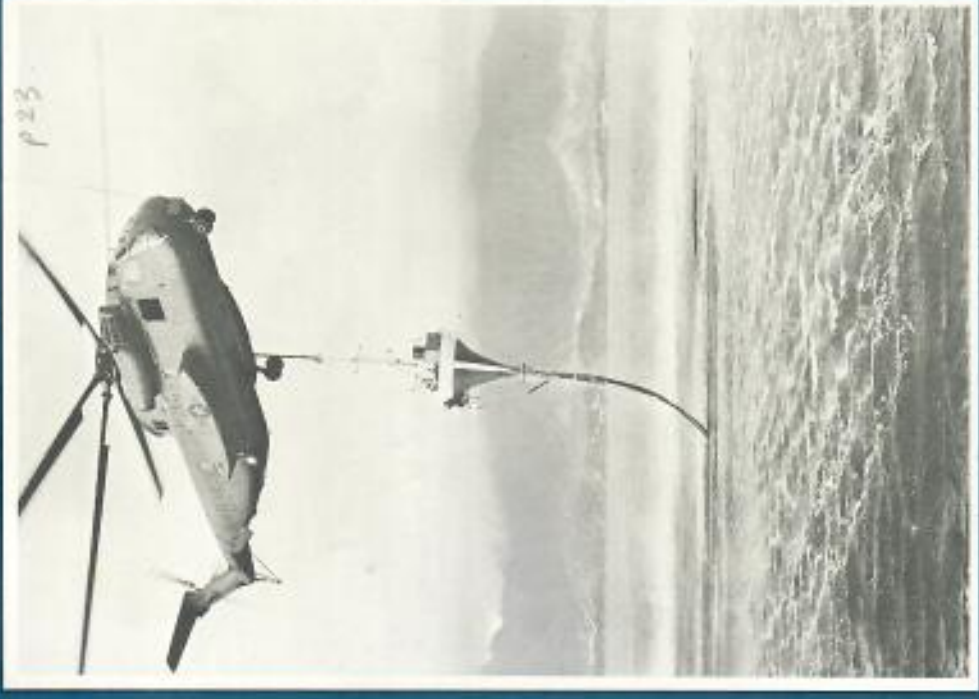


RCUH ANNUAL REPORT
FISCAL 1977



LETTER TO THE GOVERNOR

Telephone: (808) 666-8344

The Research Corporation of the University of Hawaii

November 15, 1977

The Honorable George R. Ariyoshi
Governor, State of Hawaii
Executive Chambers
Honolulu, Hawaii 96813

Dear Governor Ariyoshi:

Enclosed is the Annual Report of the Research Corporation of the University of Hawaii for the fiscal year ending June 30, 1977, submitted in accordance with the statutory requirements of the enabling legislation by which the Corporation was established.

The business volume of the Corporation was in excess of \$11,750,000 during this period. This is a new high dollar volume for the Corporation and reflects about a 7.7% increase in volume over the prior comparable period. Steady growth in the number of research projects administered is responsible for this new level of achievement. In addition to continuing our service to the University, our involvement with other departments of the State government persists in an ever expanding role.

The Regional Medical Program of Hawaii ended its eleven-year existence during the year. This program was terminated and its functions transferred to the new State Health Planning and Development Agency. The loss of this program was more than made up for by new projects in the Cancer Center of Hawaii. A contract for planning a Community-Based Cancer Control program was received and a major proposal to the National Cancer Institute was dispatched requesting in excess of \$9 million for implementation of this program over a five-year period. Prospects of this program being funded are excellent.

The Corporation joins the University's Hawaii Institute of Geophysics in the operation of the new oceanographic facilities at Snug Harbor. The relationship between HIG and the Corporation goes back 11 years, evidence of the lasting value of the Corporation to its clients.

I would like to express my appreciation to the members of the Board of Directors for their active participation during the year and to the Corporation Staff for a job well done.

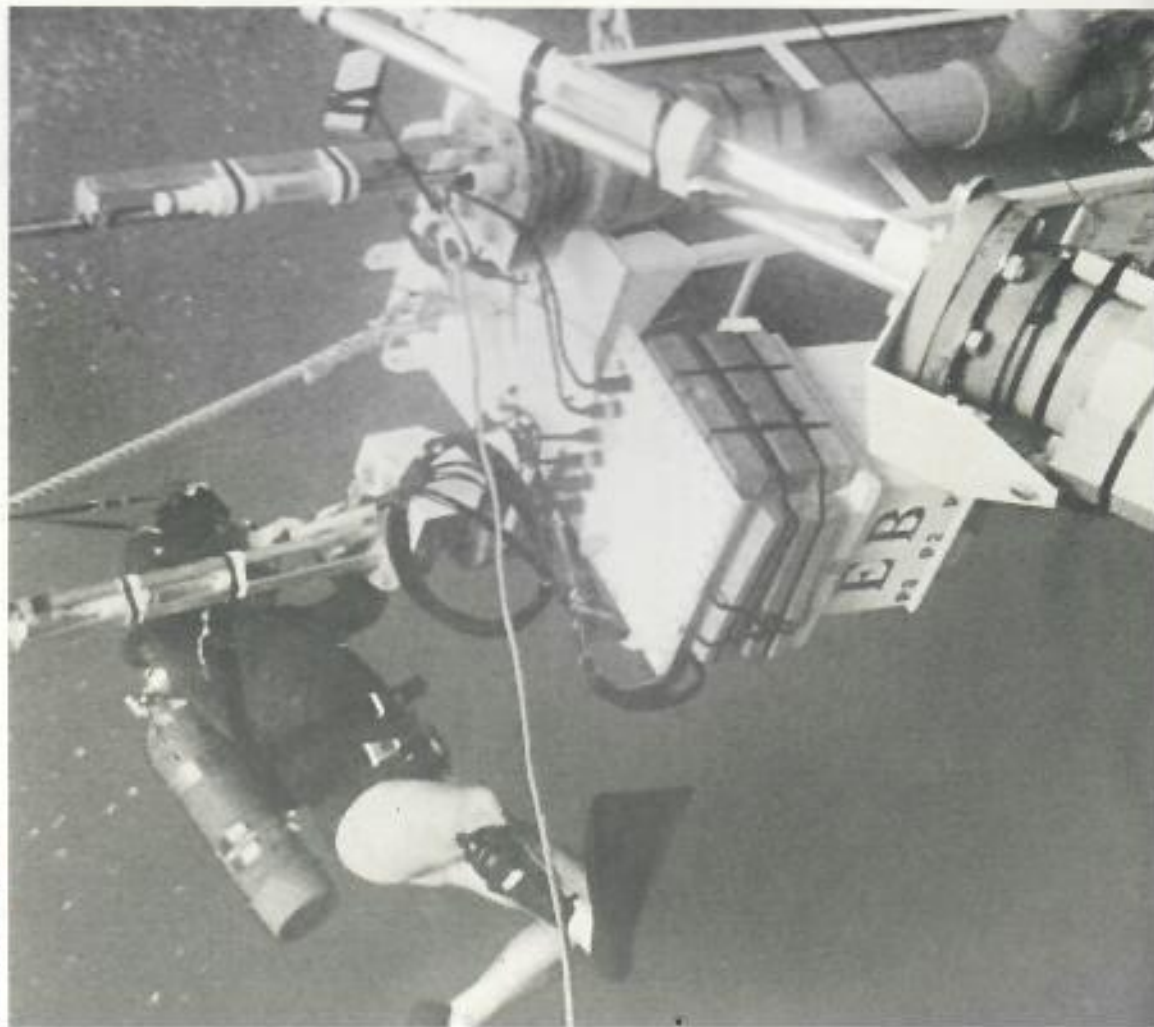
We view the future with confidence and appreciate the support we have enjoyed from your offices.

Sincerely,

Franklin Tokioka, Chairman
Board of Directors

Enclosure

Immersed buoy off the Natural Energy Laboratory, Ke-ahole Point, showing in-situ warm water bio-fouling heat exchange tubes.



The Research Corporation is a non-profit enterprise flexibly designed to assist the University, State and local agencies and the private sector in promoting and implementing scientific, educational and economic development. Focusing attention on problems of the State, Pacific island areas, and developing Pacific rim countries, it functions to make available for their solution the array of technical and professional personnel and facilities within the State. By devising and implementing research and development projects directly or as joint ventures, the corporation is enabled to work readily with other governmental agencies, international organizations, foreign nations or private businesses.

Purpose

To promote educational, scientific and literary pursuits by:

- Making available to public, private and international agencies the spectrum of expertise represented in the public and private sector of the State of Hawaii.
- Conducting basic and applied research. Engaging in joint research, educational and developmental ventures with public, private and international agencies.
- Administering selected research, educational and developmental programs of the University of Hawaii.
- Devising programs and task forces to assist developing Pacific islands and Asian areas through research, educational and developmental activities.

- Sponsoring dissemination of knowledge through publications, lectures, seminars and conferences.
- Assisting the University of Hawaii by providing professorships, technical staff and scholarships.

Organization

The Research Corporation was created by Act 209 of the 1965 State Legislature. The corporation's enabling legislation is Chapter 307 of the Hawaii Revised Statutes. It is a public instrumentality and body corporate, within the State organizational structure and attached to the University for administrative purposes, as provided for in section 26-35, Hawaii Revised Statutes 1969. The Research Corporation is governed by a nine member board of directors comprised of the president and the director of research of the University of Hawaii, the director of the Department of Planning and Economic Development of the State of Hawaii, and six members appointed by the governor and confirmed by the State senate.

Operating Flexibility

To develop a closer and more active relationship in promoting cooperative research, developmental and educational projects as joint ventures among the academic, business and governmental communities, the corporation by law is permitted to function with great flexibility.

activities

he corporation can:
enter into and perform contracts, subcontracts, grants, leases, cooperative agreements, or other transactions with agencies or instrumentalities of the United States, states, territories or possessions, and with any foreign nation, private person, firm, partnership, association, company or corporation.

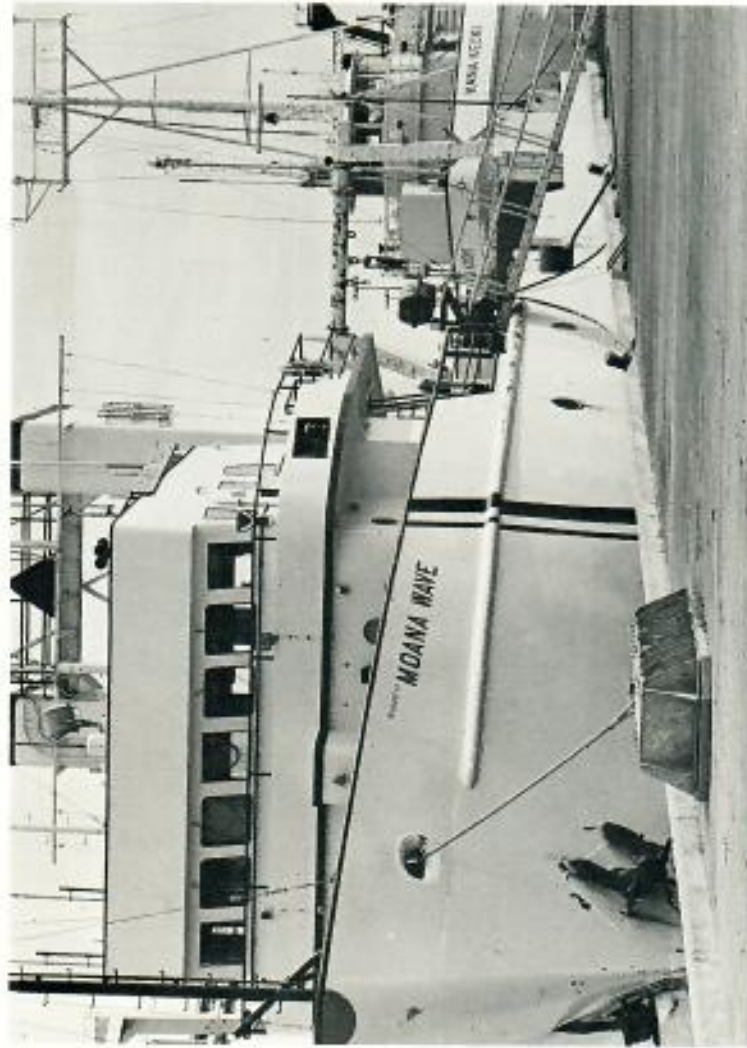
implement contracts, grants, leases, cooperative agreements, or other transactions assigned by the University of Hawaii.
stimulate and promote cooperative research projects and other educational activities by organizing and coordinating personnel from the University of Hawaii, the public and private sector of the State or elsewhere.

receive gifts, grants, devises, bequests or otherwise from private or public sources.

the Year In Review

Dr. Lee continued to participate in programs of the Cancer Center, particularly in cancer contract activities, i.e. cervical Cancer Screening Project and the community-based Cancer Control Project, and attended a meeting in Bethesda with the planning staff for the community-based Cancer Center executive committee, the Cancer Control Council and core staff of the center. He continued to serve on the National Advisory Council on Aging of the National Institutes of Health.

Dr. Lee served as principal investigator in transitional activities of the Regional Medical Program, and participated in the closing out of the Health Manpower Project of the University of Hawaii. As part of the RMPH project, Dr. Lee visited health facilities on Majuro, Ponape, Saipan and Guam. As a member of the board of trustees of the Leahi Foundation and chairman of its scientific review committee, Dr. Lee, with the assistance of Mr.



Hawaii Institute of Geophysics ships Moana Wave and Kana Keoki at the new pier 45 facilities.

the business affairs of the corporation. A special board meeting was held in October to define the duties and responsibilities of the newly formed Cancer Center of Hawaii facilities committee. This committee, recognizing the ultimate responsibility for the building of the Cancer Center rests with the Research Corporation board of directors, presented a statement of responsibilities and requested that the board delegate the authority to the committee to implement them and to insure smooth and orderly project administration. The committee's responsibilities will be to perform any and all acts to bring about the proper completion of the total building project in accordance with the program as outlined by the Cancer Center of Hawaii. Several meetings have been held by the committee since its formation.

At meetings held during the year, the personnel and budget committee approved plans for reorganization of the core staff

activities, personnel and fiscal matters and annual budget for the coming year.

Upon recommendation of the personnel committee, the amended retirement resolution for Research Corporation employees was adopted at the October meeting.

At the annual meeting in December, Mr. Franklin Tokioka was elected chairman of the board for the coming year. Consistent with Research Corporation policy of changing auditing firms every five years, the firm of Arthur Young and Company was engaged to do the external audit for the Corporation.

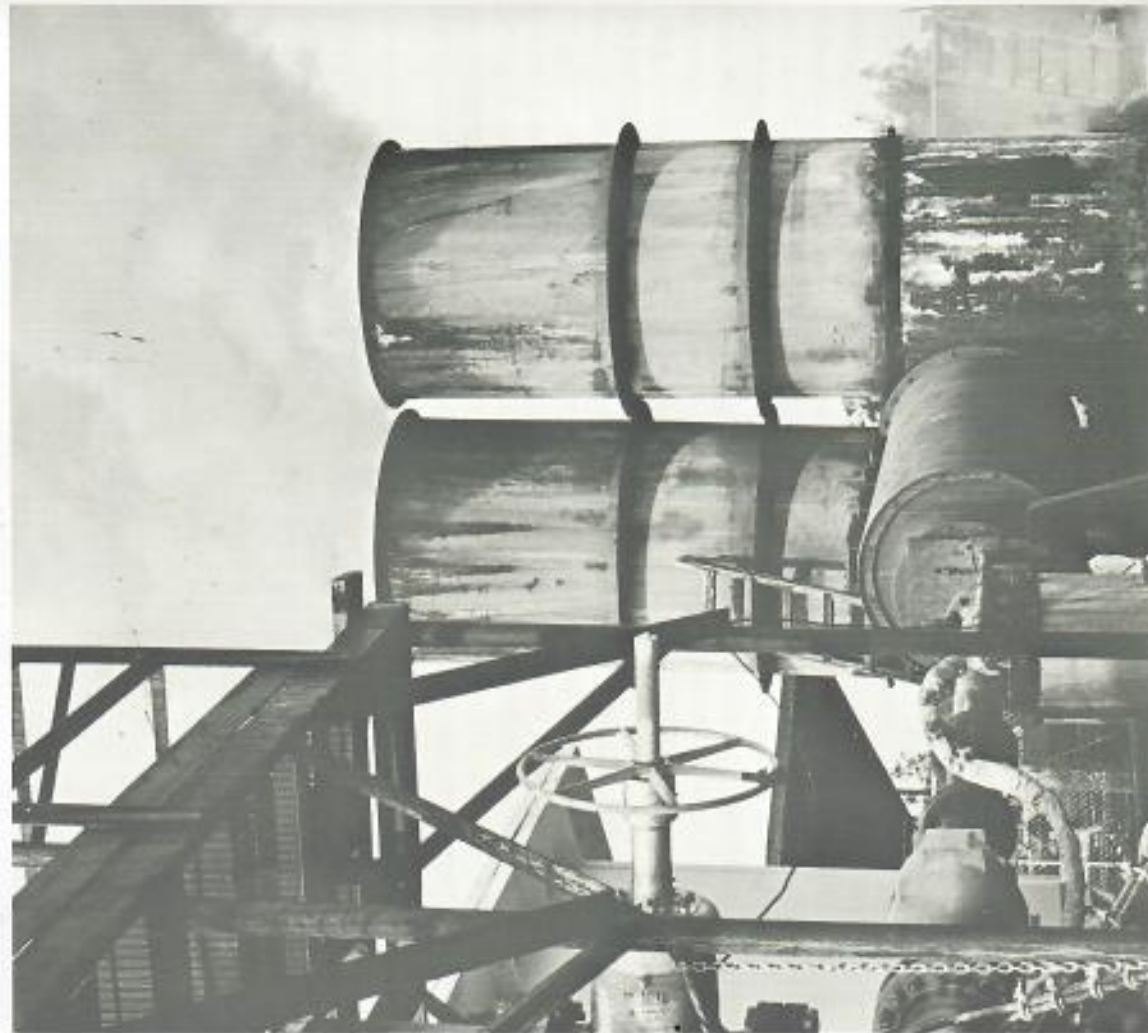
The program planning committee consisting of seven board members met during the year to discuss selected projects which might require more time than a full board can devote to them. Matters discussed at committee meetings are then presented to the board for their decision at regular meetings.

Board Activities

The board of directors held regular quarterly meetings during the year to direct



Hawaii Geothermal Project Well "A" in Puna, Hawaii being "flashed". Geothermal steam can be a major factor in energy self-sufficiency for the Big Island in the near future.



ENERGY

Hawaii is dependent upon imported petroleum products for 98% of its energy needs. This annual report will concentrate its attention on some of the programs the corporation has assisted in the field of natural energy development. Hawaii, while being bereft of fossil forms of energy, abounds with other forms of energy. These include geothermal, solar, ocean thermal energy conversion (OTEC), wind, ocean wave and bio-conversion. The latter provides a substantial amount of energy for the Big Island by virtue of sugar cane waste, bagasse, being burned in plantation mills and electricity being generated for their own needs and surplus sold to Hawaii Electric Light Company. The other forms of natural energy in Hawaii are still largely in the development stage. The various forms of energy and the involvement to date will be listed below.

Geothermal

The Research Corporation has worked with the College of Engineering for several years in the conduct of the Hawaii Geothermal Project. Early planning money was provided by a National Science Foundation grant with matching dollars coming from the State and the County of Hawaii. This project was a cooperative one from the very beginning involving county, state, national and the private sector. Successful completion of the first discovery phase came during the year when the first well drilled to 6450 feet deep

recorded temperatures in excess of 600°F, the hottest geothermal well in the world! There was doubt by some that there was a reservoir of water sufficient to sustain the well; this was disproved by a 42-day well "flashing." Estimates now suggest the well could produce steam for 100 years!

As a result of the success of this project, the Hawaii Geothermal Project Development Group was formed. Members of the group are:

State of Hawaii
County of Hawaii
University of Hawaii
Hawaii Electric Light Company

In April, 1977, the HGP Development Group submitted a proposal to the Energy Research and Development Administration (ERDA) via the Research Corporation. This proposal "Electric and Nonelectric Research Facility Utilizing the HGP-A Well on the Island of Hawaii" presented several alternatives for a well-test facility. We expect word soon as to the acceptance of this proposal and the concomitant level of funding. Geothermal resources could be a large item in the total equation towards energy self-sufficiency for the Big Island in the foreseeable future.

Ocean Thermal Energy Conversion

OTEC has been around for many years. Simply stated the difference in temperature of warm surface ocean waters (78°) and cold

deep ocean waters (42°) is enough to run a turbine and produce electricity. It works like this: a working fluid (ammonia is most commonly mentioned) is vaporized (steamed) by the fuel (warm surface water) and this gas is put through a set of turbine blades which rotate a generator producing electricity. The spent gas is cooled and condensed back to a liquid by the cold deep ocean water completing the cycle. This is basically what happens in a steam-generating plant only at much different temperature, working fluid and efficiency.

Hawaii has warm surface waters; we also have deep cold waters and at Ke-ahole Point on the island of Hawaii, these two are found less than a mile from shore. Ke-ahole Point has been designated by the State of Hawaii as the site of the Natural Energy Laboratory of Hawaii (NELH). The major early emphasis in research at this site has been in the field of OTEC.

The NELH has selected the Research Corporation to be its administrative arm. Its staff has worked closely with the NELH board of directors in the development of this facility. Tests are currently underway in cooperation with other institutions on the biofouling characteristics of the warm tropic waters upon heat exchanger tubes that would be used in a full-scale plant. There are many problems to solve before OTEC becomes a reality. We are optimistic that the NELH at Ke-ahole Point will help bring OTEC from concept to reality.

Wind

The Hawaii Natural Energy Institute (HNEI) has asked the Research Corporation to act as its business office. Several of the projects funded pursuant to HNEI funding involve wind power.

We are all aware of the trade winds that cool our islands. We take them for granted—until they stop and we realize their true value in cooling and cleansing our skies. Windmills to capture and use their

power have long captured man's imagination. In certain parts of the islands, windmills were used to pump water for agricultural purposes. With the coming of relatively cheap electricity, the windmills came into disuse and abandonment. Now with higher costs for electricity to run pumps (and electric generators) we are turning back to the windmill as a source of free, renewable power.

The problem facing this source of alternate energy is storage—storage of surplus energy generated when the winds blow strongly to utilize when the wind stops. Batteries to store electricity chemically are one answer, but they are expensive. Pumping water up to a reservoir and letting it flow down through a turbine generator when the winds fall is another expensive and land consuming answer. Possibly the final answer will be to utilize wind power when it is available and fall back on fossil or other forms of energy in times of wind shortage. Research on these, and other related questions, are being investigated by the Natural Energy Institute.

Ocean Wave

The wave power spent on the shores of our islands is familiar to us all, especially those living on the north shore where winter storm waves occasionally cause great damage. While the power behind one of these big waves is tremendous, its conversion into useful energy is a major problem. Millions of dollars have been spent on research on methods of dissipating wave energy so damage does not occur, similar expenditures will be necessary to devise methods to capture safely this energy and convert it into a useful form of energy.

Experiments have been conducted this year in conjunction with Scripps Institute of Oceanography with the open ocean Isaacs wave pump. This buoy-like device rides the open ocean swells rising and falling in turn, through a series of valves and check valves water rises up a pipe

that extends below the buoy. This water flow powers a wave generator which incorporates a hydroelectric turbine and an electrical generator. This buoy was deployed and tested in the waters off Kaneohe Bay, the final evaluations are currently being produced.

Bio-conversion

As previously noted, the Big Island uses bagasse to produce electricity in several plantation mills which sell surplus power to Hawaii Electric Light Co. For years the emphasis in Hawaii was selecting and breeding a strain of sugar cane that produced the maximum amount of sugar in relation to stalk mass. Current research is being conducted looking into the possibility of increasing the fiber or biomass without decreasing the sugar content. This would give a greater mass after milling to convert into electricity in the generation plant.

Consideration is being given to planting forests of fast-growing trees to harvest and reduce to chips to burn in boilers to produce steam and electricity. Ocean growing of giant kelp from submerged rafts fertilized by deep ocean nutrient rich waters (a by-product of an OTEC plant) are also being discussed. This kelp, after harvesting and removal of commercially valuable

by-products could be dried and burned similar to bagasse or wood chips. Other bio-conversion schemes include growing algae, producing alcohol from sugar or wood as well as high biomass as a by-product of other processes that could be transformed into other forms of energy.

Direct Solar

Home owners in Hawaii can purchase from one of several dealers solar devices to heat their household water and to heat swimming pools. In some cases, it is claimed that a customer's electric bill can be reduced by up to 50%. The Hawaii Energy House located on the Manoa campus utilizes solar water heaters in demonstrating the alternatives available in Hawaii to the home owner.

Hawaii is blessed with these many forms of potential alternate energy sources and resources. The application of them toward our everyday living will take time and money. It is unlikely that we will ever return to the days of "cheap" energy that we used to enjoy. We must work diligently and cautiously to decrease our dependence upon imported energy sources. The Research Corporation is being utilized in many such programs being conducted in the State.

NEW SERVICE ORDERED PROJECTS

FROM THE UNIVERSITY OF HAWAII

Cancer Center of Hawaii staff member prepares a patient sample for lymphocyte stimulation testing. These tests determine the effectiveness of a prescribed course of treatment.



The day to day working relationships between the University of Hawaii and the Research Corporation have been formalized by an internal agreement. Among the areas covered by this agreement are the guidelines under which a project may be assigned to the Research Corporation for management services and the form used to transfer this responsibility, the "Service Order." The following projects were assigned to the Research Corporation by the University of Hawaii by Service Order during the year.

Listed alphabetically by principal investigator:

DR. JAMES E. ANDREWS

Hawaii Institute of Geophysics
Manganese Resources
NOAA/Sea Grant Program
\$18,800

Continuation of Manganese Resources Program 09 year.

MR. JOHN BALL

Marine Advisory Program
Hawaii Coastal Zone Management Program/Year 03
State of Hawaii/Department of Planning & Economic Development
\$50,000

This project is a statewide coastal zone planning and management program which will address itself to the rationalization of Hawaii's coastal resources and uses in terms of both opportunity as well as need. It is a result of the National Coastal Zone Management Act of 1972, P.L. 92-583, which authorizes the secretary of the Department of Commerce to make annual program development grants to coastal states for the purpose of developing State coastal zone management programs for land and water resources located within the coastal environment.

DR. M. E. BITTERMAN

Department of Psychology
NATO Travel Grant
National Science Foundation
\$1,460

To support travel expenses of selected scientists to attend the NATO Advanced Study Institute on Animal Learning to be held near Ulm, West Germany during November and December 1976.

DR. ROBERT BUDDEMEIER

DR. STEPHEN SMITH
Department of Oceanography & Hawaii Institute of Marine Biology
Corals as Remote and Retrospective Environmental Recorders
National Science Foundation
\$71,500

This project is directed toward the obtaining of both remote and retrospective environmental data to assess climatic variations and the nature and effects of man's impact upon the oceans. The rate of coral growth and the chemical and isotopic composition of coral skeletons provides such records if the characteristics of coral growth are adequately calibrated.

DR. DOAK C. COX

Hawaii Environmental Simulation Laboratory
Production of Workshop Discussion Materials
Waipahu Community Association
\$1,500

The purpose of this project is to conduct a series of ten workshops dealing with land use and community values. Waipahu Community Association engaged the Hawaii Environmental Simulation Laboratory of the University of Hawaii for the performance of certain services related to the gathering and producing of research materials necessary to

foster effective participation in each discussion group.

DR. JOHN CRAVEN DR. JOHN BARDACH

Marine Programs
Law of the Sea Institute
NOAA/Sea Grant Program
\$22,000

The Law of the Sea Institute, under the sponsorship of the University of Hawaii at Manoa, shall provide a forum for the study and discussion of the law, policies, decisions and organizational arrangements related to the use of the world oceans. It shall encourage and facilitate communication and research among those interested and involved, publicly or privately, in marine affairs. It shall stimulate debate on major issues and disseminate information and ideas.

MR. TOM DINNELL

Pacific Urban Studies and Planning Program
Hawaii Coastal Zone Management Program
State of Hawaii/Department of Planning & Economic Development
\$181,500

Scope of services: Completing the coastal zone management problem analyses and policies plan; continuing the inventory of potential areas of particular concern and the development of appropriate policy and criteria for the designation thereof; and preparing a completed Hawaii coastal zone management program, including an environmental impact statement.

MR. TOM DINNELL

Pacific Urban Studies and Planning Program
State Land Use Information System and Policy Development
State of Hawaii/Department of Planning & Economic Development
\$92,812

To develop a geo-based computer inventory system, which will be implemented and demonstrated for the island of Kauai.

DR. MAXWELL DOTY

Department of Botany
Tropical Marine Agronomy
NOAA/Sea Grant Program
\$103,000
Continuation of prior year Marine Advisory Program.

DR. AUGUSTINE S. FURUMOTO

Hawaii Institute of Geophysics
Microearthquake Surveys for Geothermal Sources on Oahu
Colorado School of Mines
Subcontract.
Office of Naval Research
\$7,000

In conjunction with the geophysicists of the Colorado School of Mines; the staff members of the Hawaii Institute of Geophysics will monitor earthquakes on the island of Oahu with the objective of ascertaining geothermal resources on the same island. Six seismograph units will be deployed at strategic places.

MR. JOSEPH J. HARRIS

Sea Grant Office/Marine Programs
Marine Advisory Program
NOAA/Sea Grant Program
\$300,000
Continuation of 09 year Sea Grant Program.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Magneto-Stratigraphy of Cretaceous Rocks
National Science Foundation
\$30,000

This is a project to study, in detail, the magnetic stratigraphy of cretaceous rocks, with emphasis placed upon the determination of the boundaries of the cretaceous quiet interval. This work will entail investigations of the paleomagnetization of DSDP core material supplemented by magnetostratigraphic studies of selected cretaceous land sections where radiometric dating has been done.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Ship Operations Support
National Science Foundation
\$631,300

New grant award for continued support for operations of the R/V MOANA WAVE and R/V KANA KEOKI.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Shipboard Technician Support
National Science Foundation
\$75,000

Continued support for marine technician personnel. Marine technician personnel supported under NSF funding during calendar year 1976 are engaged in the operation and maintenance of the underway systems common to both HIG vessels, including precision echo sounding equipment, magnetometers, bathythermographs, satellite navigator, seismic reflection systems (sparker, air guns, receiving and recording equipment), seismic refraction (sonobuoy receiver and antennae), gravimeter and shipboard computers aboard the KANA KEOKI.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Modification of R/V MOANA WAVE as a Surveys Test Platform
Office of Naval Research
\$370,000

The R/V MOANA WAVE requires certain hull, deck and interior modifications prior to utilization as a SURTASS test platform. It is proposed that the University of Hawaii, utilizing its administrative and ship support capabilities, undertake to accomplish these modifications at its marine center facilities in Honolulu, and through appropriate industrial and commercial shipyard subcontracts such as may be required by program schedule constraints.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Hauverson Ridge Study
National Science Foundation
\$22,700

A comprehensive study of the Hauverson ridge which will provide an extensive set of data and will constrain and refine hypotheses on the origin of the Hawaiian ridge and linear volcanic chains in general.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Ship Operations/NSF Equipment
National Science Foundation
\$90,500

This award will provide improved facilities and shipboard scientific equipment for the research vessels KANA KEOKI and MOANA WAVE, both operated by the University of

Hawaii. The facility improvements, all for R/V KANA KEOKI, consist of the acquisition and installation of four specific but related systems for the improvement of navigation control and safety. The scientific equipment, designated for both ships, includes computer test instruments, hydrographic cable and instrumentation to improve the shipboard data processing systems.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Utilization of R/V MOANA WAVE as a Surveys Test Platform
Office of Naval Research
\$756,000

To provide services in connection with the utilization by the Naval Electronics Systems Command of the Research Vessel MOANA WAVE as a SURTASS test platform. Such services shall include, but not necessarily be limited to the following: (1) responsibility for the overall operational and fiscal management of the vessel; (2) maintenance and operation of the engine room and all ship's systems; (3) responsibility for deck operations; (4) performance of ship's sanitary duties; (5) perform routine maintenance, repair, and overhaul of the vessel; (6) responsibility for ship's provisions, minor stores and linens; and (7) provide shore support for management, administrative, maintenance and communications services to the ship.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Seismic Studies of Crustal Structures of Southern Peru and Adjucent Portions of the Andean Subduction Zone
National Science Foundation
\$24,800

A cooperative crustal seismic experiment was conducted during June of 1976 along the south coast of Peru. The experiment involved research teams from the University of Wisconsin, the University of Texas at Dallas, the Carnegie Institute of Washington, and the Instituto de Geofisico de Peru. All data is to be exchanged between all participants. The controlled source data from this experiment should enable the researchers to construct a crustal velocity section for the A line parallel to the coast, and the observations along the N line should enable the researchers to extend the velocity

structure to the east as far as the edge of the Altiplano.

DR. CHARLES E. HELSLEY

Hawaii Institute of Geophysics
Collaborative Research: Seismic Studies of the Crustal Structure of Southern Peru & Adjucent Portions of the Andean Subduction Zone
National Science Foundation to University of Texas-Dallas
\$27,769

NSF award to Dr. Charles E. Helsley while he was at University of Texas-Dallas. It has been determined that this grant would remain at UTD but the management and operational aspects would be conducted at HIG.

DR. DONALD HUSSONG

Hawaii Institute of Geophysics
International Phase of Ocean Drilling (IPOD) Site Surveys
National Science Foundation to Columbia University
Subcontract: Columbia University-University of Hawaii
\$235,390

To carry out geophysical surveys over recommended drill targets in the Nauru basin and the central Pacific basin. To carry out detailed geophysical surveys over approximately four recommended drill targets on the eastern part of the south Philippine Sea transect.

DR. DONALD M. HUSSONG

Hawaii Institute of Geophysics
Seismic Study of the Crustal Structure of the Southern Margin of the Caribbean Sea
National Science Foundation
\$133,900

To investigate, in a cooperative effort with the Lamont-Doherty Geological Observatory, two aspects of the structure of the Venezuela basin, with a short complementary experiment in the Colombia basin, that we feel are of particular importance to our understanding of the eastern Caribbean. First, we hope to resolve the poorly defined, but apparently anomalous, velocity structure of the crust and the nature of the Mohorovicic discontinuity in the basins. Second, we will study the fossil subduction zone that forms part of the southwestern margin of the Venezuela basin.

DR. JAMES H. JONES

Sea Grant Office
OTEC Heat Exchanger Biofouling Experiment

NOAA/Sea Grant
\$53,600

This project deals with the investigation of the effect of the tropical ocean water biofouling on the outside of heat exchanger elements, to be done in conjunction with the Natural Energy Laboratory of Hawaii. The Applied Physics Laboratory will design and build the test section to be used. The NELH will provide a testing site at Ke-ahole point to which will be supplied tropical ocean water typical of the environment in which the OTEC heat exchanger will operate and will conduct the tests in cooperation with APL.

DR. LAURENCE N. KOLONEL

Pacific Biomedical Research Center
Cancer Center of Hawaii
Epidemiologic Dietary Components and Cancer Development Project
National Cancer Institute
\$68,775

The study proposed here will correlate group-average dietary intake data, acquired over a two-year period on a representative sample of 6,000 Oahu residents of Caucasian, Japanese, Chinese, Filipino and Hawaiian ancestry, with the local geophysical surveys over approximately four recommended drill targets on the eastern part of the south Philippine Sea transect.

pre-treated questionnaire and colored photographs to help establish quantitative intake. For its representative sample of the population, the study will take advantage of the Health Surveillance Program of the Hawaii Department of Health, which each year identifies a cluster sample of 5,000 households throughout the State. Race, sex and age-specific incidence rates for cancer will be provided by the Hawaii Tumor Registry, a member of the SEER group of tumor registries.

DR. LAURENCE N. KOLONEL

Pacific Biomedical Research Center
Cancer Center of Hawaii
Health Effects of Asbestos Exposure Among Pearl Harbor Naval Shipyard Workers
Department of the Navy
\$102,557

A mortality study of 9,600 present and former male employees at the Pearl Harbor naval shipyard is currently in progress. These men were on the shipyard rolls on January 1, 1960 or were employed subsequently through 1970. Vital status of the

members of the cohort as of January 1, 1974, is being ascertained, and the cause of death is being determined for those who have died. The results will be compared with the expected cause-specific mortality by age, sex and race, based on the mortality experience of the general population of Hawaii during the period of observation of the study. Results will be analyzed in terms of degree of asbestos exposure, using an appropriate classification of specific jobs within the shipyard environment.

DR. PETER M. KROOPNICK

Hawaii Institute of Geophysics
Geochemical Ocean Sections Study/GEOSECS/Isotopic Measurements
National Science Foundation
\$95,700

The Geochemical Ocean Sections Study, GEOSECS, is a coherent oceanographic research program whose purpose is to make detailed measurements of oceanic constituents at all depths along sections in the Atlantic and Pacific oceans from the Arctic to the Antarctic. This project concerns that part of the GEOSECS program concerning the isotopic measurements of C-13, C-12, O-18/O-16 and deuterium/hydrogen in dissolved inorganic carbon, dissolved oxygen, atmospheric water vapor and atmospheric carbon dioxide. These measurements will be made on atmospheric and water samples collected during the GEOSECS oceanographic sampling program.

DR. PETER KROOPNICK

Hawaii Institute of Geophysics
Indian Ocean Geochemical Ocean Section Study/GEOSECS/Isotopic Measurements
National Science Foundation
\$9,900

The Geochemical Ocean Sections Study, GEOSECS, is a coherent oceanographic research program whose purpose is to make detailed measurements of oceanic constituents at all depths along sections in the Atlantic and Pacific oceans from the Arctic to the Antarctic, and the Indian Ocean from India to the Antarctic. The purpose of these measurements is to provide, for the first time, a set of physical and chemical parameters measured on the same water and applying the same analytical techniques for each compound on an oceanwide basis.



A rooftop solar water heater is among the energy saving devices at the University of Hawaii's energy house.

MR. RICHARD L. LONGFIELD
Hawaii Institute of Geophysics
Snug Harbor Facility Support
State of Hawaii
\$132,000

Additional State funding is required in support of cost accelerations to be realized as part of operational phase of the University of Hawaii Snug Harbor ship support facility. Additional costs include security services, building furnishings, warehousing and maintenance personnel, groundskeepers and appropriate equipment and additional costs for utilities.

MR. RICHARD L. LONGFIELD
Hawaii Institute of Geophysics
Vessel Operations/State Support
State of Hawaii
\$300,000

State of Hawaii contribution to ship operations.

DR. MURLI H. MANGHANI
Hawaii Institute of Geophysics
U.S./Japan Seminar on
High-Pressure Research
Applications in Geophysics
National Science Foundation
\$6,500

Support of a U.S./Japan research seminar on high-pressure research applications in geophysics to be held in Honolulu, Hawaii during June 24-27, 1976.

DR. MURLI MANGHANI
Hawaii Institute of Geophysics
Pressure Densities of Elastic
Moduli in B.C.C. Transition
Metals and Their Solid Solutions
Energy, Research & Development
Administration
\$53,921

The research under this project shall consist of pressure studies of cohesion and electronic structure of body-centered cubic metals and alloys, and other alloys with titanium and zirconium base.

DR. MING PI MI
Pacific Biomedical Research Center
Cancer Center of Hawaii
Occupational Cancer Risk in Hawaii
National Cancer Institute
\$66,849

To provide data which will permit the linkage of official records: civil defense file, birth records and death certificates for the population of Hawaii from 1942-75 with specific

emphasis on occupation and/or place of employment.

MS. JACQUELIN MILLER
DR. KEITH E. CHAVE
Environmental Center

Physical, Chemical, and Biological Characteristics of Nearshore Dredge Soil Disposal, Pearl Harbor, Hawaii. Phase A.
U. S. Navy
\$51,960

Engineering services for baseline studies and evaluation of the physical, chemical and biological characteristics of nearshore dredge soil disposal, Pearl Harbor, Hawaii, Phase A.

MR. WESLEY T. PARK
College of Continuing Education and Community Service
Comprehensive Training Program
(University Without Walls)
State of Hawaii
\$151,000

The primary objective of the comprehensive training program is to continue a successful on-going program for the period July 1, 1976 to June 30, 1977. The secondary objective is to bring the present 150 enrollees to a point of closure

(degree) or to a satisfactory transitional point where it would be possible to complete a BA degree by transferring to a local institution or complete the BS degree with Central Michigan University by taking courses at local institutions and transferring the credits to CMU.

MS. ROSE PFUND
Sea Grant Office
Program Management Publications
NOAA/Sea Grant Program
\$105,048

Continuation of program management publications 09 year.

DR. LAWRENCE H. PIETTE
Pacific Biomedical Research Center
Cancer Center of Hawaii
Cancer Center Support Grant
Department of Health, Education & Welfare
\$553,173

New grant awarded for continued support for operation of the Cancer Center of Hawaii to account for 02 year of the grant award. Total adjusted year 01 budget was \$584,822. Total first two-year grant award to date is (from 6/30/74 to 10/31/77) \$1,137,995.

DR. ROBERT SAKAI
Summer Session
Summer Institute in Gerontology
University of Hawaii at Manoa
Summer Session
\$1,616

To hire Ms. Kuhn as a guest lecturer in the course LAW 5959-Advocacy and the Elderly. Ms. Kuhn is internationally known as the national convener of the Gray Panthers and a leading advocate for the elderly.

DR. CLIFFORD W. SMITH
Department of Botany
Operation of the Cooperative
National Park Resources Studies
Unit
U.S. Department of the Interior/
National Park Service
\$27,000

The master memorandum of understanding between the National Park Service and the University of Hawaii, dated March 16, 1973, provides for the establishment and operation of the Cooperative National Park Resources Studies Unit by the University of Hawaii to direct and coordinate research and park assistance programs in areas administered by the National Park Service in Hawaii. This contract provides for

the funding required to implement this master memorandum.

DR. CLIFFORD W. SMITH
Department of Botany
Biological Survey of Haleakala National Park
U.S. Department of the Interior
National Park Service
\$15,660

A basic biological survey of Haleakala National Park has been in progress for several years as an activity of the unit. A two-year final phase of the survey of the crater district of the park will produce an annotated checklist of insects, birds, flowering plants, corallifers, ferns, mosses, liverworts, and lichens; distribution maps of life forms; and a monograph of the life forms and the distribution of each. In addition, it will provide a comprehensive collection of biological specimens.

DR. CLIFFORD W. SMITH
Department of Botany
Vegetation Map, Haleakala National Park
U.S. Department of the Interior
National Park Service
\$11,489

A vegetation map of Haleakala National Park that will delineate the ecosystems of the crater district of the park, quantitative descriptions of each vegetation unit, and a correlation analysis of ecosystems recognized with soil and environmental data will be developed in a 3-year research project.

DR. CLIFFORD W. SMITH
Department of Botany
Competition Between Native and Exotic Plants, Haleakala National Park
U.S. Department of the Interior
National Park Service
\$2,890

Competition between native and exotic plant species in the crater district of Haleakala National Park are to be identified and evaluated in a series of investigations over a 3-year period.

DR. CLIFFORD W. SMITH
Department of Botany
Change in Vegetation Following Removal of Goats, Hawaii
Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$8,040

Control of the feral goats in Hawaii

Volcanoes National Park has resulted in changes in the vegetative cover. This 3-year research program is directed toward: the monitoring of changes in vegetation in previously established plots; the production of a new vegetation map for the coastal lowlands, and the projection of the probable course of recovery of vegetation and the identification of potential problems during the period of vegetation renewal.

DR. CLIFFORD W. SMITH
Department of Botany
Ecology of Fire, Hawaii Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$10,897

Research on the ecology of fires in Hawaii Volcanoes National Park will be undertaken in a 3-year investigation that is geared to: (1) evaluate the recovery after fire of six ecosystems within the park; (2) measure the effect of fire on the survival, reproduction and growth of plants; and (3) determine appropriate management actions with regard to control or use of fire in the perpetuation and restoration of natural ecosystems.

DR. CLIFFORD W. SMITH
Department of Botany
Survey of Birds, Hawaii Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$7,081

A preliminary survey of the birds of Hawaii Volcanoes National Park and Haleakala National Park has been initiated under a previous unit activity. This survey will be continued and expanded as a 3-year research project to provide an updated checklist of birds, population density figures, and provisional distribution maps for each species found in each park.

DR. CLIFFORD SMITH
Department of Botany
Diseases of Birds, Hawaii Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$15,061

Four-year investigations of the diseases of the birds in Hawaii Volcanoes National Park and Haleakala National Park will be initiated to determine: (1) the susceptibility of native birds to malarial parasites; (2) if the night-flying mosquito is the

vector of avian malaria in Hawaii; (3) methods of transmission and potential vectors of other avian blood parasites; (4) portion of avifauna within the parks that is affected by malaria; and (5) to determine if introduced bird species can act as potential reservoirs of avian blood parasites in Hawaii.

DR. CLIFFORD W. SMITH

Department of Botany
A Plan for a Comprehensive Research Program for the Study of Rare and Endangered Birds in Hawaii's National Park
U.S. Department of the Interior
National Park Service
\$6,129

To perform all work necessary to prepare and submit a plan for a comprehensive research program for the study of rare and endangered birds in Hawaii's National Park Resources Studies Unit.

DR. CLIFFORD W. SMITH

Department of Botany
A Detailed Plan for a Research Program for Kipahulu Valley, Haleakala National Park
U.S. Department of the Interior
National Park Service
\$2,700

A research program that will provide a detailed study plan. The purpose of this plan will be to provide a basis for NPS management to develop research guidelines for Kipahulu valley and to provide the justification and specifics necessary to support funding and implement the needed research programs.

DR. STEPHEN SMITH

DR. ALBERT BANNER
DR. ROBERT BUDDEMEIER
Hawaii Institute of Marine Biology and Hawaii Institute of Geophysics
Research on Fish Toxicity and Hydrochemistry Operation of Mid-Pacific Marine Laboratory
Energy Research and Development Administration
\$118,000

Manage and operate the Mid-Pacific Marine Laboratory (MPML) and support a scientific research program with the overall aim of gaining a better understanding of the effects and fate of introduced contaminants.

Continue the description and quantitative understanding of the hydrology and groundwater geochemistry of Enewetak atoll, and use these results to interpret groundwater radioactivity in terms of

leaching, cycling, transport, and residence time models, both for the groundwater-soil-vegetation system of specific locales and for the atoll system as a whole.

Conduct a study of toxicity levels in fish populations at Enewetak, Marshall Islands, and other Pacific areas. To determine which species of fish at both Enewetak and Bikini atolls contain ciguatera toxin so that the returning Marshallese can be advised as to which species are safe to eat.

DR. STEPHEN SMITH

DR. ALBERT BANNER
DR. ROBERT BUDDEMEIER
Hawaii Institute of Marine Biology
Hawaii Institute of Geophysics
Mid-Pacific Marine Laboratory
Hydrochemistry Operation of Enewetak Atoll
Energy Research & Development Administration
\$369,495

To furnish personnel, facilities, equipment, materials, supplies, and services necessary to manage and operate the Mid-Pacific Marine Laboratory (MPML) and perform research as assigned by scientific research program in the mid-Pacific area. The overall aim of the research program is to gain a better understanding of the effects and fate of introduced contamination. The program will be accomplished by: (1) the continuing study of the biogeochemical processes, interactions, and relationships in the tropical marine environment; (2) continuing investigations to describe and quantify the understanding of the hydrology and groundwater geochemistry; and (3) conducting studies of the toxicity levels in fish populations.

DR. JAW-KAI WANG

Agricultural Engineering Department
A Systematic Approach to Irrigated Rice Production Planning in Bicol River Basin (Philippines)
U.S. Agency for International Development
\$12,000

Support of Filipino participants receiving training in Honolulu.

DR. GEORGE P. WOOLLARD

Hawaii Institute of Geophysics
Magneto-Telluric Sounding Using Deep Ocean Tri-Axial Field Management
National Science Foundation
\$22,800

Participation in this experiment will: (1) demonstrate the feasibility of long-span electric field measurements; (2) provide a comparison of long vs. short-span electric field measurements; (3) contribute data for a deep magneto-telluric sounding of the mid-oceanic crust; and (4) demonstrate the efficacy of electric field measurements for determination of oceanic water mass transports.

DR. GEORGE P. WOOLLARD
Hawaii Institute of Geophysics
Proposed Utilization of the University of Hawaii R/V MOANA WAVE in the National Oceanic and Atmospheric Administration's Outer Continental Shelf Environmental Assessment Program
National Oceanic & Atmospheric Administration
\$442,063

University research vessel charter contract with federal agency, Contract No. 03-6-022-35169.

DR. GEORGE P. WOOLLARD

Hawaii Institute of Geophysics
Replacement of Starboard Main Propulsion Engine
State of Hawaii
\$60,000

Replacement of engine block and crankshaft on the R/V KANA KEOKI.

DR. GEORGE P. WOOLLARD

Hawaii Institute of Geophysics
Preparation of a Bouguer Gravity Anomaly Map of Latin America
National Science Foundation
\$35,400

The principal investigator for a number of years has been working with scientific colleagues in a number of Latin American countries on the standardization of gravity and the establishment of an integrated network of gravity control bases extending from the United States-Mexican border southward through Central and South America. The ultimate purpose of this network of gravity anomaly maps for studying (1) the relation of gravity in the various geologic and tectonic provinces represented in Latin America which, for the most part, transcends national territorial boundaries; (2) to examine the relations between gravity and the patterns of mineralization; (3) volcanism; (4) seismicity and depths of seismic activity; (5) areas of

low Q; (6) crustal and upper mantle parameter values as defined by seismic refraction measurements and surface wave dispersion studies; and (7) such other geophysical parameters as heat flow and electrical conductivity anomalies.

DR. GEORGE P. WOOLLARD

Hawaii Institute of Geophysics
An Investigation of the NAZCA Lithospheric Plate and its Interaction with the South American Continental Block
National Science Foundation
\$89,600

The NAZCA plate project was initiated in 1971 as a joint research effort by the Hawaii Institute of Geophysics of the U of H and the School of Oceanography of Oregon State University, with supporting collaboration from both individual scientists and various agencies in Colombia, Ecuador, Peru, and Chile. The investigation employed a wide range of marine geophysical, geological and geochemical experimental techniques directed at determining the interrelationship of an oceanic crustal plate tectonic cycle to metallogenesis and eventual ore emplacement. This funding is for the last year of the NAZCA plate project, which will be concluded at the end of 1977.

DR. KLAUS WYRTKI
Hawaii Institute of Geophysics
NORPAX: A Test Program of Four Repeated Hydrographic Sections Between Hawaii and Tahiti. Phase I Test Shuttle
National Science Foundation
\$40,000

The NORPAX plans during the first GARP global experiment will include an oceanographic shuttle between Hawaii and Tahiti. The goal of this shuttle will be to document the low frequency fluctuations of the equatorial circulation with the aim to understand their low frequency dynamics.

DR. KLAUS WYRTKI

Hawaii Institute of Geophysics
NORPAX: The Interaction of Circulation, Sea Level, Heat Storage and Winds over the Pacific Ocean
National Science Foundation
\$459,400

The North Pacific Experiment (NORPAX) is a large multi-institutional research project designed to investigate: (1) very large-scale anomalous surface temperature patterns in the north and equatorial Pacific; and (2) the influence of those temperature anomalies on the world's climate.

DR. RICHARD E. YOUNG
Hawaii Institute of Geophysics
Aspects of the Ecology of Midwater Cephalopods: The Role of Bioluminescence
National Science Foundation
\$119,900

This project will continue an investigation of the roles of bioluminescence in the midwater community as demonstrated by pelagic squid (cephalopods). Behavioral observations of living squid in an ocean-going aquarium system, microscopic examination of photophore structure, and physiological measurements will be coupled to answer the following questions: (1) What structures in these cephalopods are luminescent? (2) What is the structure, functional mechanism, and capabilities of the luminescent organs? (3) In what ways do distance sensory organs besides the eyes interact with the bioluminescent systems in these animals? (4) In what way does bioluminescence in other animals affect the behavior and adaptations of cephalopods? (5) What are the basic behavioral functions of luminescence in these cephalopods? (6) What do bioluminescent functions in cephalopods reveal about the roles of bioluminescence in the oceanic ecosystem?

CONTINUING SERVICE ORDERED PROJECTS



A wind tunnel and special equipment are part of the wind calibration station at Look Laboratory.

Programs reported in an earlier annual report that have continued their activity into this fiscal year are:

DR. W. MANSFIELD ADAMS
Hawaii Institute of Geophysics
Design, Construction, Calibration
and Installation of Seismic Tsunami
Trigger
Civil Defense of Hawaii
\$40,000

DR. W. MANSFIELD ADAMS
Hawaii Institute of Geophysics
Seismic Prospecting for Magma
Reservoirs to Increase the Known
Geothermal Reserves of the World
National Science Foundation
\$65,400

DR. JAMES E. ANDREWS
Hawaii Institute of Geophysics
Mongese Resources
NOAA/Sea Grant/08 Year
\$36,678

DR. EDUARD BERG
DR. GEORGE SUTTON

SIMO LAURILA
Hawaii Institute of Geophysics
Crustal Deformation Observations
National Aeronautics & Space
Administration
\$329,853
(Total amount awarded/\$345,865)

DR. ROBERT BUJDEMEIER

DR. ALBERT H. BANNER
Hawaii Institute of Marine Biology &
Hawaii Institute of Geophysics
The Hydrochemistry of Enewetak
Atoll & Toxicity Levels in Fish
Populations at Enewetak, Marshall
Islands
Energy Research & Development
Administration
\$202,975
(From 7/1/74 to 9/30/77)

DR. ROBERT BUJDEMEIER
DR. STEPHEN V. SMITH
Hawaii Institute of Geophysics &
Hawaii Institute of Marine Biology
Corals as Remote and Restrospec-
tive Environmental Recorders
National Science Foundation
\$50,000

DR. ROBERT M. BULLOCK
Hawaii Agricultural Experimental
Station
Kona Coffee/Alternate Crops
State of Hawaii
Department of Agriculture
\$26,500
(Total amount awarded/\$53,000)

DR. ROBERT M. BULLOCK
Hawaii Agricultural Experiment
Station
Moloka Papaya Trust
Kauai Task Force
State of Hawaii
\$24,000
(Total amount awarded/\$35,000)

DR. JOHN BYSTROM
College of Arts & Sciences
Pan-Pacific Education and Com-
munication Experiments by Satellite
State of Hawaii/Legislative
Appropriation
\$1,229
(Total amount awarded/\$10,729)

DR. THOMAS CLARKE
Hawaii Institute of Marine Biology
Ecology of Pelagic Fishes in the
Central Pacific Ocean
National Science Foundation
\$102,300

DR. DOAK C. COX
Department of Geology and
Geophysics
Application of Sedimentation
Controls
State of Hawaii/Office of
Environmental Quality Control
\$34,060

DR. DOAK C. COX
Environmental Center
Hawaii Environmental Simulation
Laboratory
Ford Foundation
\$400,000
(From 10/2/72 to 10/1/76)

DR. DOAK C. COX
Environmental Center
Hawaii Environmental Simulation
Model
National Science Foundation
\$99,100
(From 10/1/72 to 10/31/76)

DR. DOAK C. COX
DR. JOHN HOLMSTROM
DR. COSTAKIS PAPACOSTAS
DR. PETER HO
Environmental Center and
Hawaii Environmental Simulation
Laboratory
Systems and Methodologies for
Carrying Capacity Analysis
State of Hawaii/Office of Environ-
mental Quality Control
\$40,000

DR. VINCENT DE FEO
Department of Reproductive Biology
Research and Training in Reproduc-
tive Biology
Ford Foundation
\$425,000
(From 7/30/71 to 7/31/78)

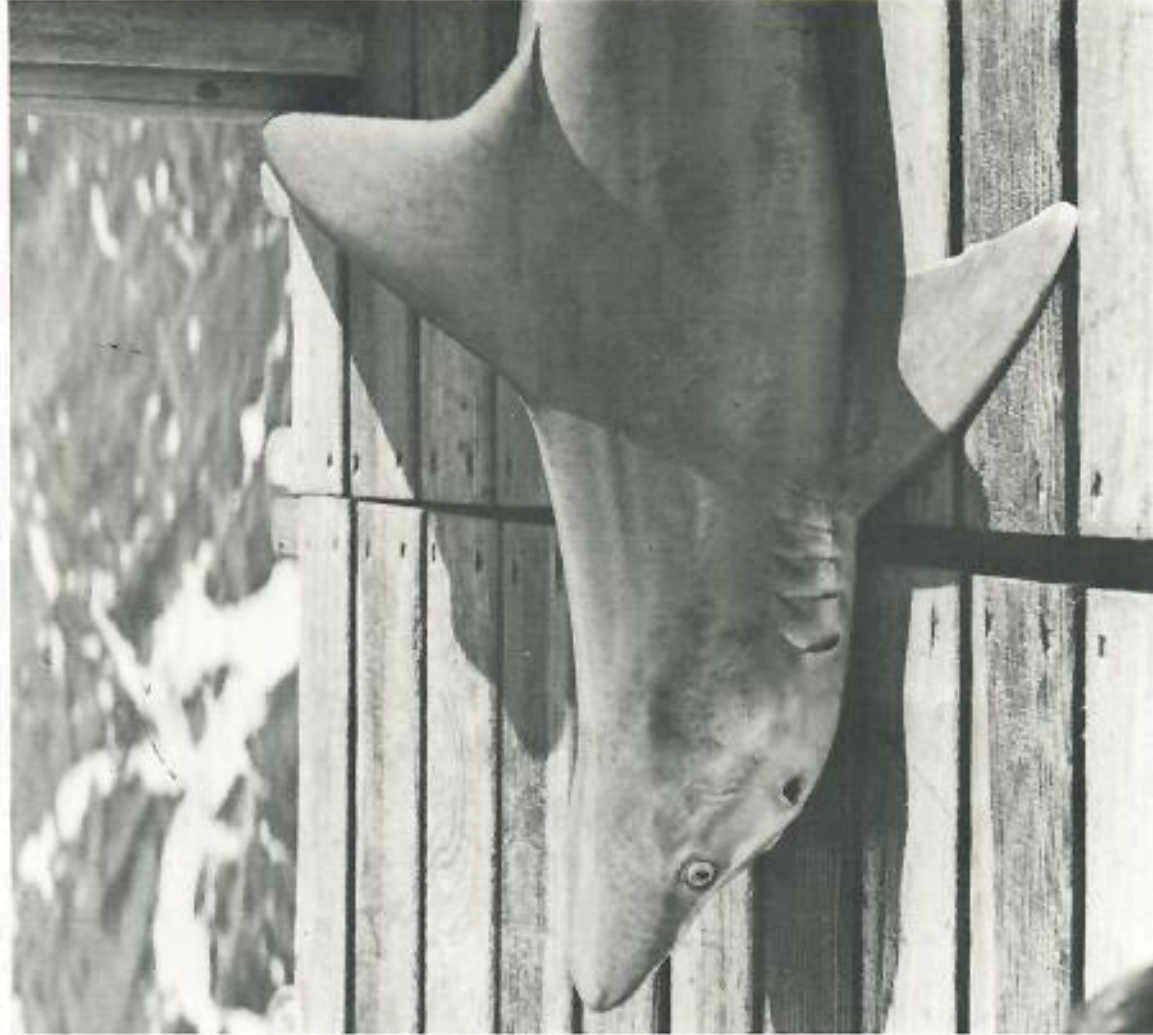
MR. TOM DINELL
Pacific Urban Studies & Planning
Program
Hawaii Coastal Zone Management
Program 1975
State of Hawaii/Department of
Planning & Economic Development
\$290,000
(From 7/1/75 to 8/31/76)

DR. MAXWELL DOTY
Department of Botany
Production of Food Colloids

- NOAA/Sea Grant/08 Year \$116,702
- MR. JOE A. HANSON**
Office of Marine Programs
Secured Advancement of Industrial Societies
NOAA/Sea Grant/08 Year \$24,740
- DR. TOMBO HIROHATA**
DR. ABRAHAM NOMURA
Pacific Biomedical Research Center
Conduct a Combined Study of the Possible Association of Dietary Factors and Noncontraceptive Exogenous Estrogens with Breast Cancer
National Cancer Institute \$210,000
(Total amount awarded/\$310,000)
- DR. DONALD HUSSONG**
Hawaii Institute of Geophysics
Geological and Geophysical Study of IPOD Drill Site Near 22°N and 177°W
National Science Foundation \$165,929
(Total amount awarded/\$246,193)
- DR. J. T. JEFFERIES**
Institute for Astronomy
Support Services Applicable to Institute for Astronomy
Mauna Kea Observatory \$30,000
- DR. PETER KROOPNICK**
Hawaii Institute of Geophysics
GEOSCS - Isotopic Measurements
National Science Foundation \$95,700
(From 1/1/76 to 6/30/78)
- MR. RONALD LINSKY**
Sea Grant Program
Advisory Services Project
NOAA/Sea Grant/08 Year \$170,766
- DR. MURLI H. MANGHANI**
Hawaii Institute of Geophysics
US-Japan Seminar on High Pressure Research Applications in Geophysics
National Science Foundation \$6,500
- DR. STANLEY V. MARGOLIS**
Hawaii Institute of Geophysics
Sedimentary and Biogenic Influence on the Microstructure and Chemistry of Pacific Manganese Nodules
National Science Foundation \$41,200
- MR. JERROLD M. MICHAEL**
School of Public Health
Health Manpower Planning Project
Public Health Service/Health Resources Administration \$110,530
- DR. DOUGLAS L. OLIVER**
Department of Anthropology
Field Studies in Anthropology
Demography Geography
Bougarville Copper Pty. Limited \$21,835
- MS. ROSE PFUND**
Sea Grant Program
Program Management Publications
NOAA/Sea Grant/08 Year \$100,997
- DR. LAWRENCE H. PIETTE**
Pacific Biomedical Research Center
Cancer Center Support Grant
Department of Health, Education and Welfare \$1,130,458
(Continued support to 1/31/78)
- DR. LAWRENCE H. PIETTE**
Pacific Biomedical Research Center
Exploratory Studies in Cancer Research
National Cancer Institute \$204,474
- DR. JOHN SHUPE**
College of Engineering
Geothermal Energy Laboratory
State of Hawaii \$80,000
- DR. JOHN SHUPE**
College of Engineering
Geothermal Energy Laboratory
Experiments
Energy Research and Development Administration \$387,748
(Total amount awarded/\$953,059)
- DR. J. A. SILVA**
DR. GORDON Y. TSUJI
Department of Agronomy and Soil Science
Crop Production & Land Capabilities of a Network of Tropical Families
Agency for International Development \$648,557
(From 7/1/74 to 7/31/77)
- DR. CLIFFORD W. SMITH**
Department of Botany
U.H. Cooperative National Park Service Unit
U.S. Department of the Interior \$1,200
- National Park Service \$9,200
(Total amount awarded/\$69,900)
- DR. STEPHEN V. SMITH**
Hawaii Institute of Marine Biology
Responses of a Tropical Estuary to Relaxation of Sewage Stress
U.S. Environmental Protection Agency \$189,160
(Total amount awarded/\$349,404)
- DR. STEPHEN V. SMITH**
Hawaii Institute of Marine Biology
Management of the Mid Pacific Marine Laboratory
Energy Research & Development Administration \$356,196
(From 7/1/74 to 9/30/76)
- DR. MARTIN VITOUSEK**
Hawaii Institute of Geophysics
North Pacific Experiment
(NORPAX) Line Islands Monitoring
National Science Foundation \$110,400
(Total amount awarded/\$220,300)
- DR. MARTIN VITOUSEK**
DR. ROBERT HARVEY
Hawaii Institute of Geophysics
Kaula Islands Taurani
Measurements
U.S. Department of Commerce \$10,000
(Total amount awarded/\$60,082)
- DR. JAW-KAI WANG**
Agricultural Engineering Department
A Systematic Approach to Irrigated Rice Production Planning in Bicol River (Philippines)
U.S. Agency for International Development \$12,000
- DR. GEORGE P. WOOLLARD**
Hawaii Institute of Geophysics
Geophysical and Geological Investigations of the Western Pacific Ocean
National Science Foundation \$212,000
- DR. GEORGE P. WOOLLARD**
Hawaii Institute of Geophysics
Support of Ship Operations
National Science Foundation \$72,800
(Total amount awarded/\$2,972,900)
- DR. GEORGE P. WOOLLARD**
DR. CHARLES E. HELSLEY
Hawaii Institute of Geophysics
Proposed Utilization of the University of Hawaii R/V MOANA WAVE
- in the National Oceanic and Atmospheric Administration's Outer Continental Shelf Environmental Assessment Program
National Oceanic and Atmospheric Administration \$402,672
(Total amount awarded/\$844,735)
- DR. GEORGE P. WOOLLARD**
Hawaii Institute of Geophysics
An Investigation of the NASA Lithospheric Plate and Its Interaction with the South American Continental Block
National Science Foundation \$224,600
(Total amount awarded/\$2,386,300)
- DR. GEORGE P. WOOLLARD**
Hawaii Institute of Geophysics
Marine Technician Support
National Science Foundation \$60,000
(Total amount awarded/\$282,748, from 12/1/73 to 5/31/77)
- DR. GEORGE P. WOOLLARD**
Hawaii Institute of Geophysics
Hawaii Institute of Geophysics
- Magneto-Telluric Sounding Using Deep Ocean Tri-Axial Field Management
National Science Foundation \$16,400
(Total amount awarded/\$39,200)
- DR. GEORGE P. WOOLLARD**
Hawaii Institute of Geophysics
Oceanographic Equipment
National Science Foundation \$173,000
- DR. GEORGE P. WOOLLARD**
Hawaii Institute of Geophysics
Acoustic, Geophysical, Chemical and Physical Oceanographic Environments in the Pacific Ocean
Office of Naval Research \$1,091,486
(Total amount awarded/\$3,247,857)
- DR. ROBERT M. WORTH**
School of Public Health
Leprosy Surveillance of Pingelapese Population
National Institutes of Health \$8,385
(Total amount awarded/\$24,355)
- DR. RICHARD YOUNG**
Hawaii Institute of Geophysics
Aspects of the Ecology of Mid-Water Cephalopods from the Waters off Oahu, Hawaii: III The Role of Bioluminescence
National Science Foundation \$97,300
(Total amount awarded/\$156,800, from 6/1/72 to 6/30/77)
- DR. KLAUS WYRTKI**
Hawaii Institute of Geophysics
North Pacific Experiment
Watch
National Science Foundation \$149,900
- DR. KLAUS WYRTKI**
Hawaii Institute of Geophysics
North Pacific Experiment
(NORPAX): Studies on the Interaction of Circulation, Sea Level, Heat Storage and Winds over the Pacific Ocean
National Science Foundation \$66,300
(Total amount awarded/\$490,300)



A joint effort between the Marine Advisory Program and the State's Department of Planning and Economic Development aims to promote the catching and eating of shark, an underutilized source of seafood in Hawaiian waters.



NEW DIRECT PROJECTS

DR. JAMES ANDREWS
Hawaii Institute of Geophysics
MAC/Mongose Nodules
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #117
\$66,000

The Research Corporation shall assist in the assessment of the manganese resources of the Hawaiian archipelago, including the laboratory analysis of samples and the field photographic surveying and sample collecting.

MR. GEORGE BALAZS
Hawaii Institute of Marine Biology
MAC/Green Sea Turtle
Management Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #118
\$18,363

To conduct site surveys and studies on the Hawaiian green sea turtle.

DR. WAYNE BALDWIN
Hawaii Institute of Marine Biology
MAC/Tuna Batifish Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #114
\$10,000

To develop a culture system for the mass production of topminnows as live baitfishes for the development of skipjack tuna fisheries.

MR. JOHN BALL
Marine Advisory Program
MAC/Marine Conservation
State of Hawaii/Marine Affairs
Coordinator
MAC/Task Order #135
\$17,864

The Research Corporation shall assist in the Marine Advisory Program production of: (1) "Do's and Don'ts for Whalewatchers" pam-

phlet; (2) "Marine Mammal Awareness" 12 radio spots and six TV spots; (3) "Whales in Hawaii" materials; (4) "Conserving Hawaii's Marine Resources"; (5) "Fish Conservation in Old Hawaii" publication; (6) "Fish and Game Regulations"; and (7) "Fish Laws in Hawaii".

DR. JOHN BARDACH
Hawaii Institute of Marine Biology
MAC/Stoney Coral Project
State of Hawaii/Marine Affairs
Coordinator
\$9,854

To carry out a study of the stoney coral living resources of Oahu, including assessment of the prevailing harvesting efforts and the flow of the products sold.

DR. EDWARD BECKMAN
Department of Physiology
MAC/Mobile Recompression
Facility
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #130
\$8,100

The Research Corporation will assist Makai Ocean Engineering, Inc. in assembling the mobile recompression facility. The mobile recompression chamber will be an excellent instructional and educational facility for researchers and students, and as an emergency facility to treat diving and other physiological diseases throughout the State.

MR. CLAUDE BERTHOUD
Canada/France/Hawaii Telescope
Corporation
\$98,479

The Research Corporation shall employ personnel for the CFHT's astronomical facility under construction on Mauna Kea, island of Hawaii.

DR. ROBERT BUDDEMEIER
Hawaii Institute of Geophysics
Groundwater Resource Evaluation
Research
Holmes & Narver, Inc./Pacific Test
Division
\$9,638

To conduct scientific research in evaluation of groundwater resources on Enewetak atoll.

DR. JOHN W. BYSTROM
PEACESAT Project
PEACESAT International
Consortium
Government of American Samoa,
American Samoa Community
College
\$27,500

The purpose of this project is to put the PEACESAT satellite ground terminal back into operation in American Samoa under the ownership and operation of the American Samoa Community College. The objective is to establish an experimental base that assures educational benefits and close relationships with the many terminals and institutions in the PEACESAT system in addition to a technically strong ground terminal with low power back-up amplifier.

DR. KEITH CHAVE
MR. DENNIS KAM
Hawaii Institute of Geophysics
MAC/Hawaii Coastal Zone
Data Bank
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #122
\$20,000

The Research Corporation shall assist in the development of the Hawaii coastal zone data bank, including the development of remote-access capabilities, so that marine and marine-related data and information be more readily and rapidly available to all agencies, departments and

others involved in marine or marine environmental management.

MR. WILLIAM R. COOPS
Natural Energy Laboratory of Hawaii
Engineering Studies and Land Surveys of the Ke-ahole Point Site of NELH
State of Hawaii/Department of Planning & Economic Development
Agreement #11 under the Master Agreement
\$46,000

Studies will include land surveys, topographic maps, preliminary utility routing, soil borings, foundation engineering, preliminary road route, subsurface water investigation and drilling of test wells.

MR. WILLIAM R. COOPS
Natural Energy Laboratory of Hawaii
The Preparation of an EIS for NELH Road and Utilities at Ke-ahole Point, Island of Hawaii
Department of Planning and Economic Development
Agreement #4 under the Master Agreement
\$59,000

An environmental impact statement (EIS) shall be prepared to determine the effects of a two-lane access road and electricity, water, telephone, and sewer facilities at the proposed NELH site at Ke-ahole point, island of Hawaii.

DR. JOHN P. CRAVEN
Law of the Sea Institute
University of Rhode Island
\$2,500

The Law of the Sea Institute and the University of Hawaii have signed an agreement to transfer the institute from the University of Rhode Island to the University of Hawaii. Funds transferred to RCUH to close out University of Rhode Island account.

DR. JOHN P. CRAVEN
Law of the Sea Institute
University of Hawaii Foundation
\$7,989

Loan from UH Foundation for continued operation of Law of the Sea Institute.

DR. MAXWELL DOTY
Department of Botany
GIDA Funds
Gilbert Islands Development Authority
\$10,000
To defray the expenses of Dr.

Maxwell Doty in continuing his research. These funds may be used, if necessary, as matching funds to the federally funded Sea Grant project.

MR. BRUCE ETHERINGTON
Department of Architecture
Housing Material Research
State of Hawaii/Hawaii Housing Authority
\$7,073

To evaluate selected building materials with potential for low cost housing construction.

MR. HAROLD FUKUNAGA
Hawaii English Program Materials
State of Hawaii/Department of Education
\$1,364,354

Continued funding for the Hawaii English Program.

DR. IAN GIBBONS
Pacific Biomedical Research Center
U.S.-France Exchange Award
National Science Foundation
\$17,150

Dr. Marie-Paul Cozon of France has accepted the U.S.-France exchange award offered to her for a period of study for 15 months in the Pacific Biomedical Research Center under the supervision of Dr. Ian Gibbons.

DR. EUGENE GRABBE
Manganese Nodule Processing
Industry Feasibility and Desirability Study
State of Hawaii/Department of Planning & Economic Development
Agreement #6 under the Master Agreement
\$75,000

A feasibility and desirability study of the manganese nodule processing industry to develop policies and actions that will lead to the utilization of minerals from the Pacific manganese nodule deposits.

DR. EUGENE GRABBE
A Research Project Relating to Development of a Shark Fishery
State of Hawaii/Department of Planning & Economic Development
Agreement #8 under the Master Agreement
\$7,500

The purpose of this demonstration project is to determine the feasibility of developing a shark fishery in Hawaiian waters. Compiling and reporting data on the efficiency and effectiveness of shark capture methods, the methodology em-

played in on-vessel processing of shark meat, distribution and marketing of captured shark, and activities involving the promotion of shark as a valuable food.

MR. JOSEPH G. GROVHOUH
DR. STANLEY MARGOLIS
Naval Undersea Center
Hawaii Institute of Geophysics
Neighbor Island Consultants Project
U.S. Corps of Engineers
\$19,451

The main purpose of this project is to assess the effects in the benthic environment due to sedimentation from the open ocean discharge of harbor dredge spoil. Based on field and laboratory analysis of data obtained at alternate disposal sites, a recommendation of the preferred disposal site at each harbor will be selected by the consultant.

DR. DAVID A. HEENAN
College of Business Administration
The Asia/Pacific Teaching Fellows Program
Fletcher School of Law & Diplomacy, Tufts University
\$21,000

The objectives of the APTFP are primarily, but not limited to, the following: (1) to assist universities and related institutions in Asia/Pacific to expand and develop their teaching programs by providing highly trained instructors capable of operating in foreign countries and (2) to provide opportunities for teaching experience and field research to pre- and post-doctoral individuals, and to recipients of agriculture, business, law, medical and other such corresponding degrees.

DR. SATORU IZUTSU
Regional Medical Program of Hawaii
Department of Health, Education, Welfare
\$165,450

Support of Hawaii RMP projects and their administration.

DR. PHELIP JACOB
MS. BETTY JACOB
Research Corporation of the University of Hawaii
Humanized Productivity Under Advanced Industrial Technology
U.S. Department of Labor
\$57,596

To conduct a study to determine how automation affects worker behavior and attitudes in the automobile factories of the U.S. and 15 European countries.

DR. JAMES JONES
DR. MAXWELL DOTY
The Natural Energy Laboratory of Hawaii
Department of Botany
Ocean Resource Development
Department of Planning and Economic Development
State of Hawaii
\$96,000

Projects to be carried out at the Natural Energy Laboratory of Hawaii Ke-ahole point site: (1) OTEC heat exchanger boatbuilding project - shall investigate the rate of biofouling on the seawater side of a heat exchanger proposed for an OTEC plant concept and (2) closed cycle solar aquaculture development project - to do research, collect and analyze data, and assemble pertinent scientific and technological information leading to the establishment of a land-based aquaculture and solar energy project at the NELH Ke-ahole point site.

DR. JAMES JONES
Marine Programs
Natural Energy Laboratory
A Test of the Isaacs Wave Pump
Department of Planning and Economic Development
Agreement #7 under the Master Agreement
\$43,323

To test the working model of the Isaacs wave pump, the wave powered generator developed at the Scripps Institution of Oceanography, in Hawaiian waters to gather data and insight into system performance and characteristics.

MR. KEN KAMIMURA
Leeward Community College
MAC/Leeward Community College Shark Program
State of Hawaii/Marine Affairs Coordinator
MAC Task Order #123
\$7,500

The training of Leeward Community College marine technician training program students in the fishing and seamanship skills necessary to capture sharks on a regular basis, including the techniques of preparing the sharks for market as soon as they are brought aboard a shark-fishing boat.

MR. KEN KAMIMURA
Leeward Community College
MAC/Shark Control Training Program
MAC Task Order #109
\$7,000

The Research Corporation shall assist the Leeward Community College in the shark abatement and training program, and prepare and be responsible for a charter agreement with the skipper of the chartered vessel, EASY RIDER.

DR. ROBERT KAMINS
Planning for Development of Geothermal Energy Resource
State of Hawaii/Department of Planning & Economic Development
\$6,000

The Research Corporation shall obtain the services of a consultant to conduct research, compile and evaluate information, and prepare written reports of findings, conclusions and recommendations, to assist and advise DPED in planning for the development of Hawaii's geothermal resource.

DR. RICHARD K. C. LEE
Research Corporation of the University of Hawaii
Regional Medical Program of Hawaii
Department of Health, Education, and Welfare
\$76,627

Support special RMP projects.

DR. THEODORE LEE
Look Laboratory
MAC/Wave Attenuation and Wave-Induced Setup
MAC Task Order #112
\$12,000

Laboratory experiments for simulating selected field conditions necessary to provide the basic data to refine mathematical modeling, and to develop a formula or a series of graphs for wave attenuation and wave setup on shallow reefs and for wave characteristics leeward of the reef will be undertaken under this project.

DR. MELVIN H. LEVIN
Arthritis Center
Hemophilia Center Support
Hemophilia Foundation of Hawaii
\$10,224

Contribution from the Hemophilia Foundation of Hawaii for continuation of the Arthritis Center activities.

MR. RON LINSKY
Ocean Research Consulting and Analysis
A Benthic Ecosystem Survey of Ke-ahole Point, Island of Hawaii
Department of Planning and Economic Development
\$10,000

Agreement #6 under the Master Agreement
\$42,364

The consultant shall perform a survey of the benthic ecosystem at Ke-ahole Point, Island of Hawaii, to quantitatively characterize the coral reef community, associated macro-invertebrates, and reef fish populations in the ocean waters at Ke-ahole point, Island of Hawaii, and to provide a description of the present habitats in the area proposed for the installation of ocean thermal power conversion equipment in terms of the micromolluscan assemblages present in the sediments.

MR. WILLIAM MADDEN
Oceanic Institute
MAC/Ornamental Fish Culture
State of Hawaii/Marine Affairs Coordinator
MAC Task Order #136
\$10,000

The Research Corporation shall assist the Oceanic Institute in development of a simplified method of ornamental fish culture for eventual utilization by the private sector.

MR. WILLIAM MADDEN
Oceanic Institute
Hawaii Fishpond Resource Assessment
Department of Planning and Economic Development
Agreement #2 under the Master Agreement
\$12,000

An assessment of all potentially usable existing brackish and salt water ponds on the islands of Hawaii, Maui, Oahu, Kauai and Molokai.

DR. SPENCER MALECHA
Department of Genetics
MAC/Malaysian Prawn Genetics
State of Hawaii/Marine Affairs Coordinator
MAC Task Order #115
\$30,000

The Research Corporation shall assist in the continued effort to upgrade existing cultured stocks of *Macrobrachium rosenbergii* through a selective breeding program.

MR. JACK MARR
ICLARM Office
MAC/ICLARM
State of Hawaii/Marine Affairs Coordinator
MAC Task Order #129
\$10,000

The Research Corporation shall

assist the International Center for Living Aquatic Resources Management in the management of its various fisheries and aquaculture research and development projects.

DR. ROBERT C. MAY

Hawaii Institute of Marine Biology
MAC/Moi Aquaculture
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #116
\$15,000

To assess the feasibility of augmenting wild stocks of moai in the Hawaiian Islands by release of hatchery-reared juveniles.

MR. DENNIS W. MCCREA

Pacific Basin Consortium
Department of Health, Education, and Welfare
Office of Education
\$75,000

The goal of the Pacific Basin Consortium is to facilitate the planning and delivery of training to special education personnel within the Pacific working with the school-age handicapped population.

MR. JOHN McMAHON

Marine Programs
MAC/Marine Turtle Study
MAC Task Order #113
\$4,236

The Research Corporation shall assist in the process of tagging sub-adult green sea turtles and studying the sites of constant feeding activity.

MR. JOHN McMAHON

Marine Programs
MAC/Blue Water Marine Laboratory
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #121

To enable the Blue Water Marine Laboratory to carry on its valuable work of introducing Hawaii's high school students to the ocean.

MR. JOHN McMAHON

Marine Programs
Blue Water Marine Laboratory Program
State of Hawaii
Department of Education
\$15,300

Additional funds from the Department of Education to provide direct services to public secondary schools through the Blue Water Marine Laboratory Program.

MR. JOHN McMAHON

Marine Programs
MAC/Papohaku Beach Data Acquisition Project
MAC Task Order #110
\$10,000

The Research Corporation shall assist in the Papohaku beach survey and underwater survey of Mokolina Island. RCUH shall also assist in the proposed invertebrate/substrate and algae surveys.

DR. COLIN NASH

Ocean Institute
MAC/Brine Shrimp Project
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #124
\$10,000

The Research Corporation shall assist the brine shrimp project at the Oceanic Institute in developing techniques for the high density culture of brine shrimp and brine shrimp eggs, and in developing a dependable source of supply of both live brine shrimp and brine shrimp eggs.

DEAN MARY NAUGHTON

Leeward Community College
MAC/R/V NOVI
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #131
\$10,100

For chartering of the University of Hawaii Research Ship R/V NOVI, on a daily charter basis, for use of the Leeward Community College's marine technician training program.

MR. HOWARD PENNINGTON

MAC/The Northwestern Hawaiian Islands Cooperative Survey
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #128
\$23,500

To provide professional, technical, and administrative services required in the support of surveys and investigations of the marine resources of the northwestern Hawaiian Islands.

MR. HOWARD PENNINGTON

MAC/Diving Chambers
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #133
\$2,000

For rental of the temporary Kewalo basin ship support and storage area by the Pacific Equatorial Research Laboratory (PERL) for the tsunami research program.

MR. HOWARD PENNINGTON

MAC/Diving Chambers
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #119
\$47,061

To purchase two Fiori Model 130B recompression chambers.

MS. ROSE PFUND

Sea Grant College Program
MAC/Mokohiki Kai 77
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #125
\$10,000

The Research Corporation shall assist the Sea Grant office in preparation of "Mokohiki Kai 77" for Hawaii's children and adult community so that they may gain a better understanding of Hawaii and the sea and its ocean resources.

DR. COLIN RAMAGE

Hawaii Institute of Geophysics
Wind and Solar Measurement Project
Department of Corporation
County/County of Maui
\$10,000

County of Maui's participation in the wind and solar measurement project. Services to be performed are: To utilize and train students of Maui Community College in the maintenance and operation of the measurement sites, and to purchase two sets of instrumentation for wind and isolation measurements.

MR. LAWRENCE P. RAYMOND

Naval Undersea Center
A Study of the Photosynthetic Efficiency of Algae
Department of Planning and Economic Development
Agreement #3 under the Master Agreement
\$20,108

To develop the test apparatus and procedure to collect data on the photosynthetic efficiency of the marine diatom, *Skeletonema Costatum*, a common algae used in many aquaculture facilities, which is capable of producing large quantities of lipids and oils, and shall gather data to be used to prepare a proposal for substantial federal funding to make algae an economical and practical source of biomass for energy.

DR. KLEONA RIGNEY

Department of Health/State of Hawaii

Implementation for a Cervical Cancer Screening Program

National Cancer Institute
\$429,133

The long-term goal of the Cervical Cancer Screening Program is to effect a significant reduction in invasive cervical cancer in the State.

DR. JOHN SHUPE

College of Engineering
Hawaii Natural Energy Institute
State of Hawaii/Department of Planning & Economic Development
Agreement #10 under the Master Agreement
\$213,000

Continued operation of HNEI to maintain a research center for alternate sources of energy in Hawaii; maintain liaison with federal, state, and county government agencies and public and private organizations involved in alternate energy research and development; maintain a clearinghouse of information on the alternate energy projects in the State.

DR. JOHN SHUPE

College of Engineering
Wind and Solar Surveys
Department of Planning and Economic Development
Agreement #1 under the Master Agreement
\$135,000

This project will be a comprehensive research program to obtain an accurate record of wind and solar insolation patterns throughout the islands to establish the feasibility of wind and solar energy conversion and to assure optimum site selection for wind and solar installations in the State of Hawaii. The research shall also include a systematic examination of potential solar and wind energy applications.

DR. JOHN SHUPE

College of Engineering
Hawaii Geothermal Project/Well Testing Program
Department of Planning & Economic Development
\$66,406

To undertake part of a comprehensive well-testing and analysis program of the Hawaii Geothermal Project's HGP-A.

MR. CLIFF SLATER

Deep Water Exploration, Ltd.
MAC/Precious Coral Management
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #134
\$1,050

To obtain data on precious coral beds in State waters which is needed by the Division of Fish and Game.

DR. STEPHEN V. SMITH

Hawaii Institute of Marine Biology
MAC/CHN Analyzer
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #127
\$10,915

To assist HIBM in the purchase of one Perkin-Elmer CHN analyzer for the various ongoing environmental and aquaculture nutritional projects vital to the State.

DR. STEVEN STRONG

Maui Memorial Hospital
MAC/Recompression Chambers
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #126
\$20,000

The Research Corporation shall assist in the establishment of a recompression chamber (also known as a hyperbaric oxygen chamber) in the intensive care unit of Maui Memorial Hospital.

DR. STEPHEN UHALLEY, JR.

Pacific Asian Affairs Council

College of Continuing Education & Community Services
State of Hawaii
\$38,617

The development and support of 44 chapters located in public and private schools and institutions of higher education throughout the State, having a combined active membership of approximately 1000 students who will provide activities on each of the islands.

DR. JAW-KAI WANG

Department of Agricultural Engineering
MAC/Prawn Production and Management Systems
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #132
\$15,000

Commercial prawn production in Hawaii is forecast to expand to several hundred ponds acres in the next few years, and expansion would be even greater if a major export market can be developed. The Research Corporation shall assist and support the prawn production and management systems development project.

MR. GEORGE YUEN

Data Base Project
Department of Health
State of Hawaii
\$8,529

Funds to be used to develop a data base for common reporting, evaluation, and planning for maternal and child health services.

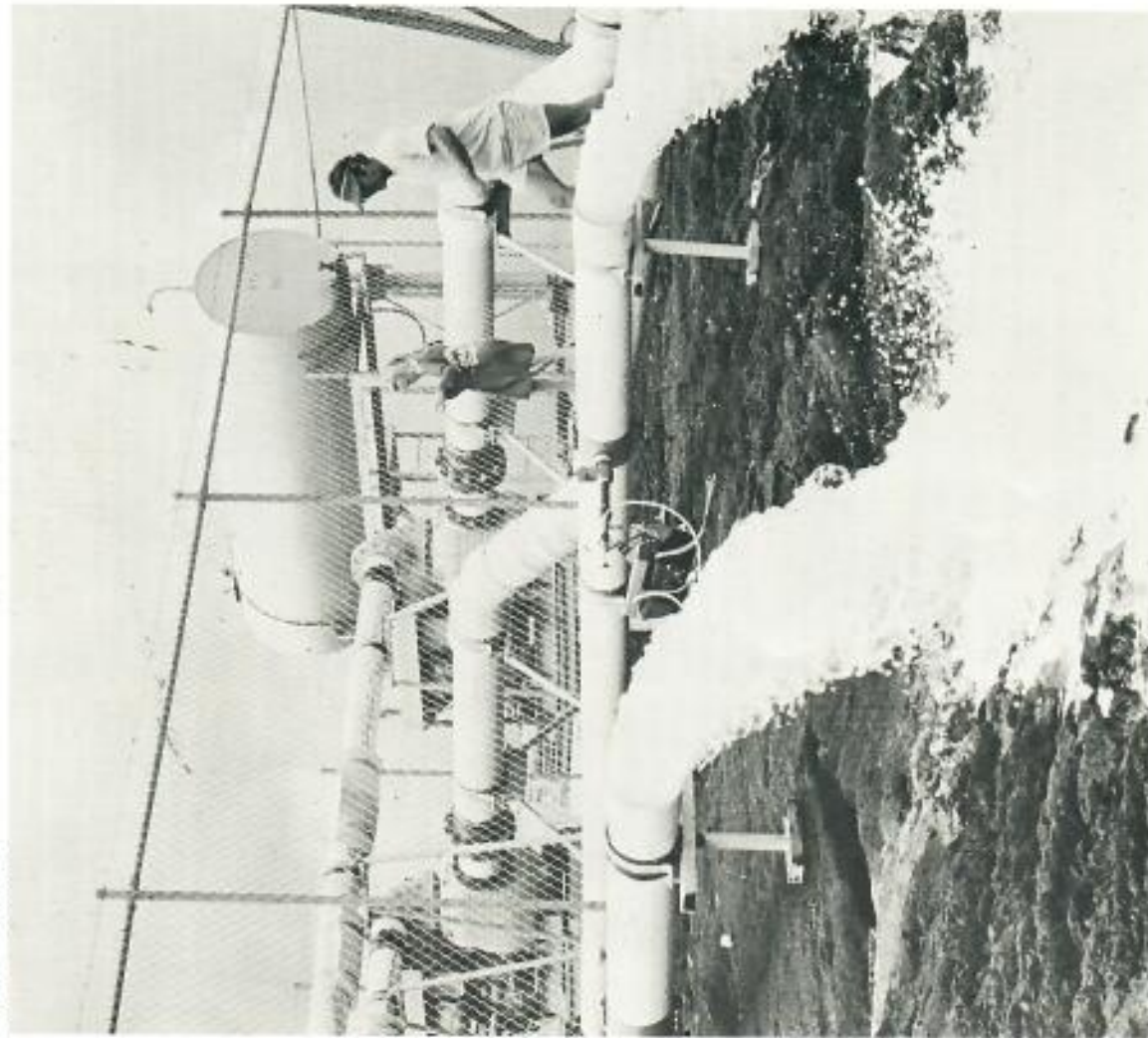
MR. GEORGE YUEN

Developmental Disabilities Training Grant
Department of Health
State of Hawaii
\$40,000

To conduct a training program for home operators and potential home operators of the developmentally disabled population.

CONTINUING DIRECT PROJECTS

Warm surface waters are pumped through a test section of heat exchangers in a proposed Ocean Thermal Energy Conversion (OTEC) system at the Natural Energy Laboratory.



Programs reported in an earlier annual report that have continued their activity into this fiscal year are:

DR. JAMES ANDREWS
Hawaii Institute of Geophysics
Manganese Nodules
Marine Affairs Coordinator
State of Hawaii
\$87,000

DR. FREDERICK M. CASCIANO
Department of Ocean Engineering
Offshore Sand Sampling
Marine Affairs Coordinator
State of Hawaii
\$44,729

DR. S. ALLAN CATTELL
DR. ROBERT TAIT
Environmental Consultants,
Incorporated
Christmas Island Brine Shrimp
Gilbert & Ellice Islands
Development Authority
\$47,200

MR. WILLIAM R. COOPFS
Research Corporation of the
University of Hawaii
Natural Energy Laboratory
Marine Affairs Coordinator
State of Hawaii
\$50,000

MR. WILLIAM R. COOPFS
Research Corporation of the
University of Hawaii
Natural Energy Laboratory
County of Hawaii
\$50,000

DR. JOHN P. CRAVEN
MR. WILLIAM R. COOPFS
Marine Programs
Makapuu Point Pier Management
Marine Affairs Coordinator
State of Hawaii
\$5,000

DR. JOHN P. CRAVEN
DR. JAMES H. JONES
Marine Programs
OTEC Studies (Ocean Thermal
Energy Conversion)
Marine Affairs Coordinator
State of Hawaii
\$38,000

DR. JOHN CRAVEN
Marine Programs
Maintenance and Repair of TINKERI
Marine Affairs Coordinator
State of Hawaii
\$5,000

DR. ANDREW DEAN
Pacific Research Section
Continued Investigation of Parasitic,
Viral and Other Infectious Diseases
in Hawaii and the Pacific Islands
National Institutes of Health
\$214,964
(Total amount awarded: \$1,471,368)

DR. MAXWELL DOTY
Department of Botany
Ocean Energy Farm
Marine Affairs Coordinator
State of Hawaii
\$10,000

DR. MAXWELL DOTY
Department of Botany
Marine Colloids
Marine Colloids, Inc.
\$20,350

DR. EVAN C. EVANS, III
Naval Undersea Center
Environmental Research Analysis &
Data Bank Operation &
Maintenance
Department of the Navy
\$87,830.47

DR. EVAN C. EVANS, III
Naval Undersea Center
Marine Microcosm Facility &
Processing Center

Marine Affairs Coordinator
State of Hawaii
\$5,000

DR. ROBERT A. GRACE
Department of Civil Engineering
Pipeline Survival Under Ocean
Wave Attack
Marine Affairs Coordinator
\$15,600

MR. EDWARD GREANEY
State of Hawaii Government
Organization Commission
State of Hawaii
\$70,000

DR. PHELIP HELFRICH
Salmon Fishery
Rockefeller Foundation
\$25,000

DR. SATORU IZUTSU
Regional Medical Program of Hawaii
Department of Health, Education &
Welfare
\$800,142

MRS. BETTY M. JACOB
Research Corporation of the
University of Hawaii
Educational and Cultural Exchange
Program
Department of State
\$6,000

MRS. BETTY M. JACOB
Research Corporation of the
University of Hawaii
Multi-National Study of Automation
& Industrial Workers in the Auto-
mobile Industry for the Economic
Development Administration
U.S. Department of Commerce
\$5,000

DR. RICHARD Y. P. JOUIN
Department of Planning and
Economic Development
Income Expenditure Accounts Study

FISCAL REVIEW

Department of Planning & Economic Development State of Hawaii \$136,500	MR. JOHN McMAHON Marine Programs Reef Habitat Marine Affairs Coordinator State of Hawaii \$6,000	DR. M. RAY SMITH DR. OLIVER WAYMAN DR. HARRY AKO DR. RALPH HEINICKE Department of Agricultural Engineering Department of Animal Science Department of Agricultural Biochemistry State of Hawaii/Department of Planning & Economic Development \$136,392
MR. KEN KAMIMURA Vocational Education/Leeward Community College Leeward Community College Marine Technology Program Marine Affairs Coordinator State of Hawaii \$5,600	MR. HOWARD PENNINGTON Marine Affairs Coordinator Keenelo Basin Storage Marine Affairs Coordinator State of Hawaii \$2,800	DR. M. RAY SMITH DR. OLIVER WAYMAN DR. HARRY AKO DR. RALPH HEINICKE Department of Agricultural Engineering Hawaii Agricultural Experiment Station/College of Tropical Agriculture Pineapple By-Products Research State of Hawaii/Department of Planning & Economic Development \$225,292
MR. PHILIP LAMBERSON Hawaii Institute of Marine Biology Agricultural Research Project/Enuewetok Lawrence Livermore Laboratory \$10,000	DR. LAWRENCE PIETTE Pacific Biomedical Research Center Cancer Construction Construction Grant DHEW/National Cancer Institute \$2,635,305	DR. M. RAY SMITH DR. OLIVER WAYMAN DR. HARRY AKO DR. RALPH HEINICKE Department of Agricultural Engineering Hawaii Agricultural Experiment Station/College of Tropical Agriculture Pineapple By-Products Research State of Hawaii/Department of Planning & Economic Development \$225,292
DR. MELVIN LEVIN Arthritis Center Arthritis Center of Hawaii State of Hawaii \$60,000	DR. LAWRENCE PIETTE Cancer Center of Hawaii Planning for a Community-Based Cancer Control Program National Cancer Institute \$257,198	DR. LEIGHTON TAYLOR MAC/Waikiki Aquarium State of Hawaii/Marine Affairs Coordinator Additional funds on MAC Task Order #127 \$37,500
DR. SPENCER MALECHA Department of Genetics Malaysian Prizun Marine Affairs Coordinator State of Hawaii \$10,000	DR. LAWRENCE PIETTE Pacific Biomedical Research Center Continuation of Demographic Cancer Research Program in Hawaii DHEW/National Cancer Institute \$526,761 (Total amount awarded/\$1,446,504)	MR. WALTER WATSON Department of Land & Natural Resources Hawaii Water Resources Regional Study Division of Water and Land Development State of Hawaii \$52,000
MR. JACK MARR International Center for Living Aquatic Resources Management (ICLARM) Marine Affairs Coordinator State of Hawaii \$20,000	DR. JOHN SHUPE Center for Engineering Research Hawaii Natural Energy Institute Department of Planning & Economic Development \$217,272	DR. GEORGE P. WOOLLARD Hawaii Institute of Geophysics Coastal Zone Research Ship Marine Affairs Coordinator State of Hawaii \$18,500
MR. JACK MARR International Center for Living Aquatic Resources Management (ICLARM) The Rocketteller Foundation \$522,000	DR. JOHN SHUPE College of Engineering Hawaii Geothermal Project Hawaiian Electric Company & Hawaii Electric Light Company \$45,000	MR. GEORGE YUEN Developmental Disabilities Program Department of Health State of Hawaii \$146,347
MR. JOHN McMAHON Marine Programs Blue Water Marine Laboratory 1976 Marine Affairs Coordinator State of Hawaii \$8,000	DR. SANFORD SIEGEL DR. THOMAS SPIETEL Department of Botany Salt Water Agriculture Marine Affairs Coordinator State of Hawaii \$3,600	

VOLUME OF BUSINESS BY SPONSORING AGENCY
FISCAL YEAR ENDING JUNE 30, 1977

UNIVERSITY PROJECTS

	Volume of Business	Percent
Federal		
Office of Naval Research	\$2,024,290	17.2
National Science Foundation	1,255,803	10.7
National Oceanographic & Atmospheric Administration	858,050	7.3
National Institutes of Health	731,656	6.2
Energy Research & Development Administration	569,374	4.8
Agency for International Development	282,893	2.4
Department of Commerce	251,833	2.1
National Aeronautics & Space Administration	183,995	1.6
Environmental Protection Agency	160,455	1.4
Department of Defense/Department of Navy	78,409	.7
Department of Interior	75,474	.6
Department of Defense/Department of Army	12,445	.1
Department of Housing & Urban Development	8,642	.1
Total U/H Federal Projects	\$6,493,319	55.2

Non-Federal

State & County Governments		
University of Hawaii at Manoa		
Hawaii Institute of Geophysics/Ship Operations & Snug Harbor	\$ 432,000	3.8
Continuing Education/Comprehensive Training	153,640	1.3
Miscellaneous University of Hawaii Purchases	190,374	1.6
Department of Agriculture	26,177	.2
Department of Planning & Economic Development	14,031	.1
Civil Defense, State of Hawaii	13,634	.1
Kauai Task Force, State of Hawaii	9,052	.1
Others		
Ford Foundation	23,370	.2
Bouganville Copper Co., Ltd.	1,800	-
Government of American Samoa, PEACESAT	481	-
Total U/H Non-Federal Projects	\$ 864,559	7.4
Total U/H Projects	\$7,357,878	62.6

VOLUME OF BUSINESS BY SPONSORING AGENCY
FISCAL YEAR ENDING JUNE 30, 1977 (continued)

DIRECT PROJECTS

	Volume of Business	Percent
Federal		
National Institutes of Health	\$1,693,628	14.4
Office of Naval Research	45,557	.4
Department of Labor	26,117	.2
National Science Foundation	10,942	.1
Energy Research & Development Administration	9,583	.1
National Office of Education	7,270	.1
Department of Defense/Pacific Air Command Air Force	5,776	.1
Department of Commerce	3,118	-
Department of Defense/Department of Army	2,989	-
Total Direct Federal Projects	\$1,804,980	15.4

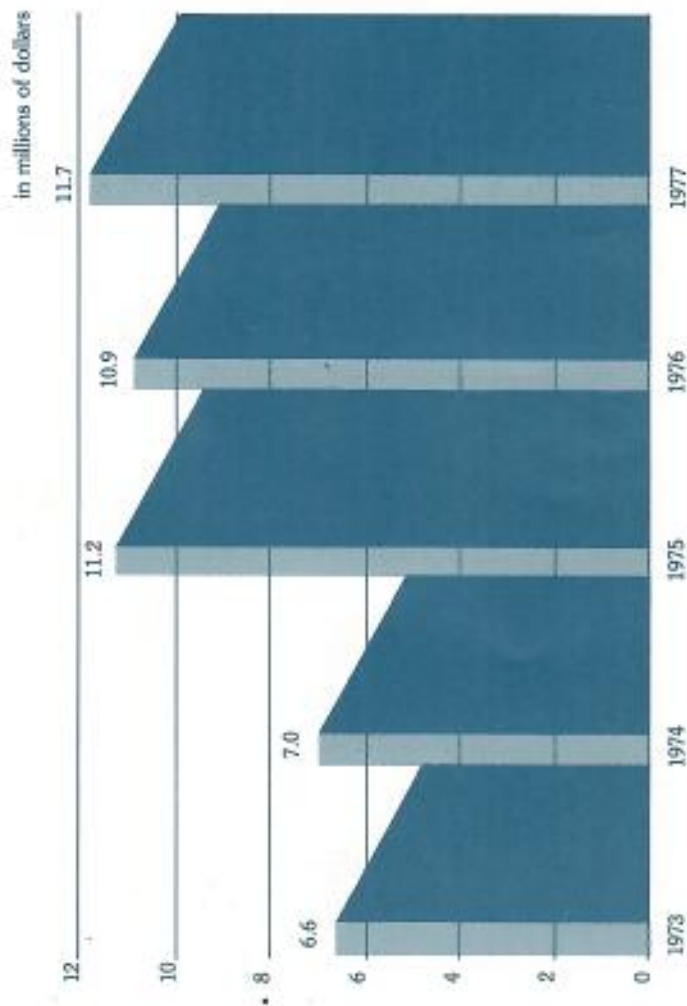
Non-Federal

State & County Governments		
Department of Planning & Economic Development	782,549	6.6
Department of Education (Hawaii English Program Materials)	555,532	4.7
Marine Affairs Coordinator	491,588	4.2
Department of Health	121,706	1.0
Government Organization Commission	65,158	.6
Pacific Asian Affairs Council	40,663	.3
County of Hawaii	17,652	.2
Department of Land & Natural Resources	13,438	.1
County of Maui	10,222	.1
Others		
Rockefeller Foundation, ICLARM	345,322	2.9
Canada/France/Hawaii Telescope Corporation	48,189	.4
Tufts University/Fletcher School of Law & Diplomacy	30,739	.3
North Atlantic Treaty Organization	22,026	.2
Government of American Samoa	21,180	.2
Neighbor Island Consultants	18,842	.2
Gilbert & Ellice Islands Development Authority	4,845	-
Marine Colloids, Inc.	1,059	-
Other Miscellaneous Non-Federal Sponsors	1,958	-
Total Direct Non-Federal Projects	\$2,592,668	22.0
Total Direct Projects	\$4,397,648	37.4
TOTAL PROJECTS	\$11,755,526	100.0

**DISTRIBUTION BY PROJECT DISCIPLINES
FISCAL YEAR ENDING JUNE 30, 1977**

	Amount	Percent
Biomedicine	\$ 2,565,842	21.8
Marine Programs		
Geology & Geophysics	5,099,185	43.3
Fisheries & Aquaculture	704,528	6.0
Environmental	462,432	3.9
Energy Research	948,754	8.1
Social Sciences	762,652	6.5
Publications and Educational Materials	544,722	4.6
Agriculture	428,846	3.7
U.H. Miscellaneous Transactions	238,562	2.1
TOTAL	\$11,755,526	100.0

GROWTH IN PROJECT ADMINISTRATION



EQUIPMENT PURCHASED EXCEEDING \$4,000

Radar, Decca RM1226 with Reflection Plotter	Water System Dual Channel Technician, Corp.	Air-Cooled Engine, and Pump Deutz Mod F4L912
Dilmar Electronics Co.	U.S. Environmental Protection Agency	Pacific Machinery, Inc.
National Science Foundation \$12,730	\$15,000	Department of Planning & Economic Development \$9,984
Gyrocompass, MK37 Mod 1 System with Master Compass \$41780	Camera, Video, S#12315 with Video Recorder S#12475 with Carrying Case	Sechrist Monoplace Hyperbaric System
Sperry Marine Co.	Electronic Systems, Inc.	Sechrist Industries
National Science Foundation State of Hawaii \$9,293	NOAA - Sea Grant \$6,950	Maui County/Marine Affairs Coordinator \$20,000
Camera, Standard Mod 372 Benthos, Inc.	W. A. Hirai and Assoc.	Write Only System, Memodyne Model 131
National Science Foundation \$5,800	Energy Research & Development Administration \$52,155	Memodyne Corp. State of Hawaii \$7,937
Camera, Standard Mod 372 with flash	Radar, Decca RM929	Communication Station
Benthos, Inc.	Radar Electronics Co.	Motorola, Inc.
National Science Foundation State of Hawaii	National Science Foundation \$14,375	Government of American Samoa \$11,240
Recorders, Water Level S#250 Parascientific Corp.	Winch, Coring Monkey Type Dux-9 S#11663 with hydraulic pump	Platemaker, Irek 175
National Science Foundation \$6,321	Markley Machinery Inc.	Variable Focus Electrostatic Smart Supply Co.
Recorders, Water Level S#251 Parascientific Corp.	National Science Foundation \$200,331	Curriculum Research and Development Group \$10,752
National Science Foundation \$6,321	Develocorder Assembly Basic Mod RF400	Collator
Recorders, Water Level S#252 Parascientific Corp.	Teledyne Corp.	Pitney Bowes Co.
National Science Foundation \$6,321	National Aeronautics & Space Administration \$16,242	Curriculum Research and Development Group \$8,046
Range Master II System	TAIL & PCA Coupler Counter System	
Keuffel & Esser, Inc.	Curtin Scientific Co.	
National Aeronautics & Space Administration \$29,317	U.S. Environmental Protection Agency \$7,200	

PAYROLL DISBURSEMENTS

\$3,971,510

TOTAL DOLLAR VOLUME

\$11,755,526

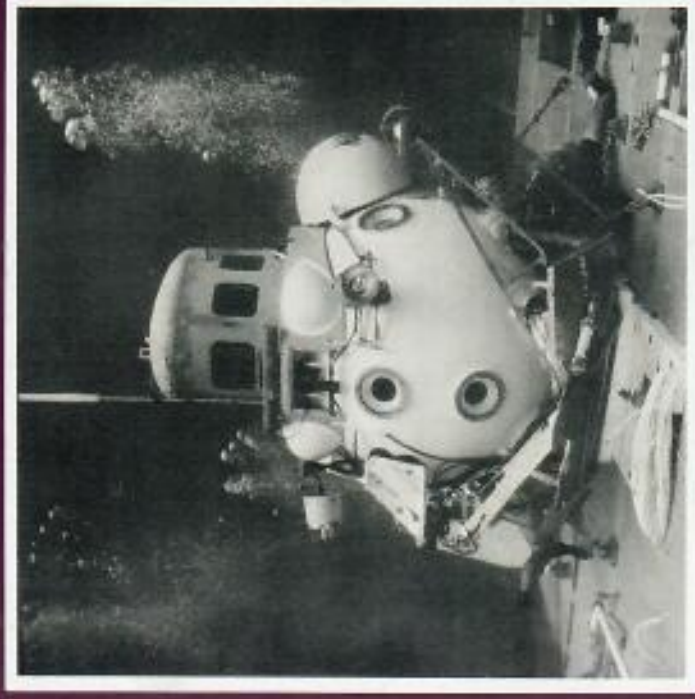
**OFFICERS AND
BOARD OF DIRECTORS
OCTOBER 15, 1977**

Chairman
Franklin Tokioka
Vice Chairman
Fujio Matsuuda
Secretary
Howard P. McLaughan
Treasurer
Sunao Miyabara
Assistant Secretary/Treasurer
Hiideo Kono
Clarence Chang
James F. Gary
Melvyn Murakami
Charles Ora

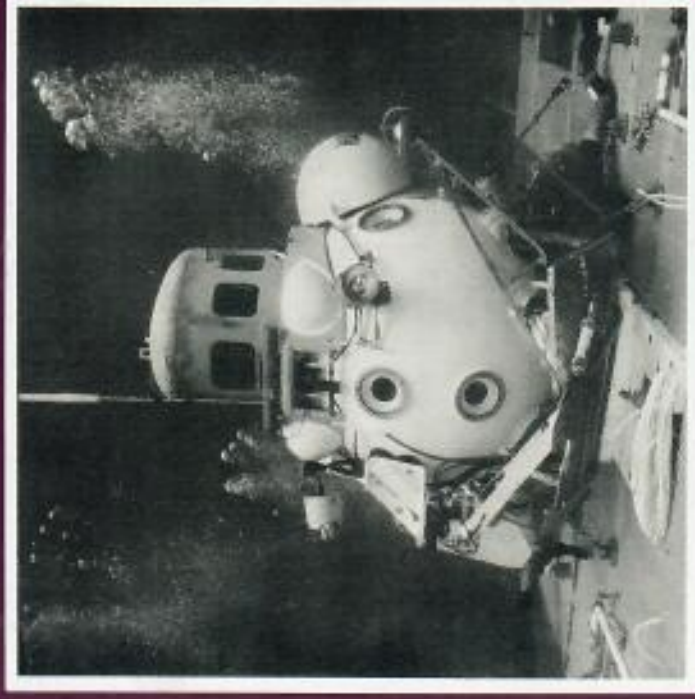
**CORPORATION STAFF
OCTOBER 15, 1977**

Executive Director
Richard K. C. Lee
Director of Administration
William R. Coops
Comptroller
Gilbert K. Oshima
Fiscal Officer
Robert P. Daniel
Administrative Assistant
Tsutomu Higuchi
Administrative Assistant
Cora Chai
Secretary
Tokiko Murakami
Clerk/Stenographer
Sharon Miyamoto
Accountant
Mary Fujihara
Accountant
Katherine T. Higa
Accounting Clerk
Emiko Yamamoto
Accounting Clerk
Janet Kanemoto
Accounting Clerk
Barbara Nakamatsu
Personnel Clerk
Katherine F. Higa
Purchasing Clerk
Gloria Keohohou
Purchasing Clerk
Glennis Marques
Clerk
Karen Fukuda

RCUH ANNUAL REPORT / FISCAL 1978



RCUH ANNUAL REPORT / FISCAL 1978



LETTER TO THE GOVERNOR

Telephone: (808) 955-6344

The Research Corporation of the University of Hawaii

November 1, 1978

The Honorable George E. Ariyoshi
Governor, State of Hawaii
Executive Chambers
Honolulu, Hawaii 96813

Dear Governor Ariyoshi:

Enclosed is the Annual Report of the Research Corporation of the University of Hawaii for the fiscal year ending June 30, 1978, submitted in accordance with the statutory requirements of the enabling legislation by which the Corporation was established.

The business volume of the Corporation achieved a new high with total billings to sponsors exceeding \$12,909,000 which reflects nearly a 10% increase in volume over the comparable prior period. The Corporation continues to increase the number of research projects administered. This orderly growth permits the Corporation staff to maintain the high quality of service to the University, other departments of the State, the Counties, and the federal government. The Board credits this continuing growth to our small and dedicated staff, who provide comprehensive and responsive management services.

A major new direction of the past year is the Corporation working with "Development Groups" in submitting proposals to the United States Department of Energy to assist the State and Counties of Hawaii toward its goal of energy self-sufficiency. The first of these Development Groups consisting of representatives of your Department of Planning and Economic Development, the Natural Energy Institute of the University of Hawaii and the County of Hawaii contracted with the Corporation to submit a proposal for an Electric and Non-Electric Research Facility utilizing the HEP/A Geothermal Well in Puna, Hawaii. This proposal was successful and a contract between the U.S. Department of Energy and the Corporation was signed for an amount exceeding \$6.7 million. We invite your attention to the section of this annual report entitled "Programs" for other Development Group proposals.

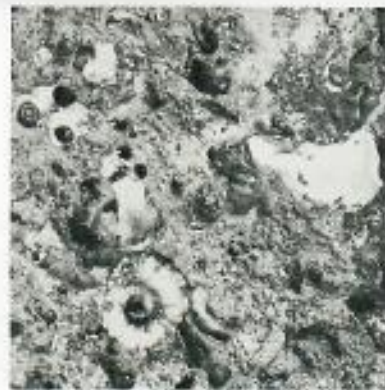
As you review the contents of this report, you will notice the continuing diversity of projects undertaken. The Board believes that the Corporation is continuing to fulfill the expectations of the Legislature. We look forward to new challenges in the future and to continue to serve Hawaii and its people.

Sincerely,

Franklin N. Socolof, Chairman
Board of Directors

Enclosure

THE RESEARCH CORPORATION



Right: Geological studies in the fossilizing process and island formation are part of Waikiki Aquarium's instruction. **Below:** Seashore Life Class—Waikiki Aquarium instruction on field trip looking at life on the reef bench.



The Research Corporation is a non-profit enterprise flexibly designed to assist the University, State and local agencies and the private sector in promoting and implementing scientific, educational and economic development. Focusing attention on problems of the State, Pacific island areas, and developing Pacific rim countries, it functions to make available for their solution the array of technical and professional personnel and facilities within the State. By devising and implementing research and development projects directly or as joint ventures, the Corporation is enabled to work readily with other governmental agencies, international organizations, foreign nations or private businesses.

Purpose

To promote educational, scientific and literary pursuits by:

- Making available to public, private and international agencies the spectrum of expertise represented in the public and private sector of the State of Hawaii.
- Conducting basic and applied research.
- Engaging in joint research, educational and developmental ventures with public, private and international agencies.
- Administering selected research, educational and developmental programs of the University of Hawaii.

- Devising programs and task forces to assist developing Pacific islands and Asian areas through research, educational and developmental activities.
- Sponsoring dissemination of knowledge through publications, lectures, seminars and conferences.
- Assisting the University of Hawaii by providing professorships, technical staff and scholarships.

Organization

The Research Corporation was created by Act 209 of the 1965 State Legislature. The Corporation's enabling legislation is Chapter 307 of the Hawaii Revised Statutes. It is a public instrumentality and body corporate, within the State organizational structure and attached to the University for administrative purposes, as provided for in section 26-35, Hawaii Revised Statutes 1969. The Research Corporation is governed by a nine member Board of Directors comprised of the President and the Director of Research of the University of Hawaii, the Director of the Department of Planning and Economic Development of the State of Hawaii, and six members appointed by the Governor and confirmed by the State Senate.

Operating Flexibility

To develop a closer and more active relationship in promoting cooperative

research, developmental and educational projects as joint ventures among the academic, business and governmental communities, the Corporation by law is permitted to function with great flexibility.

Activities

The Corporation can:

Enter into and perform contracts, subcontracts, grants, leases, cooperative agreements, or other transactions with agencies or instrumentalities of the United States, states, territories or possessions, and with any foreign nation, private person, firm, partnership, association, company or corporation. Implement contracts, grants, leases, cooperative agreements, or other transactions assigned by the University of Hawaii.

Stimulate and promote cooperative research projects and other educational activities by organizing and coordinating personnel from the University of Hawaii, the public and private sector of the State or elsewhere.

Receive gifts, grants, devises, bequests or otherwise from private or public sources.

The Year in Review

Dr. Lee continued to participate in activities of the Cancer Research Center, i.e., meetings of the Executive Committee, the Community-Based Cancer Control Council, two site visits, and the weekly core staff meetings. He was appointed by the University of Hawaii, at the recommendation of the Steering Committee of the Gerontology Development Project, as the Principal Investigator of that project. The Board of the Corporation designated Dr. Lee to serve as the Chairman of the Scientific Review Committee for the Leahi Trust Fund account and program.

Organizational activities relating to

administrative, fiscal, purchasing and personnel matters between University and Corporation staffs were discussed at a planning meeting. A similar meeting was arranged for the staffs of the Hawaii State Department of Planning & Economic Development and the Corporation for the first time.

At the invitation of the National Taiwan University Medical School and the Provincial Health Department of the Republic of China, Dr. Lee visited Taipei for discussions relating to planning and collaboration in cancer research. He attended meetings of the National Science Council in Singapore and the Interim Congress of the Pacific Science Association in Bali. While on this trip, he visited the Schools of Public Health in Diakarta and Bangkok. He had been a WHO consultant for both these schools.

Both Dr. Lee and Mr. Coops attended the annual meeting of University-Connected Research Foundations in New York City.

Mr. Coops continued as administrator of the Natural Energy Laboratory of Hawaii, working with staff and local agencies in planning for the future facilities at Ke-ahole Point, Hawaii.

Together with University representatives, Mr. Oshima went to the Kitt Peak National Observatory in Tucson, Arizona to review their job order accounting system for implementation at the Mid-level Facilities on Mauna Kea.

Professor Milton S. C. Seligson of the University of Hawaii School of Law was appointed on a part-time basis to assist the University of Hawaii Patents and Copyright Committee as well as the Research Corporation for patent and copyright matters.

Over the past five years, the number of core staff employees serving the Corporation continued at the level of seventeen while the business volume of projects increased from \$7 million to \$12.9 million.

Board Activities

Seven meetings were held by the Board of Directors during the past year. A special meeting of the Board was called on August 1, 1977, to approve the purchase of the University's IBM 370-158 computer. The Corporation entered into an agreement to purchase the computer for the University under terms of a lease/purchase arrangement with a major national financial agency.

The September Board meeting was held in Hilo. Board members and staff visited sites of various projects being administered by the Corporation. One of these was a gathering at the Puna Geothermal Well site with several Hawaii State and County officials. The Board and staff were appraised by University Natural Energy Institute of on-going activities at the geothermal site. The Board members journeyed to the Institute for Astronomy Mid-level Facilities at Hale Pohaku with a side trip to the Mauna Kea Observatory at the summit of Mauna Kea. Dr. John Jefferies, director of the Institute for Astronomy, presented the long-range

plans and his hopes for Corporation assistance over the years to the Board during lunch at Hale Pohaku. The Board members visited the site of the Natural Energy Laboratory of Hawaii at Ke-ahole Point and viewed heat exchanger test facilities before returning to Honolulu.

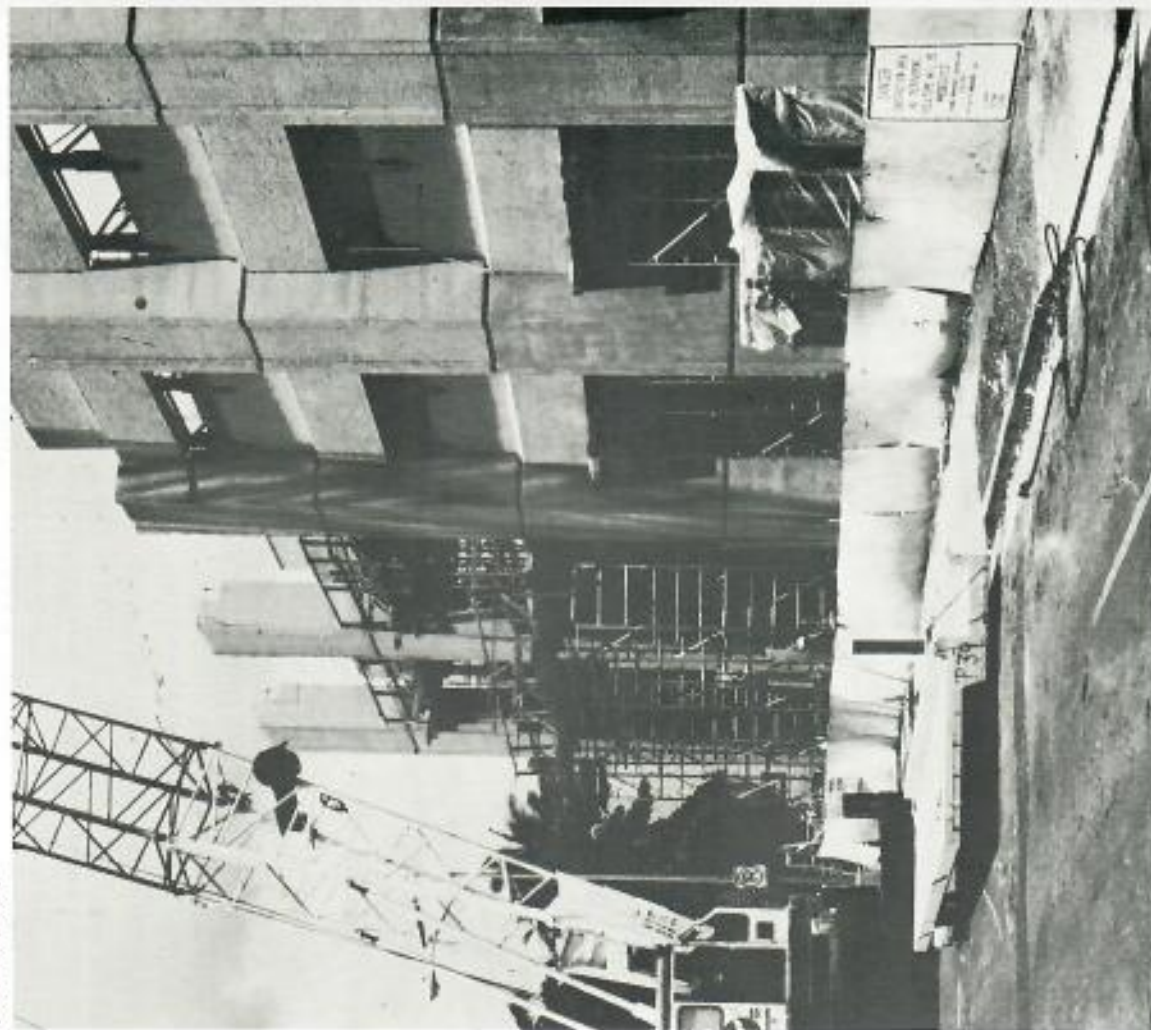
Mr. Franklin Tokioka was re-elected Chairman of the Board at the annual meeting in December.

The Board accepted management of the Leahi Trust Fund. Income from the Trust is designated for support for research in pulmonary diseases. The Board met in May to approve a contract in excess of \$6.7 million with the Department of Energy for the Geothermal Well-head Generator Feasibility Project.

On June 1, 1978, Governor Ariyoshi presided over swearing-in ceremonies for new and continuing members of the Board. Mr. John Yuen from Hilo and Mr. Gerald Pang-Ching from Maui are the two new members of the Board. Mr. Franklin Tokioka, Mr. Sunao Miyabara and Mr. Melvyn Murakami were reappointed to serve another term.

THE PROGRAMS

The Cancer Center of Hawaii under construction with pre-cast wall panels being set in place. The Corporation is responsible for the construction of this University of Hawaii facility.



The Corporation continues to engage in new and diverse programs benefiting the peoples of the State of Hawaii. Several of these major programs will be briefly discussed as they constitute major new directions for the Corporation.

The University of Hawaii entered into a contract with the National Cancer Institute for Community-Based Cancer Control Program in an amount of \$13.2 million over a five-year period. \$6.6 million of this amount will come from the National Cancer Institute; the balance of the funds will be local matching dollars. This program, under the aegis of the Cancer Center of Hawaii, will be administered by the Corporation as are the other programs of the Cancer Center. This program will be an interesting one from a management viewpoint, as major portions of the State matching commitment will be "in-kind" contributions that must be adequately documented to satisfy Federal requirements.

Ground was broken in September of 1977 for a new Cancer Center of Hawaii building, located on the Queen's Medical Center campus on a parcel of land leased to the Corporation on a long-term basis. Governor Ariyoshi made the keynote address at the ground-breaking ceremonies. The Corporation is constructing this building with funds from the National Cancer Institute, the State of Hawaii and funds provided by the

Queen's Medical Center and the Corporation will operate it for the programs of the Cancer Center of Hawaii.

In March of 1978, the Leahi Foundation formally went out of existence, with the establishment of a trust fund to be administered by the First Hawaiian Bank. The trustees of the Leahi Foundation have selected the Corporation to be the recipient of the income of this Trust Fund and to make available grants to qualified local institutions for research in pulmonary diseases. The Corporation has established a Scientific Review Committee and working with the American Lung Association will make a series of grants for research as provided in the trust agreement.

We reported in last year's report on several alternate energy projects in which the Corporation was assisting. A great deal of development has taken place in the ensuing year in this field.

The Department of Planning & Economic Development of the State of Hawaii acted as the lead agency in developing a consortium to develop the Hawaii Geothermal Project Well A in Puna, Hawaii. Other members of the consortium were the Natural Energy Institute of the University of Hawaii and the County of Hawaii. The consortium selected the Corporation as the agency to submit a proposal to the Department of Energy for a geothermal electric and non-



Hawaii Geothermal Project Well A — This 4.1 acre site will be the site of Hawaii's first geothermal electric generator project.

electric research facility, utilizing the HGP-A well. This proposal was well-received by the Department of Energy. A contract in excess of \$6.7 million was signed by the Corporation with the Department of Energy on behalf of the HGP-A Development Group consortium. Progress is well under way to putting a wellhead generator in place and to develop and generate electricity which will be sold to the Hawaii Electric Light Company commencing in 1980 for a demonstration period of two years.

The development group consortium approach worked extremely well combining various areas of jurisdiction within the State in addressing areas of major concern and the selection of the Corporation as its business agent. A similar development group consortium was established with the State of Hawaii

through its Department of Planning & Economic Development, the County of Hawaii and the Natural Energy Institute of the University of Hawaii as the lead agency. A proposal was submitted to Argonne National Laboratories in Chicago in response to a Request for Proposal for a Seacoast Test Facility by the Corporation in June of 1978. This project, if funded, will provide a land-based test facility at Ke-ahole Point which will be the site of continued OTEC component testing over the next several years. We are optimistic that this project will come to fruition.

The Natural Energy Institute of the University of Hawaii was again the lead agency in another development group consortium in developing an Ethanol from Molasses project to be submitted to the Department of Energy. This consortium,

in addition to the University, includes the State of Hawaii through its Department of Planning & Economic Development, the County of Maui and the Hawaiian Commercial and Sugar Company, owners of the now disused rum plant on the Island of Maui. This development group expects to submit a proposal early next fiscal year with the aim of producing alcohol and distributing it within the Island of Maui as a blend of gasoline, or "Gasohol."

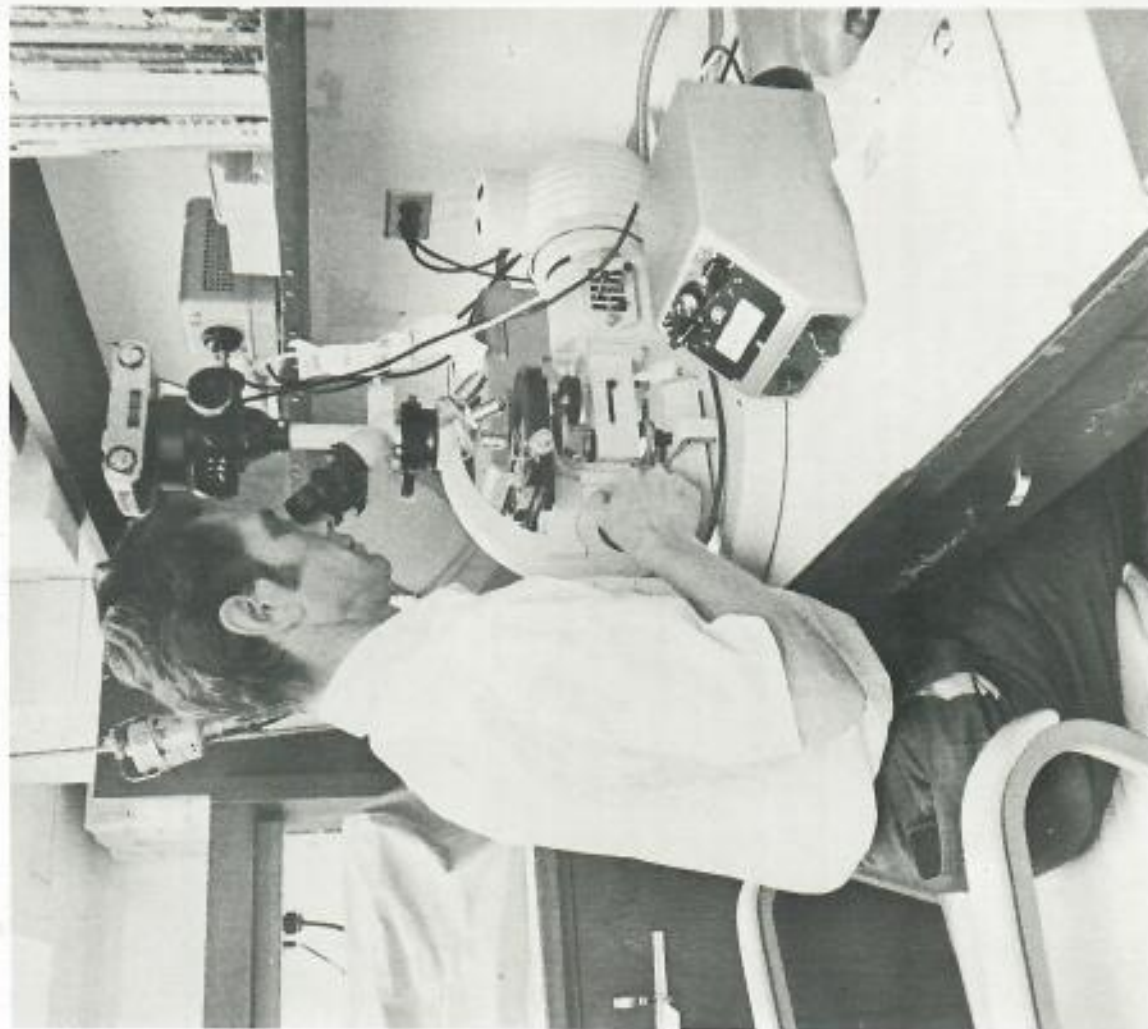
The Corporation is pleased to have been selected by these various development groups to serve as their business agent. The bridge between various agencies of the State and private industry has been built in the formation of these development groups and their joint selection of the Corporation as their business office. We feel this type of project will be a major item of the Corporation's business in the next several years.

The University of Hawaii, through its Director of Research, contracted with the Corporation during the year to assist the University in the management of one of their research institutes, the Hawaii Institute of Marine Biology. The director of HIMB had resigned, the associate director did not desire to assume the full-time director duties, and the Corporation was approached to see if they would be willing to provide interim management for HIMB until such time as a new director could be recruited. An agreement between the University and the Corporation was drawn and William Coops was assigned the responsibility of acting as HIMB Interim Director. The University of Hawaii, in using this approach to assisting in the short-term management of its facilities, adds yet another dimension to the multi-faceted services the Corporation provides, not only to the University of Hawaii, but to other agencies of the State as well.

NEW SERVICE ORDERED PROJECTS

From the University of Hawaii

Cancer Center of Hawaii researcher scanning for tumor bearing tissue.



The day to day working relationships between the University of Hawaii and the Research Corporation have been formalized by an internal agreement. Among the areas covered by this agreement are the guidelines under which a project may be assigned to the Research Corporation for management services and the form used to transfer this responsibility, the "Service Order." The following projects were assigned to the Research Corporation by the University of Hawaii by Service Order during the year.

Listed alphabetically by principal investigator.

Dr. James E. Andrews
Hawaii Institute of Geophysics
International Cooperative
Investigations of Mangrove
Nodule Environments, Hawaii-
Tahiti Transect 1978
National Science Foundation
\$15,400

This project is part of an international cooperative program to investigate the environment of manganese nodule deposition in the eastern equatorial Pacific. Field operations are concentrating on sites along a north-south transect between Tahiti and Hawaii. The French research vessel SUBOIT and the German vessel SONNE are doing field work.

Dr. John M. Arnold
Pacific Biomedical Research Center
Comparative Biology of the
Cephalopods
National Science Foundation
\$59,800

The purpose of this program is to make a multidisciplinary research effort to study several relatively unknown areas of cephalopod biology. Expert scientists from areas of metabolic biochemistry, biophysics and biomechanics, whole organism physiology, cellular and developmental biology, and evolution and functional morphology will be assembled together with cephalopod specialists in an area where the most diverse species are available.

Mr. Kent Bridges
College of Tropical Agriculture
Agricultural Information and
Service System
State of Hawaii Governor's Office
\$20,000

Objectives: (1) To continue conversion of map data to the geographic information system format. (2) Produce maps which show the availability of various types of soils indicating the distribution of specific crop lands. (3) Produce maps which are composite of several variables to show the important areas of conflict between agricultural development and other land uses.

Mr. Richard M. Bullock
Department of Horticulture
Specialty Horticulture Crops
Stepan Chemical Company
\$25,000

To collect and study under cultivated conditions perennial tropical plants of potential economic value as spices, to provide essential oils or as medicinal plants, and to assay those plants for their natural products.

Dr. John Caperon
Hawaii Institute of Geophysics
Continuous Culture Simulation of
Water Column Dynamics
National Science Foundation
\$50,000

To study the growth and behavioral response of phytoplankton populations to continuous culture conditions in a simulated ocean water column environment.

Dr. John P. Craven
Marine Programs
Law of the Sea Institute
NOAA Sea Grant
\$30,000

Sea Grant contributions to the Law of the Sea Institute. The primary focus of the Institute will be on the international aspects of law, utilization and management of the ocean.

Dr. John P. Craven
Law of the Sea Institute
Marine Programs
State of Hawaii
\$23,000

The primary focus of the Institute shall be on the international aspects of law, utilization, and management of the ocean. Emphasis shall be given to the legal, social, political and economic consequences of the evolving uses of the sea. Accordingly, the Institute shall maintain a global perspective and multi-disciplinary identification, and seek contributions from all regions of the world and from all relevant social and marine sciences and technology.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program
NOAA/Sea Grant
\$161,130

The following are long range objectives of the program in brief:
(1) To reduce the number of marine recreation accidents and to upgrade water rescue services;
(2) to provide the public and agencies with the best available information on which to base recreational area planning strategies; (3) to provide the public with information on resource management programs and their participation in the same; (4) to increase the ability of small-scale commercial fishermen to be self-sufficient; (5) to have the public increase the use of under-utilized seafood resources;
(6) to reduce boating accidents;
(7) to stimulate growth of the commercial fishing industry;
(8) to inform the public about marine-related issues; (9) to instill a conservation ethic among users of the marine environment; and (10) to increase awareness of marine conservation regulations.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program, Marine Recreation
NOAA/Sea Grant
\$17,628

This project is expected to: (1) significantly reduce recreational ocean accidents; (2) result in an upgrading of the rescue services available to the Hawaiian public.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program
Commercial and Recreational Fisheries
NOAA/Sea Grant
\$33,686

The objectives of this project are:
1) to have an impact on the ability of the small-scale commercial fishermen to support themselves and/or aid in their self-sufficiency; (2) to have an impact on the growth of the state's commercial fishing industry and to help bring the industry to the point where Hawaii can be seafood self-sufficient; and (3) to have

Hawaii's recreational fishermen increase their enjoyment, proficiency, and economy in their sport by having them learn about new equipment and their maintenance and repair.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program, Marine Environmental Affairs
NOAA/Sea Grant
\$17,628

To increase public awareness and understanding of efforts to manage the state's marine/coastal resources and to enhance citizens' participation; to increase public awareness and understanding of basic management concepts and existing federal/state/county programs to improve water quality; and to increase understanding of basic issues related to the "wise" use of Hawaii's marine resources.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program, Marine Conservation Education
NOAA/Sea Grant
\$4,678

To increase the awareness of the community of the diverse but limited resources within the coastal ecosystem and to have them learn the uses and use limitations of that system.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program
Communications and Information
NOAA/Sea Grant
\$16,070

The goals of this project are: (1) to effectively transfer marine information on a broad scale to large segments of the Hawaiian population; (2) to apply communication concepts as well as skills to the marketing and production of information-bearing materials for the various components of the Marine Advisory Program; and (3) to supply the state's marine community with applied publications by broadening the scope of the MAP resource center and promoting their use.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program
Aquaculture
NOAA/Sea Grant
\$15,263

To have the Hawaiian community learn about the basic research findings in the aquaculture field and to have them plan for this fledgling industry; and to provide potential aquaculturists with the general physical, biological and economic data that are available and to update that information as new discoveries are made.

Dr. Jack Davidson
Sea Grant Program
Marine Advisory Program
Commercial & Recreational Boating
NOAA/Sea Grant
\$33,917

The objectives of this project are:
(1) to decrease the per capita number of boat-related accidents in Hawaii; (2) to educate boaters on the maintenance and repair of their vessels; (3) to assist commercial fishermen in understanding the various loan programs available for boat purchase, construction and repair; and (4) to improve our ability to utilize maximally the ocean as a transportation medium.

Dr. Jack Davidson
Sea Grant Program
Sea Grant Office/Marine Programs
Hawaii Coastal Zone Management Program, Year 04
State of Hawaii, Department of Planning & Economic Development
\$38,000

Services to be rendered shall include: preparing and distributing a monthly newsletter concerning various issues related to coastal zone management, subject to the approval of the Planning agency; preparing and distributing appropriate newspaper supplements; developing and disseminating coastal studies educational materials; producing appropriate brochures, posters, slide shows and communications media public service announcements and items.

Mr. Tom Dinell
Pacific Urban Studies Planning Program
Maps and Land Management
Data on Hawaiian Home Lands
State of Hawaii/Hawaiian Home Lands
\$10,000

To engage in the professional services for computerized preparation of maps on the Hawaiian Home Lands and related technical data for management of said lands.

Mr. Tom Dinell
Pacific Urban Studies Planning Program
Hawaii Coastal Zone Management Program
State of Hawaii/Department of Planning & Economic Development
\$92,662

Services shall include: completing the coastal zone management problem analyses and policies plan element relating to shoreline erosion; developing guidelines as appropriate to further specify the objectives and policies of the management program; developing criteria for special management area boundary amendments for compliance with objectives, policies and guidelines of the management program; preparing the draft environmental impact assessment for inclusion in the Hawaii Coastal Zone Management Program document.

Dr. Maxwell S. Doty
Department of Botany
Tropical Marine Agronomy
NOAA/Sea Grant
\$40,000

The objectives are to obtain by laboratory work and understanding of what gel qualities and quantities are obtainable from what species of genus *Gracilaria*; to identify Hawaiian algae that are likely to be farmable seaweeds and to modify and test purging pond hypotheses and to make available the results of hypotheses concerning production of seaweed as a function of species as well as of seasonal and environmental variations.

Dr. Frederick Duennebier
Hawaii Institute of Geophysics
IPOD Downhole Seismic Experiment
National Science Foundation
\$150,000

To construct and install a downhole seismic system for a Deep Sea Drilling Project site in the Gulf of California. The downhole seismometer should provide an order of magnitude improvement in signal-to-noise ratio for seismic wave measurements compared to ocean floor data. The deployment of quiet seismic sensors in the oceans provides advantages for many phases of marine seismic studies including seismicity studies, structure of the lithosphere and asthenosphere, state of stress in the lithosphere, seismic processes along active plate boundaries, and seismic wave propagation studies. This project is a first attempt to provide such instrumentation for a DSDP site and will act as a pilot project for future experiments involving similar deployment and data recovery problems.

Dr. Richard Grigg
Hawaii Institute of Marine Biology
Bottom Fisheries in Leeward Islands
NOAA/Sea Grant
\$30,000

The proposed research is designed to complement the cooperative state-federal resource assessment program and emphasis will be on ecological analyses of bottom resources by taking advantage of the large amount of physical and biological data that will be collected by the state-federal program. Data that will be routinely collected will include trawl, trap, bottom topography, sediment grabs, plankton hauls, and STD and XBT casts. Pot and headline data and data on surface and bottom currents will also be routinely collected.

Dr. Sidney Gaines
School of Medicine
In-Vitro Cultivation of Mycobacterium leprae
Lani Booth Estate
Department of Health
\$5,071

To pursue studies to verify In-Vitro Cultivation of Mycobacterium leprae in artificial media including those developed by Dr. Olaf K. Skinsnes and Dr. Laslo Kato.

Dr. J. F. Gettrust
Dr. D. M. Hussong
Hawaii Institute of Geophysics
Investigation of Crust-Mantle Structure in Northern Venezuela
Southern Caribbean Sea
National Science Foundation
\$61,300

To investigate the crustal and upper mantle structure and tectonics of the boundary between the Caribbean plate (Venezuela Basin) and the South American plate (Northern Coastal Venezuela) using several seismic techniques.

Dr. Ronald W. Gillette
Cancer Center of Hawaii/
Pacific Biomedical Research Center
Effect of Tobacco By-Products and Other Environmental Carcinogens on Lymphoid Cell Homing and Function
The Council for Tobacco Research/U.S.A., Inc.
\$29,883

To conduct a preliminary feasibility study on the effect of carcinogenic and irritating agents, and of tobacco smoke on lymphoid cell homing and function.

Dr. Richard Grigg
Hawaii Institute of Marine Biology
Bottom Fisheries in Leeward Islands
NOAA/Sea Grant
\$30,000

The proposed research is designed to complement the cooperative state-federal resource assessment program and emphasis will be on ecological analyses of bottom resources by taking advantage of the large amount of physical and biological data that will be collected by the state-federal program. Data that will be routinely collected will include trawl, trap, bottom topography, sediment grabs, plankton hauls, and STD and XBT casts. Pot and headline data and data on surface and bottom currents will also be routinely collected.

Dr. Giselher Gust
Hawaii Institute of Geophysics
Temporal and Spatial Fine Structure of Turbulence and Bottom Stress in Sediment-Laden Sea Water Flows
National Science Foundation
\$75,400

A flume study on the characteristics of sediment-transporting well-bounded turbulent sea water flows with special emphasis on the effect of cohesive and cohesionless sediments on boundary-layer structure and dynamics.

Dr. Robert Harvey
Dr. James Andrews
Hawaii Institute of Geophysics
DUMAND Site Survey

NOAA '09 Year Program Management \$5,380

To study the environmental characteristics of the proposed DUMAND site in the Maui Basin.

Dr. Robert Harvey

Hawaii Institute of Geophysics
Open Ocean Tsunami Reporting System
NOAA
\$81,000

To construct and test an open ocean tsunami reporting system. The system will transmit pressure data acoustically on command from the sea floor to a surface buoy and thence via stationary satellite to shore. This is a cooperative project between the University of Hawaii and the NOAA ERL staff members at the Joint Tsunami Research Effort.

Dr. Charles E. Halesley

Hawaii Institute of Geophysics
Joint Institute for Marine and Atmospheric Research (JIMAR)
National Oceanic and Atmospheric Administration
\$173,100

To establish and operate the Joint Institute for Marine and Atmospheric Research. Funds to be used for the various aspects of tsunami research including source generation mechanisms, tsunami propagation, tsunami interaction with the shoreline.

Dr. Charles E. Halesley

Hawaii Institute of Geophysics
Magnetotelluric Sounding Using Deep Ocean Tri-Axial Electric Field Measurements
National Science Foundation
\$38,900

This project will measure and analyze sea floor electric and magnetic fields in the region south of Hawaii. The measurements will provide information on the electrical conductivity and temperature of the ocean crust and upper mantle as a function of depth.

Dr. Charles E. Halesley

Hawaii Institute of Geophysics
Shipboard Technician Support
National Science Foundation
\$75,000

Continued support for the technicians aboard the KANA KEOKI and MOANA WAVE.

Dr. Charles E. Halesley

Hawaii Institute of Geophysics
Ship Operations Support
National Science Foundation
\$500,000

Partial support for operation of the R/V KANA KEOKI.

Dr. Charles E. Halesley

Hawaii Institute of Geophysics
Acquisition of Electron Probe Microanalyzer
National Science Foundation
\$140,000

This request is for \$101,210 in capital equipment funds to purchase an electron microprobe for research at the University of Hawaii. Six faculty members of Hawaii Institute of Geophysics, the co-principal investigators of this proposal, have current as well as new research that includes microprobe analysis as an essential part. The research covers a spectrum of the activities here, from marine petrology to the physical properties of rocks, and from volcanic mineralogy to the composition of manganese nodules. The nearest microprobes to the University of Hawaii are in California.

Dr. Charles E. Halesley

Hawaii Institute of Geophysics
Assessment of Low Temperature Geothermal Energy Resources for the State of Hawaii
Department of Energy
\$75,000

To initiate a study of a potential low temperature resource on the Island of Oahu. For an acceleration and extension of work proposed under the Western State Cooperative Direct Heat Resources Program

Dr. Charles E. Halesley

Hawaii Institute of Geophysics
Acquisition of Oceanographic Equipment
National Science Foundation
\$30,000

Annual award for the purchase of oceanographic equipment in support of University ship operations.

Dr. Charles E. Halesley
Hawaii Institute of Geophysics
Marine Conductivity Beneath the Hawaiian Ridge
National Science Foundation
\$73,400

The goal of this project is aimed at estimating the electrical conductivity profile (100 to 600 km depth) beneath Midway Island and Hawaii Island. These data will provide indications of the change in the deep thermal realm of the Hawaiian melting anomaly over a time change of about 20 my (the differences in age between Hawaii and Midway) and will be directly of value to the understanding of the processes that formed the Hawaiian Ridge.

Dr. Louis Herman

Department of Psychology
Behavior and Social Organization of Humpback Whales in Hawaiian Breeding Waters
National Science Foundation
\$39,700

This study involves field research on humpback whales. The study site will be the islands of Moabai and Hawaii.

Dr. Richard Hinze

Curriculum Research and Development Group
Seminar on Limited English Speakers
State of Hawaii/Department of Education
\$3,974

To provide seminar leader and guest lecturers for a two-week long workshop on theories and practical strategies for teaching limited English speaking students to be held July 10-27, 1978.

Dr. D. Hussion

Dr. G. Sutton
Hawaii Institute of Geophysics
Seismicity & Crustal Structure of the Vema Fracture Zone
Lamont-Doherty Geological Observatory of Columbia University
\$12,309

To participate in the explosion refraction and seismicity studies of the Vema Fracture Zone contracted to Lamont-Doherty Geological Observatory and Columbia by NSF.

Dr. Ronald H. Knapp
Mechanical Engineering Department
High Visibility Undersea Observation Structure
NOAA/Sea Grant
\$26,099

To establish the technical and economic feasibility of constructing high visibility undersea structures which utilize a new structural concept (termed a Pseudo-Cylindrical [PC] Shell) and employ transparent acrylic plastic as the primary construction material.

Dr. Laurence Kolonel

Cancer Center of Hawaii
Reasons for Variation in Cancer Patient Survival by Race
National Cancer Institute
\$57,898

To study the ethno-racial variations in cancer patient survival for the five major ethnic groups in Hawaii.

Dr. Richard K. C. Lee

Pacific Biomedical Research Center
Gerontology Center Development Project, Workshop, Hawaii County
Hawaii County Office on Aging
\$1,042

Workshop for paraprofessionals on developing communication skills: The Art of Listening.

Dr. Anthony Lenzer

Pacific Biomedical Research Center
Gerontology Center Development Project
Administration on Aging/State of Hawaii
\$103,379

To become the vehicle whereby the University and the community can work together to improve the quality of life and services for the elderly.

Dr. Anthony Lenzer

School of Public Health
Gerontology Center Development Project Training Workshop
Executive Office on Aging
State of Hawaii
\$3,442.41

To render a training workshop for professional, administrative

and supervisory personnel engaged in elderly services.

Dr. Anthony Lenzer

Pacific Biomedical Research Center
Gerontology Center Development Project Program/Workshop
Kauai County
Kauai County Office of Elderly Affairs
\$1,470

To conduct workshops for professional staff in the field of aging.

Dr. Kevin Loh, M.D.

Pacific Biomedical Research Center
Comprehensive Multimodal Approach to Localized Resectable and Unresectable Non-Operable Bronchogenic Carcinoma
Leahi Foundation
\$13,855

Objectives: (1) The value of split-course radiotherapy in the treatment of positive mediastinal nodal disease; (2) the effectiveness of combination chemotherapy with Vincristine, Bleomycin, Adriamycin, CCNU and Cytosoxan (BACOC) as a systemic adjuvant treatment modality; (3) Intrapleural B.C.G. instillation as a form of regional immunotherapy; (4) systemic B.C.G. by scarification as a form of immunoprophylaxis against disease relapse; (5) close in vitro laboratory and in vivo immune monitoring during the different phases of the sequential multimodal therapy to establish the role of immunologic reactivity as prognostic indicator of the clinical course.

Mr. Richard L. Longfield

Hawaii Institute of Geophysics
Marine Operations
State of Hawaii
\$468,000

Continued funding of University ship operations and Marine Center facilities.

Mr. Richard Longfield

Hawaii Institute of Geophysics
Ship Operations and Snug Harbor Facility Support
State of Hawaii
\$450,000

Additional State funding is required in support of cost accelerations to be realized as part of operational phase-in of the University of Hawaii Snug Harbor Ship Support Facility. Additional costs include security services (contracted), building furnishings, warehousing and maintenance personnel, groundskeepers and appropriate equipment and additional costs for utilities.

Dr. Spencer R. Malecha

Genetics Department
Hawaiian Prawn Aquaculture: Pond Productivity Determinants
NOAA/Sea Grant
\$36,764

To aid in the development of freshwater prawn farming as a significant sector of the Hawaiian economy by: designing a better pond feed management strategy, developing hardware for increased hatchery and pond production, exploring alternative production system designs, establishing a genetically optimum stock, extending marketable shelf life, developing an optimum pond and hatchery water quality management strategy, establishing optimum hatchery and pond management systems, determining the behavior variables that contribute to an optimum pond management strategy, developing predictive production models, assessing the physical plant and program requirements for enabling technological transfer to industry and updating the economics of hatchery and grow-out production.

Dr. Spencer R. Malecha

Genetics Department
Hawaiian Prawn Aquaculture: Genetic Improvement
NOAA/Sea Grant
\$56,206

To develop the best possible genetic stock for economical hatchery and grow-out phases of Hawaiian prawn aquaculture.

Dr. Spencer R. Malecha

Department of Genetics
Hawaiian Prawn Aquaculture: Behavior Biology
NOAA/Sea Grant
\$8,883

The Avenue strain of *M. rosebergi* developed over the last ten years for commercial cultivators in Hawaii is a non-plegmatic, mildly aggressive crustacean that cannot be crowded above certain stocking rates (about 1.5 post larvae per square foot) before production levels off to a constant rate. The objective of this research is to increase the standing crop through habit manipulation and selection of behavioral phenotypes best fit to high density culture systems.

Dr. Murli H. Manghnani
Hawaii Institute of Geophysics
A Renewal Proposal for Gravity Measurements and Acquisition of Gravity Data in Oman Defense Mapping Agency
\$2,000

For establishing 200 or more gravity base stations in Sultanate of Oman to provide off-the-shelf gravity data.

Dr. Stanley Margolis
Dr. Peter Kroopnick
Hawaii Institute of Geophysics
Cenozoic Paleogeography (CENOP)
National Science Foundation
\$81,000

The CENOP project is a large scale, coordinated study of Middle and Late Cenozoic paleogeography covering approximately the last 25 million years of geologic history. The basic objective of the study is to use the deep-sea sedimentary record to develop an understanding of the evolution of the present patterns of oceanic circulation and global climates.

Dr. Richard N. Ney
Hawaii Institute of Geophysics
Magnetic Anomalies Associated with Spreading Center Jumps: Juan De Fuca Ridge
National Science Foundation
\$88,100

An unsolved problem of plate tectonic theory is the origin of the pattern of magnetic anomaly offsets near the Juan de Fuca spreading center, a pattern which appears to be incompatible with the rigid plate hypothesis. This continuing research project is

applying a new technique using a mini-computer with interactive graphics and modern software advances to the confused pattern of magnetic anomalies in the northeast Pacific.

Mr. Mark Odgaard
Dr. George Sutton
Hawaii Institute of Geophysics
Collaborative Research on the Structure and Evolution of the North Pacific Lithospheric Plate
National Science Foundation
\$139,400

To conduct a long refraction experiment in the northeastern Pacific Ocean. The long refraction line will consist of 1 to 10 ton explosions detonated at ranges of up to 1900 km, received by 15 to 20 ocean bottom seismometers. The scientific goals are: (1) to determine the fine structure of the lithosphere and upper mantle with an age of formation of 60 to 70 my; (2) to relate this structure to others on the same plate at different ages of formations; and (3) using these relationships, determine the part of evolution of the northern part of the Pacific plate from formation at the east Pacific rise to subduction in the Mariana-Japan-Kuril trench system.

Dr. Noboru Oishi
Cancer Center of Hawaii/Pacific Biomedical Research Center
Cancer Control Contract
Southwest Oncology Group
\$14,482

To participate in Phase III Group studies and protocols selected by the Cancer Control Committee of the Southwest Oncology Group.

Mr. Wesley Park
College of Continuing Education
Comprehensive Training Program (University Without Walls)
State of Hawaii
\$160,000

Continued support for the Central Michigan University, University Without Walls Project.

Ms. Rose T. Pfund
Sea Grant Program
The Publications Program
NOAA/Sea Grant
\$104,000

To produce the results of research as information packaged for a variety of users as expeditiously as possible without sacrifice to quality.

Dr. John A. Philippotts
Hawaii Institute of Geophysics
Geochemical Data Synthesis and Analyses
National Aeronautics & Space Administration
\$30,700

The objective of this research is to synthesize data and complete analytical tasks stemming from the Goddard Space Flight Center program in geochemistry. Data to be synthesized include those for Apollo 15 and 16 soils, breccias and mare basalts.

Dr. Lawrence Piette
University of Hawaii
Community-Based Cancer Control Program
Department of Health, Education & Welfare
\$892,000

The goal of this program is to implement a statewide integrated demonstration and education program in cancer control aimed toward groups at high risk for cancers of the breast, cervix and uterus, colon/rectum and lung, and to bring cases found to a definitive diagnosis and referral to high quality treatment with follow-up and rehabilitation/continuing care where required, based on the hypothesis that such a coordinated approach will result in better outcomes for cancer patients in the State of Hawaii.

Dr. Colin S. Ramage
Hawaii Natural Energy Institute
Program for Solar Energy Meteorological Research and Training Sites/Program Announcement
No. OUP-77-1
U.S. Energy Research & Development Administration
\$399,337

The goal of this program through monitoring, research and training programs is to match and react appropriately to the rapidly developing technology of extracting useful power from solar energy.

Dr. Clifford W. Smith
Department of Botany
Feral Pigs and Their Impact in Kipahulu Valley, Haleakala National Park
National Park Service
\$34,000

Three-year investigation: feral pigs and their impact in Kipahulu Valley, Haleakala National Park; will determine the distribution, abundance and biology of the feral pigs and the ecological impact of these animals and result in management recommendations relating to these exotic mammals.

Dr. Clifford W. Smith
Botany Department
Cooperative National Park Resources Studies Unit
National Park Service
\$29,106

To direct and coordinate research and park assistance programs in areas administered by the National Park Service in Hawaii.

Dr. Clifford W. Smith
Department of Botany
A Historical Synthesis of Endemic Hawaiian Birds with Special Emphasis on Birds Found Within Areas Administered by the National Park Service
National Park Service
\$4,300 First year funding

Four-year project will be conducted to prepare a series of seventeen manuscripts that as a whole will contain documentation, analysis and synthesis of the historical status of endemic Hawaiian birds.

Dr. Stephen V. Smith
Hawaii Institute of Marine Biology
Circulation and Chemistry of the Enewetak Atoll Lagoon
Energy Research & Development Administration
\$107,948

The following investigations shall be performed: (1) describe the distribution of materials in the water and calculate the flux of those materials; and (2) investigate corals and other organisms growing on mid-lagoon pinnacles as possible retrospective samples of lagoon water composition.

Dr. Fritz Theyer
Hawaii Institute of Geophysics
Piston Coring in the Equatorial Pacific
National Science Foundation
\$89,400

The aim of this project is to secure, in a major and concerted effort by the Hawaii Institute of Geophysics and the Lamont-Doherty Geological Observatory, the fundamental research material required in the next few years to trace the paleomagnetic reversal sequence recorded in deep-sea sediments back into basal Cenozoic and to allow substantial duplication of the already-known sequence. To insure success during the coring, it is proposed to collect primarily in areas of the central Pacific where early to mid-Tertiary outcrops have been proven to occur, to further define potential sites with the 3.5-KHz profiler and seismic reflection gear; to immediately date selected samples upon recovery of the core in order to continue coring with longer gear at optimal sites; and to use a piston-core orienting device to recover truly oriented paleomagnetic data.

Dr. Martin J. Vitousek
Hawaii Institute of Geophysics
North Pacific Experiment (NORPAX): Line Islands Monitoring
National Science Foundation
\$271,600

This project is part of the North Pacific Experiment (NORPAX). The goal of NORPAX is to understand long-period, large scale, ocean atmosphere coupling. This project will provide observation of equatorial current and wind system from the Line Islands.

Dr. Paul Yuen
Dr. James Jones
Engineering Department
OTEC Heat Exchanger Fouling Experiment
NOAA/Sea Grant
\$52,477

To provide data on biofouling for a heat exchanger configuration identical with that proposed

OTEC-plant operation. Collection of data has been made possible because of the completion of the design, fabrication, installation and operation of a full-scale section of an OTEC heat exchanger, two 12-inch pipelines and pumps capable of providing uncontaminated surface seawater at a continuous rate of 1,700 to 3,500 gpm.

Dr. Daniel Walker
Hawaii Institute of Geophysics
Easter Island Seismic Station
National Academy of Sciences
\$29,911

It is proposed that a high-frequency, tape recording, three-component seismograph be installed on Easter Island and operated by Chilean scientists in an effort to obtain near-field data on one of the world's most active mid-ocean ridge systems.

Dr. Lawrence F. H. Zane
Curriculum and Instruction
Vocational Training for the Commonwealth of Northern Mariana
Commonwealth of Northern Mariana
\$9,712

To provide professional training services to seven (?) vocational education teachers from the Government of the Commonwealth of Northern Mariana to undertake one or more courses offered through the University of Hawaii at Manoa Summer Session 1978.

Dr. Harry Zeitlin
Chemistry Department
Hydrometallurgical Separation of Metals from Ferronanganese Nodules and Large-Scale Uses of Residual Oxides
NOAA/Sea Grant
\$46,000

To develop a hydrometallurgical process for the selective extraction of copper, nickel, and cobalt from ferronanganese nodules and to establish a new method for large-scale uses of the residual oxides following the metallic extraction.

CONTINUING SERVICE ORDERED PROJECTS

Programs reported in an earlier annual report that have continued their activity into the fiscal year are:

Dr. W. Mansfield Adams
Hawaii Institute of Geophysics
Design, Construction, Calibration and Installation of Seismic Tsunami Trigger
Civil Defense of Hawaii
\$40,000
(From 10/1/75 to 12/31/77)

Dr. W. Mansfield Adams
Hawaii Institute of Geophysics
Seismic Prospecting for Magma Reservoirs to Increase the Known Geothermal Reserves of the World
National Science Foundation
\$65,400
(From 4/15/74 to 5/31/78)

Dr. James E. Andrews
Hawaii Institute of Geophysics
Manganese Resources
NOAA/Sea Grant Program
\$18,880
(From 9/1/76 to 8/31/77)
Continuation of Manganese Resources Program 09 Year

Dr. Eduard Berg
Hawaii Institute of Geophysics
Crustal Deformation Observations
National Aeronautics & Space Administration
\$136,000
(Total amount awarded \$481,865)

Dr. Robert Buddemeier
Dr. Albert H. Banner
Hawaii Institute of Marine Biology & Hawaii Institute of Geophysics
The Hydrochemistry of Eniwetok Atoll & Toxicity Levels in Fish

Populations at Eniwetok, Marshall Islands
Energy Research & Development Administration
\$202,975
(From 7/1/74 to 9/30/77)

Dr. Robert Buddemeier
Dr. Stephen Smith
Department of Oceanography & Hawaii Institute of Marine Biology
Corals as Remote and Representative Environmental Recorders
National Science Foundation
\$120,172
(From 1/1/77 to 7/31/79)

Dr. Robert M. Bullock
Hawaii Agricultural Experimental Station
Kona Coffee/Alternate Crops
State of Hawaii
Department of Agriculture
\$53,000
(From 7/1/74 to 12/31/77)

Dr. John Bystrom
College of Arts & Sciences
Pan-Pacific Education and Communication Experiments by Satellite
State of Hawaii/Legislative Appropriation
\$1,229
(Total amount awarded \$10,729)

Dr. Thomas Clarke
Hawaii Institute of Marine Biology
Ecology of Pelagic Fishes in the Central Pacific Ocean
National Science Foundation
\$171,572
(From 7/1/77 to 7/31/80)

Dr. John Craven
Dr. John Bardach

Marine Programs
Low of the Sea Institute
NOAA/Sea Grant Program
\$22,000
(From 1/1/77 to 8/31/77)

Dr. Jack Davidson
Marine Advisory Program
Hawaii Coastal Zone Management Program/Year 03
State of Hawaii/Department of Planning & Economic Development
\$60,000
(From 7/1/76 to 9/29/77)

Dr. Jack Davidson
Marine Advisory Program
Hawaii Coastal Zone Management Program/Year 03
State of Hawaii/Department of Planning & Economic Development
\$60,000
(From 7/1/76 to 9/29/77)

Dr. Jack Davidson
Sea Grant Office
Marine Programs
Marine Advisory Program
NOAA/Sea Grant Program
\$300,000
(From 9/1/76 to 8/31/77)
Continuation of 09 year Sea Grant Program.

Dr. Vincent De Feo
Department of Reproductive Biology
Research and Training in Reproductive Biology
Ford Foundation
\$425,000
(From 7/30/71 to 7/31/78)

Dr. Tom Dinell
Pacific Urban Studies & Planning Program

Hawaii Coastal Zone Management Program
State of Hawaii/Department of Planning & Economic Development
\$186,500
(From 9/1/76 to 9/29/77)

Dr. Maxwell Doty
Department of Botany
Tropical Marine Agronomy
NOAA/Sea Grant Program
\$103,000
(From 9/1/76 to 3/31/78)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Utilization of R/V Moana Wave as a Surrogate Test Platform
Office of Naval Research
\$1,368,600
(From 11/4/76 to 7/15/78)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Acoustic, Geophysical, Chemical and Physical Oceanographic Environments in the Pacific Ocean
Office of Naval Research
\$689,351
(Total amount awarded \$3,937,208)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Magneto-Stratigraphy of Cretaceous Rocks
National Science Foundation
\$30,000
(From 7/1/76 to 12/31/77)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Ship Operations Support
National Science Foundation
\$631,300
(From 1/1/77 to 6/30/78)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Shipboard Technician Support
National Science Foundation
\$75,000
(From 12/1/76 to 6/30/78)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Ship Operations/NSF Equipment
National Science Foundation
\$90,500
(From 1/1/77 to 6/30/78)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Hawaiian Ridge Study
National Science Foundation
\$223,700
(From 1/1/77 to 6/30/78)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Seismic Studies of Crustal Structures of Southern Peru and Adjacent Portions of the Andean Subduction Zones
National Science Foundation
\$24,800
(From 4/1/77 to 9/30/78)

Dr. Charles E. Helsley
Hawaii Institute of Geophysics
Collaborative Research: Seismic Studies of the Crustal Structure of Southern Peru & Adjacent Portions of the Andean Subduction Zone
National Science Foundation to University of Texas-Dallas
\$27,769
(From 4/1/77 to 9/30/77)

Dr. Donald M. Husong
Hawaii Institute of Geophysics
International Phase of Ocean Drilling (IPOD) Site Surveys
National Science Foundation to Columbia University Subcontract: Columbia University
University of Hawaii
\$235,390
(From 2/1/76 to 5/31/78)

Dr. Donald M. Husong
Hawaii Institute of Geophysics
Seismic Study of the Crustal Structure of the Southern Margin of the Caribbean Sea
National Science Foundation
\$133,900
(From 6/1/77 to 5/31/79)

Dr. Laurence N. Kolonel
Pacific Biomedical Research Center
Cancer Center of Hawaii
Health Effects of Asbestos Exposure Among Pearl Harbor Naval Shipyard Workers
Department of the Navy
\$172,431
(From 6/1/76 to 10/31/78)

Dr. Laurence N. Kolonel
Pacific Biomedical Research Center
Cancer Center of Hawaii

Epidemiologic Dietary Components and Cancer Development Project
National Cancer Institute
\$140,602
(From 9/30/76 to 8/31/78)

Dr. Peter Kroopnick
Hawaii Institute of Geophysics
Indian Ocean Geochemical Ocean Section Study
GEOSECS/Isotopic Measurements
National Science Foundation
\$71,600
(From 4/1/77 to 9/30/78)

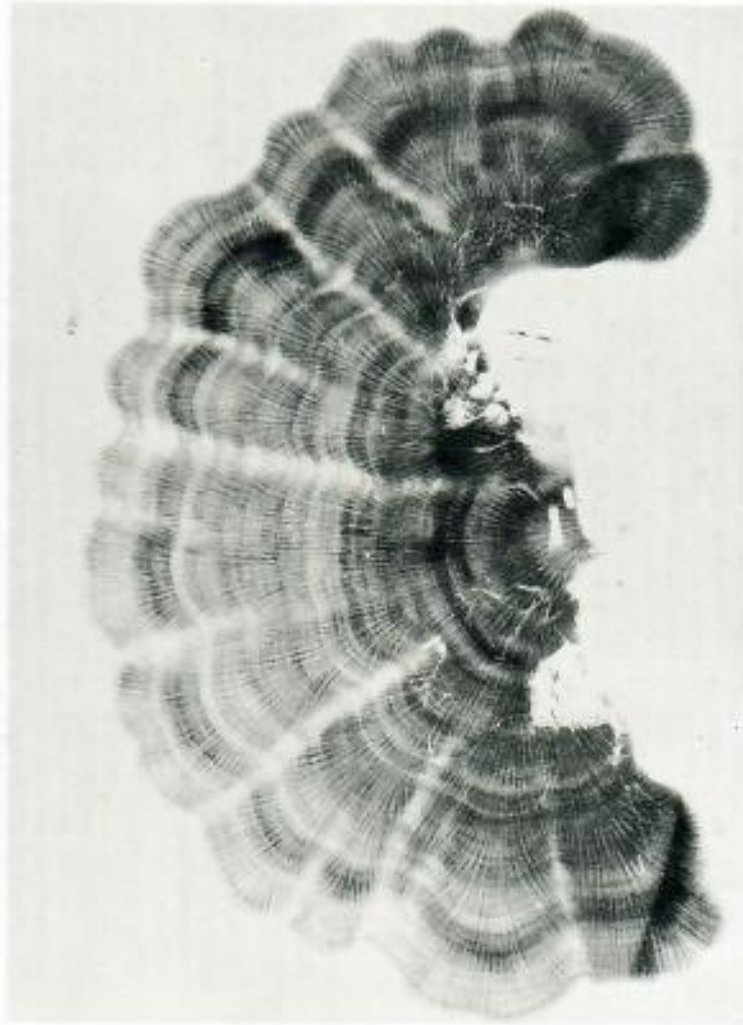
Dr. Peter Kroopnick
Hawaii Institute of Geophysics
GEOSECS/Isotopic Measurements
National Science Foundation
\$95,700
(From 1/1/76 to 6/30/78)

Dr. Murfi Maughnani
Hawaii Institute of Geophysics
Pressure Derivatives of Elastic Moduli in B.C.C. Transition Metals and Their Solid Solutions
Energy Research & Development Administration
\$44,624
(From 6/1/77 to 5/31/78)

Dr. Ming Pi Mi
Pacific Biomedical Research Center
Cancer Center of Hawaii
Occupational Cancer Risk in Hawaii
National Cancer Institute
\$137,513

Ms. Jacqueline Miller
Dr. Keith H. Chave
Environmental Center
Physical, Chemical and Biological Characteristics of Nearshore Dredge Soil Disposal, Pearl Harbor, Hawaii, Phase A.
U.S. Navy
\$82,117
(From 7/1/76 to 6/1/78)

Dr. Abraham Nomura
Pacific Biomedical Research Center
Conduct a Combined Study of the Possible Association of Dietary Factors and Nonconceptive Exogenous Estrogens with Breast Cancer
National Cancer Institute
\$25,000
(Total amount awarded \$335,000)



X-radiograph of a cross-sectional slice of a coral showing lunar and annual bands.

Ms. Rose Pfund
Sea Grant Office
Program Management
Publications
NOAA/Sea Grant Program
\$105,048
(From 9/1/76 to 12/31/77)
Constitution of program management publications 09 year.

Dr. Lawrence H. Piette
Pacific Biomedical Research Center
Cancer Center of Hawaii
Cancer Center Support Grant
Department of Health, Education & Welfare
\$483,434
(Total amount awarded \$1,613,902 for period 11/1/75 to 1/31/79)

Dr. Lawrence H. Piette
Pacific Biomedical Research Center
Exploratory Studies in Cancer Research
National Cancer Institute
\$257,421
(From 6/15/75 to 7/31/78)

Dr. Ernst R. Reese
Dr. Robert Buddemeier
Hawaii Institute of Marine Biology
Hawaii Institute of Geophysics
Mid-Pacific Marine Laboratory
Hydrogeochemistry Operation at Enewetak Atoll
Energy Research & Development Administration
\$696,495
(From 7/1/76 to 9/30/78)

Dr. Terry Sekioka
Hawaii Agricultural Experiment Station
Molokai Papaya Trust
Kauai Task Force/State of Hawaii
\$24,000
(Total amount awarded \$35,000)

Dr. J. A. Silva
Dr. Gordon Y. Tsuji
Department of Agronomy and Soil Science
Crop Production & Land Capabilities of a Network of Tropical Farms
Agency for International Development
\$1,183,401
(From 7/1/74 to 5/31/79)

Dr. Clifford W. Smith
Department of Botany
Biological Survey of Haleakala National Park
U.S. Department of the Interior
National Park Service
\$18,900
(From 10/1/76 to 9/30/78)

Dr. Clifford W. Smith
Department of Botany
Operation of the Cooperative National Park Resources Studies Unit
U.S. Department of the Interior
National Park Service
\$27,000
(From 10/1/76 to 9/30/77)

Dr. Clifford W. Smith
Department of Botany
Vegetation Map, Haleakala National Park
U.S. Department of the Interior
National Park Service
\$23,819
(From 10/1/76 to 9/30/78)

Dr. Clifford W. Smith
Department of Botany

Competition Between Native and Exotic Plants, Haleakala National Park
U.S. Department of the Interior
National Park Service
\$6,130
(From 10/1/76 to 9/30/78)

Dr. Clifford W. Smith
Department of Botany
Change in Vegetation Following Removal of Goats, Hawaii
Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$14,867
(From 10/1/76 to 9/30/78)

Dr. Clifford W. Smith
Department of Botany
Ecology of Fire, Hawaii
Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$22,237
(From 10/1/76 to 9/30/78)

Dr. Clifford W. Smith
Department of Botany
Survey of Birds, Hawaii
Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$14,231
(From 10/1/76 to 9/30/78)

Dr. Clifford Smith
Department of Botany
Diseases of Birds, Hawaii
Volcanoes National Park
U.S. Department of the Interior
National Park Service
\$57,048
(From 10/1/76 to 9/30/78)

Dr. Stephen V. Smith
Hawaii Institute of Marine Biology

Responses of a Tropical Estuary to Relaxation of Sewage Stress
U.S. Environment Protection Agency
\$180,000
(Total amount awarded \$529,404)
(From 11/24/75 to 11/23/78)

Dr. Martin Vitousek
Hawaii Institute of Geophysics
North Pacific Experiment (NORPAX) Line Islands Monitoring
National Science Foundation
\$110,400
(From 11/1/75 to 4/30/78)
(Total amount awarded \$220,300)

Dr. Jaw-Kai Wang
Agricultural Engineering Department
A Systematic Approach to Irrigated Rice Production Planning in Bicol River (Philippines)
U.S. Agency for International Development
\$30,650
(From 9/1/75 to 12/31/78)

Dr. George P. Woollard
Hawaii Institute of Geophysics
Magneto-Telluric Sounding Using Deep Ocean Tri-Axial Field Management
National Science Foundation
\$39,200
(From 5/1/76 to 4/30/78)

Dr. George P. Woollard
Hawaii Institute of Geophysics
Geophysical and Geological Investigations of the Western Pacific Ocean
National Science Foundation
\$212,000
(From 11/1/75 to 10/31/77)

Dr. Klaus Wyrski
Hawaii Institute of Geophysics
NORPAX: The Interaction of Circulation, Sea Level, Heat Storage and Winds Over the Pacific Ocean
National Science Foundation
\$485,400
(From 11/1/76 to 4/30/79)

Dr. Klaus Wyrski
Hawaii Institute of Geophysics
NORPAX: A Test Oceanographic Shuttle Between Tahiti and Hawaii
National Science Foundation
\$167,100
(From 5/1/77 to 3/31/79)

Dr. Richard E. Young
Hawaii Institute of Geophysics
Aspects of the Ecology of Mid-water Cephalopods: The Role of Bioluminescence
National Science Foundation
\$119,900
(From 1/1/77 to 6/30/79)

Dr. Paul Yuen
Dr. John Shupe
College of Engineering
Geothermal Energy Laboratory Experiments
Energy Research & Development Administration
\$958,786
(From 5/1/75 to 6/30/78)

Dr. Paul Yuen
Dr. John Shupe
College of Engineering
Geothermal Energy Laboratory Experiments
State of Hawaii
\$80,000
(From 7/3/75 to 6/30/79)

Tagging a nesting Hawaiian green turtle at night on East (Hikina) Island, French Frigate Shoals.



NEW DIRECT PROJECTS

The following projects have been entered into directly between the Research Corporation and the respective sponsors.

Listed alphabetically by principal investigator.

Dr. James E. Andrews
Department of Oceanography
MAC/Manganese Nodule
Resource Investigation Project
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #149
\$60,000

Continued research and assessment of the manganese nodule resources in the Hawaiian archipelago.

Dr. James E. Andrews
Hawaii Institute of Geophysics
MAC/Durand Project
State of Hawaii/Marine Affairs
Coordinator
MAC/Task Order #168
\$10,000

RCUJH will assist the UH/HIG in designing and constructing a DOTR prototype for use in the DUMAND project.

Dr. George Balazs
Hawaii Institute of Marine Biology
MAC/Green Sea Turtle Management Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #151
\$21,550

Continued support for the survey and retrieval of biological data on the green sea turtle.

Mr. Wayne Baldwin
Hawaii Institute of Marine Biology
Culture of Baitfish

State of Hawaii/Department of Planning & Economic Development
\$16,000

The objective of this study is to determine if topminnow is a suitable baitfish for ahu fishing in Hawaiian waters.

Dr. Karl Bathen
Department of Ocean Engineering
Acquisition of Environmental Baseline Data from a Deep-Moore Platform at Ke-ahole Point, Island of Hawaii
State of Hawaii/Department of Planning & Economic Development
\$12,190

To collect physical, biological, bacteriological and chemical data from a platform moored at the 2,000-foot depth in the Natural Energy Laboratory of Hawaii energy corridor off Ke-ahole Point.

Dr. Edward Beckman
Department of Physiology
MAC/Statewide Diving Safety Training Program
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #147
\$3,864

A workshop to be held November 14 through 17, 1977, to give medical and paramedical personnel of the State of Hawaii an up-to-date review of the therapeutic value of hyperbaric medicine.

Dr. Fred Casciano
Ocean Innovators
MAC/Sand Sampling Project
State of Hawaii

Marine Affairs Coordinator
MAC Task Order #163
\$16,120

RCUJH shall assist Fredrick Casciano in conducting a sand sampling program using the submarine sand sampler of his design.

Mr. William R. Coops
Natural Energy Laboratory of Hawaii
Department of Planning & Economic Development
\$97,000

Continued support for NELH. Funds to be used for administration operations and grant solicitation.

Mr. William R. Coops
Hawaii Institute of Marine Biology
MAC/HIMB Slide Collection
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #169
\$500

RCUJH will assist HIMB in producing a slide show for use as an extension media to inform the public of research performed at the institute.

Dr. John P. Craven
Office of the Marine Affairs
Coordinator
MAC/AEGIR Prospectus
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #150
\$4,200

For the preparation and reproduction of the AEGIR prospectus which will be submitted to the Manned Undersea Science and Technology Office of the National Oceanic and Atmospheric Administration.

Dr. John Craven
Office of the Marine Affairs
Coordinator
MAC/Refurbishment of Hopper
barric Facilities
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #155
\$22,000
RCUH will assist MAC in the
maintenance, refurbishment and
equipping of the State-controlled
hyperbaric facilities as directed by
MAC.

Dr. John Craven
Office of the Marine Affairs
Coordinator
MAC/Management of Makapuu
Point Pier
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #165
\$5,000
RCUH will assist in the manage-
ment and maintenance of the
oceanographic pier at Makapuu
Point, Oahu, Hawaii, to insure
that the facility is available
throughout the year to university,
state, foundation and other
appropriate research entities.

Dr. Jack Davidson
Sea Grant Program
MAC/Marine Advisory Program
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #160
\$6,300
RCUH will assist the MAP in
carrying out the MAP Year 10
program which aims to increase
awareness of the general public
of marine conservation programs/
issues and to improve public
understanding of conservation
principles and management
approaches.

Dr. Jack Davidson
Sea Grant Office
Agreement for a Benthic Eco-
system Survey at Ke-hole Point,
Island of Hawaii
State of Hawaii/Department of
Planning & Economic
Development
\$21,710
Continuation of studies under-
taken in June, 1976 to investigate
the present marine ecosystem in
the waters off Ke-hole Point

preparatory to the use of the site
for planned projects in research
and development of alternate
energy sources, primarily ocean
thermal energy conversion
(OTEC). Additional information is
needed for any future environ-
mental impact study and the
accumulation of baseline data
would be necessary.

Dr. Andrew Dean
Pacific Research Section
Epidemiologic and Microbiologic
Studies of Infectious Diseases in
Asia and the Pacific Islands
DHFW/National Institute of
Health
\$224,512
To conduct investigations of
parasitic, viral and other infec-
tious diseases of importance to
Hawaii and other Pacific island
possessions of the United States.
Total amount awarded under this
contract \$1,695,880.

Dr. Maxwell S. Doty
Department of Botany
Seaweed Marine Agronomy
Project
State of Hawaii/Department of
Planning & Economic
Development
\$25,620
The objectives of this project are
to develop theory constructs, to in-
volve industry problems, to intro-
duce new, natural algal products,
and to train future marine agron-
omists, leading towards the estab-
lishment of a seaweed production
and processing industry in Hawaii.

Dr. Maxwell S. Doty
Department of Botany
Seaweed Marine Agronomy
Project
State of Hawaii/Department of
Planning & Economic
Development
\$25,620
The objectives of this project are
to develop theory constructs, to in-
volve industry problems, to intro-
duce new, natural algal products,
and to train future marine agron-
omists, leading towards the estab-
lishment of a seaweed production
and processing industry in Hawaii.

Dr. Maxwell S. Doty
Department of Botany
Seaweed Chemistry
Stanford University
\$6,000
Continued support for the Sea-
weed Chemistry Project.

Dr. Gordon Dugan
Hawaii Natural Energy Institute
Integrated/Economic Analysis of
Integrated Bioconversion
Systems for Hawaii
Phase I: Culturing Algae from
Animal Manure
State of Hawaii/Department of
Planning & Economic Development
\$14,298

Dr. Gordon Dugan
Hawaii Natural Energy Institute
Integrated/Economic Analysis of
Integrated Bioconversion
Systems for Hawaii
Phase I: Culturing Algae from
Animal Manure
State of Hawaii/Department of
Planning & Economic Development
\$14,298

A biomass research program to
assist the State of Hawaii in
reducing pollution, increasing
locally-grown meat and expand-
ing natural energy utilization and
production. The engineering and
economic investigation will
explore the feasibility of estab-
lishing an integrated and self-
sustaining bioconversion oper-
ation for the production of
protein and energy. Should the
concept be developed, significant
inroads will be made toward
alleviating the presently negative
State balance of trade.

Dr. Evan C. Evans III
Naval Ocean Systems Center/
Hawaii
MAC/Hawaii Coastal Zone
/Data Bank
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #157
\$25,000
RCUH will assist MAC in sup-
porting, improving and further
developing the Hawaii Coastal
Zone Data Bank.

Dr. Evan C. Evans III
Naval Ocean Systems
Center/ Hawaii
ULUPAU Microcosm Facility
Department of the Navy
\$50,000
To furnish specialized services for
operation and maintenance of the
ULUPAU Microcosm Facility and
French Battery Sample Process-
ing Center.

Dr. Roger S. Fajjoka
Water Resources Research
Center
MAC/Microbiological Indicator
for Ascertaining Fecal Contami-
nation of Marine Recreational
Areas
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #142
\$10,000
This project will investigate the
viability of fecal streptococci as
an indicator of human fecal
contamination of marine recre-
ational areas.

Dr. Roger S. Fajjoka
Water Resources Research
Center
MAC/Microbiological Indicator
for Ascertaining Fecal Contami-
nation of Marine Recreational
Areas
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #142
\$10,000
This project will investigate the
viability of fecal streptococci as
an indicator of human fecal
contamination of marine recre-
ational areas.

Dr. Shosuke Goto
College of Tropical Agriculture
MAC/Aquaculture Pond
Management Student Report

State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #162
\$5,600
RCUH will assist the Pearl City
Instructional Facility in continued
management of their prawn
pond/student practice hatchery
and class instruction.

Dr. Richard Grigg
Hawaii Institute of Marine Biology
MAC/Cooperative Nonfluviestern
Hawaiian Islands Fishery
Investigation
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #153
\$1,260
To assist in the proposal develop-
ment and logistical data collection
for a cooperative Northwestern
Island Fishery Investigation.

Dr. Ted Gugelyk
Department of Health
Phase I: Social Aspects of
Leprosy
State of Hawaii/Department of
Health
\$11,365
A sociological study involving a
social and attitudinal survey of
the leprosy patients at Hale
Mahalu Hospital and Kalaupapa
Settlement.

Dr. Richard Y. P. Joun
Department of Planning &
Economic Development
Econometric Models
State of Hawaii/Department of
Planning & Economic
Development
\$35,000
To conduct a study that will
assist DPED in updating the
Hawaii Econometric Models and
in developing revised procedures
through which DPED can more
accurately provide long-range and
short-range forecasts of popula-
tion, employment and other
economic factors.

Dr. Richard Y. P. Joun
Department of Planning &
Economic Development
Econometric Models
State of Hawaii/Department of
Planning & Economic
Development
\$35,000
To conduct a study that will
assist DPED in updating the
Hawaii Econometric Models and
in developing revised procedures
through which DPED can more
accurately provide long-range and
short-range forecasts of popula-
tion, employment and other
economic factors.

Dr. Fred I. Kamemoto
Department of Zoology
MAC/Channel Catfish Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #166
\$10,000

Dr. Fred I. Kamemoto
Department of Zoology
MAC/Channel Catfish Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #166
\$10,000

RCUH will assist in carrying out
research directed toward blood
protein analysis by electro-
phoresis during various stages of
catfish ovarian development.

Mr. Ken Kamimura
Mr. Hal Olsen
Leeward Community College
MAC/LCC Marine Technology
Ship Time (1978)
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #161
\$17,500
RCUH will assist the LCC
Marine Technology Training
Program with the chartering of
the research vessel NOVI for
classroom use.

Dr. Robert Kamins
Department of Economics
Research on Taxation of
Tourism
State of Hawaii/Department of
Planning & Economic
Development
\$8,250
To identify and explore alterna-
tive modes of taxing tourism in
Hawaii and compile information
indicating the relative advantages
and disadvantages of each mode.

Dr. E. Alison Kay
Department of General Science
MAC/Ophi Management Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #164
\$2,000
RCUH will assist in carrying out
the continued monitoring of ophi-
populations by Dr. E. Alison Kay
to assess the effects, if any, of
recent harvesting regulations for
ophi established by the State of
Hawaii, Division of Fish and
Game.

Dr. E. Alison Kay
Department of General Science
MAC/Ophi Management Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #164
\$2,000
RCUH will assist in carrying out
the continued monitoring of ophi-
populations by Dr. E. Alison Kay
to assess the effects, if any, of
recent harvesting regulations for
ophi established by the State of
Hawaii, Division of Fish and
Game.

Dr. Ronald Knapp
Department of Mechanical
Engineering
MAC/High Visibility Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #154
\$9,644
To establish the technical and
economic feasibility of construc-
ting high visibility undersea
structures.

Dr. Ronald Knapp
Department of Mechanical
Engineering
MAC/High Visibility Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #154
\$9,644
To establish the technical and
economic feasibility of construc-
ting high visibility undersea
structures.

Mr. Hideto Kono
Dr. Paul Yuen
Dr. Bill H. Chen
Mr. William R. Coops
Mr. Jack Keppeler
Research Corporation of the
University of Hawaii
HGPA Geothermal Wellhead
Generator Feasibility Project
Department of Energy, State of
Hawaii, Hawaii Electric Light Co.,
County of Hawaii
\$5,743,256 (to be funded by DOE)
\$5,751,014 (total amount of
contract)
Objective: To show that it is
feasible to generate base load
electrical power using the geo-
thermal well at Puna, Hawaii and
a small electric generator system.

Mr. Hideto Kono
State of Hawaii/Department of
Planning & Economic
Development
Regional Operations Research
and Systems Analysis for Geo-
thermal Energy Resources for the
States of California and Hawaii
State of Hawaii/Department of
Planning & Economic
Development
\$20,000
Joint planning and funding of
energy projects by California,
Hawaii and the Department of
Energy.

Mr. Hideto Kono
State of Hawaii/Department of
Planning & Economic
Development
Hawaii Geothermal Program-A
Development Group
Hawaiian Electric Company
\$25,000
Private industry contribution to
the geothermal wellhead gener-
ator project.

Mr. Theodore Lee
Look Laboratory
MAC/Wave Attenuation Project
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #143
\$12,150
A combination of field measure-
ments and laboratory experi-
ments for simulating selected field
conditions is necessary to provide
the basic data to refine mathe-
matical modeling and to develop

Mr. Theodore Lee
Look Laboratory
MAC/Wave Attenuation Project
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #143
\$12,150
A combination of field measure-
ments and laboratory experi-
ments for simulating selected field
conditions is necessary to provide
the basic data to refine mathe-
matical modeling and to develop

Mr. Theodore Lee
Look Laboratory
MAC/Wave Attenuation Project
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #143
\$12,150
A combination of field measure-
ments and laboratory experi-
ments for simulating selected field
conditions is necessary to provide
the basic data to refine mathe-
matical modeling and to develop

a formula or a series of graphs for wave attenuation and wave setup on shallow reefs and for wave characteristics leeward of the reef.

Ms. Doreen Leland

Ms. Dale Suzinetti
Marine Options Program
MAC/Voyages into Ocean Space
Lecture Series
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #139
\$3,850

The purpose of the lecture series is to enhance and expand the public's understanding of marine-related issues and technological research so that the citizenry may participate more fully in the public policy decision-making process.

Dr. Tung Liang

Department of Agricultural Engineering
To Develop a Resource Information System for Water and Related Land Resources
State of Hawaii/Department of Land & Natural Resources
\$50,000

Because of the many alternatives available for determining the future of Hawaii, there is a need for developing a computer model capable of quickly assessing the impact of these alternatives as they relate to water and related land resources. The development of the computer model is needed to quickly assess the impact of policy changes and changes in input data to resolve differences, to evaluate the overall impact, and to coordinate the results into a meaningful, acceptable water resources plan.

Mr. Ed Lui

Hawaii Sugar Planters Association
Planning for the Development of Biomass Energy Resources
State of Hawaii/Department of Planning & Economic Development
\$16,852

To provide professional, technical and administrative help in conducting research, compiling and evaluating information on biomass, coordinating with the

University of Hawaii, county, and industry biomass programs, preparing proposals for research funding, and advising DPED in planning for the development of Hawaii's biomass energy resources. These services will complement and be supportive to the study now being done by HSPA and other public and private agencies in biomass conversion problems.

Dr. Spencer Malecha

Dr. Jeffrey Polovina
Dr. Wai-Kit Nip
Dr. James Moy
Dr. Jaw Kai Wang
Aquaculture Program
State of Hawaii/Department of Planning & Economic Development
\$125,000

The objective of the program, which includes numerous projects, is to assist the development of freshwater prawn farming to become a significant sector of the Hawaiian economy by designing a better pond feed management strategy, developing hardware for the increased hatchery and pond production, exploring alternative production system designs, establishing a genetically optimum stock, developing an optimum pond and hatchery water quality management strategy, establishing optimum hatchery and pond management systems, determining the behavior variables that contribute to an optimum pond management strategy, developing predictive production models, assessing the physical plant and program requirements for enabling technological transfer to industry, updating the economics of hatchery and grow-out production and extending marketable shell life.

Dr. Robert May

Hawaii Institute of Marine Biology
Moi Culture Research Project
State of Hawaii/Department of Planning & Economic Development
\$22,000

To conduct research directed at studying, accomplishing, and reporting upon various aspects of moi culture.

Mr. Dennis McCrea
Research Corporation of the University of Hawaii
Pacific Basin Consortium for Special Education Personnel Preparation
DHEW/Education for Handicapped Branch
\$70,000

To provide assistance in planning, development, implementation and sponsorship of personnel preparation activities for regular and special education staff in the State of Hawaii and the Territories of American Samoa, Guam and the Trust Territory of the Pacific.

Mr. John McMahon

Marine Option Program
MAC/Study of Papohaku Beach, Molokai
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #167
\$1,634

RCUH will assist the Marine Option Program in the 1978 baseline study of Papohaku Beach, Molokai.

Mr. John McMahon

Marine Option Program
MAC/Blue Water Marine Laboratory
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #144
\$30,000

To assist in the charter and equipping of a suitable vessel to serve as a facility for the introduction and training of students of the State of Hawaii in the uses of various types of oceanographic sampling gear and methods, and to provide at-sea experience in oceanography.

Mr. John McMahon

Marine Programs
Blue Water Marine Laboratory Program
State of Hawaii/Department of Education
\$26,750

To assist in coordinating and monitoring Blue Water Marine Laboratory related services to public secondary schools.

Dr. Colin E. Neesh
Oceanic Institute
MAC/World Mariculture Society
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #148
\$1,050

The Research Corporation will assist the Oceanic Institute in the pre-planning of the World Mariculture Conference to be held in Honolulu in January, 1979.

Dr. Edward K. Noda

Look Laboratory
Site Selection Bathymetry Survey, Ke-ohole Point
State of Hawaii/Department of Planning & Economic Development
\$35,670

To perform a site selection bathymetry survey for the offshore waters adjacent to Ke-ohole Point, Hawaii. It is believed that the project and the results will enhance Hawaii's chances to be selected as the site for the first OTEC pilot facility.

Ms. Rose Pfund

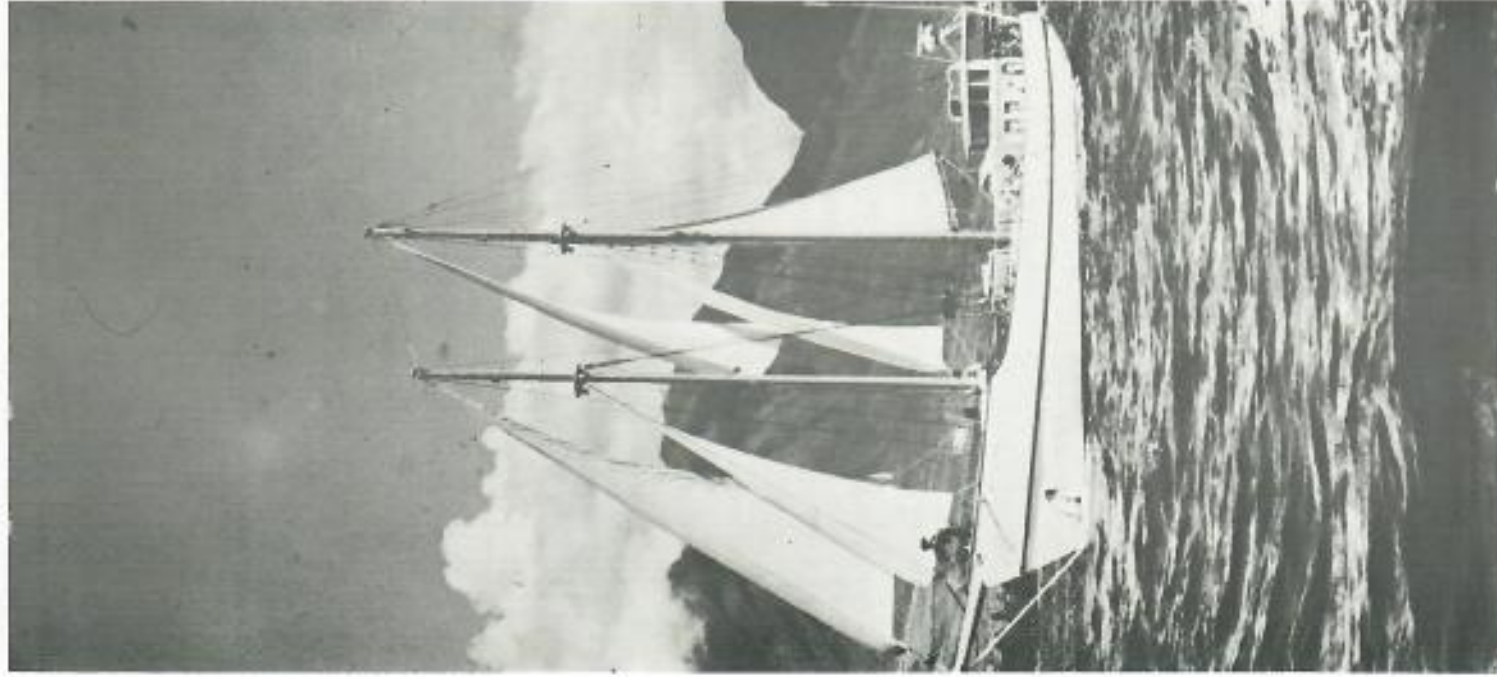
Sea Grant Office
MAC/Makohiki Kai 78
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #141
\$12,000

Makohiki Kai, festival of the sea, is a marine education "mini-expo" geared towards Hawaii school children and residents; the 1978 event will be the impact of Captain Cook's arrival, the whale slaughtering era, the recreation of the whaling town of Lahaina, Maui, and exhibits on the biology of the cetaceans.

Ms. Rose Pfund

Sea Grant Office
MAC/Sea Grant Publications Program
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #152
\$7,000

RCUH will assist the Sea Grant Publications Office in producing technical and non-technical reports for dissemination to the State's local populace interested in the marine-related areas.



R/V *Machias* is used by the Bluewater Marine Laboratory for high school educational cruises throughout the State of Hawaii.

Ms. Rose Pfund
Sea Grant Office
MAC/Third Annual Student Symposium on Marine Affairs
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #158
\$2,000
RCUH will assist the Sea Grant Program in presenting the 1978 Secondary Student Symposium on Marine Affairs.

Dr. Colin Ramage
Hawaii Institute of Geophysics
Wind Data Collection
State of Hawaii/Department of Planning & Economic Development
\$25,840
To monitor wind velocity at key instrumented sites on Oahu (Kaena Point, Kahuku, Koko Head and two central island locations), Maui, Molokai, and Hawaii using a collection system that records integrated wind speed data every six minutes on magnetic tape and shall process such data by computer to convert it to a format meeting DPED requirements.

Dr. Colin Ramage
Hawaii Institute of Geophysics
Molokai Wind Energy Survey
County of Maui
\$9,970
To undertake a wind energy measurement project within the County of Maui, utilizing and training capable Molokai residents in the maintenance and operation of the measurement sites.

Dr. Colin Ramage
Hawaii Institute of Geophysics
Wind and Solar Measurement Project
County of Kauai
\$10,000
To undertake a wind and solar measurement project within the County of Kauai, utilizing and training students from Kauai Community College in the maintenance and operation of the measurement sites.

Dr. Albert Smith
Makapuu Oceanic Institute
MAC/Skipjack & Other Fish

Species Studied by Nuclear Lens
Protein Analysis
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #170
\$4,000
RCUH will assist in carrying out the stock assessment research utilizing nuclear eye lens protein analysis by electrophoresis of skipjack tuna and other tropical fish resources.

Dr. Stephen V. Smith
Hawaii Institute of Marine Biology
IUCN Palau Project
World Wildlife Fund, Morges, Switzerland
\$6,300
Preliminary funding by the International Union for the Conservation of Nature for the preparation of a proposal to do an environmental survey of Palau, with particular emphasis on potential sites for a supertanker port and other critical sites (e.g., potential marine preserve areas).

Dr. Stanley N. Sverdlhoff
Office of the Marine Affairs
Coordinator
MAC/Internship Program
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #146
\$6,000
The Marine Option Program affords interested, competent students with on-the-job training in the field of governmental involvement with marine affairs.

Dr. Stanley N. Sverdlhoff
Office of the Marine Affairs
Coordinator
MAC/Mau Tuna Boatfish Project
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #156
\$33,000
RCUH will assist in supporting the Maui Tuna Boatfish Project.

Dr. Stanley N. Sverdlhoff
Office of the Marine Affairs
Coordinator
MAC/Pacific Maritime Academy Studies
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #171
\$640

RCUH will assist the PMA in providing diesel engineering courses to two economically disadvantaged residents from the Waimea area.

Dr. Stanley N. Sverdlhoff
Office of the Marine Affairs
Coordinator
MAC/Marine Resources Planning Project
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #172
\$1,500
Funds will be used to support an economist on a part-time, consulting basis to assist the MAC in cost/benefits analyses of marine programs and long range goals.

Dr. Patrick Takahashi
College of Engineering
Maui County Energy Self-Sufficiency Development Plan
State of Hawaii/Department of Planning & Economic Development
\$13,666
To prepare supporting material and then to write a proposal to the U.S. Department of Energy for a program for energy self-sufficiency for Maui County.

Dr. Leighton Taylor
Waikiki Aquarium
MAC/Aquarium Education Program
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #140
\$26,500
The Waikiki Aquarium Education Program provides Hawaii's residents and visitors with factual, current and education information about Hawaii's marine environment through workshops, classes, publications and live and static exhibits. The purpose of the program has been to emphasize the value and uniqueness of Hawaiian aquatic resources and to encourage non-consumptive marine participatory activities by both residents and visitors.

Mr. Lambert K. Wal
Department of Health
Developmental Disabilities Program

State of Hawaii/Department of Health
\$46,777
(1) The technical assistance to the Protection and Advocacy Agency will be in the form of a trainer. The trainer will train individuals to be advocates for developmentally disabled individuals. (2) The technical assistance to the committees will be in the form of staff with specific tasks skills appropriate to the planning, the project review and evaluation model, and training committees. (3) The computer data system involves a coordinator to assemble and communicate data between community services and Waianani Training School and Hospital.

Mr. Arthur Walker
Study of Chronic Mental Patients Returned to the Community
Alherton Family Foundation
\$3,500
The number of mental patients residing in state hospitals in the United States has been decreasing each year since 1955. This national trend has been mirrored in Hawaii; the State Hospital population has decreased from over 1,000 in 1962 to less than 200 in 1977. The mental health delivery system has changed its primary focus from the isolated state hospital to the community. This is an eight-year follow-up study of chronic mental patients who have been returned to the community.

Mr. George Yuen
Department of Health
Pediatric Immunization Program
State of Hawaii/Department of Health
\$15,004
To develop procedures and policies for assuring full pediatric immunization. The target is to achieve 90% complete immunization of 24-27 months old children enrolled in Maternal and Child Health clinics by March, 1978.

Mr. George Yuen
Department of Health
Developmental Disabilities Program/Training of Home Operators

State of Hawaii/Department of Health
\$65,887
The State Department of Health is responsible to provide services to individuals with developmental disabilities throughout the State and to monitor, evaluate, report on and further plan such services. This program will develop and refine an operational training format, time table for implementation, follow-up and evaluate the training provided.

Mr. George Yuen
Department of Health
Audiometric and Modified Ewing Tests
State of Hawaii/Department of Health
\$1,814
For the training of public health nursing staff in the administration of pure tone screening audiometry and the Modified Ewing tests. To develop and refine an operational training format, time table for implementation, follow-up and evaluate the training provided.

Mr. George Yuen
Department of Health
Assessment for Genetic Services
State of Hawaii/Department of Health
\$9,500
To compile a needs assessment for genetic services for the State of Hawaii.

Mr. George Yuen
Department of Health
School of Health Services Pilot Project
State of Hawaii/Department of Health
\$4,100
To provide an assessment of the health status and health care needs of school-age children, coordinate the establishment of short-term and long-range objectives for the delivery of school health services, develop specific plans of action for meeting these objectives.

Mr. George Yuen
Department of Health
Developmental Disabilities Program/Genetic Feasibility Study

State of Hawaii/Department of Health
\$7,926
The feasibility study will collate available data from diverse sources for a coordinated analysis. The study objectives are: (1) to determine the completeness of current ascertainment of genetic disease; (2) to estimate the prevalence and morbidity of specific categories of genetic disease in Hawaii; (3) to discover any patterns of ethnic or geographic clustering of genetic diseases in Hawaii; (4) to recommend improvements in classification and collection of genetic diseases; (5) to list current facilities for medical resources serving genetic problems; (6) to assess the potential demand for a centralized clinic service for genetic counselling, prenatal diagnosis, and medical care of patients with genetic diseases.

Mr. George Yuen
Department of Health
Comprehensive Family Planning Data System
State of Hawaii/Department of Health
\$17,915
To upgrade the statewide family planning data system as an integral part of a comprehensive maternal and children's health services data system.

Mr. George Yuen
Department of Health
Family Planning Health Education Consultant
State of Hawaii/Department of Health
\$2,400
The Research Corporation shall employ a qualified health education consultant.

Mr. George Yuen
Department of Health
State Plan for Disabled Children's Program
State of Hawaii/Department of Health
\$8,775
To develop a State Plan for the Supplemental Security Income Disabled Children's Program which will assure appropriate

CONTINUING DIRECT PROJECTS

counseling, establish individualized service plans and referral services, monitor individual service plans, provide services for children under seven years of age and for those who have never attended public schools. To be submitted on July 31, 1978.

Dr. Paul Yuen
Hawaii Natural Energy Institute
Alcohol Production from
Molasses: Characterization of
Hawaiian Commercial and Sugar
Co. (Puunene) Molasses
and Silage

State of Hawaii/Department of
Planning & Economic
Development
\$11,235

A proposal for reconstruction and operation of the former Seagram rum plant at Puunene, Maui, is being jointly prepared for submittal to the Department of Energy by the Hawaii Natural Energy Institute and the Hawaiian Sugar Planters' Association. As a means of strengthening the application for Dept. of Energy funding, preliminary studies are being proposed to obtain data relating to the project, to develop the processing expertise that will be

needed and to demonstrate to the Dept. of Energy that the capabilities for such a project are available in Hawaii.

Dr. Paul Yuen
College of Engineering
Hawaii Natural Energy Institute
State of Hawaii/Department of
Planning & Economic
Development
\$78,876

Funds provided for continued support of the Hawaii Natural Energy Institute.

Dr. Paul Yuen
Hawaii Natural Energy Institute
Alcohol Production from
Molasses: Yeast Strains
State of Hawaii/Department of
Planning & Economic
Development
\$19,845

Objectives: (1) to select and develop yeast strains from commercially available cultures which will produce 93 to 95% of the theoretical yield of alcohol from the sugar in Hawaiian molasses; (2) to determine the alcohol, acid and sugar tolerances, growth rates and yield constants of the initial strains of yeast and of the

highly efficient yeast strains selected and developed; (3) to determine the relationship between heat treatment of molasses and yields of alcohol and yeast.

Dr. Paul Yuen
Dr. James Jones
Hawaii Natural Energy Institute
Ocean Energy Resources
Development
Department of Planning &
Economic Development
\$36,751

Programs reported in an earlier annual report that have continued their activity into this fiscal year are:

Dr. James Andrews
Hawaii Institute of Geophysics
MAC/Manganese Nodules
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #117
\$66,000

Dr. George Balazs
Hawaii Institute of Marine Biology
MAC/Green Sea Turtle
Management Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #118
\$18,363

Dr. Wayne Baldwin
Hawaii Institute of Marine Biology
MAC/Tuna Bottish Study
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #114
\$10,000

Dr. John Bardach
Hawaii Institute of Marine Biology
MAC/Stoney Coral Project
State of Hawaii/Marine Affairs
Coordinator
\$9,854

Mr. Claude Berthoud
Canada/France/Hawaii
Telescope
Canada/France/Hawaii Tele-
scope Corporation
\$98,479

Dr. John W. Bystrom
PEACESAT Project
PEACESAT International
Consortium

Government of American Samoa
American Samoa Community
College
\$27,500

Dr. Keith Chave
Hawaii Institute of Geophysics
MAC/Hawaii Coastal Zone
Data Bank
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #122
\$20,000

Mr. William R. Coops
Natural Energy Laboratory of
Hawaii
Engineering Studies and Land
Surveys of the Ke-ohole Point
Site of NELH
State of Hawaii/Department of
Planning and Economic
Development
Agreement #11 under the Master
Agreement
\$46,000

Dr. John P. Craven
Law of the Sea Institute
University of Rhode Island
\$2,500

Dr. John P. Craven
Law of the Sea Institute
University of Hawaii Foundation
\$7,989

Dr. John P. Craven
Mr. William R. Coops
Marine Programs
Makapuu Point Pier Management
State of Hawaii/Marine Affairs
Coordinator
\$5,000

Dr. Andrew Dean
Pacific Research Section

Epidemiologic and Microbiologic
Studies of Infectious Diseases in
Asia and the Pacific Islands
DHEW/National Institutes of
Health
\$224,512
(Total amount awarded under
this contract \$1,695,880)

Dr. Maxwell Doty
Department of Botany
GIDA Funds
Gilbert Islands Development
Authority
\$10,000

Mr. Bruce Etherington
Department of Architecture
Housing Material Research
State of Hawaii/Hawaii Housing
Authority
\$7,073

Dr. Evan C. Evans III
Naval Undersea Center
Environmental Research Analysis
& Data Bank Operation &
Maintenance
Department of the Navy
\$87,830.47

Mr. Harold Fukunaga
Hawaii English Program
Materials
State of Hawaii/Department of
Education
\$82,4,629

Dr. Eugene Grabbe
Manganese Nodule Processing
Industry Feasibility and
Desirability Study
State of Hawaii/Department of
Planning & Economic
Development
Agreement #6 under the Master
Agreement
\$145,000

Dr. David A. Heenan
College of Business
Administration
The Asia/Pacific Teaching
Fellowship Program
Fletcher School of Law &
Diplomacy, Tufts University
\$21,000

Dr. Philip Jacob
Ms. Betty Jacob
Research Corporation of the
University of Hawaii
Humanized Productivity Under
Advanced Industrial Technology
U.S. Department of Labor
\$57,596

Dr. Richard Y. P. Joun
Department of Planning &
Economic Development
Income Expenditure Accounts
Study
Department of Planning &
Economic Development/State of
Hawaii
\$136,500

Dr. Theodore Lee
Look Laboratory
MAC/Wave Attenuation and
Wave Induced Setup
MAC Task Order #112
\$12,000

Dr. Melvin H. Levin
Arthritis Center
Arthritis Center Support
Hemophilia Foundation of Hawaii
\$10,224

Mr. William Madden
Oceanic Institute
MAC/Ornamental Fish Culture
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #136
\$10,000

Dr. Spencer Malecha
Department of Genetics
MAC/Malaysian Prawn Genetics
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #115
\$30,000

Dr. Robert C. May
Hawaii Institute of Marine Biology
MAC/Moi Aquaculture
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #116
\$15,000

Mr. Dennis W. McCrea
Pacific Basin Consortium
Department of Health, Education
& Welfare/Office of Education
\$75,000

Mr. John McMahon
Marine Programs
MAC/Marine Turtle Study
MAC Task Order #113
\$4,236

Mr. Howard Pennington
MAC/Diving Chambers
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #133
\$4,500

Mr. Howard Pennington
MAC/The Northwestern Hawaii-
an Islands Cooperative Survey
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #128
\$23,500

Dr. Kleona Rigney
Department of Health
State of Hawaii
Implementation for a Cervical
Cancer Screening Program
National Cancer Institute
\$429,133

Dr. M. Ray Smith
Dr. Oliver Wayman
Dr. Harry Aho
Dr. Ralph Heinicke
Department
Hawaii Agricultural Experiment
Station/College of Tropical
Agriculture
Phycocyst By-Products Research
State of Hawaii/Department of
Planning & Economic
Development
\$247,000

Dr. Stephen V. Smith
Hawaii Institute of Marine Biology
MAC/CHN Analyzer
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #127
\$10,915

Dr. Jaw-Kai Wang
Department of Agricultural
Engineering
MAC/Prawn Production and
Management Systems
State of Hawaii/Marine Affairs
Coordinator
MAC Task Order #132
\$15,000

Mr. George Yuen
Developmental Disabilities
Program
Department of Health/State of
Hawaii
\$146,347

Dr. Paul Yuen
Dr. John Shupe
College of Engineering
Hawaii Natural Energy Institute
State of Hawaii/Department of
Planning & Economic
Development
Agreement #10 under the Master
Agreement
\$287,222

**Volume of Business by Sponsoring Agency
Fiscal Year Ending June 30, 1978**

University Projects	Volume of Business	Percent
FEDERAL		
National Science Foundation	\$2,241,082	17.4
Office of Naval Research	1,266,136	9.8
National Institutes of Health	1,090,412	8.5
National Oceanographic & Atmospheric Administration	708,056	5.4
Agency for International Development	528,362	4.1
Department of Energy	484,073	3.8
Environmental Protection Agency	176,467	1.4
Department of Interior	121,468	.9
National Aeronautics & Space Administration	119,732	.9
Department of Defense/Department of Navy	75,755	.6
Defense Mapping Agency	1,999	—
Total U/H Federal Projects	\$6,813,542	52.8
NON-FEDERAL		
State & County Governments:		
University of Hawaii at Manoa		
Miscellaneous University of Hawaii Transactions	\$ 489,490	3.8
Hawaii Institute of Geophysics/Ship Operations & Snug Harbor	488,233	3.8
College of Continuing Education/Comprehensive Training	169,183	1.3
Department of Planning & Economic Development	176,816	1.4
Other Miscellaneous State & County Governments	29,103	.2
Department of Agriculture	5,639	—
Civil Defense, State of Hawaii	3,222	—
Others:		
Strepan Chemical Company	19,883	.2
Ford Foundation	15,297	.1
Council of Tobacco Research, USA, Inc.	12,556	.1
Southwest Oncology Group	4,801	—
Lani Booth Estate	5,071	—
Bouganville Copper Co., Ltd.	4,175	—
National Academy of Sciences	2,592	—
Lea's Foundation	2,146	—
Commonwealth of Northern Marianas	1,500	—
Total U/H Non-Federal Projects	\$1,429,707	10.9
Total U/H Projects	\$8,243,249	63.7

**Volume of Business by Sponsoring Agency
Fiscal Year Ending June 30, 1978 (continued)**

Direct Projects	Volume of Business	Percent
FEDERAL		
National Institutes of Health	\$ 2,078,385	16.1
National Office of Education	73,429	.6
Office of Naval Research	39,149	.3
Department of Labor	20,292	.2
National Science Foundation	6,330	.1
Department of Energy	5,867	—
Other Miscellaneous Federal Sponsors	92	—
Total Direct Federal Projects	\$ 2,223,544	17.3
NON-FEDERAL		
State & County Governments:		
Department of Planning & Economic Development	\$ 858,247	6.7
Department of Education	821,025	6.4
Marine Affairs Coordinator	427,525	3.3
Department of Health	149,127	1.2
Department of Land & Natural Resources	14,259	.1
County of Maui	9,147	.1
County of Kauai	4,838	—
Others:		
Canada/France/Hawaii Telescope Corporation	105,673	.8
Hawaiian Electric Co., Inc.	8,092	.1
Hemophilia Foundation of Hawaii	7,501	.1
World Wild Life Fund	7,441	.1
University of Hawaii Foundation	6,389	.1
Gilbert & Elice Islands Development Authority	4,803	—
Government of American Samoa	4,235	—
Aiheron Family Foundation	3,500	—
North Atlantic Treaty Organization	1,545	—
Other Miscellaneous Non-Federal Sponsors	532	—
Total Direct Non-Federal Projects	\$ 2,433,879	19.0
Total Direct Projects	\$ 4,657,423	36.3
TOTAL PROJECTS	\$12,900,672	100.0

*Includes \$1,036,685 of Construction Costs for the Cancer Center Building Revolving Funds. During the year, thirty-five different revolving fund projects were administered by the Research Corporation which totaled approximately \$150,000. This amount is not included in the volume of business reported herein.

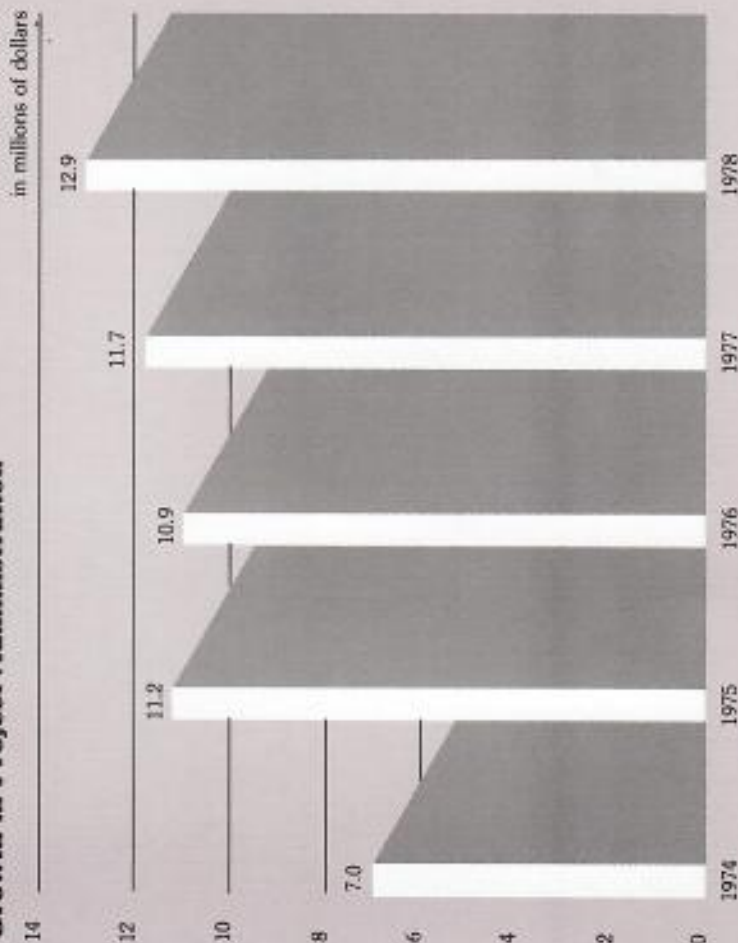
Community members assisting the Marine Advisory Program bonfish pond restoration at Richardson Ocean Center, Hilo, Hawaii.



Distribution by Project Disciplines Fiscal Year Ending June 30, 1978

	Amount	Percent
Biomedicine	\$ 3,321,872.18	25.7
Marine Programs - Geology & Geophysics	5,288,505.32	41.0
Fisheries & Aquaculture	539,817.88	4.2
Environmental	393,848.43	3.1
Energy Research	752,950.64	5.8
Social Sciences	498,304.15	3.9
Publications & Educational Materials	951,941.51	7.4
Agriculture	558,268.36	4.3
U.H. Miscellaneous Transactions	489,490.09	3.8
Astronomy	105,673.58	.8
TOTAL	\$12,900,672.14	100.0

Growth in Project Administration



Equipment Purchased Exceeding \$4,000

2 Meters, Current Contact	Trisponder System	Central Processing Unit
Mech Reading	Del Norte	Harris Corporation
AMF Electrical Products	Department of Energy	State of Hawaii
Development Div.	\$20,584	\$169,802
Office of Naval Research	Hor Wire System	CHN Analyzer w/Recorder
\$8,972	Thermo Systems Inc.	Perkin-Elmer Corp. Instruments
Micomputer	National Science Foundation	Marine Affairs Coordinator
Hewlett Packard	\$10,456	\$13,025
Department of Energy	Dato Channel Master	Boston Whaler, 21 ft.
\$20,996	L/MC Tape	McWayne Marine
Profilmeter Conductivity—	Computer Operations, Inc.	Marine Affairs Coordinator
Temp-Org-Dyrt	National Science Foundation	\$8,024
UCSD	\$7,985	IBM Memory Typewriter
National Science Foundation	Navigator, ML-1000 Loran "C"	IBM Corporation
\$40,000	Micrologic, Inc.	State Department of Education
Bridge Thermometric w/911	National Science Foundation	\$4,841
Write Step Card	\$4,283	Beet Harvester, 3 row complete
Adtech, Inc.	2 Transponders,	Heston Corporation
National Oceanographic &	Mod 210-T in Glass	Department of Planning and
Atmospheric Administration	Benhos, Inc.	Economic Development
\$4,294	National Science Foundation	\$9,550
ORE Acoustic Telemetry	\$8,460	IBM 370/158 Computer System
Modern Ocean Research	Receiver, Omega TDO-1000	ITEL Capital Services
National Oceanographic &	Teledyne Systems Company	Corporation
Atmospheric Administration	National Science Foundation	UH Computing Center
\$13,658	\$9,040	\$1,418,196

Payroll Disbursements

\$4,897,778

Total Dollar Volume

\$12,900,672

Officers and Board of Directors

November 1, 1978

Chairman
Franklin Tokioka
Vice Chairman
Fujio Matsuda
Secretary
Howard P. McKaughan
Treasurer
Sunao Miyabara
Assistant
Hideo Kono
Secretary/Treasurer
Clarence Chang
Melvyn Murakami
Genaki Pang-Ching
John Yuan

Corporation Staff

November 1, 1978

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Richard K. C. Lee
Director of Administration
William R. Coops
Comptroller
Gilbert K. Oshima
Fiscal Officer
Robert P. Daniel
Administrative Assistant
Tsutomu Higuchi
Administrative Assistant
Coro Chai
Secretary
Tokiko Murakami
Clerk/Stenographer
Sharon Miyamoto
Accountant
Mary Fujiwara
Accountant
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Accounting Clerk
Emiko Yamamoto
Accounting Clerk
Janet Kanemoto
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Personnel Clerk
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