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

The Saltonstall-Kennedy Grant Program: Fisheries Research and Development

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OUR SEAS AND OUR SKIES



OF EXCELLENCE AT NOAA

August 1, 2000

The Saltonstall-Kennedy Grant Program: Fisheries Research and Development

Report 2000

August 1, 2000

OUR SEAS AND OUR SKIES



OF EXCELLENCE AT NOAA

U.S. DEPARTMENT OF COMMERCE

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I. INTRODUCTION

This report to Congress on the Saltonstall-Kennedy (S-K) Grant Program, administered by the National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce, covers fiscal year (FY) 2000. The report contains information on the S-K Program regarding its legislative authority, the application solicitation and grant selection process, recipients, and funding information.

A notice was published in the *Federal Register* on June 21, 1999, to solicit applications contingent on the FY 2000 allocation. The application review process was initiated in FY 1999, and 20 grants totaling about \$1.68 million were awarded in FY 2000.

Appendix I contains addresses of NMFS Headquarters and Regional Offices from which information regarding the S-K Program may be obtained. Appendix II contains the *Federal Register* notice soliciting applications for the FY 2000 program. Appendix III contains a list of applications approved for funding from the FY 2000 S-K solicitation, and Appendix IV contains a list of applications disapproved.

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

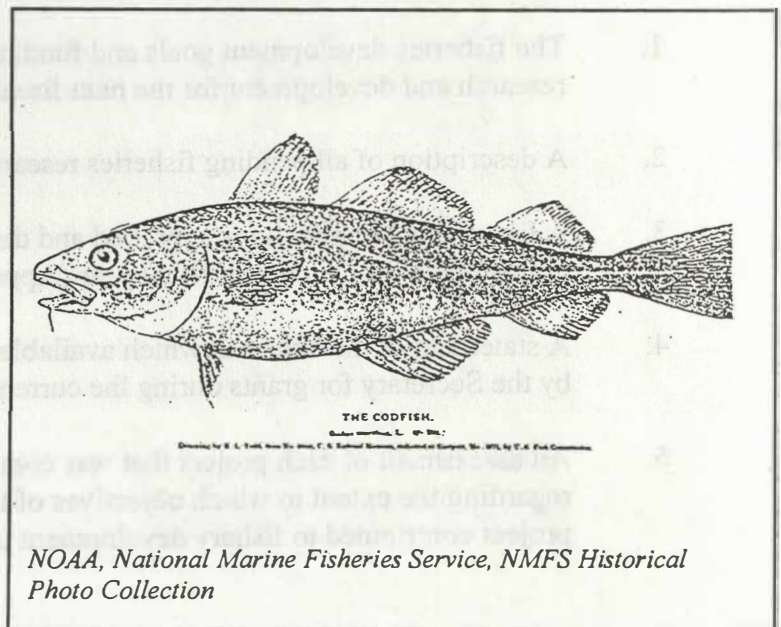
1. The fisheries development goals and funding priorities for a national program of research and development for the next fiscal year (Page 2)
2. A description of all pending fisheries research and development projects (Page 9)
3. A list of those applications approved and disapproved and the total amount of grants made for the current fiscal year (Appendices III and IV)
4. A statement of the extent to which available funds were not obligated or expended by the Secretary for grants during the current fiscal year (Page 3)
5. An assessment of each project that was completed in the preceding fiscal year regarding the extent to which objectives of the project were attained and the project contributed to fishery development (Page 47)

II. BACKGROUND

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

The S-K Grant Program funding priorities are based on the NOAA Strategic Plan, which was developed in consultation with the public. The funding priorities and the NOAA Strategic Plan are consistent with the goals and objectives of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The objective of the S-K Grant Program is to address the needs of fishing communities (as defined in the Magnuson-Stevens Act) in optimizing economic benefits within the context of rebuilding and maintaining sustainable fisheries, and in dealing with the impacts of conservation and management measures. Such conservation and management measures include those associated with the recovery of Atlantic cod (*Gadus morhua*) and other overfished species. 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* (Appendix II).

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 projects assisted under the Grant Program. NMFS expects to fund one award under the National Program from the FY 2000 allocation dealing with sustainable fisheries, as directed by Congress. For FY 2001, NMFS plans to make funds available only under the competitive Grant Program, unless otherwise directed.

The S-K fund is capitalized through annual transfers by the Secretary of Agriculture to the Secretary of Commerce of amounts equal to 30 percent of the gross receipts collected under the customs laws on imports of fish and fish products. Table 1 indicates the total duties collected on fishery products; the total receipts in the S-K fund for FY 2000; the amount appropriated to offset some of NOAA's costs related to operations, research, and facilities (ORF); and the amount allocated for the S-K Program, including the competitive Grant Program, the National Program, and program administrative costs. In FY 2000, the S-K allocation was \$1.92 million. However, an additional \$0.75 million was available for use from unobligated carryover funds and unanticipated prior year recoveries. For FY 2000, approximately \$0.19 million of S-K funds will not be obligated by the end of the fiscal year.

Table 1. S-K Funding for FY 2000 (\$ in millions)

Funding Item	Amount
Total Duties Collected on Fishery Products	\$233.07
Total S-K Transfer	69.92
ORF Offset	68.00
S-K Allocation	1.92
Carryover*	0.75
Total Amount Available for S-K	2.67
S-K Program Obligations/Commitments	
Grant Program	1.68
National Program**	0.30
Program Administration	0.50
Estimated Unobligated Balance***	0.19
Total	2.67

*Includes unanticipated prior year recoveries and FY 1999 balances not previously obligated.

**Includes \$300,000 for the Alaska Fisheries Development Foundation for activities related to sustainable fisheries (award pending).

***Unobligated balances will be returned to the S-K Program to fund already-identified costs for the FY 2001 grant cycle, which was initiated in FY 2000.

As indicated in Table 2 below, the available S-K allocation has decreased even as the total S-K transfer has generally increased. However, increases in the S-K allocation would require a corresponding reduction in critical ORF funds.

Table 2. S-K Funding, 1993–2000 (\$ in millions)

Fiscal Year	Total Duties	Total S-K Transfer	ORF Offset	Available S-K Allocation	Allocation as % of Transfer
1993	204.70	61.40	55.00	6.40	10.42
1994	215.89	61.94	54.80	7.14	11.53
1995	242.98	64.77	55.50	9.27	14.31
1996	221.27	72.89	63.00	9.89	13.57
1997	221.27	66.38	66.00	0.38	0.57
1998	219.11	65.73	62.38	3.35	5.10
1999	221.42	66.43	63.38	3.05	4.59
2000	233.07	69.92	68.00	1.92	2.75

III. FEATURE ARTICLE

BRINGING FISHERMEN AND SCIENTISTS TOGETHER

Introduction

Collaborative research efforts between social and biological scientists and commercial fishermen are increasingly being viewed as essential to sustainable fisheries for several reasons. First, collaboration mitigates the mistrust that sometimes exists between the fishing industry and fisheries managers. When scientists work side-by-side with fishermen, whether it be rigging experimental fishing gear on a commercial vessel or noting the historical observations of long-time fishermen regarding fisheries abundance trends or valuable habitat areas, a greater appreciation and respect for science and fishing can result. Second, sometimes collaboration is the best way to arrive at a mutually satisfying management solution to a problem (e.g., bycatch). Third, collaborative research can be used to accomplish the goals of providing economic assistance to the fishing industry during commercial fishery failures while obtaining useful socioeconomic or oceanographic data through the “hiring” of fishermen and commercial fishing vessels.

The U.S. General Accounting Office (GAO) released in April 2000 a report entitled *Fishery Management: Problems Remain with National Marine Fisheries Service’s Implementation of the Magnuson-Stevens Act*. The report recommended, among other things, that the Secretary of Commerce direct the Director of NMFS to “Increase the involvement of the fishing industry, its expertise, and its vessels in fishery research activities in order to expand the frequency and scope of NMFS’s data collection efforts.” The report also concluded that until NMFS can “more consistently involve others in its research activities, and improve communications with fishing communities and the industry,” industry criticisms of agency management decisions are likely to continue.

NMFS recently has been using more private vessels for research. In fact, as mentioned in Appendix II of the GAO report, private vessels contributed to 41 percent of the agency’s total research days at sea in 1998. According to the September 1998 *NOAA Fisheries Data Acquisition Plan*, “Many missions are ideally suited for fishing vessels, such as gear test studies, bycatch studies, and exploratory fishing [as well as] standardized stock abundance surveys that use gears less sensitive to changes in vessels, such as traps, purse seines, and longlines.” However, the *Plan* cites several challenges to the widespread use of fishing vessels, including availability of suitable vessels (especially during a fishing season) and sampling standardization issues. NMFS also has expressed interest in involving fishermen in survey design to a greater extent to improve fishermen’s understanding of research methods.

The innovative research and development projects funded by the S-K Program often set the stage for more widespread applications of scientific practices or new technology. During the 1990s, the S-K Program funded numerous successful grants that brought fishermen and scientists

together to find solutions to problems such as the need for effective turtle exclusion devices. More recently, several S-K Grant projects in the New England region that were completed between June 1, 1999, and May 31, 2000, brought scientists and fishermen together to help address the needs of fishing communities. This article provides an overview of some of these projects and highlights some common lessons learned by the principal investigators. None of these projects represents a perfect model for collaborative research between fishermen and scientists, but they highlight useful steps in that direction.

Onboard Data Collection

Captain Edward Boynton of the F/V Sissel B., Gloucester, Massachusetts (MA), collaborated with Dr. Linda Deegan of the Marine Biological Laboratory (MBL) at Woods Hole, MA, on an S-K project entitled "Establishing the Food Web Links between Estuaries and Nearshore Fisheries of New England" (NA76FD0106; for more information, see page 81). One of the objectives of this project was to bridge the gap between fishermen and scientists by performing a collaborative scientific study in order to understand each others' work methods. Twenty-six days of sampling were performed on the F/V Sissel B. The vessel's crew recorded (among other things) water temperature, salinity, clarity, and flow. Captain Boynton later sorted trawl catch by species and weighed and froze each sample group. Staff at the MBL analyzed the samples taken.

Captain Boynton made the following conclusions in the project's final report: "By working with the scientists, this fisherman has more understanding of how difficult and time-consuming it is to understand the mechanics of our ecosystem." Captain Boynton felt that the project "demonstrated that fishermen and their vessels can be incorporated into research programs," and he recommended that (1) more research projects should use vessels owned by fishermen, particularly during times when areas are closed to fishing activities; and (2) scientists should be aboard the fishing vessel when samples are collected.

Another recently completed S-K project, entitled "Bycatch Reduction Project," featured collaboration between scientists and commercial fishermen on fishing boats. This project (NA76FD0110; for more information, see page 64) was carried out by the Manomet Center for Conservation Science in Manomet, MA, and the project's objective was to work cooperatively with the fishing industry to develop selective trawls to reduce groundfish bycatch and discards in the Northeast. All gear trials and underwater video filming took place on chartered commercial fishing vessels. Using vessels in this way was designed to "increase fishermen's inputs, benefit from their expertise, foster industry acceptance, and aid in eventual dissemination of the gear developed." The project also was designed to "provide a vehicle by which fishermen who want to try new gear can take observers to collect catch and bycatch data...." In addition, the project featured a network of advisors consisting of commercial fishermen, gear technologists, scientists, fishery managers, and conservation group representatives.

One of this project's major findings was supported by a videotape produced by a commercial fisherman. This videotape showed squid and scup entering a trawl net at the same time but clearly separated in the water column, with squid entering the top part of the net and the scup entering much lower down. These behavioral observations suggested that it might be possible to separate squid from other species during the capture process by isolating the upper portion of the net from the lower part. This important piece of evidence would not have been available to the investigators without a close working relationship with commercial fishermen and without the fostering of an environment that encouraged scientific investigation by members of the commercial fishing community. This collaborative research methodology will be continued in a new S-K Grant made to Manomet (NA06FD0183; for more information, see page 21).

"Here at Manomet we have worked very hard to develop strong working relationships not only with commercial fishermen, but also with managers and regulators. We really believe that if we are going to be successful we have to have fishermen involved in the research with us right from the start. Not only does that improve the research by bringing fishermen's unique perspectives to design and development, but it supplies a skipper and crew that have unique practical knowledge of the gear, the grounds, and how the fishing is conducted in those areas. Equally important is that the fishermen who participate in the process firsthand go back to the dock and spread the word about how the new gear works. I have no doubt that the key to success in this form of fisheries research is based purely and simply in science/industry partnership and collaboration." Chris Glass, Manomet Center for Conservation Science

Face-to-Face Communication

The Gloucester Fishermen's Wives Association (GFWA) completed an S-K project designed to create a series of oral histories of fishermen's experiences at sea (NA76FD0112; for more information, see page 55). In addition, these oral histories were intended to collect traditional ecological knowledge of fish spawning and habitat and to begin to develop a historical record of fisherman-scientist interactions. Twenty-eight interviews were conducted with commercial fishermen, and six interviews were conducted with NMFS social and biological scientists. The investigators found that although fishermen cannot often provide quantitative information for numerical fisheries assessment, they do harbor a wealth of information on where fish migrate, aggregate, and spawn. This "spatial" environmental knowledge should be documented and corroborated through geographic information system techniques, according to the investigators, to allow other layers of information to be eventually overlaid (e.g., bathymetry, sea surface temperature).

Although the GFWA project was not able to fully develop a history of fisherman-scientist interactions, it did identify through its interviews the following barriers to effective interaction and collaboration:

- Because scientists usually work in settings (i.e., laboratories, offices, research vessels) where they are not in constant contact with marine resource users, the scientists do not get

the opportunity to become familiar with the communities that must live with the management options generated by scientific data.

- Fishermen often lack the time and educational resources to learn about fishery science, which sometimes leads to management options being rejected outright by fishermen when the options conflict with the perceptions and observations of fishermen.

However, scientists interviewed stated that they learned a great deal from their interactions with fishermen at sea, and the scientists were impressed by the fishermen's overall knowledge of the distribution, ecology, and behavior of fish species. Fishermen interviewed stated that they were impressed with the biological knowledge of scientists, the rigor and hard work that the scientists put into their sampling procedures, and the interest of the scientists in the observations of fishermen.

The University of New Hampshire (UNH) completed an S-K project similar in intent to the GFWA project. The UNH project, entitled "Collaborative Decision-Making Workshops" (NA76FD0103; for more information, see page 53), was created to provide at least 200 fisheries management stakeholders in New England with instruction in collaborative decision-making techniques. Participants in the seven workshops included state and federal agency representatives, clammers, lobster fishermen, draggermen, gillnetters, and New England Fishery Management Council members. Some notable concerns that emerged during the workshops included a belief by some parties that bringing a proposal with multi-stakeholder support to a government agency could be a waste of time because the government sometimes did not seem to listen to the stakeholders' ideas. In addition, although the workshop participants were effectively introduced to the concepts of collaborative decision making (i.e., separating people from the problem; focusing on interests, not positions; inventing options for mutual gain), some participants were skeptical about the feasibility of hiring a neutral facilitator to help address divisive issues.

Conclusion

Several recently closed S-K projects in the New England region brought fishermen and scientists together to collect and analyze fisheries data, test experimental fishing gear, collect personal observations on fisheries habitat, and foster collaborative working relationships. Projects that united fishermen and scientists on commercial fishing vessels seemed to yield the most productive and concrete results, but the oral history and collaborative decision-making projects also yielded insights into the sometimes difficult relationships between fishermen and scientists. When fishermen and scientists have the opportunity to work side-by-side or even meet in a neutral setting to discuss environmental observations or decision-making techniques, stronger relationships between these parties (which have very similar interests but sometimes opposing missions) can result. NMFS can learn from successful S-K projects that bring scientists and fishermen together as we continue to strengthen our collaborative research efforts with the fishing industry.

IV. PENDING GRANT PROGRAM PROJECTS

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

FISHERIES UTILIZATION

Grantee: Coastal Enterprises, Inc., Portland, ME
Grant No.: NA86FD0106 **NMFS Contact:** F/NER
Project Title: Maximizing the Value of the Northeast's Marine Harvest, A Resource Guide to Secondary and Byproduct Markets
Funding: **Federal:** \$99,708 **Recipient:** \$22,500

Description: To investigate domestic and export markets for secondary products and byproducts of species typically harvested in the Northeast. Specifically, this project will catalogue byproduct market opportunities; investigate byproduct markets through a survey and interviews; conduct technical evaluations of products; and conduct an economic analysis of price, quantity, packaging, and distribution. Results of the investigation will be made available in a resource guide.

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

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

MARINE RECREATIONAL FISHERIES

Grantee: Palau Conservation Society, Koror, Palau
Grant No.: NA77FD0043 *NMFS Contact:* F/SWR
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.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

Grantee: University of Rhode Island, Narragansett, RI
Grant No.: NA06FD0180 *NMFS Contact:* F/NER
Project Title: Age of Loligo with Respect to Season, Location, and Depth
Funding: *Federal:* \$48,007 *Recipient:* \$9,294

Description: To identify the timing and location of different spawning periods of Loligo. This research will be part of a collaborative effort with the NMFS's Northeast Fisheries Science Center in Woods Hole, Massachusetts. The main set of samples was collected by NMFS during their fall, winter, and spring surveys from the mid-Atlantic bight, Southern New England, Georges Bank, and the Gulf of Maine. Summer and fall inshore samples were also obtained. The squid from representative subsamples has been weighed and measured, and their sexual maturity has been determined. The resulting 915 pairs of statoliths will be used to age the subsamples. These data will provide the necessary detail to identify the timing and location of the different spawning periods. This work is an extension of previously funded S-K research.

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

Description: To develop a collaborative or community-based adaptive response program to permit communities and individuals associated with the northwest Atlantic sea scallop fishery to plan for area management strategies and capacity reduction programs. The study also proposes to develop a framework to allow communities and individuals to be more involved in area management and capacity reduction programs. This is the only way to ensure that the needs of the communities and individuals are adequately considered in area management and capacity reduction programs.

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

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

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

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

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

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

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

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

Grantee: University of Delaware, Lewes, DE
Grant No.: NA96FD0079 *NMFS Contact:* F/NER
Project Title: Genetic Monitoring of Oyster Stock Enhancement in the Chesapeake Bay
Funding: *Federal:* \$68,835 *Recipient:* \$24,819

Description: To use a genetic marker to distinguish Louisiana oyster seed outplanted in the Choptank River from resident oysters. Oyster seed of Louisiana origin were planted in the Choptank River at several defined sites in 1997. The survival and reproductive success of outplanted oyster seed will be evaluated in 1999 and 2000. This is a unique opportunity to capitalize on an ongoing stock enhancement program, and will provide direct information on its efficacy. The information obtained will be of immediate regional relevance and will highlight the value of genetic monitoring in shellfish and finfish enhancement.

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

Description: To develop an innovative training program for the transition of displaced fishers to aquaculture, hydroponics, and other related professions, while promoting hybrid striped bass aquaculture. This three stage comprehensive training program will be implemented on a continuous basis, with each stage lasting three months. The stages will be presented in the following sequence: (1) basic concepts (12 students); (2) apprenticeship (8 students); and (3) internship (4 students). Bristol Community College will provide education assistance and aquaculture courses. Eastern Fish Farms, Inc. will provide both the hydroponics/aquaculture training program and facility supervision. The demonstration facility will be constructed coincidental to program start-up with funds from the Hitachi Foundation.

Grantee: University of Maryland, Cambridge, MD
Grant No.: NA86FD0110 **NMFS Contact:** F/NER
Project Title: Inter-Laboratory Investigation of the Feasibility of Otolith Microconstituent Analysis to Characterize Atlantic Bluefin Tuna Stock Structure
Funding: *Federal:* \$105,548 *Recipient:* \$27,371

Description: To address whether inductively coupled mass spectrometry (ICPMS)- based otolith microconstituent analysis can resolve Atlantic bluefin tuna stock structure issues. Protocol and standardization procedures will be developed. In a double blind test between two ICPMS laboratories, compositional differences between western Atlantic and Mediterranean bluefin tuna otoliths will be tested.

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 for amplification and efficient selection of individuals for further examination by restriction fragment length polymorphism analysis or direct DNA sequencing.

Grantee: South Carolina Department of Natural Resources, Charleston, SC
Grant No.: NA06FD0300 **NMFS Contact:** F/SER
Project Title: Evaluation of an Alternative Harvesting Methodology for Horseshoe Crabs and Determination of Juvenile Life History Parameters in a Nursery Habitat
Funding: *Federal:* \$52,994 *Recipient:* \$5,998

Description: To compare the methodology of hand harvesting to current harvesting methods and a control group at three sites in South Carolina. Hand harvest of spawning animals 30 minutes after time of predicted high tide may allow most animals to successfully spawn before being harvested without affecting harvesting totals. Juvenile horseshoe crabs in three nursery habitats will be studied to determine growth rates, survivability, age class structure, and behaviors. Preliminary experimental design work for each study has been completed by the South Carolina Department of Natural Resources. Information obtained within these studies will be presented to the Atlantic States Marine Fisheries Commission's (ASMFC's) Horseshoe Crab Technical Committee for dissemination and management use. These research needs are specified within the ASMFC Horseshoe Crab Fisheries Management Plan.

Grantee: Texas A&M Research Foundation, College Station, TX
Grant No.: NA06FD0301 *NMFS Contact:* F/SER
Project Title: Assessment of Natal Origin and Stock Structure of Atlantic Bluefin Tuna using Otolith Elemental Fingerprints
Funding: *Federal:* \$61,165 *Recipient:* \$18,334

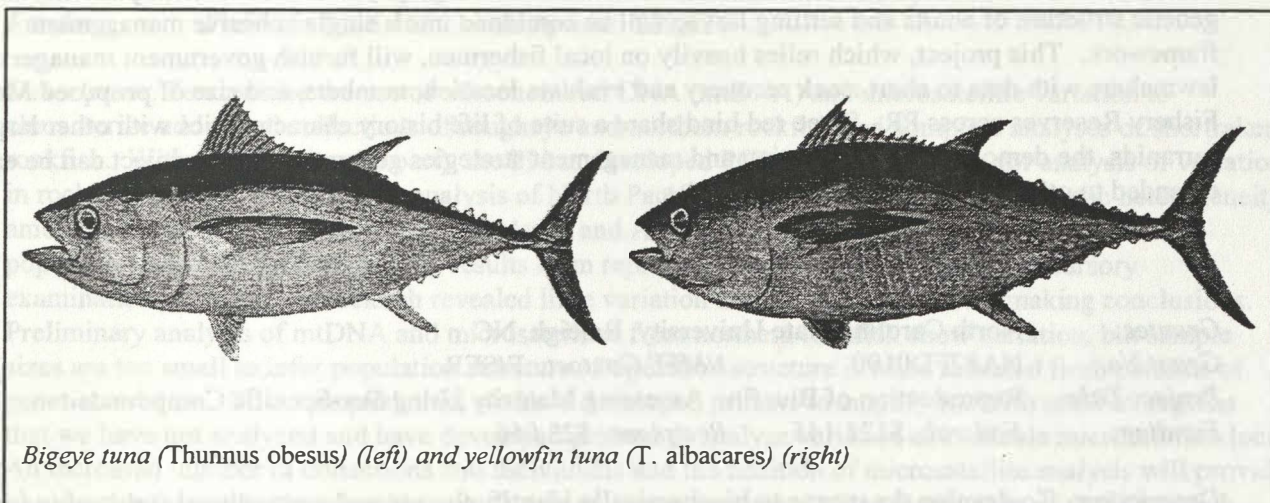
Description: To continue sampling efforts to complete the assessment of spatial and temporal “stability” of otolith elemental fingerprints and to quantify trace element signatures of juvenile bluefin tuna from 2000 and 2001 from both the western and eastern Atlantic. This research builds on two previously funded otolith microconstituents studies funded by the S-K Program. First-year support was obtained to develop otolith handling and cleaning protocols and standardization of procedures for otolith microconstituent analysis of Atlantic bluefin tuna using ICPMS. A second-year of support has been used to examine spatial and temporal scales to determine whether differences in elemental fingerprints are consistent over time or within a given spawning ground. This current research project is the next logical step in evaluating the reliability of elemental fingerprints for discriminating stocks of Atlantic bluefin tuna. By collecting specimens from several year classes and regional nurseries, the reproducibility or stability of trace element signatures can be rigorously tested. In addition, samples from two additional age classes will also provide the necessary data to construct a database of elemental fingerprints that can be used in the future to determine the natal origin of Atlantic bluefin tuna.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA
Grant No.: NA97FD0063 *NMFS Contact:* F/SER
Project Title: Development of Hypervariable, Nuclear-DNA Markers for Population Structure Analysis of Atlantic Bluefin Tuna
Funding: *Federal:* \$125,866 *Recipient:* \$21,539

Description: To develop a minimum of ten single-copy-nuclear (scn) DNA loci and 20 microsatellite DNA loci specific for Atlantic bluefin tuna using procedures developed previously by the grantee. For scnDNA loci, a bluefin tuna genomic library will be used to generate fragments 0.5-2.0 kilobase pairs in length. Appropriately sized, single-copy fragments will be sequenced to develop primer pairs for amplification using the polymerase chain reaction (PCR). Amplified loci will be digested with a suite of restriction endonucleases to identify polymorphic locus/enzyme combination. For microsatellite DNA loci, radiolabeled tri- and tetra-nucleotide probes will be used to identify candidate loci from a genomic DNA library. Candidate loci will be sequenced to identify PCR primer pairs, and amplification with individual primer pairs will be optimized. For both types of DNA markers, 20-30 individuals sampled from the western Atlantic Ocean and Mediterranean Sea will be screened to document polymorphism and identify allelic variants.

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

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



Bigeye tuna (Thunnus obesus) (left) and yellowfin tuna (T. albacares) (right)

Grantee: South Carolina Department of Natural Resources, Charleston, SC
Grant No.: NA97FD0066 **NMFS Contact:** F/SER
Project Title: Sampling and Evaluation of White Spot and IHHN Virus in Commercially Important South Atlantic Penaeid Shrimp Stocks
Funding: *Federal:* \$136,931 *Recipient:* \$42,494

Description: To screen samples of native shrimp for white spot and infectious hypodermal and hematopoietic necrosis (IHHN) viruses. Based on statistically rigorous protocol, shrimp samples will be collected during existing sampling cruises and archived. All samples will undergo an initial screen for the viruses by polymerase chain reaction, a technique successfully used by these researchers to identify viruses in local crustacean stocks. Suspect samples will be further analyzed by histopathology. Viral identification and pathogenicity will be confirmed in controlled bioassay studies. All data will be entered into an existing inventory relational database and analyzed statistically to evaluate incidence and

distribution. Results summarizing the viral disease status of indigenous stocks will be disseminated in presentations, reports, and publications.

Grantee: University of Puerto Rico, San Juan, PR
Grant No.: NA97FD0069 *NMFS Contact:* F/SER
Project Title: Management of the Red Hind Fishery in Western Puerto Rico through a Regional Demographic Analysis
Funding: *Federal:* \$144,100 *Recipient:* \$91,364

Description: To develop and parameterize a population model for managing red hind (*Epinephelus guttatus*) in western Puerto Rico (PR). Red hind are one of the most commercially important species of the Caribbean, the Bahamas, and Bermuda. Increasing fishing pressure has caused substantial reduction in size and structure of the stock that threatens to collapse the fishery. The University of Puerto Rico researchers will work cooperatively with the State Fisheries Laboratory to develop a scientifically based management plan for this fishery. Information from adult demography, larval settlement patterns, and the genetic structure of adults and settling larvae will be combined into a single cohesive management framework. This project, which relies heavily on local fishermen, will furnish government managers and lawmakers with data to chart stock recovery and evaluate location, numbers, and size of proposed Marine Fishery Reserves across PR. Since red hind share a suite of life history characteristics with other large serranids, the demographic information and management strategies generated in this project can be easily extended to other threatened grouper fisheries.

Grantee: North Carolina State University, Raleigh, NC
Grant No.: NA87FD0100 *NMFS Contact:* F/SER
Project Title: Reproduction of Bluefin: Assessing Maturity Using Sex-Specific Compounds
Funding: *Federal:* \$128,145 *Recipient:* \$23,066

Description: To develop the means to biochemically identify the sex and maturational status of individual bluefin tuna, using routine immunoassay of sex-specific hormones and proteins present in blood and muscle tissue samples. These substances vary seasonally with sex and maturation in all teleost fish studied to date, and can serve as indicators for age at maturity and sex ratio in a population. An antiserum and immunoassay for bluefin vitellogenin, the egg-yolk protein precursor specific to maturing female fish, will be created. Muscle and plasma samples will be analyzed for estradiol-17B and vitellogenin to identify mature females, and testosterone and 11-ketotestosterone to identify mature males. Detailed histological examination of the gonads will be conducted to definitively identify the sex and state of maturation of individual fish. The hormone and vitellogenin profiles of these fish will be used to identify levels of these substances characteristic of each specific stage of maturation, and to develop a length-based maturity schedule.

Grantee: University of South Alabama, Mobile, AL
Grant No.: NA77FD0077 *NMFS Contact:* F/SER
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 provide regulatory agencies with information for evaluating the effects of policy changes on user groups. The project will 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 Alaska, Fairbanks, AK
Grant No.: NA06FD0171 *NMFS Contact:* F/AKR
Project Title: Population Structure of Rougheye, Shortraker, and Northern Rockfish Based on Analysis of Mitochondrial DNA Variation and Microsatellites: Completion
Funding: *Federal:* \$135,466 *Recipient:* \$28,624

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

Grantee: University of Alaska, Fairbanks, AK
Grant No.: NA96FD0054 *NMFS Contact:* F/AKR
Project Title: Population Structure of Rougheye, Shortraker, and Northern Rockfish Based on Analysis of Mitochondrial DNA Variation in Microsatellites
Funding: *Federal:* \$151,018 *Recipient:* \$25,783

Description: To use mitochondrial DNA (mtDNA) and microsatellite variation to characterize the population structure of rougheye and shortraker rockfish, and conduct a preliminary survey of northern rockfish. Primers will be developed to amplify unanalyzed rockfish mtDNA regions and to analyze variation at microsatellite loci. With S-K funding (in part), the Principal Investigator has developed polymerase chain reaction-based techniques for analysis of variation in rockfish mtDNA. Preliminary analysis of north Pacific rougheye rockfish revealed strong genetic heterogeneity among collections of

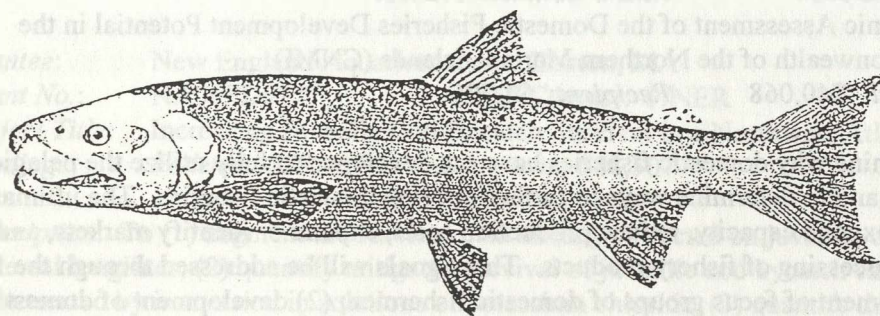
fish in the Gulf of Alaska and Aleutian Islands, indicating a population structure most likely resulting from reproductive isolation. An examination of shortraker rockfish revealed little variation, providing no basis for conclusions. Northern rockfish have been sampled, but not yet analyzed. An increased number of collections and individuals and the addition of microsatellite analysis will provide improved information to more clearly delineate the stock structure of these species in the Gulf of Alaska and Aleutian Islands.

Grantee: University of Washington, Seattle, WA
Grant No.: NA96FD0055 *NMFS Contact:* F/AKR
Project Title: The Effects of Fishery-Induced Directional Selection on Run Timing in Sockeye Salmon
Funding: *Federal:* \$80,903 *Recipient:* \$8,467

Description: To (1) quantify selection pressure on run timing by comparing the temporal pattern of escapement with that of the total run (catch plus escapement) in five fishing districts for the last 35-40 years; (2) examine whether the selective pressure on run timing increases with the systems by compiling the data on total run and compare predicted change to absolute change per system; (3) estimate the heritability of run timing within these populations; and (4) measure the potential correlated effects of selection for run timing on selection for spawning time through two related field studies.

Grantee: Squaxin Island Tribe, Shelton, WA
Grant No.: NA96FD0130 *NMFS Contact:* F/NWR
Project Title: Rebuilding Naturally Spawning Coho Salmon Stocks--An Assessment of Bycatch Reduction Measures and Spawning Escapement Stock Composition in the Southern Puget Sound (Fishery Management Area 13 D-K)
Funding: *Federal:* \$141,768 *Recipient:* \$141,768

Description: To estimate the stock composition and the abundance and distribution of hatchery and naturally-spawned coho salmon contributions to the Tribal commercial coho salmon fishery. The Squaxin Tribe will sample 100% of the fishery in 1999 and 2000. All salmon will be examined for marks and coded wire tags. Scale samples will be collected. Adult sampling weirs will be installed on Skookum Creek and Mill Creek, which feed Area 13 D-K. Fish caught in the weirs will be examined to assess the straying rate of hatchery-origin coho salmon in Area 13 D-K creeks to estimate the stock composition of the spawning escapement. In addition to collecting mark, tag, and scale data at the weirs, other selected creeks in Area 13 D-K will be surveyed to recover coho carcasses. Those fish will be examined for marks and coded wire tags. Scale samples will be collected to determine origin.



THE KISUTCH OR SILVER SALMON.

Oncorhynchus kisutch (Walb.), J. & C. (p. 477.)

Drawing by E. L. Todd, from No. 2734, U. S. National Museum, published in *Bulletin*, (London) 32, October 12, 1901, by Dr. T. H. Bean.

NOAA, National Marine Fisheries Service, NMFS Historical Photo Collection

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

Grant No.: NA76FD0213 **NMFS Contact:** F/NWR

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.: NA76FD0405 **NMFS Contact:** F/NWR

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, Washington, 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: Commonwealth of the Northern Mariana Islands
Grant No.: NA96FD0094 *NMFS Contact:* F/SWR
Project Title: Economic Assessment of the Domestic Fisheries Development Potential in the Commonwealth of the Northern Mariana Islands (CNMI)
Funding: *Federal:* \$40,068 *Recipient:* \$4,795

Description: To determine why domestic fisheries have not developed to fully utilize the pelagic fishery resources of the CNMI and to determine ways to further develop domestic fisheries. The ultimate goal is to identify methods to expand capacity, reduce production costs, expand or identify markets, and promote feasible value-added processing of fishery products. These goals will be addressed through the following objectives: (1) development of focus groups of domestic fishermen; (2) development of domestic capacity database; (3) analysis of vessel production costs; (4) analysis of labor-leisure choice decisions made by fishermen; (5) identification of market constraints; (6) investigation of infrastructure constraints; (7) finance and legal constraint investigation; and (8) report of findings.

Grantee: Regents of the University of California, Santa Barbara, CA
Grant No.: NA96FD0208 *NMFS Contact:* F/SWR
Project Title: Restoration of the White Abalone in Southern California: Population Assessment, Brood Stock Collection, and Development of Husbandry Technology
Funding: *Federal:* \$244,806 *Recipient:* \$105,841

Description: To develop the basic husbandry and culture techniques and a biological habitat model for white abalone. The study will include a field work component and a laboratory/culture component. In the field work component, live, individual broodstock abalone will be located using a manned submersible and collected by hand using scuba divers. Existing bathymetry data will be entered into a geographic information system to generate a map identifying optimal search areas for white abalone habitat. The bathymetry data and flora and fauna data collected during the survey will be used to develop the habitat model to help researchers identify optimal areas for future white abalone outplanting and restoration work. The husbandry and culture techniques will be developed in the laboratory/culture component. These techniques may help establish white abalone as an important aquaculture food product for the current abalone aquaculture industry, and provide individuals for use in restoration.

Grantee: Regents of the University of California, Santa Barbara, CA
Grant No.: NA86FD0070 *NMFS Contact:* F/SWR
Project Title: Evaluation of the Sustainability of the Sea Cucumber Fishery in California
Funding: *Federal:* \$93,124 *Recipient:* \$43,376

Description: To provide a biological basis for the management of a sustainable sea cucumber fishery in the northeast Pacific, especially in California. This will be achieved by documenting historical changes in standing stocks of *Parastichopus californicus* and *P. parvimensis* and estimating the effects of the fishery on the standing stocks; characterizing the size structure of populations of both species; and collecting data on demographic and population parameters crucial to fishery management.

FISHERIES BYCATCH

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

Description: To (1) augment the survival data already collected on juvenile cod bycatch caught by demersal longlines, (2) quantify mitigated survival of juvenile cod bycatch caught by demersal longlines when treated by immersion in solutions of potassium chloride, (3) quantify the degree of physiological stress experienced by juvenile cod bycatch caught by demersal longlines through the analysis of biological parameters in the blood, and (4) continue to solicit advice from longline fishermen relative to increasing the survival of groundfish discards.

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

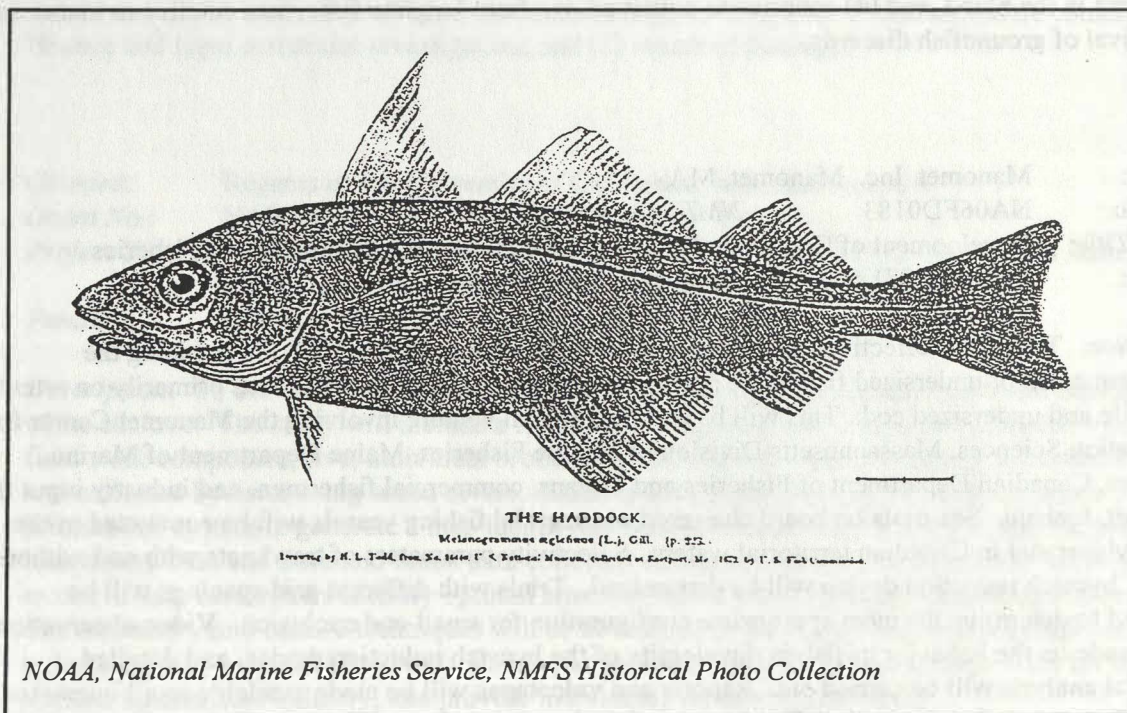
Description: To test the effectiveness of a new bycatch reduction device (Ex-It) in reducing the inadvertent catch of undersized fish in the northwest Atlantic. The study will focus primarily on retention of juvenile and undersized cod. This will be an international venture involving the Manomet Center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

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

Description: To verify whether bay scallops and sea scallops respond to certain acoustic stimuli, and ascertain if a dredge could be developed that would take advantage of this behavior. Observations of bay scallops in situ have shown that they react to certain acoustic stimulation and will swim vertically off the sea bottom. The dredge would be of a type that lightly skims over the sea bottom, thus reducing impact to the benthos which would, if associated with bay scallop harvesting, include eel grass.

Grantee: New England Aquarium Corporation, Boston, MA
Grant No.: NA86FD0108 **NMFS Contact:** F/NER
Project Title: Increasing Survival of Juvenile Atlantic Cod (*Gadus morhua*) and Haddock (*Melanogrammus aeglefinus*) in the Northwest Atlantic Demersal Longline Fishery
Funding: **Federal:** \$163,244 **Recipient:** \$127,386

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



Grantee: New England Aquarium Corporation, Boston, MA
Grant No.: NA77FD0105 *NMFS Contact:* F/NER
Project Title: Leatherback Turtle Movements in Relation to New England Pelagic Fisheries
Funding: *Federal:* \$81,225 *Recipient:* \$0

Description: To identify whether fishing practices can be modified to reduce incidental capture of leatherback turtles. Satellite tags will be placed on leatherback sea turtles on the New England pelagic fishing grounds. The tags will be used to follow the turtles' movements, diving patterns, and interactions with pelagic swordfish longline and drift gillnet fishing activities, in relation to oceanographic conditions.

Grantee: Maine Department of Marine Resources, Augusta, ME
Grant No.: NA76FD0101 *NMFS Contact:* F/NER
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 statistically analyzed to determine the percent bycatch.

Grantee: Atlantic Gillnet Supply, Inc., Gloucester, MA
Grant No.: NA76FD0107 *NMFS Contact:* F/NER
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 test its efficiency during sea trials, both alone and in combination with pingers, to determine whether marine mammal bycatch can be avoided.

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 relation to bottom trawls using a low-light video camera system, and to develop hypotheses on species- or species group-specific behavioral patterns based on the

video data. The results of these behavioral analyses will be used to design innovative techniques for separating flatfish from groundfish in small mesh trawls. Alternate-paired tow comparisons aboard fishing vessels will be conducted to evaluate a separator trawl design.

Grantee: Gulf and South Atlantic Fisheries Development Foundation, Inc., Tampa, FL
Grant No.: NA87FD0099 *NMFS Contact:* F/SER
Project Title: Enhancing Industry Contributions Toward Bycatch Reduction in the Shrimp Fisheries of the Gulf of Mexico and South Atlantic
Funding: *Federal:* \$486,342 *Recipient:* \$54,500

Description: To address the bycatch issue in the southeastern shrimp trawl fishery by working cooperatively with the shrimp industry to enhance their contribution to the development, evaluation, or modification of existing or new bycatch reduction devices (BRDs). With BRD regulations being drafted and/or implemented, only now are the gears being used extensively. The day-to-day knowledge and experience of commercial fishers can provide valuable insights towards addressing current inadequacies of available BRDs. To support industry contribution in the development of the most efficient BRDs, the Foundation will solicit proposals from industry representatives to develop or modify BRDs, and will work with the successful applicants to complete tests and evaluations of modified BRDs or new designs.

Grantee: Fisheries Information Services, Juneau, AK
Grant No.: NA06FD0170 *NMFS Contact:* F/AKR
Project Title: Tools for Reducing Inadvertent Take and Bycatch Wastage of Skates and Sharks in Hook-and-Line Fisheries
Funding: *Federal:* \$3,400 *Recipient:* \$850

Description: To develop detailed information about bycatch of skates and sharks in observed hook-and-line fisheries off Alaska. The first work product will be a compilation and analysis of data demonstrating seasonal and areal trends of such bycatch over the past eight years. The second work product will be a detailed summary of utilization of such bycatch over the same time frame.

Grantee: University of Washington, Seattle, WA
Grant No.: NA96FD0120 *NMFS Contact:* F/AKR
Project Title: Reducing Seabird Bycatch in the North Pacific Longline Fisheries
Funding: *Federal:* \$180,000 *Recipient:* \$20,090

Description: To establish an industry-university collaboration to test a subset of required seabird bycatch mitigation devices on active commercial longline vessels using specially trained fishery observers. This work will be conducted in two fisheries during the 1999 and 2000 fishing seasons: The Individual Transferrable Quota sablefish and halibut longline fisheries operating in the Gulf of Alaska; and the Pacific cod fishery operating in the Bering Sea/Aleutian Islands area. Two required mitigation devices will be compared to a control in each fishery. The data collection and analysis strategy focuses on linking seabird abundance and behavior data during gear deployment to observed hooking rates. In addition, the

species-specific interactions of seabirds with longline fishing gear on active fishing vessels will be characterized. The investigators will work with the industry and resource management agencies in developing recommendations for specific seabird bycatch avoidance regulations and performance standards based on project results. Recommendations for future research projects and research protocols will also be developed.

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

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

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

Description: To fish tangle nets at several locations and estimate catch per set, species composition, and immediate mortality of all species caught. The tangle net is analogous to a small meshed gill net, but rather than gilling the fish, it entangles the fish by the teeth or maxillary bones. The fish are able to continue respiring and can be released live from the net. The investigators will compare our results to a conventional gill net to evaluate reductions in bycatch. All fish released from the tangle net will be tagged for later recovery at hatcheries and on spawning grounds for estimation of their long-term survival.

Grantee: Pflieger Institute of Environmental Research, Oceanside, CA
Grant No.: NA06FD0447 *NMFS Contact:* F/SWR
Project Title: A Device for Greatly Reducing Fishing Mortality for Protected Giant Seabass (*Stereolepis gigas*) and Jewfish (*Epinephelus itajara*)
Funding: *Federal:* \$19,211 *Recipient:* \$15,999

Description: To create a device (see below) that returns fish back to the bottom using detachable (and recoverable) weights, eliminating unintentional mortalities. California's giant seabass and Florida's jewfish are both very large protected species that are incidentally caught by recreational and commercial hook and line anglers. When brought to the surface, the air in the swim bladder of these fishes expands greatly, making the fish so buoyant that it cannot swim back to the bottom when released. Good-intentioned anglers often pierce the body wall and swim bladder to vent the excess air. However, when the fish swims away, it usually dies from the injury.

PRODUCT QUALITY AND SAFETY

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

Description: To study the physical effects on lipid oxidation of fish oil in encapsulated systems. Lipid oxidation of powders is principally determined by the physico-chemical properties of the emulsion droplets and encapsulating matrix, the presence of antioxidants, and the processing condition. The information gained from this project will lead to future technological innovation for increased utilization of fish oil in commercial food products. These innovations will be of considerable benefit to U.S. fisheries.

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

Description: To implement a pilot program to transfer ion selective electrode technology to the seafood industry. Ion selective electrode methodology has been successfully developed for routine monitoring of volatiles in seafood (AOAC 999.01) for quality, particularly characteristics of initial decomposition. Organization of the 6-month pilot will be accomplished with the cooperative efforts of the National Fisheries Institute, which will solicit the 8–10 companies for their involvement in the project. All meters, probes, and reagents necessary will be assembled in a kit form and donated by Orion Research, Inc. Additional chemical, microbiological, and sensory testing, as well as verification of industry results, will be done at the Food Science and Nutrition Department at the University of Rhode Island, the Rhode Island Department of Health, and/or NMFS Sensory to add to the existing seafood database. Results will be statistically analyzed, and information will be disseminated through participant survey and informal forums/workshops.

Grantee: University of Southern Mississippi, Hattiesburg, MS
Grant No.: NA06FD0298 **NMFS Contact:** F/SER
Project Title: A Histamine Dipstick Test for Spoilage in Fisheries Products
Funding: **Federal:** \$57,023 **Recipient:** \$23,723

Description: To incorporate a recombinant enzyme (the investigators currently are in the process of cloning and expressing kidney diamine oxidase) into a second-generation histamine dipstick, which then will be compared to the standard AOAC test in a method validation study. Scombroid poisoning is a form of chemical poisoning that occurs when consumers ingest spoiled tuna and related fish. It typically is associated with high levels of histamine produced by bacterial decomposition of these fish. Because odor and appearance do not reliably indicate this type of spoilage, a simple test for histamine that can be used in widespread quality-control testing of fisheries products is needed. The investigators have developed and published such a rapid test in the form of a dipstick. Before this dipstick can be produced on a large scale in a form suitable for widespread use, however, the histamine-specific enzyme component must be produced in large quantities and optimized for the currently allowed FDA levels for histamine.

Grantee: Louisiana State University Medical Center, New Orleans, LA
Grant No.: NA97FD0062 **NMFS Contact:** F/SER
Project Title: Reduction in the *Vibrio vulnificus* Load in Oysters by a Novel Short-Term Combination Biodepuration Treatment
Funding: **Federal:** \$173,111 **Recipient:** \$133,283

Description: To conduct studies on oysters naturally contaminated with *Vibrio vulnificus* and undergoing biodepuration on a pilot scale. Pooled bacteriophage specific for *V. vulnificus* and anti-*V. vulnificus* protein will be used to reduce the microbial burden to levels deemed safe when such oysters are eaten raw. Prior investigations have resulted in the isolation of nine bacteriophage specific for *V. vulnificus*. Pools of these phage have successfully reduced *V. vulnificus* populations *in vitro* and *in vivo* among live oysters artificially contaminated with the organisms. These data suggest that pooled phage could be successfully used in the biodepuration of oysters destined for raw consumption. A protein has also been isolated from oyster tissue. This protein specifically acts against *V. vulnificus*, significantly reducing its populations both *in vitro*, and *in vivo* with oysters artificially contaminated with the organism. The protein has been partially characterized and at least three fragments have been sequenced. Populations of *V. vulnificus* were found to be markedly reduced when this protein was jointly used with pooled phage in the biodepuration of oysters artificially contaminated with *V. vulnificus*.

Grantee: University of Southern Mississippi, Hattiesburg, MS
Grant No.: NA97FD0067 *NMFS Contact:* F/SER
Project Title: A Histamine Dipstick Test for Spoilage in Fisheries Products
Funding: *Federal:* \$52,875 *Recipient:* \$22,207

Description: To further develop a sensitive, accurate, rapid, and convenient dipstick for determining histamine levels in seafood products and make it commercially feasible. The researchers have developed and published such a dipstick test. Before this dipstick can be produced on a large scale in a form suitable for widespread use, however, the histamine-specific enzyme component must be produced in large quantities and optimized for the currently allowed Food and Drug Administration levels for histamine. Scombroid poisoning occurs when consumers ingest spoiled tuna and related fish. It is typically associated with high levels of histamine produced by the bacterial decomposition of these fish. Since odor and appearance do not reliably indicate this type of spoilage, a simple test of histamine for use in widespread quality control testing of fisheries products is needed.

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

Description: To (1) determine ozone concentrations necessary for inactivating microbial biofilms on seafood equipment and reducing microbial counts on raw material used for ready to eat (RTE) production; (2) evaluate the effect of ozone on *Listeria monocytogenes* inoculated seafoods; (3) measure shelf life characteristics of ozone treated RTE seafoods; and (4) compare ozone and chlorine treatments for RTE production in a commercial operation.

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

Description: To (1) compare adenosine triphosphate (ATP) bioluminescent assays to aerobic plate count methods to determine surface contamination levels on processing lines, equipment surfaces, and utensils after sanitation by plant personnel; (2) compare contamination load on surfaces after different processing and sanitation shifts and correlate residual sanitizer (chlorine and quaternary ammonium compounds) concentration on surfaces with ATP bioluminescence levels; (3) determine if the ATP bioluminescent assay distinguishes microbial contamination of raw materials from non-microbial ATP for use as a control point at receiving; and (4) conduct in-plant workshops and demonstrations of the ATP bioluminescent assay and determine if microbial quality of raw products improves after training of plant personnel.

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

Description: To provide approaches to the study and mitigation of harmful algal blooms. A field guide to the common phytoplankton in western Washington waters will be developed and published. The guide will contain light microscope and scanning electron microscope photographs of many phytoplankton species and short descriptions of characteristics. The guide will include many harmful species and serve as a guide for health managers who are examining water samples on site. Also, the researchers will continue their monitoring program for harmful algal species on Washington coastal beaches and the Puget Sound Basin. This data will allow researchers to better understand the temporal and spatial variability of various harmful species in the region.

Grantee: University of Arizona, Tucson, AZ
Grant No.: NA06FD0448 **NMFS Contact:** F/SWR
Project Title: Development of Real-Time PCR Assays for Detection of White Spot Syndrome Virus, Yellow Head Virus, Taura Syndrome Virus, and Infectious Hypodermal and Hematopoietic Necrosis in Penaeid Shrimp
Funding: *Federal:* \$75,393 *Recipient:* \$47,671

Description: To develop a rapid, sensitive, and reliable method (real-time PCR) for screening shrimp viruses. This method can be employed at points of entry so that imports can continue and the U.S. shrimp industry will be protected. This method also can be used to screen U.S. shrimp and marine products that are being exported to the growing number of countries requiring certification. Viral diseases in marine shrimp have become prevalent and caused severe economic losses in many countries. Several virulent viruses have been spread to other countries through trade in live and commodity shrimp and infected farm shrimp and wild stocks. Following the lead of its major trade partners in the Americas, the U.S. government may ban imports of shrimp from countries known to have viral epizootics. Such a ban would constitute a trade barrier that would adversely affect a \$12 billion industry in shrimp importation in the U.S.

Grantee: PacMar, Inc., Honolulu, HI
Grant No.: NA86FD0067 *NMFS Contact:* F/SWR
Project Title: Development of a HACCP-Based Strategy for the Control of Histamine for the Fresh Tuna Industry
Funding: *Federal:* \$199,513 *Recipient:* \$34,622

Description: To develop a Hazard Analysis Critical Control Point (HACCP)-based approach to the problem of histamine formation in fresh tuna which integrates the industry linkages (fishing vessel/processor/distributor) in an effective, efficient, and practical system capable of ensuring public safety and compliance with FDA seafood regulations. This will be achieved by (1) evaluating epidemiological data on histamine toxicity in Hawaii; (2) developing fishing fleet profiles in terms of fishing methods, post-harvest handling methods, and potential risk of histamine production; (3) verifying the post-harvest handling procedures by using temperature loggers deployed at sea to record the temperature history of fish aboard fishing vessels; and (4) determining the importance of gear type, post-handling methods, and fresh tuna quality grades as indicators of histamine concentration.

Grantee: Woods Hole Oceanographic Institution, Woods Hole, MA
Grant No.: NA57FD0012 *NMFS Contact:* F/SWR
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. In addition, the hypothesis that the onset of PSP in northern California is linked to the relaxation of upwelling, and the transport of established blooms to the shore with warm stratified offshore waters, will be tested.

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

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

AQUACULTURE

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

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

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

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

Grantee: Woods Hole Oceanographic Institution, Woods Hole, MA
Grant No.: NA96FD0078 *NMFS Contact:* F/NER
Project Title: Aquaculture Regulation: Economic and Legal Models for the U.S. Exclusive Economic Zone
Funding: *Federal:* \$92,935 *Recipient:* \$26,107

Description: To develop a framework for analyzing access system design for ocean mariculture operations and to characterize an economically optimal access system. An economic analysis will be conducted to complement current efforts by academia, public interest groups, Federal agencies, and the U.S. Congress to develop laws and regulations governing ocean mariculture in the U.S. Exclusive Economic Zone.

Grantee: University of Rhode Island, Kingston, RI
Grant No.: NA76FD0143 *NMFS Contact:* F/NER
Project Title: Development of Commercial Aquaculture of Black Sea Bass
Funding: *Federal:* \$99,385 *Recipient:* \$15,246

Description: To evaluate the potential for raising black sea bass from eggs to juveniles as a commercial aquaculture endeavor. The researchers will 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 the investigations will follow procedures proven successful with other species. Eggs in excess of the study requirements will be provided to others interested in black sea bass aquaculture.

Grantee: University of Maryland Biotechnology Institute, Baltimore, MD
Grant No.: NA76FD0145 *NMFS Contact:* F/NER
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 to facilitate the regulatory approval of the technology, making it accessible to commercial hatcheries and finfish growers.

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

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

Grantee: Bioshelters, Inc., Amherst, MA
Grant No.: NA66FD0017 **NMFS Contact:** F/NER
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 intent of the project is to create an inexpensive technique which the aquaculture industry will readily adopt, with widespread water quality benefits to the receiving waters downstream from aquaculture facilities.

Grantee: University of Texas at Austin, Austin, TX
Grant No.: NA06FD0299 **NMFS Contact:** F/SER
Project Title: Development of Hatchery Technologies for Snapper
Funding: **Federal:** \$169,987 **Recipient:** \$33,938

Description: To address the development of larval rearing technologies for the production of juvenile snapper for off-shore operations. Results from this project are expected to (1) diversify the number of cultured species available to the mariculturist, (2) expand our understanding of larval rearing requirements of snapper, and (3) advance commercial technologies for the production of fingerlings. The proposed research will build on previous projects that successfully developed maturation techniques for the year-round spawning of yellowtail snapper as well as mass production techniques for other marine species such as red drum. Yellowtail snapper is one of several snapper species that are listed as "overfished" and displays positive potential for development in the mariculture industry. We have maintained spawning populations of wild fish since 1992 and currently have an F1 population of laboratory-reared fish spawning three times per week producing 250,000 eggs/spawn. Initial protocols for larval rearing using live and prepared feeds have resulted in overall survival of 3% from egg to advanced juvenile.

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

Description: To provide information and technologies critical to generating predictable sex ratios in flounder restocking efforts and producing monosex stocks of faster growing females for mariculture. The means to control sex determination in summer and southern flounders will be developed. In addition, markers and timing of sex determination in flounder will be determined to characterize the developmental periods during which temperature irreversibly exerts its effect.

Grantee: South Carolina Department of Natural Resources, Charleston, SC
Grant No.: NA77FD0078 *NMFS Contact:* F/SER
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 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 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.

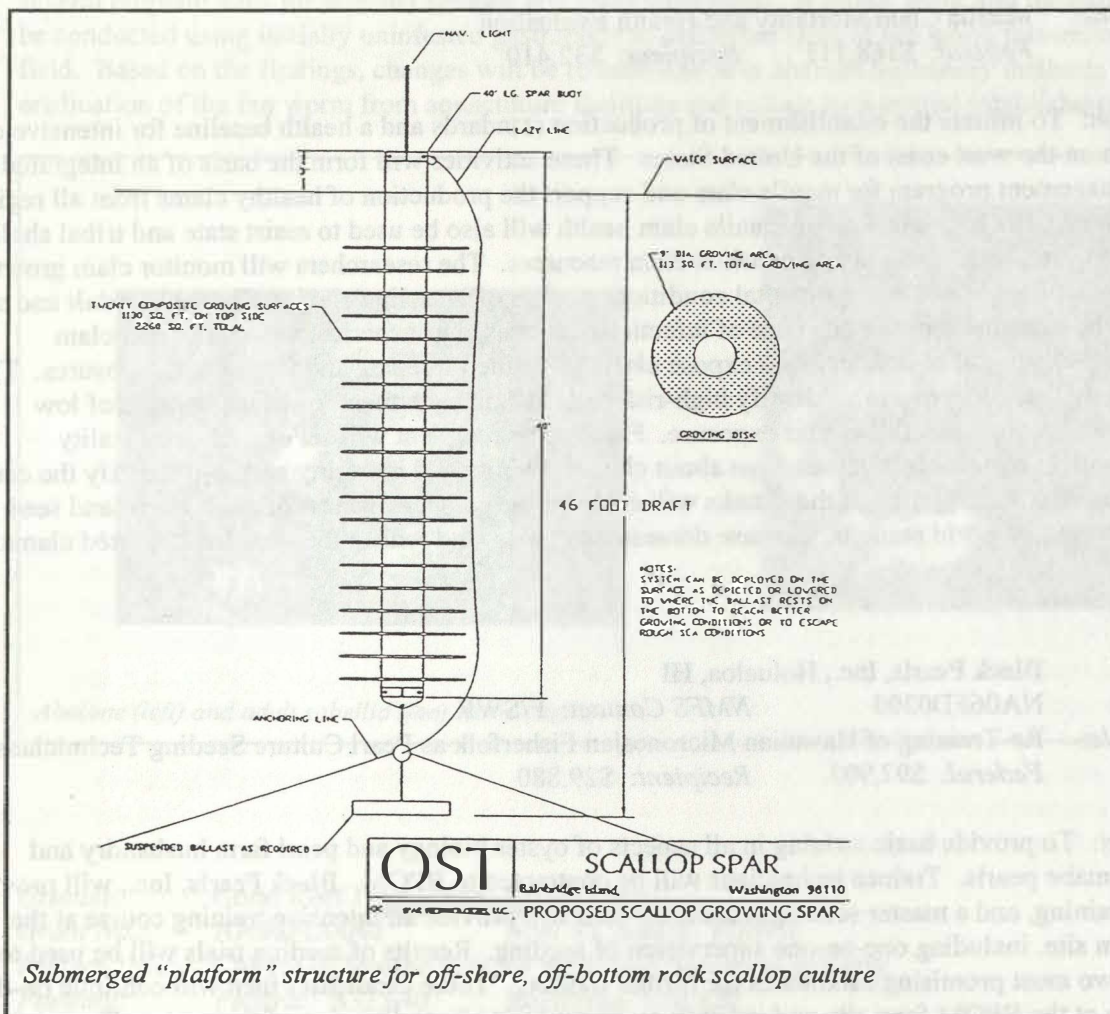
Grantee: Qutecak Native Tribe, Seward, AK
Grant No.: NA66FD0045 *NMFS Contact:* F/AKR
Project Title: Broodstock Selection and Hatchery Development of Purple-Hinged Rock Scallops (*Crassodoma gigantea*) for Marine Aquaculture
Funding: *Federal:* \$69,795 *Recipient:* \$35,145

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

Description: To develop technology and methodology to culture the rock scallop to maturity and commercial harvest in high-energy, off-shore environments in an ecological and economically viable and

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



Grantee: Pacific Shellfish Institute, Olympia, WA
 Grant No.: NA06FD0280 NMFS Contact: F/NWR
 Project Title: Probiotics to Increase Shellfish Hatchery Production
 Funding: Federal: \$99,986 Recipient: \$36,132

Description: To improve the production efficiencies and profits of national production of shellfish seed using beneficial bacteria to displace disease-causing bacteria. The recipient will use its large collection of shellfish hatchery bacteria and other bacteria, as well as new isolates, to select those bacteria with the strongest probiotic effect. The selected bacteria will be tested by the recipient to determine whether the

bacteria can prevent bacterial disease in oyster seed and larvae using a laboratory challenge system. If successful, the project will provide candidate probiotic bacteria for use in a future commercial-scale test.

Grantee: Pacific Shellfish Institute, Olympia, WA
Grant No.: NA96FD0194 *NMFS Contact:* F/NWR
Project Title: Manila Clam Mortality and Health Evaluation
Funding: *Federal:* \$168,111 *Recipient:* \$32,410

Description: To initiate the establishment of production standards and a health baseline for intensive clam production on the west coast of the United States. These activities will form the basis of an integrated health management program for manila clam and support the production of healthy clams from all regions of the country. The baseline data on manila clam health will also be used to assist state and tribal shellfish biologists in assessments of public and tribal clam resources. The researchers will monitor clam growth, survival, yield, health, and environmental conditions at sites of intensive clam production. Adult and seed clams will be examined for the presence of infectious diseases, and experimental studies at a clam production facility will be conducted to expose clams to defined freezing and freshwater exposures. This latter study will allow growers to identify high-risk beds and manage them to reduce impacts of low temperature and excessive freshwater exposure. Finally, the recipient will set up a clam mortality response team to address grower concerns about clam morbidity and mortality and help identify the causes of such episodes. Completion of these tasks will enhance the competitiveness of adult clams and seed clam production in world markets, increase domestic supplies, and reduce the need for imported clams.

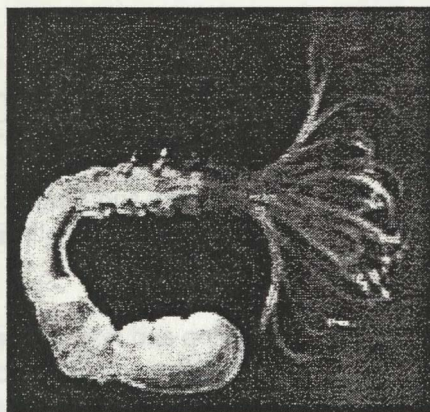
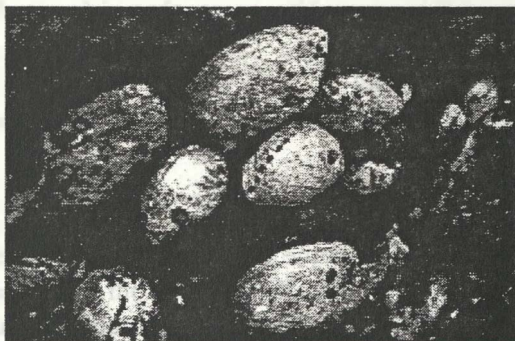
Grantee: Black Pearls, Inc., Holualoa, HI
Grant No.: NA06FD0303 *NMFS Contact:* F/SWR
Project Title: Re-Training of Hawaiian Micronesian Fisherfolk as Pearl Culture Seeding Technicians
Funding: *Federal:* \$97,903 *Recipient:* \$29,880

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

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

Description: To describe the life history of the fan worm which infests cultured abalone. All life stages and reproductive ability at temperatures experienced in California will be identified. Life stages of fan

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



Abalone (left) and adult sabellid (fan) worm (right)

Grantee: Coral Reef Foundation, Koror, Palau
Grant No.: NA86FD0068 **NMFS Contact:** F/SWR
Project Title: Culture of Marine Fish for the Home Aquarium Industry
Funding: *Federal:* \$32,640 *Recipient:* \$10,420

Description: To identify species of marine fish appropriate for the aquarium trade and develop "low-tech" mariculture methods to raise these species for sale in the marine aquarium trade. It is anticipated that this work will encourage increased involvement of Pacific Islanders in this industry by expanding the number of species available for culture.

Grantee: Regents of the University of California, Oakland, CA
Grant No.: NA86FD0069 *NMFS Contact:* F/SWR
Project Title: Development of Rock Scallop Grow-Out Techniques
Funding: *Federal:* \$48,088 *Recipient:* \$6,815

Description: To develop recommendations on rock scallop grow-out methods by conducting laboratory experiments, dissections, and pilot field studies. Laboratory work will examine behavioral and developmental mechanisms responsible for final attachment. The field studies, to be done in collaboration with California aquaculturists, will further refine potential grow-out techniques identified in the laboratory for use in various culture systems.

HABITAT CONSERVATION

Grantee: University of Florida, Gainesville, FL
Grant No.: NA97FD0065 *NMFS Contact:* F/SER
Project Title: Conserving and Enhancing Essential Fish Habitats by Differentiating the Specific Sources of Fecal Pollution in Estuarine Waters
Funding: *Federal:* \$89,922 *Recipient:* \$13,192

Description: To develop and test innovative methods to determine the specific type and extent of human and non-human fecal pollution, and produce tools to identify the specific animal sources of fecal pollution in estuarine waters. Estuarine waters are the habitat of numerous marine species, including molluscan shellfish. This habitat is increasingly impacted by fecal bacteria, signifying a decrease in water quality, and potential risk of human and resource disease. The researchers will expand on previous research showing that selected phenotypic and genotypic characteristics accurately discriminate between human and non-human sources of *E. coli*. The investigation involves: (1) isolating *E. coli* from predominant agriculture and wildlife species; (2) determining ribotype (DNA fingerprint), multiple antibiotic resistance, and serotype profile; (3) correlating specific profiles with animal source; and (4) defining the significant fecal pollution sources within the study site.

Grantee: University of Massachusetts, Boston, MA
Grant No.: NA97FD0070 *NMFS Contact:* F/SER
Project Title: The Effect of Bank-Barrier Reef Lagoon Habitat Loss on Post-Settlement Juvenile and Sub-Adult Coral Reef Fishes
Funding: *Federal:* \$85,790 *Recipient:* \$43,261

Description: To (1) quantify the extent and patterns of lagoon habitat use by post-settlement and juvenile reef fishes; and (2) quantify the impacts of habitat loss on post-settlement and juvenile fishes in lagoon habitats and sub-adult fishes in adjacent coral reef habitats. Tropical marine near shore habitats, specifically bank-barrier reef lagoon habitats, are important nursery areas for coral reef fishes. These habitats are threatened by numerous activities, especially coastal development, which may cause habitat loss due to sedimentation. Resource managers must know which of these habitats are essential fish habitats so that appropriate conservation strategies can be formulated. There are two major theories on

processes that control the total number of coral reef fishes; recruitment limitation and habitat limitation. The results will show which habitats are essential early life stage habitats for the observed species; i.e., whether the loss of lagoon habitats has an effect on sub-adult abundance on adjacent coral reefs. This information will be directly applicable to current fisheries management issues and useful to local and Federal agencies, commercial and recreational fishermen, and private citizens and citizen groups.

Grantee: University of Washington, Seattle, WA
Grant No.: NA76FD0036 **NMFS Contact:** F/AKR
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.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

Project No.: 05-SE-31 **NMFS Contact:** FISER
Project Title: Red Drum (Sciaenops ocellatus) Mark/Capture 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 project and accepted estimated methodology of mark and recapture will be used to assess the current status of the stock. Estimates indicate that if 10,000-20,000 red drums are tagged within a relatively short time, and then approximately 50,000 fish are examined for the presence of tags, a reasonably precise estimate of the adult red drum biomass can be developed for use in quota and resource allocation decisions. The goals are to improve red drum fishery management and optimize commercial and recreational utilization of the resource.

V. PENDING NATIONAL PROGRAM PROJECTS

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

FISHERIES UTILIZATION

Grantee: Alaska Fisheries Development Foundation, Anchorage, AK
Grant No.: NA86FD0580 *NMFS Contact:* F/AKR
Project Title: An Ocean of Answers
Funding: Federal: \$150,000 *Recipient:* \$0

Description: To investigate the development of a permanent endowment for the Alaska Fisheries Development Foundation to support the goals and objectives of the Magnuson-Stevens Fishery Conservation and Management Act by (1) conducting a feasibility study and donor survey; (2) designing a capital development campaign; (3) designing an educational outreach campaign; (4) creating an endowment instrument and a plan for perpetuity; and (5) exploring funding assistance available from state and local governments and other funding organizations.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

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

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

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

Description: To conduct an experiment to detect fishing power differences between the net and vessel configuration used by NMFS during their Gulf of Alaska (GOA) triennial groundfish surveys and the net and vessel configuration used by the Alaska Department of Fish and Game (ADF&G) during their annual GOA crab survey. The results of this experiment will allow both NMFS and ADF&G to augment each survey by allowing direct comparisons of the respective databases. For example, being able to fully incorporate the ADF&G survey database into the annual status of stocks process would greatly enhance the management of important groundfish species such as walleye pollock, Pacific cod, and many flatfish species.

Project No.: 97-AK-02 *NMFS Contact:* F/AKR
NA77FD0164
Project Title: Monitoring and Evaluation of the Halibut and Sablefish Individual Fishing Quota (IFQ) System
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/AKR
Project Title: Development of an Experimental Approach to Testing the Efficacy of Steller Sea Lion Fishery Exclusion Zones
Funding: *Federal:* \$24,900

Description: To develop an experimental design for the evaluation of Steller sea lion fishery exclusion zones which, when implemented, will increase the likelihood of recovery of threatened Steller sea lion populations in Alaska, and reduce the conflicts between the fishing industry and the Steller sea lion recovery program.

Project No.: 97-AK-06 *NMFS Contact:* F/AKR
Project Title: 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. Currently, these data systems are an inefficient means of retrieving the amount and detail level of information needed for information requests and for research purposes. This

project will provide contractual assistance to structure and retrieve data so as to address these information needs. Tasks include: improving system documentation; developing reports and data summaries; and increasing the variety, amount, and detail of information available through NMFS Internet sites and computer bulletin boards.

Project No.: 96-SW-02 *NMFS Contact:* F/SWR

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 in deterring California sea lions from interacting with CPFV operations, and the associated effect on angler catch rates; and (5) test the pulsed-power discharge system in waters off California.

FISHERIES BYCATCH

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

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

Funding: *Federal:* \$60,000

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.

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

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 for 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-SW-01 *NMFS Contact:* F/SWR
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.

PRODUCT QUALITY AND SAFETY

Grantee: Interstate Shellfish Sanitation Conference, Columbia, SC
Grant No.: NA97FD0087 *NMFS Contact:* F/SF2
Project Title: Development of a National Education Program to Influence Consumption Behavior of High-Risk Individuals Regarding Raw Molluscan Shellfish
Funding: Federal: \$250,000 *Recipient:* \$52,500

Description: To minimize the number of illnesses and deaths resulting from the bacterial pathogen, *Vibrio vulnificus*, due to the consumption of raw oysters. This will be achieved by educating high-risk consumers to make an informed choice to modify their behavior, thus reducing the risk and, consequently, the number of cases. This education campaign will focus on both the target-specific content of the information and the dissemination process. Expanded assistance will be provided to states to enhance the national implementation of the program developed under an ongoing grant, and to assist other interested states in participating in the program.

AQUACULTURE

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

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

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

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

FISHERIES UTILIZATION

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

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

Grantor: University of Maine, Orono, ME
Grant No.: NA74FD0190 **NMFS Contact:** F/SER
Project Title: Determination of Aeration Rates, End-Product Quality, and Extractions Analysis of In-Vessel Composting Systems for Crab Waste Treatment
Funding: Federal: \$85,132 **Acquirer:** \$13,732

Abstract: This study was conducted to evaluate in-vessel composting of crab processing waste mixed with wood shavings as a bulking agent. Experimental vessels were designed and built for the research study. Four different aeration strategies with individual aeration were used as treatments. Composting process parameters and resulting final product quality characteristics were compared for the different aeration treatments. A 28-day in-vessel composting phase with a final curing phase in outdoor windows

Project Title: *Development of a...*
Funding: *Federal 200,000*

The project is designed to...
The primary objective is to...
The project will be...

Project Title: *Development of a...*
Funding: *Federal 200,000*

The project is designed to...
The primary objective is to...
The project will be...

Funding: *Federal 200,000*

Description: To provide the...
The project is designed to...
The primary objective is to...
The project will be...

Project Title: *Development of a...*
Funding: *Federal 200,000*

The project is designed to...
The primary objective is to...
The project will be...

VI. COMPLETED GRANT PROGRAM PROJECTS

This section contains an assessment of each S-K Grant Program project completed during the period June 1, 1999 to May 31, 2000, regarding the extent to which the objectives of the project were attained and the project contributed to fishery development. The projects are listed by grantee within each subject area, along with the grant number, project title, federal funding level, recipient funding level (i.e., cost share), and NMFS contact.

FISHERIES UTILIZATION

Grantee: University of Massachusetts, Amherst, MA
Grant No.: NA86FD0107 *NMFS Contact:* F/NER
Project Title: Bioconversion of Mackerel Byproducts into Value-Added Products for the Nursery and Plant Propagation Industry
Funding: *Federal:* \$62,215 *Recipient:* \$18,708

Assessment: This project has helped to develop mackerel hydrolysates, both soluble and insoluble, into value-added products that can be commercialized into the nursery and seed industries. The project has clearly identified that the proline, proline analog (hydroxy proline), and proline precursors (glutamic acid and arginine) in the fishery hydrolysates are involved in improving plant propagation efficiency and seed vigor beyond the general nutrient value of fishery byproducts. This efficiency can be improved with some synergistic phenolics. Based on this, the preliminary results indicate elite clonal extracts of oregano with natural phenolics can show improved seed vigor and improved propagation efficiency with fishery hydrolysates. Based on the preceding solid and very successful conceptual foundation, the investigators proposed a strategy to commercialize mackerel and other fishery byproducts into the nursery and seed industries. In order to accomplish this, a fishery byproduct producer (Connolly Sea Foods) and the University of Massachusetts have been brought together to produce a spin-off company—PhytoBioSystems—to develop a commercial formulation that can be marketed to the U.S. nursery and seed industries. This project resulted in three manuscripts published or accepted for publication and two more manuscripts in preparation.

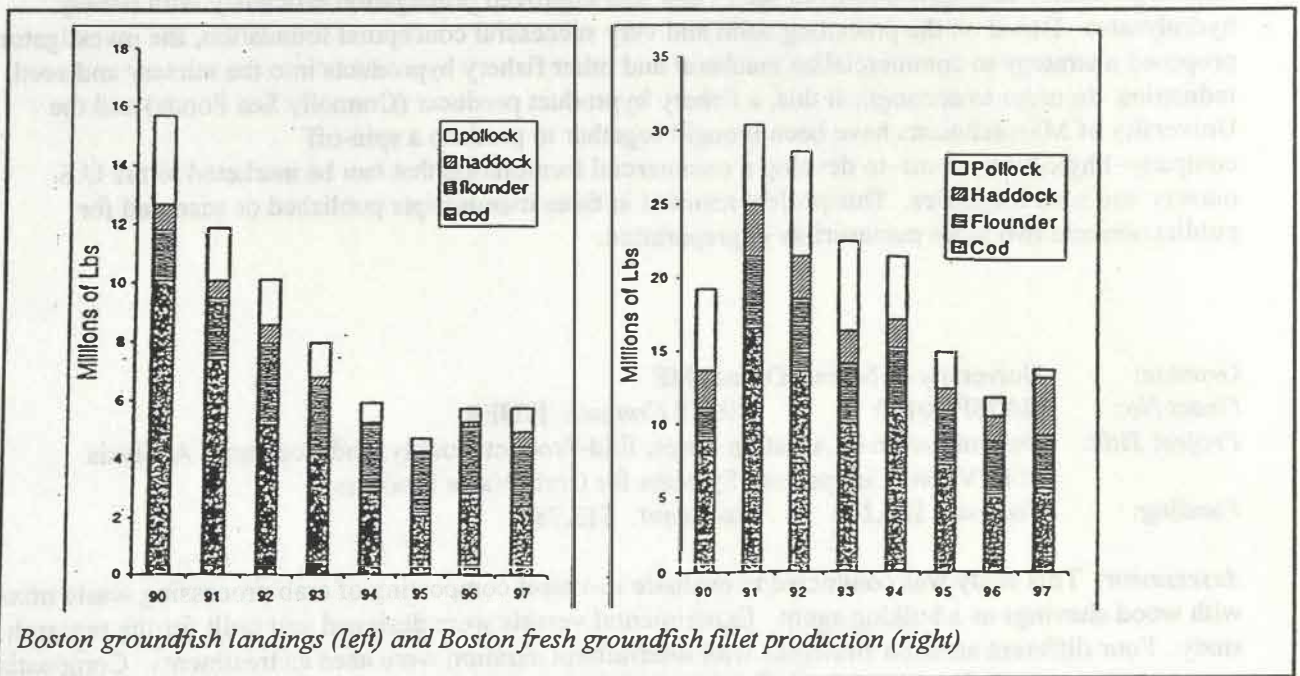
Grantee: University of Maine, Orono, ME
Grant No.: NA76FD0100 *NMFS Contact:* F/NER
Project Title: Determination of Aeration Rates, End-Product Quality, and Economic Analysis of In-Vessel Composting Systems for Crab Waste Products
Funding: *Federal:* \$86,172 *Recipient:* \$13,788

Assessment: This study was conducted to evaluate in-vessel composting of crab processing waste mixed with wood shavings as a bulking agent. Experimental vessels were designed and built for the research study. Four different aeration strategies with intermittent aeration were used as treatments. Composting process parameters and compost final product quality characteristics were compared for the different aeration treatments. A 28-day in-vessel composting phase with a final curing phase in outdoor windrow

was the process tested. All aeration treatments provided suitable conditions for adequate in-vessel composting with no significant differences in the process parameters for the different treatments. The in-vessel composting was successful for all treatments, producing a high-quality compost product. For the different aeration treatments, product quality characteristics had similar results in general. The tests showed that differences in ambient temperatures and differences in initial mix conditions created more variability in final product quality than the aeration treatment differences caused. An economic evaluation was conducted to compare two commercial in-vessel composting systems—windrow composting and land filling—as alternative waste treatment options. The economic analysis indicated that in-vessel composting systems could be profitable, but windrow composting was the most cost-effective composting system. However, windrow composting can be problematic. In-vessel composting has the advantages of allowing for the containment of odors and isolation of the waste from vectors and vermin while providing an environmentally friendly value-added product from the crab processing waste.

Grantee: University of Massachusetts, Dartmouth, MA
Grant No.: NA76FD0108 **NMFS Contact:** F/NER
Project Title: Investigate the Impact of Reduced Fresh Groundfish Supply on Processors and Wholesalers
Funding: Federal: \$28,896 **Recipient:** \$11,641

Assessment: Based on earlier work conducted by the recipient, this project analyzes the impact of the drop in the supply of whole fish on New England processors after the implementation of Amendments 5 and 7. The following 10 conclusions were reached: (1) Despite the continuing decline of groundfish landings, Boston continues to lead fresh groundfish processing in New England (see below). (2) With the possible exception of Gloucester, processors in other ports have not fared as well as those in Boston.



(3) Long-term relationships or loyalties among processors, their suppliers, and their customers have continued to erode, contributing to the day-to-day variability of ex-vessel input prices on the one hand and wholesale prices on the other. Although operating and profit margins may not have changed radically on an annualized basis, profit margins have become increasingly difficult to maintain. (4) Survival techniques—including importing fresh fillets, exploiting niches, substituting for groundfish, focusing more on wholesaling, and closely watching the bottom line—continue and have been extended, becoming essential features of successful processors' purchasing and marketing strategies. (5) Boston's advantages in transport costs and clustering far outweigh access to local landings of processors in other ports. (6) Smaller firms have turned to wholesaling or have simply vanished. Not only are there fewer and typically larger firms, but the processors' markets have become more concentrated. (7) Although no processor can be said to enjoy an assured supply of whole fish, large firms are better able to draw on widely scattered geographic sources and adapt to display auctions, which now are an indispensable source of domestic whole fish. (8) It had been assumed that increased supplies of underutilized species would likely lead to intense price competition for a small share of the established markets. This did not occur. Demand expanded for these and other species, followed by intensive fishing and then stock declines. These formerly underutilized stocks are now severely depleted. The U.S. Department of Commerce is preparing restrictive management plans for these species. (9) It was predicted that the number of firms that switched to wholesaling firms from processing would decline because some of the firms that had switched could not survive the competitive pressures of wholesaling. There is some evidence of this, but it is not conclusive. (10) Although stock recovery does not look promising for any Atlantic groundfish species, an increase in groundfish stocks and landings could stabilize or may even reverse declines in employment and in the number of processing firms.

Grantee: University of Massachusetts, Amherst, MA
Grant No.: NA76FD0109 *NMFS Contact:* F/NER
Project Title: Commercialization of an Ultrasonic Device for Measuring Fat Content of Mackerel
Funding: *Federal:* \$68,758 *Recipient:* \$0

Assessment: The overexploitation of certain fish species has meant that the fishing industry has directed its attention toward the use of underutilized species such as mackerel. The effective utilization of mackerel largely depends on its fat content, and, therefore, the fishing industry requires analytical techniques to rapidly grade mackerel according to its composition. A hand-held ultrasonic device has been developed that can be used to provide information about fish composition. The composition is determined from measurements of the ultrasonic velocity of fish, either at a fixed temperature or over a range of temperatures. A series of empirical equations was developed to relate ultrasonic velocity measurements to fish composition. The recipient demonstrated that the compositions determined using the ultrasonic velocity technique were in good agreement with those determined by official methods for a number of fish species including cod, mackerel, salmon, and tuna. The technique is now at the stage where a commercial instrument manufacturer could develop it, providing there is sufficient interest and a large enough market in the fishing industry.

Grantee: Rhode Island Seafood Council, Wakefield, RI
Grant No.: NA66FD0016 **NMFS Contact:** F/NER
Project Title: Commercial Utilization of Atlantic Mackerel: Technology, Production, and Marketing
Funding: **Federal:** \$198,082 **Recipient:** \$51,250

Assessment: This project consisted of two basic areas of work tied together by several objectives: (1) cyroprotection of light-flesh mackerel mince and prototype product development and (2) break-even analysis for the production of Atlantic herring and Atlantic mackerel frozen block products. The project addressed quality parameters for frozen mince, commercial pilot testing of mechanical systems, and prototype production for market trials. In addition, the project reviewed landings, trade, and management of mackerel and herring and provided break-even analysis, analysis of market potential for the products that were developed, and the results of product testing. Although the team of professionals assembled for this project worked well together, progress was delayed by supply issues and an oil spill. Product evaluation yielded very positive scores for taste, texture, and "mouth feel" across the spectrum of products. However, ultimately the investigators determined that commercial production would not be feasible. Project managers had hoped that a processor would be able to move among different projects and thus fully utilize raw material, but this became impossible when machine processing and extraction of the light flesh on the frozen mackerel was attempted. Utilization of the whole mackerel as a mince product proved to be too expensive and noncompetitive with other products in the market.

Grantee: University of Georgia, Athens, GA
Grant No.: NA77FD0061 **NMFS Contact:** F/SER
Project Title: Assessment of Ark Populations in the Whelk and Calico Scallop Fishing Grounds off the Coasts of Georgia and Florida to Determine Distribution, Abundance, and Potential Commercial Fishery Development for the Cut-Ribbed Ark (*Anadara floridana*) and Other Promising Commercial Ark Species
Funding: **Federal:** \$49,521 **Recipient:** \$23,489

Assessment: This study surveyed wild ark populations to determine potential commercial fishery development in Georgia. Most ark beds occurred in closed waters that have not been certified by the State of Georgia for the harvest of shellfish. The ark beds are limited in size and could be easily overfished. In addition, density is generally low, so commercial harvest probably is not economically feasible. However, two ark species, the blood ark (*Anadara ovalis*) and the incongruous ark (*A. brasiliiana*), demonstrated rapid growth and relatively large size. These species show potential for use in marine aquaculture.

Grantee: University of Alaska, Fairbanks, AK
Grant No.: NA76FD0034 **NMFS Contact:** F/AKR
Project Title: Utilization of Giant Grenadier (*Albatrossia pectoralis*)—Year 2: Production of Stabilized Mince and Development of a Promotional/Marketing Study
Funding: **Federal:** \$86,543 **Recipient:** \$17,308

Assessment: Stabilized minces were produced from giant grenadier (*Albatrossia pectoralis*) fillets using flaking technology and the addition of additives including gums and proteins. Carrageenan and konjak flour and carrageenan/whey protein and carrageenan/beef protein mixtures significantly firmed the mince

and provided good frozen shelf life stability. However, evaluation by potential end users of the products found poor texture when compared to cod and pollock minces. The use of giant grenadier in stabilized minces does not appear to be a good use for this resource.

Grantee: Alaska Food Group, Juneau, AK
Grant No.: NA76FD0041 *NMFS Contact:* F/AKR
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

Assessment: Alaskan resources vary from low-value species that have little to no market acceptance to very high-priced wanted species where marketability is limited only by supply. This study concentrated on the marketability of dried underutilized salmon and bycatch species to the Asian market. How to transform a low-value raw material into a valuable consumer product that can be sold at a price that covers all processing and transportation costs and that yields a profit is a common issue being addressed around the world. Until now, Alaskan and other Pacific Coast-based processors have been able to fish top-end valuable fisheries resources and either throw overboard or avoid unwanted species. However, this study found that drying lower-valued species is a viable solution to bycatch problems. This study included the following recommendations: (1) identify established dried seafood products in a targeted country and then use a backwards-planning technique that starts with the consumer and the market price sold at retail and then works backwards to the catching of the resource; (2) select a target market or segment of a market and concentrate on penetrating that market; (3) support, promote, and encourage tariff reductions in countries that consume dried and value-enhance seafoods; (4) invite dried seafood technicians to assist in the development of American-made seafood products to better accommodate the tastes of a targeted foreign consumer population; and (5) develop partnerships with foreign dried seafood producers and marketing companies to help create markets for Alaskan-produced dried seafood products.

Grantee: Oregon State University, Corvallis, OR
Grant No.: NA90AAHSK138 *NMFS Contact:* F/NWR
Project Title: Role of Pacific Groundfish in International Groundfish Trade—Year 2
Funding: *Federal:* \$74,744 *Recipient:* \$25,296

Assessment: The objective of the project was 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 Pacific groundfish may play in the international trade arena. The report is a series of country chapters that describe various trends (up to the early 1990s) in groundfish production, demand, trade, distribution, and consumption for the following countries: United States, China, Japan, Norway, Russia and the Baltic states, Mexico, and Korea.

Grantee: Oregon State University, Astoria, OR
Grant No.: NA76FD0212 *NMFS Contact:* F/NWR
Project Title: Production of Anserine and Carnosine Containing Antioxidant from Surimi Wash Water
Funding: *Federal:* \$71,070 *Recipient:* \$11,081

Assessment: The objective of this research was to determine the concentration of anserine and carnosine in surimi wash water at all stages of processing, to test methods to remove and concentrate the dipeptides, and to study the effect of dipeptides on color of seafood products. Anserine and carnosine are water-soluble dipeptides (found in the skeletal muscle of fish) that have antioxidant properties. These dipeptides were removed through the washing process in surimi production using heat treatments and ultrafiltration. The content of anserine and carnosine in surimi wash water was highest in the first two stages of surimi processing using both heat treatment and ultrafiltration. Iron concentration in surimi wash water was negligible and did not affect antioxidant activity. Surimi wash water extract at a lower concentration combined with other food antioxidants was effective in maintaining color in salmon patties. Surimi wash water extract potentially can be used as an economical food antioxidant that can extend shelf life. However, more research is needed to remove compounds that contribute to undesirable flavors and odors.

MARINE RECREATIONAL FISHERIES

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA
Grant No.: NA77FD0073 *NMFS Contact:* F/SER
Project Title: Analysis of the Genetic Stock Structure of Atlantic Sailfish using Restriction Fragment Length Polymorphism Analysis of Both Mitochondrial DNA and PCR-Amplified DNA
Funding: *Federal:* \$62,713 *Recipient:* \$12,859

Assessment: The goal of this study was to evaluate the east-west stock hypothesis currently used by the International Committee for the Conservation of Atlantic Tunas for the management of sailfish. Both mitochondrial and nuclear DNA was analyzed using samples taken from sailfish in the eastern and western Atlantic. Overall genetic diversity was very high, and no consistent differences were found between fish from the two regions. The results of the study are consistent with a small amount of east-west gene flow and substantially larger amounts of north-south gene flow. Because statistical values obtained from east-west comparisons were on the edge of significance, it appears the most conservative management decision would be to continue with current management models.

Grantee: Florida Atlantic University, Boca Raton, FL
Grant No.: NA77FD0075 *NMFS Contact:* F/SER
Project Title: Production and Testing of Immunoassay Kits for the Identification of Billfish Species
Funding: *Federal:* \$18,000 *Recipient:* \$1,530

Assessment: The goal of the project was to modify and improve a previously developed billfish identification kit. The modified kit employs a monoclonal antibody that binds to a site on sailfish albumin

found in the blood and tissues of sailfish. The kit consists of a white polystyrene paddle that is dipped into a macerated sample of sailfish tissue. After addition of three reagents, a blue color develops on the surface of the paddle in the presence of sailfish tissue.

Grantee: Boone Bait Company, Winter Park, FL
Grant No.: NA27FD0095 *NMFS Contact:* F/NWR
Project Title: Analyze the Impact of EC92 on the U.S. Fishing Tackle Industry
Funding: *Federal:* \$ 79,000 *Recipient:* \$45,000

Assessment: The objective of this study was to describe and analyze the emerging European rules and regulations concerning imports of fishing tackle that were being established as the result of the formation of the European Union. These rules and regulations govern tariffs, standards, labeling requirements, and other non-tariff barriers. Eastern Bloc tariff and non-tariff barriers also were described. The report was based on interviews with government and key industry representatives during 1992 and 1993. Distributors, wholesalers, and retailers were interviewed about the following markets: Belgium, France, Germany, Spain, Portugal, Holland, Scotland, Ireland, England, Norway Sweden, Czech Republic, Hungary, and Poland. The study concluded that Europe will represent the largest and easiest opportunity for marketing outside the continental United States. Results were formally presented to the American Fishing Tackle Manufacturers Association in November 1993.

Grantee: MBC Applied Environmental Sciences, Costa Mesa, CA
Grant No.: NA76FD0050 *NMFS Contact:* F/SWR
Project Title: Southern California Commercial Sportfish Catch Database
Funding: *Federal:* \$93,755 *Recipient:* \$88,383

Assessment: Microfiche copies of the *Los Angeles Times* (which reports the daily catch of commercial sportfishing boats along the southern California coast) from 1959 to 1997 were searched, and more than 14,000 daily reports were assembled and photocopied. These data, representing almost 400,000 catch reports for some 25 sportfishing landings, were compiled into a CD-ROM database that allows rapid retrieval of historical catch and angler effort data and the analysis of spatial and temporal trends.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

Grantee: University of New Hampshire, Durham, NH
Grant No.: NA76FD0103 *NMFS Contact:* F/NER
Project Title: Collaborative Decision-Making Workshops
Funding: *Federal:* \$ 25,800 *Recipient:* \$ 0

Assessment: The goal of this project was to have a minimum of 200 fisheries management stakeholders from New England receive instruction in collaborative decision making. Seven workshops were held: two in Massachusetts and Maine and one each in New Hampshire, Rhode Island, and Connecticut. The

curriculum was appropriate and met the goal of introducing the concept of collaborative decision making. The evaluations were very good with a couple of exceptions. The investigators did use the evaluation to make changes as the process went along. The two concerns that surfaced were: (1) Why should stakeholders attempt to solve problems when the government always has the last say. Specifically, many fishermen had trouble understanding the value of bringing a proposal or solution with multi-stakeholder support to a government agency. They felt that past experiences demonstrated that the government did not listen. It was felt that going to all the trouble of bringing people together could be a waste of time. (2) When participants began to "see the light" and started to think seriously about addressing an issue, the following question always came up: Who is going to pay for the facilitator? Most people recognized the value of having a neutral facilitator but could not imagine fishermen coming up with the money to pay for one. There are many opportunities to use collaborative problem solving in fisheries and marine issues, and these opportunities can improve the quality of the decisions and our marine environment.

Grantee: Marine Biological Laboratory, Woods Hole, MA
Grant No.: NA76FD0111 *NMFS Contact:* F/NER
Project Title: Determination of Spawning Success and Female Fecundity to Assess the New England Squid Fishery
Funding: Federal: \$89,021 *Recipient:* \$47,049

Assessment: The recipient examined actual and potential reproductive output of loligo squid with particular attention to the females' abilities to lay multiple clutches of eggs. Combining the results of two summer spawning seasons, 28 of 47 females that laid eggs in captivity produced substantial clutches (i.e., 5 or more egg capsules per clutch) at least twice. Multiply ovipositing females exhibited a variety of patterns of oviposition, ranging from relatively small clutches at short intervals to large clutches several weeks apart. Actual reproductive output varied greatly between females. In both years, the number of egg capsules and ova laid showed a negative relationship with the combined mass of the ovary and oviduct at the time of death. Separate correlations between the number of ova laid and the combined number of oocytes and ova remaining in the reproductive tract at death revealed a similarly negative, although statistically weaker, relationship in both years. Most important, the number of ova laid in captivity (mean = 11,800 in 1997 and mean = 15,293 in 1998) exceeded the combined number of ova and oocytes remaining at death (mean ca. 4,500 in both years) by roughly three times, providing an indication of the extent to which only counting remaining oocytes and ova can underestimate fecundity. The ages of ovipositing females spanned four to six months. Interestingly, neither age nor mantle length consistently affected reproductive output, i.e., short young females could be just as fecund as longer older females. A supplementary feeding experiment failed to demonstrate an effect of feeding regime on captive life span or reproductive output. The females in one year (1998) were maintained in isolation without access to males; these females laid fertilized eggs, some over periods of 15 or more days, demonstrating the use of stored sperm. For females that had oviposited in both years, the oocytes remaining in the ovary always ranged greatly in size and structure. Thus, the "spawning strategy" of *Loligo pealeii* appears to involve multiple ovipositions over weeks or months, with oocytes possibly being developed continually. Placing the results of this study in a larger context, reproduction by females in this and other loliginids most likely entails copulation with multiple males and laying of multiple clutches of eggs, possibly in different locations.

Grantee: Gloucester Fishermen's Wives Development Programs, Inc.
Grant No.: NA76FD0112 **NMFS Contact:** F/NER
Project Title: Oral History Project to Collect Traditional Ecological Knowledge (Including Spawning Area Data) and Develop an Historical Record of Fisherman/Scientist Interactions
Funding: *Federal:* \$54,203 *Recipient:* \$4,750

Assessment: This project conducted interviews with fishermen with the intention 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. Twenty-eight interviews were conducted, 21 of which were with individuals, and 7 others that were with two or more interviewees. Full transcription of 17 of the interviews has yielded about 650 pages of oral history. Fishermen were the respondents in 22 interviews. National Marine Fisheries Service scientists (social and biological) were the respondents in six interviews. Given the allocated funds and time, not all the tapes have been transcribed and analyzed. The GIS component of this project was an essential part of the critical documentation process and should continue to be supported. The recipient's findings indicate that both the environmental knowledge and the fishing practices of fishermen are inherently spatial. If fisheries science is to consider input from fishermen at the level of resource assessment, then it is vital that their spatial/environmental knowledge be documented and corroborated via mapping and GIS techniques. Although fishermen cannot often provide quantitative information for numerical assessment, they harbor a wealth of information on where fish migrate, aggregate, and spawn. In addition, fishermen can provide accurate records of their own spatial fishing practices, also useful to fisheries assessment. The recipient concludes that with additional support, the recipient could develop and maintain a GIS database of fishermen's local environmental knowledge.

Grantee: New York University Medical Center, Tuxedo, NY
Grant No.: NA76FD0144 **NMFS Contact:** F/NER
Project Title: Mixed Stock Analysis of Wintertime Aggregations of Striped Bass along the Mid-Atlantic Coast
Funding: *Federal:* \$80,016 *Recipient:* \$35,901

Assessment: Almost all striped bass (*Morone saxatilis*) along the mid-Atlantic coast originate from two estuaries: the Hudson River and the Chesapeake Bay. Both stocks winter in coastal waters, where they may be subject to bycatch fisheries (e.g., the Cape Hatteras, North Carolina, dogfish fishery). Virtually nothing is known regarding the stock composition of wintertime aggregations of striped bass. During the mid-1970s, it was estimated that about 90% of the striped bass found along the northeast U.S. coast were from the Chesapeake Bay. By the late 1980s, the Hudson River was contributing more than half of the striped bass found along the coast. In 1993, the historical high for the Maryland juvenile striped bass survey was recorded; thus, relative contributions of the two stocks may have shifted back toward domination by the Chesapeake Bay stock. The grant recipient analyzed genotypic frequency data derived from composite information on single-copy nuclear DNA and mitochondrial DNA major length variation of striped bass collected from three latitudinally widespread locations: during winter 1995--1996 off the New Jersey coast, and during winter 1997--1998 at the mouth of Delaware Bay and off Cape Hatteras, North Carolina. The recipient also determined genotypic frequencies for striped bass from three reference spawning tributaries of the Chesapeake Bay not previously characterized: the Nanticoke, Patuxent, and Pocomoke Rivers. Contingency analysis indicated an absence of statistical heterogeneity among the three wintertime coastal collections. Stock composition analysis of the aggregate wintertime collections ($N =$

356) showed a strong Chesapeake Bay contribution (80%) and a lower Hudson River contribution (20%). Stock composition analysis of the contemporaneous Delaware Bay and North Carolina collections in aggregate showed contributions of about 16% for the Hudson River stock and 84% for the Chesapeake Bay stock. Discrete stock composition analyses on the three collections suggested a significantly higher Hudson River contribution for the New Jersey collection, but asynchronicity and statistical questions made the validity of such analyses uncertain. The recipient also examined the utility of additional mitochondrial DNA and nuclear DNA markers for stock composition analysis of coastal migratory striped bass.

Grantee: Skidaway Institute of Oceanography, Savannah, GA
Grant No.: NA77FD0066 **NMFS Contact:** F/SER
Project Title: Use of Probes and Artificial Recruit Collectors to Monitor and Enhance the Success of Bay Scallop Reseeding Programs
Funding: **Federal:** \$60,393 **Recipient:** \$27,191

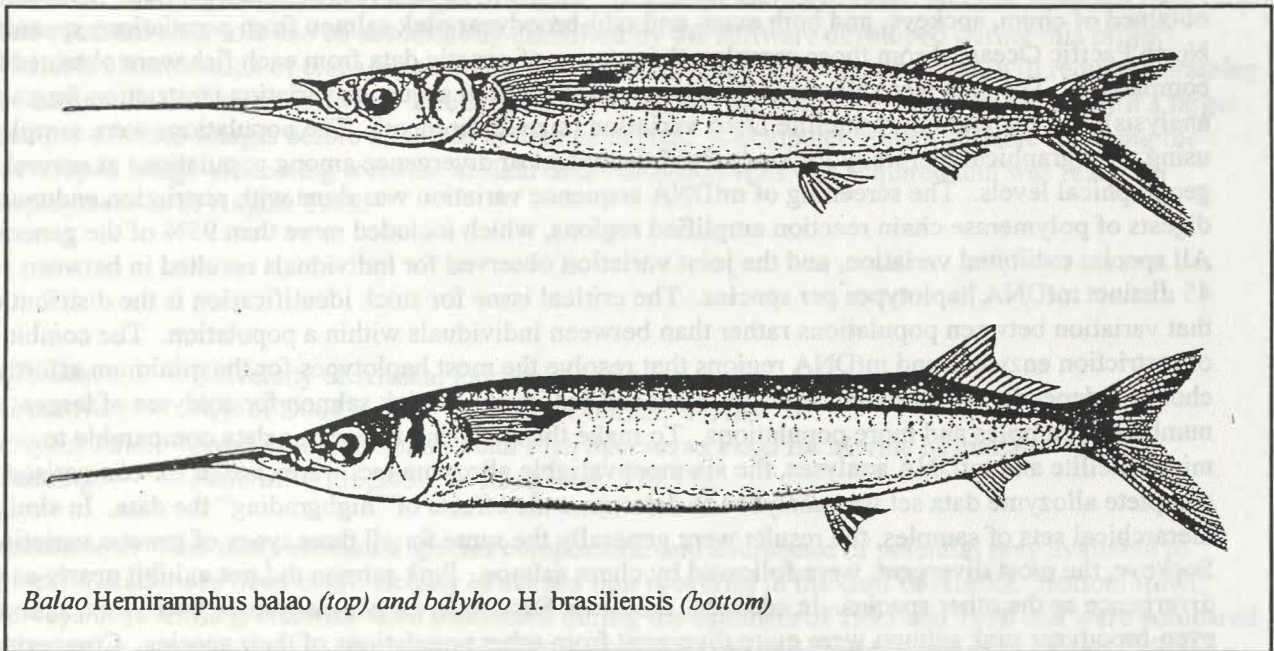
Assessment: This project's first objective was to develop a bay scallop-specific genetic probe that could be used to quantitatively detect bay scallop larvae in plankton samples. The second objective was to determine whether reintroduction of bay scallops into Tampa Bay, Florida, produced larvae and whether larval production could be correlated to recruitment success. These goals were fully achieved. A genus-specific *Argopecten* probe was designed, and this probe was used in field studies to demonstrate that scallops transplanted into Tampa Bay did produce larvae. Enhanced recruitment relative to previous years was observed, but it was unclear whether this was due to reintroduced bay scallops.

Grantee: Gulf & South Atlantic Fisheries Development Foundation, Tampa, FL
Grant No.: NA77FD0068 **NMFS Contact:** F/SER
Project Title: Continuation of an Observer Program to Characterize and Compare Regional Efforts in the Directed Shark Fishery in the Eastern Gulf of Mexico and South Atlantic
Funding: **Federal:** \$180,238 **Recipient:** \$0

Assessment: This award supported on-board fishery observers in the commercial shark longline fishery. Three observers monitored 45 fishing trips that fished 94 longline sets. The catch was dominated by sandbar, tiger, and Atlantic sharpnose sharks. Based on the NMFS stock assessment, the two species that appear to be most affected by this fishery are sandbar and dusky sharks. Size limits appear appropriate for this fishery because (1) a substantial number of immature individuals of both species are caught and landed and (2) several stock evaluations have indicated that reducing mortality on these younger size groups will make the greatest contribution to stock recovery.

Grantee: Florida Fish and Wildlife Conservation Commission
Grant No.: NA77FD0069 **NMFS Contact:** F/SER
Project Title: Assessing Status and Trends of Florida's Halfbeak Fishery
Funding: *Federal:* \$64,899 *Recipient:* \$51,068

Assessment: The goal of this research was to determine whether changes in landings and effort in the halfbeak fishery during the early 1990s indicated a need for further management options. The two species in this fishery are the ballyhoo and balao (see below). The research showed that there was a gradual increase in harvest rates over time and that fishing effort had shifted southward. A sharp rise in landings in the early 1990s was caused by a geographic shift in the fishery due to the implementation of the Florida net ban and is believed to be temporary. Overall, the halfbeak fishery and its resource population were found to be healthy, and the investigators determined that further fishing regulations were unnecessary.



Grantee: Louisiana State University, Baton Rouge, LA
Grant No.: NA57FD0070 **NMFS Contact:** F/SER
Project Title: Economic Analysis of the U.S. Shrimp Market and Impacts of Management Measures
Funding: *Federal:* \$96,776 *Recipient:* \$32,378

Assessment: The primary purpose of the study was to analyze world trade in warm-water shrimp, with emphasis given to the United States and Japan. A 10-equation system of import demand and export supply functions was developed and estimated using quarterly time-series data covering the 1985–1995 period. An equation depicting the Gulf of Mexico dockside price was developed and estimated using quarterly time-series data for the 1980–1995 period. Results of these exercises were then used to forecast changes in relevant endogenous variables, particularly the Gulf of Mexico dockside price, that would likely occur as the result of specific changes in key exogenous variables such as regional aquaculture

production. The simulation analysis suggests that even relatively large changes in certain exogenous factors, such as Asian cultured shrimp production, will have only moderate impacts on the Gulf of Mexico dockside price structure.

Grantee: University of Alaska Fairbanks, Fairbanks, AK
Grant No.: NA76FD0032 *NMFS Contact:* F/AKR
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

Assessment: This project was designed to provide a comparison of three sources of genetic variability for use in stock identification of Pacific salmon, specifically chum, sockeye, and pink salmon. Samples were obtained of chum, sockeye, and both even- and odd-broodyear pink salmon from populations spanning the North Pacific Ocean. From those samples, three types of genetic data from each fish were obtained for comparison. The data were allozyme variation, mitochondrial sequence variation (restriction fragment analysis), and nuclear microsatellite DNA variation (size differences). The populations were sampled using a geographical hierarchy for analysis of the extent of divergence among populations at several of the geographical levels. The screening of mtDNA sequence variation was done with restriction endonuclease digests of polymerase chain reaction amplified regions, which included more than 95% of the genome. All species exhibited variation, and the joint variation observed for individuals resulted in between 17 and 45 distinct mtDNA haplotypes per species. The critical issue for stock identification is the distribution of that variation between populations rather than between individuals within a population. The combination of restriction enzymes and mtDNA regions that resolve the most haplotypes for the minimum effort were chosen independently for chum, sockeye, and each broodyear of pink salmon for analyses of larger numbers of samples and more populations. To make the analysis of allozyme data comparable to microsatellite and mtDNA analyses, the six most variable allozyme loci were chosen for comparison. The complete allozyme data set was analyzed to determine the effects of "highgrading" the data. In similar hierarchical sets of samples, the results were generally the same for all three types of genetic variation. Sockeye, the most divergent, were followed by chum salmon. Pink salmon did not exhibit nearly as much divergence as the other species. In addition, the Little Susitna River populations of both chum salmon and even-broodyear pink salmon were quite divergent from other populations of their species. Comparisons indicate that no one type of genetic variation is uniformly better. From rank order of their performance in different species and at different levels of hierarchy, they average nearly the same in their utility. However, it is clear that microsatellites and mtDNA often have an advantage at lower levels of hierarchy, whereas allozymes appear to have an advantage at higher levels. The assessment at this point is that there is no single answer for which type of genetic variation is best for stock identification. In each application, a decision must be made as to which type of variation, or combination of types, is appropriate. It does appear that the DNA-based methods may have advantages over allozymes for resolutions of salmon stocks originating within smaller geographic regions. However, allozyme variation will suffice and may be preferable for analyses covering broader areas.

Grantee: Alaska Department of Fish & Game, Kodiak, AK
Grant No.: NA76FD0039 **NMFS Contact:** F/AKR
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

Assessment: Tanner crab (*Chionoecetes bairdi*), snow crab (*C. opilio*), northern rock sole (*Lepidopsetta polyxystra*), and southern rock sole (*L. Bilineata*) support import commercial fisheries in Alaska. Problems in distinguishing Tanner crabs from snow crabs and northern rock sole from southern rock sole pose problems to fisheries management and research. This project worked toward developing computer image-processing algorithms capable of distinguishing video images of Tanner crabs from snow crabs and northern rock soles from southern rock soles, as well as toward developing a field version of a prototype image-processing system. Results of this project showed that carapace outlines can be successfully extracted from high-noise video images of whole live Tanner and snow crabs and that northern rock sole and southern rock sole can be successfully classified by the software developed during this project. Reliable classification of crabs based on the extracted carapace contours, however, will require retraining of current classification software. The algorithm for classifying rock sole should be tested with a larger sample of video images before it is used in data gathering. A computer system suitable for using the developed image-processing software at field data-collection sites was acquired and was ready for deployment as of August 1999.

Grantee: University of Alaska, Fairbanks, AK
Grant No.: NA66FD0043 **NMFS Contact:** F/AKR
Project Title: Availability of Commercial Fish Species as Food for Marine Mammals—Year 2
Funding: *Federal:* \$135,545 *Recipient:* \$23,172

Assessment: This study estimated species composition and abundance of potential prey available to juvenile Steller sea lions in the vicinity of six sea lion rookeries in the Gulf of Alaska. Bottom trawl surveys of juvenile groundfish were conducted during the summers of 1995 and 1996 and were compared to a similar survey conducted in 1994. In 1996 a predator sampling program was added to analyze the prey composition of large predatory fishes caught by longline at four sea lion rookeries. Abundance of juvenile flatfishes and gadids in trawl samples differed significantly among rookeries but not among years. Higher abundances of both groups were found in the western part of the study area along the Alaska Peninsula. Lowest abundances of flatfishes and gadids were found in the vicinity of the sea lion rookeries on Sugarloaf and Marmot Island. Fishes were a minor component of Pacific halibut diets near Sugarloaf and Marmot Island, while a large proportion of fishes, particularly gadids and osmerids, were consumed by halibut at Atkins and Ugamak Islands. Low abundances of potential sea lion prey in both trawl samples and fish diets in the eastern part of the study area coincided with the highest observed declines in sea lion populations.

Grantee: University of Washington, Seattle, WA
Grant No.: NA76FD0299 *NMFS Contact:* F/NWR
Project Title: Development of a Semi-Automated Microsatellite Based Genotyping System for Kinship Analysis of Chinook Salmon
Funding: *Federal:* \$80,145 *Recipient:* \$11,089

Assessment: The objective of this project was to develop and test a sensitive genetic tool for accurate, large-scale kinship analyses of chinook salmon. A total of 64 microsatellite loci were screened and used to select a panel of 14 highly variable loci for kinship determination. The panel of loci was tested using real chinook salmon families as well as simulated populations and was found to be highly effective for determining relatedness. Tests of the panel of loci on six chinook populations confirmed that the loci are sufficiently variable in all populations to serve in kinship analysis.

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

Assessment: The objective of this project was to design and implement an educational program to initiate novice fishermen in subsistence fishing methods and values and to facilitate exchange of resource knowledge between subsistence fishers and scientifically trained fishery managers. The recipient implemented project objectives through presentations to elementary-, intermediate-, and high school-aged children. Presentations also were made at community events and conferences, and meetings were convened with local fishers and scientific experts. This grant helped support an annual program that trains intermediate- and high school-aged youths in subsistence fishing methods/values. With the help of outside scientific expertise, a resource monitoring program was established at the subsistence fishing area.

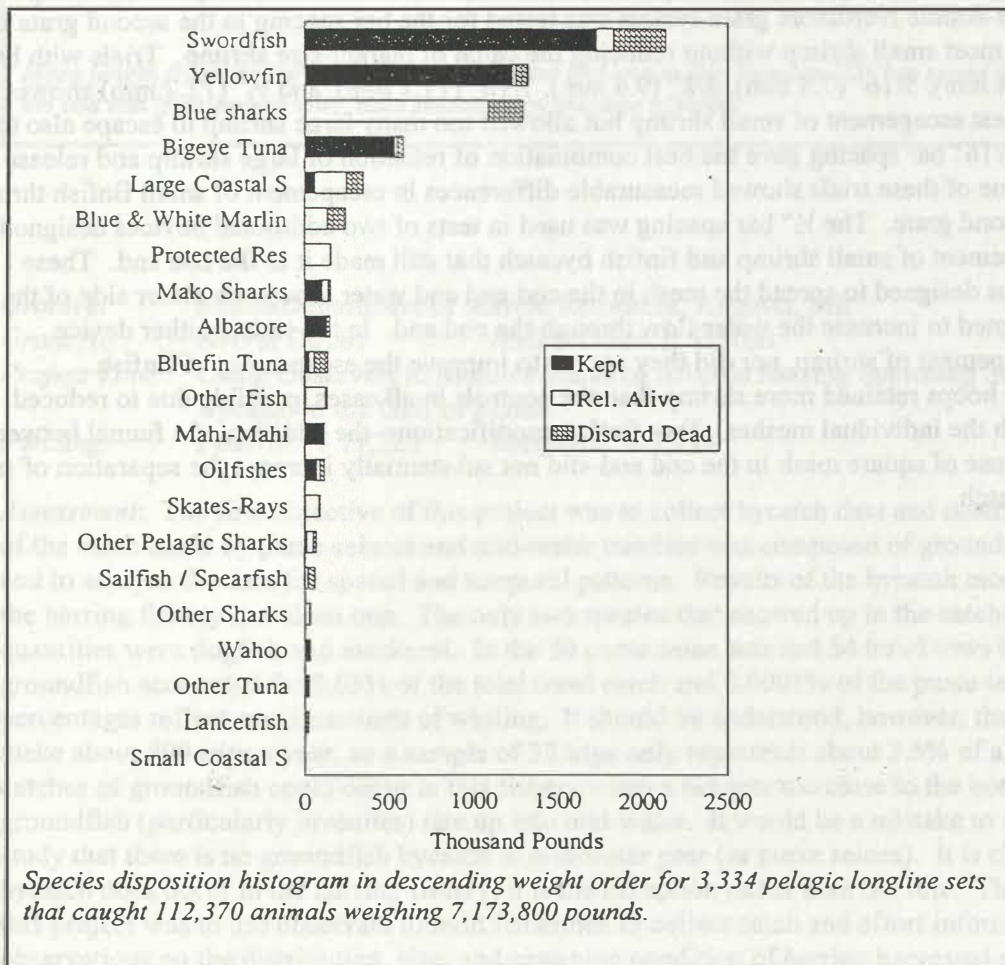
Grantee: The Regents of the University of California, Berkeley, CA
Grant No.: NA76FD0053 *NMFS Contact:* F/SWR
Project Title: Sportfish in California Waters: Seasonal and Interannual Distribution and Dependence on Oceanic Temperature
Funding: *Federal:* \$88,400 *Recipient:* \$0

Assessment: Fishery reports of California passenger fishing vessels covering California and Mexican coastal waters from 1936 to 1998 were recovered from deteriorating paper ledgers into a digital database. The electronic database was extensively verified and includes monthly summaries and annual totals of catch and effort on a fine spatial grid spanned by California Department of Fish and Game fish blocks. It contains a total of 338 million angler hours and catch of 266 marine fish and invertebrate species. The long time and detailed spatial coverage of effort and catch represent a unique resource for fisheries research and management. Monthly estimates of catch and catch per unit effort for migratory species in southern California waters show a rich spatial and temporal variability on seasonal, interannual, and decadal time scales. Of particular note is the unprecedented availability of highly desirable migratory sport fish species during the 1990s, which coincides with anomalously warm oceanic waters.

FISHERIES BYCATCH

Grantee: National Fisheries Institute, Inc., Arlington, VA
Grant No.: NA86FD0113 **NMFS Contact:** F/NER
Project Title: Bycatch in Pelagic Longline Fisheries: Temporal, Spatial, Gear, and Operational Characteristics for Longline Sets North of 35 Degrees North Latitude
Funding: Federal: \$35,173 **Recipient:** \$11,618

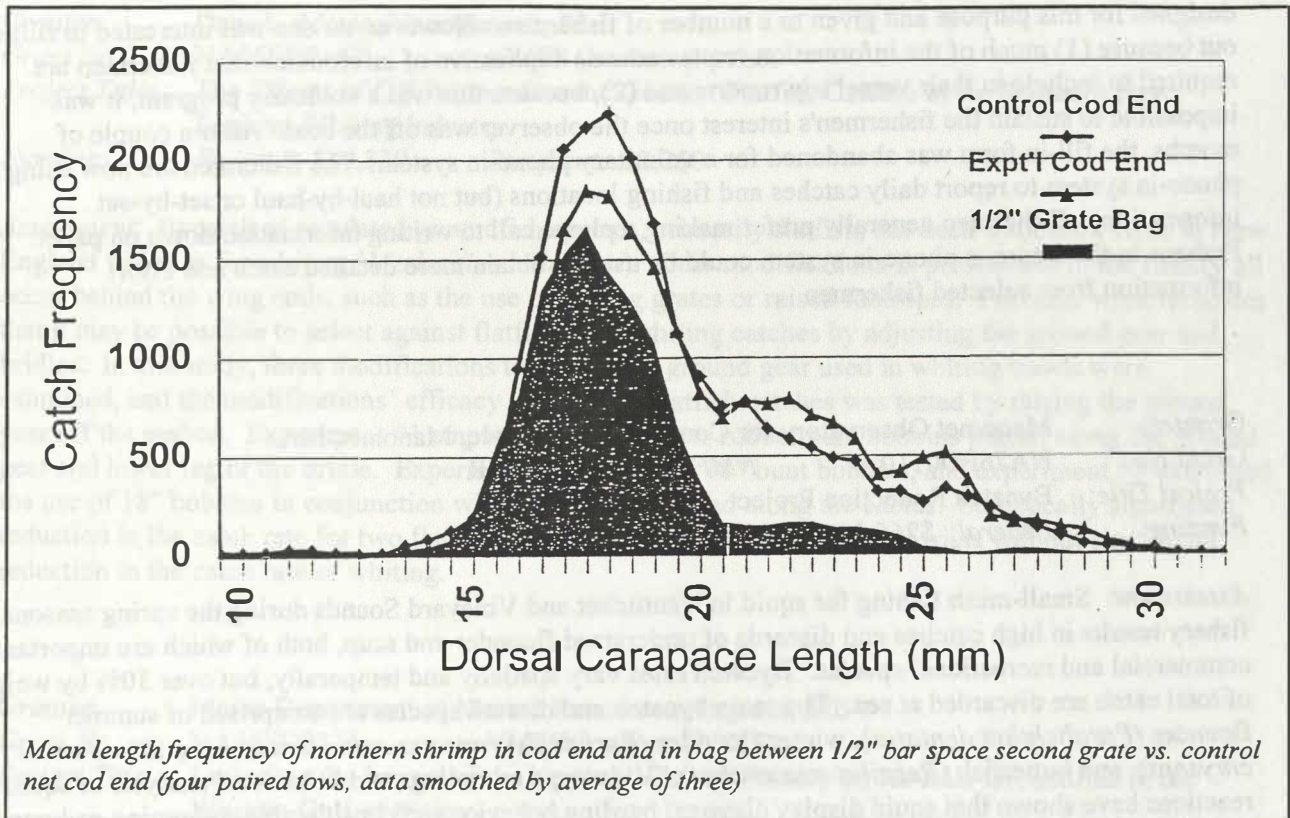
Assessment: This project supported the production and distribution of 600 copies of a 78-page "Captain's Report" on the Multi-Species Characteristics of the U.S. Atlantic Pelagic Longline Fishery. The report was based on data collected by on-board scientific observers deployed on U.S. pelagic longline vessels between 1990 and 1997, accounting for 3,397 sets with 2.2 million hooks and a total catch of slightly more than 115,000 individual animals. The primary emphasis was on analyzing the temporal, spatial, gear, and operational characteristics within distinct regions of the U.S. fishery and relating these characteristics to the resulting multi-species catch. The report updated and expanded previous summaries by providing additional details on operating practices, fishery performance, and gear characteristics. The report also provided catch and disposition characteristics in terms of both numbers and weight by species and/or species group that was kept, released alive, and/or discarded dead (see below).



The presentation and development of weight estimates by species and disposition based on a data set of set-specific animal records is a new treatment of the available data. Additionally, the report provided distribution maps based on the use of Geographic Information System software for 16 species and described several "species of management concern" in separate case study sections. The "Captain's Report" was produced on heavy coated paper in a spiral bound format that will stand up to use aboard boats. The report was sent to permit holders of swordfish and shark permits as well as to regional management councils and scientists in federal, state, and international organizations.

Grantee: Maine Department of Marine Resources, Augusta, ME
Grant No.: NA76FD0097 *NMFS Contact:* F/NER
Project Title: Reduction of Finfish and Juvenile Shrimp Bycatch in the Gulf of Maine Northern Shrimp Fishery through the Use of a Modified Double Nordmore Grate
Funding: *Federal:* \$131,402 *Recipient:* \$15,223

Assessment: Shrimp fishermen in the Gulf of Maine are required to use a finfish excluder called a Nordmore grate. This single grate is very effective at releasing large fish from nets, but it is not very good at releasing finfish similar in size to shrimp. Prior work showed some success in reducing the catch of submarket-size shrimp by the addition of a second Nordmore grate, with the second grate releasing the small shrimp. The double Nordmore grate system was tested for the bar spacing in the second grate that would release the most small shrimp without reducing the catch of market-size shrimp. Trials with bar spaces of 1/4" (6.4 mm), 5/16" (7.9 mm), 3/8" (9.6 mm), 7/16" (11.1 mm), and 1/2" (12.7 mm) showed that 1/2" provided the best escapement of small shrimp but allowed too many large shrimp to escape also (see next page). The 7/16" bar spacing gave the best combination of retention of large shrimp and release of small shrimp. None of these trials showed measurable differences in escapement of small finfish through the bars of the second grate. The 1/2" bar spacing was used in tests of two additional devices designed to improve the escapement of small shrimp and finfish bycatch that still made it to the cod end. These devices were hoops designed to spread the mesh in the cod end and water scoops on either side of the second grate designed to increase the water flow through the cod end. In the tests, neither device improved the escapement of shrimp, nor did they appear to improve the escapement of finfish. Unexpectedly, the hoops retained more shrimp than the controls in all cases, possibly due to reduced water flow through the individual meshes. Two further modifications—the addition of a funnel between the grates and the use of square mesh in the cod end—did not substantially increase the separation of small shrimp from the catch.



Grantee: Maine Department of Marine Resources, Augusta, ME
Grant No.: NA76FD0101 **NMFS Contact:** F/NER
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

Assessment: The first objective of this project was to collect bycatch data and determine what percentage of the catch made by purse seiners and mid-water trawlers was composed of groundfish and other species and to analyze the data for spatial and temporal patterns. Results of the bycatch monitoring indicate that the herring fishery is a clean one. The only two species that showed up in the catches in significant quantities were dogfish and mackerel. In the 50 purse seine sets and 54 trawl tows that were monitored, groundfish accounted for 0.05% of the total trawl catch and 0.0001% of the purse seine catch, and those percentages reflect small amounts of whiting. It should be understood, however, that mid-water trawlers make about 800 trips a year, so a sample of 27 trips only represents about 3.5% of all trips. Occasional catches of groundfish could occur in this fishery when a net gets too close to the bottom or when groundfish (particularly juveniles) rise up into mid-water. It would be a mistake to conclude from this study that there is no groundfish bycatch in mid-water gear (or purse seines). It is clear that whatever bycatch does occur in the herring fishery, it is the exception rather than the rule. The second objective of this project was to use observers to train fishermen to collect catch and effort information and record other observations on the distribution, size, and spawning condition of herring harvested at sea. A form was

designed for this purpose and given to a number of fishermen. However, no one was interested in filling it out because (1) much of the information requested was duplicative of information that fishermen are required to include in their vessel trip reports and (2), because this was a voluntary program, it was impossible to sustain the fishermen's interest once the observer was off the boat. After a couple of months, the fill-in form was abandoned for a voluntary phone-in system. The fishermen are now using the phone-in system to report daily catches and fishing locations (but not haul-by-haul or set-by-set information). Fishermen generally prefer making a phone call to writing information down on paper. Perhaps in the future, a phone-in system could be used to obtain more detailed catch and effort information from selected fishermen.

Grantee: Manomet Observatory for Conservation Science, Manomet, MA
Grant No.: NA76FD0110 *NMFS Contact:* F/NER
Project Title: Bycatch Reduction Project
Funding: *Federal:* \$266,139 *Recipient:* \$254,288

Assessment: Small-mesh fishing for squid in Nantucket and Vineyard Sounds during the spring seasonal fishery results in high catches and discards of undersized flounder and scup, both of which are important commercial and recreational species. Bycatch rates vary spatially and temporally, but over 30% by weight of total catch are discarded at sea. The main bycatch and discard species are comprised of summer flounder (*Paralichthys dentatus*), winter flounder (*Pseudopleuronectes americanus*), scup (*Stenotomus chrysops*), and butterfish (*Peprilus triacanthus*). Videotape recordings and behavioral analysis of squid reactions have shown that squid display classical herding behavior and considerable swimming endurance in the forward part of the net. *Loligo* are shown to rise when dropping back toward the codend and, in some cases, are shown to turn and rise on tiring. This behavior was used to separate squid from the main bycatch species. Separator trawl test trials demonstrated that clear separation between squid and bycatch species could be achieved by simple gear modifications. Almost all the bycatch was shown to occur in the bottom codend of the separator trawl, and subsequent trials with a raised foot rope trawl demonstrated that bycatch and discard rates could be reduced from greater than 30 percent to less than 3 percent by weight overall. This is a significant reduction in discards. Many other studies of bycatch and discard reduction claim success with much less dramatic effects, and in many cases the gear modifications required are expensive and difficult to rig correctly. In this case, the investigators not only have demonstrated substantial reductions in discards, but also have demonstrated that these reductions can be achieved by a simple and inexpensive gear modification. Further work is needed to determine the most effective means of incorporating these results into gear designs that effectively reduce discards in the squid fishery while maintaining all or a substantial portion of the marketable catch. Economic analysis of proposed gear changes should be conducted with input from industry members, and fishermen should be more widely informed regarding the observed natural behavior of squid. However, it is clear that bycatch and discards can be significantly reduced in this small-mesh fishery in a cost-effective manner. Further, the results illustrate the importance of direct observation and of the need to understand the natural behavior of each of the species of concern. Information of this nature is often difficult to gather, but it can help lead to innovative, simple, and cost-effective solutions to apparently complex bycatch and discard problems in fisheries.

Grantee: Dana L. Morse, Narragansett, RI
Grant No.: NA76FD0141 *NMFS Contact:* F/NER
Project Title: The Effects of Off-Bottom Ground Gear on Flatfish Catches in the Southern New England Whiting Industry
Funding: *Federal:* \$65,339 *Recipient:* \$2,250

Assessment: Bycatch of regulated groundfish species, primarily flatfish, has been a constant issue in New England fisheries for whiting (*Merluccius bilinearis*). Gear modifications in present use in the fishery all occur behind the wing ends, such as the use of sorting grates or raised footropes. Previous work indicates that it may be possible to select against flatfish from whiting catches by adjusting the ground gear and bridles. In this study, three modifications to traditional ground gear used in whiting trawls were examined, and the modifications' efficacy in reducing flatfish catches was tested by raising the ground gear off the seabed. Experiment #1 employed 12"-diameter rubber bunt bobbins placed along the ground gear and lower leg of the bridle. Experiment #2 employed 18" bunt bobbins, and experiment #3 examined the use of 18" bobbins in conjunction with trawl floats placed along the cables. Statistically significant reduction in the catch rate for two flatfish species occurred in the third set of trials without significant reduction in the catch rate of whiting.

Grantee: Maine Department of Marine Resources, Augusta, ME
Grant No.: NA46FD0324 *NMFS Contact:* F/NER
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

Assessment: Six configurations of the Nordmore grate and cod end mesh were tested for northern shrimp mesh selectivity. Of these configurations, the shrimp fishery standard 1-3/4" diamond mesh was considered the control mesh, and this mesh, as well as the Nordmore grate with 1-3/4" diamond mesh cod end and Nordmore grate with 1-1/4" square mesh, were tested at 12 inshore stations for finfish retention. The Nordmore grate with a 1-1/2" square mesh cod end provided the best selection curve for shrimp, but this configuration was added after testing the other nets and has not been tested for finfish retention. The Nordmore grate with 1-1/4" square mesh cod end showed improved release of silver hake and red hake over the Nordmore grate with 1-3/4" diamond mesh, but it showed no improvement for alewives and was less satisfactory for small plaice. Habitat, benthic community, and predator-prey data based on this study were added to the Maine Department of Marine Resources database for further characterization of inshore areas.

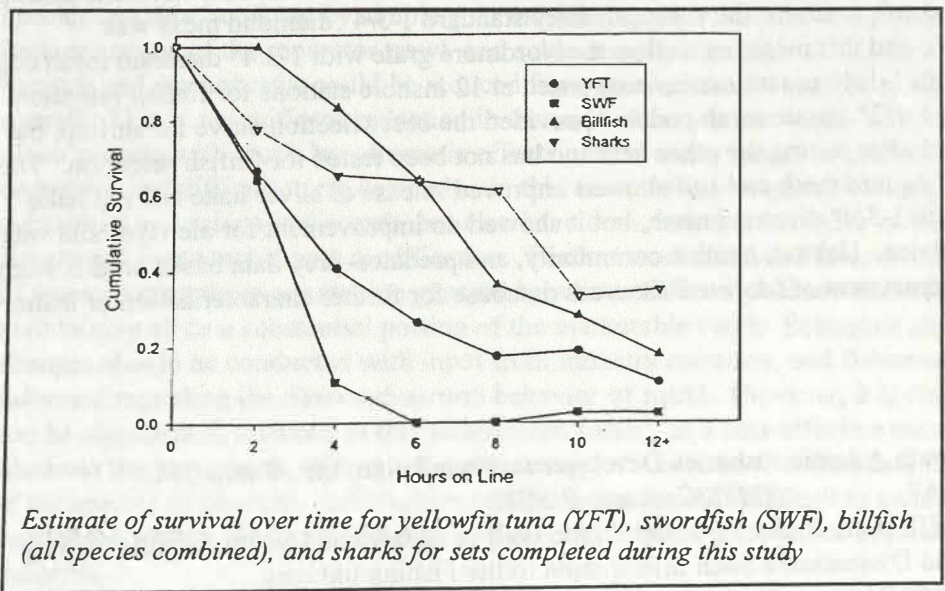
Grantee: Gulf and South Atlantic Fisheries Development Foundation, Inc., Tampa, FL
Grant No.: NA77FD0067 *NMFS Contact:* F/SER
Project Title: Continued Efforts to Reduce Bycatch in the Gulf of Mexico and South Atlantic Shrimp Fisheries and Disseminate Such Information to the Fishing Industry
Funding: *Federal:* \$560,740 *Recipient:* \$0

Assessment: The project continued research on bycatch reduction in the southeastern U.S. shrimp fishery. Activities included evaluating new bycatch reduction devices (BRDs) and disseminating information

concerning current BRDs to the shrimp industry. Observers made 14 trips aboard 11 different trawlers, logging 342 days monitoring 415 tows, to evaluate 9 different BRD configurations and 2 soft turtle-excluder device (TED) designs. The ET BRD (4.5" X 9" oval fisheye), EB BRD (a double fisheye), QA BRD (Jones BRD), RA BRD (Davis BRD #1), and EA BRD (Hickman BRD) all showed promise as bycatch reduction devices. To promote a better understanding of BRDs and the regulations associated with them, more than 80 industry-based workshops were conducted throughout the Gulf of Mexico. Foundation personnel worked cooperatively with Sea Grant and NMFS personnel to provide the most up-to-date information on the subject.

Grantee: Mote Marine Laboratory, Sarasota, FL
Grant No.: NA57FD0031 **NMFS Contact:** F/SER
Project Title: Reduction of Bluefin Tuna and Undersize Swordfish Bycatch in Atlantic Longline Fisheries
Funding: *Federal:* \$128,438 *Recipient:* \$13,804

Assessment: The purpose of the award was to determine times, depths, areas, temperatures, and water temperature profiles of the water mass associated with longline catches of yellowfin tuna with a goal of reducing bycatch. Yellowfin were caught between 18 and 24 degrees C and between 25 and 80 meters depth. Swordfish were primarily caught between 30 and 40 meters depth. Survival of fish caught on longline varied. Billfish survival remained high for the first two hours on the line, but yellowfin tuna, sharks, and swordfish all had rapid declines in survival after just the first hour (see below). Controlling the depth of the longline to the depth and temperature appropriate for the species targeted should reduce bycatch. Also it appears that using circle hooks could reduce some of the relatively high mortality rates seen in the first few hours after hooking.



Grantee: Alaska Fisheries Development Foundation, Inc., Anchorage, AK
Grant No.: NA36FD0149 *NMFS Contact:* F/AKR
Project Title: Trawl Codend Mesh Size and Shape Investigations to Reduce Catch and Discard of Undersized Pollock
Funding: *Federal:* \$675,000 *Recipient:* \$0

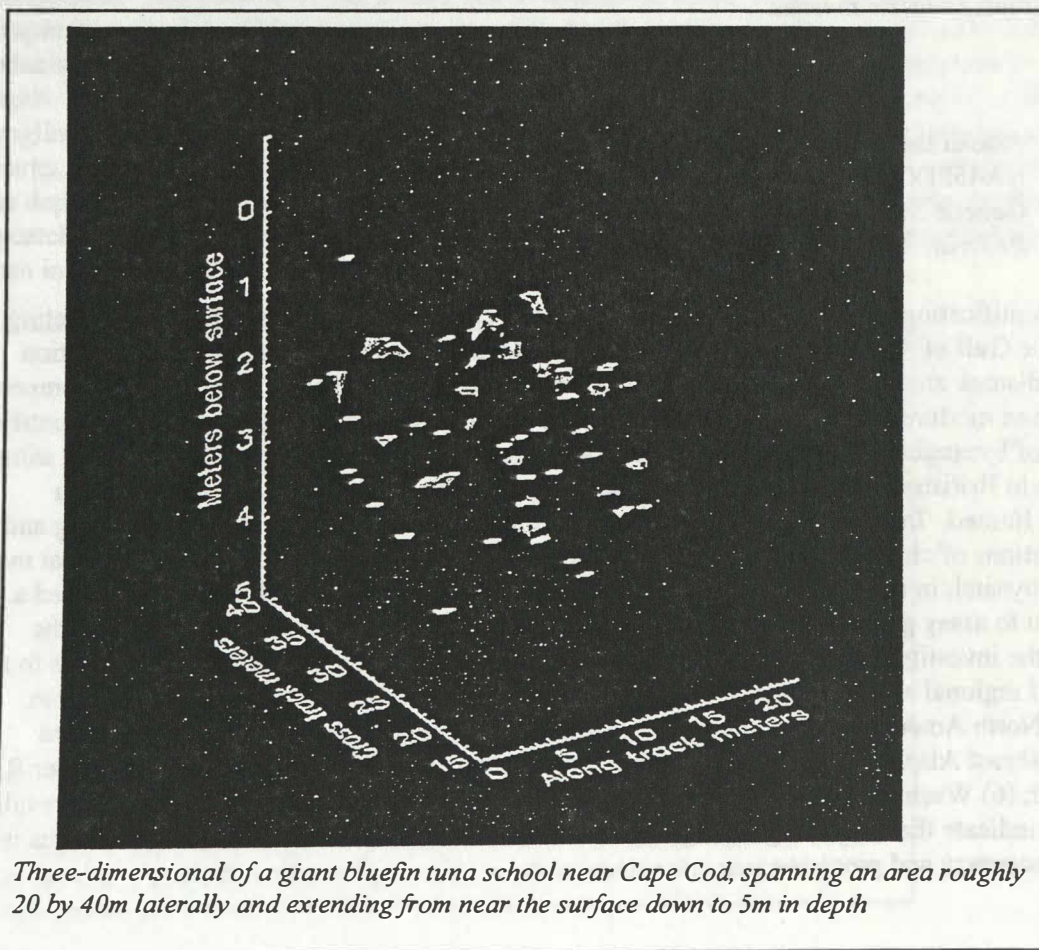
Assessment: The objective of this project was to test the survival of small pollock that escape through codend and intermediate trawl meshes. At-sea experiments were conducted in the Gulf of Alaska by replacing top panels of the trawl codend and extensions with escape panels for selectivity and escape-mortality trials. Escapees from the meshes were herded via a specially designed top panel cover into a specially designed caging system and recaptured. Collection units were towed to a cage-staging site and secured to the bottom. Captured pollock were monitored daily by divers over 14 days to determine mortality. Results indicated that most of the mortality took place during the first four post-escape days. Thereafter, mortality was low but continued until the experiment was terminated. Mortality was clearly related to fish size, with large fish more likely to survive the trawling and escape process. Results suggested lower mortalities for fish escaping meshes in the extension than fish escaping through the codend. Fourteen-day mortality caused by escapement and the caging/holding processes ranged from 46–84% for pollock that escaped through the codend meshes and ranged from 47–63% for fish that escaped through intermediate meshes.

Grantee: Alaska Department of Fish and Game, Anchorage, AK
Grant No.: NA46FD0356 *NMFS Contact:* F/AKR
Project Title: Genetic Stock Identification of Alaska Chinook Salmon
Funding: *Federal:* \$144,951 *Recipient:* \$31,235

Assessment: Identification of the origins of chinook salmon captured as bycatch in fisheries targeting groundfish in the Gulf of Alaska and Bering Sea/Aleutian Islands is a management and conservation concern. Mixed-stock analysis using genetic data has been successfully used to identify stock components of chinook salmon mixtures in Washington and British Columbia and may be an ideal tool for identifying stock of origin of bycaught chinook salmon in Alaskan waters. Although populations of chinook salmon from California to British Columbia have been genetically characterized, data describing Alaskan populations are limited. In this study the investigators collected genetic data from wild-spawning and hatchery populations of chinook salmon from throughout Alaska to better identify populations that may be contributing to bycatch in the Gulf of Alaska and the Bering Sea. The investigators also developed a multiplex screen to assay genetic variation at microsatellite loci, a class of DNA markers. With the allozyme data, the investigators performed simulation studies using maximum likelihood methods to test identifiability of regional stock groupings of chinook salmon in mixtures. Data were included from throughout the North American range of chinook salmon. Eight regions were studied: (1) Western Alaska; (2) Southeast Alaska; (3) British Columbia, non-Fraser River; (4) British Columbia, Fraser River; (5) Puget Sound; (6) Washington Coastal; (7) Columbia River; and (8) California–Oregon. The results of the simulations indicate that major regional groups of chinook salmon can be identified in mixtures with a high degree of accuracy and precision.

Grantee: Arete Associates, Inc., Tucson, AZ
Grant No.: NA77FD0045 NMFS Contact: F/SWR
Project Title: Demonstration and Evaluation of the Streak Tube Imaging LIDAR for Use in Bycatch Reduction
Funding: Federal: \$139,131 Recipient: \$42,399

Assessment: The Airborne Streak Tube Imaging LIDAR (ASTIL) was evaluated for use in detecting schools of tuna in Eastern Tropical Pacific (ETP) waters in order to aid in reducing bycatch of dolphin associated with yellowfin tuna. Three airborne experiments were conducted, and data were collected for southern bluefin tuna, yellowfin tuna, akule (*trachiurops crumenophthalmus*), giant bluefin tuna (GBFT) (see below), and dolphin. (Two of the airborne experiments were funded directly by this research. One southern bluefin tuna experiment was only provided with data analysis supported by this research.) The LIDAR signature of tuna was studied and extended to an evaluation of fish and fish school detection of GBFT using STIL experimental data. The utility of fish school detection was confirmed for GBFT in terms of detection statistics for binary hypothesis testing and also by direct implementation of a three-dimensional matched-filter algorithm. Based on the GBFT observations, modeled performance estimates were made for yellowfin in the ETP for an upgraded ASTIL system.



PRODUCT QUALITY AND SAFETY

Grantee: University of Rhode Island, Kingston, RI
Grant No.: NA76FD0140 **NMFS Contact:** F/NER
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

Assessment: The goal of this project was to validate the ammonia ion-selective electrode for determination of seafood quality by correlation to expert sensory assessment. Ammonia ion-selective electrode (ISE) measurements, reported as apparent ammonia, were successfully correlated to expert sensory assessment on six different fish species stored on ice and held at room temperature. At both storage temperatures, TVB-N, TMA-N, and apparent ammonia clearly showed the same development trend over the storage periods. ISE measurements mirrored TVB concentrations with a correlation of TVB with ISE at $r^2=0.92$. The pattern of change of the sensory scores also followed the same general trend as the chemical tests. Initial statistical analysis on the samples showed a correlation of r and r^2 of 0.74 and 0.54, respectively, with an ISE value of over 22 corresponding to sensory failure. However, with advanced fish spoilage, the ISE measurements became more erratic. Therefore, to eliminate the impact of badly spoiled fish, final regression was conducted on samples containing <30 mg/100g apparent ammonia with sensory values ranging from 11 to 88. This resulted in an r and r^2 between sensory scores and ISE measurements of 0.88 and 0.77, respectively. Regression analysis predicted a value of 19.6 mg/100g of apparent ammonia in fish tissue at the sensory limit of 50, regardless of storage conditions. All of the samples tested showed that the measurement of apparent ammonia with the ISE procedure could be used as a predictor of borderline quality and decomposition based on expert sensory determinations.

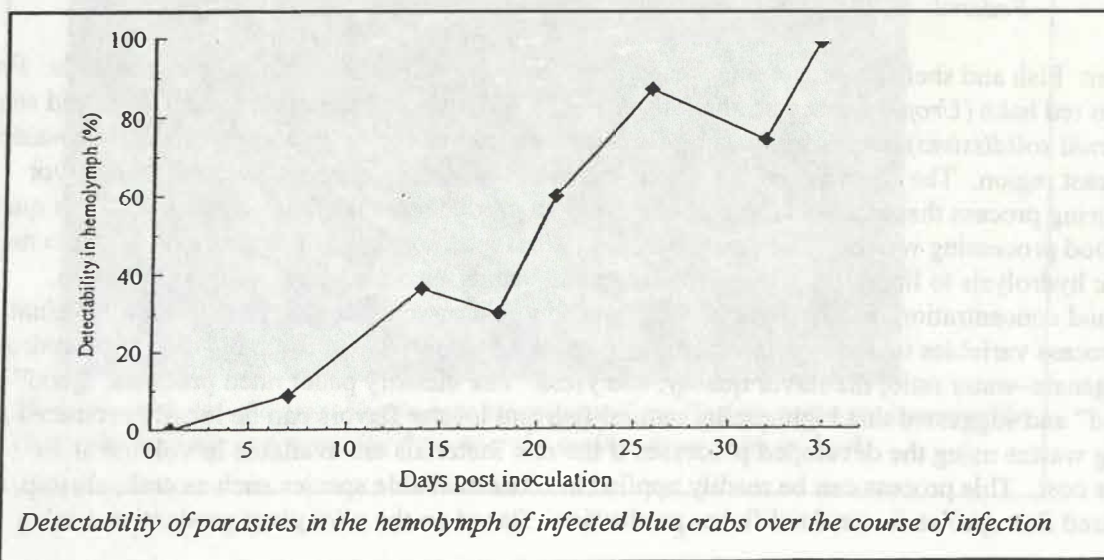
Grantee: University of Rhode Island, Kingston, RI
Grant No.: NA76FD0142 **NMFS Contact:** F/NER
Project Title: Technology Development for Flavor Production from Seafood Processing Wastes
Funding: Federal: \$108,123 **Recipient:** \$28,134

Assessment: Fish and shellfish processing wastes constitute two-thirds of incoming raw materials. Frame waste from red hake (*Urophycis chuss*), the lobster bodies left after collecting claws and tails, and sea clam (*Spisula solidissima*) bellies from clam processing are commercially important processing wastes in the Northeast region. The objective of this study was to develop an enzyme-assisted seafood flavor manufacturing process that enables U.S. manufacturers to produce specialty-flavor stocks of high quality from seafood processing wastes. The general process developed consisted of separation of usable meat, proteolytic hydrolysis to liberate flavor-giving free amino acids, enzyme inactivation, maturation, filtering, and concentration or dehydration. Flavor-production optimization was achieved by evaluating various process variables including the enzyme system, the hydrolysis condition, the degree of hydrolysis, the homogenate-water ratio, the flavor quality, and yield. The industry panel rated products "good" to "very good" and suggested that high-quality natural fish and lobster flavors can be locally produced from processing wastes using the developed processes if the raw materials are available in volume at an acceptable cost. This process can be readily applied to other available species such as crab, shrimp, and underutilized fish species for seafood flavor production. Based on the pilot plant production trial, a

production scale-up can be easily achieved using a simple steam injection vessel that allows good temperature control of water as heating medium.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA
Grant No.: NA76FD0148 **NMFS Contact:** F/NER
Project Title: Mortality and Pathophysiology Studies of Blue Crabs Infected with the Parasitic Dinoflagellate *Hematodinium perezii*
Funding: Federal: \$117,868 **Recipient:** \$13,511

Assessment: On the eastern seaboard of the United States, populations of the blue crab *Callinectes sapidus* experience recurring epizootics of a parasitic dinoflagellate. The parasite, *Hematodinium perezii*, fulminates in the summer and autumn causing mortalities in high-salinity embayments and estuaries. In laboratory studies, the recipient experimentally investigated high mortality due to the disease, assessed differential hematological changes in infected crabs, and examined proliferation of the parasite. Mature, overwintering, non-ovigerous female crabs were injected 10^3 or 10^5 cells of *H. perezii*. Mortalities began 14 days after infection, with a median time to death of 30.3 ± 1.5 d (se). Subsequent mortality rates were greater than 86% in infected crabs. A relative risk model indicated that infected crabs were 7 to 8 times more likely to die than controls, with decreases in total hemocyte densities covarying significantly with mortality. Hemocyte densities declined precipitously (mean = 48% within 3 days of infection) and exhibited differential changes in subpopulations of granulocytes and hyalinocytes that lasted throughout the course of the infection. Crabs that did not present infections after injection (i.e., "immune") did not show hemocytopenia and exhibited significant long-term (21–27 days) granulocytemia. Detection of the parasite in the hemolymph of infected crabs increased from approximately 30% after 14 days to 60% after 21 days to 100% after 35 days (see below). Plasmodial stages were, however, detectable in histological preparations of the heart within 32 days of infection and increased in number over 5 and 7 days. Sporulation of the parasite occurred over a short time (at least 4 days, after 43 days infection) and did not culminate in the immediate death of the host. The mortality studies indicate that *H. perezii* represents a significant threat to the blue crab fisheries in high-salinity estuaries and may have a greater effect on mature females that move to higher salinities to breed.



Grantee: Baylor College of Medicine, Houston, TX
Grant No.: NA77FD0080 **NMFS Contact:** F/SER
Project Title: Molecular Assessment of Public Health Suitability of Shellfish for Human Consumption
Funding: *Federal:* \$183,680 *Recipient:* \$0

Assessment: Viruses originating in human fecal pollution that are carried by shellfish can lead to serious health hazards. Existing sanitation standards rely on the detection of bacteria, not viruses, present in feces. Norwalk-type viruses (NLV) and hepatitis A virus (HAV) have been the most common viral shellfish-associated disease agents. The goals of this research were to develop an infective assay for NLV and other caliciviruses and to develop an immunocapture reverse-transcriptase polymerase chain reaction (RT-PCR) assay for the detection of these viruses in shellfish. Approaches explored for the infectivity assay included evaluation of primary and continuous cell lines, of different additives and physical conditions, and of different methods of virus inoculum preparation. None of these approaches provided consistent evidence of virus replication. However, an immunocapture RT-PCR assay for the detection of Norwalk virus was developed along with modifications of the RT-PCR assay to improve its performance characteristics. The new assay allows the detection of Norwalk virus added to shellfish tissues.

Grantee: Mote Marine Laboratory, Sarasota, FL
Grant No.: NA77FD0081 **NMFS Contact:** F/SER
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

Assessment: This study was undertaken to determine the sensitivity and selectivity of protein biomarkers produced in clams as a result of exposure to polyether toxins from the toxic dinoflagellate *Gymnodinium breve*. Clams (*Merceneria merceneria*) were exposed to live *G. breve* cells for periods ranging from 3 to 21 days and subjected to biodepuration following exposures for 14 days. Of five possible protein biomarkers observed from preliminary investigations, two were consistently expressed during replicated experiments, and only one was found exclusively following toxin exposure. The results indicate that the expression of the five protein biomarkers was variable between exposure times and culture conditions. Therefore these protein biomarkers failed to serve as reliable markers of polyether toxin exposure in clams. Results of the toxin analyses of this study led to the speculation that the parent toxins were rapidly altered by the clams to metabolites that were still toxic but not detectable by high-performance liquid chromatography methods.

Grantee: University of Florida, Gainesville, FL
Grant No.: NA67FD0037 **NMFS Contact:** F/SER
Project Title: Moisture Content in Penaeid Shrimp Destined for U.S. Consumption
Funding: *Federal:* \$65,395 *Recipient:* \$30,206

Assessment: Initial or nonprocess moisture levels for wild brown and white shrimp harvested from the Gulf of Mexico varied from 75% for brown shrimp to 77% for white shrimp. After normal water treatment, the moisture levels rise to 80% and 84% respectively. After thawing and cooking, normally treated shrimp contained a moisture content of about 76%. However, shrimp soaked in phosphate

treatments of 2%, 4%, or 6% sodium tripolyphosphate (STP) instead of water treatment displayed moisture content ranging from 78.5% to 83.6% after cooking. Simply stated, this study has yielded justification and direction for the utilization of phosphating agents to retain moisture in penaeid shrimp in both domestic and international commerce.

Grantee: University of Washington, Seattle, WA
Grant No.: NA66FD0103 *NMFS Contact:* F/NWR
Project Title: *Heterosigma carterae*: Laboratory Induction of Toxin Production/Target Marine Species--Year 2
Funding: *Federal:* \$106,098 *Recipient:* \$7,522

Assessment: The objective of this project was to determine the environmental factors that induce bloom formation and maximize toxin production, as well as to analyze the susceptibility of both vertebrate and invertebrate marine species to *Heterosigma* toxin. The goals and objectives of this project were not achieved. Research efforts focused on conducting a hemolytic assay to identify "hot" cells so that the toxin could be further refined and tested on invertebrate and vertebrate species. The summary data showed that there were wide variances in the hemolytic activity. There was no obvious correlation in the relationship between specific physiological parameters, cell densities, and hemolytic activity. Due to failures with hemolytic assay test, the investigator was unable to determine the susceptibility of vertebrate and invertebrate marine species to the toxin.

Grantee: University of Washington, Seattle, WA
Grant No.: NA66FD0113 *NMFS Contact:* F/NWR
Project Title: Harmful Algal Blooms and Their Impacts on Shellfish and Finfish in Western Washington
Funding: *Federal:* \$165,569 *Recipient:* \$0

Assessment: The objectives of this project were to learn more about organisms that produce domoic acid, determine environmental conditions that control blooms of *Alexandrium catenella*, continue monitoring the seasonal and regional distributions of all likely harmful algal species, and maintain the phytoplankton network of growers and university, state, and federal personnel. Results from the field studies identified at least six species of *Pseudo-nitzschia* that are potential domoic acid producers. They occur on coast beaches in the May-through-October period. In Puget Sound/Hood Canal, *Pseudo-nitzschia* are present during all months but are most abundant from April to October. The researchers concluded that physical oceanography plays a large part in the distribution of the species, but the researchers were unable to determine how cells/toxins reach razor clams on coastal beaches. *Alexandrium* species occurred infrequently in the coast samples but were commonly found in samples taken during the May--September period in Manchester, Allyn, and Quartermaster Harbor. Researchers determined that spring/neap tidal cycle may be a major factor influencing timing, duration, and peak concentrations of *Alexandrium* in Quartermaster Harbor. Researchers maintained contact with the phytoplankton network, and information is exchanged when potential harmful algal species are found.

Grantee: The Regents of the University of California, Berkeley, CA
Grant No.: NA76FD0046 **NMFS Contact:** F/SWR
Project Title: Investigation of the Role of Rickettsiales-Like Procaryotes and Withering Syndrome of Black Abalone: Koch's Postulates and Molecular Probes
Funding: **Federal:** \$55,040 **Recipient:** \$37,099

Assessment: The objective of the project was to establish the relationship between Rickettsiales-like organisms (RLOs) and withering syndrome of abalone (black and other species) by attempting to fulfill Koch's Postulates and using epidemiological approaches. The goals of the project were attained. Tools were developed to detect and identify the Rickettsiales-like procaryote (RLP) and establish that the RLP is the causative agent of withering syndrome in abalone. Based on these results, the California Department of Fish and Game (CDFG) has implemented a policy in which all movement of animals from areas where the RLP has been observed requires a health examination of the animals. In addition, the CDFG has implemented a policy stating that no RLP-infected abalone may be imported into waters that are free of the bacterium.

Grantee: Monterey Bay Aquarium Research Institute, Moss Landing, CA
Grant No.: NA76FD0051 **NMFS Contact:** F/SWR
Project Title: Rapid Detection of Harmful Algal Bloom Species and Their Associated Toxins using DNA Probes and a Receptor Binding Assay
Funding: **Federal:** \$128,578 **Recipient:** \$33,673

Assessment: This project focused on the challenge of obtaining near-real-time data on the abundance (spatial and temporal) and toxicity of algal cells for the routine monitoring and scientific investigation of harmful algal blooms and their associated toxins. The primary impediment to obtaining such information is a lack of appropriate, field-tested methods. This project was designed to resolve this problem by evaluating the performance of two techniques that lend themselves to rapid detection of algal cells and their toxins: species-specific DNA probes and phycotoxin receptor binding assays, respectively. The project focused on populations of domoic acid (DA)-producing diatoms of the genus *Pseudo-nitzschia* that occur in Monterey Bay, California. Species-specific probes targeting *Pseudo-nitzschia* were applied using both whole-cell and sandwich hybridization methods, with good agreement between methods observed during the early stages of bloom development when cells were actively growing. Although some discrepancies arose toward the latter phase of a bloom, due largely to underestimates using the whole-cell technique with cells in poor condition, both approaches were generally effective in detecting toxic cells at concentrations relevant for routine monitoring. The receptor binding assay reliably detected DA associated with cells during periods of bloom development, but the assay occasionally revealed DA in the absence of recognizable, intact cells as blooms declined. Precise estimates of cell abundance and toxicity may not be required for routine monitoring. Perhaps most important for public health officials and wildlife biologists are up-to-date trends of where potentially toxic *Pseudo-nitzschia* species are; whether the populations are on the rise, falling, or exceeding some threshold value; and whether any associated toxicity warrants attention. In this regard, sandwich hybridization application of DNA probes for *Pseudo-nitzschia* and the DA receptor binding assay are technologies that show good promise and should be tested further against currently used methods in collaborative trials.

Grantee: Virginia Institute of Marine Science, Gloucester Point, VA
Grant No.: NA76FD0052 *NMFS Contact:* F/SWR
Project Title: The Therapeutic Treatment of Abalone Infected with the Putative Agent of Abalone Withering Syndrome
Funding: *Federal:* \$118,213 *Recipient:* \$11,993

Assessment: Withering syndrome (WS) is a debilitating and fatal disease of black abalone (*Haliotis cracherodii*) that is caused by a rickettsia-like organism (RLO). Foci of the RLO are found infecting the digestive tract (intestinal epithelia and digestive tubule epithelia). The RLOs occur at extremely high levels in early infections, with less-intense infections occurring in seriously afflicted abalone. The major sign of the syndrome, the withered and weakened foot, is an end-stage symptom of the disease. Populations of black abalone have been decimated by WS. Red abalone (*H. Rufescens*) appear less affected by the disease. Laboratory observations suggest that they are more resistant to its effects. This study undertook controlled laboratory studies to examine the efficacy of several antibiotics in treating afflicted abalone. Treatments consisted of injecting naturally infected abalone with low, moderate, or high levels of specific anti-rickettsial antibiotics. Control groups of naturally infected abalone were injected with diluents. In daily doses over a two-week course, we tested the following drugs for efficacy against the disease: chloramphenicol, tetracycline, sarafloxacin, and clarithromycin. Intramuscular injections were given to ensure delivery. Tetracycline at 25 mg/kg and 50 mg/kg (body weight) was moderately to completely successful in ridding black and red abalone of RLOs. Surprisingly, chloramphenicol, sarafloxacin, and clarithromycin were not effective when given intramuscularly. Intermediate-term, long-term, and oral dosing trials indicated varying levels of efficacy of oxytetracycline dependent upon dose regimen and timing of necropsy. Tetracycline and oxytetracycline may provide a potential treatment against rickettsial diseases of abalone.

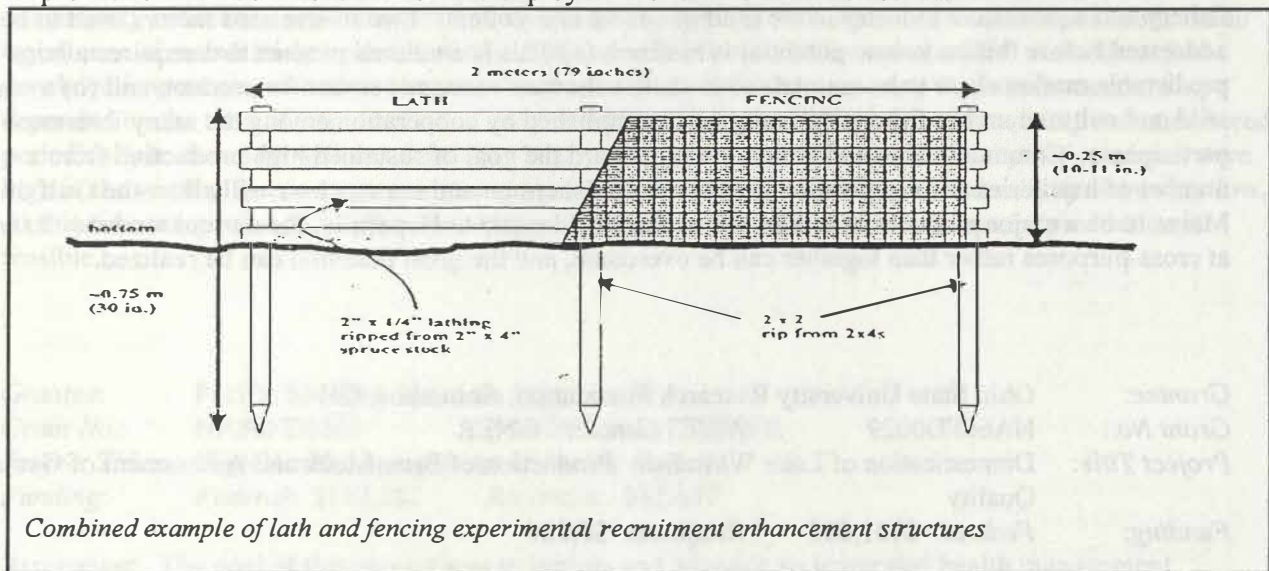
Grantee: Regents of the University of California, Berkeley, CA
Grant No.: NA47FD0416 *NMFS Contact:* F/SF2
Project Title: Microbial Safety: Rapid Methods for Shellfish and Seawater-Injured *E. coli*
Funding: *Federal:* \$72,209 *Recipient:* \$29,034

Assessment: This study addressed two major problems: (1) the development of a simple, rapid, sensitive test for fecal contamination in shellfish based on the indole production by *E. coli*, and (2) the need for a reliable test for fecal contamination in seawater. The investigators developed a "Colitag-S" medium, which contained buffer salts; hydrolysate; tryptophan (to ensure indole production by *E. coli*); and trimethylamine oxide (which *E. coli* and related bacteria convert to trimethylamine, a basic product that neutralizes acids produced from the fermentation of endogenous shellfish glycogen). The investigators found that their Colitag-S medium and its indole reaction provided a good test for *E. coli* in shellfish. Attempts to improve resuscitation of seawater-injured *E. coli* and thus make it a more suitable indicator in marine waters were promising in the laboratory through the use of pyruvate in the medium, but attempts were less promising in field studies. The investigators suggested that this method should be tested further in waters with higher levels of fecal contamination than those of San Francisco Bay.

AQUACULTURE

Grantee: MER Assessment Corporation, South Harpswell, ME
Grant No.: NA76FD0096 **NMFS Contact:** F/NER
Project Title: Enhancement of Recruitment of the Soft-Shell Clam *Mya arenaria*
Funding: Federal: \$29,823 **Recipient:** \$1,592

Assessment: Four recruitment enhancement structures and treatments—(1) vertical wooden laths, (2) plastic fencing, (3) pine boughs, and (4) substrate raking—were tested against controls to determine their comparative effectiveness in increasing settlement of the soft-shell clam *Mya arenaria*. (A lath and fencing structure diagram is shown below.) The test was conducted at three tidal heights at five separate sites within a nearly fully draining tidal basin in Biddeford Pool, Maine, during the summer of 1997. Recruitment of *M. arenaria* during 1997 was generally low and occurred principally in the lower intertidal zone. Nevertheless, statistically significant improvement in recruitment was observed for wooden and plastic structures and the raked treatment, although the effectiveness of individual structure types and treatments was inconsistent from site to site. The results suggest that a moderate amount of raking of the bottom, associated with commercial harvesting activity, may be beneficial in improving the suitability of the bottom for settlement of late-stage larvae. Furthermore, vertical current-interference structures also appear to be effective in enhancing recruitment, although the design of such equipment needs to be improved to make both construction and deployment of such structures cost-effective.



Grantee: University of New Hampshire, Durham, NH
Grant No.: NA76FD0104 **NMFS Contact:** F/NER
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

Assessment: The project focused on the development of an integrated hatchery and sea ranching system that would allow the widest possible participation by the fishing community in the Gulf of Maine. The

potential for large-scale urchin production in the Gulf of Maine has been demonstrated by the wild fishery, but the future of this production will lie in the realm of aquaculture. This represents an effort to refine a series of techniques for a hatchery and out-planting system that is economically feasible for the broadest participation within the fishing community, and it includes direct involvement of fishermen. All results to date indicate the approach is feasible. The principal findings follow: (1) Recruitment studies of juvenile urchins have shown a consistent pattern of very low recruitment northeast of Penobscott Bay and higher numbers to the southwest of Penobscott Bay. Recruitment has declined steadily throughout the Gulf of Maine, and this pattern parallels the decline in harvests each year since 1993. (2) Larval cultivation studies suggest that an open system utilizing natural plankton has potential for replacing the closed cultivation system currently in use in Japan. Selective filtration and supplementation with cultured phytoplankton appear to be a means for a reduced overhead hatchery system that would allow the broadest possible involvement of members of the fishing community. (3) Juvenile cultivation to 10 mm in test diameter is feasible within one year on a diet of diatom film supplemented by *Ulva*. Natural diatom films that provide a diet that matches other diets for growth rates up to 10 mm are easy to produce in an open system. (4) Small urchins 10 mm and larger can be effectively out-planted for stock enhancement and/or sea ranching during the winter months with high survival rates. It should be possible to go from spawning adult urchins to raising larvae to metamorphosis to growing juveniles to out-planting size within one year. (5) Alternation of the reproductive cycle in green urchins by manipulation of the photoperiod shows great promise for extending the reproductive period for hatchery production. Photoperiod may also be altered to produce high-quality roe at times of high demand. Both applications will greatly enhance the economic potential of green sea urchins in the Gulf of Maine. (6) The economic potential for a sustained sea urchin fishery and aquaculture industry in the Gulf of Maine is excellent. Two interrelated factors need to be addressed before this economic potential is realized: (a) This is a volume product that requires a large and predictable market share to be maintained to realize the best economic return for product, and (b) a viable wild and cultured urchin fishery will only be accomplished by cooperation among the many interested participants. Communication and collaboration toward the goal of sustained high production from a number of hatcheries and cooperation between wild fishermen and sea ranchers will allow the Gulf of Maine to be a major producer of urchin roe on the world market. Hopefully, the current tendency to work at cross-purposes rather than together can be overcome, and the great potential can be realized.

Grantee: Ohio State University Research Foundation, Columbus, OH
Grant No.: NA66FD0029 *NMFS Contact:* F/NER
Project Title: Domestication of Lake Whitefish: Production of Broodstock and Assessment of Gamete Quality
Funding: *Federal:* \$101,005 *Recipient:* \$6,526

Assessment: This project was designed to (1) assess the responses of fish to various formulations of low-cost diets measured by the quality of gametes produced and (2) examine reproductive development in lake whitefish in captivity. Through a series of experiments, the optimal formulation of a low-cost, low-pollutant broodstock diet and the effect that feeding had on quality of gametes were determined. The fish meal analog, a mixture of animal byproducts, was used to replace fish meal protein. The basal diet, formulated after a preliminary study to determine the optimal protein requirement for lake whitefish, was used as control. The results clearly indicated that growth of lake whitefish was significantly affected when fish meal protein was replaced by the animal byproduct mixture at 50% and 100%. However, increasing the content of animal byproduct in the diet up to 50% did not affect lake whitefish reproductive performance (quality of the sperm, fecundity, progeny survival). The success of lake whitefish

domestication required a comprehensive understanding of the reproductive cycle and its hormonal control. In this study, the researchers provided such information on captive and wild lake whitefish broodstock. This project provided the desired information for successful farming of a new aquaculture species in the Great Lakes Region. However, further work is needed on the reproduction of the species.

Grantee: University of Alaska Southeast, Juneau, AK
Grant No.: NA76FD0035 *NMFS Contact:* F/AKR
Project Title: Nori Cultivation: Physiological Ecology of Native Alaskan *Porphyra* Species—Year 3
Funding: *Federal:* \$151,351 *Recipient:* \$33,149

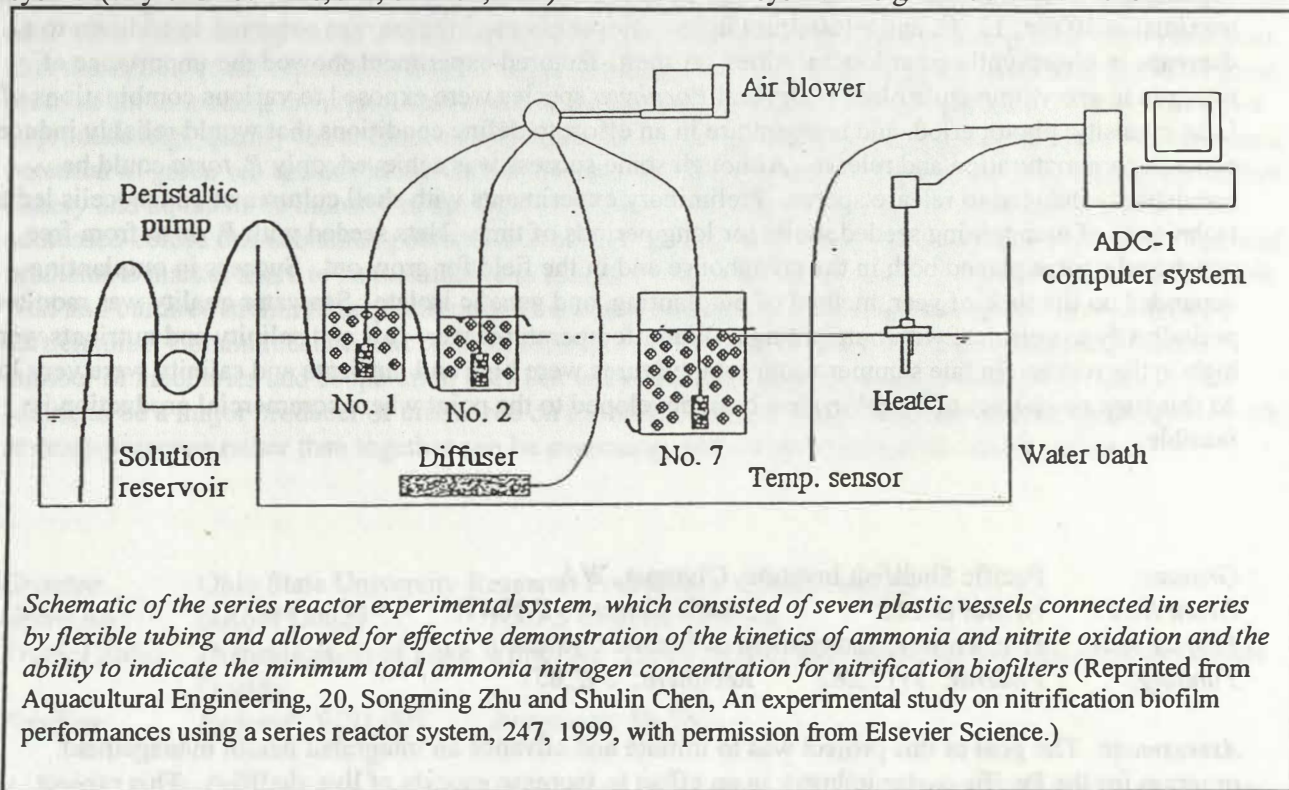
Assessment: Results of studies that were conducted on the response of conchocelis cultures to applied phytohormones found that plant hormones increase the growth of *Porphyra conchocelis* but do not directly induce conchosporangia formation. Juvenile blades of *Porphyra torta* showed differential growth depending on seeding density and substrate composition. Photosynthesis of small blades of *P. torta* was maximal at 30 ppt, 12 °C, and $>160 \mu\text{mol m}^{-2} \text{s}^{-1}$. Some photoinhibition was observed in addition to a decrease in photosynthesis at low salinities. A multi-factored experiment showed the importance of nitrogen in growth juvenile blades. Several *Porphyra* species were exposed to various combinations of light intensity, photoperiod, and temperature in an effort to define conditions that would reliably induce conchospore maturation and release. Although some success was achieved, only *P. torta* could be consistently induced to release spores. Preliminary experiments with shell cultures of conchocelis led to techniques of maintaining seeded shells for long periods of time. Nets seeded with *P. torta* from free conchocelis were placed both in the greenhouse and in the field for grow out. Success in outplanting depended on the time of year, method of outplanting, and genetic isolate. Seawater quality was monitored periodically to correlate with outplantings. Water temperatures were low and salinity and nutrients were high in the winter. In late summer water temperatures were high and nutrients and salinity were very low. At this time no species of *Porphyra* has been developed to the point where commercial production is feasible.

Grantee: Pacific Shellfish Institute, Olympia, WA
Grant No.: NA86FD0262 *NMFS Contact:* F/NWR
Project Title: High Health Management of Pacific Oysters
Funding: *Federal:* \$117,282 *Recipient:* \$42,657

Assessment: The goal of this project was to initiate and advance an integrated health management program for the Pacific oyster industry in an effort to increase exports of live shellfish. This project initiated development of regional documentation of health and disease history to meet threshold criteria for the Organization Internationale Epizooties (OIE), which is the technical organization that advises the World Trade Organization on matters of animal health. Five growing areas in three Pacific Coast states were sampled for disease. No OIE-certifiable diseases were found in these areas. However, other diseases certifiable by state agencies were detected. A framework high health management plan was developed in cooperation with the membership of the Pacific Coast Oyster Growers' Association. This plan will help support efforts to obtain export certification for live shellfish from the Animal and Plant Health Inspection Service of the U.S. Department of Agriculture. In the course of this project, investigators identified additional health program work activities needed to further this program.

Grantee: Washington State University, Pullman, WA
Grant No.: NA76FD0300 **NMFS Contact:** F/NWR
Project Title: Optimal Design of a Water Recirculating System for Shellfish Depuration
Funding: *Federal:* \$98,820 *Recipient:* \$29,802

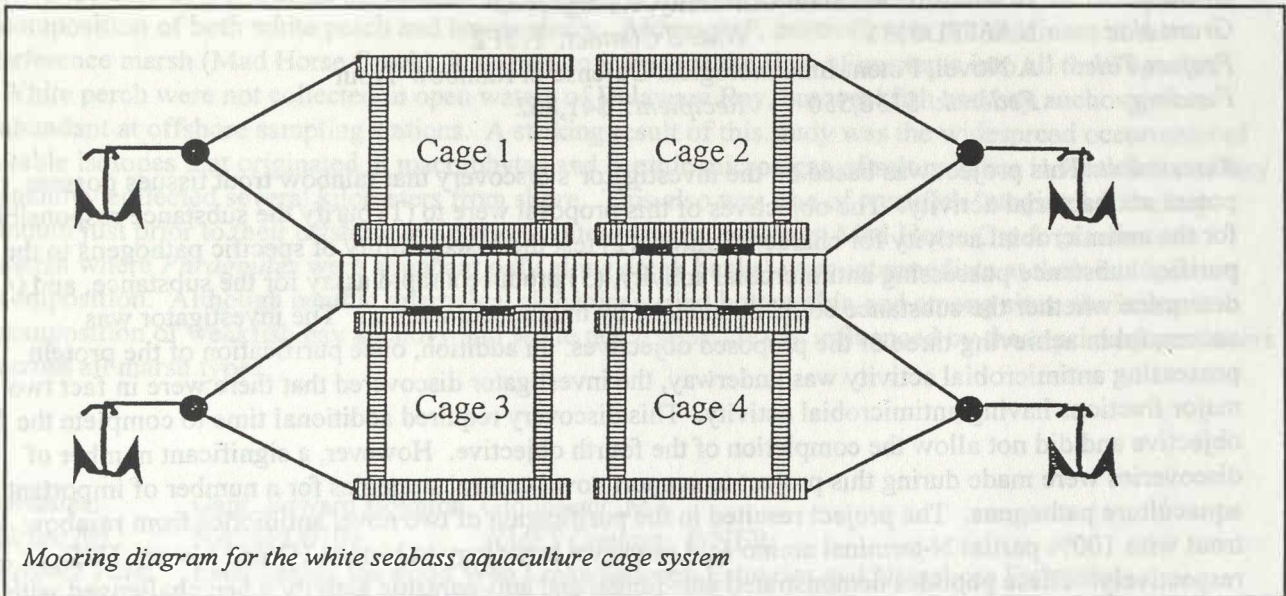
Assessment: The objective of the project was to develop a closed, recirculating shellfish depuration system that was cost-effective and environmentally sound and that met sanitation and other regulatory requirements. Researchers found that temperature was a key factor in determining shellfish excretion rates. In addition, UV transmittance of the wastewater stream was an important factor affecting the disinfection efficiency of the UV devices. For the best disinfection efficiency, wastewater flow rates need to be maintained sufficiently high for a recirculating UV disinfecting system, especially for a large UV unit working with a lower-UV transmittance wastewater. The investigators evaluated three different biofilter systems (fluidized bed, submerged trickling, plastic bead). Investigators also developed an effective experimental apparatus called a “series reactor system” (see below), which evaluated and characterized nitrification biofilters. Researchers conducted an evaluation of a commercial recirculating system (Taylor Resources, Inc, Shelton, WA) and formulated system design recommendations.



Grantee: Hubbs-Sea World Research Institute, San Diego, CA
Grant No.: NA76FD0019 **NMFS Contact:** F/SWR
Project Title: Commercialization of White Seabass Aquaculture, Pilot Program Out-Grow to Market
Funding: *Federal:* \$208,982 *Recipient:* \$72,494

Assessment: This project set out to determine whether cage culture technologies could be adapted to grow white seabass (*Atractoscion nobilis*) to a marketable size in an offshore, semi-exposed location. (A

diagram of the cage system is shown below.) The project was also designed to evaluate the marketability of sub-adult, farm-raised white seabass and to tag and release a portion of the fish into the ocean. The results of this award suggest that cage culture of white seabass is technologically, biologically, and economically feasible on a large scale and in a semi-exposed location. This is an important finding because regulatory agencies, especially in California, have been extremely cautious and reluctant in allowing this type of commercial aquaculture.



Grantee: Black Pearls, Inc., Holualoa, HI
Grant No.: NA76FD0054 *NMFS Contact:* F/SWR
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

Assessment: Previous research work by the investigators had demonstrated the technical feasibility of commercial pearl farming in Hawaii. Further development of this lucrative industry was primarily limited by the restrictions on leasing ocean space in the State. This project therefore had four broad original goals: (1) to establish a formal public-private partnership between Black Pearls, Inc., and Hawaii's Department of Land and Natural Resources to set up a commercial pearl farm and reestablish wild stocks of the Hawaiian pearl oyster; (2) to pioneer a permitting pathway for ocean leases for commercial aquaculture in Hawaii and to document the process so others may follow; (3) to obtain a lease over a site for the first commercial Hawaiian pearl farm/reproductive reserve and to obtain all necessary permits; and (4) to identify cost-effective nursery grow-out techniques. These goals were revised and adapted to the contingencies that arose over the course of the project, and the remainder of the project was then targeted toward pushing a revised Ocean Leasing Bill through the Hawaii House and Senate and toward addressing the formalities and operational considerations for obtaining a lease for the site near the Honolulu Airport reef runway in Keehi Lagoon. In July 1999, Hawaii's Governor signed the new bill into law. Black Pearls, Inc., has been working with the Hawaii's Aquaculture Development Program to obtain a lease over

the Keehi Lagoon area. This will be the first ocean aquaculture lease in the State. This precedent should encourage other aquaculturists to follow suit. The proving of the process will mark a significant milestone in the development of aquaculture in Hawaii.

Grantee: North Carolina State University, Raleigh, NC
Grant No.: NA67FD0131 **NMFS Contact:** F/SF2
Project Title: A Novel, Potent Immunological Defense in Rainbow Trout
Funding: *Federal:* \$136,550 *Recipient:* \$41,862

Assessment: This project was based on the investigator's discovery that rainbow trout tissues possess potent antibacterial activity. The objectives of this proposal were to (1) purify the substance responsible for the antimicrobial activity for characterization, (2) test the susceptibility of specific pathogens to the purified substance possessing antimicrobial activity, (3) produce a rapid assay for the substance, and (4) determine whether the substance could be induced by immunostimulation. The investigator was successful in achieving three of the proposed objectives. In addition, once purification of the protein possessing antimicrobial activity was underway, the investigator discovered that there were in fact two major fractions having antimicrobial activity. This discovery required additional time to complete the first objective and did not allow the completion of the fourth objective. However, a significant number of discoveries were made during this project to support novel control strategies for a number of important aquaculture pathogens. The project resulted in the purification of two novel antibiotics from rainbow trout with 100% partial N-terminal amino acid sequence homology to histone H1 and histone H2B, respectively. These peptides demonstrated anti-fungal and anti-parasitic activity when challenged with water mold and the parasitic dinoflagellate *Amyloodinium ocellatum*, respectively. The anti-parasitic activity appears to be a major finding because there are few therapeutants effective in controlling *Amyloodinium*, an important pathogen of warm water marine fish. In addition, the investigator developed a quantitative ELISA to measure levels of these peptides in tissues. These results provide the basis for the development of a field assay to assess fish health and innate immunity.

HABITAT CONSERVATION

Grantee: New Jersey Marine Science Consortium
Grant No.: NA86FD0109 **NMFS Contact:** F/NER
Project Title: The Role of Tidal Salt Marsh as Essential Habitat in Production of Juvenile Weakfish (*Cynoscion regalis*)
Funding: *Federal:* \$89,384 *Recipient:* \$84,141

Assessment: Stable isotope ratios of carbon, nitrogen, and sulfur in weakfish (*Cynoscion regalis*), bay anchovy (*Anchoa mitchilli*), and white perch (*Morone americana*) from Delaware Bay were a function of the relative position of the marsh restoration trajectory. With one exception, weakfish captured in different zones of the open bay displayed significant differences in their isotope composition. Fish captured in the upper bay had isotope signatures characteristic of *Phragmites australis*-dominated marshes, and weakfish from the lower bay had greater similarities to *Spartina alterniflora*-dominated marshes. Weakfish collected in mid-bay were intermediate in their stable isotope composition. Benthic

microalgae also contributed to weakfish nutrition in the open bay. Fish collected in tidal creeks—Mad Horse Creek in mid-bay and Dennis Creek in the lower bay—did not differ significantly from each other, nor did they differ from fish captured in the corresponding open-water zone. White perch and bay anchovy collected in polyhaline restoration and reference (Moore's Beach) sites also had stable isotope signatures that reflected contributions from both benthic microalgae and *Spartina alterniflora*. Isotope values from white perch captured at the reference site were slightly enriched compared to the restoration sites. At mid-estuary, oligo-mesohaline locations, *Phragmites australis* contributed to the isotopic composition of both white perch and bay anchovy. Although *P. australis* was not dominant at the reference marsh (Mad Horse Creek), it seemed to influence the flow of nutrients into all three species. White perch were not collected in open waters of Delaware Bay, but weakfish and bay anchovy were abundant at offshore sampling stations. A striking result of this study was the widespread occurrence of stable isotopes that originated in macrophytes and benthic microalgae of salt marshes in weakfish and bay anchovy collected several kilometers from shore. This also was true of weakfish "staging" at the bay mouth just prior to their offshore emigration. Interestingly, fish from Mad Horse Creek (a reference marsh where *Phragmites* were abundant only along creek banks) were intermediate at their isotopic composition. Although benthic microalgal signature varied both within and among sites, the isotopic composition of weakfish bay anchovy and white perch were clearly influenced by these primary producers across all marsh types.

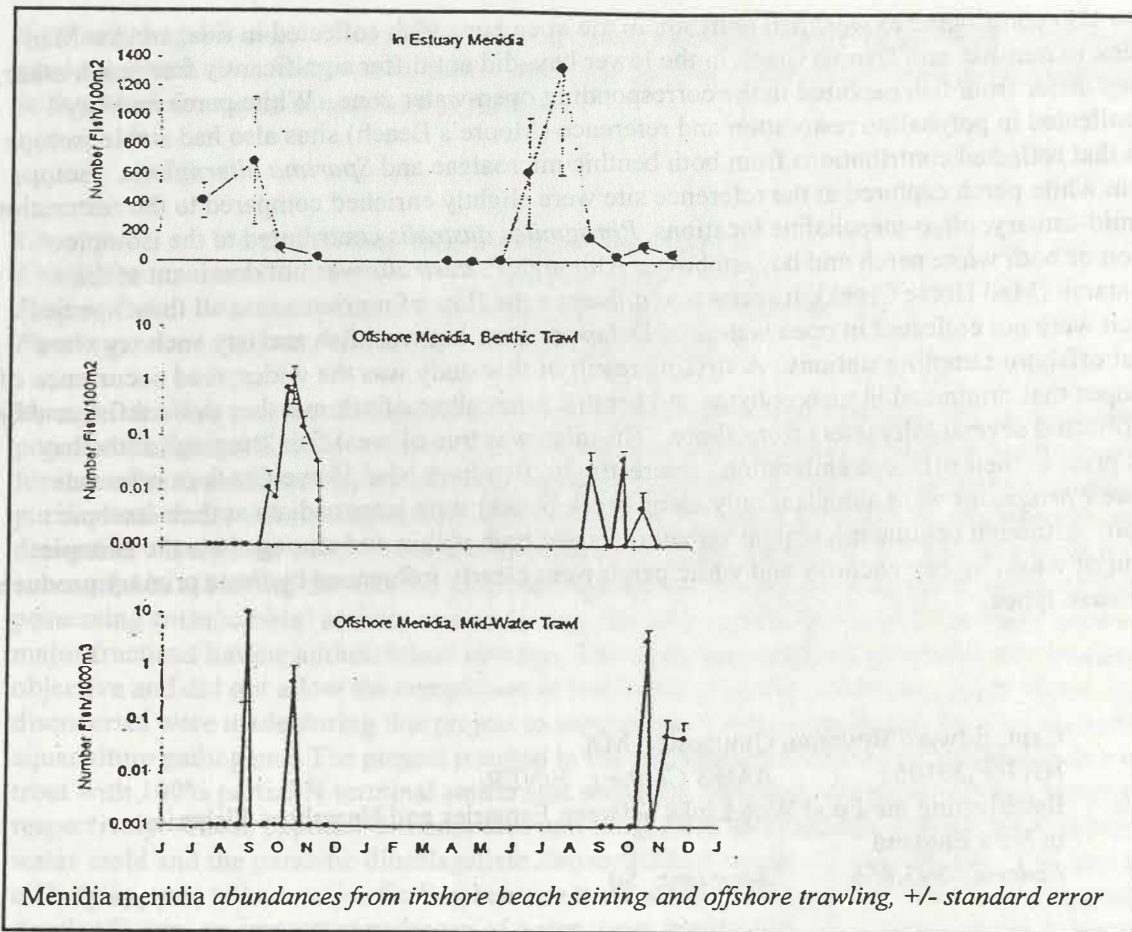
Grantee: Capt. Edward Boynton, Gloucester, MA

Grant No.: NA76FD0106 **NMFS Contact:** F/NER

Project Title: Establishing the Food Web Links between Estuaries and Nearshore Fisheries in New England

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

Assessment: This was a collaborative project between a Gloucester fisherman and a scientist from the Ecosystems Center of the Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts. The two objectives of this study were first to establish the food web link between the estuaries and the nearshore fisheries of Ipswich Bay and second to bridge the gap between fishermen and scientists by learning and understanding each other's work methods. The project centered on sampling predetermined sites to ascertain the timing and magnitude of the migration of estuarine fish going into the nearshore waters of Ipswich Bay. The study used stable isotopes to conclusively demonstrate the connection between forage fish and the estuary. Environmental data of temperature, salinity, chlorophyll-a, water clarity, nutrients, and current flow were also examined to ascertain the trigger mechanisms of the migration. Sampling for the project began in August 1997. The first year had 18 sampling days using the F/V SISSEL B. As the result of a time extension to the project, a second sampling season took place. Sampling for the second year began in September 1998. There were eight sampling days on the vessel and five additional beach seining days when winds exceeded the safe limits of work aboard the vessel. All totaled, there were 31 sampling days for the project. The Ecosystems Center at the MBL conducted the analysis of the samples collected during the project and provided a detailed report of its findings. Briefly, the report stated that "comparison of abundance, timing, size and stable isotope value of *Menidia menidia* in estuary and offshore indicated that large quantities of fish move offshore in the fall [see next page]. The importance of Atlantic silversides as a forage fish for larger coastal fishes is well known. This study demonstrates that Atlantic silversides may represent an important trophic link between marshes and offshore food webs."



Grantee: Virginia Commonwealth University, Richmond, VA
 Grant No.: NA76FD0147 NMFS Contact: F/NER
 Project Title: Critical Evaluation of Conservation Success in Restoration of James River
 and Ocean Run American Shad
 Funding: Federal: \$163,542 Recipient: \$157,212

Assessment: The recipient examined the efficacy of captive breeding and release for recovery of viable American shad populations in the James River, Virginia, watershed. Responding to severe declines in the strength of the anadromous runs in the James and other east coast rivers, state and federal agencies responsible for managing the resource deemed that a propagation program was necessary to help the James population achieve long-term viability. This project was designed as a model to combine molecular genetic methods with other traditional marking approaches for evaluating the effects and contribution of the propagated fish to a recovered population. The evaluation focused on four key questions: (1) Is there evidence of an infra-specific stock structure among river populations of American shad in the mid-Atlantic? The purpose of this part of the study was to establish appropriate sources of brood from several candidate populations. Ultimately, it was observed that, based on microsatellite DNA variation (and from mitochondrial DNA variation previously recorded for those specimens), temporally stable genetic character arrays differed among rivers without any observable fine-scale structure. (2) Does the brood

collection strategy capture the full range of genetic variation observed in the source population? No significant differences were observed between the allelic arrays of captured brood and the source-river population. (3) Do hatchery-reared juvenile shad capture the full range of diversity in the source-river population? It was observed that there was a comparable level of diversity in the progeny compared with the parents. (4) Are there any temporal changes in the pool of molecular markers signaling a response to artificial selection for conditions in the culture environment? In several experiments, differences were detected in the genetic arrays between family-sets taken early (post-fertilization) and late (pre-stocking) in the culture process. These results are consistent with expectations from hatchery selection, although additional tests are required to confirm the importance of selection and to confidently eliminate other explanations, such as possible sampling bias. The results from this evaluation have inspired several changes in the James River breeding and culture program to promote/mimic more natural background levels of genetic diversity as well as to ensure viable populations of American shad.

Grantee: The Research Foundation of the State University of New York, Stony Brook, NY
Grant No.: NA66FD0012 *NMFS Contact:* F/NER
Project Title: Identification of Continental Shelf Groundfish Nursery Habitats in the New York Bight
Funding: *Federal:* \$200,000 *Recipient:* \$48,119

Assessment: This project assessed habitat characteristics and recruitment of marine organisms, with New York Bight continental shelf groundfish as the target organisms. Within this context, the recipient was able to determine what features of the benthic habitat are utilized as critical settlement and nursery habitat and how they change during the early ontogeny of fish. The habitat variables that best determine juvenile demersal fish distributions include temperature, salinity, depth, and benthic community constituents (e.g., scallops). Temperature was a particularly important variable for yellowtail flounder as a determinant of settlement and nursery habitat. Several months after settlement of yellowtail flounder, a rapid rise in temperature due to an early autumn water column turnover may have contributed to a significant loss of young-of-year yellowtail in 1996. Quality and quantity of nursery habitat also change seasonally (again primarily due to bottom temperature variation) for another common demersal fish, the silver hake. Specifically, change in bottom temperatures over time allowed more extensive settlement habitat to be available as the season progressed. The recipient was also interested in advancing the commercial fishing community's awareness of the role of habitat in relation to stock abundance and health. This goal was approached by both including a subset of the fishing community in the collection of the above data as well as by presenting the results to the fishing community via several different forums and articles throughout the Northeast. This study also financially assisted several members of the regional fishing community during a period of economically difficult conditions.

Grantee: Texas Parks and Wildlife Department, Austin, TX
Grant No.: NA77FD0072 *NMFS Contact:* F/SER
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

Assessment: Within the last 10–12 years, a number of mariculture facilities have been constructed along the Texas coast, primarily in Matagorda Bay and the Lower Laguna Madre. This industry began at a time

when commercial shrimping on native species was maximized, and this was a "solution" to providing more shrimp that was welcomed with relatively few restrictions or regulations. The use of exotic shrimp and the incidence of exotic shrimp diseases have changed the acceptance of this industry. This project provides an accurate and easily used map of the coastline, precise locations of mariculture facilities that can be used in GIS analyses and visual displays, and an initial method of modeling the escapement of shrimp or release of effluent containing diseases from these site. Using a fairly simple hydrodynamic model that has been specifically tuned to Matagorda Bay that can also eventually be used in other portions of the Texas coastline, managers can begin to apply visual analyses to some of the most perplexing problems facing them today. Although this analysis models shrimp as neutrally buoyant (passively being moved in the currents), the premise is generally tenable. The model also shows promise as a foundation for building in more complexity to account for shrimp movement or sedimentation of effluent particles. Even in this preliminary form, the model can help narrow the possible sources of exotic shrimp and shrimp diseases discovered in Texas waters.

Grantee: Alaska Department of Fish and Game, Kodiak, AK
Grant No.: NA86FD0077 **NMFS Contact:** F/AKR
Project Title: Bottom Trawl Assessment of Seasonal Distribution of Tanner Crab, Pacific Cod, and Shallow-Water Flatfish in Marmot Bay, Alaska
Funding: **Federal:** \$129,563 **Recipient:** \$113,972

Assessment: This project's primary objective was to better quantify the habitat requirements of early benthic phase (EPB; from settlement through approximately age 2+) red king crab (RKC; *Paralithodes camtschaticus*) *in situ* and to investigate the importance of those unique nursery habitat requirements in spatially structuring the southeast Bering Sea population and generating recruitment variability within the stock. The investigators used a combination of field investigation and retrospective data analysis. These studies established that EBP RKC rely heavily, if not exclusively, upon complex shallow-water habitat for settlement and early recruitment. Settlement and post-settlement survivorship was high within rocky nursery habitat and lower in shell-hash. No settlement or survivorship could be detected in homogeneous muddy-silt habitat despite high levels of larval supply. These habitat requirements suggest that recruitment to fishable stocks is likely to be governed by the spatial structure of the stock in relation to suitable EBP nursery habitat. In particular, the delivery of larvae to suitable settlement sites will be critical to ensure future recruitment, and this process can only be ensured if larvae are spawned and hatched in areas that are oceanographically "upstream" of nursery habitats. In order to assess the likelihood of these events with the Bristol Bay population, the investigators have begun an oceanographic modeling effort that will predict larval delivery patterns given present knowledge of regional oceanography and spatial stock structure. This model will enhance the ability to predict the impact of environmental factors on large-scale recruitment trends and help the investigators to identify spatially explicit management options for the stock. The investigators also have analyzed historic shifts in centers of adult breeding distribution to study how subsequent larval dispersion may effect survival relative to final settlement in nursery habitat. In order to fully realize the goal of developing spatially explicit stock management models, future research should include assessment of local habitat structure and distribution, as well as field research examining larval distribution and behavior in relation to important oceanographic features and conditions.

VII. COMPLETED NATIONAL PROGRAM PROJECTS

This section contains an assessment of each S-K National Program project completed during the period June 1, 1999 to May 31, 2000, regarding the extent to which the objectives of the project were attained and the project contributed to fishery development. The projects are listed by subject area, along with the project number, project title, federal funding level, and NMFS contact.

MANAGEMENT ALTERNATIVES AND FISHERIES USER CONFLICTS

Project No.: 97-NE-19 *NMFS Contact:* F/NER
Project Title: An Assessment and Test Project of Current Technologies in Days-at-Sea Accounting Systems to Improve NMFS Customer Service
Funding: *Federal:* \$150,000

Assessment: The Northeast Regional Office of NMFS operates a system whereby commercial fishing vessels are allocated a limited number of days at sea (DAS) each year to fish. NMFS awarded a contract to the consulting firm of Booz-Allen & Hamilton to evaluate the feasibility of using or obtaining automated technology to increase the efficiency, flexibility, and usability of the call-in system for reporting DAS. Booz-Allen & Hamilton interviewed 33 individuals from NMFS enforcement, regulatory, science, and data-analysis staff; the U.S. Coast Guard; fishery management council staff; and fishermen. The current system was found to satisfy the requirements for which it was created, but enhancements were identified. Booz-Allen & Hamilton found that systems do exist that can meet the needs of NMFS in automating a significant portion of the DAS call-in system program. The firm also recommended that NMFS continue the process of acquiring an automated account access system by resolving outstanding issues (i.e., type of database) and developing and sending a request for proposal to the top vendors identified by Booz-Allen & Hamilton.

Grantee: Washington Department of Fish and Wildlife
Grant No.: 97-NW-02 *NMFS Contact:* F/NWR
Project Title: Encounter and Release Rates for Salmonids, Birds and Marine Mammals in the Marine Sport Salmon Fishery in Puget Sound, Washington
Funding: *Federal:* \$84,000

Assessment: The objective of the project was to evaluate whether there is a bias in angler reporting of the number of fish released in dockside sampling of sport harvest. In order to achieve this goal, an independent estimate of the number of fish retained and released was generated from data collected during direct, on-the-water observations of the fisheries. (A sample data form is shown on the next page.) The sport fishery encounter rate for non-target species was estimated during the 1997 sport fishing season in the Strait of Juan De Fuca and Puget Sound. In most cases, the species composition of the catch from direct, on-the-water observations was not statistically different from that reported by samplers conducting dockside interviews of angler catch. Observed angler hook-ups resulted in salmon being brought to the boat about 79% of the time. Approximately 14% of the observed hook-ups resulted in drop-offs. The

remainder of the hook-ups were bottomfish, mackerel, and a small number of seabirds. Marine mammal interactions were below the detection rate of these studies.

Date: / /									
CRC Area									
Location									
Boat Crew									
Sample #	Outcome	Direct observed	Observer Species ID	Size	Reason for Release	Angler Species ID	Bird Condition	Hook	Comments
Sequential	Retained	Yes	1=chinook	Legal	Not legal	1=chinook	Alive	Removed	As appropriate
	Released	No	2=chum	Sub-legal	Sub-legal size	2=chum	Dead	Not removed	
	Drop-off		3=pink		Too small	3=pink			
			4=coho		Not desired	4=coho			

Sample encounter and release data form

Grantee: Oregon Department of Fish and Wildlife
 Project No.: 97-NW-04 NMFS Contact: F/NWR
 Project Title: Pinniped-Salmonid Co-Occurrence: Assessment of Potential Impacts of Pinnipeds on Salmonids in Selected Estuaries
 Funding: Federal: \$120,000

Assessment: The objective of the project was to determine where and if management actions are needed to reduce or eliminate pinniped predation impacts on west coast salmonids. The Alsea River and Rogue River systems were chosen to test research methodologies and to estimate the consumption of salmonids by pinnipeds, particularly on coho salmon in these areas. Predation observations, collection of harbor seal scat samples for food habits analysis, counts of pinnipeds at haul out sites were collected three month period during 1997. On the Alsea River, only one predation event was recorded during the 330 observation periods. On the Rogue River, 40 predation events were recorded during the 490 observation periods. Prey remains were found in 87% of the scat samples on the Alsea River (selected Alsea River scat sample results shown on the next page) and 94% of the scat samples taken from the Rogue River. Over 20 species of fish and cephalopods were identified in the analyses of samples in each river. California sea lions tended to be more aggressive and obvious while killing and consuming salmonids, while Harbor seals were noticeably more secretive in preying on salmon. Early, heavy fall rains may have contributed to the low numbers of predation events observed on the Alsea River.

<u>Prey Species</u>	<u>% Frequency of Occurrence</u>	<u>Minimum # Individuals</u>
Salmonid Total	9.5	6
Salmonid Adult	9.5	6
Flatfish	27.0	20
Pacific Herring	25.4	28
Rex Sole	22.2	24
Fish unid.	22.2	na
English Sole	19.0	31
Pacific Tomcod	15.9	19
Pacific Staghorn Sculpin	9.5	9
Pacific Sanddab	6.3	8
Poacher	6.3	4
Starry Flounder	4.8	8
Octopus	3.2	5
Rockfish	3.2	2
Smelt	3.2	2
Herring/Shad	1.6	1
Lingcod	1.6	1
Northern Anchovy	1.6	1
Pacific Lanprey	1.6	1
Pacific Mackerel	1.6	1
Peamouth	1.6	1

Prey species identified from Pacific harbor seal scat (fecal) samples (n=63) collected during October 1997 at the Alsea River lower estuary haul-out sites

Project No.: 97-SW-04

NMFS Contact: F/SWR

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

Funding: Federal: \$113,000

Assessment: The identification rockfish larvae archived in the California Cooperative Oceanic Fisheries Investigations (CalCOFI) ichthyoplankton collection was completed, and data were analyzed. Continuous time series were constructed for four species (*Sebastes paucispinis*, *S. levis*, *S. jordani*, and *S. aurora*), and a partial time series was completed for *S. diploproa*. The data for *S. levis*, the cowcod, was used in a population assessment for that species submitted to the Pacific Fisheries Management Council. The larval data proved to be critical in the construction of a population model for that species, which is considered threatened. A stock rebuilding plan is now being formulated for this species. The results of the study were communicated in a paper given by the investigator at the annual CalCOFI conference held at the Scripps Institution in November 1999. A manuscript analyzing the distribution and abundance of the rockfish larvae identified under this grant, as well as larvae identified previous and subsequent to the grant, was completed and accepted for publication in *California Cooperative Oceanic Fisheries Investigations Reports*. Project funds were insufficient to completed the identification of *S. diploproa* larvae for the years 1972–1986.

Project No.: 97-SF-01 **NMFS Contact:** F/SF2
Project Title: The Federal Role in Subsidizing and Otherwise Influencing Harvesting Capacity in U.S. Fisheries
Funding: **Federal:** \$190,953

Assessment: The 1996 Sustainable Fisheries Act included a provision for a Task Force to study the role of the federal government in investment decisions in fisheries managed under the Magnuson-Stevens Fishery Conservation and Management Act. The Task Force in its *Report to Congress* (available online at <http://www.nmfs.gov/sfa/ITF.html>) concluded that federal subsidies and other federal fisheries programs (i.e., development, marketing, and promotion) have had a direct role in the build-up of capital and capacity in some U.S. fisheries. This impact, however, is impossible to quantify in any exact way. The Task Force recommended that the federal government limit the funding of such programs to be consistent with conservation-oriented national policy goals. In particular, priorities for federal tax, lending, and grants programs should avoid exacerbating the overcapacity problem now facing the nation's fisheries. The Task Force also recommended that when legislation establishes or funds programs affecting the fishing industry, part of the mandate and budget authorization shall place proper emphasis on the generation of adequate data to permit the quantitative evaluation of the capacity and subsidy effects of the program.

FISHERIES BYCATCH

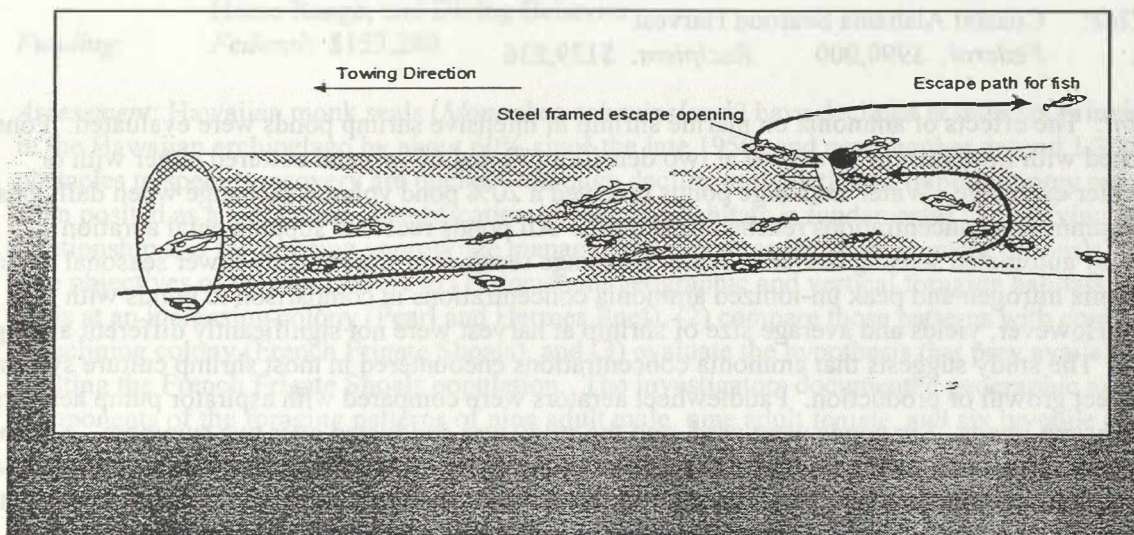
Project No.: 97-NW-14 **NMFS Contact:** F/NWR
Project Title: Reduction of Bycatch in the West Coast Prawn Trawl Fisheries
Funding: **Federal:** \$168,568

Assessment: This grant focused on evaluation of three methods (the Nordmore grid, a separator panel, and a "fish eye" [see next page]) for excluding bycatch species in the West Coast fisheries for spot prawns *Pandalus platyceros*. Bycatch in the prawn trawl fishery is a critical problem because many of the bycatch stocks, including several species of rockfish *Sebastes sp.*, are potentially overfished. Evaluation of the three excluders provided a great deal of information about the excluders' suitability in this fishery. Although none of the devices excluded the bycatch efficiently, evaluation of these excluders provided enough information about performance to suggest a type of gear that would effectively reduce the volume of bycatch without risk of loss of the target species. Funding from this grant allowed completion of a one-year research project that, although not definitely providing the solution to the proposed problem, provided a great deal of information and proposed a solution that can be pursued in subsequent research projects.

Project No.: 87-5W-03

Project Title: Characterization of the

Fish eye



PRODUCT QUALITY AND SAFETY

Grantee: University of North Carolina, Charlotte, NC

Grant No: NA36FD0271 **NMFS Contact:** F/SF2

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

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

Assessment: The goal of this project was to develop methods for the differentiation and enumeration of *Vibrio vulnificus* cells present in the environment in the “viable but nonculturable” (VBNC) state. The investigator completed all of this project’s major goals, including successfully conducting studies on the detection and characterization of VBNC-specific cold shock proteins. Although the investigator submitted draft reports, the S-K Program does not expect to receive a final report for this project.

AQUACULTURE

Grantee: Auburn University, Auburn, AL
Grant No.: NA66RG0206 *NMFS Contact:* F/SF2
Project Title: Coastal Alabama Seafood Harvest
Funding: *Federal:* \$990,000 *Recipient:* \$139,836

Assessment: The effects of ammonia on marine shrimp in intensive shrimp ponds were evaluated. Ponds were stocked with *Litopenaeus vannamei* at two densities (33 and 66/m²) and cultured either with or without water exchange. Water exchange ponds received a 20% pond volume exchange when daily peak un-ionized ammonia concentrations reached 0.20 mg/L. All ponds received supplemental aeration controlled by automated sensing devices. Water exchange resulted in significantly lower seasonal mean total ammonia nitrogen and peak un-ionized ammonia concentrations in comparison to ponds with no exchange. However, yields and average size of shrimp at harvest were not significantly different among treatments. The study suggests that ammonia concentrations encountered in most shrimp culture systems will not affect growth or production. Paddlewheel aerators were compared with aspirator pump aerators for use in shrimp ponds. Six ponds were used, and the study was conducted over two summers. A higher total yield in paddlewheel-treatment ponds resulted from significantly higher shrimp survivals compared to shrimp in aspirator pump treatment. Specifically, use of paddlewheels produced 5,915 shrimp/ha with 100% survival at a 17g mean weight. The aspirator pumps used significantly more electricity than the paddlewheel aerators to maintain the same dissolved oxygen saturation. Water quality variables were not significantly different between treatments in the first run, but total and un-ionized ammonia were significantly higher in ponds in the paddlewheel treatment during the second experiment. The bait fish demonstration farm focused on bull minnow (*Fundulus grandis*, gulf killifish). The production strategy utilized a two-pond rotation system for spawning, egg hatching, fry production, and final grow-out. This project provided assistance in the areas of curriculum development, equipment selection, fish for grow-out, and follow-up trouble shooting to a high school in a traditional fishing community (Bayou LaBatre) to help establish an aquaculture program. The high school aquaculture project in Bayou LaBatre is a model for the entire Southeast region.

Project No.: 96-SE-OX *NMFS Contact:* F/SF2
Project Title: Shellfish Disease and Pathology
Funding: *Federal:* \$15,000

Assessment: This project funded travel costs for two investigators to collect samples in aquaculture facilities in Charleston, SC, in response to an outbreak of shellfish disease. The investigators collected hundreds of samples, some of which were sent to a laboratory at the University of Arizona for analysis. Analysis found that a white spot-type virus was present in the aquaculture facilities from which samples were collected. This project also funded three weeks of training in shellfish disease and pathology for the two investigators at the University of Arizona.

HABITAT CONSERVATION

Project No.: 97-SW-03 *NMFS Contact:* F/SWR
Project Title: Characterization of Hawaiian Monk Seal (*Monachus schauinslandi*) Pelagic Habitat, Home Range, and Diving Behavior
Funding: *Federal:* \$153,280

Assessment: Hawaiian monk seals (*Monachus schauinslandi*) have declined at their six principal colonies in the Hawaiian archipelago by about 60% since the late 1950s and now number around 1,300–1,400. The obstacles to species recovery are unclear, although decline or depletion of important prey resources has been posited as a key factor. Identification of foraging habitats is fundamental to clarifying that relationship and formulating appropriate management measures that may promote the seals' recovery. The objectives of this study were to (1) document geographic and vertical foraging habitats used by monk seals at an increasing colony (Pearl and Hermes Reef), (2) compare those patterns with comparable data at a declining colony (French Frigate Shoals), and (3) evaluate the hypothesis that prey availability is limiting the French Frigate Shoals population. The investigators documented geographic and vertical components of the foraging patterns of nine adult male, nine adult female, and six juvenile (five male and one female) Hawaiian monk seals at Pearl and Hermes Reef from November 1997 through September 1998 using satellite-linked telemetry. Seals at Pearl and Hermes Reef foraged mostly in relatively shallow (8–40 m) waters within or on the outer slope of the atoll, rarely ranging more than a few kilometers away. Moreover, seals segregated by age and sex when foraging within this small atoll. In contrast, earlier studies reported that seals at French Frigate Shoals foraged deeper and further away (up to 217 km from haulout sites) and did not generally segregate. These data support the hypothesis that prey resources may be more dispersed and perhaps less abundant at French Frigate Shoals. The data also highlight the importance of, and critical need for, spatial and temporal details of the foraging patterns of Hawaiian monk seals, particularly of young seals, at various colonies for strategic conservation and management.

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

Alicia E. Jerboe, National Marine Fisheries Service (FWSR)
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APPENDIX I

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5 United States Code Appendix Section 2 et seq., and the General Services Administration (GSA) rule on Federal Advisory Committee Management, Title 41 Code of Federal Regulations subpart 101-6.10, the Secretary of Commerce has determined that the establishment of the Advanced Technology Program (ATP) Advisory Committee (the "Committee") is in the public interest in connection with the performance of duties imposed on the Department by law.

The Committee will advise the Director of the National Institute of Standards and Technology (NIST) on ATP programs, plans, and policies.

The Committee will consist of not fewer than six nor more than twelve members appointed by the Director of NIST and its membership will be balanced to reflect the wide diversity of technical disciplines and industrial sectors represented in ATP projects. NIST invites and requests nominations of individuals for appointment to the Committee.

The Committee will function solely as an advisory body, in compliance with the provision of the Federal Advisory Committee Act.

Authority: Federal Advisory Committee Act: 5 U.S.C. App. 2 and General Services Administration Rule: 41 CFR subpart 101-6.10.

Dated: June 14, 1999.

Karen H. Brown,

Deputy Director.

[FR Doc. 99-15584 Filed 6-18-99; 8:45 am]

BILLING CODE 3510-13-M

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[Docket No. 960223046-9151-04; I.D. 050799B]

RIN 0648-ZA09

Financial Assistance for Research and Development Projects to Strengthen and Develop the U.S. Fishing Industry

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Notice of solicitation for applications.

SUMMARY: NMFS (hereinafter referred to as "we" or "us") issues this document to describe how you, the applicant, can apply for funding under the Saltonstall-Kennedy (S-K) Grant Program and how we will determine whether to fund your proposal.

Under the S-K Program, we provide financial assistance for research and development projects that address various aspects of U.S. fisheries (commercial or recreational), including, but not limited to, harvesting, processing, marketing, and associated infrastructures.

DATES: We must receive your application by close of business August 20, 1999, in one of the offices listed in section I.E. Applications Addresses of this document. You must submit one signed original and nine signed copies of the completed application (including supporting information). We will not accept facsimile applications.

ADDRESSES: You can obtain an application package from, and send your completed application(s) to, the NMFS Regional Administrator located at any of the offices listed in section I.E. Applications Addresses of this document.

FOR FURTHER INFORMATION CONTACT: Alicia L. Jarboe, S-K Program Manager, (301) 713-2358.

SUPPLEMENTARY INFORMATION:

I. Introduction

A. Background

The Saltonstall-Kennedy Act (S-K Act), as amended (15 U.S.C. 713c-3), established a fund (known as the S-K fund) that the Secretary of Commerce uses to provide grants or cooperative agreements for fisheries research and development projects addressed to any aspect of U.S. fisheries, including, but not limited to, harvesting, processing, marketing, and associated infrastructures. U.S. fisheries¹ include any fishery, commercial or recreational, that is or may be engaged in by citizens or nationals of the United States, or citizens of the Northern Mariana Islands, the Republic of the Marshall Islands, Republic of Palau, and the Federated States of Micronesia.

The objectives of the S-K Grant Program, and therefore the funding priorities, have changed over the years since the program began in 1980. The original focus of the program was to develop underutilized fisheries within the U.S. Exclusive Economic Zone (EEZ).

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), originally passed in 1976, directed us to

give the domestic fishing industry priority access to the fishery resources in the EEZ.

To accelerate development of domestic fisheries, the American Fisheries Promotion Act of 1980 amended the S-K Act to stimulate commercial and recreational fishing efforts in underutilized fisheries.

In the following years, the efforts to Americanize the fisheries were successful to the point that most nontraditional species were fully developed and some traditional fisheries became overfished. Therefore, we changed the emphasis of the S-K Program to resource conservation and management. Funding priorities included a range of conservation and management issues and aquaculture.

In 1996, the Sustainable Fisheries Act (SFA) (Pub. L. 104-297), was enacted. The SFA amended the Magnuson-Stevens Act and supported further adjustment to the S-K Program to address the current condition of fisheries.

The Magnuson-Stevens Act, as amended by the SFA, requires us to undertake efforts to prevent overfishing, rebuild overfished fisheries, insure conservation, protect essential fish habitats, and realize the full potential of U.S. fishery resources. It further requires that we take into account the importance of fishery resources to fishing communities; provide for the sustained participation of such communities; and, to the extent possible, minimize the adverse economic impacts of conservation and management measures on such communities. The Magnuson-Stevens Act defines a "fishing community" as "a community which is substantially dependent on or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, and crew and United States fish processors that are based in such community." (16 U.S.C. 1802 (16)).

The NOAA Strategic Plan, updated in 1998, has three goals under its Environmental Stewardship Mission: Build Sustainable Fisheries (BSF), Recover Protected Species, and Sustain Healthy Coasts. The S-K Program supports fisheries research and development activities that directly relate to the BSF goal.

The revised objectives for BSF, consistent with the Magnuson-Stevens Act, are:

1. Eliminate and prevent overfishing and overcapitalization.
2. Attain economic sustainability in fishing communities.

¹For purposes of this document, a fishery is defined as one or more stocks of fish, including tuna, and shellfish that are identified as a unit based on geographic, scientific, technical, recreational and economic characteristics, and any and all phases of fishing for such stocks. Examples of a fishery are Alaskan groundfish, Pacific whiting, New England whiting, and eastern oysters.

3. Develop environmentally and economically sound marine aquaculture.

Our goal for the FY 2000 S-K Grant Program announced in this document is to address the needs of fishing communities in terms of the preceding BSF objectives. This goal is reflected in the funding priorities listed in section II of this document. Successful applications will be those aimed at helping fishing communities to resolve issues that affect their ability to fish; make full use of those species that are currently under Federal or state fishery management plans (FMPs) and cultured species; and address the socioeconomic impacts of overfishing and overcapitalization.

The S-K Program is open to applicants from a variety of sectors, including industry, academia, and state and local governments. However, the scope of this program is limited to marine species and Great Lakes species.

B. Changes from the Last Solicitation Notice

We have changed some of the conditions and procedures in this document from the last S-K Grant Program solicitation notice published on March 2, 1998 (63 FR 10191). Therefore, we encourage you to read the entire document before preparing your application.

C. Funding

We are soliciting applications for Federal assistance, pursuant to 15 U.S.C. 713c-3(c). This document describes how you can apply for funding under the S-K Grant Program, and how we will determine which applications we will fund.

Funding for projects depends on an allocation of funds by Congress for the S-K Grant Program in Fiscal Year (FY) 2000, which begins on October 1, 1999. We expect about \$1.5 million to be available for FY 2000. We cannot guarantee that sufficient funds will be available to make awards for all approved applications submitted under this program.

In order to be funded under the S-K Grant Program, applications must propose activities that: address the funding priorities listed in section II of this document; are expected to produce a direct benefit (e.g., tool, information, service, or technology) to the fishing community (as defined in section I.A. of this document); and can be accomplished within 18 months. Acceptable research and development activities include applied research, demonstration projects, pilot or field testing, or business plan development.

However, we will not fund projects that primarily involve infrastructure construction, port and harbor development, or start-up or operational costs for private business ventures. Furthermore, if your proposed project primarily involves data collection, it must be directed to a specific problem or need and be of a fixed duration, not of a continuing nature, in order to be considered.

D. Catalog of Federal Domestic Assistance

The S-K Grant Program is listed in the "Catalogue of Federal Domestic Assistance" under number 11.427, Fisheries Development and Utilization Research and Development Grants and Cooperative Agreements Program.

E. Applications Addresses

Northeast Region, NMFS, One Blackburn Drive, Gloucester, MA 01930; (978) 281-9267.

Southeast Region, NMFS, 9721 Executive Center Drive, North, St. Petersburg, FL 33702-2432, (727) 570-5324.

Southwest Region, NMFS, 501 West Ocean Boulevard, Suite 4200, Long Beach, CA 90802-4213, (562) 980-4033.

Northwest Region, NMFS, 7600 Sand Point Way, NE., BIN C15700, Building 1, Seattle, WA 98115, (206) 526-6115.

Alaska Region, NMFS, P.O. Box 21668, Juneau, AK 99802 or Federal Building, 709 West 9th Street, 4th Floor, Juneau, AK 99801-1668, (907) 586-7224.

F. Electronic Access Addresses

This solicitation and the application package are available on the NMFS S-K Home Page at: www.nmfs.gov/sfweb/skhome.html.

The 1998 updated Executive Summary of the NOAA Strategic Plan is available at: www.strategic.noaa.gov/ and the Magnuson-Stevens Act is available at: www.nmfs.gov/sfa/magact/

The list of species that are currently under Federal FMPs is in the publication, *Status of Fisheries of the United States*, available at: www.nmfs.gov/sfa/reports.html.

II. Funding Priorities

Your proposal must address one of the priorities listed below as they pertain to marine or Great Lakes species. If you select more than one priority, you should list first on your application the priority that most closely reflects the objectives of your proposal.

If we do not receive proposals that adequately respond to the priorities listed, we may use S-K funds to carry

out a national program of research and development addressed to aspects of U.S. fisheries pursuant to section 713c-3(d) of the S-K Act, as amended.

The priorities are not listed in any particular order and each is of equal importance.

A. Conservation Engineering

Reduce or eliminate adverse interactions (that affect fishing activity) between fishing operations and nontargeted, protected, or prohibited species (e.g., juvenile or sublegal-sized fish and shellfish, females of certain crabs, Endangered Species Act (ESA)-listed fish, marine turtles, seabirds, or marine mammals), including the inadvertent take, capture, or destruction of such species.

Improve the survivability of fish discarded or intentionally released and of protected species released in fishing operations.

Reduce or eliminate impacts of fishing activity on essential fish habitat that adversely affect the sustainability of the fishery.

B. Optimum Utilization of Fishery Resources Currently under Federal or State Management, and Cultured Species

Reduce or eliminate technical barriers to trade.

Minimize harvest losses.

Develop usable products from economic discards (whole fish discarded because they are an undesirable species, size, or sex, or parts of fish discarded as not commercially useful) and byproducts of processing.

C. Fishing Community Transition

Help fishing communities to address the socioeconomic effects of overfishing and overcapitalized fisheries through such activities as planning and demonstration projects. Specific areas for these activities could include retraining of fishermen for alternative employment, alternative uses for existing fishing industry infrastructure, and planning for fishing capacity reduction. Activities may complement, but should not duplicate, programs available from other Federal, state, or local agencies.

D. Marine Aquaculture in the Off-Shore Environment

Advance the implementation of marine aquaculture in the off-shore environment (i.e., the EEZ) by addressing technical aspects such as systems engineering, environmental compatibility, and culture technology. Applications should demonstrate that

the goal is to support off-shore industry development.

Reduce or eliminate legal and social barriers to off-shore aquaculture development, e.g., legal constraints, use conflicts, exclusionary mapping, appropriate institutional roles.

III. How to Apply

A. Eligibility

To apply for grants or cooperative agreements, you must follow the instructions in this document. You are eligible to apply if:

1. You are a citizen or national of the United States;

2. You are a citizen of the Northern Mariana Islands (NMI), being an individual who qualifies as such under section 8 of the Schedule on Transitional Matters attached to the constitution of the NMI;

3. You are a citizen of the Republic of the Marshall Islands, Republic of Palau, or the Federated States of Micronesia; or

4. You represent an entity that is a corporation, partnership, association, or other non-Federal entity, non-profit or otherwise (including Indian tribes), if such entity is a citizen of the United States or NMI, within the meaning of section 2 of the Shipping Act, 1916, as amended (46 U.S.C. app. 802).

We support cultural and gender diversity in our programs and encourage women and minority individuals and groups to submit applications. Furthermore, we recognize the interest of the Secretaries of Commerce and Interior in defining appropriate fisheries policies and programs that meet the needs of the U.S. insular areas, so we also encourage applications from individuals, government entities, and businesses in U.S. insular areas.

We encourage applications from members of the fishing community, and applications that involve fishing community cooperation and participation. We will consider the extent of fishing community involvement when evaluating the potential benefit of funding a proposal.

You are not eligible to submit an application under this program if you are an employee of any Federal agency; a Regional Fishery Management Council (Council); or an employee of a Council. However, Council members who are not Federal employees can submit an application to the S-K Program.

Our employees, including full-time, part-time, and intermittent personnel, are not allowed to help you prepare your application, except to provide you with information on program goals, funding priorities, application procedures, and completion of

application forms. Since this is a competitive program, we will not provide assistance in conceptualizing, developing, or structuring proposals, or write letters of support for a proposal.

B. Duration and Terms of Funding

We will award grants or cooperative agreements for a maximum period of 18 months.

We do not fund multi-year projects under the S-K Program. If we select your application for funding and you wish to continue work on the project beyond the funding period, you must submit another proposal to the competitive process for consideration, and you will not receive preferential treatment.

If we select your application for funding, we have no obligation to provide any additional future funding in connection with that award. Renewal of an award to increase funding or extend the period of performance is totally at our discretion.

Even though we are publishing this announcement we are not required to award any specific grant or cooperative agreement, nor are we required to obligate any part or the entire amount of funds available.

C. Cost Sharing

We are requiring cost sharing in order to leverage the limited funds available for this program and to encourage partnerships among government, industry, and academia to address the needs of fishing communities. You must provide a minimum cost share of 10 percent of total project costs, but your cost share must not exceed 50 percent of total costs. (For example, if the proposed total budget for your project is \$100,000, you must contribute at least \$10,000, but no more than \$50,000, toward the total costs. Accordingly, the Federal share you apply for would range from \$50,000 to \$90,000.) If your application does not comply with these cost share requirements, we will return it to you and will not consider it for funding. The funds you provide as cost sharing may include funds from private sources or from state or local governments, or the value of in-kind contributions. You may not use Federal funds to meet the cost sharing requirement except as provided by Federal statute. In-kind contributions are non-cash contributions provided by you as the applicant or by non-Federal third parties. In-kind contributions may include but are not limited to, personal services volunteered to perform tasks in the project, and permission to use, at no cost, real or personal property owned by others.

We will determine the appropriateness of all cost sharing proposals, including the valuation of in-kind contributions, on the basis of guidance provided in 15 CFR parts 14 and 24. In general, the value of in-kind services or property you use to fulfill your cost share will be the fair market value of the services or property. Thus, the value is equivalent to the cost for you to obtain such services or property if they had not been donated. You must document the in-kind services or property you will use to fulfill your cost share.

If we decide to fund your application, we will require you to account for the total amount of cost share included in the award document.

D. Format

Your application must be complete and must follow the format described here. Your application should not be bound in any manner and must be printed on one side only. You must submit one signed original and nine signed copies of your application.

1. Cover Sheet

You must use Office of Management and Budget (OMB) Standard Form 424 and 424B (4-92) as the cover sheet for each project. (In order to complete item 16 of Standard Form 424, see section V.A.5. of this document.)

2. Project Summary

You must complete NOAA Form 88-204 (10-98), Project Summary, for each project. You must list on the Project Summary the specific priority to which the application responds (see section II. of this document).

3. Project Budget

You must submit a budget for each project, using NOAA Form 88-205 (10-98), Project Budget and associated instructions. You must provide detailed cost estimates showing total project costs. Indicate the breakdown of costs between Federal and non-Federal shares, divided into cash and in-kind contributions. To support the budget, describe briefly the basis for estimating the value of the cost sharing derived from in-kind contributions. Specify estimates of the direct costs in the categories listed on the Project Budget form.

You may also include in the budget an amount for indirect costs if you have an established indirect cost rate with the Federal government. For this solicitation, the total dollar amount of the indirect costs you propose in your application must not exceed the indirect cost rate negotiated and approved by a cognizant Federal agency prior to the proposed effective date of the award, or 100 percent of the total proposed direct

costs dollar amount in the application, whichever is less. The Federal share of the indirect costs may not exceed 25 percent of the total proposed direct costs. If you have an approved indirect cost rate above 25 percent of the total proposed direct cost, you may use the amount above the 25-percent level up to the 100-percent level as part of the non-Federal share. You must include a copy of the current, approved, negotiated indirect cost agreement with the Federal government with your application.

We will not consider fees or profits as allowable costs in your application.

The total costs of a project consist of all allowable costs you incur, including the value of in-kind contributions, in accomplishing project objectives during the life of the project. A project begins on the effective date of an award agreement between you and an authorized representative of the U.S. Government and ends on the date specified in the award. Accordingly, we cannot reimburse you for time that you expend or costs that you incur in developing a project or preparing the application, or in any discussions or negotiations you may have with us prior to the award. We will not accept such expenditures as part of your cost share.

4. Narrative Project Description

You must provide a narrative description of your project that may be up to 15 pages long. The narrative should demonstrate your knowledge of the need for the project, and show how your proposal builds upon any past and current work in the subject area, as well as relevant work in related fields. You should not assume that we already know the relative merits of the project you describe. You must describe your project as follows:

a. Project goals and objectives. Identify the specific priority listed earlier in the solicitation to which the proposed project responds. Identify the problem/opportunity you intend to address and describe its significance to the fishing community. State what you expect the project to accomplish.

If you are applying to continue a project we previously funded under the S-K Program, describe in detail your progress to date and explain why you need additional funding. We will consider this information in evaluating your current application.

b. Project impacts. Describe the anticipated impacts of the project on the fishing community in terms of reduced bycatch, increased product yield, or other measurable benefits. Describe how you will make the results of the project available to the public.

c. Evaluation of project. Specify the criteria and procedures that you will use to evaluate the relative success or failure of a project in achieving its objectives.

d. Need for government financial assistance. Explain why you need government financial assistance for the proposed work. List all other sources of funding you have or are seeking for the project.

e. Federal, state, and local government activities and permits. List any existing Federal, state, or local government programs or activities that this project would affect, including activities requiring: certification under state Coastal Zone Management Plans; section 404 or section 10 permits issued by the Corps of Engineers; experimental fishing or other permits under FMPs; environmental impact statements to meet the requirements of the National Environmental Policy Act; or scientific permits under ESA and/or the Marine Mammal Protection Act. Describe the relationship between the project and these FMPs or activities, and list names and addresses of persons providing this information. If we select your project for funding, you are responsible for complying with all applicable requirements.

f. Project statement of work. The statement of work is an action plan of activities you will conduct during the period of the project. You must prepare a detailed narrative, fully describing the work you will perform to achieve the project goals and objectives. The narrative should respond to the following questions:

(1) What is the project design? What specific work, activities, procedures, statistical design, or analytical methods will you undertake?

(2) Who will be responsible for carrying out the various activities? (Highlight work that will be subcontracted and provisions for competitive subcontracting.)

(3) What are the major products? You must include milestones, describing the specific activities and associated time lines to conduct the scope of work. Describe the time lines in increments (e.g., month 1, month 2), rather than by specific dates. You must identify the individual(s) responsible for the various specific activities.

This information is critical for us to conduct a thorough review of your application, so we encourage you to provide sufficient detail.

g. Participation by persons or groups other than the applicant. Describe how government and non-government entities, particularly members of fishing communities, will participate in the project, and the nature of their

participation. We will consider the degree of participation by members of the fishing community in determining which applications to fund.

h. Project management. Describe how the project will be organized and managed. Identify the principal participants in the project. If you do not identify the principal investigator, we will return your application without further consideration. Include copies of any agreements between you and the participants describing the specific tasks to be performed. Provide a statement of the qualifications and experience (e.g., resume or curriculum vitae) of the principal investigator(s) and any consultants and/or subcontractors, and indicate their level of involvement in the project. If any portion of the project will be conducted through consultants and/or subcontracts, you must follow procurement guidance in 15 CFR part 24, "Grants and Cooperative Agreements to State and Local Governments," and 15 CFR part 14, "Uniform Administrative Requirements for Grants and Agreements with Institutions of Higher Education, Hospitals, Other Non-Profit, and Commercial Organizations." If you select a consultant and/or a subcontractor prior to submitting an application, indicate the process that you used for selection.

5. Supporting Documentation
You should include any relevant documents and additional information (i.e. maps, background documents) that will help us to understand the project and the problem/opportunity you seek to address.

IV. Screening, Evaluation, and Selection Procedures

A. Initial Screening of Applications

When we receive applications at any of the NMFS Regional Offices, we will first screen them to ensure that they were received by the deadline date (see DATES); include OMB form 424 signed and dated by an authorized representative (see section III.D. of this document); were submitted by an eligible applicant (see section III.A. of this document); provide for at least a 10-percent cost share but not more than 50 percent (see section III.C. of this document); involve an eligible activity (see section I.C. of this document); address one of the funding priorities in this document for marine and Great Lakes species (see section II.A.-D. of this document); and include a budget, statement of work, and milestones, and identify the principal investigator (see sections III.D.3. and III.D.4. of this document). If your application does not

conform to these requirements and the deadline for submission has passed, we will return it to you without further consideration.

We do not have to screen applications before the submission deadline, nor do we have to give you an opportunity to correct any deficiencies that cause your application to be rejected.

B. Evaluation of Proposed Projects

1. Technical Evaluation

After the initial screening, we will solicit individual evaluations of each project application from three or more appropriate private and public sector experts to determine the technical merit. These reviewers will be required to certify that they do not have a conflict of interest concerning the application(s) they are reviewing. They will assign scores ranging from a minimum of 60 (poor) to a maximum of 100 (excellent) to applications based on the following criteria, with weights shown in parentheses:

a. Soundness of project design/conceptual approach. Applications will be evaluated on the conceptual approach; the likelihood of project results in the time frame specified in the application; whether there is sufficient information to evaluate the project technically; and, if so, the strengths and/or weaknesses of the technical design relative to securing productive results. (50 percent)

b. Project management and experience and qualifications of personnel. The organization and management of the project will be evaluated. The project's principal investigator and other personnel, including consultants and contractors participating in the project, will be evaluated in terms of related experience and qualifications. Applications that include consultants and contractors will be reviewed to determine if your involvement, as the primary applicant, is necessary to the conduct of the project and the accomplishment of its objectives. (25 percent)

c. Project evaluation. The effectiveness of your proposed methods to monitor and evaluate the success or failure of the project in terms of meeting its original objectives will be examined. (10 percent)

d. Project costs. The justification and allocation of the budget in terms of the work to be performed will be evaluated. Unreasonably high or low project costs will be taken into account. (15 percent)

Following the technical review, we will determine the weighted score for each individual review and average the individual technical review scores to determine the final technical score for

each application. Then, we will rank applications in descending order by their final technical scores and determine a "cutoff" score that is based on the amount of funds available for grants. We will eliminate from further consideration those applications that scored below the cutoff.

2. Constituent Panel(s)

For those applications at or above the cutoff technical evaluation score, we will solicit individual comments and evaluations from a panel or panels of three or more representatives selected by the Assistant Administrator for Fisheries (AA). Panel members will be chosen from the fishing industry, state government, non-government organizations, and others, as appropriate. We will provide panelists with a summary of the technical evaluations, and, for applications to continue a previously funded project, information on progress on the funded work to date.

Each panelist will evaluate the applications in terms of the significance of the problem or opportunity being addressed, the degree of fishing community involvement in conducting the project, and the merits of funding each project. Each panelist will provide a rating from 0-4 (poor to excellent) for each project, and provide comments if they wish. Panel members will be required to certify that they do not have a conflict of interest and that they will maintain confidentiality of the panel deliberations.

Following the Constituent Panel meeting, we will average the individual ratings for each project. We will then develop a ranking of projects based on the individual ranks within each of the priority areas.

C. Selection Procedures and Project Funding

After projects have been evaluated and ranked, we will use this information, along with input from the NMFS Regional Administrators (RAs) and Office Directors (ODs), to develop recommendations for project funding. RAs/ODs will prepare a written justification for any recommendations for funding that fall outside the ranking order, or for any cost adjustments.

The AA will review the funding recommendations and comments of the RAs/ODs and determine the projects to be funded. In making the final selections, the AA may consider costs, geographical distribution, and duplication with other federally funded projects. Awards are not necessarily made to the highest ranked applications.

We will notify you in writing whether your application is selected or not. If

your application is unsuccessful, we will return it to you. Successful applications will be incorporated into the award document.

The exact amount of funds, the scope of work, and terms and conditions of a successful award will be determined in preaward negotiations between you and NOAA/NMFS representatives. The funding instrument (grant or cooperative agreement) will be determined by NOAA Grants. You should not initiate your project in expectation of Federal funding until you receive a grant award document signed by an authorized NOAA official.

V. Administrative Requirements

A. Your Obligations as an Applicant

You must:

1. Meet all application requirements and provide all information necessary for the evaluation of the proposal, including one signed original and nine signed copies of the application.

2. Be available to respond to questions during the review and evaluation of the proposal(s).

3. Submit a completed Form CD-511, "Certification Regarding Debarment, Suspension and Other Responsibility Matters; Drug-Free Workplace Requirements and Lobbying." The following explanations are provided:

a. Nonprocurement debarment and suspension. Prospective participants (as defined at 15 CFR 26.105) are subject to 15 CFR part 26, "Nonprocurement Debarment and Suspension" and the related section of the certification form prescribed above applies;

b. Drug-free workplace. Grantees (as defined at 15 CFR 26.605) are subject to 15 CFR part 26, subpart F, "Governmentwide Requirements for Drug-Free Workplace (Grants)," and the related section of the certification form prescribed above applies;

c. Anti-lobbying. Persons (as defined at 15 CFR 28.105) are subject to the lobbying provisions of 31 U.S.C. 1352, "Limitation on Use of Appropriated Funds to Influence Certain Federal Contracting and Financial Transactions," and the lobbying section of the certification form applies to applications/bids for grants, cooperative agreements, and contracts for more than \$100,000, and loans and loan guarantees for more than \$150,000; and

d. Anti-lobbying disclosures. Any applicant who has paid or will pay for lobbying using any funds must submit an SF-LLL, "Disclosure of Lobbying Activities," as required under 15 CFR part 28, appendix B.

4. If applicable, require applicants/bidders for subgrants, contracts,

subcontracts, or other lower tier covered transactions at any tier under the award to submit a completed Form CD-512, "Certifications Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion-Lower Tier Covered Transactions and Lobbying" and disclosure form SF-LLL, "Disclosure of Lobbying Activities." Form CD-512 is intended for your use and should not be sent to the Department of Commerce (Commerce). You should send an SF-LLL submitted by any tier recipient or subrecipient to Commerce only if your application is recommended for funding. Instructions will be contained in the award document. We will provide you with all required forms.

5. Complete Item 16 on Standard Form 424 (4-92) regarding clearance by the State Point Of Contact (SPOC) established as a result of E.O. 12372. You can get the list of SPOCs from any of the NMFS offices listed in this document or from the S-K Home Page (see section I.F. Electronic Access Addresses of this document). It is also included in the "Catalog of Federal Domestic Assistance." You must contact the SPOC, if your state has one, to see if applications to the S-K Program are subject to review. If SPOC clearance is required, you are responsible for getting that clearance in time to submit your application to the S-K Program by the deadline.

6. Complete Standard Form 424B (4-92), "Assurances—Non-construction Programs."

B. Your Obligations as a Successful Applicant (Recipient)

If you are selected to receive a grant award for a project, you must:

1. Manage the day-to-day operations of the project, be responsible for the performance of all activities for which funds are granted, and be responsible for the satisfaction of all administrative and managerial conditions imposed by the award.

2. Keep records sufficient to document any costs incurred under the award, and allow access to these records for audit and examination by the Secretary of Commerce, the Comptroller General of the United States, or their authorized representatives; and, submit financial status reports (SF 269) to GMD in accordance with the award conditions.

3. Submit semiannual project status reports on the use of funds and progress of the project to us within 30 days after the end of each 6-month period. You will submit these reports to the individual identified as the NMFS Program Officer in the funding agreement.

4. Submit a final report within 90 days after completion of each project to the NMFS Program Officer. The final report must describe the project and include an evaluation of the work you performed and the results and benefits in sufficient detail to enable us to assess the success of the completed project.

We are committed to using available technology to achieve the timely and wide distribution of final reports to those who would benefit from this information. Therefore, you are required to submit final reports in electronic format, in accordance with the award terms and conditions, for publication on the NMFS S-K Home Page. You may charge the costs associated with preparing and transmitting your final reports in electronic format to the grant award. We will consider requests for exemption from the electronic submission requirement on a case-by-case basis.

We will provide you with OMB-approved formats for the semiannual and final reports.

5. In addition to the final report in section V.B.4. of this document, we request that you submit any publications printed with grant funds (such as manuals, surveys, etc.) to the NMFS Program Officer for dissemination to the public. Submit either three hard copies or an electronic version of any such publications.

C. Other Requirements of Recipients

1. Federal Policies and Procedures
If you receive Federal funding, you are subject to all Federal laws and Federal and Commerce policies, regulations, and procedures applicable to financial assistance awards. You must comply with general provisions that apply to all recipients under Commerce grant and cooperative agreement programs.

2. Name Check Review
You may be subject to a name check review process. We use name checks to determine if you or any key individuals named in your application have been convicted of, or are presently facing, criminal charges such as fraud, theft, perjury, or other matters that significantly reflect on your management, honesty, or financial integrity.

3. Financial Management Certification/Preaward Accounting Survey

You may, at the discretion of the NOAA Grants Officer, be required to have your financial management systems certified by an independent public accountant as being in compliance with Federal standards specified in the applicable OMB

Circulars prior to execution of the award. If you are a first-time applicant for Federal grant funds, you may be subject to a preaward accounting survey by Commerce prior to execution of the award.

4. Past Performance

Unsatisfactory performance under prior Federal awards may result in an application not being considered for funding.

5. Delinquent Federal Debts

We will not award any Federal funds to you or any subrecipients who have an outstanding delinquent Federal debt or fine until either:

a. The delinquent account is paid in full,
b. A negotiated repayment schedule is established and at least one payment is received, or

c. Other arrangements satisfactory to Commerce are made.

6. Buy American

You are encouraged to the extent feasible to purchase American-made equipment and products with the funding provided under this program.

7. Preaward activities

If you incur any costs prior to receiving an award agreement signed by an authorized NOAA official, you do so solely at your own risk of not being reimbursed by the Government. Notwithstanding any verbal or written assurance that you may have received, there is no obligation on the part of Commerce to cover preaward costs.

8. False statements

A false statement on the application is grounds for denial or termination of funds and grounds for possible punishment by a fine or imprisonment (18 U.S.C. 1001).

Classification

Prior notice and an opportunity for public comments are not required by the Administrative Procedure Act or any other law for this notice concerning grants, benefits, and contracts.

Furthermore, a regulatory flexibility analysis is not required for purposes of the Regulatory Flexibility Act.

This action has been determined to be not significant for purposes of E.O. 12866.

Applications under this program are subject to Executive Order 12372, "Intergovernmental Review of Federal Programs."

This document contains collection-of-information requirements subject to the Paperwork Reduction Act (PRA). The collection of this information has been approved by OMB under control numbers 0348-0040, 0348-0043, 0348-0046, and 0648-0135. Notwithstanding any other provision of law, no person is

required to respond to, nor shall any person be subject to a penalty for failure to comply with, a collection of information subject to the requirements of the PRA unless that collection of information displays a currently valid OMB control number.

A solicitation for applications will also appear in the "Commerce Business Daily."

Dated: June 15, 1999.

Penelope D. Dalton,

Assistant Administrator for Fisheries,
National Marine Fisheries Service.

[FR Doc. 99-15723 Filed 6-18-99; 8:45 am]

BILLING CODE 3510-22-F

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

[I.D. 060899A]

Marine Mammals; File No. P466B

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Receipt of application for amendment.

SUMMARY: Notice is hereby given that Scott D. Kraus, Ph.D., Edgerton Research Laboratory, New England Aquarium, Central Wharf, Boston, MA 02110-3309, has requested an amendment to scientific research Permit No. 1014.

DATES: Written or telefaxed comments must be received on or before July 21, 1999.

ADDRESSES: The amendment request and related documents are available for review upon written request or by appointment in the following office(s):

Permits and Documentation Division, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13705, Silver Spring, MD 20910 (301/713-2289);

Regional Administrator, Northeast Region, NMFS, One Blackburn Drive, Gloucester, MA 01930, (978/281-9250); and

Regional Administrator, Southeast Region, NMFS, 9721 Executive Center Drive North, St. Petersburg, FL 33702-2432 (813/570-5312).

Written comments or requests for a public hearing on this request should be submitted to the Chief, Permits and Documentation Division, F/PR1, Office of Protected Resources, NMFS, 1315 East-West Highway, Room 13130, Silver Spring, MD 20910. Those individuals requesting a hearing should set forth the specific reasons why a hearing on this

particular amendment request would be appropriate.

Comments may also be submitted by facsimile at (301) 713-0376, provided the facsimile is confirmed by hard copy submitted by mail and postmarked no later than the closing date of the comment period. Please note that comments will not be accepted by e-mail or other electronic media.

FOR FURTHER INFORMATION CONTACT:
Ruth Johnson 301/713-2289.

SUPPLEMENTARY INFORMATION: The subject amendment to Permit No. 1014, issued on August 29, 1996 (61 FR 51688) is requested under the authority of the Marine Mammal Protection Act of 1972, as amended (16 U.S.C. 1361 *et seq.*), the Regulations Governing the Taking and Importing of Marine Mammals (50 CFR part 216), the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 *et seq.*), and the regulations governing the taking, importing, and exporting of endangered fish and wildlife (50 CFR parts 222-226).

Permit No. 1014 authorizes the permit holder to: take up to 350 northern right whales (*Eubaleana glacialis*) by harassment during approach closer than 100 feet by vessel or less than 1000 ft. by aircraft. Of these 80 may be biopsy darted; 10 radio tagged, 15 satellite tagged, and 50 ultrasonically measured; collect tissue samples dead stranded animals and exported to Canada, South Africa, New Zealand, Australia and England; and export 100 samples taken legally in other countries.

The permit holder requests an amendment to: play sounds back to up to 100 right whales annually. Sounds projected will not exceed the sound pressure levels found in the normal oceanic environment. Additionally, up to 50 whales will be tagged with suction-cup acoustic recording tags to determine received sound levels from both playback experiments and controlled vessel approaches.

In compliance with the National Environmental Policy Act of 1969 (42 U.S.C. 4321 *et seq.*), an initial determination has been made that the activity proposed is categorically excluded from the requirement to prepare an environmental assessment or environmental impact statement.

Concurrent with the publication of this notice in the Federal Register, NMFS is forwarding copies of this application to the Marine Mammal Commission and its Committee of Scientific Advisors.

Dated: June 10, 1999.

Ann D. Terbush,

Chief, Permits and Documentation Division,
Office of Protected Resources, National
Marine Fisheries Service.

[FR Doc. 99-15720 Filed 6-18-99; 8:45 am]

BILLING CODE 3510-22-F

DEPARTMENT OF COMMERCE

Patent and Trademark Office

[Docket No. 980326078-9120-02]

Internet Usage Policy

AGENCY: Patent and Trademark Office, Commerce.

ACTION: Notice.

SUMMARY: The Patent and Trademark Office (PTO) is publishing the final Internet usage policy to provide guidance to PTO employees regarding the use of the Internet for official PTO business. The policy covers communications with applicants via Internet electronic mail (e-mail), and using the Internet to search for information concerning patent applications and elements appearing in trademark applications. Guidelines for citing electronic information are provided in the attachment.

DATES: The Internet usage policy is effective June 21, 1999.

FOR FURTHER INFORMATION CONTACT: Magdalen Greenlief, by mail to her attention addressed to Box Comments—Patents, Assistant Commissioner for Patents, Washington, D.C. 20231; by telephone at (703) 305-8813; by facsimile transmission to (703) 305-8825; or by electronic mail through the Internet to "magdalen.greenlief@uspto.gov".

SUPPLEMENTARY INFORMATION: The PTO published a "Request for Comments on Proposed Internet Usage Policy" in the Federal Register on October 26, 1998 (63 FR 57101) and in the Official Gazette of the Patent and Trademark Office on November 17, 1998 (1216 OG 74). The proposed policy is being adopted without change. The attached guidelines for citing electronic information have been revised.

Discussion of Public Comments

Sixteen comments were received by the PTO in response to the request for comments. All comments have been fully considered. The comments generally support (1) the use of Internet e-mail for communications between applicant and the PTO, and (2) the use of the Internet to perform searches provided the confidentiality of pending patent applications is not compromised.

Region	Project Title	Responsible Organization	Federal Funding	Recipient's Cost Share
Alaska				
1.	Tools for Reducing Individual Fish and Species Wastage of Sharks and Sharks in Hook-and-Line Fisheries	University of Alaska, Fairbanks	1,000	400
2.	Utilization Options for Silver Cod	University of Alaska, Fairbanks	10,000	10,000
3.	Population Structure of Freighters, Shortnose, and Northern Pwalley Based on Analysis of Mitochondrial DNA Variation and Microsatellite Completion	University of Alaska, Fairbanks	10,000	10,000
			21,000	20,400
Northeast				
1.	Stress and Performance of Farmed Open Ocean Aquaculture	University of Massachusetts, Dartmouth	10,000	10,000
2.	Improvement of Oxidative Stability of Encapsulated Fish Oil in Fish Feed	University of Massachusetts, Dartmouth	10,000	10,000
3.	Community-Based Area Management Strategies and Capacity Building Programs for the Box Scallop Fishery	University of Massachusetts, Dartmouth	10,000	10,000
4.	Age of Loligo with Respect to Sexing, Location, and Depth	University of Massachusetts, Dartmouth	10,000	10,000
5.	Development of Off-Exchange Device for Northwest Atlantic Trawl Fisheries	University of Massachusetts, Dartmouth	11,000	10,000
6.	Industry Pilot to Evaluate the Feasibility of Selective Electrodes for Use as a Simple, Rapid Demersalization of Sealoff Ours	University of Massachusetts, Dartmouth	10,000	10,000
7.	Increasing Juvenile Cod Bypass Survival in a Northwest Atlantic Longline Fishery	University of Massachusetts, Dartmouth	10,000	10,000
			61,000	60,000
Northwest				
1.	Evaluate Tangle Nets for Selective Fishing	Washington Dept. of Fish and Wildlife, Olympia, WA	10,000	10,000

APPENDIX III

FY 2000 S-K Applications Recommended for Funding

<u>Region</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
Alaska				
1.	Tools for Reducing Inadvertent Take and Bycatch Wastage of Skates and Sharks in Hook-and-Line Fisheries	Fisheries Information Services Juneau, AK	3,400	850
2.	Utilization Options for Bitter Crab	University of Alaska Fairbanks Fairbanks, AK	76,669	16,111
3.	Population Structure of Rougheye, Shortraker, and Northern Rockfish Based on Analysis of Mitochondrial DNA Variation and Microsatellites: Completion	University of Alaska Fairbanks Fairbanks, AK	135,466	28,624
Sum			215,535	45,585
Northeast				
1.	Stress and Performance of Finfish in Open Ocean Aquaculture	University of Rhode Island Kingston, RI	69,979	13,548
2.	Improvement of Oxidative Stability of Encapsulated Fish Oil in Food Powders	University of MASS - Amherst Amherst, MA	92,073	33,798
3.	Community-Based Area Management Strategies and Capacity Reduction Programs for the Sea Scallop Industry	Virginia Institute of Marine Science Gloucester Point, VA	179,565	76,914
4.	Age of Loligo with Respect to Season, Location, and Depth	University of Rhode Island Narragansett, RI	48,007	9,294
5.	Development of Cod Excluder Devices for Northwest Atlantic Trawl Fisheries	Manomet, Inc Manomet, MA	71,500	40,600
6.	Industry Pilot to Evaluate the Ammonia Ion Selective Electrode for Use as a Simple, Rapid Determination of Seafood Quality	University of Rhode Island Kingston, RI	99,265	28,510
7.	Increasing Juvenile Cod Bycatch Survival in a Northwest Atlantic Longline Fishery	New England Aquarium Corp. Boston, MA	99,457	88,307
Sum			659,846	290,971
Northwest				
1.	Evaluate Tangle Nets for Selective Fishing	Washington Dept. of Fish and Wildlife Olympia, WA	78,377	23,468

FY 2000 S-K Applications Recommended for Funding

<u>Region</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
Northwest				
2.	Rock Scallop Culture in the Off-Shore Environment	Taylor Resources, Inc. Shelton, WA	91,179	54,938
3.	Probiotics to Increase Shellfish Hatchery Production	Pacific Shellfish Institute Olympia, WA	99,986	36,132
		Sum	269,542	114,538
Southeast				
1.	A histamine dipstick test for spoilage in fisheries products.	University of Southern Mississippi Hattiesburg, MS	57,023	23,723
2.	Development of Hatchery Technologies for Snapper	University of Texas at Austin Austin, TX	169,987	33,938
3.	Evaluation of an Alternative Harvesting Methodology for Horseshoe Crabs and Determination of Juvenile Life History Parameters in a Nursery Habitat	S.C. Department of Natural Resources Charleston, SC	52,994	5,998
4.	Assessment of Natal Origin and Stock Structure of Atlantic Bluefin Tuna Using Otolith Elemental Fingerprints	Texas A&M Research Foundation College Station, TX	61,165	18,334
		Sum	341,169	81,993
Southwest				
1.	A Device for Greatly Reducing Fishing Mortality for Protected Giant Seabass (<i>Stereolepis gigas</i>) and Jewfish (<i>Epinephelus itajara</i>).	Pfleger Institute of Env. Research Oceanside, CA	19,211	15,999
2.	Re-Training of Hawaiian Micronesian Fisherfolk as Pearl Culture Seeding Technicians	Black Pearls, Incorporated Holualoa, HI	97,903	29,880
3.	Development of Real-Time PCR Assays for Detection of White Spot Syndrome Virus, Yellow Head Virus, Taura Syndrome Virus, and Infectious Hypodermal and Hematopoietic Necrosis in Penaeid Shrimp	University of Arizona Tucson, AZ	75,393	47,671
		Sum	192,507	93,550

<u>Region</u>	<u>Project Title</u>	<u>Recipient Organization</u>	<u>Federal Funding</u>	<u>Recipient's Cost Share</u>
		Grand Total	1,678,599	626,637

APPENDIX IV

FY 2000 S-K Applications Not Recommended for Funding Page 4

Region	Project Title	Applicant	Requested Federal Funding	Applicant's Cost Share
Alaska	1. Development of a Field Techniques Manual for the Collection of Data on King Crab, Lithodes and Paralithodes	William E. Doolittle Dublin, IA	24,807	7,258
	2. Collection and Nursery Culture of Olive and Sea Cucumber Young Using Current-Driven, Unpowered Submersible Pipe Traps	Alaska Technical Sea Research Seward, AK	65,241	19,500
	3. Age and Growth, Demographics and Thermal Biology of Spiny Shards, <i>Lirina striata</i> , in Alaska Waters	Marine Institute of Alaska Glasgow, AK	125,541	43,976
	4. In-season and Post-season Substrate Surface Survey Project	Chukchi Sea Marine Council Ketchikan, AK	74,742	33,220
	5. The Quality of Commercial Fish Species Around Steller Sea Lion Habitats	Alaska Fisheries Research Program Eggenville, AK	67,978	19,311
	6. Evaluation of Effectiveness of Modifications to Bering Sea Snow Crab Fishing Gear on Catch of Legal Snow Crab, <i>Chionoecetes opilio</i> , Unintended Snow Crab, and Tanner Crab, <i>C. bairdi</i>	State of Alaska Anchorage, AK	200,944	52,240
	7. Testing and Development of Criteria to Quantify Chondrocytic <i>opilio</i> , <i>leardi</i> , and Their Hybrids	State of Alaska Anchorage, AK	42,967	21,039
	8. Underwater S.H.E.D. - Submersible Harvest & Economic Development in the Dive Fisheries of Southeast Alaska	University of Alaska (SEAFAC) Chugiak, AK	228,904	227,000
	9. Southwest Alaska Sperm Whale Avoidance Project	University of Alaska Southeast Sitka, AK	198,215	32,551
	10. Field Trials & Optimization of a Rapid Test to Detect Paralytic Shellfish Poisoning (PSP) in Bivalves & Water Samples	Southwest Alaska (SEAFAC) Wrangell, AK	61,000	30,520
	11. Seafloor Classification by Acoustic Methods to Define Areas of Extensive Fan Habitat and High Potential for Gear Damage and Loss	University of Massachusetts Boston, MA	164,000	23,114

APPENDIX IV

FY 2000 S-K Applications Not Recommended for Funding

Region	Project Title	Applicant	Requested Federal Funding	Applicant's Cost Share
Alaska				
	1. Development of a Field Techniques Manual for the Collection of Data on King Crabs, Lithodes and Paralithodes	William E. Donaldson Dublin, NH	29,800	7,055
	2. Collection and Nursery Culture of Clam and Sea Cucumber Young Using Current-Driven, Upweller/Downweller Pipe Traps	Alaska-Southeast Bio-Research Sitka, AK	95,844	18,500
	3. Age and Growth, Demographics and Thermal Biology of Salmon Sharks, Lamna ditropis, in Alaska Waters.	Virginia Institute of Marine Science Gloucester Point, VA	175,881	43,679
	4. In-season and Post-season Subsistence Salmon Survey Project	Orutsararmuit Native Council Bethel, AK	94,744	38,329
	5. The Quality of Commercial Fish Species Around Steller Sea Lion Haulouts	University of Alaska Fairbanks Fairbanks, AK	87,079	18,321
	6. Evaluation of Effectiveness of Modifications to Bering Sea Snow Crab Fishing Pots on Catch of Legal Snow Crab, Chionocetes opilio, Undersized Snow Crab, and Tanner Crab, C. bairdi	State of Alaska Juneau, AK	206,944	52,345
	7. Testing and Development of Criteria to Identify Chionocetes opilio, bairdi, and Their Hybrids	State of Alaska Juneau, AK	42,867	21,039
	8. Underwater S.H.E.D. - Sustainable Harvest & Economic Development in the Dive Fisheries of Southeast Alaska	Southeast Alaska (SARDFA) Wrangell, AK	228,564	227,000
	9. Southeast Alaska Sperm Whale Avoidance Project	University of Alaska Southeast Sitka, AK	158,215	53,561
	10. Field Trials & Optimization of a Rapid Test to Detect Paralytic Shellfish Poisoning (PSP) in Geoducks & Water Samples.	Southeast Alaska (SARDFA) Wrangell, AK	61,808	52,820
	11. Seafloor Classification by Acoustic Methods to Define Areas of Essential Fish Habitat and High Potential for Gear Damage and Loss.	University of Washington Seattle, WA	180,638	23,114

FY 2000 S-K Applications Not Recommended for Funding Page 2

<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funding</u>	<u>Applicant's Cost Share</u>
Alaska				
12.	Steller sea Lions and Commercial Fisheries: A Decision Support System Analysis	N. Pacific Marine Science Foundation Seattle, WA	62,670	50,530
13.	Management of Kvichak River Sockeye Salmon Cycle, Evaluating the New Management System	University of Washington Seattle, WA	132,127	15,129
14.	Relating Health and Condition of Alaskan Pinnipeds to Survival and Reproduction.	Patience Browne Seattle, WA	94,322	20,000
15.	Development and Testing of a Satellite-Linked Imaging Station for Remote Monitoring of Steller Sea Lion Rookeries.	Texas A&M Research Foundation College Station, TX	233,742	43,753
Sum			1,885,245	685,175

Northeast

1.	Aquaculture of Blue Mussels in the Unprotected Oceanic Environment	S & R. Marine Hampton, NH	58,260	48,500
2.	A Study to Preserve Herrings Indefinitely by a New Salting Process, to Create a Strategic Food Supply for National or International Emergency or Commerce and a Profitable Alternative to Ground Fishing for Whose Restrictions Many Fishermen are Suffering	Angelo G. Cefalu Dorchester, MA	15,000	3,000
3.	Stock Structure and Essential Habitat of Walleye and Yellow Perch Fisheries in the Great Lakes from DNA Markers	Case Western Reserve University Cleveland, OH	166,275	36,625
4.	Composite Trends of the Multispecies Population, Mapping of Habitat Quality and Remediation of the Soncreant-Walker Creek Drain into Lake Erie	MGS Services Southfield, MI	323,542	52,642
5.	A Practical Approach to Assessing the Feasibility of Integrating Aquaculture into Private Marinas for Public Resource Use and Investigating the Economic Benefit to Shellfishing Communities	Rhode Island Seafood Council Wakefield, RI	129,934	108,040

FY 2000 S-K Applications Not Recommended for Funding

Region	Project Title	Applicant	Requested Federal Funding	Applicant's Cost Share
Northeast				
6.	The Culture and Reproductive Ecology of Sea Scallops: Creating New Employment Opportunities for Fishermen, Aquaculturists, and Fishing Communities	Beals Island Regional Shellfish Hatchery, Machias, ME	225,506	43,612
7.	Spatial Analyses of the Coastal Stock Complex of Atlantic Herring (<i>Clupea harengus</i>)	University of Rhode Island, Kingston, RI	70,401	8,022
8.	A Comparison of Cage and Land-based Production of Haddock	Massachusetts Institute of Technology, Cambridge, MA	75,600	8,400
9.	Alternative Fishing Methods for the Inshore Commercial Fishing Vessel: A Quantitative Evaluation	Bay and Harbor Research, Gloucester, MA	21,220	8,400
10.	The Good Stewardship Project: A Conservation Education Project for the New Immigrant Populations of the New York Metropolitan Area	Brooklyn College and RF CUNY, Brooklyn, NY	178,288	107,658
11.	Culture of the Arkshell Clam, <i>Anadara ovalis</i> , in Coastal Georgia and the Oceanside Lagoon System of Virginia	The Research Foundation of SUNY, Cortland, NY	94,904	31,105
12.	Methods Towards Converting Fishery Waste Biomass to Commercially Marketable Products	Marine Bio Products, Inc., Quincy, MA	75,000	12,000
13.	Utilization of Broken Blue Mussels, a Waste Product from the Mussel Industry as a Diet for Tautog (Blackfish), a New Aquaculture Species	University of Rhode Island, Kingston, RI	125,624	51,781
14.	Technology Development for Enzyme-Assisted Flavor Production from Seafood Processing Wastes and Underutilized Fish Species: Refinement of Flavor Recovery Process and Pilot Plant Scale-Up	University of Rhode Island, Kingston, RI	101,125	23,522
15.	Evaluating the Potential for Reduced Pollutant Dispersion at a Multiproduct Open Ocean Aquaculture Facility in Rhode Island Sound	Woods Hole Oceanographic Institution, Woods Hole, MA	141,359	125,980

<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funding</u>	<u>Applicant's Cost Share</u>
Northeast				
	16. New England Regional Strategy for Bycatch Reduction Technology Development and Implementation	Conservation Law Foundation, Inc Boston, MA	40,000	8,155
	17. Adaptation and Development of Environmentally Conscious Benthic Fish Traps for the New England Groundfishery	Capt Kevin M. McCormick Rowley, MA	62,850	10,100
	18. Testing Two Bar Spacings and Vertical Orientation in the Nordmore Grate for Bycatch Reduction in an Observer-Based Experimental Shrimp Fishery Conducted in an Area of Higher Groundfish Concentration	Gulf of Maine Aquarium Portland, ME	84,090	60,316
	19. Acoustically Reflective Gillnet to Reduce Bycatch	Atlantic Gillnet Supply, Inc. Gloucester, MA	199,636	197,200
	20. Use of Crab Processing Waste to Produce a Chitosan-based Metal Adsorbent for Wastewater Treatment	University of Maine Orono, ME	99,889	26,208
	21. Maximizing the Value of Cultured Marine Finfish: Integration of a Land-based Hatchery/Nursery Conditioning System with Open Ocean Aquaculture	Great Bay Aquafarms, Inc Portsmouth, NH	110,110	55,050
	22. Removing Legal and Social Barriers to Offshore Aquaculture in New England - Reducing Tensions and Conflicts Among Users	University of Maine Portland, ME	64,674	20,467
	23. Determination of Essential Fish Habitat and Other Life History Parameters of Atlantic Sturgeon (<i>Acipenser oxyrinchus oxyrinchus</i>) in Virginia's Chesapeake Bay	Virginia Institute of Marine Science Gloucester Point, VA	128,465	21,765
	24. Commercialization of Value-Added Mackerel Byproducts for Nursery and Seed Industries	University of Massachusetts Amherst, MA	92,875	22,290
	25. Optimization and Comparison of Cultural and Molecular Methods for Detection of Mycobacterial Infections in <i>Morone saxatilis</i>	Virginia Institute of Marine Science Gloucester Point, VA	141,081	38,411

FY 2000 S-K Applications Not Recommended for Funding Page 5

<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funding</u>	<u>Applicant's Cost Share</u>
Northeast				
26.	An Interdisciplinary Framework for Decisions on Land-Based Marine Aquaculture, Open-Ocean/Nearshore Aquaculture, and Stock Enhancement	University of Rhode Island Kingston, RI	132,341	101,600
27.	Technology Development for the Full Utilization of the Cownose Ray (Phinoptera bonasus)	Virginia Institute of Marine Science Gloucester Point, VA	54,542	16,967
28.	Technology Development in the Restructuring of Underutilized Seafoods	Virginia Institute of Marine Science Gloucester Point, VA	52,077	16,308
29.	Grey Sole Fingerling Production in Shallow Recirculating Raceways	Massachusetts Institute of Technology Cambridge, MA	58,800	7,000
30.	Development and Testing of a Species-Specific Gillnet Pinger	University of New Hampshire Durham, NH	122,996	27,692
31.	Quantification of Substrate Changes Due to Various Intensities of Scallop Dredging in the New York Bight	The Richard Stockton College of NJ Pomona, NJ	71,881	8,160
32.	Aquaculture Training for Commercial Shellfishermen of Narragansett Bay	Roger Williams University Bristol, RI	22,612	14,300
33.	Spatial and Temporal Patterns of Reproduction and Settlement for Two Species of Blue Mussel in the Gulf of Maine	University of Maine Orono, ME	76,756	43,121
34.	Understanding and Reducing Seabed Disturbance by Bottom Trawl Fishing Gear	University of Rhode Island Kingston, RI	115,800	41,578
35.	Determining the Advantages and Disadvantages of a Variety of Crab Processing Waste Based Composts for Greenhouse and Nursery Container Media	University of Maine Orono, ME	104,888	15,182
36.	Oyster Reef Restoration: Optimizing Design Criteria to Maximize Oyster Production	Virginia Institute of Marine Science Gloucester Point, VA	64,118	23,979
Sum			3,702,519	1,445,136

<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funding</u>	<u>Applicant's Cost Share</u>
Northwest				
1.	Genetic Stock Identification of ESA - Listed Chinook Stocks in the Catch of Northern Washington Coastal Fisheries	Makah Indian Tribe Neah Bay, WA	177,733	32,407
2.	Evaluation of a Salmon carcass analog as a source of marine-derived nutrients for freshwater salmonid habitat restoration	Bio - Oregon, Inc. Warrenton, OR	97,046	45,237
3.	Assessment of Geoduck Recruitment Potentials Based on Breeding Temperature Determination	Northwest Indian College Bellingham, WA	124,334	23,473
4.	Ecological Characterization and Water Column Effects of Suspended Mussel Culture Systems	University of Washington Seattle, WA	96,410	31,452
5.	Establishing a Regional Seafood Technology Collection	Edward Kolbe Portland,, OR	129,938	39,366
6.	Contribution of Threatened Hood Canal Summer Chum to Bycatch of Chum Salmon in Commercial Net Fisheries in Puget Sound	Point No Point Treaty Council Kingston, WA	90,971	28,660
		Sum	716,432	200,595
Southeast				
1.	Population Structure Analysis of Atlantic Bluefin Tuna Using Hypervariable Nuclear DNA Markers	Virginia Institute of Marine Science Gloucester Point, VA	133,169	36,359
2.	Application of a Genetic Probe to Assess the Fate of Bay Scallop (<i>Argopecten irradians</i>) Larvae at a Restoration Site in Sarasota Bay, FL	Fish & Wildlife Conserv. Commission Tallahassee, FL	127,007	33,693
3.	Profile Incidence of Salmonella in Cultured Penaeid Shrimp through Harvest and Processing	University of Florida Gainesville, FL	128,563	64,196

Funding Page 2
FY 2000 S-K Applications Not Recommended for Funding

Region	Project Title	Applicant	Requested Federal Funding	Applicant's Cost Share
Southeast				
	4. Genetic Approaches for Stock Enhancement of Red Drum (<i>Sciaenops ocellatus</i>).	Texas A&M Research Foundation College Station, TX	134,512	52,013
	5. Developing an Identification Guide for Commercially Important Shark Species of the Atlantic and Gulf of Mexico	University of Mississippi University, MS	20,263	13,957
	6. Field tests of acoustic alarms to reduce the by-catch of bottlenose dolphins in gill nets.	Duke University Durham, NC	86,798	20,137
	7. Hook selectivity of sharks caught by longline in the Gulf of Mexico.	Mote Marine Laboratory Sarasota, FL	52,741	5,860
	8. Evaluation of erosive-carapace lesions of Florida spiny lobster (<i>Panulirus argus</i>).	Florida State University Tallahassee, FL	97,673	31,019
	9. A program to document catch composition and stock assessment parameters of the south Atlantic commercial rock shrimp fishery.	Gulf & So. Atlantic Fish. Foundation Tampa, FL	433,856	50,400
	10. Earth on Ice	Velocity Performance Inc. Summerfield, NC	1,491,000	480,000
	11. Marine Aquaculture in the Off-shore Environment	Louisiana State University Baton Rouge, LA	32,871	6,211
	12. A Pilot Project to Demonstrate Offshore Cage Culture of Wreckfish (<i>Polyprion americanus</i>)	S. C. Dept. of Natural Resources Charleston, FL	85,560	23,553
	13. Productivity of sustainable micogravity aquaculture for technological advancement and development in aquaculture of edible fish.	Hillsborough Community College Tampa, FL	157,051	24,400
	14. Production of Dolphinfinh (<i>Coryphaena Hippurus</i>) for offshore cage culture: investigating the effects of stocking density and feeding rate on growth, survival and incidence of cannibalism	Florida Institute of Technology Melbourne, FL	72,285	26,539
	15. Socioeconomic Basis of Fishing Community Transitions on the Georgia Coast	Univ. of Georgia Research Foundation Athens, GA	71,577	24,906

FY 2000 S-K Applications Not Recommended for Funding Page 8

<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funding</u>	<u>Applicant's Cost Share</u>
Southeast				
16.	Optimizing Nutrition and Water Filtration for Nursery Culture of Common Snook	Harbor Branch Oceanographic Inst. Fort Pierce, FL	69,425	46,351
17.	Comprehensive census of the fishery of Puerto Rico	PR Dept. of Nat. & Environ. Resources SAN JUAN, PR	42,601	16,996
18.	Conservation/fisheries initiative for sea turtle conservation.	Sea Turtle Inc. South Padre Island, TX	94,000	42,000
19.	Determining the in-trawl duration of wild sea turtles using four rigid turtle excluder devices (TEDs).	University of Georgia Athens, GA	48,845	16,810
20.	A program to estimate sea turtle abundance and fishery related mortality along the northwestern Gulf of Mexico.	Gulf & So. Atlantic Fish. Foundation Tampa, FL	494,901	55,000
Sum			3,874,698	1,070,400
Southwest				
1.	Monitoring and reporting catch, effort and biological data on Pacific recreational fisheries.	Peter Fithian Kailua-Kona, HI	107,528	11,000
2.	Enhancing the Sustainability of Tourism and Fishing through the increased use of locally produced marine resources by the hotel/restaurant sector in the Republic of Palau.	The University of Memphis Memphis, TN	34,289	7,765
3.	Validation and calibration of fatty acid signatures in blubber as indicators of prey in Hawaiian monk seal diet.	Hubbs - Sea World Research Institute San Diego, CA	104,987	47,600
4.	Genetic Marking and Genotyping of a Captive Broodstock of California Halibut	California State University Long Beach Long Beach, CA	41,028	15,033
5.	Securing and Strengthening the U.S. Troll-Caught Albacore Tuna Canned Market	Western Fishboat Owners Ass. Eureka, CA	101,500	12,893
6.	Quantification of essential fish habitat inside and outside marine protected areas for shellfish resources in Northern California	Regents University of California Davis, CA	162,904	22,359

FY 2000 S-K Applications Not Recommended for Funding Page 9

<u>Region</u>	<u>Project Title</u>	<u>Applicant</u>	<u>Requested Federal Funding</u>	<u>Applicant's Cost Share</u>
Southwest				
7.	Box Crab: An Experimental Fishery	Gregory John Ewart Ventura, CA	152,708	27,292
8.	Essential Shellfish Fisheries Habitat Design: Open-ocean Pilot Project	Bruce A. Steele Santa Barbara, CA	110,078	68,860
9.	Stress Effects and Survivorship During Catch and Release of White Seabass (Atractoscion nobilis)	California State University Long Beach Long Beach, CA	95,464	47,225
10.	Assessment of Bycatch Reduction Devices and Habitat Impacts in California's Shrimp/Prawn Fisheries	Texas Tech University Lubbock, TX	173,454	111,692
11.	Characterization of Hawaiian monk Seals habitat use, diving patterns, and foraging success at Kure Atoll, Northwestern Hawaiian Islands.	Hubbs - Sea World Research Institute San Diego, CA	171,000	42,250
12.	Development of Acoustic stunning methods for the tuna fishery	Nature's Own Research Association Dover, NH	177,000	65,000
13.	Feasibility Study and Recommendations for Development of an Offshore Aquaculture Industry in American Samoa	The Oceanic Institute Waimanalo, HI	52,182	6,796
14.	Optimum Utilization and Reduction of Economic Discards in Pelagic Longline Fisheries: Use of Innovative Carbon Monoxide-Based Processing Technologies	PacMar, Inc. Honolulu, HI	75,588	9,761
15.	Blue Shark Appraisal & Product / Market Development	Diamond Bay Specialty Seafood, HI, Inc Kahului, Maui, HI	240,000	82,000
		Sum	1,799,710	577,526
		Grand Total	11,978,604	3,978,832