NWHI/SURVEY AND ASSESSMENT OF THE GREEN SEA TURTLE RESOURCES
Task Order No. 173 (4053)

PROGRESS REPORT

MAC INVESTMENT: $20,504 (FY 1978-79)

MATCHING FUNDS (SEE OVERVIEW)

OPERATING AGENCY: HAWAII INSTITUTE OF MARINE BIOLOGY

PRINCIPAL INVESTIGATOR: GEORGE H. BALAZS

OBJECTIVES

The overall objective of this study is to develop basic biological and ecological information relevant to the wise, long-term management and conservation of the Hawaiian green sea turtle population. Specific objectives include:

1. locating and censusing aggregations of turtles in their nearshore feeding pastures;
2. ascertaining productivity and population trends at the sole colonial breeding site of French Frigate Shoals;
3. determining the developmental migrations of immature turtles;
4. gaining information on natural growth ages and ages of sexual maturity;
5. determining the food sources used by each size category; and
6. determining the factors that limit the population.

Life history information of this nature will be of direct use and benefit to the State of Hawaii in developing compatible programs of fisheries resource utilization, particularly in waters of the Northwestern Hawaiian Islands. The recent designation of all U.S. populations of green sea turtles as "threatened" increases the need to gather this management-oriented information.

METHODS

Intensive land-based and underwater field studies are periodically conducted at various locations throughout both the major and Northwestern Hawaiian Islands. Research activities are focused on population sampling through capture and tagging, as well as direct observations of feeding, basking and breeding activities. In addition, an extensive network of informants comprised of the general public and cooperating military agencies has been assembled to gather information on the locations and activities of turtles.

RESULTS

A. A series of lengthy and comprehensive field studies has provided basic life history information on turtle aggregations occurring at Necker, French Frigate Shoals, Laysan, Lisianski, Pearl and Hermes Reef, Midway, Kure, Oahu, Lanai and the Big Island (Hawaii).

B. Natural growth rates of immature turtles in resident pastures at French Frigate Shoals and Midway/Kure have been determined for periods of up to 37 months in the wild. Rates of growth have ranged from only .01 to .21 cm. per month. At the Big Island off the Kau District, rates of growth have ranged from .38 to .52 cm. per month.

C. Comprehensive food studies, involving samplings of stomach contents, have identified two genera of algae *(Codium and Caulerpa)* as major dietary components of turtles residing in the Northwestern Hawaiian Islands. In the major islands, *Pterocladia, Codium, Amansia and Ulva* have been found to be principal sources of food.

D. Monitoring of the breeding assemblage at French Frigate Shoals has indicated that approximately 250 adult females were present during the 1978 reproductive season.

DISCUSSION

The availability of travel to remote areas of the Leeward Islands has been enhanced by the charter arrangements made by the MAC Office with the Easy Rider Corporation. Support of this project by the MAC Office has made it possible to develop within Hawaii an authoritative source of information on sea turtles that can be drawn upon internationally and, most importantly, by island nations of the Pacific region.

Research results and conclusions to date are contained within the numerous publications and reports authored by the Principal Investigator. Lectures on the Northwestern Hawaiian Islands and the Hawaiian green sea turtle research project were presented to audiences throughout the state on seven occasions. An invitational ad hoc meeting of the IUCN Marine Turtle Specialists Group was attended in Toronto, Ontario to formulate international research strategies. All travel expenses were paid by IUCN/WWF of Switzerland and an invitational meeting on sea turtles convened by NMFS was attended at the National Space Technologies Laboratory, Mississippi at the expense of the NMFS, Washington, D.C.

PROJECT CONTINUENCE

Research being conducted is on schedule, with significant contributions being made to our knowledge of the biology and ecology of the Hawaiian green turtle population.

FIFTH ANNUAL REPORT

FROM THE

MARINE AFFAIRS COORDINATOR

TO THE

GOVERNOR

AND

LEGISLATURE

STATE OF HAWAII

JULY 1978 TO JUNE 1979

CONTENTS

"PROMOTING OCEAN OPPORTUNITIES"

Keynote Luncheon Address

by

Governor George R. Ariyoshi

Hawaii Ocean Law Association Seminar
November 30, 1979
Hawaiian Regent Hotel

It is my pleasure to be here today to speak with you about the ways in which our State government is promoting ocean opportunities.

Many people see Hawaii only as islands, beautiful but small, gradually becoming crowded, and isolated from the rest of the world by thousands of miles of ocean waters.

Many people who look at a map of the North Pacific Ocean are impressed with how small Hawaii appears — only a few dots in the middle of that vast ocean.

However, that is not how I see these Islands, or their very considerable resources.

To the ancient Hawaiians, the ocean was a natural extension of the land — a place to work and play and travel. Far from being adrift, we are surrounded and blessed by a bountiful resource, rich in minerals, food, and energy.

My Administration is dedicated to promoting ocean opportunities, and today I would like to discuss briefly the manganese nodule industry, aquaculture, fisheries, and ocean thermal energy conversion.

One of our goals is to establish industries that are environmentally clean and compatible with our unique Hawaiian life-style.

These goals are set forth very clearly in the Hawaii State Plan, which is the first legislatively-adopted plan in the United States.

Under a section of this Plan, regarding potential growth activities, it is our stated objective to "generate new ocean-related economic activities in mining, food production, and scientific research."

In this regard, we are actively pursuing this objective with our manganese nodule, aquaculture, and fishery programs.

The State government's public interest in manganese nodules began a decade ago with the publication of a document called "Hawaii and the Sea," and has continued ever since with increasing intensity.

The estimated potential benefits from a manganese industry are substantial — $262 million in annual revenues, 6,000 jobs during the construction stage, and 2,415 permanent new jobs after construction is completed.

The annual revenues of a single processing plant could rank sixth in comparison with the sales of the major corporations in Hawaii.

We have worked with the National Oceanic and Atmospheric Administration — "NOAA" — to produce further research on transportation and processing aspects of the industry.

We are now working with NOAA on a new volume which expands our research.

At this point, we believe that the problem of waste disposal from the processing of nodules — or so-called "tailings," is the most important one to be solved. Thus, we have initiated a three-year program to study waste disposal both on land and at sea. As a first step, we have entered into a joint study program with Ocean Minerals Company.

To our knowledge, we will be the first government entity in the nation to obtain actual tailings from a manganese nodule consortium for study purposes.

We have recently contacted the various consortia to invite them to join with us in an application to the Environmental Protection Agency for a research permit for ocean disposal.

By obtaining the permit, we intend to establish a marine test site area which will be useful to the consortia in their own ocean disposal research.

Hawaii is the only State in the Union with a manganese nodule program, and we are the only State actively seeking this new industry.

U.S. Senator Spark M. Matsunaga has introduced and is leading the Senate toward passage of a bill which will allow mining to begin. Concurrently, our own State program has begun research which will help assure that processing is a clean industry and the excess products are either useful, or at least environmentally harmless.

Hawaii also is in the forefront in aquaculture development. We completed a State aquaculture development plan in 1978, making us the first State in the union to have such a plan, and also one which is now being used as a model by national planners designing the Federal program. Our Aquaculture Development Program is also working with President Carter's Joint Subcommittee on Aquaculture.

Our State aquaculture plan has two sectors: a commercial production sector, and a research, training, and technology-transfer sector.

This Aquaculture Development Program is developing new species through research and development projects.

Our College of Tropical Agriculture at the University of Hawaii has been instrumental in building up our local industry and assisting developing countries in the Pacific Basin.

Hawaii now leads the world in prawn research, and will be the site of the world's largest commercial freshwater prawn farm.

Lowe Aquafarms, Inc. on Oahu now has 110 acres in prawn production, and expects to have 400 acres in production in a few years.

Close behind is Kilauea Agronomics, the C. Brewer prawn farm on Kauai, which currently is at 100 acres, and is expected to be 300 acres at full size.

Projections indicate that by the year 1990, we may have 5,700 acres in commercial aquaculture production, with 2,134 direct and indirect jobs, and wholesale revenues of $71 million.

By the year 2000, these figures could be five times larger: 28,000 acres, 9,000 jobs, and $330 million in revenues.

The cultivation of fish in ponds has long been a part of Hawaii's heritage. The same is true of fishery activities. Through the Department of Planning and Economic Development, the State is now offering financial assistance to fishermen through its Fishing Vessel Loan Programs. Last year, the Pacific Tuna Development Foundation sponsored a cooperative effort with the National Marine Fisheries Service to develop an anchored fish-aggregation system in Hawaii's waters.

This year, the Legislature responded by funding 26 fish aggregation buoys, which will soon be installed, and will attract fish for more efficient fishery activity.

The Pacific Tuna Development Foundation also has worked with the fishermen of Truk, the Marshall Islands, Guam, and American Samoa on fishing techniques.

Even with all this significant activity to benefit the fishing industry, I have felt that the industry needs a master plan for development.

Therefore, I am pleased that the first draft of the Hawaii Fisheries Development Plan by the Department of Land and Natural Resources is under review.

The fisheries development plan will note the enigma of having an ocean of fish around around us, and a population of fish-lovers, yet years of decline in our fishing industry. Last year we produced only 13 million pounds of fish.

The new plan will provide the rationale for the expansion of the fishing industry and envisions an industry in 1990 that will produce close to 19 million pounds with a fleet of more than 100 fishing vessels of all sizes, and more than 1,000 new jobs.

I believe that our fishing industry is now on the threshold of major expansion, given the proper business initiative, capital investment, and government support.

In another bounty from the sea, the Hawaii State Plan includes the objective of "increased energy self-sufficiency."

Ocean thermal energy conversion, or OTEC, is an ocean opportunity we are actively promoting.

The State of Hawaii has already accumulated an impressive record in OTEC.

Interest in OTEC developed rapidly after the foundation in 1974 of the Hawaii Natural Energy Institute, located at the University of Hawaii, and the Natural Energy Laboratory of Hawaii, located at Ke-ahole Point on the Big Island.

As you will hear further this afternoon, Mini-OTEC, floating near Ke-ahole Point, became on August 2, 1979 the world's first closed cycle, self-sustaining OTEC system operating at sea.

In my telegram to President Carter announcing that historic moment, I pointed out that OTEC is a workable, renewable, essentially inexhaustible energy resource which can be brought on-line soon.

Mini-OTEC has proven that the concept is sound and large OTEC plants can be practical. I believe that Ke-ahole Point deserves to be recorded in history as

the site of an important technological turning point, just as Kitty Hawk, North Carolina, does with the first flight by the Wright brothers.

Next Spring, OTEC-1 will be positioned off the coast of the Big Island near Kawaihae.

While Mini-OTEC was built without federal funding, the federal government is sponsoring OTEC-1 and has agreed to spend $2,235,000 on warm water experiments at the Seacoast Test Facility.

I am pleased to announce that by July 1, 1980, we expect to be pumping water to begin onshore experiments for the U.S. Department of Energy at the Seacoast Test Facility at Ke-ahole Point.

Our next goal is to make Hawaii the location of a 10/40 megawatt OTEC plant which the federal government is expected to build at a cost of $150 million as a proto-type before full-scale commercialization.

One consortium, consisting of Westinghouse, Dillingham, Gibbs & Hill, Inc., Brown & Root Development, Inc., and the Hawaiian Electric Company, has already announced plans to compete for the 10/40 plant.

We will counsel and cooperate with any consortium which proposes Hawaii as a 10/40 site, because we believe it is in the State's best interests to have several proposals specifying Hawaii as the plant site.

If one of the Hawaii proposals is successful, our research indicates that a 10/40 plant would create 2,100 new jobs and add $76 million to our economy. The siting of a 10/40 plant would also continue Hawaii's world leadership in OTEC development.

I have mentioned manganese nodules, aquaculture, fisheries, and OTEC as major ocean opportunities which my Administration is actively promoting. Now I would like to discuss very briefly two areas of effort and concern which I believe are essential to promoting all of these opportunities.

One involves permit procedures and the other is marine education.

First, it is important that our governmental machinery does not become an obstacle to the development of new ocean industries.

Large number of permits are required and time-consuming procedures must be followed before a new industry can be established.

I am concerned that potential industries which are environmentally clean, may be prevented from being established because of these requirements.

It is now time to make effective efforts to cut some of the red tape, while not compromising our environment, health, or safety.

My Administration has responded to this problem in two major ways.

First, existing permits and procedures have been studied to assist industry and the public in understanding which permits are required, which governmental entities issue them, and how long it is likely to take to obtain them.

An initial survey of permits and procedures for OTEC plants is now under way.

Far more important, however, is our second response to the permit system: our intention to reform it.

Our Coastal Zone Management Program has studied this problem for nearly two years. A number of suggestions have been made, such as a master permit application form, the simultaneous consideration of an application by all agencies concerned, the institution of deadlines by which the government must act, and the designation of a lead agency for each application.

In 1977 the Legislature passed Act 74, which called upon each County to designate a central coordinating agency to collect permit information, to coordinate applications and hearings, and to research the possibility of a master application form. Our reform efforts are continuing. My Administration is committed to giving the green light to those new industries which are environmentally sound and compatible with the life-style of our people.

The second area of concern is marine education.

We are an ocean State, and our future will largely depend on our ability to understand this and to make wise use of our ocean resources.

I am pleased, therefore, to report that we have just completed our State Master Plan for Marine and Aquatic Education. This plan will provide students from kindergarten through high school with exposure to, and knowledge of, marine opportunities.

It will support innovative and practical programs at the Community College and University levels, and will further provide advanced studies for business executives, scientists, and other citizens interested in marine policy issues.

Our master plan will help educate our people in recognizing the importance of our ocean resources, to discover and promote new opportunities, and to be trained and prepared to fill the new jobs which those opportunities create.

In closing, I congratulate the Hawaii Ocean Law Association for organizing and sponsoring this seminar, and I congratulate all of you who are here today for giving ocean resources this priority.

We are proud of what we have accomplished in Hawaii, and I pledge the strong effort of my Administration in continuing to work for even further achievements in the almost unlimited opportunities our ocean offers us.

Mahalo and Aloha.

THE OCEAN CHALLENGES OF THE EIGHTIES

A decade of exploration and encouragement of Hawaii's ocean programs has been completed. These efforts have been successful. A number of infant enterprises have been born whose growth as major economic entities in the State of Hawaii is assured. Success, however, often brings its own problems. If we do not respond properly, these enterprises could very well overwhelm us. The new technologies and industries of the ocean will come to Hawaii with a force and magnitude that could outstrip our present ability to control. We must be prepared.

Two major challenges face us now:

1) *We must ensure that these industries develop in a manner that enhances--not degrades--our environment and our quality of life.*

2) *We must ensure that the people of Hawaii have every opportunity to participate in every phase of that development.*

It is now clear that aquaculture has become a healthy and expanding industry, attracting not only Hawaii entrepreneurs, but major outside corporate interests as well. The development of fish aggregation buoys and various other fish attractant techniques--plus the incipient development of OTEC-related aquaculture--puts Hawaii in the forefront of the inevitable global shift from energy-devouring highly mobile pursuit of the ocean's living resources to the stationary cultivation of salt water animals and plants. Sea farming is the wave of the future, and Hawaii rides on the precarious crest of that wave.

It is now clear that OTEC, or ocean thermal energy, will be developed; that the United States as a whole is committed to such a development; and that the major part of the national effort to develop OTEC as a viable and reliable form of alternate energy will take place in Hawaii.

The energy potential of OTEC is enormous. On a world-wide basis, OTEC could produce more energy than the U.S. now consumes annually (70 "quads" for OTEC, vs. 65 current "quads" for the U.S.). With the major research and development of OTEC based in Hawaii, it would not be incorrect or inappropriate to assert that Hawaii could be American's "MIDDLE EAST" for the production of energy.

National funding and scientific participation doesn't happen in Hawaii because Hawaii is a national priority, but because what Hawaii is doing will be used on a national and international scale. We must recognize that--without proper preparation on our part--Hawaii's role could change from that of a partner, to that of a pawn.

It is now clear that Hawaii will also be the prime center of activity for deep sea manganese nodule mining, and eventually for other forms of ocean industry. Estimates of the capital investment required for a full-scale, commercial manganese nodule mining and processing operation range from 500 million to one billion. Such an enterprise would rank among the largest of Hawaii's corporations.

It is now clear that Hawaii's eminence in ocean science and technology will continue to expand. The impending award of funding for a National Underwater Laboratory System, utilizing the Hawaii-owned habitat AEGIR and submersible STAR II, the increasing support for Project DUMAND, and the technological development connected with OTEC complement the continued development of the University's Oceanographic Expeditionary Center at Snug Harbor. These advances are joined by the current construction of the University's Ocean Science Building and the continued in-migration of the nation's foremost ocean scientists. In ocean science and technology, Hawaii has arrived.

Finally, as if all of these successful efforts were not enough, it is now clear that modern forms of marine transportation will return to Hawaii, in the form of American flag cruise ships, in the form of jet hydrofoils, and possibly in the form of the Hawaii-pioneered semi-submersible ferry.

To be prepared for all this, what must Hawaii do? To ensure that our environment and life style are not casualties of national and global movements, to ensure that Hawaii's people are not passed over for the jobs and opportunities that ocean industries offer, Hawaii must accomplish three things.

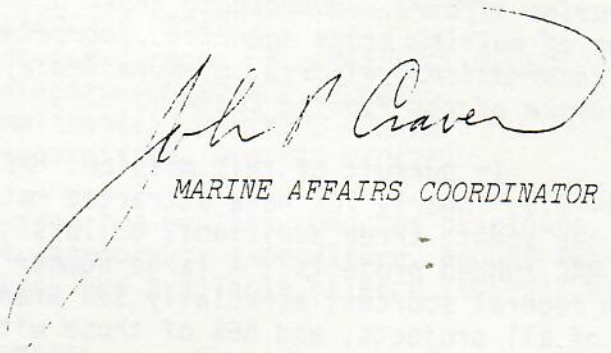
FIRST, we shall have to greatly accelerate our education efforts if we want even a modest chance of meeting this goal. The establishment and support of a Marine Education Plan is a first step, but this endeavor must continue until such time that an ocean orientation and an ocean education are automatic components and considerations of those institutions and agencies having a responsibility for education in Hawaii.

SECOND, the assistance and support of Hawaiian facilities, Hawaiian institutions, and Hawaiian legal and regulatory procedures that provide the appropriate Hawaiian incentives and constraints that permit us to meet our own goals.

THIRD, the support of second generation institutions across the spectrum of marine opportunities. If Hawaii does not build and run the infrastructure associated with these enormous marine industries, someone else will.

Were it not for these three challenges, the role of the Marine Affairs Coordinator would be greatly diminished. Ultimately, the functions of such an office could easily be included in a regular department. But for the immediate future, the need is still there.

Hawaii must move swiftly if the opportunities of the ocean are not to become an economic, environmental, or social burden. Hawaii is now an ocean state, and we need to begin to adjust ourselves to this reality.



MARINE AFFAIRS COORDINATOR

M A H A L O

A special "thank you" and "mahalo nui loa" to University of Hawaii Marine Option Program students Phyllis Ha and Jeanette Hedenshau, for the outstanding contributions they made to this Annual Report while working as MAC Office Interns.

FERROMANGANESE RESEARCH IN THE HAWAIIAN ARCHIPELAGO
Task Order No. 149

FINAL REPORT

MAC INVESTMENT: $18,000 (FY 1978-79)

MATCHING FUNDS
NONE

OPERATING AGENCY: DEPARTMENT OF OCEANOGRAPHY &
HAWAII INSTITUTE OF GEOPHYSICS

PRINCIPAL INVESTIGATOR: DR. JAMES E. ANDREWS

OBJECTIVES

This project is examining the potential of an offshore dumping site at Puna, Hawaii to evaluate environmental and mechanical problems of slurry dumping related to possible nodule processing activity in the Puna District. Near shore ocean dumping will be perhaps the least expensive and environmentally the least difficult method of nodule tailing disposal. This preliminary investigation is being made to establish the feasibility and acceptability of such activity offshore Puna.

METHODS

Existing charts were examined and a candidate site selected. This is a broad, steeply descending sea valley which comes very near shore between Hilo and Cape Kumukahi. A near shore bathymetric survey was run over the head of the valley and 57 bottom samples and 2 bottom photos were obtained in July 1978. All stations and tracks were controlled by Trisponder navigation.

Bottom samples are being analyzed for grain size and chemical components--particularly trace heavy metals and materials anticipated in nodule tailings.

Bathymetric results have been submitted previously. Chemical analyses are still underway. Possible trends observed include a strong positive manganese:Iron (Me:Fe) correlation and a probable correlation between Cadium(Cd) and distance from Hilo. The latter is at very low levels (<10 ppm) and appears to show man's input to the environment. In the Hawaiian Islands this information could prove to be an extremely useful tracer of recent sedimentary processes.

DISCUSSION

Data obtained to date is adequate in terms of sampling but deficient in bathymetric coverage and bottom photo coverage. On the basis of results to date the site appears appropriate for ocean dumpling use in relation to future nodule processing.

SUMMARY/CONCLUSIONS

The project is scheduled for continuation in order to complete the analytical work and to collect date (bathymetry and bottom photos) not obtained in 1978. Support is anticipated from Coastal Zone Management (CZM) ($20,000) with matching from MAC ($10,000). This is all part of the on-going State evaluation of the nodule processing industry and plant sites in the Hawaiian Islands.

HAWAII COASTAL ZONE DATA BANK
Task Order No. 157

PROGRESS REPORT

MAC INVESTMENT:	$45,000 (FY 1978-79)	MATCHING FUNDS $7,573 (FY 1978-79) HAWAIIAN ELECTRIC CO.
OPERATING AGENCY:	DEPARTMENT OF OCEANOGRAPHY University of Hawaii	$2,937 (FY 1978-79) OTHER PROJECT FEES
PRINCIPAL INVESTIGATOR:	DR. KEITH CHAVE	

OBEJCTIVES

The Hawaii Coastal Zone Data Bank (HCZDB) is a RCUH administered project within the Department of Oceanography at the University of Hawaii. The HCZDB has functioned since 1972 as a computerized repository of marine biological data collected through environmental research in the nearshore waters of the Hawaiian archipelago. HCZDB data files include results of surveys of fish abundance, benthic communities, plankton, water quality variables and physical factors including temperature, salinity and tides. The HCZDB serves as an efficient source of such information for investigators from state and federal agencies, university research projects and private companies with environmental data needs. The HCZDB also performs statistical analyses and had developed computer routines for summarizing and presenting data in graphical and table formats.

METHODS

The HCZDB makes use of several computer systems for data analysis and storage. A major feature of the HCZDB is the master taxonomic listing of Hawaiian marine organisms. Each of over 15,000 species occurring in Hawaiian waters is identified by a ten digit hierarchical code. The list provides a basis for standardizing species identifications. During FY 1978-79, authorities on Hawaiian algae, fishes, molluscs and marine mammals were consulted and suggested changes which were incorporated into the master listings.

The MAC has been a major supporter of HCZDB activities. MAC funding in FY 1978-79 has supported the general management of the HCZDB, the maintenance of computerized data files, the development of more efficient means of data entry, retrieval and analysis, and the expansion of the HCZDB user community.

MAC funds provided in October of 1978 created the position of project manager of the HCZDB. The project manager was charged with evaluating the function, performance and potential of the HCZDB, expanding the number of users of HCZDB services, and increasing the amount of alternate funding for HCZDB activities.

RESULTS

MAC funding during 1978-79 supported major revisions of the HCZDB master species lists for algae, fishes, mollusks, and marine mammals. Methods of interactive data entry and graphical data presentation were developed through MAC support. During 1978-79 a fee system was instituted for assigning charges to users for specific HCZDB services. The fee system is generating funds to cover basic data file maintenance and supervision.

The HCZDB user community has grown significantly in 1978-79. The following projects were among those utilizing HCZDB data files or analytical services and provided funding:

* Hawaiian Electric Company Environmental Division monitoring of the impact of the Kahe power plant operations on marine biological communities.

* The Kaneohe Bay Sewage Abatement Study, sponsored by the Environmental Protection Agency and MAC. The HCZDB has provided data storage, analysis, graphical and tabular summaries and comparative data from previous investigations.

* The Marine Option Program Program-National Science Foundation Student Study Project. The HCZDB provided guidance in sampling design and statistical analyses, computer facilities and analytical routines to the students involved.

* The Northwestern Hawaiian Islands Studies (Task Order No. 173) sponsored by Sea Grant and MAC. The HCZDB provided archived data, statistical routines, and specific analyses to several of the individual projects involved.

* The Hawaii State Fishery Master Plan Project. The HCZDB is providing assistance in interpreting computerized catch and effort data on Hawaiian fisheries, and has developed routines for the graphical presentation of catch and effort data.

* The University of Hawaii Environmental Center study of ocean dredge spoils dump sites. The HCZDB advised on and carried out statistical analyses of data collected at control and dump sites to evaluate the effects of dumping on selected benthic organisms.

* The HCZDB also provided analytical and computer support for Bishop Museum projects, graduate student research at the University of Hawaii, and researchers from the University of Guam, the Palau Marine Laboratory and the fisheries branch of the government of American Samoa.

SUMMARY/DISCUSSION

The major accomplishments of the HCZDB during FY 1978-79 were the revisions of the master species list, the institution of a standarized fee system, and the increase in the number of HCZDB users. The major problem encountered was the inability to obtain funding for the development of a more efficient means of data storage and retrieval. Existing computer data base management sytems are inadequate to handle the intricacies inherent in scientific survey results. The HCZDB has been cooperating with Naval Ocean Systems Command (NOSC) personnel and others in developing a computer data base management system for scientific data. Attempts by NOSC at obtaining funding for such a system have been unsuccessful. The HCZDB will continue to be involved in developing such a system.

PROJECT CONTINUENCE

The HCZDB is an ongoing project; its usefulness should increase as its data files expand. MAC funding in FY 1979-80 will enable the HCZDB to make more efficient its data file structure in certain selected areas and will aid the seeking of additional users for its data files and analytical services. The HCZDB will be preparing proposals for federal funding to support continued development of the centralized data bank concept.

HCZDB personnel will be carrying out MAC Task Order No. 202 a study of the possible effects of pollution on marine biological communities in the Kapahulu Groin to Black Point area of Oahu. The study will include the analysis and summary of scientific data collected in the area over the past ten years by various investigators and archived within HCZDB files.

NORTHWESTERN HAWAIIAN ISLANDS FISHERIES INVESTIGATIONS
Task Order No. 173

AN OVERVIEW

FY 1978-79 FUNDING:	*(Also shown in Table 1 on following page)*
MAC INVESTMENT:	$103,621
MATCHING FUNDS:	$194,366, SEA GRANT 250,000, NATIONAL MARINE FISHERIES SERVICE 330,000 (ship time), NATIONAL MARINE FISHERIES SERVICE 75,000, U.S. FISH AND WILDLIFE SERVICE 10,000, UNIVERSITY OF WASHINGTON
OTHER STATE SUPPORT:	$ 20,000, STATE DIVISION OF FISH AND GAME 80,000, UNIVERSITY OF HAWAII
OPERATING AGENCY:	NATIONAL MARINE FISHERIES SERVICE (NMFS)

The following five progress reports are descriptions of the MAC Office-assisted projects within the Northwestern Hawaiian Islands Fisheries Investigations, Task Order No. 173 (hereafter called "the program").

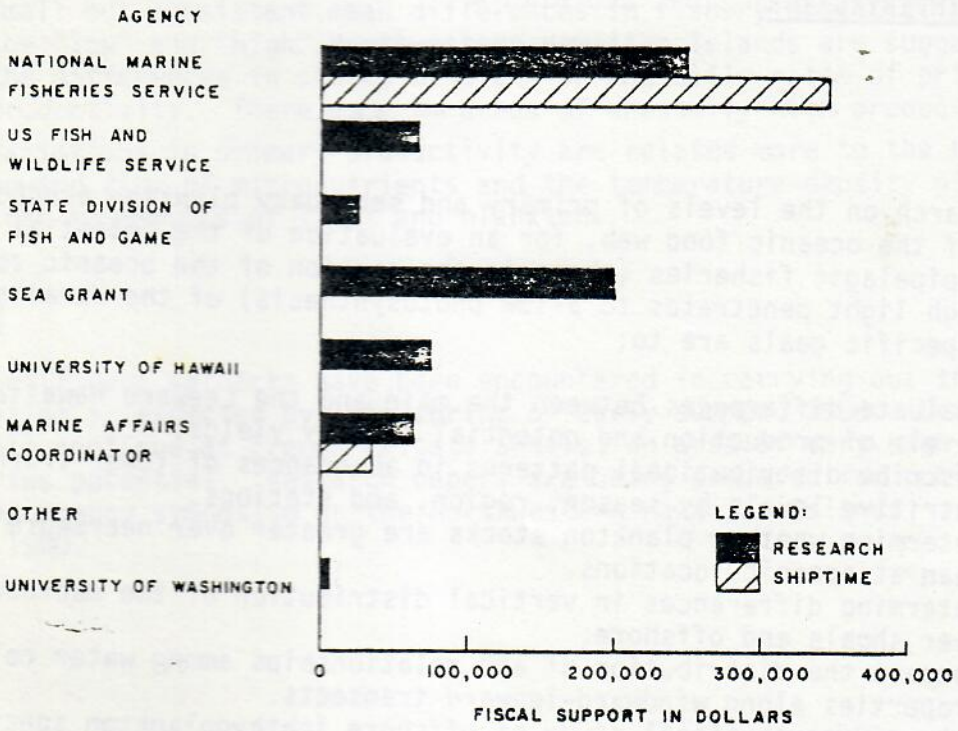
The program was introduced this year to facilitate assessment of the potential for fisheries development and for management of the living resources of the Leeward or Northwestern Hawaiian Islands (NWHI); it is a cooperative Sea Grant, State of Hawaii and NMFS undertaking which complements an existing Tripartite Cooperative Agreement between the NMFS, the U.S. Fish and Wildlife Service and the State Department of Fish and Game to make a five-year stock assessment of fisheries and avian resources of the NWHI.

The NWHI region consists of islets, reefs, shoals, guyots, and seamounts which span three-quarters (1,150 miles) of the entire Hawaiian Archipelago. The NWHI have served principally as a wildlife refuge since 1909 (see figure 1) but a shift toward use of them for both continued wildlife refugia and selective utilization of fisheries is anticipated because of the accelerating competition and interest in the tuna and other marine food resources in the NWHI area of the North Central Pacific Ocean. Other factors, such as implications of the 200-mile limit, with its creation of new mechanisms for fishery management and planning, and disputes between the state and the federal governments over boundries and over development versus preservation further compels the program's work.

MAC funding of the program [and related research on monk seals (T.O. No. 193) and ciguatoxin (T.O. No. 198)] represents a major part of the State's share in the functional responsibilities of the Tripartite Cooperative Agreement. The set of projects which comprise the program will be revised and increased in Fiscal Years 1979-'80, '80-'81, and will remain a closely coordinated multidisciplinary effort to address questions that deal with the potential productivity of the Hawaiian Archipelago as a system (or set of systems).

The joint programs will contribute toward the development of an ecological model of the area by NMFS, utilizing the Dynamic Numerical Marine Ecosystem (DYUMES) model developed at the Northwest Center of NMFS in Seattle. These data and analyses will provide the scientific basis for the rational management of the NWHI fisheries resources and contribute significantly to the area of marine science.

Table 1. Agency Support for Research and Shiptime in the NWHI in FY 1978-79



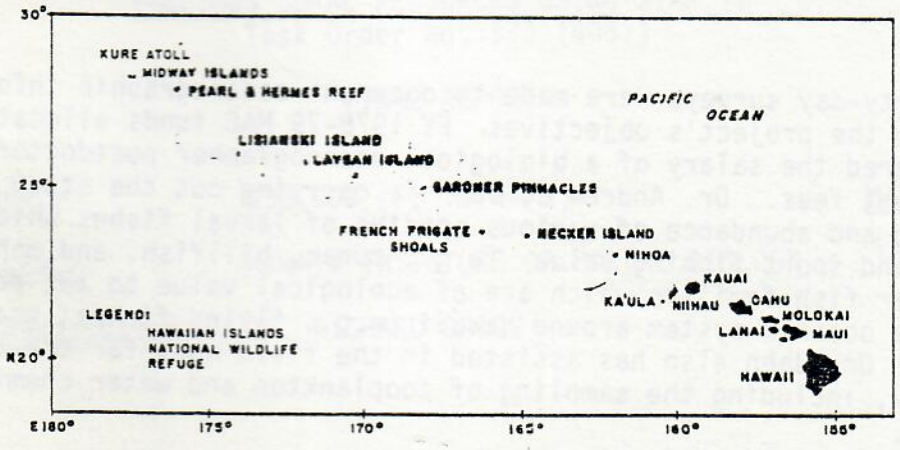


Figure 1. Location of the Hawaiian Islands National Wildlife Refuge

STUDY OF PUAKO BAY RESOURCES FOR MANAGEMENT PLANNING
Task Order No. 189

PROGRESS REPORT

MAC INVESTMENT:	$20,000 (FY 1978-79)	MATCHING FUNDS NONE
OPERATING AGENCY:	DIVISION OF FISH AND GAME HAWAII COOPERATIVE FISHERY RESEARCH UNIT	
PRINCIPAL INVESTIGATOR:	KENJI EGO	

OBJECTIVES

To determine and assess the physical and biological characteristics of the nearshore and reef areas of Puako Bay, South Kohala, for purposes of monitoring:

a. trends in fish populations
b. changes in the marine environment
c. effects of man-induced ecological disturbances upon fishes

To determine and assess:

a. fishing patterns and pressures
b. fish catch compositions

To obtain other information that may be useful in assessing the effects of proposed developments in the area and for the formulation of suitable management measures.

METHODS

Field studies were carried out by divers using SCUBA. Dives were made at depths from 0-80' along the length of the Puako reef tract in order to determine local habitat types and to compile species lists for each of the habitats. Permanent transects were set up in order to obtain more detailed information on the distribution and abundance of the larger invertebrates and fish. Additional dives were also made at seven other locations on the Kona coast to be used as a basis for comparison with Puako reef. Collection of fish from each of the habitats was begun using standard fishing methods. Measurements and weight were taken prior to removal of the gut contents and otoliths for further study.

Assessment of the local fishery was initiated by conducting informal interviews with the residents of the Puako beach-front in order to obtain background information on the type and frequency of the fishing observed, as well as any long-term patterns or changes noted.

In addition, passive observation of the fishing activity was begun. The number of fishermen, methods used, time of day, and day of week were recorded. Whenever possible, the catch composition was also noted.

RESULTS

Repeated observations at the Puako reef tract have resulted in the establishment and descriptions of six habitat zones. No area has yet been found on the Kona coast whose physical characteristics closely resemble those at Puako.

Assessment of the fishery by informal interviews and passive observations indicate taht the present fishing is generally recreational in nature, consisting largely of families who often come to fish for the weekend. The long-term nature of the fishing pressure has no apparent pattern, but has been marked by sporadic increases and a sharp decline following the Labor Day weekend. Occasional large-scale collections of limu (edible seaweed) and sea urchins were noted. In addition, commercial dive boats and recreational divers have been observed.

DISCUSSION

Analysis of the early data has not yet been carried out. However, several steps have been made toward completion of the stated goals of this project. Field work carried out to date has resulted in the identification of the habitat types present at the Puako reef tract. Establishment of permanent transect lines, combined with systematic surveys of the entire area, has yielded much information on species composition and spatial distribution throughout the area. A formal report will substantiate the findings.

Assessment of the local fishery by informal interview of residents and by passive observation of the fishermen is proceeding as planned. Quantitative information on species and amounts of fish caught has yet to be determined.

CONCLUSIONS

Until more complete and quantitative data can be accumulated, any definite conclusions would be premature. It appears that the area is a rather distinctive environment with considerable resource values (both fish and invertebrate) and that at least the shallow reef top and surge zone is subject to fairly intense recreational use, including fishing. It will be important to characterize and quantify the fishing effort further.

PROJECT CONTINUENCE

The continuance and completion of this MAC-initiated project will be federally funded through the Department of Land and Natural Resources. Completion of the project is expected to be on schedule--Summer 1981.