

NPRB Proposal Summary Page

NPRB Use Only

Reference No: 36

Date Submitted: December 9, 2005

Date Received: December 7, 2005

(To be filled in by applicant)

Project Title: Marine Habitat Mapping Technology Workshop for Alaska

Project Period: From September 2006 To August 2008

Name, Address, Telephone Number and Email Address of Applicant:

Greg/Gretchen Simpson/Hundertmark
University of Alaska Fairbanks
P.O. Box 757220, Fairbanks, Alaska, 99775-7220, United States
907-474-2464/7124
907-474-7204
proposals@sfos.uaf.edu

Principal Investigator(s): (Include name, affiliation and email address):

Dr. Brian J. Allee , University of Alaska Fairbanks, brian.allee@sfos.uaf.edu
Dr. Jennifer R. Reynolds , University of Alaska Fairbanks, jreynolds@guru.uaf.edu

Research Priority and Subcategory:

Primary 2.c.ii Marine habitat mapping technology workshop

Summary of Proposed Work (250 words or less):

In the marine science community, there is now broad recognition that a comprehensive ecosystem approach is necessary for effective management of marine resources. An important step in defining essential fish habitat and potential mitigative measures is to understand the relationship between habitat characteristics, fish distribution, and fishing effort and other human activities [e.g., Barnes and Thomas, 2005]. There is a need, however, for a synthesis approach in which experts in the various aspects of marine habitat mapping identify the key issues, evaluate technologies and techniques available to address them and those that are in development, and present the results in a form that can be used to educate managers and other interested parties. This synthesis may serve as a reference to aid in matching needs with the tools for specific marine habitat mapping programs. We propose to conduct a workshop on the topic of marine habitat mapping technologies, emphasizing (a) available tools and techniques; (b) methodologies for classifying seafloor habitats; (c) a synthesis approach, to aid those who are not experts in the field; (d) a focus on needs specifically in the three large marine ecosystems around Alaska, i.e., Gulf of Alaska, Bering Sea/Aleutian Islands, and Arctic; and (e) a workshop format that includes and educates a wide range of interested groups such as local community leaders, commercial fishing organizations, and NGOs. The workshop format that we propose will serve both the wider community and the managers/researchers who need specific technical knowledge about marine habitat mapping.

Funding:

Total NPRB Funding Requested: **\$149,960.00**
By Institution:
\$134,582.00 (University of Alaska Fairbanks)
\$15,378.00 (San Jose State University Foundation (Moss Landing Marine Laboratories))

Total Matching Funds Used: **\$0.00**

Legally Binding Authorizing Signature and Affiliation:

Project Title: Marine Habitat Mapping Technology Workshop for Alaska

Proposal Summary:

In the marine science community, there is now broad recognition that a comprehensive ecosystem approach is necessary for effective management of marine resources. Federal legal mandates for designation of Essential Fish Habitat and Habitats of Particular Concern, for example, are a recognition of this development. An important step in defining essential fish habitat and potential mitigative measures is to understand the relationship between habitat characteristics, fish distribution, and fishing effort and other human activities [e.g., Barnes and Thomas, 2005]. There is a need for a synthesis approach in which experts in the various aspects of marine habitat mapping identify the key issues, evaluate technologies and techniques available to address them as well as those that are in development, and present the results in a form that can be used to educate managers and other interested parties. This synthesis could serve as a reference that would aid in matching needs with the tools for specific marine habitat mapping programs. We propose to conduct a workshop on the topic of marine habitat mapping technologies, emphasizing (a) available tools and techniques, including potential applications and costs; (b) methodologies for classifying seafloor habitats; (c) a synthesis approach, to aid those who are not experts in the field; (d) a focus on needs specifically in the three large marine ecosystems around Alaska, i.e., Gulf of Alaska, Bering Sea/Aleutian Islands, and Arctic; and (e) a workshop format that includes and educates a wide range of interested groups such as local community leaders, commercial fishing organizations, and NGOs. The workshop format that we propose will serve both the wider community and the managers/researchers who need specific technical knowledge about marine habitat mapping.

Project Responsiveness to NPRB Research Priorities or identified project needs:

In the marine science community, there is now broad recognition that a comprehensive ecosystem approach is necessary for effective management of marine resources. Federal legal mandates for designation of Essential Fish Habitat and Habitats of Particular Concern, for example, are a recognition of this development. Managers of marine resources, and others who strive to understand the marine environment, are facing a growing need to define and delineate ecosystems and to recognize the linkages between different aspects of the marine environment. With regard to human activities, any regulatory measures adopted to minimize impacts, without the information of whether or where vulnerable habitat is at risk, may be ineffective or unnecessarily restrictive. An important step in defining essential fish habitat and potential mitigative measures is to understand the relationship between habitat characteristics, fish distribution, and fishing effort and other human activities [e.g., Barnes and Thomas, 2005]. This issue is discussed as a priority in the Science Plan of the North Pacific Research Board (November 2005).

The term benthic habitat mapping refers to characterization of the seafloor geology (substrate) and biology. Benthic habitat mapping delineates regions that are potential habitat for species that depend on the benthic environment in some way. These maps directly address issues of habitat distribution. Properly constructed, benthic habitat maps may be used to infer population size and density of individual species or species assemblages, and as a tool for evaluating the health of benthic ecosystems.

The primary difficulty lies in reconciling the need to define and characterize marine habitats over the large areas covered by ecosystems or populations, i.e., large enough to be useful for management or predictive modeling purposes, with the capabilities and cost of the technologies available to accomplish this at high enough resolution. Techniques and technologies for benthic habitat mapping and characterization have been under development in the U.S. and elsewhere over the past 20-30 years, and have been used in the U.S. West Coast and Alaska regions since the early 1990s [Reynolds et al., 2001].

To address the need for habitat maps that cover significant areas of the seafloor in an efficient way, the general approach developed by the scientific community is to combine acoustic mapping of the seafloor

with groundtruthing and biological surveys by visual observations. In essence, a geological interpretation of the acoustic mapping data is used to extrapolate the visual observations across a much wider area of the seafloor. Based on this combination of data, the wider area is then divided, or classified, into different types of habitats. The acoustic mapping itself, as well as the visual observations, can be done as a series of nested surveys in order to maximize the efficiency of this process and the quality of the results. The extent to which the extrapolation is valid depends on the complexity of the area, acquisition of representative observations, resolution of the data, successful geological interpretation, and identification of the significant fish/habitat associations. For analysis of fish/habitat associations and their relationship to fisheries and oceanographic conditions, the habitat data may be merged in a GIS database with commercial and survey fishery data, and any available oceanographic data.

For benthic species, the characteristics of the seafloor substrate are a crucial factor in determining species distribution and population densities [e.g., Nasby-Lucas et al., 2002]. On a local scale, and in the absence of human-induced disturbances, depth and substrate are usually the primary variables. Other factors, such as water mass characteristics, currents, and nutrient supply, vary on a larger scale and thus exert less control on local variability of benthic habitat. But even at a regional scale, where spatial and temporal variation in these factors is more important, the depth and substrate may still dominate and may be related to the presence of local currents, nutrient supply, etc. Thus, a map of benthic habitat starts with a map of seafloor depth and substrate characteristics.

The biological aspect of benthic habitat mapping involves identification of the species that are present, species-habitat associations, and population densities if possible. Because of the need for species identification, the biological surveys have been limited to visual surveys and sampling. Experimentation with new techniques has so far not produced a revolution in this aspect of habitat mapping. For example, experiments with laser line scan mapping, which produces data intermediate in scale between that of acoustic mapping and visual observations, were somewhat successful but revealed drawbacks that have not been overcome to date [e.g., O'Connell and Wakefield, 1994; Tracey et al., 1998; Stevens, 2005; Yoklavich, 2005 and http://www.research.noaa.gov/spotlite/archive/spot_laser.html]. A newly developed technique with comparable resolution is the Dual-frequency Identification SONar (DIDSON), a so-called acoustic camera [Rose, 2005]. In general, however, rather than pushing the limits of data resolution, recent efforts have focused on improving underwater camera systems of various kinds and the platforms on which they are mounted [e.g., Somerton and Glendhill, 2005].

The approaches described above have been designed for mapping spatial variations in habitat. Habitats can also change over time. This may happen through physical changes in the substrate, oceanographic circulation patterns, water temperature and salinity, or nutrient supply. Habitat is a potential home for organisms, so strictly speaking, habitat change does not refer to changes in the inhabitants, unless they themselves structure habitat for other species (e.g., deep corals and sponges, kelp forests). Temporal changes in habitat may be predicted, through knowledge of the ecosystem, and may be directly monitored by establishing a baseline habitat map which is supplemented by observations over time. This is a very general statement, encompassing all sorts of potential changes and driving mechanisms, and specific situations need to be matched to appropriate mapping and monitoring methods.

However, a range of available mapping systems, survey tools, sampling tools, and classification schemes, as well as experimental systems under development, confronts anyone trying to design a new habitat mapping program. A symposium held in 2004 by the American Fisheries Society, on "Benthic Habitats and the Effects of Fishing," addressed many of these issues [Barnes and Thomas, 2005]. There is a need, however, for a synthesis approach in which experts in the various aspects of marine habitat mapping identify the key issues, evaluate available technologies and techniques as well as those that are in development, and present the results in a form that can be used to educate managers and other interested parties. This synthesis could serve as a reference that would aid in matching needs with tools for specific

marine habitat mapping programs.

We propose to conduct a workshop on the topic of marine habitat mapping technologies, emphasizing (a) available tools and techniques, with their potential applications and costs; (b) methodologies for classifying seafloor habitats; (c) a synthesis approach, to aid those who are not experts in the field; (d) a focus on needs specifically in the three large marine ecosystems around Alaska, i.e., Gulf of Alaska, Bering Sea/Aleutian Islands, and Arctic; and (e) a workshop format that includes and educates a wide range of interested groups such as local community leaders, commercial fishing organizations, and NGOs. The workshop format that we propose will serve both the wider community and the managers/researchers who need specific technical knowledge about marine habitat mapping. This proposal is a direct response to the NPRB 2006 Request for Proposals, section 2.c.ii, "Marine habitat mapping technology workshop."

Project Design and Conceptual Approach:

Overview: The workshop will be organized and run by PIs Brian Allee, Jennifer Reynolds, and Gary Greene, and by the staff of the Alaska Sea Grant Program. Extensive preparation prior to the workshop will identify the principal technological and methodological issues in marine habitat mapping in the Alaska region. The workshop will be a presentation and assessment of this information pertinent to Alaska and the Northeast Pacific, drawn from regional, national, and international sources. A formal Steering Committee (see Project Management) has been set up to advise on selection of topics and invited speakers, and committee members will also act as editors for a peer-reviewed synthesis publication following the workshop.

The 2.5-day workshop will be conducted in Anchorage, Alaska, in late March or early April, 2007. It will combine three elements. The first two days will include: (1) a series of approximately 15 invited speakers, presenting 30-minute synthesis talks on topics specified by the Steering Committee; and (2) an open poster session for attendees to present their priorities and activities in marine habitat mapping, and to provide a venue for discussion and interaction among attendees. Day 3 will be a half-day technical writing session by breakout groups composed of the 15 invited speakers and approximately 15 additional people with relevant technical expertise. The activities of the breakout groups will be open to those who wish to observe. The outcome of this technical discussion is intended to contribute to the preparation of synthesis papers by the invited speakers. The written summaries produced by these groups, together with material from speaker presentations, will form the basis for an Executive Summary of the workshop.

Following the workshop, the invited speakers will be asked to submit 10-15 page synthesis papers on the topics assigned to them by the Steering Committee. These papers will be peer-reviewed for publication as a synthesis volume, and are intended to be a reference for planning marine habitat mapping activities in Alaska and the Northeast Pacific. Because of the considerable effort requested of these invited speakers, on topics chosen by the Steering Committee rather than by the speakers themselves, we have included honoraria for the speakers in the workshop budget. This will help to ensure a commitment by the most appropriate speakers/authors, and promote a level of effort that will result in high-quality synthesis presentations and manuscripts.

Steering Committee: The members of the Steering Committee represent organizations that need marine habitat mapping for resource management, and/or represent the scientific community that actually conducts marine habitat mapping. In addition to PIs Brian Allee, Jennifer Reynolds, and Gary Greene, the committee members are Dave Witherell, North Pacific Fisheries Management Council (Anchorage); Doug Woodby, Alaska Department of Fish & Game, Commercial Fisheries Division (Juneau); and Jon Kurland, NOAA Fisheries, Habitat Conservation Division (Juneau).

It is not necessary that the Steering Committee all be experts in marine habitat mapping technology. Instead, they must all have enough background knowledge to conduct in-depth discussions with members of the wider marine community. While the PIs and the Steering Committee are capable of selecting topics and speakers without further input, we feel it would be most useful to solicit input from a wide range of agencies, organizations, and researchers, including regional, national, and international. All of the proposed Steering Committee members have agreed to serve, and brief biographical descriptions are included below under Project Management.

Intended audience/participants:

The first priority of this workshop is a technical and methodological review of marine habitat mapping as applied to the Alaskan region. Second, the workshop can also serve as a community education and outreach forum. Adding this function requires modest additional support and an appropriate format. We expect 100-120 attendees from the following groups: fishery and marine resource managers, academic researchers (and students), representatives of the state government, non-governmental organizations (NGOs), fishery councils, commercial fishing organizations, coastal communities, and companies that operate marine mapping and imaging surveys.

During the first two days of the workshop, the presentations by invited speakers will serve as a short-course on marine habitat mapping for this general audience. Attendees will also be invited to participate in the poster session, planned for the evening of the first day and 3 hours in the middle of the second day. Poster submissions will not be reviewed in advance, but instead will be an open forum for exchange of information and viewpoints. Posters might present actual habitat mapping projects; display capabilities of commercial companies; present viewpoints of commercial fishing organizations with respect to habitat mapping; needs and goals of a coastal community; or concerns of a non-governmental organization. This will be an opportunity for attendees to interact with each other, discuss their needs and goals for habitat mapping, and explore potential partnerships for the future. A volume of brief poster abstracts will be distributed with the meeting program.

The format for the third day of the workshop is intended to result in a written technical summary. To accomplish this, the invited speakers and additional selected professionals, approximately 30 people in all, will be divided into smaller working groups for discussion and writing assignments on specific topics. These technical writing sessions will be open to those who wish to observe. The summaries produced by these groups will serve as the basis for an Executive Summary report of the workshop, to be distributed via the Alaska Sea Grant web site in May, 2007. A preliminary version could be made available to the North Pacific Research Board in April, 2007.

Possible topics:

Examples of topics to be addressed at the workshop include, but of course are not limited to, the following.

- A discussion of what is habitat, why is it mapped, and what is meant by habitat mapping.
- Multibeam mapping technologies and how to select the most appropriate.
- Visual survey technologies and how to select the most appropriate.
- Importance of appropriate data analysis methods, and discussion of examples.
- Alternatives to multibeam and visual surveys, especially newly developed and experimental methods.

- How to approach the mismatch between needs and cost/resource requirements for habitat mapping. This includes the problem of scale, concepts of nested surveys and extrapolation methods.
- Data requirements and methodologies for actually classifying benthic habitats.
- Mechanisms for dissemination of habitat information, and access to habitat information (databases or metadata).
- Alaska marine environments, including the range of seafloor characteristics and environmental influences, and different habitat mapping approaches for different environments.
- Examples from other regions, especially at high latitude.

Outreach and Education:

One important outcome of our proposal is that it represents a major opportunity to educate Alaskans on the incredible technological capacity of habitat mapping for application in state and federal fishery management. A number of outreach outputs are planned which would include the workshop event itself, an executive summary of the workshop and finally a peer reviewed synthesis of the workshop. Specifically:

- We are proposing to build capacity in this highly technical field among Alaskans who are functioning in a technical role and who have a responsibility to inform decision makers.
- The invited speakers will provide technical papers, which will define and essentially match the appropriate mapping technologies with the specific benthic habitat types found in Alaskan marine environments. This will result in a functional matrix of mapping technologies and benthic habitat types that will assist managers in choosing the most cost-effective and useful approaches to marine habitat mapping needs in the Alaskan region.

The first outreach output would involve opening the workshop to a broad constituency of Alaskans to include the management agencies, Alaska Department of Fish and Game, National Marine Fishery Service, North Pacific Fishery Management Council members and staff, Alaska Board of Fisheries members and staff, other state and federal agencies, academic scientists and students, federal and state legislators and their staff, environmental groups and other NGO's, commercial fishermen, fishery organizations, local borough and city leaders, and commercial mapping companies.

An Executive Summary of the workshop will be distributed via the Alaska Sea Grant web site.

Finally, the major outreach outcome will be the production of a peer-reviewed synthesis on CD. This product would be scheduled to be available in May of 2008. The synthesis can be made available through Alaska Sea Grant, which has a distribution system in place. It can be listed on ASG's web site and in the publications catalog, and email and hard copy notices can be sent out alerting the public of its availability.

Publications: This workshop format will produce several separate publications. First, there will be a printed abstracts book that will include extended abstracts from all invited speakers, and brief poster abstracts from attendees. Second, a program book will be printed for distribution to participants at the workshop. Third, summaries written on the third day of the workshop will be developed into an Executive Summary and will be made available on the Alaska Sea Grant web site. Finally, a peer-reviewed synthesis of topics, written by the invited speakers. This synthesis volume will be published

approximately one year later as a monograph on CD. Remaining copies of these publications will be transferred to NPRB at the end of the performance period.

Peer review of the synthesis volume will be administered by the staff of the Alaska Sea Grant Program, under the direction of the Steering Committee. The Steering Committee will be responsible for choosing reviewers and will act as editors for the publication.

The synthesis volume is envisioned as a collection of approximately 15 chapters, each 10-15 pages in length, total approximately 250 pages. The volume will be indexed. The chapters will be written by the invited speakers, on the topics identified by the Steering Committee and addressed at the workshop. The authors will be expected to consider/incorporate feedback and additional information gathered at the workshop in their subsequent manuscripts. For this reason, the manuscripts will not be due at the time of the workshop but instead will be due two months later for peer review.

Project Management:

Alaska Sea Grant will be the primary coordinator of the benthic habitat mapping workshop under the guidance of the PIs and Steering Committee, and will produce, publish, and distribute the synthesis publication. ASG has vast experience coordinating workshops, conferences and symposia for the scientific community. We are currently organizing the 24th Lowell Wakefield Fisheries Symposium; this symposium series has gained international recognition for high quality presentations, organization, and proceedings books. Recently Alaska Sea Grant has coordinated several conferences and workshops in collaboration with NOAA Fisheries, Alaska Department of Fish and Game, North Pacific Fishery Management Council, NGS's and coastal communities. For past, current and future symposia, visit the ASG web site at <http://www.uaf.edu/seagrant/Conferences/symposia.html>.

Alaska Sea Grant is well known for producing quality publications, including conference materials and workshop and symposium proceedings books, many of which have won national awards for excellence. ASG has a system for publications marketing and distribution, which can be utilized to effectively and efficiently provide the synthesis CD to the public.

Alaska Sea Grant's administrative staff will provide the following services to the benthic habitat mapping workshop:

- Secure a host hotel – negotiate contract for meeting space and guest room block; set up and manage master account (upon receipt of grant)
- Design a workshop logo (upon receipt of grant)
- Develop email list to send call for posters and workshop announcement, registration information; with suggestions from Steering Committee (upon receipt of grant)
- Produce electronic call for posters and conference announcement; send out first call in summer 2006, second call in early fall 2006, and registration reminder in winter 2006/2007.
- Provide web support - design and maintain the main meetings page to include online poster abstract submission, conference agenda, printable registration form and online secure registration and other meeting information (location, steering committee, sponsors, etc.) See sample at <http://www.uaf.edu/seagrant/Conferences/fish-com/announce.html> (start summer 2006)
- Manage poster submissions (winter 2006) and organize poster session
- Assist in promotion of meeting through media contacts, newsletters, etc. (ongoing; start upon receipt of grant)
- Coordinate registration - process electronic, mail, phone and fax registrations, prepare nametags for workshop

- Produce abstracts book for distribution at the meeting, to include abstracts from invited speakers and all poster presentations. Produce program book for participants.
- Coordinate and in some cases arrange for speaker travel
- Provide on-site support at the workshop - attend workshop, handle on-site registrations, hotel accommodations/facilities, arrange catering, room set-up and A/V.
- Distribute Executive Summary of Workshop in May, 2007. A preliminary version could be made available to the North Pacific Research Board in April, 2007 (to aid NPRB in preparation of the next NPRB funding request for proposals).
- Produce peer-reviewed synthesis of workshop outcome on available marine habitat mapping technologies and their applicability to Alaskan needs. Produce and distribute CDs to participants and public. Promote through targeted mailings, emails, newsletters, etc., host on web site so it can be found by browser searches. Due by end of funding period.

PIs Allee, Reynolds, and Greene, together with Sherri Pristash, Meetings & Education Coordinator of Alaska Sea Grant, will ensure that logistical arrangements are accomplished in a timely manner, that the workshop program is developed, that the invited speakers are secured and their travel arrangements are made, and finally that the peer-reviewed synthesis publication is produced, printed and distributed.

The Steering Committee for this workshop has been selected for their knowledge of mapping technologies and the needs of the Alaska region. We are using the Steering Committee format to coordinate the workshop planning with managers who have a critical need for habitat mapping in Alaska, i.e., NMFS, ADFG, NPFMC. The Steering Committee will be charged with discussing habitat mapping needs, technologies, and strategies with agencies, fishery managers, policy makers, academic researchers, coastal communities, commercial fishing organizations, and companies that operate mapping and surveying equipment. The Steering Committee will help to determine the invited speakers and topics, and will provide suggestions for how to reach the intended audience for the workshop and for sales of the synthesis book. The following people have agreed to serve on the Steering Committee for the term of this project.

Steering Committee:

Brian Allee, Director, Alaska Sea Grant College Program (PI)
 Jennifer Reynolds, University of Alaska Fairbanks, benthic mapping specialist (PI)
 Gary Greene, Moss Landing Marine Laboratory, benthic mapping specialist (PI)
 Jon Kurland, NOAA Fisheries, Habitat Conservation Division
 Dave Witherell, North Pacific Fisheries Management Council, Ecosystems and Habitats
 Doug Woodby, Alaska Dept. of Fish and Game, Commercial Fisheries Division

Dr. Brian Allee is Director of the Alaska Sea Grant College Program. He is responsible for overall program strategic planning, program development, implementation and monitoring. His focus is to help to identify Alaska's critical marine resource problems. He nurtures collaborative partnerships between the university, state and federal agencies, the fishing industry, and other coastal communities and constituencies to contribute to the solution of Alaska's marine resource problems. Dr. Allee's professional interests are the impact of the regime shift on marine resources, fisheries restoration and enhancement, and freshwater and marine aquaculture. Dr. Allee has worked as a fisheries scientist and manager in the public, private and private nonprofit sectors in Alaska, Washington and Oregon for more than 30 years. He was project manager for subbasin planning in the Columbia River, encompassing the states of Washington, Oregon, Idaho and Montana. He was Executive Director of the Columbia Basin Fish and Wildlife Authority, Director of the Fisheries Rehabilitation, Enhancement and Development Division, Alaska Department of Fish and Game, and President of the Prince William Sound Aquaculture Corporation.

Dr. Jennifer Reynolds is currently the Interim Director for the West Coast & Polar Regions Undersea Research (WCPR) Center, one of six regional centers in NOAA's Undersea Research Program (NURP). In 2006, Dr. Reynolds expects to resume her permanent position as a geological oceanographer on the faculty of the School of Fisheries & Ocean Sciences, and Science Director in the WCPR Center. This Center has a long history of active support for development of habitat mapping techniques in the West Coast and Alaska regions [Reynolds et al., 2001]. Dr. Reynolds has extensive experience in seafloor mapping, sampling, and imaging, and is currently the lead geologist on a NPRB-funded interdisciplinary research to identify coral and sponge habitat associations and to map the distribution of these habitats in a 500-km section of the central Aleutian Ridge. She is also collaborating on two other Alaska habitat mapping projects with NOAA/NMFS biologists, one on the outer continental shelf at Kodiak Island with Jon Heifetz and the other on the submarine slopes of Bogoslof Volcano with Mark Zimmermann.

Dr. H. Gary Greene has been involved in marine geological research for nearly 40 years with 28 years of experience at the U.S. Geological Survey, Branch of Marine Geology, and nearly 12 years in academia at Moss Landing Marine Laboratories, part of the California State University system. In 1988 he established a marine benthic habitat mapping project at the USGS using side-scan sonar to map substrate types that could be potential rockfish habitats. He pioneered the art and techniques of seafloor mapping by working with biologists at NOAA's National Marine Fisheries Service and the Alaska Department of Fish and Game. Upon arriving at Moss Landing Marine Laboratories in 1994 as its Director, Gary established the Center for Habitat Studies to carry on his work on marine benthic habitat characterization that he started at the USGS. Through this Center he has received grants and contracts (e.g., NOAA, Sea Grant, NMFS, NOS, and Sanctuary programs, USGS, California Depart. Fish and Game, Alaska Dept. of Fish and Game, Dickenson Foundation and the SeaDoc Society) to pursue his pioneering efforts in mapping potential habitats from geophysical data sets and documenting habitats through the use of human occupied submersibles and ROVs.

Dr. Greene has been instrumental in organizing and leading marine benthic habitat mapping workshops, seminars, scientific sessions, and projects. He co-organized and convened the first major habitat-mapping workshop with the French that took place in 1997 in Noumea, New Caledonia. Since that time, he has participated as an organizer and convener in over 10 such activities including six GeoHab conferences, the California Seafloor Mapping Taskforce, and several sessions of the SOPAC (South Pacific Geoscience Commission) Working Group on Habitats. Presently Gary is a Co-Chair for the Strategic Planning Workshop for California Marine Habitat Mapping sponsored by the California Coastal Protection Council and California Coastal Conservancy to take place December 12-13, 2005.

Mr. Jon Kurland is the Assistant Regional Administrator for Habitat Conservation with the National Marine Fisheries Service. He oversees the Alaska Region's Habitat Conservation Division, which carries out the agency's legal mandates to conserve habitats that support living marine resources. His group identifies and conserves Essential Fish Habitat (EFH) through fishery management, and provides technical advice to other agencies and the public on ways to minimize the effects of development activities on habitats that support commercially harvested fish as well as marine mammals. Before moving to Alaska in 2002, Jon was the national EFH Coordinator for NMFS in the headquarters office in Silver Spring, Maryland. He was responsible for coordinating the agency's implementation of the EFH provisions of the Magnuson-Stevens Fishery Conservation and Management Act, and developing national regulations, policy, and guidance for the agency's EFH activities. Previously he worked for nine years in the habitat conservation program of the NMFS Northeast Region in Gloucester, Massachusetts. Jon received an M.A. in Marine Affairs from the University of Rhode Island and a B.A. (with Honors) in Government and Public Policy from Hamilton College, and he is an alumnus of the Williams College / Mystic Seaport Maritime Studies Program.

Mr. David Witherell is the Deputy Director of the North Pacific Fishery Management Council. He has been a fishery management analyst with the Council for the past 13 years. His areas of expertise include bycatch, fish habitat, marine protected areas, and ecosystem issues.

Dr. Doug Woodby is the Chief Fisheries Scientist for Marine Fisheries with the Alaska Department of Fish and Game, Commercial Fisheries Division. He has supervised surveys of marine invertebrates, including their benthic habitats and distribution in Alaska for the past 15 years. He is currently a principal investigator on an NPRB funded research project to map coral and sponge distribution in the central Aleutian Islands region, including the development of a predictive model relating coral and sponge distribution to substrate and physical habitat features.

Project Costs:

Overview of Workshop Costs (Year 1):

This budget includes: Salary support for Co-PI Jennifer Reynolds; Co-PI Gary Greene (in the separate MLML budget); Meetings Coordinator Sherri Pristash; Web Coordinator Carol Kaynor; Artist Dave Partee (logo, publications cover design); Publication layout by Jan Gunderson; and travel coordination by Adie Callahan. Travel support to the workshop is included for PI Allee, Co-PI Reynolds, Co-PI Greene (in the MLML budget), and Meetings Coordinator Pristash. Travel is also budgeted for Steering Committee member Doug Woodby (the other Steering Committee members are federal employees); for the 15 invited speakers; and one day's lodging and per diem for 15 additional 3rd day contributors. Supplies are needed for the workshop, e.g., nametags, poster easels. Contractual/Service costs include: production of abstract volume (300 copies) and workshop program (200 copies); shipping publications and supplies to the workshop; Invited Speaker honoraria; meeting space and catering at an Anchorage hotel. The latter will be partly offset through registration fees.

Overview of Synthesis Publication Costs (Year 2):

This budget includes: Salary support for Co-PI Jennifer Reynolds; Co-PI Gary Greene (in the MLML budget); synthesis book manager Sue Keller; and publication layout by Jan Gunderson. Contractual/Services include index compilation for the synthesis volume; production of the CDs (300 copies); and distribution of the CDs, i.e., packaging, shipping and postage costs.

References:

- Barnes, P.W. and J.P. Thomas (eds.), 2005: *Benthic Habitats and the Effects of Fishing*. American Fisheries Society, Symposium 41, Bethesda, Maryland, 890 pp.
- Greene, H.G., R. Kvitek, J.J. Bizarro, C. Bretz, and P. Iampietro, 2004: *Fisheries Habitat Characterization of the California Continental Margin*. California Sea Grant Publication T-053.
- O'Connell, V.M., Carlile, D.W., 1993. Habitat-specific density of adult yelloweye rockfish *Sebastes ruberrimus* in the eastern Gulf of Alaska. *Fishery Bull.*, U.S. 91, 304-309.
- O'Connell, V.M. and Wakefield, W.W., 1994: *Workshop proceedings: Applications of side-scan sonar and laser line systems in fisheries research*. Alaska Department of Fish & Game, Special Publication 9, Juneau, Alaska.
- Reynolds, J.R., R.C. Highsmith, B. Konar, C.G. Wheat, and D. Doudna, 2001: Fisheries and fisheries habitat investigations using undersea technology. *Proceedings of Oceans 2001, MTS/IEEE Conference, Marine Technology Society, Columbia, Maryland* 2:812-820.
- Rose, C., 2005: Tracking fish in trawls with the DIDSON acoustic camera. In Somerton, D.A. and Glendhill, C.T. (eds.), *Report of the National Marine Fisheries Service Workshop on Underwater Video Analysis*. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-68, p. 11.
- Somerton, D.A. and C.T. Glendhill (eds.), 2005: *Report of the National Marine Fisheries Service Workshop on Underwater Video Analysis*. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-68, 69 pp.

- Stevens, B.G., 2005: Use of video and sector scanning sonar for studying Tanner crab aggregations. In Somerton, D.A. and Glendhill, C.T. (eds.), *Report of the National Marine Fisheries Service Workshop on Underwater Video Analysis*. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-68, pp. 6-7.
- Tracey, G.A., Saade, E., Stevens, B., Selvitelli, P., and Scott, J., 1998: Laser line scan survey of crab habitats in Alaskan waters. *J. Shellfish Res.*, 17, 1483-1486.
- Valentine, P.C., and Lough, R.G., 1991. The sea floor environment and the fishery of eastern Georges Bank -- the influence of geologic and oceanographic environmental factors on the abundance and distribution of fisheries resources of the northeastern United States continental shelf. U.S. Geol. Survey Open-File Report 91-439.
- Yoklavich, M.M., Greene, H.G., Cailliet, G.M., Sullivan, D.E., Lea, R.N. and Love M.S., 2000, Habitat association of deep-water rockfishes in a submarine canyon: an example of a natural refuge. *Fisheries Bulletin*, v. 98, p. 625-641.
- Yoklavich, M., 2005: Using video observations from submersibles and laser line scanners to survey benthic fishes, macro-invertebrates and habitat types in deepwater off California. In Somerton, D.A. and Glendhill, C.T. (eds.), *Report of the National Marine Fisheries Service Workshop on Underwater Video Analysis*. U.S. Dept. of Commerce, NOAA Tech. Memo. NMFS-F/SPO-68, pp. 19-23.

NPRB BUDGET SUMMARY FORM: UAF

| | | | | |
|--------------------------------|---|---------------|---------------|----------------|
| PROJECT TITLE: | Marine Habitat Mapping Technology Workshop for Alaska | | | |
| PRINCIPAL INVESTIGATOR: | Allee, Reynolds | | | |
| FUNDING SOURCE | YEAR 1 | YEAR 2 | YEAR 3 | TOTAL |
| NPRB Funding | 106,455 | 28,128 | 0 | 134,582 |
| Match/In Kind | | | | 0 |
| TOTAL | 106,455 | 28,128 | 0 | 134,582 |

Annual cost category breakdowns will be requested for matching funds only if project is funded

| Cost Categories | NPRB Year 1 | NPRB Year 2 | NPRB Year 3 | NPRB TOTAL | Match/In kind TOTAL (all years) |
|--|------------------------|------------------------|------------------------|-----------------------|--|
| 1. Personnel Salaries | 16,213 | 10,851 | | 27,064 | |
| 2. Personnel Fringe Benefits | 8,909 | 5,487 | | 14,396 | |
| 3. Travel (include 1 trip to review mtg in Anchorage each year plus for the year following project conclusion) | 33,400 | 0 | | 33,400 | |
| 4. Equipment | 0 | | | 0 | |
| 5. Supplies | 600 | | | 600 | |
| 6. Contractual/Consultants | 0 | 0 | | 0 | |
| 7. Other (Include \$2000 for education and outreach) | 20,500 | 4,700 | | 25,200 | |
| Total Direct Costs | 79,622 | 21,038 | 0 | 100,660 | 0 |
| Indirect Costs | 26,833 | 7,090 | | 33,922 | |
| TOTAL PROJECT COSTS | 106,455 | 28,128 | 0 | 134,582 | 0 |

NPRB BUDGET SUMMARY FORM: MLML

| | | | | |
|--------------------------------|---|---------------|---------------|---------------|
| PROJECT TITLE: | Marine Habitat Mapping Technology Workshop for Alaska | | | |
| PRINCIPAL INVESTIGATOR: | Gary Greene, MLML | | | |
| FUNDING SOURCE | YEAR 1 | YEAR 2 | YEAR 3 | TOTAL |
| NPRB Funding | 8,634 | 6,744 | 0 | 15,378 |
| Match/In Kind | | | | 0 |
| TOTAL | 8,634 | 6,744 | 0 | 15,378 |

Annual cost category breakdowns will be requested for matching funds only if project is funded

| Cost Categories | NPRB Year 1 | NPRB Year 2 | NPRB Year 3 | NPRB TOTAL | Match/In kind TOTAL (all years) |
|--|------------------------|------------------------|------------------------|-----------------------|--|
| 1. Personnel Salaries | 4,736 | 3,394 | | 8,130 | |
| 2. Personnel Fringe Benefits | 616 | 458 | | 1,074 | |
| 3. Travel (include 1 trip to review mtg in Anchorage each year plus for the year following project conclusion) | 1,500 | 1,500 | | 3,000 | |
| 4. Equipment | | | | 0 | |
| 5. Supplies | | | | 0 | |
| 6. Contractual/Consultants | | | | 0 | |
| 7. Other (Include \$2000 for education and outreach) | | | | 0 | |
| Total Direct Costs | 6,852 | 5,352 | 0 | 12,204 | 0 |
| Indirect Costs | 1,782 | 1,392 | | 3,174 | |
| TOTAL PROJECT COSTS | 8,634 | 6,744 | 0 | 15,378 | 0 |

NPRB BUDGET SUMMARY FORM - MULTIPLE ORGANIZATIONS

| PROJECT TITLE: | Marine Habitat Mapping Technology Workshop for Alaska | | | | | | | | | | | | | | | | |
|-----------------------------------|---|--------|---------|--------|-------|---------|--------|---|---------|--|--|--|---|---------|--------|---|---------|
| PRINCIPAL INVESTIGATOR(S): | Allee, Reynolds; Gary Greene, MLML; PI names from 3rd organization; PI names from 4th organization | | | | | | | | | | | | | | | | |
| FUNDING SOURCE | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">YEAR 1</th> <th style="width: 25%;">YEAR 2</th> <th style="width: 25%;">YEAR 3</th> <th style="width: 25%;">TOTAL</th> </tr> <tr> <td style="text-align: center;">115,088</td> <td style="text-align: center;">34,872</td> <td style="text-align: center;">0</td> <td style="text-align: center;">149,960</td> </tr> <tr> <td colspan="3"></td> <td style="text-align: center;">0</td> </tr> <tr> <td style="text-align: center;">115,088</td> <td style="text-align: center;">34,872</td> <td style="text-align: center;">0</td> <td style="text-align: center;">149,960</td> </tr> </table> | YEAR 1 | YEAR 2 | YEAR 3 | TOTAL | 115,088 | 34,872 | 0 | 149,960 | | | | 0 | 115,088 | 34,872 | 0 | 149,960 |
| YEAR 1 | YEAR 2 | YEAR 3 | TOTAL | | | | | | | | | | | | | | |
| 115,088 | 34,872 | 0 | 149,960 | | | | | | | | | | | | | | |
| | | | 0 | | | | | | | | | | | | | | |
| 115,088 | 34,872 | 0 | 149,960 | | | | | | | | | | | | | | |
| NPRB Funding | 115,088 | | | | | | | | | | | | | | | | |
| Match/In Kind | 0 | | | | | | | | | | | | | | | | |
| TOTAL | 115,088 | | | | | | | | | | | | | | | | |

Annual cost category breakdowns will be requested for matching funds only if project is funded

| Cost Categories | NPRB Year 1 | NPRB Year 2 | NPRB Year 3 | NPRB TOTAL | Match/In kind TOTAL (all years) |
|---|------------------------|------------------------|------------------------|-----------------------|--|
| 1. Personnel Salaries | 20,949 | 14,245 | 0 | 35,194 | 0 |
| 2. Personnel Fringe Benefits | 9,525 | 5,945 | 0 | 15,470 | 0 |
| 3. Travel (include 1 trip to review mtg in Anchorage each year plus for the year following project conclusion) | 34,900 | 1,500 | 0 | 36,400 | 0 |
| 4. Equipment | 0 | 0 | 0 | 0 | 0 |
| 5. Supplies | 600 | 0 | 0 | 600 | 0 |
| 6. Contractual/Consultants | 0 | 0 | 0 | 0 | 0 |
| 7. Other (Include \$2000 for education and outreach) | 20,500 | 4,700 | 0 | 25,200 | 0 |
| Total Direct Costs | 86,474 | 26,390 | 0 | 112,864 | 0 |
| Indirect Costs | 28,614 | 8,482 | 0 | 37,096 | 0 |
| TOTAL PROJECT COSTS | 115,088 | 34,872 | 0 | 149,960 | 0 |