

CORAL REEF FISH DIVERSITY OF KG TEKEK, PULAU TIOMAN MARINE PARK

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ABSTRACT

A random dive survey of coral reef fish of Kg. Tekek, Pulau Tioman Marine Park was conducted to look at the diversity of coral reef fish in the area. The survey was conducted at various depths from the deepest part, after coral slope to the shallowest part, near the shoreline. Night dive was also conducted to look at the nocturnal species. A total of 191 species of coral reef fish from 41 families were observed at the study area. Pomacentridae (damselfish) is the most dominant family with the highest number of species (39 species), followed by Labridae (wrasse) with 28 species. Gobiidae is the third largest family found in the area, with 16 species. Other major families that have high species numbers in the area are Serranidae (groupers), Apogonidae (cardinalfish) and Scaridae (parrotfish). One of the major absentee from the area is family Chaetodontidae (butterflyfish), with only 4 species observed. The number of species observed during the study is higher when compared to the other sites from previous study that was conducted at Pulau Tioman Marine Park.

INTRODUCTION

Marine parks and marine protected areas were created at various locations in the world with aims to promote conservation, recreation, education, research and management of coastal resources and seas (Upton, 1992). Pulau Tioman was gazetted as a marine park in 1994, with other 40 islands from the surrounding waters in Kedah, Terengganu, Pahang, Johor and Wilayah Persekutuan Labuan under the Fisheries Act 1985 (Anon, 1996, Nickerson et al., 1998, Hiew, 1999, Spalding et al., 2001). However, little research has been conducted to look at the diversity of coral reef fish species in this unique ecosystem. For example, short survey was conducted at a few localities in the marine parks by Harborne et al. (2000). They found a total of 233 coral reef fish species in the Pulau Tioman Marine Park area at seven sites. Randall and Kuitert (1982), described comprehensively one species, *Coris pictoides* (black stripe coris) based on specimen found in Tioman waters.

Objective of survey:

1. To obtain a complete list of coral reef fishes adjacent to Kg Tekek, Pulau Tioman based on visual observation

METHODOLOGY

The study was done in ten days from 7th October 2004 to 12th October 2004 and then continued from October 28th to 31st, 2004 at the reef adjacent to Kg Tekek, Tioman Island. Underwater observation was done using SCUBA diving apparatus at the coral reef area. The species was identified *in-situ* and noted on the waterproof polyester sheets. For the unidentified species, underwater photographs and notes were taken, for further comparisons with illustrations and references (Woods & Woods, 1987). However, there are certain limitations using this method with certain families. Wrasse (Family Labridae) and parrotfish (Family Scaridae) caused particular problems because of similar colour pattern amongst a number of species and different colour phases associated with sex and sex changes within single species (Woods & Woods, 1987, Lieske & Myers, 1994, Allen, 1997 and Randall *et. al.*, 1997). The species were identified accordingly (Allen, 1991; Burgess et al., 1991; Allen, 1997; Lieske & Myers, 1994; Randall et al., 1997; Kuitert & Debelius, 1997; Kuitert & Kozawa, 1999). Observation was done at all depths from the greatest (coral slope area), to the shallowest depth (near the shoreline) where possible to obtain the complete species list of the area. Night dive were also conducted to look at the nocturnal fish composition of the area.

The reefs adjacent to Kg Tekek extends from about 5m from the shoreline to about 60-70m out until the reef slope where it drops down to about 10m before it levels out to a sandy area. From our observations coral diversity and density are higher on the southern side of the study site compared to the northern side. Branching corals such as *Porites cylindrica* is to be found in massive numbers and covering wide areas within the survey area. Massive corals such as *Porites lobata*, *Porites rus* and *Porites lutea* dominate the area and has immense colony growth in the area with heights and width up to 2-3m. Sometimes up to 10 of these colonies are found to be growing next to each other. Large table corals (e.g. *Acropora cytherea*) were found to be up to 5.3m in diameter and massive corals (e.g. *Porites lutea*) up to 2-3m in height and diameter were found. This indicates the corals are very old as typically corals grow very slowly sometimes at 0.1cm per year. Generally the coral density and diversity is very high within 0-50m from the deeper ends of the survey area that is the reef slope. Nearer to the shoreline the corals are sparsely distributed and low in diversity where the dominant coral species was *Pocillopora damicornis* (Affendi Yang Amri, unpublished data).

Coral reef fish species estimation.

Coral reef fish estimation is based on the methods developed by Allen (1991 & 1997) based on his analysis of coral reef fishes from 35 Indo Pacific locations, which have been extensively studied (Werner and Allen, 1998, Allen and Werner, 2002). This index was based on the number of coral reef fish species present that belonging to the families: Chaetodontidae, Pomacanthidae, Pomacentridae, Labridae, Scaridae, and Acanthuridae. All selected groups are important components of reef communities, have widespread distributions and closely associated with those of coral reefs ecosystem. The total number of species in each of the six families for a given area/site is combined to obtain an index of coral fish diversity (CFDI). The CFDI allows comparison of fish diversity throughout the Indo-west Pacific area (Table 1) and this index also permit extrapolation of the approximate total number of coral reef species at a given location by using a simple regression formula. Based on their regression analysis of 35 Indo Pacific locations that have been comprehensively studied, Allen and Werner (2002) suggested that estimate total fish fauna for surrounding sea less than 2000km² is:

$$\text{Total fish fauna} = 3.39 (\text{CFDI}) - 20.595$$

This estimate of total fish fauna based on CFDI predictor value can be used to check the thoroughness of a short-term survey that was conducted in the area (Werner and Allen, 1998, Allen and Werner, 2002) as in the case of this study. The value can also be used to estimate the relative diversity of coral reef fish within the area.

Table 1. Interpretation of CFDI values in terms of relative categories of diversity (Allen and Werner, 2002).

Relative biodiversity	Single site	Restricted area	Country-region
Extraordinary	>150	>330	>400
Excellent	130–149	260–329	330–399
Good	100–129	200–259	220–329
Moderate	70–99	140–199	160–219
Poor	40–69	50–139	80–159
Very poor	<40	<50	<80

RESULTS & DISCUSSION

Species Diversity

A total of 192 species of coral reef fish from 41 families were observed at coral reef of Kg Tekek, Tioman. Complete checklist of species is listed in Appendix 1.

Coral reef fish species found at study site shows a similar composition like other areas in the coral reef ecosystem in the Indo-Pacific Region (Figure 1). Pomacentridae (damselfish) is the most dominant family and has the highest number of species (39 species), followed by Labridae (wrasse) with 28 species. Gobiidae is the third largest family found in the area, with 16 species. Other major families that have high species numbers in the area are Serranidae (groupers), Apogonidae (cardinal fish) and Scaridae (parrotfish). One of the major absentees from the area is family Chaetodontidae (butterflyfish), with only 4 species observed. These seven families usually contributed about 70 to 80 percent of the fish species encountered in the coral reef ecosystem (Sale, 1991; Allen & Werner, 2002).

CFDI value for the six families of coral reef fish of the study sites is 82 and from this value, based on the proposed formula by Allen and Werner (2002), it is estimated the total number of coral reef fish species of that can be found at the study site is 257. More species would be observed if more observation is to be conducted and if fish collection was also conducted during the study. This would add cryptic and hidden species like Anguilliformes (eels) and Apogonidae (cardinalfish), camouflaged species such as Scorpaenidae (scorpionfish), Antennariidae (frogfish), Pleuronectiformes (flatfish), and small species like Gobiidae (gobies), Blenniidae (blennies) and Callionymidae (dragonets) (Kunzmann et al., 1999; Allen & Werner, 2002). Based on

the CFDI value, relative diversity of coral reef species at the sites is to be consider as moderate when compared to the other sites in the Indo-Pacific area (Refer to table 1).

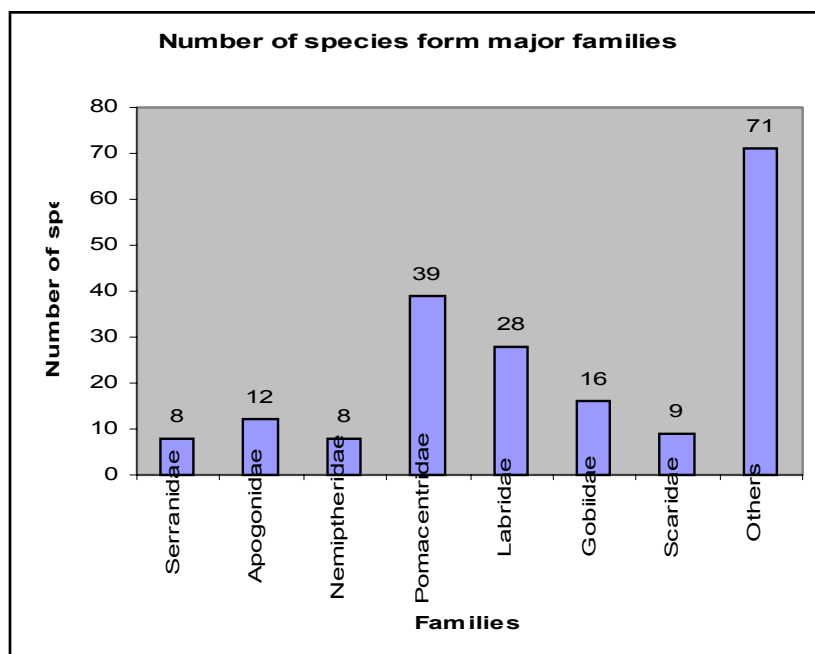


Fig. 1: Total number of species from major families observed at study sites

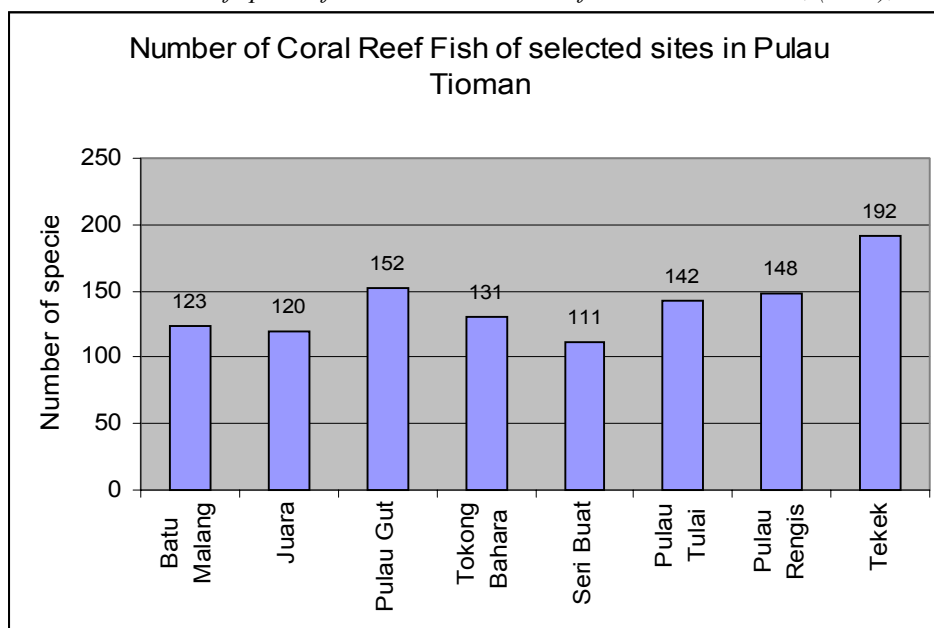
The number of coral reef associated butterflyfish (Family Chaetodontidae) is quite low (4 species) in the area. Low number of Chaetodontid is probably influenced by overall structure of coral cover in the area. Coral reef in the area is dominated by branching *Porites* sp. and with limited coverage of branching staghorn coral (*Acropora* sp.). Bouchon-Navaro et al. (1985) and Ohman et al. (1998) observed that the abundance of Chaetodontidae was significantly correlated to the distribution of staghorn coral (*Acropora* sp.) colonies on the reef. The same condition was also observed at Pulau Payar Marine Park, where the highest number of Chaetodontidae were observed at staghorn *Acropora* area as compared to the other coral types (Yusuf & Ali, 2004). The highest concentration of butterfly fish in the area is observed at big table coral in at the reef flat near the resort. The most common butterflyfish observed in the area is *Chaetodon octofasciatus*, which usually associated with turbid water coral reef area (Hutomo et al., 1991). One threatened species was observed in the study area, *Cheilinus undulatus* (maori wrasse), which is listed in IUCN Red list of threatened species (IUCN, 2002). This species was harvested in various parts of the world for live fish trade and fetch a very high price in restaurant in the East Asian Countries (IUCN, 2002). Other rare and important species observed was *Coris pictoides* (black stripe coris). This species was originally described based on specimen found in Tioman (Randall and Kuiter, 1982). Only one individual of above species were observed during the study.

Comparison with other sites in Pulau Tioman Marine Park

The number of coral reef fish species observed at the study site is slightly lower when compared to previous study that was conducted in Pulau Tioman by Coral Cay Conservation (Harborne et. al, 2000), which observed a total of 233 coral reef fish species from 7 sites around Pulau Tioman. In this study, only 192 species of coral reef fish were observed. However when comparing the number of coral reef fish species between sites from previous study, Tekek (this study site) has the highest diversity of coral reef fish species in Pulau Tioman (Figure 2).

High number of species observed at the study site shows the uniqueness of the area in supporting various species of coral reef fish. High diversity of coral reef fish species is caused by high diversity of substrate and coral cover in a relatively small area. The area is quite unique when compared to other areas in Pulau Tioman as is not dominated by branching *Acropora*, but mainly by massive and branching *Porites*. The area also provided diverse substrate for coral reef fish proliferation i.e. deep sandy area, dense branching and boulder corals (*Porites* sp.), shallow soft coral area, big table coral and sandy reef flat area. Since some species tend to associate with certain type of substrate, high diversity of substrate at study site supported greater diversity of coral reef fish.

Figure 2: Number of coral reef fish species of Tekek and other area in Pulau Tioman.
Numbers of species from the other sites are from Harborne et. al, (2000),



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REFERENCES

- Allen, G.R. and T. B. Werner, 2002. Coral reef fish assessment in the 'coral triangle' of Southeastern Asia. *Environmental Biology of Fishes*, **65**(2): 209-214.
- Allen, G.R., 1991. Damsel-fishes of the world. Mergus Publishers, Melle, Germany. 271 p.
- Allen, G.R., 1997. *Marine fish of the Great Barrier Reef and South-East Asia*. Western Australian Museum, Perth. 292 p.
- Anon., 1985. *Legislature of Malaysia*. 1985. Part IX. Marine Parks and Marine Reserves. Sections 41 to 45. Fisheries Act 1985 (Act 317). pp. 89-92.
- Bouchon-Navaro, Y. and C. Bouchon, 1989. Correlation between chaetodontid fishes and coral communities of the Gulf of Aqaba. *Environ. Biol. Fish.*, **25**: 1-3
- Burgess, W. E., H. R. Axelrod and R. Hunziker, 1991. *Dr. Burgess's mini atlas of marine aquarium fishes*. T.F.H. Publications, Inc.
- English S, C. Wilkinson and V. Baker (eds), 1997. *Survey manual for Tropical Marine Resources (2nd Edition)*. Australian Institute of Marine Science. ASEAN-Australia Marine Science Project. 390 p.
- Harborne, A., D. Fenner, A. Barnes, M. Beger, S. Harding and T. Roxburgh, 2000. *Status Report on the Coral Reefs of the East Coast of Peninsula Malaysia*. Coral Cay Conservation Ltd, London, SW19 2JG, UK. 89 p.
- Hiew, K.W.P. 1998. *Marine Parks of Malaysia: A Management Tool for Fisheries Resources*. Bay of Bengal News II (12): 6-8.
- Hutomo, M, S. R. Suharti & I. H. Harahap, 1991. Spatial variability in chaetodontid fish community structure of Sunda Straits reefs. *Proc. of the Reg. Symp. On Living Resources in Coastal Areas, Manila*, Pp.151-161.
- IUCN 2002 red list of threatened species. WorldWideWeb. <http://www.redlist.org/search/details.php?species=4592>. 9 Nov 2003.
- Kuiter, R.H. and H. Debelius, 1997. *Southeast Asia tropical fish guide*. IKAN-Underwasserarchiv, Frankfurt, Germany.
- Kuiter, R.H. and T. Kozawa, 1999. *2nd Edition fish of Indo-West Pacific: Apogonidae: Pictorial guide*. Aquatics Photographics, Victoria, Australia and Anthis (Nexus), Aichi, Japan.

- Kunzmann, A., J.E. Randall and I. Suprihanto, 1999. Checklist of the shore fishes of the Mentawai Islands, Nias Islands and the Padang Region of West Sumatera. *NAGA*, **22**(1): 4-10.
- Lieske, E. and R. Myers, 1994. *Collins pocket guide: Coral reef fishes: Caribbean, Indian Ocean and Pacific Ocean including The Red Sea*. Harper Collins Publisher, London. 400p.
- Nickerson, G.J., G. Ching and K. Hiew. 1998. *Balancing tourism and resource conservation in Malaysia's Pulau Payar Marine Park*. Intercoast Network: International Newsletter of Coastal Management. 34: 8-9.
- Ohman, M.C., A. Rajasuriya and S. Svensson. 1998. The use of butterflyfishes as bio-indicator of habitat structure and human disturbance. *Ambio*, **27**(8): 708-716.
- Randall, J. E. and R. H. Kuitert, 1982. Three new labrid fishes of the genus *Coris* from the Western Pacific. *Pac. Sci.*, **36**(2):159-173.
- Randall, J.E., G.E., Allen and R. C., Steene 1997. *Fishes of the Great Barrier Reef and Coral Sea (revised and expanded edition)*. Crawford House Publishing, Bathurst, NSW and University of Hawaii Press, xx + 557 p.
- Sale, P. S.1991. Introduction. In Sale, P.S. (ed.). *The ecology of fishes on coral reefs*. Academic Press, Inc. San Diego, California. 754 p.
- Spalding, M.D., C. Ravilious and E.P. Green, 2001. *World Atlas of Coral Reefs*. University of California Press, Berkeley, USA. 424 p.
- Upton, H. F., 1992. Biodiversity and conservation of the marine environment. *Fisheries*, **17**: 20-25
- Werner, T.B. and G.R. Allen, 1998. Conservation International's Marine Rapid Assessment (RAP).In Dight, I., R. Kenchington and J. Baldwin (eds.). *Proceedings, International Tropical Marine Ecosystems Management Symposium (ITMEMS) November 1998, Townsville, Australia*. pp. 336-340
- Wood, C. R. and E. M. Wood, 1987. The coral reef of the Bodgaya Islands (Sabah: Malaysia) and Pulau Sipadan. *Fishes. Malay. Nat. J.*, **40**:285-310.
- Yusuf, Y. and A. B. Ali, 2004. *The use of butterflyfish (Chaetodontidae) as bioindicator in coral reef ecosystems*. In Phang, S., -M. and M. T. Brown (eds.). *Biomonitoring of tropical coastal ecosystems*. University of Malaya Maritime Research Center (UMMReC), Kuala Lumpur, Pp 175- 183.

Appendix 1: Checklist of coral reef fish of Kg Tekek, Tioman. #The distributions and concentration of the species is indicated as "RARE (R), OCCASIONAL (O), or COMMON (C)" in the comment column. Commercial species is indicated as "V" and threatened species is indicated as "T".

	FAMILY	GENUS	SPECIES	COMMON NAME	Comment[#]
1.	HEMISCYLLIDAE	<i>Chiloscyllium</i>	<i>indicum</i>	Bamboo Shark	R
2.	NARCINIDAE	<i>Temera</i>	<i>hardwickii</i>	Electric Ray	R
3.	DASYATIDAE	<i>Himantura</i>	<i>jenkinsii</i>	Stingray	R
4.	DASYATIDAE	<i>Taeniura</i>	<i>lymma</i>	Stingray	O
5.	MURAENIDAE	<i>Gymnothorax</i>	<i>javanicus</i>	Morey eel	O
6.	MURAENIDAE	<i>Siderea</i>	<i>thyrsoidea</i>	Morey eel	O
7.	OPHICHTHIDAE	<i>Ophichthus</i>	<i>melanochir</i>	Snake eel	R
8.	PLOTOSIDAE	<i>Plotosus</i>	<i>lineatus</i>	Marine catfish	R, V
9.	GOBIESOCIDAE	<i>Diademichthys</i>	<i>lineatus</i>	Clingfish	O
10.	SYNODONTIDAE	<i>Synodus</i>	<i>variegatus</i>	Lizardfish	C
11.	HOLOCENTRIDAE	<i>Myripristis</i>	sp.	Squirrelfish	O
12.	HOLOCENTRIDAE	<i>Sargocentron</i>	<i>rubrum</i>	Squirrelfish	O
13.	FISTULARIIDAE	<i>Fistularia</i>	<i>commersonii</i>	Comet fish	R
14.	CENTRISCIDAE	<i>Aeolicus</i>	<i>strigatus</i>	Razorfish	R
15.	SCORPAENIDAE	<i>Dendrochirus</i>	<i>zebra</i>	Scorpionfish	R
16.	SCORPAENIDAE	<i>Scorpaenopsis</i>	<i>venosa</i>	Scorpionfish	R
17.	SCORPAENIDAE	<i>Scorpaenopsis</i>	<i>diabulosa</i>	Scorpionfish	R
18.	SERRANIDAE	<i>Cephalopholis</i>	<i>argus</i>	Grouper	O, V
19.	SERRANIDAE	<i>Cephalopholis</i>	<i>boenack</i>	Grouper	C, V
20.	SERRANIDAE	<i>Cephalopholis</i>	<i>cyanostigma</i>	Grouper	C, V
21.	SERRANIDAE	<i>Cephalopholis</i>	<i>microprion</i>	Grouper	C, V
22.	SERRANIDAE	<i>Ephinephelus</i>	<i>bleekeri</i>	Grouper	R, V
23.	SERRANIDAE	<i>Ephinephelus</i>	<i>fuscoguttatus</i>	Grouper	R, V
24.	SERRANIDAE	<i>Plectropomus</i>	<i>areolatus</i>	Grouper	R, V
25.	SERRANIDAE	<i>Plectropomus</i>	<i>leopardus</i>	Grouper	R, V
26.	GRAMMISTIDAE	<i>Diplorion</i>	<i>bifasciatum</i>	Soapfish	R
27.	PSEUDOCROMIDAE	<i>Pseudochromis</i>	<i>ransonneti</i>	Dottyback	O
28.	APOGONIDAE	<i>Apogon</i>	<i>bandanenis</i>	Cardinalfish	C
29.	APOGONIDAE	<i>Apogon</i>	<i>compressus</i>	Cardinalfish	C
30.	APOGONIDAE	<i>Apogon</i>	<i>cyanosoma</i>	Cardinalfish	C
31.	APOGONIDAE	<i>Apogon</i>	<i>chrysopomus</i>	Cardinalfish	C
32.	APOGONIDAE	<i>Apogon</i>	<i>trimaculatus</i>	Cardinalfish	R
33.	APOGONIDAE	<i>Archamia</i>	<i>fucata</i>	Cardinalfish	C
34.	APOGONIDAE	<i>Archamia</i>	<i>macroptera</i>	Cardinalfish	C
35.	APOGONIDAE	<i>Archamia</i>	<i>zoesterophora</i>	Cardinalfish	C
36.	APOGONIDAE	<i>Cheilodipterus</i>	<i>artus</i>	Cardinalfish	C
37.	APOGONIDAE	<i>Cheilodipterus</i>	<i>quinquelineatus</i>	Cardinalfish	C
38.	APOGONIDAE	<i>Cheilodipterus</i>	<i>macrodon</i>	Cardinalfish	C
39.	APOGONIDAE	<i>Siphamia</i>	<i>versicolor</i>	Cardinalfish	R
40.	GERREIDAE	<i>Gerres</i>	<i>acinaces</i>	Mojarra	O
41.	CARANGIDAE	<i>Alepes</i>	<i>melanoptera</i>	Trevallys	O, V
42.	CARANGIDAE	<i>Carangoides</i>	<i>ferdau</i>	Trevallys	R, V
43.	CARANGIDAE	<i>Caranx</i>	<i>sexfasciatus</i>	Trevallys	R, V
44.	CARANGIDAE	<i>Elagatis</i>	<i>bipinnulata</i>	Trevallys	R, V
45.	CARANGIDAE	<i>Selar</i>	sp.	Trevallys	O, V
46.	LUTJANIDAE	<i>Lutjanus</i>	<i>argentimaculatus</i>	Snapper	R, V

47.	LUTJANIDAE	<i>Lutjanus</i>	<i>carponotatus</i>	Snapper	R, V
48.	LUTJANIDAE	<i>Lutjanus</i>	<i>decussatus</i>	Snapper	O, V
49.	LUTJANIDAE	<i>Lutjanus</i>	<i>ehrenbergi</i>	Snapper	O, V
50.	LUTJANIDAE	<i>Lutjanus</i>	<i>lutjanus</i>	Snapper	O, V
51.	CAESIONIDAE	<i>Caesio</i>	<i>caerulaurea</i>	Fusilier	C, V
52.	CAESIONIDAE	<i>Caesio</i>	<i>cuning</i>	Fusilier	C, V
53.	CAESIONIDAE	<i>Pterocaesio</i>	<i>chrysozona</i>	Fusilier	C, V
54.	HAEMULIDAE	<i>Plectorhinchus</i>	<i>chaetodonoides</i>	Sweetlips	O, V
55.	HAEMULIDAE	<i>Plectorhinchus</i>	<i>flavomaculatus</i>	Sweetlips	R, V
56.	HAEMULIDAE	<i>Plectorhinchus</i>	<i>gibbosus</i>	Sweetlips	R, V
57.	NEMIPHTERIDAE	<i>Pentapodus</i>	<i>bifasciatus</i>	Monocle bream	O
58.	NEMIPHTERIDAE	<i>Pentapodus</i>	<i>setosus</i>	Monocle bream	O
59.	NEMIPHTERIDAE	<i>Scolopsis</i>	<i>affinis</i>	Monocle bream	C
60.	NEMIPHTERIDAE	<i>Scolopsis</i>	<i>bilineatus</i>	Monocle bream	C
61.	NEMIPHTERIDAE	<i>Scolopsis</i>	<i>ciliatus</i>	Monocle bream	C
62.	NEMIPHTERIDAE	<i>Scolopsis</i>	<i>lineatus</i>	Monocle bream	C
63.	NEMIPHTERIDAE	<i>Scolopsis</i>	<i>margaritifera</i>	Monocle bream	C
64.	NEMIPHTERIDAE	<i>Scolopsis</i>	<i>monogramma</i>	Monocle bream	C
65.	LETHRINIDAE	<i>Lethrinus</i>	<i>erythropterus</i>	Emperors	O, V
66.	LETHRINIDAE	<i>Lethrinus</i>	<i>harak</i>	Emperors	R, V
67.	LETHRINIDAE	<i>Lethrinus</i>	sp.	Emperors	R, V
68.	MULLIDAE	<i>Parupeneus</i>	<i>heptacanthus</i>	Goatfish	R
69.	MULLIDAE	<i>Upeneus</i>	<i>tragula</i>	Goatfish	C
70.	PEMPHERIDAE	<i>Pempheris</i>	<i>venicolensis</i>	Sweeper	C
71.	EPHIPPIDAE	<i>Platax</i>	<i>tiera</i>	Batfish	O
72.	CHAETODONTIDAE	<i>Chaetodon</i>	<i>adiergastos</i>	Butterflyfish	R
73.	CHAETODONTIDAE	<i>Chaetodon</i>	<i>baronessa</i>	Butterflyfish	R
74.	CHAETODONTIDAE	<i>Chaetodon</i>	<i>octofasciatus</i>	Butterflyfish	C
75.	CHAETODONTIDAE	<i>Chelmon</i>	<i>rostratus</i>	Butterflyfish	O
76.	POMACANTHIDAE	<i>Chaetodontoplus</i>	<i>mesoleucus</i>	Angelfish	C
77.	POMACANTHIDAE	<i>Pomacanthus</i>	<i>sexstriatus</i>	Angelfish	R
78.	POMACENTRIDAE	<i>Abudefduf</i>	<i>bengalensis</i>	Damselfish	O
79.	POMACENTRIDAE	<i>Abudefduf</i>	<i>sexfasciatus</i>	Damselfish	C
80.	POMACENTRIDAE	<i>Abudefduf</i>	<i>vaigiensis</i>	Damselfish	C
81.	POMACENTRIDAE	<i>Amblyglyphidodon</i>	<i>aureus</i>	Damselfish	C
82.	POMACENTRIDAE	<i>Amblyglyphidodon</i>	<i>curacao</i>	Damselfish	C
83.	POMACENTRIDAE	<i>Amblyglyphidodon</i>	<i>leucogaster</i>	Damselfish	C
84.	POMACENTRIDAE	<i>Amphiprion</i>	<i>clarkii</i>	Damselfish	C
85.	POMACENTRIDAE	<i>Amphiprion</i>	<i>frenatus</i>	Damselfish	C
86.	POMACENTRIDAE	<i>Amphiprion</i>	<i>ocellaris</i>	Damselfish	C
87.	POMACENTRIDAE	<i>Amphiprion</i>	<i>sandaracinos</i>	Damselfish	C
88.	POMACENTRIDAE	<i>Amphiprion</i>	<i>perideraion</i>	Damselfish	C
89.	POMACENTRIDAE	<i>Amphiprion</i>	<i>polymnus</i>	Damselfish	C
90.	POMACENTRIDAE	<i>Cheiloprion</i>	<i>labiatus</i>	Damselfish	C
91.	POMACENTRIDAE	<i>Chromis</i>	<i>atripectoralis</i>	Damselfish	C
92.	POMACENTRIDAE	<i>Chromis</i>	<i>cinerascens</i>	Damselfish	C
93.	POMACENTRIDAE	<i>Chromis</i>	<i>viridis</i>	Damselfish	O
94.	POMACENTRIDAE	<i>Chrysiptera</i>	<i>rollandi</i>	Damselfish	O
95.	POMACENTRIDAE	<i>Chrysiptera</i>	<i>unimaculata</i>	Damselfish	O
96.	POMACENTRIDAE	<i>Dascyllus</i>	<i>reticulatus</i>	Damselfish	O
97.	POMACENTRIDAE	<i>Dascyllus</i>	<i>trimaculatus</i>	Damselfish	C
98.	POMACENTRIDAE	<i>Dischistodus</i>	<i>fasciatus</i>	Damselfish	C

99.	POMACENTRIDAE	<i>Dischistodus</i>	<i>melanotus</i>	Damselfish	C
100.	POMACENTRIDAE	<i>Dischistodus</i>	<i>perspicillatus</i>	Damselfish	C
101.	POMACENTRIDAE	<i>Dischistodus</i>	<i>prosopotaenia</i>	Damselfish	C
102.	POMACENTRIDAE	<i>Hemiglyphidodon</i>	<i>plagiometapon</i>	Damselfish	C
103.	POMACENTRIDAE	<i>Neoglyphidodon</i>	<i>melas</i>	Damselfish	C
104.	POMACENTRIDAE	<i>Neoglyphidodon</i>	<i>nigroris</i>	Damselfish	C
105.	POMACENTRIDAE	<i>Neopomacentrus</i>	<i>anabatoides</i>	Damselfish	C
106.	POMACENTRIDAE	<i>Neopomacentrus</i>	<i>cyanomus</i>	Damselfish	C
107.	POMACENTRIDAE	<i>Neopomacentrus</i>	<i>filamentosus</i>	Damselfish	C
108.	POMACENTRIDAE	<i>Plectroglyphidodon</i>	<i>lacrymatus</i>	Damselfish	C
109.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>alexanderae</i>	Damselfish	C
110.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>chrysurus</i>	Damselfish	O
111.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>coelestris</i>	Damselfish	C
112.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>cuneatus</i>	Damselfish	C
113.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>grammorhynchus</i>	Damselfish	C
114.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>lepidogenys</i>	Damselfish	O
115.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>moluccensis</i>	Damselfish	C
116.	POMACENTRIDAE	<i>Pomacentrus</i>	<i>philippinus</i>	Damselfish	O
117.	LABRIDAE	<i>Bodianus</i>	<i>mesothorax</i>	Wrasse	O
118.	LABRIDAE	<i>Cheilinus</i>	<i>chlorourus</i>	Wrasse	O
119.	LABRIDAE	<i>Cheilinus</i>	<i>fasciatus</i>	Wrasse	O
120.	LABRIDAE	<i>Cheilinus</i>	<i>trilobatus</i>	Wrasse	O
121.	LABRIDAE	<i>Cheilinus</i>	<i>undulatus</i>	Wrasse	R, T
122.	LABRIDAE	<i>Choerodon</i>	<i>schoenleinii</i>	Wrasse	O
123.	LABRIDAE	<i>Cirrhilabrus</i>	<i>cyanopleura</i>	Wrasse	O
124.	LABRIDAE	<i>Coris</i>	<i>pictoides</i>	Wrasse	R
125.	LABRIDAE	<i>Diproctacanthus</i>	<i>xanthurus</i>	Wrasse	O
126.	LABRIDAE	<i>Epibulus</i>	<i>insidiator</i>	Wrasse	C
127.	LABRIDAE	<i>Gomphosus</i>	<i>varius</i>	Wrasse	O
128.	LABRIDAE	<i>Halichoeres</i>	<i>argus</i>	Wrasse	C
129.	LABRIDAE	<i>Halichoeres</i>	<i>chloropterus</i>	Wrasse	C
130.	LABRIDAE	<i>Halichoeres</i>	<i>hortulanus</i>	Wrasse	C
131.	LABRIDAE	<i>Halichoeres</i>	<i>prosopeion</i>	Wrasse	O
132.	LABRIDAE	<i>Halichoeres</i>	<i>purpurascens</i>	Wrasse	O
133.	LABRIDAE	<i>Halichoeres</i>	<i>scapularis</i>	Wrasse	C
134.	LABRIDAE	<i>Halichoeres</i>	<i>vrolikii</i>	Wrasse	C
135.	LABRIDAE	<i>Hemigymnus</i>	<i>melapterus</i>	Wrasse	O
136.	LABRIDAE	<i>Labrichthys</i>	<i>unilineatus</i>	Wrasse	O
137.	LABRIDAE	<i>Labroides</i>	<i>dimidiatus</i>	Wrasse	C
138.	LABRIDAE	<i>Labrobsis</i>	<i>manabei</i>	Wrasse	O
139.	LABRIDAE	<i>Leptojulid</i>	<i>cyanopleura</i>	Wrasse	O
140.	LABRIDAE	<i>Oxycheilinus</i>	<i>diagrammus</i>	Wrasse	O
141.	LABRIDAE	<i>Pseudocheilinus</i>	<i>hexataenia</i>	Wrasse	O
142.	LABRIDAE	<i>Pteragogus</i>	<i>cryptus</i>	Wrasse	O
143.	LABRIDAE	<i>Stethojulis</i>	<i>interrupta</i>	Wrasse	O
144.	LABRIDAE	<i>Thalassoma</i>	<i>lunare</i>	Wrasse	C
145.	SCARIDAE	<i>Bolbometopon</i>	<i>muricatum</i>	Parrotfish	R
146.	SCARIDAE	<i>Chlorurus</i>	<i>microrhinos</i>	Parrotfish	O
147.	SCARIDAE	<i>Chlorurus</i>	<i>bowersi</i>	Parrotfish	O
148.	SCARIDAE	<i>Chlorurus</i>	<i>sordidus</i>	Parrotfish	C
149.	SCARIDAE	<i>Scarus</i>	<i>hyselopterus</i>	Parrotfish	O
150.	SCARIDAE	<i>Scarus</i>	<i>ghobban</i>	Parrotfish	C

151.	SCARIDAE	<i>Scarus</i>	<i>niger</i>	Parrotfish	O
152.	SCARIDAE	<i>Scarus</i>	<i>quoyi</i>	Parrotfish	C
153.	SCARIDAE	<i>Scarus</i>	<i>rivulatus</i>	Parrotfish	C
154.	SPHYRAENIDAE	<i>Sphyraena</i>	<i>barracuda</i>	Barracuda	O
155.	SPHYRAENIDAE	<i>Sphyraena</i>	<i>flavicauda</i>	Barracuda	O
156.	PANGUIPEDIDAE	<i>Parapercis</i>	sp.	Sandperch	C
157.	PANGUIPEDIDAE	<i>Parapercis</i>	<i>xanthozona</i>	Sandperch	C
158.	BLENNIIDAE	<i>Atrosalaris</i>	<i>fuscus</i>	Blennies	O
159.	BLENNIIDAE	<i>Ecsenius</i>	<i>bicolor</i>	Blennies	O
160.	BLENNIIDAE	<i>Ecsenius</i>	<i>yaeyamaensis</i>	Blennies	O
161.	BLENNIIDAE	<i>Meiacanthus</i>	<i>grammistes</i>	Blennies	O
162.	BLENNIIDAE	<i>Petroscirtes</i>	<i>variabilis</i>	Blennies	C
163.	GOBIIDAE	<i>Amblygobius</i>	<i>hectori</i>	Gobies	O
164.	GOBIIDAE	<i>Amblygobius</i>	<i>phalaena</i>	Gobies	O
165.	GOBIIDAE	<i>Amblyeleotris</i>	<i>diagonalis</i>	Gobies	C
166.	GOBIIDAE	<i>Amblyeleotris</i>	<i>gymnocephala</i>	Gobies	C
167.	GOBIIDAE	<i>Amblyeleotris</i>	<i>steinitzi</i>	Gobies	C
168.	GOBIIDAE	<i>Cryptocentrus</i>	<i>cinctus</i>	Gobies	C
169.	GOBIIDAE	<i>Cryptocentrus</i>	<i>fasciatus</i>	Gobies	C
170.	GOBIIDAE	<i>Cryptocentrus</i>	<i>leptocephalus</i>	Gobies	C
171.	GOBIIDAE	<i>Ctenogobius</i>	<i>pomastictus</i>	Gobies	C
172.	GOBIIDAE	<i>Exyrias</i>	<i>bellissimus</i>	Gobies	O
173.	GOBIIDAE	<i>Gobiodon</i>	<i>citrinus</i>	Gobies	O
174.	GOBIIDAE	<i>Gobiodon</i>	<i>quinquestrigatus</i>	Gobies	O
175.	GOBIIDAE	<i>Gobiodon</i>	sp.	Gobies	O
176.	GOBIIDAE	<i>Istigobius</i>	<i>decoratus</i>	Gobies	C
177.	GOBIIDAE	<i>Oplopomus</i>	<i>oplopomus</i>	Gobies	O
178.	GOBIIDAE	<i>Valenciennea</i>	<i>muralis</i>	Gobies	C
179.	GOBIIDAE	<i>Valenciennea</i>	<i>puellaris</i>	Gobies	C
180.	GOBIIDAE	<i>Valenciennea</i>	<i>randalli</i>	Gobies	O
181.	MICRODESMIDAE	<i>Ptereleotris</i>	<i>microlepis</i>	Dartfish	C
182.	SIGANIDAE	<i>Siganus</i>	<i>corallinus</i>	Rabbitfish	O
183.	SIGANIDAE	<i>Siganus</i>	<i>guttatus</i>	Rabbitfish	C
184.	SIGANIDAE	<i>Siganus</i>	<i>stellatus</i>	Rabbitfish	O
185.	SIGANIDAE	<i>Siganus</i>	<i>virgatus</i>	Rabbitfish	C
186.	SIGANIDAE	<i>Siganus</i>	<i>vulpinus</i>	Rabbitfish	C
187.	BOTHIDAE	<i>Pseudorhombus</i>	<i>diplospilus</i>	Flounder	R
188.	BALISTIDAE	<i>Balistoides</i>	<i>viridescens</i>	Triggerfish	O
189.	TETRAODONTIDAE	<i>Arothron</i>	<i>mappa</i>	Pufferfish	O
190.	TETRAODONTIDAE	<i>Arothron</i>	<i>nigropunctatus</i>	Pufferfish	O
191.	TETRAODONTIDAE	<i>Arothron</i>	<i>stellatus</i>	Pufferfish	O
192.	DIODONTIDAE	<i>Diodon</i>	<i>hystrix</i>	Porcupinefish	O