

DISTRIBUTION AND OCCURRENCE OF  
MILKFISH CHANOS CHANOS (FORSKAL)

by

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Abstract

The geographic distribution of Chanos chanos: Family - Chanidae: Order Isospondyli, is discussed from available literature sources as well as actual surveys made by the writer. The existence of the species in natural waters as well as its culture in specific areas are noted. The seasonal occurrence and distribution of milkfish fry which is the basis of aquaculture for this species is enumerated.

An attempt is also made to describe the nature of distribution of the species in the countries where surveys have been made or where data is available.

Introduction

The milkfish, Chanos chanos: Family Chanidae: Order Isospondyli, is the single living species of this family. It is a recent species of large fishes of the Indo-Pacific Region, although it has several fossil relatives from European cretaceous and eocene deposits. It has an elongate, spindle-shaped body covered with silvery cycloid scales and with deeply forked tail. It is a powerful swimmer and a natural inhabitant of marine waters, although, being euryhaline, it enters freshwater areas whenever conditions are favorable.

The milkfish was first described by Peter Forskal, from an expedition arranged by the Danish government, to study the natural history of South West Arabia. Peter Forskal born in Finland, and a student of Linnaeus was the naturalist of the expedition. He died during the expedition in 1763. Only one of the six (6) members of the expedition, Carsten Neibuhr, returned to Denmark in 1767.

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All fishes in the collection were preserved as dried specimens, or more correctly as dried skins and sent to Copenhagen via Bombay, China and South Africa. Forskal named the fish Mugil chanos.

The type specimens of Chanos chanos were taken from Jidda, (Kjeddae) Saudi Arabia in the Red Sea. There are two skins of the milkfish, the larger, 280 mm T.L. was used as Forskal type, and a smaller specimen T.L. 200 mm was described by Forskal as Cyprinus Leuciscus Linne. These are preserved at the Zoological Museum of the University of Copenhagen.

In view of the great difference of the milkfish from the mullets Mugil of Linnaeus; Baron Lacepede in 1803, separated the milkfish in another genus elevating the specific name of Forskal into a genus. Other genera synonymously used for Chanos are Lutodiera, Scoliostranus and Ptycholepis besides others.

As mentioned above, the milkfish is distributed in the Indian and Pacific Oceans. It occupies a more or less parallel segment along the tropical and sub-tropical seas of these two oceans and contiguous waters. The species is essentially a warm pelagic fish but may inhabit coastal areas and even enters certain inland freshwaters during certain periods of its life history. It is also possible that its distribution may be influenced by oceanic currents, and availability of fertile coastal shelves which serve as grazing area.

The species is an important food fish in the Indo-Pacific region. Although the fishery for this species from natural waters is very limited and sporadic, it has been found for a long time that it lends itself to controlled husbandry or culture. The practice of milkfish culture is extensively developed particularly in Indonesia, the Philippines and Taiwan. This industry has also been initiated in other areas. Collectively, these three places have a hectarage of about 400,000 hectares of developed brackish water milkfish ponds producing about 200,000 tons of marketable fish valued from U.S.\$100,000,000 to \$200,000,000 per year with an investment valued at about \$600 to \$1,000 million.

Since the seed stock for pond culture is not artificially hatched in hatcheries but is collected from natural milkfish fry grounds, the collection, transport, and distribution of milkfish fry is a subsidiary industry in the countries where milkfish culture is highly developed. Likewise, pond construction and management operations had been well developed in these areas.

## Geographic Distribution and Occurrence

### Geographic Range of Distribution

According to recorded evidence from published literature the western limit of the geographic range of distribution of Chanos chanos extend from the Red Sea and the Eastern coast of Africa through the China and Indonesian Seas to the whole breadth of the Pacific Ocean up to the eastern limit consisting of the southwestern coast of the United States and of Mexico. Within this latitudinal range, it occurs from as far north as the coast of southern Japan to as far south as the coast of eastern Australia and of New Zealand (Figure 1 and Annex A). On the extreme western range the species occupy the Red Sea and the tropical eastern coast of Africa including the adjacent islands of Madagascar, Seyshelles and Mauritius. Eastward in the eastern Indian Ocean, this species is encountered along the coast of Porttosa, western and eastern India.

The zone representing the South China Sea and the various Indonesian waters appears to be the center of distribution of this species, the headquarters of marine fishes. It is possible that the species evolved in this area. It is known to occur in Thailand, Vietnam, Khmer Republic, Taiwan, China, southern coast of Japan, the Philippines, eastern states of Malaysia, of Sabah, Sarawak and the Indonesian Islands of Java, Sumatra, Kalimantan, Sulawisi, Madura, Moluccas and Irian Jaya and others. In the western Pacific it occurs from Ryukkyo, Japan; Papua-New Guinea and Australian state of Queensland and New South Wales; New Zealand, New Caledonia, New Hebrides, Solomon Islands, Palau and the Caroline Island Group. In Central Pacific, the species is well distributed in the Hawaiian Islands, Marshall Island, Gilbert and Ellice Islands, Fiji Islands, Tongga, Society Islands, Quamotu Archipelago. Further eastward, Chanos chanos occurs along the southwestern coast of the United States from San Francisco City southward. It was reported to be abundant along the Gulf of California and also occurs along the western coast of Mexico. There is no record of its occurrence, however, south of the Mexico coast nor along the eastern coastal zones of the Central American countries and South American continent.

### Seasonal Occurrence

The milkfish in its natural habitat has been recorded to appear only periodically during each year. It has been observed that mature spawners go in schools and swim towards certain coastal shores during their spawning periods. In many places, the peak of spawning occurs only once a year namely

from April to July with maximum occurrence in May and June (Philippines, Taiwan, China and Vietnam). There are other areas where two peaks of spawning are characteristics or with lesser peak in May, June and a higher one in September-October. Being an inhabitant of tropical seas, however, it is generally known that some spawning occur in almost every month of the year at some specific area within a given geographic unit. In the Philippines for example, although the peak period is April to June, spawning is known to occur at some spawning grounds, at almost all months of the year except probably in the cold months of December, January and February.

#### Distribution by Region or Country

The following observations are based from investigations during the travel of the senior author in the countries where milkfish occurs, supplemented by available published literature.

##### Madagascar

The milkfish is known to occur extensively around the coastal zone of the Malagasy Republic. In some coastal areas, large size fingerlings and half grown milkfish are exploited from mangrove swamps and estuarine waters (Annex B). It is peculiar, however, that round this island the fry grounds are only known in the southwestern coast of the country. There is no developed pond culture for this species in the country but the extensive mangrove swamps located along the south and north extremities of the country are potential areas for the development of milkfish pond industry. The eastern coast of the island has a very narrow tidal range (5m) and the western side has extremely high tidal fluctuations (5 $\frac{1}{2}$ m) so that milkfish culture impoundments would not be practical.

##### Sri Lanka

The milkfish occur along the coast of Sri Lanka. The location of fry grounds, however, is known to be confined to the sandy coastal shores at the north eastern and western coast of the country. Pond culture of this species is being initiated.

### Indonesia

Perhaps the site for the most extensive occurrence of Chanos chanos is found in the Indonesian Archipelago. Chanos fry is collected around the northern province of Sumatra, around the coast of Java and the neighboring islands of Sulawesi, Kalimantan, Madura and others. The country has a long existing milkfish pond culture industry in its major islands and possesses high potentials for further expansion.

### Malaysia

Although a number of published reports mentioned the existence of milkfish along the coast of Penang in West Malaysia, these have not been confirmed. There is no confirmation of the existence of milkfish neither in the western or eastern coasts of Peninsular Malaysia. In the eastern states, however, particularly Sabah, milkfish fry is collected and pond culture of the species is practiced.

### Philippines

Previously there used to be a number of areas in the country where milkfish from the open sea are harvested in small quantities. The areas where this was practised are now rapidly disappearing perhaps due to over exploitation and changes due to ecological conditions in such areas. It is known to enter Naujan Lake as Juveniles. The major fishing grounds for milkfish fry are known but it is suspected that there are areas which have not yet been discovered. However, the amount obtainable in these areas, (the natural grounds) as source of seed fish for the rapidly expanding pond system have been fluctuating very widely so that investigations of method of induced spawning has become imperative.

### Hawaiian Islands

The milkfish is known to occur in the islands of the Hawaiian Island Group. During early periods extensive fish impoundment areas were in existence in these islands. But these areas are now rapidly being reclaimed and the industry has declined considerably. The fish is, however, still found in the market.

### Island of the Mid-Pacific

Several islands in the mid-Pacific are known to be natural habitats of Chanos chanos. The fishery for this species from natural waters exists as a traditional source of food in many of these islands. In the Tonga Archipelago in the mid-South Pacific, a salt water lake at Numaho Island was supposed to be the site for natural breeding of the milkfish and the grown up fish from this lake was periodically harvested as feast food of the native population. It is possible, however, that the bangos population of the lake has come in with the highest springtide of the year or during typhoons when the sand or reef separating the lake and the open sea may have been temporarily opened. No confirmation of actual spawning of milkfish in this lake has been made.

### Summary, Conclusions and Recommendations

It can be generalized that the milkfish occurs in the tropical and sub-tropical Indian/Pacific Oceans. Its distribution in specific geographic units within this range is, however, influenced by local ecological factors. Since this species is important as source of natural fishery as well as for aquaculture, the micro-distribution in specific areas should be investigated.

Aquaculture for this species is established in a very limited area within its geographic range. In other areas where the species is acceptable as food fish, promotion of its culture should be encouraged.

Very little is known of the biology of Chanos chanos in natural waters especially its migrations, feeding habits, spawning behaviour, etc. In order to have a clear understanding and better conservation and utilization of this species, studies on its biology in its natural habitat should be encouraged and supported.

Present observations indicate that the occurrence or milkfish fry as source of stocking material for the aquaculture industry has been uncertain and highly fluctuating. In order to stabilize the supply of this valuable commodity concerted research for the induced spawning of this species under controlled conditions should be conducted. The Philippines appears to be the best place where such sophisticated undertaking should be tried, as we have the facilities, the funds and the areas where this can be done. What is needed is a little concentration of effort and knowledge on the physiology of fishes, both of which are no longer difficult to surmount.

ANNEX A

AREAS OF OCCURRENCE OF CHANOS FRY

Country	Shore Areas
India	Gulf of Manaar Palf Bay (fry entering saline lagunes) Coromandel Coast (fry entering backwaters) Malabar Coast, southern section (fry ascending small streams)
Indonesia	
Sumatra	North Coast, between Kutaradja and Lhokseumave South Pagai Islands
Java	North Coast, exclusive of the deltas of the great rivers South Coast; Djember regency only
Madura	All coasts including those of the adjacent islands
Borneo	East, southeast and southwest coast, excluding the deltas of the great rivers (incidental reports only)
Celebes	South coast, Gulf of Mandar, Gulf of Bone West coast, Spermonde Islands, Sangir Talaud
Bali	North, southeast and southwest coast
Lombok	West and southeast coast
Sumbawa	North coast, Komodo
Timor	Bay of Kupang
Philippines	
Luzon	Northwest coast; south coast, Batangas and Balayan Bays
Cebu	
Panay	
Mindanao	Zamboanga, and Davao Province

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Country	Shore Areas
Mindoro	
Marinduque	
Taiwan	Southeast and southwest coast
Thailand	Bay of Bangkok
Vietnam	Annam coast, from Songceau to Phanrang
Fiji	Coast near Nadi

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From: SCHUSTER 1960



ANNEX B

AREAS OF OCCURRENCE OF YOUNG CHANOS

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Country	Shore Areas
India	Gulf of Manaar and Palk Bay Coromandel coast Malabar coast (southern section)
Ceylon	West coast: Dutch Bay
Indonesia	
Sumatra	North coast (one location only)
Java	North coast
Sumbawa	North and east coast
Hawaiian Islands	Oahu, Molokai
Fiji	Coast near Nadi

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From: SCHUSTER 1960

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