

Marine Fish Farming Seen Within Decade

Man's dream of being able to farm marine fish as farmers have domesticated and bred cattle and other animals over the centuries is a significant step nearer realization as the result of scientific and technological research and experiments during the past ten years or more, reports the United Nations' Food and Agriculture Organization (FAO).

In this connection an interesting account of the work done in the United Kingdom in "farming" plaice, Dover sole, turbot, lemon sole, cod, saithe and gray mullet is given in a paper to be presented at a forthcoming Technical Conference on Fishery Products. The Conference, which is being convened by the FAO, will be held in Tokyo from 4 to 11 December, 1973, at the invitation of the Government of Japan.

The paper, on Studies on the Acceptability of Farmed Fish, has been prepared by members of the staff of the White Fish Authority, London, the Torry Research Station, Aberdeen, and the Marine Laboratory of the Ministry of Agriculture, Fisheries and Food, United Kingdom.

The experimental farms where most of the work has been done by fish cultivation units are in the Scottish sea lochs at Ardtoe and elsewhere and in the warm outflow from the Hunterston

Power Station. In these places Dover sole and plaice have been hatched and reared from egg to marketable size while turbot, lemon sole, cod, saithe and gray mullet have been reared from their juvenile stage after capture at sea to marketable size. Although turbot and lemon sole have also been spawned and hatched they have not yet been reared beyond the early larval stages to metamorphosis in the farms though this has been done in the laboratory.

The teams working on this fish farm program include veterinarians and pathologists looking into problems of health and disease control, nutritionists formulating a variety of wet fish feeds and, lately, moist and dry pelleted feeds, engineers concerned with the design and development of fish holding facilities ashore and at sea, and food science/market development experts who are working with the Torry Research Station staff in assessing the qualities of fish and determining their market and consumer acceptability.

The main effort in all this work is to establish a commercially viable system of fish farming. This includes not only the ability to hatch and rear fish but to produce fish of acceptable appearance, texture and flavor. A series of flavor tests have shown that farm-reared plaice and sole compare

reasonably well with the wild fish.

However, tests relating to shape, and skin and flesh colors have indicated some possible consumer resistance. For example, wild plaice have color on their top side and are white on their underside. Farm-reared plaice may vary from no pigmentation on either side to the top-side type of pigmentation on both sides. Such differences, including the darker tinge of the flesh of farm fish, may call for a special marketing effort. But, as the paper concludes "what will determine to a large extent whether farmed fish will be acceptable to the consumer are the method of presentation and the price, both of which could overcome any consumer resistance due to appearance or flavor."

The paper ends on the optimistic note that within the next ten years fish farms "will be producing perfectly acceptable fish on a viable commercial basis" but adds that "the farmed fish of the future may not resemble closely any of the species which are at present on the market any more than domesticated cattle resemble wild cattle or deer."

The paper is one of about 70 to be presented at the Conference. These papers and the discussion will result in a survey for the first time of the world situation of fishery products industry, identifying areas of critical importance at present and likely trends and developments in future.

Publications

Russian Translations

The following three Russian publications were recently translated and printed in Israel for the National Marine Fisheries Service (NMFS), NOAA, under the Special Foreign Currency Science Information Program (financed with Public Law 480 funds). They are sold at the indicated prices by the National Technical Information Service (NTIS), Springfield, Va. 22151. When ordering, cite the translations'

accession numbers.

1. "Chemistry and Technology of Pacific Fish," by I. V. Kizevetter, Pacific Research Institute of Marine Fisheries and Oceanography (TINRO), Vladivostok, 1971, 304 pp.

The volume presents a precise chemical and technological characterization of traditional Far Eastern fishes as well as of many commercial species handled by Soviet fisheries in the Pacific Ocean. The species studied encompass the western and eastern areas of the North Pacific including the tropical latitudes of the eastern zone, the Korean Straits, the South China Sea, the Gulf of Tonkin, the eastern part of the

Indian Ocean, the coasts of Western Australia and New Zealand, and the Australian Bight.

Accession number: TT 72-50019.
\$6.00.

2. "Life Activity of Pelagic Communities in the Ocean Tropics Based on Data of the 44th Cruise of R/V *Vityaz*," edited by M. E. Vinogradov, Academy of Sciences of the U.S.S.R., P. P. Shirshov Institute of Oceanology, Moscow, 1971, 298 pp.

A collection of 24 papers dealing with the biological productivity of ocean tropics, specifically of an area of the Pacific Ocean south of the equator and west of 180°E. Topics

covered by the papers include: the process of creation of primary production; evaluation of the utilization of solar energy in a pelagic community; vertical variations of primary production; analysis of the pigment system of phytoplankton and its variability; the abundance and production of the microbial population and its role in zooplankton alimentionation; investigation of the specific composition of pelagic communities in tropical waters; tropic structure of plankton communities; determination of the production intensity of zooplankton; quantitative evaluation of metabolic processes in planktonic organisms; evaluation of the part played by fish larvae in pelagic food chains; distribution and composition of organic detritus and its mineralization characteristics; bioluminescence as a manifestation of the life activities of pelagic communities; and studies of hydrological and hydrochemical environmental parameters, including the distribution of nitrogen, phosphorus, silicon, and iron.

Accession number: TT 72-50035.

\$6.00

3. "Soviet Fisheries Investigations in the Indian Ocean," edited by A. S. Bogdanov, Proceedings of the All-Union Research Institute of Marine Fisheries and Oceanography (VNIRO), Moscow, 1971, 152 pp.

A collection of 10 papers covering the results of the 2nd VNIRO expedition to the Indian Ocean on board of R/V *Akademik Knipovich* from December 1965 through May 1966. The expedition studied the northern part of the Indian Ocean for determining the possibility of developing Soviet fisheries in that region. Investigations were carried on the shelves of the Bay of Bengal, the eastern part of the Andaman Sea, and, to a lesser extent, areas south of Madras. They included oceanographic research; collection of plankton, benthos, commercial invertebrates, and fishes; industrial fishery techniques; and the technology of products from commercial species. Catches and the ichthyofauna of the surveyed regions are

discussed in great detail.

Accession number: TT71-50128.

\$3.00

Polish Translations

The translation and printing of selected articles from the Polish journal *Technika i Gospodarka Morska* (Marine Technology and Management) was recently started in Poland for the National Science Foundation under the Special Foreign Science Information Program (financed with Public Law 480 funds). The translations are sold for \$3.00 per copy by the National Technical Information Service (NTIS), Springfield, Va. 22151. Selections from two or three issues are included under one cover and the first ones to be published are from Vol. 20, 1970: Nos. 1-2 as TT 70-55125/1,2, and Nos. 3-4 as TT 70-55125/3,4. When ordering, cite the translations' accession numbers. Articles on fisheries in the translated issues include: world fisheries in 1968; future of Polish fisheries in the Baltic Sea; activation of the Polish salmon fishery; progress in deep freezing of fish; fisheries and agriculture—comparison of two fields of economy; information service system for Soviet fisheries; results obtained by various types of fishing vessels; role of short-range fisheries; commercial law as an instrument of guidance in the East German fishery economy; Polish marine fisheries in 1969; Polish fishery zone; and assessment of fish quality by means of hydrolocation devices.

German, Italian Translations

One Italian and two German fishery publications produced by the Naples Zoological Station were translated and printed in Israel for the Smithsonian Institution under the Special Foreign Currency Science Information Program

(financed with Public Law 480 funds). Their titles and accession numbers are: "Fauna and Flora of the Bay of Naples," Monograph No. 38, Eggs Larvae and Juvenile Stages of Teleostei, by Salvatore Lo Bianco, Parts I and II, 1931-1933, 417 pp., TT 68-50346; and "Fauna and Flora of the Bay of Naples," Monograph No. 35, *Cephalopoda*, by Adolf Naef, Part I, Vol. I, Fascicle I, 292 pp., TT 68-50343/1, and Part I, Vol. I, Fascicle II, 917 pp., TT 68-50343/2. The Smithsonian Institution was unable to obtain the copyright release for these publications. As a result, they were printed in a very limited number of copies and no outside distribution was made. The Naples Zoological Station has recently informed the Translation Program, National Marine Fisheries Service, that it has a small supply of the translations in paper cover and is willing to sell them for \$16.00 per copy. They can be ordered from Prof. G. Bacci, Commissario Governatorato, Stazione Zoologica, Naples, Italy.

Recent NMFS Scientific Publication

NOAA Technical Report NMFS SSRF-668, Serchuk, Fredric M., and David W. Frame, "An annotated bibliography of the cunner *Tautoglabrus adspersus* (Walbaum)." May 1973, ii + 43 p. For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

ABSTRACT

This annotated, indexed bibliography of the cunner contains 347 entries including references on taxonomy, distribution, life history, physiology, behavior, commercial and sport fisheries, and related fields. It may be considered current through June 1972.