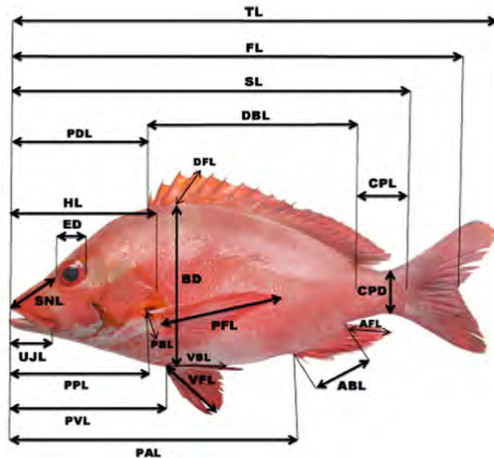


# IDENTIFICATION OF GROUPERS AVAILABLE IN INDIAN WATERS

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TL – Total Length	BD – Body Depth	ABL – Anal Base Length
SL – Standard Length	DFL – Dorsal Fin Length	CPD – Caudal Peduncle Depth
FL – Fork Length	DBL – Dorsal Base Length	CPL – Caudal Peduncle Length
HL – Head Length	PFL – Pectoral Fin Length	PDL – Pre-dorsal Length
ED – Eye Diameter	PBL – Pectoral Base Length	PPL – Pre-pectoral Length
SNL – Snout Length	VFL – Ventral Fin Length	PVL – Pre-ventral Length
UJL – Upper Jaw Length	VBL – Ventral Base Length	PAL – Pre-anal Length
	AFL – Anal Fin Length	

## Family Serranidae - Sea basses

Sea basses are mostly marine in habitat with widespread occurrence from tropical and temperate seas. Fishes are characterised by an opercle with three spines with the main spine in centre and one each above and below. Body scales are generally ctenoid with cycloid scales also reported. Lateral line is continuous, not extending onto caudal fin. Single continuous dorsal fin, in some with notches, 7- 13 spines. Anal fin with 3 spines; caudal fin usually rounded, truncate, or lunate. Tip of maxilla exposed, pelvic fin with one spine and five soft rays; seven branchiostegal rays usually present. Colour patterns are helpful for identification of species, but variations are common based on ground of capture. Colour changes have also been noticed when the fish are brought to the shore. Red List assessments show that 20 species (12%) risk extinction if current trends continue, and an additional 22 species (13%) are considered to be Near Threatened.

Three subfamilies Serraninae, Anthinae and Epinephelinae are recognized worldwide with about 64 genera and 529 species (Fraser and Pauly online).

### **Subfamily Serraninae**

Synchronous hermaphroditism, with both sexes functional at the same time in a single individual, is characteristic of most species in the Subfamily Serraninae. Although these synchronous hermaphrodites can fertilize their own eggs, they normally spawn in pairs and alternate the release of eggs or sperm in order to have their eggs fertilized by the other fish.

The subfamily includes 13 genera *Acanthistius*, *Bullisichthys*, *Centropristis*, *Chelidoperca*, *Cratinus*, *Diplectrum*, *Dules*, *Hypoplectrus*, *Paralabrax*, *Parasphyraenops*, *Schultzea*, *Serraniculus* and *Serranus* with 86 valid species.

### **Subfamily Anthinae**

Includes around 21 genera, *Acanthistius*, *Anthias*, *Caesioperca*, *Caprodon*, *Epinephelides*, *Gigantias*, *Hemanthias*, *Holanthias*, *Hypoplectrodes*, *Lepidoperca*, *Luzonichthys*, *Plectranthias*, *Pronotogrammus*, *Pseudanthias*, *Rabaulichthys*, *Sacura*, *Serranocirrhitus*, *Stigmatonotus*, *Tosana*, *Tosanoides*, and *Trachypoma*, with about 214 species and is mostly being Indo-West Pacific in distribution.

### **Subfamily Epinephelinae**

The tribe Epinephelini is one of the most speciose percoid assemblages, with hypothesized monophyly comprising 167 species.

The subfamily includes around 30 genera *Aethaloperca*, *Alphestes*, *Anyperodon*, *Cephalopholis*, *Cromileptes*, *Dermatolepis*, *Epinephelus*, *Gonioplectrus*, *Gracilia*, *Mycteroperca*, *Paranthias*, *Plectropomus*, *Saloptia*, *Triso*, *Variola*, *Aulacocephalus*, *Belonoperca*, *Diploprion*, *Bathyanthias*, *Liopropoma*, *Rainfordia*, *Aporops*, *Grammistops*, *Jeboehkia*, *Pogonoperca*, *Pseudogramma*, *Rypticus*, *Suttonia* and *Nippon*.

### **Key to the genera of Serranidae**

Less than 1/2 of upper border of opercle joined to body by skin; dorsal-fin spines VII to XI ..... (tribe Epinephelini)- **1a**

1a. Dorsal-fin spines VII or VIII; lower edge of preopercle with 1 to 3 enlarged spines (usually hidden by skin, but these spines can be detected by running a finger or probe along preopercle edge).

Anal-fin spines weak, the first and second covered by skin; preorbital depth 0.7 to 2 times eye diameter; head length 2.8 to 3.1 times in standard length . . . . .

**Plectropomus**

1b. Dorsal-fin spines IX to XI; lower edge of preopercle smooth except for a few species of *Epinephelus* with 1 to 4 enlarged serrae ..... **2**

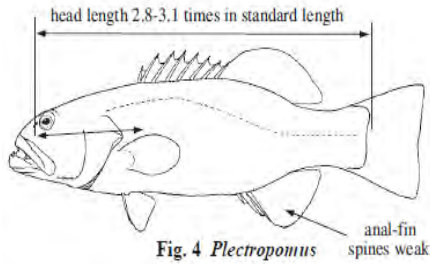
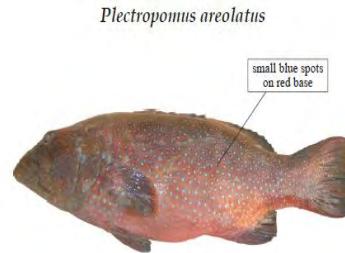
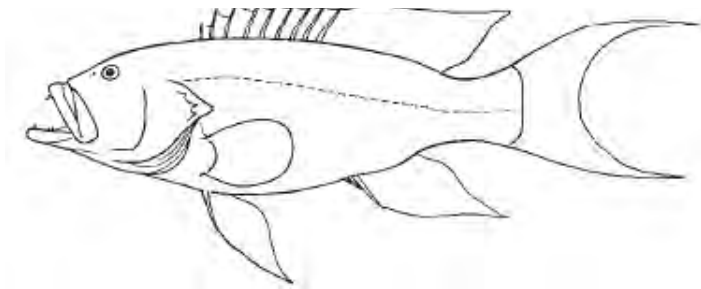


Fig. 4 *Plectropomus* anal-fin spines weak



*Plectropomus areolatus*

2a. Caudal fin deeply lunate or forked; dorsal-fin spines IX. . . . . **Variola**



2b. Caudal fin rounded, truncate, or concave; dorsal-fin spines 9-11.....**3**

3a. No teeth on palatines; body and head elongate and markedly compressed, the greatest body width 11 to 15% of standard length and more than 3 times in head length ..... **Anyperodon leucogrammicus**



3b. Palatines with teeth; body compressed in some species, but its width only 1.8 to 3 times in head length . . . . . **4**

- 4a. Dorsal profile of head markedly concave; dorsal-fin spines X; rear nostrils of adults a long vertical slit . . . . . ***Cromileptes altivelis***



- 4b. Dorsal profile of head straight, convex or slightly concave; dorsal-fin spines IX or XI. . . . . **5**

- 5a. Pectoral fins distinctly asymmetric, the fifth or sixth rays longest; dorsal fin with IX spines and 17 or 18 soft rays; caudal fin truncate . . . . . ***Aethaloperca rogae***



- 5b. Pectoral fins symmetric or nearly so, the middle rays longest; dorsal fin with IX to XI spines and 12 to 21 soft rays; caudal fin rounded, truncate, or emarginate . . **18**

- 6a. Dorsal-fin spines 9 . . . . . **19**

- 6b. Dorsal-fin spines 11 . . . . . **20**

- 19a. Caudal fin rounded; dorsal-fin membranes distinctly incised between spines. . . . . ***Cephalopholis***

- 19b. Body depth 2.4 to 4.1 times in standard length, usually less than head length; dorsal fin with XI spines and 12 to 19 soft rays, the base of soft-rayed part shorter than or equal to that of spinous part. . . . . ***Epinephelus***

**Key to the species of *Cephalopholis* occurring in the area**

1. Caudal fin rounded; head length 2.2 to 2.7 times in standard length; colour pattern not of alternating stripes of blue and orange-yellow . . . . . **2**

- 2a. Anal-fin rays usually 8; colour generally brown to dark brown . . . . . **3**

- 2b. Anal-fin rays 9 (rarely 10); colour generally red, orange, or yellow . . . . . **8**

- 3a. Small dark spots or dark-edged pale blue spots on head and/or body . . . . . **4**

- 3b. No small dark spots or blue ocelli on head or body . . . . . **5**

- 4a. Dorsal-fin rays 15 to 17; lateral scale series 92 to 106; pectoral-fin length 1.5 to 1.8 times in head length; blue ocelli on head, body, and basally on median fins; juveniles greenish grey, the median fins yellow . . . . . ***Cephalopholis cyanostigma***
- 4b. Pectoral fins short, their length 1.5 to 1.8 times in head length; colour generally brown or yellowish brown, with dark blue lines on head, body, and fins; black spot between upper. 2 opercular spines . . . . . ***Cephalopholis formosa***
- 5a. Body brown, with 7 to 8 more or less distinct dark bars; fins dark brown, with pale blue line caudal fin corner. . . . . ***Cephalopholis boenak***
- 5b. Dorsal-fin rays 15 to 17; lower limb of first gill arch with 17 to 19 gill rakers; colour dark brown, covered with small dark-edged blue ocelli; 6 pale bars often visible on rear half of body . . . . . ***Cephalopholis argus***
6. Dorsal-fin rays usually 14 or 15; lower limb of first gill arch with 13 to 16 gill rakers; no auxiliary scales on body scales; colour not as above . . . . . **7**
- 7a. Lateral-line scales 66 to 80 colour generally red to reddish brown with widely scattered whitish blotches (Indian Ocean) or generally brownish, covered with small dark red to reddish brown spots and irregular white blotches. . . . . ***Cephalopholis sonnerati***
- 7b. Lateral-line scales 45 to 68; colour not as above . . . . . **8**
- 8a. Lateral-line scales 54 to 68; caudal fin blackish red, with red pectoral fins. . . . . ***Cephalopholis urodeta***
- 8b. Lateral-line scales 45 to 56; colour not as above . . . . . **9**
- 9a. Lateral scale series 79 to 90; head length 2.2 to 2.4 times in standard length; dark brown saddle spot on caudal peduncle, followed by a smaller spot; submarginal dark streak at corners of caudal fin . . . . . ***Cephalopholis leopardus***
- 11b. Lateral scale series 90 to 121; head length 2.3 to 2.6 times in standard length; colour not as above . . . . . **12**
- 12a. Head, body, and fins covered with small blue ocelli . . . . . **13**
- 12b. No blue spots on head, body, or fins . . . . . **14**

13a. Body with 4 or 5 dark blotches along base of dorsal fin, a faint blotch on nape and 2 smaller ones on peduncle (blotches sometimes merging with or being replaced by dark red vertical bars); most specimens with dark-edged blue lines radiating from eyes . . . . . ***Cephalopholis sexmaculata***

13b. No dark blotches on body or blue lines radiating from eyes . . . . . ***Cephalopholis miniata***

14a. Edge of subopercle and interopercle distinctly serrate; pelvic fins usually reaching anus, their length 1.6 to 2 times in head length; colour generally orange-yellow to orange-red or golden, with red to orange dots on head and dorsally on body . . . . . ***Cephalopholis aurantia***

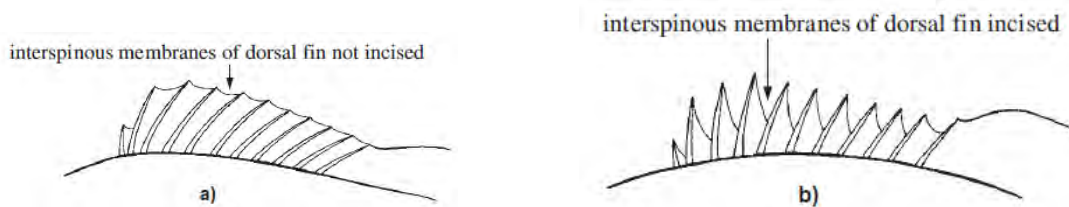
**Key to the species of *Epinephelus* occurring in Indian waters**

1a. Caudal fin of adults emarginate to truncate (slightly rounded on some *E. bleekeri* and juveniles, and convex if broadly spread in adults) . . . . . **2**

1b. Caudal fin rounded (truncate on some *E. fasciatus* from Oceania) . . . . . **12**

2a. Interspinous membranes of dorsal fin not incised. . . . . **3**

2b. Interspinous membranes of dorsal fin incised. . . . . **6**



3a. Gill rakers elongate, no rudiments, 20 to 23 rakers on lower limb of first gill arch; dorsal-fin rays 17 to 19; colour purplish to brownish grey with yellowish brown dots on head and longitudinal brown lines on dorsal part of body (lines usually lost on large adults) . . . . . ***Epinephelus undulosus***

3b. Gill rakers not elongate and rudiments often present, 13 to 18 rakers on lower limb of first gill arch; dorsal-fin rays 15 to 17; colour not as above . . . . . **4**

4a. Second dorsal-fin spine of adults elongated, its length 1.8 to 2.4 times in head length; total gill rakers on first gill arch 20 to 23; body depth 2.7 to 3.2 times in standard length; body reddish brown with a white dot on each scale; broad dark red margin on spinous portion of dorsal fin . . . . . ***Epinephelus irroratus***

- 4b. Second dorsal-fin spine not elongate (third or fourth spines longest); total gill rakers on first gill arch 24 to 28; body depth 2.3 to 2.9 times in standard length . . . . . **5**
- 5a. Body dark purplish grey with scattered irregular whitish blotches; body depth 2.6 to 2.9 times in standard length . . . . . ***Epinephelus multinotatus***
- 5b. Head, body, and fins bluish grey with numerous blackish dots; large adults with scattered irregular blackish spots and blotches, most smaller than pupil; body depth 2.4 to 2.7 times in standard length . . . . . ***Epinephelus cyanopodus***
- 6a. Lateral-line scales 48 to 54; head and at least front of body with small spots, either yellow (pale in preservative) or brown . . . . . **7**
- 6b. Lateral-line scales 56 to 76; spots on head and body dark brown or absent . . . . . **10**
- 7a. Caudal fin truncate to slightly rounded; body depth 3.0 to 3.5 times in standard length; head, body, dorsal fin, and upper third of caudal fin with small orange-yellow spots, the lower two-thirds of caudal fin dark grey; anal and paired fins dusky, without spots . . . . . ***Epinephelus bleekeri***
- 7b. Caudal fin slightly emarginate (truncate on some *E. chlorostigma*); body depth 2.7 to 3.4 times in standard length; spots on head, body, and fins yellow or yellowish brown to dark brown; anal fin with spots. . . . . **8**
- 8b. Head, body, and fins covered with small, close-set, yellowish brown to dark brown spots (dark in preservative) . . . . . **9**
- 9a. Dorsal-fin rays 15 to 17; anal fin of adults rounded to slightly angular, the longest soft ray 2.0 to 2.6 times in head length; 14 to 16 gill rakers on lower limb of first gill arch; pyloric caeca 11 to 17; dark spots on body of adults about equal to pupil . . . . . ***Epinephelus areolatus***
- 9b. Dorsal-fin rays 16 to 18; anal fin of adults angular or pointed, the longest soft ray 1.9 to 2.3 times in head length; 15 to 18 gill rakers on lower limb of first gill arch; pyloric caeca 26 to 52; dark spots on body of adults distinctly smaller than pupil . . . . . ***Epinephelus chlorostigma***
- 12a. Anal-fin rays 9 (rarely 10); body with 5 dark bars below dorsal fin, the last 2 bars as broad as preceding bars; 2 pale interspaces below soft dorsal fin . . . . . ***Epinephelus octofasciatus***

12b. Anal-fin rays 8 (rarely 7 or 9); colour not as above . . . . . **13**

13. Lateral-line scales 56 to 65; lateral body scales smooth; rear nostrils and anterior nostrils subequal; juveniles with 2 broad, longitudinal, black-edged whitish bands that disappear in adults, the dark edges breaking into dashes and spots, which may be lost in large adults . . . . . ***Epinephelus latifasciatus***

14. Lateral-line scales with branched tubules; eye small, its diameter about 1/8 head length for specimens of 20 cm length, about 1/9 head length at 35 cm, and 1/13 head length at 145 cm standard length; interorbital wide, the width more than 1/5 head length for specimens of 23 to 153 cm standard length; maximum length about 270 cm; juveniles yellow, with 3 broad black bars on body and irregular black bands on head . . . . . ***Epinephelus lanceolatus***

### **Some common species**

#### ***Aethaloperca rogae* (Forsskal, 1775)**

Redmouth grouper

D IX, 17; A III, 8; P 17-18; V I, 5.

Body rounded its depth greater than head length; mouth slightly superior; dorsal profile of head steeply sloped; small hump on nape; pre-operculum finely

serrated; operculum with 3 undeveloped spines; pelvic fins equal to pectorals, reaching the level of anus or beyond; caudal fin truncate.

Body uniformly dark brown to black; reddish inside the mouth, gill cavity and upper jaw membrane; soft-rayed part of dorsal fin and caudal fin margin white white.

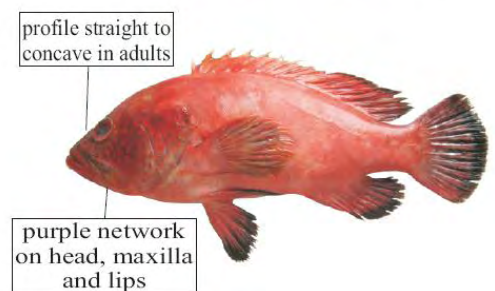


#### ***Cephalopholis sonnerati* (Valenciennes, 1828)**

Tomato hind

D IX, 15; A III, 9; P 17-18; V I, 5; Gr 14 to 16.

Body depth, greater than or equal to head length; dorsal profile of head near eye and nape strongly convex; mouth small, slightly superior; maxilla reaches posterior of eye; pre-operculum rounded; **operculum spines very small, poorly developed**; Body bright orange to red, with scattered bluish-white

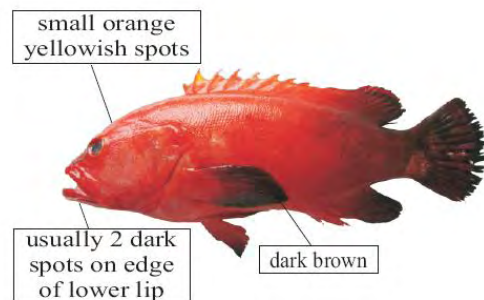




spots; head purplish to red with numerous close-set orange-red spots; opercular flaps dark reddish; all fins reddish, the membranes of soft dorsal, caudal, anal, pectoral and pelvic fins dark red to dusky.

### ***Cephalopholis urodeta***

Similar to *C. sonnerati*, but differs in the absence of the reticulate pattern in *C. sonnerati*



### ***Epinephelus polyphkadion* (Bleeker 1849)**

Camouflage grouper

D XI, 15; A III, 8; P 16; V I, 5; LL 47 to 52; Gr (8-10) + (15-17).

Dorsal profile of head evenly convex; maxilla reaches rear edge of eye; pre operculum rounded, the serrae at corner slightly enlarged; two undeveloped spines in operculum; inter spinous membranes moderately incised; caudal fin rounded; body scales ctenoid.

Body pale brownish covered with numerous small dark brown spots; some irregular dark blotches



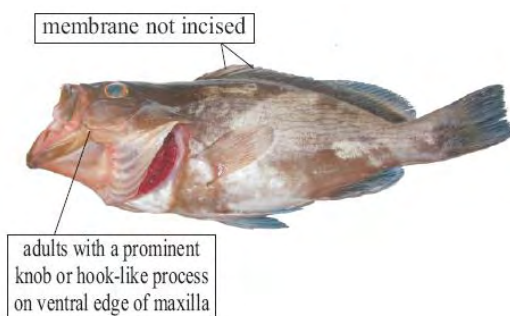
superimposed with the spots scattered in head and body; **a prominent black blotch on caudal peduncle**; dark spots extend all over head, including lower jaw, lips and inside of mouth; numerous small white spots on fins and a few on head and body.

### ***Epinephelus undulosus* (Quoy & Gaimard 1824)**

Wavy-lined grouper

D XI, 20; A III, 8; P 18; V I, 5; LL 70 to 75.

Eyes small; mouth superior to slightly protractile; pre-operculum highly serrated at the



angle; operculum notched with 2 undeveloped spines; **dorsal fin membrane not notched** between the spines; body scales ctenoid, except on belly; caudal fin truncate to slightly concave. Body generally brownish to purplish grey, usually with golden brown

to yellowish spots on head and upper body, which becomes wavy longitudinal lines in mid body; median fins and pelvic fin black to brown in base and bluish in the tip; preserved specimen becomes brownish with dark spots and lines.

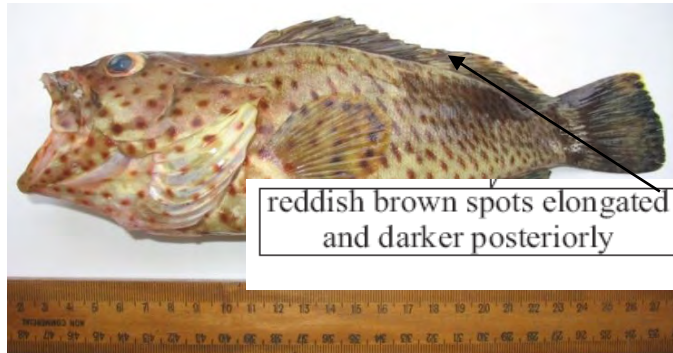
***Epinephelus longispinis* (Kner 1864)**

Longspine grouper

D XI, 16; A III, 8; P 18; V I, 5; LL 49 to 53; Gr (8 to 11) + (15 to 17).

Body deep, upper edge of operculum straight or slightly convex, with 3 undeveloped spines; the third or fourth spine longest, its length contained 2.1 to 2.6 times in head length; caudal fin rounded, convex.

Body pale to brownish and grey laterally; reddish to dark brown spots all over the body, which is round in head and slightly elongated in sides; some dark



reddish brown spots elongated and darker posteriorly

spots or blotches at dorsal fin base; median and paired fins with dark brown spots; tip of the fins slightly yellowish; preserved specimen becomes brownish with dark spots.

***Plectropomus leopardus* (Lacepede 1802)**

Leopard coral grouper

D VII, 12; A III, 8; P 16; V I, 5; LL 89 to 99; Gr (1-3) + (6-10).

Body elongate, robust; Head comparatively small, 2.7 to 3.1 times in standard length; dorsal profile of the head slightly sloped, with a concave insertion near nape; eyes slightly prominent; mouth oblique, slightly superior; preoperculum rounded,



with 3 large, spines along lower half; operculum with 3 flat spines, the upper and lower spines covered by skin; pectoral fins subequal to pelvic fins; caudal peduncle broad; caudal fin emarginated.

Body brownish to orange-red, with numerous small dark-edged, blue spots on head and body (except ventrally) and fins; spots slightly elongated near mid body; pectoral fins reddish with darker rays; a indistinct dark band at rear margin of caudal fin.

***Variola albimarginata* (Baissac 1953)**

White-edged lyretail

D IX, 14; A III, 8; P 18; V I, 5; LL 120-130; Gr (7-9) + (13-16).

Body elongated, moderately deep; dorsal profile of head gently sloped; eyes small; mouth oblique, terminal; jaws with sharp canine teeth; maxilla reaches beyond the eye; pre-operculum finely serrate; operculum spines not well developed; soft rays tips of fins slightly elongated; caudal fin crescentic, the upper and lower rays elongate.



Brownish orange to reddish with numerous irregular, small whitish to pink or lavender spots to streaks; fins colour same as body except pectoral fin and caudal fin rear margin; rear margin of caudal fin dusky with a narrow white edge; pectorals yellowish; preserved specimens changes complete brownish white.

***Epinephelus coeruleopunctatus* (Bloch, 1790)**

White Spotted grouper

D XI, 15; A III, 8; P 18; V I, 5; LL 52-62; Gr 10+14-17.



Body moderately elongated; dorsal profile of the head nearly straight; head pointed; Body depth more or less equal to head length; pre-operculum rounded, serrated; eyes big, prominent; dorsal and anal fin soft rays, pectoral and caudal fins

rounded.

Body brownish gray to black with numerous large white spots including fins; dark blotches below dorsal fin and caudal peduncle; prominent black streak on maxillary groove.

***Cephalophalis miniata* (Forsskål, 1775)**

Coral hind

D XI, 14; A III, 8; P 17; V I, 5; LL 47-56; Gr 7-9+14-16.

Body moderately deep; dorsal profile of the head straight, with convex above eye; maxilla big, crossing the rear edge of eye; eyes small; pre-operculum rounded; soft rays of dorsal and anal fin, pectoral and caudal fins rounded.



Body orange to reddish brown, with small blue spots all over the body including fins; Margin of soft rays of dorsal and anal and caudal fins bluish.

***Anyperodon leucogrammicus* (Valenciennes, 1828)**

Slender grouper

D XI, 14; A III, 8; P 15; V I, 5; LL 61-72; Gr 7-9+14-17.

Body elongated, slightly compressed; head elongated, its length greater than body depth; dorsal profile of the head slightly sloped to straight; eyes moderate; mouth



large terminal; pre-operculum slightly serrated, rounded; interfin membrane of soft rays transparent; soft rays of dorsal and anal fin, pectoral and caudal fins rounded.

Body greenish brown to gray with numerous reddish spots including head and fins; spots in head small; 3 to 4 longitudinal white bands running from mouth to caudal peduncle.

***Cephalopholis argus* (Schneider, 1801)**

Peacock hind

D XI, 16; A III, 9; P 16; V I, 5; LL 46-51; Gr 9-11+17-19.

Body deep; head big, its length 2.4 to 2.7 times in standard length; eyes small; mouth big, terminal to slightly superior; maxilla extends beyond to the level of eye; pectoral fin fleshy; dorsal and anal fin soft rays, pectoral and caudal fins rounded.



Body dark brown with numerous blue to white spots with dark margin; 5 to 6 pale vertical bars on the rear part of body; dorsal fin spines with orange margin; posterior margin of median fins darker with a narrow white tip; pectoral fin with dark brownish to purplish red posterior edge.

***Cephalopholis formosa* (Shaw, 1812)**

Bluelined Hind

D IX, 18; A III, 8; P 15; V I, 5; LL 47-51; Gr 6+15.

Body moderately, deep; dorsal profile of the head sloped with convex inter-orbital; eyes small; maxilla ends at



posterior end of the eye; dorsal and anal fin soft rays, pectoral and caudal fins rounded; body scales ctenoid.

Body dark yellowish brown, fins darker; wavy longitudinal blue lines all over body including head and fins; blue spots on the snout, lower part of head and thorax.

### ***Epinephelus lanceolatus* (Bloch 1790)**

Giant grouper

D XI, 14; A III, 8; P 16; V I, 5; LL 46-51; Gr (9-11)+(17-19).

Body robust in adult and slightly deep in juveniles; dorsal profile of the head slightly convex; eyes small; mouth moderately big, terminal to superior; maxilla reaching rear edge of eye; pre-operculum finely serrated in edges; inter fin membrane of spines



notched; soft rays of dorsal and anal fin, pectoral and caudal fins rounded.

Body greyish yellow above, grayish white below and sides with numerous

uneven black blotches all over the body; head darker; fins yellowish with black blotches; juveniles with 3 irregular black bars in body, large adults dark brown to grey. This is a protected species under Wild Life (Protection) act, 1972 of India.

### ***Cephalopholis cyanostigma* (Valenciennes, 1828)**

Blue spotted hind

D IX, 15; A III, 8; P 15; V I, 5; LL 46 to 50; Gr 7-9+14-18

Body moderately compressed, deep; dorsal profile of head convex above eye; eyes small slightly projected; mouth large terminal to superior; maxilla vertically reaching the rear edge of the eye; pre-operculum rounded; body scales ctenoid; soft rays of the dorsal and anal fin, pectoral and caudal fin rounded.



Body brown to brownish red, head darker; with numerous black edged bluish spots all over the body

including fins; spots in head, chest and belly comparatively big with spots in fins and posterior body; sides with 4 to 5 dark chain like bars; median fins darker than body colour; pectoral fin darker or with black margin at the free tip.

***Epinephelus ongus* (Bloch, 1790)**

White streaked grouper

D XI, 14; A III, 8; P 15; V I, 5; LL 48 to 53; Gr 8-10+15-18.

Body comparatively deep; dorsal profile of head steeply sloped, slightly convex above eye; eyes big projected; mouth moderately small; maxilla vertically reaching middle of



the eye; head slightly pointed; pre operculum rounded; soft rays of dorsal and anal fins, pectoral and caudal fin rounded.

Body brownish with numerous small white spots all over the body which sometimes forms wavy lines; head

darker with less white spots; median fins with small white spots, posterior margin darker with white tip; paired fins greyish brown.

***Epinephelus merra* (Bloch, 1793)**

Honeycomb grouper

D XI, 17; A III, 8; P 17; V I, 5.

Body robust, slightly compressed, elongated; mouth superior, large, maxilla exposed, slightly protractile; small, slender teeth on jaws, vomer and palatine; some small canines on front; eyes prominent; dorsal profile of the head sloped; pre-operculum serrated; one flat spine on operculum; small ctenoid scales; pectoral fin like an hand fan; caudal fin rounded.



Body grey above and lighter below; brown to black spots all over the body, hexagonal anteriorly, rounded posterior; fins rays of dorsal and caudal fin yellowish; pectoral and pelvic fins dark brown to black.

***Epinephelus flavocaeruleus* (Lacepède, 1802)**

Blue-and-yellow grouper

D XI, 8; A III, 5; P 16; V I, 5; LL 61-74; GR (9-10) + (15-17)

Body deep; dorsal profile convex; eyes small, head length 2.5 in SL; BD 2.5 in SL; nostril top of the eye; mouth inferior;



teeth canine; operculum with undeveloped spines; pre-operculum serrated; interfin membrane of dorsal fin deeply notched; caudal fin truncate; caudal peduncle thick and short. In fresh condition body colour blackish with bright yellow dorsal, anal and caudal fins; outer tip of caudal blackish; in formalin preserved specimens fins are whitish; black tip of caudal fin is retained.

***Epinephelus spilotoceps* (Schultz, 1953)**

Four saddle grouper

D XI,17;A III,8;P 17;l,5;LL 60-69;GR (7-8)+(15-18)

Body elongated; pre dorsal profile is slightly convex; eyes small; head length 2.5 in SL; BD 2.5 in SL; mouth inferior; maxillary ends at the middle of the eye; teeth canine;



operculum with one developed spine; pre-operculum serrated; pectoral fin origin in front of the pelvic fins; dorsal fin spinous interfin membrane deeply notched; caudal fin truncate; caudal peduncle thick and short.

In fresh condition the body colour is yellowish brown with spot all over the body; in formalin preserved specimens the black spots are light black.

***Epinephelus diacanthus* (Valenciennes, 1828)**

Thornycheek grouper

D XI, 15-17; A III, 8-9; P 18-20; VI, 5; LI 105-120.

Body depth contained 2.8 to 3.2 times in standard length. Pre-opercle border forming nearly a right angle, with 1 to 3 enlarged serrae at the angle; sides of lower jaw with 2 rows of small subequal teeth; anterior nostrils tubular, with a large flap posteriorly extending over rear nostril; lower gillrakers 14 to 16. caudal fin rounded to almost truncate. Pored lateral line scales 53 to 60. Body generally buff, with 5 more or less distinct, vertical dark bars; 4 bars below dorsal fin and 5<sup>th</sup> on caudal peduncle. Ventral part of head and body reddish. Some specimens with a black streak across cheek at upper edge of maxilla. Dark bars on body sometimes absent.

