Description: To provide information needed by NMFS and the State of Oregon to determine where and if management actions are needed to reduce or eliminate pinniped predation impacts on the recovery of west coast salmonids. Field observations on pinniped foraging will be conducted in Oregon estuaries during salmonid migration. Information will be collected on counts of pinniped on haul-outs and in-river, foraging behavior, and observed prey consumption. Spawning escapement (run size) data will be obtained from the State and compared to pinniped occurrence and foraging behavior. Minimum estimates of pinniped predation on each salmonid run will be determined and compared to spawning escapements and preseason forecasts to assess impacts.

Project No.: 97-SW NMFS Contact: F/SWO

Project Title: Develop and Test Pulsed-Power Devices

Funding: Federal: $300,000

Description: To construct a pulsed-power device that will deter California sea lions from interacting with commercial passenger fishing vessels (CPFV). A contractor will be competitively selected to: (1) develop and construct the pulsed-power device; (2) establish safety zones for marine mammals; (3) conduct a transmission loss experiment to evaluate the appropriateness of the predicted safety zones; (4) design an experimental protocol to evaluate the effectiveness of the pulsed-power system on deterring California sea lions from interacting with CPFV operations and its effect on angler catch rates; and, (5) test the pulsed-power discharge system in waters off California.

Project No.: 97-SW-04 NMFS Contact: F/SWO

Project Title: Reconstructing Time Series of Rockfish Abundances by Conventional and Molecular Techniques

Funding: Federal: $113,000

Description: To examine the California Cooperative Oceanic and Fisheries Investigations (CalCOFI) data base from the perspective of rockfish management. Rockfish data will be summarized to provide fisheries managers with a time series on historical trends in rockfish abundances. Abundance and time series information will be assembled for familiar and newly identified rockfish species in the CalCOFI ichthyoplankton collections.

Project No.: 97-SW-05 NMFS Contact: F/SWO

Project Title: Genetic analysis of the Population Structure of Thresher Sharks (Lamnifores: *Alopiidae*) in the Northeastern Pacific Ocean

Funding: Federal: $44,000

Description: To determine genetically the stock/species structure of thresher shark stocks in the northern Pacific Ocean utilizing state of the art DNA auto-sequencing equipment.

Project No.: 97-NE-19 NMFS Contact: F/NEO

Project Title: Innovative Approach to Improve Fisheries Management

Funding: $150,000

Description: To analyze current technologies in "phone in" accounting systems for potential use in Northeast regional fishery management programs. A consulting firm will be selected using a competitive bid process to: (1) prepare a written assessment of available systems detailing features and prices; (2) present these findings to the New England Fishery Management Council and NMFS representatives; and, (3) select and oversee a test project of the most optimal system.

Project No.: 97-SE-21 NMFS Contact: F/SEO

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 examined for the presence or absence 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.

Project No.: 97-SE-23 NMFS Contact: F/SEO

Project Title: Collection of Biological Samples and Catch/Effort Data from the U.S. South Atlantic and Gulf of Mexico Headboat Fisheries

Funding: Federal: $169,664

Description: To elevate coverage under the NMFS Gulf of Mexico headboat fishery survey to the level maintained from 1986-1994. These data have been used extensively in stock assessments and other analyses to support the Fishery Management Plan for the reef fish resources of the Gulf of Mexico. In 1998, the recreational harvest of red snapper will be managed under a quota system. Landings of red snapper from the headboat fishery must be monitored for successful quota management. The project will: (1) collect length/weight data from approximately 2,000 fish/month; (2) collect biological materials (otoliths, gonads, etc.) from approximately 200 fish/month; and, (3) distribute, collect, code, and verify approximately 1,200 trip reports per month.

Project No.: 97-SF-01 NMFS Contact: F/SF

Project Title: The Federal Role in Subsidizing and Otherwise Influencing Harvesting Capacity in U.S. Fisheries

Funding: Federal: $200,000

Description: To contract for a study on the Federal government's role in: (1) subsidizing the expansion and contraction of fishing capacity in the U.S. fishing fleets; and (2) otherwise influencing the aggregate capital investments in fisheries. The study will analyze information on a number of Federal financial service programs administered by the Department of Commerce and other Federal agencies, as well as on other Federal programs and policies to determine to what degree these initiatives have influenced investment in the fisheries harvesting sector. The information will be used to help determine effective approaches to address overcapitalization in the harvesting sector.

Project No.: 97-SF-02 NMFS Contact: F/SF

Project Title: Comprehensive Management Plan for the Pelagic Longline Fishery

Funding: Federal: $50,000

Description: To contract for the design and conduct of a survey and workshops on the Atlantic pelagic longline fishery, in cooperation with the Longline Advisory Panel, in order to develop recommendations for a comprehensive management system for this fishery, including property rights-based management systems if appropriate.

Fisheries Bycatch

Grant Program

Grantee: University of Alaska Fairbanks, Fairbanks, AK

Grant No.: NA66FD0041 NMFS Contact: F/AKO

Project Title: Flatfish Size Separation in Trawl Gear: Technique to Increase Bycatch Reduction and Underutilized Species Development

Funding: Federal: $178,510 Recipient: $55,942

Description: To provide research to determine the applicability of separator panels to reducing discards in the rock sole fishery, separating flatfish species, and improving the halibut release in directed cod trawl fisheries. The result will ensure wise management of the fisheries and attainment of optimum yields from stocks, as well as preserve the integrity of the fishery; in particular, focusing on reducing the catch of male rock sole and developing techniques to separate halibut and arrowtooth flounder.

Grantee: Alaska Fisheries Development Foundation, Anchorage, AK

Grant No.: NA56FD0620 NMFS Contact: F/AKO

Project Title: Practical Application of Fishing and Handling Techniques in Estimating the Mortality of Discarded Trawl-Caught Halibut

Funding: Federal: $154,452 Recipient: $0

Description: To evaluate the practical application of two estimates of mortality of discarded trawl-caught halibut. Accurate estimates of mortality avoid damage to the halibut resource, preserve the integrity of the directed halibut fishery, and impact the amount of fishing time available to the groundfish trawl fleet.

Grantee: International Pacific Halibut Commission, Seattle, WA

Grant No.: NA66FD0049 NMFS Contact: F/AKO

Project Title: Size-Specific Spatial Dynamics of Pacific Halibut: A Key to Reduce Bycatch in the Groundfish Fisheries

Funding: Federal: $46,000 Recipient: $13,250

Description: To provide a prediction of relative Pacific halibut bycatch rates in groundfish fisheries of the Bering Sea and Gulf of Alaska, using distribution of halibut size classes and patterns of groundfish harvest, as a means of reducing halibut bycatch.

Grantee: Alaska Fisheries Development Foundation, Inc., Anchorage, AK

Grant No. NA36FD0149 NMFS Contact: F/AKO

Project Title: Trawl Cod-End Mesh Size and Shape Investigations to Reduce Catch and Discard of Undersized Pollock

Funding: Federal: $675,000 Recipient: $0

Description: To develop and test experimental cod-ends (square mesh vs. diamond mesh) designed to reduce the catch of small pollock, and estimate the short-term and long-term effects of the experimental cod-ends on the harvest, economics, and status of the pollock stocks.

Grantee: University of Alaska, Anchorage, AK

Grant No.: NA26FD0154-01 NMFS Contact: F/AKO

Project Title: Management of the Incidental Catch of Crab, Halibut, Herring, and Salmon in the Groundfish Fisheries Off Alaska

Funding: Federal: $44,436 Recipient: $7,250

Description: To extend an existing simulation model so that it covers all existing groundfish fisheries and allocational conflicts; then, test the model's ability to apportion bycatch to target fisheries by gear type and define the approach that minimizes the net cost of bycatch.

Grantee: Alaska Department of Fish and Game, Anchorage, AK

Grant No.: NA46FD0356 NMFS Contact: F/AKO

Project Title: Genetic Stock Identification of Alaska Chinook Salmon

Funding: Federal: $144,951 Recipient: $31,235

Description: To evaluate the ability of genetic data to identify stock components of the trawl bycatch in the Bering Sea, Aleutian Islands, and Gulf of Alaska.

Grantee: Fisheries Information Services, Juneau, AK

Grant No.: NA76FD0033 NMFS Contact: F/AKO

Project Title: Study of Bycatch Avoidance by Fishermen in Hook and Line Greenland Turbot Fishery

Funding: Federal: $10,806 Recipient: $0

Description: To provide: (1) a database and maps for bycatch avoidance; (2) in season hot-spot and individual-vessel monitoring in 1997; and, (3) a narrative assessment of the fishery in 3 years under three different conditions, including an analysis of which bycatch reduction approaches are most effective.

Grantee: University of Alaska Fairbanks, Fairbanks, AK

Grant No.: NA76FD0037 NMFS Contact: F/AKO

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 FITC, 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 exploited to separate flatfish species.

Grantee: Scientific Fishery Systems, Anchorage, AK

Grant No.: NA77FD004 NMFS Contact: F/SWO

Project Title: Long Range Tuna Detection

Funding: Federal: $75,000 Recipient:$0

Description: To produce a complete engineering prototype design specification and cost estimate for a high power acoustic projector coupled with an array of receivers that will detect schools of yellowfin tuna at ranges in excess of 30 km. This represents an effort to develop methods of locating schools of tuna not associated with dolphin.

Grantee: Arete Associates, Inc., Tucson, AZ

Grant No.: NA77FD0045 NMFS Contact: F/SWO

Project Title: Demonstration and Evaluation of the Streak Tube Imaging Lidar (STIL) for Use in Bycatch Reduction

Funding: Federal: $139,131 Recipient: $42,399

Description: To conduct an airborne demonstration of Streak Tube Imaging Lidar (STIL), a type of sensor system, for use in surveillance to find tuna not associated with dolphin. Data gathered from in-flight tests will be analyzed and a summary of research findings will be prepared.

Grantee: Maine Department of Marine Resources, Augusta, ME

Grant No.: NA46FD0324 NMFS Contact: F/NEO

Project Title: Lessening the Impact of the Northern Shrimp Fishery on Juvenile Groundfish in the Western Gulf of Maine

Funding: Federal: $99,240 Recipient: $46,419

Description: To provide a careful definition of the habitat in which the juvenile groundfish are found, including the physical habitat and the prey species of the juvenile groundfish. Work will focus on assessing the modification of shrimp fishing gear by using square mesh in the cod-end; assessing the effect of the use of the Nordmore grate and of the square mesh on the mesh selection curve for northern shrimp; and further characterizing the interaction between juvenile groundfish and northern shrimp.

Grantee: University of Rhode Island, Kingston, RI

Grant No.: NA46FD0325 NMFS Contact: F/NEO

Project Title: Reduction of Flatfish Bycatch in the Small Mesh Bottom Trawls Used in the New England Whiting Fishery: An Investigation of Fish Behavior and an Evaluation of Separator Trawl Technologies

Funding: Federal: $84,232 Recipient: $57,550

Description: To investigate fish behavior in the vicinity of bottom trawls using a low-light video camera system; and to develop species- or species group-specific behavioral patterns based on the video data. The researchers will utilize the results of these behavioral analyses to design innovative techniques for separating flatfish from groundfish in small mesh trawls, and conduct alternate-paired tow comparisons aboard fishing vessels to evaluate a separator trawl design.

Grantee: New England Aquarium Corporation, Boston, MA

Grant No.: NA66FD0028 NMFS Contact: F/NEO

Project Title: Selectivity and Survival of Atlantic Cod, *Gadus morhua,* and Haddock, *Melanogrammus aeglefinus,* in a Northwest Atlantic Longline Fishery

Funding: Federal: $200,000 Recipient: $80,452

Description: To examine the selectivity of commercial hook gear, i.e., hook size and shape, hook spacing, and bait size, to evaluate the claim that juvenile fish caught by hook have minimal stress, and consequently, better survival. The degree of stress induced will be analyzed through the quantification of stress parameters in the blood of the bycatch in relation to the location of hooking wounds, depth of set, and rate of gear retrieval.

Grantee: SER Enterprises, Fairhaven, MA

Grant No.: NA66FD0026 NMFS Contact: F/NEO

Project Title: Sea Scallop Dredge Finfish Excluders: Development and Demonstration of Techniques to Eliminate or Reduce the Bycatch of Finfish in the New Bedford Scallop Dredge

Funding: Federal: $101,048 Recipient: $40,333

Description: To examine a commercial scallop dredge in operation using the Towed Underwater Gear Observation System (TUGS) and a fixed camera, to evaluate gear modifications to reduce bycatch of finfish in sea scallop dredges on commercial fishing grounds. A workshop will be held in New Bedford, MA, to discuss with sea scallop fishermen the various approaches to reducing bycatch. An economic analysis will be conducted to evaluate the impact of the gear modifications. The findings will be shared with industry.

Grantee: New England Aquarium Corp., Boston, MA

Grant No.: NA77FD0105 NMFS Contact: F/NEO

Project Title: Leatherback Turtle Movements in Relation to New England Pelagic Fisheries

Funding: Federal: $81,225 Recipient: $0

Description: To place satellite tags on leatherback sea turtles on the New England pelagic fishing grounds in order to follow their movements, diving patterns, and interactions with pelagic swordfish longline and drift gill net fishing activities, in relation to oceanographic conditions. This information will be used to identify whether fishing practices can be modified to reduce incidental capture of leatherback turtles.

Grantee: Manomet Observatory for Conservation Science, Manomet, MA

Grant No.: NA76FD0110 NMFS Contact: F/NEO

Project Title: Bycatch Reduction Project

Funding: Federal: $266,139 Recipient: $254,288

Description: To develop selective trawls and lay the foundation for their use in the industry. Activities include reviewing the literature on fishing gear experiments, creating an industry advisory group, using underwater video and other electronics to analyze fish behavior with regard to standard fishing gear and gear which has been modified to increase selectivity, comparing modified gear with controls using paired tows, producing videos of the results, and distributing the new technology to the industry.

Grantee: Atlantic Gillnet Supply, Inc., Gloucester, MA

Grant No.: NA76FD0107 NMFS Contact: F/NEO

Project Title: Effectiveness of Acoustically Reflective Gillnet in Reducing/ Eliminating Marine Mammal Bycatch

Funding: Federal: $170,860 Recipient: $79,700

Description: To prepare a monofilament gillnet enhanced with acoustically reflective material and to test its efficiency during sea trials, both alone and in combination with pingers, to determine whether marine mammal bycatch can be avoided.

Grantee: Maine Department of Marine Resources, Augusta, ME

Grant No.: NA76FD0101 NMFS Contact: F/NEO

Project Title: Using Observers to Monitor Status of Atlantic Herring Spawning Stocks and Groundfish Bycatch in the Gulf of Maine.

Funding: Federal: $ 71,220 Recipient: $ 5,332

Description: To sample the extent of bycatch associated with mid-water trawling and surface purse seining for herring to see if groundfish constitute more than 5% of the catch, the current regulatory limit established by the New England Fishery Management Council. Observers will take 20 trips to sea of at least 5 consecutive days on a single fishing vessel, subsampling the catch and counting and weighing all species other than herring. The resulting data will be analyzed statistically to determine the percent of the catch which is represented by bycatch.

Grantee: South Carolina Department of Natural Resources, Charleston, SC

Grant No.: NA67FD0032 NMFS Contact: F/SEO

Project Title: Bycatch of Atlantic and Shortnose Sturgeons in the South Carolina Shad Fishery - Year 3

Funding: Federal: $37,013 Recipient: $13,169

Description: To document sturgeon bycatch, survival, age and size distributions, and relative trends; to collect tissue samples for genetic analysis. Year 2 efforts were directed toward analysis of year one data and preparations for field efforts. In year 3 a third season of sturgeon bycatch data will be collected. Field personnel will accompany commercial shad gill netters and examine all sturgeon captured. Data on survival, lengths, and weights will be recorded. Barbels (for genetic analyses) will be taken from both species, and pectoral spines (for aging) from Atlantics. Fishing effort in the area will be estimated from weekly overflights, allowing expansion of observed CPUE and survival data to the entire study area. All 3 years of data will be analyzed, with years 2 and 3 data providing information on interannual variability in bycatch, survival, and age distribution.

Grantee: Gulf and South Atlantic Fisheries Development Foundation, Inc., Tampa, FL

Grant No.: NA57FD0261 NMFS Contact: F/SEO

Project Title: Final Implementation of High-Priority Objectives of a Bycatch Reduction Research Program for the Gulf of Mexico and South Atlantic Shrimp Fishery

Funding: Federal: $601,725 Recipient: $0

Description: To place observers onboard cooperating commercial vessels for 200 days to continue quantitative data collection on bycatch composition and expand evaluations of bycatch reduction device (BRD) effectiveness (400 days) initiated with previous funding. The goal of this project is to alleviate bycatch problems in the shrimp fishery, and offer alternative management strategies.

Grantee: Texas Parks and Wildlife Department, Austin, TX

Grant No.: NA67FD0034 NMFS Contact: F/SEO

Project Title: Degradability of Natural Materials Used to Attach Escapement Panels to Blue Crab Traps in Texas Coastal Waters

Funding: Federal: $16,306 Recipient: $5,435

Description: To assess degradable qualities of four natural binding materials in construction of escapement panels on blue crab traps for use in Texas coastal waters. Three specific objectives are to: (1) determine degradability (days to failure) of four different natural binding twines *in situ* over a period of one year to simulate a trap ghost fishing; (2) correlate the days to failure of each material with water temperature, salinity, and dissolved oxygen; and, (3) compare degradability of materials between four field sites that represent a variety of fishing environments in Texas coastal waters.

Grantee: Gulf and South Atlantic Fisheries Development Foundation, Inc., Tampa, FL

Grant No.: NA77FD0067 NMFS Contact: F/SEO

Project Title: Continued Efforts to Reduce Bycatch in the Gulf of Mexico and South Atlantic Shrimp Fisheries and Disseminate Such Information to the Fishing Industry

Funding: Federal: $560,740 Recipient: $0

Description: To address the issue of bycatch in the shrimp trawl fishery of the southeast U.S. Three objectives are to: (1) continue observer coverage aboard commercial shrimp vessels evaluating the efficiency of bycatch reduction devices (BRDs); (2) provide support for additional industry contribution to the development, evaluation, or modification of existing or new BRDs; and, (3) disseminate programmatic results to the most directly affected group, the commercial shrimp fishers, through a series of workshops.

Grantee: South Carolina Department of Natural Resources, Charleston, SC

Grant No.: NA77FD0065 NMFS Contact: F/SEO

Project Title: Removing Gas from the Distended Swim Bladder of Reef Fish: Does it Really Increase Post-release Survival?

Funding: Federal: $38,196 Recipient: $9,827

Description: To reduce bycatch mortality and increase the effectiveness of management for reef fishes of the southeastern U.S. by determining whether puncturing the swim bladder affects survival.

National Program

Project No.: 97-AK-04 NMFS Contact: F/AKO

Project Title: Development of a Research Program Outlining Specific Plans for Testing the Effectiveness of Seabird Bycatch Avoidance Gear and Methods Used in the Alaskan Groundfish Longline Fisheries

Funding: Federal: $20,000

Description: To develop a research program that outlines specific plans for testing seabird bycatch avoidance gear and methods used by fishermen in the Alaskan longline fisheries. This would include: the identification of qualitative and quantitative data sources (for example, fishermen employing the required gear and methods, observers collecting data onboard these vessels, experiments performed by government agency personnel); design of statistically valid experiments to test the effectiveness of the required gear and methods; and, identification of resources needed to carry out the research program. Subsequent implementation of the research program to test the effectiveness of the seabird avoidance gear and methods could identify any appropriate revisions that may be warranted for the requirements that are currently being proposed.

Project No.: 97-AK-13 NMFS Contact: F/AKO

Project Title: Bycatch of Halibut and Sablefish as an Impediment to Development of a Commercial Fishery for Arrowtooth Flounder

Funding: Federal: $200,000

Description: To develop approaches to minimize the bycatch of halibut and sablefish in a directed arrowtooth flounder fishery. In order to develop a commercial fishery for arrowtooth flounder, the bycatch issue must be addressed. The composition, distribution, annual cycle, and natural history of the species will be examined. Historical information available from NMFS surveys will be analyzed to develop predictive models of catch composition based on environmental factors, geographic location, and time. Windows of spatial distribution of fish stocks may allow arrowtooth flounder harvesting without significant bycatch of prohibited species.

Project No.: 97-NW-01 NMFS Contact: F/NWO

Project Title: Columbia River Steelhead Stock Composition and Bycatch Monitoring Program

Funding: Federal: $125,000

Description: To characterize passage timing of selected steelhead stocks at Bonneville Dam and stock-specific impacts in both the fall and winter/spring season fisheries. The current stock composition monitoring program only distinguishes between hatchery and wild fish and Group A and Group B steelhead. The Group A/B distinction depends on assumptions related to passage timing or length information which provide conflicting results. This project will focus initially on distinguishing among ten steelhead groups.

Project No.: 97-NW-02 NMFS Contact: F/NWO

Project Title: Recreational Salmon Fishery Bycatch Assessment

Funding: Federal: $84,000

Description: To: (1) provide information necessary for evaluating the effect of selective fisheries on natural-origin chinook and coho; (2) develop estimates of encounter rates for selected Washington coastal and Puget Sound fisheries; and, (3) continue development of methods to efficiently monitor selective fisheries. Trained observers will be placed onboard recreational fishing vessels to collect information on the frequency and species of all fish encountered, including legal- and sublegal-sized chinook and coho salmon. The same fisheries will be sampled simultaneously using shore-based observers to compare the efficacy of shore-based data collection. This determination is critical because of the prohibitive cost of routine onboard monitoring.

Project No.: 97-NW-14 NMFS Contact: F/NWO

Project Title: Bycatch Reduction in the West Coast Shrimp Trawl Fishery

Funding: Federal: $168,568

Description: To adapt finfish separator technology to the west coast pink shrimp trawl fishery. Finfish bycatch can impose a burden on shrimp trawlers by increasing the cost of catch sorting, damaging the shrimp in their catch, or forcing them to leave otherwise productive grounds. The research proposed here is aimed at reducing shrimp loss rates with various existing shrimp separator designs. Commercial shrimp trawlers operating under normal fishing conditions will be employed for these studies. From the results, guidelines for troubleshooting and improving the performance of separators will be developed and communicated to fishermen and gear manufacturers on the west coast.

Project No.: 97-SW-01 NMFS Contact: F/SWO

Project Title: Determination of Viable Technical and Operational Solutions for Reduction of Economic Discards in the Northwestern Hawaiian Islands Lobster Fishery

Funding: Federal: $99,000

Description: To identify commercially viable technical or operational measures to significantly reduce lobster bycatch (economic discards) and minimize bycatch mortality in the Northwestern Hawaiian Islands lobster fishery. Previous research on retention of spiny and slipper lobsters in trapping gear will be reviewed, and current commercial post-harvest handling procedures will assessed, to determine if changes in gear or operations can be made to reduce bycatch and minimize mortality of unavoidable bycatch.

Project No.: 97-NE-13 NMFS Contact: F/NEO

Project Title: Development of Solutions for the Problem of Entanglement of Right Whales with Fixed Fishing Gear

Funding: Federal: $60,000

Description: To develop solutions to the problem of right whale entanglement with the buoy lines of fixed fishing gear. This will be accomplished with a contract to design, develop, and test a weak link which will allow the surface buoy of fixed fishing gear to separate from the line when the buoy line is snagged. The contract will also include the development of a mechanism or means to replace knots and buoy attachments with smooth transitional devices which will not hang up on the baleen or appendages of right whales.

Product Quality and Safety

Grant Program

Grantee: University of Washington, Seattle, WA

Grant No.: NA66FD0103 NMFS Contact: F/NWO

Project Title: *Heterosigma carterae:* Laboratory Induction of Toxin Production/Target Marine Species - Year 2

Funding: Federal: $106,098 Recipient: $7,522

Description: *Heterosigma* is a toxic alga known to cause mass mortalities in farmed salmon and other finfish. The researcher will utilize a *Heterosigma* isolate to determine the environmental factors that induce bloom formation and maximize toxin production. Further, the recipient will analyze the susceptibility of both vertebrate and invertebrate marine species to *Heterosigma* toxin.

Grantee: University of Washington, Seattle, WA

Grant No.: NA66FD0113 NMFS Contact: F/NWO

Project Title: Domoic Acid, Diatoms, and the Shellfish Industry in Western Washington/ Harmful Phytoplankton Blooms and Their Impacts on the Shellfish and Finfish Fisheries in Western Washington

Funding: Federal: $165,569 Year 1 Recipient: $0 Year 1
$173,888 Year 2 $0 Year 2

Description: To determine which species of algae produce domoic acid in Washington coastal waters; determine the environmental conditions that enhance or control toxin production in those species; identify factors controlling the distribution of the domoic acid-producing species; and, elucidate the role of domoic acid on the phytoplankton themselves. Domoic acid has been found in Dungeness crab and other shellfish and presents a severe health hazard to humans. Results from this work may provide needed information that will allow for an early warning of potential blooms.

Grantee: Woods Hole Oceanographic Institution, Woods Hole, MA

Grant No.: NA57FD0012 NMFS Contact: F/SWO

Project Title: A Predictive Index for Paralytic Shellfish Poisoning Events on the Northern California Coast

Funding: Federal: $42,007 Recipient: $0

Description: To investigate whether a predictive index developed for paralytic shellfish poisoning (PSP) in northwest Spain can be applied to northern California; to test the hypothesis that the onset of PSP in northern California is linked to the relaxation of upwelling and the delivery or transport of established blooms to the shore with warm, stratified offshore waters.

Grantee: PacMar, Inc., Honolulu, HI

Grant No: NA66FD0057 NMFS Contact: F/SWO

Project Title: Development of a Stock Profile for Methyl Mercury in the North Pacific Broadbill Swordfish Fishery

Funding: Federal: $240,963 Recipient: $51,062

Description: To develop a stock profile for methyl mercury in the North Pacific swordfish fishery. This profile has the potential as a predictive model to be used by industry and regulatory agencies as guidelines for identifying potential methyl mercury hazards in swordfish.

Grantee: Monterey Bay Aquarium Research Institute, Moss Landing, CA

Grant No.: NA76FD0051 NMFS Contact: F/SWO

Project Title: Rapid Detection of Harmful Algal Species and Their Associated Toxins Using DNA Probes and a Receptor Binding Assay

Funding: Federal: $128,578 Recipient: $33,673

Description: To test sea water for the presence of *Pseudonitzschia* diatoms using a probe that was developed as the result of a previous grant. If successful, a method to identify and even predict the presence of domoic acid will have been perfected. Domoic acid is a dangerous toxin that infects fish who eat the host diatoms, and in turn, poisons humans who eat infected fish.

Grantee: The Regents of the University of California, Berkeley, CA

Grant No.: NA76FD0046 NMFS Contact: F/SWO

Project Title: Investigation of the Role of Rickettsiales-Like Procaryotes in Withering Syndrome of Black Abalone: Koch's Postulates and Molecular Probes

Funding: Federal: $55,040 Recipient: $37,099

Description: To continue the ongoing investigations of the possible causes of withering syndrome, a disease that has infected and decimated abalone populations along the coast of California.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA

Grant No.: NA76FD0052 NMFS Contact: F/SWO

Funding: Federal: $118,213 Recipient: $11,993

Project Title: The Therapeutic Treatment of Abalone Infected with the Putative Agent of Abalone Withering Syndrome

Description: To test and evaluate the efficacy of several different antibiotics for the treatment of withering syndrome in abalone. Withering syndrome is a serious and, thus far, incurable disease which has decimated some populations of abalone in southern and central California waters.

Grantee: California State University, Hayward Foundation, Hayward, CA

Grant No.: NA76FD0048 NMFS Contact: F/SWO

Project Title: Using an Innovative Technique to Assess Fecal Contamination in Estuarine Waters and Shellfish

Funding: Federal: $39,613 Recipient: $24,838

Description: To investigate a new method for enhancing the recovery of certain bacteria to assess fecal contamination in estuarine waters and in shellfish. Results of this project will improve the quality and safety of commercially available shellfish.

Grantee: University of Massachusetts, Amherst, MA

Grant No.: NA66FD0020 NMFS Contact: F/NEO

Project Title: Development of Rapid Non-Destructive Technique to Measure Fat Content of Mackerel

Funding: Federal: $52,000 Recipient: $21,552

Description: To adapt an ultrasonic technique, which has already been successfully used to analyze the fat content of other foods, for use with mackerel; and to analyze the effectiveness of the technique in various locations, and the usefulness of the new process compared to the traditional ways of measuring fat content.

Grantee: Virginia Institute of Marine Sciences, Gloucester Point, VA

Grant No.: NA66FD0018 NMFS Contact: F/NEO

Project Title: An Investigation into the Epizootiology of *Hematodinium perezi*, a Parasitic Dinoflagellate in the Blue Crab, *Callinectes sapidus*

Funding: Federal: $87,523 Recipient: $12,765

Description: To examine the parasite *Hematodinium perezi* to determine its distribution and abundance in blue crabs of various ages and sizes, and if possible, to correlate parasite stages with specific host factors (molt stage, sex, life history stage, size, and population density). Since little is known about this parasite, the research seeks to clarify the potential threat to the blue crab fishery.

Grantee: University of Rhode Island, Kingston, RI

Grant No.: NA66FD0021 NMFS Contact: F/NEO

Project Title: An Inter-Laboratory Study for the Use of the Ammonia Electrode to Evaluate Seafood Quality

Funding: Federal: $53,146 Recipient: $8,712

Description: To enlist eight independent laboratories to jointly evaluate the performance of the ammonia ion-selective electrode as a rapid, simple screening procedure for seafood quality. The protocol guidelines outlined by the Association of Official Analytical Chemists (AOAC) International will be used, and total volatile base and trimethylamine analyses will also be done, where possible. The study will evaluate the success of this technique on fatty fish, in comparison to results of prior work on lean fish flesh. All data will be analyzed statistically.

Grantee: University of Rhode Island, Kingston, RI

Grant No.: NA76FD0140 NMFS Contact: F/NEO

Project Title: Standardization of the Ammonia Electrode Method for the Evaluation of Seafood Quality by Correlation to Sensory Analysis

Funding: Federal: $77,780 Recipient: $6,298

Description: To design and implement a valid sensory and analytical protocol for correlation with results obtained with an ammonia ion selective electrode (ISE) for seafood quality. The anticipated benefits will be a simple rapid procedure for screening seafood quality.

Grantee: University of Rhode Island, Kingston, RI

Grant No.: NA76FD0142 NMFS Contact: F/NEO

Project Title: Technology Development for Flavor Production from Seafood Processing Wastes

Funding: Federal: $108,123 Recipient: $28,134

Description: To refine the current enzyme hydrolysis technique for seafood flavor manufacturing and to optimize purification and concentration procedures for commercial scale-up. The overall goal is to help create a seafood flavor manufacturing industry while improving the current flavor manufacturing process.

Grantee: University of Georgia, Athens, GA

Grant No.: NA67FD0035 NMFS Contact: F/SEO

Project Title: The Effect of Phosphates on the Moisture Content of Commercial Shrimp and Their Use to Improve the Quality and Shelf Life of Frozen Breaded Shrimp

Funding: Federal: $94,219 Recipient: $40,325

Description: To treat four commercial species of shrimp with phosphates and then measure the following quality attributes of frozen breaded shrimp made from the treated raw materials: (1) water content and distribution in shrimp and breading to assess desiccation and moisture migration; (2) nutritional content; (3) amine levels; (4) rancidity; (5) phosphate levels; and, (6) sensory quality. Also, to measure moisture levels in four domestic and foreign commercially important species of freshly caught shrimp; monitor changes in the moisture content of nonbreaded shrimp after treatment with phosphates; determine moisture levels in treated and untreated shrimp after freezing; and, measure moisture levels in fresh and frozen treated and untreated shrimp harvested at different times of the year.

Grantee: University of Florida, Gainesville, FL

Grant No.: NA67FD0037 NMFS Contact: F/SEO

Project Title: Moisture Content in Penaeid Shrimp Destined for U.S. Consumption

Funding: Federal: $65,395 Recipient: $30,206

Description: To authenticate the moisture content for penaeid shrimp in an effort to address good manufacturing practices, regulatory compliance, and consumer expectations. All data will be based on authentic, verified sampling plans and analytical procedures for four domestic wild species and one primary cultured species of foreign origin. Also, to establish "natural" non-processed moisture levels, accounting for all processing steps, plus freezing methods, thawing, refreezing, use of phosphates, and cooking.

Grantee: Baylor College of Medicine, Houston, TX

Grant No.: NA77FD0080 NMFS Contact: F/SEO

Project Title: Molecular Assessment of Public Health Suitability of Shellfish for Human Consumption

Funding: Federal: $183,680 Recipient: $0

Description: To develop methods for the detection of potentially infectious human caliciviruses that will contribute directly to improve shellfish safety and will provide the tools needed for a better understanding of the epidemiology and transmission of these viruses.

Grantee: Mote Marine Laboratory, Sarasota, FL

Grant No.: NA77FD0081 NMFS Contact: F/SEO

Project Title: Utilization of Molecular Biomarkers to Provide an Assay for Shellfish Exposure to Polyether Toxins from Harmful Algal Blooms

Funding: Federal: $212,883 Recipient: $68,910

Description: To determine the sensitivity and selectivity of protein biomarkers for toxin exposure. Clams will be exposed to known concentrations of *G. breve* at Mote Marine Laboratory. Extracts of select tissue will be analyzed for brevetoxin content by HPLC and by receptor binding assay. An aliquot of the extracts will be assayed by one-dimensional electrophoresis to determine the time course of expression and extinction of the protein biomarkers relative to toxin content and animal testing.

Grantee: University of Florida, Gainesville, FL

Grant No.: NA77FD0079 NMFS Contact: F/SEO

Project Title: Critical Control Limits, Infective Dose, and Prevalence of Pathogenic Vibrio Species in Shellfish Products

Funding: Federal: $95,660 Recipient: $37,278

Description: To determine levels of *V. vulnificus* that pose human health risks, the critical controls that can maintain *V. vulnificus* at safe concentrations in shellfish products, and the prevalence of pathogenic *Vibrio* spp. in the environment.

Grantee: University of North Carolina, Charlotte, NC

Grant No: NA36FD0271 NMFS Contact: F/SF

Project Title: Detection and Enumeration of Viable but Nonculturable *Vibrio vulnificus*

Funding: Federal: $108,808 Recipient: $0

Description: To develop methods for the differentiation and enumeration of *Vibrio vulnificus* cells present in the environment in the "viable but nonculturable" state.

Grantee: CAS-Emcon Marine Sciences, Inc., Carlsbad, CA

Grant No.: NA37FD0193 NMFS Contact: F/SF

Project Title: P-450 RGS: A Rapid, Inexpensive Screening Test for Seafood Contamination

Funding: Federal: $168,736 Recipient: $7,180

Description: To develop and refine the Reporter Gene System (RGS) for use in rapid screening of seafood products for the presence of toxic, carcinogenic or mutagenic contaminants; to transfer this capability to a commercial laboratory; and to provide guidance for the potential transfer to government laboratories. Use of this approach on field-collected or shipped samples will test the ability of the method to screen actual samples and compare the responses of the RGS to chemical analyses.

Grantee: University of Maryland, Baltimore, MD

Grant No.: NA36FD0224 NMFS Contact: F/SF

Project Title: Rapid Identification and Enumeration of *Vibrio vulnificus*, and its Application to Aquaculture and Seafood Safety

Funding: Federal: $ 60,000 Yr. 1 Recipient: $7,953 Yr. 1
$ 108,372 Yr. 2 $5,200 Yr. 2

Description: To identify and further characterize factors which may contribute to the ability of *Vibrio vulnificus* to cause human diseases.

Grantee: North Carolina State University, Raleigh, NC

Grant No.: NA67FD0500 NMFS Contact: F/SF

Project Title: A New Toxic Dinoflagellate Affecting Cultured and Wild Estuarine Fish - Year 2

Funding: Federal: $149,953 Recipient: $38,932

Description: To characterize the ecological distribution, algal physiology, disease effects, and toxin of a new toxic dinoflagellate recently discovered in the Albelmarle-Pamlico Estuary. The data will provide critical information needed to assess the impact that this toxic dinoflagellate has on wild and cultured fish populations.

Grantee: Regents of the University of California, Berkeley, CA

Grant No: NA47FD0416 NMFS Contact: F/SF

Project Title: Microbial Safety: Rapid Methods for Shellfish and Seawater-Injured *E. coli*

Funding: Federal: $72,209 Recipient: $29,034

Description: To complete the final development of a rapid, sensitive, and more simplified test for the detection of *E. coli* in shellfish. The method will reduce by 50% the time and labor required for current routine microbiological screening of molluscan shellfish. It will also increase the sensitivity, making it easier to investigate whether low concentrations of *E. coli* correlate well with other indicators of possible hazards. The new test will make *E. coli* enumeration simple enough to incorporate into HACCP plans and seafood microbiological standards.

Grantee: University of Southern Mississippi, Hattiesburg, MS

Grant No.: NA66FD0091 NMFS Contact: F/SF

Project Title: A Putrescine/Cadaverine Dipstick Test for Decomposition

Funding: Federal: $51,179 Recipient: $33,122

Description: To develop a simple and rapid method for detecting toxic levels of microbially produced putrescine and cadaverine in tuna and other fish.

National Program

Grantee: Interstate Shellfish Sanitation Conference

Grant No.: NA67FD0260 NMFS Contact: F/SEO

Project Title: *Vibrio vulnificus* Model Education Campaign

Funding: Federal: $250,000 Recipient: $55,920

Description: To minimize the number of illnesses and deaths resulting from the bacterial pathogen, *Vibrio vulnificus,* by educating high risk consumers to avoid consumption of raw oysters. The primary objective will be to increase the number of high-risk consumers who (1) receive and understand the message (comprehension) and (2) say they would not eat raw oysters (behavior change). This project will also attempt to reach individuals who are at risk and are unaware of their existing medical condition.

Aquaculture

Grant Program

Grantee: University of Alaska Southeast, Juneau, AK

Grant No.: NA46FD0355 NMFS Contact: F/AKO

Project Title: Nori Cultivation: Physiological Ecology of Native Alaskan Porphyra Species - Year 1

Funding: Federal: $137,070 Recipient: $20,338

Description: To define the physical, chemical, biological, and ecological characteristics necessary to cultivate successfully some red marine algae (seaweed, known in Japan as "laver" or "nori"), with a goal of eventually developing a seaweed aquaculture industry for Alaska.

Grantee: University of Alaska Southeast, Juneau, AK

Grant No.: NA66FD0044 NMFS Contact: F/AKO

Project Title: Nori Cultivation: Physiological Ecology of Native Alaskan Porphyra Species - Year 2

Funding: Federal: $117,166 Recipient: $16,521

Description: To define the physical, chemical, biological, and ecological characteristics necessary to cultivate successfully some red marine algae (seaweed, known in Japan as "laver" or "nori"), with a goal of eventually developing a seaweed aquaculture industry for Alaska.

Grantee: University of Alaska Southeast, Juneau, AK

Grant No.: NA76FD0035 NMFS Contact: F/AKO

Project Title: Nori Cultivation: Physiological Ecology of Native Alaskan Porphyra Species - Year 3

Funding: Federal: $151,351 Recipient: $33,149

Description: To determine the physiological and ecological conditions for the successful cultivation of native Porphyra species in the state of Alaska. Laboratory experiments will determine or confirm the optimal culture conditions for growth and maturation of conchocelis and release of conchospores of up to four Alaskan species of Porphyra with commercial aquaculture potential.

Grantee: University of Alaska, Fairbanks, AK

Grant No.: NA46FD0352 NMFS Contact: F/AKO

Project Title: A Low-Cost Rearing Method for Alaskan Oyster Spat

Funding: Federal: $47,607 Recipient: $0

Description: To examine the use of phytoplankton mass cultured in outdoor saltwater ponds using artificially upwelled water as the culture medium to accelerate the growth of newly-settled Pacific oyster spat. The results will be compared to literature values, and a cost-benefit analysis of the outdoor mass culture method vs. the single species method will be performed.

Grantee: Qutecak Native Tribe, Seward, AK

Grant No.: NA66FD0045 NMFS Contact: F/AKO

Project Title: Broodstock Selection and Hatchery Development of Purple-Hinged Rock Scallops, *Crassodoma gigantea*, for Marine Aquaculture.

Funding: Federal: $69,795 Recipient: $35,145

Description: To develop sources of purple-hinged rock scallop seedstock suitable for use in suspended culture and develop or demonstrate cost-effective approaches for advancing environmentally sound private aquaculture development.

Grantee: University of Washington, Seattle, WA

Grant No.: NA66FD0099 NMFS Contact: F/NWO

Project Title: Development of Protocols for Pacific Halibut Enhancement

Funding: Federal: $116,454 Recipient: $0

Description: To develop effective methods of broodstock maintenance, optimal environmental conditions for holding larvae, and an appropriate feeding protocol that converts postlarvae from live to prepared feeds using experimental rations. A key impediment preventing the successful rearing of Pacific halibut has been the inability to develop a methodology to produce post larval halibut.

Grantee: Oregon State University, Corvallis, OR

Grant No.: NA66FD0107 NMFS Contact: F/NWO

Project Title: Microencapsulated Delivery of Amino Acids to Striped Bass and Other Altricial Larvae

Funding: Federal: $169,897 Recipient: $33,393

Description: To evaluate the usefulness of lipid-walled microcapsules in enhancing the delivery of dietary amino acids and stimulation of feeding behavior of striped bass larvae. Although striped bass is the target species of this research, results and methods will be applicable to other species of finfish. The development of finfish aquaculture in the U.S. is impeded by a lack of high quality micro-particulate diets that are digestible and meet the nutritional needs of larvae.

Grantee: Oregon State University, Newport, OR

Grant No.: NA66FD0110 NMFS Contact: F/NWO

Project Title: Conservation of Commercial Kumamoto Oyster Broodstock

Funding: Federal: $81,890 Recipient: $12,465

Description: To produce a pure Kumamoto oyster, which will require the redevelopment of the broodstock. West Coast oyster growers are finding that Kumamoto oyster seed is producing a hybridized Kumamoto and Pacific oyster, which has less value in the marketplace. The recipient will obtain samples of broodstock from participating farms and determine which are pure Kumamoto, and will cull those which carry the Pacific oyster genes. Further, the recipient will attempt to obtain pure Kumamoto oysters at traditional growout sites, in order to bolster a pure Kumamoto broodstock for commercial use.

Grantee: Pacific Shellfish Institute, Olympia, WA

Grant No.: NA66FD0123 NMFS Contact: F/NWO

Project Title: Oyster Seed Mortality Prevention

Funding: Federal: $97,335 Recipient: $34,275

Description: To attempt to determine precise causes of seed mortality by detailing seed growth and health; compare the growth and health of diploid and triploid oysters; publish a description of the histological development of oyster seed; and, develop a protocol for the examination and diagnosis of juvenile oyster diseases.

Grantee: Washington State University, Pullman, WA

Grant No.: NA26FD0110-01 NMFS Contact: F/NWO

Project Title: Improved Fertilization Solutions for Cryopreserved Salmonid Sperm

Funding: Federal: $54,479 Recipient: $8,378

Description: To develop improved conditions so that sperm cryopreservation can be easily and reproducibly applied in salmonid enhancement and aquaculture projects. The researchers will compare motility and fertilization rate with cryopreserved sperm and various fertilization solutions. They will also examine the effect of varying concentrations of egg yolk, which has been identified as a critical variable, in the extender solution for the sperm cryopreservation.

Grantee: Black Pearls, Inc., Holualoa, HI

Grant No: NA57FD0083 NMFS Contact: F/SWO

Project Title: The Hawaiian Black-Lip Pearl Oyster: Restoring the Stocks, Re-establishing the Pearl Shell Fishery and Evaluating the Potential for Reef Ranching and Pearl Farming

Funding: Federal: $91,034 Recipient: $12,050

Description: To begin the restoration of the Hawaiian black-lip pearl oyster by developing methods to re-establish and enhance the commercial pearl shell fishery, and by assessing the potential for extensive reef ranching for pearl shell production and/or pearl farming in Hawaii. Baseline population data will be obtained to allow future monitoring of changes in standing stocks or recruitment. Methods of reef re-seeding of hatchery-produced spat will be tested, and data from these tests will be used to assess the viability of reef ranching or farming black pearls.

Grantee: The Regents of the University of California, Oakland, CA

Grant No: NA66FD0050 NMFS Contact: F/SWO

Project Title: Rock Scallop Culture: Optimizing Growth Rates Through the Manipulation of Attachment and Water Movement

Funding: Federal: $14,531 Recipient: $5,273

Description: To conduct laboratory experiments to further define factors impacting rock scallop growth and thus advance the aquaculture potential of this animal.

Grantee: Black Pearls, Inc., Holualoa, HI

Grant No: NA66FD0056 NMFS Contact: F/SWO

Project Title: Remote Hatchery Production of Pearl Oyster Spat for Commercial Black Pearl Farms in the Marshall Islands

Funding: Federal: $96,695 Recipient: $59,543

Description: To investigate and develop the commercial feasibility of using a remote hatchery in Hawaii to provide pearl oyster spat to commercial black pearl farms in the Marshall Islands and throughout Micronesia.

Grantee: Marine Resources Management Division, Colonia, Yap FSM

Grant No: NA67FD0053 NMFS Contact: F/SWO

Project Title: *Trochus* Reseeding in the Outer Islands of Yap State, FSM

Funding: Federal: $12,040 Recipient: $11,847

Description: To seed and establish reproducing populations of the commercial topshell, *Trochus niloticus*, in the remaining outer islands of Yap State.

Grantee: Black Pearls, Inc., Holualoa, HI

Grant No.: NA76FD0054 NMFS Contact: F/SWO

Project Title: The Hawaiian Pearl Oyster Partnership: a Public-Private Initiative for Commercial Pearl Oyster Farming and a Test Case of Ocean Leasing Laws

Funding: Federal: $99,540 Recipient: $15,557

Description: To develop a public/private partnership between the State of Hawaii and private interests to establish ocean leasing for aquaculture in Hawaii. The grantee will attempt to obtain the first commercial aquaculture ocean lease and establish a farm/reproductive reserve for a species that was once abundant in the main Hawaiian Islands but is now considered rare.

Grantee: Hubbs-Sea World Research Institute, San Diego, CA

Grant No.: NA76FD0049 NMFS Contact: F/SWO

Project Title: Commercialization of White Seabass Aquaculture, Pilot Program Grow-Out to Market

Funding: Federal: $208,982 Recipient: $72,494

Description: To test the commercial feasibility of white seabass aquaculture from grow-out to market. Currently, white seabass are raised to small sizes for use only in stock enhancement. This project will grow the fish to a larger size and attempt to introduce the fish in the commercial market to test the technical and economic feasibility of a commercial white seabass aquaculture operation.

Grantee: Ohio State University Research Foundation, Columbus, OH

Grant No.: NA66FD0029 NMFS Contact: F/NEO

Project Title: Domestication of Lake Whitefish, *Coregonus clupeaformis:* Production of Broodstock and Assessment of Gamete Quality

Funding: Federal: $101,005 Recipient: $6,526

Description: To determine the optimum diet formulation for lake whitefish broodstock by substituting analogs (mixtures of animal byproducts such as blood or feathers) for fish meal in the diet formulation. The fish meal will be replaced by analog concentrations of 25, 50, or 75 percent. Gamete ripening and steroid hormone correlations in both sexes will be monitored during the yearly cycle. The researchers will examine female fecundity, biochemical composition of eggs, and survival of embryos and fry after different dietary treatments. Males will be examined for milt density, motility, and fertility after cryopreservation. The primary objective of the modified diet would be its lower cost, assuming no decline in the overall health and reproductive potential of the broodstock fish, and this naturally translates to greater profitability for the aquaculture operation.

Grantee: Westport Fishing Corporation, New Bedford, MA

Grant No.: NA66FD0027 NMFS Contact: F/NEO

Project Title: Sea Scallop Enhancement and Sustainable Harvesting

Funding: Federal: $157,000 Recipient: $156,936

Description: To separate sub-marketable sea scallops taken during normal fishing operations and transport them to a grow-out site which eight fishing vessels will share, each with its own lane within the area. In addition to open bottom culture, some scallops will be kept in cages on the bottom, or in cages in the water column, for growth comparisons. Underwater video cameras (TUGOS) will be used to monitor scallop activity and bottom conditions. An economic analysis will assess the entire operation and the results will be shared with the fishing industry.

Grantee: New England Fisheries Development Assn., Boston, MA

Grant No.: NA66FD0023 NMFS Contact: F/NEO

Project Title: A New Harvest: Sea Scallop Enhancement and Culture in New England

Funding: Federal: $265,548 Recipient: $34,074

Description: To collect scallop spat from promising locations using traditional and new gear. The spat will be cultured to 5-10 mm at the University of New Hampshire Jackson Laboratory, then stocked for on-bottom and suspended culture. This process will be evaluated with on-board processing of spat and stocking directly to the grow-out areas without the intermediate culture stage at the Jackson Lab. Two to three one-acre sites will be used as the grow-out areas under conditional permits. The fishermen involved will also secure seed scallops and stock the areas to test their suitability and to gain experience in this new "fishery." The grantees will also produce a quarterly newsletter for the industry on sea scallop aquaculture.

Grantee: University of Maine, Orono, ME

Grant No.: NA66FD0024 NMFS Contact: F/NEO

Project Title: Refinement of Computer Models for Determining Distribution of Finfish Aquaculture Wastes and Transfer of Technology to Regulatory Agencies

Funding: Federal: $118,900 Recipient: $16,916

Description: To refine previous computer simulation models, taking into account critical shear velocities associated with re-suspension of settled wastes. Readily usable models will be assessed and modified to be more user-friendly, and the technology transferred to state and federal regulators. Work under a previous S-K award has clearly shown that computer simulation models are effective tools for estimating distribution of net-pen aquaculture wastes. Yet this technology is not easily available to regulators for routine applications.

Grantee: Bioshelters, Inc., Amherst, MA

Grant No.: NA66FD0017 NMFS Contact: F/NEO

Project Title: Renovation of Phosphorous and Other Aquacultural Wastes Using Constructed Wetlands with Planted Peat and Rockwool

Funding: Federal: $65,559 Recipient: $7,160

Description: To "filter" the discharge water from an aquaculture facility using an artificial wetland constructed from peat and rockwool, and planted with reed canary grass. The primary objective is to remove phosphorous. The experiment will evaluate the use of doping agents, lime, iron, and aluminum sulfate in removing phosphorous. The grantee anticipates the study will create an inexpensive technique which the aquaculture industry will readily adopt, with widespread water quality benefits to the receiving waters downstream from their facilities.

Grantee: MER Assessment Corporation

Grant No.: NA76FD0096 NMFS Contact: F/NEO

Project Title: To Investigate Culture Technique to Rear Fingerling Size Atlantic Cod and Larval/Fingerling Sized Haddock for Use in Production Aquaculture and for Use in a Public Restoration Project to Study the Efficacy of Restoring Natural Cod Stocks in the Gulf of Maine.

Funding: Federal: $477,773 Recipient: $46,068

Description: To transfer cod aquaculture techniques from a research project to a commercial enterprise. Experimental techniques developed at the University of Maine will be transferred to a production level at a commercial hatchery. The investigators will: (1) optimize brood fish handling and transport techniques; (2) upscale successful laboratory larval cod rearing techniques; (3) investigate and demonstrate cost-effective juvenile cod feeding and rearing techniques at a production scale; (4) explore and mitigate causes of juvenile cod mortality; (5) document and transfer successful cod hatchery management techniques via the production of a management guide and training video; and, (6) explore larval and juvenile haddock rearing techniques as a premise for future commercialization. In addition, this project will provide significant numbers of juvenile cod to the Maine Department of Marine Resources for restoration stocking experiments to enhance Gulf of Maine cod stocks.

Grantee: University of Rhode Island, Kingston, RI

Grant No.: NA76FD0143 NMFS Contact: F/NEO

Project Title: Development of Commercial Aquaculture of Black Sea Bass

Funding: Federal: $99,385 Recipient: $15,246

Description: To collect broodstock, evaluate natural and artificial spawning, conduct photoperiod studies, and analyze the effects of salinity changes and various diets for black sea bass, each phase of which will follow procedures which have proven successful for other species. Eggs in excess of the study requirements will be provided to others interested in black sea bass aquaculture. This base-line study will provide essential data to evaluate the potential for raising black sea bass from eggs to juveniles as a commercial aquaculture endeavor.

Grantee: University of New Hampshire, Durham, NH

Grant No.: NA76FD0104 NMFS Contact: F/NEO

Project Title: Development of an Integrated Aquaculture and Sea Ranching System for the Green Sea Urchin, *Strongylocentrotus droebachiensis*, in the Gulf of Maine

Funding: Federal: $165,720 Recipient: $52,660

Description: To: (1) manipulate the reproductive cycle to extend the period when ripe gametes for larval culture can be obtained; (2) standardize the rearing of larval and juvenile urchins for mass cultivation; (3) utilize a commercial diet to document the timing and economics of land-based grow-out versus field grow-out and short-term bulking for maximum roe yield; (4) determine the optimum size and time of year for seeding urchins into a field site for sea ranching; and, (5) integrate the various information obtained from the research and from the literature to produce a system for a sustainable urchin fishery.

Grantee: Purdue University, West Lafayette, IN

Grant No.: NA76FD0149 NMFS Contact: F/NEO

Project Title: Toward Sustainable Aquacultural Production Systems: Promoting Optimum Media for Nitrifying Bacteria in Recirculating Aquaculture Systems

Funding: Federal: $120,700 Recipient: $0

Description: To explore the potential of establishing a selective or optimal medium for nitrifying bacteria for recirculating system aquaculture. Five minerals, critical for the bacteria but rarely added to diets for fish, will be the focus of this research. The potential results of this research are sustainable recirculating systems for mass production of a variety of species.

Grantee: University of Maryland Biotechnology Institute, Baltimore, MD

Grant No.: NA76FD0145 NMFS Contact: F/NEO

Project Title: Optimization and Clearance Studies of a New Hormone-based Spawning Induction Technology for Aquacultured Finfish

Funding: Federal: $132,546 Recipient: $77,826

Description: To optimize an efficient, reliable, and physiologically sound technology to induce ovulation, spawning, and sperm production in farmed fish, using hybrid striped bass. This work will provide information that will facilitate the regulatory approval of the technology in view of making it accessible to commercial hatcheries and finfish growers.

Grantee: North Carolina State University, Raleigh, NC

Grant No.: NA47FD0296 NMFS Contact: F/SEO

Project Title: Reproduction of Flounder: Biotechnology for Controlled Breeding in Fishery Enhancement and Aquaculture

Funding: Federal: $86,120 Recipient: $35,008

Description: To determine the feasibility of utilizing state-of-the-art knowledge and techniques in fish reproductive physiology in mass restocking of flounder fisheries and commercial flounder farming. Repeated volitional spawning of captive flounder broodstock will be attempted using subdermal implants that chronically release a synthetic analog of gonadotropin-releasing hormone. Routine clinical measures of flounder maturity will be taken using blood levels of sex steroid hormones and egg precursors. Gonadal maturity will be further verified by histological analysis and ultrasound image analysis. This information will lead to simple, non-invasive tests for maturity that can be used by biologists or fish farmers.

Grantee: University of Texas, Austin, TX

Grant No.: NA67FD0039 NMFS Contact: F/SEO

Project Title: Development of Cost-Effective Low-Pollution Feeds for Marine Species

Funding: Federal: $65,888 Recipient: $27,855

Description: To advance environmentally sound aquaculture through the development of low-pollution feeds for the commercial production of *Sciaenops ocellatus* and *Penaeus vannamei*. This research will build on previous projects which were designed to produce basic data required for the formulation of low-pollution diets. The proposed research will evaluate the enhancement of dietary nutrient availability through the application of enzymatic and probiotic supplements for marine species (red drum and Pacific white shrimp). Results from the proposed studies will promote the development of environmentally sound marine aquaculture and significantly expand our understanding of the polluting effects of feeds and their effects on water quality.

Grantee: Texas A & M Research Foundation, College Station, TX

Grant No.: NA67FD0036 NMFS Contact: F/SEO

Project Title: Technology Development for Commercial Production of Native Bait Shrimp in the U.S.

Funding: Federal: $247,000 Recipient: $85,450

Description: To develop culture methods for native bait shrimp for the sportfishing industry and the bait shrimp dealers, which will reduce overfishing of shrimp populations and provide more jobs. The objectives of the proposed study are to identify limiting factors and develop technology needed for production of native bait shrimp. Experiments will be conducted under controlled laboratory conditions, in outdoor ponds, and in an experimental intensive raceway system. The laboratory studies will identify nutritional growth limiting factors, while the outdoor studies will test and develop the needed production management technology.

Grantee: University of Texas, Austin, TX

Grant No.: NA57FD0032 NMFS Contact: F/SEO

Project Title: Development of Methods for the Mass Cultures of Marine Ornamental Fishes and Invertebrates

Funding: Federal: $88,859 Recipient: $18,509

Description: To design larval rearing systems and feeding protocols for the mass culture of two popular marine ornamentals, spotfin hogfish and peppermint shrimp. Captive rearing of marine ornamentals will provide the framework for mass cultivation of many commercially valuable species, thereby reducing collection pressures on wild stocks and coral reef habitats.

Grantee: Mississippi Agricultural and Forestry Experiment Station
Mississippi State, MS

Grant No.: NA67FD0033 NMFS Contact: F/SEO

Project Title: Use of Constructed Wetlands to Improve Water Quality in Finfish Pond Culture, Phase II

Funding: Federal: $146,806 Recipient: $17,712

Description: To evaluate the effectiveness of constructed wetlands in improving water quality in aquaculture ponds and assess the potential economic benefits associated with the new technology. Six one-quarter acre fish ponds and six constructed wetlands will be used. Water quality parameters will be monitored on a daily and weekly basis. Fish growth will be measured by comparing stocking weight to harvest weight. Off-flavor testing will be conducted on a quarterly basis. The effects of the use of constructed wetlands, wetlands size, and water flow rates will be evaluated by using covariance analysis. The additional benefits arising from the use of constructed wetlands will be compared to the associated costs of constructing and operating the marsh systems. Investment analysis will be conducted on treatments (wetlands size, water flow rates) which have favorable budget results. Technology and information transfer activities such as newsletters, mass media, journal articles, extension publications and demonstrations will be conducted based on project results. The project will supplement research in 12 additional one-quarter acre ponds and nine constructed wetlands.

Grantee: The University of Texas at Austin, Austin, TX

Grant No.: NA77FD0070 NMFS Contact: F/SEO

Project Title: Application of Nutritional Strategies for the Development of Low Pollution Feeds for Marine Species

Funding: Federal: $70,625 Recipient: $29,134

Description: To evaluate the effects of dietary protease supplement on growth and net protein retention for red drum and Pacific white shrimp.

Grantee: South Carolina Department of Natural Resources, Charleston, SC

Grant No.: NA67FD0030 NMFS Contact: F/SEO

Project Title: Sustainable Aquaculture and Stock Enhancement for Native White Shrimp, *Penaeus setiferus*

Funding: Federal: $142,369 Recipient: $32,879

Description: To determine effects of stocking density, level of dietary protein, and their interaction on growth and survival of *P. setiferus* in intensive culture; and, to develop a reliable, cost-effective means for enhancing wild stocks of *P. setiferus* following winter kill, using artificially overwintering sub-adults. The primary factor limiting aquaculture industry use of *P. setiferus* is its slower growth rate under pond culture conditions, apparently because *P. setiferus* is more carnivorous than *P. vannamei*, and requires more dietary protein. The protein requirements of *P. setiferus*, and the possible interactions of dietary protein and population density, will be evaluated in a factorial experiment using various levels of protein in the diet and various stocking densities. To investigate winter kill of overwintering brood shrimp, which has severely reduced or eliminated South Carolina's spring "rock shrimp" fishery and often caused a marked decrease in the fall fishery as well, the researchers will enclose a 0.1 ha pond in a greenhouse structure and overwinter 15,000 subadult *P. setiferus* (half of which have been tagged). Survivors will be stocked into natural water in late April, and their subsequent recruitment to the spawning population determined by trawl sampling and reports of tagged shrimp captures from the commercial fishery.

Grantee: S.C. Department of Natural Resources, Charleston, SC

Grant No.: NA77FD0078 NMFS Contact: F/SEO

Project Title: Hard Clam (*Mercenaria mercenaria*) Mariculture in U.S. Waters: Evaluating the Effects of Large-Scale Field Outgrowth Practices on Clam Growth, Nutrition, and Inshore Estuarine Creek Communities

Funding: Federal: $138,570 Recipient: $ 38,914

Description: To conduct several experimental field studies, in conjunction with a large-scale operating clam enterprise, to: (1) evaluate experimentally the potential effects of food and flow on individual ("seed") clam growth at various stocking densities within creeks and among seasons; (2) manipulate pen and clam densities and configurations to examine the direct and indirect effects of large-scale clam mariculture on inshore creek communities; and (3) utilize stable isotope ratios to provide insight into clam diets and food web structure.

Grantee: Regents of the University of California, Berkeley, CA

Grant No.: NA66FD0104 NMFS Contact: F/SF

Project Title: Fate and Microbial Effects of Aquaculture Drug Residues in the Environment

Funding: Federal: $172,165 Recipient: $51,969

Description: To develop data on the environmental fate and effects of two chemotherapeutants used in aquaculture in order to expedite FDA approval of drugs for industry and assess environmental issues associated with their use.

Grantee: North Carolina State University, Raleigh, NC

Grant No.: NA67FD0131 NMFS Contact: F/SF

Project Title: A Novel, Potent, Immunological Defense in Rainbow Trout

Funding: Federal: $136,550 Recipient: $41,862

Description: To characterize a novel, potent, antimicrobial polypeptide from rainbow trout, *Oncorkynchus mykiss,* using methods already developed to isolate it in a quantity that will allow it to be tested against selected fish pathogens. Also, to develop a rapid test for measuring the activity in tissue and determine if activity is inducible after "immunization."

Grantee: Cornell University, Ithaca, NY

Grant No.: NA66FD0059 NMFS Contact: F/SF

Project Title: Increasing Economic Efficiency of Water Recirculating Systems by Improving Water Quality and Reducing System Costs

Funding: Federal: $88,940 Recipient: $82,960

Description: To evaluate and demonstrate a new nutrification system (reduces costs by a factor of 30); evaluate/demonstrate cost efficient solids removal techniques, including use of ozone; and, demonstrate findings with commercial cooperators using full scale systems.

National Program

Project No.: 96-NW NMFS Contact: F/NWO

Project Title: Captive Broodstock Technology

Funding: Federal: $275,000

Description: To evaluate the adaptability of various marine finfish to captive rearing, select four species for broodstock spawning; diagnose and treat diseases associated with these projects, and, develop larval and juvenile feeds that minimize environmental effects of marine aquaculture.

Project No.: 96-SW NMFS Contact: F/SWO

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 so that artificial spawning is performed only during periods of peak spawning potential; and, to 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-NE NMFS Contact: F/NEO

Project Title: Shellfish and Finfish Aquaculture Enhancement: Technology Development and Demonstration

Funding: Federal: $180,400

Description: To expand upon research on the bay scallop to develop modern technology for the commercial production of the bay scallop from spawn to plate using intensive and extensive cultivation strategies. Techniques include culture strategies, selective breeding, proper nutrition determination, and disease susceptibility. Also, to initiate research to develop culture techniques for commercial production of the tautog from spawn to an acceptable market size using intensive, extensive, and land-based cultivation strategies. Research includes development of recirculating seawater culture systems and use of these systems to develop cultivation strategies for the early life history stages, including larvae and juveniles. Nutritional requirements of the early life history stages, disease susceptibility, and stock identification of the broodstock used as spawners will also be investigated.

Project No.: 97-NE-07 NMFS Contact: F/NEO

Project Title: Shellfish and Finfish Aquaculture: Recirculating Systems Technology Development, Testing, and Demonstration

Funding: Federal: $235,945

Description: To: (1) advance significantly the culture and promotion of commercially and recreationally important marine shellfish and finfish species, such as scallop and tautog; (2) identify and communicate practical operational parameters of closed, recirculating, land-based culture systems for marine finfish and shellfish; and, (3) evaluate the economic costs and returns associated with the operational parameters and identify key economic factors affecting the financial viability of those land-based recirculating systems.

Project No.: 96-SE-PC NMFS Contact: F/SEO

Project Title: Climate Controlled Seawater System

Funding: Federal: $57,000

Description: To construct a climate controlled seawater system at the NMFS Panama City Laboratory that can be operated in a full flow-thru mode or adjusted to recirculating mode. The system will be used for research to further develop hatchery rearing techniques for red drum, and to further investigate spawning, rearing, and growth requirements and the sex reversal process of gag grouper and porgies.

Project No.: 96-SE-GA NMFS Contact: F/SEO

Project Title: Penaeid Aquaculture

Funding: Federal: $35,000

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

Project No.: 96-SE-ML NMFS Contact: F/SEO

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 is to be held for development of a draft base permitting process.

Project No.: 96-SE-OX NMFS Contact: F/SEO

Project Title: Shellfish Disease and Pathology

Funding: Federal: $15,000

Description: To initiate a startup program at the NMFS Oxford Laboratory to focus on the effects of shellfish diseases and their pathology in aquaculture species.

Habitat Protection

Grant Program

Grantee: The Research Foundation of State University of New York, Stony Brook, NY

Grant No.: NA66FD0012 NMFS Contact: F/NEO

Project Title: Identification of Continental Shelf Groundfish Nursery Habitats in the New York Bight

Funding: Federal: $200,000 Recipient: $48,119

Description: To assess recruitment of marine organisms in relationship to habitat characteristics in the New York Bight, with a focus on groundfish. The researchers intend to identify critical settlement/nursery habitat and how requirements for this habitat change during the growth and development of the organisms. The investigators intend to encourage fishermen to be actively involved in the study, and to present their findings at regional Fishermen's Forums.

Grantee: Virginia Commonwealth University, Richmond, VA

Grant No.: NA76FD0147 NMFS Contact: F/NEO

Project Title: Critical Evaluation of Conservation Success in Restoration of James River and Ocean Run American Shad

Funding: Federal: $163,542 Recipient: $157,212

Description: To sample mitochondrial and satellite DNA from hatchery broodstock and fry and to compare with wild fish to see if restoration procedures are maintaining natural biodiversity. Prior studies have shown the James River and other shad rivers to be quite diverse and genetically discrete from one river to another. The study will help fisheries managers to be confident that restoration efforts using stocking will not adversely impact upon the wild stocks.

Grantee: Capt. Edward Boynton, Gloucester, MA

Grant No.: NA76FD0106 NMFS Contact: F/NEO

Project Title: Establishing the Food Web Links Between Estuaries and near Shore Fisheries in New England

Funding: Federal: $93,866 Recipient: $0

Description: To determine nutrients present from the Parker River estuary, and the fish fauna present, by collecting samples at six stations on the ocean side of Parker Island in Ipswich Bay, MA. Sampling will be done by beam trawl on the bottom and at mid-depth. Fish taken will be measured and weighed; water temperature and salinity will be recorded. In addition, chlorophyll-a levels will be determined from water samples on a monthly basis. Predictions of the relationships between these observations, as well as the interactions with other levels in the food web, will be made and the relative importance of the estuary to the species found will be described.

Grantee: University of Washington, Seattle, WA

Grant No.: NA76FD0036 NMFS Contact: F/AKO

Project Title: Recruitment Limitation in Alaska Red King Crab: The Importance of Early Life History Stages.

Funding: Federal: $115,175 Recipient: $21,532

Description: To examine settlement behavior and habitat use of juvenile red king crab (*Paralithodes camtschaticus*) in order to quantify nursery habitat suitable for management and protection.

Grantee: South Carolina Department of Natural Resources, Charleston, SC

Grant No.: NA77FD0063 NMFS Contact: F/SEO

Project Title: Critical Habitats of Atlantic Sturgeon

Funding: Federal: $129,473 Recipient: $27,621

Description: To collect information on the abundance, habitat use, age distribution, and seasonal movements of adult Atlantic sturgeon in two major river systems to assist the effective management and recovery of Atlantic sturgeon stocks in the southeastern U.S.

Grantee: Texas Parks and Wildlife Department, Austin, TX

Grant No.: NA77FD0072 NMFS Contact: F/SEO

Project Title: An Analytical Method for Predicting Potential Spread of Exotic Species from Aquaculture and Aquatic Research Facilities in Texas

Funding: Federal: $54,243 Recipient: $18,132

Description: To develop GIS coverages (maps) for each of the river drainage basins in Texas; locate each aquaculture and aquatic research facility near the Texas coast that could contain exotic aquatic species; and, develop analytical procedures to determine the potential impact of escapement of exotic species on Texas commercial and recreational fisheries industries for each facility, and for potential future sites within each basin.

National Program

Project No.: 97-SW-03 NMFS Contact: F/SWO

Project Title: Characterization of Hawaiian Monk Seal (*Monachus schauinslandi*) Pelagic Habitat, Home Range, and Diving Behavior

Funding: Federal: $153,280

Description: To characterize pelagic habitat use and foraging patterns of adult monk seals. This information will improve understanding of habitat needs which are critical to the survival of the monk seal and will enable the better integration of protective measures to ensure conservation of the monk seal with fishery regulations to maintain sustainable fisheries.

Project No.: 97-HC-01 NMFS Contact: F/HC

Project Title: National Project to Pursue Habitat Management as an Innovative Approach to Fisheries Management

Funding: Federal: $600,000

Description: To provide each of the five NMFS Regions with $120,000 for work to be conducted under contracts and in-house relating to identifying essential fish habitat (EFH). The objectives are to describe, identify and map EFH for managed species, and determine threats to habitat and corrective measures, on a regional basis. Each region will cooperate with the appropriate state agencies and Fishery Management Council(s) (FMCs) in accomplishing the work, which will include preparing literature searches, writing technical sections, preparing tabular data, and compiling maps. Habitat information will be compiled for each Federally managed species, peer reviewed, and documented. To the extent practical, products will be electronically available (with Geographic Information System (GIS) and other analytic capabilities) as tables, maps and narratives, and will be transmitted to the appropriate FMCs as statutorily required EFH recommendations. These activities will be coordinated with the NMFS Headquarters Office of Habitat Conservation.

Project No: 97-HC-03 NMFS Contact: F/HC

Project Title: Mapping Fishery Habitat to Support Innovative Fisheries Management

Funding: Federal: $350,000

Description: To establish and implement an overall framework for identifying and mapping essential fish habitat (EFH) for priority species, as well as threats to habitat and corrective measures. Protocols will be developed for identifying threats to EFH and implemented with the NMFS Regional Habitat Programs, Fishery Management Councils, and states. The project will describe the information needed to: (1) allow Fishery Management Councils to incorporate EFH management into fishery management plans; (2) establish priorities by which fishery management plans will be amended; and, (3) develop plans for collecting and analyzing the necessary information.

Other

Grant Program

Grantee: Boone Bait Co., Inc., Winter Park, FL

Grant No.: NA27FD0095 NMFS Contact: F/SF

Project Title: Impact of EC92 on U.S. Fishing Tackle Sales

Funding: Federal: $79,000 Recipient: $45,000

Description: To analyze the new rules and regulations that will impact U.S. manufactured fishing tackle in Europe as a result of EC92, including tariffs, standards, labeling requirements and non-tariff barriers, if any; and to identify tariff and non-tariff barriers that affect U.S. markets for fishing tackle in the Eastern Bloc countries.

IV. Completed Projects

The following section contains an assessment of each S-K Grant and National Program project completed during the period April 1, 1996 to May 31, 1997, 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, funding levels, and NMFS contact.

Fisheries Utilization

Grant Program

Grantee: Alaska Fisheries Development Foundation, Inc., Anchorage, AK

Grant No.: NA26FD0126-01 NMFS Contact: F/AKO

Project Title: Full Scale Demonstration of the Harvesting and Processing of Arrowtooth Flounder

Funding: Federal: $350,000 Recipient: $0

Assessment: The objective of this project was to develop production levels of surimi from Arrowtooth flounder, monitor changes in the quality of the surimi over time, and test the acceptance of surimi by firms that manufacture finished products from surimi. Arrowtooth flounder can be harvested, processed and transported to the consumer without softening, if no temperature abuse occurs. However, it contains endogenous protease(s) that cause the flesh, when not cooked correctly, to turn into an unappetizing mush. Researchers have developed several methods for dealing with the protease problem including the removal of the majority of the protease(s) by multiple water washes, cooking processes that rapidly transit the narrow temperature window of protease activity, and the use of protease(s) inhibitors, etc. The objectives of this project were to: (1) evaluate the traditional surimi processing system and its usefulness in resolving the flesh softening enigma found in Arrowtooth flounder; (2) to test the use of various protease inhibitors in the manufacture of surimi in an attempt to eliminate this problem; (3) to produce commercial volumes of Arrowtooth flounder surimi; and, (4) to obtain "user" evaluation of Arrowtooth flounder surimi for use in the manufacturing of surimi-based analog products. The researchers managed to manufacture a usable surimi product from Arrowtooth flounder which was comparable to Alaska pollack A grade. The approach and evaluation of test batches suggested that both beef plasma protein and a potato-derived inhibitor were moderately effective and resulted in a surimi, from which was believed, crab analogs could be manufactured. The project was successful in uncovering and proving a method of surimi manufacture and use that rendered inactive the endogenous protease(s) contained in Arrowtooth flounder flesh.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA

Grant No: NA56FD0010 NMFS Contact: F/SWO

Project Title: Parasitological Examination of Wasting Disease in Black Abalone, *Haliotis cracherodii*

Funding: Federal: $112,659 Recipient: $27,967

Assessment: The objective was to conduct parasitological and microbiological examinations of the possible causative agent(s) of withering foot syndrome, a debilitating and fatal disease in black abalone. It was found that withering syndrome is caused by a putative rickettsia-like organism (RLO). The RLOs infect the digestive gland, digestive tubules, and columnar epithelial cells of the intestine. Chronic infection, with presumed autoinfection, results in malabsorption which ultimately leads to starvation of the afflicted abalone. Future work can now concentrate on developing a treatment for the disease.

Grantee: Kevin G. Hart, Majuro, Republic of the Marshall Islands

Grant No: NA27FD0145-01 NMFS Contact: F/SWO

Project Title: Program for Development of Outer Island Fisheries in the Republic of the Marshall Islands

Funding: Federal: $59,625 Recipient: $6,450

Assessment: The objectives were to develop small-scale, family-oriented commercial fisheries on the outer islands of the Marshall Islands. Outer island families tested the suitability of different vessel types for lagoon and reef fishing. Fish were smoked, dried, or salted, and sold in urban centers. Data collected from fishing and processing operations was not sufficient for estimating the abundance of reef fish. However, the project proved very successful at developing alternative sources of income for outer island residents.

Grantee: University of Guam, Mangilao, Guam

Grant No: NA26FD0241-01 NMFS Contact: F/SWO

Project Title: A Regional Management Plan for a Sustainable Sea Cucumber Fishery for Micronesia

Funding: Federal: $58,190 Recipient: $ 6,500

Assessment: The objectives were to develop a sea cucumber management/development plan to ensure a sustainable sea cucumber fishery for various areas in Micronesia. Regional fisheries officers and technical advisors reviewed information collected during the multi-year study of sea cucumber fisheries. A substantial data base on the biology and ecology of sea cucumbers was established and provided the basis of the development of a generic plan. Reproductive cycles were defined, techniques for assessing resources were developed and used, and the ability to spawn individuals in captivity was perfected. A management plan incorporating the norms and customs of the various areas of Micronesia was developed and circulated. It has been adopted in several locations in Micronesia (e.g., Yap State).

Grantee: K&T Fishing Corporation, Fairhaven, MA

Grant No.: NA67FD0009 NMFS Contact: F/NEO

Project Title: Oceanic Squid Fishery

Funding: Federal: $134,820 Recipient: $33,400

Assessment: The F/V *Perseverance* was converted to conduct exploratory squid jigging operations. Conversion consisted of installing a light platform with an array of lights, a small electric generating system, and four jigging machines, two fully automatic and two manual. A total of 65 jigging stations were occupied between September and November 1996. On 80% of the stations occupied under good observing conditions off the shelf-slope, the oceanic neon flying squid, *Ommnestrephes bartramii*, was observed or caught. A total of 141 neon flying squid were caught and specimens sent to the NMFS Systematics lab at the Smithsonian and to potential buyers. A detailed literature search was conducted on the neon flying squid, but little was found about its distribution and ecology in the Northwest Atlantic. Even though the catches made during this project would seem too low to predict commercial potential, quite a few of these squid were observed. Surveys earlier in the season and at greater depths should be undertaken.

Grantee: New England Fisheries Development Foundation, Boston, MA

Grant No.: NA46FD0331 NMFS Contact: F/NEO

Project Title: Alternative Technologies to Improve the Economics of Treating Clam Processing Waste Water

Funding: Federal: $169,535 Recipient: $18,965

Assessment: The segment of the seafood industry most severely impacted by implementation of the Clean Water Act of 1972 has been clam processing. In many cases, municipal treatment facilities have required clam processing plants to decrease the organic load of their effluent and/or have substantially increased the cost of treatment. This project investigated novel methods for treating waste water, in an attempt to help clam processors decrease their dependence on municipal treatment facilities, while potentially profiting from the sale of the end products of treatment. Three alternative technologies were tested: chitosan flocculation, fermentation, and ultrafiltration. These methods were chosen because investigators believed that they were capable of decreasing the organic load of clam processing effluent, and because they all produced potentially marketable products by which the industry could profit. In all respects, ultrafiltration was superior to the other two technologies examined, and to standard biological treatment. All three alternative methodologies reduced organic load; however, ultrafiltration resulted in the greatest reduction. The final product of ultrafiltration proved to be more marketable than the products of chitosan flocculation or fermentation. Finally, capital expenses, operating costs, and the payback period for ultrafiltration were significantly less than for either standard biological treatment or the other methods tested. The use of ultrafiltration for selected waste water streams, such as post-grind wash water, could divert the majority of clam processing "pollution" into a profitable flavor product. In many cases, the organic load remaining in the untreated streams will be acceptable to municipal sewage treatment facilities.

Grantee: New England Fisheries Development Association, Boston, MA

Grant No.: NA46FD0332 NMFS Contact: F/NEO

Project Title: Harvesting the Value-Added Potential of Atlantic Hagfish in New England

Funding: Federal: $140,148 Recipient: $20,163

Assessment: This project has determined that more profit can be realized in the Northeast region from the hagfish fishery. Tanning of hagfish skins was carried out in a New England processing plant, and a brochure describing the uniqueness of the leather was designed, produced, and distributed. Another value-added aspect is the potential for utilizing the meat in prototype food products for Oriental populations, as texture and the presence of a notochord in the body make the fish undesirable to the American palate. However, very little is known about the biology and life history of hagfish, and the measures needed to insure that the fishery remains sustainable. Although this project demonstrated that the New England region can support a small hagfish fishery, it would be wise to learn more about this fish before the fishery becomes too large.

Grantee: University of Massachusetts, Amherst, MA

Grant No.: NA46FD0323 NMFS Contact: F/NEO

Project Title: Cutting "In Solution" as a Method of Improving Atlantic Mackerel Fillet Quality

Funding: Federal: $53,057 Recipient: $9,500

Assessment: The purpose of this study was to determine if it was possible to improve the quality of mackerel fillets by filleting them under water. Treating cut mackerel fillets with a liquid to remove pro-oxidative compounds was advantageous to the product. Supplementation with antioxidants improved the process further. The highest quality product was produced when fresh fish were used. Unfortunately, this process will produce a waste water that has a high BOD due to the blood proteins that accumulate. Electrocoagulation appears promising to recover the protein and clean up the wash water to make this process feasible on an industrial scale.

Marine Recreational Fisheries

Grant Program

Grantee: Palau Marine Resources Division, Koror, Palau

Grant No: NA37FD0521-01 NMFS Contact: F/SWO

Project Title: Small-Scale Sustainable Sports Fishing Development for Palau

Funding: Federal: $68,110 Recipient: $64,000

Assessment: The project goals were to determine the potential for a small-scale sustainable sports fishery and to train fishermen as tour guides using the proven techniques of sports fishing and conservation methods. Information on the prime target species for the sports fishery was summarized, and fishing trials were conducted to verify and document fish locations. Recommended management regimes and safety requirements were documented, and Palauans were trained in the proper techniques and methods of sports fishing.

Management Alternatives and Fisheries User Conflicts

Grant Program

Grantee: University of Alaska Fairbanks, Fairbanks, AK

Grant No.: NA66FD0042 NMFS Contact: F/AKO

Project Title: Comparison of Three Genetic Methodologies for Stock Identification of Pink, Chum, and Sockeye Salmon in the North Pacific (Phase 1)

Funding: Federal: $138,674 Recipient: $27,735

Assessment: Genetic variation is routinely used to identify origins of salmon caught in mixed fisheries, intercepted by foreign fisheries, and taken as bycatch in fisheries directed at other species. Historically protein electrophoresis has been the primary tool, but the method has some drawbacks, such as a limitation on the scope of the genetic variability resolved and a requirement for quality tissue samples that often necessitates use of liquid nitrogen or dry ice in the field. DNA-based methods offer opportunities for exposing much more genetic variation and have less rigorous requirements for sample quality. This project proposed to determine the genetic markers which will be used to acquire genetic data from populations of chum, sockeye, and both even- and odd-broodyear pink salmon. These data will be used to compare the nature of the genetic variation between populations. In this preliminary study, subsamples of these populations were screened for variation in mitochondrial DNA sequences and for variation at nuclear microsatellite DNA loci. The geographic distribution of samples screened spans the North Pacific Ocean from southern Southeast Alaska to Asia. Substantial mtDNA variation was resolved for all species and three variable microsatellite loci were found for each species. These results will be used to select markers that will be evaluated in larger sample sizes from more numerous populations in the next phase of the project. At the end of the project, variation resolved on a fish-by-fish basis, using both DNA-based data and data derived from protein electrophoresis, will be compared and evaluated for their performance to detect stock structure.

Grantee: Oregon State University, Corvallis, OR

Grant No.: NA46FD0397 NMFS Contact: F/NWO

Project Title: Estimates of Effective Fishing Efforts for the West Coast Groundfish Trawl Fishery

Funding: Federal: $30,811 Recipient: $8,686

Assessment: The study was designed to improve the accuracy of future stock assessments for West Coast groundfish by deriving estimates of annual effective fishing effort by the trawl fleet, which may be used as indices of fishing mortality in refining assessments of catch-at-age data. The researchers conducted an analysis of trawl logbook data from Washington and California for 13 groundfish using 20 trawlers (ten from each state) for the period 1985-92. Selected data were analyzed in a stepwise manner using generalized linear models of catch rates to measure the importance of the factors: year, season, boat, net type, latitude, and depth. In the logistic regression analyses of the zero catch tows, essentially all factors were found to be highly significant for all species in both states. Depth and boat were the first or second most influential factors in different state-species combinations. In an analyses of pairwise interactions, the year-boat interaction was influential in a majority of factor combinations. In the analyses of non-zero tows, all factors were again found to be highly significant, and again boat and depth were the first or second most influential variables in different factor combinations. The researcher estimated standardized CPUE for each species for individual areas, based on the top 4 boats for each species and state.

Grantee: Oregon State University, Corvallis, OR

Grant No.: NA46FD0490 NMFS Contact: F/NWO

Project Title: Identification of Disease-Resistant Genes in Fish to Monitor Interactions Between Wild and Cultured Stocks

Funding: Federal: $168,222 Recipient: $30,058

Assessment: The goal of the project was to determine whether the expression of the Mx gene is correlated with resistance to IHNV in wild and cultured salmonids, and whether the trout Mx gene may be used as a genetic marker for disease resistance. Researchers found that all fish expressed Mx mRNA at 48 hours post injection. The investigator found that there were different RFLP patterns among individuals from the same stocks of fish, but that some species of fish also shared the same patterns. However, a marker for Mx expression was not found because all fish in these populations expressed mRNA transcripts of the correct size.

Grantee: Washington Department of Fish and Wildlife, Olympia, WA

Grant No. NA66FFD0105 NMFS Contact: F/NWO

Project Title: Evaluation of Electronic Detection for Coded Wire Tags in Salmon from Commercial, Sport, and Hatchery Rack Sampling Programs

Funding: Federal: $140,000 Recipient: $87,881

Assessment: The project was designed to determine the feasibility and reliability of electronic detection devices used to identify coded wire tags (CWTs) in salmon. Mass marking of adipose fins of hatchery coho salmon has been proposed as a tool to allow selective harvest of hatchery salmon, and reduce the harvest of wild stocks. The adipose fin mark has historically indicated the presence of a CWT. In order to maintain the CWT system as a means of collecting critical data about salmon, it has been recommended that an electronic detection method be developed for use by fish management agencies. Researchers found that both the wand and R-8 tube detector reliably detected CWTs in coho salmon. However, replacing the current method of visual sampling for CWTs with electronic detection devices will involve significant increases in sampling time and effort. Electronic sampling will require that each fish be lifted into place to be tested. The study found that the use of the R-8 tube will require a functioning diverter gate and counter to realize any significant advantages over the wand.

Grantee: Regents of the University of California, Santa Barbara, CA

Grant No: NA56FD0011 NMFS Contact: F/SWO

Project Title: Population Genetics of Adult Red Sea Urchins, *Strongylocentrotus franciscanus*, Along the Pacific Coast

Funding: Federal: $68,055 Recipient: $7,610

Assessment: The primary objective of the project was to determine the number of genetically distinct stocks of adult red sea urchins along the Pacific coast as indicated by possible variations in the DNA sequences of individuals sampled from six sites. The DNA results show that the binding gene of adult red sea urchins has a highly variable region and that the high allelic variation in this section exhibits a high non-synonymous:synonymous ratio. These results suggest that all adult red sea urchin populations along the Pacific coast are genetically distinct.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA

Grant No.: NA36FD0131 NMFS Contact: F/NEO

Project Title: Evaluation of Scallop Dredge Ring Sizes

Funding: Federal: $161,449 Recipient: $123,044

Assessment: This project evaluated the performance of 3.5 inch scallop dredge rings during six to eight commercial scallop trips from Mid-Atlantic and New England ports. There were eight trips between September 1993 and April 1995, conducted under various conditions and in different resource areas. From July to August 1994, gear trials were conducted on the Canadian portion of Georges Bank. This was a valuable opportunity as it afforded an evaluation of the 3.5 inch ring in an area with an abundance of scallops with multiple year classes in the population. Three trips were conducted in the mid-Atlantic region, specifically to evaluate the effects of ring size on a very large incoming year. Information collected during this project was made available to industry and supporting management agencies via written and oral presentations. A copy of these reports is included in the final report.

Grantee: South Carolina Wildlife and Marine Resources Department, Charleston, SC

Grant No.: NA57FD0030 NMFS Contact: F/SEO

Project Title: Location and Stock Identification of Spawning Aggregations of Gag, *Myteroperca microlepis*, along the Southeast Coast of the United States

Funding: Federal: $106,646 Recipient: $17,381

Assessment: The goal of this project was to use rapid survey methods to locate gag (*Mycteroperca microlepis*) spawning aggregations and determine the relationship between spawning adults and juveniles recruited to nursery habitats. Using side scan sonar to locate, and underwater television (UWTV) and plankton sampling to confirm, spawning aggregations were located. The identity of stocks was determined by tagging and genetic work. DNA amplification techniques were used to identify individuals from specific spawning sites, and to determine if juveniles in estuarine nursery habitats can be identified as progeny from particular spawning aggregations. Finally, the project determined sex ratios of gag in spawning aggregations throughout the South Atlantic Bight. The data indicated that gag are spawning north of Florida. Large adult gag in spawning condition were collected at the shelf edge off Charleston, South Carolina. Underwater television noted the presence of few gag during the spawning season, but occasional groups were seen at the shelf edge. Plankton tows collected only one *Mycteroperca spp.* larva. Genetic analysis indicated no clear pattern of stock structure in gag, and suggested year-class differences in microsatellite allele frequencies. To resolve this, a large sample size (at least 50 fish from each year class from each geographic area) and ageing data are needed. Sex ratios of gag off the southeastern Atlantic coast have changed over the last 20 years, perhaps as a result of fishing pressure.

Grantee: Gulf and South Atlantic Fisheries Development Foundation, Inc., Tampa, FL

Grant No.: NA57FD0067 NMFS Contact: F/SEO

Project Title: An Expansion of an Observer Program to Characterize and Compare the Southeast U.S. Directed Shark Fishery to Include the East Coast of Florida

Funding: Federal: $79,054 Recipient: $0

Assessment: The objective was to develop a cooperative shark resource data collection system to enhance the reliability of subsequent management strategies, through an expansion of an ongoing observer program for the Atlantic and Gulf coasts of Florida and North Carolina. During the project, observers monitored the shark fishery along the Atlantic coast of Florida. In 1995, efforts focused in North Carolina, the central Florida Atlantic coast, and the Florida Gulf coast. During the first fishing season of 1996, monitoring continued in North Carolina, the Florida Atlantic coast, and the Florida Gulf coast.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA

Grant No.: NA57FD0068 NMFS Contact: F/SEO

Project Title: Molecular Genetic Analysis of White Marlin Population Structure

Funding: Federal: $47,598 Recipient: $17,231

Assessment: The objective of this study was to describe the population genetic structure of white marlin in the Atlantic Ocean. RFLP analysis of mtDNA revealed considerable genetic variation among all samples, and indicated significant heterogeneity in the distribution of haplotypes among geographically distant samples. This information was used to evaluate the current stock models employed by the ICCAT (North and South Atlantic, total Atlantic), neither of which were supported by the data. The results of this study were consistent with a "leaky" barrier to gene flow across the Atlantic Ocean in an east/west direction, and substantial gene flow in a north/south direction across the western Atlantic.

Fisheries Bycatch

Grant Program

Grantee: University of Washington, Seattle, WA

Grant No.: NA56FD0618 NMFS Contact: F/NWO

Project Title: Reduction of Seabird Bycatch in Salmon Drift Gillnet Fisheries

Funding: Federal: $200,000 Recipient: $8,298

Assessment: The purpose of the project was to determine if the incidental capture of seabirds in Puget Sound sockeye and chum salmon gillnet fisheries can be eliminated, or significantly reduced, through gear modification and/or changes in fishery practices. Researchers found that dramatic inter-annual and in-season variation of seabird abundance is the single most important factor in determining the magnitude of seabird entanglements. Results from this study confirm that visual barriers are an effective means of reducing seabird bycatch. Nets with pingers and 20 mesh nets caught fewer rhinoceros auklets, and significantly fewer common murres, while catching fewer salmon, but not significantly fewer salmon than the control net. Although pingers show some promise as a bycatch reduction device, more research is needed at this time. The 50 mesh net did not meet the goal of the project, because it was impractical to fish and entangled porpoises. Finally, researchers found that morning change of light sets should be eliminated because of the high rate of seabird encounters.

Grantee: Division of Fish and Wildlife, Department of Natural Resources, Saipan, MP

Grant No.: NA17FD0243-01 NMFS Contact: F/SWO

Project Title: Fabrication and Deployment of a System of Fish Aggregation Devices (FADs)

Funding: Federal: $26,790 Recipient: $20,000

Assessment: The goal of this project was to develop a FAD program in the Commonwealth of the North Marianas Islands (CNMI). FADs were fabricated in Honolulu, Hawaii and shipped to the CNMI for deployment. Several CNMI Department of Fish and Wildlife staff were trained in FAD fabrication, deployment and monitoring. The FADs deployed managed to aggregate local pelagic fish (skipjack, mahi mahi); however, performance measured by time on station and volume of reported catch from each FAD suggested benefits other than commercial catch must be obtained to justify the expense of the program. Given the growing sport fishery in the CNMI, the DFW planned to continue the program using other funding sources.

Grantee: William Hugo Amaru, South Orleans, MA

Grant No. NA66FD0011 NMFS Contact: F/NEO

Project Title: A Size Selective, Near-Zero Mortality Trawl for Silver Hake

Funding: Federal: $83,863 Recipient: $12,007

Assessment: This project experimented with square mesh netting and an excluder device to minimize discards of non-target species and sizes. Between May and October 1996, experiments were carried out over 25 trips on fishing grounds east of Cape Cod where whiting have traditionally been taken. Comparisons were made of the results of nearly 100 alternating tows using a control/experimental sequence. Videographic details of fish behavior were recorded. The results of these tests show that a trawl can be used in the New England silver hake fishery, at least under present fishing conditions, that will meet the bycatch standards and allow the potential for capture of larger target species.

Grantee: University of New Hampshire, Durham, NH

Grant No.: NA66FD0014 NMFS Contact: F/NEO

Project Title: An Investigation and Development of Active Acoustic Deterrent for Harbor Porpoise in the Gillnet Fishery

Funding: Federal: $112,609 Recipient: $27,171

Assessment: The purpose of this work was to find an acoustic signal which will cause avoidance in free-swimming harbor porpoise without habitutation and without alerting seals to the presence of gillnets filled with fish. If such a sound could be found, the next generation of pingers for gillnet attachment could be developed to reduce the incidental take of harbor porpoise. In 1996, a total of 112 porpoises were observed during 32 days of sound trials using one type of sound, a 50 kHz ping that occurs at intervals comparable to commercially available pingers. In 1996 weather conditions were vastly better than in 1993 (32 vs. 18 viable working days), but porpoise densities were at an all-time low for the region. These low numbers limited the number of valid trials available for testing, so only one sound type was tried during the season. This type of study can be very effective at determining the effects of acoustic signals on free-swimming marine mammals. However, better information on the hearing thresholds of porpoises at different frequencies is critically needed. Otherwise, the uninformed fear that a very low probability event may injure a few individual animals will continue to impede the ability to answer the scientific questions necessary for the truly effective conservation and management of marine mammal populations.

Grantee: University of Georgia Sea Grant, Athens, GA

Grant No.: NA57FD0033 NMFS Contact: F/SEO

Project Title: To Introduce New TED Designs to the Southeastern Atlantic Shrimp Fleet and to Compare Their Bycatch Exclusion Rates and Shrimp Retention Rates with Established TED Designs

Funding: Federal: $53,557 Recipient: $39,197

Assessment: The objective of the project was to introduce modified and certified Turtle Exclusion Devices (TEDs) to the commercial shrimp industry to allow the escapement of large leatherback turtles. Catch rates of bycatch and shrimp retention were compared for two soft TED designs and a super-shooter style hard TED. The standard Super Shooter (SS), modified Super Shooter (MSS), standard Morrison (MORR), and Modified Morrison (MMORR) TEDs were tested off Fernandina, Florida. A total of ten one-hour daytime tows were completed and analyzed. The SS, MSS, MORR and MMORR were tested off of St. Simons Island, Georgia, from May to December, 1995. A total of 70 one-hour daytime and 10 one-hour nighttime tows were completed and analyzed.

Early in the project, the soft TEDs exhibited a pouching tendency which was indicated by the capture of small jellyballs. NMFS gear specialists reviewed underwater video and suggested adjustments for tightening the panels. The soft TEDs were modified and reinstalled halfway through the project.

Grantee: Mote Marine Laboratory, Sarasota, FL

Grant No.: NA37FD0087 NMFS Contact: F/SEO

Project Title: King Mackerel Hooking Mortality

Funding: Federal: $61,256 Recipient: $10,982

Assessment: The original goals of the project were to improve preliminary estimates of king mackerel release mortality, and to determine if hooking mortality estimates based on short-term (first two hours after release) survival can be used to provide reasonable estimates of hooking mortality, by tracking king mackerel for periods up to 24 hours. An ancillary goal was to provide information which would increase confidence in hooking mortality estimates for Spanish mackerel and would serve as rough estimates for hooking mortality of other pelagic fishes. A total of 18 king mackerel were caught, tagged and released. Of these, 16 were tracked and two were lost. With regard to the first goal, the additional number of king mackerel tracked during this project greatly improved the estimate of king mackerel release mortality by decreasing the statistical confidence interval. Previously, the estimated mortality would have been 17.6% with a 95% confidence interval of 3.3 to 48.5% (Edwards, 1994). As a result of the project, the estimate was revised to 19.4% and the 95% confidence interval was reduced to 7.4 to 37.8%. If past data on Spanish mackerel release mortality are pooled with the present information on king mackerel, a release mortality estimate of 17.2% with a reasonably narrow 95% confidence interval of 8.9 to 28.5% is obtained. With regard to the second goal, the project showed that the projected low (<10%) release mortality was a reasonable estimate. Taken together, these two findings should allow fishery managers to apply reasonable estimates of hooking mortality for king mackerel (and indirectly to Spanish mackerel and other pelagic species) with reasonable confidence.

Grantee: North Carolina State University, Raleigh, NC

Grant No.: NA57FD0130 NMFS Contact: F/SEO

Project Title: Skimmer Trawl Modifications to Reduce Bycatch in the Inshore Brown and Pink Shrimp Fishery in North Carolina

Funding: Federal: $55,742 Recipient: $12,507

Assessment: The objective of this project was to design, build, and test a low-profile skimmer trawl, and compare its performance to a standard sized skimmer trawl for amount of catch, species composition, and size of bycatch. Catch composition of a standard high profile skimmer trawl net (12 ft) and a low profile skimmer trawl net (3 ft.) in the North and Newport Rivers, North Carolina were compared. Each gear type was alternately rigged on the port and starboard sides of a commercial shrimping vessel and the catch were sampled according to criteria established by the Southeast Area Monitoring and Assessment Program, to determine if modifying skimmer trawl nets by decreasing the vertical height of the net would lower bycatch rates, yet maintain shrimp catch. Total shrimp catch in the low profile net was significantly lower than that in the control net (-32.9%, $p = 0.0001$), and significantly lower for brown shrimp (*Penaeus aztecus*) by -39.1% ($p = 0.0001$), but pink shrimp (*P. duorarum*) catches were not significantly different (-17.1%, $p = 0.1934$). In the sample, weight of finfish biomass to total catch biomass, excluding debris, was similar (47.5% finfish in the low profile net and 44.8% finfish in the high profile net). The low profile net was not effective in reducing bycatch under most conditions. Because of increased catch rates of brown shrimp by the high profile net, results suggest that shrimpers may find it advantageous to utilize a high profile skimmer net during the brown and pink shrimp seasons, rather than a low profile net. The low profile net may be advantageous to fishermen under conditions of high wind, shrimping in areas where tight turns are mandated, presence of large amounts of floating debris, and shallow water.

Grantee: Texas Parks and Wildlife Department, Austin, TX

Grant No.: NA57FD0131 NMFS Contact: F/SEO

Project Title: Assessment of Composition and Magnitude of Bycatch Associated with the Commercial Shrimp Trawling Industry in Northern and Mid-Texas Coastal Bays During the Spring and Fall Texas Commercial Bay Shrimp Open Seasons

Funding: Federal: $65,024 Recipient: $21,709

Assessment: The project goals and objectives were to: (1) determine percent composition by weight and number of target species (shrimp) and all non-target species caught in commercial shrimp trawls within bays on the northern and mid-Texas coast; (2) determine catch rate and mean size of target and non-target species; (3) compare average percent composition of commercial bay trawl species to species composition in the Texas Parks and Wildlife Department's (TPWD) fishery independent bay trawl surveys; and, (4) compare 1995 bycatch composition and magnitude on the northern and mid-Texas coast during the 1995 spring and fall shrimping seasons to preliminary single-year bycatch data collected during 1992 in Galveston Bay and during 1993 in Corpus Christi Bay., and compared these data with previous year 1992 and 1993 bycatch studies. This project determined percent composition, catch rate and mean size of commercial shrimp and bycatch organisms in 1995 spring and fall commercial shrimp seasons in Galveston Bay, Matagorda Bay, San Antonio Bay and Corpus Christi Bay. It also conducted statistical analyses on percent composition of major commercial shrimp and bycatch organisms collected in commercial and TPWD samples during the spring and fall shrimping season on the northern and mid-Texas coast. This knowledge will assist in the management of Gulf of Mexico recreational and commercial marine organisms and associated fisheries, as well as in environmental issues and management regimes related to Texas bay and gulf ecosystems.

Grantee: National Fisheries Institute, Inc., Arlington, VA

Grant No.: NA47FD0391 NMFS Contact: F/SF

Project Title: Framework for Industry Consideration of Incidental Bycatch in Pelagic Longline Fisheries

Funding: Federal: $62,207 Recipient: $0

Assessment: The objective of this project was to provide baseline information to members of the longline fishing industry to encourage practical suggestions for operational changes that could minimize bycatch. Data from over 1,500 U.S. set records and over 5,400 Japanese set records were analyzed and summarized by region for catch composition, disposition characteristics, survival rates, and gear and operational features. The summary information was provided to fishermen at workshops conducted under the grant, at the Bycatch Symposia in Seattle and Rhode Island, and at the Blue Water Fishermen's Association's annual meeting. These data allowed fishermen to compare their experiences against other fishery operations. Active participants in the pelagic longline fishery were surveyed for their opinions on practical options to reduce bycatch with minimal economic impact, and their responses were quantified. This project established the foundation for industry participation in the management process for developing mechanisms to address bycatch issues.

Product Quality and Safety

Grant Program

Grantee: University of Alaska Fairbanks, Fairbanks, AK

Grant No.: NA66FD0046 NMFS Contact: F/AKO

Project Title: Electromagnetic Sensor for Automatic Detection of Parasites in Fish

Funding: Federal: $73,575 Recipient: $14,715

Description: The objective of the project was to evaluate the physical factors involved in placement of SQUID magnetometers relative to the defect on detection sensitivity, to reach an ultimate goal of developing an electromagnetic sensor to automatically detect deeply embedded parasites as well as those at the surface. The traditional means of detection, candling, is only able to detect surface parasites. The project attempted to determine the design parameters for automatic parasite detection sensors in the seafood industry. It was shown that the magnetic signature of a single parasite embedded in a small fillet could be detected under particular conditions. An extension of the work showed that the signal of interest is independent of the frequency of the injected current up to 2000 Hz and that the magnitude of the signal scales with current amplitude. The project confirmed that SQUID magnetometers have adequate sensitivity and spatial resolution to detect and localize fish parasites in fish fillets. However, determination of detection depth was not accomplished due to difficulty with the experimental technique. Further refinements to the cancellation plate technology and SQUID detection coils should provide significant improvement in parasite detectability in thick samples.

Grantee: University of Washington, Seattle, WA

Grant No.: NA46FD0399 NMFS Contact: F/NWO
NA66FD0102

Project Title: Fish Kills Associated with *Heterosigma* Surface Blooms

Funding: Federal: $50,739 Yr. 1 Recipient: $ 0 Yr. 1
$48,193 Yr. 2 $ 9,060 Yr. 2

Assessment: The goal of this project was to identify the factors that cause dense surface concentrations of the alga *Heterosigma,* and identify if any of the factors associated with surface occurrence cause the development of toxicity. The researchers demonstrated that axenic cultures do not appear to have the capacity to kill salmonids; however, infecting the strain of *Heterosigma* with bacteria renders it toxic to fish. Further, they found that a minimum of 16 hours of light are necessary to develop toxicity. Researchers were unable to determine how fish are killed by *Heterosigma.*

Grantee: Monterey Bay Aquarium Research Institute, Pacific Grove, CA

Grant No: NA57FD0009 NMFS Contact: F/SWO

Project Title: Evaluation of Nucleic Acid Probes for Identifying Domoic Acid-Producing *Pseudonitzschia* Species

Funding: Federal: $78,730 Recipient: $0

Assessment: The goal of this project was to develop and test a molecular probe that would detect and quantify various species of *Pseudonitzschia*, a diatom associated with the production of domoic acid. Ribosomal RNA-targeted DNA probes were devised and tested on several *Pseudonitzschia* species. The method of identification developed is called whole cell (or *in situ*) hybridization. The method requires approximately 3 hours to execute, with hands-on time approximately equal to 1 hour. Costs of expendable supplies are approximately $2.50 per sample. Assuming a labor charge of $22.50/hr, total costs associated with this assay are approximately $25 per sample.

Grantee: Regents of the University of California, Santa Cruz, CA

Grant No.: NA36FD0306 NMFS Contact: F/SWO

Project Title: Extra-Algal Elements That May Cause Domoic Acid Production in Diatoms

Funding: Federal: $89,812 Recipient: $40,927

Assessment: The purpose of this research was to determine whether the production of domoic acid, a toxin derived from diatoms, is controlled by a non-algal agent: bacterium, virus, or plasmid. The researcher was unable to make a determination because some of the planned test methods did not work, and most tests were inconclusive.

Grantee: Oregon State University, Corvallis, OR

Grant No: NA37FD0191 NMFS Contact: F/SF

Project Title: Replicative Potential, Tissue Distribution and Survival in Molluscan Shellfish of Putative Norwalk-like Caliciviruses Originating from Ocean Hosts

Funding: Federal: $178,752 Yr. 1 Recipient: $39,950 Yr. 1
$201,590 Yr. 2 $81,967 Yr. 2

Assessment: The objective was to develop extraction and assay methods for recovering known caliciviruses from tissues of shellfish given a measured quantity of virus, and to test for calicivirus replication in shellfish exposed to various known caliciviruses. Molluscan shellfish are known to be contaminated with several potential human pathogens including the caliciviruses, which have been implicated in severe outbreaks of viral gastroenteritis. Lack of specific, reliable tests for caliciviruses and other pathogens has resulted in shellfish waters being closed to harvesting because the status of contamination could not be determined. Furthermore, decontamination methods of relaying and depuration have proven to be inadequate for insuring the safety of raw shellfish contaminated with caliciviruses. Under this project, caliciviruses were isolated from naturally and experimentally exposed shellfish stocks using mammalian cell culture systems. Retention (and possible replication) of these viruses in shellfish was demonstrated for 60 days or more under depuration using continuous flow sterile sea water. The project also demonstrated that caliciviruses occur naturally within ocean sources including shellfish, and identified calicivirus contamination in both open and closed shellfish beds on all coasts (Atlantic, Gulf, and Pacific), although the source of these viruses (marine or terrestrial) remains unknown.

Grantee: Woods Hole Oceanographic Institution, Woods Hole, MA

Grant No. NA47FD0447 NMFS Contact: F/SF

Project Title: Detection and Quantification of Toxic Dinoflagellate Species Using Molecular Probes

Funding: Federal: $121,022 Recipient: $20,746

Assessment: The objective of the project was to develop species-specific or strain-specific assays for harmful algal species. Polyclonal antibodies (PAbs) to *Alexandrium tamarense* were produced and were then affinity purified to minimize cross-reactions. The initial production of PAbs was highly successful. Affinity purification required two different approaches, i.e., positive selection of the anti-*Alexandrium* antibodies and negative adsorption with subsequent removal of the cross-reacting antibodies. The negative adsorption method appeared to be the best approach; however, even after adsorption, significant cross-reactions with *Pyrodinium* remained. Therefore, negative adsorption proved to be as challenging and unfruitful as the positive selection methods for purified antibodies. Despite considerable effort, the project did not result in a usable, purified polyclonal antibody. It is now clear that monoclonal antibodies offer the best chance of producing highly specific antibodies to *Alexandrium*.

Grantee: University of Florida, Gainesville, FL

Grant No: NA46FD0491 NMFS Contact: F/SF

Project Title: Rapid Methods to Differentiate Pathogenic and Non-Pathogenic Strains of *Vibrio vulnificus* in Molluscan Shellfish

Funding: Federal: $151,617 Recipient: $28,466

Assessment: The goal of the research was to develop rapid and accurate methods to differentiate pathogenic from non-pathogenic strains of *Vibrio vulnificus* in molluscan shellfish. *V. vulnificus* can cause life-threatening disease in persons who have underlying disease and who consume raw shellfish. High genetic variation was found, using the restriction fragment-length polymorphism (RFLP) technique, among clinical and environmental isolates by pulsed field gel electrophoresis. In contrast, ribotype profiles showed greater homology. Individual oysters were found to contain numerous strains of *V. vulnificus* while single strains were found in the blood of all patients tested. These data indicate that hypervirulent strains likely occur among mixed populations of the bacteria in oysters. A phagocytic cell assay did not correlate with *V. vulnificus* strain virulence in human cases or the mouse model. Prior to this study, there was no method to predict which *V. vulnificus* strains in oysters caused human disease, the number of pathogenic strains in oysters, or estimates of the infectious dose. Further development of these methods will provide regulatory agencies and the shellfish industry a means to predict potential public health hazards from *V. vulnificus.*

Grantee: University of South Alabama, Mobile, AL

Grant No.: NA67FD0098 NMFS Contact: F/SF

Project Title: Further Development of a Highly Sensitive Assay for Use in the Detection of Toxins Responsible for Diarrhetic Shellfish Poisoning (DSP)

Funding: Federal: $133,204 Recipient: $26,198

Assessment: The study investigated a unique pharmacologic property of okadaic acid (OA) and dinophysistoxin-1 (DTX-1), the major toxins associated with diarrhetic shellfish poisoning (DSP), to determine if this property could be used to develop a rapid and reliable test for detection of DSP toxins in shellfish. Since the harmful effects of OA and DTX-1 are caused by their ability to inhibit protein phosphatases, inhibition of enzyme activity correlates well with toxicity. An enzyme based assay (PP2A assay) was developed and tested for sensitivity and reliability under highly controlled conditions. Next, the assay's performance was tested in a whole shellfish matrix, and results indicated that the PP2A assay was effective at detecting toxins in crude methanol extracts of whole oysters, and the method compared favorably with an HPLC-based method as well. In an attempt to make the assay more cost effective, researchers produced a "hybrid" enzyme that could be expressed in large amounts yet still had very high sensitivity. The PP2A method looks promising for development into a sensitive and reliable method for the detection of DSP. This should benefit the shellfish industry through increased consumer confidence, and the general public through improved seafood safety.

Grantee: North Carolina State University, Raleigh, NC

Grant No.: NA37FD0227 NMFS Contact: F/SF

Project Title: A New Toxic Dinoflagellate Affecting Cultured and Wild Estuarine Fish

Funding: Federal: $119,891 Recipient: $37,620

Assessment: The goal of the project was to characterize the ecological distribution, algal physiology, disease effects, and toxin of a new toxic dinoflagellate, *Pfiesteria piscida*, recently discovered in the Albelmarle-Pamlico Estuary. The organism is highly toxic and has been implicated in several major fish kills. The project was temporarily halted until a more rigid safety plan for handling the toxic dinoflagellate in the laboratory was developed. A field sampling survey for *Pfiesteria piscida* was conducted in the Albemarle-Pamlico Estuary. Collaborators also identified this organism in the Delaware Bay and Chesapeake Bay Estuaries. The optimal salinity for toxic blooms was determined to be 15 ppt, with a range from nearly freshwater to 35 ppt. Fish were exposed to a standardized concentration of the algae and examined. A variety of adverse effects were observed in toxin-exposed fish, including massive skin damage, edema, and hematological changes. The toxin was successfully extracted from seawater and the extract was demonstrated to kill fish in a bioassay.

Grantee: Baylor College of Medicine, Houston, TX

Grant No: NA47FD0428 NMFS Contact: F/SF

Project Title: Distribution of Norwalk/Norwalk-Like Virus in Shellfish

Funding: Federal: $232,284 Recipient: $14,796

Assessment: The objective was to use polymerase chain reaction (PCR) and nucleic acid-based transcription and hybridization technologies to detect and follow the course of Norwalk virus (NV) progression within shellfish after bioaccumulation from environmental sea water. The specific goals were to determine the tissue distribution of NV in oysters and clams and to determine whether tissue-associated viruses adversely affect shellfish depuration effectiveness. Long-term, the project is expected to lead to the exploration of practices that will enhance depuration effectiveness by determining which practices promote elimination of tissue-associated viruses. The eastern oyster, *Crassostrea virginica*, and the hardshell clam, *Mercenaria mercenaria*, were exposed to varying concentrations of NV for 4-24 hour bioaccumulation times, and tissues including the stomach, digestive diverticulum, adductor muscle, and hemolymph cells were examined for the presence of virus, using RT-PCR, *in situ* transcription, and *in situ* PCR techniques. Depuration effectiveness was compared to a bacterial indicator standard, *E. coli*, in experiments with *C. virginica*. NV was present in all oyster and hardshell clam tissues examined following bioaccumulation. NV was depurated less efficiently than *E. coli* from oysters.

Aquaculture

Grant Program

Grantee: Ocean Spar Technologies, Bainbridge Island, WA

Grant No.: NA56FD00071-01 NMFS Contact: F/NWO

Project Title: Offshore Aquaculture Harvest and Transport Concept: Feasibility and Development

Funding: Federal: $172,892 Recipient: $36,217

Assessment: The goal of the project was to develop an integrated method of harvest and transport of fish from large scale, offshore net pen facilities. This project resulted in the development of a new generation of net pen cage called Sea Station. Sea Station is conical in shape and made up of a single spar buoy, a rim and spoke lines. The Sea Station was safely towed at a speed of 51 cm/second without changing shape or volume. Also, the investigators successfully developed a mechanism within the Sea Station system to channel fish to an opening connected to a harvest pen. The Sea Station is able to transport and harvest fish with a minimal stress to the salmonid. The system appears to have other operational qualities, including the capability to sink the unit in adverse weather conditions and taut netting that can resist predators.

Grantee: Oregon State University, Corvallis, OR

Grant No.: NA46FD0418-01 NMFS Contact: F/NWO

Project Title: Use of Red Microalgae, *Palmaria mollis* in Improving Hatchery Seed Production of the Red Abalone, *Haliotis rufescens*

Funding: Federal: $118,658 Recipient: $24,897

Assessment: The study was designed to improve hatchery seed production of the red abalone (*Haliotis rufescens*) by using dulse throughout the process of broodstock conditioning, larval settlement/ metamorphosis, and rearing juveniles to seed size. Current hatchery production programs rely on diatom films, which are difficult to maintain under nursery conditions, and high mortality rates have resulted. Researchers found that conditioning broodstock on a diet of dulse instead of kelp resulted in the production of eggs of significantly higher protein and lipid content, as well as higher hatching success rates. The project failed to grow from post-metamorphosis to the 10 mm size in continuous culture with dulse, which may have been due to poor survival of abalone in the 30 gallon fiberglass tank. Further research will be required to assess the potential commercial benefits from rearing abalone with high densities of dulse.

Grantee: Micronesian Mariculture Demonstration Center, Koror, Palau

Grant No.: NA46FD0045-01 NMFS Contact: F/SWO

Project Title: Propagation of Reef Corals for the International Aquarium Trade: Phase 1 - *Cnidaria (alcyonacea)*

Funding: Federal: $52,037 Recipient: $1,500

Assessment: The goals of this project were to develop methods for controlled, sustainable mass propagation (cloning) of commercially valuable soft corals, *Cnidaria (alcyonacea*), for the international saltwater aquarium trade, and to promote the establishment of an export industry based on propagated soft corals. Three species of soft coral were successfully propagated and marketed to the international aquarium trade. Market acceptance was rated as excellent and demand far exceeded supply. A commercial wholesaler developed an advertising campaign in conjunction with the project, greatly enhancing the benefits derived from the investigation.

Grantee: Micronesian Mariculture Demonstration Center, Koror, Palau

Grant No.: NA57FD0082 NMFS Contact: F/SWO

Project Title: Propagation of Reef Corals for the International Aquarium Trade: Phase II - *Cnidaria (scleractinia)*

Funding: Federal: $49,097 Recipient: $1,500

Assessment: The goal of the project was to locate and identify commercially valuable species of *Scleractinian* corals (hard corals) indigenous to Palau, and screen the more valuable species for suitability as candidates for mass culture through asexual propagation. The project was terminated by mutual consent of the grantee and NMFS because the expected Principal Investigator was not available and could not be replaced.

Grantee: Black Pearls, Inc., Holualoa, HI

Grant No.: NA36FD0375-01 NMFS Contact: F/SWO

Project Title: Feasibility of Commercial Black Pearl Farming on Namdrik Atoll, Marshall Islands

Funding: Federal: $132,831 Recipient: $94,450

Assessment: The goals of this project were to assess the feasibility of commercial-scale pearl farming in Namdrik Lagoon, Marshall Islands, and to establish a sound technical and business management basis for the development of small-scale local pearl farming. The project evaluated the availability of spats, and obtained growth and survival data of farmed pearl oysters. The project proved the feasibility of using a remote hatchery (located in Kona, Hawaii) to rear out spat and return them to Namdrick Atoll. While the technical feasibility of rearing oysters on Namdrick was proven, significant socio-economic and logistical problems were encountered. Prospects for economic development of the pearl oyster industry appear promising in the Republic of the Marshall Islands but future efforts should concentrate in areas with better access to requisite inputs.

Grantee: The Research Foundation Jointly with Brooklyn College - CUNY, New York, NY

Grant No.: NA36FD0384 NMFS Contact: F/NEO

Project Title: Molecular Tagging of Lake Sturgeon as a Means of Identification for Use in Developing a Domesticated Breeding Stock for Use in Population Re-establishment and for Conservation Enforcement Programs

Funding: Federal: $113,857 Recipient: $31,151

Assessment: The objective of this project was to produce a molecularly tagged breeding stock of lake sturgeon to ensure the positive identification of their progeny in nature and in the commercial marketplace. In order to generate an initial stock of transgenic lake sturgeon carrying a non-removable molecular tag, lake sturgeon eggs were micro-injected with an *Escherichia coli B*-galactosidase gene coupled to constitutive SV40 promoter immediately after fertilization. The resulting embryos and fish have been tested for bacterial *B*-galactosidase expression by determining their ability to form an indigo blue color after exposure to X-gal solutions. More than 35% of the micro-injected embryos displayed *B*-galactosidase activity. Control embryos showed no color development under identical conditions, which eliminates the possibility that the blue color formed by the experimental embryos was caused by endogenous *B*-galactosidase. At the end of the project, the transgenic stock was chemically preserved for future study of the distribution of bacterial *B*-galactosidase gene expression in various tissues and organs. Although not field tested, it is believed that the transgenic lake sturgeon stock generated by this project would have been useful for: (1) positive identification of illegally taken lake sturgeon; (2) population estimation following standard release/recapture methods; and, (3) population re-establishment/enforcement conservation programs. Moreover, since the efficacy of the methods used to generate transgenic lake sturgeon has been clearly demonstrated, it is believed that the same techniques may be used in the future to produce transgenic stocks of other commercially important fish species in order to address similar practical problems in various fisheries.

Grantee: Ohio State University Research Foundation, Columbus, OH

Grant No.: NA36FD0099 NMFS Contact: F/NEO

Project Title: Domestication of Lake Whitefish, *Coregonus clupeaformis*: Protein and Amino Acid Requirements to Optimize Feed Utilization and Growth

Funding: Federal: $98,425 Recipient: $4,519

Assessment: This project studied the requirements for protein and ten essential amino acids for maximizing growth and optimizing feed utilization in cultured lake whitefish. Through a series of feeding experiments, it determined the quantitative requirement for protein and limiting essential amino acids. Protein requirement was estimated with practical, fish meal-based diets. Weight gain and tissue free amino acids were used as criteria to determine the optimum protein level for growth, which was estimated at 36.5% in the whitefish grow-out phase. Aspartate aminotransferase was characterized in whitefish as an indicator for protein metabolism. Muscle and liver lipids were characterized in whitefish that were fed experimental diets in captivity to marketable size; results indicated enriched levels of polyunsaturated fatty acids (important in human nutrition) in muscle. A broken-line model was used to establish the optimum protein level, and free amino acid concentrations in tissues were used as supporting evidence for physiologically meaningful conclusions. The optimum level of arginine and lysine in the whitefish diet is 1.2-1.5% of dry diet. Changes in free amino acids followed increased levels of these limiting amino acids. Evidence has been presented that a dietary pH around 7.0 improves semi-purified diet utilization; however, further studies must concentrate on increased diet palatability and acceptability. This project resulted in production of the first generation of "domesticated" lake whitefish. Further nutritional studies with domesticated whitefish will accelerate development of diets specifically formulated for this potential new aquaculture species in the Great Lakes region.

Grantee: New England Fisheries Development Association, Boston, MA

Grant No.: NA46FD0330 NMFS Contact: F/NEO

Project Title: Commercial Tank Culture of Summer Flounder

Funding: Federal: $277,392 Recipient: $48,071

Assessment: Prior work funded under Saltonstall-Kennedy showed summer flounder, *Paralichthys dentatus*, to be a potential candidate for commercial culture. This project undertook numerous experiments to determine the commercial feasibility of tank culture. Experiments were directed at both the larval and juvenile stages of life history. The research was aimed at improving larval survival and better defining nutritional needs and at what stages these needs are critical. Stocking densities of juveniles, growth rates, feed trials, and how to minimize the development of malpigmented juveniles were also investigated. Additional research evaluated the market potential for farm raised summer flounder and the economics of farming summer flounder in a land-based tank farm. Since one of the most likely scenarios of a commercial tank farm would involve recirculating technology, the research included setting up a recirculating system for all of the juvenile culture experiments.

Grantee: University of New Hampshire, Durham, NH

Grant No.: NA66FD0015 NMFS Contact: F/NEO

Project Title: A Symposium: Open Ocean Aquaculture — What We Know, What We Don't Know, What We Need to Know

Funding: Federal: $34,674 Recipient: $0

Assessment: A 3-day international symposium was conducted on open ocean aquaculture which provided a forum for the discussion of technical, biological, environmental, regulatory, economic, and social issues surrounding this concept. The conference featured 40 speakers from the East, Gulf and West Coasts of the United States, both coasts of Canada, and Russia, Norway, Sweden, Ireland, Portugal, Italy, Israel and New Zealand. Proceedings have been published and are available from NOAA Sea Grant.

Grantee: New England Fisheries Development Association, Boston, MA

Grant No.: NA46FD0327 NMFS Contact: F/NEO

Project Title: Polyculture of Sea Scallop Suspended from Salmon Net Pens

Funding: Federal: $85,625 Recipient: $4,800

Assessment: This project demonstrated that sea scallops (*Placopecten magellanicus*, initial size 10 mm) held in pearl nets adjacent to salmon net pens can grow to market size (60-70 mm) in 22 months. Growth rates of 0.09 and 0.10 mm/day were attained at the two sites in Northeastern Maine, and were as high as 0.12 mm/day during the first 16 months. Neither accelerated nor decelerated growth due to the scallops being held in close proximity to the salmon pens was evident. Mean shell heights were significantly different with the depth of the pearl nets; however, no consistent patterns of shell height with depth were apparent. Overall survival of scallops held in pearl nets was 64.3% and 66.2% at the two sites. Periodic testing for PSP toxins indicated that scallops grown in the area studied would be unlikely candidates for sale in whole animal or roe-on markets. However, farm-raised scallops were not significantly different from commercial scallops in taste and texture, and would be an acceptable product to consumers. Improvements in methodology need to be made before scallops can be raised in polyculture with salmon in a cost effective manner. Methods to improve the economics are needed, such as decreasing labor costs and increasing growth rates of scallops. This study demonstrated good growth of scallops, a new use for previously unutilized space, and a possible way for fish farmers to diversify.

Grantee: University of Arizona, Tucson, AZ

Grant No.: NA56FD0621 NMFS Contact: F/SF

Project Title: Taura Syndrome of Marine Penaeid Shrimp: Development and Application of Molecular Detection Methods of TSV from Domestic Shrimp Aquaculture and Evaluation of Challenge Studies in Gulf of Mexico Species

Funding: Federal: $69,922 Recipient: $36,544

Assessment: The objective of this project was to develop rapid, highly sensitive molecular probes for the recently discovered Taura Syndrome Virus (TSV) and to apply these probes as diagnostic reagents to be used by the aquaculture industry to prevent TSV from entering or becoming established in the U.S. As a result of the research, new knowledge on the biology and host range were developed. Modern detection methods for the virus were developed, including serological methods using fluorescent and enzyme-linked detection methods with polyclonal and monoclonal antibodies to TSV antigens. Non-radioactive cDNA probes were developed and applied to *in situ* hybridization assays for TSV in histological sections. A PCR method was developed for TSV and successfully applied to the detection of the virus in fresh hemolymph samples. Native shrimp species were challenged with TSV. The white shrimp, *Penaeus setiferus*, was found to be highly susceptible to infection and disease in the postlarval stages, while juveniles of the species were found to be relatively resistant. In contrast, postlarval and juvenile stages of the brown shrimp, *P. aztecus*, and the pink shrimp, *P. duorarum*, were found to be refractory to TSV.

National Program

Project No.: 96-SE-CH NMFS Contact: F/SEO

Project Title: Aquaculture

Funding: Federal: $25,000

Assessment: The objectives of the project were to identify and address issues that impede ecologically safe expansion of the mariculture industry and to develop technical information to minimize impacts on the environment and on the health of human consumers. Project scientists represented NMFS in various meetings to address issues (national and international) and propose activities in mariculture research and development. Various presentations at international meetings were supported by the project. The project assisted an interagency risk assessment of viruses in penaeid shrimp. To address a major impediment to the expansion of the industry, i.e., the lack of effective and approved chemotherapeutants, research was initiated to improve drug dosage forms for use in aquatic systems, in collaboration with the Medical University of South Carolina. Two important products of the project are: *An Evaluation of Potential Shrimp Virus Impacts on Cultured Shrimp and Wild Shrimp Populations in the Gulf of Mexico and Southeastern U.S. Atlantic Coastal Waters* (along with numerous other scientists) and *Aquatic Therapeutant Delivery Systems* (a comprehensive review of literature relevant to chemotherapeutants in aquatic systems).

Habitat Protection

Grant Program

Grantee: Washington State University, Pullman, WA

Grant No.: NA46FD0396 NMFS Contact: F/NWO

Project Title: Evaluation of Mechanical Methods and Herbicide/Adjuvant Treatments for the Effective Control of *Spartina*

Funding: Federal: $35,378 Recipient: $1,491

Assessment: The major objective of the project was to develop an effective and environmentally safe integrated system to control *Spartina spp.*, an invasive cordgrass found in Willapa Bay, WA. Control efforts evaluated included hand-pulling, mowing, combined mowing/herbicide treatments and various herbicide applications. The results found that the effectiveness of various treatments in rank order were: (1) hand-mowing; (2) herbicide applications; (3) hand-mowing and herbicide treatment; and, (4) hand pulling. Hand mowing treatments controlled *Spartina* 95% and cost $312 per acre. Also, the study found that in utilizing herbicides, the most effective month for applying treatment was July; the most effective application method was a hand held wipe, and that X-77 was the most effective adjuvant. Given the labor-intensive nature of these control efforts and the environment in which *Spartina* resides, all of these ground-based, by-hand treatments can control only limited acreage. Attempts to simulate aerial treatments were ineffective.

Grantee: University of Maine, Machias, ME

Grant No.: NA46FD0328 NMFS Contact: F/NEO

Project Title: Biotic and Abiotic Factors Influencing Recruitment and Subsequent Mortality of Soft-Shell Clams in Eastern and Southwestern Maine

Funding: Federal: $77,004 Recipient: $12,247

Assessment: The objectives of this project were to determine the role of biotic and abiotic factors in influencing the recruitment success of soft shell clams at different intertidal areas in Maine, and to identify the role of sedimentary regime and tidal height. Between 1982 and 1992, landings of soft-shell clams (*Mya arenaria* L.) in Hancock and Washington counties of Maine declined by 90% while, concomitantly, landings in southwestern Maine increased by 15% over the same time interval. To better understand the factors that may have contributed to the apparent resource decline in eastern Maine, parallel manipulative experiments were conducted at six intertidal mud flats in eastern Maine and six in southwestern Maine from April to November 1995. The importance of tidal height, mesh netting to exclude mobile predators, and spatial variability on the recruitment of clams was examined. It was found that average abundances of *Mya* spat were two orders of magnitude greater in southwestern Maine than in eastern Maine. In a series of 2-week experiments at two eastern and two southwestern sites designed to pinpoint times of peak settlement of individuals, it was found that settlement peaks from mid- to late July in southwestern Maine and 4-6 weeks later in eastern Maine. Differences in peak abundance between the two regions were even more dramatic than in the long-term study. Apparently, the difference in abundance between southwestern and eastern Maine *Mya* populations begins prior to larval settlement from the plankton.

Other

Grant Program

Grantee: Regents of the University of California, Santa Barbara, CA

Grant No: NA46FD0493 NMFS Contact: F/SWO

Project Title: Control of the European Green Crab in California: Detection of Natural Enemies

Funding: Federal: $54,687 Recipient: $19,842

Assessment: This project examined introduced populations of green crabs for parasites and evidence of predation. A comparison was made between the parasites, growth, and reproductive performance of the introduced green crab, and the existing published information on native green crab populations in Europe. It was found that introduced populations attain a large size due to the absence of predators found in the European populations. The research suggests that native parasites might be able to control the growth of introduced species.

APPENDIX I

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 (F/SF2)
Utilization Research and Services Division
1315 East-West Highway
Silver Spring, Maryland 20910
Telephone: (301) 713-2358

Kenneth L. Beal, National Marine Fisheries Service (F/NEO)
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One Blackburn Drive
Gloucester, Massachusetts 01930
Telephone: (508) 281-9267

Ellie F. Roche, National Marine Fisheries Service (F/SEO)
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Patricia J. Donley, National Marine Fisheries Service (F/SWO)
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Kevin A. Ford, National Marine Fisheries Service (F/NWO)
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William P. Hines, National Marine Fisheries Service (F/AKO)
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APPENDIX II

FY 1996 S-K Applications Recommended for Funding

	Project Title	Recipient	Federal Funding	Recipient's Cost Share
Alaska				
1.	Comparison of Three Genetic Methodologies for Stock Identification of Pink, Chum, and Sockeye Salmon in the North Pacific: Stage Two	University of Alaska Fairbanks Fairbanks, AK	$156,604.00	$28,567.00
2.	Study of Bycatch Avoidance by Fishermen in Hook and Line Greenland Turbot Fishery	Fisheries Information Services Juneau, AK	$10,806.00	$0.00
3.	Utilization of Giant Grenadier (Albatrossia pectoralis) II: Production of Stabilized Mince and Development of a Promotional/Marketing Study	University of Alaska Fairbanks Fairbanks, AK	$86,543.00	$17,308.00
4.	Nori Cultivation: Physiological Ecology of Native Alaskan Porphyra Species	University of Alaska Southeast Juneau, AK	$151,351.00	$33,149.00
5.	Recruitment Limitation in Alaskan Red King Crab: The Importance of Early Life History Stages	University of Washington Seattle, WA	$115,175.00	$21,532.00
6.	Quantitative Evaluation of Species Specific Flatfish Behavior: Basis for Bycatch Reduction and Selective Trawl Development	University of Alaska Fairbanks Fairbanks, AK	$62,076.00	$12,415.00
7.	Blended Seafoods: Utilizing Bycatch for New Products from Undervalued Fish.	University of Alaska Fairbanks Fairbanks, AK	$79,920.00	$15,984.00
8.	Development of an Expert Computer-Based Imaging System to Enhance Fisheries Management of Crab and Groundfish Fisheries	State of Alaska Kodiak, AK	$93,695.00	$13,624.00
9.	Dried Fish Asian Market Investigation and Analysis and an Industry Demonstration Project to Produce Dried Fishery Products from Underutilized Salmon and Bycatch Species	Catrina C. Mitchell-Alaska Food Group Juneau, AK	$189,980.00	$80,935.00
		Total:	**$946,150.00**	**$223,514.00**
Northeast				
1.	Critical Evaluation of Conservation Success in Restoration of James River and Ocean Run American Shad	Virginia Commonwealth University Richmond, VA	$163,542.00	$157,212.00
2.	Establishing the Food Web Links Between Estuaries and Nearshore Fisheries in New England	Edward Boynton Gloucester, MA	$93,866.00	$0.00

	Project Title	Recipient	Federal Funding	Recipient's Cost Share
3.	Determination of Spawning Success and Female Fecundity to Assess the New England Squid Fishery	Marine Biological Laboratory Woods Hole, MA	$89,021.00	$47,049.00
4.	Enhancement of Recruitment of the Soft-shell Clam (Mya arenaria)	MER Assessment Corporation South Harpswell, ME	$29,823.00	$1,592.00
5.	Mixed Stock Analysis of Wintertime Aggregations of Striped Bass Along the Mid-Atlantic Coast	New York University Medical Center Tuxedo, NY	$80,016.00	$35,901.00
6.	Leatherback Turtle Movements in Relation to New England Pelagic Fisheries	New England Aquarium Corp. Boston, MA	$81,225.00	$0.00
7.	Bycatch Reduction Project	Manomet Observ for Conserv Science Manomet, MA	$266,139.00	$254,288.00
8.	Investigate the Impact of Reduced Fresh Groundfish Supply on Processors and Wholesalers	University of Massachusetts, Dartmouth North Dartmouth, MA	$28,896.25	$11,640.35
9.	Development of Commercial Aquaculture of Black Sea Bass	University of Rhode Island Kingston, RI	$99,385.00	$15,246.00
10.	Evaluation of Selectivity & Efficiency of Sea Scallop Dredges	Virginia Institute of Marine Science Gloucester Point, VA	$97,839.00	$49,950.00
11.	Determination of Aeration Rates, End-Product Quality and Economic Analysis of In-Vessel Composting Systems for Crab Waste Products	University of Maine Orono, ME	$86,172.00	$13,788.00
12.	Crangon Shrimp Resource Utilization in the Northwest Atlantic	Maine Dept. of Marine Resources Augusta, ME	$86,893.00	$0.00
13.	Development of an Integrated Aquaculture and Sea Ranching System for the Green Sea Urchin (Strongylocentrotus droebachiensis) in the Gulf of Maine	University of New Hampshire Durham, NH	$165,720.00	$52,660.00
14.	Collaborative Decision Making Workshops	University of New Hampshire Durham, NH	$25,880.00	$0.00
15.	Effectiveness of Acoustically Reflective Gillnet in Reducing / Eliminating Marine Mammal Bycatch	Atlantic Gillnet Supply, Inc. Gloucester, MA	$170,860.00	$79,700.00
16.	Commercialization of Ultrasonic Device for Measuring Fat Content of Mackerel	University of Massachusetts Amherst, MA	$68,758.00	$0.00

	Project Title	Recipient	Federal Funding	Recipient's Cost Share
17.	Oral History Project to Collect Traditional Ecological Knowledge (Including Spawning Area Data) and Develop an Historical Record of Fishermen/Scientists Interactions	Gloucester Fishermen's Wives Gloucester, MA	$54,203.00	$4,750.00
18.	Mortality and Pathophysiology Studies of Blue Crabs Infected with the Parasitic Dinoflagellate Hematodinium perezi	Virginia Institute of Marine Science Gloucester Point, VA	$117,868.00	$13,511.00
19.	Standardization of the Ammonia Electrode Method for Evaluation of Seafood Quality by Correlation to Sensory Analysis	University of Rhode Island Kingston, RI	$77,780.00	$6,298.00
20.	Toward Sustainable Aquacultural Production Systems: Promoting Optimum Media for Nitrifying Bacteria in Recirculating Aquaculture Systems	Purdue University West Lafayette, IN	$120,700.00	$0.00
21.	Reduction of Finfish and Juvenile Shrimp Bycatch in the Gulf of Maine Northern Shrimp Fishery Through the Use of a Modified Double Nordmore Grate	Maine Department of Marine Resources Augusta, ME	$131,402.00	$15,223.00
22.	The Effects of Off Bottom Ground Gear on Flatfish Catches in the Southern New England Whiting Fishery	Dana L Morse Narragansett, RI	$65,338.76	$2,250.00
23.	Bleach-Dipped Lobster Detection Technique	Bio-Concept Laboratories, Inc. Salem, NH	$41,179.00	$9,750.00
24.	Optimization and Clearance Studies of a New Hormone-Based Spawning Induction Technology for Aquacultured Finfish	University of MD Biotech. Institute Baltimore, MD	$132,546.00	$77,826.00
25.	Using Observers to Monitor Status of Atlantic Herring Spawning Stocks and Groundfish Bycatch in the Gulf of Maine	Maine Department of Marine Resources Augusta, ME	$71,220.00	$5,332.00
26.	Technology Development for Flavor Production from Seafood Processing Wastes	University of Rhode Island Kingston, RI	$108,123.00	$28,134.00
27.	To Investigate Culture Technique to Rear Fingerling-Size Atlantic Cod and Larval Fingerling-Sized Haddock for Use in Production Aquaculture and for Use in a Public Restoration Project to Study the Efficacy of Restoring Natural Cod Stocks in the Gulf of ME	University of Maine Orono, ME	$477,773.00	$46,068.00
		Total:	**$3,032,168.01**	**$928,168.35**

	Project Title	Recipient	Federal Funding	Recipient's Cost Share
Northwest				
1.	Harmful Phytoplankton Blooms and their Impacts on the Shellfish and Finfish Fisheries in Western Washington	University of Washington Seattle, WA	$173,888.00	$0.00
2.	Pacific Salmon Captive Broodstocks: A Comparison of the Reproductive Performance of Full-sib Reared in Fresh and Saltwater	Washington Dept. of Fish and Wildlife Olympia, WA	$47,964.00	$26,023.00
3.	Optimal Design of a Water Recirculating System for Shellfish Depuration (and Wet Storage)	Washington State University Pullman, WA	$98,820.00	$28,575.00
4.	Development of a Semi-automated Micro Satellite-based Genotyping System for Kinship Analysis of Chinook Salmon (Oncorhynchus shawytscha)	University of Washington Seattle, WA	$80,145.00	$11,089.00
5.	Estimation of the Stock Composition of Commercial Chum Salmon Fisheries in Puget Sound, Washington	Northwest Indian Fisheries Comm. Olympia, WA	$135,475.00	$33,671.00
6.	Production of a Carnosine and Anserine Containing Antioxidant Extract from Surimi Wash Water	Oregon State University Astoria, OR	$71,070.00	$11,081.00
		Total:	**$607,362.00**	**$110,439.00**
Southeast				
1.	Critical Control Limits, Infective Dose, and Prevalence of Pathogenic Vibrio Species in Shellfish Products	University of Florida Gainesville, FL	$95,660.00	$37,278.00
2.	Molecular Assessment of Public Health Suitability of Shellfish for Human Consumption	Baylor College of Medicine Houston, TX	$217,477.00	$0.00
3.	Analysis of the Genetic Stock Structure of the Atlantic Sailfish Using Restriction Fragment Length Polymorphism Analysis of Both Mitrochondrial DNA and PCR Amplified Nuclear DNA	Virginia Institute of Marine Science Gloucester Point, VA	$62,713.00	$12,859.00
4.	Production and Testing of Immunoassay Kits for the Identification of Billfish Species	Florida Atlantic University Boca Raton, FL	$18,000.00	$1,530.00
5.	Continuation of an Observer Program to Characterize and Compare Regional Efforts in the Directed Commercial Shark Fishery in the Eastern Gulf of Mexico and South Atlantic	Gulf & South Atlantic Fish. Dev. Found Tampa, FL	$180,238.00	$0.00

	Project Title	Recipient	Federal Funding	Recipient's Cost Share
6.	Continued Efforts to Reduce Bycatch in the Gulf of Mexico and South Atlantic Shrimp Fisheries and Disseminate Such Information to the Fishing Industry	Gulf & South Atlantic Fish. Dev. Found Tampa, FL	$560,740.00	$0.00
7.	Monitoring the Socio-Economic Impacts of Federal Regulations on Gulf of Mexico Commercial Shrimp Fishermen	University of South Alabama Mobile, AL	$68,750.00	$70,785.00
8.	Assessment of Ark Populations in Whelk and Calico Scallop Fishing Grounds off the Coasts of GA and FL to Determine Distribution, Abundance, and Potential Commercial Fishery Development for the Cut-ribbed Ark (A.floridana) & Other Promising Ark Species	University of Georgia Athens, GA	$49,521.00	$23,489.00
9.	Removing Gas from the Distended Swim Bladder of Reef Fish: Does It Really Increase Post-Release Survival?	S.C. Department of Natural Resources Charleston, SC	$38,196.00	$9,827.00
10.	Development of Microsatellite Loci for Stock Structure Study of Gulf Red Snapper	Texas A&M Research Foundation College Station, TX	$46,389.00	$13,397.00
11.	Grand Lake Commercial Freshwater Mussel Stock Assessment	Oklahoma Dept.of Wildlife Conservation Oklahoma City, OK	$33,227.00	$244.00
12.	Utilization of Molecular Biomarkers to Provide an Assay for Shellfish Exposure to Polyether Toxins from Harmful Algal Blooms	Mote Marine Laboratory Sarasota, FL	$212,883.00	$68,910.00
13.	A Cooperative Interstate Study to Evaluate Non-Reporting Level of Recreational Anglers Who Capture Tagged Red Drum	S.C. Department of Natural Resources Charleston, SC	$68,625.00	$28,478.00
14.	Reproductive Parameters Needed to Evaluate Recruitment Overfishing of Spotted Seatrout in the Southeastern U.S.	Univ. of Georgia Res. Foundation, Inc. Athens, GA	$97,338.00	$14,625.00
15.	Assessing Status and Trends of Florida's Halfbeak Fishery	FL Dept. of Environmental Protection Tallahassee, FL	$64,899.00	$19,900.00
16.	Application of Nutritional Strategies for the Development of Low Pollution Feeds for Marine Species	University of Texas at Austin Austin, TX	$70,625.00	$29,134.00
17.	Use of Genetic Probes and Artificial Recruit Collectors to Monitor and Enhance the Success of Bay Scallop Reseeding Programs	Skidaway Institute of Oceanography Savannah, GA	$60,393.00	$27,191.00

	Project Title	Recipient	Federal Funding	Recipient's Cost Share
18.	Hard Clam (Mercenaria mercenaria) Mariculture in U.S. Waters: Evaluating the Effects of Large-Scale Field Outgrowth Practices on Clam Growth, Nutrition, and Inshore Estuarine Creek Communities	S.C. Department of Natural Resources Charleston, SC	$138,570.00	$38,914.00
19.	Critical Habitats of Atlantic Sturgeon	S.C. Department of Natural Resources Charleston, SC	$129,473.00	$27,621.00
20.	Genetic Structure, Status, and Mixed Stock Analysis of Atlantic Sturgeon in the Southeastern U.S.	New York University Medical Center Tuxedo, NY	$175,000.00	$88,594.00
21.	An Analytical Method for Predicting Potential Spread of Exotic Species from Aquaculture and Aquatic Research Facilities in Texas	Texas Parks and Wildlife Department Austin, TX	$54,243.00	$18,132.00
		Total:	**$2,442,960.00**	**$530,908.00**
Southwest				
1.	The Hawaiian Pearl Oyster Partnership: A Public-Private Initiative for Commercial Pearl Farming, and a Test Case of Ocean Leasing Laws.	Black Pearls, Inc. Holualoa, HI	$99,540.00	$15,757.00
2.	Rapid Detection of Harmful Algal Species and their Associated Toxins Using DNA Probes and a Receptor Binding Assay	Monterey Bay Aquarium Research Inst. Moss Landing, CA	$128,578.00	$33,673.00
3.	Sport Fish in California Waters: Seasonal and Interannual Distribution and Dependence on Oceanic Temperature	The Regents of the Univ. of CA La Jolla, CA	$88,400.00	$0.00
4.	Sustainable Sport Fishery Development for Palau: Demonstration Project	Palau Conservation Society Koror, PW	$103,284.00	$10,000.00
5.	Long Range Tuna Detection	Scientific Fishery Systems, Inc. Anchorage, AK	$75,000.00	$0.00
6.	Investigation of the Role of Rickettsiales-like Procaryotes in Withering Syndrome of Black Abalone: Koch's Postulates and Molecular Probes.	Regents, University of California Davis, CA	$155,040.00	$37,099.00
7.	Molecular Genetic Analysis of Anadromous Steelhead Trout (Oncorhynchus mykiss) at the Southern Extent of their Range: A Comparison of Genetic Methods.	Stanford University Stanford, CA	$103,821.00	$29,901.00

	Project Title	Recipient	Federal Funding	Recipient's Cost Share
8.	The Therapeutic Treatment of Abalone Infected with the Putative Agent of Abalone Withering Syndrome	Virginia Institute of Marine Science Gloucester Point, VA	$118,213.00	$11,993.00
9.	Commercialization of White Seabass Aquaculture, Pilot Program Out-grow to Market	Hubbs - Sea World Research Institute San Diego, CA	$208,982.00	$72,494.00
10.	Southern California Commercial Sportfish Catch Database	Mbc Applied Environmental Sciences Costa Mesa, CA	$146,397.00	$133,994.00
11.	Demonstration and Evaluation of the Streak Tube Imaging LIDAR (STIL) for use in Bycatch Reduction	Arete Associates Incorporated Tucson, AZ	$139,153.00	$31,747.00
12.	Using an Innovative Technique to Assess Fecal Contamination in Estuarine Waters and Shellfish	California State University Foundation Hayward, CA	$39,613.00	$24,838.00
		Total:	**$1,406,021.00**	**$401,496.00**
		Grand Total:	**$8,434,661.01**	**$2,194,525.35**

APPENDIX III

FY 1996 S-K Applications Not Recommended for Funding

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
Alaska				
1.	An Economic Valuation of the Kenai Peninsula Pacific Halibut Sport/Charter Fisheries	University of Alaska Fairbanks Fairbanks, AK	$94,290.00	$0.00
2.	Embracing Comprehensive Rationalization: Pareto Safety and Policy Feasibility of Alternative ITQ Allocations to Both Harvesters and Processors--An Economic Analysis.	Washington State University Pullman, WA	$80,799.00	$24,536.00
3.	Toward Improved Bycatch Management in Multispecies Fisheries: The Bering Sea-Aleutian Islands Groundfish Fisheries	Regents, University of California Davis, CA	$116,630.00	$22,694.00
4.	The Effects of Fishery-Induced Directional Selection on Run Timing in Sockeye Salmon	University of Washington Seattle, WA	$69,762.00	$26,685.00
5.	Automated Broadband Sonar Fish Size and Abundance Estimation	Scientific Fishery Systems, Inc. Anchorage, AK	$99,985.00	$37,500.00
6.	"Chunk-Lite" Salmon: The Development of Texturized Products from Late Harvest Pink Salmon.	Alaska Fisheries Development Foundatn Anchorage, AK	$203,329.00	$60,955.00
7.	Analysis of the Impacts of Individual Transferable Quotas on the Alaska Halibut Fishery	Regents, University of California Davis, CA	$90,274.00	$21,849.00
8.	Application of Artificial Intelligence to Reduce Bycatch and Develop a Commercial Fishery for Arrowtooth Flounder	Alaska Fisheries Development Foundatn Anchorage, AK	$203,199.00	$0.00
9.	Hydrodynamic Studies of Codends to Improve Fish Escape and Survival	Alaska Fisheries Development Foundatn Anchorage, AK	$168,036.00	$0.00
10.	Cooperative Industry Survey for Atka Mackerel	University of Washington Seattle, WA	$194,569.00	$199,580.00
11.	Bycatch Mortality of King and Tanner Crab: A review and Analysis of the Literature and Research Data	Alaska Fisheries Development Foundatn Anchorage, AK	$26,505.00	$0.00
12.	Measurement of Fisheries Harvests Using Ultrasonic Bin Sensors and Computer Signal Processing to Improve Fisheries Management and Utilization	University of Washington Seattle, WA	$98,094.00	$34,210.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
13.	Alternative Fishery Development, Chignik, Alaska	William A. Brewer Olympia, WA	$81,000.00	$0.00
14.	Improve Species Selectivity and Reduce Bycatch in Longline Fisheries through the Development of Functionally Enhanced, Processed Baits from Alaskan Seafood Wastes	Alaska Fisheries Development Foundatn Anchorage, AK	$474,107.00	$51,950.00
15.	Examination of the Relationship Between Variable Mesh Size/Escape Rings in Crab Pots and the Escape and Retention of Chionoecetes bairdi, Tanner Crab	State of Alaska Kodiak, AK	$173,477.00	$42,015.00
16.	Reduction of Bycatch Mortality & Waste of Marine Food Resources in the Bering Sea Rock Sole Fishery through Investigative Application of Pot Capture Techniques	Situk, Inc. Sitka, AK	$97,975.00	$97,125.00
17.	Togiak Weir Project: Developing a Feasible Large-River Weir Design to Enhance Fisheries Management and to Improve Data Collection on Chinook & Coho Species of the Togiak River of Southwestern Alaska	Bristol Bay Native Association Dillingham, AK	$55,650.00	$3,695.00
18.	Fully Automated and Integrated Database System for Use in Fisheries	Richard Dale Lomsdale Kirkland, WA	$140,500.00	$0.00
19.	Determining the Feasibility of Creating a Small Boat Marine Fisher for Chukchi Sea Area Residents	Bering Sea Fishermens Association Anchorage, AK	$767,325.00	$0.00
20.	Alaska Longliner Bycatch Study	Kevin Hufford Valdez, AK	$25,000.00	$0.00
		Total:	**$3,260,506.00**	**$622,794.00**
Northeast				
1.	Spotted Wolfish, Anarichas minor: Investigations into the Potential for a New Marine Finfish Aquaculture Species	New England Aquarium Corporation Boston, MA	$96,119.00	$10,185.00
2.	Safety and Efficacy of Ozone in Controlling Microbial Contamination of Fresh Fish	National Food Processors Association Washington, DC	$80,053.00	$65,320.00
3.	Enhancing the RI Fisheries for Winter Flounder (Pleuronectes americanus) with Hatchery-Reared Juveniles: A Feasibility Pilot Study for Stock Enhancement of Flounder in Northeastern U.S.; Monitor Growth and Survival of Tagged, Stocked, and Wild Young	University of Rhode Island Narragansett, RI	$147,849.00	$62,067.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
4.	Bioconversion of Mackerel Byproducts into Value-Added Products for the Nursery and Plant Propagation Industry	University of Massachusetts Amherst, MA	$62,215.00	$18,078.00
5.	The Impact of Fishing Gear on Migrating Silver Phase American Eels (Anguilla rostrata).	University of Mass, Dartmouth North Dartmouth, MA	$38,512.00	$16,083.00
6.	Southern Populations of the Surf Clam Spisula: Identification, Distribution, and Potential Yield to the Commercial Fishery	Virginia Institute of Marine Science Gloucester Point, VA	$102,049.00	$66,282.00
7.	Physical and Biological Processes Influencing the Recruitment of Walleye	Michigan State University East Lansing, MI	$116,148.00	$26,198.00
8.	Development and Demonstration of a Floating Hatchery/Nursery Shellfish Culture System	Martha's Vineyard Shellfish Group, Inc Oak Bluffs, MA	$47,431.00	$7,725.00
9.	Assessing the Use of Special Management Zones as Fisheries Management Tools in the Mid-Atlantic Region	Rutgers University Piscataway, NJ	$30,270.00	$18,077.00
10.	Market-Based Incentives to Marine Fisheries Bycatch Reduction: A Cost-Effectiveness Analysis	Woods Hole Oceanographic Institution Woods Hole, MA	$86,873.00	$18,371.00
11.	Hard Clam Habitat Enhancement and Aquaculture: A Side-by-Side Test of Alternate Technologies	NJ Aquaculture Association Toms River, NJ	$278,028.00	$131,300.00
12.	Deep Water Vertical Longlining	Michigan Fishing, Inc. Fairhaven, MA	$126,940.00	$74,000.00
13.	Development and Demonstration of a Recirculating Phosphating System for Optimum Utilization of Phosphates and Reduced Effluent in Scallop and Shrimp Processing Facilities	VA Polytechnic Institute and State Un. Blacksburg, VA	$71,300.00	$28,842.00
14.	Genetic Immunization of Salmonid Fish Against Infectious Pancreatic Necrosis Virus (IPNV)	DiagXotics, Inc. Wilton, CT	$184,775.00	$21,070.00
15.	Producing High Quality Herring and Mackerel Fillets By Rapid Blood Removal and Antioxidant Application	University of Massachusetts Amherst, MA, MA	$125,821.00	$72,291.00
16.	Development of an Immunodiagnostic Field Test for Identification of Tuna(Thunnus) Species	Virginia Institute of Marine Science Gloucester Point, VA	$65,333.00	$19,270.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
17.	Survey of the Charter/Party Boat Industry in New England: Its Social and Economic Importance to Fisheries	Captain John H. Wadsworth Waterford, CT	$56,900.00	$0.00
18.	Well Boat Conversion Project	Atlantic Salmon of Maine Machiasport, ME	$295,959.31	$127,019.00
19.	Molecular Stock Identification of Silver Hake Based on a Neuro-Fuzzy Model	University of Rhode Island Kingston, RI	$198,355.00	$82,181.00
20.	Development of a Magnetic Immuno Bead Detection Assay for Aeromonas salmonicida–the Causative Agent of Furunculosis	University of Massachusetts Amherst, MA	$71,375.00	$0.00
21.	Enhanced Striped Bass Larval Survival and Growth with Hormone Enriched Microencapsulated and Bioencapsulated Diets	Virginia Institute of Marine Science Gloucester Point, VA	$131,465.00	$26,380.00
22.	Monitoring the Maine Lobster Zone Management Law: A Case Study in Co-Management	University of Maine Orono, ME	$213,345.00	$60,399.00
23.	Ultrasonic Fish Grading and Sorting System	Sonic Technologies Hatboro, PA	$327,418.00	$25,530.00
24.	Assisting in the Restoration and Management of Atlantic Salmon in Lake Ontario and Its Tributaries	Natural Heritage Institute San Francisco, CA	$123,745.00	$23,164.00
25.	Development of a Tidal Water/Coastal Zone Aquaculture Management Plan and Demonstration of Transient Gear Aquaculture	RI Economic Development Corp. Providence, RI	$139,587.00	$48,070.00
26.	Development of Generic HACCP Models for Seafood Processors	National Food Processors Association Washington, DC	$77,550.00	$65,320.00
27.	The Reduction in Harvest of Undersized Summer Flounder (Paralichthys dantatus) as Bycatch in the Mid-Atlantic Sea Scallop Dredge Fishery	Virginia Institute of Marine Science Gloucester Point, VA	$147,809.00	$66,962.00
28.	Establishment of a Sustainable Whelk Fishery in the Gulf of Maine	Maine Dept of Marine Resources Augusta, ME	$90,187.00	$0.00
29.	The Use of Cavitation Level Ultrasound to Enhance the Uptake of Vaccines and Antobiotics by Striped Bass and Channel Catfish	University of MD Biotechnology Inst. College Park, MD	$120,000.00	$69,754.00
30.	Aquaculture Production Potential for a Disease Resistant Strain of the Oyster Crassostrea virginica at Multiple Chesapeake Bay Sites	Virginia Institute of Marine Science Gloucester Point, VA	$92,784.00	$39,139.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
31.	Microbial Decontamination of Fish Using High Intensity Ultrasound	University of Massachusetts Amherst, MA	$70,739.00	$0.00
32.	Proposal to Study Sea Urchin Fishery Enhancement	Timothy J. Dowling Raymond, ME	$128,950.00	$21,000.00
33.	Lobster Modeling for Industry Decision Making	University of Rhode Island Kingston, RI	$105,012.00	$17,833.00
34.	Sustainable Pot Fishing: A Demonstration of a Habitat-Friendly, Resource-Sparing, and Commercially Viable Method of Fishing	Massachusetts Institute of Technology Cambridge, MA	$119,342.00	$57,317.00
35.	Management Techniques for Enhancing Hard Clam Populations in Chincoteague Bay, MD	MD Department of Natural Resources Annapolis, MD	$107,200.00	$82,147.00
36.	Airborne Mapping of Coastal Phytoplankton Biomass for Shellfish Aquaculture Sites	University of Maine Orono, ME	$109,299.00	$31,983.00
37.	Gloucester Herring, Market Optimization & Technical Support Project	Gloucester Herring Corporation Gloucester, MA	$276,750.00	$0.00
38.	Molting and the Effect of Environmental Factors on the Spread of Hematodinium perezi in the Blue Crab (Callinectes sapidus)	Virginia Institute of Marine Science Gloucester Point, VA	$97,900.00	$11,148.00
39.	Stock Discrimination and Harvest Rates of Lake Michigan Steelhead Populations Using Otoliths Elemental Fingerprinting	The Regents of the University of MI Ann Arbor, MI	$120,854.00	$0.00
40.	Fish Gelatin From Fish Bone Waste	Cornell University Ithaca, NY	$70,675.00	$27,662.00
41.	Production of Transgenic Flounder Species Carrying Salt Inducible Carp Gonadotropin Genes	The Richard Stockton College of NJ Pomona, NJ	$114,707.00	$57,915.00
42.	Development of a Commercial Squid Jigging Fishery with Light Attraction	J & A Fishing Corporation New Bedford, MA	$236,152.00	$157,719.00
43.	Improving Seed Production and Quality in Striped Bass Aquaculture: Vitellogenin-Mediated Transport of Essential Egg Componants	University of MD Biotechnology Inst. College Park, MD	$117,525.00	$61,407.00
44.	Opening Markets for Live Fish and Shellfish	New England Fisheries Dev. Association Boston, MA	$85,027.00	$6,329.00
45.	Design of an Optimal Access System for Ocean Mariculture	Woods Hole Oceanographic Institution Woods Hole, MA	$74,486.00	$22,842.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
46.	The Use of an Input-Output Model for the Assessment of the Potential Impact of Future State Actions Related to Blue Crab Population Management in Maryland	Salisbury State University Salisbury, MD	$79,558.00	$43,681.00
47.	Continued Development and Field Testing of Fishing Industry Self-Governance, "Bottom Up" Co-Management in the Maine Softshell Clam and Lobster Fisheries: Improving Fisheries Management for Sustainable Use	Georges River Clam Fishery Rest. Proj. Rockland, ME	$21,400.00	$10,000.00
48.	Development of an Acoustic Tracking System for Harbor Porpoises (Phocoena phocoena) in the Vicinity of Gillnets	University of Rhode Island Narragnasett, RI	$112,550.00	$0.00
49.	Development of Northern Stone Crab Fishery	Matthew Vitiello Rockport, MA	$133,634.00	$22,000.00
50.	The Design, Construction and Demonstration of the Economic Potential of Brine Freezers When Used On Board Vessels in the Gulf of Maine Winter Shrimp Fishery to Enhance the Ex-Vessel Value and Quality of the Product while Increasing Sea Jobs	T / R Fish, Inc. Portland, ME	$65,596.00	$0.00
51.	Low Temperature Storage of Bay Scallop Larvae--A New Management Tool for Shellfish Hatcheries	Cornell Cooperative Extension Southold, NY	$52,261.00	$0.00
52.	Development of Value-Added Products from Fish Processing Waste	University of Rhode Island Kingston, RI	$194,717.00	$96,096.00
53.	Furunculosis Vaccine Efficacy and Seasonal Variation in the Immune Response of Pre-Smolt Atlantic Salmon	Virginia Institute of Marine Science Gloucester Point, VA	$72,683.00	$7,689.00
54.	Americanization and Utilization of Atlantic Mackerel and Atlantic Herring Fisheries	Long Island Seafood Export, Inc. East Quogue, NY	$145,000.00	$60,000.00
55.	Spatial and Temporal Variability in the Distribution, Abundance, and Fishery of Blue Crab in Maryland Waters of the Chesapeake Bay	Maryland Dept. of Natural Resources Annapolis, MD	$132,598.00	$65,283.00
56.	Overcoming Barriers to the Development of a Sea Scallop Aquaculture Industry in Massachusetts	University of MA, Dartmouth North Dartmouth, MA	$103,125.00	$41,655.00
57.	Advanced Offshore Mussel Farm System	Woods Hole Oceanographic Institution Woods Hole, MA	$193,770.00	$70,000.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
58.	The Improved Development of Crab Meat Extraction Machine to Enable Optimum Utilization of Crab Resources and Enhance Processing Opportunities for the Many Species of Crabs Harvested in U.S. Waters	Peter R. Howard Randolph, MA	$79,105.00	$78,528.00
59.	Joint Venture to Develop Novel Biotech Products from the Blood of Fish	Aquabio Products Sciences, Inc. Salisbury Cove, ME	$329,764.00	$86,000.00
60.	Assessment of Contaminant Uptakes in Finfish Aquaculture in Boston Harbor	Massachusetts Institute of Technology Cambridge, MA	$40,933.00	$11,002.00
61.	Comparisons of the Eastern Oyster's Immune Response to Perkinsus marinus with Other Bivalves, a Possible Basis for Selection	Virginia Institute of Marine Science Gloucester Point, VA	$70,960.00	$18,358.00
62.	Management of Fishing Stock by Retraining Fishermen for Merchant Marine Careers	Northeast Maritime, Inc. New Bedford, MA	$116,620.00	$12,130.00
63.	Presque Isle Dual Use Aquaculture Project	Maine School Administrative District 1 Presque Isle, ME	$203,700.00	$45,390.00
64.	Marketing Michigan Fish Businesses and Products and Ensuring Product Quality and Safety	Chippewa/Ottawa Treaty Fish Mgt. Auth. Sault Ste. Marie, MI	$218,369.00	$52,250.00
65.	Massive Seeding of Large Bay Scallops in Buzzards Bay	Taylor Seafood, Inc. Fairhaven, MA	$308,490.00	$470,594.00
66.	Assessment of Asian Shark Fin Trade and Implications for Shark and Dogfish Management	University of Rhode Island Kingston, RI	$35,939.00	$9,448.00
67.	Evaluation of Low-Tech, Large-Scale Cage Culture to the Cultivation of the American Oyster in the Inshore, Coastal and Offshore Waters of the Mid-Atlantic Region	DeAlteris Associates, Inc. Jamestown, RI	$159,489.00	$46,148.00
68.	Management of the Surfclam Fishery: Resolution of Population Subdivision Issues Using Genetic Techniques	Rutgers University, IMCS New Brunswick, NJ	$182,962.00	$82,671.00
69.	Preparing the Northeast Region for HACCP	New England Fisheries Dev. Association Boston, MA	$90,100.00	$15,100.00
70.	Impact and Management of the Exotic European Green Crab (Carcinus maenas) in the Northeastern US: Consequences for Bay Scallop (Argopecten irradians) and Quahog (Mercenaria mercenaria) Fisheries	Smithsonian Institution Washington, DC	$107,442.00	$62,749.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
71.	A Model Industrial Park for Advancing Environmentally Sound Private Aquaculture: Stimulating the Development of Commercial Aquaculture in New England	Massachusetts Institute of Technology Cambridge, MA	$105,596.00	$36,256.00
72.	Development and Evaluation of ATP Luminescence Bacteriological Testing of Seafood	AquaPharm Technologies Corporation Colombia, MD	$235,200.00	$100,800.00
73.	Promote Local Aquaculture to Investors & Consumers	New England Fisheries Dev. Assoc. Boston, MA	$36,030.00	$5,000.00
74.	Working to Eliminate the Bycatch of Marine Turtles in the Fixed-Gear Fisheries of the Northeast	University of Rhode Island Kingston, RI	$70,512.00	$35,181.00
75.	Industry Directed Fishery Data Enhancement	University of Massachusetts, Dartmouth North Dartmouth, MA	$753,476.00	$162,177.00
76.	Design of Sounds for Reducing Dolphin Bycatch in Herring Fisheries	University of Maryland College Park, MD	$87,050.00	$0.00
77.	Open Ocean Groundfish Aquaculture Demonstration	University of New Hampshire Durham, NH	$252,998.00	$42,993.00
78.	An Aquaculture Training Project Targeted At Chesapeake Bay Watermen in Virginia	Virginia Marine Resources Commission Newport News, VA	$48,055.00	$20,646.00
79.	Truro Aquaculture Project " A Study of Sea Scallop Aquaculture in Cape Cod Bay"	Judith Dutra North Truro, MA	$98,550.00	$0.00
80.	Deep Water Electronic Package to Complement Financial Assistance Award Number NA56FK0101–Shrimp Fishing by Trawling, 100-700 Fathoms	Harold A. Loftes, Jr. Wakefield, RI	$95,890.00	$23,784.00
81.	Bluefin Tuna Fattening: Demonstration of New Value-adding Technique in the Northeast	New England Aquarium Corporation Boston, MA	$334,917.00	$128,942.00
82.	Investigation of Acoustic Devices for Deterring Cetacean Bycatch	RI Div. of Fish, Wildlife & Est. Res. Wakefield, RI	$98,730.00	$0.00
83.	What Are the Realistic Market Opportunities For Aquaculture Products from the Northeast US?	New England Fisheries Dev. Assoc. Boston, MA	$28,450.00	$4,550.00
84.	Improving Communication between Scientists, Fishermen, and Fisheries Managers	Massachusetts Institute of Technology Cambridge, MA	$56,805.00	$13,230.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
85.	Assessing the Impacts of Dinoflagellate Blooms on Non-Indigenous Oyster Species: Evaluating their Role in Relation to Proposed Introductions to Chesapeake Bay	The Acadamy of Natural Sciences St. Leonard, MD	$115,788.00	$59,024.00
86.	Investigation of a New Aquaculture for the Mid-Atlantic Region: Black Sea Bass, Centropristis striata	University of Maryland Eastern Shore Princess Anne, MD	$194,919.00	$0.00
87.	Towards Better Management of a Resource: Studies on Bycatch and Mortality of Juveniles of the Sea Scallop (Placopecten magellanicus)	Richard Taylor Gloucester, MA	$135,640.00	$39,230.00
88.	Northwest Atlantic Groundfish: Toward Sustainable Fishery Resources	American Fisheries Society Bethesda, MD	$147,968.00	$2,888.00
89.	Little River Shellfish Demonstration Project	Merrimack Valley Planning Commission Haverhill, MA	$35,645.00	$9,319.00
90.	Develop the Overseas Market and Local Processing for a Clean Inshore Whelk Fishery	Solar Sea Seafood, Inc. Portland, ME	$157,500.00	$13,000.00
91.	Native Species Utilization Project	Poling Aquaculture, Inc. Hillsboro, NH	$115,069.00	$33,500.00
92.	Increasing the Market Value of Monkfish and Monkfish Livers	University of Rhode Island Kingston, RI	$270,973.00	$42,205.00
93.	Navesink River Hard Clam State Enhancement Project	Baymen's Protective Association Navesink, NJ	$118,196.00	$0.00
94.	Comparative Study of Economic Benefits of a Floating Air-Driven Upweller Shellfish Culturing Unit Relative to Traditional Shellfish Culturing Methods	Aeros Cultured Oyster Company Shirley, NY	$31,114.00	$17,300.00
95.	Develop and Test a Low-Cost Oyster Seed Collection and Nursery Culture System to Produce Disease-Free, Plantable Seed Oysters	Chesapeake Appreciation, Inc. Annapolis, MD	$51,816.00	$3,570.00
96.	Aquaculture of the Tautog (Blackfish)--Abbreviation of Growth Rate, Intensive Juvenile Rearing and Pen Culture for Southern New England	University of Connecticut Noank, CT	$100,498.00	$42,000.00
97.	Southeastern New England Regional Fisheries Project	Fairhaven Fisheries Institute, Inc. Fairhaven, MA	$209,850.00	$0.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
98.	A Process for the Commercial Production of Low Cost, High Lipid Algae	Merry Hill Farm Bridgewater, CT	$93,610.00	$93,615.00
99.	Enhanced Nursery Phase Productivity Utilizing A Multi-Use Aquaculture Dock System	Warwick Cove Marina, Inc. Warwick, RI	$54,400.00	$0.00
100.	Counter-Rotating Propeller Shaft System	The Evolution Company Rockland, ME	$105,291.00	$105,291.00
101.	Depuration of Metals From Soft-shell Clams: Allowing Harvest From Previously Closed Areas	New England Fisheries Dev. Association Boston, MA	$45,438.00	$7,000.00
102.	Evaluation of Seafood Processing Aid (SPA)	Cornell University Ithaca, NY	$70,516.00	$33,096.00
103.	A New Type of Food Processor	Frederick B Wishner New York, NY	$89,296.00	$23,300.00
104.	Design, Construct, Test byTrawl Survey, Selectivity of Trawl Gear to Greatly Reduce or Eliminate Bycatch of Juvenile Targeted (Regulated) Species and Non-Targeted Species. Trawl Designs for Groundfish, Whiting and Scallops	Geoffrey T. Moulton Rockport, MA	$240,000.00	$0.00
105.	Nasketucket Bay Project	Fairhaven Fisheries Institution, Inc. Fairhaven, MA	$247,939.00	$0.00
106.	A Pilot Shellfish Aquaculture Training Program for Commercial Fishermen in SE Massachusetts	Fisher College Attleboro, MA	$97,178.00	$37,040.00
107.	Determination of Reproductively Distinct Populations of Pleuronectes americanus (Winter Flounder) via Polymorphic DNA Markers.	University of Connecticut Storrs, CT	$116,548.00	$61,321.00
108.	Harbor Porpoise Bycatch Mitigation through Adaptive Community Management	New England Aquarium Corp. Boston, MA	$91,025.00	$15,001.00
109.	Determination of Toxic Impacts on Aquaculture Hatcheries on Virginia's Eastern Shore Using Field and Mesocosm Studies	VA Polytechnic Institute and State U. Blacksburg, VA	$84,715.00	$21,092.00
110.	Limiting Lobster Pot and Catch Loss Through Acoustically Activated Release Mechanisms and Blind Fishing	Advanced Acoustic Concepts, Inc. Ronkonkoma, NY	$113,141.00	$0.00
111.	Development of Alternative Fisheries for Small Fishing Communities	Belford Seafood Corporation Belford, NJ	$233,107.00	$150,900.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
112.	Squid Fishing Using Light Attraction: A Demonstration of a Selective Method of Squid Fishing without Habitat Impacts	Massachusetts Institute of Technology Cambridge, MA	$122,460.00	$28,267.00
113.	Harvesting Crabs in the Gulf of Maine	Victor P. Levesque Franklin, ME	$94,990.00	$0.00
114.	Aquaculture Curriculum Development	The College of West Virginia Beckley, WV	$200,000.00	$56,875.00
115.	Optimizing the Utilization of Lobster through Expanded Marketing Techniques while Continuing to Modify and Enhance Conventional HACCP Guidelines	Claw Island Foods, Inc. Vinalhaven, Knox, ME	$250,000.00	$75,750.00
116.	Sequence and Length of the Telomeres of the Bay Scallop (Argopecten irradians) and the Deep Sea Placopecten magellanicus as They Relate to Aging.	Harborlife, Inc. Nantucket, MA	$29,780.00	$3,900.00
117.	Cultivation of Bay Scallops (Argopecten irradians) in Algal Rich Eelgrass (Zostera marina) Beds	The Water Works Group, Inc. Westport Point, MA	$44,410.00	$25,374.00
118.	Gulf of Maine Cooperative Herring Assessment	Gulf of Maine Aquarium Portland, ME	$355,000.00	$355,000.00
119.	Examination of Role of Pesticide Run-Off in Shellfish Hatching Failure on the Eastern Shore of Virginia	University of Maryland Cambridge, MD	$104,658.00	$0.00
120.	Selective Fishing Gear Development	J & A Fishing Corporation New Bedford, MA	$99,700.00	$23,020.00
121.	Development of a Management Information System for Monitoring Sublegal Sized Lobster Populations Using GIS and GPS	University of Maine Orono, ME	$103,223.00	$9,855.00
122.	Aquaculture of American Elvers (Eels) in a Controlled Environment to the Fingerling Stage of Development	Aqua Products International, Inc. Rockland, ME	$63,875.00	$9,550.00
123.	Developing a Market Identity for United States East Coast Fish and Seafood Products in Rapidly Expanding Asian Markets Including China, Korea, and Taiwan	First Coastal Westhampton, NY	$83,575.00	$2,800.00
124.	Lake Michigan Forage Fish Survey Project Smelt Study	Michael J. LeClair Two Rivers, WI	$29,500.00	$10,500.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
125.	Strategic Planning Project to Reduce Bycatch and Gear Conflicts and Evaluate Co-Management Through a Pilot Program to Retrain and Employ Fishermen as Observers	MA Fishermen's Partnership, Inc. Gloucester, MA	$624,198.00	$6,000.00
126.	Operational Assessment of Pilot Ultrafiltration and Hydrolysate Processing of Underexploited Finfish Waste Slurry	Nu-C Associates Gloucester, MA	$98,200.00	$0.00
127.	Development of Marketplace Information Essential to Foster Effective Marketing of Aquaculture Products from New England	The Aquaculture Coalition, Inc. Boston, MA	$248,915.00	$0.00
128.	Increasing Fishermen's Participation on NMFS Research Vessels and Connecting Fishermen to Internet Access	Gloucester Fishermen's Wives Dev. Prog Gloucester, MA	$30,089.00	$2,000.00
129.	To Expand the Marketability of Fisheries in Boston to Make Boston-Based Fishermen and Processors Remain In the Competitive Market	New England Fish Exchange Boston, MA	$328,348.00	$65,700.00
130.	A Program to Develop and Demonstrate a Cost-Effective Aquaculture System Integrated with Hydroponics. Adult Retraining, Public Awareness, and Development of a "How To" Publication.	Greater New Bedford Reg. Voc-Tech HS New Bedford, MA	$362,430.00	$75,360.00
131.	Aquaculture Technical Support Program	New Jersey Academy for Aquatic Science Camden, NJ	$108,000.00	$30,000.00
132.	Depuration of Polluted Clams (Mya arenaria) by Using Submerged Containers in Near Shore Ocean Waters	Capt. Kevin M. McCormick Rowley, MA	$99,570.00	$39,638.00
133.	Pilot Hatchery - Juvenile Rearing Facility - Atlantic Cod, and Method of Large-Scale Production of Juveniles as Alternative Occupation for Fishermen	Cell Research, Inc. Chestnut Hill, MA	$240,316.00	$13,956.00
134.	Mariculture and Marketing of Yearling Surf Clams in Federal Waters Off Coastal Georgia and South Carolina from October through June	Frontier Farming Orleans, MA	$83,773.00	$18,705.00
135.	Economic Expenditures and Catch Data Associated With the New York and New Jersey Recreational Fishery for Large Pelagics	New York Sportfishing Federation Oakdale, NY	$73,217.00	$27,350.00
136.	Enhance Local Inshore Populations of Lobster by Land-Based Hatchery	Richard J. Harrington Gloucester, MA	$76,315.00	$0.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
137.	Introduce New England Whiting to Midwest Market via Advertising and Distribution	New Horizon Fishpacking, Inc. New London, CT	$725,120.00	$622,650.00
138.	Development of Mackerel Seine Fishery and Fresh Daily Shoreside Markets	Mark C. Bichrest Brunswick, ME	$146,455.00	$85,002.50
139.	Saving and Raising through Aquaculture the Juvenile Fish which Come as Bycatch in the Inshore Shrimp and Scallop Fishery	Otter Creek Marine Otter Creek, ME	$149,000.00	$0.00
140.	Cobscook Bay Poly Culture	Cobscook Bay Aquaculture, Inc. Peery, ME	$160,444.00	$49,000.00
141.	Analysis of Factors Surrounding Catch	Northeast Maritime, Inc. New Bedford, MA	$47,370.00	$780.00
142.	Economic Feasability of Tag and Release Only Fishing of Summer Flounder by Recreational Anglers in Southern New York	Gary J. Blackler Amity Harbor, NY	$21,862.00	$0.00
143.	Fisheries Bycatch Utilization Program	James F. Hensinger Marlton, NJ	$196,700.00	$0.00
144.	Mutation and Reproduction at Boston Dump Site 13855/25720	Peter Parisi Gloucester, MA	$494,000.00	$22,000.00
145.	Enhancement, Revitalization, and Rejuvenation of the State of Rhode Island's Coastal Ponds, Rivers, Streams, Estuaries, Bays and Ocean--Mollusk Development and Growth	John S. Mistowski Narragnasett, RI	$50,000.00	$0.00
		Total:	**$20,446,510.31**	**$6,293,434.50**
Northwest				
1.	Development of a Molecular Diagnostic Probe for Denman Island Disease (Mikrocytos mackini), a Certifiable Disease of Pacific Oysters	Pacific Lutheran University Tacoma, WA	$79,061.00	$16,818.00
2.	Mortality and Health Management of Pacific Oysters	Pacific Shellfish Institute Olympia, WA	$183,566.00	$31,617.00
3.	Replicative Potential, Tissue Distribution, and Survival in Molluscan Shellfish of Putative Norwalk-Like Caliciviruses Originating from Ocean Hosts. Year 3: Molecular Probes for Assessing the Safety of Shellfish Contained with Caliciviruses	Oregon State University Corvallis, OR	$202,043.00	$68,839.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
4.	Estimation of the Stock Composition of Chum Salmon in Admiralty Inlet (Puget Sound), Washington	Northwest Indian Fisheries Comm. Olympia, WA	$106,394.00	$0.00
5.	Characterization and Expression of the Salmonid Nramp Gene and Correlation with Host Defense Mechanisms in Macrophages	University of Wisconsin-Milwaukee Milwaukee, WI	$95,663.00	$31,385.00
6.	Salmonid Mortalities Associated with Heterosigma Cultures	University of Washington Seattle, WA	$102,055.00	$16,228.00
7.	Evaluating Fish Excluder Technology to Reduce Bycatch in the Pink Shrimp Trawl Fishery	Oregon Department of Fish and Wildlife Portland, OR	$71,635.00	$23,794.00
8.	Survival of a Non-Target Coho Salmon Caught and Released in Commercial Purse Seine Fisheries	Natural Resources Consultants Seattle, WA	$74,422.00	$4,350.00
9.	A Critical Identification of Micronutrient Difference between Wild and Hatchery Reared Salmonids: A Survey of Outmigrant in Streams and Barge	University of Washington Seattle, WA	$181,598.00	$34,140.00
10.	Heterosigma carterae: Environmental Induction of Toxin Production and Target Marine Species	University of Washington Seattle, WA	$150,268.00	$41,149.00
11.	Development of a Nearshore Rockfish Research and Management Plan for the Pacific Coast	Pacific States Marine Fisheries Comm. Gladstone, OR	$140,000.00	$14,825.00
12.	Improve Halibut Spawning Quality by Manipulating Water Temperature and Photoperiod	International Pacific Halibut Comm. Seattle, WA	$105,776.00	$103,736.00
13.	Poylculture of Manila Clams and Geoduck Clams and Hatchery Rearing	Lummi Indian Business Council Bellingham, WA	$123,161.00	$0.00
14.	Spring Chinook Salmon Fishery Project on the Coquille Reservation	Coquille Indian Tribe Coos Bay, OR	$69,834.00	$38,148.00
15.	Develop Cost-effective Approaches for Advancing Environmentally Sound Private Aquaculture through Culturing Systems and Disease Control, thus Improving the Ability of the Industry to Meet Regulatory Requirements	Idaho Department of Agriculture Boise, ID	$292,965.00	$0.00
		Total:	**$1,978,441.00**	**$425,029.00**

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
Southeast				
1.	Genetic Approaches to Penaeus setiferus Aquaculture	S.C. Department of Natural Resources Charleston, SC	$159,687.00	$14,306.00
2.	Aquaculture of the Blood Ark (Anadara ovalis)	University of Georgia Athens, GA	$49,160.00	$17,941.00
3.	Evaluating Increased Top-Width of the Channelized Missouri River as an Innovative Approach to Improve Management of Declining Populations of Native Fish	Rivers Corporation Crofton, NE	$121,663.00	$35,897.00
4.	Molecular Tools for Fisheries Management: A Method for the Unequivocal Identification of Penaeid Shrimp Postlarvae	University of South Carolina Columbia, SC	$83,049.00	$15,599.00
5.	Rock Shrimp Size Selectivity of Mesh Size In the Cod End (Bag) and Body of the Trawl	University of Georgia Athens, GA	$59,005.00	$30,341.00
6.	Reducing the Incidental Impact of Shrimp Trawls on Protected and Nontargeted Species by Technical Demonstration and Evaluation of TED Modifications	University of Georgia Brunswick, GA	$82,978.00	$31,625.00
7.	Age and Growth of the Blacktip Shark (Carcharhinus limbatus) in the Eastern Gulf of Mexico, Including Age Validation and Assessment of Tag Effects	Mote Marine Laboratory Sarasota, FL	$79,968.00	$19,942.00
8.	A Risk Assessment of Bycatch Reduction Devices	University of Miami Miami, FL	$98,498.00	$22,670.00
9.	Culture and Propagation of High Value Caribbean Anthozoa Including Order Gorgonacea, Order Corallimorpharia, and Order Zoanthidea	Coral Reef Ranch, Inc. Homestead, FL	$69,562.00	$6,550.00
10.	Reducing the Inadvertent Capture of Non-Targeted Species and Eliminating Shrimp Loss through Refinement, Demonstration, and Evaluation of BRDs and Harvesting Methods	University of Georgia Brunswick, GA	$56,251.00	$26,585.00
11.	Evaluation of Commercial Cage Aquaculture of Single Oyster Sets on Plastic Mold Cultch	Oyster Technologies Houma, LA	$47,721.00	$17,279.00
12.	Hybridization of Atlantic and Southern Atlantic Surfclams for Aquaculture	University of Georgia Athens, GA	$52,460.00	$11,380.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
13.	Development of a Highly Sensitive Color-Based Assay for the Detection of Toxins Responsible for Diarrhetic Shellfish Poisoning (DSP)	University of South Alabama Mobile, AL	$130,939.00	$29,551.00
14.	An Evaluation of the Effects of Transplanting Gulf of Mexico Oysters to Virginia Waters on Vibrio vulnificus Burdens	Virginia Institute of Marine Science Gloucester Point, VA	$56,278.00	$18,034.00
15.	Do Estrogens in Artificial Diets Reduce Productivity in Marine Finfish Aquaculture?	Medical University of South Carolina Charleston, SC	$163,444.00	$24,752.00
16.	Marine Fish Cage Aquaculture: Siting and Performance Criteria, Environmental Impact, and Status as a Vocational Alternative to Coastal Inshore Net Fishing in Florida	FL Dept. of Environmental Protection Tallahassee, FL	$489,111.00	$206,685.00
17.	Modifying Turtle-Catching Nets to Reduce Entanglement of Cetaceans	Texas A&M Research Foundation College Station, TX	$92,664.00	$29,320.00
18.	Fisheries Bycatch Reduction and Management Alternatives in the Gulf of Mexico	University of Southwestern Louisiana Lafayette, LA	$248,516.00	$52,624.00
19.	Creating New Nursery Habitat for Age-0 Red Snapper (Lutjanus campechanus) by Planting Oyster Shells: a Possible Solution to Bycatch Mortality	Auburn University Auburn, AL	$47,994.00	$24,146.00
20.	Movement, Age, and Growth of Gray Triggerfish (Balistes capriscus) Inhabiting Artificial Reefs in the Northern Gulf of Mexico	Univiversity of South Alabama Mobile, AL	$69,528.00	$26,924.00
21.	Monitoring Bycatch of Pelagic Longline Fisheries in the Northern Gulf of Mexico	Russell Research Associates, Inc. Norwood, LA	$196,693.00	$0.00
22.	Assessment of Composition and Magnitude of Bycatch Associated with the Live Bait Shrimp Trawling Industry in Texas Coastal Bays	Texas Parks and Wildlife Department Austin, TX	$85,281.00	$26,615.00
23.	Developing an Index of Abundance for the West Atlantic Spawning Stock of Bluefin Tuna	Mote Marine Laboratory Sarasota, FL	$196,437.00	$0.00
24.	Consumer and Health Professional Education: Vibrio vulnificus	National Fisheries Institute, Inc. Arlington, VA	$210,552.00	$0.00
25.	Comparison of Biogenic Amine Formation with AromaScan Analysis as Indices for Aquatic Product Quality and Safety	University of Florida Gainesvile, FL	$96,315.00	$70,957.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
26.	The Rapid Determination of Microbial Contamination of Fish and Shellfish by Measurement of Adenosine Triphosphate	Florida Institute of Technology Melbourne, FL	$79,846.00	$0.00
27.	Field Tests of Pingers to Reduce the Bycatch of Bottlenose Dolphins	Duke University Durham, NC	$112,113.00	$0.00
28.	Reduction of Bycatch and Mortality of Diamondback Terrapins (Malachemps terrapin) in Crab Traps	University of North Florida Jacksonville, FL	$30,091.00	$1,516.00
29.	Improving the Health of Sturgeon and Its Production Efficiency through Diet Modification	University of Florida Gainesville, FL	$67,252.00	$56,907.00
30.	Reduction in the V. vulnificus Load in Oysters Destined for Raw Consumption Using Species-Specific Bacteriophage	Louisiana State University Med. Center New Orleans, LA	$187,288.00	$100,715.00
31.	New Directions for Fishery Management: A Citizens Guide to Innovative Approaches	Auburn University Auburn, AL	$37,131.00	$11,851.00
32.	Reducing Contaminants in Food Produced by Aquaculture: A New Approach	Medical University of South Carolina Charleston, SC	$45,822.00	$0.00
33.	Determination of End-Point Temperature of Hot-Process Smoked Fish	Univ. of Georgia Res. Foundation, Inc. Athens, GA	$133,650.00	$26,324.00
34.	Biotic Factors Affecting Intensive Culture of Red Drum (Sciaenops ocellatus) from Fingerlings to Stockers	Florida Institute of Technology Melbourne, FL	$45,123.00	$0.00
35.	Development of Blue Crab Byproduct Recovery Facilities for the Blue Crab Industry	Full Circle Solutions, Inc. Gainesville, FL	$172,671.00	$11,400.00
36.	Common Pool Resources and Individual Transferable Quotas (ITQ): Experimental Investigation	Georgia State Univ. Res. Foundation Atlanta, GA	$70,053.00	$29,808.00
37.	Determining the Rate of Sexual Succession in the Protogynous Red Grouper (Epinephelus morio) and its Relationship to Effective Management	University of South Florida St. Petersburg, FL	$114,438.00	$54,081.00
38.	Comparison of Survival of Bycatch Associated with Bait Shrimping in Three Texas Estuarine Areas	Texas Parks and Wildlife Department Austin, TX	$55,869.00	$18,621.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
39.	Aquaculture Opportunities for Three Coastal Rural Counties Affected by the Florida Net Ban	Southeastern Fisheries Assn. Inc. Tallahassee, FL	$35,000.00	$2,000.00
40.	Evaluation of Bycatch Reduction Device Gear in the Texas Bay Shrimp Trawl Fishery	Texas Parks and Wildlife Department Austin, TX	$197,088.00	$50,480.00
41.	Micro-Controlled Production Aquaculture Systems	University of Florida Gainesville, FL	$28,689.00	$39,395.00
42.	The Potential for Reduction and/or Elimination of the Vibrio vulnificus Bacterium from Gulf of Mexico Oysters Relayed to High-Salinity Waters of the Federal Outer Continental Shelf	Sea Star Industries, Inc. Gulf Breeze, FL	$212,550.00	$139,750.00
43.	Development of the Stakeholder Exchange and Conflict Management (SEACoM) Model for Fisheries Co-Management	Clemson University Clemson, SC	$125,700.00	$21,118.00
44.	Dolphin (Coryphaena hippurus) Stock Assessment Study in the South Atlantic and Gulf of Mexico	Mote Marine Laboratory Sarasota, FL	$180,551.00	$30,574.00
45.	Ozone Parameter Study for Aquaculture--Finfish Applications in a Novel Foam Fractionator/Filter	Tampa Bay Tropicals, Inc. Ruskin, FL	$93,805.00	$24,315.00
46.	Survey of Ciguatera in Fish and Algae from the Florida Keys	FL. Dept. of Enviromental Protection Tallahassee, FL	$120,110.00	$39,865.00
47.	Investigation of the Cellular Toxic Mechanisms of Caribbean Maitotoxin	University of South Alabama Mobile, AL	$66,250.00	$25,298.00
48.	Identification of Critical Quality Attributes for Acceptance of Underutilized Fish in Menu Items of Restaurants	Univ. of Georgia Research Foundation Athens, GA	$121,205.00	$66,378.00
49.	A National Cooperative Habitat Program for Fisheries	Gulf States Marine Fish. Commission Ocean Springs, MS	$191,323.00	$0.00
50.	Fishing effort and Resource Allocation in the Florida Stone Crab Fishery	FL. Dept. of Enviromental Protection Tallahassee, FL	$135,343.00	$43,915.00
51.	Health Criteria as Predictors of Growth and Survival of Hatchery-Reared Common Snook, Striped Mullet, and Red Drum	Harbor Branch Oceanographic Inst. Fort Pierce, FL	$149,701.00	$87,295.00
52.	Development of a Highly Sensitive Assay to Detect Ciguatoxin and Brevetoxin in U.S. Coastal Waters	University of South Alabama Mobile, AL	$63,938.00	$24,464.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
53.	Development of an Improved Oyster Grow-Out System to Reduce the Impact of MSX and Dermo in Oysters Being Raised within North Carolina Waters	Mr. Milton Lester Spruill, Jr. Rodanthe, NC	$25,055.00	$7,640.00
54.	Bycatch Reduction in the U.S. Gulf of Mexico Menhaden Fishery	Louisiana State University Baton Rouge, LA	$74,364.00	$15,894.00
55.	High Density Recirculating Aquaculture Demonstration	Tampa Bay Tropicals, Inc. Ruskin, FL	$431,194.00	$50,000.00
56.	Revision of Fisheries Bulletin 64	University of South Carolina Columbia, SC	$71,554.00	$23,163.00
57.	Integration of Time and Temperature Indicator Devices for Monitoring the Thermal Conditions During the Harvesting, Processing, and Distribution of Molluscan Shellfish	University of Florida Gainesville, FL	$69,865.00	$30,424.00
58.	Solving TED and BRD Problems; A Regional Approach to Turtle Exclusion, Fish Reduction, and Shrimp Reduction	University of Georgia Athens, GA	$92,881.00	$48,268.00
59.	Enhancing Florida's Charter and Sportfishery with Fish Aggregating Devices	Florida Institute of Technology Melbourne, FL	$123,336.00	$8,460.00
60.	Evaluate the Market for Ocean-Farmed Products	Sea Trek Industries, Inc. Gulf Breeze, FL	$81,641.00	$0.00
61.	Grow-Out of Penaeus vannamei Shrimp in a Closed Recirculating System	White Velvet Shrimp Inc. West Columbia, TX	$120,000.00	$110,000.00
62.	Approaches to Reduce Bycatch in the Shrimp Industry	Environmental Solutions International Silver Spring, MD	$89,064.00	$9,576.00
63.	Pilot Project: Ocean Farming of Selected Species of Finfish in the Gulf of Mexico	Sea Trek Industries, Inc. Gulf Breeze, FL	$915,024.00	$118,750.00
64.	Feasibility Study of Finfish Hatchery to Support Commercial Ocean Farming in the Gulf of Mexico	Sea Trek Industries, Inc. Gulf Breeze, FL	$103,125.00	$0.00
		Total:	**$8,113,457.00**	**$2,087,968.00**
Southwest				
1.	Standardized Data Collection System	Oceantronics, Inc. Honolulu, HI	$74,126.00	$0.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
2.	Evaluation of the Effectiveness of Using Live Milkfish (Chanos chanos) as Bait on Commercial Longline Vessels	The Oceanic Institute Honolulu, HI	$190,311.00	$0.00
3.	Diversification of Rural Edible Seaweed Farms--Abalone as a Second Crop	Hawaiian Marine Enterprises Honolulu, HI	$91,680.00	$18,694.00
4.	White Abalone (Haliotis sorenseni) Restoration Project	Proteus Seafarms International, Inc. Ojai, CA	$126,813.00	$48,575.00
5.	Selective Breeding of Giant Clams (T. maxima) for More Marketable Colors in the Aquarium Trade	Robert Reimers Enterprises, Inc. Majuro, MH	$55,050.00	$6,082.00
6.	Population Structure and DNA Profile of Selected Rockfishes in the California Live-Fish Fisheries	Calif. Polytechnic State Univ. Found. San Luis Obispo, CA	$75,643.00	$15,126.00
7.	Acoustic Telemetry of Winter-Run Chinook Salmon in the Ocean	Regents, University of California Davis, CA	$97,304.00	$0.00
8.	Pulsed Power System Sea Lion Deterrent Device	Pacific States Marine Fisheries Comm. Gladstone, CA	$300,947.00	$24,876.00
9.	Evaluate and Develop Low-Mortality Methods for Assessment of Deep-Sea Snapper (Etelis spp.) Resource in the Main Hawaiian Islands	State of Hawaii Honolulu, HI	$113,600.00	$44,826.00
10.	Live Milkfish as Bait for the Hawaii Pelagic Longline Fishery	Argonaut Honolulu, HI	$234,286.00	$45,000.00
11.	Evaluation of Fishery Refugia Concepts: Movements of Subtidal Fishes Associated with Big Creek Ecological Reserve	San Jose State Univ. Foundation San Jose, CA	$93,805.00	$29,500.00
12.	Analysis of Acoustic Behavior of Dolphins to Develop Tuna/Dolphins Bycatch Prevention Measures	University of Hawaii Honolulu, HI	$211,377.00	$0.00
13.	The Use of Ozone in a Recirculating Abalone Culture System	Cardiff Seafarms, Inc. Cardiff by the Sea, CA	$98,420.00	$0.00
14.	Aquaculture Development	Marine & Wildlife Resources Pago Pago, AS	$135,196.00	$77,917.00
15.	Application of Microsatellite DNA Loci to Fishery Management of Red Abalone (Haliotis refescens) in California	Genetic Identification Services Chatsworth, CA	$122,078.00	$67,538.00

	Project Title	Applicant	Federal Funding	Applicant's Cost Share
16.	Increased Seafood Safety through Improved and Alternative Methods for Ciguatera Screening	University of Hawaii Honolulu, HI	$119,200.00	$24,890.00
17.	Hawaii and Pacific Islands Seafood: Market and Product Quality Development	State of Hawaii Honolulu, HI	$434,349.00	$163,780.00
18.	Development of a Marine Recirculating System for White Seabass (Atractoscion nobilis).	Proteus Seafarms International, Inc. Ojai, CA	$221,090.00	$72,500.00
19.	Use of Artificial Magnetic Fields to Separate Tuna from Dolphin Before Netting to Reduce Dolphin Bycatch to Zero in Commercial Tuna Fishery	Meruit, Inc. Santa Monica, CA	$50,578.00	$40,826.00
20.	Development of Acoustic Stunning Methods for the Tuna Fishery	Nature's Own Research Association Dover, NH	$330,250.00	$0.00
		Total:	**$3,176,103.00**	**$680,130.00**
		Grand Total:	**$36,975,017.31**	**$10,109,355.50**