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United States. Interagency Committee on Marine Science and Engineering

OCEAN DATA RESOURCES

PREPARED AT THE REQUEST OF

HON. WARREN G. MAGNUSON, *Chairman*

FOR THE USE OF THE

COMMITTEE ON COMMERCE

PURSUANT TO

S. Res. 222

NATIONAL OCEAN POLICY STUDY

MARCH 1975

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LETTER OF TRANSMITTAL

SENATE COMMITTEE ON COMMERCE,
U.S. SENATE,
Washington, D.C.

DEAR COLLEAGUE: After the National Ocean Policy Study was authorized by Senate Resolution 222, the Study Committee determined that one of its initial thrusts would be directed toward a review of the adequacy of the national capability for ocean data management. To embark upon this review, the Study Committee requested the Interagency Committee on Marine Science and Engineering (ICMSE) to undertake a study and prepare a report setting forth the locations, principal contacts, capabilities, and resources of the facilities involved with ocean data and then to prepare a detailed report on all aspects of ocean data activities.

The document transmitted herewith is in response to the first request, listing all of the Federal Government agencies, state and regional facilities, academic institutions, and industrial marine-oriented companies actively participating in acquisition, processing, dissemination, and use of ocean data. It was prepared by ICMSE, working through the Environmental Data Service of NOAA and the Committee member agencies.

This reference document is intended for use by members of the Senate National Ocean Policy Study Committee as they review the adequacy of present institutional mechanisms for providing the comprehensive data base necessary for operations in the marine environment.

WARREN G. MAGNUSON,
Chairman, Committee on Commerce.
ERNEST F. HOLLINGS,
Chairman, National Ocean Policy Study.

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MAY 23, 1972.

Subject: Statement of Interagency Policy for Marine Data and Information Management.

To: Associate Administrator for Marine Resources, National Oceanic and Atmospheric Administration, Department of Commerce.

At its May 11, 1972, meeting, the Interagency Committee on Marine Science and Engineering (ICMSE) endorsed the enclosed Statement of Interagency Policy for Marine Data and Information Management in order to further interagency cooperation in this area. The statement was prepared at the request of ICMSE by the National Oceanographic Data Center Advisory Board.

LETTER OF SUBMITTAL

FEDERAL COUNCIL FOR
SCIENCE AND TECHNOLOGY,
INTERAGENCY COMMITTEE ON
MARINE SCIENCE AND ENGINEERING,
U.S. DEPARTMENT OF COMMERCE,
Rockville, Md., October 21, 1974.

Hon. ERNEST F. HOLLINGS,
U.S. Senate,
Washington, D.C.

DEAR SENATOR HOLLINGS: I am transmitting with this letter the report on Ocean Data Resources requested of the Interagency Committee on Marine Science and Engineering in your May 10, 1974, letter.

With the establishment of NOAA in 1970, the National Oceanographic Data Center and National Climatic Center were united under NOAA's Environmental Data Service (EDS). Thus, the primary national data centers for ocean and atmosphere were joined in a single agency, as recommended by the Commission on Marine Science, Engineering, and Resources.

Recognizing that increasingly larger quantities of marine environmental data (and samples) were being collected, and that special attention would be needed to insure that these data would become fully available to secondary users, the ICMSE promulgated a Statement of Interagency Policy for Marine Data and Information Management in May 1972. The policy statement is included in the Appendix.

Today, EDS provides a national mechanism by which interdisciplinary environmental data collected by many agencies, private sources, and other nations are made available to the general user community once the initial collection purposes have been served.

The EDS marine data user community includes Federal agencies, State and local governments, industry, colleges and universities, regional environmental councils and commissions, the general public, and the international community. World Data Center-A, Oceanography, is co-located with the National Oceanographic Data Center, Washington, D.C.; (World Data Center-B, Oceanography, is located in Moscow, USSR). Recently, in addition to providing traditional data services, EDS increasingly has been called upon to contribute to the solution of such problems as the energy crisis. National efforts in this area are concentrated in the coastal zone, where efficient and effective planning, site selection, design, construction, and operation of all facilities depend heavily upon interdisciplinary, historical, or "baseline" data. Such data are also needed to predict and assess the impact on the environment of such things as accidental oil spills.

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Specifically, EDS has furnished detailed data and statistics on severe storm, ice, tsunami, and earthquake probabilities for the Council on Environmental Quality's Outer Continental Shelf Study for Gas and Oil Exploration off the Atlantic Coast and Gulf of Alaska; prepared comprehensive environmental descriptions for the U.S. Atlantic, Gulf, and Pacific coasts, and the Great Lakes for CEQ's Floating Nuclear Power Plant Study, as well as more detailed environmental descriptions for four selected Atlantic coast areas; provided environmental descriptions to the Bureau of Land Management pertaining to OCS oil and gas leasing off the South Texas coast; prepared an Environmental Guide for the U.S. Gulf Coast, containing detailed environmental profiles for seven potential Gulf Coast Deep Water Port sites, requested by the Corps of Engineers; compiled an Environmental Guide for Seven U.S. Ports and Harbor Approaches for CEQ to aid in selecting suitable supertanker terminal sites for the United States; and provided chapters on climate and weather for the Department of the Interior's Final Environmental Impact Statement, Proposed Trans-Alaska Pipeline, for both the marine route and the pipeline itself.

The Committee is pleased to present this report and looks forward to continued participation in the National Ocean Policy Study.

Sincerely,

ROBERT M. WHITE,
Chairman, Interagency Committee on Marine Science & Engineering.

The need for a policy statement to lay the foundation for enhancing cooperative efforts among Federal agencies stems from recognition that increasingly larger quantities of marine environmental data and samples are being collected, and that special measures may be required to insure that these data and samples—and any derived information—become available to secondary users, that is, users other than those for whom the data and samples are originally acquired. Toward this end, the statement urges that agencies work actively to establish bilateral agreements with the Environmental Data Service of NOAA and the Smithsonian Institution, and that agency or departmental level marine environmental data, sample and information policies be adopted and promulgated to further the aims of the interagency policy statement.

It is recognized that several agencies and offices have in being policy statements generally consistent with that enclosed herewith, such as those of the Office of the Oceanographer of the Navy, the IDOE Office of NSF, and NOAA. Additionally, a few bilateral agreements exist or are being established, such as those between NOAA and a number of agencies, for example, NSF, EPA, and the Office of the Oceanographer of the Navy. Nevertheless, it appears that broader application of the principles of the policy statement is needed. Therefore, ICMSE supports and encourages the measures recommended in the policy statement and solicits your assistance in achieving this acceptance within the Department of Commerce.

ROBERT M. WHITE,
Chairman (Acting), Interagency Committee on Marine Science and Engineering.

Enclosure.

A STATEMENT OF INTERAGENCY POLICY FOR MARINE DATA AND INFORMATION MANAGEMENT

The Federal Government, through mission-oriented activities of many of its agencies and bureaus, and through a variety of research and operational contractors, collects or causes to be collected large quantities of marine environmental data and samples. In addition to the purposes for which these data and samples were originally collected, they constitute a valuable national resource, the proper management of which is the responsibility of the Federal Government. Secondary users of these data, samples, and resulting information include agencies of the Federal Government; elements of State and local governments; industry; colleges and universities; regional environmental councils and commissions; the general public and international activities. To meet the requirements of these secondary users, both for the present and during the decades to come, it is essential that there be implemented a systematic procedure to assure that this resource is adequately indexed, documented, and cataloged in preparation for dissemination to the user community and is archived in such a manner that the data and samples are readily accessible to the users. Data and information that are acquired for a specific purpose but which are not then made available for dissemination to other users, for all practical purposes do not exist; therefore, they should be made available as soon as possible after they are collected or derived.

The Interagency Committee on Marine Science and Engineering (ICMSE),

Recognizing the development of the National Oceanic and Atmospheric Administration's family of national environmental data and information centers and of the Smithsonian Oceanographic Sorting Centers (SOSC),

Noting further the existing and developing Federal environmental data management policy statements and the interagency environmental data management agreements,

Endorses the concept and value of such policy statements and interagency agreements and

Strongly urges the members of ICMSE, as a matter of interagency marine science and engineering policy, to:

a. Work actively with the Environmental Data Service of NOAA toward establishment of bilateral marine environmental data management agreements which provide or identify the mechanisms and resources whereby marine physical, chemical, geological, geophysical and biological data or their inventories and indices are promptly and properly archived.

b. Work actively with the Smithsonian Institution toward establishment of bilateral agreements as to the mechanisms, procedures and/or resources whereby the data information on marine collections are properly archived and, as appropriate, biological and geological specimens are properly sorted, curated and managed for optimal utilization.

c. Promulgate within their agency, or at the departmental level if considered appropriate, a marine environmental data, sample and information policy which embodies the principles established above, identifies the procedures and responsibilities within the agency, or department, as to development and implementation of inventories and serves as a broad general policy framework for interagency data management coordination.

INTRODUCTION

This report on ocean data resources has been prepared in response to a request from the National Ocean Policy Study of the U.S. Senate to the Interagency Committee on Marine Science and Engineering. The report lists the locations, principal contacts, capabilities, and facilities involved with ocean data. While the request was directed toward information on Federal agency activities, similar information on State and regional activities, academic institutions, industry, and nonprofit organizations have also been included to provide a perspective in relating Federal ocean data activities within the overall national ocean data effort. It must also be noted that the report addresses itself primarily to data management activities; it does not include the significant efforts involved in the actual acquisition of ocean data through research and survey.

In compiling the list of industries and nonprofit organizations, 267 were selected from a review of some 600 marine-oriented organizations as representing significant capabilities in ocean data collection, processing, or analysis. Companies engaged primarily in hardware manufacture or sales are not included.

Abstract of Federal Agencies' Participation in Ocean Data Programs

DEPARTMENT OF DEFENSE

Department of Defense ocean programs support both military and civil purposes. The programs of the Navy, the Defense Mapping Agency, and the Advanced Research Projects Agency are directed to meeting military requirements. The marine programs of the Army Corps of Engineers fall in the civil works category.

Navy ocean science, engineering, and operational programs are conducted at academic institutions, Navy research laboratories and installations, private research laboratories, and industrial organizations. The Navy participates in cooperative programs wherever possible and beneficial to Navy needs. This includes both domestic and foreign oceanographic programs where pooling of resources can provide results normally not available to a single agency.

Although the Navy is both producer and consumer of its own efforts in oceanography, it provides much of the data and technology used by the civil sector. Conservatively, about 90 percent of the Navy ocean program is unclassified and can therefore be made available promptly to meet civil requirements.

The Naval Weather Service Command provides oceanographic prediction services to military forces. Many of these services are adaptable to, and are used for, civilian purposes. The Naval Weather Service Command comprises four computer equipped Fleet Weather Centrals—Guam, Pearl Harbor, Norfolk, and Rota, each having areas of responsibility, within which each collects environmental observa-

tions, processes data, and provides oceanographic predictions and warnings. In addition, there are eight weather facilities which provide oceanographic services as required mainly in support of aviation operations or local staffs. Several facilities have special functional oceanographic responsibilities, for example, Suitland concentrates on ice formation. The hub, and central computer site, of Naval Weather Service Command is at the Fleet Numerical Weather Central, Monterey, which devotes a significant portion of its operations and resources to oceanographic predictions, particularly as related to antisubmarine warfare and national defense. Security considerations constrain a more detailed description of these functions here.

In fulfilling its oceanographic prediction responsibilities, the Naval Weather Service deals mainly with physical oceanography—temperature, salinity, motion, and other characteristics of the ocean. However, a significant number of the driving forces are atmospheric in origin. Therefore, it is possible to predict changes in selected ocean parameters by integrating the total exchange of heat and momentum occurring at the ocean/atmosphere interface. The Naval Weather Service, with a dual mission responsibility for both oceanographic and meteorological predictions, is structured and operates specifically to accommodate this interface solution.

The Naval Oceanographic Office (NAVOCEANO) conducts applied military oceanographic work to provide the fleet with operational environmental data. It has the responsibility for the acquisition of survey data and the related technology for the Defense Mapping Agency (DMA).

DEFENSE MAPPING AGENCY (DMA)

DMA has the responsibility for all DOD mapping, charts, and geodesy. Its Hydrographic Center produces marine charts and related products and publications for fleet and commercial use.

The marine science programs of the Corps of Engineers support coastal and Great Lakes investigations of water and related land resources. The broad spectrum of corps civil works responsibilities in these areas include comprehensive long-range planning, preauthorization project development, design, construction, operation and maintenance of projects, and regulatory activities. Project purposes include navigation, beach and shore erosion protection, coastal flood control, water quality improvement and flow control, water-based recreation, fish and wildlife conservation and enhancement, floodplain management services, and other purposes authorized by law.

DEPARTMENT OF COMMERCE

Two agencies of the Department of Commerce, the National Oceanic and Atmospheric Administration (NOAA) and the Maritime Administration (MARAD), contribute to the Federal ocean program.

The basic missions of NOAA are the development, operation, and maintenance of a national system for observing and predicting the state of the atmosphere, rivers, and oceans, and the conduct of research and development that contributes to the exploration, conservation, and development of marine resources. Additionally, an essential part of the NOAA program is the development of the neces-

sary scientific understanding, technological capabilities, and support services required to carry out the foregoing missions.

NOAA's Environmental Data Service indexes, archives, retrieves, summarizes, analyzes, and disseminates environmental data. It provides environmental information services that support government, public, academic, and industrial users. EDS is comprised of the National Oceanographic Data Center, the National Climatic Center (marine climatology), the National Geophysical and Solar-Terrestrial Data Center (marine geology and geophysics, including seismology, gravimetry, and geomagnetism), the Environmental Science Information Center, and the Center for Experiment Design and Data Analysis. Six discipline-oriented world data centers (dating from IGY) are collocated with EDS data centers. EDS operates an Environmental Data Index (ENDEX) and Oceanic and Atmospheric Scientific Information System (OASIS).

NOAA's National Weather Service (NWS) acquires atmospheric and sea-surface data which are used to provide forecasts and warnings for coastal and offshore waters. These data are then archived at the National Climatic Center. The marine observations are obtained from the cooperative merchant ship program and from trained observers aboard Coast Guard ocean station vessels. Tide observations, for tsunami warning system purposes, are collected by the NWS observatories at Honolulu, Hawaii, and Palmer, Alaska.

NOAA's National Ocean Survey (NOS) provides nautical charts which are basic tools required for waterborne commerce, expanding marine industries, and recreational boating. Program activities include hydrographic surveying and the compilation, reproduction, and distribution of nautical charts, coast pilots, Great Lakes Pilot, and other publications. Ocean mapping, investigation, and services consist of the acquisition and dissemination in suitable form of scientific data necessary to support many types of marine activities. The products include charts depicting bottom topography, ocean currents, and other physical variables of importance.

NOAA's National Marine Fisheries Service (NMFS) seeks to strengthen the U.S. domestic and international economic position in marine fisheries in order to decrease dependence on fish imports, expand exports, and develop and preserve fish resources. The Service seeks to accomplish this by maintaining and increasing the productivity and competitiveness of the U.S. fishing industry and by effectively conserving and allocating fisheries resources of interest to the United States. The NMFS also has the responsibility to protect and conserve endangered species and marine mammals.

NOAA's National Environmental Satellite Service (NESS) manages and operates the national operational environmental satellite system, composed of earth-orbiting spacecraft equipped to observe and collect environmental data on a global basis. Images of the earth and clouds and measurements of radiation from the atmosphere and ocean surface are acquired and processed at the World Meteorological Center in Washington for application to weather, marine, hydrologic, and resource survey services.

NOAA's sea grant program is the only national instrument for carrying out cooperative programs in the coastal zone with State and

local governments, academic institutions, and industry, for the purpose of fostering marine resource development, technology, environmental research, education, and training, and advisory services. Its major activities include assisting coastal States to improve their ability to manage their coastal zones through research, education, and advisory services; facilitating the ability of private enterprise to explore for and utilize marine resources and engage in marin ecommerce and commercial recreational activities through technology development, identification of new or unutilized marine resources, and providing the information required for the solutions to socio-economic and legal problems; operating and managing a national marine advisory program to facilitate the transfer of information between researchers and users; and helping provide the skilled manpower required to meet national needs in marine activities.

NOAA's Office of Coastal Zone Management was established in 1973 to administer the Coastal Zone Management Act of 1972 (Public Law 92-583) which provides Federal grants and other support to assist the coastal States and territories in the development and implementation of management programs for their coastal zones. The Office also administers title III of the Marine Protection, Research, and Sanctuaries Act of 1972 that calls for the study and designation of marine sanctuaries for the purpose of preserving them or restoring them due to their conservation, recreational, ecological, or esthetic values.

Both of these major program components will require substantial development of scientific, technical, and cultural data and information. Some of the needed management data, information synthesis, and applied research will be generated by the States. Reliance upon existing and developing Federal data sources will also be significant.

Typically, the programs will include compilations of basic shoreline and near-shore data, base maps, satellite imagery, resource inventories, and environmental data summaries. Grants may also be used to initiate or continue technical studies to identify or assess resources, capabilities, mechanisms, alternatives, et cetera, in relation to achieving the objectives of the Coastal Zone Management Act.

NOAA's Environmental Research Laboratories' (ERL) oceanographic research program is conducted primarily by the Atlantic Oceanographic and Meteorological Laboratories (AOML) and the Pacific Marine Environmental Laboratory. Included are studies of the dynamics of the upper oceanic boundary layer, the role of internal waves in the overall dynamics of the water column, investigations of the open ocean and Continental Shelf characteristics of seismic sea waves (tsunamis), and investigations of current patterns. Marine ecosystem analysis programs are also a responsibility of ERL.

The Maritime Administration provides a broad range of programs for revitalizing the U.S. flag merchant marine so that it can meet this Nation's shipping needs for commerce and defense. MARAD collects, processes, and analyzes comprehensive data regarding the foreign world merchant fleet and the U.S. world merchant fleet. Fifty-two (52) elements of data are maintained.

The only aspects of these programs applicable to the ocean data study, however, are those directed toward gaining a better understanding of the nature of the ocean surface and the environmental effects on the operation and design of merchant vessels.

Assessment of oceanic data is performed at the Maritime Operations Data Center which is part of the National Maritime Research Center

at Kings Point, N.Y. This information will be used in connection with the research conducted at the Computer Assisted Operational Research Facility (CAORF). CAORF is also under construction at the National Maritime Research Center, Kings Point, N.Y., and provides a ship-bridge simulator for national use to identify and relate the vital human, operational, technical, and other factors which affect safety, economy, and environmental impact of maritime operations by measuring of human responses in a controlled marine environment.

The Maritime Administration through its concern in the control of vessel source pollution is supporting research programs relating to the collection of data and development of techniques for use in evaluating the distribution and baseline levels of hydrocarbons in the world's oceans. The Maritime Administration has conducted jointly funded research work with private industry and other government agencies to collect, measure, and analyze levels of hydrocarbons along tanker routes covering the Pacific, east, and gulf coasts, the Caribbean, the Mediterranean Sea, and the Persian Gulf. This type of research data will be used by the Maritime Administration in the formulation of standards for the control of ship-generated pollution.

NATIONAL SCIENCE FOUNDATION

The National Science Foundation supports basic and applied oceanographic research at academic, nonprofit, and industrial institutions, as well as in Federal agency laboratories. Seven offices within the Foundation fund research programs as well as provide support for the ships and equipment necessary to carry them out.

The International Decade of Ocean Exploration (IDOE) is the Foundation's major marine research effort. Its basic objective is to accelerate understanding and prediction of the oceans and their resources through support of large-scale, multi-institutional, international projects. Programs are in four areas: environmental quality, seabed assessment, environmental forecasting, and living resources.

DEPARTMENT OF TRANSPORTATION

The U.S. Coast Guard, maritime arm of the Department of Transportation, has as its main mission, safety of life and property at sea and the enforcement of maritime laws and treaties, particularly as they relate to pollution prevention and fisheries conservation.

The former mission includes search and rescue, aids to navigation, merchant marine safety, and recreational boating safety. Ancillary to and in support of both of the main missions are the collection of oceanographic data by ocean station vessels, oceanographic vessels, and polar icebreakers, the processing of such data, and the entire Coast Guard research and development program.

The research and development program goals are to apply the benefits of science and technology to Coast Guard missions and responsibilities, to improve service to the public, and to reduce costs. To achieve these goals, three major objectives have been identified. These are: (1) To increase the capacity of the national marine transportation system, (2) to protect and enhance the marine environment, and (3) to protect public safety at sea.

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DEPARTMENT OF THE INTERIOR

The Department of the Interior obtains, processes, stores, and disseminates data that relate to the identification, evaluation, development, and use of the Nation's nonliving and recreational resources, including those of the coastal zone and seabed of the Outer Continental Shelf and adjacent marine areas. The nonliving resources include water for human and industrial use, as well as minerals and fossil fuels. The recreational resources include gamefish of the Nation's streams and lakes, migratory birds, waterfowl, and other wildlife in addition to the well-known recreational facilities encompassed by the National Park and Wildlife Refuge Systems.

Interior's U.S. Geological Survey (USGS) acquires and utilizes basic cartographic, geophysical, geological, hydrological, geochemical, and mineral resources data in support of its responsibilities for "classification of the public lands, and examination of the geological structure, mineral resources, and products of the national domain." Current marine efforts focus on gathering information about the Nation's Outer Continental Shelf in order to expedite efficient and safe production of oil, gas, and other energy resources. USGS continues traditional research and fact-finding activities that aim at evaluating: (1) The total offshore mineral resource base available to meet needs of the Nation's economy; (2) the nature of geologic environments and their hazards as they relate to coastal and offshore resource development; and (3) the quantities and quality of water available for use in the coastal zone, including amounts discharged to the oceans. In support of its activities, USGS maintains an integrated nationwide earth science computer system for processing, storage and retrieval of cartographic, water, and mineral resource data; and manages comprehensive referral services through its National Cartographic Information Center and Office of Water Data Coordination. In conjunction with regulatory responsibilities, USGS compiles and periodically publishes records of OCS oil, gas, and mineral production and revenues.

Interior's Bureau of Land Management (BLM) has responsibility for administration of the Outer Continental Shelf lease program, which includes the assembly of pertinent data and preparation of environmental impact studies. It supports baseline and monitoring studies by others to collect and process data that is not available through existing sources. BLM serves as the office of record for data and activities relating to the OCS leasing program.

The U.S. Bureau of Mines (USBM) has Federal responsibility for the collection, analysis, and dissemination of data relating to mineral supply and demand, both on- and offshore. It also conducts research on mineral recovery and processing and serves as the focal point in Government for associated data, including that applicable to offshore operations.

Interior's Fish and Wildlife Service (FWS) in support of its responsibilities for conservation of the Nation's wildlife and gamefish resources, has initiated a service to provide key biological information and technical assistance needed for more knowledgeable land and water use decisions. A portion of this program applies directly to the coastal zone, specifically to a better understanding of coastal ecosystem inter-

relationships, OCS mineral production, and the siting of deep-water ports and offshore atomic plants.

ENVIRONMENTAL PROTECTION AGENCY

The major mission of the Environmental Protection Agency (EPA) is to prevent, control, and abate pollution of our environment. EPA's marine science and engineering programs reflect the authorizing legislation within categories of environmental studies, engineering development, and regulatory activities.

In the category of environmental studies are programs that study: 1. The effects of pollutants on marine fish and wildlife, 2. fate of pollutants in the marine environment, 3. biological and chemical processes in the Great Lakes. EPA conducts comprehensive estuarine regional planning studies, and technical studies of pollution conditions in support of State agencies, and supports also a related data storage and retrieval system.

DEPARTMENT OF STATE

The Department of State, with the assistance of departments and agencies of the Federal Government possessing responsibilities relating to the oceans, formulates and implements U.S. policy in international ocean affairs. The Department conducts negotiations with foreign governments on international ocean affairs problems, both bilaterally and multilaterally, and within the forums of international organizations.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

The Department of Health, Education, and Welfare ocean-related programs are concerned with supporting basic medical research using marine organisms, providing advice and assistance on marine health science affairs, and regulating the safety and wholesomeness of marine foods. The authorities for administering these activities are primarily the Public Health Service Act and the Food, Drug, and Cosmetic Act.

ATOMIC ENERGY COMMISSION

The Atomic Energy Commission (AEC) marine sciences research program is directed toward determining those environmental factors which influence the movement of radioelements through the marine environment, the possible means and rates of return of radioactivity to man through marine food webs, and basic ecological processes. Within this broad program are studies on biological, physical, and chemical oceanography, and studies related to operational activities such as the impact of waste heat from nuclear power stations on local ecosystems at such sites.

The AEC supports multidisciplinary studies of nuclear powerplant siting, including the environmental effects of such siting and subsequent powerplant operation. The research encompasses investigation of trace element cycling, modeling of water circulation, biological production, and the effects of waste heat on ecosystems.

The AEC also supports research in the world oceans. Advances have been made in subjects such as circulation rates within the mixed layer of the oceans, vertical microstructure in the oceans, and abyssal water circulation.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The National Aeronautics and Space Administration's (NASA) oceanography-related activities are primarily concerned with finding ways that remote-sensing techniques, data relay techniques, and drifting buoy position location techniques can be combined with appropriate aerospace technology to satisfy the needs of Federal, State, and regional agencies for improved coastal-zone or open-ocean data acquisition and data collection systems.

As NASA has no operational role or mission in the discipline area of oceanography, NASA maintains a close cooperative working relationship with those Federal agencies that do have such roles and missions, to insure that NASA's oceanographic efforts are responsive to their needs. NASA not only looks to these agencies to define their requirements for data, but also seeks their active participation in the planning and conduct of experiments in the field.

SMITHSONIAN INSTITUTION

The marine science activities of the Smithsonian Institution involve the systematics and ecology of marine organisms and investigations of marine biological and geological phenomena. Support services are provided in sampling, sorting, identification, curation, and data management of natural history specimens.

The National Museum of Natural History (NMNH) maintains the largest collection of biological specimens and geological samples in the world. These collections are actively being studied by scientists and constitute an important resource for research on current and historical environmental conditions.

The Smithsonian Oceanographic Sorting Center (SOSC) is a service unit of the Smithsonian Institution operated by the international environmental science program. Acting as a central processing laboratory, SOSC receives, sorts, records, curates, and distributes marine as well as freshwater collections in order to efficiently and accurately make these collections available to specialists.

International Aspects of Data Management

Local, national, and regional oceanographic activities in and among foreign countries constitute a major and very important source of data. Data collected by these non-U.S. activities and acquired by the United States through various exchange arrangements are vital to insure worldwide coverage of oceanographic data corresponding to our Nation's concerns in the global environment.

The primary international mechanism for the centralization and international exchange of oceanographic and related environmental data is the World Data Center system. World Data Center A—Oceanography is collocated with the U.S. National Oceanographic Data Center (NODC) and this arrangement provides for a steady and

voluminous flow of contemporary data from foreign sources into the U.S. NODC data banks. Most data collected by international cooperative programs and experiments, such as, for example, programs under the Integrated Global Ocean Station System (IGOSS), International Decade of Ocean Exploration (IDOE), Global Atmospheric Research Project Atlantic Tropical Experiment (GATE), et cetera, and data acquired by international organizations such as the International Council for the Exploration of the Seas (ICES), are automatically deposited in the World Data Center system. In addition, much data are voluntarily deposited in the World Data Centers by International Oceanographic Commission (IOC) member nations under the "declared national program" concept.

NODC is further augmenting the flow of data provided to World Data Center A, through bilateral data exchange arrangements with national oceanographic data centers and oceanographic activities in over 25 countries.

The IOC Working Committee on International Data Exchange seeks to modernize, broaden, and expand international data exchange arrangements and to promote wider access to, and accelerate the flow of, data and information from data-collecting programs to data centers serving the international data user community. Through U.S. efforts in the working committee, the World Data Centers and the U.S. NODC will be able to acquire a greater variety of oceanographic data in more cost-effective formats as well as gain timely information on marine data holdings throughout the world.

I. FEDERAL OCEAN DATA FACILITIES AND CAPABILITIES

ATOMIC ENERGY COMMISSION

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources	
			Man-years	Amount (thousands)
Associated Universities, Inc., Brookhaven National Laboratory, Upton, N.Y.	Dr. George H. Vineyard, director.	Data analysis, interpretation, storage, and dissemination in support of physical, chemical, biological oceanography, and fisheries research.	1.0	$50
Argonne National Laboratory, 9700 South Cass Ave., Argonne, Ill.	Dr. Robert G. Sachs director.	Data analysis, interpretation, storage, and dissemination in support of physical, chemical, and biological oceanography.	.5	25
Oak Ridge National Laboratory, Oak Ridge Operations Office, P.O. Box X, Oak Ridge, Tenn.	Dr. Herman Postma, director.	Data analysis, interpretation, storage, and dissemination in support of fisheries research and biological oceanography.	.1	5
Puerto Rico Nuclear Center, University of Puerto Rico, College Station, Mayaguez, P.R.	Dr. Lawrence Ritchie, director.	Data analysis, interpretation, storage, and dissemination in support of physical, chemical, biological oceanography, and fisheries research.	.5	25
University of California, Lawrence Livermore Laboratory, P.O. Box 808, Livermore, Calif.	Dr. Roger E. Batzel, director.	Data analysis, interpretation, storage, and dissemination in support of chemical and biological oceanography and geology/geophysics.	.5	25
Battelle Memorial Institute, Pacific Northwest Laboratory, P.O. Box 999, Richland, Wash.	Dr. Edward L. Alpen, director.	Data analysis, interpretation, storage, and dissemination in support of chemical and biological oceanography. Remarks: In addition to in-house ocean data activities, the AEC (through its Division of Biomedical and Environmental Research) expends approximately $5,000,000 on research and surveys relating to marine radioactivity. These contracts, with both universities and private organizations, yield significant marine data which arrive in the public domain through the primary research journals and through data reports submitted to the National Technical Information Service. In fiscal year 1974, specific steps were taken to broaden the submission of data and data inventories to the Environmental Data Service in accordance with the ICMSE policy statement on marine science and engineering data.	1.0	50

DEPARTMENT OF COMMERCE/MARITIME ADMINISTRATION

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
Maritime Administration, Assistant Administrator for Commercial Development, Commerce Building, Room 4885, Washington, D.C.	Mr. Marvin Pitkin	Contract efforts are supported for the collection and analysis of ocean wave spectra data, and other marine data relating to naval architecture (ship design), arctic port development, etc.		
National Maritime Research Center, Kings Point, N.Y.	Capt. L. S. McCready, director.	Gather, process, and analyze data on crew accidents, ship collisions, grounding, and strandings. Directs operation of Computer Assisted Operational Research Facility (CAORF).		

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/ENVIRONMENTAL DATA SERVICE

Environmental Data Service, Washington, D.C.	Dr. Thomas S. Austin, director.	Administration		
Environmental Data Index (ENDEX), Environmental Data Service, Washington, D.C.	Mr. Christopher Noe, chief.	Marine science data referral	9.0	$358
Center for Experiment Design and Data Analysis, Washington, D.C.	Dr. Joshua Z. Holland, director.	Collecting, processing, analyzing, and interpreting data from special observation programs.	40.0	1,034
National Climatic Center, Federal Building, Asheville, N.C.	Mr. William H. Haggard, director.	Marine meteorological data collection, processing, compilation, and dissemination, statistical analyses. Note: Resources include $1,300,000 reimbursable services to Naval Weather Service and National Ocean Survey.	50.0	1,600
National Geophysical and Solar-Terrestrial Data Center, Boulder, Colo.	Mr. A. H. Shapley, director.	Geological and geophysical data collection, processing, compilation, and dissemination.	10.5	330
National Oceanographic Data Center, Washington, D.C.	Mr. R. V. Ochinero, director.	Oceanographic data collection, processing, archiving, analysis, and dissemination.	99.7	1,966
EDS/NODC Liaison Office, NOAA, P.O. Box 271, La Jolla, Calif.	Mr. Nelson Ross, Jr., liaison officer.	Data and inventory submissions, data services, Marine Advisory Service.	1.5	31
EDS/NODC Liaison Office, AOML/NOAA, 15 Rickenbacker Causeway, Miami, Fla.	Mr. John Sylvester, liaison officer.	Data and inventory submissions, data services, Marine Advisory Service.	1.5	28
EDS/NODC Liaison Office, Woods Hole Oceanographic Institution, Woods Hole, Mass.	Mr. George Heimerdinger, liaison officer.	Data and inventory submissions, data services, Marine Advisory Service.	.3	11
Environmental Science Information Center, Washington, D.C.	Dr. Joseph Caponio, director.	Administration/staff		
Oceanic and Atmospheric Scientific Information System (OASIS).	Mr. James R. Stear	Computerized bibliographic information retrieval system for marine sciences.	5.1	163

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/ENVIRONMENTAL RESEARCH LABORATORIES

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources	
			Man-years	Amount (thousands)
Environmental Research Laboratories, Boulder, Colo.	Dr. Wilmot N. Hess, director.	Administration		
Atlantic Oceano. & Met. Laboratories, 15 Rickenbacker Causeway, Virginia Key, Miami, Fla.	Dr. H. B. Stewart, Jr., director.	Physical, geological, chemical oceanography including STD, current meter, acoustic and, optical data analysis and modeling. Storm surge prediction; image enhancement.	16.0	$512
National Hurricane Research Laboratory, University of Miami, Box 8265, 1365 Memorial Dr., Coral Gables, Fla.	Dr. R. C. Gentry, director.	Atmospheric and oceanographic data relating to hurricanes and storm surges such as temperature profiles, cloud physics data, and radar picture analysis.	10.5	490
Pacific Marine Environmental Laboratory, University of Washington, Seattle, Wash.	Dr. R. E. Burns, director (acting).	Chemical oceanography, physical oceanography including STD and current meter data. Tsunami propagation and run-up.	5.0	250
Joint Tsunami Research Effort, 2525 Correa Rd., University of Hawaii, Honolulu, Hawaii.	Dr. G. Miller, director	Activities and resources are included under parent laboratory (PMEL) above.		
Great Lakes Environmental Laboratory, NBOC-1, Rm. 100, Rockville, Md.	Dr. E. Aubert, director	Lake hydrology, chemical limnology, physical limnology, limnogeology.	5.0	250

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/NATIONAL ENVIRONMENTAL SATELLITE SERVICE

National Environmental Satellite Service, Federal Office Building 4, Suitland, Md.	Mr. David Johnson, director.	Administration		
Environmental Products Group, NOAA/NESS, Suitland, Md.	Mr. Russell Koffler, chief.	Development of satellite data products for operational ocean services.	3.0	$100
Environmental Sciences Group/NOAA/NESS, Suitland, Md.	Dr. E. Paul McClain, chief.	Research, analysis and interpretation of satellite data for marine applications.	8.0	310
Field Services Division, NOAA/NESS, Suitland, Md. Stations at San Francisco, Kansas City, Suitland, Miami, and planned for Anchorage and Ann Arbor, Mich	Mr. John Hussey, chief.	Specialists provide analysis and interpretation of satellite data for local/regional marine services. Four oceanographer positions established spring 1974; hires in progress.	2.3	47
Sensor Processing and Applications Division, NOAA/NESS, Suitland, Md.	Dr. John Leese, chief	Development and maintenance of automated techniques for preparing; operational sea surface temperature data analyses and other marine products.	5.0	150
Visual Products Support Branch, NOAA/NESS, Suitland, Md.	Mr. William Plew, chief.	Preparation, storage, and retrieval services for satellite data archives.	1.0	15
Spacecraft Oceanography Group, NOAA/NESS, Suitland, Md.	Mr. John Sherman, chief.	Development of techniques for acquisition and processing of ocean data by remote sensing from aircraft and satellites.	5.0	356

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/NATIONAL MARINE FISHERIES SERVICE

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources	
			Man-years	Amount (thousands)
National Marine Fisheries Service, Page Building 2, Washington, D.C.	Mr. Robert Schoning, director.	Administration		
Associate Director for Resource Research, Page Building 2, Washington, D.C.	Dr. William Royce, director.	Administration/staff		
Atlantic Environmental Group, Page Building 2, Washington, D.C	Dr. Merton Ingham, director.	Historical and Ship of Opportunity physical, oceanographic, and meteorological data analyses.	5.2	$146
Pacific Environmental, c/o Fleet Num. Weather Cen., Naval Postgraduate School, Monterey, Calif.	Mr. James Johnson, director.	Historical and Ship of Opportunity physical, oceanographic, and meteorological data analyses.	9.0	247
Northwest Fisheries Center, 2725 Montlake Blvd. East, Seattle, Wash.	Dr. Dayton Alverson, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	8.0	230
Auke Bay Fisheries Laboratory, Post Office Box 155, Auke Bay, Alaska.	Dr. William Smoker, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	3.5	100
Southeast Fisheries Center, 75 Virginia Beach Dr., Miami, Fla.	Mr. Harvey Bullis, Jr., director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	4.4	125
Northeast Fisheries Center, Woods Hole, Mass.	Dr. Robert Edwards, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	6.0	144
Southwest Fisheries Center, Post Office Box 271, 8604 La Jolla Shores Dr., La Jolla, Calif.	Dr. Brian Rothschild, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	2.5	114
Honolulu Laboratory, 2570 Dole Street, P.O. Box 3830, Honolulu, Hawaii.	Mr. Richard Shomura, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	2.0	35
Atlantic Estuarine Fisheries Center, Pivers Island, P.O. Box 570, Beaufort, N.C.	Dr. Theodore Rice, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	4.0	127
Gulf Coastal Fisheries Center, Building 302, Fort Crockett, Galveston, Tex.	Dr. Joseph Angelovic, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	3.0	88
Middle Atlantic Coastal Fisheries Center, P.O. Box 428, Highlands, N.J.	Dr. Carl Sinderman, director.	Fishery catch and effort analyses. Biomass, plankton, primary productivity, and nutrient data analyses. Physical-chemical oceanographic data analyses.	.8	43

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/NATIONAL MARINE FISHERIES SERVICE—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
College Park Fisheries Technology Laboratory, College Park, Md.	Mr. Harry L. Seagran, director.	Microconstituents. Contaminant data analysis and dissemination.	.8	$22
National Ocean Survey, Rockville, Md.	RADM Allen Powell, director.	Administration		
NOAA Data Buoy Office, Mississippi Test Facility, Bay St. Louis, Miss.	Mr. James Winchester, director.	Collection and processing of environmental data from buoys for synoptic and archival use.	6.0	650
Office of Marine Surveys and Maps, Rockville, Md.	Capt. Robert Munson, associate director.	Staff		
Oceanographic Division		Collection, analysis, interpretation, storage, and dissemination of tidal, tidal current, and temperature-salinity-density data; statistical, harmonic, and nonharmonic analysis; interpretation for verified tide reducers for hydrography; establishment of datum planes; determination of type of tide; model verification. Storage and retrieval of tidal current and density data and results implemented both within NOS to support ongoing programs and at EDS (NODC) which provides public distribution. Dissemination by NOS is in the form of summaries, reports, bulletins, and published tables.	49.5	1,105
Marine Chart Division		Collection, analysis, interpretation, storage and dissemination of data required in the publication of navigation charts, coast pilot editions.	119.0	2,461
Coastal Mapping Division		Collection, analysis, interpretation, storage, and dissemination of aerial photography and horizontal control data required in the compilation of Florida boundary maps, shoreline manuscripts, storm evacuation maps, coastal inundation maps, chart topography, and for aerial current studies.	68.3	1,878
Lake Survey Center, 630 Federal Bldg. and U.S. Court House, Detroit, Mich.	Capt. Kenneth MacDonald.			
Water levels studies		Collection, analysis, interpretation, storage-retrieval, and dissemination of water level records in support of the Great Lakes navigation charting program, scientific and engineering studies. Dissemination is in the form of published summaries, tables, and reports.	10.0	220
Hydrographic processing		Collection, analysis, interpretation, storage-retrieval, and dissemination of sounding and related marine data required to produce a navigation chart and related publications such as Great Lakes Pilot.	14.0	210

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/NATIONAL MARINE FISHERIES SERVICE—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
Atlantic Marine Center, 439 West York St., Norfolk, Va.	Rear Adm. Alfred C. Holmes, director.			
Hydrographic processing		Collection, analysis, and interpretation of sounding (depth), tides, horizontal control, and related records required to smooth plot and verify hydrographic surveys in support of the nautical charting program.	24.0	$371
Coastal mapping (photogrametry)		Collection, analysis, interpretation, and compilation of aerial photographic data into shoreline manuscripts for hydrographic survey smooth sheets and shoreline maps for chart topography, both in support of the nautical charting program.	46.0	669
Pacific Marine Center, 1801 Fairview Ave. East, Seattle, Wash.	RADM. Herbert Lippold, Jr., director.			
Hydrographic processing		Collection, analysis, and interpretation of sounding (depth), tides, horizontal control, and related records required to smooth plot and verify hydrographic surveys in support of the nautical charting program. Note: NOS resources include 29.5 man-years and $744,000 for reimbursable work.	25.0	505

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/NATIONAL WEATHER SERVICE

National Weather Service, Silver Spring, Md.	Dr. G. P. Cressman, director.			
National Meteorological Center, Federal Office Bldg., No. 4, Suitland, Md.	Dr. F. G. Shuman, director.	Environmental data collection and preparation of basic weather and ocean analyses and forecast guidance for use by offices.	17.0	$595
National Hurricane Center, P.O. Box 8286, Coral Gables, Fla.	Dr. N. Frank, director.	Environmental data collection for predicting tropical storm developments and movements and related effects, such as high seas and storm surges, and for the development of methods for predicting growth and movement of tropical storms.	22.0	561
National Weather Services, Observatories, Honolulu, Hawaii, Palmer and Adak, Alaska.	Director, International Tsunami Information Center, Honolulu, Hawaii.	Seismic and tide data collection and prognosis and dissemination of seismic wave (tsunami) watches and warnings on a regional, national, and Pacific-wide basis.	19.0	550
National Weather Service Forecast Offices (Marine) (23 offices located throughout the United States and Puerto Rico).	Director, Ocean Services Division, National Weather Service, Headquarters.	Environmental data collection, analysis, and prognosis and the dissemination of products on marine weather and waves for coastal and offshore areas and ice conditions for Alaskan waters and the Great Lakes.	68.0	1,653

DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/
OFFICE OF COASTAL ZONE MANAGEMENT

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
Office of Coastal Zone Management, NOAA, Rockville, Md.	Mr. Richard R. Gardner, deputy director.	Most coastal states and territories are using OCZM funds to collect oceanic and coastal zone data which may have national applications.		
Manned Undersea Science and Technology Office, Office of Marine Resources, NOAA, MR 6, Rockville, Md.	Dr. Donald Beaumariage, director.	M.U.S. & T. funds the lease of undersea platforms, research submersibles, and habitats for marine science missions with principal investigations from NOAA, universities supported by NSF, Sea Grant, and other Federal agencies. Data collected is in the form of photographs, scientist abstract data, special instrumentation results, and includes data on diving physiology and environmental monitoring.		
DEPARTMENT OF COMMERCE/NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION/OFFICE OF SEA GRANT				
Office of Sea Grant, 6010 Executive Blvd., Rockville, Md.	Dr. Robert B. Abel, director.	The Office of Sea Grant recognizes the potential resource represented by data collected by Sea Grant researchers and, therefore, has procedures to assure that these data are adequately documented and cataloged. Following discussions between the grantee and an NODC representative to determine the documentation necessary to ensure meaningful interpretation by subsequent users, grantees are required to submit data inventories to NODC within 30 days after completion of each cruise or data collection phase, and submit the data within 1 year. Resources for data management are not routinely identified.		
NOAA Marine Advisory Service, Office of Sea Grant, Rockville, Md.	Mr. Howard Eckles, program manager.	See the Abstract of Federal Agencies' Participation in Ocean Data Programs and pt. III.		
DEPARTMENT OF DEFENSE (ARMY)				
U.S. ARMY CORPS OF ENGINEERS				
Coastal Engineering Research Center, Kingman Bldg., Fort Belvoir, Va.	Col. James L. Trayers, director.	Coastal ecology; sand inventories; beach and coastal characteristics; waves, tides, and currents in coastal zone; inlet and estuary hydrodynamics.	90.0	$3,600
Waterway Experiment Station, P.O. Box 631, Vicksburg, Miss.	Col. George H. Hilt, director.	Bathymetric surveys; waves, tides, and currents in harbors, estuaries; structural response to ocean dynamics.	125.0	5,000
Cold Regions Research and Engineering Laboratory, P.O. Box 282, Hanover, N.H.	Col. Robert L. Crosby, director.	Ice forces on structures and shorelines; ice and permafrost effects on navigation works.	10.0	200

DEPARTMENT OF DEFENSE (ARMY)—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
22 Coastal District or Division Offices of Corps of Engineers.	Col. John Parish, Jr., executive director/CW.	Coastal zone bathymetry and topography, hydraulics of coasts, bays, estuaries, including waves, currents, and tides; channel and harbor surveys. Note: Because the data activities of the Corps are integral parts of project activities of complex nature, man-year and dollar resources invested in data activities are difficult to determine accurately. These figures are to be considered preliminary estimates.	385.0	$7,700
DEPARTMENT OF DEFENSE (DEFENSE MAPPING AGENCY)				
Defense Mapping Agency, Hydrographic Center (DMAHC), Washington, D.C.	Capt. Scott Drummond, director.	Bathymetric data storage and dissemination; maintains the Bathymetric Library for the DMA/DOD.	8.0	$145
Defense Mapping Agency, Aerospace Center (DMAAC), St. Louis, Mo.	Col. D. D. Hawkins, director.	Marine gravity data storage and dissemination; maintains the Gravity Library for the DMA/DOD.	5.0	65
DEPARTMENT OF DEFENSE (NAVY)				
Chief of Naval Research, 800 North Quincy St., Arlington, Va. Office of Naval Research, Maury Center for Oceanographic Science. Office of Naval Research, Earth Sciences Division. Office of Naval Research, Ocean Science and Technology Division.	Rear Adm. M. D. Van Orden. Dr. J. Brackett Hersey, director. Dr. Peter Badgley, director. Mr. Gordon R. Hamilton, director.	Whereas these offices are principally administrative and/or management-oriented, the research contracts which they support generate significant quantities of ocean data. ONR offices have long been aware of their national marine data management responsibilities. Since 1965 the ONR Ocean Science and Technology Division has provided approximately $20,000 annually to NODC for data center support rendered to ONR contractors. ONR has always encouraged its contract scientists to deposit data and data inventories with NODC, and in 1973 this policy was formalized (Oceanavinst 3161.4A) as a contract requirement.		
Naval Research Laboratory, Washington, D.C.	Capt. J. T. Geary, director.	Ocean data processing, analysis, interpretation, storage, and dissemination.	70.0	$3,500
Naval Weather Service Command, Washington Navy Yard, Washington, D.C.	Capt. W. S. Houston, commander.	Global oceanographic analysis and predictions of select physical parameters and applications. Alpha-numeric and graphic formats of unclassified products suitable for civil use. Full range of data collection, processing, interpretation, storage, and dissemination.	330.0	2,887
Naval Air Development Center, Warminister, Pa.	Mr. Russell Mason, technical director (acting).	Ocean data collection, processing, analysis, interpretation, storage, and dissemination.	8.0	400

DEPARTMENT OF DEFENSE (NAVY)—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
Naval Coastal Systems Laboratory, Panama City, Fla.	Mr. G. G. Gould, technical director.	Inshore ocean data processing, analysis, interpretation, and dissemination.	8.0	$300
Naval Ordnance Laboratory, White Oak, Silver Spring, Md.	Dr. W. C. Wineland, associate technical director for research.	Ocean data processing, analysis, interpretation, storage, and dissemination.	6.0	300
Naval Ship Research and Development Center, Bethesda, Md.	Dr. A. Powell, technical director.	Ocean data collection, processing, analysis, interpretation, storage, and dissemination.	3.0	150
Naval Undersea Center, San Diego, Calif.	Dr. Howard L. Blood, technical director.	Ocean data processing, analysis, interpretation, storage, and dissemination.	30.0	1,600
Naval Underwater Systems Centers, Newport, R.I., New London, Conn.	Mr. H. E. Nash, technical director.	Ocean data processing, analysis, interpretation, storage, and dissemination.	30.0	1,600
Naval Oceanographic Office, Suitland, Md.	Dr. B. E. Olson, scientific and technical director.	Collection, processing, storage, analysis, and dissemination of oceanographic and hydrographic data; includes the DOD Geomagnetic Data Library, other data files, and the preparation of oceanographic products in support of Navy planning and fleet activities.	335.0	7,500
U.S. Naval Postgraduate, Monterey, Calif.	Dr. Dale Lieper, chairman, Department of Oceanography.	Ocean data analysis, interpretation, processing, and dissemination.	2.0	50
Naval Air Systems Command Environmental Prediction Research Facility, Monterey, Calif.	Capt. Robert C. Sherar, commanding officer.	Analysis and interpretation of oceanographic data in support of research and development of oceanographic predictive models for operational use.	3.0	63

ENVIRONMENTAL PROTECTION AGENCY

Office of Research and Development, 401 M Street SW., Rm. 3202, Washington, D.C.	Mr. A. Trakowski, Jr., Assistant Administrator for Research and Development.	Administration		
Region I	Mr. John McGlennon, Regional Administrator, J. F. Kennedy Federal Bldg., Rm. 2203, Boston, Mass.	Administration		
National Marine Water Quality Laboratory, P.O. Box 277, West Kingston, R.I.	Dr. Eric Schneider, director (acting).	Data collection, analysis, interpretation, storage, and dissemination as relates to marine pollution and research.	2.0	$50
Region II	Mr. Gerald M. Hansler, Regional Administrator, 26 Federal Plaza, Rm. 908, New York, N.Y.	Administration		
Edison Water Quality Research Laboratory, Edison, N.J.	Mr. Richard Dewling, director, surveillance and analysis laboratory.	Data collection, analysis, interpretation, storage, and dissemination as relates to ocean disposal baseline surveys.	5.0	125

ENVIRONMENTAL PROTECTION AGENCY—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
Region III	Mr. Daniel Snyder III, Regional Administrator, Curtis Bldg., 6th and Walnut Sts., Philadelphia, Pa.	Administration		
	Mr. William Muir, regional oceanographer.	Data collection, analysis, interpretation, storage, and dissemination as relates to ocean disposal baseline surveys.	15.0	$300
Region IV	Mr. Jack E. Ravan, regional administrator, 1421 Peachtree St., NE., Atlanta, Ga.	Administration		
Gulf Breeze Environmental Research Laboratory, Gulf Breeze, Fla.	Dr. Thomas Duke, director.	Data collection, analysis, interpretation, storage, and dissemination as relates to marine pollution and research.	2.0	50
Region V	Mr. Francis T. Mayo, regional administrator, 1 North Wacker Dr., Chicago, Ill.	Administration		
Grosse Ile Laboratory, 9311 Groh Rd., Grosse Ile, Mich.	Mr. Nelson Thomas, director.	Data collection, analysis, interpretation, storage, and dissemination as relates to large lakes research programs.	11.0	1,900
National Environmental Research Center, Cincinnati, Ohio.	Dr. Andrew Breidenbach, director.	Administration		
Methods Development and Quality Assurance Laboratory.	Mr. Dwight Ballinger, director, 1014 Broadway, Cincinnati, Ohio.	Great Lakes reference samples	1.0	25
Region IX	Mr. Paul DeFalko, Jr., director, 100 California St., San Francisco, Calif.	Administration		
Region X	Mr. Edwin Coate, regional administrator (acting), 1200 6th Ave., Seattle, Wash.	Administration		
Pacific Northwest Environmental Research Laboratory, 200 Southwest 35th St., Corvallis, Oreg.	Dr. Donald Baumgartner.	Data collection, analysis, interpretation, storage, and dissemination as relates to marine pollution and research.	2.0	50
Headquarters, Office of Water and Hazardous Materials.	Mr. James L. Agee, deputy assistant administrator (acting).	Administration		
Marine Protection Branch	Mr. T. Wastler, chief, Waterside Mall East, Room 731A, 401 M St. SW. Washington, D.C.	Data collection, analysis, interpretation, storage, and dissemination as relates to ocean disposal baseline surveys.	25.0	600
Monitoring and Data Support Division.	Mr. Edmund Notzon, director, Waterside Mall East, Room 837B, 401 M St. SW., Washington, D.C.	Water pollution monitoring, data acquisition, dissemination, and storage-retrieval (STORET).	1.0	75
Office of Pesticide Programs	Dr. Henry J. Korp, deputy assistant administrator, Waterside Mall East, Room 539A, 401 M St. SW., Washington, D.C.	Administration		

ENVIRONMENTAL PROTECTION AGENCY—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources: Man-years	Fiscal year 1974 resources: Amount (thousands)
Technical Services Division	Dr. William S. Murray, director, Waterside Mall E., Rm. 315B, 401 M St. SW., Washington, D.C.	National pesticides monitoring program for water.	.8	$10
Office of Radiation Programs	Dr. William D. Rowe, deputy assistant administrator, Waterside Mall E., Rm. 558, 401 M St. SW., Washington, D.C.	Administration		
Field Operations Division	Mr. Charles E. Weaver, director, Waterside Mall E., Rm. 513, 401 M St. SW., Washington, D.C.	Environmental radiation, ambient monitoring system (ERAMS), surface water component.	.1	1.5
HEALTH, EDUCATION & WELFARE				
Food and Drug Administration, Shellfish Sanitation Branch, HFF-417, Room 3810, Federal Office Bldg. 8, 200 C St. SW., Washington, D.C.	Mr. J. D. Clem, Chief	Analysis of chemical and bacteriological data.	4.0	$100
DEPARTMENT OF THE INTERIOR				
Office of Saline Water, 18th and C Sts. NW., Washington, D.C.	Mr. J. W. O'Meara, director.	Data collection, analysis, interpretation, storage, and dissemination.	9.5	$276
Bureau of Land Management, 18th and C Sts. NW., Washington, D.C.	Mr. Curtis Berklund, director.	Data collection, analysis, interpretation, storage, and dissemination.	4.5	1,460
Fish and Wildlife Service, 18th and C Sts. NW., Washington, D.C.	Dr. Lynn Greenwald, director.	Data collection, analysis, interpretation, and dissemination.	32.0	1,950
Fish and Wildlife Service, Biological Services, 18th and C Sts. NW., Washington, D.C.	Mr. Allan Hirsch, chief.	Currently being organized to collect, process, and provide biologic information relating to gamefish, wildlife and ecosystems including those of the coastal zone.		
Fish and Wildlife Service, Great Lakes Laboratory, 1451 Green Rd., Post Office Box 640, Ann Arbor, Mich.	Dr. Howard D. Tait, director.	Data collection, analysis, interpretation, storage, and dissemination.	13.0	800
Bureau of Mines, 18th and C Sts. NW., Washington, D.C.	Mr. Thomas Falkie, director (acting).	Data collection, analysis, interpretation, storage, and dissemination.	.75	29
Bureau of Reclamation, 18th and C Sts. NW., Washington, D.C.	Mr. Gilbert Stamm, commissioner.	Data analysis, interpretation, and dissemination.	2.0	64
National Park Service, 18th and C Sts. NW., Washington, D.C.	Mr. Ronald H. Walker, director.	Data activities supporting underwater trail development, educational programs, and preservation of natural resources in the National Park System.	2.0	52
U.S. Geological Survey, National Center, Reston, Va.	Dr. Vincent McKelvey, director.	Administration		
Conservation Division, Branch of Marine Evaluation, National Center, 600, Reston, Va.	Mr. Russell Wayland, chief.	Data acquisition (mostly from private sources), analysis, interpretation, storage, and dissemination in support of offshore leasing.	61.0	4,600

DEPARTMENT OF THE INTERIOR—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources	
			Man-years	Amount (thousands)
Geologic Division, National Center, 915, Reston, Va.	Dr. Charles Masters, chief (acting).	Headquarters administration		
Office of Marine Geology, 345 Middlefield Rd., Menlo Park, Calif.	Dr. David W. Scholl, branch chief.	Data collection, analysis, interpretation, storage, and dissemination.	33.0	$935
La Jolla Marine Geology, Laboratory, 8604 La Jolla Shores Dr., La Jolla, Calif.	Dr. George W. Moore	Included in Menlo Park's figures		
Marine Geology, P.O. Box 1916, Corpus Christi, Tex.	Dr. L. E. Garrison	Data collection, analysis, interpretation, storage, and dissemination.	8.0	182
Marine Geology, Woods Hole, Mass.	Mr. John C. Behrendt, branch chief.	Data collection, analysis, interpretation, storage, and dissemination.	38.0	1,010
Water Resources Division, National Center, Reston, Va.	Mr. Robert Schoen	Collection, analysis, and dissemination of stream flow and water quality data of major discharges into bay, estuarine or ocean areas, including data activities in support of special estuarine or coastal zone studies.	193.0	1,925
Topographic Division, National Cartographic Information Center, National Center, 505, Reston, Va.	Mr. John Swinnerton, chief.	Computerized system for locating and obtaining maps, charts, cartographic and associated materials for the United States and its territories which include coastal regions, oceanic islands, and offshore areas.	3.5	80
Office of Water Resources Research, 18th and C Sts. NW, Washington, D.C.	Mr. Warren A. Hall, director.	Through grants, supports data activities of industries, academic groups, and States in coastal zone; manages Water Resources Scientific Information Center.	1.5	800
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION				
National Space Science Data Center, Goddard S.F.C., Code 601, Greenbelt, Md.	Dr. James I. Vette, director.	Collection of NIMBUS satellite remote-sensor-acquired sea surface radiometric data, storage, and retrieval of data and dissemination of data in form of digital data tapes or photo facsimiles.	6.0	$100
NATIONAL SCIENCE FOUNDATION				
Office for the International Decade of Ocean Exploration, 1800 G St. NW., Washington, D.C.	Mr. Feenan Jennings, head.	Since its inception in 1970 the IDOE program has included a strong ocean data management administration as a matter of sound scientific practice as well as clear national policy. IDOE guidelines, requiring bilateral negotiations with the Environmental Data Service as a condition of the grant, predate the May, 1972 ICMSE data policy statement. IDOE investigators are principally located at research institutions having well established data capabilities for which appropriate support is provided in the research grants.		

NATIONAL SCIENCE FOUNDATION—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources	
			Man-years	Amount (thousands)
Division of Environmental Sciences, 1800 G St., NW., Washington, D.C.	Mr. Albert Crary, head.	In addition to the standard rights-in-data clauses in all NSF grants, DES issues a detailed letter to each grantee (since November, 1972) prescribing data arrangements to be made with appropriate national data centers. EDS is provided, semi-annually, an annotated list of NSF/DES grants for which data arrangements are probably of interest.		
Office of Polar Programs, 1800 G St. NW., Washington, D.C.	Mr. Kendall Moulton, acting deputy head.	In both Arctic and Antarctic oceanographic research support, grantees are urged to deposit physical oceanographic data with NODC. Some physical oceanographic information is filed with biological marine data at the Smithsonian Oceanographic Sorting Center. In all cases, the normal outlet is through publication in scientific journals which in themselves serve as repositories for data.		
Office of National Centers and Facilities Operations, National Ocean Sediment Coring Program, 1800 G St. NW., Washing, D.C.	Mr. Daniel Hunt, Jr., head.	The information handling system for the deep sea drilling project (DSDP) is operated by Scripps Institution of Oceanography. Data are distributed to requesters as printouts, photographs, computer plots, punched cards, and magnetic tapes. In addition to the regular publication of the initial reports of the deep sea drilling project, the initial core descriptions, and a series of technical reports. The system is expected to be expanded during the international phase of ocean drilling extension (1975–80) and will be especially designed to (1) process data for inclusion in the published initial reports of the deep sea drilling project; (2) produce a published guide to DSDP core material; (3) produce standardized presentations of data for each drill site; (4) assist in core repository management.		
SMITHSONIAN INSTITUTION				
Center for Short-Lived Phenomena, Cambridge, Mass.	Mr. Robert Citron, director.	Descriptions of nature and location of short-lived events of scientific interest (sea floor landslides, earthquakes, animal migrations, storm surges, new islands, volcanism, oil spills, fish kills, marine mammal beachings and migrations, tsunamis, etc.) are relayed to CSLP. Data cards prepared and indexed for retrieval and immediate notification of events sent to subscribers in each category. Contract level is $24,000.	2.0	$40

NATIONAL SCIENCE FOUNDATION—Continued

Organization	Principal contact	Data activity capabilities	Fiscal year 1974 resources	
			Man-years	Amount (thousands)
Smithsonian Oceanographic Sorting Center, Navy Yard Annex, Bldg. 159, Washington, D.C.	Ms. Betty Landrum, director.	Biological data (e.g., types of organisms) produced, acquired, stored, processed, disseminated; along with specimens; also Antarctic ocean bottom photos stored, processed, described, and distributed. Contract work for other agencies is at about the level of $44,000.	0	$3
DEPARTMENT OF TRANSPORTATION/U.S. COAST GUARD				
Office of Operations, USCG Headquarters, Washington, D.C.	Rear Adm. R. H. Scarborough, chief.	Policy formulation, administration, and management of oceanographic and meteorological data collection activities. Data publication.	1.0	$42
USCG Oceanographic Unit, Bldg. 159-E, Navy Yard Annex, Washington, D.C.	Capt. E. A. Delaney, commanding officer.	Physical and chemical oceanographic data collection, processing, analysis, interpretation, dissemination, and publication.	40.0	885
International Ice Patrol, Governors Island, N.Y.	Comdr. A. D. Super, ice patrol officer.	Iceberg and physical oceanographic data collection, analysis, interpretation, dissemination, and publication.	7.0	140
9th Coast Guard District, Cleveland, Ohio.	Rear Adm. A. A. Heckman, commander.	Ice Navigation Center, Great Lakes ice data collection, analysis, interpretation, and dissemination.	2.0	50
USCG Communications Stations, Miami, Perrine, Fla.	Lt. Comdr. V. Gaida, commanding officer.	Environmental Buoy Data collection, processing, and dissemination.	10.0	130
Office of Marine Environment and Systems, USCG Headquarters, Washington, D.C.	Rear adm. R. I. Price, chief.	Policy formulation, administration, and management of marine pollution data collection activities.		
Marine Environmental Protection, Division, USCG Headquarters, Washington, D.C.	Capt. S. A. Wallace, chief.	Pollution incident reporting system (PIRS). Oil and hazardous substances data and information collection processing, storage, dissemination, and publication.	40.0	450
Office of Research and Development, USCG Headquarters, Washington, D.C.	Rear Adm. A. H. Siemens, Chief.	Management of research projects requiring data collection activity.		
USCG Research and Development Center, Avery Point, Groton, Conn.	Capt. G. Mann, commanding officer.	Oceanographic, and marine engineering data collection, analysis, storage, and publication.	48.0	1,824

II. STATE AND REGIONAL OCEAN DATA FACILITIES

ORGANIZATION	PRINCIPAL CONTACT
ALABAMA	
Department of Conservation and Natural Resources 64 North Union Street Montgomery, Alabama 36104	Claude D. Kelley Commissioner
Division of Game and Fish 64 North Union Street Montgomery, Alabama 36104	Claude D. Kelley Director
Division of Marine Resources P.O. Box 188 Dauphin Island, Alabama 36528	William F. Anderson Director
State Soil and Water Conservation Committee Room 203, Beard Building 1445 Federal Drive Montgomery, Alabama 36109	Wilbur B. Nolen Executive Secretary
Water Improvement Commission 749 State Office Building Montgomery, Alabama 36104	Ira L. Myers, M.D. Chairman
Alabama Cooperative Fishery Unit Fisheries Building Auburn University Auburn, Alabama 36830	Dr. Lohn S. Ramsey Leader
ALASKA	
Department of Environmental Conservation Pouch O Juneau, Alaska 99801	Max C. Brewer Commissioner
Division of Marine and Coastal Zone Management Pouch O Juneau, Alaska 99801	Y. R. Nayudu Director
Department of Fish and Game Subport Building Juneau, Alaska 99801	James W. Brooks Commissioner
Commercial Fisheries Division Subport Building Juneau, Alaska 99801	Carl Rosier Director
Department of Natural Resources Pouch M, Goldstein Building Juneau, Alaska 99801	Charles F. Herbert Director
Water Branch Lands Division Pouch M, Goldstein Building Juneau, Alaska 99801	Dean J. Nation Chief
Division of Geological and Geophysical Surveys 3001 Porcupine Drive Anchorage, Alaska 99504	Donald C. Hartman State Geologist
Division of Oil and Gas 3001 Porcupine Drive Anchorage, Alaska 99504	Homer Burrell Director

ORGANIZATION	PRINCIPAL CONTACT
ALASKA—Continued	
Alaska Cooperative Wildlife Research Unit University of Alaska Fairbanks, Alaska 99701	Dr. David R. Klein Leader
State Extension Services University of Alaska Fairbanks, Alaska 99701	Dr. James W. Matthews Director
CALIFORNIA	
The Resources Agency 1419 Ninth Street Sacramento, California 95814	N. B. Livermore, Jr. Secretary
State Reclamation Board 1419 Ninth Street Sacramento, California 95814	Col. Albert E. McCollam Chief Engineer and General Manager
State Water Resources Control Board 1416 Ninth Street Sacramento, California 95814	Bill B. Dendy Executive Officer
Navigation and Ocean Development 1416 Ninth Street Sacramento, California 95814	John E. Bennett Director
Colorado River Board 217 West First Street Los Angeles, California 90012	Myron B. Holburt Chief Engineer
Fish and Game Commission 1416 Ninth Street Sacramento, California 95814	Leslie F. Edgerton Executive Secretary
Department of Fish and Game 1416 Ninth Street Sacramento, California 95814	Edward C. Greenwood Chief, Marine Resources
Department of Conservation 1416 Ninth Street Sacramento, California 95814	Ray B. Hunter Director
Department of Water Resources 1416 Ninth Street Sacramento, California 95814	William R. Gianelli Director
San Francisco Bay Conservation and Development Commission 30 Van Ness Avenue San Francisco, California 94102	Charles R. Roberts Executive Director
California Cooperative Fishery Unit Fisheries Department Humboldt State College Arcata, California 95521	Dr. Roger A. Barnhart Leader
State Extension Services University of California 2200 University Avenue Berkeley, California 94720	Dr. George B. Alcorn Director
Marine Advisory Programs/Sea Grant Department of Animal Physiology University of California at Davis Davis, California 95616	Maynard W. Cummings Extension Wildlife Specialist and Coordinator
Southern California Coastal Water Research Project 1100 Glendon Avenue Los Angeles, California 90024	George E. Hlanka Project Manager

ORGANIZATION	PRINCIPAL CONTACT
CONNECTICUT	
Department of Agriculture Room 273 State Office Building Hartford, Connecticut 06115	John E. Baker Director, Aquaculture Division
Department of Environmental Protection State Office Building 165 Capitol Avenue Hartford, Connecticut 06115	Douglas M. Costle Commissioner
Fish and Wildlife Unit State Office Building 165 Capitol Avenue Hartford, Connecticut 06115	Cole W. Wilde Chief
Water and Related Resources Unit State Office Building 165 Capitol Avenue Hartford, Connecticut 06115	Zell E. Steever Director
State Extension Services University of Connecticut Storrs, Connecticut 06268	Edwin J. Kersting Director W. R. Whitworth Fisheries Expert
DELAWARE	
Department of Natural Resources and Environmental Control The Edward Tathall Building Legislative Avenue and D Street Dover, Delaware 19901	John R. Bryson Secretary
Division of Environmental Control The Edward Tathall Building Legislative Avenue and D Street Dover, Delaware 19901	N. C. Vasuki Director
Division of Fish and Wildlife The Edward Tathall Building Legislative Avenue and D Street Dover, Delaware 19901	Darrell Louder Director
Division of Soil and Water Conservation The Edward Tathall Building Legislative Avenue and D Street Dover, Delaware 19901	William R. Ratledge Director
Geological Survey University of Delaware Newark, Delaware 19711	Robert R. Jordan State Geologist
State Extension Service University of Delaware Newark, Delaware 19711	Dr. Samuel M. Gwinn Director
Marine Extension Service University of Delaware College of Marine Studies Field Station Lewes, Delaware 19958	Howard Seymour Marine Extension Specialist

ORGANIZATION	PRINCIPAL CONTACT
FLORIDA	
Department of Natural Resources Larson Building Gaines Street at Monroe Tallahassee, Florida 32301	Randolph Hodges Executive Director
Coastal Coordinating Council 309 Magnolia Plaza Tallahassee, Florida 32301	Bruce Johnson Coordinator
Division of Marine Resources Larson Building Gaines Street at Monroe Tallahassee, Florida 32301	Harmon Shields Director
Marine Research Laboratory Bureau of Marine Science and Technology 100 Eighth Street, SE. St. Petersburg, Florida 33701	Dr. Dale S. Beaumariage Laboratory Supervisor
Florida Cooperative Extension Service 1038 McCarty Hall University of Florida Gainesville, Florida 32611	Dr. Joe N. Busby Director of Extension Service and Sea Grant
Marine Advisory Program G-022C McCarty Hall University of Florida Gainesville, Florida 32611	Donald Y. Aska Coordinator
State University System Institute of Oceanography St. Petersburg, Florida 33701	Dr. Robert E. Smith Director
GEORGIA	
Coastal Plain Area Planning and Development Commission P.O. Box 1223 Valdosta, Georgia 31601	James H. Rainwater, Jr. Chief, Outdoor Recreation and Tourism
Department of Natural Resources 270 Washington Street, SW. Atlanta, Georgia 30334	Joe D. Tanner Commissioner
Environmental Protection Division 270 Washington Street, SW. Atlanta, Georgia 30334	R. S. Howard, Jr. Director
Game and Fish Division 270 Washington Street, SW. Atlanta, Georgia 30334	Jack Crockford Director
Coastal Fisheries Office P.O. Box 1097 Brunswick, Georgia 31520	
Department of Mines, Mining, and Geology 19 Hunter Street, SW. Atlanta, Georgia 30334	J. H. Auvil Director
Georgia Cooperative Fishery Unit School of Forestry University of Georgia Athens, Georgia 30601	Dr. Alfred C. Fox Leader
State Extension Service University of Georgia Athens, Georgia 30602	Dr. Charles P. Ellington Director
Marine Advisory Program University of Georgia Athens, Georgia 30602	David Harrington Leader

ORGANIZATION	PRINCIPAL CONTACT
GUAM	
Department of Agriculture Agana, Guam 96910	Jose T. Baranas Director
Division of Fish and Wildlife Agana, Guam 96910	Isaac I. Ikehara Director
Extension Service University of Guam P.O. Box EK Agana, Guam 96910	William L. Thuemmel Acting Director
HAWAII	
Department of Health Box 3378 Honolulu, Hawaii 96801	Walter B. Quisenberry, M.D. Director
Department of Land and Natural Resources Box 621 Honolulu, Hawaii 96809	Sunao Kido Chairman
Division of Fish and Game 1179 Punchbowl Street Honolulu, Hawaii 96813	Michio Takata Director
Division of Water and Land Development P.O. Box 373 Honolulu, Hawaii 96809	Robert T. Chuck Manager-Engineer
Office of Environmental Quality Control 550 Halekauwila Street Third floor Honolulu, Hawaii 96813	Dr. Richard E. Marland Director
Hawaii Cooperative Fishery Unit 2538, The Mall University of Hawaii Honolulu, Hawaii 96822	Dr. John A. Maciolek Leader
State Extension Services University of Hawaii Honolulu, Hawaii 96822	C. Pearis Wilson Director
ILLINOIS	
Department of Conservation State Office Building Springfield, Illinois 62706	Anthony T. Dean Director
Division of Water Resource Management 2300 South 31st Street Springfield, Illinois 62764	(vacant) Chief Waterway Engineer
Environmental Protection Agency 2200 Churchill Road Springfield, Illinois 62706	William L. Blaser Director
State Geological Survey 121 Natural Resources Building Urbana, Illinois 61801	John C. Frye Chief
State Natural History Survey Division 179 Natural Resources Building Urbana, Illinois 61801	George Sprugel, Jr. Chief
Aquatic Biology Section 179 Natural Resources Building Urbana, Illinois 61801	G. W. Bennett Head
State Extension Services University of Illinois Urbana, Illinois 61801	Dr. J. B. Claar Director
Sea Grant Services 213 Mumford Hall University of Illinois Urbana, Illinois 61801	Robert D. Walker Specialist in Natural Resources

ORGANIZATION	PRINCIPAL CONTACT
INDIANA	
Department of Natural Resources 608 State Office Building Indianapolis, Indiana 46204	Joseph D. Cloud Director
Division of Fish and Wildlife 608 State Office Building Indianapolis, Indiana 46204	Richard E. Bass Head
Division of Nature Preserves 608 State Office Building Indianapolis, Indiana 46204	William B. Barnes Head
Division of Water 608 State Office Building Indianapolis, Indiana 46204	Robert F. Jackson Head
Geological Survey 611 North Walnut Grove Bloomington, Indiana 47401	John B. Patton Director and State Geologist
State Soil and Water Conservation Commission Room 5, AGAD Building Purdue University West Lafayette, Indiana 47907	Charles C. McKee Executive Secretary
State Extension Service Purdue University West Lafayette, Indiana 47907	Dr. Howard G. Diesslin Director
Sea Grant Services Department of Forestry and Conservation Purdue University West Lafayette, Indiana 47907	Herbert C. Krauch Extension Wildlife and Sea Grant Specialist
LOUISIANA	
Wildlife and Fisheries Commission 400 Royal Street New Orleans, Louisiana 70130	J. Burton Sagelle Director
Division of Oyster, Water Bottoms and Seafood 400 Royal Street New Orleans, Louisiana 70130	Harry Shafer Chief
Division of Water Pollution Control P.O. Drawer FC University Station Baton Rouge, Louisiana 70803	Robert A. LaFleur Chief
Louisiana Cooperative Fishery Unit Agricultural Center Louisiana State University Baton Rouge, Louisiana 70803	Dr. Charles F. Bryan Leader
State Extension Services Louisiana State University Baton Rouge, Louisiana 70803	John A. Cox Director
Sea Grant Services Louisiana State University Baton Rouge, Louisiana 70803	Dr. James F. Fowler Extension Assistant
MAINE	
Department of Marine Resources State House Annex Augusta, Maine 04330	Spencer Apollonio Commissioner
Department of Natural Resources State Office Building Augusta, Maine 04330	Lawrence Stuart Commissioner
Sea and Shore Fisheries Department State Office Building Augusta, Maine 04330	Robert Dow Director, Marine Research

ORGANIZATION	PRINCIPAL CONTACT
MAINE—Continued	
Maine Cooperative Fishery Unit Department of Zoology University of Maine 313 Murray Hall Orono, Maine 04473	Dr. Richart W. Hatch Leader
State Extension Services University of Maine Orono, Maine 04473	Edwin H. Bates Director
State Planning Office 189 State Street Augusta, Maine 04330	Philip M. Savage State Planning Director
Research Institute for the Gulf of Maine (TRIGOM) 96 Falmouth Street Portland, Maine 04103	Donald Horton Executive Director
State Soil and Water Conservation Commission State Office Building Augusta, Maine 04330	Charles L. Booth Executive Director
MARYLAND	
Department of Natural Resources Rowe Boulevard and Taylor Avenue Annapolis, Maryland 21401	James Coulter Secretary
Fisheries Administration Rowe Boulevard and Taylor Avenue Annapolis, Maryland 21401	Robert J. Rubelmann Administrator
Maryland Environmental Service Rowe Boulevard and Taylor Avenue Annapolis, Maryland 21401	Thomas D. McKewen Director
Power Plant Siting Program Rowe Boulevard and Taylor Avenue Annapolis, Maryland 21401	Lee Zeni Director
Water Resources Administration Rowe Boulevard and Taylor Avenue Annapolis, Maryland 21401	Herbert M. Sachs Administrator
State Extension Services University of Maryland College Park, Maryland 20742	Dr. Robert E. Wagner Director Dr. Dean Tuthill Fish and Wildlife Specialist
MASSACHUSETTS	
Department of Natural Resources Leverett Saltonstall Building 100 Cambridge Street Boston, Massachusetts 02202	Arthur W. Brownell Commissioner
Division of Conservation Services Leverett Saltonstall Building 100 Cambridge Street Boston, Massachusetts 02202	Matthew B. Connolly, Jr. Director
Division of Marine Fisheries Leverett Saltonstall Building 100 Cambridge Street Boston, Massachusetts 02202	Frank Grice Director
Division of Mineral Resources Leverett Saltonstall Building 100 Cambridge Street Boston, Massachusetts 02202	Robert C. Blumberg Director

ORGANIZATION	PRINCIPAL CONTACT
MASSACHUSETTS—Continued	
Division of Water Pollution Control Leverett Saltonstall Building 100 Cambridge Street Boston, Massachusetts 02202	Thomas C. McMahon Director
Division of Water Resources Leverett Saltonstall Building 100 Cambridge Street Boston, Massachusetts 02202	Charles F. Kennedy Director and Chief Engineer
Division of Fisheries and Game 100 Cambridge Street Boston, Massachusetts 02202	James M. Shepard Director
Massachusetts Cooperative Fishery Unit 204 Holdsworth Hall University of Massachusetts Amherst, Massachusetts 01002	Roger J. Reid Leader
State Extension Services University of Massachusetts Amherst, Massachusetts 01002	Dr. Arless A. Spielman Director
Sea Grant Services University of Massachusetts Amherst, Massachusetts 01002	John H. Noyes Fish and Wildlife Specialist
MICHIGAN	
Department of Natural Resources Mason Building Lansing, Michigan 48926	A. Gene Gazlay Director
Fisheries Division Mason Building Lansing, Michigan 48926	Wayne H. Tody Chief
Geological Survey Division Mason Building Lansing, Michigan 48926	Arthur E. Slaughter Chief
Solid Waste Management Division Mason Building Lansing, Michigan 48926	Fred B. Kellow Chief
Hydrological Survey Division Mason Building Lansing, Michigan 48926	Dale W. Granger Chief
Water Resources Commission Mason Building Lansing, Michigan 48926	Ralph W. Purdy Executive Secretary
State Extension Services Michigan State University East Lansing, Michigan 48823	Dr. Gordon Guyer Director
MISSISSIPPI	
Air and Water Pollution Control Commission P.O. Box 827 Jackson, Mississippi 39205	Glen Wood, Jr. Executive Director
Game and Fish Commission Robert E. Lee Office Building 239 North Lamar Street P.O. Box 451 Jackson, Mississippi 39205	Barry O. Freeman Chief of Fisheries
State Board of Water Commissioners 416 North State Street Jackson, Mississippi 39201	Jack W. Pepper Water Engineer

ORGANIZATION	PRINCIPAL CONTACT
MISSISSIPPI—Continued	
State Soil and Water Conservation Committee Box 1609 Jackson, Mississippi 39205	Gale Martin Executive Secretary
State Extension Services Mississippi State University State College, Mississippi 39762	Dr. W. M. Bost Director
Sea Grant Advisory Service Drawer Z Gulfport, Mississippi 39762	Leon O. Paulette Director
NEW HAMPSHIRE	
Council of Resources and Development State House Annex Concord, New Hampshire 03301	James E. Minnoch Chairman
Department of Resources and Economic Development State House Annex Concord, New Hampshire 03301	George Gilman Commissioner
Fish and Game Department 34 Bridge Street Concord, New Hampshire 03301	Bernard W. Corson Director
Inland and Marine Fisheries Division 24 Bridge Street Concord, New Hampshire 03301	Richard G. Seamans Chief
State Conservation Committee Room 201 State House Annex Concord, New Hampshire 03301	Donald Clarke Chairman
Water Resources Board 37 Green Street Concord, New Hampshire 03301	George M. McGee, Sr. Chairman
Water Supply and Pollution Control Commission Prescott Park 105 Loudon Road Box 95 Concord, New Hampshire 03301	William A. Healy Executive Director
State Extension Services University of New Hampshire Taylor Hall Durham, New Hampshire 03824	Dr. Maynard C. Heckel Director
NEW JERSEY	
Bureau of Geology and Topography P.O. Box 1889 Trenton, New Jersey 08625	Kemble Widmer State Geologist
Department of Environmental Protection Labor and Industries Building Box 1390 Trenton, New Jersey 08625	Richard J. Sullivan Commissioner
Division of Fish, Game, and Shellfisheries Box 1390 Trenton, New Jersey 08625	Russell Cookingham Director
Division of Marine Services Box 1390 Trenton, New Jersey 08625	Thomas M. O'Neill Acting Director

ORGANIZATION	PRINCIPAL CONTACT
NEW JERSEY—Continued	
Division of Water Resources Box 1390 Trenton, New Jersey 08625	Charles Pike Director
Bureau of Recreation Division of Parks, Forestry, and Recreation P.O. Box 1889 Trenton, New Jersey 08625	(Vacant) Director
Bureau of Navigation Division of Natural Resources P.O. Box 1889 Trenton, New Jersey 08625	(Vacant) Director
State Extension Services Rutgers—The State University New Brunswick, New Jersey 08903	Dr. John L. Gerwig Director
Sea Grant Services Rutgers—The State University New Brunswick, New Jersey 08903	Austin N. Lentz Specialist
NEW YORK	
Department of Environmental Conservation 50 Wolf Road Albany, New York 12201	Henry L. Diamond Commissioner
Division of Fish and Wildlife 50 Wolf Road Albany, New York 12201	Herbert Doig Director Carl Parker Director, Bureau of Fish
Geological Survey State Museum and Science Service State Education Building Room 973 Albany, New York 12224	James F. Davis Geologist
Office of Environmental Planning New York Department of Public Service 44 Holland Avenue Albany, New York 12208	Dennis A. Rapp Director
New York Cooperative Fishery Unit Fernow Hall Cornell University Ithaca, New York 14850	Alfred W. Eipper Leader
State Extension Services New York State College of Agriculture Ithaca, New York 14850	Dr. David L. Call Director
Sea Grant Services Department of Natural Resources Fernow Hall Cornell University Ithaca, New York 14850	Bruce T. Wilkins Director
NORTH CAROLINA	
Department of Natural and Economic Resources P.O. Box 27687 Raleigh, North Carolina 27611	James E. Harrington Secretary
Water and Air Resources P.O. Box 27687 Raleigh, North Carolina 27611	Earle C. Hubbard

ORGANIZATION	PRINCIPAL CONTACT
NORTH CAROLINA—Continued	
Division of Commercial and Sport Fisheries P.O. Box 769 Morehead City, North Carolina 28557	Dr. Tom Linton Director
Division of Mineral Resources P.O. Box 27687 Raleigh, North Carolina 27611	Stephen Conrad Director
State Soil and Water Conservation Committee 112 West Lane Street Raleigh, North Carolina 27611	S. Grady Lane Director
North Carolina Cooperative Fishery Unit Box 5577, 4105 Gardner Hall North Carolina State University Raleigh, North Carolina 27607	Melvin T. Huish Leader
State Extension Service North Carolina State University Raleigh, North Carolina 27607	Dr. George Hyatt, Jr. Director
Sea Grant Services 129 Food Science Building North Carolina State University Raleigh, North Carolina 27607	Dr. Frank B. Thomas Seafoods Specialist
Sea Grant Services 2124 Gardner Hall North Carolina State University Raleigh, North Carolina 27607	Dr. David E. Davis Head, Zoology
OHIO	
Department of Natural Resources Fountain Square Columbus, Ohio 43224	William B. Nye Director
Division of Geological Survey Fountain Square Columbus, Ohio 43224	Charles Caster Head, Lake Erie Section
Ohio Environmental Protection Agency P.O. Box 1049 Columbus, Ohio 43216	Ira L. Whitman Director
Ohio Cooperative Fishery Unit Ohio State University 1735 Neil Avenue Columbus, Ohio 43210	Dr. Richard A. Tubb Leader
State Extension Services Ohio State University 2120 Fyffe Road Columbus, Ohio 43210	Dr. Roy M. Kottman Director
OREGON	
Department of Environmental Quality 1234 Southwest Morrison Street Portland, Oregon 97205	Diarmuid F. O'Scannlain Director
Department of Geology and Mineral Industries 1069 State Office Building Portland, Oregon 97201	Raymond E. Corcoran State Geologist
Fish Commission 307 State Office Building Portland, Oregon 92701	Thomas E. Kruse Director
State Engineer 1178 Chemeketa Street, NE. Salem, Oregon 97310	Chris L. Wheeler State Engineer

ORGANIZATION	PRINCIPAL CONTACT
OREGON—Continued	
State Wildlife Commission Box 3503 Portland, Oregon 97208	John McKean Director
Fishery Division Box 3503 Portland, Oregon 97208	C. F. Campbell Chief
Environmental Management Box 3503 Portland, Oregon 97208	W. E. Pitney Chief
State Marine Board 109 Agriculture Building Salem, Oregon 97310	Robert F. Rittenhouse Director
Water Resources Board 1158 Chemeketa Street, NE. Salem, Oregon 97310	Fred D. Gustafson Director
Oregon Cooperative Fishery Unit Department of Fisheries and Wildlife Oregon State University Corvallis, Oregon 97331	(Vacant) Leader
State Extension Service Oregon State University Corvallis, Oregon 97331	Joseph R. Cox, Sr. Director
Marine Advisory Program Oregon State University Marine Science Center Newport, Oregon 97365	William Q. Wick Head
Governor's Assistant for Natural Resources State Capitol Salem, Oregon 97310	
PUERTO RICO	
Department of Health Box 10427 Hato Rey, Puerto Rico 00919	Victor A. Gonzalez, M.D. Assistant Secretary for Environmental Health
Department of Public Works P.O. Box 8218 San Juan, Puerto Rico 00910	Antonio Santiago Vazquez Secretary
Bureau of Planning and Use of Water Resources P.O. Box 8218 San Juan, Puerto Rico 00910	Emilio Colon Director
Bureau of Geology and Mineral Resources P.O. Box 8218 San Juan, Puerto Rico 00910	Leovigildo Vasquez Inigo Director
Program of Geology and Mineral Resources Department of Industrial Research G.P.O. Box 3088 San Juan, Puerto Rico 00936	Eduardo Aguilar State Geologist
Extension Services University of Puerto Rico Rio Piedras, Puerto Rico 00928	Enrique R. Ortiz Director
RHODE ISLAND	
Division of Water Pollution Control Department of Health Davis Street Providence, Rhode Island 02903	Carleton A. Maine Chief

ORGANIZATION	PRINCIPAL CONTACT
RHODE ISLAND—Continued	
Department of Natural Resources 83 Park Street Providence, Rhode Island 02903	Dennis J. Murphy, Jr. Director
Division of Fish and Wildlife 83 Park Street Providence, Rhode Island 02903	Thomas J. Wright Chief
Division of Coastal Resources 83 Park Street Providence, Rhode Island 02903	Charles F. Replinger Chief
State Water Resources Board 265 Melrose Street Providence, Rhode Island 02907	Alex DiMartino Chairman
Cooperative Extension Work in Agriculture and Home Economics University of Rhode Island Kingston, Rhode Island 02881	Dr. David F. Shontz Associate Director
Department of Resource Economics (Sea Grant) College of Resource Development 133 Woodward Hall University of Rhode Island Kingston, Rhode Island 02881	Andreas A. Holmsen Professor
SOUTH CAROLINA	
Division of Geology State Development Board P.O. Box 927 Columbia, South Carolina 29202	Norman K. Olson State Geologist
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Del Monte Packing Corp., 215 Fremont Street, San Francisco, Calif. 94119.
Dow Chemical Co., Government Affairs Department, Building 566, Midland, Mich. 48640.
Dunegan Research Corp., 2044 Research Drive, Livermore, Calif., 94550.
EG&G, Inc., Environmental Equipment Division, 151 Bear Hill Road, Waltham, Mass, 02154.
Earth Sciences Research, Inc., 133 Mt. Auburn Street, Cambridge, Mass, 02138.
ESSO Inter-American, Inc., 396 Alhambra Circle, Coral Gables, Fla. 33134.
ESSO Production Research Co., P.O. Box 2189, Houston, Tex. 77001.
FMC Corp., 1105 Coleman Avenue, San Jose, Calif. 95110.
Fairchild Camera & Instrument Corp., Controls Division, Transducer Plant, 423 National Avenue, Mt. View, Calif. 94040.
Franklin Institute Research Laboratories, Institute for the Development of Riverine and Estuarine Systems, 20th Street & Benjamin Franklin Parkway, Philadelphia, Pa. 19103.
Fluor Ocean Services, Inc., P.O. Box 36878, 6200 Hillcroft, Houston, Tex. 77036.
Forest Oil Corp., 1000 Corpus Christi State National Building, Corpus Christi, Tex. 78401.
GTS Corp., 744 St. Charles Avenue, New Orleans, La. 70130.
General Dynamics Corp., Electric Boat Division, Eastern Point Road, Groton, Conn. 06340.
General Dynamics Corp., Marine Technology Center, 2930 North Harbor Drive San Diego, Calif. 92101.
General Electric Co., Electronic Systems Division, Heavy Military Electronics Department, P.O. Box 1122, Syracuse, N.Y. 13201.
General Electric Co., Re-entry & Environmental Systems Division, Ocean Systems Programs Department, 3198 Chestnut Street, Philadelphia, Pa. 19101.
General Instrument Corp., Harris ASW Division, 33 Southwest Park, Westwood, Mass. 02090.
General Motors Corp., AC Electronics Defense Research Laboratories, Goleta, Calif. 93017.
General Oceanographics, Inc., 2172 Dupont Drive, Suite 13, Newport Beach, Calif. 92660.
Geometrics, Ocean Services Division, 8802 Daffodil, Houston, Tex. 77042.
Geophysical Data Processing, Center, Inc., 5322 Elm Street, Houston, Tex. 77036.

Geophysical Exploration Corp., 6101 Southwest Freeway, Suite 129, Houston, Tex. 77027.
Geophysical Service Inc., Subsidiary of Texas Instruments Inc., 13500 North Central Expressway, Dallas, Tex. 75222.
Getty Oil Corp., 3903 Stony Brook, Houston, Tex. 77042.
Global Marine, Inc., 650 South Grand Avenue, Los Angeles, Calif. 90017.
W. R. Grace & Company, Dewey & Almy Chemical Division, 62 Whittemore Avenue, Cambridge, Mass. 02140.
Grefco Inc., 630 Shatto Place, Los Angeles, Calif. 90005.
Greinier Environmental Sciences, 1 Village Square, Baltimore, Md. 21210.
Grumman Aircraft Engineering Corp., South Oyster Bay Road, Bethpage, N.Y. 11714.
Gulf Oil Corp., P.O. Box 1392, Bakersfield, Calif. 93302.
Gulf Oil Company-Latin America, P.O. Box 910, Coral Gables, Fla. 33134.
Gulf Research and Development Co., 3800 Madison Avenue, New York, N.Y. 10017.
Gulf Research and Development Co., Houston Technical Service Co., Houston, Tex. 77003.
Hamilton Brothers Oil Corp., 1600 Broadway, Denver, Colo. 80202.
HRB-Singer, Inc., Subsidiary of the Singer Co., Box 60, Science Park, State College, Pa. 16801.
Frederic R. Harris, Inc., 501 Gulf Life Towers, Jacksonville, Fla 32207.
Hales and Co., 66 Brookmead Road, Wayne, Pa. 19087.
Humble Oil and Refining Co., P.O. Box 2180, Houston, Tex. 77001.
Hydro Surveys, Inc., 1532 Cordova Road, Fort Lauderdale, Fla. 33316.
Hydronautics, Inc., Pindell School Road, Laurel, Md. 20810.
IIT Research Institute, 10 West 35th Street, Chicago, Ill. 60616.
Ichthyological Associates Inc., 301 Forest Drive, Ithaca, N.Y. 14850.
Infinity, Ltd., 50 East Mt. Pleasant, Livingston, N.J. 07039.
Innerspace Technology, Inc., 27 Frederick Street, Waldwick, N.J. 07463.
The International Nickel Company, Inc., Francis Lo LaQue Corrosion Laboratory, P.O. Box 656, Wrightsville Beach, N.C. 28480.
International Oceanographic Foundation, 10 Rickenbacker Causeway, Miami, Fla. 33149.
Intersea Research Corp., 11760 Sorrento Valley Road, San Diego, Calif. 92121.
Interstate Electronics Corp., Oceanics Division, 707 East Vermont Avenue, Anaheim Calif. 92803.
Jet Research Center, Inc., P.O. Box 246, Arlington, Tex. 76010.
Johns-Manville Corp., Industrial Products Division, Greenwood Plaza, Denver, Colo. 80217.
Judith Joye, 50 West 55th Street, New York, N.Y. 10019.
Julie Research Laboratories, Inc., 211 West 61st Street, New York, N.Y. 10023
Kaman Sciences Corp., 1500 Garden of the Gods Road, Colorado Springs, Colo. 80907.
Kennecott Exploration, Inc., Ocean Operations Division, Ocean Resources Department, 10306 Roselle Street, San Diego, Calif. 92121.
James S. Krogen & Company, Inc., 2500 South Dixie Highway, Miami, Fla. 33131.
LTV Research Center, Hawaiian Division, 219 Keawe Street, Honolulu, Hawaii 96813.
Lamont-Doherty Geological Observatory, Columbia University, Torrey Cliff, Palisades, N.Y. 10964.
Lear Siegler, Inc., 3171 South Bundy Drive, Santa Monica, Calif. 90406.
Lewis & Lewis Offshore, Inc., P.O. Box 820, 271 South Hemlock Street, Ventura, Calif. 93001.
Linden Laboratories, Inc., P.O. Box 920, State College, Pa. 16801.
Ling-Temco-Vought, Inc., P.O. Box 5003, Dallas, Tex. 75222.
Arthur D. Little, Inc., Acorn Park, Cambridge, Mass. 02140.
Litton Industries, Data Systems Division, P.O. Box 7601, Van Nuys, Calif. 91409
Living Marine Resources, Inc., 11339 Sorrento Valley Road, San Diego, Calif. 92121.
Lockheed Missiles & Space Co., P.O. Box 504, Sunnyvale, Calif. 94088.
Lockheed Ocean Laboratory, 3380 Harbor Drive, San Diego, Calif. 92101.
Lykes Brothers, Inc., Systems & Engineering Division, 2000 Calumet Street, Clearwater, Fla. 33515.
MPR Associates, Inc., 1140 Connecticut Avenue NW., Washington, D.C. 20036.
MSB Systems Inc., 110-16 72nd Avenue, Forest Hills, N.Y. 11375.

Marathon Oil Co., P.O. Box 2380, Anchorage, Alaska 99510.
Marine Advisers, Inc., Division of Bendix, P.O. Box 690, Solana Beach, Calif. 92075.
Marine Biological Laboratory, 1056 MBL Street, Woods Hole, Mass. 02543.
Marine Contracting International, Inc., 3280 Post Road, Southport, Conn. 06490.
Marine Dynamics, Box 521, Long Beach, Calif. 90801.
Marine Exploration Company, Inc., 2995 NW South River Drive, Miami, Fla. 33125.
Marine Experimental Services, Inc., P.O. Box 9466, San Diego, Calif. 92109.
Marine Hydrographic Associates, Inc., 18 Monroe Street, Herndon, Va. 22042.
Mandrel Industries, Inc., Ray Geophysical Division, 6909 Southwest Freeway, Houston, Tex. 77036.
Marineland of the Pacific, Biological Laboratory, Palos Verdes Drive South, Palos Verdes Estates, Calif. 90274.
Marineland Research Laboratory, RFD 1, Box 122, St. Augustine, Fla. 32084.
Marine Pollution Control Corp., 9010 Roselawn Avenue, Detroit, Mich. 48204.
Marine Resource Consultants, Inc., 225 Santa Monica Boulevard, Santa Monica, Calif. 90401.
Marine Resources, Inc., 48 Mill Street, Pultneyville, N.Y. 14538.
Marine Service Co. of Houston, 8201 Erath, P.O. Box 5475, Houston, Tex. 77025.
Marine Specimens Unlimited, Inc., 1320 139th Street, P.O. Box 877, Marathon, Fla. 33050.
Marine Technique, Inc., 4607 Toni Lane, San Diego, Calif. 92115.
McCormick Oil & Gas Corp., 1204 Tenneco Building, Houston, Tex. 77002.
McCulloch Oil Corp., 10880 Wilshire Boulevard, Los Angeles, Calif. 90224.
Meteorology International, Inc., P.O. Box 349, 419 Webster Street, Monterey, Calif. 93940.
Meteorology Research, Inc., P.O. Box 637, 464 West Woodbury Road, Altadena, Calif. 91001.
Methods Research Corp., 105 Willow Avenue, Staten Island, N.Y. 10305.
Mobil Research & Development Corp., Engineering Department, P.O. Box 900, Dallas, Tex. 75221.
Morris Guralnick Associates, Inc., Guralnick & Lee Engineering Co., 583 Market Street, San Francisco, Calif. 94105.
The Mogul Corp., 1201 South Graham Street, P.O. Box 1267, Charlotte, N.C. 28201.
Mote Marine Laboratory, 9501 Blind Pass Road, Sarasota, Fla., 33581.
Mount Desert Island Biological Laboratory, Salisbury Cove, Maine 04672.
N. P. Research Corp., 190 DeSoto Parkway, Satellite Beach, Fla. 32055.
National Engineering Science Co., Westgate Research Park, McLean, Va. 22101.
National Research Center, Inc., 680 Wilshire Place, Los Angeles, Calif. 90005.
North American Weather Consultants, Aerometric Research Inc., Santa Barbara Municipal Airport, Goleta, Calif. 93017.
Newport Laboratories, Inc., 630 East Young Street, Santa Ana, Calif. 92705.
North American Rockwell Corp., Autonetics Division, 3370 Miraloma Avenue, Anaheim, Calif. 92803.
Northrop Corp., 1700 North Lynn Street, Suite 1100, Arlington, Va. 22209.
Northwest Oceanographers, Inc., 1045 Gayley Avenue, Suite 205, Los Angeles, Calif. 90024.
ODEC, Inc., Ocean Data Equipment Division, 25 Graystone Street, Warwick, R.I. 02886.
Occidental Petroleum Corp., 6000 Stockdale Highway, Bakersfield, Calif. 93309.
Ocean City Research Corp., Tennessee Avenue & Beach Thoroughfare, Ocean City, N.J. 08226.
Ocean Data Systems, Inc., 6000 Executive Boulevard, Rockville, Md. 20850.
Ocean Measurements, Inc., 301 Broadway, Suite 200, Riviera Beach, Fla. 33404.
Ocean Research Corp., 31 Main Street, P.O. Box 67, Kennebunk, Maine 04043.
Ocean Resources, Inc., 3344 Industrial Court, San Diego, Calif. 92121.
Ocean Routes, Inc., 1534 Page Mill Road, Palo Alto, Calif. 94304.
Ocean Science Capital Corp., 459 Hamilton Avenue, Palo Alto, Calif. 94301.
Ocean Science and Engineering, Inc., 3 Choke Cherry Road, Rockville, Md. 20850.
Ocean Science and Engineering, Inc., 1601 West Water Street, Long Beach, Calif. 90802.
Ocean Search, Inc., Subsidiary of Aluminum Company of America, 1200 Ring Building Washington, D.C. 20036.
Ocean Systems, Inc., 270 Park Avenue, New York, N.Y. 10017.

Oceanics, Inc., Technical Industrial Park, Plainview, N.Y. 11803.
Oceanic Institute, Lummi Island Laboratory, Lummi Island, Bellingham, Wash. 98262.
Oceanographic Engineering Corp., Division of Dillingham Corp., P.O. Box 1560, La Jolla, Calif. 92038.
Oceanographic Services, Inc., Subsidiary of Global Marine, Inc., 135 East Ortega Street, Santa Barbara, Calif. 93101.
Oceanography & Pollution Research, 1904 McArthur Street, Manchester, Tenn. 37355.
Offshore Power Systems, 8000 Arlington Expressway, Jacksonville, Fla. 32211.
Ogden Technology Laboratories, Ocean Systems Division, 100 Smith Street, Farmingdale, N.Y. 11735.
Operations Research, Inc., 1400 Spring Street, Silver Spring, Md. 20910.
Osborn Laboratories of Marine Science, New York Aquarium, The Boardwalk at West 8th Street, Brooklyn, N.Y. 11224.
Pacific Gas & Electric Co., 245 Market Street, San Francisco, Calif. 94106.
Pacifica, Coastal & Marine Mapping Co., Pacifica Ocean Research, Inc., 2980 Plaimer, Palm Springs, Calif. 92262.
Palisades Sofar Station, Palisades Geophysical Institute, FPO New York, N.Y. 09560.
Panoramic Studios, 179 West Berks Street, Philadelphia, Pa. 19122.
Pennsylvania Research Associates, Inc., 1428 Fort Road, Cornwells Heights, Pa. 19020.
Perry Submarine Builders, 100 East 17th Street, Riviera Beach, Fla. 33404.
Petroleum Publishing Co., 211 South Cheyanne, Tulsa, Okla. 74101.
Petty Geophysical Engineering Co., Tower Life Building, 310 South St. Mary's, P.O. Drawer 2061, San Antonio, Tex. 78297.
Pexamine Corp., 3914 Fairhill Drive, Houston, Tex. 77042.
Phillips Petroleum Co., 1010 Security Life Building, Denver, Colo. 80202.
Placid Oil Co., 2500 First National Bank Building, Dallas, Tex. 75202.
Poseidon Scientific Corp., 85 Marcus Boulevard, Hauppauge, N.Y. 11787.
Potomac Research, Inc., 7655 Old Springhouse Road, Westgate Research Park, McLean, Va. 22101.
Presearch, Inc., 8720 Georgia Avenue, Silver Spring, Md. 20910.
Princeton Applied Research Corp., P.O. Box 2565, Princeton, N.J. 08502.
Puget Sound Museum of Natural History, 1500 North Warner Street, Tacoma, Wash. 98406.
RCA Service Co., P.O. Box 15005, West Palm Beach, Fla. 33401.
The Rath Co., P.O. Box 226, 7445 Girard Avenue, La Jolla, Calif. 92037.
Raytheon, Submarine Signal Division, Ocean Systems Center, 1847 West Main Road, Portsmouth, R.I. 02871.
Rebikoff Underwater Products, 245 Southwest 32nd Street, Fort Lauderdale, Fla. 33315.
Research Triangle Institute, Engineering and Environmental Sciences Division, Environmental Sciences Group, P.O. Box 12194, Research Triangle Park, N.C. 27709.
Reynolds Sub-Marine Services Corp., 615 Southwest Second Avenue, Miami, Fla. 33130.
Resources for the Future, Inc., 1755 Massachusetts Avenue NW., Washington, D.C. 20036.
Sanders Associates, Inc., Digital Communications Department, 95 Canal Street, Nashua, N.H. 03060.
Santa Catalina Marine Biological Laboratory, Big Fisheries Cove, Santa Catalina Island, P.O. Box 398, Avalon, Calif. 90704.
Scripps Institute of Oceanography, La Jolla, Calif. 92037.
Seismic Explorations International, S.A., Subsidiary of Whitehall Electronics Corp., 3616 West Alabama, Houston, Tex. 77027.
Seismograph Service Corp., 6200 East 41st Street, P.O. Box 1590, Tulsa, Okla. 74102.
Shell Development Co., P.O. Box 481, Houston, Tex. 77001.
Shell Oil Co., Box 127, Metairie, La. 70004.
Shell Oil Co., One Shell Plaza, P.O. Box 2463, Houston, Tex. 77001.
Sierra Club, 1050 Mills Tower, San Francisco, Calif. 94104.
Sierra Research Corp., P.O. Box 3007, Boulder, Colo. 80303.
Signal Oil & Gas Co., Golden Center I, 2800 North Loop West, Houston, Tex. 77018.
Singer-General Precision, Inc., Kearfott Division, 1150 McBride Avenue, Little Falls, N.J. 07424.

Skelly Oil Co., 1088 Lincoln Tower Building, 1060 Lincoln Street, Denver, Colo. 80203.
Society of Toxicology, Inc., c/o Dr. Robert Scala, Secretary, Esso Research & Engineering Co., Medical Research Division, P.O. Box 45, Linden, N.J. 07036.
Sport Fishing Institute, 719 13th Street NW., Suite 503, Washington, D.C. 20005.
Standard Oil of California, Western Operations, Inc., P.O. Box 7-839, Anchorage, Alaska 99501.
Standard Oil Co. (New Jersey), 30 Rockefeller Plaza, New York, N.Y. 10020.
Sub Sea Oil Service, 498 Sara Drive, R.D. No. 1, Annapolis, Md. 21401.
Sun Oil Co., P.O. Box 1798, Denver, Colo. 80201.
Sun Oil Co., Production Research Laboratory, 503 North Central Expressway, Richardson, Tex. 75080.
Superior Oil Co., P.O. Box 1521, Houston, Tex. 77001.
System Development Corp., 2500 Colorado Avenue, Santa Monica, Calif. 90406.
TRW Systems/AUTEC Project Office, 3800 Southern Boulevard, West Palm Beach, Fla. 33406.
TRW Systems, Systems Engineering and Integration Division (SEID), One Space Park, Redondo Beach, Calif. 90278.
Robert Taggart, Inc., 3930 Walnut Street, Fairfax, Va. 22030.
Teledyne Exploration, A Teledyne Co., Marine Sciences Division, 5825 Chimney Rock Road, Houston, Tex. 77036.
Tenneco Oil Co., P.O. Box 2511, Houston, Tex. 77001.
Tenneco Oil Co., Lafayette, La. 70501.
Terra Resources, Inc., P.O. Box 2329, Tulsa, Okla. 74101.
Tesoro Petroleum Corp., 1460 Bank of New Orelans, 1010 Common Street, New Orleans, La. 70112.
Tetra Tech, Inc., 7730 Herschel Street, La Jolla, Calif. 92037.
Texaco, Inc., P.O. Box 60252, New Orleans, La. 70160.
Texaco, Inc., 3350 Wilshire Boulevard, Los Angeles, Calif. 90005.
Texas Gas Exploration Corp., P.O. Box 52310, Houston, Tex. 77052.
Texas Instruments, Inc., Service Group, 13500 North Central Expressway, P.O. Box 5621, Dallas, Tex. 75222.
Texas Pacific Oil Co., Inc., 1700 One Marine Place, Dallas ,Tex. 75220.
John I. Thompson & Co., 1118 22nd Street NW., Washington, D.C. 20037.
The Research Corp. of New England, 125 Silas Deane Highway, Wethersfield, Conn. 06109.
H. M. Tiedemann & Co., Inc., 1 State Street, New York, N.Y. 10004.
Tracor Marine, Ocean Technology Division, P.O. Box 13114, Port Everglades, Fla. 33316.
Tracor/MAS, Ocean Technology Division, P.O. Box 13107, Port Everglades, Fla. 33316.
Undersea Enterprises, P.O. Box 15844, Honolulu, Hawaii 96815.
Undersea Association, 925 Jamestown Avenue, Indian Harbor Beach, Fla. 32937.
Underwater Service Associates, Inc., P.O. Drawer U, Morgan City, La. 70380.
United Geophysical Corp., Subsidiary of the Bendix Corp., 2650 East Foothill Boulevard, Pasadena, Calif. 91109.
United States Testing Co., Inc., 1415 Park Avenue, Hoboken, N.J. 07030.
Van Camp Sea Food Co., Division of Ralston Purina Co., 840 Van Camp Street, Port of Long Beach, Calif. 90801.
Vitro Laboratories, 14000 Georgia Avenue, Silver Spring, Md. 20910.
The Western Co., Research Division, 2201 North Waterview Parkway, Richardson, Tex. 75080.
Western Geophysical Co., Litton Industries, 933 North LaBrea Avenue, Los Angeles, Calif. 90038.
Westinghouse Electric Corp., Oceanic Division, Box 1488, Annapolis, Md. 21404.
Westinghouse Electric Corp., Ocean Research Laboratory, Ocean Research & Engineering Center, P.O. Box 1771, Annapolis, Md. 21404.
Wheeler Industries, 1150 Connecticut Avenue NW., Washington, D.C. 20036.
Whitehall Electronics Corp., Seismic Engineering Co., Seismic Explorations International, S.A. Geophysical Data Processing Center, Inc., 1133 Empire Central, Dallas, Tex. 75247.
Wrightsville Marine Bio-Medical Laboratory, 7205 Wrightsville Avenue, Wilmington, N.C. 28401.

V. REFERRAL SERVICES

Organizations listed in Parts I and II are not repeated in this list. Most, if not all, also perform referral services.

Arctic Bibliography Project

Arctic Institution of North America, 3458 Redpath Street, Montreal, P.Q. Canada 109. Maret Martna (Miss), Editorial Project Director. Reference, referral, abstracting and indexing services/Arctic research.

Arctic Environmental Information and Data Center

University of Alaska, 707 A Street, Anchorage, Alaska 99501. David Hickok, Director. Reference and referral services, literature searches/Arctic, Alaska environment.

Bernice P. Bishop Museum Pacific

Scientific Information Center, Post Office Box 6037, Honolulu, Hawaii 96818. Edwin H. Bryan, Jr., Manager. Reference and referral services/Pacific area.

Chevron Oil Field Research Company

Technical Information Center, Post Office Box 446, La Habra, California 90631. H. K. Phinney, Jr., Supervisor. Reference, referral and literature searching services/oil field research technology and marine environment.

Coastal Coordinating Committee Information Section

309 Magnolia Office Plaza, Tallahassee, Florida 32301. Referral and information services/coastal zone activities.

Coastal Resources and Science Service Center

Division of Marine and Coastal Zone Management, Department of Environmental Conservation, State of Alaska. Pouch O, Juneau, Alaska 99801. Technical information coastal ecosystems.

Civil Engineering Laboratory Technical Library

Civil Engineering Laboratory, Department of the Navy, Department of Defense' Port Hueneme, California 93041. Frances Rugen, Librarian. Reference service, literature surveys/materials in the marine environment.

Eutrophication Information Program

Water Resources Center, University of Wisconsin, 1975 Willow Drive, Madison, Wisconsin 53706. Dr. Paul D. Uttormark, Director. Reference, abstracting services, bibliographic services, analysis and evaluation/Great Lakes chemical, biological, and hydrological processes.

Geological Data Center

University of California, San Diego, California 92038. T. E. Chase. Reference/Pacific Ocean geological and geophysical data from Scripps Institution of Oceanography.

Great Lakes Commission Information Services

2200 North Campus Boulevard, Ann Arbor, Michigan 48105. Albert Z. Ballert, Director of Research. Reference and referral services and data compilation/Great Lakes water resources.

INFRARED INFORMATION AND ANALYSIS CENTER

Environmental Research Institute of Michigan, P.O. Box 618, Ann Arbor, Michigan 48107. Dr. George Zissis, Director. Research, referral technical analysis and evaluation, literature surveys/remote sensing.

INSTITUTE FOR THE DEVELOPMENT OF RIVERINE AND ESTUARINE SYSTEMS (IDRES) INFORMATION CENTER

Science Information Services, Franklin Institute Research Laboratories, Benjamin Franklin Parkway at 20th Street, Philadelphia, Pennsylvania 19103. Patricia A. Devlin, Project Leader. Information, referral, and literature search services/estuarine research, particularly the Delaware River Basin.

INSTITUTE OF POLAR STUDIES

Ohio State University, 125 South Oval Drive, Columbus, Ohio 43210. Dr. Emanuel D. Rudolph, Director. Reference, analysis and evaluation, technical data compilation/Arctic and Antarctic Regions, ice, geology, botany, and zoology.

INTERNATIONAL OCEANOGRAPHIC FOUNDATION

10 Rickenbacker Causeway, Virginia Key, Miami, Florida 33149. F. May Smith, Executive Secretary. Information and referral services/oceanology (popular).

INTERNATIONAL TSUNAMI INFORMATION CENTER

2525 Correa Road, Honolulu, Hawaii 96822. Gaylord R. Miller, Director. Reference/Tsunamis, historical data and bibliographic services.

MARINE BIOLOGICAL LABORATORY LIBRARY

MBL Street, Woods Hole, Massachusetts 02543. Reference and referral services/ocean sciences, especially marine biology.

MARINE RESOURCES INFORMATION CENTER (MARIC)

Massachusetts Institute of Technology, Cambridge, Massachusetts 02139. Mrs. Barbara Passero, Information Manager. Reference and referral services/marine resources, aquaculture, fisheries technology, law of the sea, ocean engineering.

MARINE TECHNOLOGY SOCIETY

1730 M Street, NW., Suite 412, Washington, D.C. 20036. Mrs. Libby Wallace, Executive Director. Reference and referral services/ocean science and marine technology.

MUSEUM OF COMPARATIVE ZOOLOGY

Harvard University, Oxford Street, Cambridge, Massachusetts 02138. Reference and referral services/zoology, sedimentation, oceanography.

NATIONAL EARTHQUAKE INFORMATION CENTER

Environmental Research Laboratories, Earth Sciences Laboratory, Building R10/S, Boulder, Colorado 80302. James L. Land, Director. Reference and referral, data compilation, technical evaluation and analysis/seismology and earthquakes.

NATIONAL OCEANOGRAPHIC INSTRUMENTATION CENTER

National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Rockville, Maryland 02852. Gilbert Jaffe, Director. Research and analysis/oceanographic instrumentation.

NATIONAL REFERRAL CENTER

Science and Technology Division, Library of Congress, Washington, D.C. 20540. John Price, Assistant Chief, Reference and Referral Services. Referral services/ocean sciences.

NAVAL AIR DEVELOPMENT CENTER

Warminster, Pennsylvania 18974. H. B. McCaulley, Captain, U.S.N., Director. Reference, referral, research/ocean surveillance.

NAVAL AIR ENGINEERING CENTER

Philadelphia, Pennsylvania, T. F. Lechner, Captain, U.S.N. Director. Referral, technical analysis and evaluation/oceanology.

NAVAL ORDNANCE LABORATORY

White Oak, Maryland 20910. Dr. W. C. Wineland, Associate Technical Director (Acting). Reference, technical analysis, referral/underwater sound and acoustics.

NAVAL POSTGRADUATE SCHOOL

Monterey, California 93940. George R. Luckett, Librarian. Reference, referral, literature survey, SDI services/oceanography.

NAVAL UNDERWATER SYSTEMS CENTER TECHNICAL LIBRARY

Naval Underwater Systems Center, Department of the Navy, Department of Defense, New London, Connecticut 06320. William F. Saars, Acting Director (203). Reference services, literature survey/underwater research.

OCEAN LIBRARY AND INFORMATION CENTER (OLIC)

P.O. Box 2369. La Jolla, California 92037. Ellen M. Sneberger, Librarian. Reference, bibliographic services/ocean sciences.

OCEAN SCIENCE INFORMATION CENTER

Hamilton Library 205, University of Hawaii, Honolulu, Hawaii 96822. Barbara Tillett, Director. Reference and referral services/ocean sciences.

OFFICE OF THE OCEANOGRAPHER OF THE NAVY, MANAGEMENT INFORMATION DIVISION

200 Stovall Street, Alexandria, Virginia 22332. Raymond D. Hagen, Director. Referral/oceanographic activities of the United States Navy.

OFFICE OF WATER DATA COORDINATION

U.S. Geological Survey, National Center 417, Reston, Virginia 22092, Russel H. Langford, Chief. Referral services/water resources and data.

OIL SPILL INFORMATION CENTER

University of California, Sciences Engineering Library, Santa Barbara, California 93106. Information, referral, and bibliographic services/offshore oil spills, oil pollution in the marine environment, oil spill control measures.

REGIONAL INFORMATION AND COMMUNICATION EXCHANGE

Fodreu Library, Rice University, P.O. Box 1892, Houston, Texas 77001. Reference, literature searching and referral services/ocean sciences, gulf coastal areas.

SMITHSONIAN SCIENCE INFORMATION EXCHANGE

Room 300, 1730 M Street, NW., Washington, D.C. 20036. David F. Hersey, Director. Information/scientific research projects (1965 to present).

TECHNICAL INFORMATION SECTION, COLD REGIONS RESEARCH AND ENGINEERING LABORATORY

CRREL-71, P.O. Box 282, Hanover, New Hampshire 03755. Wesley Pretkiewicz, Director. Reference and referral services, bibliographic compilations/ice, Arctic Regions, Antarctic Regions.

THE OCEANIC FOUNDATION

Makapuu Point, Waimanalo, Hawaii 96795. Dr. H. Burr Steinbach. Reference, referral and bibliographic services/marine biology, ecosystems.

UNDERSEA MEDICAL SOCIETY

9650 Rockville Pike, Bethesda, Maryland 20014. Dr. C. W. Shilling, Executive Secretary. Reference, referral, and literature searching services/underwater medicine.

WATER RESOURCES CENTER ARCHIVES

University of California, Berkeley, California 94720. Gerald J. Giefer, Librarian. Reference/ocean engineering, oceanography.

WATER RESOURCES ECONOMICS INFORMATION PROGRAM

University of Wisconsin, 1513 University Avenue, Madison, Wisconsin 53706. Leroy G. Zweifel, Director. Referral, abstracting, literature surveys/water resources.

WATER RESOURCES SCIENTIFIC INFORMATION CENTER

Office of Water Research and Technology, U.S. Department of the Interior, Washington, D.C. 20240. Raymond A. Jensen, Manager. Reference and bibliographic references/water research.

WILLIAM T. CLAPP LABORATORIES

Battelle Memorial Institute, Washington Street, Duxbury, Massachusetts 02332. Reference, referral, and literature searching services/ocean sciences.

WORLD DATA CENTER A, OCEANOGRAPHY

World Data Center A, Oceanography, National Oceanic & Atmospheric Administration, Washington, D.C. 20235. Ronald E. Moffatt, Associate Director. Data compilation, referral/oceanographic data, marine geology, marine biology.

VI. BIBLIOGRAPHY OF DIRECTORIES OF MARINE SCIENCE ACTIVITIES

A Directory of Information Resources in the United States, *Biological Sciences*, Science & Technology Division, National Referral Center, Library of Congress, Washington, D.C., 1972.

A Directory of Information Resources in the United States, *Water*, Science & Technology Division, National Referral Center, Library of Congress, Washington, D.C., 1966.

A Directory of Information Resources in the United States, *Physical Sciences and Engineering*, Science & Technology Division, National Referral Center, Library of Congress, Washington, D.C., 1971.

A Survey of Environmental Science Organizations in the USA, Dr. J. Y. Wang and Mr. Raymond R. Balter, eds., Environmental Sciences Institute, San Jose, California, 1970.

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Conservation Directory, 1974; a list of organizations, agencies, and officials concerned with natural resource use and management. William E. Clark, ed., Washington, D.C.: The National Wildlife Federation, 1974. ITS publication 71-1.

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Development Activities in the Marine Environment: Directory of Personnel. Coastal Plains Center for Marine Development Services, Washington, D.C., August, 1970. ITS Publication 70-1.

Directory of Experts on Marine Pollution. Food and Agriculture Organization of the United Nations, Rome, 1973.

Directory of Institutions Engaged in Pollution Investigations, Contaminants in Aquatic Organisms, Food and Agriculture Organization of the United Nations, Rome, 1973.

Directory of Marine Sciences Programs and Facilities on the Pacific Coast, David H. Montgomery, ed., California State Polytechnic College, San Luis Obispo, California, 1970.

Directory of Newsletters, Sea Grant Marine Advisory Service, May 15, 1974.

Directory of U.S. Marine Scientists, 1974 (in work), National Academy of Sciences, Washington, D.C., 1974.

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