

## FISHERY BIOLOGY

"Fishery Bulletin" of the National Oceanic & Atmospheric Administration, National Marine Fisheries Service, Department of Commerce, Vol. 69, No. 2, April 1971, pp. 253-453, illus., contains 19 technical reports on investigations in fishery science.

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"Swimming Speed, Tail Beat Amplitude, and Size in Jack Mackerel, *Trachurus symmetricus*, and Other Fishes," by John R. Hunter and James R. Zweifel, pp. 253-266.

"The objective of the study was to determine the relationships between swimming speed, fish length, tail beat amplitude, and tail beat frequency in a pelagic marine fish, jack mackerel, *Trachurus symmetricus*. To accomplish this objective, dorsal cine photographs were taken of fish swimming in currents of different speeds in a specially designed activity chamber. For comparative purposes tests were also run on three other marine fish: chub mackerel, *Scomber japonicus*; Pacific sardine, *Sardinops sagax*; and a shark, *Triakis henlei*."

"Sustained Speed of Jack Mackerel, *Trachurus symmetricus*," by John R. Hunter, pp. 267-272.

The purpose of this study was "to determine the sustained speed threshold of jack mackerel, *Trachurus symmetricus*, a pelagic marine fish of commercial importance. The body form and musculature of *Trachurus* appear to be designed for greater hydrodynamic efficiency at high speeds than other species heretofore studied. In *Trachurus*, lateral musculature is concentrated in the anterior

portion of the trunk, and inserts by tendons on a small deeply forked caudal fin."

There is interest in comparing the sustained speed capabilities of *Trachurus* with that of fish with other body forms. Also, sustained speed data are significant in predicting migratory capabilities and physiological limits.

"The Transplanting and Survival of Turtle Grass, *Thalassia testudinum*, in Boca Ciega Bay, Florida," by John A. Kelly Jr., Charles M. Fuss Jr., and John R. Hall, pp. 273-280.

This article describes the procedures for and results of transplantation of turtle grass into modified environments. "Turtle grass was transplanted to an unvegetated, dredged canal and a hand-cleared portion of a flourishing grass bed. Complete or partial success was attained in 7 of 14 methods used. The best method, in which short-shoots (rhizomes removed) were dipped in a solution of plant hormone (Naphthalene Acetic Acid) and attached to construction rods for transplanting, was 100% successful and may be suitable for general application."

"Effect of Dietary Fish Oil on the Fatty Acid Composition and Palatability of Pig Tissues," by Robert R. Kifer, Preston Smith Jr., and Edgar P. Young, pp. 281-302.

This report deals with the problem of a "fishy" flavor in the meat of pigs. This flavor results sometimes when pigs are fed fishery products--fish meal, for example, above a certain concentration in the diet.

Pigs were fed diets containing fish oil to investigate: (1) the effect on the taste of meat of feeding fish oil to pigs, (2) the effect, on taste of meat, of withdrawing the oil from the

diet at given times, (3) the fatty acid composition of the body tissues of the pigs, and (4) the relation of composition to meat taste.

"Cetaceans from the Lesser Antillean Island of St. Vincent," by David K. Caldwell, Melba C. Caldwell, Warren F. Rathjen, and John R. Sullivan, pp. 303-312.

The authors present a preliminary list of cetaceans collected and observed in a fishery for blackfish or pilot whales (*Globicephala*) in waters of Lesser Antillean Island of St. Vincent. Nearest published records in the western Atlantic are given; also, limited biological notes on some species. The taxonomic relationships of the two forms of *Stenella* are suggested; both species are illustrated. Landings of pilot whales in the fishery over a 9-year period are included.

"Contributions to the Biology of the Royal Red Shrimp, *Hymenopenaeus robustus* Smith," by William W. Anderson and Milton J. Lindner, pp. 313-336.

The royal red shrimp, *Hymenopenaeus robustus*, has been located in commercial concentrations in three areas off the United States about 250 to 550 m deep: (1) the St. Augustine Grounds off Florida's east coast; (2) off Dry Tortugas; and (3) off Mississippi River Delta.

The authors collected information intermittently on the biology of the St. Augustine species.

The reproductive systems of males and females are described and illustrated. Burrowing and swimming habits observed from research submarine 'Aluminaut' are summarized.

"Sex Pheromone Activity of the Molting Hormone, Crustecdysone, on Male Crabs (*Pachygrapsus crassipes*, *Cancer antennarius*, and *C. anthonyi*)," by James S. Kittredge, Michelle Terry, and Francis T. Takahashi, pp. 337-344.

"The pheromone released by permolt female (*Pachygrapsus crassipes*) is a heat-stable non-ionic polar lipid. The coincidence of the release of the pheromone and the nubial molt suggested that the molting hormone,

crustecdysone, may also function as a sex pheromone. Adult male crabs were observed to display typical precopulatory behavior when exposed to dilute solutions of crustecdysone." Threshold concentrations for behavioral response were found. These provide basis for a theory of the evolution of pheromone communication in the Arthropods.

"Characteristics of Sea-Surface Temperature Anomalies," by L.E. Eber, pp. 345-356.

"Sea-surface temperature anomalies in the North Pacific Ocean, constructed from a 14-year series (1949-62) of monthly mean charts, exhibit numerous instances of quasi-stationary behavior." Selected examples show a recurring pattern. The principal feature is a positive or negative cell in anomaly field between lat. 30° N and 50° N.

"Induced Spawning of the Northern Anchovy, *Engraulis mordax* Girard," by Roderick Leong, pp. 357-360.

"This report describes a method for bringing the anchovy to ripeness and the effectiveness of various hormone treatments in inducing spawning. As far as is known this was the first successful attempt to artificially mature and spawn this pelagic fish in the laboratory."

"Gill Raker Apparatus and Food Selectivity Among Mackerels, Tunas, and Dolphins," by John J. Magnuson and Jean G. Heitz, pp. 361-370.

This article describes quantitatively the gill raker apparatus of certain scombrids and coryphaenids with respect to the gap between gill rakers and filtering area of first gill arch. It compares differences in gill raker gap among species and fish lengths; and considers proportion that observed inter- and intraspecific variations in the diet are associated functionally with morphometrics of gill raker apparatus.

"Nature of Free Radicals in Freeze-Dried Fishery Products and Other Lipid-Protein Systems," by William T. Roubal, pp. 371-377.

The article deals with recent research using systems which, for first time, are favorable for detection and study of electro-

paramagnetic resonance (ERP) spectrometer signals that arise with onset of lipid oxidation. Mechanisms for forming radicals and reactions of radicals are discussed.

"The Relation Between Exercise and Biochemical Changes in Red and White Muscle and Liver in the Jack Mackerel, *Trachurus symmetricus*," by Austin W. Pritchard, John E. Hunter, and Reuben Lasker, pp. 379-386.

This study reexamined the "metabolic and locomotor roles of red and white muscle by measurement of glycogen, lactate, and fat levels in the muscle and glycogen levels in the liver in fish exposed to various velocity treatments of known strength and duration. Juvenile jack mackerel, *Trachurus symmetricus*, were used because the maximum sustained speed threshold for 6 hours of continuous swimming had been established for it-- and all chemical measurements were related to known levels of swimming performance.

"*Sebastes variegatus*, Sp. N. from the Northeastern Pacific Ocean (*Pisces Scorpaenidae*)," by Jay C. Quast, pp. 387-398.

"A new scorpaenid fish, *Sebastes variegatus*, from the Gulf of Alaska is characterized by an elongate body that tapers symmetrically anteriorly and posteriorly; presence of preopercular, postopercular, tympannic, and parietal spines and lack of supraocular, coronal, and (usually) nuchal spines; 18 (rarely 17 or 19) rays in the pectoral fin; a second anal fin spine that is longer than the third; black membranes on the spinous dorsal and caudal fins; a dark brown to jet black peritoneum; and a dark blotched pattern on the sides that is interrupted over the posterior 2/3 of the body by an unpigmented band along the lateral line. The known geographic range is from Unimak Pass (Aleutian Islands) to Queen Charlotte Sound (British Columbia)."

"Calico Scallop Distribution, Abundance, and Yield Off Eastern Florida, 1967-68," by Richard B. Roe, Robert Cummins Jr., and Harvey R. Bullis Jr., pp. 399-410.

In an 18-month period, Aug. 1967-Dec. 1968, the NMFS Exploratory Fishing and Gear Research Base in Pascagoula, Miss., surveyed the calico scallop (*Argopecten gibbus*) grounds off eastern Florida. The survey dis-

closed aspects of life history, distribution, abundance, and yield and annual variation in geographical and depth distribution.

"Effects of Delayed Initial Feeding on Larvae of the Grunion, *Leuresthes tenuis* (Ayres)," by Robert C. May, pp. 411-426.

The purposes of this study were "to determine the effects of delayed initial feeding on mortality, on growth, and on the ability of grunion (*Leuresthes tenuis*) larvae to begin feeding and to utilize ingested food, and to ascertain what changes in the morphology and chemical composition of the larval body occur during starvation."

"The Relative Sampling Performance of 6- and 10-foot Isaacs-Kidd Midwater Trawls," by William A. Friedl, pp. 427-432.

This report deals with the relative sampling abilities of two sizes of Isaacs-Kidd midwater trawl (IKMT), a type of net used widely in marine and freshwater investigations. The results apply to IKMT in general; the assessment explains the degree to which data obtained with different trawls are comparable.

"Studies on the Use of Carbon Dioxide Dissolved in Refrigerated Brine for the Preservation of Whole Fish," by Harold J. Barnett, Richard W. Nelson, Patrick J. Hunter, Steven Bauer, and Herman Groninger, pp. 433-442.

Storing fish in refrigerated seawater has many advantages over storing them in ice, but the former also has disadvantages; one is the difficulty in controlling growth of spoilage bacteria in the fish. This article reports the effect on growth of bacteria in rockfish and chum salmon of dissolving carbon dioxide in brine. Storing fish in refrigerated brine treated with carbon dioxide inhibited bacteria growth, retarded rate at which fish decrease in quality, and increased their storage life by at least 1 week.

"DDT Residues in Seawater and Particulate Matter in the California Current System," by James L. Cox, pp. 443-450.

"Continuous samples of seawater and organic particulate material collected along

linear transects in the California current system were analyzed for DDT residues." DDT residue concentrations in whole seawater is determined. Geographical patterns in these concentration values are discussed in relation to mechanisms of land-sea DDT residue transfer. The author describes experimental results that implicate adsorption as the uptake mechanism for algal cells.

"Egg Loss During Incubation from Offshore Northern Lobsters (Decapoda: Homaridae)," by Herbert C. Perkins, pp. 451-453.

"Egg loss during incubation from offshore northern lobsters, *Homarus americanus* Milne Edwards, was estimated by counting the eggs of 196 females. The lobsters were captured along the continental shelf off southern New England during October (eggs recently extruded), April, and June (eggs nearly ready to hatch). Egg loss during the period October to June averaged 36% for females of all sizes studied."



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#### DISCOLORATION IN CANNED CRAB MEAT

"Blueing of Processed Crab Meat. II. Identification of Some Factors Involved in the Blue Discoloration of Canned Crab Meat (*Callinectes sapidus*)," by Melvin E. Waters, SSR-Fisheries No. 633, 7 pp., illus., May 1971.

An outbreak of blue discoloration in canned crab meat occurred during 1969. Mr. Waters reports the result of a study to pinpoint the cause of blueing and suggest a remedy.

Results showed that iron was involved in the discoloration. Also, that a buffered solution of citric acid (pH 6.5-6.8) prevented formation of the blue-colored complex.

#### MECHANICAL PROCESSING OF BAY SCALLOP MEATS

"Influence of Mechanical Processing on the Quality and Yield of Bay Scallop Meats," by N. B. Webb and F. B. Thomas, SSR-Fisheries No. 624, 11 pp., illus., April 1971.

The commercial method of shucking bay scallops by hand is costly. A mechanical method has been developed to reduce costs while maintaining or improving quality of processed meats.



Shell stock loading conveyor for delivery to the rotating metal rollers.

This study compared quality and yield of bay scallops processed by mechanical means with corresponding values of those processed by typical hand method. The mechanical method included heat-shocking of the shell-stock, roller-vibration removal of the meats and viscera, and later separation of viscera from meats.

The results indicate that quality and yield of meats from bay scallops processed mechanically "is equivalent to quality and yield of those processed commercially by hand."

#### FLOATING LABORATORY

"Floating Laboratory for Study of Aquatic Organisms and Their Environment," by George R. Snyder, Theodore H. Blahm, and Robert J. McConnell, Circular 356, 16 pp., illus., May 1971.

The National Marine Fisheries Service built a floating laboratory to study environmental problems in the Columbia River. The barge that supports the lab was provided by the U.S. Navy. A complex electrical and water-supply system, plus biological research equipment, were installed aboard barge. These made it possible to conduct research near sites where problems are expected to occur.

#### CALIFORNIA MARINE FISH CATCH

"The California Marine Fish Catch for 1969," by Leo Pinkas, Fish Bulletin 153, 47 pp., 2 figs., 24 tables, and an appendix, 1970. Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814.

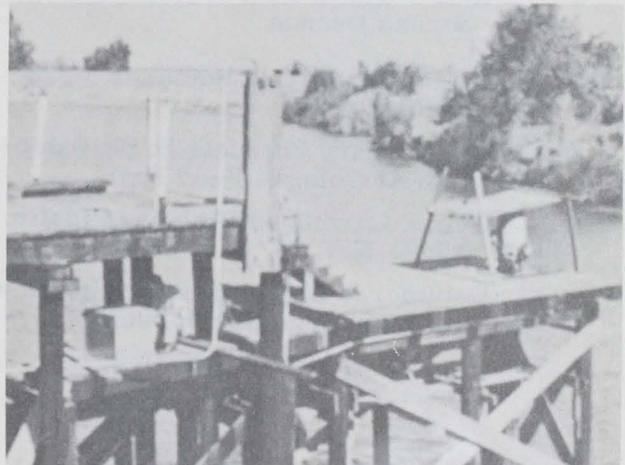
This bulletin provides records of amounts and values of some living marine resources taken by California's commercial fisheries in 1969. It summarizes catches by partyboat sportfishing industry. The small quantities of freshwater fish taken commercially in inland areas are also detailed.



#### KING SALMON

"Migrations of Adult King Salmon (*Oncorhynchus tshawytscha*) in the San Joaquin Delta (As Demonstrated by the Use of Sonic Tags)," by Richard J. Hallock, Robert F. Elwell, and Donald H. Fry Jr., Fish Bulletin 151, 92 pp., 22 figs., 11 tables, 6 appendices, 1970. Department of Fish and Game, 1416 Ninth Street, Sacramento, California 95814.

Each fall king salmon pass through the Sacramento-San Joaquin Delta bound for the Sacramento and San Joaquin River systems. Starting in 1961, salmon runs of the San Joaquin, but not Sacramento's, suffered disaster.



Monitor housed on an irrigation pump platform, San Joaquin River near Bowman Road, fall 1965. (Photo: John A. Shaver)

This was due probably to water conditions in San Joaquin part of Delta. From 1964 through 1967, salmon tagged with sonic tags were released in Delta's central part to determine their reaction to low oxygen levels and reversed flows. Electronic equipment enabled researchers to follow tags and record their movement past fixed points. Salmon avoided water with less than 5 ppm dissolved oxygen by staying farther downstream until oxygen block cleared. Temperatures over 66° F. had a similar, but less sharply defined, effect.