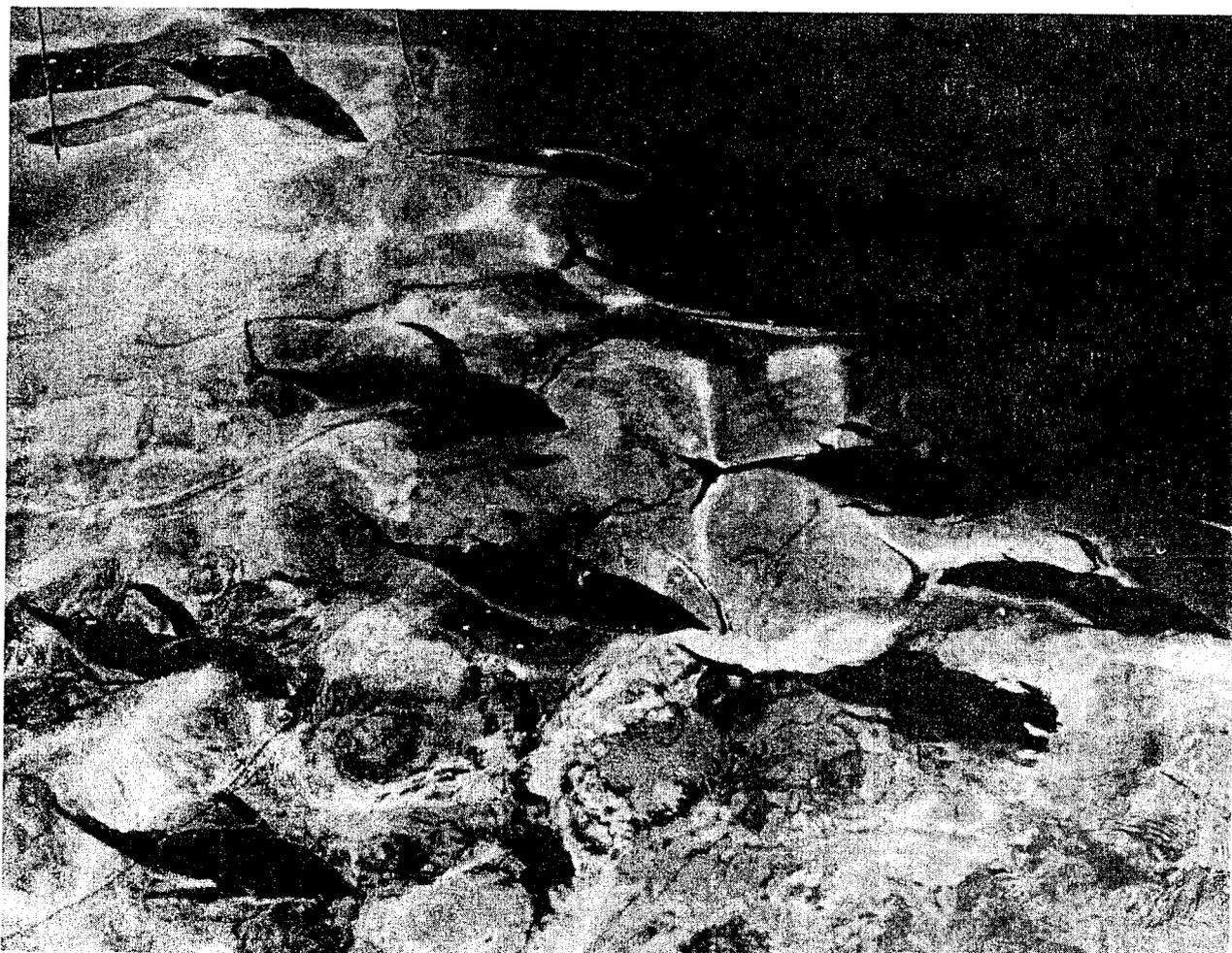


U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

SOUTHWEST
FISHERIES
CENTER
HONOLULU
LABORATORY



APRIL 1979

*This brochure does not constitute a publication and is for
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SOUTH PACIFIC COMMISSION

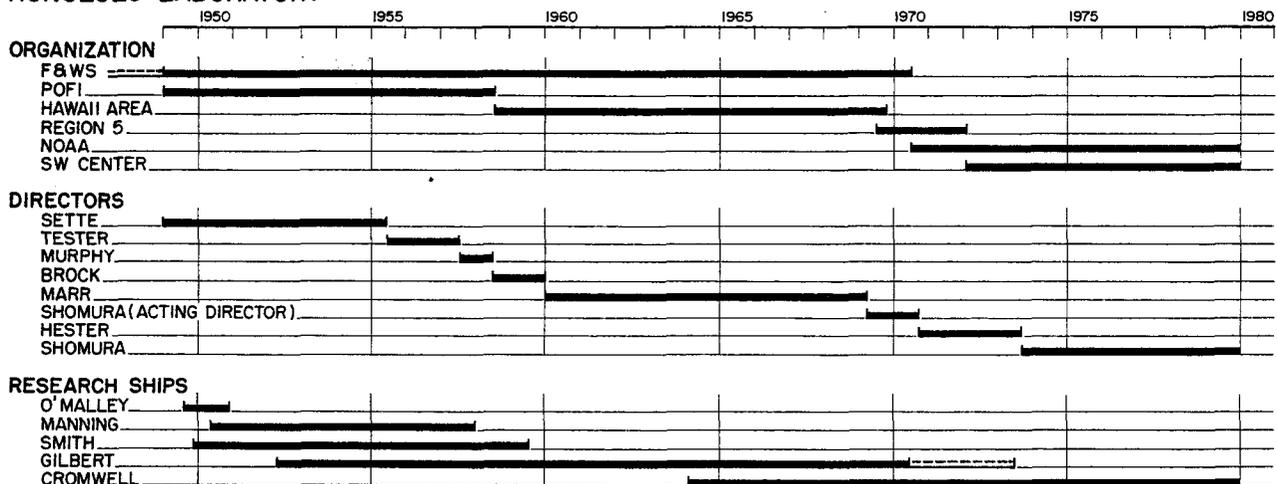
THE HONOLULU LABORATORY HISTORY, ACCOMPLISHMENTS, AND CURRENT PLANS

BACKGROUND

The Honolulu Laboratory of the Southwest Fisheries Center was established by Public Law 329 of the 80th Congress in 1947 for the exploration, investigation, and development of high-seas fisheries of the territories and island possessions of the United States in the tropical and subtropical Pacific Ocean and intervening seas. Funds for the Laboratory were released in July 1948 and in 1949, the Pacific Oceanic Fishery Investigations (POFI), as the Laboratory was known then, began its research operations. In 1950, POFI moved into its newly completed permanent laboratory building located adjacent to the University of Hawaii in Honolulu's historic Manoa Valley.

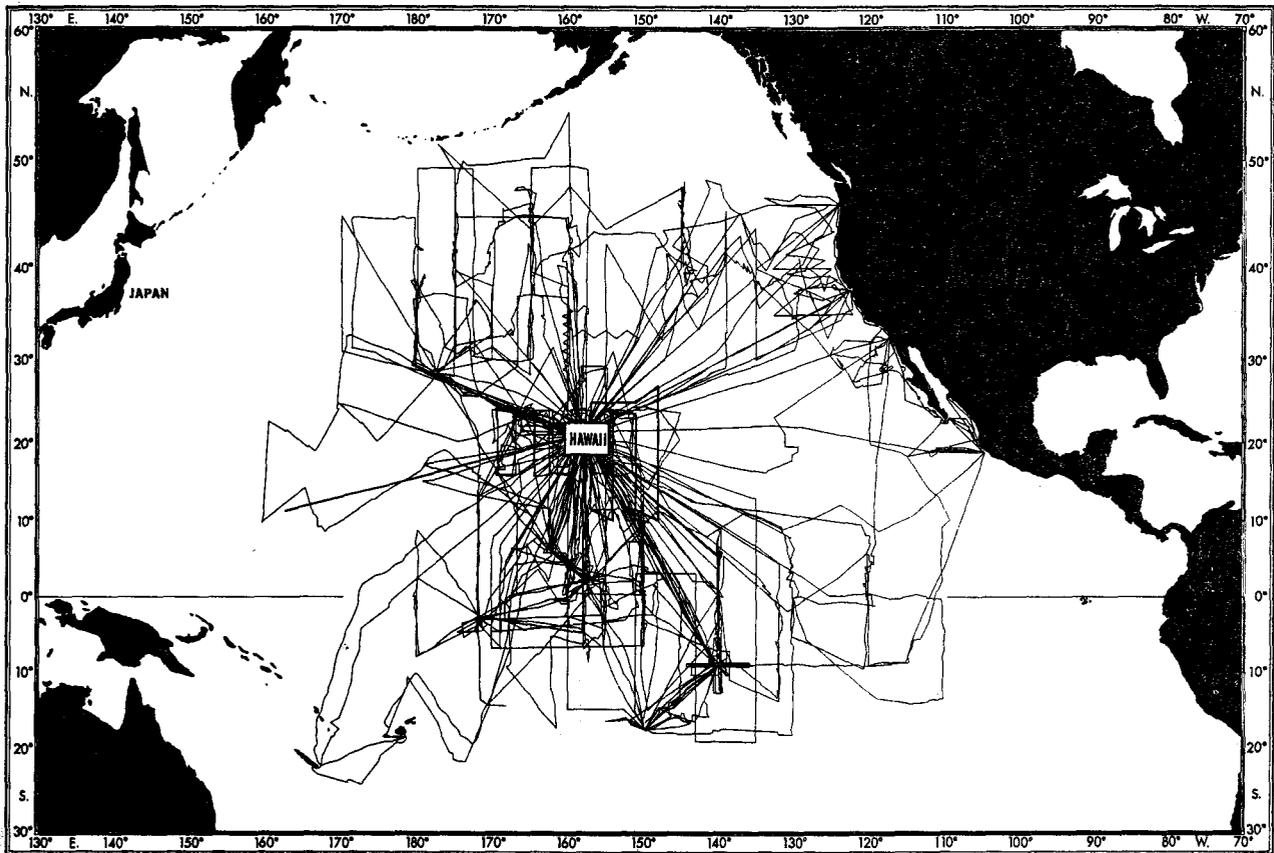
The Laboratory has gone through several major changes in its 29 years of existence including reorganizations, changes in directors, objectives, and fundings. Presently the Honolulu Laboratory is part of the Southwest Fisheries Center, one of four regional fishery research centers in the National Marine Fisheries Service. In addition to overseeing the research activities of the Honolulu Laboratory, the Southwest Fisheries Center is responsible for the conduct of fishery and related studies in laboratories at La Jolla, Monterey, and Tiburon, California. The headquarters of the Southwest Fisheries Center is located at the La Jolla Laboratory.

HONOLULU LABORATORY



SCIENTIFIC ACTIVITY

In the years before the 1970 reorganization which created the National Oceanic and Atmospheric Administration (NOAA), the Tuna Industry Advisory Committee guided the research directions of the Honolulu Laboratory. The interaction between the Honolulu Laboratory and this Committee resulted in extensive, systematic fishery and oceanographic explorations in the Pacific



Ocean from the Aleutian Islands to New Caledonia, and from the American Continent to Palau in the Western Caroline Islands. Some of the scientific achievements of the Laboratory resulting from this exploratory and related work are listed below.

1. Discovering and delineating the easterly flowing Equatorial Undercurrent (Cromwell Current). Its discovery solved one of the major oceanographic puzzles of our time, the great imbalance of the amount of water flowing westward in the Pacific Ocean as compared to the amount flowing to the east.
2. Locating a concentration of large, deep-swimming tunas in an equatorial band and determining their relationship to the oceanographic and meteorological features of the Pacific Ocean.
3. Maintaining tunas in captivity for extended periods. The Honolulu Laboratory was the first research laboratory to do so and even today, no other facility in the world captures and holds the delicate skipjack tuna. This development has opened the way for the Honolulu Laboratory and visiting scientists to conduct significant experiments on the behavior and physiology of tunas including describing the visual acuity of skipjack tuna and kawakawa; determining the hydrodynamics of kawakawa and its effect on behavior; and obtaining conclusive evidence that yellowfin tuna can physiologically thermoregulate.
4. Providing an atlas of the oceanography of the central Pacific Ocean. This description provides basic environmental information of the

world of the pelagic fishes, information that is essential to the exploratory and developmental stages of a fishery.

5. Elucidating the migration of the albacore and skipjack tuna in the Pacific.
6. Identifying the larvae and juveniles of yellowfin and skipjack tunas and determining their distribution.
7. Providing an estimate of the potential yield of the skipjack tuna resources in the Pacific Ocean. The Honolulu Laboratory studies have contributed to the dramatic development of skipjack tuna fishing activities in the western tropical Pacific.
8. Determining the age of local anchovy, nehu, from otolith markings. This is significant in that this is the first demonstration that otolith markings can be used to determine the age of tropical fish species.
9. Developing anchored fish aggregating systems in Hawaiian waters to enhance commercial and recreational fishing success for pelagic fishes; e.g., tunas, billfishes, mahimahi, and wahoo.
10. Discovering spiny lobster and demersal fish resources in the North-western Hawaiian Islands.
11. Determining the cause of "honeycombing" in skipjack tuna and developing procedures to prevent it. The recommendations resulting from this study were instrumental in reducing considerable losses to the Hawaiian skipjack tuna industry.
12. Developing bioeconomic models on billfishes and precious corals in Hawaiian waters.
13. Completing a major survey of the charter boat trolling fishery in Kailua-Kona, Hawaii.
14. Developing new estimation techniques for cohort analysis.
15. Applying dynamic programming methods to fishery management. Techniques for decisionmaking under uncertainty have been developed including qualitative descriptions of optimal policies, approximation of larger models by smaller ones, "discretization" procedures, Bayes procedures and partially observed states.
16. Determining the spawning habits of albacore in the South Pacific including a description of the spawning season and major spawning grounds.

As is true in any research organization, not all endeavors come to successful conclusions and the Honolulu Laboratory certainly has had its share of inconclusive or unsuccessful projects. However, even these "not so successful" research results add to the bank of knowledge and contribute to a better understanding of problems.

The Honolulu Laboratory has sponsored and participated in various international workshops including those on baitfishes, small tunas, billfishes, and albacore. Several of these workshops were responsible for producing for the first time and in a unified way descriptions of the biology and particularly the population dynamics of several species. However, perhaps of greater importance is that through these means a great deal of cooperative research and goodwill has been generated among the Indo-Pacific countries.

PLANS FOR THE IMMEDIATE FUTURE

The enactment of the Fishery Conservation and Management Act of 1976 has required some changes in the research efforts of the Honolulu Laboratory. The Western Pacific Regional Fishery Management Council, which is charged with developing Fishery Management Plans (FMP) for the U.S. fishery conservation zone around Hawaii, American Samoa, and Guam, relies heavily on the Honolulu Laboratory for scientific and technical assistance. Unlike other areas in the continental United States where the Regional Councils can call on many research oriented agencies for help, in Hawaii, where the Western Pacific Regional Fishery Management Council is headquartered, the Honolulu Laboratory is one of only a few such organizations that can be of assistance. Thus, one of the recent major efforts of the Honolulu Laboratory has been, and will be in the immediate future, research in support of the Western Pacific Regional Fishery Management Council in their preparation of FMPs.

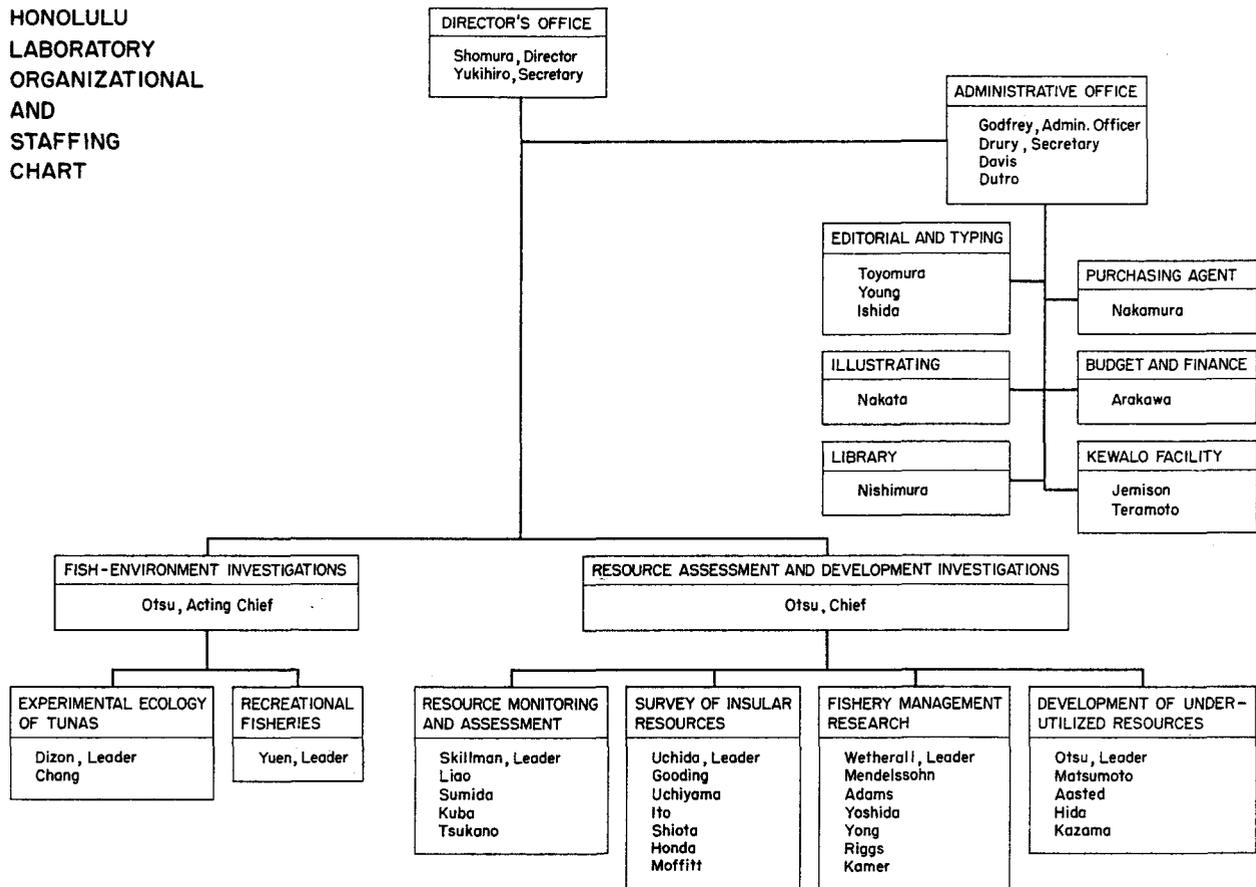
More recently, the impending organization of the South Pacific Fisheries Agency portends greater involvement of the Honolulu Laboratory in fishery research in the south and western Pacific and the Indian Ocean. What form the South Pacific Fisheries Agency will take is not clear at present. However, it is certain that the Honolulu Laboratory will have an important role in the participation of the United States in the functioning of the Agency. It is anticipated that the Southwest Fisheries Center and our Laboratory in particular will be the lead groups in the U.S. that will be conducting research on the pelagic and nearshore resources of waters surrounding the island states constituting the South Pacific Fisheries Agency.

Included in the work plan are studies on fishery management techniques, economics, stock assessment and population dynamics, and the environmental influence on the ecology of tunas. Also planned are continued studies delineating and assessing the resources of the Northwestern Hawaiian Islands and other coastal areas of direct interest to the United States. As noted above, earlier survey work by the Honolulu Laboratory led to the discovery of spiny lobster and bottom fish resources in the nearshore waters of these islands. Current and future work will involve investigations on various aspects of the biology of the spiny lobsters and bottom fishes including fishery development and stock assessment. This program in Hawaii will involve the cooperation of Sea Grant, the University of Hawaii, the U.S. Fish and Wildlife Service, and the Hawaii Division of Fish and Game.

PRESENT ORGANIZATION OF THE HONOLULU LABORATORY

The Honolulu Laboratory, under Richard S. Shomura, Director, is composed of two research groups and an administrative section. The Resource Assessment and Development Investigations is headed by Tamio Otsu. The Fish-Environment Investigations, which is presently without a permanent leader, is being temporarily headed also by Tamio Otsu. Mary Lynne Godfrey heads the Administrative Office. The permanent scientific and technical staff of the Laboratory includes 29 persons.

HONOLULU LABORATORY ORGANIZATIONAL AND STAFFING CHART



Number of permanent scientific and technical staff of the Honolulu Laboratory	
	Number
Biological Technician	5
Computer Aid	1
Computer Programmer	1
Economist	1
Fishery Biologist	14
Fishery Methods and Equipment Specialist	2
Mathematician	1
Operations Research Analyst	2
Physical Science Technician	1
Statistician	1

DESCRIPTION OF THE HONOLULU LABORATORY RESEARCH PROGRAMS

Experimental Ecology of Tunas

PRINCIPAL INVESTIGATOR: DR. ANDREW E. DIZON

Environmental variables in the ocean undoubtedly play a role in the distribution and ecology of pelagic fishes. This program seeks to determine the variables that influence the ecology of tropical tunas through their behavioral and physiological responses to environmental alterations under controlled experiments. Most the experiments will be carried out using specimens maintained at the Honolulu Laboratory's Kewalo Research Facility.

In the near term attempts will be made to answer three broad questions: (1) what are the limiting environmental conditions for such active fishes as tunas to thrive in the apparently energy-poor pelagic tropical seas; (2) what are the advantages of tunas' apparent ability to conserve heat and thermoregulate; and (3) what, if any, environmental factors trigger sexual maturation in tunas.

Investigations on thermoregulation in tunas will include use of telemetry techniques to measure body temperature in free-swimming fish. By control of swimming speed by density manipulation, the effect of rapid swimming (hence high internal heat production) on body temperature will be studied. This is an important consideration because it is currently not known whether tunas can be forced into a sufficiently high activity level to produce lethal body temperatures and whether large tropical tunas are activity-limited in warm waters.

In related studies, the caloric cost of swimming at various velocities will be determined and these data and data on diel activity will be used to construct a balanced energy budget. The determination of the energy cost of swimming will be done by the use of standard respirometric techniques. Here again, swimming speed will be controlled by manipulation of fish density; increased density will force a fish that has no swim bladder to swim faster to maintain hydrostatic equilibrium.

A problem that may be related to the physiology of tunas is that yellow-fin tuna caught by handlines in tropical waters seasonally and episodically exhibit a condition referred to locally as "burnt." This condition of raw tuna in which the flesh is opaque, light in color, and has a sour taste, is a significant economic problem because it drastically reduces the market value of the fish and limits the expansion of the attractive, low-investment handline fishery. A hypothesis proposes that this condition may be initiated by the high heat production and metabolic waste output of a struggling fish which is subsequently exacerbated by inadequate refrigeration of the catch. A study of the etiology of burnt tuna will be continued and noninvasive methods will be developed for the identification of this condition at the marketplace.

Development of Underutilized Fishery Resources

PRINCIPAL INVESTIGATORS: TAMIO OTSU AND
WALTER M. MATSUMOTO

Species of pelagic fishes such as skipjack and yellowfin tunas may be found concentrated in schools of varying sizes in the central Pacific. Other species such as wahoo and mahimahi are usually less concentrated and are more often found in smaller groupings. These fishes, whether concentrated in large schools or in small, loose groups, remain underexploited because they must still be searched out and found before they can be caught. Anchored objects have been reported to be effective in congregating fishes and fish schools, thus essentially eliminating the searching phase of fishing. Experimental work done earlier indicated that anchored floating objects do aggregate fish and are adaptable to conditions in Hawaiian waters. However, little is known about the composition of the biological communities under and around the floating objects or their stability. Also, fishery managers must have better data to determine how the deployment of large networks of anchored floating devices will impact on fishery yields.

Activities in this program will be concentrated in three broad areas. First, the program will be involved in two joint projects deploying new aggregating devices. Second, a study of the composition and dynamics of biotic communities associated with floating objects will be initiated. And finally, investigations will be carried out on methods to enhance the effectiveness of aggregating devices.

In a cooperative project between the Government of American Samoa and SWFC-Honolulu Laboratory, eight aggregation buoys will be deployed and monitored in Samoan waters. Fishing boats will be chartered to attempt purse seining and pole-and-line fishing (using cultured mollies as bait) on fish congregated near the buoys. Because of existing oceanographic conditions in the central Pacific, purse seines have been relatively inefficient in catching tunas in these waters; however, purse seining in conjunction with aggregating objects could be profitable. Also, although mollies are not highly regarded as bait, they may prove to be adequate when used to catch fish congregated around buoys.

A proposal developed in cooperation with the State of Hawaii Division of Fish and Game will seek State funding of a statewide system of buoys for the nearshore waters of the Hawaiian Islands. Using funds from external sources, a program will also be developed to quantify the effectiveness of existing buoys in Hawaiian waters. Our Laboratory has obtained a 33-ft vessel which may be ideal for use in monitoring surveys of the existing buoys. Sonar and sub-surface video methods will be used to observe and quantify fish species congregated near the buoys; as a control surveys will be made of areas having similar oceanographic features but lacking aggregating devices. Furthermore, to aid in identifying commercially valuable species associated with the existing buoys, interviews with operators of sport and commercial vessels who fish around the buoys will be continued. These interviews will also provide a measure of the relative use of the aggregating devices and their benefits to the fishing community.

If pending proposals are funded, a cooperative effort will be made by our Laboratory, the University of Hawaii, and the State Division of Fish and Game to develop and test an attractant odor dispersion system designed to enhance the effectiveness of aggregation structures. Should an attractant odor dispersion system be effective, it could be used to enhance the fish-aggregating properties of floating objects in attracting fish in commercial quantities.

In addition, an ancillary study will be conducted jointly with the U.S. Fish and Wildlife Service to determine the diet of seabirds. This study of the food habits of seabirds and knowledge of the distribution of seabirds should provide valuable information about the type and volume of fish consumed by seabirds and the degree of competition for food sources common to seabirds and predator fish such as tunas.

Resource Monitoring and Assessment, Pacific and Indian Oceans

**PRINCIPAL INVESTIGATORS: DR. JERRY A. WETHERALL AND
DR. ROBERT A. SKILLMAN**

Research carried out in this program will aid in fishery resource management and economic planning and will also provide background data essential for international fishery negotiations. Current research plans include: (1) evaluating the status of important pelagic fish populations in the central and western Pacific and Indian Oceans, (2) analyzing basic fishery statistics to elucidate the biological factors affecting the fish population dynamics, biomass production and yield potential, and (3) developing improved analytical models and statistical techniques for stock assessment and estimation of population parameters.

The stocks of fish that will be given primary consideration include tunas, billfishes, and other important pelagic species of interest to U.S. commercial and recreational fishermen. Stocks of baitfishes and pelagic sharks will be given secondary attention.

Research results, which will be disseminated through administrative reports, workshop documents, and papers published in scientific journals will have direct application to: (1) the formulation of Fishery Management Plans in support of the Western Pacific Regional Fishery Management Council, (2) the preparation of advice relative to U.S. participation in international fishery organizations such as Indo-Pacific Fisheries Commission, Indian Ocean Fishery Commission, and the proposed South Pacific Fisheries Agency, and (3) the improvement of stock assessment methodology and techniques of fish population analysis used by fishery scientists worldwide.

The work planned for the near term will focus on assessment of tuna stocks in the central and western Pacific (excluding skipjack tuna). Production model analyses will be prepared for presentation and discussion at an international Tuna Stock Assessment Workshop scheduled for June 1979 in Shimizu, Japan. Also, research in progress on the growth of North Pacific albacore and double-tagging methodology will be completed and submitted for publication.

Fishery Management Research

**PRINCIPAL INVESTIGATORS: DR. ROY MENDELSSOHN AND
DR. MICHAEL F. ADAMS**

The Fishery Management Research program is responsible for a wide range of research in fishery management, economics, and monitoring, and in developing new management techniques and schemes. Plans have been set in motion compiling economic data bases for commercial and recreational fisheries in Hawaii, American Samoa, Guam, and the Northern Mariana Islands and in modeling and analyzing the data to provide a broad picture of the economic importance of fishing, fish products, and processors in these areas. The economic analysis will include development of supply and demand curves, bioeconomic models and market studies, as well as theoretical work on how to evaluate the benefits derived from recreational fishing. Much of the analyses will be used in developing Fishery Management Plans for billfish, spiny lobster, bottom fish, and precious coral in cooperation with the Western Pacific Regional Fishery Management Council.

In addition to managing its own surveys in compiling the necessary data bases, the program will provide input into the National Recreational Fishing Survey and also into the National Recreational and Commercial Socio-Economic Data contracts.

The research in developing new management techniques is aimed at explicitly treating the uncertainties in fish population dynamics within the context of the decisionmaking process. Methods are being developed that maximize expected returns, take into account costs due to year-to-year fluctuations, and also trade off expected return against long-term risk.

Work is continuing on insuring numerical accuracy and approximating larger problems by smaller ones. Also, means of optimal decisionmaking in the face of multiple, conflicting objectives are being studied, including techniques to directly integrate the cost of research when developing management schemes. Some of this research is used in drawing up management alternatives for Fishery Management Plans.

Work will also continue on monitoring tuna fishing activity in American Samoa and Hawaii, and in preparing monthly and quarterly summaries of these data, including catch and effort statistics, and economic data on market transactions.

Current major emphasis will be to: (1) finalize analyses that will be included in Fishery Management Plans, (2) complete manuscripts describing ongoing work, (3) monitor survey activities presently underway, and (4) edit, summarize, and analyze two large economic data sets, that of imports of fish products to Hawaii and the complete records of the major fish auction in Honolulu.

Survey of Insular Resources

PRINCIPAL INVESTIGATOR: RICHARD N. UCHIDA

The Honolulu Laboratory embarked on a full-scale investigation of the marine resources of the Northwestern Hawaiian Islands (NWHI) in fiscal year 1977; the investigation was enlarged to include Guam and the Northern Mariana Islands in fiscal year 1978. The overall objectives of this program, which are to determine the status of commercially important marine species around the NWHI, Guam, the Northern Marianas, and American Samoa, were in part formulated in response to the Fishery Conservation and Management Act (FCMA) of 1976, which prescribed a 200-mile fishery conservation zone (FCZ) around these areas.

Under the provisions of the FCMA, the Western Pacific Regional Fishery Management Council has the responsibility of preparing Fishery Management Plans for the U.S. FCZ in the central and western Pacific Ocean. However, although the central Pacific islands, Kingman Reef, Palmyra, Johnston, Howland, Baker, Jarvis, and Wake are U.S. possessions, they have not as yet been placed under the Council's jurisdiction. Presumably, the program to investigate the marine resources will have to be expanded as new areas are added to Council jurisdiction.

The immediate program objectives are:

1. Continue systematic field surveys to refine current knowledge of the distribution and relative abundance of spiny and slipper lobsters, red snappers, pink snappers, blue-line snappers, sea bass, scombrids, and jacks.
2. Increase sampling effort to locate stocks of bigeye scad, mackerel scad, squid, and octopus.
3. Increase sampling effort in the 50- to 200-fathom depth range using specially designed fish traps and the Noreastern trawl to evaluate the stock of demersal and benthopelagic fish and shellfish at these depths.
4. Survey waters around American Samoa to identify resources having potentials for commercial development.
5. Begin detailed studies on spiny lobster morphometry, spawning, sexual maturity, fecundity and age, and growth.
6. Continue studies to determine the occurrence and frequency of occurrence of ciguatoxic fishes in the NWHI and American Samoa.
7. Continue to collect catch-effort data from commercial vessels fishing in NWHI.
8. Determine the feasibility of using aerial photographs to enumerate populations of terrestrial animals on islands and atolls in the NWHI.

An important aspect of the study of the NWHI is the interrelationship between the marine environment and the terrestrial animals. The NWHI (exclud-

ing Midway), which was designated a National Wildlife Refuge in 1909, is a sanctuary for numerous species of seabirds, the Hawaiian monk seal, and sea turtles. However, the boundary of the refuge is in dispute between the State of Hawaii and the U.S. Department of the Interior's Fish and Wildlife Service, which manages the refuge. Thus, studies are needed to determine the ecological relationships between protected refuge animals and marine species which offer potentials for commercial fishery development.

Recreational Fisheries

PRINCIPAL INVESTIGATOR: HEENY S. H. YUEN

Large pelagic fishes such as the billfishes are sought by recreational as well as commercial fishermen. Ecologically, billfishes are similar to the tunas; biologically, less is known about billfishes than the tunas. Even less is known about some of the other important pelagic fishes such as the mahimahi and wahoo. Ostensibly, this program is meant to primarily benefit the recreational fishermen. However, the ultimate benefit will be the conservation and full utilization of these fishes by all interests and, perhaps, a more equitable allocation of fishery quotas.

To learn more of the biology of these fishes, studies have been planned to look at their short- and long-term movements. Earlier studies have revealed that skipjack tuna have definite diel patterns of vertical movement. Knowledge of these patterns may contribute to improving fishing efficiency. Study of the movements of blue marlin, striped marlin, mahimahi, and yellowfin and bigeye tunas will be conducted by tracking experiments. Tracking consists of following a fish to which a depth-sensitive sonic transmitter has been attached.

Work will include the determination of proper gear and procedures to effectively track fish from a small boat and the application of these gear and procedures in actual tracking experiments. These experiments are limited to elucidating the short-term movements of fish because the life of the transmitter is no longer than 3 days. A study of longer term movements of fish, which will be limited to striped marlin in the beginning, will make use of foreign longline catch-effort data. Inferences on the movement of longline-caught fish may be made by following the geographical location of areas of high catch rates over time. Such an analysis may yield information on the migratory movements of striped marlin from which stock structure inferences may be made.

SENIOR STAFF MEMBERS



RICHARD S. SHOMURA

DIRECTOR, HONOLULU LABORATORY

(Fishery Biologist, Research Administration)

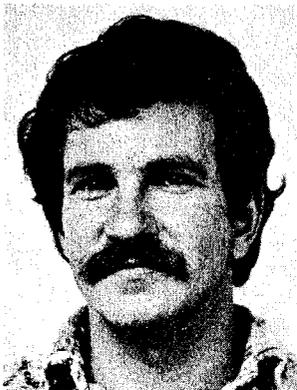
M.S. (Zoology), University of Hawaii, Honolulu, 1961. NMFS Honolulu Laboratory, 1950-70; Southwest Region, 1970-71; Tiburon Laboratory, 1971-73; rejoined Honolulu Laboratory, 1973.

AFFILIATIONS: American Fisheries Society, American Institute of Biological Sciences, American Institute of Fishery Research Biologists, American Museum of Natural History, American Society of Ichthyologists and Herpetologists, Ecological Society of America. Member, Governor's (1) Advisory Sub-committee on Invertebrate and Aquatic Biota (1973-), (2) Marine Mammals/Advisory Committee (1978-), (3) Marine Technology Advisory Committee, Leeward Community College, University of Hawaii (1975-).

FIELD: Ecology of marine fishes.

HONORS: Special Act Award, 1955; Quality Increase, 1966; Honolulu Laboratory nominee for Federal Executive of the Year, 1966; Superior Performance Award, 1967; Special Achievement Award, 1974; Outstanding Performance Ratings, 1975 and 1977.

PUBLICATIONS, 1950-78: Published, 38.



ANDREW E. DIZON

LEADER, EXPERIMENTAL ECOLOGY OF TUNAS

(Supervisory Fishery Biologist, Research)

Ph.D. (Zoology), University of Wisconsin, 1971. Joined NMFS Honolulu Laboratory, 1971.

AFFILIATIONS: Affiliate Graduate Faculty of the University of Hawaii, American Association for the Advancement of Science, American Fisheries Society.

FIELD: Tuna physiological ecology as related to open sea distribution and orientation. Fish sensory physiology. Bioenergetics of fish. Underwater telemetry and acoustics.

HONORS: National Defense Education Act, 1966-67. Project Associate, Japan-United States Cooperative Science Program, Otsuchi, Iwate-ken, Japan, 1970. Incentive Award, 1974. Honolulu Laboratory nominee for Federal Manager of the Year, 1978.

PUBLICATIONS, 1971-78: Published, 21; in preparation, 3.



MARY LYNNE GODFREY

ADMINISTRATIVE OFFICER

B.A., University of California at Los Angeles, 1943.
 Joined NMFS Honolulu Laboratory, 1950.

AFFILIATION: Hawaiian Academy of Science.

FIELD: Administration.

HONORS: Phi Beta Kappa, 1943; Superior Performance Award, 1961; Honolulu Laboratory nominee for Outstanding Woman Federal Employee, 1966.

PUBLICATIONS, 1950-78: Published, 1.



TAMIO OTSU

CHIEF, RESOURCE ASSESSMENT AND DEVELOPMENT INVESTIGATIONS

(Supervisory Fishery Biologist, Research)

B.A. (Zoology), University of Hawaii, Honolulu, 1950.
 Joined NMFS Honolulu Laboratory, 1950.

AFFILIATIONS: American Fisheries Society, American Institute of Fishery Research Biologists, Hawaiian Academy of Science, International Oceanographic Foundation. Member, Working Party on Tuna Tagging, Food and

Agriculture Organization of the United Nations; Alternate Member, Advisory Committee on Invertebrates and Aquatic Vertebrates, Board of Agriculture, State of Hawaii.

FIELD: Ecology of marine fishes of the Pacific Ocean.

HONORS: Bronze Star; Superior Performance Award, 1962; Outstanding Performance Award, 1969; Honolulu Laboratory nominee for Outstanding Federal Manager of the Year, 1970; Honolulu Laboratory nominee for NMFS Outstanding Employee (Management/Supervisory), 1975; Special Achievement Award, Honorable Mention for Best Publication in Marine Fisheries Review, 1975; 30-Year Federal Service Pin, 1977; Cash Award for Outstanding Performance Rating, 1978.

PUBLICATIONS, 1950-78: Published, 43. Translations (from the Japanese), 61.



ROBERT A. SKILLMAN

LEADER, RESOURCE MONITORING AND ASSESSMENT

(Fishery Biologist, Research)

Ph.D. (Zoology with studies in population ecology, population genetics, and biomathematics), University of California, Davis, 1969. Joined NMFS Honolulu Laboratory, 1969.

AFFILIATIONS: American Fisheries Society, Ecological Society of America, Hawaiian Academy of Science.

FIELD: Biomathematics, population ecology, population dynamics, ecology.

PUBLICATIONS, 1969-78: Published 4; in preparation, 3.



RICHARD N. UCHIDA

LEADER, SURVEY OF INSULAR RESOURCES

(Supervisory Fishery Biologist, Research)

B.S. (Fisheries), University of Washington, Seattle, 1951. Joined NMFS Honolulu Laboratory, 1954.

AFFILIATIONS: American Association for the Advancement of Science; American Institute of Fishery Research Biologists; American Fisheries Society; The American Museum of Natural History; Smithsonian Institution; Hawaiian Academy of Science; International Oceanographic

Foundation; Member, Hawaii Conservation District Lands Functional Plan Advisory Committee; Member, Western Pacific Regional Fishery Management Council (WPRFMC) Lobster Planning Team; Chairman, WPRFMC Seamount Resources Planning Team; Councilor, Hawaiian Academy of Science, 1975.

FIELD: Survey and assessment of fishery resources; life history of commercially important demersal fish and shellfish; life history of tuna and tuna-like fishes; life history of tuna baitfishes; tuna fishery development in the central and western Pacific; aquaculture.

HONORS: Superior Performance Awards, 1962, 1969, 1978; Superior Achievement Awards, 1974, 1976; Letter of Commendation, 1967; Honolulu Laboratory nominee for Federal Employee of the Year, 1975.

PUBLICATIONS, 1956-78: Published, 22; in preparation, 2.



JERRY A. WETHERALL

LEADER, FISHERY MANAGEMENT RESEARCH
(Supervisory Fishery Biologist, Research)

Ph.D. (Fisheries), University of Washington, Seattle, 1971. Joined NMFS Honolulu Laboratory, 1974.

AFFILIATIONS: American Statistical Association, Society of Sigma Xi.

FIELD: Development of models and analytical techniques for fish stock assessment; fish population dynamics; biomathematics; statistics.

HONORS: Special Achievement Award, 1975; Outstanding Performance Ratings, 1977, 1978; Honolulu Laboratory nominee for Federal Employee of the Year (Supervisory), 1977.

PUBLICATIONS, 1974-78: Published, 3; in preparation, 3.



HEENY S. H. YUEN

LEADER, RECREATIONAL FISHERIES
(Fishery Biologist, Research)

M.S. (Fishery Biology), University of Hawaii, Honolulu, 1954. B.S. (Zoology), University of Michigan, 1950. Joined NMFS Honolulu Laboratory, 1950.

AFFILIATIONS: American Fisheries Society, American Institute of Fishery Research Biologists, Hawaiian Academy of Science, Society of Sigma Xi.

FIELD: Fishery biology.

HONORS: Honolulu Laboratory nominee for NMFS Outstanding Employee (Professional/Nonsupervisory), 1975; Honolulu Laboratory nominee for Federal Manager of the Year, 1976; Special Achievement Award, 1976.

PUBLICATIONS, 1950-78: Published, 22.