

REPORT FOR THE MONTH OF OCTOBER 1965

A razor back scabbard fish, *Assurger anzac*, was examined. This recovery represented the third known *Assurger* from California and the fifth recorded from the world's oceans.

According to the pre-season crab survey just completed the catch for the 1965-66 season is expected to be 1,100,000 pounds with a range from 800,000 to 1,400,000 pounds.

A new, smaller midwater trawl was developed by the Pelagic Fish staff for use on survey cruises. The new net was successful in capturing all project species while being easier, faster, and safer to use.

This month eleven tagged sand bass were recovered following liberty periods of 113 to 298 days.

A new species of mantis shrimp of the genus *Nannosquilla* was collected off San Clemente Island.

Roedel and Messersmith were asked, by NBC News, to comment on the anchovy situation. Comments were made on the status of Fish and Game Commission action, the fishery, size of the anchovy population and its potential value as part of the October 22, 6:30 PM news cast IN LIVING COLOR.

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PACIFIC HAKE WORKSHOP MEETING

Seattle, Washington
October 12-13, 1965

This meeting, sponsored by the U.S. Bureau of Commercial Fisheries, and chaired by John Glude, Assistant Director for the Pacific Northwest Region, proved to be one of the most profitable that MRO people had participated in for some time.

Total registration was about 30, with about 25 attending each of the sessions. Organizations represented included:

BCF, Biological Laboratory, Seattle
" Technological Laboratories, Seattle and Terminal Island
" Exploratory Fishing and Gear Research Base, Seattle
" Calif. Current Resources Laboratory, La Jolla
Washington State Department of Fisheries
University of Washington
Oregon Fish Commission
Oregon State University
International Pacific Halibut Commission, Seattle
California Department of Fish and Game

The Agenda covered:

Resource Assessment
Harvesting Methods
Technology
Biology
Standardization of Techniques
Marketing and Economics
International Use of Resource
Management Functions
Future Plans and Recommendations

A background document, prepared by J.L. Baxter and A.T. Pruter, formed the foundation for the discussions. Complete minutes will be forthcoming in the near future, so these remarks will touch on highlights only.

An indication of the importance which the BCF attaches to the potential of a hake industry is this: in the Pacific Northwest, they have dropped most of their freshwater research on salmon and are spending the money, about \$150,000 a year, on hake research.

Everyone agreed that a hake fishery was certain to start along the Pacific coast in the fairly near future. It appears to be most imminent in Washington. The group felt strongly that a standardization of techniques among the several agencies concerned and increased research effort were essential so that scientists would be able to take full advantage of this situation wherein they could study a population before it was fished and had coordinated plans ready for studies of the fishery when it started.

Various individuals and organizations were given responsibility for designing forms, conducting tagging experiments to determine the most suitable type of

tag, identifying and studying further a myxosporidian parasite present in a large proportion of Pacific Northwest samples, and determining racial composition of the stock.

One major biological problem at present is to determine whether the Pacific Northwest population moves off southern California to spawn or whether it simply moves offshore during its period of unavailability in the Northwest.

As part of our expanded pelagic fish survey, we will work with two BCF vessels in the late winter and early spring of 1966 off the southern Calif. coast to gather information on spawning concentrations, on natural mortality rates, and other biological information.

A good deal of attention was devoted to the problems of technology, marketing and economics, with the feeling expressed by the technological people that fish meal might be pricing itself out of the world market as a food supplement, that a hake fishery might not be economic at a much lower price level for fish meal and, therefore, the future was not entirely rosy. The concensus was that fishermen could probably make do if fish meal prices did not drop too severely, particularly if the hake fishery were prosecuted on more or less of an incidental basis.

The regulatory powers of the three states were discussed at some length, in an effort to explore institutional restrictions, which might hamper the development of a fishery. In California, a successful hake fishery would depend upon the Fish and Game Commission issuing reduction permits and upon its permitting the use of a mid-water trawl under the provisions of Code Section 8606.

The group agreed that hake be discussed at least informally at the forthcoming PMFC meeting, and that it might be desirable to have a short formal presentation. Jack VanHyning of the Oregon Fish Commission agreed to take this matter up with Leon Verhoeven, Executive Director of PMFC. (This plan was confirmed subsequently)

Another meeting of essentially this group, with representatives of industry, is a possibility for early 1966.

The meeting was adjourned about 2:PM on Oct. 13. John Glude who was an excellent host throughout the meeting, took us on a tour of the new two million dollar BCF laboratory and through the University of Washington's College of Fisheries, where we had very informative discussions with Dr. Richard VanCleve, Dr. Lauren Donaldson, who showed us with pride his 15-pound, 2-1/2 year old rainbow trout and his self-developed run of king salmon which were just beginning to return to the pond at the college. Dr. Alexander Dollar showed us throughout his new technological laboratories at the College.

To repeat, we regard this as one of the most profitable meetings that either of us have attended in a long time.

Phil M. Roedel
Manager

John L. Baxter
Marine Biologist

Third Annual Meeting California-Nevada Chapter of the
American Fisheries Society

California Academy of Science, San Francisco, California
October 1-2, 1965

Over 110 members and guests participated in the Third Annual Meeting of the California-Nevada Chapter of the American Fisheries Society.

The stimulating and informative talks included a wide range of subject matter. Spanning the broad spectrum of fisheries biology (marine and fresh water) the 18 speakers spoke on some of the current problems in taxonomy, the status of various biological studies, manipulation of the environment, fish farming, statistical methodology, and fish disease. One report concerned a grandiose study being conducted to find the optimum in utilization of solar energy in the aquatic environment.

The paper by Dr. Kenneth Watt, Experimental Studies on Predators by Largemouth Bass and Bluegill, was for me, the most exciting and stimulating work presented. Not only were the mechanics of predators being elucidated but the objective of the entire program is to discover, if possible, broad underlying biological principles or laws similar to those in the physical or chemical sciences.

Other highlights from the reported work included manipulation of the environment in reservoirs; marine fish forming potentials; and the simultaneous occurrence of warm water at Bonneville Dam and in the eastern Pacific Ocean during 1957-60. Associated with the increased temperature at the dam was a marked upswing in the shad population in the Columbia River.

Officers elected for the forthcoming year were President George McCammon, California Fish and Game; Vice-President Izadore Barrett, Int. Am. Tropical Tuna Comm.; Secretary-Treasurer Leo Pinkas, California Fish and Game. ---
Leo Pinkas

California Seafood Institute Meeting

Newport Beach, California
October 22-23, 1965

The California Seafood Institute is an organization for wholesale fish dealers and fish brokers. John Gilchrist, their legislative representative, assists the President, Mike Turnacliffe of Meredith Fisheries, in conducting and programming meetings. At their dinner meeting on October 22, I gave a talk on the Department's Planning with emphasis on the marine sector. They were particularly interested in my comments on the necessity for creating a demand for California fish products. The relationship between commercial and sport fishing also aroused their interest.

This group is in a growing process and they take action helpful to their industry. They are concerned with any legislative proposals affecting their industry. At this meeting, they were trying to become a more cohesive force and to improve their stature as a fisheries marketing group.

Their business meeting on the 23rd was followed by a presentation by Dr. Wheeler North on the kelp industry.

The meetings were interesting and it is desirable if a Department representative could attend their meetings when possible. --- E. C. Greenhood

1. BOTTOMFISH

A. Fishery

Flatfish: Landings for the month were high and nearly comparable with those of previous months. Sole concentrations were scattered and increased effort was necessary to maintain the catch. The trawl fleet fished between southern Oregon and the Santa Barbara channel. Dover sole, caught from deep water, dominated Eureka and Fort Bragg landings. English sole was the leading species at other ports. Santa Barbara fishermen had improved English sole fishing in depths of over 100 fathoms in the channel. The central California catch of English sole came from moderate depths between 20 and 70 fathoms.

Petrale landings were uniformly low along the coast.

Rockfish: Rockfish were secondary to sole in October trawl landings. Rockfish were virtually absent from landings at Santa Barbara, Avila, and Morro Bay, while moderate catches were landed at other parts.

B. Research

Flatfish: The routine tasks of catch sampling and fishing log and landing ticket editing procedures were accomplished.

Data analyses were continued on several sets of data. Analysis of sample box data, collected in the 1950's, was begun. Tables were composed and draft revisions were made in manuscripts of English sole age and tagging studies.

A survey of dealers at all trawl ports was conducted by Mackett and Aasen of Biostatistics and Smith, Nitsos, and Jow during the week of October 4-8. The objective of the survey was to determine the accuracy of trawl landing data furnished by dealers. The quality of data appears to be high.

Project is on schedule.

Rockfish: Taxonomic studies were continued. Available material was increased with the addition of specimens collected from southern California waters during the recent cruise of the N. B. SCOFIELD. The examination of fresh specimens has provided evidence for giving Sebastes rufus species rank separate from its previous synonym, S. ovalis.

The project is on schedule.

2. SHELLFISH

A. Fishery

Crab: Season closed. Season opens November 9 in the central California area.

Oysters: Two truckloads, totaling 1017 bushels of Eastern oysters were planted in Tomales Bay during the latter part of the month. These oysters came from the vicinity of New Haven, Connecticut and were

inspected for pests at place of origin by W. A. Dahlstrom.

Seed buyers from Coast Oyster Company and Johnson Oyster Company have been in Japan negotiating for seed next year. There is a rumored seed shortage.

Shrimp: Season closed October 31st. No landings were reported during the month. Three vessels have been fishing shrimp out of Brookings, Oregon, but it is not known if they have been fishing shrimp from California's Area A bed.

B. Research

Abalone: Abalone project is behind schedule because project leader is on vacation and shortly will be on a two year's leave of absence. The position cannot be filled for about two months because of accumulated C.T.O. and vacation time.

Crab: The pre-season survey was completed October 27 by the NAUTILUS. A total of 6,193 crabs were taken at 70 stations by 697 traps. The catch consisted of 2,521 legal males, 3,443 sub-legal males, and 229 females. The average legal catch per trap of 3.6 is higher than the 1964 catch of 2.8 but lower than the 1963 catch of 4.3. According to the survey, we believe the catch for the 1965-66 season will be 1,100,000 pounds with a range from 800,000 to 1,400,000 pounds.

The best catches were made from Bodega Bay to the Russian River in 10-22 fathoms of water. Good catches were also made south of the San Francisco lightship in 15-25 fathoms.

The sub-legal catch of 4.9 is the highest since 1961 but still does not indicate a healthy population according to past surveys.

Condition of the crabs was good with only 5 percent of the crabs being soft. Fifteen females were collected with eggs for egg counts and fertility studies.

Preparations are underway for the pre-season crab cruise at Eureka which will get underway November 3. Commercial trawlers have reported catches of 1000-1200 pounds of large males north-west of Eureka in depths of 24-28 fathoms. Crabs are reported in good condition.

Oysters and Clams: A shipment of 2100 European Flat oyster seed and 300 Eastern seed was received by air freight from the Fish and Wildlife laboratory at Milford, Connecticut. The seed was placed in trays at Tomales Bay and some will be transferred to Drakes Bay and Morro Bay. Observations will be made of growth and survival. It is hoped that the spawning stock of European oysters can be built up so that a natural set of seed may be obtained if conditions are favorable.

Observations and measurements were made on European seed from W. Budge's hatchery at Pigeon Point. Two tiles containing 185 spat were placed in the waters of Tomales Bay on September 15, 1965. At that time, the seed averaged 5 mm. in length. On October 18, 1965, approximately 33 days later, the seed averaged 15 mm. in length and 150 were still living (84 percent survival).

Shrimp: The manuscript on The Larval Development of Laboratory-Reared Ocean Shrimp is in the final stages. The drawings have been completed.

Biologists aboard the N. B. SCOFIELD completed a survey of the Area A (Crescent City - Eureka) shrimp bed. A total of 117 tows were made and catch rates ranged up to 2500 pounds per hour. The best concentrations were located between the Klamath River and Crescent City in 70-80 fathoms. Counts per pound (excluding zeros) ranged from 87 - 188. The year class composition was 21.7 percent 1965, 68.3 percent 1964, 9.1 percent 1963, and .9 percent 1962. Last year the incoming year class made up approximately 88 percent of the population.

Except for the Abalone Project, the Shellfish Program is on schedule.

3. PELAGIC FISH

A. Fishery

Landings in tons <u>Species</u>	<u>October 1-31</u>		<u>January 1 - October 31</u>		
	<u>1965*</u>	<u>1964</u>	<u>1965*</u>	<u>1964</u>	<u>10 yr. mean 1954-1963</u>
Anchovy	555	443	2,000	2,160	9,978
Mackerel, jack	3,825	7,308	24,475	36,310	23,611
Mackerel, Pacific	458	2,282	2,000	12,008	14,795
Sardines	59	750	800	5,952	23,773
Squid	66	22	6,515	6,084	5,032
	4,963	10,805	35,790	62,514	77,189

* Estimated. Accumulated landings are revised monthly.

Annual landings to date remain considerably below that of 1964 and the 10 year mean. The decline in Pacific mackerel is caused by a succession of poor year-classes. Anchovy landings are down due to decreased demand. Sardines cannot be found. We cannot speculate as to the reason for reduced jack mackerel landings.

Most catches of jack and Pacific mackerel and sardines were made at Cortes Bank. Offshore catches of jack mackerel were predominately small fish as compared to larger fish caught along the coast. Pacific mackerel landings consisted of older fish except for a few young-of-the-year caught at Cortes Bank.

October cannery receipts at the two active plants on Monterey Bay consisted of: 530 tons of locally-caught anchovy; 360 tons of jack mackerel, 80% of which was locally caught, the balance trucked from Morro Bay; and 15 tons of locally-caught squid. Sardine landings were nil. Squid landings were low because of unavailability of the usual fishing grounds.

B. Research

Routine sampling and age reading continued at a considerably reduced level. Two of four samplers were at sea and a third was promoted and transferred.

Sardine length frequency data were compiled for an age-composition manuscript.

Considerable effort was devoted to preparing for a proposed anchovy fishery.

C. Aerial Surveys

The data obtained from past aerial surveys were reviewed. It was concluded that under present conditions the effort directed to these surveys could not meet the objective of determining relative abundance and hence were no longer justified. These flights were subsequently terminated.

D. Live Bait

Albacore created a demand for live bait that exceeded the supply at Morro Bay and Avila.

During September, bait boats reported selling 70,866 scoops (425 tons) of bait.

E. Sea Survey

The ALASKA returned from the third of five fall survey cruises on October 4, and departed for the fourth on October 14.

The third cruise covered northern Baja California. Sardines were scarce throughout the area, with only a few small catches recorded. Anchovies were quite abundant, although fathometer traces were less dense than last year. A lack of sardines and an abundance of anchovies, has been the pattern in this area during recent years. The fourth cruise will cover southern California.

A new, smaller midwater trawl was tested on the last cruise, and was found to be quite successful. The new trawl has a 30 foot square mouth compared to the 50 foot mouth on the regular net. The smaller net opened to 25-27 feet, and was successful in capturing all the program species. The main advantages of the new net are the ease, speed, and safety with which it can be handled. From all indications it will make an excellent sampling tool.

On schedule except for the age composition analysis of sardines and Pacific mackerel data.

4. TUNA

A. Albacore Fishery

The commercial fishery persisted off central and northern California despite frequent periods of severe weather. The most productive areas were off Morro Bay, Monterey, San Francisco, and Cape Mendocino.

Although the substantial albacore landings this month will bring the season's total production closer to our estimated 21 million pounds, only a spectacular climax will save the 1965 season from being the worst since 1947, when only 13 million pounds were landed. One bright note, however, was injected at month's end by a catch of 60 large fish about 40 miles southwest of Ensenada, Baja California.

Sportfishing centered off Morro Bay where catches ranged from 1 to 5 fish per angler. Smaller numbers were taken near Monterey and San Francisco when the weather permitted.

B. Albacore Research

Sampling of the albacore fleet activities continued at major California ports; and progress was made in editing fishermen's logbooks and in reading the backlog of albacore scales. We now are evaluating our methods of determining the age composition of the commercial catch to see if it can be improved.

Our contract with the Mission Bay Research Foundation terminated with the release of 288 tagged albacore and 1 bluefin tuna. We planned to tag bluefin exclusively this season but we were unable to do so because of the very poor fishing and the erratic behavior of the fish schools.

Two tagged albacore were recaptured this month. One was marked and released during last year's pre-season survey aboard the N. B. SCOFIELD and the other only two months ago by the Mission Bay Research Foundation vessel SEASCO.

A report, "Status of the 1965 Pacific Coast Albacore Fishery," was written and forwarded to Pacific Marine Fisheries Commission headquarters in Portland, Oregon. It was supposed to have been prepared by Idaho biologists, but the task was delegated to California. The PMFC meeting will convene November 16-20, at Boise, Idaho.

Another paper, "Ocean Temperature and Albacore Behavior," was prepared for the Japan Tuna Fishery Research Conference to be held at Kochi, Japan, November 16-18, 1965.

C. Bluefin Tuna Fishery

In early October, some fishermen trolling for albacore caught a few, small bluefin tuna (<20 pounds) off Monterey; and a "50-ton" school of 200-pound bluefin was observed chasing sauries near San Miguel Island. For all practical purposes, however, the season had ended in September; then a brief flurry of activity near Cedros Island, Baja California breathed new life into the fishery. During a four-day period in October, seven seiners netted between 700 and 800 tons of bluefin, bringing the season's catch to nearly 6.5 thousand tons -- still considerably less than the 10-15 thousand tons landed during the last four years.

D. Bluefin Tuna Research

Tags from 15 bluefin were recovered this month; 13 had been at liberty for about a year while the others were out only a short time. Growth of tagged bluefin, at liberty for a year or more, corresponds well with growth rates obtained from interpreting the annuli on scales.

When tagged bluefin are reported by fishermen we generally obtain the required historical data. By contrast, cannery workers rip the tags from the fish, to insure receiving the one-dollar reward, and necessary information is seldom obtained--we need to cover the waterfront continually

to improve this situation, but lack of personnel precludes adequate coverage.

Collecting and processing age, length, and catch-effort data continued routinely; and we also are testing and improving the efficiency of scale-sampling.

After considerable investigation, we concluded that electrophoresis of the eye lens proteins was a practicable method for elucidating the population structure of bluefin tuna. This technique now has been applied, and preliminary results indicate that bluefin off southern Baja California and those off California are homologous. However, southern Australia bluefin appear to be genetically distinct. Details of this analysis have been summarized and submitted to the University of California at Irvine as a doctoral dissertation. The dissertation is entitled "Electrophoretic Studies of Marine Fish Eye Lens Protein and Its Relationship to Evolution at the Molecular Level."

E. Miscellaneous

1. Max Franklin, a graduate student in biology at Long Beach State, was appointed Seasonal Aid in October.
2. Bob Koski spent four days attending a SCUBA diving, refresher seminar and one day receiving defensive driver training.

F. Schedule

The Tuna Program is well behind schedule as a result of accumulated loss of time caused by:

1. Staff vacancies.
2. Special planning assignments.
3. SCUBA diving seminar.
4. Assignment of a third man to preseason albacore cruises.
5. Salary Committee assignments.
6. Assignment of time to the library.
7. Driver education training.
8. Extra PMFC report.
9. Jury duty assignments.

5. SPORTFISH

A. Partyboat

Research

Eleven tagged sand bass were recovered in October, following liberty periods of 113 to 298 days. Some fish moved as much as 12 miles, and the most any bass grew was 2½ inches.

From a lot of 85 sand bass tagged March 28, 1965, 15 (approx. 18%) have been recovered in a 7-month period. Work was continued on an age-length analysis of California halibut. Portions of a catch bulletin were re-written.

Fishery

The catch of key marine species, accumulated through September, compares with 1964 as follows: (rounded to nearest 500).

<u>Through September</u>	<u>1965</u>	<u>1964</u>
Kelp and sand bass	1,095,000	990,000
Rockfish	1,064,500	734,000
Bonito	666,000	1,093,500
Barracuda	406,000	279,500
Calif. halibut	88,500	110,500
Salmon	49,500	82,500
Yellowtail	10,000	36,000
Striped bass	7,500	20,500

B. Environmental and Behavioral Studies of Coastal Sportfishes (DJ F22R)

A report of the results of our Point Loma study was completed and is being retyped before submission to the editor. The Orange County out-fall study received final typing and was re-submitted to the editor for publication in the Quarterly.

Spiny lobsters were again sampled at San Clemente Island, primarily for length-weight data. Observations were also made on their distribution and condition. The adult lobster population has virtually completed its seasonal moulting and many shed shells were seen on the bottom.

The recording thermograph was replaced at San Clemente Island, at an 80-foot depth, to note temperature fluctuations. These temperature records may corellate with lobster behavior.

Project personnel spent one week at Monterey attending and participating in the Department's annual SCUBA diving seminar.

The acquisition of Ron Strachan from the Pelagic Fish program brought the project back to fall strength. With Ron's help, we should be able to get the project back on schedule in the not-to-distant future.

Turner (Department Diving Safety Officer) with assistance from Safety Board members, Wardens Thomas and McGuire, conducted the Department's annual SCUBA seminar-refresher course at Monterey, October 19, 20 and 21, 1965. Lecture sessions covered: (i) The Department Operations Manual - SCUBA section, and how these rules apply to Department divers; (ii) new diving methods and techniques; (iii) deep diving problems; and (iv) surf entry and associated diving problems. Field sessions dealt with the techniques of: (i) Ditch and recovery of equipment; (ii) free ascent from 80-foot depths; (iii) surf entry; and (iv) general safe diving practices.

Twenty Department divers were present during one or more days of the session.

C. Blue Rockfish Management Study (DJF12R3)

Analysis of F19R data continued and is on schedule.

Miller spent two days in Terminal Island going over future programming of F12R data collection with Leo Pinkas and Norm Abramson.

Odemar attended a department skindiving conference at Monterey on October 20 and 21.

Miller presented a talk on sport fisheries to 80 members and friends of the San Jose Skindivers Club on October 20th.

Project is on schedule.

D. Southern California Marine Sport Fish Survey (DJ F20R)

Routine sampling of shoreline sportfishing activity continued throughout the month. Data reports and general comments from the census clerks indicate that fishing activity has stabilized at a level considerably lower than the summertime plateau. Fishing success picked up markedly during October. Excellent catches (4 fish per man hour) of opaleye and halfmoon were made in the rocky areas of Palos Verdes Peninsula while the sandy beaches yielded good catches of barred surfperch. The 'hot spots' or warm-water areas associated with steam-generating plants continued to provide a variety of species for the angler (spotfin croaker, yellowfin croaker, bonito, white croaker, etc.), and thus were the most popular fishing areas.

Two aerial surveys to assess shoreline sportfishing activity were hampered by fog, so the resulting observations encompassed only a portion of the coastline which normally ranges from the United States - Mexican boundary to Jalama Beach State Park. The observed fishing effort, however, was distributed in approximately the same manner as during previous aerial surveys. About 10 percent of the fishermen were in areas not being sampled by our ground survey crews.

A FORTRAN program to process our current shoreline fishing survey data has been expanded to include all the desired parameters: i.e. total effort, total catch, catch-per-unit-of-effort, species composition, and vital statistics of our sampling effort. At month's end the full program was in the debugging stage.

Two days were spent with Dan Miller reviewing project objectives, sampling procedures, and initial results; all preparatory to his forthcoming survey.

The recommended corrections in the barracuda manuscript were completed and the opus was resubmitted to the Marine Resources editor.

Project is on schedule.

6. SPECIAL PROJECTS

A. Southern California:

A new Special Projects assignment, the grunion schedule, was completed for 1966 and distributed.

Preparation for the red tide research project continued and a skiff to be used in sampling was transported from Morro Bay.

There was some renewed activity with seismic permits.

Progress was made on the Santa Monica Bay Trawl Study manuscript and drawings.

A booklet on red tide is in preparation.

Project is on schedule.

B. Northern California:

October 11, an inspection was made of a bay water impoundment at Sierra Point just east of Brisbane. As the water from this 100 acre diked area is removed, a seining operation is being carried on by the developer to return all trapped fish to the bay. Pumping operations are proceeding slowly to allow time for the dike to stabilize.

The first draft of a report of the San Francisco Bay Study 1963-1964 was prepared for editing.

The project is on schedule.

7. BIOSTATISTICS

A. Data Processing

Regular Reports:

Statistical reports of July, 1965 landings and shipments were completed.

The increase in work load, brought about by a greater number of fish deliveries during the summer, has added an additional 30 days to our normal 45 day lag of preparing these reports.

The September processors and cannery reports were completed and a letter summarizing the tuna case pack was mailed.

The sardine landings since the beginning of the season have been of so little consequence that we have suspended publishing the sardine case pack figures. Part of the problem stems from the fact that landings of mixed species are reported as the dominant species in the load. Almost all of the sardine canning was made from sardines separated from loads reported as mackerel.

The September marine partyboat catch reports were completed and a letter summarizing the catch was mailed. Starting with the September letter, striped bass will always be reported in the letter even though it does not rank among the top 13 species.

Almost all of the annual statistical reports summarizing the 1964 landings were completed. Only a listing of the data for each boat's record during 1964 remains to be done.

Annual reports for abalone, halibut, white seabass and salmon were completed.

Special Reports:

A summary of the partyboat catch and effort in the San Francisco Bay-Delta area during 1964 was prepared for Fred Myers - Water Projects, San Francisco.

The length-weight regression computer program was used to determine the curves of lobster-tail weight on carapace length. Both raw and cooked weights were used. The work was done for Charles Turner of Environmental and Behavioral Studies of Coastal Sportfish.

A meeting was held with the Training Officer to discuss reporting procedures and data processing of training records.

Work in Progress:

A system for preparing the monthly landings report that the USFWS and DFG publish cooperatively was presented to Computer Sciences Corporation for their estimate of costs involved to program and run the job. Negotiations are still in progress.

Work is continuing on editing the tape containing 1964 albacore log data.

Field:

Fish markets, wholesale fish dealers and processors, and bait dealers from Newport to Morro Bay were visited. Questions pertaining to the editing of fish receipts and processor reports were resolved.

Wholesale fish dealers throughout the State who purchase fish from trawl fishermen were interviewed in an effort to determine the accuracy of our trawl landing statistics.

Three days were spent by the field representative, attending the SCUBA diving refresher seminar at Monterey.

B. Technical Assistance and Biometrical Analysis

Statistical and Mathematical Analysis:

Sampling plans for a future survey of the San Francisco-Monterey coast were discussed with Dan Miller.

Computers:

Estimates of log relative fishing power were obtained for 313 albacore vessels. Variance estimates, needed to compute relative fishing power for these vessels, will be produced on the next computer run.

Yield isopleths were computed for barracuda.

An 1107 deck for the BMD polynomial fitting program was obtained from Computer Sciences.

8. BIOLOGICAL NOTES

During October several unusual fish catches were called to our attention at California State Fisheries Laboratory. On October 4 we were sent two fish: a juvenile black scabbardfish, Lepidopus xantusi, that was caught in a bait net off the Balboa Jetty, and a needlefish, Strongylura exilis, that was caught in the Los Angeles Harbor area. Near the end of the month we received a razorback scabbardfish, Assurger anzac, that had washed ashore at Torrance Beach, Santa Monica Bay. It represented the third known Assurger from California and the fifth recorded from the world's oceans. The two not from California were from Australia and Japan. The only other unusual catch was a wandering shad that was caught nearby during the last week of the month. It had been eating pinhead anchovies and euphausiids.

A 30-inch (fork length) bonito was processed that weighed 10½ pounds and was 6 years old as indicated by its otoliths. The stomach, of an albacore that was caught some 50 miles off Morro Bay, was crammed with pinhead anchovies, but also contained the remains of several larval rockfish and a full grown (3 inch long) lanternfish.

While conducting observations on spiny lobsters at San Clemente Island D.J. F22R project divers collected a new species of mantis shrimp of the genus Nannosquilla. Specimens have been sent to Dr. Ray Manning at the U.S. National Museum who is currently revising eastern Pacific species.

9. VESSELS

ALASKA

Vessel returned from a 3 weeks Pelagic fish study cruise off southern California waters.

N. B. SCOFIELD

The vessel was engaged in a 4 weeks shrimp study off northern California waters.

NAUTILUS

The NAUTILUS was used for 4 weeks crab study off San Francisco and vicinity.

MOLLUSK

This vessel was secured during the month.

10. MISCELLANEOUS

A. Meetings, Talks and Visitors:

October 1 - Roedel, Baxter and Messersmith attended the Fish & Game Commission Meeting in Los Angeles at which time the Commission considered issuing anchovy reduction permits.

The Commission deferred action until the next meeting.

- October 1-2 - Fitch, Aplin, Gotshall, Smith, and Pinkas attended the 3rd annual meeting of the California-Nevada chapter of the American Fisheries Society at San Francisco.
- October 4 - J. L. Squire, Jr. of the Tiburon Marine Laboratory met with Greenhood, Baxter, Messersmith, Wood, and Bailey to discuss processing aerial spotter logs obtained by the Tiburon Laboratory.
- October 4-5 - H. Orcutt and W. Dahlstrom attended Oyster Mortality conference at Eureka. Representatives from the Pacific coast states and industry were in attendance.
- October 5 - Aplin met in Berkeley with Frank Jones and members of the California Department of Public Health to discuss sampling of shellfish in San Francisco Bay for a contamination study.
- October 6 - Roedel and Don Johnson, Bureau of Commercial Fisheries, conferred with Mr. Shannon and Grader in Sacramento.
- October 6 - Radovich, Baxter, Messersmith, Symons, and Wood met for aerial survey discussion.
- October 7 - Baxter and Messersmith conferred with Ahlstrom, Vrooman and Murphy regarding anchovy problems.
- October 7 - H. Orcutt met with R. Elwell to discuss MRO's role in the San Francisco Bay Water Quality Study.
- October 8 - Turner met with the Cardiff Development Company to discuss their proposed plan for a marina at San Elijo Lagoon; Cardiff and Carlsbad.
- October 12-13- Roedel and Baxter participated in a BCF sponsored meeting on hake. (See report elsewhere.)
- October 15 - Radovich, Gates, Roedel and Baxter discussed anchovy regulations with Fullerton and Kaneen at the Terminal Island Laboratory.
- October 18 - Baxter participated in CalCOFI meeting at La Jolla.
- October 19 - Roedel and Johnson spent the day in La Jolla on Committee of Two business conferring with Drs. Schaeffer, Ahlstrom, and Murphy.
- October 19 - Mr. Forbes of Forbes, Stevenson & Co., Economics Research, visited Biostatistics and the laboratory. He is under contract to present an economic development plan for San Diego Harbor. He spent several days doing library research.

- October 19 - Carlisle discussed Shell Oil Co's. seismic plans with Dick Karsner, Terminal Island.
- October 21 - Baxter attended Regional Manager-Branch Chief Staff meeting at Sacramento.
- October 21-22- Roedel and Messersmith prepared a short audio-visual news item on the anchovy situation. It was presented in living color on NBC.
- October 22 - H. Orcutt met with J. Leslie and A. Albouze in Sacramento to discuss requirements of personnel in the proposed Oyster Disease Study.
- October 22-23- Roedel was an official observer at the Governors Advisory Commission on Ocean Resources.
- October 22-23- Greenhood attended the California Seafood Institute meeting at Newport Beach. On the 22nd, a talk was given by Greenhood on salmon, sole, shrimp, crab and resource planning. On the 23rd, Dr. Wheeler North of Cal Tech discussed kelp growth and kelp predator control.
- October 25 - Roedel attended the open session of the American Fisheries Advisory Committee to the BCF. This meeting was held in San Pedro.
- October 25 - Carlisle discussed Signal Oil's seismic plans with Roy Earhart, Terminal Island.
- October 26 - H. Orcutt met with representatives of Fish and Game, Beaches and Parks, Water Quality Control Board, Water Resources, and Humble Oil Co., to discuss the proposed refinery near Moss Landing.
- October 28 - Mr. A. Hortig, representing State Lands, Mr. Gil Thompson, and Aplin met with Mr. Foster and members of his staff to discuss the location of a marina on the shore of Foster City.
- October 28 - Aplin attended a meeting of the Bay Conservation and Development Commission.
- October 29 - Turner attended Channel Island Symposium, Santa Barbara Botanic Garden.
- October 30 - Greenhood and Petrich met with a legislative analyst and a member of the Department of Finance at Eureka to discuss SCOFIELD replacement.

B. Personnel:

- October 11 - Evelyn L. Perrine appointed Intermediate Stenographer, library.

- October 11 - Nancy A. Wright appointed Intermediate Typist,
Biostatistics.
- October 15 - John E. Cosgrove, Motor Vessel Engineman, deceased.
- October 18 - Alec R. Strachan, promoted to Marine Biologist II,
DJ F22R.

A handwritten signature in black ink, appearing to read "Phil M. Roedel". The signature is written in a cursive, flowing style with a large, prominent initial "P".

Phil M. Roedel
Manager

jg/100

The Resources Agency of California
Department of Fish and Game
Marine Resources Operations

SPORTFISH PROGRAM

SOUTHERN CALIFORNIA MARINE SPORT FISH SURVEY, D. J. F 20 R

PERSPECTIVE

In the 10 year period 1950-60, California's population increased by 5.2 million people, with an additional 2.2 million expected by 1963. Concurrently there was phenomenal growth in recreational boating. These factors corroborated numerous field observations indicating a significant but undocumented harvest of fish. Information regarding this harvest is not only vital for resource management but for short and long range community planning involving industrial, residential, and recreational development.

One scientific approach to managing a living marine resource requires detailed knowledge of man's total take. Toward this end the Department of Fish and Game has gathered commercial fishery statistics since 1916 and similar data from the sportfishing party boats since 1936. Sportfishing effort and catch from piers, jetties, private boats, and the shoreline was not measured until the late 1950's. This was a limited survey encompassing only central and northern California and extended for not more than a year or two on any one mode of fishing.

OBJECTIVE

The Southern California Marine Sport Fish Survey, a Dingell-Johnson Federal Aid project, was initiated in July 1962 to measure sportfishing activities and catch from piers, jetties, private boats, and the shoreline between Point Conception and the United States-Mexican boundary. The completion of this survey would close the gap in our knowledge of fishing activities within the state.

Specific survey objectives are:

- a. To obtain statistically measurable estimates of the total angler effort by area, time, and species.

Prepared by Leo Pinkas, October 1965.

- b. To obtain statistically measurable estimates of the total angler catch by species, area, time, and gear.
- c. To compute a catch-per-unit-of-effort value for the more important species.
- d. To determine if competition exists between sport and commercial fishermen for the same fish species, and if so, to what degree it exists.
- e. To obtain whenever possible (as a secondary activity) life history information on important sport species.

PROCEDURE

Total enumeration would solve our problem in the simplest and most direct manner, however the manpower requirements for this approach far exceed the project's allotted monies. Therefore, an alternative procedure of estimating fishing effort and catch from samples has been adopted.

Probability sampling was the most desirable technique because it provides a common reproducible base for evaluating results. Again, to sample adequately all phases of the problem (piers, jetties, skiffs, and the shoreline), would require more people and money than is available. Thus a piece-meal approach has been adopted: piers and jetties will be worked in calendar year 1963, skiffs and yachts in 1964, and the shoreline in 1965.

The sampling technique we have applied to the piers and jetties has been a combination of cluster and systematic sampling. We grouped all structures by twos according to their geographical location, and scheduled counts and conducted interviews systematically within a defined 12-hour day.

Sampling in time and space was accomplished by stratifying the year into three, four-month periods with a further breakdown into week days and week-end days including holidays. Both "days" and "pier groups" were serially numbered to facilitate random selection from a table of random numbers. Sample size was arbitrarily selected according to the available manpower.

The sampling plan we have developed for the skiffs and yachts followed the same pattern we used for the piers and jetties, except for modification for physical layout and the different behavior of boaters.

The probability sampling plan to estimate shoreline fishing activities and catch was designed in part to conform to the configuration and particular problems of the coastline and in part by the experience we gained during the previous years work. The decision to sample for a period of one year, April 1, 1965 through March 31, 1966, was purely arbitrary. The year was

stratified into 12, monthly periods, with a further breakdown into week days and week-end days including holidays. The sample day was subdivided into AM and PM periods of equal length. The length of the sampling day varies according to the mean length of daylight, thus it is 10 hours long in winter, 12 hours in spring and fall, and 14 hours long in summer.

The geographical area, Jalama Beach State Park to the United States-Mexican boundary, was grouped into two major segments: (i) the open coast, and (ii) inland bays. These two general areas were then subdivided into units ranging from $\frac{1}{2}$ to 4 miles long. Each unit was then placed into one of two categories: (i) accessible to the general public, or (ii) not accessible to the general public. The 90 open coast and 11 bay units accessible to the general public comprise our sampling frame. Periodic aerial flights will ascertain the degree of fishing activity in the inaccessible units outside our frame.

Other features of our shoreline sampling plan, such as sample size, methods of random selections of days and units, are as described above.

An early write-up of survey techniques and results is being facilitated by processing all data on high-speed computers. A program to handle the pier and jetty data was recently completed by the Biometrical Analysis Unit and our raw information is being used in this program.

DISCUSSION

Although there are a number of weaknesses in our sampling plans, for example, each estimate is associated with a large variance, by far the most serious drawback is a lack of continuity. The piece-meal approach will yield discontinuous data between areas and between various modes of fishing. At best, this approach will give us only a bare insight into the fishery. A comprehensive statewide survey is needed to provide meaningful information which can be tied to existing data. Since an annual recurring survey is far too expensive, a periodic approach, perhaps every four or five years, would yield enough data to note trends and answer questions required for long range community planning.

PUBLICATIONS

By 1966 two bulletins summarizing the results of the Barracuda-White Sea-bass Management Study (the preceding D. J. project) should be well on the way to publication. Work will also have been started on a paper describing the results of our pier and jetty survey. Results of the skiff and shoreline surveys will be analyzed and reported on during the spring and summer of 1966.

STAFF

Leo Pinkas, Marine Biologist III, Project Leader, Programming for Computer Process of data, data analysis and write-up of results, relief sampler.

Malcolm S. Oliphant, Marine Biologist II, Supervision of field activities, assist in writing a program to process data, data analysis and write-up of results, relief sampler.

Charles W. Haugen, Aquatic Biologist I, Creel census of shoreline and bay units, assist in processing data, and write-up of results.