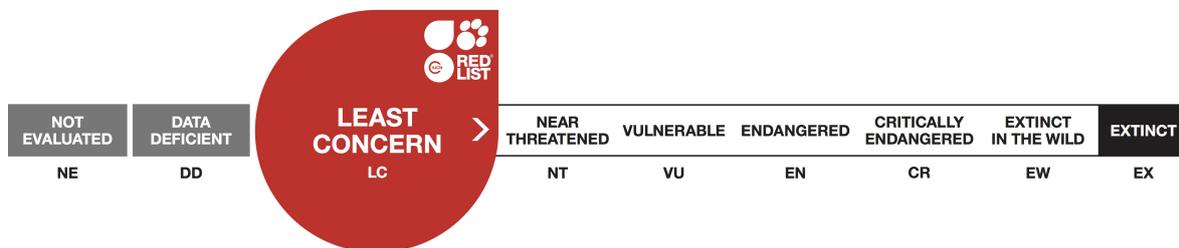




Epinephelus coioides, Orange-spotted Grouper

Assessment by: Amorim, P., Choat, J.H., Fennessy, S., Law, C., Ma, K., Myers, R., Nair, R., Rhodes, K., Sadovy, Y., Samoily, M., Suharti, S. & To, A.



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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Actinopterygii	Perciformes	Epinephelidae

Taxon Name: *Epinephelus coioides* (Hamilton, 1822)

Synonym(s):

- *Epinephelus suillus* Valenciennes, 1828
- *Serranus nebulosus* Valenciennes, 1828

Regional Assessments:

- Persian Gulf

Common Name(s):

- English: Orange-spotted Grouper, Estuary Cod
- French: Mérou Taches Oranges

Taxonomic Notes:

This species is frequently mis-identified as *Epinephelus malabaricus* or *E. tauvina* in aquaculture and fisheries literature (Heemstra and Randall 1993).

Assessment Information

Red List Category & Criteria: Least Concern [ver 3.1](#)

Year Published: 2018

Date Assessed: November 21, 2016

Justification:

This widely distributed species inhabits nearshore habitats from estuaries (juveniles) to coral reefs (adults) and one generation length is estimated as 12.5 years. It is exploited in several parts of its range. It is considered overexploited in Oman and the Persian Gulf, with estimated declines of 51% over the past three generations in the Persian Gulf population. Based on the dominance of juveniles in landings, it is also potentially overfished in Hong Kong, Papua New Guinea and the Solomon Islands, but quantitative data are lacking. Global catch is reported primarily only from two main areas: the Persian Gulf/Gulf of Oman and China/Hong Kong, which has declined by 40% over the past 27 years or two generation lengths. It is under effective management in Australia and Indonesia, but conservation measures are not considered effective elsewhere in its range. Overfishing is a threat in certain localities, but is not known to be a major threat on a global-level at this time; therefore it is listed as Least Concern. Improved monitoring of catches and management where it is heavily fished is recommended. The change in status from the previous assessment reflects an improved application of the Red List categories and criteria, as well as a better understanding of available data.

Previously Published Red List Assessments

2004 – Near Threatened (NT)

Geographic Range

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.

Country Occurrence:

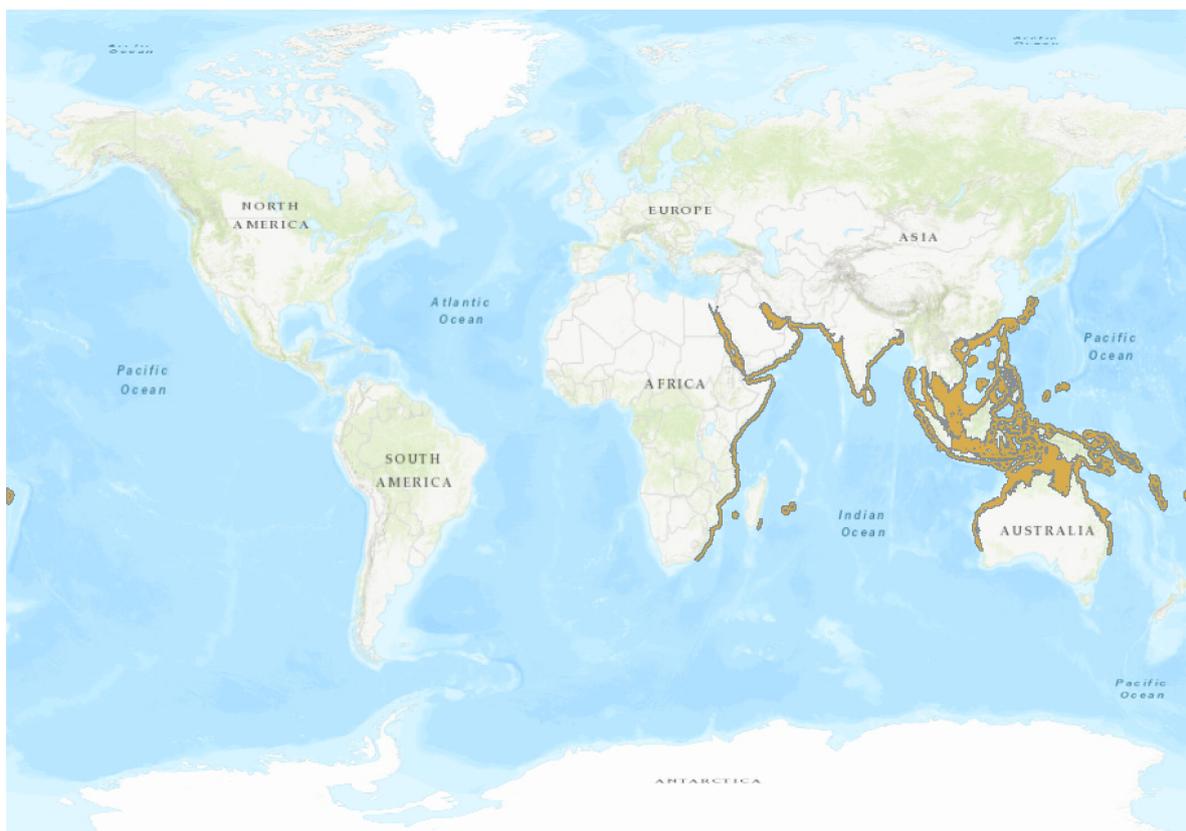
Native: Australia; Bahrain; Bangladesh; Brunei Darussalam; Cambodia; China; Disputed Territory (Paracel Is., Spratly Is.); Djibouti; Egypt; Eritrea; Fiji; French Southern Territories (Mozambique Channel Is.); Hong Kong; India; Indonesia; Iran, Islamic Republic of; Iraq; Israel; Japan; Jordan; Kenya; Kuwait; Macao; Madagascar; Malaysia; Mauritius; Micronesia, Federated States of ; Mozambique; Myanmar; Oman; Pakistan; Palau; Papua New Guinea; Philippines; Qatar; Réunion; Saudi Arabia; Singapore; Solomon Islands; Somalia; South Africa; Sri Lanka; Sudan; Taiwan, Province of China; Tanzania, United Republic of; Thailand; Timor-Leste; United Arab Emirates; Vanuatu; Viet Nam; Yemen

FAO Marine Fishing Areas:

Native: Indian Ocean - western, Indian Ocean - eastern, Pacific - northwest, Pacific - western central, Pacific - southwest

Distribution Map

Epinephelus coioides



Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Range

Extant (resident)

Compiled by:

IUCN Grouper and Wrasse Specialist Group



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



Population

According to reconstructed catch data compiled by Sea Around Us, global catch of this species (including data reported to FAO) has been declining since 1987 by 40% from 15 tonnes to 9 tonnes in 2014, which is a period of 27 years. Landings are primarily from Hong Kong, China and Iran and secondarily from Saudi Arabia (Pauly and Zeller 2015). It is inferred that fishing effort has not declined, and has likely increased. Though declining in parts of its range, population decline on a global level is not known to come close to qualifying for the thresholds under Criterion A.

Western Indian Ocean: This species is commonly captured in the grouper fishery off southern Kenya (total catch was about 40 kg in 2007) (Agembe *et al.* 2010). It is one of the most abundant groupers recorded in underwater surveys off western India (Sluka and Lazarus 2010). In the central eastern coast of India, *Epinephelus coioides* comprised 22% of catch in 2009 to 2011 (Kandula *et al.* 2015). During a trawl survey conducted in the Persian Gulf and Oman Sea in 2003/2004, this species comprised 0.2 to 0.5% of the total biomass (Valinassab *et al.* 2006). This species is overfished in Oman and the Persian Gulf (Grandcourt *et al.* 2005, Grandcourt *et al.* 2009, Grandcourt *et al.* 2011, McIlwain *et al.* 2016). *Epinephelus coioides* is found at higher densities on artificial reefs than on natural habitats in the UAE, which may amplify exploitation (Feary *et al.* 2011). In a 2013 regional Red List assessment of its population in the Persian Gulf, landings from Kuwait, Abu Dhabi, Bahrain, Kuwait, Iran and Saudi Arabia declined by an average of 51% over three generation lengths (27 years). From 1979-2012, landings of *E. coioides* in Kuwait declined from 318.5 mt in 1979 to 119.8 mt in 2012, representing a 62% decline over 33 years (J. Bishop pers. comm. 2013). From 2004-2012, landings of *E. coioides* in Bahrain declined from 572.3 mt in 2004 to 161.6 mt in 2012, representing a 72% decline over eight years (E. Abdulqader pers. comm. 2013). From 2005-2011, FAO landings of *E. coioides* reported by Qatar declined from 2,093 mt in 2005 to 1,292 mt in 2011, representing a 38% decline over seven years (FAO 2013). Over the last 10 years (2002-2012), aggregate serranid landings declined by 36% (1233 to 788 mt) (Annual Fisheries Statistics Report for Abu Dhabi Emirate 2002, 2013). A fisheries resource survey conducted in 2002 in UAE waters recorded a 13% decline in abundance for *E. coioides* (Shallard 2003). From 1999-2012, FAO landings of *E. coioides* reported by Iran declined by 24% from 4,460 mt in 1999 to 3,399 mt in 2012 (FAO 2013).

Pacific Ocean: In Indonesia, the fishery for this species is not considered overfished, catch is not populated with juveniles and overfishing risk is relatively low (Mous and Pet 2016). Underwater surveys conducted on Hong Kong reefs from 2014 to 2016 described this species as 'uncommon', with a sighting frequency of 2.7 (sightings per trip), although this does not necessarily reflect its population status in Hong Kong (Shea and Ho 2016). A market survey conducted in Hong Kong from 2004 to 2006 observed 689 wild-caught individuals of this species, of which 93% were caught in Hong Kong waters and all were considered to be immature (To 2009, To and Sadovy de Mitcheson 2009). A survey conducted from 2012 to 2013 in Hong Kong restaurants and wet markets, observed 4,046 individuals of *E. coioides*, which comprised about 15.7% of all groupers by number, and 99% were immature (included samples from mariculture, Lam 2013). This species is common in Taiwan (K-T. Shao pers. comm. 2016), and 11 and 19 tonnes were landed in Taiwan in 2014 and 2015, respectively (Taiwan Fishery Year Book 2014-2015). A spawning aggregation of 1,000 to 5,000 individuals of *Epinephelus coioides* has been reported from Papua New Guinea. Fishers reported that they landed between 200 and 500 fish in a night 30 to 40 years ago, whereas by 2003, they landed between 50 and 100 fish in a night, a decline of 50% (Hamilton 2003). A market survey conducted in Honiara, Solomon Islands in 2015 to 2016 recorded that 54 out of

5425 grouper individuals were identified as *E. coioides* and sizes ranged from 22 to 83 cm total length, with 41% being immature (K. Rhodes pers. comm. 2016). In Australia, this species is heavily fished in inshore habitats, but remains common due to its high growth and population turnover rates (H. Choat pers. comm. 2017).

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

This species inhabits coral reefs typically along continental coastlines and large islands (Carpenter *et al.* 1997, Grandcourt *et al.* 2005). Juveniles often occur in estuaries over sand, mud and gravel substrate and amongst mangroves (Kailola *et al.* 1993, Randall *et al.* 1997). It primarily consumes fishes, shrimps, crabs and other benthic crustaceans (Grandcourt *et al.* 2005). Its maximum total length is 172 cm and is a diandric protogynous hermaphrodite (Grandcourt *et al.* 2009). Juvenile sexual differentiation in this species can be significantly influenced by social factors (Liu and Mitcheson 2011). In the Persian Gulf, it has been aged to at least 22 years (Mathews and Samuel 1991, Grandcourt 2006, M. Abdullah pers. comm. 2010). Female age at first maturity is four years at 34 cm total length. Males reach maturity at 67.5 cm and 7.5 years and transition occurs at 50 to 75 cm at 4 to 8 years of age (M. Abdullah pers. comm. 2010). McIlwain *et al.* (2016) reported a size and age at 50% maturity for females of 58 cm total length and four years, respectively. Based on a longevity of 22 years, age of first maturity of 4 years, and applying the mean generational turnover formula in Depczynski and Bellwood (2006), one generation length is estimated to be 12.5 years. It forms seasonal spawning aggregations in the Persian Gulf from March to June (Heemstra and Randall 1993, Grandcourt *et al.* 2009) and in New Caledonia in late October to early December (M. Kulbicki pers. comm. 2004). A spawning aggregation of 1,000 to 5,000 individuals of *Epinephelus coioides* has been reported from Papua New Guinea that forms in the muddy/sandy bottom of a large shallow bay for three to four days in every month of the year. At night, the fish sleep partially buried in the mud (Hamilton 2003).

Systems: Marine

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).

Threats (see Appendix for additional information)

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).

Conservation Actions (see Appendix for additional information)

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.

Credits

Assessor(s): Amorim, P., Choat, J.H., Fennessy, S., Law, C., Ma, K., Myers, R., Nair, R., Rhodes, K., Sadovy, Y., Samoilys, M., Suharti, S. & To, A.

Reviewer(s): Linardich, C.

Facilitators(s) and Compiler(s): Carpenter, K.E.

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Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
9. Marine Neritic -> 9.3. Marine Neritic - Subtidal Loose Rock/pebble/gravel	Resident	Suitable	Yes
9. Marine Neritic -> 9.4. Marine Neritic - Subtidal Sandy	Resident	Suitable	Yes
9. Marine Neritic -> 9.5. Marine Neritic - Subtidal Sandy-Mud	Resident	Suitable	Yes
9. Marine Neritic -> 9.6. Marine Neritic - Subtidal Muddy	Resident	Suitable	Yes
9. Marine Neritic -> 9.10. Marine Neritic - Estuaries	Resident	Suitable	Yes
12. Marine Intertidal -> 12.4. Marine Intertidal - Mud Flats and Salt Flats	Resident	Suitable	Yes
12. Marine Intertidal -> 12.7. Marine Intertidal - Mangrove Submerged Roots	Resident	Suitable	Yes

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
1. Residential & commercial development -> 1.1. Housing & urban areas	Ongoing	Unknown	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
1. Residential & commercial development -> 1.2. Commercial & industrial areas	Ongoing	Unknown	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.1. Intentional use: (subsistence/small scale) [harvest]	Ongoing	Unknown	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.4. Fishing & harvesting aquatic resources -> 5.4.2. Intentional use: (large scale) [harvest]	Ongoing	Unknown	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
9. Pollution -> 9.1. Domestic & urban waste water -> 9.1.2. Run-off	Ongoing	Unknown	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions in Place
In-Place Land/Water Protection and Management
Occur in at least one PA: Yes
In-Place Species Management
Harvest management plan: No
Successfully reintroduced or introduced benignly: Unknown
Subject to ex-situ conservation: Yes

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions Needed
1. Land/water protection -> 1.1. Site/area protection
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management
5. Law & policy -> 5.1. Legislation -> 5.1.2. National level

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Distribution
Lower depth limit (m): 100
Upper depth limit (m): 0
Habitats and Ecology
Generation Length (years): 12.5

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