



HONOLULU
LA JOLLA
MONTEREY
TIBURON



SOUTHWEST FISHERIES CENTER

MONTHLY REPORT - DECEMBER 1982

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SOUTHWEST FISHERIES CENTER

LA JOLLA, CALIFORNIA

HONOLULU LABORATORY

LA JOLLA LABORATORY

TIBURON LABORATORY

PACIFIC ENVIRONMENTAL GROUP

MONTHLY REPORT - DECEMBER 1982

STATUS OF PUBLICATIONS

Published

Adams, P B 1982 Feeding behavior of the widow rockfish
(*Sebastes entomelas*): A diurnally feeding rockfish. pp.198-214
In (G.M. Cailliet and C.A. Simenstad, (eds.)). Gutshop '81.
Washington Sea Grant Publication WSG-WO 82-2, Seattle, Washington.

Landings of widow rockfish have increased from insignificant to dominating the rockfish fishery in just a few years. The reason for this is the development of a new nighttime fishery for widow rockfish versus the traditional daytime fishery for other commercially important rockfishes. This means that widows are aggregated at night and are dispersed during the day which is the opposite of traditional commercially important rockfishes. The diet of widows is similar in composition to other rockfishes, but there are major differences in the relative abundances of the diet items. Although the data is limited by sampling problems, it indicates that widows are feeding on the submerged daytime portion of the vertical migrating layer. There are also seasonal differences in the diet of widow rockfish. These differences accompany changes in reproductive activity. The importance of feeding behavior of the widow rockfish in management and the importance of feeding behavior generally in management is discussed.

Au, David and Wayne Perryman. 1982. Movement and speed of dolphin schools responding to an approaching ship. Fish. Bull. U.S. 80(2): 396-401.

Eight dolphin schools of the species Stenella attenuata, S. longirostris, and S. coeruleoalba were approached by ship and observed from a helicopter in the eastern Pacific to study their responses to the vessel. All schools swam away from the projected track of the approaching ship. Their movement, relative to the ship, followed paths that curved around the ship. Average swimming speeds while avoiding the ship varied from 5.1 to 8.8 knots. In some cases avoidance apparently began at 6 or more miles away from the ship. The effect of this behavior on shipboard censusing of dolphins is discussed.

Bakun, Andrew and Richard H. Parrish. 1982. Turbulence, transport, and pelagic fish in the California and Peru Current systems. Calif. Coop. Oceanic Fish. Invest. Rep. 23:99-112.

The California and Peru Current systems are compared in terms of three environmental processes thought to be likely regulators of reproductive success of pelagic fishes: (1) turbulent mixing, leading to destruction of fine-scale food strata required for successful first feeding of larvae, (2) offshore transport, resulting in loss of reproductive products, and (3) upwelling intensity, as it relates to total productivity of the system. Newly generated climatological distribution of coastal-oceanic temperature contrast, wind-generated turbulent energy production, sea surface wind stress, and surface Ekman transport are presented. A consistent pattern of avoidance of centers of maximum upwelling, which are characterized by intense turbulence mixing and offshore transport, is noted in the reproductive strategies of anchovies. Large stocks tend to occur in regions of low turbulent mixing, downstream of upwelling maxima.

Husby, David M. and Craig S. Nelson. 1982. Turbulence and vertical stability in the California current. Calif. Coop. Oceanic Fish. Invest. Rep. 23:113-129.

Summaries of historical surface marine wind observations and subsurface temperature data are used to examine the seasonal and spatial characteristics of wind-generated turbulent energy production and of stability of the upper water column over the California Current region. A recent hypothesis suggests that survival of first-feeding larval anchovies, Engraulis mordax, depends on the aggregation of properly-sized food organisms in a stable water column in the absence of strong wind-induced turbulence. A comparison of wind mixing and stability indices for regions encompassing the principal spawning grounds of the three subpopulations of northern anchovy demonstrates that peak spawning occurs during seasons and in locations associated with stable stratification, relatively low rates of turbulent energy production, and weak offshore transport (upwelling).

The average intensity of wind-generated turbulent energy production is similar during peak spawning periods in all three regions. This suggests optimum levels of turbulence and stability in the upper water column -- levels that favor survival of first-feeding larvae. Although examination of mean conditions is useful in a comparative study, the average intensity of turbulent wind mixing over a spawning season is not likely to be well correlated with interannual variability in recruitment. Rather, the existence of sufficient time-space windows within which turbulence does not exceed critical values may be the relevant factor. To investigate this possibility, time series of wind-generated turbulent energy production are presented for recent periods associated with large variations in year-class strength.

Chess, J.R. 1982. Predator-prey studies of the shortbelly rockfish: Offshore sampling problems. pp.58-62. In G.M. Cailliet and C.A. Simenstad, (eds.). Gutshop 81 Washington Sea Grant, Publication WSG-WO 82-2, Seattle, Washington.

The feeding behavior of shortbelly rockfish, Sebastes jordani, has been investigated near Ascension Submarine Canyon off central California (37°00'N, 122°27'W) since the spring of 1979. To determine diel feeding patterns, replicate trawl samples have been taken during the hours immediately before sunrise and sunset. Midday and midnight depth stratified plankton collections have also been made to determine the diel distribution patterns of potential prey species.

Studies of offshore trophic relationships using approaches developed with shallow nearshore studies are complicated by an inability to make direct observations. Rather, relationships must be inferred from samples taken with remote devices such as plankton nets and trawls.

Consistent sample collecting has been inhibited by inexperienced personnel and the limitations of certain shipboard equipment. In order to sample isolated aggregations of fish with reliability, sophisticated electronic equipment is required. A high resolution depth sounder, Loran plotter and trawl monitoring equipment, including a time/depth recorder and Furuno net sonde have recently been used to more effectively collect samples. The experiences gained during the past several years have also contributed to more effective sampling.

Analysis of gut fullness data collected thus far indicate that shortbellies do not have a well defined diel feeding mode, rather they feed both day and night.

The primary prey taken during the day and night are euphausiids. They are taken almost exclusively during the night but during daylight hours large species of calanoid copepods comprise a significant portion of the shortbelly diet.

- Kaya, Calvin M., Andrew E. Dizon, Sharon D. Hendrix, Thomas K. Kazama, and Martina K.K. Queenth. 1982. Rapid and spontaneous maturation, ovulation, and spawning of ova by newly captured skipjack tuna, Katsuwonus pelamis. Fish. Bull., U.S. 80:393-396.
- Lo, Nancy, C.H., Joseph E. Powers, and Bruce E. Wahlen. 1982. Estimating and monitoring incidental dolphin mortality in the eastern tropical Pacific tuna purse seine fishery. Fish. Bull., U.S. 80(2): 396-401.

Administrative Reports

Honolulu Laboratory

- Barnett, William B. 1982. Seamount trawl fishery in the Fishery Conservation Zone, foreign vessel observer report, Aso Maru (September 18-26, 1982). SWFC Admin. Rep. H-82-21.
- Kamer, Gary L. 1982. Procedures to be followed in preparing weekly and monthly reports on skipjack tuna landings in Hawaii. SWFC Admin. Rep. H-82-22.

La Jolla Laboratory

- Huppert, Daniel and Cynthia Thomson. 1982. Annual summary files from the 1974 thru 1976 coastwide summary data base: contents and summary statistics. SWFC Admin. Rep. LJ-82-29.
- MacCall, Alec. 1982. Population model and simulations for the revised anchovy management plan. SWFC Admin. Rep. LJ-82-30.
- Methot, Richard. 1982. Age-specific abundance and mortality of northern anchovy. SWFC Admin. Rep. LJ-82-31.

Approved by Center Director

- Bartoo, Norman W. and Keith R. Parker. Summary Paper - Reduction of bias generated by age-frequency estimation using the von Bertalanffy growth equation. To be published as a Special Scientific Report - Fisheries.
- Ferris, Steven D., John E. Graves, and Andrew E. Dizon. The genetic relationship of Atlantic and Pacific skipjack tuna as revealed by mtDNA restriction analysis. For consideration for publication in Fishery Bulletin, U.S.
- Loeb, V.J., P.E. Smith and H.G. Moser. Ichthyoplankton and zooplankton abundance patterns in the California Current area, 1975. For submission to CalCOFI Reports.

Loeb, V.J., P.E. Smith and H.G. Moser. Geographical and seasonal patterns of larval fish species structure in the California Current area, 1975. For submission to CalCOFI Reports.

HONOLULU LABORATORY

INSULAR RESOURCES INVESTIGATION

Research Cruise Completed to Seamounts and Northwestern Hawaiian Islands

The NOAA research vessel Townsend Cromwell (cruise 82-05) returned to Honolulu on December 2 from a 45-day cruise to the central North Pacific seamounts and the Northwestern Hawaiian Islands (NWHI). The primary missions of the cruise were to collect biological, bathymetric, and oceanographic data from waters around the seamounts, and to conduct several specially designed experiments involving spiny lobsters and bottom fishes in the NWHI. The seamount survey was conducted at several seamounts to the northwest of the Hawaiian chain, including the Hancocks, which are within the U.S. Fishery Conservation Zone (FCZ), and Colahan, Kanmu, and Kinmei which are outside the FCZ. The Cromwell's catches at the Hancocks were relatively good compared with those on the seamounts outside the FCZ, which were very poor. The limited data indicate that the resources on the Hancock Seamounts may be recovering from the intense fishing pressure by Japanese and Soviet trawlers before passage of the Magnuson Fishery Conservation and Management Act. However, it is unclear whether the poor catch results at the other three seamounts reflect stock depletion or insufficient sampling effort.

Meeting Held to Discuss Undersea Research

Reginald M. Gooding, Fishery Biologist, reports that a meeting of personnel from Hawaii Undersea Research Laboratory (HURL), U.S. Fish and Wildlife Service, the NOAA research vessel Townsend Cromwell, and the Southwest Fisheries Center (SWFC), Honolulu Laboratory, was held to discuss the logistics of conducting research using the HURL submersible, Makalii, at French Frigate Shoals and Necker Island in June-July 1983. Based on the discussion during the meeting, which clarified what is possible and practical in such a research effort, the Honolulu Laboratory's proposal entitled, "Ecological survey in waters off Necker Island and French Frigate Shoals with the HURL submersible, Makalii," was revised.

* * * * *

Research assistant Michael P. Seki continued work on an Ocean Thermal Energy Conversion report. Other members of the Insular Resources Study Task continued with the preparation of papers to be presented at the NWHI symposium which will be held in May 1983.

Tuna Fishing Data From the Mariana Archipelago Analyzed

Dr. Jeffrey J. Polovina, Task Leader of the Resource Assessment Investigation of the Mariana Archipelago, and research assistant Nathaniel T. Shippen, have completed an Administrative Report entitled, "Estimates of the catch and effort by Japanese longliners and baitboats in the Fishery Conservation Zone of the Mariana Archipelago." This Report represents historical catch and effort data from Japanese longliners for the period 1965-1979, from baitboats for the period 1970-1979, and an analysis of the data.

For the period 1965-1979, the total annual tuna catches from Japanese longliners in the FCZ around Guam ranged from 9 to 1,334 metric tons (MT), and from 71 to 576 MT in the FCZ around the Commonwealth of the Northern Mariana Islands (CNMI). The tuna catches for the period 1976-1979 were above average as compared with those of the period 1965-1975 in the FCZ around Guam and the CNMI. The catch was composed predominantly of albacore, Thunnus alalunga, yellowfin tuna, T. albacares, and bigeye tuna, T. obesus. During the latter part of the 1969-1979 period, there was an increase in the catch, effort, and catch per unit of effort in the lower portion of the archipelago (lat. 11°-16°N).

The most abundant tuna in the archipelago appears to be skipjack tuna, Katsuwonus pelamis. The annual total tuna catches from Japanese baitboats for the period 1970-1979 ranged from 300 to 2,059 MT for the FCZ around Guam and from 2,554 to 12,564 MT for the FCZ around CNMI. Skipjack tuna comprise over 90% of the tuna caught by the baitboats. The middle latitudes (16°-21°N) provided consistently good catches.

FISHERY MANAGEMENT RESEARCH PROGRAM

New Computer Hardware Obtained for Data Entry System

The Mohawk Data Sciences Series 2100 dual station data entry system has been installed at the Honolulu Laboratory. An instructor was brought in from the company to provide 3 days of on-site training and technical support to the Laboratory's data entry and ADP staff. Several key-to-disk data entry applications have already been developed and the phasing out of the IBM 029 key punch machines has begun. This new hardware, with its communications capabilities and 5 MB hard disk, will significantly improve the Laboratory's efficiency for handling its large volume of incoming data.

Spiny Lobster Regulations Discussed

Researchers in the Fishery Management Research Program met with personnel from the Western Pacific Program Office, Southwest Region, and the U.S. Coast Guard to discuss the implementation of regulations for the spiny lobster fishery management plan. The regulations are scheduled for implementation in February 1983.

Survey of Retail Seafood Firms Nearing Completion

Samuel G. Pooley, Industry Economist, reports that the survey of retail seafood firms in Hawaii is nearing completion. Sampling of the seafood firms has been highly successful and the results of the survey are expected from the contractor early in the spring of 1983.

Hawaii 1982 Skipjack Tuna Landings Below 1981 Landings

The December 1982 Hawaii landings of skipjack tuna were estimated at 44 MT, which is 57 MT below the December 1981 landings and 109 MT below the 1964-1979 long-term average for December. The cumulative landings from January through December were estimated at 1,757 MT, which is 437 MT below the 1981 landings for the same period and 2,275 MT below the 1964-1979 long-term average for the same period (Figure 1).

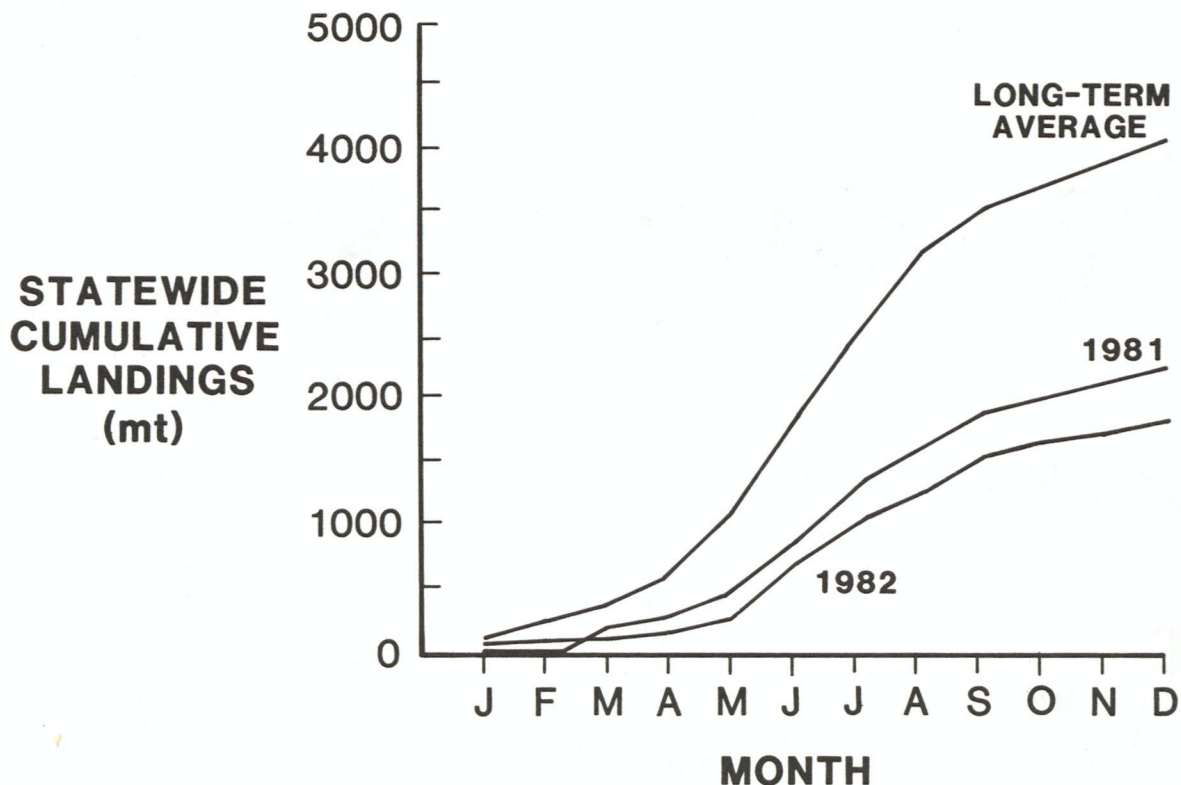


Figure 1.--Cumulative landings in the Hawaiian skipjack tuna fishery.

LA JOLLA LABORATORY

Coastal Fisheries Resources Division

COASTAL AND RECREATIONAL FISHERIES RESEARCH FOR MANAGEMENT

1974-76 Coastwide Summary Data Base Completed

Dr. Daniel Huppert and Cynthia Thomson, Industry Economists, report the completion of an Administrative Report entitled, "Annual summary files from the 1974 thru 1976 Coastwide Summary Data Base: Contents and Summary Statistics" (LJ-82-29). The main purpose of the study was to estimate the number of West Coast commercial fishing vessels engaging in a variety of fishing activity patterns at various levels of intensity. In the process, the authors created series of data files containing annual summary records for each fishing vessel. Each record contains the vessel's ID number, annual catch by species group, estimated total revenue earned, gear types used, and geographical zones fished.

Data are organized into three files per year: one for vessels landing only salmon, one for vessels landing no salmon and one for vessels landing both salmon and non-salmon species. The total number of records (i.e., number of vessels) represented in the data files are as follows:

	<u>1974</u>	<u>1975</u>	<u>1976</u>
Salmon-only	4035	4869	4389
Non-salmon	2593	2807	3400
Combination	7553	6700	8169
TOTAL	1,4181	1,4376	1,6958

Frequency distributions of catch per vessel by species and of estimated total revenue indicate that most vessels catch relatively small amounts and earn fairly low incomes from fishing. All histograms of annual catch and annual revenue tend to be highly positively skewed. This characteristic of the fleet can be illustrated by comparing the number of vessels presented above with a similar table showing number of vessels with estimated gross revenue greater than \$10,000.

Salmon-only	290	309	266
Non-salmon	770	799	943
Combination	1510	1404	2174
TOTAL	2,570	2,512	3,383

Roughly 18.5% of the active commercial fishing vessels had estimated gross revenues greater than \$10,000 during 1974-76.

A major portion of the report consists of tables showing number of vessels which landed fish in given species groups and number which landed fish from combinations of species groups. An example of this type of "two-way fishery activity chart" is shown here for the 1975 salmon-only vessels.

Two Way Fishery Activity Chart for Salmon-Only Vessels in 1975

	CHINOOK	COHO	PINK	CHUM	SOCKEYE	STEELHEAD	UNSPECIFIED
CHINOOK	4103 (785)*	3213	1330	978	1082	57	14
COHO		3816 (442)	1387	1045	1080	32	2
PINK			1465 (4)	823	1120	0	0
CHUM				1066 (15)	756	0	0
SOCKEYE					1181 (22)	0	0
STEELHEAD						66 (7)	0
UNSPECIFIED							20 (6)

*Number in parentheses is number of vessels landing only one species.

The report contains similar charts for each year and vessel group (salmon-only, non-salmon and combination) as well as comparable charts for vessels with estimated gross revenues greater than \$10,000.

Micro-Nekton Sampling Workshop Held

A workshop on the sampling of micro-nekton was convened by Dr. Paul Smith and chaired by Dr. Richard Methot, fishery biologists at the La Jolla Laboratory, and held at the Scripps Institution of Oceanography on December 15. The objectives of the workshop were to review sampler technology, to assess the capabilities of existing samplers, and to suggest gear modifications and acquisitions that would improve the ability to quantitatively sample juvenile fish and squid.

Descriptions of various trawls and seines were presented by Dr. William Pearcy, Oregon State University; Dr. Edward DeMartini, Univ. California Santa Barbara; Dr. Roger Hewitt, SWFC; Waldo Wakefield, Univ. California San Diego (SIO), and Ken Miller, California Department of Fish and Game (CDF&G). Pearcy noted that the suite of samplers recommended by an international committee (SCOR Working Group 52) is comprised of the bongo plankton net, a Tucker type trawl with 8 m sq. mouth opening, and a midwater trawl with 50-200 m sq. opening. However, these trawls are usually towed behind a vessel and are likely to collect a biased sample of organisms inhabiting the upper few meters of the water column.

An adequate juvenile fish sampler must quantitatively sample the upper water column. Immediate work was suggested to evaluate the sampling bias of existing gear: the 6 ft. Isaacs-Kidd trawl nets need to be compared to catches by seines and by trawls towed at the surface between two vessels. Although much of this comparison work will require the chartering of specialized vessels. It was identified by the workshop participants as a high priority project.

Additional topics of discussion were the characteristics for a potential standard midwater trawl, specific gear evaluations to be conducted on the NOAA research vessel, David Starr Jordan, during 1983, and the need for an adequate net monitoring system and sonar to support the trawl studies.



Attendees of the recent Micro-Nekton Sampling Workshop: Top row (l-r): Geoff Moser, Southwest Fisheries Center (SWFC); Allen Shanks, Scripps Institution of Oceanography (SIO); Waldo Wakefield, SIO; John Hunter, SWFC; Bill Lenarz, Tiburon Laboratory; Roger Hewitt, SWFC. 2nd row (l-r): Dick Parrish, Pacific Environmental Group; Alec MacCall, SWFC; Ken Miller, California Department of Fish and Game; Bill Percy, Oregon State University; Bob Fountain, U.C. Santa Barbara (UCSB); Steve Reilly, SWFC. 3rd row (l-r): Jay Barlow, SWFC; Ed DeMartini, UCSB; Tony Chess, Tiburon Laboratory; Sandy Hawes, SWFC; Doug Demaster, SWFC. Front Row: Paul Smith, SWFC; Rick Methot, SWFC; Nancy Lo, SWFC; Gail Theilacker, SWFC; Reuben Lasker, SWFC; Pete Adams, Tiburon Laboratory.

New Draft Anchovy Plan Submitted

A draft revision of the Anchovy Fishery Management Plan (FMP) has been prepared by the Anchovy Plan Development Team (PDT) composed of co-leader Dr. Richard Methot and Dr. Alec MacCall of the Southwest Fisheries Center, Dr. O. Mathison, University of Alaska, Herb Frey, California Department of Fish and Game, and Dr. Dan Huppert, SWFC. The revision was presented to the Pacific Fishery Management Council.

The FMP revision was motivated by recent advances in stock assessment technology developed at the Southwest Fisheries Center (SWFC). The "egg production method" has given a direct estimate of anchovy spawning biomass which tends to be lower than the previous indirect larva census estimates. Also, the time series of historical anchovy egg production recently developed by mathematician Dr. Nancy Lo has been calibrated to provide an improved time series of anchovy spawning biomass. This new time series shows that the previous larva census estimates tended to be relatively insensitive to changes in actual spawn production (and presumably spawning biomass as well).

The Anchovy PDT has used this new information to update the previous FMP and to construct a new model of anchovy population dynamics for the purpose of developing and evaluating management options. This new model incorporates nearly twice the information of the previous model. The new model shows the anchovy resource to be more productive per unit biomass than did the previous model. However, because the biomass itself is lower than was previously thought, estimated sustainable yields are substantially smaller, being somewhat over one-half the previous estimates.

One of the important issues in anchovy management has been the "forage reserve," a level of spawning biomass below which the fishery is severely restricted. The forage reserve was set at one million short tons by the previous FMP. An equivalent reserve under the new FMP would be 200 to 400 thousand metric tons, based on several criteria including direct translation from the previous model, historical anchovy abundances, and analysis of economic optimality. The PFMC will decide on an appropriate value of the new forage reserve when they make their selection of management options during the coming year.

From a relatively lightly fished resource a decade ago, the anchovy stock has now reached full exploitation by the combined U.S. and Mexican fisheries. The stock has declined from a maximum of about 2 million metric tons during 1973-75 to about 0.4 million metric tons in 1982. The stock level was near optimum during 1980-81 but mediocre year classes in 1979 and 1980, and a very poor year class in 1981, combined with a fishery operating at MSY level (under normal recruitment conditions) have caused the recent decline. Landings by the relatively small U.S. fishery have declined substantially in recent years, and landings by the large, unregulated Mexican fishery are likely to decline in 1982-83 due to reduced availability.

COASTAL EASTERN PACIFIC POPULATION BIOLOGY OF FISHES

Width-Weight Relation and Caloric Values for Larval-Fish Prey Examined

In studies of larval fish energetics, it is necessary to know dry weights and caloric values of prey items. As part of a study to examine the effect of diet on growth of larval northern anchovy, Engraulis mordax, fishery biologist Gail Theilacker and NOAA Jr. Fellow Amy Kimball have determined these values for the nauplii and copepodites of Tigriopus californicus, a harpacticoid copepod, and for the rotifer, Brachionus plicatilis. Both organisms are easily cultured in the laboratory and are a suitable food for the Engraulis larvae.

Larval fish prey were selected on the basis of size, with width being the limiting factor (Hunter 1981). Width, in addition to being more pertinent, has been shown to be a better predictor of wet weight than copepod length, and the accuracy of width as a predictor of weight was comparable to that of copepod volume (Pearre 1979). In Theilacker and Kimball's study, both width-weight and volume-weight models for nauplii, copepodites, and rotifers were created.

Caloric values have been reported for adult calanoid copepods (Lawrence 1976; Comita and Schindler 1963) and for the adult harpacticoid, Tigriopus californicus (Slobodkin and Richman 1961), but there are no reported values for copepod nauplii and copepodites.

This month Theilacker and Kimball sorted copepod and rotifer samples for caloric and ash determinations. Copepod samples were initially sized by differential screening, but because late naupliar stages and early copepodite stages are the same width and pass through the same screen, individuals were manually separated from debris and to life stage. More than 20,000 nauplii and copepodites were needed for each calorimetric and each ash determination (we mention this in hopes the paucity of samples will be overlooked).

Caloric values for the samples were determined using a Phillipson calorimeter. The ash-free caloric values for the three copepod life stages were similar, averaging 5.8 calories, and the rotifers contained fewer calories, 4.8 cal (Table 1). However, on a width-specific, individual basis, a rotifer contains more calories than a copepod nauplius (Table 2). This is due to the rotifers weighing more per unit width and containing less ash per unit weight.

Table 1. Caloric and ash values.

	n	%ash	n	calories/mg ash-free dry wt.
<u>Brachionus plicatilis</u>				
rotifers	7	7.8 ¹	3	4.8
<u>Tigriopus californicus</u>				
nauplii	2	16.2	3	5.8
copepodites	2	16.6	2	6.0
adults	2	7.3	2	5.9

¹Theilacker and McMaster, 1971

Table 2. Comparison of rotifer and copepod nauplius caloric values.

Prey	Width class (um)	Per Individual		Caloric value (X10 ⁻³ cal.)
		Dry weight (ug)	Volume (X10 ⁶ um ³)	
<u>Brachionus plicatilis</u>				
Rotifers	74.3 - 109.7	0.10	.67	.44
	109.8 - 146.7	0.22	1.80	.97
	146.8 - 183.8	0.41	3.06	1.80
	183.9 - 195.0	0.47	3.76	2.07
<u>Tigropus californicus</u>				
Nauplii	74.3 - 109.7	0.04	.21	.20
	109.5 - 146.7	0.13	.57	.64
	146.8 - 183.8	0.25	1.21	1.23
	183.9 - 195.0	0.38	1.68	1.86
Copepodites	146.8 - 183.8	0.63	3.49	3.09
	183.9 - 195.0	1.20	6.38	5.88

Abundance Parameters for Northern Anchovy Updated

Using new data from 1981 and 1982, together with the egg and larva data collected in the past, Dr. Nancy Lo, Mathematician at the La Jolla Laboratory updated the estimation of three parameters required for abundance assessments of the northern anchovy (*Engraulis mordax*): larva hatching time, yolk-sac stage larval growth, and retention of eggs and larvae in nets of various mesh sizes. The first two parameters are temperature dependent.

The growth data of yolk-sac larvae were updated by including a set of new data collected in 1981, consisting of larva length and age collected at three temperatures: 13.5, 15.0, and 16.5°C. The new data and those used by Zweifel and Lasker (1976) were fitted to an exponential equation expressing the relation between hatching time (t_h) and water temperature (temp):

$$t_h = 18.726 \cdot e^{-0.125 \cdot \text{temp}}$$

Equation (1) can be used to estimate anchovy egg production from the standing stocks of eggs and average water temperature.

The 1981 larva growth data combined with those used by Zweifel and Hunter (MS) were examined and refitted to Gompertz growth curves for each of the data sets collected at 6 temperatures.

Growth Temperature Dependence

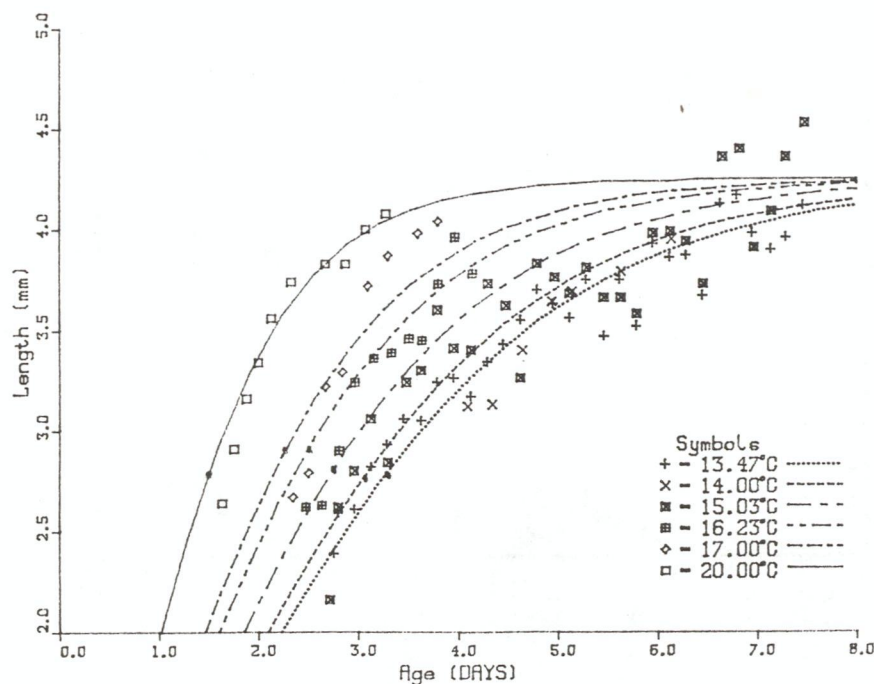


Figure 1. Growth curves of anchovy yolk-sac larvae at six temperatures as re-fitted to Gompertz growth curves. Dots are original observations.

SURVEY SYSTEMS DEVELOPMENT AND EVALUATION

New Improved Fine Mesh Plankton Nets Tested

Technical improvements suggested by fishery biologist Bill Flerx were incorporated in the recent construction of new fine mesh nets of mesh size 0.035 millimeters, 0.075 mm, and 0.150 mm. The latter two nets have been tested on the last two CalCOFI cruises, and proved to be 100% efficient, with no extrusion of anchovy eggs occurring; the nets filter 3 cubic meters in the upper 70m. The smallest net was 75% efficient, but showed no evidence of clogging during tows made in December 1982 north of Pt. Conception (Figure 1).

The key change in net construction which allows the use of fine meshes is the construction of a sheath of rugged viny mesh 1mm in width. This net protects the 0.035 - 0.150 mm mesh below without impairing filtration or washing of the underlying mesh.

It is currently planned to adopt the 0.150 mm mesh net as the standard for the anchovy biomass estimate with the egg production method. Yolk sac larvae are damaged and a small portion of the anchovy eggs are extruded through the 0.333 mm net in some seasons. Calibrations of the newer nets and some silk nets will be completed in March and April.

FINE MESH EFFICIENCY TEST

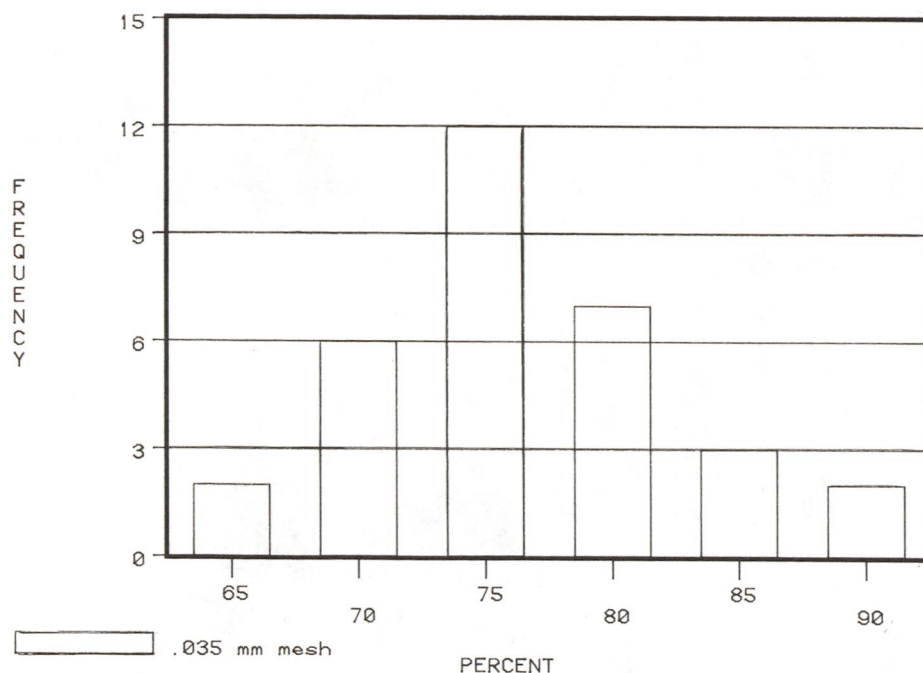


Figure 1: Efficiency of 0.035 mm mesh.

Initial Conditions for Anchovy Egg Production Established

A new estimation procedure for anchovy biomass assessment called the "egg production method" has been developed by scientists at the Southwest Fisheries Center to improve the precision and decrease the cost of the annual spawning biomass estimate required by the Anchovy Management Plan under the Fisheries Conservation and Management Act. Knowledge of egg production in the sea is a key determinant of the cost of this method.

Recently, fishery biologist Paul Smith reported good progress in elucidating the initial conditions of egg patchiness, characteristic of the northern anchovy which restricts its spawning in space and time. According to Dr. Smith, patchiness in anchovy eggs originates at several space scales and at the daily time scale.

The time scale is established by the tendency for anchovy to spawn in a few hours around 10:00 p.m. The space scales are found in the anchovy school group, the school, and the reproducing female and attendant males. The space scale of the school group is about 5 miles (8 km). The space scale of the school is 10 to 100 meters. The critical scales for the individual female and attendant males are not known.

Pertinent facts which have a bearing on this problem are: 1) 97% of anchovy eggs spawned in 1980-1982 were fertilized; 2) anatomically, the volume of one egg is the same as 90 million sperm; 3) the maximum anchovy egg sample per unit surface was of 1 day old eggs concentrated at 6,460 eggs per square meter; 4) the maximum measured egg concentration per unit volume was 31 eggs per liter and 5) eggs are spawned under a small proportion of the ocean area and rapidly disperse to cover 70% of the sea surface area.

If one further assumes that a million sperm per milliliter are necessary for a high rate of external fertilization, and that females shed their eggs into a cylinder with a radius of 1 cm, while swimming at 30 cm per second, then 90 million sperm could fertilize eggs at a concentration of 11 per liter. Eggs at the measured concentration of 31 per liter could then be fertilized by 32 million sperm. If the female released eggs at a rate of 6 per second, there would be 64 eggs per liter, spawning time would be a half-hour for 10,000 eggs and only 16 million sperm would be required for each egg. To achieve a concentration of more than 100 eggs per liter, the spawning time would have to be less than 20 minutes and the layer of eggs would be as thin as 0.1 meter, given the maximum observed egg concentration per unit area. For concentrations of less than 10 per liter to obtain, the spawning period would exceed 3 hours duration, and would require 500 million sperm per egg or more. The most reasonable values for the initial concentration of eggs, therefore, lies between 10 and 100 eggs per liter.

To examine the changes in egg abundance during the first few hours, it would be more effective to take low volume, long, oblique sampling tows through the spawning schools to integrate the apparent patchiness on the inter-fish scale while retaining the ability to describe the school scale

patchiness. Adoption of such a procedure at the time of anchovy spawning could reduce the number of samples required markedly and permit the description of cannibalism and other predation at the time of spawning.

Oceanic Fisheries Resources Division

COASTAL MARINE MAMMAL PROJECT

Harbor Seals Radio-Tagged at San Miguel Island

In October and November 1982, a joint study of the Northwest and Alaska Fisheries Center (NAFAC), Hubbs/Sea World Research Institute, (HSWRI) and the Southwest Fisheries Center (SWFC) was conducted to determine the hauling-out pattern, movement, and diving ability of harbor seals on San Miguel Island. Participating in this research were: Dr. Robert DeLong (NWFS), Dr. Douglas DeMaster (SWFC), Brent Stewart (HSWRI), and two student interns, John Anderson and Laurie Passero, from Southampton College, Long Island, New York.

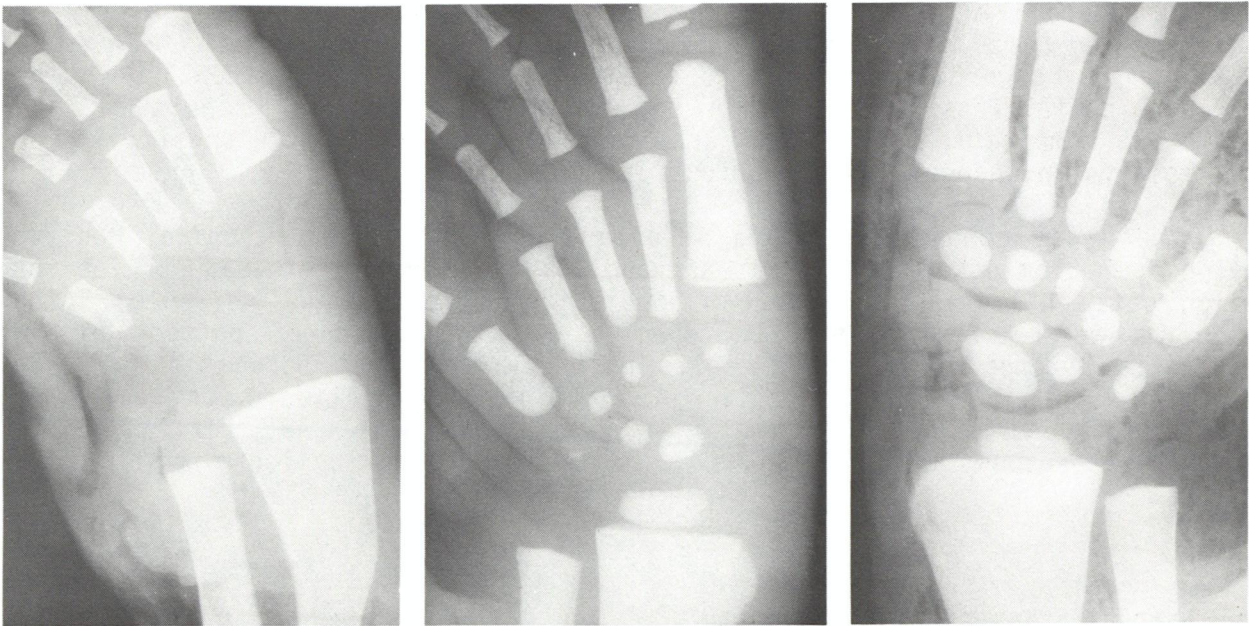
Nineteen harbor seals were captured in hoop nets and physically restrained while radio tags were attached to the pelage with a fast-drying epoxy cement. The animals were also flipper-tagged and measured. Four remote receiving stations were established at the four major haulout sites on San Miguel Island to monitor the time individual animals hauled out and the time they returned to the water. Analysis of the data is currently underway. The preliminary results suggest that site fidelity is high during this time of the year, but that movements between hauling-out sites and even between islands are occurring. Feeding cycles were found to vary from 1 to at least 5 days. The peak haulout was typically mid-afternoon, but this was often affected by disturbance from vessels.

Radiographs Used for Age-Determination in Sea Lions

Dr. Douglas DeMaster, Leader of the Coastal Marine Mammal Project at the La Jolla Laboratory is collaborating with Dr. Alistair Watson of the University of Florida to investigate the possibility of using the sequence of ossification in the developmental stages of bones as a technique for age-determination in the California sea lion. The study will concentrate on age-determination of pups and discrimination of pups that were born prematurely and pups born at full term. If the technique works, the mortality of pups due to premature birth and other causes can be separated.

As a background to this research, Dr. Watson had previously completed a feasibility study using the developmental stages of the bones in the thoracic flipper as a technique for age determination in the California sea lion, Zalophus californianus. The study was based on a series of radiographs (see Figures 1, 2, and 3). The analysis of the results from the examination of 11 Zalophus flippers demonstrated a developmental sequence, particularly

pronounced in the capital region. In young, or neonate specimens, there were no signs of ossification in the 9 carpal bones nor in the 7 adjacent epiphyseal ossification centers. All stages in the developmental sequence, however, were not represented in the sample. It is known, nevertheless, from other studies that each of the ossification centers develop in sequence and later coalesce with the appropriate adjacent bone. This suggests that the appearance and fusion of ossification centers are age related and might be used for age determination of specimens.



Figures 1, 2, and 3: Developmental stages of thoracic flipper bones.

MARINE MAMMAL LIFE HISTORY PROJECT

Specimens Received for Life History Analysis

Specimen material from dolphins killed on 47 tuna boat cruises in the ETP for 1982 were received by the Marine Mammal Life History Project for examination. So far, reproductive material from 42 cruises has been rough-sorted and examined macroscopically for ovarian scars by biological laboratory technician Ruth Miller and fishery biologist Virginia Cass. These data have been coded and edited and are being prepared for logging into the Southwest Fisheries Center computer data base. The remainder of the material is now being processed, and the examination should be completed by mid-January 1983.

MARINE MAMMAL ASSESSMENT

NRC Fellow Completes Stay at SWFC

During December, Dr. K. Radway Allen, a world authority on the population dynamics of cetaceans and formerly head of the Division of Fisheries, CSIRO, Australia, completed his initial structuring of a generalized, age-structured back calculation model for cetacean populations. Dr. Allen was in residence at the Southwest Fisheries Center since September, working with the Marine Mammal Assessment group under a National Research Council Senior Fellowship. Dr. Allen's interactive, computerized model was developed to calculate original population size given an observed current size following a known catch regime; to determine "optimum" population levels for various definitions of optimum; to examine the internal consistency of different combinations of vital parameters; and to examine the sensitivity of the results to changes in the various parameters.

The model computer programs were written with eastern tropical Pacific dolphin populations in mind (but are applicable to other cetacean species for which catch histories and current population estimates are available). The programs were tested using data specific to the offshore spotted dolphin (*Stenella attenuata*) and the results particular to that population will be reported in a planned scientific publication. Dr. Allen has prepared a manuscript describing the computer programs and their use; this paper is undergoing review and should be available for distribution within a few months.

TUNA AND BILLFISH RESOURCES PROGRAM

DNA Used to Analyze Genetic Variability in Tuna

Dr. John Graves, NCR NOAA Research Associate at the Southwest Fisheries Center (SWFC) and Dr. Andy Dizon, Fishery Biologist, recently applied a new technique for investigating relatedness both within and between species to skipjack tuna from the Atlantic and Pacific Oceans. Endorestriction nuclease analysis of mitochondrial DNA, which has been used successfully to demonstrate population structure in mammals, indicated a surprisingly high degree of genetic similarity between skipjack tuna from the two oceans. These results suggest continued genetic contact between the two populations since the uplift of the Panama land bridge 1.3 million years ago. A manuscript outlining these results has been submitted for consideration to Fishery Bulletin.

Samples of skipjack tuna were obtained from Hawaii, Brazil, and Ghana for further analysis of the relatedness of tuna from the Atlantic and the Pacific Ocean.

Also during the month of December, Dr. Stephen Ferris of the Department of Biochemistry, University of California at Berkeley, worked with Graves and Dizon, to evaluate different methods for extracting and visualizing mtDNA fragments from frozen marine mammal and tuna tissues.

During this period the three scientists visited Dr. John Petruska, Molecular Biology Division, University of Southern California, to discuss a promising new technique designed by Dr. Petruska which can perform mtDNA analysis on highly degraded tissues. A collaborative effort was planned to evaluate the new technique with squid, tuna, and marine mammal tissues.

Analysis of 20 samples of spotted dolphin, *Stenella attenuata*, obtained from fishery biologist Dr. William Perrin, was started this month. Preliminary work indicated that the tissues are sufficiently fresh for analysis. In fact, it was possible to extract pure mtDNA from one of the samples. Normally, this is possible only with fresh or ultra-low temperature frozen tissues, not animals frozen in the round at normal food freezer temperatures. The results of an analysis utilizing two samples (one from the northern group, the other from the southern) and five restriction enzymes will be available next week.

Dizon and Graves are co-investigators on a Sea Grant proposal submitted by Dr. Greg Calliet of the Moss Landing Marine Laboratory. The work proposed is an mtDNA analysis of relatedness among and within pelagic shark populations.

Study of Fecundity of Atlantic Skipjack Tunas Completed

Dr. David Au, Operation Research Analyst, reports that a histological examination of female skipjack tuna gonads from tuna collected in the western Atlantic Ocean was completed by Dr. Steven Goldberg from Whittier College, California. A total of 951 female gonads was examined, 916 from Brazil and 35 from the Caribbean, to assess reproductive condition. A portion of the Brazilian sample (from 25°S to 45°W) was in spawning condition in November; the condition continued through March. The Brazilian fish are batch spawners and spawn more than once. Minimum length of sexually mature females was 510 mm with minimum gonad indices of 30. For skipjack tuna measuring 510-720 mm fork length (2600-9650 g), the average number of eggs was 385,936.

TIBURON LABORATORY

FISH COMMUNITIES INVESTIGATION

Broad Parallels Sought in Feeding Relationships of Coastal Predatory Fishes

Most coastal predators, both nearshore and offshore, switch from one major prey to another at times during the year than can be predicted; often there is at the same time a change in fishing activities. These seasonal shifts in prey, which are widespread, if not universal, among predatory fishes, are considered particularly important to the Predator-Prey task's goal of integrating information from different coastal communities with the activities of the fishing fleets in order to define broad generalizations in fishing relationships.

The king salmon, Oncorhynchus tshawytscha, provides an example, as demonstrated by the studies of fishery biologists Peter Adams and Connie Ryan. Most years the fishing for king salmon begins inshore in February, when the fish is feeding primarily on anchovies. In mid-April the king salmon shifts its diet to juvenile rockfishes, and at the same time the fishing fleet shifts its activities offshore. The king salmon changes its diet again in mid-July, when it shifts back to anchovies, and again there is a simultaneous shift by the fishing fleet, which returns inshore.

When the king salmon and salmon fishermen change their behavior, other coastal fishes switch their major prey. For example, biological technician Dan Howard's work has shown that when the king salmon shifts to juvenile rockfish from anchovies, the greenling, Hexagrammos decagrammos, a benthic nearshore predatory fish, switches its prey to juvenile rockfishes from crabs. Then, in mid-July, when the king salmon shifts from juvenile rockfishes back to anchovy, the greenling shifts from juvenile rockfishes to benthic amphipods.

Identifying these broad parallels in the activities of predators as different as the pelagic salmon and the benthic greenling provides increased understanding of the major influences on coastal fisheries.

Plans for Groundfish Workshop Completed

Dr. William Lenarz, leader of the Rockfish Analysis Task, reports considerable interest in the Second Western Groundfish Workshop. The workshop will be held at the Asilomar Conference Center, Monterey, California, January 10-12, 1983. Fifty-eight papers covering a wide range of topics will be presented in eight sessions. It appears that between 100 and 150 scientists will attend the meeting.

UNDERUTILIZED FISHERY RESOURCES

Fish Attraction Buoys to be Deployed off Southern California

The use of anchored buoys as "fish-aggregating-devices" (FADs) was pioneered in the U.S. by the Hawaii Laboratory of the Southwest Fisheries Center. After initial success in Hawaiian waters, the use of FADs spread to many of the islands in the Central and South Pacific. Perhaps the most successful employment of FADs is in the tuna purse seine fishery in the Philippines, where for many years "payaos," rafts constructed of bamboo, have been used to aggregate tunas.

Off the coast of California, bluefin tuna show up regularly in summer and fall, and are caught by purse seiners working out of San Pedro and Port Hueneme. Tiburon researchers believe that FADs deployed at strategic areas may attract and hold the fish, providing greater efficiency to the fishery. A cooperative project to install FADs has been initiated by the Fishermen's Cooperative Association of San Pedro, the Southwest Region of NMFS, and the Southwest Fisheries Center's Tiburon Laboratory.

The staff of the Fisheries Development Task at Tiburon is assembling equipment and materials needed to build FADs to be deployed in the vicinity of Tanner Bank or Sixty Mile Bank in late June, 1983.

Much of the equipment needed for constructing the FADs has been donated by the U.S. Coast Guard. Coast Guard personnel as well as personnel of the Hawaii Laboratory have also contributed useful technical advice on how to construct and anchor the FADs.

Ocean Whitefish Shows Promise As a Market Item

Ocean whitefish, Caulolatilus princeps, is the only member of the family Malacanthidae (or Branchiostegidae) on the West Coast; six species occur in the western Atlantic. More importantly, three species are found in Japan, and these fishes are among the highest priced fish in central Japan. Although these species differ greatly in color from the ocean whitefish, there is enough similarity in body shape and flesh characteristics to warrant market trials according to fishery biologist Sus Kato, task leader.

A sample of ocean whitefish, provided by Joe Farrell of the Southwest Region, was recently given to a San Francisco, California, fish broker. The fish was treated in several ways (dried, marinated) and hand-carried to Japan for market review. The fresh fish would be served as sashimi, and frozen fish can be used as "kasuzuke" or "misozuke," two forms of marinated fish commonly eaten in Japan; salmon and sablefish are often served this way. Partial drying of smaller individuals is also thought to be a viable product.

Attempts to market ocean whitefish domestically have been hindered by reports that some individuals caught in shallow water have extremely bitter flesh. This needs to be documented, and if true, shallow-water fish should be excluded from the market. The fish appears to be abundant in southern California, but is probably more numerous off Baja California. As fresh sashimi, ocean whitefish is quite good, similar to petrale sole in appearance and taste.

FISHERIES INFORMATION SYSTEMS AND AUTOMATIC DATA PROCESSING

CALFIN Update

The design of the CALFIN "credit card" system was completed in December. The "credit card" system would issue each fisherman a card with the appropriate name and number embossed, and each dealer an imprinter to print this information, as well as dealer information and a boat number, on the receipt. This will reduce fish receipt error by 40%.

The 1980 Fish Landing data was 31% complete in December; the data have been entered and verified. DEC microcomputers with Okidata printers were ordered for the California Department of Fish and Game (CDF&G) offices in Eureka, Fort Bragg, Menlo Park and Monterey, California.

A CALFIN and ADP planning session was held in Sacramento, California, on December 3 to discuss the planning of the CALFIN, ADP and data collection. Norm Abramson, Tiburon Laboratory, Fred Kellenberger, SWFC HQ, Gary Smith, SWR, Svein Fougner, SWR, Tim Farley, CDF&G, Mel Odemar, (CDF&G), Dick Heimann, (CDF&G) and Eric Knaggs (CDF&G) attended the meeting. Dave Mackett, Planning Officer at the SWFC, was the facilitator. The committee developed 59 major activities during the workshop. Further meetings are planned to discuss and clarify the proposed activities.

WPACFIN Update

Western Pacific Fishery Information Network (WPACFIN) Committees Hold Meetings

David C. Hamm, Computer Systems Analyst, reports that the first meetings of the Technical Subcommittee of the Data Goals Committee, Western Pacific Fishery Information Network (WPACFIN), took place during the week of November 29th at the Honolulu Laboratory. Hamm chaired the meetings which were attended by a total of seven technical representatives from the American Samoa Office of Marine Resources, Guam Division of Aquatic and Wildlife Resources, and the CNMI Division of Fish and Wildlife. A wide variety of technical matters concerning the implementation and operation of WPACFIN in each of the island areas was discussed during the week. Training was also provided on several software packages and workshops were held on data base development, data and file handling, and quality control procedures.

The second meeting of the Western Pacific Data Goals Committee was held at the Makaha Resort on December 7, 1982. Twenty people attended the meeting, including representatives from all participating fisheries offices, as well as guests and visitors. During this meeting, Kitty Simonds, Western Pacific Regional Fishery Management Council (WPRFMC), was elected to chair the Committee for a 1-year term. The document, "Guidelines for the Western Pacific Data Goals Committee," was reviewed, modified, and adopted by the

Committee. Hamm reported on the previous week's technical subcommittee meetings and briefly discussed the current status and future plans of WPACFIN.

Further WPACFIN Activities Reported

David Hamm, Computer Systems Analyst, reported that the survey design projects for Guam and the Northern Mariana Islands are progressing well. The principal investigator and contractor, Ernest Brazier of CIC Research, Inc., attended 2 days of the technical subcommittee meetings held at the Honolulu Laboratory before spending 1 week each on Guam and Saipan studying their specific needs and problems of data collecting and processing. His 2 weeks of on-site investigations were very productive and he plans to develop preliminary draft reports for each area by the end of January.

Also, WPACFIN has now received all of the historical commercial landings data from the Guam Fishermen's Coop covering the period from July 1979 (when the Coop started) through December 1981. Additional data will be added to the files as they become available.

Finally, because the Honolulu Laboratory will no longer have use of the computer facilities at the East-West Center after February 1983, Hamm is making plans to use the supermicrocomputer system that is being considered by the Laboratory.

ADP Activities

Dorothy Roll, Computer Systems Analyst, reports that procurement requests for the two La Jolla Standard Microsystems and peripherals for the Oceanic Fisheries Resources Division, an amendment to increase by \$30,000 the Honolulu Laboratory's computer services contract with the University of Hawaii, and the microcomputer system for the Southwest Region's Western Pacific Program Office (WPPPO) in Honolulu sent to Washington, D.C., in November 1982 have been approved.

The approval for the second phase procurement (upgrade) for the Tiburon Laboratory's remote job entry system has been delayed until the new NOAA ADP Procurement Checklist has been completed and returned to the approval review board in Washington, D.C. The new checklist has been implemented through the Department of Commerce in order to capture additional information required by the General Services Administration (GSA) Temporary Regulation 64.

During December two procurement packages were sent to Washington, D.C., for approval actions. The packages contained the procurement request for a multiuser upgrade and software for the Honolulu Laboratory's Compu Pro Cp/M based microcomputer system and the procurement request for four printers for the four La Jolla Standard Microsystems in the Coastal Fisheries Resources Division.

ORION System Assessed

Susan Iacometti, Computer Systems Analyst, participated in the egg survey and the mini-CalCOFI cruise aboard the David Starr Jordan from November 29 through December 17. She and Rich Charter, CalCOFI Data Manager, utilized and assessed the Oceanographic Research Interactive Onboard Network (ORION) System in the collection of environmental data during the cruise. The ORION is implemented on the Hewlett Packard 9845 microcomputer which is a single tasking-single user machine. With increasing demands for shipboard data management functions, the new requirements indicate the need for hardware update to a computer system capable of handling multi-users and multi-tasks. During the cruise, Ms. Iacometti interviewed the ship's master and chief steward on their request for designing and implementing a food inventory system.

FRS Work Continues

Robert Nydam, Computer Programmer Analyst, is modifying the report programs for the Financial Reporting System (FRS) to satisfy the new output format requirements. Labor and commitment data for the first 3 months of Fiscal Year 1983 have been entered into the system. The full series of reports for a specific TDP will be generated in early January as a test run. After thorough verification of the test output, a full report for the Center will be produced.

Microcomputer Users Meet

On December 14 ADP Operations held a microcomputer users session with key users from the Center's two divisions. The agenda items were the status of the systems on and off site, installation and length of test time, maintenance/repair procedures, catalogue of users software, and the initiation of a periodic newsletter. Nine La Jolla Standard microsystems are currently in operation. One is located in the Southwest Region Office in Terminal Island, two in the Tiburon Laboratory, and six in the La Jolla Laboratory. Of these six, four are in the Oceanic Fisheries Resources Division (OFRD), one in the Coastal Fisheries Resources Division (CFRD), and one in ADP Operations. Two systems for OFRD have been approved and are on order. Implementation of the existing systems revealed the unreliability of the California Computer Systems (CCS) memory boards, RAM Module #2065. CCS acknowledges this fact and these boards will be updated with the RAM Module #2066.

* * * * *

Dorothy Roll and Robert Nydam attended the Digital Equipment Computer Users Society (DECUS) symposium on December 5. This special interest group meeting was held in Anaheim, California. Speakers were users from government and private sectors; the sessions were monitored by DEC specialists who answered technical questions.

* * * * *

Rita Ford, key operator through the UCSD's computer center, entered on duty December 1. She replaces Ruth Toles, who was terminated owing to personnel cutbacks at UCSD.

MISCELLANEOUS

HONORS AND AWARDS

La Jolla Laboratory

Dr. Doug DeMaster, Leader of the Coastal Marine Mammal Project, was appointed to the U.S. Marine Mammal Commission's Committee of Scientific Advisors on Marine Mammals.

PUBLIC AFFAIRS

La Jolla Laboratory

- December 2 - Jim Squire, Fishery Biologist, delivered a talk on "Management of Billfish Resources in the Eastern Pacific" to the San Diego Rod and Reel Club in San Diego, CA.
- 12 - The Southwest Fisheries Center participated in the 3rd annual "Day at the Docks" waterfront festival, sponsored by the San Diego Sportfishing Council and the Port of San Diego.



Ken Raymond explains the work of the Southwest Fisheries Center to visitors at the "Day at the Docks" waterfront festival.

PRESS RELEASE

Honolulu Laboratory

December 9 - "Honolulu-Based Research Vessel Investigates Seamount Fishery Resources."

SEMINARS

La Jolla Laboratory

- December 1 - Sandra Thomas, Attorney at Law, presented a seminar entitled "Let's Discuss Goals and Directions," as part of the Federal Women's Program.
- 2 - Dr. K. Radway Allen, Post-Doctoral Research Associate, gave a lecture on "Whales - Science and Politics."
- 13 - Dr. Robert L. Edwards, Special Assistant to the Assistant Administrator for Fisheries, presented a seminar entitled "Update on the U.S. - Canada Boundary Dispute."
- Ms. Helen Mustafa, Remote Sensing Coordinator of the NMFS Laboratory in Woods Hole, Massachusetts, talked on "Status of Northeast Area Remote Sensing System (NEARSS) and Remote Sensing Activities at the Northeast Fisheries Center."
- 14 - Dr. Gary Myers, Scripps Institution of Oceanography, presented a seminar on "Recent Observations of Large Scale Variability in Surface and Subsurface Temperature of the Tropical Pacific."

Tiburon Laboratory

December 3 - Karen Taberski, San Francisco State University, "Histological Effects of Benzene on Juvenile Striped Bass," Masters Thesis Seminar.

TRAINING

Tiburon Laboratory

- September 2 - Maxwell Eldridge, Fishery Biologist, Population
December 17 Biology. San Francisco State University.
- December 29-30 - Sennen Salapare, Fishery Biologist, "How to write
clear reports." Brogan Clear-writing Seminars.

MEETINGS AND TRAVEL

Honolulu Laboratory

- December 6-7 - Dr. Izadore Barrett, Richard S. Shomura, and
Dr. Robert A. Skillman attended the WPRFMC meeting
at Makaha, Oahu.
- 8 - Dr. Barrett, Richard Shomura, Dr. Skillman, Kitty
Simonds of the WPRFMC, and Dr. Paul Callaghan,
University of Guam, met to discuss MPRFMC matters.
- 9 - Richard Shomura, Richard Uchida, and Dr. Polovina
attended a meeting of the Coordinating Council on
Research--Northwestern Hawaiian Islands.
- 10 - Richard Shomura participated in the NWHI fisheries
decision-making group meeting sponsored by the
University of Hawaii Sea Grant Program at the Marine
Science Building, University of Hawaii.
- Samuel Pooley chaired the 3rd meeting of local
fishery economists in the Honolulu Laboratory
conference room. The meeting included a special
session on recreational valuation analysis.
- 13 - Richard Shomura presided at the Townsend Cromwell
post-cruise meeting (TC-82-05).
- 14 - Richard Shomura attended the Hawaii Fisheries
Coordinating Council meeting at the Hawaii State
Department of Land and Natural Resources.

La Jolla Laboratory

- December 1-3 - Dave Mackett traveled to Sacramento, California, to attend State-Federal meeting on Coastal Marine Mammal Program and to Terminal Island, California, to facilitate ADP planning meeting.
- 2-12 - Paul Fiedler traveled to Seattle, Washington, to report on satellite fisheries work to NWAFC and to San Francisco, California, to present a paper at the AGU/ASLO Conference.
- 3 - Fred Kellenberger traveled to Sacramento, California, to attend a CALFIN planning meeting.
- 5 - Dorothy Roll and Bob Nydam traveled to Anaheim, California, to attend a DATATRIEVE workshop.
- 5-8 - Izadore Barrett traveled to Makaha (Oahu), Hawaii, to attend the Western Pacific Council meeting.
- 5-10 - Dave Mackett traveled to Charlottesville, Virginia, to attend a training course on Interactive Planning.
- 5-11 - Robert Owen traveled to San Francisco, California, to attend the AGU-ASLO meeting.
- 7-9 - A Pre-retirement Counseling Workshop was held in the auditorium. Approximately 22 participants attended the workshop, including personnel from the National Weather Service, Southwest Regional Office, Veterans Administration Hospital and the Southwest Fisheries Center.
- 8-18 - Mike Laurs traveled to Acquafredda di Maratea, Italy, to participate as invitee to North Atlantic Treaty Organization (NATO) Advanced Research Institute on "Mechanisms of Migration in Fishes," and consult with fishery scientists at FAO in Rome.
- Ron Lynn traveled to Acquafredda di Maratea, Italy, to make a presentation of Physical Oceanographic Approach to Study of Fish Migration at NATO-sponsored Advance Research Institute.
- 9-10 - Doug DeMaster traveled to Monterey, California, to meet with new research group of California Department of Fish and Game working on gill nets in California.
- 20-23 - Chuck Oliver traveled to San Clemente Island to continue studies on pinnipeds.

- 21 - A meeting of the anchovy sub-committee of the Pacific Council's SSC was held in the auditorium.

Tiburon Laboratory

- December 2-3 - Norman J. Abramson traveled to La Jolla, California.
- 12-13 - Sus Kato traveled to Los Angeles and San Pedro, California, to discuss joint research projects with industry personnel. He also met with the General Manager of the San Pedro Fishermen's Cooperative Association to discuss the mackerel project as well as the installation of a fish aggregating buoy.
- 15 - Peter Adams, James Chess, Edmund Hobson and William Lenarz traveled to La Jolla, California, to attend the juvenile fish gear workshop.
- 20-22 - Ed Ueber traveled to Ft. Bragg and Eureka, California, to attend a meeting of industry and Oregon State University researchers.

Pacific Environmental Group

- December 6-10 - Several of the PEG staff attended the Fall Annual AGU Meeting in San Francisco, California. Gunter Seckel, Paul Sund, Doug McLain, Richard Parrish and Craig Nelson all gave papers at the meeting.
- 14-15 - Dr. Richard Parrish was in La Jolla, California, to attend a workshop on sampling gear for juvenile fishes.
- 16 - Gunter R. Seckel gave a briefing on PEG activities to Capt. H. Nicholson the new commanding officer of FNOC.

VISITORS

Honolulu Laboratory

- December 9 - Mike McCoy of the Micronesian Maritime Authority visited Richard Shomura.
- Dr. Paul Scheuer of the University of Hawaii discussed ciguatera research with Richard Shomura.

- 22 - Carroll McCutcheon, Chief, Personnel Division, and Candace Turner, Area Personnel Officer, Western Administrative Support Center, Seattle, Washington, visited the Laboratory.

La Jolla Laboratory

- December 3 - Kevin Carlson, University of California, San Diego.
7 - Michael C. White of the Truk Government met with Norm Bartoo to discuss data needs.
- 7-10 - Margaret Payne (Attorney), Ronald Gable (Financial Planner), Kathrina Killian (Field Representative Social Security), Mary Kovac (Consultant, Civil Service Retirement), and Mr. Dale Mayswinkle (Director, OPM Los Angeles Training Center), visited the Laboratory to present a Pre-retirement Counseling session.
- 14 - David E.T. LeRoux, National Party Member of the South African Parliament, met with Izadore Barrett, John Carr, and Reuben Lasker.
- 15 - Mitchell Roffer, University of Miami, Miami, Florida.
- 16 - Sheridan Stone, Wildlife Biologist, SWFC Honolulu Laboratory.
- 20 - Douglas Moffet, University of Connecticut.
- 22 - Dennis Hedgecock, University of California, Davis.
- 28 - W.J. Berg, University of California, Davis.

Tiburon Laboratory

- December 1 - Hannah Bernard, San Francisco, California.
- 5 - Bruce Wyatt, U.C. Davis Sea Grant, Davis, California.
- 14 - Kate Monahan, Providence Fish Co., Seattle, Washington.

Pacific Environmental Group

- December 13 - Ron Schlitz from the Northeast Fisheries Center in Woods Hole, Massachusetts.

13-14 - M.A. Roffer from the Rosenstiel School of Marine and Atmospheric Sciences in Miami, Florida.

16-17 - William Sprigg from the National Climate Program Office in Rockville, Maryland.

PERSONNEL ACTIONS

Honolulu Laboratory

December 17 - Doris J. Alcorn, Wildlife Biologist - Termination.
20 - Miriam B. Pillos, NOAA Jr. Fellow - Return to Duty.
31 - Frederick V. Schlexer, Wildlife Biologist - Termination.
- Randy F. Stark, Computer Programmer - Resignation.

La Jolla Laboratory

December 8 - Barry Finzel, Computer Assistant - Temporary Appointment.
10 - William C. Davis, Computer Aid - Resignation.
Randall Smith, Biological Technician - Transfer/Separation.
11 - William Brinkerhoff, Biological Technician - Transfer/Separation.
13 - Amy Kimball, NOAA Jr. Fellow - Return to Duty.
- Lisa Lau, NOAA Jr. Fellow - Return to Duty.
15 - Victorio Gorospe, Biological Technician - Extension of Temporary Appointment.
20 - Roberta Folk, NOAA Jr. Fellow - Return to Duty.
- Richard Kiy, NOAA Jr. Fellow - Return to Duty.
27 - Sandra Paez, NOAA Jr. Fellow - Return to Duty.

UNITED STATES
DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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