

Alaska Sea Grant
C O L L E G E P R O G R A M

IMPLEMENTATION PLAN

2006–2008




Sea Grant
Alaska

Alaska Sea Grant College Program

Fairbanks

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Implementation Plan 2006–2008

The Alaska Sea Grant College Program is a marine research, education, and extension service headquartered at the University of Alaska Fairbanks School of Fisheries and Ocean Sciences.

The Alaska Sea Grant College Program is supported by the National Oceanic and Atmospheric Administration Office of Sea Grant, Department of Commerce, under grant no. NA 16RG2321 (project no. A/161-01 and M/170-01), and by the University of Alaska with funds appropriated by the state.

AK-ADMIN-55
2006
doi:10.4027/asgcpip.2006



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Message from the Director

I am proud to present this implementation plan for 2006 to 2008 as a living representation of our program direction and scope of work.

This plan is a manifestation of our strategic plan. It defines our niche in addressing pressing issues surrounding Alaska's marine, estuarine, and coastal watershed ecosystems, which still function and most remain pristine.

Alaska has an incredibly broad scope of ecosystems and habitats, with a corresponding array of conservation and use issues that we could address with adequate resources. However, the reality of limited resources dictates that we expend our efforts in the most effective and efficient way possible.

With that in mind, and armed with input from constituents around the state, we worked with our Alaska Sea Grant Advisory Committee to narrow the focus of our program from eleven National Sea Grant themes to five themes that are most relevant to Alaska. Those themes, with their objectives and strategies, form the structure of our strategic plan. The strategic plan provides the foundation for all of our research,

education, and extension activities, which are described in this implementation plan.

The implementation plan nests a collection of objectives, outcomes, and actions that articulate specific directions we will take over the next two years; in some sense, this document shows where the "rubber meets the road."

We realize that things change, so our planning process is dynamic; that is, we remain flexible so that we can change course when it makes sense. Periodically we will reexamine and revise our strategic and implementation plans to keep pace with shifting needs and opportunities.

Our research portfolio for 2006–2008, summarized in this plan, is composed of projects that are interdisciplinary and address one or more of our five strategic themes. Each research project includes an outreach component to ensure that results get conveyed to people who can put them to use.

Our research, education, and extension programs provide Alaskans with useful products and services that can be applied in improving management, conservation, and use of our marine, estuarine, and coastal watershed



resources. The research and outreach described in this implementation plan are results-oriented and aim for explicit measurable outcomes, which we will periodically evaluate.

I invite you to contact me with any advice on how Alaska Sea Grant can help this great state ensure the long-term health and utility of its marine, estuarine, and coastal watershed resources.

A handwritten signature in black ink, appearing to read "Brian Allee".

Brian Allee, Ph.D.
Director
Alaska Sea Grant College Program

Introduction

The 30 state and territorial Sea Grant programs work cooperatively with the National Sea Grant College Program to establish broad themes for Sea Grant’s research, education, and extension. The national Sea Grant agenda is organized into eleven themes and three national priority areas. The national themes are:

- Aquaculture
- Biotechnology
- Coastal Communities and Economies
- Coastal Natural Hazards
- The Digital Ocean
- Ecosystems and Habitats
- Fisheries
- Marine and Aquatic Science Literacy
- Seafood Science and Technology
- Urban Coasts
- Invasive Species

All of the national themes apply to Alaska—some more than others. We analyzed each theme, and narrowed Alaska’s primary focus to five national themes that are most relevant to our state. They are:

- Coastal Communities and Economies
- Ecosystems and Habitats
- Fisheries

- Marine and Aquatic Science Literacy
- Seafood Science and Technology

We associated each of the six remaining national themes with one of our five major themes. After all themes were prioritized and organized, goals were set for the major themes along with objectives, outcomes, indicators, and strategies to pursue each goal in the strategic plan, and action items in the implementation plan. More information on the themes can be found in the strategic plan.

National Priority Areas

The National Sea Grant College Program has identified three National Priority Areas, all of which apply to Alaska:

- Oyster Research and Restoration
- Harmful Algal Blooms
- Enhanced Fisheries Extension

In 2004, Alaska Sea Grant successfully competed for supplemental National Sea Grant funding in Enhanced Fisheries Extension. This National Priority Area fits well into our Fisheries and our Coastal Communities and Economies themes. The funding allowed us to hire two

Marine Advisory Program agents, located in Cordova and Petersburg, regions severely affected by a downturn in international markets for wild salmon.

Alaska Sea Grant has long been involved with the issue of harmful algal blooms (HABs). The cumbersome process of testing for the associated paralytic shellfish poisoning (PSP) has hindered the growth of Alaska's shellfish farming industry. We have funded research and extension aimed at mitigating the threat of PSP and developing faster, reliable methods for testing shellfish for the deadly toxin. The National Priority Area in HABs promises to help us continue our work in this important area.

The National Priority Area in oyster research and restoration likewise could help Alaska Sea Grant assist the state's fledgling oyster farming industry. In 2004, an outbreak of *Vibrio parahaemolyticus* appeared in farmed oysters in Prince William Sound, probably due to unusually warm water temperatures. The region's oyster harvest was temporarily shut down when people on a cruise ship became ill after eating shellfish from the Sound. Assistance from the Marine Advisory Program was key to solving the problem and reopening the farms. Funds from this National Priority Area could do much to aid Alaska Sea Grant in helping the state's oyster farming industry address this and other oyster diseases.

Institutional and Territorial Characteristics

Alaska's awe-inspiring landscape accounts for nearly one-fifth the area of the United States, and its natural resources help fuel the national economy. Central to Alaska's importance to the nation and the world are its marine resources. At some 36,000 miles, Alaska has more coastline than the rest of the United States combined. Alaska seas cover about 75 percent of the U.S. continental shelf. Those waters host some of the world's most abundant populations of marine life and influence the entire Pacific Ocean food web.

Alaska's coastal and marine resources are the lifeblood of Alaska's society. Nearly everyone in Alaska lives along the ocean coast or major rivers that flow into the ocean, and Alaska has the greatest percentage of citizens who rely on native marine plants and animals as their first or second most important food source. The state's three largest private industries—oil, seafood, and tourism—all depend in some way on our oceans.

Alaska's waters annually yield more commercial fisheries harvest than the total for the rest of the United States, all of it from wild fish stocks. This ocean bounty contributes positively to the international balance of trade.

Fourteen percent of U.S. crude oil production comes from Alaska, most of it extracted from wells along the coast and offshore. The industry is by

far Alaska's most valuable in terms of state tax money generated, and it provides high-paying jobs for many Alaskans and generates millions of dollars of revenue in supply and other support services. All of the oil is transported via ship through the state's pristine waters.

The burgeoning visitor industry rivals the seafood industry in both dollar value and number of people employed. Much of the visitor industry is dependent on the beauty and vitality of our marine and coastal resources. Each year, the number of people who visit Alaska on cruise ships alone far exceeds the population of the state.

As the United States and the world increasingly look to Alaska for extractive and aesthetic resources, the state must find ways to serve those needs while not depleting or destroying its assets. While most other states grapple with how to fix problems that stem from misuse of natural resources, we still have time in Alaska to prevent problems. Alaska Sea Grant, as part of a collegial national network, is ideally situated to apply lessons learned in other states in an effort to not only fix, but also prevent marine-related problems.

Within Alaska, travel is not trivial. Alaska's highway system is limited. Many major communities, including Juneau, Alaska's capital, are accessible only by air or water, and some communities are accessible only by air. These limitations and Alaska's rugged geographic conditions strain

human and monetary resources and present logistical nightmares for people trying to conduct management, scientific, educational, or commercial activities.

Social issues demand careful and innovative approaches to resource use and management. Management of Alaska's commercial, subsistence, and sport fisheries is divided among often-overlapping state, federal, and Native jurisdictions; and international rules sometimes apply. State resource management laws sometimes conflict with federal laws. Interest groups vie for what they believe is their fair share of the state's natural resources or for complete preservation of resources. These often-contentious conditions present a perfect environment for the Alaska Sea Grant College Program to exercise its strength as a conduit for sharing science-based information that can be used to equitably resolve disagreements.

Planning Process

This implementation plan represents one step in Alaska Sea Grant's planning cycle. Our first step was to form a 28-member Alaska Sea Grant Advisory Committee in 2003 to help us identify state priorities and focus our research, education, and extension into a subset of the National Sea Grant themes. Committee members include representatives from an array of constituent groups—K–12 education, marine conservation, ecotourism and cruise ship industries, petroleum



extraction and mining, coastal engineering, commercial fishing and seafood processing, resource management, Alaska Natives, and others.

The next step was to begin work in 2004 on a new strategic plan to address our priorities in specific ways, based on input from our constituents. We used print media, Internet, community meetings, and the telephone to gather advice from the consumers and potential consumers of our research, education, and extension resources.

Guided by the survey results and with further input from the Advisory Committee, by fall 2004 we articulated Alaska Sea Grant's overall strategy, including our vision, mission, major themes, goals, objectives, expected outcomes, and strategies to pursue the goals and objectives. The Advisory Committee reviewed and approved the draft, and in late December 2004, the strategic plan was made available with our Announcement of Funding Opportunity to cover the 2006–2008 funding cycle. The term of the strategic plan is 2004 to 2010.

Following that, in the late summer and fall of 2005, we developed this implementation plan. The purpose of this plan is to translate the strategic plan into action in two-year increments; the term of this implementation plan is 2006 to 2008. It repeats the goals and objectives from our strategic plan and spells out what Alaska Sea Grant will do in 2006 and 2007 to move toward accomplishing the goals.

These actions are intended to yield measurable benefits for Alaska. To

ensure this happens, we developed expected outcomes (impacts) and measures of success (indicators) for each objective in the plan. We will use these when we review our progress at the end of each term of the implementation plan and make adjustments for the next two-year plan. This process of biennial review and adjustment will ensure that Alaska Sea Grant is responsive to changing conditions, and will result in an adaptive approach to managing the Alaska Sea Grant College Program.

Priorities for Implementation and Funding

Process Used to Select Research Action Items

Our plan contains research action items (funded projects) and education and extension action items. The process to select our current research action items began in 2004 when we issued an Announcement of Funding Opportunity for 2006–2008. Fifty-one preliminary proposals (pre-proposals) totaling \$7.1 million were submitted. The Alaska Sea Grant director convened a review panel consisting of several Advisory Committee members and the Alaska Sea Grant Management Team. Panel members represented a broad spectrum of agencies and private industry throughout Alaska:

- Alaska Miners Association
- Alaska Ocean Observing System
- Government and Community Relations, Holland America
- Institute of Marine Science, University of Alaska Fairbanks
- National Marine Fisheries Service
- National Park Service
- Northern Southeast Regional Aquaculture Association
- U.S. Fish and Wildlife Service
- United Fishermen's Marketing Association

The panel ranked pre-proposals on the basis of (1) importance to Alaska and how the project fits Alaska Sea Grant strategic themes, (2) innovation and encouraging new areas of research, (3) feasibility of project within proposed budget, and (4) value and effectiveness of outreach component. Based on comments and rankings by the review panel, the group recommended that 33 pre-proposals be developed into full proposals.

Full proposals were received for all projects. Each proposal was sent to three to five peer reviewers who had agreed to review them. Reviewers were asked to provide comments on the validity and significance of the science being proposed, its potential applicability to important problems, and the quality of the approach, methodologies, facilities, and investigators. The proposal evaluation criteria were those established by the National Sea Grant Program, specifically:

- *Rationale*: the degree to which the proposed activity addresses an important issue, problem, or opportunity in development, use, or management of marine or coastal resources.



- *Scientific or Professional Merit:* the degree to which the activity will advance the state of the science or discipline through use and extension of state-of-the-art methods.
- *Innovativeness:* the degree to which new approaches to solving problems and exploiting opportunities in resource management or development, or in public outreach on such issues, will be employed; alternatively, the degree to which the activity will focus on new types of important or potentially important resources and issues.
- *Qualifications and Past Record of Investigators:* degree to which investigators are qualified by education, training, and/or experience to execute the proposed activity; record of achievement with previous funding.

A six-person advisory panel met in Anchorage in September 2005 to consider the proposals and peer reviews. The panelists were asked to interpret the peer reviews within the specialized field of the proposal under consideration, evaluate proposals on the basis of overall quality, and assign a numerical rating using the same criteria as our peer review form. Each panelist was requested to serve as discussion leader for three or four proposals and had the primary responsibility for the written panel summary. Other panelists provided input and rated projects as applicable. Several Advisory

Committee members, as well as the Alaska Sea Grant Management Team, participated and provided useful perspectives.

In most cases, there was great consistency between the peer reviews and the support of the research panel. The panel ranked the projects, and Alaska Sea Grant Director Brian Allee made the final funding decisions. Full details of this process, including peer and panel reviews, were included in the panel book and letter of intent submitted to and approved by Megan Agy, Alaska Sea Grant program monitor in the National Sea Grant Office.

In addition to the competitive selection process for research projects, three external extension and information professionals reviewed the Marine Advisory Program and Education Services proposals. The reviewers used the standard criteria used for the research proposals. The extension and education services proposals are presented in their entirety in the Alaska Sea Grant Omnibus.

Process Used to Identify Education and Extension Action Items

The Alaska Sea Grant 2006–2008 Announcement of Funding Opportunity, distributed in December 2004, contained a requirement that all research proposals include a significant outreach component aimed

at user groups. While composing their proposals, researchers consulted with Marine Advisory Program and/or Education Services to help them craft outreach components. These outreach components then became action items for the Marine Advisory Program and/or Education Services.

Other educational needs that could be addressed by the Marine Advisory Program or Education Services were identified in the constituent survey we conducted at the outset of the strategic planning process, through Alaska Sea Grant Advisory Committee meetings, and in formal meetings and other conversations with stakeholders during development of the Alaska Sea Grant Strategic Plan. Still others were identified while developing our strategic goals, objectives, strategies, outcomes, and indicators.

Other education and extension projects will emerge as needs arise over the course of the two-year period covered by this implementation plan. That contingency is accommodated in both the Marine Advisory Program and Education Services four-year plans.

MARINE ADVISORY PROGRAM FOUR-YEAR PLAN

The Marine Advisory Program four-year plan was developed after initial discussions at the November 2004 Marine Advisory Program retreat. Paula Cullenberg, Marine Advisory Program leader, worked with small

groups of Marine Advisory faculty to decide on the major components. Cullenberg prepared the final plan with assistance from Ray RaLonde, associate program leader; Kate Wynne; Chuck Crapo; and Terry Johnson. Brian Allee, Dorothy Childers, Liz Brown, Reid Brewer, Torie Baker, Sunny Rice, Don Kramer, and Dolly Garza reviewed the plan. Action items were carried over to this implementation plan.

EDUCATION SERVICES FOUR-YEAR PLAN

The Marine Advisory Program plan includes many projects, primarily publications, which are partnerships with Education Services. The collaborations represent a major part of the Education Services four-year plan. Marine Advisory Program agents and specialists, who interact directly with community members, identify specific educational needs, conduct the necessary research or compile the essential information, and provide that material to Education Services to package in the most appropriate manner (e.g., book, pamphlet, radio story, news story, etc.), and promote and distribute the information to users.

Education Services manager Kurt Byers prepared the plan, with assistance from Sue Keller, Doug Schneider, Carol Kaynor, David Partee, Sherri Pristash, and Kathy Kurtenbach. Cullenberg examined it and Allee approved it.

Theme One

Coastal Communities and Economies

Goal

Increase the ability of residents of coastal communities to understand and adjust to short- and long-term changes in marine, estuarine, and coastal watershed resource use and availability, as well as the environmental conditions that can affect the well-being of Alaskans. Foster environmentally sensitive development of industries that rely on Alaska's marine, estuarine, and coastal watershed resources.

OBJECTIVE 1

Support economic diversity and self-sufficiency in Alaska's coastal communities by providing education and training that helps local residents develop coastal enterprises, such as shellfish aquaculture, seafood processing, tourism, and other industries, and gain employment at local resource management agencies.

Outcomes/Impacts

- People in coastal areas acquire a wider array of professional and vocational skills.
- Residents of coastal Alaska diversify their economic base through new business ventures.
- Residents of coastal Alaska have access to training and employment opportunities in the field of natural resource management.
- Rural Alaskans continue to enjoy a strong subsistence lifestyle.

Indicators

- Number of workshops given and people trained in professional and vocational skills.
- Number of new titles of publications on professional and vocational skill development, and number of each title distributed.
- Number of workshops on successfully adapting to change, including alternative livelihoods.
- Number of publications on business and occupational opportunities.

- Number of businesses begun in new or emerging coastal enterprises.
- Number of people maintaining their subsistence lifestyle.

Research Actions

1. **A Global Analysis of Salmon Prices: How Low Can They Go?** (R/32-03)

Keith R. Criddle, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Mark Herrmann, School of Management, University of Alaska Fairbanks

Researchers will estimate how low Alaska salmon prices might need to drop to stay competitive, and what industry reorganizations might need to occur to raise product prices or lower production costs to remain economically viable.

2. **Improving Yields of Pacific Oysters in Alaska** (R/42-01)

Raymond RaLonde, Alaska Sea Grant Marine Advisory Program, University of Alaska Fairbanks

Chris Langdon, Hatfield Marine Science Center, Oregon State University

Ford Evans, Hatfield Marine Science Center, Oregon State University

Researchers will conduct growth experiments of genetically selected Pacific oysters, to develop fast-growing brood stock that can be used to produce seed to help the state's shellfish industry become more competitive and build economic capacity in coastal communities.

Education and Extension Actions

1. Help coordinate the workshop, "Sustainability of the Arctic-Yukon-Kuskokwim (AYK) Salmon Fisheries," sponsored by the Arctic-Yukon-Kuskokwim Sustainable Salmon Initiative.
2. Organize the "Alaska Crab Enhancement Workshop" in cooperation with NOAA Fisheries, Alaska Department of Fish and Game, harvest organizations, industry, and coastal communities, and organize and sponsor a public seminar in conjunction with the ComFish commercial fishing trade show in Kodiak, Alaska.
3. Assist with organization of the "Copper River Workshop No. 2," a meeting sponsored primarily by Ecotrust, with financial and staff support from Alaska Sea Grant.
4. Marine Advisory faculty conduct training in shellfish farm operations and business management, conduct market research, develop written manuals and Web-based information, host statewide conferences, and interface between growers, tribal groups, communities, and agency regulators.
5. Publish and distribute *Planning Seafood Cold Storage* and a seafood freezing manual.
6. Publish and distribute two *Charter Log* newsletters per year.

7. Reprint *Fishing for Octopus*.
8. Produce “Sea Grant Minute” radio spots to highlight current events and issues addressed by Marine Advisory Program.

OBJECTIVE 2

Provide information and assistance to coastal communities to enable effective responses to coastal hazards and to help communities plan and design infrastructure for development of industries utilizing marine, estuarine, and coastal watershed resources in environmentally sensitive and culturally appropriate ways.

Outcomes/Impacts

- The awareness of coastal communities is raised about coastal hazards.
- People and businesses in coastal areas are prepared to respond effectively to coastal hazards.
- Decision-makers are educated about coastal construction, development, and use techniques.
- Communities, decision-makers, and industry engage in forums to find ways to develop industries in environmentally and culturally compatible ways.
- Alaska industries are developing in an environmentally sensitive way in coastal areas.

Indicators

- Number of people who attend seminars on coastal hazard risk management.
- Number of people who attend seminars on methods of environmentally sensitive development.
- Number of research and extension informational items distributed and workshops given to decision-makers about coastal hazard risk management and environmentally sensitive industry development.
- Number of companies adopting these techniques.
- Number of agencies and businesses that develop disaster response action plans.
- Number of people who take emergency preparedness steps.

Research Action

1. Responses to Coastal Erosion in Alaska: A Guide for Coastal Residents, Businesses, Resource Managers, Engineers, and Builders (A/75-02)

Orson P. Smith, School of Engineering, University of Alaska Anchorage

The researcher will prepare a comprehensive first-of-its-kind guide to nonstructural responses and constructed responses to coastal erosion. The guide will be published by Alaska Sea Grant, and will help coastal residents and businesses, coastal resource managers, designers, and constructors of coastal public and private works make wise planning decisions.

Education and Extension Actions

1. Assess the state of knowledge about how to develop coastal areas with environmentally sensitive techniques and research.
2. Reproduce the video, *Ocean Fury: Tsunamis in Alaska*.
3. Produce an inventory of studies on coastal erosion control and engineering solutions.

OBJECTIVE 3

Build capacity in Alaska's coastal communities by improving professional and vocational training opportunities, particularly with Alaska Natives and other rural Alaskans, in the seafood, tourism, shellfish aquaculture, and other industries.

Outcomes/Impacts

- Coastal Alaskans, particularly Alaska Natives and rural residents, have the training or technical information that enables them to pursue occupations in the seafood, tourism, shellfish farming, and other industries and enterprises in their home communities.
- Alaskans in rural coastal communities have the skills and access to education needed to pursue careers in fisheries, marine science, or natural resource management.
- Coastal Alaskans have access to the information they need to participate fully in natural resource–related decisions in their region.

Indicators

- Number of participants in workshops, conferences, and training classes related to economic diversity and alternative occupations.
- Number of consultations or amount of educational material distributed around the state, including geographic reach, ethnic diversity of clientele, and variety of occupations.



- Number of partnerships with groups around the state interested in supporting capacity building and economic diversity.

Education and Extension Actions

1. Marine Advisory faculty consult with industry to determine what job skills are needed.
2. Revise, expand, and develop contacts for the list of institutes and facilities providing training in coastal and marine vocations and publish it on the Alaska Sea Grant Web site.
3. Utilize a NOAA-funded initiative to encourage more Alaska Native students to pursue education and careers in marine-related sciences. This includes interviews, creation of an advisory team, and writing a scoping paper and proposal for further funding.
4. Marine Advisory faculty will deliver workshops and training, in partnership with community groups, related to increasing value from an area's natural resources, including seafood processing and marketing and shellfish farming.
5. Encourage tourism and other coastal businesses by providing training, workshops, and public presentations related to business operations, developing markets, and success stories from other coastal sites.

Theme Two

Ecosystems and Habitats

Goal

Maintain the ecosystem function of Alaska’s important marine, estuarine, and coastal watershed habitats with a minimum of human-caused disruptions or negative impacts.

OBJECTIVE 1

Conduct research, education, and extension to provide greater understanding among Alaskans and those making policy decisions regarding the role and function of habitat in marine, estuarine, and coastal watershed ecosystems.

Outcomes/Impacts

- The level of knowledge of Alaskans and decision-makers about the role and function of habitat in ecosystems is increased.
- The level of knowledge of Alaskans about invasive species is increased.
- Concerns of coastal Alaskans are incorporated into resource agency and policy discussions.
- Alaskans and decision-makers are knowledgeable about restoring damaged ecosystems in marine, estuarine and coastal watershed environments.

Indicators

- Evidence of increase in the use of Alaska Sea Grant information by public policy-setting and regulatory bodies.
- Number of research studies on habitat as a function of the larger ecosystem, and the critical relationship between life history stages and ecosystem health.
- Number of extension education projects on the importance of healthy ecosystems.
- Number of people who attend extension programs and workshops on healthy ecosystems and the role of habitat in ecosystems.
- Development of Best Management Practices for restoring damaged habitats in marine, estuarine, and coastal watershed ecosystems.
- Number of people who know how to identify and report invasive species.
- Number of incidents of invasive species.



Research Actions

1. **The Seasonal and Interannual Patterns of Larvaceans and Pteropods in the Coastal Gulf of Alaska, and Their Relationship to Pink Salmon Survival** (R/101-05)

Russell Hopcroft, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Juvenile pink salmon appear to preferentially feed upon two understudied groups of marine zooplankton: larvaceans and thecosome pteropods. These species may be tied to salmon survival and returns. This project will provide the first detailed characterization of larvaceans and pteropods in the Gulf of Alaska, and their impact on pink salmon survival.

2. **The Interannual Variability of Zooplankton within Prince William Sound, Alaska: Assessment of the ZooScan System as a Tool for Optimizing Juvenile Pink Salmon Release** (R/101-06)

Russell Hopcroft, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Researchers will assess two decades of data on zooplankton abundance to better understand the timing of specific zooplankton abundance in relation to juvenile salmon release from hatcheries. This project also will test ZooScan, a new digital imaging system designed to measure the abundance, biomass, and composition of major zooplankton groups. If successful, ZooScan systems could be used to monitor prey availability and improve the timing of juvenile salmon release by hatcheries.

3. **Exposure of Wintering Sea Ducks to Disease Agents and Parasite Burdens in Southwest Alaska** (R/101-07)

Kimberly Trust, U.S. Fish and Wildlife Service

Paul Flint, U.S. Geological Survey

Tuula Hollmen, Alaska SeaLife Center

Reid Brewer, Alaska Sea Grant Marine Advisory Program, University of Alaska Fairbanks

Sea ducks in Unalaska Bay appear to be in poor physical condition and have been exposed to a variety of disease agents, possibly due to contaminated water. Researchers will assess sea duck health in Unalaska Bay, and within Izembek National Wildlife Refuge as a control, to determine rates of disease exposure. This study will aid in the management of Steller's eiders, a federally listed threatened species, and spur cooperative partnerships with community wastewater treatment and seafood processing facilities to address potential contaminant problems.

4. **Multispecies Fisheries Models for Ecosystem Decision Support (R/31-14)**

Terrance J. Quinn II, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Most fisheries are managed as a single species without significant consideration to other affected species. This project continues development of models that incorporate multiple species into management decisions. In the new work, researchers will alter North Pacific Fishery Management Council (NPFMC) harvest goals for each of five species in the Gulf of Alaska to evaluate alternative harvest strategies and test the viability of the model.

5. **Analysis of the Collapse of the Kodiak Red King Crab Stock and Fishery (R/31-15)**

Gordon H. Kruse, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Thomas Weingartner, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Researchers will conduct a retrospective analysis of the Kodiak red king crab stock and fishery, including the natural and anthropogenic factors surrounding its rise, collapse, and failure to rebuild. This study is expected to broaden understanding of major changes that have occurred in the Gulf of Alaska marine ecosystem, and aid in planning red king crab stock enhancement efforts.

Education and Extension Actions

1. Sponsor a forum for decision-makers to elicit their research needs.
2. Publish *Field Guide to Northeast Pacific Cephalopods*, by Elaina Jorgensen.
3. Publish *Field Guide to Alaska Sharks and Skates*, by Duane Stevenson, et al.
4. Marine Advisory faculty will participate on marine-related boards and committees, including the Marine Fisheries Advisory Committee, National Marine Protected Areas Advisory Committee, Pacific States Marine Fisheries Commission, Coastal Resource Service areas, NOAA Fisheries Alaska Scientific Review Panel, *Exxon Valdez* Oil Spill Trustee Council Public Advisory Council, Federal Subsistence Regional Advisory Council, and The Alaska Sea Otter and Steller Sea Lion Commission.
5. Distribute information about invasive species, including identification and reporting procedures.



OBJECTIVE 2

Conduct outreach activities with coastal community members, tourists, recreational users, industry, and others to enhance the understanding of the value of healthy ecosystem function, negative human impacts on ecosystem function, and environmental emergencies.

Outcome/Impacts

- Less harassment of marine wildlife occurs by visitors, charter boat operators, or tour companies, due to their use of responsible viewing guidelines.
- Deleterious human interactions with marine wildlife, such as shipping noise, entanglements, strandings, bycatch, oil spills, and other potential hazards, are reduced or mitigated.
- University resources and expertise are readily available and useful to coastal residents and others responding to environmental crises.
- Informed coastal residents develop and implement protocols to detect environmental anomalies and monitor or initiate responses.

Indicators

- Development of Best Management Practices for marine wildlife viewing.
- Number of people who attend workshops and number of publications distributed that educate people to avoid adverse impacts on wildlife and ecosystems.
- Number of charter boat operators or other tourism operations that use Best Management Practices around marine wildlife.
- Number of incidents reported and citations issued for wildlife harassment violations.
- Number of people who attend workshops and participate in other educational efforts directed to prevention and education about adverse human impacts on ecosystems.
- Publication of a directory of university resources and expertise available in environmental emergencies, and number distributed to coastal communities.
- Number of entanglements, strandings, oil spills, and other potential hazards.
- Rate of bird bycatch in the small-boat longline fishery.

Research Action

1. **Ma-ku (Dead Beached Sea Mammal): An Alaska Natives' Field Guide to Stranding Response (A/143-01)**

Lianna Jack, The Alaska Sea Otter and Steller Sea Lion Commission

Donna Willoya, The Alaska Sea Otter and Steller Sea Lion Commission

Researchers will work with Alaska Native groups, scientists, and resource agencies to produce a culturally appropriate field guide to help Alaska Natives collect data and samples on stranded marine mammals. Such a culturally appropriate guide will empower Alaska Natives to contribute to the scientific management of marine mammals.

Education and Extension Actions

1. Marine Advisory faculty will work with the Alaska Ocean Observing System to conduct workshops and other training to familiarize local residents with the design and use of ocean observing systems.
2. Marine Advisory faculty will promote responsible wildlife viewing with a campaign that may include workshops, placards, publication of a handbook, an *Alaska Seas & Coasts* issue, and use of radio and video.
3. Marine Advisory faculty will provide training in environmental monitoring via workshops and hands-on classes, in partnership with the Native American Fish and Wildlife Society and the Environmental Protection Agency.
4. Education Services will publish and distribute *A Responsible Harbor Users Handbook*, by Valdez Port Director Alan Sorum.
5. Marine Advisory faculty will broaden their involvement with the Marine Mammal Stranding Network, facilitating transfer of marine mammal carcasses to educational institutions and/or using them for educational activities, such as public necropsies.
6. Include a section in a new field guide, *Guide to Marine Mammals and Turtles of Hawaii and the Eastern North Pacific*, on avoiding damage to habitat of protected marine species, mitigation of marine debris entanglement, and reducing entanglement of sea turtles with fishing gear. The field guide will be produced cooperatively with Hawaii Sea Grant.
7. Marine Advisory faculty will provide outreach on seabird deterrent gear for small-boat longliners.

Theme Three

Fisheries

Goal 1

Develop management strategies that incorporate ecosystem approaches to fishery harvest balanced with conservation of Alaska's living resources from marine, estuarine, and coastal watershed environments.

OBJECTIVE 1

Fund socioeconomic and biological research on ecosystem approaches to fishery harvests that are sustainable and that minimize impacts on ecosystem functioning.

Outcomes/Impacts

- Sustainable harvest of Alaska fisheries resources are balanced with conservation of marine, estuarine, and coastal watershed resources.
- Decision-makers have a better understanding and knowledge based on research, which they can use to improve ecosystem approaches to fisheries management.

Indicators

- Number of new research publication titles produced, and number distributed of each.
- Number of people who attend symposia, workshops, and other meetings.
- Number of proceedings distributed to decision-makers.
- Number of populations of harvested species maintained at healthy, viable levels.
- No net loss of other species due to fisheries harvest activities, such as bycatch, integrity/condition of habitats, etc.

Research Actions

1. **Acoustic Behavior of Salmon** (R/21-01)

*John K. Horne, School of Aquatic and Fishery Science, University of Washington
Deborah Burwen, Alaska Department of Fish and Game*

Acoustic technologies, such as side-scan sonar, are commonly used to assess salmon escapement within rivers too wide or muddy for direct visual counts. Researchers seek to better understand how fish behavior influences the acoustic signal. Results will help scientists produce more accurate assessments of salmon returns that will improve salmon management.

2. **Outbreeding Depression in Pink Salmon: Effects of Hybridization between Seasonally Distinct Pink Salmon Subpopulations (Phase 2)** (R/31-13)

Anthony Gharrett, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

William W. Smoker, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Milo D. Adkison, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Raymond RaLonde, Alaska Sea Grant Marine Advisory Program, University of Alaska Fairbanks

Outbreeding depression (reduced survival due to fitness-related genetic traits) occurs in hybrids of genetically different salmon populations, but little is known about the scope or magnitude of these effects. Researchers will study hybrids of related populations of early and late run pink salmon to better understand the extent and effects of outbreeding depression.

3. **A Global Analysis of Salmon Prices: How Low Can They Go?** (R/32-03)

Keith R. Criddle, School of Fisheries and Ocean Sciences, University of Alaska Fairbanks

Mark Herrmann, School of Management, University of Alaska Fairbanks

Researchers will estimate how low Alaska salmon prices might need to drop to stay competitive, and what industry reorganizations might need to occur to raise product prices or lower production costs to remain economically viable.

4. **Economic Impacts of Alaska Fisheries** (R/32-04)

Gunnar Knapp, Institute of Social and Economic Research, University of Alaska Anchorage

Researchers will describe and explain the economic impacts and benefits of Alaska's sport, commercial, personal-use, and subsistence fisheries. The objective of this project is to provide Alaska policy makers and citizens with a tool useful in helping to make public policy decisions.



Education and Extension Actions

1. Sponsor an interdisciplinary workshop to develop indices of ecosystem performance.
2. Publish a report on Russian salmon science, *Ecological consequences of large-scale chum salmon production*, translated by Kenneth Coyle, University of Alaska Fairbanks School of Fisheries and Ocean Sciences.

OBJECTIVE 2

Develop collaborative partnerships with NOAA Fisheries, Alaska Department of Fish and Game, U.S. Fish and Wildlife Service Federal Subsistence Management Program, North Pacific Fishery Management Council, nongovernmental organizations, and industry to help fund research, education, and extension on ecosystem approaches to sustainable fishery harvests balanced with resource conservation.

Outcomes/Impacts

- Alaska Sea Grant resources are leveraged to produce research, information, and knowledge for decision-makers.
- Alaska fishery researchers in all organizations are more aware of the array of fisheries research, education, and extension conducted in Alaska.
- Researchers conduct research that is relevant to management decision-makers, and are better linked to decision-makers.
- Collaborations develop among researchers and outreach personnel in different fishery research and management organizations.

Indicators

- Number of new partnerships by Alaska Sea Grant with fisheries researchers and outreach personnel in other organizations.
- Number of fisheries researchers who are knowledgeable about other fisheries research being conducted.
- Proportion of research being conducted that is relevant to management decision-making.

Education and Extension Actions

1. Sponsor symposium of entities conducting research in Alaska's fisheries resources.
2. Convene a meeting of outreach personnel from marine resource research and management organizations to learn what each group is doing, and forge collaborations on outreach.
3. Coordinate a pre-Lowell Wakefield Fisheries Symposium workshop on ecosystem-based fisheries management.

4. Coordinate the 24th Lowell Wakefield Fisheries Symposium, “Resiliency of Gadid Stocks to Fishing and Climate Change.”
5. Coordinate the 25th Lowell Wakefield Fisheries Symposium “Ecosystem Approaches to Fisheries Management.”
6. Select topics for future Lowell Wakefield symposia and scientific meetings that are timely and important to the environment, resources, economy, and quality of life in Alaska and the North.
7. Strengthen partnerships between Alaska Sea Grant and the North Pacific Fishery Management Council, Alaska Department of Fish and Game, and NOAA Fisheries, and develop new partnerships with other agencies for financial and resource support.
8. Publish and distribute the proceedings book from the Lowell Wakefield Fisheries Symposium, “Biology, Assessment, and Management of North Pacific Rockfishes.”
9. Publish and distribute the proceedings book from the Lowell Wakefield Fisheries Symposium, “Sea Lions of the World: Conservation and Research in the 21st Century.”
10. Provide a local forum for researchers from various agencies to present their work to community residents.

OBJECTIVE 3

Build local capacity of rural residents to contribute to resource monitoring and data collection work.

Outcomes/Impacts

- Integration of traditional knowledge with Western science leads to a more robust understanding of natural systems.

Indicators

- Number of research projects that incorporate traditional knowledge.
- Number of rural residents and commercial fishermen training in or working as fisheries or related technicians.

Education and Extension Actions

1. Institute an agency awareness program to let industry know about the trained human resources available.
2. Marine Advisory faculty work with the statewide Marine Mammal Stranding Network to help the public and research organizations respond to strandings.
3. Develop a credit-bearing fisheries technician short course curriculum to offer around the state.



OBJECTIVE 4

Increase the credibility of fisheries research among fishermen by facilitating the participation of individual fishermen or groups in research design and implementation related to their industry or resource base.

Outcomes/Impacts

- Credibility of research is increased because fishermen and others participate in the design and/or execution of research projects.
- A broader foundation is created for research efforts.

Indicators

- Number of fishermen who participate in research design.
- Number of fishermen who participate in execution of research projects.
- Level of fishermen's acceptance of research results.
- Number of fishermen who are skeptical and negative toward research.

Education and Extension Actions

1. Consult with Sea Grant programs in other states to find out the benefits of involving fishermen in research design and execution, and how to engage participation by fishermen.
2. Marine Advisory faculty coordinate with researchers to solicit participation of fishermen in research design and execution.

Goal 2

Enhance and improve the profitability and viability of Alaska's commercial fishermen and fishing communities.

OBJECTIVE 1

Increase business planning and management skills among commercial fishermen.

Outcomes/Impacts

- Commercial fishermen operate their businesses more cost-effectively.
- More commercial fishermen's businesses remain viable.
- The number of fishermen utilizing good business practices increases.

Indicators

- Number of commercial fishing bankruptcies.
- Number of people attending training workshops on business management.

- Number of publications distributed on business management.
- Number of fisheries business start-ups and expansions.
- Number of fishermen utilizing good business practices.

Education and Extension Actions

1. Publish a commercial fishing business forms booklet/software product in 2006.
2. Deliver a statewide program through the Fisheries Business Assistance Project that includes electronic and hard-copy, user-friendly financial management tools; workshops and trainings on marketing, estate planning, options to enter a fishery, reducing costs through efficiencies, etc.; publications and fact sheets related to various financial and business questions; and development of a direct marketing starter kit.

OBJECTIVE 2

Increase the capacity of coastal communities to support commercial fisheries, processors, and other related industries as a vital economic source in their community.

Outcomes/Impacts

- Net increase occurs in the value of a fishery, attributable to marketing.
- Little lag time occurs after a new fishery is opened before being fished.
- Economies are stronger and local prosperity increases.
- Local recognition increases of Alaska Sea Grant as a valuable partner for building capacity in local communities.
- Coastal communities in Alaska receive economic benefit from the fisheries in their region.
- Fishermen are able to participate in new fisheries as they develop.
- Users and regulators collaboratively address bycatch concerns.

Indicators

- Fishery value attributable to marketing efforts.
- Elapsed time after a new fishery opening before fishing occurs.
- Attitudes of local communities toward Alaska Sea Grant.
- Number of Fisheries Business Assistance materials used throughout the state.
- Number of small catcher-processor operations in the state.
- Review of coastal community economies indicating the value of fishing businesses in the area.



Education and Extension Actions

1. Provide access to information about emerging fisheries using electronic and print media, as well as public presentations by fisheries researchers.
2. Conduct Marine Advisory Program workshops on how to prosecute new fisheries.
3. Continue seabird deterrent gear outreach. Marine Advisory Program agents Rice and Baker participate in Pacific Seabird Group meetings and present their research to the North Pacific Fishery Management Council.

OBJECTIVE 3

Support innovation and entrepreneurship among fishermen seeking to improve their business through reducing operating costs or increasing the value of their catch.

Outcomes/Impacts

- Fishermen are utilizing innovative methods.
- Fishermen are more effective in harvest and utilization of fisheries resources.
- Ex-vessel product quality is increased.

Indicators

- Number of fishermen utilizing innovative methods.
- Number of fishermen doing their own direct marketing.
- Number of research projects on improving fisheries harvest and utilization.
- Number of extension and education projects directed at fisheries utilization and harvest.
- Number of people who attend workshops on fish quality.

Education and Extension Actions

1. Conduct workshops on direct marketing.
2. Marine Advisory faculty conduct workshops and distribute information to fishermen on fisheries business management and how to increase value of the catch.

OBJECTIVE 4

Enhance the ability of individual fishermen, communities, and local advisory groups to understand, participate in, and respond to changes in the management of their fisheries.

Outcomes/Impacts

- Fishermen have a greater understanding of all aspects of their fisheries.
- Fishermen have increased participation in fishery management.
- Fishermen are better equipped to successfully continue fishing after changes to fishery management.
- A broader representation of groups attends the Managing Fisheries—Empowering Communities conferences.
- Engagement in resource management decisions by rural residents is increased.
- Involvement in implementation of resource management decisions by rural residents is greater.
- Fishermen make a smooth transition to fisheries rationalization when applicable.

Indicators

- Level of knowledge of fisheries by fishermen.
- Level of participation in fisheries.
- Number of participants in the Managing Fisheries—Empowering Communities conference or related meetings, and number of proceedings books distributed.
- Number of groups represented at the Managing Fisheries—Empowering Communities conference or related meetings.
- Number of rural residents who participate in management decisions.
- Number of people who attend workshops/presentations on upcoming fisheries rationalization.

Education and Extension Actions

1. Distribute free bird-deterrent gear to small-boat longliners to reduce seabird bycatch and help avoid fishery restrictions.
2. Sponsor the second “Managing Fisheries—Empowering Communities” conference in September 2006.
3. Marine Advisory faculty conduct workshops and distribute information on fisheries rationalization.

Theme Four

Marine and Aquatic Science Literacy

Goal

Improve the decision-making capacity of Alaskans through increased knowledge of Alaska’s marine, estuarine, and coastal watershed resources and understanding of management, utilization, and conservation issues.

OBJECTIVE

Conduct formal and nonformal educational activities to equip people with the knowledge required to make sound decisions in the management, use, and conservation of Alaska’s marine and aquatic resources, leading to a sense of stewardship, and with the knowledge required to work in marine-related careers or vocations.

Outcomes/Impacts

- Alaskans’ level of knowledge needed to make sound decisions is increased.
- Alaskans make better-informed decisions that result in healthier marine, estuarine, and coastal watershed ecosystems.
- Alaskans apply information provided by Alaska Sea Grant in a multitude of situations involving management, use, and conservation of Alaska’s marine, estuarine, and coastal watershed resources.
- Alaskans become qualified to work in marine-related careers or vocations.
- High school students increase their understanding of marine issues and gain skills to use in college.
- K–8 students are aware of marine, estuarine, and coastal watershed ecosystems and the need to balance their use and conservation.

Indicators

- Number of efforts to ask constituents what information they need in order to make sound decisions.
- Number of educational and informational products and services that respond to constituents’ decision-making needs.

- Number of scientific and technical materials used in formal, home school, and free-choice learning educational settings.
- Number of lay-public educational events attended.
- Number of educational materials distributed to the general public.
- Number and variety of educational products distributed to K–12 students, teachers, and schools.
- Number and variety of educational products distributed to nonformal/free-choice–learning entities.
- Number and quality of testimonials from users of our educational resources.
- Number of Alaska schools and students that participate in the Alaska Region National Ocean Sciences Bowl (NOSB).
- Number of NOSB students who enter college programs in marine-related fields.
- Number of workshops given to K–12 teachers, and number of participants.
- Number of Alaska high school and college graduates who go on to work in resource management, research, and marine-related careers or vocations.
- Number of educational resources developed and distributed that include Alaska Native knowledge.
- Number of Alaska Sea Grant radio and print stories that cover global warming.

Research Action

1. **Endangered Species and Sea Duck Teaching Kits for Coastal Alaska Public School Districts** (A/141-01)

Charla Sterne, U.S. Fish and Wildlife Service

Populations of 10 of the 15 known species of Alaska sea ducks have inexplicably declined, and biologists and waterfowl managers seek to understand the causes. To foster better public understanding of sea ducks and their coastal habitats, investigators in this project will develop and deliver K–8 curricula and teaching kits to 13 schools in western Alaska and the Aleutian Islands.

Education and Extension Actions

1. Review information from the constituent survey done during the Alaska Sea Grant strategic plan scoping process to help determine information needs of constituents.
2. Survey K–12 science teachers throughout the state to determine their educational resource and training needs.
3. Communicate with Alaska Natural History Association, Alaska SeaLife Center, and other free-choice learning entities to determine their information needs.
4. Publish and distribute two *Alaska Seas & Coasts* periodicals per year.



5. Support the Marine Science Module of University of Alaska Fairbanks Alaska Summer Research Academy every year by providing at least one full scholarship and travel for a rural or Alaska Native student to attend camp.
6. Support the Alaska regional competition of the National Ocean Sciences Bowl by providing funds for travel for some of the judges, organizers, and volunteers; art show competition prizes; cash awards to winning teams; official videographer; postage and mailing supplies for the research project coordinator; and Web support (maintain Web site, post all papers/projects, team photos, contest instructions, etc.).
7. Coach or support a teacher-coach of a National Ocean Sciences Bowl high school team.
8. Develop a Marine Education Resources Web site in 2006.
9. Revitalize the Alaska Sea Week Curriculum Program in 2006–2009.
10. Help fund and provide teaching materials each year for the Alaska 4-H Fisheries, Natural Resource and Youth Development Program, “Salmon in the Classroom” project.
11. Collaborate with the Alaska Department of Education to carry out its proposed program for training teachers in how to develop marine resource teaching kits.
12. Develop a teaching kit on sea ducks in 2007 for loan to teachers, schools, and other educators.
13. Publish and distribute annual catalogs of Alaska Sea Grant publications and videos.
14. As necessary, update and reprint *Guide to Northeast Pacific Flatfishes*, *Guide to Marine Mammals of Alaska*, *Guide to Northeast Pacific Rockfishes*, *Field Guide to Bird Nests and Eggs of Alaska’s Coastal Tundra*, *Surviving on Foods and Water of Southeast Alaska Shores*, *Alaska’s Ocean Bounty* placemat, and other educational publications and videos.
15. Attend at least five community events and trade shows each year to learn the educational needs of constituents and disseminate educational materials.
16. Produce and distribute six articles in 2006–2008 on marine issues being addressed by Alaska Sea Grant for leading marine trade and popular magazines, such as *Pacific Fishing*, *Alaska* magazine, *Alaska Business Monthly*, and *Alaska Fisherman’s Journal*.
17. Produce and distribute at least three one-page fact sheets each year that highlight Alaska Sea Grant work.
18. Produce a minimum of 20 Arctic Science Journeys Radio stories each year, enhance them with reports compiled from interviews in the field with researchers, and include Alaska Native knowledge when appropriate.

19. Work with educators and partners beginning in 2008 to create a comprehensive Web educational campaign on topics of statewide or regional interest and importance.
20. Conduct and assist with marine science and Native culture camps.
21. Conduct beach walks and necropsies of marine mammal carcasses when possible.
22. Prepare and conduct classroom presentations on marine and aquatic topics.
23. Complement Alaska Marine Safety Education Association (AMSEA) activities by providing and coordinating AMSEA training and producing educational materials, and by a Marine Advisory faculty member serving on the AMSEA board.
24. Present the *Alaska Resource Issues Forum* in video, in person, or on radio to examine topical and potentially controversial issues, and include Alaska Native knowledge when appropriate.
25. Hold the Aleutian Life Forum conference annually in Unalaska to “celebrate and encourage the understanding of the diversity of life in the Aleutian Islands and Bering Sea,” in coordination with partners, including Alaska Native groups.
26. Convey information gained from researchers to coastal communities to keep residents informed of research efforts.

Theme Five

Seafood Science and Technology

Goal

Increase the economic value and enhance the reputation of Alaska's fisheries and seafood resources.

OBJECTIVE 1

Improve the quality of seafood products.

Outcomes/Impacts

- Alaska seafood products gain a worldwide reputation for quality.
- Markets are expanded for Alaska seafood products.
- Increased prices for seafood products lead to increased profits for Alaska processors and fishermen.

Indicators

- Results of Alaska Seafood Marketing Institute (ASMI) buyer or industry survey on the quality of Alaska seafood.
- Results of government or industry surveys (such as NOAA Fisheries, state, ASMI, seafood NGOs, etc.)
- Percent of fish chilled upon capture.
- Percent of fish bled at capture.
- Percent of number 1 fish (top-quality fish).
- Price paid to the fishermen for high-quality fish.

Education and Extension Actions

1. Maintain collaborations and coordination with ASMI.
2. Support product development and quality control efforts of small processors through individual consultation and demonstration projects.

3. Conduct workshops, including the “Just in Time” quality series for fishermen, direct marketers, and processing workers; “Nuts and Bolts of Seafood Processing”; and the development of “Improving Seafood Processing Operations” designed to assist processors in improving quality, safety, and efficiency. Teaching tools to be used in these courses include slide presentations and DVDs on best operating practices, and individual consultations with fishermen, coastal communities, and small processors on processing options, quality systems, and product development.
4. Complete a statewide training DVD on salmon handling and quality, designed for gillnet and troll fishermen.
5. Provide workshops and training in the Yukon and Kuskokwim regions on icing, bleeding, and using slush ice bags on skiffs.

OBJECTIVE 2

Increase the net value of fisheries resources by developing progressive and innovative processing methods to reduce production costs.

Outcomes/Impacts

- Profits increase in processing sector.
- Consumption of energy and fresh water is reduced.
- Small- to mid-sized processors are strengthened.
- Coastal economies are strengthened and expanded with more viable processing businesses.

Indicators

- Results of Alaska Department of Commerce, Community and Economic Development surveys of processors.
- Number of processors that reduce energy and/or fresh water consumption.

Research Action

1. **Developing Microencapsulated Fish Oil Powder from Alaska Salmon Oil for Nutraceutical Markets** (R/54-02)

Subramaniam Sathivel, Fishery Industrial Technology Center, University of Alaska Fairbanks

Charles Crapo, Alaska Sea Grant Marine Advisory Program, University of Alaska Fairbanks

The value of Alaska salmon oil may be increased through purification and manufacture for use as oil powders for the human-grade food industry. Researchers will develop and evaluate salmon oil powders for shelf-life stability, sensory quality, nutritional properties, product acceptance, and market potential.



Education and Extension Actions

1. Conduct a regional workshop in Southeast Alaska looking at potential ways to utilize salmon and other fish byproducts.
2. Marine Advisory faculty establish collaborations among processors, fishermen, and coastal communities to create products and move production projects from the pilot to the development phase.
3. Distribute information on processing plant energy and fresh water conservation.
4. Provide Marine Advisory faculty consultations with processors on water and energy conservation.

OBJECTIVE 3

Expand the variety of seafood products available to consumers and improve state, domestic, and international marketing.

Outcomes/Impacts

- New value-added Alaska seafood products are produced.
- Use of underutilized species is increased.
- Excitement about and demand for Alaska seafood products is generated.
- Products are linked to and driven by market demand and consumer preferences.

Indicators

- Number of new products produced.
- Products produced are meeting market demand.

Education and Extension Actions

1. Provide consultations by Marine Advisory faculty with small seafood processors who are testing new products and developing new markets.
2. Distribute information on how to tap the economic potential of underutilized species.

OBJECTIVE 4

Provide information to commercial fishermen on how to increase the value of their catch by improving quality, direct-marketing their own catch, or value-added processing.

Outcomes/Impacts

- Fishermen conduct direct marketing.

- Fishermen improve the quality of the catch delivered to processors and get higher prices.
- Fishermen focus on quality over quantity of their catch.
- A greater variety of marketable products is developed and profits increase.
- Fishermen spend less time on fishing grounds and more time in processing.
- Fishermen retain more value from their catch by processing some or all of it themselves before sale.

Indicators

- Number of consultations by Marine Advisory faculty with processors on new product development and expansion of markets.
- Number of Marine Advisory workshops and presentations on direct marketing for fishermen.
- Number of *Fishermen's Direct Marketing Manual* distributed.
- Number of fishermen doing their own direct marketing as seen through number of catcher-seller licenses issued by the Alaska Department of Fish and Game.
- The existence of quality-price incentives from processors.
- Number of fishermen qualifying for higher prices.
- Number of fishermen focusing on quality over quantity.
- Number of fishermen with increased profitability.
- Amount of fresh Alaska seafood that is sold in the United States.
- Number of small processors operating in the state.

Education and Extension Actions

1. Distribute the books *Care and Handling of Salmon: The Key to Quality, Recoveries and Yields from Pacific Fish and Shellfish*, *Care of Halibut Aboard the Fishing Vessel*, *Fishermen's Direct Marketing Manual*, and other topical publications and videos.
2. Conduct direct marketing workshops and presentations.
3. Publish success stories of direct marketing.
4. Produce quality and handling instructional DVD for salmon trollers and gillnetters.
5. Hold seafood quality training workshops along the Yukon River.
6. Marine Advisory faculty provide consultations with fishermen who want to increase quality or market their own fish.



OBJECTIVE 5

Assist fishermen, new processors, and coastal communities to determine how to enter the seafood industry or to improve the efficiency of their operations.

Outcomes/Impacts

- Fishermen's profitability is increased.
- Operating costs decrease for fishermen and new processors.
- Solutions are found to cold storage, transportation, and logistics problems.
- The number of new businesses increases.
- Some fishermen enter the seafood processing business.

Indicators

- Number of fishermen attending training sessions.
- Number of new businesses.
- Results of surveys on business operating costs.
- Number of catcher-seller licenses issued annually by Alaska Department of Fish and Game.

Education and Extension Actions

1. Produce and distribute cold storage publications.
2. Distribute energy efficiency pamphlets.
3. Hold "Introduction to Seafood Processing" classes in Bristol Bay and other sites around the state.
4. Conduct HACCP classes approximately six times a year around the state.
5. Marine Advisory faculty consult with small processors on a regular basis related to quality and product development.

OBJECTIVE 6

Enhance the food safety of seafood products and help the seafood industry maintain stringent food safety standards.

Outcomes/Impacts

- Consumer confidence in the safety of Alaska seafood is improved.
- The incidence of illnesses caused by consumption of Alaska seafood is reduced.
- Utilization of paralytic shellfish poisoning (PSP) test kits is widespread.
- Small- and mid-sized processors receive fewer seafood safety citations.

Indicators

- Number of incidents of seafood-borne illness as reported by the state Office of Epidemiology.
- Number of PSP test kits distributed to Alaska coastal communities.
- Results of Alaska Seafood Marketing Institute survey of consumer confidence.
- Number of citations relative to number of processors and to number of inspections conducted.

Research Action

1. Alaska Oyster Safety: Monitoring and Identification of *Vibrio parahaemolyticus* (R/51-04)

Brian Himelbloom, Fishery Industrial Technology Center, University of Alaska Fairbanks

Alexandra Oliveira, Fishery Industrial Technology Center, University of Alaska Fairbanks

In summer 2005, more than sixty Alaska tourists were stricken with food poisoning caused by consuming locally maricultured oysters containing pathogenic *Vibrio parahaemolyticus*. Researchers will set up a *V. parahaemolyticus* monitoring/early warning system at mariculture farms in Prince William Sound, Kachemak Bay, and Southeast Alaska. Researchers will study the cold water tolerance of the pathogen in an effort to find creative, cost-effective ways to prevent accumulation of the pathogen in oysters.

Education and Extension Actions

1. Train fishermen and processors through “Hazard Analysis and Critical Control Point” (HACCP) workshops, “Seafood Sanitation,” “Better Process Control School,” and “Introduction to Seafood Processing” in credit or noncredit classes offered upon request on a traveling, community-based schedule.
2. Publish brochures and other publications, such as our Sea Gram series, to provide information on seafood safety associated with shellfish care, handling of sport-caught fish, etc.
3. Publish and distribute book, *Safety in Seafood Processing*.
4. Conduct usability trials of portable PSP test kits.
5. Marine Advisory faculty participate in local, state, or national seafood quality and safety advisory groups and attend Pacific Fisheries Technologists meetings.



OBJECTIVE 7

Assist seafood processors and coastal communities in analyzing the options and potential for new technology, products, and efficiencies related to waste utilization management.

Outcomes/Impacts

- Awareness is greater of the impact of waste management problem.
- Identifiable action steps are taken in operating techniques to reduce waste.
- Marketable products that utilize waste are developed.
- Seafood processors do not receive large fines from Environmental Protection Agency.
- Coastal communities increase the value of their fisheries by developing an economical use for seafood waste.

Indicators

- Number of people who attend education forums.
- Number of personnel contacted at processing plants about status of waste utilization.
- Number of new marketable products that utilize waste.
- Number of seafood processors receiving fines for discharge levels from the Environmental Protection Agency.
- Number of business licenses issued for seafood byproduct operations.

Education and Extension Actions

1. Create a Web site and database on fish waste management options and economics to provide needed information.
2. Distribute the *Advances in Seafood Byproducts* book.
3. Conduct another conference on seafood byproduct utilization and produce proceedings book.
4. Sponsor a pilot project on seafood processing waste utilization in a Southeast Alaska community, if one can be identified.
5. Sponsor a regional workshop to exchange information about new technology, products, and efficiencies related to waste utilization management.

Review and Revision

The six-year term of the Alaska Sea Grant Strategic Plan is 2004–2010; the two-year term of this implementation plan is 2006–2008. Thus, there will be three implementation plans during each strategic plan cycle. Before the current implementation plan expires, Alaska Sea Grant staff will conduct a formal review of the plan. Staff and faculty will meet to discuss how well the plan functioned, and a survey of Alaska Sea Grant constituents will be conducted to further assess its effectiveness. Alaska Sea Grant staff and faculty will then meet with the Alaska Sea Grant Advisory Committee to review the plan, using the information gathered from staff, faculty, and the survey. Together Alaska Sea Grant and the Advisory Committee will assess the plan's effectiveness and make revisions that will be incorporated into the next implementation plan for 2008–2010. The review will focus on the desired outcomes, using the indicators to guide the assessment. This review and update will be a biennial event, following an adaptive management approach.

Emerging Issues

The implementation plan review process will include a component to identify new issues that have emerged

since the then-current implementation plan was adopted, so that new issues can be considered for attention in each update.

A likely source of change during the life of the implementation plan is unexpected opportunities, events, or emergencies, such as the Asian Tsunami in 2004 and the wreck of the cargo ship *Selendang Ayu* in 2004 and capsizing of the container ship *Cougar Ace* in 2006, both in the Aleutian Islands region. When such emergencies and other events arise that clearly call for involvement by Alaska Sea Grant, we will respond and adjust our implementation plan accordingly.

Distribution

The implementation plan will be available to the public in both print and electronic format. A draft copy was presented to the Advisory Committee in November 2005. The plan accompanied our omnibus proposal package. In late summer 2006, copies of this printed version will be sent to key people, including our Advisory Committee; Sea Grant and NOAA administrators; the National Sea Grant Review Panel; university and college officials in Alaska who are involved with issues that Alaska Sea Grant addresses; marine resource and



coastal managers; leaders of marine industry; port and harbor administrators; directors of key conservation groups and other nongovernment entities concerned with issues covered by our themes; Alaska Native leaders; and selected K–12 and nonformal educators and education groups, including the Alaska Science Teachers Association. We also will send copies to those constituents who attended the community meetings we held to receive advice on our strategic plan. Distribution of paper copies of the plan will be augmented by widespread notification of its availability via our monthly *Fishlines* newsletter, which targets an array of stakeholders interested in Alaska Sea Grant and the issues we address. The latest edition of our implementation plan also will be available on our Web site (www.alaskaseagrant.org).

National Relevance

Geographically isolated from other states, Alaska often is rightly considered a unique region. Certainly it does not share the same kind and array of multistate relationships that link other Sea Grant programs on a geographic, and often topical, basis.

However, in both aesthetic and economic terms, the enormity and national and international importance of Alaska's marine resources transcend the state's vast boundaries. And considering the trans-boundary nature of the North Pacific and Arctic ocean resources and the attendant utilization, conservation, and management issues, these facts dictate that much of our work has regional, national, and international implications and utility.

The National Sea Grant College Program has identified eleven major thematic areas that address critical marine, Great Lakes, and coastal issues in the United States. Alaska Sea Grant's decision to adopt and pursue five national themes as our own ensures that our efforts have national relevance.

Good examples of Alaska Sea Grant's work in our five themes that may be applied elsewhere in the United States includes:

- Finding new and better approaches for managing sustainable marine fisheries on an ecosystem scale.
- Improving ways to forecast and mitigate the effects of shore erosion and tsunamis, and educating the public in ways to protect their lives and property.
- Developing ways to help coastal communities adjust to economic decline and other pressures, and develop strategies to revitalize traditional coastal industries and create new ones.
- Increasing scientifically derived knowledge about the mechanisms that influence environmental change in marine, estuarine, and coastal watershed ecosystems.
- Creating innovative techniques that can be applied nationwide for educating people of all ages and walks of life about marine, estuarine, and coastal watersheds and the need to be good stewards of those resources.
- Developing new products from the bounty of the sea, improving the quality of seafood, and reducing the waste of protein from the nation's seas.
- Working with indigenous populations to incorporate their traditional knowledge and participation in scientific inquiry and resource management.

Delivering Results to the State, Region, and Nation

Our products are knowledge and service. Successful implementation of our strategy and resultant benefits to society will depend on the generation of useful information coupled with effective transfer of that information.

Information is generated through our research. Research needs are suggested to us by our constituents in a variety of ways, which are described in our strategic plan.

Information transfer is carried out through actions that include direct contact with users by Alaska Sea Grant personnel; articles in scientific and professional journals; conferences, workshops, and meetings; books and videos; interaction with trade and popular print and broadcast media; and the World Wide Web. Many specific actions to provide information are noted in this plan, but no doubt many other actions will be undertaken as our strategies play out and as unanticipated opportunities and emergencies arise.

We have a long history of effectively transferring our information throughout the region, nation, and the world. For example, from September 2001 to June 2006 we distributed 85,600 information pieces to all 50 states, Puerto Rico, Guam, American Samoa, the District of Columbia, and 78 other nations. That pattern will continue.

The seafood industry receives our information through Alaska Sea Grant–published publications, articles in the seafood industry trade literature, and regular interaction between our researchers and seafood quality specialists and their cohorts, and with people who work in the seafood industry in other states.

For example, Don Kramer, a Marine Advisory Program seafood quality specialist, is a highly regarded, long-time member of and Alaska delegate to the Pacific Fisheries Technologists (PFT) organization, which provides a direct information-sharing link between Alaska Sea Grant and seafood technologists throughout the Pacific region. He also is nationally recognized for his work in helping to develop a program to train seafood processors on how to write Hazard Analysis and Critical Control Point (HACCP) plans, which are mandated by the federal government. Marine Advisory Program agent Liz Brown also is heavily involved with PFT, serving as its secretary and co-organizer of the group's 2006 annual meeting.

For over 20 years and still today, our highly respected Lowell Wakefield Fisheries Symposium series and associated conference proceedings books provide a proven means for

international exchange of science-based information, including Alaska Sea Grant–funded research. The information is used by managers to better inform their decision-making on trans-boundary fisheries resources, and by academicians to educate future decision-makers. Our current thrust into ecosystem-based approaches to marine resource management will be effectively expressed on the regional, national, and international scene via Wakefield meetings and associated information-sharing techniques.

Alaska Sea Grant research is published in scientific and professional journals accessed by people worldwide. Some of our researchers are widely acknowledged as among the best in their fields. For example, three Alaska Sea Grant–funded researchers are members of the Scientific and Statistical Committee (SSC) of the North Pacific Fishery Management Council (NPFMC), and one of them chairs the committee. Their presence on the SSC provides a direct conduit for Alaska Sea Grant information to become part of the toolbox available to one of the world’s preeminent fishery management bodies.

Likewise, Marine Advisory Program agents and specialists and their work are well known outside the boundaries of Alaska, including at the international level. Marine Advisory Program agent Terry Johnson’s expertise in Russian Far East commercial fisheries, and marketing specialist Quentin Fong’s knowledge of Pacific Rim seafood marketing, are perhaps

without equal in the Sea Grant network.

The expertise of our conservation specialist, Rick Steiner, in domestic and international government policy dealing with large-scale marine oil spill prevention, response, and mitigation has been applied in several foreign nations that have suffered damaging spills. In the aftermath of the *Exxon Valdez* oil spill in 1989, he provided key information that significantly influenced the evolution of oil spill laws and policy at the state and federal levels.

More recently, Steiner’s expertise was tapped with the wreck and oil spill of the bulk carrier, *Selendang Ayu*. While en route to Asia in December 2004, the ship lost power, drifted aground, and broke in half at Unalaska in the Aleutian Islands, polluting the water with oil and tons of soybeans. The incident resulted in the crash of a USCG rescue helicopter, which killed six of the ship’s crewmembers who had been hoisted aboard the helicopter. (Coincidentally, prior to the wreck, we began distribution of a new video from one of our partner groups, the Alaska Marine Safety Education Association, on helicopter rescue procedures.)

Steiner has since led an effective effort to get a better shipping safety system considered for the Aleutian Islands region, which is a sensitive, pristine marine ecosystem heavily used for international shipping. Further emphasizing Steiner’s call for better shipping safety in the



Aleutians, in July 2006 another huge cargo ship with a load of 4,700 cars, en route from Japan to North America, capsized off the Aleutians. This time, all 23 crewmembers were saved in a USCG helicopter rescue and no significant volume of oil was spilled or cargo lost to the sea.

Recent collaboration between MAP agents Torie Baker and Sunny Rice and Ed Melvin of Washington Sea Grant resulted in an ongoing project that has helped North Pacific small-boat longline fishermen dramatically reduce seabird bycatch.

In a new regional effort, our marine mammal specialist, Kate Wynne, and Education Services staff are working in partnership with Hawaii Sea Grant, with funding assistance from NOAA Fisheries and others, to produce another in a series of award-winning marine mammal/sea turtle identification guides authored by Wynne—this one to cover Hawaii, California, Oregon, and Washington, coauthored with Mary Donohue of Hawaii Sea Grant. Thanks to a supplemental grant from a NOAA marine debris program, this field guide will include information about marine debris mitigation, a chronic regional challenge, especially for Hawaii and Alaska. Wynne earlier collaborated with Rhode Island Sea Grant and NOAA Fisheries to publish a field guide to U.S. Atlantic marine mammals and sea turtles, a book that won the nation's most prestigious award for nature guides.

Our supporting partnership in marine safety training with the Alaska

Marine Safety Education Association has been applied regionally, nationally, and internationally. Much of the Alaska commercial fishing fleet is home-ported in Washington and Oregon. Thousands of those fishermen have learned federally mandated marine safety and survival techniques from AMSEA-trained instructors. We remain committed to helping AMSEA carry out this life-saving effort by publishing, promoting, and distributing their instructional materials. A new thrust beginning in 2006 will be to distribute the Alaska Sea Grant/AMSEA book *Beating the Odds on Northern Waters* throughout the northeastern states and eastern Canada.

Our Education Services manager is the 2006 Chair of the National Sea Grant Communicators Steering Committee, his second turn at the wheel. Throughout his 18-year tenure with Alaska Sea Grant, he has been called upon to share his thoughts on national communication issues and strategies, and he conceptualized the design for the now-ubiquitous Sea Grant logo, which was executed by one of our former graphic artists. He and other Alaska Sea Grant Education Services staff often help sister programs in the regional and national network, including the National Sea Grant Office, improve and expand communication efforts.

Alaska Sea Grant information is transferred through an ambitious and highly productive publications effort, which is one of Alaska Sea Grant's 2001 Best Management Practices. Every

year, thousands of our publications and videos, most authored by Alaska Sea Grant researchers and Marine Advisory Program personnel, are requested and used by people across the nation and around the world. That success is growing with the addition of a staff position dedicated to publications marketing, coupled with new marketing technology and techniques. Publication distribution rose from 16,000 products in 2004 to more than 25,000 in 2005. With publication of the upcoming Pacific marine mammal guide, we intend to extend our reach regionally into the lower West Coast states. We also will disseminate more informational products in British Columbia, which shares some of our marine resources and grapples with similar utilization and management challenges. Discussions are under way with the Canadian government to adapt our new book on northern small port and harbors management for use in Canada. All Alaska Sea Grant publications and videos continue to be available from the National Sea Grant Library.

Our radio series, Arctic Science Journeys (ASJ), has an international reach, with some stories broadcast on the Voice of America. Stories are picked up by several high-profile science news Web sites and other broadcast outlets. Print news sources outside of Alaska also use ASJ stories.

A key tool for conveying Alaska Sea Grant information and achieving results is the Internet. Among Sea Grant programs, Alaska Sea Grant

was one of the pioneering users of the Web, and we remain in the vanguard. Via the Web, for those who have access, virtually every aspect of Alaska Sea Grant is shared with people in the state, region, nation, and the world. But we also recognize that many constituents do not have access to the Web, and we continue to use traditional communication techniques to ensure that they receive our information and that we receive their input.

Summaries of all Alaska Sea Grant research are included on our Web site. Marine Advisory Program expertise and resources are presented with contact information for each agent and specialist. All of our books and videos are described, coupled with convenient methods to get them. Some publications are downloadable as PDFs. In the period of this implementation plan, we will develop a marine education resources section that features products and information geared for the K–12 and nonformal learning communities, with links to other Sea Grant education Web sites, including the BRIDGE at Virginia Sea Grant.

These are just a few examples of how we deliver Alaska Sea Grant results to people throughout the nation and the world.

Conclusion

This implementation plan lays out how we will generate and convey in 2006–2008 the results of high-quality research, education, and extension activities, born of advice from our stakeholders, to people who can put it to use improving their lives while they execute good stewardship of Alaska's marine, estuarine, and coastal watershed resources.

Appendix I

Definitions of planning terms

Actions: actual, specific projects that must be completed to achieve a strategy. Where the work takes place; convert strategic plans into action. (Often included in the implementation or operational plan instead of the strategic plan.)

Goal: a broad statement of intent providing directional context for setting objectives. (Often worded “to improve, increase or decrease, maintain, provide, foster, sustain.”)

Indicator: a predetermined measurement of quality, effectiveness, or success; the information used to determine success, which can be quantity, quality, timeliness, cost, amount of improvement, effectiveness. Also known as *outcome measure, performance measure, evaluation criterion, metric, or benchmark*.

Mission: statement of the organization’s basic purpose or reason for being; the business the organization pursues.

Objective: an output-oriented statement of what needs to be done to move toward meeting a goal (action or product). A concise statement of what

will be accomplished, how much or to what extent, by when; answers the question “What shall we do?” Tends to be addressed by solutions (strategies).

Outcome: a statement of what would result if the objective were achieved. A result, benefit, effect, end-point, or target to be achieved with the objective, from which success, effectiveness, or quality can be determined. Also known as *impact* or *target*.

Strategy*: a specific course of action to achieve an objective; defines the steps (methods) needed to reach it, and is a list of ways to accomplish an objective (to-do list), often a jumping-off point for annual work plans. Answers the question “How shall we do it?”

Thematic issue*: an opportunity, problem, factor, trend, etc., that has overarching significance to the organization or its customers, or as an internal or external challenge to the organization’s mission, direction, policies, way of doing business, or culture.

Vision: statement of a preferred future state; the overall destination.

* Strategies and thematic issues are presented only in our companion *Strategic Plan 2004–2010*, available on request.

To obtain additional copies of this implementation plan, strategic plan, or project directory, contact

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