

SUBJECT: FISHERIES OCEANOGRAPHY

CLASSIFICATION OF PISCES

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Basic Features of PISCES

Pisces is a Class in the Subphylum Vertebrata of the Phylum Chordata, so they have all of the characteristics of both of these groups in addition to the following:

- ☐ Skin covered in **scales**
- ☐ **Ectothermic**, cold blooded
- ☐ **Soft shelled eggs that must be laid in water**
- ☐ **External fertilization**
- ☐ All members are **fully aquatic**
- ☐ Limbs modified into **fins**
- ☐ Gas exchange through **gills**

Kingdom - Animalia

Phylum - Chordata

Subphylum - Vertebrata

Class - Pisces

CLASSIFICATION OF PISCES

- **Agnatha** - jawless fish
- **Cyclostomata** - no jaw so the mouth cannot close, retractable teeth - hagfish and lampreys
- **Chondrichthyes** - cartilaginous fish, skeleton made of cartilage rather than bone, gill slits at the side of the head, urea retained in the blood for osmotic balance.
- **Elasmobranchii** - no swim bladder, teeth in several series, heterocercal (vertically asymmetrical) tail - sharks and rays
- **Osteichthyes** - bony fish
- **Sarcopterygii** - fleshy finned fishes (ancestors of tetrapods) - Coelocanth, lungfishes
- **Actinopterygii** - ray finned fishes, fins are skin supported by a number of bony spines or rays
- **Teleostei** - moveable lower and upper jaw, homocercal (symmetrical) tails - Most living fishes are members of this group

CLASSIFICATION

Muller's classification (1844)

Class PISCES

Subclasses: **DIPNOI** (Lung fishes); **TELEOSTEI** (Bony fishes); **GANOIDEI** (*Polypterus*, *Amia*, *Lepidosteus*); **ELASMOBRANCHI** (Cartilagenous fishes); **MARSIPOBRANCHI** (Cyclostomes); **LEPTOCARDII** (Amphioxus).

Berg's classification (1940)

Series PISCES

Class **PLACODERMI** (Pterichthyes; Coccostei; Acanthodi)

Class **ELASMOBRANCHI** (Cartilagenous fishes)

Class **HOLOCEPHALI** (*Chimaera*)

Class **DIPNOI** (Lung fishes)

Class **TELEOSTOMI**

Subclass **Crossopterygii** (*Latimeria*)

Subclass **Actinopterygii** (Bony fishes).

Romer's classification (1959)

Series PISCES

Class **PLACODERMI** (Pterichthyes; Coccostei; Acanthodi)

Class **CHONDRICHTHYES**

Subclass **Elasmobranchi** (Sharks, dogfishes, skates, rays)

Subclass **Holocephali** (*Chimaera*)

Class **OSTEICHTHYES**

Subclass **Sarcopterygii**

Order **CROSSOPTERYGII** (*Latimeria*)

Order **DIPNOI** (Lungfishes)

Subclass **Actinopterygii** (All bony fishes)

TAXONOMY

What is taxonomy?

It is the science deals with classification of organisms according to their resemblances and differences

IUCN: International Union for Conservation of Nature

What is species?

Animals have same appearance and habits, reproductively isolated from other animals and interbreed in wild is called species (group of organisms which are highly similar in structure, function and behaviour) Eg. Skipjack tuna not breed with grouper

What is genus?

Groups of species which are similar in structure, function and behaviour.

What is binomial nomenclature?

Naming the organisms consists of two parts i.e Genus – first (first letter starts with capital); Species – Second (first letter starts with small)

Genus – singular Genera – plural

Phylum – singular Phyla - plural

Eg. Kawakawa – *Euthynnus affinis* (Latti) Yellowfin tuna – *Thunnus albacares* (kanneli)

What is taxa?

Groups of organisms (singular – taxon)

What is dichotomous key?

Classification of organism on the basis of contrasting features (di – two: chotomous – branching) Dichotomous keys for identification of various classes of vertebrate on the basis of contrasting features

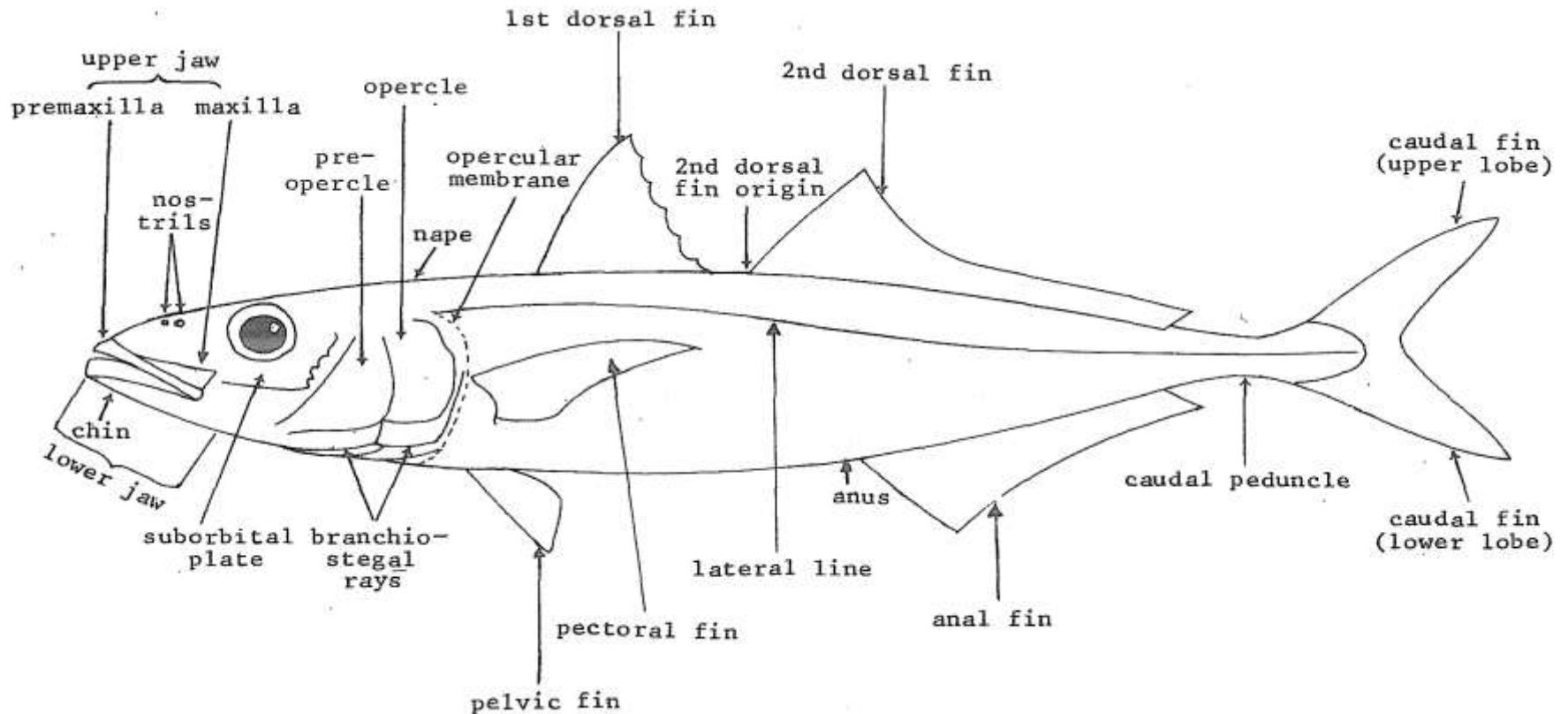
Order of classification

<i>Kingdom</i>	King
<i>Phylum</i>	Please
<i>Class</i>	Can
<i>Order</i>	Our
<i>Family</i>	Family
<i>Genus</i>	Go
<i>Species</i>	Space

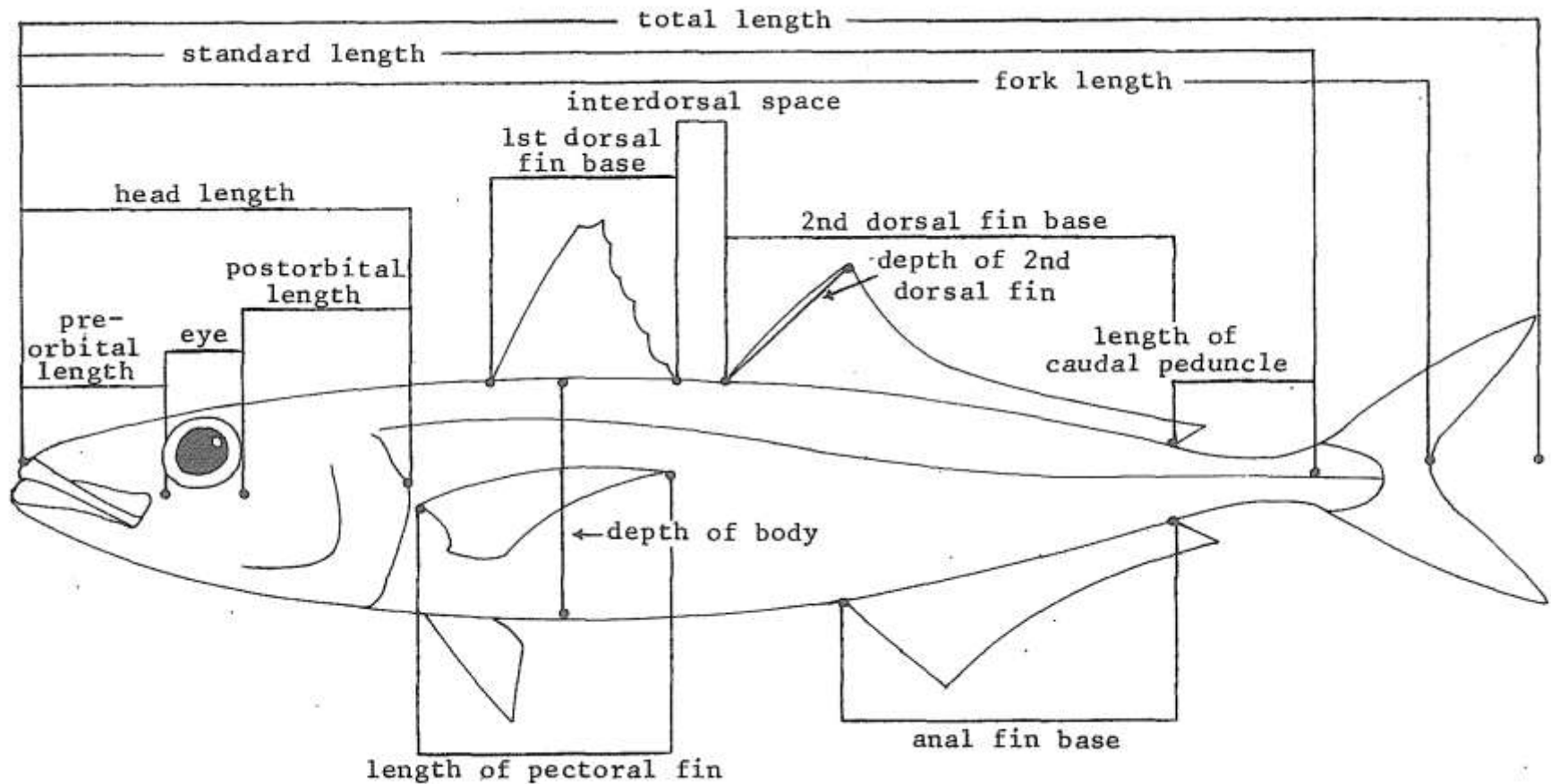
Example of order of classification

<i>Level</i>	<i>Man</i>	<i>Fish</i>
<i>Kingdom</i>	Animalia	Animalia
<i>Phylum</i>	Chordata	Chordata
<i>Subphylum</i>	Vertebrata	Vertebrata
<i>Class</i>	Mammalia	Mammalia
<i>Order</i>	Primates	Perciformes
<i>Family</i>	Hominidea	Scombridae
<i>Genus</i>	Homo	katsumons
<i>Species</i>	Sapiens	pelamis

Morphometric Measurements of a Fish



Morphometric Measurements of a Fish

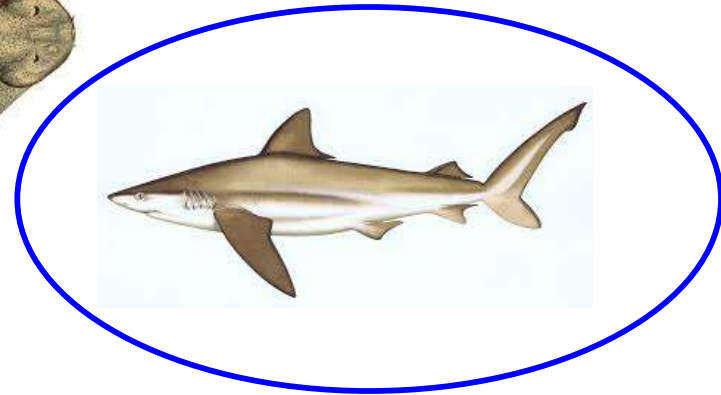
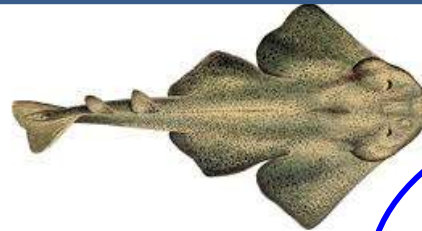


CLASSIFICATION OF PISCES

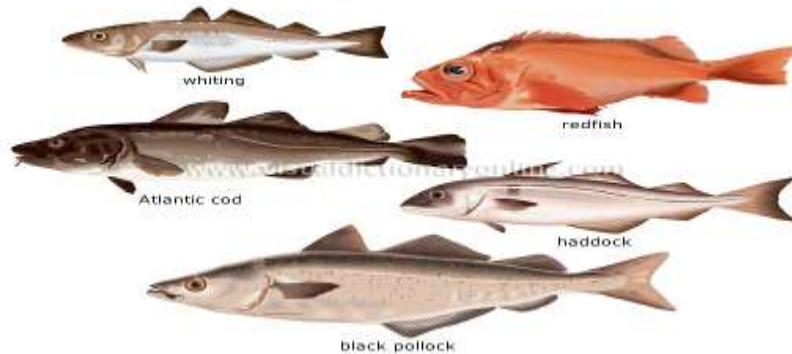
Placodemi



Elasmobranchi (Chondrichthyes)



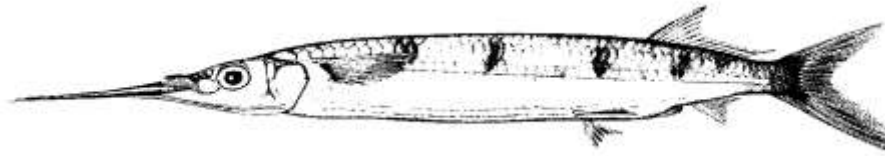
Osteichthyes



Hemiramphus far

Taxonomic Classification

Kingdom	:	Animalia
Phylum	:	chordata
Class	:	Actinopterygii
Order	:	Beloniformes
Family	:	Exocoetidae
Genus	:	Hemiramphus
Species	:	<i>Hemiramphus far</i>



Vernacular Name: Black-barred half beak, Black-barred gar fish.

External Features:

- An elongate fish with a greatly prolonged body
- Lower jaw looks Beak-like; and the upper jaw is short, triangular and scales less.
- No spines in the fins;
- Dorsal fin rays are 12 to 14 anal fin rays are 10 to 12.
- Pectoral fins are short.
- Caudal fin deeply forked, lower lobe much longer than upper

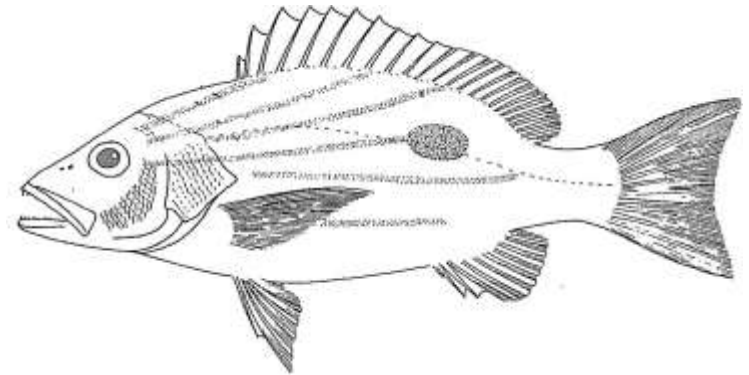
Diet: Adults feed mainly on sea grasses, to a lesser extent on green algae and diatoms.

Colour: Dark bluish above, silvery white below, with 3 to 9 (usually 4 to 6) vertical bars on the sides. Beak dark, with a bright red fleshy tip.

Lutjanus sp.,

Taxonomic Classification

Kingdom	:	Animalia
Phylum	:	Chordata
Class	:	Actinopterygii
Order	:	Perciformes
Family	:	Lutjanidae
Genus	:	Lutjanus
Species	:	<i>Lutjanus sp.,</i>



Vernacular Name: Lunartail snapper, Perch

External Features:

- A small, robust snapper body with a shallow or indistinct notch present in the edge of preopercle
- Snout profile straight or convex; Vomerine teeth are present.
- Dorsal fin with 10 spines and 13 or 14 soft rays.
- Anal fin with 3 spines and 8 soft rays;
- Emarginated caudal fins are present. Lateral line scales 47 to 48

Diet: It feeds mainly on the fishes and crustaceans

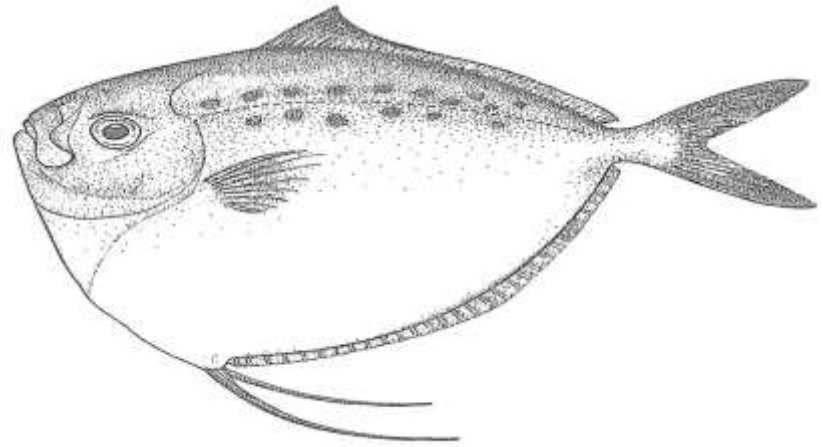
Colour: Ground colour grey-brown, yellow along ventral surface, Dorsal fin greyish or dusky; Caudal fin with a prominent black lunate marking, Anal, pelvic and pectoral fins Yellow.

Size: Maximum size of the fish - 25 cm; Common Size of the fish - 18 cm.

Mene maculata

Taxonomic Classification

Kingdom	:	Animalia
Phylum	:	Chordata
Class	:	Actinopterygii
Order	:	Perciformes
Family	:	Menidae
Genus	:	Mene
Species	:	<i>Mene maculata</i>



External Features:

- Extremely compressed Body is present.
- The Upper jaw is protrusile; bands of villiform teeth in jaws, Gillrakers are well developed.
- Dorsal fin and anal fins are long and low, the anterior rays slightly elevated, the rays very short and overgrown with skin in adults.
- Pectoral fins are shorter than head, with 15 rays.
- The caudal fin is forked

Diet: It feeds on the small invertebrates.

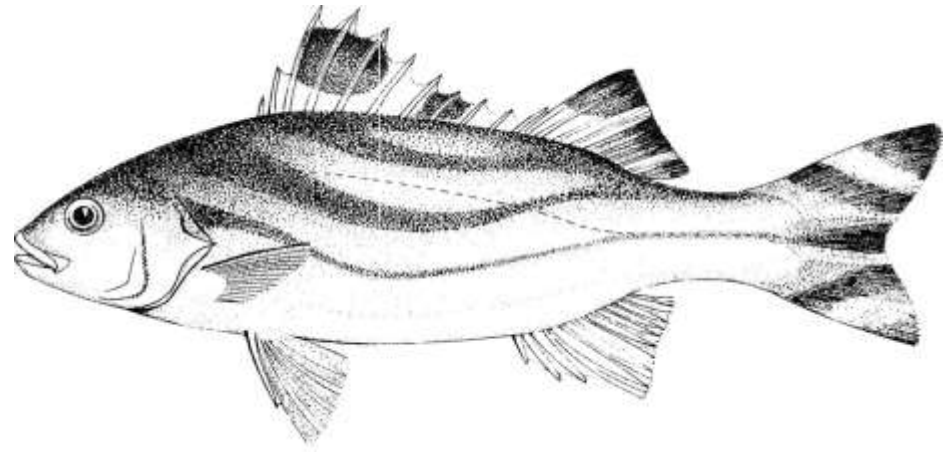
Colour: Dark blue dorsally and silvery white present in below. Several small round black spots are present on the dorsal part of body.

Size: Maximum size - 24 cm; common size - 18 cm.

Terapon jarbua

Taxonomic Classification

Kingdom	:	Animalia
Phylum	:	Chordata
Class	:	Actinopterygii
Order	:	Perciformes
Family	:	Terapontidae
Genus	:	Terapon
Species	:	<i>Terapon jarbua</i>



External Features:

- A moderate-sized species. Oblong compressed body is present.
- Jaws are equal, gape slightly oblique; conical shaped teeth are present.
- Slightly recurved in villiform bands.
- Dorsal fin with 11 or 12 spines and 9 to 11 soft rays.
- The first spine very short, the 4th to 6th spines are longer. Anal fin with 3 spines and 7 to 10 soft rays

Diet: Feeds on fishes and invertebrates; commonly a scale-eater.

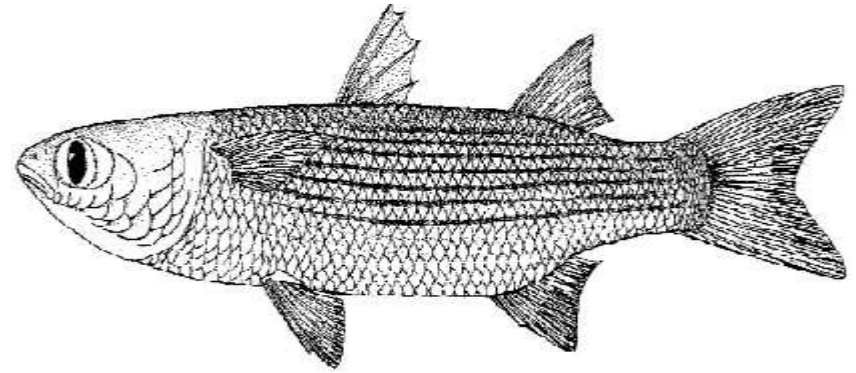
Colour: Body silvery-greyish on the dorsally and silvery white in ventrally; 3 or 4 dark brown or black, downwardly curved longitudinal stripes on body

Size: Maximum size - 30 cm; common size - 25 cm.

Mugil cephalus

Taxonomic Classification

Kingdom	:	Animalia
Phylum	:	Chordata
Class	:	Actinopterygii
Order	:	Mugiliformes
Family	:	Mugilidae
Genus	:	Mugil
Species	:	<i>Mugil cephalus</i>



External Features:

- Body robust, head much flattened dorsally.
- Fatty (adipose) tissue covering most of eye; lips thin, lower lip with a high symphysial knob; Labial teeth are present.
- First dorsal fin origin nearer to snout tip than to caudal fin base; second dorsal fin origin in front of vertical through midpoint of anal fin base.
- anal fin with 3 spines and 8 soft rays; second dorsal and anal fins lightly scaled anteriorly.

Diet: Feeds on small algae (diatoms and foraminifera) and other organic matter, both living and detrital, taken in with sand or mud.

Colour: olive-green on back part, silvery on the sides, and shading to white below. 6 or 7 indistinct brown bands down flanks, a dark purple blotch at base of pectoral fin. Margins of dorsal and caudal fins dusky

Size: Maximum: 90 cm; common to 35 cm.

FISHING GROUNDS AND SEASONS

FISHING GROUNDS

Fishery resources in Maldives are largely subjected to fishing ground and fishing season. The area where marine resources are taken are called fishing grounds. It includes

- 1.In - shore**
- 2.Near – shore**
- 3.Off – shore**

1. In – shore water

- 1.It is associated with the reef. It includes shallow lagoons, reef flat, reef front and reef slope**
- 2.All fishes found in in-shore waters are demersals and few pelagic like tuna**
- 3.It includes bait fish, aquarium fish, reef fish an shark. Other invertebrates like lobsters, crab, sea cucumber, shrimp and octopus**

2. Near – shore water

- 1.It is a water near the reef, within and around atolls ie. Deep lagoons within an atoll and areas between atoll**
- 2.The productivity near by reef environs is high**
- 3.Fish found in near-shore waters are a mixture of demersals and pelagics**
- 4.Fishes like bait fish, frigate tuna, kawakawa, marlin, dolphin fish, tuna like species, deep water sharks etc are found in this zone**

3. Off – shore water

- 1.Off – shore is the oceanic water and this water provide the most of Maldivian catches**
- 2.This catch are all pelagics and includes skipjack and yellow fin tuna**
- 3.These three areas are general and there is no physical barrier between them. In some cases fish from one area freely move into another areas such as**
 - a.Travelly move between the in-shore and near-shore water**
 - b.Tuna move between near-shore and off-shore water**

THANK YOU