

Records of Milkfish, *Chanos chanos* (FORSSKÅL) from Mainland Japan

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The occurrence of milkfish known so far in mainland Japan has been consolidated. The fish, 5-56 cm FL, have been known from the following nine localities: Nakatane, Kagoshima Pref.; Chiran, Kagoshima Pref.; Ibusuki, Kagoshima Pref.; Kushima, Miyazaki Pref.; Reihoku, Kumamoto Pref.; Susaki, Kochi Pref.; Nachi Katsuura, Wakayama Pref.; Lake Hamana, Shizuoka Pref.; and Shimizu, Shizuoka Pref. The fish occurred in a variety of places such as coastal waters, a mouth of a river or a stream, a tide-pool, eel ponds, and prawn ponds.

Being a tropical fish, occurrence of milkfish in the waters around Japan proper is rather seldom, although they frequent the Ryukyu waters; Ryukyu fishermen even have local names for the fish (Gushiken, 1972). In current literature, occurrence of the fish has been reported only from two places of mainland Japan: Nagasaki (Jordan and Herre, 1906) and Susaki, Kochi Prefecture (Kamohara, 1934).

Recently, collections of milkfish in Japanese waters have been known at various places, but almost no report on them has been published. This paper summarizes the records of occurrence of milkfish in mainland Japan and its adjacent islands.

Records of larval milkfish, 10 to 14 mm TL, are not included in this paper, but are to be reported elsewhere (Senta et al, 1980).

Materials

The published and unpublished records of milkfish from mainland Japan are consolidated in this paper. Any information on

the occurrence of milkfish was ascertained either by an interview or through an exchange of letters. A questionnaire was also sent to 96 fisheries and marine research organizations in western Japan belonging to universities, the Fisheries Agency or prefectural governments (Fig. 1). Questions were asked if any milkfish specimens are being kept in the laboratory or the fish have ever been caught in nearby waters. The authors received a total of 71 replies to the questionnaire.

Records of Milkfish

Fig. 1 illustrates nine localities, as represented by double circles, at which the occurrence of milkfish has been known. Although the occurrence of the fish has also been reported from two other localities indicated by solid dots, the authors could not verify the information. Locations of research organizations which informed the authors that no milkfish have been known in nearby waters are also shown by open dots. A brief explanation for each of the

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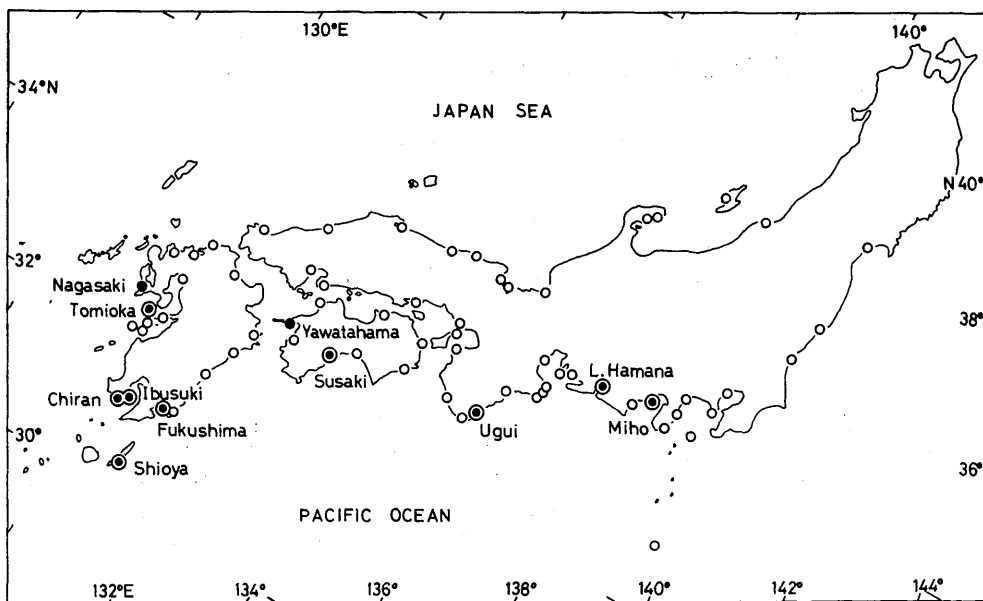


Fig. 1. A map showing the occurrence of milkfish in mainland Japan. Double circles, places at which solid records of milkfish are known; solid dots, places with uncertain records of milkfish; open dots, locations of fisheries and marine research organizations which informed the authors that no milkfish have been known in nearby waters.

occurrence records is given below.

1. Shioya, Nakatane Town, Kagoshima Prefecture.

Mr. Mitsuaki Sato of the Tokyo University of Fisheries (personal communication) caught a specimen of milkfish, 89.1 mm FL, with a cast net at the mouth of a small stream on November 10, 1974. The water temperature at the time of collection was 20.5°C and the chlorinity 66.7 ppm. The specimen is deposited at the National Science Museum in Tokyo (cat. no. NSMT 29342).

The authors also operated a gillnet in a small river flowing in front of Kumano Shrine in Shioya on November 8, 1979. The river is separated from the sea by a sluice which is opened only at low tide on rainy days. Two milkfish, 159 and 103 mm FL (NFS* 7911001 and 7911002) were caught at

locations 300-500 m upstream from the sluice, where the river was several meters wide and some 50 cm deep. The water temperature at the time of collection was 21.3°C and had almost no salinity.

The above mentioned river serves as a drainage for the water passages of eel ponds constructed on the reclaimed land along the river. Into the eel ponds, which are owned by Mr. Haruo Funai, milkfish often invade and grow there until the water temperature in the ponds falls too low in winter**. On October 15, 1979 or so, one of the ponds was dried to harvest eels. Three individuals of milkfish of almost the same size were then found and preserved in formalin. A worker at the pond kindly offered the authors one of the specimens, which was 213 mm FL and 178 g in body weight (NFS 7910001).

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** This information was originally suggested to the authors by Mr. Kimiyoshi Hayashi of the Yokosuka City Museum (personal communication).

2. Minamibeppeu, Chiran Town, Kagoshima Prefecture.

The Kagoshima Establishment for prawn culture of the Mitsui Norin Kaiyo Sangyo Co. Ltd. is located here. It has 13 round outdoor concrete tanks, 36 m in diameter and 120 cm deep. Sea water is led through a series of huge concrete pipes, 120 cm in diameter, from the sea bottom 10 m below surface and 130 m off the coast to a well at the shore, from which sea water is then pumped up and distributed to each of the concrete tanks. Across each tank is laid a PVC pipe, 3 cm in diameter, along the length of which some twenty holes, 13 mm in diameter, open for letting water into the tank.

The establishment started operating in August 1973. The first harvest of prawns was made in April 1974, when a few individuals of milkfish were found in one of the concrete tanks. Mr. Kunie Ueno, chief of the establishment, kindly gave the authors two of such specimens, 154 and 161 mm FL, which are now kept in the Nagasaki University Nomo Fisheries Station (NFS 7404001 and 7404002).

According to Mr. Hideo Mochizuki of the establishment, three to five milkfish of 10 to 15 cm FL were found in one or another of the tanks during harvest season of prawn, March to May, almost every year.

It is sure that the milkfish found in the tank had entered there as fry through the sea water system during the preceding summer. According to the daily records of water temperature in culture tanks, the lowest temperature observed during the period from the start of operation to the time of recovery of the specimens was 14.1°C observed on February 24, 1974. In cold winters, the water temperature fell much lower, e.g. as low as 11.3°C on Feb-

ruary 16 and 17, 1977. It is doubtful if milkfish also survives in the tanks over such a cold winter.

3. Gataguchi, Jucho, Ibusuki City, Kagoshima Prefecture.

Eel culture was started here in around 1960 with ten 990-m² ponds of 120 cm deep. The bottom of the pond then was lower than the high water level of the sea. The water passage for drainage leads to a camber situated at the mouth of a small river flowing into Kinko Bay. The water temperature of the ponds was kept above 28°C all year round by introducing hot water from a hot spring. Mr. Isamu Kubota, the pond owner, and Mr. Minoru Tsuru, director of the Ibusuki Freshwater Substation, Kagoshima Prefectural Fisheries Experimental Station told the authors that several dozens of milkfish, about 30 to 40 cm TL, were caught from each of the ponds in around 1970. No specimens, however, seem to have been kept anywhere.

The milkfish must have entered the ponds from the sea during the preceding summer and wintered there.

A few years later, the ponds were reconstructed with the bottom being laid above the seawater level so that the pond can be dried when needed. After that Mr. Kubota found no milkfish in the ponds.

4. Fukushima, Kushima City, Miyazaki Prefecture.

Dr. Takemichi Hidaka (personal communication), ex-director of the Tokai Regional Fisheries Research Laboratory, obtained a specimen of milkfish in July or August 1958 and two specimens also in July or August 1965. All the specimens were about 7-8 cm TL, and were caught by Mr. Kinzo Kawabata, a local fisherman, with a cast net in the Fukushima River, about 1 km upstream from the mouth.

5. Tomioka, Reihoku Town, Kumamoto Prefecture.

A specimen, 558 mm FL, was caught with a set net at Ogoshi, Tomioka on November 5, 1973. The specimen is deposited at the Amakusa Marine Biological Laboratory, Faculty of Science, Kyushu University (uncatalogued). (Personal communication from Dr. Satoshi Nojima of the same laboratory).

6. Susaki City, Kochi Prefecture.

Kamohara (1934) noted that in the specimen room at the Fisheries Experimental Station of Kochi Prefecture he saw a specimen of milkfish, about 45 cm long (total length?), caught in Susaki Bay. Neither the date of collection nor the name of the fishing gear involved is given in his paper. Mr. Masurao Hirata of the same experimental station informed the authors that the specimen, as well as any record of it which might have existed, was lost since the station had thereafter suffered complete destruction twice, once by a fire and another by a tidal wave.

7. Ugui, Nachi Katsuura Town, Wakayama Prefecture.

A specimen, 51.5 mm FL, was caught with a scoop net together with several juvenile grey mullet *Mugil cephalus* Linnaeus in a small tide pool at Ugui coast on August 20, 1967. Mr. Shojiro Fukui, a member of the Ichthyological Society of Japan, who collected the specimen kindly presented it to the authors (NFS 6708001).

8. Lake Hamana, Shizuoka Prefecture.

A specimen (length not given) was caught using a gill-net by a fisherman of Shirasu, Hamamatsu City in the middle of October 1970, and another one, 16 cm SL, was found at a fish market in Kiga, Hosoe Town on November 6 of the same year

(Watanabe, 1970). Mr. Kunio Umega, a science teacher of Kiga Primary School, informed the authors that the October specimen which is 24 cm FL is kept in his school (uncatalogued).

In November 1978, a milkfish, a little smaller than 20 cm TL, was found in the set-net catch landed at the Kiga Fish Market (personal communication from Mr. Hiroshi Fushimi of the Hamanako Branch, Shizuoka Prefectural Fisheries Experiment Station).

9. Miho, Shimizu City, Shizuoka Prefecture.

A dead specimen, 171.4 mm SL, was found stranded on Miho beach on December 7, 1972 (Fujii, unpublished). The specimen is now kept in Nippon Luther Shingaku Daigaku (SKSK* 6259).

Supplementary Note

Matsubara (1965) mentioned Tosa (=Kochi Prefecture) and Nagasaki as the northern limit of distribution of milkfish in Japan. The latter seems to be based on Jordan and Herre (1906), who, regarding the distribution of milkfish, wrote "north to the Hawaiian Islands and to Nagasaki;" but continued "not seen by us in Japan". In their synonym list of *Chanos chanos*, Jordan and Herre (1906) included *Chanos orientalis* Cuvier and Valenciennes "from Japan". As this specimen was sent by Temminck to the Paris Museum from the Museum of Leyden (Valenciennes, 1847), they must have judged that the locality was Nagasaki, although Valenciennes failed to give it in his paper. Actually, the type specimen of *Chanos orientalis* Valenciennes was sent to the Museum of Leyden by Kuhl and Van Hasselt from Java (personal communication

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from Dr. Charles Roux of Muséum National D'histoire Naturelle). No precise record of milkfish from Nagasaki seems to exist.

Tatara et al. (1965) included the name of milkfish in the list of fishes caught by trawlers, based at Yawatahama fishing port and operating in the open sea on the continental shelf neighboring to Shikoku, during the period from June 1957 to March 1961. The exact date and place of collection and number and size of milkfish caught are not given in their report. Through the courtesy of Dr. Shinji Kudo of the Nansei Regional Fisheries Research Laboratory, the authors went through the original catch records of the Yawatahama trawlers for the above mentioned period, but failed to find the record of milkfish.

Hayashi (1976) reported that milkfish was cultured together with eel in fish ponds at Shioya, Nakatane Town, Kagoshima Prefecture, inserting a photograph of "milkfish ponds" in his paper. To verify this information, the authors visited the ponds on August 27, 1977 and saw Mr. Yutaka Funai, the chief of the ponds. He told the authors that since their start of operation in 1971 they had never cultured milkfish, although in 1972 or 1973 some grass carp *Ctenopharyngodon idellus* Valenciennes and silver carp *Hypophthalmichthys molitrix* Valenciennes were stocked into the eel ponds. It is likely that Mr. Hayashi mistook grass carp (sohii or sogyo in Japanese) for milkfish (sabahii).

Among the negative answers to the questionnaire concerning occurrence of milkfish, one from Mr. Kiyoki Tsutsumi of the Hachijo Substation, Fisheries Experimental Station of Tokyo Prefecture, especially attracted the authors' attention. According to him, no milkfish has ever been recorded either from the Izu Islands or

from the Ogasawara Islands through the investigations on ichthyofauna made so far, including those made in the pre-war years. This makes a remarkable contrast with the frequent occurrence of the species in the Ryukyu Islands which are located at the same latitude as the Ogasawara Islands.

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日本本土におけるサバヒ어의記録

千田哲資・平井明夫**

従来日本本土において、サバヒ어は公式には長崎と土佐の2箇所からのみ知られており、しかも前者ははっきりした根拠に基くものではなかった。近年、鹿児島県より静岡県に至る8箇所、新たにサバヒ어が記録された。標本の大きさは尾叉長5~56cmの範囲に及び、それらが採集されもしくは出現した場所は、河口域、タイドプール、沿岸の定置網、養鰻池、クルマエビ養殖池など多彩である。

日本におけるサバヒ어仔魚の出現については別途報告する予定であり、本報告には含めなかった。

* News Letter from Hamanako Branch, Shizuoka Prefectural Fisheries Experiment Station.

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