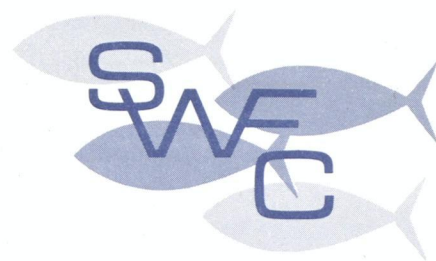




HONOLULU

LA JOLLA

TIBURON



SOUTHWEST FISHERIES CENTER

MONTHLY REPORT — JULY 1974

RESEARCH HIGHLIGHTS

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NOAA/NMFS

SOUTHWEST FISHERIES CENTER
La Jolla, California

HONOLULU LABORATORY
LA JOLLA LABORATORY
TIBURON LABORATORY

MONTHLY REPORT - JULY 1974

STATUS OF PUBLICATIONS

Published

Alvariño, A. 1974. CHAETOGNATHA. Fifteenth Edition of the Encyclopaedia Britannica, 18-19.

The publication includes a short description of the phylogenetic relationships, together with the Natural History, Ecology, Life Cycle, Food, Reproduction, Parasites, Anatomy, Physiology, Distribution, Indicator species.

Matsumoto, V.M.E. Kh. Al'strom, S. Dzhons, V.L. Klave, V. Dzh. Richards, S. Ueianagi (Matsumoto, W.M., E.H. Ahlstrom, S. Jones, W.L. Klawe, W.J. Richards, and S. Ueyanagi)

K voprosu ob identifikatsii lichinok tuntsov, v chastnosti roda Thunnus. (On the clarification of larval tuna identification particularly in the genus Thunnus.)

Trudy AtlantNIRO, 53: 12:33 (In Russian)

(This paper originally published in 1972, Fishery Bulletin 70(1): 1-12, attempted to resolve conflicting views on the identification of larvae of Thunnus alalunga and T. albacares, and to clarify the status of other Thunnus species.)

This report does not constitute publication and is for information only.

Approved by Center Director

"First California record of the serranid fish, Anthias gordensis Wade" by Edmund S. Hobson. For publication in California Fish and Game

"Inter-annual climatic fluctuations: Their influence on biological systems" by N.E. Clark, H.C. Fritts and T.J. Blasing. For publication in Science.

Translations

The following translations from the Japanese were completed by Mr. Tamio Otsu of the Honolulu Laboratory and are available at the Southwest Fisheries Center, National Marine Fisheries Service, NOAA, Honolulu, Hawaii 96812:

Horikawa, Akio. 1974. Japan's tuna production (Waga kuni no maguro gyogyo seisan). Suisan Shuho (The Fishing and Food Industry Weekly) 707: 16-19. March 25, 1974. Suisansha K.K. (Translated from Japanese by Tamio Otsu, 1974, 7 p., Translation No. 4.)

Katsuo-Maguro Nenkan. 1973. Japanese skipjack tuna fishery development in foreign areas (Katsuo kaihatsu--kaigai katsuo-zuri gyogyo). Katsuo-Maguro Nenkan (Skipjack-Tuna Yearbook). Suisan Shinchosa K.K., Tokyo, p. 151-158. (Translated from Japanese by Tamio Otsu, 1974, 12 p., Translation No. 5.)

Tohoku Regional Fisheries Research Laboratory. n.d. Atlas of skipjack tuna fishing grounds in southern waters, 1973 fishing season (July 1973-May 1974) (Showa 48 nendo nanpō katsuo gyokyo). [Five pages text, 14 charts.] (Translated from Japanese by Tamio Otsu, 1974, 22 p., Translation No. 7.)

Urabe, Shiro (interviewer). 1974. There's a keen interest in developing new skipjack tuna fishing grounds (Shingyojo no kaihatsu ni iyoku wo moyasu). Suisan Sekai 23(1): 84-93. [Interview with two brothers, both fishing masters on vessels belonging to the Abekane Suisan K.K.] (Translated from Japanese of selected portions of article by Tamio Otsu, 1974, 17 p., Translation No. 6.)

ALBACORE FISHERIES INVESTIGATIONS

Preparations Completed for Second Phase of Cooperative NMFS-AFRF Albacore Studies

Dr. Michael Laurs, Leader of the Albacore Fishery Investigations at the La Jolla Laboratory, reports that preparations were completed for the

second phase of the cooperative NMFS-AFRF albacore studies which are being conducted during the 1974 West Coast albacore fishery season. Three commercial albacore jig fishing vessels on charter to the American Fishermen's Research Foundation (AFRF) are participating in phase two of the studies. Operations plans were finalized, equipment was installed, fishing boat captains were given instructions, and the AFRF vessels departed San Diego on July 16.

The three vessels have been operating mainly in areas away from the albacore fleet and are conducting fish scouting, tagging, and oceanographic observations. Technicians from the La Jolla Laboratory are participating in the operations aboard two of the vessels. At the end of July approximately 300 fish had been tagged and released, bringing the total number of tagged fish released during the 1974 season to about 1,700.

The NOAA research vessel, David Starr Jordan, with Dr. Laurs as the cruise leader, departed San Diego on July 29 for a 2-week cruise in waters off San Diego-Los Angeles Bight area to evaluate the availability of albacore in nearshore southern California waters, and also to evaluate the feasibility of transporting live albacore ashore. Dr. Lasker who is accompanying Dr. Laurs, is conducting plankton pumping experiments, and in cooperation with the Scripps Research Clinic, collecting blue sharks for pituitary extraction during the first week of the cruise. Mr. Ron Dotson, Biological Technician, spent several days preparing a tank system designed by Dr. Laurs with the assistance of Dr. John Roberts, NOAA Research Fellow at the La Jolla Laboratory, for transporting live albacore under anesthesia. Results of this experiment will be reported next month.

* * * * *

The staff of the Albacore Fisheries Investigation at the La Jolla Laboratory is processing the data collected during the offshore albacore/oceanography survey conducted in cooperation with the American Fishermen's Research Foundation (AFRF) in May-June 1974, during Jordan cruise 86. The initial goal is to complete a report by late October 1974, covering all joint research with the AFRF, of which this survey is a part.

Mr. R. Nishimoto, Fishery Biologist, with the aid of part-time students standardized and graphed all the AFRF charter vessel catches, and graphed the frequency distribution of fork length in 10-day time strata. The sea surface temperature has been plotted for the 10-day periods.

Oceanographers R. Lynn and K. Bliss, and Mr. T. Mulitauaopele, Fishery Biologist, have been processing the oceanographic and fish catch data collected aboard the Jordan. Final maps of ships' tracks

and trolling operations are now completed. Salinities and oxygen concentration have been calculated; contoured charts of sea-surface temperature and fish catch have been completed in rough form and the processing of Nansen cast data and calibration of the STD and thermo-salinograph records has been started.

COASTAL FISH COMMUNITIES INVESTIGATIONS

Feeding Rates of Small Juvenile Olive Rockfish Determined

This month the investigators studying nearshore fish communities at the Tiburon Laboratory, Dr. Edmund Hobson, Project Leader, working with Fishery Biologist Tony Chess, continued observing juvenile kelp bed fishes. They did further work with small juveniles of olive rockfish (*Sebastes serranoides*), an important recreational species. They had recently determined that when smaller than about 60 mm SL, juveniles of this species feed mostly by day, even though the larger juveniles feed primarily at night. The smaller juveniles appear in the water column about 40 minutes before sunrise, but generally do not begin feeding until the sun has risen. Forty-nine specimens, 44-59 mm SL, were collected for the study of feeding habits.

The incidence in gut contents of their major prey, calanoid copepods, illustrates the onset of feeding in the morning, and the rate at which they feed. There were no calanoids in the 24 individuals taken in three collections 40, 30, and 15 minutes before sunrise. Of 11 collected at sunrise, eight were empty, two contained four calanoids, and one contained five. Of eight collected 15 minutes after sunrise, only one was empty, whereas the other seven contained 4-26 calanoids (mean 14). Finally, all six collected 30 minutes after sunrise contained 93-130 calanoids (mean 115).

COASTAL FISHERIES INVESTIGATIONS

Silver Salmon Arrive at Tiburon

On July 10 and 11, Mr. Bruce Wyatt, University of California, Davis Sea Grant Extension Agent and Mr. Bill Ver Brugge, San Francisco Tyee Club, transferred about 10,000 silver salmon from the Department of Fish and Game's Mad River Hatchery to the holdings pen at Tiburon. This marks the beginning of the final stage of this year's cooperative program to research the feasibility of rearing silver salmon at Tiburon for release into the recreational and commercial fisheries. Mr. Lloyd Richards, Biological Technician at Tiburon, reports that overcrowding in the transport tank caused the loss of about 800 fish while moving and during the first few days in the pen; mortality has now declined to about 0.2% per day. The silvers have exhibited a 50% weight gain

during the first 3 weeks at Tiburon and now weigh about 1/20 of a pound; daily food consumption has risen from 8-13 pounds of Oregon moist pellets.

The major problem is excessive algal growth on the inner net; this clogs the meshes and retards circulation. Vacuuming is being used to remove the algae and methods of retarding its growth will be explored.

The salmon rearing program is of great interest to Bay Area recreational fishermen and the press has given it substantial coverage. Articles have appeared in the San Francisco Examiner and the San Rafael Independent Journal; KPIX-TV used the project as its feature story on the evening news program of July 28.

* * * * *

The California fishery for the red sea urchin, Strongylocentrotus franciscanus, which was developed largely through the involvement of Mr. Sus Kato, Fishery Biologist at the Tiburon Laboratory, completed its first full season this spring. About 10 firms processed the roe for export to Japan. This year, starting in August, about a dozen firms are expected to process roe. With the establishment of a substantial fishery, certain questions have arisen regarding the fishery and the biology of sea urchins. Two Sea Grant projects have been initiated to look into the population structure of the red urchin, and into the interaction between the red and purple urchin (S. purpuratus). The former study, conducted at SIO is aimed at management, while the latter, based at UCSB is concerned with the environmental effects of removal of red urchins by the fishery. This study will be carried out by Steve Schroeter, a Ph.D. candidate at UCSB. Schroeter was recently hired by the Tiburon Laboratory half-time to conduct this study and to monitor the fishery.

Angler's Guide to the United States Pacific Coast

Work continues on the Angler's Guide, being prepared by Fishery Biologist Jim Squire of the La Jolla Laboratory and Publications Specialist, Susan Smith of the Tiburon Laboratory. The book describes marine sport fishes, fishing grounds, and angler facilities along the west coast from California to Alaska, and also includes American Samoa and Guam.

During July, the section covering southern California was received from outside reviewers and their suggestions incorporated. Work also continued on the illustrations of tropical marine game fishes, which will be included in the fish list section.

FISH ENVIRONMENT INVESTIGATIONS

Activity of Skipjack Tuna in Rapidly Cooling Water

The long-range goal of the Honolulu Laboratory's program on Life Studies of Tuna and Tunalike Fishes is to generate a predictive model of tuna distribution, abundance, and availability to fisheries. The basis of the model is to be the joint physiological and behavioral responses of tunas to environmental variables, as determined in part through experimental work with captive fishes. To explore the potential value of such a modeling approach and to provide an objective framework for further experimental work, Drs. William H. Neill and Andrew E. Dizon have developed a simulation model for the responses of fishes to temperature, a variable of recognized importance in the ecology not only of tunas but also of fishes in general.

One notion implicit in the model is that the likelihood of fish responding to a gradient of temperature depends both on the level and the rate of change of temperature. The faster the rate of change of temperature ($dT/ds \cdot ds/dt = dT/dt$) and the nearer the temperature to the lethal, the more likely is the fish to respond.

Preliminary experimental results consistent with this proposition have now been obtained for skipjack tuna in the behavioral thermoregulation system (doughnut tank). In four experiments with two individual 1.5 kg fish, the subject swam with very few reversals of direction until the water, cooling at about $0.050^{\circ}\text{C min}^{-1}$, reached a temperature several degrees below ambient. Then, in each experiment, the fish began making frequent reversals in swimming direction. The temperatures at which reversals abruptly appeared in the four experiments were 21.40° , 21.50° , 20.90° , and 21.20°C . In spatial gradients of temperature, such behavior would tend to concentrate skipjack tuna near the 21°C isotherm and prevent them from entering cooler water.

Implication of Thermal Physiology on Distribution of Skipjack Tuna

In June Dr. William H. Neill of the Honolulu Laboratory reported construction of a tentative energy budget for central Pacific skipjack tuna; development of the budget was a collaborative effort by Drs. James F. Kitchell and John J. Magnuson of the University of Wisconsin and Dr. Neill. The energetics model suggested the following ecological proposition: skipjack tuna smaller than about 12 kg are growing at rates substantially less than maximal, being limited by availability of food and/or predatory efficiency; skipjack tuna larger than about 15 kg obtain a maximum daily ration but are limited in further growth by a physiological constraint of large size coupled with an effective mechanism of heat retention--overheating of the muscle mass, especially during bursts of feeding activity.

Dr. Neill has now completed a preliminary analysis of the overheating problem. If it is assumed that 35°C is the temperature at which skipjack tuna muscle breaks down when exposed over a period of time, then it is possible to calculate maximum water temperatures at which skipjack tuna can safely operate (without regulation of heat exchange efficiency). At minimum activity, the red muscle of skipjack tuna metabolizes at about 1 mg O₂ g⁻¹ hr⁻¹; the corresponding rate of demand for maximum activity is about 7 mg O₂ g⁻¹ hr⁻¹, part of which must be met anaerobically.

The preliminary analysis suggested the following conclusions: Skipjack tuna larger than 12.5 kg cannot indefinitely sustain minimum activity in waters warmer than 30°C. At 5 kg, the critical temperature for minimum activity is about 31.5°C. But of more concern are the water temperatures critical for normally active fish, whose red muscle may metabolize at about 3 mg O₂ g⁻¹ hr⁻¹: 30°C at 1 kg, 25°C at 5 kg, and 20°C at 12.5 kg.

These calculations imply that large fish must seek out cooler waters if they are to be as active as smaller fish. This could be achieved by large fish living at higher latitudes or at greater depths than smaller fish. Low rates of heat exchange in large skipjack tuna permit forays of several minutes duration into surface waters warmer than the critical temperature if the fish is initially at thermal equilibrium with deeper, cooler water.

Two Seasonal Peaks in Skipjack Tuna Spawning Suggested by Skipjack Tuna Larvae Catches in Equatorial Pacific Ocean

Oceanographer Dr. Richard A. Barkley, Chief, Fish-Environment Investigations, reports that analysis of skipjack tuna larvae catches in the equatorial Pacific upstream of Christmas Island suggests two seasonal peaks in spawning, one in spring in the northern hemisphere, and another in spring in the southern hemisphere. This north-south distinction is most marked in catches of skipjack tuna juveniles with the Cobb midwater trawl, and less distinct in catches of larvae with the 1-m net. A minimum in juvenile catches occurs at the equator and at 3.5°N in the Cromwell equatorial cruise data; for larvae, the minimum is less distinct and somewhat farther north.

NMFS Scientists Provide Services at 16th Annual Hawaiian International Billfish Tournament

The Hawaiian International Billfish Tournament is an event of considerable economic and social significance to the town of Kailua-Kona. NMFS Honolulu Laboratory has participated in this event for the past 13 years by providing scientific services. Heeny Yuen, Bernard Ito, Ray Sumida, and Cynthia Unninayar attended this, the 16th annual tournament, to collect general biological information and samples of the spleen, kidney, heart, pyloric caeca, liver, muscle, blood, and stomach contents of 47 specimens were collected for mercury tests. Mr. Yuen and Mrs. Unninayar presented a 3-hour seminar on the biology of Pacific blue marlin and current results of research on mercury in this species.

* * * * *

Biological Aid Elliott Kawahara continued to plot the results of long-line catches of billfishes in the Pacific and Indian Oceans from Japanese records of 1962-71 inclusive. Plots for Pacific blue marlin and striped marlin have been completed. Plots for the black marlin and broadbill swordfish are partially complete.

MARINE MAMMAL INVESTIGATIONS

Natural Mortality of Porpoise Studied

Dr. William F. Perrin, Fishery Biologist at the La Jolla Laboratory spent July 8-16 at the Marine Mammal Study Center of the U.S. National Museum in Washington, D.C., examining skulls of spotted porpoise (*Stenella attenuata*) prepared by the Center under contract to NMFS. The 670 specimens were cleaned so that they can be examined for evidence of infection by a nematode, *Crassicauda* sp., that causes irreversible bone lesions in the pterygoid region of the skull. Since the scars are more prevalent in calves than in adults, the parasite must be a factor in natural mortality, and it is hoped that examination of a large age-stratified series will yield quantitative estimates of the magnitude of that component of natural mortality. Approximately half the series were ready for examination by Dr. Perrin during his visit to the USNM; the remainder were subsequently prepared and shipped to SWFC for examination. The raw data will be ready for analysis in August.

Reports Indicate NMFS-Designed Tuna Purse Seine Net Effective in Reducing Porpoise Mortalities

Informal reports reaching the La Jolla Laboratory from Jerry Jurkovich of the NMFS Northwest Fisheries Center aboard the new tuna seiner, South Pacific, indicate that the NMFS-designed, large-volume tuna purse seine net is performing well under actual fishing conditions. Porpoise mortalities have been held to a low level, comparable to the lowest rate yet achieved, which occurred on a NMFS charter cruise in November-December 1973 under optimum conditions. While the large volume of the net helps save porpoise, it is also apparently effective in catching tuna.

Summary Report of Porpoise Research in Preparation for Commerce Report to Congress

The entire scientific staff of the Marine Mammal Investigation at the La Jolla Laboratory is pooling its expertise to complete the preparation of a report due in early September summing up the progress of research undertaken since the beginning of the accelerated porpoise program almost 2 years ago. This report will be submitted to NMFS for incorporation in

the Secretary of Commerce's report to Congress in conformance with the provisions of the Marine Mammal Protection Act of 1972. Items to be covered will include results of porpoise life history studies, estimates of porpoise mortality, population estimates derived from the aerial survey and marine mammal watch, development of porpoise-saving fishing gear, some conclusions on the impact of the tuna fishery on the porpoise populations, and recommendations for future porpoise research.

* * * * *

Data taken by trained NMFS porpoise observers sent to sea on U.S. tuna seiners are an important source of information in estimating numbers of porpoise killed in the tuna fishery. By the end of July, 36 observer trips had been completed within the Commission Yellowfin Regulatory Area (CYRA). There are four observers still at sea; one of the observers is on a seiner operating within the CYRA, two are on boats fishing outside the regulatory area, and one observer is accompanying a U.S. tuna boat fishing off Africa.

PHYSIOLOGY INVESTIGATIONS

Effects of Petroleum in the Marine Environment Studied at Marinas

To more fully understand possible hydrocarbon pollution from boat marinas, a new series of experiments were begun at the Tiburon Laboratory. The first objective is to evaluate the introduction and subsequent volatilization of low boiling aromatics and other compounds with corresponding gas chromatograph retention times deposited into the Bay via outboard motors.

An outboard motor was run in neutral for 1 hour in a large tank of sea water. Subsurface water samples were taken periodically, during that hour and for 30 days thereafter. Gas chromatograph analysis reveals that 11 major components displaying relatively high concentrations and eluting between benzene and naphthalene are present. Gasoline has a boiling point range of 60-200°C which encompasses the aromatic fractions being scanned (benzene 80°C - naphthalene 218°C). Identification and quantification of these components is being done. Aromatics are still persisting after 2 weeks and sampling is continuing.

Effects of Benzene on Larval Anchovies Tested

The first in a second series of experiments testing the effects of benzene on anchovy larvae was begun. Treatments of three different concentrations and two exposure periods were given to anchovy larvae at or near yolk sac depletion. Growth, behavior, respiration, and survival are being measured. Although the experiment is still underway, preliminary results indicate significant differential survival and respiration between controls and treatments with benzene.

In conjunction with the experiments on larval anchovy, several other larvae are being reared from eggs collected in San Francisco Bay. Excellent survival was observed and collections of developmental series are being made of Hypsopsetta guttulata and Citharichthys. The effect of aromatic hydrocarbons on flatfish larvae is being considered for study.

Distribution and Transfer of Pollutants in Coastal Waters Studied

Continuing toward the objectives of understanding the distribution and transport of pollutants in coastal waters, Dr. Vance E. McClure, Research Chemist at the Tiburon Laboratory, worked on the preparation of a manuscript "Chlorinated Hydrocarbons: Analytical Methods and Levels Off Southern California" (with E.D. Scura, SIO), reviewed the draft of an analytical methods manual written by researchers with the Environmental Protection Agency, designed experiments to study the electrokinetic properties of marine colloids, and performed laboratory work to develop a low-level procedure for the detection of aromatic hydrocarbons in biota.

Dr. McClure reports he has perfected the measurement of aromatic hydrocarbons in natural waters at levels commonly found in nearshore and estuarine locations near urban and industrial areas. Measurements in the biota will allow assessment of the biological amplification resulting from chronic exposure, will provide base-line data and will give an appreciation for the levels of pollutant that can be expected in the "blanks" run with higher dose toxicity tests.

STOCK ASSESSMENT AND FISHERY EVALUATION INVESTIGATIONS

Industry Economist Joins SAFE Investigation

Mr. Daniel Huppert joined the staff at the La Jolla Laboratory as Industry Economist on June 23. Under the Sea Grant program at the University of Washington, Mr. Huppert studied the Washington groundfish industry and the Pacific halibut industry. Having completed his doctoral dissertation, An Economic Analysis of the Washington State Coastal Trawl Fishery, he expects to receive his Ph.D. degree in economics this fall. In addition to his academic training in natural resource economics, and international trade theory, a 2-year stint with the NORFISH project at the University of Washington has given him a wide familiarity with systems analysis, computer modeling, and quantitative techniques in fisheries research.

Participating in the Stock Assessment and Fishery Evaluation Investigations, Mr. Huppert will, among other things, develop in cooperation with the members of the staff, a bio-economic computer simulation model of the global tuna fisheries system. While he will work primarily on the Global Tuna Task, it is anticipated that the development of innovative methodology and realistic bio-economic models will be equally applicable to other fishery resources. Dr. William Fox, Investigation Leader, stated that the addition of Mr. Huppert to the SAFE Investigation will significantly improve our ability to meet our responsibilities of technically advising in the management of tuna and, in the future, California coastal fisheries through broadening the Investigation's expertise.

Work on Systems Analysis of the World Tuna System Accelerated

A major effort is being made at the La Jolla Laboratory to provide the SWFC and NMFS with a system analysis of the tuna fisheries, i.e., identification of the major problems, quantitative analyses of various alternative solutions, specification, and scheduling of research needs--including manpower and fiscal requirements, and evaluation of alternative communication structures for implementing the optimal solution. The workshop got off to a good start on July 9 with a meeting of various NMFS scientists and administrators, industry representatives, and some independent experts on systems analysis.

Dr. Brian Mar, University of Washington Professor of Civil Engineering remained at the Center for 3 weeks to aid in the development of the systems analysis. Dr. Mar held a series of workshops on "Macro-dynamic model building"--a technique for constructing rather simple dynamic models encapsulating theoretical and empirical relationships from experts of several disciplines into models which trace complex interactions which may not be obvious to individuals of any single discipline. These techniques are being applied to the tropical tuna surface fisheries.

The systems analysis and dynamic modeling are being carried on by Dr. William Fox, Investigation Leader, and Daniel Huppert, Industry Economist, at the La Jolla Laboratory. A final report on the initial efforts will be available on or about August 12.

Assessment Made of Atlantic Tuna Stock

Dr. W. Lenarz, Fishery Biologist, and Mr. A. Coan, Mathematician, with some assistance from J. Zweifel, Mathematician, and K. Brennecke, Mathematical Technician, were occupied most of July working on stock assessment of Atlantic tunas. The results of these studies will be presented in the forms of working documents at the fall meetings of ICCAT and Indian Ocean Fishery Commission. Their studies include a production model analysis of the bigeye Atlantic tuna fishery, a cohort and production model analysis of the Atlantic albacore fisheries, and an examination of some of the aspects of the interaction between longline and surface fisheries for tuna. The longline-surface interactions study is scheduled for completion in August, the albacore study in September, and the bigeye tuna study in late September or early October. Mr. L.A. Zavola-Camin, Scientific Researcher on a training mission from the Instituto de Pesca, Santos, Brazil, is participating in the albacore study as part of his training.

NMFS Technician Stationed in Puerto Rico to Sample Transshipped U.S. and Foreign-Caught Tuna from Atlantic

Eugene Holzapfel, Biological Technician at the La Jolla Laboratory, will be stationed in Mayaguez, Puerto Rico, from August to December 1974 to

obtain length samples and to ascertain the species composition of tuna caught by U.S. and foreign vessels in the Atlantic. An estimated 75% of the Atlantic tuna catch (much of it taken on longlines) which would not otherwise be sampled, is transshipped to Puerto Rico for processing at the five canneries in Mayaguez. The data obtained by Mr. Holzapfel will contribute significantly to the statistical base of information on Atlantic tunas, in fulfillment of the U.S. commitment to the International Commission for the Conservation of Atlantic Tunas, which has responsibility for the study of the populations of tuna exploited in tuna fishing in the convention area.

Final Report Completed on Assessment of Southern California Fisheries

Alec MacCall, Fishery Biologist, CF&G, and Gary Stauffer, NMFS, completed the final report for the California Department of Fish and Game/National Marine Fisheries Service contract entitled, "Stock Assessment, Fishery Evaluation, and Fishery Management of Southern California Recreational and Commercial Fisheries." Emphasis in this report is on assessment of stocks and evaluation of present fishery levels for northern anchovy, California barracuda, Pacific bonito, jack mackerel, white seabass, and California yellowtail. Brief status reports are included for Pacific mackerel and Pacific sardine. Also included are discussions of anchovy fishery interactions and trophic interactions, as well as brief discussions of target species flexibility and trends in the partyboat and wetfish fisheries. Concluding the report is a list of suggestions and recommendations for the improvement of management capabilities for southern California fisheries. Results of this work will be presented to the State-Federal Steering Committee meeting at the SWFC on August 8, 1974.

Stock Recruitment Model Progress

Mr. J. Zweifel, Mathematician, and Dr. W. Lenarz, Fishery Biologist, continued work on the development of the stock recruitment model of fishes of the California Current region. Within the week, Craig Nelson of the NMFS Pacific Environmental Group in Monterey will provide final summaries of ship drift in the form of two-way frequency tables of magnitude and direction by area. Several modifications have been made to his retrieval program so that parameters other than component means will be available for analysis. The summaries of long-term deviations from the biased and unbiased means which have been requested will permit the operation of the model for both average conditions and for realistic departures from the average situation.

One of the most critical components of the Stock Recruitment model is believed to be survival at onset of larval feeding. A study is underway, using the historical CalCOFI data, to examine the relationship in terms

of numbers of feeding and non-feeding larvae found and to calculate survival rates and estimates of variability for this period in the life history.

January Mean Current Estimated from XBT Data

Mr. J.F.T. Saur, Oceanographer at the La Jolla Laboratory, reports that the mean January dynamic height profile, geostrophic current, and volume transports relative to the 500 decibar (essentially 500 m) surface have been computed for the Hawaii-San Francisco route from XBT observations during the period 1967-73. The computations, which also require salinity, use a two-layer model for estimating the salinity from the observed surface temperature and surface salinity and historical subsurface temperature-salinity relationships. Results show that the surface geostrophic current component across the section is about 2 cm/sec equatorward over most of the section. Exceptions are a narrow poleward countercurrent along the California Coast of about 5.5 cm/sec and a lack of significant net current in a narrow region near Hawaii and in the Transition Zone between the California Current and the eastern North Pacific Central water. The latter result indicates anti-cyclonic (clockwise) horizontal shear on the California side of the Transition Zone and cyclonic (counterclockwise) shear on the Hawaiian side. Such current shears in relation to the Transition Zone have been observed during the albacore-oceanography cruise on the NOAA research vessel, Jordan in May-June 1974, according to Oceanographer R. Lynn.

Although the speed of the countercurrent is much higher than that across other parts of the section, it is so narrow that it has less than 20% of the transport of the equatorward flow. Consequently, the net volume transport across the section (above 500 m) is 8.4 million cubic meters per second toward the equator.

Mr. Saur is continuing preparation of archived observations to compute mean fields of subsurface temperature for other months. He has also reviewed Hawaii-San Francisco sections in 1968 and 1969 and Ms. H. Hogan, Biological Aid, has punched correction and control cards to be used in preparing data tapes on a standard grid. Also, temperature-salinity relationships from historical hydrographic station data have been plotted for at least 1 month of each of four seasons and five regions for determination of the polynomials to be used in the lower layer of the computational model.

STOCK AND RECRUITMENT INVESTIGATIONS

Dr. Roberts Completes NRC/NOAA Post-Doctoral Fellowship

In his last report as the NRC-NOAA Research Associate at the La Jolla Laboratory, Dr. John L. Roberts wishes to express deeply-felt thanks

to the many who have been so helpful at the Southwest Fisheries Center and on the R/V David Starr Jordan in making his leave of absence from duties at the University of Massachusetts, Amherst, a productive experience that will be hard to equal in the future.

Finally, success has been obtained in sampling information from respiratory interneurons as Pacific mackerel (Scomber japonicus) and striped bass (Morone saxatilis) reach swimming speeds that permit them to switch from active gill ventilation to the passive or ram mode (one success each species). Simply stated, the respiratory interneurons lose their rhythmicity so that it appears that the only remaining activity serves to adjust and hold a mouth gape appropriate for maintaining gill perfusion by the respiratory stream entering the mouth. Just how higher control centers in the brain regulate the active-passive conversion is not known, but previous reports have shown that the respiratory "centers" in the fish brain seem to be receiving useful information from receptors that detect tail movements and water flow velocity.

A joint study with Dr. Jeffrey B. Graham, Smithsonian Tropical Research Institute, Balboa, Canal Zone, has been completed with the Pacific mackerel. Part of the results were described last month. Electromyograms and temperatures recorded from the heart, and from the red and white swimming muscles suggest the mackerel could be a "good" tuna if it were to develop the tuna-type vascular retia to recycle muscular heat when swimming. The thermal rise (ΔT) of the heart, white and red muscles during swimming at 4-to-5 body lengths/second (35-39 cm fish) averages 0.65, 0.70, and 0.8°C, respectively. These values for the excess heat generated in mackerel muscles exceed known values for swimming salmonids by a factor of 2-to-3 times according to Dr. F.E.J. Fry (University of Toronto). The experiments suggest that such measurements with advanced scombrids (tunas) might aid in understanding the role of vascular retia as heat exchangers.

Senior Scientist Attends CICAR Ichthyoplankton Workshop in Mexico City

Senior Scientist Elbert H. Ahlstrom of the La Jolla Laboratory attended the CICAR Ichthyoplankton Workshop in Mexico City, held at the Centro de Preclasificacion Oceanica de Mexico (CPOM), July 17-26, under the auspices of UNESCO and the Comision Oceanografica Intergubernamental of Mexico. He served as chairman of three sessions which included the introductory session on taxonomy (which required a full day), the summary session on taxonomy ($\frac{1}{2}$ day), and a taxonomy session dealing with the early life history stages of Myctophidae-Gonostomatidae ($\frac{1}{2}$ day). In addition, he was a principal consultant on problems of identifying specimens brought to the workshop by participants.

Other NMFS/NOAA personnel who attended the meeting included Dr. William Richards of the Southeast Fisheries Center (SEFC) who was coordinator of the scientific activities of the workshop; Mr. Thomas Potthoff of SEFC who was a co-chairman with Dr. Richards on the taxonomy session dealing with early life history stages of scombrids (tunas and their allies), and billfishes. Mr. Robert Marak of the MARMAP Field Office in Narragansett, R.I., discussed sampling gear, preservation and handling of collections, including sorting for fish eggs and larvae and demonstrated a chemical-density method of separating fish eggs and larvae from other constituents of the plankton.

The 31 participants at the CICAR Workshop came from 11 countries. Although the lectures given by session chairmen were in English, much of the information was translated into Spanish by Dr. Elda Fagetti, UNESCO representative at CPOM who handled arrangements for the workshop.

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Dr. Ahlstrom reports that work continued on the handbook of early life history stages of California Current fishes. Life history series are presently being prepared for stromateoid fishes and for bothid flatfishes. A manuscript dealing with neuston net collections made on extended CalCOFI cruise 7205, is in preparation by Dr. Ahlstrom and Biological Technician E. Stevens.

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Dr. Geoffrey Moser has continued his work on the identification guide to eastern Pacific scorpionfish larvae. The larvae of Scorpaenodes xyris were analyzed and described this month using samples obtained on CalCOFI and EASTROPAC cruises. The section on the larvae of Ectreposebastes imus is presently about half completed.

Analysis of the bottom fish samples from Magdalena Bay continued this month. This is a cooperative project with the Mexican government and the University of Baja California at Ensenada. The work is being carried out in this laboratory by two summer aids, Elaine Carlin and Jack Christian.

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Mr. K. Lal, Fishery Biologist with the California Department of Fish and Game, who is collaborating with Dr. Reuben Lasker in efforts to spawn and rear striped bass, an important sport fish, in the sea water aquarium at the SWFC continued this month. Survival of larvae maintained in 60% sea water was satisfactory but from day 30 onward larvae kept in 80% sea water suffered higher mortality. These larvae were fed on live marine rotifers (Brachionus) from day 7 through 20 and on brine shrimp nauplii thereafter.

The experiment to mature the gonads of striped bass maintained under red and white lights proved that red lights kept on during the day and night were detrimental and apparently led to death from starvation. One fish found dead in tank II had an empty gut and several others appeared highly emaciated at the time of biopsy. Changes were made in the light regime to prevent further loss of fish, as follows:

Tank	Day light	Night light	Remarks
I	60 watt, white	12 watt, white	No change
II	From 80 red to 60 white	40 red	Change day light
III	From 40 red to 80 white	From 12 white to 40 red	Change day and night
IV	60 watt white	From 40 red to 12 white	Change night light

The night lights were also connected to the light control units last month so that at present the night lights remain off during the day.

Eggs in females in tank I were the only ones that continued an upward trend, to 0.5 mm and one female with a few large 0.7 mm eggs was injected with human chorionic gonadotrophins. Eggs of females in tanks II and III equipped with the red lights showed no changes but the ripe males dried up. Similarly, the number of ripe male striped bass in tank IV went down from 14 to 10 and the females injected last month with sex hormones from this tank regressed the size of their eggs to 0.4 mm. Presumably the malfunctioning of a light control unit giving reduced voltage upset results of tanks 1 and 4.

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Dr. Reuben Lasker, Leader of the Stock and Recruitment Investigations, reports that the April 1975 issue of the Fishery Bulletin is complete and that papers are being processed by Dr. Bruce Collette, newly-appointed Scientific Editor for the Bulletin, and himself for the July 1975 issue. Approximately 40 papers are still Dr. Lasker's responsibility since this number were out for review on July 1, 1974 when the editorship of the journal became Dr. Collette's task.

SURVEY SYSTEMS ANALYSIS INVESTIGATIONS

Automatic Sonar System Successfully Field Tested

An automated hydro-acoustic data acquisition and processing system was tested this month aboard the R/V David Starr Jordan. The system was developed at SWFC by Lt. R. Hewitt, NOAA Officer, and Mr. Jack Brown, Electronics Technician, to collect pelagic fish school information including counts, dimensions and echo pulse amplitudes as well as monitor a time base and the ship's speed. The system calculates range corrected target strengths and may be programmed to generate survey summaries including biomass estimates.

The system basically consists of a PDP 8/I computer (with 16K memory) interfaced with an analog-to-digital signal converter to the solid-state sonar receiver, also fabricated at SWFC. The returning echo is sampled every 1.3 milliseconds (1 m resolution) and tested for the existence of a signal above a predetermined threshold. Using numerical criteria established for the purpose of distinguishing valid targets from reverberation and random noise, the program establishes a target register and updates the information stored there as long as continuous reception of the target is maintained. A time pulse is obtained from the ship's simplex clock system and speed is monitored by interfacing the D.C. voltage output from the ship's log through the analog-to-digital converter. The data acquisition program is written in machine language while the processing program is in focal, allowing flexibility in output design and ease in software changes. Program switching and loading is automatic and time variable.

For the current cruise, the output format was an event listing of individual detected targets and associated information on their size, time of detection, ship's speed, midrange and target strength. System output was then compared to analog wet paper recordings from the existing gear array. Initial testing under widely varying conditions revealed a greater target resolution than was necessary and criteria for target definition were modified to accommodate variations in sonar signal generation. Further testing was conducted at 1-hour, 4-hour, 8-hour, and 10-hour intervals during both day and night periods and under varying reverberation levels.

System response was judged excellent from a one-to-one comparison with wet paper recordings. A cumulative frequency diagram of school count and school area agrees well with similar data acquired by hand methods on previous cruises. Target strength data also agree well with those collected on earlier cruises as well as with independent samples from California Department of Fish and Game and the Navy (NURD/NUC).

Planned system improvements include an automatic variable threshold based on integrated volume reverberation, peripheral data storage and a towed body transducer array.

Real time biomass estimates of pelagic schooling fishes in the California Current region are possible with the above system. Work is continuing, at the La Jolla Laboratory, toward the isolation of sampling errors and biases associated with such estimates.

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Requests for time series and preparations of biological and physical data are essential to the evaluations and publications of the CalCOFI studies by Survey Systems Analysis Investigations were prepared and submitted to the Automatic Data Processing Center at La Jolla. Until the delivery of such series, attempts are being made to design a number of tasks which can be carried out without the benefit of ADP.

A program review of the Investigation's progress to date is scheduled for August 14, 1974.

TUNA ASSESSMENT AND DEVELOPMENT INVESTIGATIONS

Skipjack Tuna Resources is Topic of Three Manuscripts in Preparation in Fishery Analysis Program

Tuna Monitoring and Assessment of the Pacific and Indian Oceans are carried out at the Honolulu Laboratory by the Fishery Analysis Program under the leadership of Dr. Robert A. Skillman. Within this Program major emphasis has been placed on stock assessment, fishery monitoring, and fishery liaison aspects of SWFC's skipjack tuna development plan. In order to accomplish these ends, and also to monitor the stocks of other tuna and tunalike resources of U.S. concern, the Program is organized into several subgroups.

Continuing with an assessment of skipjack tuna resources, Fishery Biologist Richard N. Uchida completed the first draft of a working paper entitled "Recent developments in fisheries for skipjack tuna, Katsuwonus pelamis, in the central and western Pacific and Indian Oceans." The paper was prepared for the IOFC/IPFC Tuna Working Party at the request of J.A. Gulland, FAO Fishery Resources Division. Essentially, the paper points out that Japan has moved aggressively in skipjack tuna fishery development opportunities in the central and western Pacific by entering into joint ventures to assist developing island governments and territories. The Japanese provide technical assistance, equipment, training, capital and expertise in various fields related to the fishing industry. Many of the island governments and territories either have already established joint ventures with Japanese firms or are in the process of having their skipjack tuna and bait resources examined.

Also in July, Mr. Uchida finished revision of his manuscript "Reevaluation of fishing effort and apparent abundance in the Hawaiian skipjack tuna, Katsuwonus pelamis, fishery, 1948-70" and turned it over to the Program Leader for review. Finally, he started revision of a second manuscript, "Observations on behavior of skipjack tuna, Katsuwonus pelamis, schools in Hawaiian waters, June-August 1967 and 1968" following reviews by Drs. John Magnuson and Richard Whitney.

Sensitivity Study of the Generalized Production Model for the South Pacific Albacore Fishery is Completed

Dr. Skillman, Fishery Biologist with the assistance of Mathematician Marian Y.Y. Yong has completed the sensitivity study of the generalized production model for the South Pacific albacore fishery. This is a part of the assessment of other tuna and tunalike resources. A brief report summarizing this study has been submitted to the Director, Honolulu Laboratory.

The initial assessment of this fishery, utilizing fishing effort measured in both hooks and days fished for all vessels, and the best available estimates of total catch, estimated the maximum sustainable "average" yield (MSAY) to be 33,000-35,000 metric tons. Using new total catch estimates obtained by estimating non-Samoan catches of Korean and Taiwanese vessels from the reported number of vessels landing by foreign port (rather than accepting the preliminary estimates of catch for the Pacific as given in the Asian Tuna Conference Proceedings), and using the same measure of catch per unit effort (CPUE), the MSAY estimates were 33,000-37,000 metric tons. Adding "corrections" for hypothetical 10%, 25%, 50% under-reporting for Korean and Taiwanese non-Samoan catches produced MSAY estimates of 35,000-39,000 metric tons. Utilizing the new catch estimates but using separately CPUE statistics for Japanese, Korean, and Taiwanese vessels in the American Samoa fishery, the estimates of MSAY ranged from 34,000-37,000 metric tons. In addition, for the Samoan fishery, it was found that there has been no temporal trend in catch per unit effort of yellowfin tuna and that CPUE for albacore and yellowfin tuna are not correlated. Hence, the fishery has not been changing over to a yellowfin tuna fishery, and there should be no need to standardize the effort statistics for species mixture. Finally, it was found that the average CPUE for the peak months of June, July, and August was highly correlated (99% probability level) with the yearly estimate of albacore CPUE. Again, the use of this measure of CPUE should have no significant effect on the estimation of MSAY.

Dr. Skillman has concluded that the MSAY for the South Pacific albacore fishery as it is now carried out is about 35,000 metric tons and that any further generalized production model analyses would not yield substantially different results. That is not to say that a yield per recruit or cohort analysis would not add to our knowledge of the fishery or aid in the management of the resource.

Honolulu Laboratory Sets Up Baitfish Aging Facility in Long Beach Harbor Area

Honolulu Laboratory continues its efforts to find means of supplying baitfish to the skipjack tuna fisheries of the central and western Pacific Ocean. High mortalities incurred thus far in shipping live bait from California to Hawaii may be alleviated by the use of "aged" bait, bait that has been held in captivity past the stage of initial heavy mortality. Because there are no bait-holding facilities in Long Beach Harbor, it was decided to construct a temporary facility. Plans are to use only aged bait on future trial shipments.

Roger Green, Leader, Baitfish Project, Fishery Biologist Dr. Jerry Wetherall, and Research Assistant Thomas Kazama traveled to Long Beach to set up a bait aging facility. Also assisting were William Craig, SWFC Regional Office, and Lt. Warren Taguchi, NOAA Corps Officer from the La Jolla Laboratory. Lt. Taguchi had previously located and obtained from the U.S. Coast Guard a site suitable for the operation.

Two 24-foot diameter plastic swimming pools were assembled and plumbing installed for water supply. A flow-through rate of approximately 125 gallons per minute for each tank is supplied by a submersible pump. Approximately 1,500 pounds of anchovy were loaded into each tank to hold for the next shipment to Hawaii in early August. The bait is being cared for by Mr. Craig and employees of Bill's Bait Company, the supplier.

Small Skipjack Tuna Catches Continue in Hawaiian Fishery

Hawaiian skipjack tuna fishermen made 208 trips during the month of July for an estimated catch of 560 metric tons of skipjack tuna. This catch was 705 metric tons below the catch in July 1973 and 330 metric tons less than the July average for 1948-73. The catch through July of this year is estimated at 2,109 metric tons, 1,006 metric tons below last year's catch for the same period and 631 metric tons below the long-term average.

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Government of American Samoa employees Pulou Niutoa and Henry Sesepasara recorded the lengths of 2,745 albacore from 60 vessels during the period June 22 to July 25, according to Research Assistant Ray Sumida. They also collected 52 sets of catch and effort data. An average size of 86.3 cm and an albacore catch per 100 hooks of 2.41 were determined utilizing data collected from 10 vessels.

SWFC PRESENTS NON-TECHNICAL SHORT COURSE ON POPULATION DYNAMICS FOR MEMBERS OF FISHERY COMMUNITY

More than 20 fishing industry executives and representatives of sport fishing groups, and state and federal agencies, participated in a non-technical short course on population dynamics of fishes at the Center, July 11-12. During the intensive 2-day course, Dr. Rothschild, Center Director, Drs. William Fox and William Lenarz, and Mr. David Mackett of the La Jolla Laboratory, and Mr. Norman Abramson of the Tiburon Laboratory, presented lectures on such subjects as the concepts of population dynamics, measuring the abundance of fish stocks by catch-per-unit of effort, production models, yield-per-recruit, and the role of population dynamics in fishing management. The idea for the short course originated with Dr. Rothschild, to help members of the fishery community better understand the significance and meaning of concepts and methods used in fisheries management which are of vital interest and concern to them. Dr. Rothschild said he believed that at the end of the course participants had a better knowledge of the conceptual basis for most of the techniques used in fisheries analysis and also a feeling for the way computers are used.

PUBLIC AFFAIRS

Record Number of Youths Spending Working Summer at SWFC

Seventeen young people, a record number, are working at the Southwest Fisheries Center in La Jolla this summer learning to raise fish, plotting meteorological charts, studying the taxonomy of rockfish, working up fisheries statistical data, assisting in curating the larval fish collection, manning the switchboard, typing, and cataloging library books. The youths, 10 boys and seven girls, are sponsored by such federally and state-funded programs as the Neighborhood Youth Corps, Youth Employment Summer, Bixby-Work Learn Program, Upward Bound, and the gifted student programs of local high schools.

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- July 15 - Maxwell B. Eldridge, Fishery Biologist at the Tiburon Laboratory, spoke at a luncheon given by the Rotary Club of North Oakland on the subject of "Programs and Activities of the Tiburon Fisheries Laboratory."
- 24 - Dr. Nate Clark spoke to a group of students from Curie Elementary School, who visited the Center.
- 29 - Ms. Merrily Severance, Physical Scientist, discussed career opportunities in oceanography with students from Dana Junior High School, San Pedro, California, who visited the Center as part of the course curriculum.

MEETINGS AND TRAVEL

- July 1-2 - Lt. Warren Taguchi, NOAA Officer serving at the La Jolla Laboratory, was in Long Beach selecting an alternate dock site for the Honolulu anchovy baitfish project, on which he is assisting.
- 2 - Mr. Norman Abramson, Acting Director, Tiburon Laboratory, attended a meeting at Scripps Institution of Oceanography on possible areas of cooperative research between SWFC and the University.
- 7-9 - Ms. Anita Coit, Administrative Assistant, accompanied Mr. Howard Fraley, NASO, Seattle, to Tiburon to review personnel administration with the Tiburon staff.
- 9-10 - A meeting of an ad hoc working party on systems analysis of the world tuna fisheries was held at the La Jolla Laboratory. Organized by David Mackett, SWFC Planning Officer, and Dr. William Fox, Fishery Biologist, the purpose of the meeting was to elicit problem statements and potential remedial actions from a variety of industry, NMFS, and academic observers. In addition to the organizers the attendees included: Dr. Brian J. Rothschild, SWFC Director; Dr. James Joseph, IATTC; Mr. Gerald V. Howard, NMFS Regional Director; Mr. Larry Snead, NMFS International Activities Staff; Mr. Doyle Gates, Tuna Research Foundation; Dr. Garry Brewer, RAND Corporation, Dr. Brian Mar, Professor of Civil Engineering, University of Washington; Dr. Daniel Huppert, SWFC Industry Economics; and Mr. Norm Mendes.
- Mr. Maxwell Eldridge, Tiburon Laboratory, met with Dr. C. O'Connell, Fishery Biologist at the La Jolla Laboratory, concerning histological sectioning of fish larvae. Identification of unknown fish larvae were also verified with the aid of Dr. Ahlstrom's staff and reference collection.
- 9-15 - Dr. William Perrin spent a week at the Smithsonian Institute examining a large series of porpoise skulls for a study of natural mortality caused by parasites. (See write-up under Marine Mammal Investigations, page 8.)
- 10 - Mr. Izadore Barrett, Deputy Director, met with Dr. D.L. Alverson, Center Director, NWFC, in Seattle to discuss porpoise gear research.

- July 11 - Drs. R. Lasker and J. Hunter, of the La Jolla Laboratory, travelled to Cal Tech to attend a Symposium on Swimming and Flying in Nature. Mr. W. Vlymen, who has worked with Dr. Lasker, presented a paper on swimming energetics of the larval anchovy.
- Mr. Shomura left Honolulu to attend the 7th Technical Meeting on Fisheries, South Pacific Commission, in Nuku-alofa, Tonga (July 15-19). He returned to Honolulu on July 22.
- 12-20 - Fishery Biologist Heeny S. H. Yuen, Physical Science Technician Cynthia Unninayar, and Research Assistants Bernard M. Ito and Ray F. Sumida traveled to Kailua-Kona, Hawaii to the 16th Annual Hawaiian International Billfish Tournament, where they provided scientific services and collected catch data and samples of Pacific blue marlin for mercury analysis.
- 15 - Messrs. Lloyd Richards and Norman Abramson of Tiburon met with Chris Dewees of UC, Davis Sea Grant and Robert Brown of the San Francisco Tyee Club on methods of improving operation of the silver salmon rearing pen.
- 15-16 - Dr. Paul Smith, La Jolla Laboratory, traveled to Monterey, California with Dr. Michael Colebrook, visiting scientist from Plymouth, England to examine long-term time series of oceanographic and meteorological variables.
- Lt. Warren Taguchi was in Long Beach handling details for the baitfish project.
- 16 - Fishery Biologist Tamio Otsu, Honolulu Laboratory, accompanied Southwest Regional Director Gerald Howard to the Pacific Tuna Development Foundation board of directors meeting, held in Honolulu at the Royal Hawaiian Hotel.
- 17-26 - Dr. Elbert H. Ahlstrom attended the CICAR Ichthyoplankton Workshop held in Mexico City.
- 19 - Mr. Izadore Barrett, Deputy Director SWFC, attended a meeting of the State Advisory Committee on Underwater Parks, as a member of the committee.
- Dr. Brian Rothschild visited the Tuna Research Foundation in Terminal Island.

- July 22-25 - Dr. Brian Rothschild attended a meeting in Redondo Beach, California on July 22 concerning the new MARMAP Program Development Plan. Dr. Paul Smith attended this same meeting from July 22-25.
- 28-31 - Mr. Shomura traveled to La Jolla where he and Dr. Jerry Wetherall met with laboratory staff concerning albacore population dynamics. Mr. Shomura also met with vessel committee members Barrett, Abramson, and Howard to prepare for the return of the Townsend Cromwell to Honolulu. Mr. Shomura is chairman of the vessel committee.
- 29 - Mr. Ben Remington, SWFC Executive Officer, traveled to Terminal Island to meet with Regional Director Howard on PIDC/PTDF matters.
- 31 - Mr. Sus Kato and Dr. Edmund Hobson, Tiburon Laboratory, traveled to Monterey to attend a workshop on shark research at the invitation of ONR and AIBS. They participated in a working group which discussed the state of knowledge of the biology, systematics, behavior, and population dynamics of sharks. The group presented its findings along with recommendations for future research on sharks.
- July 31- August 1 - Dr. Rothschild and David Mackett traveled to Los Angeles to attend a meeting with NOAA and the Bureau of Land Management personnel.

VISITORS

Honolulu Laboratory

- July 18 - Mr. Shozo Konno, Iwatani & Company, Tokyo.
- 22 - Dr. Rogene K. Thompson, U.S. Peace Corps, Camp Careau, Centre de Flacq, Mauritius, accompanied by Mr. Takuji Fujimura, Hawaii State Division of Fish and Game.
- 27 - Dr. Maynard Steinberg, Director, Pacific Utilization Research Center, NMFS, Seattle, accompanied by Mr. John Ball, Coordinator, Marine Advisory Program, University of Hawaii.
- 29 - Mr. Ben M. Sablan, Fisheries Specialist, Trust Territory of the Pacific Islands, Marine Resources Division, Kolonia, Ponape, Eastern Caroline Islands.

La Jolla Laboratory

- July 3 - Dr. Rothschild received representatives from Senator Alan Cranston's office.
- 2-3 - Mr. Pete Jensen, NMFS, Washington, D.C.
- 3-5 - Dr. Peter Miyake, ICCAT
- 8-23 - Dr. Brian Mar, University of Washington
- 9 - Mr. Larry E. Snead, NMFS/NOAA, Washington, D.C.
- Mr. Doyle E. Gates, Tuna Research Foundation, Terminal Island
- 10-12 - Mr. Howard L. Fraley, NASO, Seattle, Washington
- 9-10 - Mr. Max Eldridge, NMFS Tiburon Laboratory
- 11 - Mr. James K. Jennings, Jr. Zapata Ocean Resources, San Diego
- Dr. Rex R.C. Edwards, University of Liverpool, England
- 15 - Dr. Quentin Bone, Marine Biological Laboratory, Citadel Hill, Plymouth, England
- 23-25 - Dr. J. Scharffe, FAO, Rome, Italy
- Mr. Richard McNeely, NMFS, SWFC, Seattle
- 27 - Dr. I. Muher Dic., Director of Fishery of Senegal
- Dr. Babacour Diob, President, SOSAP, Dakar
- Dr. Harold Rosenthal, Biolog, Anstalt, Helgoland, Hamburg
- 29 - Mr. Norman Abramson, Tiburon Laboratory
- 28-31 - Mr. Richard Shomura, Honolulu Laboratory
- 30 - Mr. Gerald V. Howard, Regional Director, Terminal Island

Tiburon Laboratory

- July 1 - Mr. Ed Whitehead, U.S. Fish and Wildlife Service
- 3 - Mr. John Belshe, U.S. Army Corps of Engineers, Honolulu
- Mr. James Jackson, Sea Habitat Corp., San Francisco

- July 8 - Ms. Anita Coit, Southwest Fisheries Center
- Mr. H.L. Frawley, NASO, Seattle, Washington
- 10 - Mr. Ed Neal, San Francisco Examiner
- 25 - Mr. Christopher M. Dewees, UC at Davis, Sea Grant
- 26 - Mr. Joaquim Scharfe, FAO, Rome
- Bill Hillman, KPIX-TV, San Francisco

PERSONNEL ACTIONS

- July 1 - S. Reilly, Biological Aid - Termination - La Jolla
- 2 - A. Steinmetz, Laborer - Temporary Appointment - La Jolla
- 5 - J. Whitmore, Clerk-Typist - Ext. of LWOP - Tiburon
- A. Jellett, Clerk-Typist - Ext. of Temporary Appointment - Tiburon
- 6 - E. Setzler, Biological Technician - Expiration of Temporary Appointment - La Jolla
- 8 - C. Love, Oceanographer, Temporary Appointment - La Jolla
- E. Sandknop, Biological Technician - Pay Adjustment to Full Time - La Jolla
- 9 - C. Unnimayer, Physical Science Aid - Temporary Appointment - Honolulu
- 10 - D. Powers, Biological Aid - Termination - La Jolla
- 14 - J. Medley, Clerk-Steno, Transfer - Tiburon
- 18 - N. Abramson, Acting Director - Extension of Temporary Promotion - Tiburon

HONORS AND AWARDS

Dr. Reuben Lasker, Leader of the Stock and Recruitment Investigations at the La Jolla Laboratory, has been invited to join the Advisory Panel for Oceanography in the Research Directorate of the National Science Foundation. Dr. Lasker will be mainly concerned with the Biological Oceanography sub-panel where he will study and evaluate research proposals presented to the National Science Foundation for funding.

Dr. Brian J. Rothschild, Director of the Southwest Fisheries Center, has been offered and has accepted an appointment as Adjunct Professor in the Department of SIO/Institute of Marine Resources in the Scripps Institute of Oceanography at the University of California, San Diego, effective July 1, 1974 to June 30, 1975.

July 31 - Lloyd Richards, Biological Technician, Tiburon -
Quality Step Increase

TRAINING

Mr. Ralph Bates, Systems Analyst, La Jolla Laboratory, attended a course on techniques of file design and data base structure in San Diego July 30-August 1, 1974.

