



SEAFDEC/UNEP/GEF Project on Establishment and Operation of a Regional System of Fisheries *Refugia* in the South China Sea and Gulf of Thailand

Epinephelus coioides

Orange-spotted grouper



Scientific classification

Kingdom:	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Perciformes
Family:	Serranidae
Subfamily:	Epinephelinae
Genus:	Epinephelus
Species:	<i>E. coioides</i>

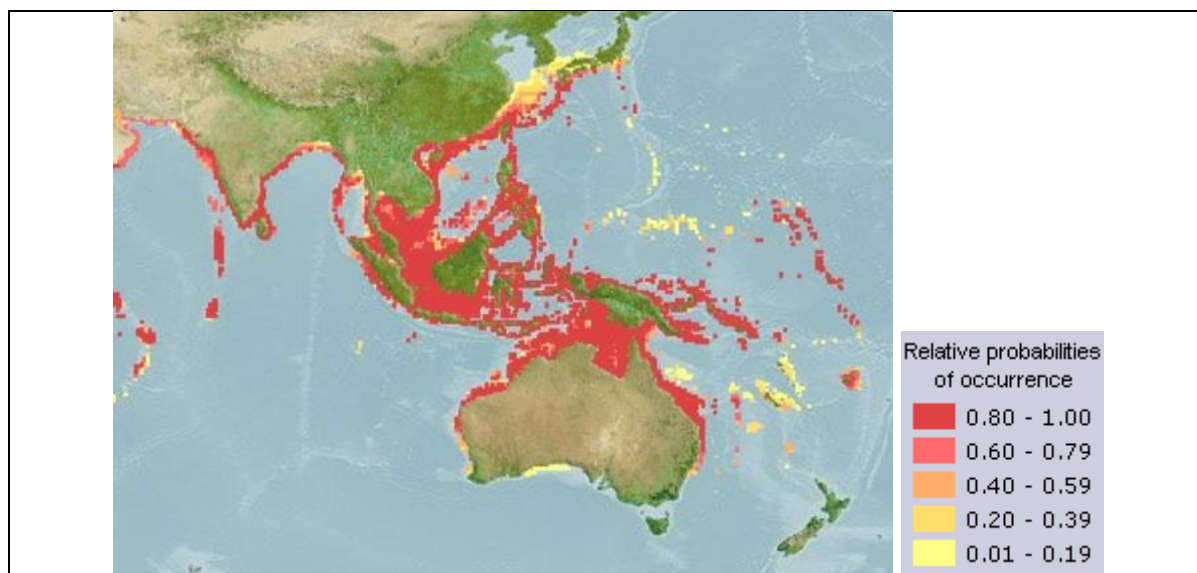
Binomial name

Epinephelus coioides
([Hamilton](#), 1822)

A. Environment/Ecology:

Marine; brackish; reef-associated; depth range 1 - 100 m (Ref. [167](#)). Subtropical; 37°N - 34°S, 28°E - 180°E (Ref. [5222](#))

B. Distribution:



Indo-West Pacific: Red Sea south to at least Durban, South Africa and eastward to Palau and Fiji, north to the Ryukyu Islands, south to the Arafura Sea (Ref. [9819](#)) and Australia. Recently reported from the Mediterranean coast of Israel (Ref. [5222](#)). Frequently misidentified as *Epinephelus tauvina* or *Epinephelus malabaricus* (Ref. [27362](#)).

C. Length at first maturity / Size / Weight / Age:

Maturity: L_m [48.3](#), range 25 - 30 cm Max length : 120 cm TL male/unsexed; (Ref. [47613](#)); max. published weight: 15.0 kg (Ref. [11228](#)); max. reported age: 22 years (Ref. [3627](#)) **Length at First Maturity= 25-30 cm Size= 55-75 Weight= 15kg Age= 2-3years (FiA,2020)**

D. Short description

Dorsal spines (total): 11; **Dorsal soft rays** (total): 13-16; **Anal spines**: 3; **Anal soft rays**: 8. This species is distinguished by the following characters: elongated body with greatest body depth at 2.9-3.7 in SL (for specimens 10-78 cm SL); head length 2.3-2.6 in SL. interorbital width 5.0-6.2 in HL; preopercle with enlarged serrae at angle and a broad shallow notch just above angle; upper edge of operculum straight or somewhat convex; maxilla reaches to or slightly past a vertical at rear edge of eye; upper jaw length 17-20% of SL; midlateral part of lower jaw with 2-3 rows of subequal teeth; gill rakers of first gill arch 8-10 + 14-17; pyloric caeca 50-60; lateral body scales rough, with minute auxiliary scales (body scales ctenoid except for nape, back, thorax, abdomen and above anal-fin base with cycloid scales); lateral-line scales 58-65; lateral-line tubes of anterior scales branched in adults. Colour: head and body tan dorsally, shading to whitish ventrally; numerous small brownish orange or reddish brown spots on head, body, and median fins; body with 5 faint, irregular, oblique, dark bars which bifurcate ventrally (irregular H-shaped bars); back with 3-4 blackish saddles; orange spots become poorly defined and darker with growth (Ref. [39231](#), [90102](#)).

E. Biology

Inhabit turbid coastal reefs (Ref. [9710](#)) and are often found in brackish water (Ref. [27362](#)) over mud and rubble (Ref. [6390](#)). Solitary (Ref 90102). Juveniles are common in shallow waters of estuaries over sand, mud and gravel and among mangroves (Ref. [6390](#)). Feed on small fishes, shrimps, and crabs. Probably spawn during restricted periods and form aggregations when doing so (Ref. [27352](#)). Females mature at 25 to 30 cm (2 to 3 years old), and sexual transition occurs at 55 to 75 cm (Ref. [39231](#)). Eggs and early larvae are probably pelagic (Ref. [6390](#)). Has been tested in several countries as a potential species for mariculture (Ref. [43448](#)). Caught with hook-and-line, traps, trawls, and lift nets. Common and expensive in markets of the region; sold fresh and kept alive at restaurants in Asian countries (e.g. Hong Kong and Taiwan Province of China) (Ref. [39231](#)).

F. Life cycle and mating behavior

Pelagic spawner (Ref. [32184](#)).

G. Fisheries

(NA)

H. IUCN Red List Status

GEOGRAPHIC RANGE

- **Taxonomy**

Kingdom:	Animalia
Phylum:	Chordata
Class:	Actinopterygii
Order:	Perciformes
Family:	Epinephelidae
Genus:	Epinephelus

- **Geographic Range**

NUMBER OF LOCATIONS

UPPER DEPTH LIMIT : 0 metres

LOWER DEPTH LIMIT : 100 metres

RANGE DESCRIPTION

This species is distributed in the Indo-Pacific Ocean from Durban, South Africa; north along East Africa, including Madagascar, Reunion and Mauritius, to the Red Sea and Persian Gulf; east to Palau and Fiji; north to the Ryukyu Islands, Japan; and south to the Arafura Sea and northern Australia (Heemstra and Randall 1993). It has also migrated through the Suez Canal to the eastern Mediterranean (Randall 1995). Its depth range is zero to 100 metres.

- **Population**

CURRENT POPULATION TREND : Decreasing

- **Habitat and Ecology**

System : Marine

Habitat type : Marine Neritic, Marine Intertidal

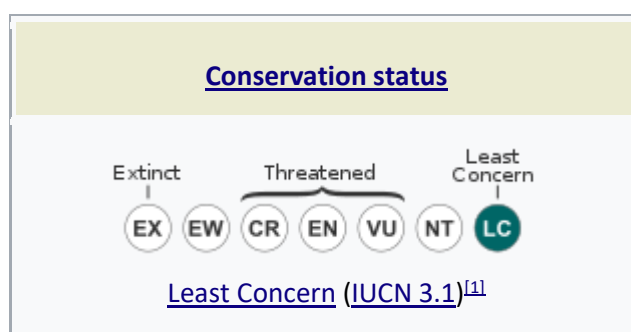
Generation Length : 12.5 years

- **Biological resource use :**

Fishing & harvesting aquatic resource

- **Threats**

Overfishing is a major threat to populations in the Persian Gulf (Grandcourt et al. 2005) and China, but this is not considered a major threat on a global-level at this time. Degradation of estuaries (juvenile habitat) and coral reefs (adult habitat) may also impact this species (Burke et al. 2002).



- **Use and Trade**

This species is important to fisheries through much of its range. It supplies live and chilled fish markets, both domestic and international. Mariculture of this species is extensive in Southeast Asia (Sadovy 2000). It is cultured for local consumption in Thailand and Singapore and for export using mainly wild-caught juvenile seed (Heemstra and Randall 1993, Yashiro 1996). Hatchery production has recently increased. Juveniles are still taken from the wild for grow-out in mariculture operations, but this is very poorly documented. This species is one of the most common next to *E. awoara* used to supply the large mariculture industry of Fujian, China; however, *E. coioides* juveniles are mainly sourced from hatchery production, not wild-caught fisheries (Liu and Sadovy 2009). Spawning aggregations are targeted by local fishers via spear in Papua New Guinea (Hamilton 2003). It is the most important reef-associated, commercial species in the Persian Gulf and is mainly collected via demersal traps (Grandcourt et al. 2005) as well as longlines and trawls (Carpenter et al. 1997). In northern Oman, fishermen target this species with semicircular wire basket traps (McIlwain et al. 2016). It is also commonly taken as bycatch in the shrimp and cutlassfish trawl fisheries of Iran (Raeisi et al. 2011, Paighambari and Daliri 2012, Hosseini et al. 2012).

- **Conservation Action**

Conservation measures directed to the Persian Gulf population have included reduction in fishing effort, modification of gear selectivity and the introduction of juvenile escape panels in the demersal trap fishery. In Qatar, fishery regulations include restricted mesh size,

number of vessels, trip frequency and licensing (A. Al-Kuwayr pers. comm. 2013). However, these measures were found to be ineffective (Grandcourt et al. 2011). Suggested alternative measures include a moratorium on the use of traps in the offshore demersal fishery of Abu Dhabi (Grandcourt et al. 2011). There are no restrictions on fishing effort for this species in Oman (McIlwain et al. 2016). This species is under total protection in New South Wales, Australia (Public Consultation Document 2002) and there is a strict length limit enforced in Queensland, Australia (Fishing Industry Organization and Marketing Amendment Regulation 1993). This species was released on Hong Kong artificial reefs in Yan Chau Tong and Hoi Ha Wan Marine Park in 2001 as a part of restocking trial (Cheung 2001), it is not known if this improved recovery.

I. More Information:

1) Stocks

(NA)

2) Ecology

<i>Ecology of Epinephelus coioides</i>	
Main Ref.	Randall, J.E. and P.C. Heemstra, 1991
Distribution	<p>Brackishwater</p> <ul style="list-style-type: none"> • estuaries/lagoons/brackish seas • mangroves <p>Highlighted items on the list are where <i>Epinephelus coioides</i> may be found.</p>
Remarks	Probably make frequent use of shelters, suggesting an 'ambush' method of feeding (Ref. 6390). Inhabit turbid coastal reefs (Ref. 9710) and are often found in brackish water (Ref. 27362) over mud and rubble (Ref. 6390). Juveniles are common in shallow waters of estuaries over sand, mud and gravel and among mangroves (Ref. 6390). Feed on small fishes, shrimps, and crabs. Probably spawn during restricted periods and form aggregations when doing so (Ref. 27352). Eggs and early larvae are probably pelagic (Ref. 6390).
Substrate	
Substrate	Benthic; Soft Bottom: mud; Hard Bottom: rubble;
Substrate Ref.	Letourneur, Y., P. Chabanet, P. Durville, M. Taquet, E. Teissier, M. Parmentier, J.-C. Quéro and K. Pothin, 2004

3) Diet

Food and Feeding Habits: Diet Composition *Epinephelus coioides*

n = 1

Main Food	Percent	Trophic Level (y)	Predator Life Stage	Country	Locality	Ref.
nekton	37	4.0	adults	New Caledonia	1985-1997	55797
zoobenthos	37	4.0	adults	New Caledonia	1985-1997	55797

4) Reproduction

Reproduction of *Epinephelus coioides*

Main Ref.	Heemstra, P.C. and J.E. Randall, 1993
Mode	protogyny
Fertilization	external
Mating type	
Spawning frequency	one clear seasonal peak per year
Spawning aggregation	Yes. Ref. SCRFA, Science and Conservation of Fish Aggregations, 2018
Batch spawner	Ref.
Reproductive guild	nonguarders open water/substratum egg scatterers
Parental Care	none
Description of life cycle and mating behavior	Pelagic spawner (Ref. 32184).
Search for more references on reproduction	Scirus

5) Maturity

Maturity studies for *Epinephelus coioides*

n = 5

Sort by Lm Country Locality tm

Lm (cm)	Length (cm)	Age range (y)	tm (y)	Sex of fish	Country	Locality
	49.0 -	-		unsexed		Asia-Pacific Region
	25.0 - 30.0	2.0 - 3.0		female		Arabian Gulf
43.5 TL	-	-	2.70	female	United Arab Em.	coast of the Emirate of Abu Dhabi, Sept. 2000-March 2003
53.0 TL	-	-		female	India	North Andhra Region (17°01'N-19°22'N; 83°23'E-85°14'E), Sept 2009-Oct 2011
92.0 TL	-	-		male	India	North Andhra Region (17°01'N-19°22'N; 83°23'E-85°14'E), Sept 2009-Oct 2011

6) Spawning

Spawning for *Epinephelus coioides*
n = 1

J	F	M	A	M	J	J	A	S	O	N	D	Country	Locality
		111	111	111								United Arab Em.	coast of the Emirate of Abu Dhabi, Sept. 2000-March 2003

7) Spawning aggregation

Spawning Aggregations of *Epinephelus coioides*
[n = 1]

Country	Spawning type	Aggregation type	Status
Papua New Guinea	Unknown	Unknown	Decreasing

8) Fecundity

Fecundity for *Epinephelus coioides*
Sort by Country Locality
[n = 1]

Country	Locality	Absolute Fecundity	
		min	max
India	North Andhra Region (17°01'N-19°22'N; 83°23'E-85°14'E), Sept 2009-Oct 2011	43,618	463,940

9) Eggs

Egg Characteristics of *Epinephelus coioides*

Main Ref.	Ordinio-Aguilar, R., H. Kohno, A. Ohno, M. Moteki and Y. Taki, 1995
Place of Development	buoyant (pelagic)
Shape of Egg	spherical
Attributes	smooth, not sticky
Color of Eggs	transparent
Get Information on	Scirus

10) Egg development

(NA)

11) Age/Size

List of Population Characteristics records for *Epinephelus coioides*

n = 8

Sex	Wmax	Lmax (cm)	Tmax (y)	Country	Locality
unsexed		95		Global	East Indies
unsexed		97.9	12.2	United Arab Em.	Abu Dhabi, 2002-2003
unsexed	1.5 kg	100		South Africa	Not specified
unsexed		100		Indonesia	Not specified
unsexed		111	22	Kuwait	Kuwait
unsexed		120			Asia-Pacific Region
unsexed		120		Oman	Not specified
unsexed		120		Iran	Persian Gulf and Oman Sea

12) Growth

Growth parameters for *Epinephelus coioides*

Maximum Length 120cm TL

n = 2

Note that studies where L_{oo} is very different (+/- 1/3) from L_{max} are doubtful.[M vs K graph](#)

[n = 1]

		M vs Linf graph		[n = 1]							
		Longevity vs 3/K graph		[n = 1]							
		$\phi = 3.13$		$L_{inf} = 97.9$ cm TL		$K = 0.1$					
				Median record no. 2							
				55546Ref. 55546							
Loo (cm)	Lengt h Type	K (1/y)	to (years)	M (1/y)	Temp° C	Ø'	Countr y	Localit y	Questionabl e	Captiv e	
93.0	TL	0.167		0.20	23.5	3.16	Kuwait		No	No	
97.9	TL	0.140	-1.50			3.13	United Arab Em.	Abu Dhabi	No	No	

13) Length-weight

Length-Weight Parameters for <i>Epinephelus coioides</i>									
Length-weight (log a vs b) graph						[n=6]			
						Hide graph			
Sort by		<input type="radio"/> a		<input checked="" type="radio"/> b		<input type="radio"/> Country		<input type="radio"/> Locality	
Score	a	b	Sex	Length (cm)	Length type	r ²	n	Country	Locality
<input type="text" value="0.96"/>	0.01990	2.990	mixed	14.2 - 107.0	TL	0.956	440	India	Visakhapatnam, Andhra Pradesh / 2009-2011
<input type="text" value="0.60"/>	0.01440	3.024	unsexed		TL		1912	Kuwait	
<input type="text" value="1.00"/>	0.02160	3.053	unsexed	16.0 - 51.0	SL	0.995	15	Philippines	Davao Gulf / 2009-2012
<input type="text" value="0.99"/>	0.01050	3.084	unsexed	6.5 - 111.0	TL	0.994	41	New Caledonia	lagoon
<input type="text" value="0.99"/>	0.00990	3.102	mixed	6.5 - 111.0	FL	0.994	44	New Caledonia	
<input type="text" value="0.50"/>	0.01020	3.232	Mixed		TL			United Arab Em.	Abu Dhabi, 2002-2003

14) Length-length

Length-length Parameters for <i>Epinephelus coioides</i>						
[n=6]						
Unknown length	a	b	Known length	r	Length range (cm)	Sex of fish
SL	-0.630	0.840	TL	0.999773	11.2 - 82.5	unsexed
TL	0.000	1.000	FL		-	unsexed
TL	0.000	1.148	SL		-	unsexed

TL	0.000	1.217	SL		-	unsexed
TL	0.349	1.223	SL	0.998	16 - 51	unsexed
TL	0.000	1.227	SL		-	unsexed

15) Length-frequencies

(NA)

16) Morphometrics

Morphometric Data for *Epinephelus coioides*

n = 4

Picture Name	Length		Lifestage	Aspect ratio
Epcoi_u0.gif	31.9	SL	unsexed	0.99
Epcoi_u1.jpg	9.1	SL	juvenile	1.42
Epcoi_u3.jpg	12.9	SL	unsexed	1.25
Epcoi_u5.jpg	19.6	SL	unsexed	

Picture Used	EPCOI_U0.GIF
Size (cm)	31.9 SL
Sex	unsexed
Total length (TL)	584 pixels
Standard length	82.2 % TL
Fork length	100.0 % TL
Pre-anal length	59.9 % TL
Pre-dorsal length	32.4 % TL
Pre-pelvic length	30.5 % TL
Pre-pectoral length	32.0 % TL
Body depth	23.8 % TL
Head length (HL)	35.4 % TL
Eye diameter	11.6 % HL
Pre-orbital length	23.7 % HL
Aspect ratio of caudal fin	0.992808

Picture Used	Epcoi_u1.jpg
Size (cm)	9.1 SL, 11.2
Sex	juvenile
Total length (TL)	605 pixels

Standard length	87.1 % TL
Fork length	100.0 % TL
Pre-anal length	57.2 % TL
Pre-dorsal length	28.1 % TL
Pre-pelvic length	30.6 % TL
Pre-pectoral length	29.1 % TL
Body depth	26.3 % TL
Head length (HL)	32.4 % TL
Eye diameter	19.9 % HL
Pre-orbital length	18.4 % HL
Aspect ratio of caudal fin	1.41858
Picture Used	EPCOI_U3.JPG
Size (cm)	12.9 SL, 16.3
Sex	unsexed
Total length (TL)	584 pixels
Standard length	81.5 % TL
Fork length	100.0 % TL
Pre-anal length	56.2 % TL
Pre-dorsal length	28.9 % TL
Pre-pelvic length	29.6 % TL
Pre-pectoral length	26.9 % TL
Body depth	25.7 % TL
Head length (HL)	31.8 % TL
Eye diameter	18.3 % HL
Pre-orbital length	24.2 % HL
Aspect ratio of caudal fin	1.25261
Picture Used	Epcoi_u5.jpg
Size (cm)	19.6 SL, 24.9
Sex	unsexed
Total length (TL)	600 pixels
Standard length	83.3 % TL
Fork length	100.0 % TL
Pre-anal length	55.0 % TL

Pre-dorsal length	27.3 % TL
Pre-pelvic length	28.5 % TL
Pre-pectoral length	27.5 % TL
Body depth	24.5 % TL
Head length (HL)	29.8 % TL
Eye diameter	13.4 % HL
Pre-orbital length	22.9 % HL
Aspect ratio of caudal fin	1.47271

17) Morphology

(NA)

18) Larvae

Larvae Information Summary for *Epinephelus coioides*

Main Ref:	Kailola, P.J., M.J. Williams, P.C. Stewart, R.E. Reichelt, A. McNee and C. Grieve 1993
	Yolk-sac larvae
Place of development	planktonic
Larval area	North West Shelf, Australia

19) Recruitment

(NA)

20) Abundance

(NA)

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