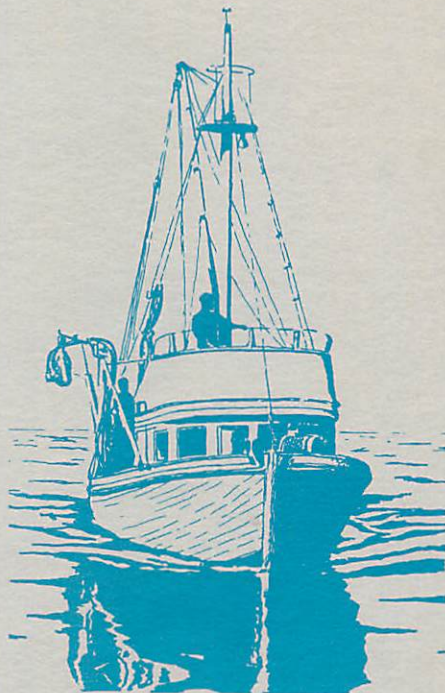


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A REPORT ON THE  
UNIVERSITY OF ALASKA  
SEA GRANT PROGRAM  
FOR 1971-1972



**A REPORT ON THE UNIVERSITY OF ALASKA  
SEA GRANT PROGRAM  
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Alaska Sea Grant Program  
University of Alaska

June 1973

Alaska Sea Grant Report No. 73-8



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PHOTO CREDITS: Pages 6 and 7, C. D. Evans, Arctic Environmental Information and Data Center, University of Alaska. All other photos courtesy of the U. S. Fish and Wildlife Service.



A lead in the ice of the Beaufort  
Sea 30 miles off Point McIntyre.

## FOREWORD

Bordered by two oceans and three seas, the coast of Alaska is a dominant feature of a vast northern subcontinent. Stretching for 6,640 miles, the Alaska coast represents more than half of the general coastline of the United States, and the continental shelves adjacent to Alaska encompass 830,000 square miles or three-fourths of the total American shelf.

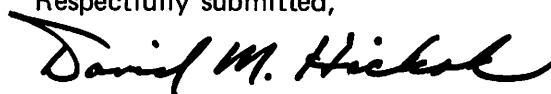
From these seas and along these coasts the Nation harvests much of its bounty of natural resources—in fisheries, in timber and petroleum. Here too, increased supplies will be sought in the years ahead as the United States seeks to supply a seemingly insatiable resource appetite.

This need to serve national economic and development objectives poses continuing problems, notably, limitations in knowledge, environmental-developmental conflicts, and changing socio-political situations. Additionally, these are compounded by the State's tremendous geographic diversity and the multi-cultural occupancy of its coastal zone.

During 1970 the National Office of Sea Grant within the National Oceanic and Atmospheric Administration (NOAA) entered into a partnership with the University of Alaska to establish an Alaska Sea Grant Program responsive to many of the unique challenges of Alaska's northern seas and coastal regions.

This report summarizes and highlights the accomplishments and problems of the Alaska Sea Grant Program during the period May, 1971 through October, 1972.

Respectfully submitted,



David M. Hickok  
Director

# UNDERSTANDING OUR COASTAL ZONE



Beach north of Point Lay in the Chukchi Sea.

The two greatest problems, in sheer magnitude of understanding within the Alaska coastal zone involve the change of coastal land tenure from government to Native citizens, and the acquisition of sufficient scientific and technological knowledge to permit the economic and political feasibility of natural resource recovery and delivery to markets.

These two problems have many facets and have involved the attention of diverse University organizations, including a good deal of Sea Grant program effort, in the seeking of solutions.

The change in coastal land tenure in Alaska is the product of the Alaska Native Claims Settlement Act of 1971 (P.L. 92-203; 85 Stat. 688). Under this Act, the Congress extinguished aboriginal claims in Alaska and awarded as compensation for this taking of land a reconveyance of 40 million acres of land and a cash settlement of approximately one billion dollars.

The impact upon coastal land tenure within Alaska from the land settlement legislation is tremendous due to the patterns of coastal villages and regional uses which the Act serves by granting land title.

For example, notwithstanding the current status of federal withdrawals for national con-

servation purposes or the potential of new areas, some 60 plus percent of the Bering and Chukchi Sea coasts from Bristol Bay to Icy Cape could pass to private title. In magnitude, this transfer of coastal land tenure from governmental to private interests equals about 15 percent of the entire U.S. coastal zone. More expressively, perhaps, the impact of such ownership can be ascertained by comparing the Chukchi Sea coast between Pt. Hope and Icy Cape, about one-ninth of the area previously mentioned, which will pass in fee title to one group, the Inupiat Eskimo. This area, rich in oil, gas, and coking coal, equals the coastline between Santa Cruz and San Diego, California!

Along this coast also will be the future site of an Arctic port affecting a multitude of U.S. interests, both private and public. This Chukchi Sea coast will doubtlessly be a scene of resource development in the next few years; however, the main arena for the acquisition of new Arctic knowledge and technological data has been in the vicinities of the Prudhoe Bay, Beaufort Sea oil discoveries and around Barrow, Alaska. The focus of the terrestrial effort has been through the U.S. IBP Tundra Biome Program. Coastal zone studies have not received the same coordinated management effort, but have been sup-



People from Barrow going home to Nuigsut across the frozen Beaufort Sea.

A meeting of the Arctic Slope Regional Corporation at Alyeska.

ported primarily by the Office of Naval Research, the National Science Foundation, and the Alaska Sea Grant Program.

In addition to working on Arctic challenges, the Alaska Sea Grant Program has given high priority to coastal zone problems in Cook Inlet's offshore oil producing area and in Prince William Sound, the eventual terminus of the proposed Trans-Alaska Pipeline.

In these areas Sea Grant and allied investigators are involved with or have accomplished the following:

- research into land and resource values pertinent to Native land selections, including participation in nine regional seminars and the detailed analysis and synthesis of knowledge on resources, land values, future transportation, and other developmental situations within the Arctic coastal zone;
- studied and reported on factors affecting water management on the Arctic coastal plain and North Slope of Alaska with particular reference to the likely effects of man's activity in developmental areas;
- prepared an overview report on the environmental regions, zones, and ecotypes of the Alaska coastal zone;

- prepared an overview analysis on the impact of national law of the sea positions on Alaska regimes and resources, related these views to state and federal officials, and encouraged the legislative establishment of an Alaska Law of the Sea Commission;
- in a coordinated effort between the Sea Grant and Tundra Biome programs, established criteria and initial plans for a system of ecological reserves in Alaska and initiated federal and state agency responses to this national and international program;
- completed a report necessary for the resumption of oil and gas leasing in Cook Inlet, Alaska;
- completed, but not published, a comprehensive coastal zone-urban area atlas of the heartland of Alaska;
- completed a "Catalog of Hydroclimatological Data for Alaska's Coastal Zone;" and
- instituted and completed some phases of detailed ecological investigations of arctic coastal waters centering on the Colville River-Beaufort Sea area, Port Valdez, Prince William Sound region, the northeastern Gulf of Alaska, and Mt. St. Augustine volcano in lower Cook Inlet.





Seal Rocks, Montague Island, Prince William Sound.

Unique among the 50 states, Alaska's marine resources are already of major importance to the state's economy. When sufficient scientific and technological information is obtained and economic and political conditions become favorable, Alaska's marine resources will see additional development.

Fisheries have long been Alaska's most important industry, yet there remains even greater possibilities for further development. The potential of new markets for hitherto under-utilized products is an important facet of the Alaska Sea Grant Program. Researchers of the College of Biological Sciences and Renewable Resources and the Institute of Marine Science have, during the past year, made a detailed assessment of the under-utilized shellfish resources of Prince William Sound region of Alaska in hopes of future development of a shellfishery. Three separate groups are being studied—clams and oysters, shrimp, and crabs. Project activities are concentrating upon techniques for the evaluation of shellfish stocks including new methods and instruments for assessing distribution, abundance, and behavior. Results of the study indicate a potential for a clam industry. Further

## DEVELOPING OUR MARINE RESOURCES

studies are being directed toward development of that resource.

Seaweeds are potentially a source for raw chemicals and a source of food for man. Alaska, with its relatively undeveloped coastal zone and pollution-free waters, offers an excellent possibility for development of a seaweed industry. Scientists of the Institute of Marine Science have made an extensive survey of the waters of southeast and southcentral Alaska for potential stocks of economic value during the past year. This survey led to the discovery of beds of "bull kelp" (*Nerocystro* sp.) within easy range of a site for drying and storage. Preliminary chemical analysis indicates that it is suitable for marketing.

For Alaska, marine mammals present a unique resource in kind, number, and value, and as such, their study and understanding constitute a special opportunity and obligation. Research on marine mammals has been conducted at the Institute of Arctic Biology for many years. Researchers have made many important contributions to the understanding of populations, physiology, and life history. Under support of the Alaska Sea Grant Program the University investigators have developed a cooperative effort with the biologists of the Alaska Department of Fish and Game. This group seeks to correlate physiological, behavioral, sensory, and ecological knowledge with studies of population dynamics and productivity; information needed for marine mammal management and regulation.

During the past year, support from our Sea Grant Program has resulted in the following accomplishments or failures.

- Natural stocks of marine macrophytes of the coastal waters of southeast and southcentral Alaska have been assessed.
- Preliminary analysis of the nutritive value of eelgrass has been accomplished.
- Assessments of the stocks of soft-shell, butter, and littleneck clams of Prince William Sound have been made.
- Initial surveys for paralytic shellfish poison have been made on the stocks of clams in Prince William Sound.

- Growth and density studies of the littleneck clam are underway to provide needed information for management of the resource.
- Experimental oyster plants indicated that growth was poor and that fouling organisms created problems.
- Pink shrimp were not found in sufficient abundance in Prince William Sound to allow high-frequency sonic survey methods to be tested.
- Methods were developed for estimating the size of the dungeness crab population.
- Preliminary data was gathered on the distribution, size, and sex composition of the Snow crab population of the eastern Prince William Sound.
- Data and samples were accumulated and analyzed on the age, morphometry, growth, food, and reproduction of Bering Sea Harbor Seals.
- Studies of comparative fetal growth and development, molt and pelt characteristics, and comparative anatomy of adults from two harbor seal populations were made in the continued research for differential diagnostic characteristics.
- Qualitative and quantitative investigations of fats were made in connection with investigations of feeding habits of seals.
- Samples were obtained and analyzed for biochemical evidence of any genetic differences between the land-breeding and ice-breeding harbor seals.
- Five hundred tissue samples have been collected for analysis for concentrations of heavy metals.
- Lead and arsenic were found in trace amounts in marine mammals that frequent the seas adjacent to Alaska.
- Mercury was found in the livers of marine mammals and was found to reach ten times the F.D.A. accepted levels for human food consumption in some species collected from specific locations.
- Unusually high concentration of PCB's and lesser amounts of DDT were found in the adipose tissue of Alaskan marine mammals.



## INVESTIGATING OUR FROZEN SEAS

The development of the marine resources of our northern seas is impeded by the presence of ice during most of the year. Not only does this ice present an obstacle to transportation, but it also presents a dynamic hazard to fixed structures. Orderly development of any coastal facility will require knowledge of the dynamics and physical properties of this ice. Investigators of the Geophysical Institute and the Institute of Arctic Environmental Engineering are currently developing techniques for measurement of naturally occurring stresses and strains in this near-shore sea ice.

Wide area observations of sea ice conditions and distribution are of great interest. The amount of open water in the Arctic Ocean influences the Arctic heat budget and thus the Arctic climate. Distribution of the ice is of great practical importance due to the restriction it has on shipping. Researchers of the Geophysical Institute have, during the past period, been developing techniques for the use of satellite imagery to determine sea ice conditions throughout the summer months.

Accomplishments during the past period by investigators working under our Sea Grant Program include:

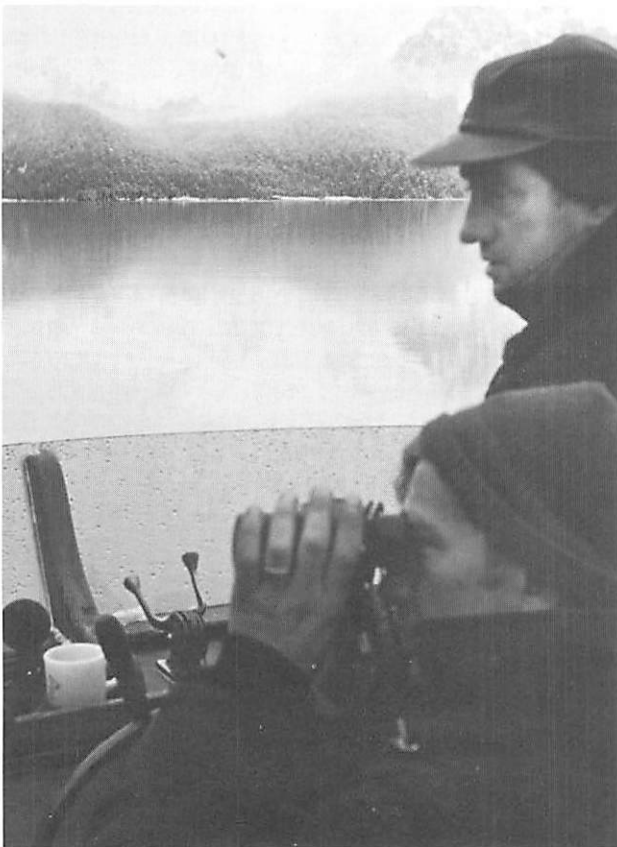
- development and manufacture of instruments to take direct measurement of stress in the nearshore sea ice;
- development of techniques to implant and calibrate the stress instruments in the sea ice;
- development of techniques for interpreting satellite data to interpret sea ice conditions;
- correlation between wind direction and the movement of the ice pack was made;
- ice conditions as interpreted by satellite were compared with those made from aircraft;
- monthly mean albedo maps have been compiled from satellite data and compared with albedo values obtained by other methods.

The photo at left shows spring ice jammed against Cross Island in the Beaufort Sea.

## RELATING INFORMATION TO OUR PEOPLE

The challenge of relating information to people in Alaska on marine and coastal science and resources is compounded by distance, variations in environments and resources in six coastal-marine regions, and by linguistics. Distance and transportation factors are generally well known as being somewhat difficult between regional centers. Travel to and accommodations in many of the coastal villages of western Alaska are especially hard for the uninitiated to understand. Each coastal region of Alaska has its own priority resource situations, marketing drawbacks, and educational levels of understanding. Moreover, in many areas of marine interest in western and Arctic Alaska, English is a second language to Native dialects—Yupik or Inupiat.

In response to these regional aspects, the Marine Advisory Program has new staff members. One of the new agents has an area of responsibility extending from Anchorage through southeast Alaska. Another, who is the program's first bilingual agent, is responsible for the Yupik-speaking area of the Yukon-



Pictured at right is Tatitlek, a Native fishing community in Prince William Sound. The village is accessible only by boat or float plane.

Kuskokwim delta, where 12,000 Eskimo residents receive their primary income from fishing and the harvest of marine mammals. Both of these new agents are lifelong residents of their district and have extensive background in commercial fisheries.

The new agents have become acquainted with their functions as advisory agents by delivering a series of short courses, workshops, conferences, and seminars.

Marine Advisory Program activities have also included the synthesis of information on the physical oceanography of Bristol Bay. This compilation of water characteristics, bottom types, and climatologic data is designed for the use of commercial fishermen.

The Alaska Sea Grant Program also focused State attention on the needs for a center of resource and environmental information. As a result, the Alaska Legislature established and funded within the University the Arctic Environmental Information and Data Center. The Center provides a research and information service

to a variety of coastal users—federal, state, and local governmental agencies, industry and private citizens—providing environmental and resource data related to coastal zone developments. Additionally, cooperative, informational, and investigative programs have been developed with State and Federal agencies, and particular attention has been directed towards the transfer of resource, environmental, and land planning information necessary to assist in the implementation of the Alaska Native Claims Settlement Act.

Other accomplishments include:

- a conference on fishing vessel safety;
- a seminar on International Law of the Sea and Alaska's fisheries;
- a seminar on the environmental impact of oil on Prince William Sound;
- the conduct of various fisheries workshops throughout the state;
- the teaching of fisheries oceanography and technology in coastal communities.



The work of the Alaska Sea Grant Program has resulted in the following publications:

- Bretschneider, C.L., Charles Sargent, John P. Doyle, and R.L. Strandtmann. "Facilities Development, Construction and Operation Problems and Related Environmental Conflicts and Problems of the Ice Stressed Coastal Areas of Alaska." Special Project Report, Sea Grant Program, University of Alaska, October 1970.
- Burns, J.J. "Remarks on the Distribution and Natural History of Payophilic Pinnipeds in the Bering Sea and Chukchi Seas." *J. Mam.*, 51:445-54.
- Carlson, R.F. and Gunter Weller. "A Catalog of Hydroclimatological Data for Alaska's Coastal Zone." Institute of Water Resources, University of Alaska, Report IWR 25, Sea Grant Report 72-2, May 1972.
- Doyle, John P. "Fish Plant Sanitation and Cleaning Procedures." Fisheries Extension Program, University of Alaska, Marine Advisory Bulletin No. 1, 10 p.
- Doyle, John P. "Freezing of Fish to Maintain Quality." Cooperative Extension Service, University of Alaska, Publication No. 127, September 1972, 12 p.
- Evans, Charles D., Eugene Buck, Richard Buffler, Greg Fisk, Robert Forbes, and Walter Parker. "The Cook Inlet Environment, A Background Study of Available Knowledge." Alaska Sea Grant Program, University of Alaska, August 1972.
- Greenwood, J.K. and R. Sage Murphy. "Factors Affecting Water Management of the North Slope of Alaska." Institute of Water Resources, University of Alaska, Report IWR 19, Sea Grant Report 72-3, February 1972, 42 p.
- Kinney, P.J., D.M. Schell, Vera Alexander, D.C. Burrell, R. Cooney, and A.S. Naidu. "Baseline Data Study of the Alaskan Arctic Aquatic Environment." Institute of Marine Science, University of Alaska, Report R 72-3, March 1972, 275 p.
- Lewellen, Robert I. "Studies on the Fluvial Environment Arctic Coastal Plain Province Northern Alaska." Littleton, Colorado, 1972, 280 p.
- McRoy, C. Peter, John J. Goering, M.T. Gottschalk, Mary Mueller, and Sam Stoker. "Survey of Macrophyte Resources in the Coastal Waters of Alaska." Institute of Marine Science, University of Alaska, Report R 71-6, May 1971, 40 p.
- Mendenhall, Vivian. "Utilization and Disposal of Crab and Shrimp Wastes." Fisheries Extension Program, University of Alaska, Marine Advisory Bulletin No. 2, March 1971, 40 p.
- Norris, J. "Population Estimation Techniques for Dungeness Crabs." M.S. Thesis, 1972.
- Shiels, W.F. and D.W. Hood. "Artificial upwelling in Alaskan Fiord Estuaries." *The Northern Engineer*, Vol. 2, No. 4, 1970.
- "Aquatic Collection." The University of Alaska Museum, University of Alaska, College, Alaska, 4 p.
- "Challenges in the Alaskan Coastal Zone—A Report on the Activities of the Alaska Sea Grant Program." Alaska Sea Grant Program, University of Alaska, Publication 72-1, February 1972, 32 p.

# FINANCING OUR PROGRAM

## Expenditure By Activity\*

<b>EDUCATION</b>	
College Level	212,907
<b>ADVISORY SERVICES</b>	
Extension Program	135,544
Other Advisory Service	30,539
<b>MARINE RESOURCE DEVELOPMENT</b>	
Aquaculture	12,014
Living Resources	312,029
<b>MARINE TECHNOLOGY RESEARCH AND DEVELOPMENT</b>	
Ocean Engineering	83,364
<b>MARINE ENVIRONMENTAL RESEARCH</b>	
Coastal Zone Management	330,008
Ecosystem Research	867,472
<b>PROGRAM MANAGEMENT</b>	137,946
<b>TOTAL</b>	<b>\$2,121,823</b>

\* Totals are not official; official audited figures are not available at time of preparation.

## Supporting Agencies

### FEDERAL

National Sea Grant Program – NOAA

### STATE

University of Alaska

Alaska Department of Fish and Game

### OTHER

Arctic Slope Regional Corporation

Ahtna, Inc.

Alaska Native Foundation

Bering Strait Native Assoc.

Hooper Bay Village Corp.

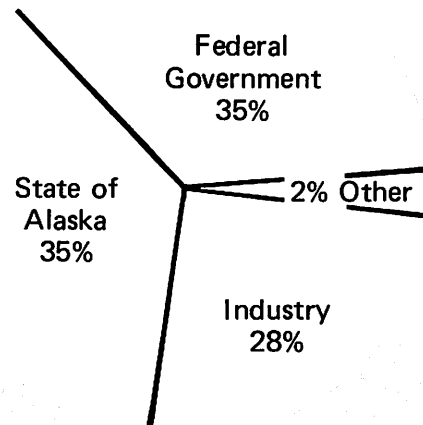
### INDUSTRY

Alaska Oil and Gas Association

Western Oil and Gas Association

Alyeska Pipeline Service Company

## Income By Agency





## OUR ADVISORY TEAMS

### Alaska Sea Grant Advisory Committee

Stuart G. Bigler  
Director  
National Weather Service  
Anchorage, Alaska

James W. Brooks  
Commissioner  
Alaska Department of Fish and Game  
Juneau, Alaska

John Oktolik  
Point Hope Village Council  
Point Hope, Alaska

James Scott  
Retired Anchorage District Manager  
Bureau of Land Management  
Eagle, Alaska

Lowell A. Wakefield  
Distinguished Associate in Fisheries  
University of Alaska  
Port Lions, Alaska

Pearse M. Walsh  
Director  
Lost River Mining Corp., Ltd.  
Nome, Alaska

J. L. White  
Acting Division General Manager  
Mobil Oil Corporation  
Anchorage, Alaska

### Alaska Sea Grant Council

Charles E. Behlke  
Dean  
College of Mathematics and Engineering  
University of Alaska

Carl S. Benson  
Head  
Department of Geology  
University of Alaska

Robert Carlson  
Director  
Institute of Water Resources  
University of Alaska

Victor Fischer  
Director  
Institute of Social, Economic and Government Research  
University of Alaska

David M. Hickok  
Director  
Alaska Sea Grant Program  
University of Alaska

Donald W. Hood  
Director  
Institute of Marine Science  
University of Alaska

Charles Lafferty  
Dean  
Statewide Services  
University of Alaska

Keith B. Mather  
Director  
Geophysical Institute  
University of Alaska

Peter R. Morrison  
Director  
Institute of Arctic Biology  
University of Alaska