

Bering Sea Ecosystem Biophysical Metadatabase: A Collaborative Research Tool for Fisheries Oceanography and Ecosystem Investigations

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The U.S. National Oceanic and Atmospheric Administration (NOAA) is beginning a project to assemble a biophysical metadatabase on the Bering Sea ecosystem. The goal of this project is to facilitate research, education, and general knowledge of the Bering Sea by locating and assembling an inventory of the biological and physical data that have been collected on the Bering Sea ecosystem.

The three-year project is funded by NOAA's Environmental Services Data Information Management (ESDIM) Program. The project is managed by the Fisheries-Oceanography Coordinated Investigations Program through the Alaska Fisheries Science Center (AFSC) and Pacific Marine Environmental Laboratory (PMEL). Bernard Megrey and Allen Macklin serve as the project's co-leaders. The inventory of physical and biological data will help PICES and other researchers, managers, students, fishermen, and the general public investigate and understand the complex ecosystem of the Bering Sea. The inventory will be presented in an indexed, annotated catalogue (metadatabase) available through various mechanisms, including the World Wide Web (WWW). Those seeking more information or having knowledge of data that would enhance the metadatabase are urged to register through the WWW at URL <http://www.pmel.noaa.gov/bering/mdb/>, or contact Dr. Bernard Megrey, NOAA/AFSC, 7600 Sand Point Way N.E., Seattle, WA 98115, U.S.A., 01-206-526-4147 (phone), 01-206-526-6723 (fax), or at bmegrey@afsc.noaa.gov.

What are metadata? They are brief summaries and references to the actual scientific data. For example, if the data were vertical profiles of ocean properties obtained from CTD casts, the metadata would describe the locations and times of the casts, the inclusive depths, the variables measured, the location of the data, and the name of the person to contact to request access to the data. The data themselves are not part of the metadatabase and continue to reside with their owner. Metadata will be described in a

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common set of terminology and definitions using the recently established Federal Geographic Data Committee (FGDC) metadata standards.

When completed, the metadatabase will address a serious deficiency identified in 1996 by the National Research Council. In their report on the Bering Sea ecosystem, the council concluded that a directory of data and information sources relevant to the Bering Sea, catalogued in one place, was critically needed. Furthermore, they flagged the lack of such a database as the one major impediment to studying the Bering Sea. Although there is no accessible database at present, the project has identified many different types of physical and biological data that have been collected. For example, single-point and gridded time series, repetitive observations from earth orbiting satellites, ocean surveys of physical and biological oceanographic significance, specimen collections, and historical records of animal population changes have been assembled. Unfortunately, there is no easy way to know what institution has what research data holding because the data reside in the custody of various investigators or their institutions. Data are available from at least the last century, and in the last two decades the Bering Sea has been the subject of close scrutiny by such major research programs as the Outer Continental Shelf Environmental Assessment Program (OCSEAP) and Processes and Resources of the Bering Sea Shelf (PROBES). What is needed, and what NOAA's ESDIM Program has funded through this project, is a single, stand-alone resource that will reference as much historical data as can be located.

Recently the Bering Sea's economic and biological significance has provided impetus for the proliferation of a number of developing and active, regional (PICES/GLOBEC CCCC, Bering Sea Impacts Study, Bering Sea Ecosystem Project), national (Bering Sea FOCI, Southeast Bering Sea Carrying Capacity, Bering Sea Ecosystem Study), and international (PICES/GLOBEC, Japanese and Russian programs) research

efforts aimed at understanding dynamics of the Bering Sea ecosystem. All of these current programs have active and/or planned field and data collection components associated with them and are in a position to contribute to, and benefit from, the metadatabase.

Presently, the project is intent on identifying those researchers and institutions with data holdings that pertain to the Bering Sea ecosystem. Generally, data from the eastern Bering Sea is better known, so the project is focusing on cooperating with Asian scientists and their institutions. Toward that end, PICES has been an important and willing partner. The project mailed an information letter and metadata entry form to all scientists on the PICES general mailing list. Oral presentations were made to each of the PICES Committees during the Sixth Annual Meeting in Pusan, South Korea, during October 1997, a close working relationship with the PICES Technical Committee on Data Exchange was established, and a poster describing the project was centrally located in the meeting area. As a result of these activities, important contacts were established and information on the whereabouts and accessibility of data was obtained.

Besides its outreach through PICES, the project has also published its call for data in over twenty scientific newsletters worldwide, and made an appeal for data references to the subscribers of news from the North Pacific Fishery Management Council and the Fisheries-Oceanography Coordinated Investigations community.

You can participate and contribute to this project by identifying sources of physical and biological data on both the eastern and western parts of the Bering Sea ecosystem you are familiar with, submitting a form describing your data, remain available to answer questions we may have about your metadata, and submit updates as new data become available. We seek data products related to the Bering Sea ecosystem that span all biological and physical scientific disciplines, including historical as well as current information and information products on all Bering Sea ecosystem components, ranging from open ocean to intertidal areas. Types of information that are of interest include, but are not limited to, CTD; XBT or other water property and water chemistry information sources;

ocean currents and velocities; bathymetry; all satellite images, including maps of atmospheric circulation, ocean color, ocean SST, or ocean chlorophyll concentrations; abundance and distribution of all biological organisms from all trophic levels of the ecosystem, from microbacteria and small benthic organisms to whales; sea bird data; sea ice physics; geological information; bottom composition; information on atmospheric circulation; properties of the atmosphere and ocean-atmosphere interface; sources of anthropogenic contamination; and harvest of exploited marine populations.

*Please bear in mind that we are **NOT** interested in the actual data.* Rather, we plan to report the existence of the data with a metadata description. Metadata succinctly describe the content, quality, condition, spatial and temporal characteristics of data. A database of metadata is not a database of scientific data observations; rather it serves as a tool, which simply references the existence of data and information products. Reporting your information as metadata will keep your data under your control while assisting other scientists in locating and understanding your data.

Benefits from this project will accrue both immediately and with time. Although the call for data only was published in the middle of the summer of 1997, response has been good. By fall there were already appreciable returns of forms and an obvious excitement for the project. Nearly 70 forms from five countries have provided references to data representing all facets of the ecosystem – from chemistry to ice physics to microbiology to fish, birds, and mammals (*Fig. 1*). As well, the project has compiled addresses of nearly 70 WWW home pages that contain data relevant to the Bering Sea ecosystem. The project home page has been queried nearly 4,000 times since June from a wide variety of international locations, with most queries following outreach activities by mail or meeting (*Fig. 2*). In the coming year, metadata will be compiled and made available through the project's home page and through the NOAA Data Server. The historical metadatabase should be completed by the end of 1999. Updates on project status will appear regularly on the metadatabase home page on the WWW at <http://www.pmel.noaa.gov/bering/mdb/>.



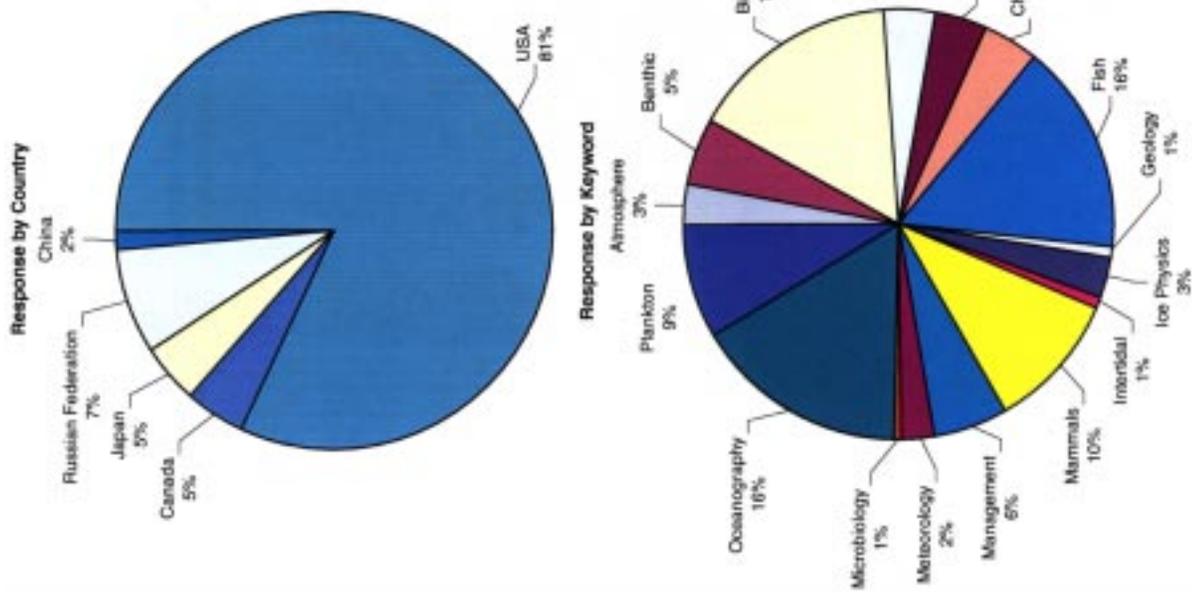


Fig. 1 Responses of 65 returned Bering Sea Ecosystem metadata entry forms tabulated according to country of response (top) and ecosystem component keyword response (bottom).

Bering Sea Ecosystem Metadatabase Home Page Hits

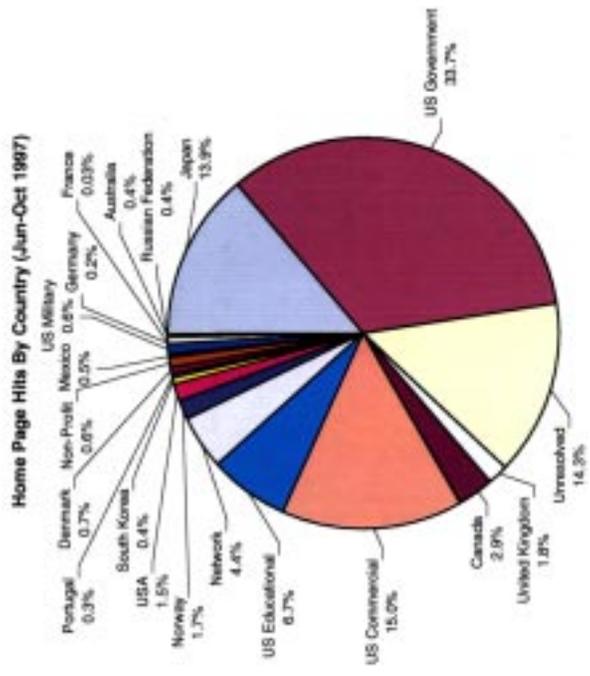
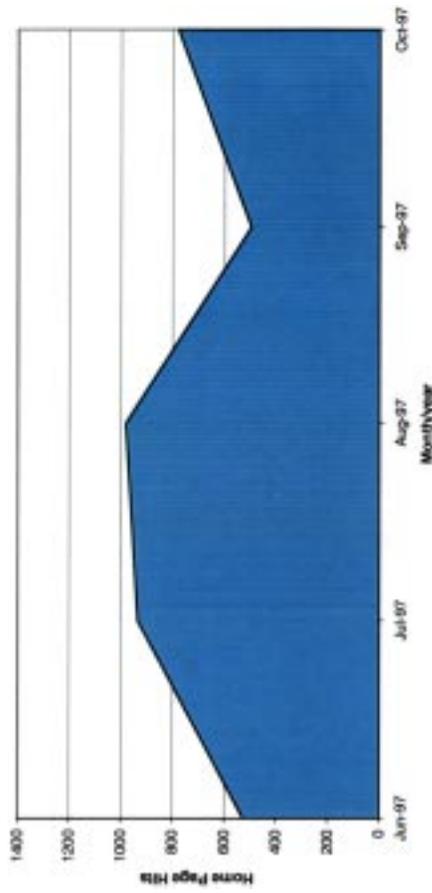
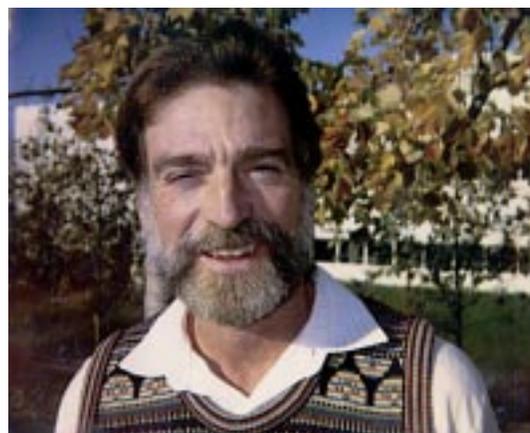


Fig. 2 Summary of Bering Sea Ecosystem Home activity from June 1997 to October 1997 (top) and a distribution of the hits by country (bottom).

Dr. Bernard Megrey is a research fisheries biologist with NOAA's Alaska Fisheries Science Center in Seattle, Washington, U.S.A., where he has worked since 1982. Presently serving as lead investigator for recruitment modeling studies for Fisheries-Oceanography Coordinated Investigations (FOCI), he has over 15 years experience studying the dynamics of exploited North Pacific fish populations, the relationships of the biophysical environment to recruitment variability, and the application of computer technology to fisheries research and natural resource management.



Mr. Allen Macklin is a meteorologist with NOAA's Pacific Marine Environmental Laboratory in Seattle, Washington, U.S.A. Presently he is the coordinator for Fisheries-Oceanography Coordinated Investigations (FOCI), a NOAA research program focused on building sustainable fishery resources in the Gulf of Alaska and Bering Sea while maintaining a healthy ecosystem. Allen received his B.Sc. (1970) and M.Sc (1975) from the University of Washington. Since then he has acquired over 20 years of experience studying Alaskan coastal meteorology and its relationship to the physical and biological oceanography of the region. His research encompasses wind drag on Bering Sea seasonal pack ice; katabatic, gap, and other ageostrophic winds in coastal areas; and relationships between measured attributes of the physical environment and the recruitment of marine fish.



PICES Seventh Annual Meeting
 October 14 - 25, 1998
 Fairbanks, Alaska, U.S.A.

Science Board Symposium: The impacts of the 1997/98 El Niño event on the N. Pacific Ocean and its marginal seas

Controlling factors for lower trophic levels (especially phytoplankton stocks)

Decadal variability of the North Pacific climate

Carbon cycle in the North Pacific Ocean (co-sponsored by JGOFS)

Science and technology for environmentally-sustainable mariculture

Contaminants in high trophic level biota - linkages between individual and population responses

Climate change and carrying capacity of the North Pacific: recent findings of GLOBEC and GLOBEC-like programs in the North Pacific

More information available at the PICES Secretariat

A Note of Thanks

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