



Alaska Sea Grant

Marine Advisory Program

**Four Year Plan
2006-2010**

August, 2005

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Alaska Sea Grant Marine Advisory Program Four Year Plan 2006-2010

About This Plan

This four-year Alaska Sea Grant Marine Advisory Program (MAP) proposal covers the period from February 1, 2006 to January 31, 2010. This is the first time MAP has submitted a four year rather than a two year proposal. The longer duration of the proposal makes sense given that outcomes from Marine Advisory extension work are generally seen in changes in how people think and behave. For example, an extension effort designed to enhance the shellfish aquaculture industry in Alaska will encompass years of educational methods that might include, trainings, conferences, consultations, marketing analysis and applied research. MAP's work is usually partnered with other groups, agencies, or industries who are also working to solve problems or take advantage of opportunities. All of these individual activities, when viewed together, can illustrate how MAP's work "makes a difference" to our constituents.

Evaluation of the effectiveness of Marine Advisory Program's work is carried out annually through progress reports, in the fourth year of this plan by MAP and every four years by the National Sea Grant Program's Performance Assessment Team (PAT) reviews. Alaska Sea Grant's next PAT is scheduled for September 2006.

This proposal is forward looking and attempts to identify emerging problems and opportunities important to Alaska and related to the Sea Grant mission. Marine Advisory Program's approach of identifying these issues and developing educational programs to address them strives to be innovative, to positively impact behavior and livelihoods, and to generate new ideas to conserve, manage and enjoy the marine resources of Alaska.

Alaska's Coastal and Marine Environment, Communities and Issues

Alaska's seas, coasts and inland waters are vital to the culture and economy of the state, and among the most productive and pristine in the nation. The state's 34,000 miles of coastline is over half of the entire shoreline of the country. The federal exclusive economic zone (EEZ) reaching 200 miles off Alaska is over twice the size of the land

area of the state; 75% of the total continental shelf of the United States borders Alaska. Alaska's coastal habitats include a temperate rain forest and the only arctic ecosystem in the United States. These lands and waters nurture the most abundant populations of fish, shellfish, seabirds and marine mammals anywhere in the nation.

Alaska's people are intimately connected to its oceans and watersheds. Alaska Natives continue a cultural dependence on the harvest of wild food that has lasted for thousands of years. Annual subsistence harvest levels by both Native and non-Native residents vary across the state from about 20 lbs per person in the urban areas of Alaska to a high of over 600 lbs. per person in Bristol Bay and areas north. Many of Alaska's remote coastal communities survive on a mixed and mutually dependent subsistence/cash economy.

The commercial fishing industry in Alaska produces about half of all fishery landings in the United States. It is the largest private sector employer in the state; nearly 20 per cent of all jobs in Alaska are linked to commercial fisheries, seafood processing, and support services. In many small communities in Alaska, fishing is virtually the only source of income from the private sector.

The global economy has impacted the commercial fisheries throughout the state. Alaska salmon fishermen have worked hard in the last two years to combat competition from an increase in production of farmed salmon. While some fishermen have left the industry, many remain and have increased their competitiveness by improving product quality and by building on the "wild Alaska salmon" identity. Meanwhile, groundfish, shellfish and halibut fisheries have increased in value through innovative fishing rights privatization programs under development by the North Pacific Fishery Management Council.

Alaska's visitor industry is the only private sector industry that has been growing continually since statehood in the 1950's. More than 1.5 million visitors come to Alaska each year, primarily to see the state's pristine natural beauty and wildlife. The cruise ship industry, for example, brings 900,000 visitors a year to Ketchikan, a community of 18,000 year round residents. Tourists in Alaska spend over \$700 million a year, and the industry supports about 25,000 seasonal or permanent jobs annually.

Yet, coastal Alaska is not isolated from national and global impacts. The December 2004 *Selendang Ayu* oil spill in the Aleutian Islands has raised many questions about shipping safety, anthropogenic effects on ecosystem dynamics and the importance of strengthening communication between local communities, government agencies and university researchers. Under unprecedented warm ocean conditions in summer 2004, Alaska's shellfish growers experienced the first-ever outbreak of *Vibrio parahaemolyticus* in the state's history. Steller sea lions and short-tailed albatross are endangered species and reduced populations of sea otters and sea birds are puzzling to scientists and keep the threat of federal restrictions looming over commercial fishermen and subsistence users. Climate change is warming the arctic more quickly than elsewhere in the world, which is destined to affect marine resource range and habitat.

Coastal communities across the state are struggling to diversify their economies and to strengthen and improve on traditional means of employment, particularly in response to

low salmon prices. Interest is high in rural tourism, coastal businesses, and work in fisheries and environmental monitoring. Balancing commercial enterprise while maintaining traditional lifestyles or a “small town character” will take planning and commitment.

Physical hurdles that coastal communities in Alaska confront include their geographic isolation and lack of connection with each other. Internet availability and use is regionally and culturally mixed; the majority of Alaskans outside of the three major metropolitan areas live in vast roadless areas and travel by plane or ferry. Together with the high cost of fuel and electricity, coastal Alaskans have always faced formidable challenges in trying to develop successful businesses, traveling to critical decision making meetings, and just keeping in touch with information and new options.

The economic and spiritual reliance of Alaskans on the marine and freshwater environments are strong reasons that the well-being of our marine and coastal environment is critical to our future.

The Sea Grant Mission

The mission of the National Sea Grant program to *enhance the sustainable use and conservation of the ocean, coastal and great Lakes resources to benefit the economy and the environment* is carried out in our state by the Alaska Sea Grant College Program (ASG). Sea Grant accomplishes its mission through an integrated program of research, extension and education. The extension arm of Alaska Sea Grant is developed and delivered by the Alaska Sea Grant Marine Advisory Program.

The mission of the Marine Advisory Program is to *enhance the sustainable use, conservation, understanding and enjoyment of seas and coasts by developing and disseminating science-based information to the broad array of Alaska’s marine resource users.*

To carry out this role in Alaska, the Marine Advisory Program:

- Identifies and prioritizes emerging coastal or marine issues;
- Develops educational activities and extension programs that transfer knowledge to individuals or groups so they can solve problems or create new opportunities;
- Develops links with organizations, agencies, industries and individuals in order to maximize the impact of our educational programs;
- Stimulates researchers, policy makers and others to focus on concerns related to coastal and marine issues;
- Evaluates the effectiveness and impacts of our programs and adjusts our efforts in response.

Background and Institutional Setting

The Marine Advisory Program at the University of Alaska, predates the establishment of a Sea Grant College program in the state. The first marine extension agent was hired in Alaska in 1963. The University of Alaska became a Sea Grant College in 1970, and the Marine Advisory Program was established and funded in part by Sea Grant. Beginning in 1974, the Marine Advisory Program became a part of the Cooperative Extension Service (CES) in Alaska. In 1987, the University of Alaska Fairbanks (UAF) reorganized, creating a new School of Fisheries and Ocean Sciences. Marine Advisory Program was placed within the school, thus bringing together research and extension faculty and providing new collaborative approaches in these disciplines.

In the last 42 years, Marine Advisory Program has grown into a highly respected extension education service with nationally and internationally recognized faculty. MAP has developed programs in marine safety, seafood technology, fisheries education and marine conservation that have been integral in the growth of the state and have served as national models.

Currently, the Marine Advisory Program is integrated into Alaska Sea Grant and participates fully in the development and design of that program. The Marine Advisory program leader is also Associate Director of Alaska Sea Grant and is an active participant in the Sea Grant Management Team. The program leader participates in strategic planning and determining extension and research priorities for the program.

MAP faculty are full participants in the University of Alaska Fairbanks academic structure. All have academic homes in the School of Fisheries and Ocean Science (SFOS) with all the privileges and responsibilities of faculty. The program leader participates in the Executive Council of the School of Fisheries and Ocean Sciences, acting as a link between the academic dean and the MAP faculty.

The Program Leader/Associate Director has numerous responsibilities related to program planning, faculty supervision, and program administration. For example, the program leader:

- Develops, with faculty and staff, the overall MAP plan and focus areas,
- Reviews and assists faculty in developing and implementing annual workloads,
- Reviews monthly reports from faculty and prepares a monthly narrative and annual reports for the ASG Director and Dean of SFOS,
- Conducts annual program reviews based on reports of accomplishments and other materials,
- Conducts hiring of faculty and staff and supports them in their positions,
- Provides overall budgeting and grant administration duties,
- Seeks new funding opportunities,
- Represents Alaska Sea Grant and the MAP to the University, National Sea Grant Office, public policy agencies, NGOs, industry and other constituents.

Major Programmatic Accomplishments (2003-2005) and Upcoming Issues

The Alaska Sea Grant Marine Advisory Program has moved forward in the last two years to improve our program delivery and representation across the state. In particular:

- **The Marine Advisory Program is more fully integrated into the Alaska Sea Grant Program.** The MAP has become more effectively integrated with the Alaska Sea Grant program. In October, 2004, a Sea Grant Topical Assessment Team (TAT) recommended that: “the MAP should be recognized as fully a major component of the Alaska Sea Grant College Program’s mission in research, outreach and education. This should enhance the recognition of the MAP as part of Sea Grant at the University level while not diminishing the MAP’s recognition with stakeholders or limiting the range and depth of its activities.

In response, MAP has more fully linked our name and identity to Alaska Sea Grant. MAP faculty have actively participated in the current ASG research proposal process in both review and by partnering in proposals, have actively engaged in the Sea Grant strategic planning process and participates in support of the Alaska Sea Grant statewide advisory council deliberations. These efforts are intended to enhance Alaska Sea Grant’s name recognition in the state and fully link the two programs in the public’s awareness.

- **Marine Advisory Program faculty has grown in number.** In the past two years, MAP has filled five faculty positions increasing our capacity of agents and specialists to 14. Two positions are funded by the Sea Grant Fisheries Extension Enhancement initiative, placing Sunny Rice in Petersburg and Torie Baker in Cordova. Liz Brown was hired to fill the vacant position in Dillingham and Terry Reeve was hired to fill a vacant position in Bethel. All four of these individuals bring a strong background in the fishing and seafood industry, increasing our overall ability to respond to economic declines in the industry.

Reid Brewer was hired to establish a new office in Unalaska/Dutch Harbor, funded by a NOAA grant designed to mitigate impacts from fisheries closures due to the endangered species status of the Steller sea lion. Reid’s focus on marine education and linking science to community members has been a new emphasis in that community and will serve as an extension education model for other regions in the state.

- **Three new coastal offices were opened.** One new office was opened in the state, two long empty offices were reopened and a number of new partnerships were formed further demonstrating community commitment to the program. The Unalaska office space, furniture and utilities is donated by the Unalaska City School District to house Reid Brewer. Unalaskans have been urging Sea Grant to place a marine extension agent in their community for many years, noting that it is the most valuable seafood port in the nation. The Prince William Sound office

in Cordova was reopened after 14 years. Office space is donated to the program by the Prince William Sound Aquaculture Corporation. The office in Bethel serving the Yukon/Kuskokwim region was reopened after laying idle for three years. This office makes Bethel the only coastal community in the state to house both a MAP agent and a Cooperative Extension agent. Recently, the agents were able to co-locate, increasing the overall extension effort in the region. These new and reopened offices complement the pre-existing offices in Anchorage, Ketchikan, Petersburg, Homer, Dillingham and Kodiak.

- **Growing external funding indicates support for Sea Grant's extension work.** The amount of external funding to Alaska Sea Grant Marine Advisory Program has increased significantly in the last two years, most coming to the program directly, through non-competitive grants. Funding partners now include: Washington State University (CSREES funds) to support the Trade Adjustment Assistance technical assistance program, the US Fish and Wildlife Service to fund seabird bycatch avoidance outreach, the Alaska Department of Commerce and Community Development to support shellfish aquaculture work and the Fisheries Business Assistance Project, the Alaska Marine Safety Education Association to fund marine safety training by Reid Brewer in Unalaska, NOAA to fund a marine extension agent in Unalaska as well as Steller sea lion research, the Pollock Conservation Cooperative Research Consortium which funds seafood technology training in western Alaska, and the Alaska Seafood Marketing Institute which funds Just in Time seafood processor training and HACCP. All of these funds (approximately \$600,000 in FY05) are used to supplement the Sea Grant Marine Advisory Program objectives described in this plan.
- **Communication within Alaska Sea Grant and to our constituents has improved** and support has been provided to MAP faculty. MAP updated our website www.marineadvisory.org to include general information, contact information and upcoming events. An internal website for in-house programmatic information is in use, as well as a listserv used to exchange information related to the Fisheries Business Assistance Program. ASG Communicators are assisting MAP faculty with webcam interoffice connections to bring agents in closer contact with each other. An annual program retreat has been initiated and training and computer support has been enhanced. MAP faculty report monthly on the internal site and a monthly report circulated to all Sea Grant staff is developed by the program leader. We have revitalized the long dormant publication, Alaska Seas and Coasts, which is now designed to provide an in depth overview and analysis of coastal and marine issues important to Alaskans.
- **A Tourism/Recreation Specialist was designated by the program.** Terry Johnson, in the Homer office, fills that role. Terry is focusing on developing a statewide responsible marine wildlife viewing program, assisting coastal tourism businesses such as charter operators and rural tourism operations, and providing safety and access information for some of Alaska's remote recreational sites.

- **We have taken an active and innovative role in a number of critical state issues** in the last two years including: participating in the state's salmon revitalization plan and in the industry's and communities efforts across the state to keep that industry healthy; supporting the economic health and well being of our coastal communities through work supporting shellfish aquaculture, tourism and subsistence; and enhanced the sustainability of our marine and coastal resources through bycatch reduction applied research and outreach, marine education of adults and youth, community participation in environmental monitoring, and response and prevention education related to environmental emergencies such as oil spills and outbreaks of marine pathogens.
- The Alaska Sea Grant Program is also involved in **two National Sea Grant initiatives that are primarily carried out by the Marine Advisory Program faculty**. The Coastal Community Development program is based on the assumption that coastal communities depend on healthy ecosystems and economics for their survival. In Alaska, focus in the coastal community development revolves around economic diversity and capacity building.

The Fisheries Extension Enhancement initiative by National Sea Grant was a competitively funded initiative that resulted in the hire of Torie Baker and Sunny Rice for the next five years. Both are involved in fisheries extension projects related to adapting to changing times in the fishing industry over the last few years.

Future programmatic issues include:

- Consistently **promoting new ideas for creating opportunities and solving problems** in the content of our programs and striving for **creativity and innovation** in program delivery.
- Determining areas of focus that identify upcoming needs for the purpose of **refilling positions vacated by potential upcoming retirements**.
- Collaborating more fully **with the Cooperative Extension Service** so that our mutual constituents in the state can more easily find and access extension assistance and information.
- **Maintain the quality of our work despite flat funding by the University and Sea Grant**. Recent increased capabilities have been primarily funded by the FEE program (4 years left in this funding), NOAA (1 year left), the state (1 year left) and the Trade Adjustment Assistance program (possibly 2-3 years left). Finding new grant funds to support our capacity will continue to be a major effort.
- Continually working to **encourage the importance of outreach and engagement** at the University level, both to respond to an evaluation process

designed for traditional campus-based faculty, and to encourage the value of extension education in linking faculty activities such as research to constituents' priorities.

- Continuing to strive to **fully integrate the Alaska Sea Grant program** internally and to present the program to state and national constituents.

The Purpose of this Plan

This Alaska Sea Grant Marine Advisory Program plan, 2006-2010, serves a number of purposes. The plan:

- Describes how MAP will contribute to the mission of the Alaska Sea Grant (ASG) program by serving the coastal and marine constituents in our state.
- Provides an understanding of the MAP program to peer reviewers, members of the ASG Advisory Committee and others,
- Serves as a guiding document for the Marine Advisory Program faculty and staff as well as an orientation tool to new employees of MAP.
- Provides an outline for reporting and a measure of progress toward anticipated outcomes,
- Highlights the Marine Advisory Program's approach and contributions to Alaska Sea Grant, the University of Alaska, state of Alaska, National Office of Sea Grant, NOAA and other national and international constituents,

How we plan

The Alaska Sea Grant Marine Advisory Program plan 2006-2010 is based on Alaska Sea Grant's Strategic Plan which emphasizes five thematic areas (see www.alaskaseagrant.org). The mission of Alaska Sea Grant is to *“develop and support research, education, and outreach programs and partnerships to help sustain economic development, traditional cultural uses, and conservation of Alaska's marine, estuarine, and coastal watershed resources.”*

The five national theme areas highlighted by the Alaska Sea Grant Strategic Plan include: Ecosystems and Habitat; Fisheries; Seafood Technology; Marine Literacy; and Coastal Communities and Economies.

The MAP plan is outlined under these five themes. The plan reflects our capacity as extension faculty members and our resources. Under each heading is a statement related to **major issues and trends** in Alaska and the role of MAP, both now and in the next four years, in anticipating and responding to these issues.

Each discussion is followed by the Alaska Sea Grant **goal**, or long-term target in this area. The **objectives** listed below each goal describe steps to be taken by the Marine

Advisory Program within the time span of this plan. That is, the objectives represent actions that can achieve the outcomes suggested by the goal and which are measurable during the life of the plan through some means. These may include surveys, statistics, direct communication with clientele or other means of evaluation.

Methodologies are the approaches we use to meet our objectives. They illustrate the variety of education and communication tools used. Annual workloads and annual activity reports by each faculty outline in more detail the anticipated methods to be used by faculty and are reviewed by the faculty and program leader.

In terms of outreach education, Alaska is challenged by huge distances between people, little road connection, an extremely diverse and multicultural population, and a wide variety of learning styles. The methodologies listed also illustrate that reaching an objective may contain many pieces, from training to consultation to conferences to websites, and that one methodology or one activity will not suffice to fully achieve an objective (i.e. computer connections are still slow and limited in rural Alaska).

Annual workloads and annual activity reports by each faculty outline in more detail the anticipated methods to be used by faculty and are reviewed with the faculty and program leader.

Anticipated outcomes may reflect short or long term impacts. It is measure of how MAP work “makes a difference” and should be measurable or be able to be illustrated in some way.

The MAP plan is forward looking in design. Through this plan, MAP tries to anticipate changing conditions in Alaska and set creative, innovative, but realistic objectives designed to assist Alaskans seize opportunities or respond to change.

Alaska Sea Grant Theme Areas: Marine Advisory Programmatic Objectives

When arranged by themes, the objectives of MAP for 2006-2010 illustrate the diversity of our program, the level of our involvement in maintaining the wise use and stewardship of our coastal and marine resources, and the steps we plan to make to meet this commitment.

Ecosystems and Habitat: *Caring for Alaska's ecosystems*

Alaska's 34,000 miles of coastline and its waters have ecosystems ranging from arctic deltas to glacial fjords and volcanic seamounts. Expansive, diverse and productive, these habitats support a wealth of plant, invertebrate, fish, bird and mammal resources that have supported humans for millennia. As global climate changes occur and domestic and offshore fisheries continue, the maintenance of healthy ecosystems is critical to the sustainability of these resources.

Ecosystem Approach to Management (EAM) is the current NOAA fisheries management policy that seeks to integrate human, biotic, and abiotic components into resource management decisions. The approach tries to evaluate the interactive events and activities that occur between entire watersheds, coastal zones, and ocean realms. In addition, resource managers are mandated to focus on Habitats of Particular Concern, Critical Habitat, and Essential Habitat of specific marine resources. These areas are cumulatively considered Marine Protected Areas with varying degrees of restriction placed on human activities.

Based on the EAM framework, human activities with potentially detrimental impacts on Alaska's coastal and marine habitats and resources include

- Commerce : marine accidents and spills, marine debris, toxins/contaminants, shipping noise, tourism,
- Fishing : derelict gear, hard bottom gear damage, fixed gear entanglement, aquaculture operations, processing waste/discharge, bycatch
- Military: sonar, old dump sites, noise from rocket launches
- Coastal development: loss of forest, wetlands and aquatic habitat, loss of water access, waste management, non-point source pollution, sediment runoff.

Public involvement in the evaluation and minimization of these human impacts may range from voluntary individual stewardship to mandatory regulatory compliance. Each is founded on informed awareness and often involves opportunities for public comment, input, and participation. MAP is recognized as a key facilitator and resource program in many such Alaska initiatives.

MAP is beginning to partner with the developing Alaska Ocean Observing System (AOOS) to better understand what oceanographic information Alaska's "stakeholders" are most interested in. The AOOS mission is to improve our ability to rapidly detect changes in marine ecosystems and living resources, and predict future changes and their consequences for the public good. The AOOS is an "end-user" driven program being produced with the needs of mariners, scientists, industry, resource managers, educators

and other users in mind. With MAP's community connections and spatial heterogeneity, agents are well informed of the needs of coastal community members.

MAP has the cumulative expertise and dispersed geographic coverage to develop programs that foster understanding of human role in Alaska's coastal, and marine habitats. This expertise allows MAP to take a leadership role in:

- Observing, monitoring and mitigating human interactions with seabirds, mammals and other parts of an ecosystem,
- Promoting understanding and stewardship of Alaska's resources
- Identifying and encouraging sustainable resource use
- Facilitating public participation in the review of marine policies affecting coastal residents and resources

Goal : Maintain the healthy ecosystem functions of Alaska's important marine, estuarine, and coastal watershed habitats.

Objectives:

1. Involve the public in the monitoring of the marine environment and resources, as a way to increase knowledge and understanding of coastal ecosystem function. (RaLonde, Wynne, Garza, Brewer).
2. Enhance responsible interactions between tourists and recreational users and Alaska's marine resources. (Johnson, Wynne, Reeve)
3. Encourage prevention of and response to marine mammal or seabird interactions with humans such as bycatch, entanglements, strandings, military (sonar), rocket launches, shellfish farming, fisheries, shipping noise, ports and harbors (Wynne, Steiner, Rice, Brewer, RaLonde, Baker, Garza)
4. Enhance the understanding and involvement of coastal residents in management and decision making related to marine resource and development issues. (Cullenberg, Brown, Brewer, Rice, Steiner, Wynne, RaLonde, Baker, Garza)
5. Contribute science-based information to the development of marine policy through involvement in regional, national and international advisory panels. (Wynne, Johnson, Garza, RaLonde, Steiner)
6. Promote involvement of coastal residents in understanding, prevention and response to environmental emergencies such as oil spills, animal die-offs, coastal storms and pathogen outbreaks. (Wynne, RaLonde, Cullenberg, Steiner, Brewer, Baker)

Methods:

A variety of methods will be used to meet these objectives and will be tailored to the audience and the regional requirements of the approach. Following are some examples of methodologies and activities:

- working with AOOS to partner local residents with the design and use of ocean observing systems via workshops and trainings,
- promote responsible wildlife viewing with a campaign that can include workshops, placards, publication of a handbook, Alaska Seas and Coasts issue, use of radio and video.
- training in environmental monitoring via workshops and hands on classes will be used in partnership with the Native American Fish and Wildlife Society and the Environmental Protection Agency.
- Marine mammal interactions involve facilitating disposal of the carcass to educational institutions and/or using the opportunity for educational activities such as public necropsies. MAP faculty will broaden their involvement with the marine mammal stranding network developed by NOAA.
- Alaska Seas and Coasts is an analytical publication, produced twice yearly, that looks in depth at current marine issues in Alaska.
- The Alaska Resource Issue Forum, formerly strictly a video program, has been used as a structure to bring together speakers involved in both sides of marine issues needing public input and decisions. The ARIF has broadened into a tool used both for live public discussion or via radio.
- *Guide to marine mammals and turtles of Hawaii and the eastern North Pacific* will have a section on avoiding damage to habitat of protected marine species, mitigation of marine debris entanglement and reducing entanglement of sea turtles with fishing gear. This will be produced cooperatively with Hawaii Sea Grant.
- A number of MAP faculty participate actively on marine related boards and committees including MAFAC, National MPA Advisory Committee, Pacific Marine States Fishery Commission, Coastal Resource Service areas, the NOAA Fisheries Alaska Scientific Review Panel and the Exxon Valdez Oil Spill Trustee Council Public Advisory Council, Federal Subsistence Board Regional Advisory Council.
- Agents are also involved with state, local and tribal resource management bodies such as the Alaska Sea Otter and Steller Sea Lion Commission (TASSC).
- The fishing gear recycling program in a number of Alaska ports will be reassessed and revitalized, and an Unalaska marine debris tracking project will be initiated pending NOAA funding.

Partners include the Native American Fish and Wildlife Society, NOAA Office of Protected Species, Alaska region; the Alaska Steller Sea Lion and Sea Otter Commission; the Shipping Safety Partnership; the Alaska Wilderness Recreation Tourism Association; the Alaska Marine Conservation Council; Hawaii Sea Grant; Alaska Ocean Observing System. Outside funding from Hawaii Sea Grant, the NOAA Office of Protected Species and the EPA will be used to support this program.

Anticipated outcomes:

- Less harassment of marine wildlife will occur by visitors, charter boat operators or tour companies since responsible viewing guidelines are commonly used by operators around the state leading.
- Deleterious human interactions with marine wildlife will be reduced through educational efforts to mitigate impacts of shipping noise, entanglements, strandings, bycatch, oil spills and other potential hazards.
- Coastal residents and others responding to environmental crises will have easy and useful access to University resources and expertise.
- Informed coastal residents will develop and implement protocols to detect environmental anomalies and monitor or initiate response
- Concerns of coastal Alaskans will be incorporated into resource agency and policy discussions

Fisheries: *Alaska's Fishing Industry Looks Ahead*

The commercial fishing industry in Alaska is the state's largest private employer and is a significant part of the state's economy. The direct economic output from fishery resources harvested off Alaska's shores as measured by the first wholesale value, is in the range of \$2.3 billion annually. The fishing and seafood industry support thousands of fishermen, processors and others, as well as providing the economic backbone of coastal communities from Ketchikan to Kotzebue. Alaska's fisheries management programs are known around the world for being conservative, cautious and effective and are frequently cited as a role model for other jurisdictions. Commercial fishing defines a significant part of Alaska's identity.

As with any dynamic industry, adapting to change is something that Alaska's commercial fisheries must deal with constantly. Fish and shellfish populations fluctuate in response to environmental changes, harvest levels and other variables. Markets and prices for Alaska's seafood respond to the global economy and to the changing preferences of a growing population of worldwide consumers. Management systems, intent on preserving the value and health of the resources change often, particularly when both federal and state fisheries are valuable but guided by differing mandates.

The federally managed fisheries in Alaska are adopting various versions of "rationalization" or privatization of the commercially harvested resources. A variety of innovative management programs including the American Seafood Act, the Bering Sea crab rationalization program, Individual Fishing Quotas for halibut, blackcod and crab, the Community Development Quota program, the Community Quota Purchase program and the emerging Gulf of Alaska rationalization program have all been enacted in the last decade. While these programs seek to conserve the resource as well as maintain ex-vessel value, each operates differently, with complex sets of regulations that have resulted in both intended and unintended consequences.

On the state management side, the salmon fisheries involves thousands of coastal rural Alaska residents struggling to respond to intense international competition, low prices and in some areas, low stock returns that have combined to cause severe economic consequences in many regions of the state. In many fisheries, the number of active salmon permits fished has dropped to less than 50% as fishermen and regulators continue to explore management changes that can improve quality and value.

The complex nature of Alaska fisheries and management challenges coastal residents. How can they keep abreast of and interact and influence the public decision making processes that significantly defines the future of their fishery's viability and their community's economic survival? The Alaska Sea Grant Marine Advisory Program has a long history of working closely with both fishing communities and managers in translating the complexities of management as well as facilitating opportunities for managers and coastal fishermen and communities to hear from each other.

Alaska fishermen are also responding to the changes in the global marketplace by maintaining or increasing the value of their harvest. In the nine years from 1994 to 2002, the ex-vessel value of Alaska's salmon industry fell 75% from over \$560 million to under \$150 million. Despite this series of disastrously low price years, Alaska salmon fishermen remain committed to sustaining their fishery. The 2003 and 2004 salmon seasons have seen a resurgence in the demand for "wild" salmon providing a much needed opportunity for fishermen to increase ex-vessel prices and reversing the trend in declining industry value. In 2004, MAP surveyed 2,300 salmon fishermen from fifty communities about their information needs and future plans in the fishery. Over 70% responded that they intend to stay in the salmon fishery for up to 10 years, with many noting that they intend to stay fishing for the rest of their lives.

Salmon fishermen, by far the largest Alaskan gear group with nearly 10,000 permit holders, are diversifying their means of making a living, depending less on salmon as a full time occupation. Many are participating in other fisheries such as halibut and crab. Others are working to increase the value of their catch and fishing businesses through efficiencies and obtaining a higher value for their catch by organizing regional marketing associations or cooperatives. Direct marketing by fishermen is becoming an important part of their income stream.

Partnering with the Alaska Department of Commerce, Community and Economic Development and the USDA Trade Adjustment Assistance Program, MAP is involved in a statewide, diversified project called the Fisheries Business Assistance Project www.fishbiz.org designed to provide fishermen with training and tools to enable them to improve their fishing business efficiencies and management, diversify into other fisheries, and transfer their skills to other related employment.

Alaskan communities are involved with trying to keep fishing, processing and support industries a continuing strong economic base. For example, as longtime fishermen, holding title to valuable halibut IFQ and salmon and herring permits, grow older and look to retirement, coastal communities face the need to keep fishing opportunities financially

accessible to the local next generation. But many keen young fishermen are finding it increasingly difficult to afford to buy in. For communities trying to keep fishing, processing and support industries a continuing vital part of their economic base, this is a serious problem. MAP is working closely with community advisory groups to develop tools for financial analyses and information that can help young people enter these valuable fisheries and maintain ownership of fishing rights in coastal communities. fisheries.

New fisheries have the potential to emerge as ocean conditions and/or market and consumer preferences change. For example, shrimp have not been commercially fished in many parts of Alaska for almost fifteen years. The cooling of North Pacific waters have resulted in the reappearance of large amounts of shrimp. Should harvestable quantities return to the Gulf of Alaska, shrimp will re-emerge as a “new” fishery. Dogfish shark have not been targeted in Alaska since the 1970’s, but a recent increase in bycatch of dogfish by fishermen has led to research on its potential as a directed fishery. In both cases, fishermen and fishery managers will need to understand how to harvest, handle and successfully market these species. In anticipating these fisheries, MAP can help provide technology transfer and assist in management discussion forums for developing these potential fisheries.

Finally, national and international initiatives and global environmental changes which may have substantial impact on Alaska’s commercial fishing industry can create uncertainty. The NOAA initiative to develop an offshore aquaculture industry has the potential to impact market conditions of a number of fisheries in Alaska and is a source of major statewide concern. Global climate change is predicted to impact fish and shellfish ranges and harvest significantly. MAP plays an important role in providing science-based information to Alaska fishermen on current national and international conditions as well as facilitating the ability for fishermen to have an active voice in decisions relating to these conditions.

Alaska’s fishing industry is transforming as the result of the global seafood market and climate changes. The impact of salmon farming on Alaska’s commercial salmon fishery, consumer demand for quality and convenience, the initiative to develop an offshore marine aquaculture industry, the increase in demand cause by population growth and the recent emphasis of seafood as healthy food choice compels the Alaskan seafood industry to change. Educating fishermen, seafood processors, and marketers in the new ways of doing business and in contributing to the decision making process is essential if changes are to occur in an orderly and responsive manner.

Goal:

To enhance and improve the profitability and viability of Alaska’s commercial fishermen and fishing communities.

Objectives

1. 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. (Cullenberg, Baker, Crapo, Garza, Reeve)
2. Facilitate the participation of individual fishermen or groups in research design and implementation related to their industry or resource base. (Rice, Reeve)
3. Support innovation and entrepreneurship by fishermen seeking to improve their business through reducing operating costs or increasing the value of their catch. (Rice, Brown, Kramer, Crapo, Cullenberg, Johnson, Baker, Reeve, Kramer)
4. Enhance the business and financial management tools used by fishermen and fishing communities to encourage the long term viability of fishing as an economic base. (Rice, Baker, Johnson, Reeve, Fong)
5. Increase the capacity of coastal communities to support commercial fisheries, processors and other related industries as a vital economic source in their community. (Rice, Crapo, Baker, Kramer, Fong, Reeve)
6. Assist cooperative or regional marketing efforts designed to enhance the value of a fishery. (Baker, Fong, Reeve)
7. Anticipate and prepare for emerging fisheries such as the dogfish fishery and the shrimp fishery in the Gulf of Alaska. (Johnson, Baker, Rice)

Methods:

Methods used respond to each objective, the intended audience, and various aspects of the region delivered such as communication methods, cultural differences and access to information. The following are examples of methods used by MAP in its fisheries extension program:

- The Fisheries Business Assistance Project will deliver a statewide program 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; development of a Direct Marketing Starter Kit.
- The Managing Fisheries Empowering Communities conference will continue and has the potential to become an annual statewide fishing communities forum.
- Public presentations by fisheries researchers will be used as well as electronic and print media to provide access to information about emerging fisheries;
- MAP will continue to work with fishermen's groups and marine researchers to facilitate collaborative research via advisory group planning, cooperative fisheries research initiatives, distribution coordination of free bycatch reduction gear, etc.

-Focus groups, conference and class evaluations, and surveys will be used to assess needs throughout these efforts.

Partners: MAP has been actively involved with the State of Alaska Fisheries Revitalization Plan administered by the Alaska Department of Commerce, Community and Economic Development. Other partners include the USDA Trade Adjustment Assistance program. NOAA Fisheries, the North Pacific Fishery Management Council, the Federal Subsistence Boards, and the Alaska Department of Fish and Game are partners in the efforts to increase community and fishermen participation in changing fisheries management. The USFWS, NOAA Alaska Region Office of Protected Species, Washington Sea Grant and the Pacific States Marine Fisheries Commission are partners in bycatch reduction outreach; the United Fishermen of Alaska as well as numerous regional fishermen's associations such as Cordova District Fishermen United, Kuskokwim Fishermen's Working Group and the Yukon River Drainage Fishermen's Association are active partners and advisors on a variety of fisheries projects. A number of community development quota programs such as the Bristol Bay Economic Development Corporation are partners. Outside funding from the industry-sponsored Pollock Conservation Cooperative Research Consortium, the CSREES program via Washington State University and the State of Alaska support Sea Grant's funding of this fisheries extension effort.

Anticipated Outcomes:

- Some fishermen will successfully adapt to changes within the industry by modifying their business strategies to improve their business viability in the face of changes in either management or market conditions.
- Some fishermen will have the tools and skills that they need to either leave the fishery or diversify to other activities that supplement their fishing business.
- Coastal community residents will better understand and be better able to participate in the changing management of their fisheries and fisheries managers will have had more opportunity to hear input from coastal residents.
- Collaborative research between fishermen and researchers will occur more frequently.
- Coastal communities will have the skills and tools to more effectively assess the level of involvement and investment they should make to support their local fishing industry.
- If new fisheries emerge, fishermen, processors and support industries will have the information they need to effectively harvest, process and market these resources.

Seafood Science and Technology: *The Alaska Seafood Industry at the Crossroads*

Alaska's fisheries continue to be the most productive and valuable in the United States. In 2003, Alaska fishermen landed 56% of the total US catch with ex-vessel value in excess of \$990 million and processed value over \$2.2 billion. In addition to being the largest fishery, it is also the most diverse with over forty commercially harvested species and sixty communities dependent on these marine resources. Alaska fisheries have been singled out as being among the best managed in the world. The Marine Stewardship Council (MSC) has certified both Alaska pollock and Alaska salmon as sustainable, well managed fisheries.

Today, the Alaska seafood industry is a mix of stable and rapidly changing fisheries. Each presents challenges and opportunities. Federal fisheries in Alaska including groundfish, (pollock, Pacific cod, flatfish and rockfish), halibut, black cod and most recently crab have become "rationalized" where fisheries are managed via cooperatives, individual, community or processor quotas. The "olympic" or "race for fish" days, when huge volumes were delivered in a matter of days followed by long periods of idle capacity are progressively giving way to rationalized, more steady state management regimes. Processors can adjust product forms responding to market opportunities and operate more efficiently. This move to a market-driven approach encourages processors to explore better uses for fisheries resources, developing higher valued products and improving byproduct utilization. The rationalization of the Gulf of Alaska groundfish fisheries, a very significant restructure of a large and historical fishery, is under development and will be in place before the end of this plan.

Alaska's salmon industry is also in the midst of enormous market-driven changes. The growing interest in "wild" caught fish in preference to farm-reared salmon has provided a window of opportunity to reclaim market share. Once the largest producers of salmon, Alaska salmon harvesters now provide less than 30 percent of the world supply. But Alaska is now the largest niche wild salmon producer in a sea of farm-raised product. Understanding the unique qualities of wild Alaska salmon and consistently delivering that quality for consumers is the primary challenge. Adding value to Alaska's salmon fisheries and improving quality continues to be a critical area where the Alaska Sea Grant Marine Advisory Program assists the industry.

The quality challenge is exacerbated by the complexity and volume of the fisheries where five species of salmon are harvested by four gear types in 26 far-flung management regions compressed into a four-month season. In Western Alaska, including the Bristol Bay gillnet fishery, most salmon still are not chilled at the point of harvest. At the other end of the spectrum, the famed Copper River gillnet fishery and the Southeast troll fishery, salmon are carefully landed, bled and chilled aboard the fishing vessel.

Capturing the new "wild" Alaska salmon niche has produced a level of optimism in the Alaska salmon fishery not seen for years. However, many of the core challenges remain. Pink salmon accounts for the largest volume and lowest price. Variable quality still

limits many fisheries from achieving better acceptance by buyers. The complexity and need for technical information and assistance only accelerates.

Shellfish aquaculture continues a small, but steady growth in Southeast and Southcentral Alaska. As production climbs and additional markets are sought, growers need more information about their products. Little is known about seasonal variation and its effect on quality as well as practical shelf life of many products. Developing new markets requires growers understand their products to be able to describe the uniqueness of this Alaska product.

The *Vibrio parahaemolyticus* outbreak in Prince William Sound oysters in 2004 also highlights the need for credible information to growers and consumers about the product safety of Alaska's farmed shellfish. The monitoring of temperature through the Alaska Ocean Observing System (AOOS) will help forecast adverse temperature increases so that shellfish growers can lower their nets below the thermocline and reduce the risk of a *Vibrio* outbreak.

Of necessity, Alaska seafood processors are having to address their waste streams. In the past decade, the U.S. Environmental Protection Agency has imposed increasingly stringent regulations on the discharge of processing wastes into coastal waters. As a result, processors are looking to either reduce this discharge or find other uses for some of the waste. Utilizing fish waste is a difficult challenge. Current methods such as fish meal production require significant investment and large volumes of waste, only available in two or three communities in Alaska and during short summer seasons. Are there alternatives to standard byproduct utilization? Investigating potential uses for this material will become a necessary task for all seafood processors.

In all these areas the role of seafood technology is critical. The Alaska industry must compete in a world market where access to information often makes the difference between gaining and losing customers. In addition, a high turnover in plant workers requires continued annual quality training in seafood facilities. Much of the information is technical - chemistry of shelf life, biology of spawning salmon, microbiological safety of ready to eat seafoods and physics of fish waste handling. The Alaska Sea Grant Marine Advisory Program has supported the technical needs of the Alaska seafood industry for over four decades. During these upcoming four years, our strong capacity in this area will allow us to continue that role providing much needed assistance to processors, fishermen and coastal communities in managing, harvesting and processing Alaska's marine resources.

MAP's extension work in seafood technology partners extensively with the University of Alaska Fairbanks' Fishery Industrial Technology Center (FITC). Both the Seafood technology specialist and the marketing specialist at MAP have joint appointments with the FITC.

Goal

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

Objectives:

- 1: Assist commercial fishermen in increasing the value of their catch by improving quality, direct marketing their own catch, or further processing. (Crapo, Brown, Fong, Kramer, Johnson, Baker, Rice, Reeve)
2. Assist fishermen, new processors and coastal communities to determine how to enter the seafood industry or to improve the efficiency of their operations. (Crapo, Fong, Kramer, Rice, Johnson, Brown, Reeve)
3. Support product development and quality control efforts of small processors through individual consultation and demonstration projects. (Crapo, Kramer, Reeve)
4. Educate harvesters, processors, sport fishermen, charter operators and consumers on seafood handling and quality, safety and other health-related issues. (Crapo, Kramer, Brown, RaLonde, Baker, Reeve)
5. Enhance the understanding of and skills needed by the developing shellfish farming industry to evaluate and understand quality and safety issues of marine toxins and pathogens. (Crapo, RaLonde, Kramer)
6. Assist seafood processors and coastal communities in analyzing the options and potential for new technology, products and efficiencies related to waste utilization management. (Crapo, Baker, Brown)

Methods:

Methods are tailored to each objective, the intended audience and the needs of the region. The following are examples of methods that will be used the MAP Seafood Technology program:

-The training of fishermen and processors includes: Hazard Analysis and Critical Control Point (HACCP) workshops, Seafood Sanitation, Better Process Control School, Introduction to Seafood Processing in either credit or noncredit classes offered on a traveling, community-based schedule by request.

-Other workshops include 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 including PowerPoint presentations and DVDs on best operating practices, individual consultations to fishermen, coastal communities and small processors on processing options, quality systems and product development.

-Applied research and demonstration projects in partnership with industry such as adding value to small oysters, evaluation of slurry ice systems, evaluating packaging materials

for fresh fish shipment and correlating bruising, salmon quality and handling are important tools in developing new products and procedures.

- Publications and brochures such as our Sea Grams series on seafood safety associated with shellfish care and handling of sport-caught fish, etc.
- Creation of a website and database on fish waste management options and economics will provide needed information.
- Formal presentations and web-based and popular press publications designed to make current technology and research available to industry and fishermen will continue to be developed as needed.
- The participation of MAP agents and specialists in local, state or national advisory groups and the annual Pacific Fisheries Technology meeting are valuable opportunities to extend the program.

Partners include the Alaska Seafood Marketing Institute (ASMI) in support of consumer and industry educational efforts, the University of Alaska Fishery Industrial Technology Center, the Alaska Shellfish Growers Association, and large and small seafood processors, the Alaska Department of Environmental Conservation, and the Environmental Protection Agency, Pacific Fishery Technologists, Indian Valley Meats, Bristol Bay Economic Development Corporation, coastal communities and tribal groups. Outside funding from ASMI, the Alaska Department of Commerce, Community and Economic Development, the Pollock Cooperative and the USDA CSREES and ARS programs support the Alaska Sea Grant seafood technology program.

Anticipated Outcomes

- Fishermen who are attempting to increase the value of their catch by marketing it themselves or engaging in some level of processing before sale will have the information they need to start their operations, or to develop new markets.
- Seafood processors, particularly smaller or emerging companies, will have the information needed to help them optimize the safety, quality and profitability of their products as well as information about new and emerging products.
- Shellfish farmers will have the skills and knowledge they need to respond to marine toxin outbreaks, to participate in testing, and to monitor and respond to pathogens as well as inquiries from their markets about these outbreaks.
- Fishermen, processors, sport fishermen, charter operators and consumers will have access to current information about handling of their seafood to preserve quality and safety.
- Seafood processing companies will adopt new processes that conserve energy and water, reduce waste, and improve productivity through efficiency.
- Fishermen and processors will have information about emerging fisheries related to current processing techniques and markets.

Marine and Aquatic Science Literacy: *Engaging Alaskans in Marine Resource Issues*

“To successfully address complex ocean and coastal issues, balance the use and conservation of marine resources, and realize future benefits from the ocean, an interested, engaged public is essential.” (US Commission on Ocean Policy, Final Report, 2004).

Perhaps nowhere in the nation are residents more actively engaged in marine and coastal resource issues than Alaska. This makes marine education a critical component in making informed decisions about using and conserving these resources. Living in a state highly dependent on the seas and coasts for economic opportunity and quality of life, Alaskans must have knowledge of the marine environment in order to respond appropriately to inevitable changes.

One of the greatest anticipated environmental impacts in the arctic and sub-arctic is climate change. As the only state in the US located in the Arctic, Alaskans need reliable information and educational sources to respond and adapt to ocean changes. Since so many coastal communities depend on marine resources for work, food, culture and trade, understanding the implications of climate change is imperative. With climate change on the forefront, ecosystem implications will include: fisheries emigrations, extensions of invasive/competitive species, physiological intolerance, erosion and changes in current/frontal systems resulting in shifting ice edge and storms.

Alaska Natives are actively pursuing a larger role in the management of marine resources they depend on for a subsistence lifestyle. From successful co-management of sea otter, walrus, polar bear, harbor seal and to a limited extent Steller sea lions, to participation in policy making resource boards and councils to fisheries management, and watershed monitoring, Alaska Natives need education and training that also incorporates their local traditional knowledge with sound scientific principles in order to best participate and effect decision making. MAP has been actively involved in developing and providing classes and training programs in marine science, fisheries science, subsistence resource management, marine mammal monitoring, seafood quality and safety, shellfish aquaculture, water quality monitoring, and watershed management. We strongly believe that building capacity of Alaska Natives and other rural Alaskans to participate in the process of managing Alaska’s marine resources improves the prospect for responsible stewardship and sustainability on a broad level.

MAP is involved in a number of marine literacy educational activities across the state. Activities include marine safety training, watershed education, marine science camps, and teacher education. MAP actively participates in the annual National Ocean Science Bowl competition for high school students.

In Unalaska, community members have welcomed a program where marine scientists traveling through the region relay their work through public presentations. The “Forum of Alaska Marine Issues” has presented close to 20 speakers in Unalaska in the last year,

representing university, state and federal agencies. Average attendance is consistently over 30 community members (Unalaska's population is 4,000). The success of this program will be a model for use in other MAP communities.

MAP faculty will be more active in university level teaching, particularly as the School of Fisheries and Ocean Sciences modifies their bachelor degree program. Initiatives to expand the fisheries undergraduate program are underway. As the availability of distance delivery and videoconferencing within the University of Alaska system improves, MAP faculty teaching participation from their coastal communities will increase. In addition, MAP agents can help facilitate taking the monitoring and management needs of rural communities and channel them into accredited and certificate resource programs. We can provide short courses in rural areas around the state, and can serve on committees of graduate students who are living in rural Alaska and taking their degree through distance education.

With the inception of the Alaska Ocean Observing System (AOOS), MAP has the ability to provide regional links between scientists and stakeholders that will be needed for input in design and practical information needs and to encourage use of the system. By encouraging the "two-way" flow of information, residents will learn about the current trends in marine research and researchers will gain valuable traditional knowledge from local residents borne by generations of coastal experience.

As the Ocean Commission notes, "informal education requires outreach programs, in partnership with local communities to make contact with individuals where they live and work, regarding issues that affect how they live and work, in a style that speaks to them."

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.

Objectives

1. Create opportunities for youth and adults to develop a sense of stewardship and enhance their understanding of Alaska's marine and freshwater ecosystems and habitats. (Brewer, RaLonde, Wynne, Garza, Rice, Baker, Kramer, Brown, Reeve)
2. Enable two way interactions between coastal residents and scientists with observations/information about the marine environment. (Brewer, Wynne, Baker)
3. Foster the safe and environmentally compatible use and enjoyment of Alaska's waters.(Johnson, Brewer, Cullenberg, Wynne)

4. Support marine science education directed at a variety of audiences such as fishermen, fishery observers, recreational and subsistence users.(Kramer, Wynne, Brewer, Garza, Baker)

Methods

Methodology used will vary based on the intended audience, the objective of the program and the regional circumstances. Some anticipated methods include:

- Publication of *Alaska Seas and Coasts*, a journal designed to share marine issues in more depth with Alaska residents;
- Conduct marine and culture camps;
- Beach walks and necropsies of marine mammal carcasses as possible;
- Prepare and conduct classroom presentations;
- Coach or support a teacher-coach of a National Ocean Science Bowl high school competition;
- Complement the Alaska Marine Safety Education Association activities by teaching, coordinating, producing educational materials or as an advisor on the board;
- Write articles and provide information sharing in newspapers, popular journals, radio and websites;
- Present the Alaska Resource Issues Forum in video, in person or on radio to examine topical and potentially controversial issues
- Coordinate with partners the Aleutian Life Forum, an annual conference held in Unalaska to “celebrate and encourage the understanding of the diversity of life in the Aleutian Islands and Bering Sea.”
- Work with local/regional medio to pass information gained from researchers to coastal communities to keep residents “current” on the results of the research efforts.

Partners include the Native American Fish and Wildlife Association; CORE (NOSB); Alaska Marine Safety Education Association; Alaska Sea Life Center, Prince William Sound Science Center, Alaska Oceans Observing System

Anticipated outcomes

- Alaskans will enjoy the marine environment and will develop a sense of environmental stewardship of the marine environment
- Alaskans will have increased knowledge of marine resource issues so that they can make better decisions. Possible measurement tools:
- Increased adoption of marine education materials by school districts
- Alaska’s youth are introduced to marine issues prior to career decisions.

Coastal Communities and Economies: *Challenges to Remain Viable*

The objectives of the Alaska Sea Grant Marine Advisory Program related to coastal communities and economies are best described as support for economic development, capacity building and enhancement of the coastal community quality of life.

Alaska's coastal towns and villages can be characterized as vibrant, culturally unique, and community-oriented. There are over eighty communities dotting Alaska's coastline and less than 10% are connected by road to any other community.

Forty percent of Alaska's rural residents are Alaska Native. Residents in rural villages, both Native and non-Native share a rich, rural culture which has been important for generations and continues to define their economies, communities and identity.

The "lack of connection" via roads is one of the most defining aspects of Alaska's coastal communities and often is relished by its residents. The inability to reach other communities or urban areas by any overland method creates a myriad of "islands" in the state. The people of these "island" communities care about and for each other, and fiercely cherish their independence and the life styles they have created.

However, this lack of connectivity creates many economic and educational challenges. Cost of power in small Alaska communities often defines the economic feasibility of small businesses. In Bethel, for example, the average price per kwh of electricity (primarily generated by diesel generators) is \$0.28/kWh, well about the US average of \$0.06/kwh or even Anchorage's level of \$0.11/kwh.

Fuel costs, predicted to rise, will severely impact fishing and tourism operations and other marine and coastal businesses. The ability to fly to urban Alaska for less expensive shopping or to attend statewide policy making meetings is often curtailed due to high ticket costs. During the last four years, the Alaska Board of Fisheries has cut all meetings held in rural Alaska due to transportation costs, effectively passing on the cost of participating in this public process to individuals. Rural residents have felt the impact of this travel embargo and feel they have less input to decisions which affect their everyday lives.

Lack of connection also translates into lower efficiencies and higher costs of seafood production and consolidation. Fish harvested in each community may not have the volume or economic value needed to support a local public cold storage, but without it, fishermen remain dependent on a shrinking number of processors who are severely limited in their ability to add value to their catch or obtain the profit margins required to stay open.

The salmon industry, as a good example, has been struggling to increase value and compete with the glut of farmed salmon in the worldwide market. Addressing fuel, electricity and transportation costs is a significant challenge in supplying chilled, fresh salmon to the supermarkets of the US. Despite these added costs, fishermen from Quinhagak to Yakutat to Craig have developed markets for their salmon that have

brought higher income into these communities. This has been made possible by both community and state support, as well as individual innovation. The level of success that they have had to date is a testimony of the resilience and value placed by coastal Alaskans on their fisheries.

However, low fish prices also have been a motivator for coastal Alaskan communities to search for economic diversity. In Southeast Alaska, the cruise ship industry has been a major infusion of private dollars. In Ketchikan, for example, recovering from a decline in timber harvest in the Tongass National Forest and low prices for pink salmon, the cruise ship industry has provided significant income to a community recovering from a decline in timber harvest in the Tongass National Forest and low prices for pink salmon. In 2005, over 900,000 cruise ship visitors will stop in Ketchikan (population 18,000), up from 250,000 in 2000.

Smaller tourism ventures are also being explored by Alaskans in coastal communities from Wrangell to Kotzebue. As small scale tourism businesses are created, MAP Advisory can play an important role in providing information and sharing of experiences that can inspire new ideas and avoid economic pitfalls. Community improvement projects using Smart Growth principles are being undertaken for both the benefit of residents and to attract tourists.

Shellfish aquaculture is also a growing industry, further diversifying coastal economies. Continued rapid development in Southeast Alaska, Prince William Sound and Kachemak Bay is adding jobs and stability. MAP's aquaculture specialist has been instrumental in the development of this small-scale industry since its beginning in the early 1990's. Currently 52 operations dot the coastline, with another 16 anticipated to start up in the next few years. Since this is a small industry with limited resources, MAP has been involved at all levels, from assessment of sites and farm operations, to marketing questions as well as quality and safety issues.

Other marine businesses are evolving and developing in coastal Alaska as dependence on the salmon fishery is changing. In partnership with the State of Alaska, and the USDA's Trade Adjustment Assistance Program, MAP has participated in the state's Fisheries Revitalization Plan and will continue to advance its support, training and education through MAP's new Fisheries and Coastal Business Assistance Project. Supported by USDA and the State of Alaska, the Fisheries Business Assistance Project will provide training and consultation in marketing, processing, and business plan development, as well as tools via web, publications and video.

In the Aleutian Chain and Western Alaska, the prospects for economic diversity are more limited. In those areas, the focus is to increase value and efficiencies in the fishing industry. For example, a major push in Bristol Bay and on the Yukon River is to finally begin chilling fish upon capture. Raising overall quality opens the potential for domestic markets and regional branding of fresh fish and the complex move away from lower valued canned salmon.

Another potential for expanding jobs and economic stability in these communities is to involve more local residents in seasonal research and monitoring activities, jobs traditionally held by non-residents. Training local fisheries technicians, environmental water quality monitors, and biotechnicians is occurring sporadically throughout rural Alaska. In collaboration with Cooperative Extension Service, tribal groups and fishermen's associations, MAP will work to link resource materials and university credit to these various programs.

Reaching a goal of economic diversity while maintaining the quality of life of coastal Alaska communities requires informed decisions and communication among all parties. For example, the proposed hard rock gold and copper mine in the uplands of Bristol Bay and the proposed oil/gas exploration home to the world's largest and most pristine sockeye salmon habitat and commercial fishery have spurred an increasingly emotional dialog among residents, state government and developers into these issues. MAP's role in these hard decisions will be to provide a forum for the exchange and discussion of information and ideas.

Despite struggling with economic uncertainty, rural and coastal Alaskans share a strong interest in maintaining the health of their natural resources, their ability to interact with their environment through the subsistence culture and a continued viability of their unique community character. At its program core, over the last 40 years, MAP has played a consistent role in supporting this quality of life, through its subsistence related educational activities, and by bringing university resources to their coastal regions.

Goals

Increase the knowledge of coastal community residents to understand and adjust to short-term 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 Alaska's marine, estuarine, and coastal watershed industries.

Objectives:

1. Increase the knowledge and ability of coastal residents, industry groups and tribes to develop an economically and environmentally sound shellfish aquaculture industry (RaLonde, Garza).
2. Enhance the ability for coastal Alaskans to assess the feasibility of small tourism operations in their regions and to have the information and training needed to develop their tourism operation. (Johnson, Fong, Reeve)

3. Increase participation of coastal residents in research and environmental monitoring activities in their region, and encourage them to pursue science-related careers (Garza, Cullenberg, Brown, RaLonde, Baker)

4. Enhance the subsistence lifestyle and overall quality of life and unique character of coastal Alaska communities and individuals through educational programs. (Garza, Rice, Reeve)

Methods:

Methods are tailored to the objectives, the audience, and the region of the state served. Examples of some of the methods used and some of the partnerships in the coastal communities and economies program include:

- A NOAA-funded initiative to encourage more Alaska Native students to pursue education and careers in marine related sciences will include interviews, creation of an advisory team, writing a scoping paper and proposal for further funding; Credit-bearing internships within UA system for students with resource management agencies will be developed in conjunction with the UAF curriculum process;

- Supporting the growth of the shellfish aquaculture industry in coastal communities will include applied research on grow out techniques, trainings in farm operations and business management, market research, development of written manuals and web-based information, hosting statewide conferences and interfacing between growers, tribal groups, communities and agency regulators.

- Encouraging tourism and other coastal businesses will include methods such as trainings, workshops, and public presentations related to business operations, developing markets and success stories from other coastal sites.

- Workshops, website and written materials will be produced for in support of subsistence harvest practices and regulations. This effort will be valuable to new residents who wish to enjoy Alaska's bountiful resources, as well as to lifelong residents who wish to share and document their knowledge and skills. Alaska is unique in supporting and maintaining cultural practices and rural life ways.

Partners include: NOAA's Minority Serving Institution program; the College of Rural Alaska, UAF; the USFWS Office of Subsistence Management; State of Alaska Office of Tourism and Department of Commerce, Community and Economic Development; the Alaska Shellfish Growers Association; the Native American Fish and Wildlife Association; the Copper River Watershed Project.

Anticipated Outcomes

- Coastal communities will continue to diversify their economies and will demonstrate an understanding of how to develop new options.
- Shellfish operators will demonstrate an understanding of the business and operational considerations in developing and maintaining their shellfish aquaculture operations.
- Local residents and community leaders will demonstrate a fuller understanding of the considerations in developing and maintaining rural tourism operations.
- More local residents will be involved in seasonal employment as researchers or monitors.
- The University of Alaska will form a partnership with natural resource agencies to encourage Alaska Native students to pursue careers in coastal and marine sciences.
- Local residents will better understand the value and dependence on subsistence resources. Traditional knowledge will be documented and shared.

Organization and Management of the Marine Advisory Program: Our Place in Alaska Sea Grant

The Alaska Sea Grant Marine Advisory Program (MAP) is staffed by coastal agents, specialists and support staff. The educational programs of the MAP agents and specialists vary in response to the needs of each region, but often coastal challenges are common to several regions and the nation at large. ASG, the state of Alaska (through the University of Alaska Fairbanks) and various grants and contracts fund the Marine Advisory Program.

Although its presence is scattered across a state the size of 1/3 of the lower 48, the Alaska Sea Grant program operates as an integrated organization of research, extension and education through a variety of means. The ASG management team, composed of the ASG Director Brian Allee, Associate Director Paula Cullenberg (who also serves as the MAP leader), the Program Coordinator, Michele Frandsen and the Educational Services manager, Kurt Byers, meets monthly. As Associate Director of Alaska Sea Grant, the MAP leader is able to discuss and identify the priorities of the extension faculty so as to integrate with the ASG funded research and communication products.

The MAP faculty is involved with the research program of Alaska Sea Grant in a number of ways. MAP faculty contributed to the development of the ASG strategic plan, which was used in the request for research proposals. Several MAP faculty commented on the submitted preproposals. In a number of instances, MAP faculty discussed the development of an outreach component in the full proposal with researchers, and in some cases, agreed to participate in the final proposal, if funded. The most striking example of integration between research and extension is found when a MAP faculty serves as an investigator on an ASG-funded research proposal. In a number of cases, although not included as a formal member of the research team, a MAP faculty member will serve as an important link between investigators and the local residents in the region of the research.

The inclusion of a required outreach component in research projects funded by ASG is new in the 2006-2008 funding cycle. The intention of ASG is to see interaction between the research community, MAP faculty and the stakeholders of the region grow into an ongoing process of translating the impact of research to coastal communities.

The Marine Advisory Program faculty also works closely with the Educational Services staff to meet Alaska Sea Grant's mission. The staff provides a wide range of services such as producing publications, offering consultation on writing, editing, and web design. Most often the MAP faculty will research, compile and develop content that is then produced by the ASG Educational Services staff. In the last two years, MAP has collaborated with the Educational Services staff to produce a number of publications such as "Ocean Treasure: Commercial Fishing in Alaska;" "Alaska Seas and Coasts –Steller

Sea Lions Boom or Bust?” and “Common Edible Seaweeds of Southeast Alaska.” ASG webmaster, Carol Kaynor, has assisted the Trade Adjustment Assistance program in developing an interactive project website, and trained MAP staff to maintain their site. Together with the MAP Instructional media specialist, Deborah Mercy, the Educational Services group works closely with MAP to meet Alaska Sea Grant’s mission.

The MAP leader routinely participates in meetings of the Alaska Sea Grant Advisory Council for planning, priority setting and proposal review purposes. The Advisory Council represents the diverse geographic regions and coastal issues in Alaska. All of the above underscore the integrated nature of Alaska Sea Grant.

Faculty, Staff and Offices

MAP has a staff of 17, which includes thirteen faculty members and an administrative and technical staff of four. The agents and specialists are university faculty and hold academic rank in the School of Fisheries and Ocean Sciences.

The location of MAP offices and a table depicting our faculty and staff are displayed below. MAP agents live in nine coastal communities in the state and are responsible for developing educational programs, conducting and/or facilitating applied research or demonstration projects which respond to local emerging issues and needs. Field agents are also involved in delivering statewide (and at times, national/international) educational programs within their subject matter expertise. This allows field staff to develop specialized knowledge which can be shared with a wider audience, and encourages teamwork within the Marine Advisory Program and with the wider research community.

MAP specialists have subject matter expertise and their responsibilities generally operate on a statewide, national, and at times, international level. Specialists support agent activities in their subject areas, conduct related academic research and translate other research and information related to their expertise into specialized, practical information for use by agents and coastal audiences.

Alaska Sea Grant Marine Advisory Program offices (ASG Director, Education Services are located in Fairbanks on the UAF campus)



Alaska Sea Grant Marine Advisory Program Faculty and Staff

T. Baker	Res. Asst. Prof.	Prince William Sound Agent	Cordova
B. Bradley	Staff	Program Coordinator	Anchorage
R. Brewer	Res. Asst. Prof.	Aleutians Agent	Unalaska
A. Camos	Staff	Program Assistant	Anchorage
J. Carpenter	Staff	Fiscal Officer	Anchorage
P. Cullenberg	Associate Professor	Program Leader, Coastal Community Dev. Spec.	Anchorage
L. Brown	Asst. Prof.	Bristol Bay Agent	Dillingham
C. Crapo	Professor	Seafood Technology Specialist	Kodiak
Q. Fong	Assistant Professor	Marketing Specialist	Kodiak
D. Garza	Professor	Southeast Agent	Ketchikan
T. Johnson	Professor	Kenai Peninsula Agent	Homer
D. Kramer	Professor	Seafood Technology Specialist	Anchorage
D. Mercy	Staff	Instructional Media Specialist	Anchorage
R. RaLonde	Professor	Aquaculture Specialist	Anchorage
T. Reeve	Asst. Prof.	Yukon/Kuskokwim Agent	Bethel
A. Rice	Res. Asst. Prof.	Southeast Agent	Petersburg
R. Steiner	Professor	Marine Conservation Specialist	Anchorage
K. Wynne	Associate Professor	Marine Mammal Specialist	Kodiak

MAP has grown considerably since 2003. A new office was opened in Unalaska/Dutch Harbor and offices have reopened in Cordova (Prince William Sound) after 14 years and in Bethel following a recruitment lag. Vacancies were filled in Dillingham and Bethel.

The Unalaska and Prince William Sound positions reflect a strong community commitment and partnership. The MAP agents are situated in office space donated by the Unalaska City School District in Unalaska and the Prince William Sound Aquaculture Association in Cordova.

In Unalaska, Reid Brewer has focused on marine education with children and adults, as well as marine mammal issues. Reid is a recent graduate of the Institute of Marine Science, University of Alaska Fairbanks with an M.S. in marine biology. His background also includes diving and a stint in the military. His position is funded by a NOAA grant related to the decline of endangered Steller sea lions and by the Alaska Marine Safety Education Association. The community of Unalaska had been urging Alaska Sea Grant Marine Advisory Program to place a MAP agent in this community, home of the most valuable fishing port in the US, for a number of years. Reid also serves as a bridge to the seafood processing industry and the University's seafood technology resources.

Prince William Sound's community of Cordova has also been encouraging the return of a marine advisory agent to the region since the move of MAP agent, Rick Steiner in 1990 to Anchorage. With the success of the Fisheries Extension Enhancement proposal to National Sea Grant, ASG had the funds to fill this position. Torie Baker, who in 2003 acted as the program's Trade Adjustment Assistance statewide coordinator, and who is a long time resident of Cordova and active in the Copper River salmon fishery filled the position. Torie also has a master's degree in adult education, with her research focused on how fishermen learn. Torie still coordinates TAA, but also is involved in the statewide Fisheries Business Assistance Project, and regionally with marine safety, fishing quality and marketing issues and other local concerns.

The FEE program also supported the hire of Sunny Rice in Petersburg, replacing retiring agent, Brian Paust. Without the FEE funding, this office would have been closed as budget constraints prevented refilling it with state dollars. Sunny had been Brian's program assistant for 7 years and completed her master's degree in Public Administration prior to taking the position. She has been working on seabird bycatch deterrence in partnership with Washington Sea Grant, coordinating MAP's TAA program in Southeast Alaska, as well as working with the community of Petersburg in educational efforts designed to maintain the integrity of the fishing industry in this community.

Reid, Torie and Sunny are all hired as Research Assistant Professors, and will follow the same progression in rank as other faculty. However, their positions are dependent on continued grant funding.

Terry Reeve was hired to refill the Yukon/Kuskowkim field agent position. This position was funded by the UAF President's initiative fund as a response to the salmon crisis declared by the state in this region. Terry has a long background in fisheries development in Western Alaska and is working with many of the coastal Alaska Native communities involved in all phases of village fisheries development as well as rural tourism and education.

Liz Brown is completing her second year with the program as the marine advisory agent in Bristol Bay. Liz joined the program as an affiliate a number of years ago in her role of seafood technology training coordinator at Sheldon Jackson College in Sitka. She followed up that position with a job working at the Department of Environmental Conservation in Unalaska. In Bristol Bay, Liz is working with fishermen who are trying to increase value from the salmon industry, as well as linking fisheries interns with University credit and resources. Both Terry and Liz are hired as assistant professors and are supported by a mix of state and Sea Grant funds.

These new faculty members have supplemented our continuing staff. MAP Leader and Coastal Community Development Specialist, Paula Cullenberg, Associate MAP leader and Aquaculture Specialist, Ray RaLonde, Seafood Quality Specialist, Don Kramer and Marine Conservation Specialist, Rick Steiner, are all located in Anchorage. Deborah Mercy, instructional media specialist; Beverly Bradley, Program Coordinator, Julie Carpenter, Fiscal Coordinator and Angela Camos, Program Assistant are also located in our Anchorage office.

Ketchikan agent, Dolly Garza, is involved with subsistence activities in Southeast as vice-chairman of the Federal Subsistence regional advisory council and has served on the council for about ten years. Dr. Garza is also vice-chair of the The Alaska Sea Otter and Steller Sea Lion Commission which has a sea otter co-management agreement with the US Fish and Wildlife Service. She is active each spring and summer teaching workshops on indentifying and using marine resources as a family and cultural activity.

Terry Johnson, spends half of his time as the Marine Recreation and Tourism Specialist for the program and works also on fishing business activities and staffs our Homer office. Both are important components of the economy in the Kachemak Bay/Cook Inlet communities.

Three MAP faculty members are housed at the University of Alaska Fishery Industrial Technology Center in Kodiak. Marketing Specialist, Quentin Fong, and Seafood Quality Specialist, Chuck Crapo, have joint appointments with MAP and FITC. MAP's Marine Mammal Specialist, Kate Wynne, is also located in Kodiak, working on marine mammal issues throughout the Gulf of Alaska and in the Aleutian Chain area and on a statewide and national basis.

The MAP faculty is a relatively balanced mix of tenured/non-tenured, associate to full professors. We have six tenured, full professors on staff (Terry Johnson was promoted to Professor in 2005); two associate professors (one is tenured) and five assistant professors, non-tenured. Three of our faculty will be up for promotion and/or tenure during this plan period.

In addition, MAP added Jerry Dzugan to our group as an affiliate faculty member. Jerry is the longtime executive director of the Alaska Marine Safety Education Association. AMSEA is the standard bearer of marine safety education in Alaska and the nation, and

was originally formed by the Marine Advisory Program in 1985. AMSEA and MAP partner in many ways, with the MAP leader serving on the board of directors. Jerry recently completed a methods of instruction training for the MAP faculty.

Up to four faculty members may be retiring before 2010. Openings within the Alaska Sea Grant Marine Advisory Program generally are rare, and replacing open positions will be the subject of discussion and analysis within the program. However, with the current level of relatively flat funding at the School of Fisheries and Ocean Sciences and with Sea Grant, having the ability to replace these positions is uncertain. It is a constant effort to retain or increase University base funding at UAF. Alaska Sea Grant Marine Advisory Program will continue to look toward outside funding to supplement state and Sea Grant funds to support our capacity.

The Importance of Partnerships

The Alaska Sea Grant Marine Advisory Program broadens its impact through collaborative partnerships with private and public groups and individuals both in and outside of Alaska. These interactions include activities such as information exchange, coordination of programs, presentations at workshops, development of educational materials, participation in regional or statewide organizations, applied research projects and one-on-one consultations with marine users.

Other Sea Grant programs MAP continues to work closely with several other Sea Grant programs, particularly Washington and Oregon. Washington Sea Grant Marine Advisory Service and MAP are collaborating on the development of a Fisheries Business Assistance Program and an Intensive Technical Assistance Program funded by USDA's Trade Adjustment Assistance program. We are closely involved with WA Sea Grant in efforts to reduce seabird bycatch in the longline fisheries in Alaska. In addition, a Pacific coasts network is has reformed and most recently had a meeting in Astoria, OR to discuss regional fisheries extension activities.

Local and State Interactions MAP faculty interact daily, weekly or monthly with local, state, and federal agencies, marine-related businesses such as fishermen, seafood processors, charter boat operators, Alaska Native organizations, marine resource organizations, K-12 schools and researchers from all of the Universities in the state. We have a Memorandum of Understanding with the Alaska Cooperative Extension Service to share space and effort, when possible. Currently, several of our offices are the only source of CES publications in the community.

Regional and National Interactions MAP faculty members participate in program activities on a regional and national basis that have an impact on Alaska's resources or people. Partners include the Western Regional Aquaculture Association and the Seafood HACCP Alliance.

NOAA Interactions MAP faculty members frequently interact with various departments in NOAA. Kate Wynne currently serves on several NOAA advisory committees

including the Marine Fisheries Advisory Committee. Dolly Garza sits on NOAA's national Marine Protected Areas committee. Sunny Rice has worked closely with NOAA Alaska Region on seabird bycatch issues. Paula Cullenberg worked with NOAA and the NPFMC to coordinate a conference on community involvement in fisheries management.

Evaluating What We do

Evaluation of program activities is important to the Marine Advisory Program and Alaska Sea Grant on both an individual and organizational basis. It provides stakeholders an understanding of what is being accomplished with public funds that are spent on program activities—the return on the public investment in Marine Advisory Program and Alaska Sea Grant. As Alaska Sea Grant's extension program, evaluation and program results by MAP reflect on the overall success of Alaska Sea Grant. Evaluation also serves as a means to plan and change programs for the future.

Individual accountability is accomplished through the extensive planning and reporting requirements of individual faculty. Faculty members prepare annual reports of activities and accomplishments that are used as the basis for individual evaluations. Annually, faculty members prepare a workload form that is reviewed by the Program Leader and the Dean of the School of Fisheries and Ocean Sciences. The bottom line in all activities is that MAP faculty can demonstrate that they “have made a difference” as a result of their educational and outreach activities.

Project activity evaluations are conducted on both a formal and informal basis. At MAP-sponsored workshops, there is usually an evaluation questionnaire for participants. Major programs may be evaluated by other methods such as – mail, interview or post-meeting surveys measuring increased knowledge gained by participants; personal observations of changes resulting from participation in a MAP program (e.g. increased number of shellfish aquaculture operations, fishermen selling fish to local businesses, or teachers participating in marine science classes), or qualitative evaluations through informal interviews and observations.

Formal reporting and evaluation are also important in providing a measure of quality, results, and benefits for each major MAP activity. MAP programs are reviewed by ASG administration, and MAP participates in Alaska Sea Grant's annual program report, providing an overview of the program, its accomplishments and benefits, funding from all sources, awards and recognition received by faculty and staff, description of our activities, and a self-evaluation.

In the fourth year of this plan, MAP will complete a comprehensive evaluation of our work and develop the next four year plan.

Alaska Sea Grant's work is evaluated by National Sea Grant Program's Performance Assessment Team (PAT) reviews every four years. Alaska Sea Grant's next PAT is scheduled for September 2006.

Program Priorities and Directions for the Future

Improving the Program: MAP will continue to nurture and improve our program so that it envisions trends; emphasizes creativity, new ideas, innovation and commitment in fulfilling our mutual mission. We will support our faculty and staff in their work and careers as well as recruit talented, passionate, capable and team-oriented faculty to maintain the legacy of MAP and Alaska Sea Grant.

Responding to Change: We will continue to work to ensure that our program matches the needs of the state and maintain diversity in our faculty. A major challenge is identifying opportunities and remaining flexible enough to meet them.

Optimizing Integration: We will continue to strive for integration in Alaska Sea Grant so that the Alaska public will feel the impact of our program and use Alaska Sea Grant as a resource. We will also strive to integrate MAP faculty into the SFOS faculty through persistent education and example.

Maintaining rapid response capabilities: As one of the only units in SFOS and UAF that is capable of responding quickly to the needs of the public, MAP has an obligation to hold onto that flexibility, and clarify the value of that approach to others both within and outside the University.

Marine Education needs: We will continue to stay engaged in the development of marine education programs for schoolchildren and community members.

Defining the Needs of the state: We will continue to strive to stay up to date and forward thinking in the development of our program.