Outstanding NMFS Authors Are Honored

The outstanding papers authored by National Marine Fisheries Service scientists and published in the *Fishery Bulletin* and the *Marine Fisheries Review* in 1979 and 1980 have been announced by the NMFS Publications Advisory Committee.

For the *Fishery Bulletin* in 1979, J. Roe Hunter and Stephen R. Goldberg were cited for their outstanding paper entitled "Spawning Incidence and Batch Fecundity in Northern Anchovy, *Engraulis mordax*," 77(3):641-652. Hunter is with the NMFS La Jolla Laboratory, Southwest Fisheries Center, La Jolla, Calif., and Goldberg is with the Department of Biology, Whittier College, Whittier, Calif.

Selected as the best paper in 1979 in the *Marine Fisheries Review* was "Management for Increasing Clam Abundance," 41(10):10-22. It was written by Clyde L. MacKenzie, Jr., of the NMFS Sandy Hook Laboratory, Northeast Fisheries Center, Sandy Hook, N.J.

Chosen as the best paper in 1980 in the *Fishery Bulletin* was Peter B. Adams' "Life History Patterns in Marine Fishes and the Consequences for Fisheries Management," 78(1):1-12. Adams is with the NMFS Tiburon Laboratory, Southwest Fisheries Center, Tiburon, Calif.

And, chosen as the outstanding paper in the *Marine Fisheries Review* in 1980 was "Historical Shore-Based Catch of Bowhead Whales in the Bering, Chukchi, and Beaufort Seas," 42(9-10):5-19, by Willman M. Marquette and John R. Bockstoce. Marquette is with the National Marine Mammal Laboratory, Northwest and Alaska Fisheries Center, Seattle, Wash., and Bockstoce is Curator of Ethnology at the New Bedford Whaling Museum in New Bedford, Mass. The paper was part of a special issue, "The Bowhead Whale: Whaling and Biological Research," edited by Howard W. Braham, Willman M. Marquette, Teresa W. Bray, and J. Stephen Leatherwood.

Developed in 1975, the annual outstanding publication awards program recognizes NMFS employees who have made exceptional contributions to the knowledge and understanding of the resources, processes, and organisms studied as a part of the NMFS mission.

Fishery Bulletin papers must document outstanding scientific work while *Marine Fisheries Review* papers must be effective and interpretive contributions to the understanding and knowledge of NMFS mission-related studies.

Any NMFS employee may recommend publications of the appropriate calendar year for award consideration. Authors must have been employed by the NMFS at the time the paper was published. Nominations must include the author's name, paper title and number of pages, series name and volume number, justification to support the nomination, and the name and office affiliation of the nominator.

Japanese, NMFS Scientists Study Tuna Eggs, Larvae

Work has started on a cooperative study of skipjack tuna spawning and rearing by scientists from the NMFS Southeast Fisheries Center's Honolulu Laboratory and the Kinki University Fisheries Laboratory of Wakayama, Japan, reports Richard S. Shomura, Honolulu Laboratory Director. The Japanese scientists, Teruo Harada and his assistant, Shigeru Miyashita, are world renowned experts on the spawning and aquaculture of marine fish species. They will be working with Honolulu Laboratory scientists who work under Richard Brill, leader of the Laboratory's Experimental Ecology of Tunas project. Brill's team of researchers includes Thomas K. Kazama, Fishery Biologist; Sharon D. Hendrix, a graduate student at the University of Hawaii; and Research Assistant Linda A. Barroclough.

Harada and Miyashita arrived in Honolulu on 11 June to observe the skipjack tuna spawning operations at the Kewalo Research Facility and also to make preparations for shipping samples of viable fertilized tuna eggs and live larval tunas to Japan. The purpose of shipping these live specimens to Japan is to compare the results of rearing experiments at the Kewalo Research Facility with those at the Kinki University facilities. Earlier experiments at Kewalo showed that skipjack tuna larvae failed to live beyond about 12 days and the Honolulu Laboratory scientists are trying to determine the causes of these results.

Harada returned to Japan on 20 June to begin the rearing experiments while Miyashita remained in Honolulu to help in making shipping arrangements. Miyashita returned to Japan on 3 July.

According to Kazama, by early July five shipments of viable fertilized eggs and live skipjack tuna larvae have been made to Kinki University. Although the fate of all the specimens shipped to Japan was not known, about 70 percent of the larvae survived the rigors of shipping. However, all the larvae in the first few shipments died soon thereafter. Harada and Miyashita have made plans to return during next year's skipjack tuna spawning season, said Shomura.

Salt and Seafood: A Growing Issue

Sodium Labeling Is "Key Issue" for Pacific Fisheries Technologists

The 1982 Pacific Fisheries Technologists' Annual Meeting was held at Sacramento, Calif., 21-24 March. Approximately 135 conferees attended the meeting and 40 papers were presented in six different sessions: Fishery Development, Seafood Handling and Preservation; Decomposition Indices; Energy Conservation; Salt in Seafood Products; By-product Technology; and Aquaculture.

John Spinelli, Director of the Utilization Research Division of the NMFS Northwest and Alaska Fisheries Center, served as panel moderator for the session on "Salt in Seafood Processing." Eight papers were presented, and it was believed that sodium labeling would probably emerge as the key issue facing the industry in 1983 and beyond. Fred Hill of the University of California at Davis pointed out that proposed legislation requiring sodium labeling was undoubtedly prompted by the fact that about 60 million Americans suffer from some form of or level of hypertension, and while a high intake of salt can aggravate this condition, in only 1 percent of the cases can salt be pinpointed as the cause for hypertension.

From a technological point of view, several industry members believe it would be difficult to comply with the proposed regulation that a product shall be deemed to be misbranded if it contains 120 percent more sodium than the declared mean sodium content.

In response to the sodium problem, it was felt that primary research efforts should be directed at lowering the salt in seafood products and developing processing methods and control to assure a uniform sodium content in the product.

John Spinelli

Sodium Content of Rockfish Held in RSW

Due to the holding and processing of some fish, sodium uptake is unavoidable and may fall under proposed regulations (see article in column 1). Under these proposed regulations, two major central problems are apparent: 1) The amount of sodium taken up by the tissue, and 2) the variability of the sodium in the tissue from fish to fish in the same lot. To assess these problems, salt uptake studies in refrigerated seawater (RSW) at 0° C were undertaken by the Northwest and Alaska Fisheries Center's Utilization Research Division.

In our initial studies on variability, we measured sodium uptake in yellowtail rockfish, *Sebastes flavidus*. This variation around the mean can be expressed as the standard deviation (SD) or the percent standard deviation (%SD = 100 (SD/mean)).

Samples of fish were removed from the RSW at regular intervals (0, 1, 2, 3, 4, and 7 days) and filleted. Sodium was measured in the fillets after suitable processing. Prior to being placed in RSW, rockfish fillets contain 56 mg% sodium, but after 1 day the value doubled (108 mg%). At the end of 7 days, the fillets contained 311 mg% sodium, approximately a sevenfold increase. The variability (%SD) of the sodium on a day-to-day basis was reasonably good. The initial value (56 mg%) had a %SD of 5.3% and on day 7 the variation was 17.8%. However, the day 4 sampling had a wide range of sodium values (113 to 371 mg%, %SD = 36.5%).

We feel that foaming may have been the cause of this variation since, on day 3, we removed a large quantity of stiff, heavy foam, and then again on day 4 more foam was removed. After foam removal, it was discovered that the top layer of fish, which was removed for sampling, was not covered with RSW. Therefore the sampled fish may have had erratic contact with RSW causing the wide range of uptake.

If all the sampled data on flesh sodium (day 0 to day 7) is pooled to mimic 1 week's catch, the batch average for sodium is 177 mg% with a SD of 95. The percent standard deviation is then 53.6%. The highest sodium content of all the samples was 371 mg%, falling within 120% of the overall mean of the pooled data. This preliminary experiment indicated that variation from sample to sample on a given day is relatively small (%SD of about 20%). Therefore, the controlling factor of sodium variation in the pooled data is the length of exposure to RSW, not daily variation in sodium uptake.

Jack Wekell

High Pressure Injection Used to Add Salt to Sablefish Fillets

Recently completed experiments by the Utilization Research Division (URD) of the NMFS Northwest and Alaska Fisheries Center have demonstrated that salt and other aqueous additives, such as condensed phosphates, antioxidants, and enzyme inhibitors, can be uniformly dispersed in fish fillets by high pressure injection.

Using a pilot plant injection machine developed by the URD and built by Oceanic Associates[1], Bellevue, Wash., uniform concentrations of salt varying from 2.0-5.0 percent (in water phase) were injected into sablefish fillets. The salt concentration in the fillets was easily varied by either changing the concentration of the brine and/or changing the pressure and timing of the injection pulse. Inspection of the fillets after smoking revealed no evidence of physical damage to the fillets.

The edibility characteristic of the injected fillets was indistinguishable from conventionally brined fillets. Other tests are in progress to determine whether the quality of frozen fillets can be maintained via the injection of aqueous additives such as phosphates, enzyme inhibitors, and antioxidants.

John Spinelli

[1]Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.