



INTRODUCTION

Welcome to the 10th newsletter of our Specialist Group – I am sure you have all been waiting with anticipation for this, but the delay was worthwhile, as you will see. Many of our members have been busy with one of the main responsibilities of our group, namely to carry out species assessments, and the newsletter was delayed so that the results of this could be reported on here. We also have some interesting biological and fisheries information on serranids from a wide range of countries (Japan, India, Mexico, Costa Rica and Brazil), and two items on trade in groupers in Hong Kong – one dating back to the 1960s! Not forgetting the labrid-lovers, there are updates on progress with the CITES humphead wrasse regulation. However, we could do with more wrasse items, so please send these through, plus any updates on progress with your work. It will also be useful to provide brief resumés of all our members in the next newsletter – so we can get to know each other's various specialities – please send these to me as well.

Enjoy the newsletter

Sean Fennessy (seanf@ori.org.za)
Editor

MESSAGE FROM THE CHAIR

It has certainly been a busy year since our last newsletter, and, thankfully, quite a productive one. I am happy to be able to report on some real progress towards several of the goals I set out last time. As a reminder, these were to complete red list assessments for all groupers, compile a publication on all species based on the information collected for assessments, and build further on the CITES Appendix II listing of the Napoleon fish. The Grouper Atlas project was also initiated by Phil Heemstra and photos are slowly being collected. Please keep this project in mind when you have the opportunity to document different colour phases of groupers during your work and market visits, and forward photos to Phil.

A highlight in the year, and one that many of you shared with me, was the grouper workshop held this past February in Hong Kong. We managed, and I am still not sure quite how, to finish 139 assessments in four and a half days (during the brief half day respite this harsh taskmaster allowed, we took a trip to two of Hong Kong's largest live fish markets this seemed to open quite a few eyes to the scope and size of this growing international trade - groupers from throughout much of the Indo-Pacific were on show). That we succeeded in completing our task was largely due to the excellent facilitation at the workshop and to the detailed preparations made beforehand by many participants and by SG member Kevin Rhodes (please see article below for details). A big thank you is due!

A report on the workshop is available (see below) and I presented some of the results at a recent meeting in Nice, organized by the Groupe d'Etude du Merou, at the 2nd International Symposium on Mediterranean groupers; news on this in the next newsletter. There may also be possibilities for assessment workshops of wrasses in future; I will keep you all up to date as opportunities unfold.

We have made some progress in assisting Indonesia to develop an export quota for the Napoleon fish, *Cheilinus undulatus*. Working with FAO and fish modeller extraordinaire, Dr. Andre Punt, we have developed a fishery model to estimate a level of export that should be sustainable. This will be released shortly (caveats and all) and some of the underlying field information can be found in the website www.humpheadwrasse.info (see CITES section). Pat Colin and Allen To joined me for some of this work and Pat developed a great technique, using a simple housing and Global Positioning System unit, for monitoring this elusive and generally uncommon animal (see cited website). It was a great opportunity to visit some spectacular areas in Indonesia but also quite alarming in areas where very few to no (in one case) Napoleons were seen despite many tens of kilometres of ideal habitat surveyed. The hope is that the FAO model, which involves an interactive component allowing country-specific input that can be added at any time, may be adopted by other countries seeking to use a quota to manage exports. Other management methods are, of course, available but if it is a quota that is needed, we hope that the FAO model will be a useful starting point.

Finally, a word on the Nassau grouper, *Epinephelus striatus*. This species remains in very poor shape, as far as we can tell. Recent data from Cuba suggests continuing low levels for the species, and management of aggregations is proving a challenge in the Bahamas despite some excellent efforts at a few sites. Recent promising initiatives in Belize, whereby all known aggregations were seasonally protected, have not stemmed aggregation fishing and declines and further discussions

are underway. These three countries are presumably particularly important for the species given their large reef areas. All in all, the signs are that this species is doing very badly. So much so, that, at the last Gulf and Caribbean Fisheries Institute meeting in Belize in November, 2006, the Caribbean Fishery Management Council (one of the eight councils of the National Marine Fisheries Service of the US government) held a meeting which went on far longer than any of us would have expected because of the many problems widely recognized that this species is facing. All the signs are that it needs help - and I need suggestions.

Best of wishes

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WORKSHOP FOR GLOBAL RED LIST ASSESSMENT OF GROUPERS, HONG KONG

The groupers (Family Serranidae; Subfamily Epinephelinae) comprise about 160 species globally in the tropics and subtropics. Many groupers are commercially important and assessments to date on a subset of species suggest that the group might be particularly vulnerable to fishing. An assessment of all grouper species was needed to examine the sub-family as a whole and set conservation and management priorities as indicated. This report summarizes the outcomes of the first complete red listing global assessment for all groupers conducted by the Groupers and Wrasses IUCN Specialist Group (GWSG) at a workshop in Hong Kong, 7-11 February, 2007, at the Robert Black College of the University of Hong Kong (HKU). The aim of the workshop was to assess 139 groupers, in addition to those that are currently on the red list (i.e. assessed within the last 10 years), thereby completing all 161 species.



The workshop had 23 participants from eleven countries (Allen To, Andy Cornish, Annadel Cabanan, Athila Bertoncini, Barry Russell, Beatrice Ferreira, Being Yeeting, Claudine Gibson, Dave Pollard, Janice Chanson, John Choat, Kent Carpenter, Kevin Rhodes, Liu Min, Luiz Rocha, Mathew Craig, Melita Samoily, Michel Kulbicki, Phil Heemstra, Robert Myers, Sarah Valenti, Sean Fennessy, Yvonne Sadovy; see website for contact details <http://www.hku.hk/ecology/GroupersWrasses/iucnsg/index.html>).

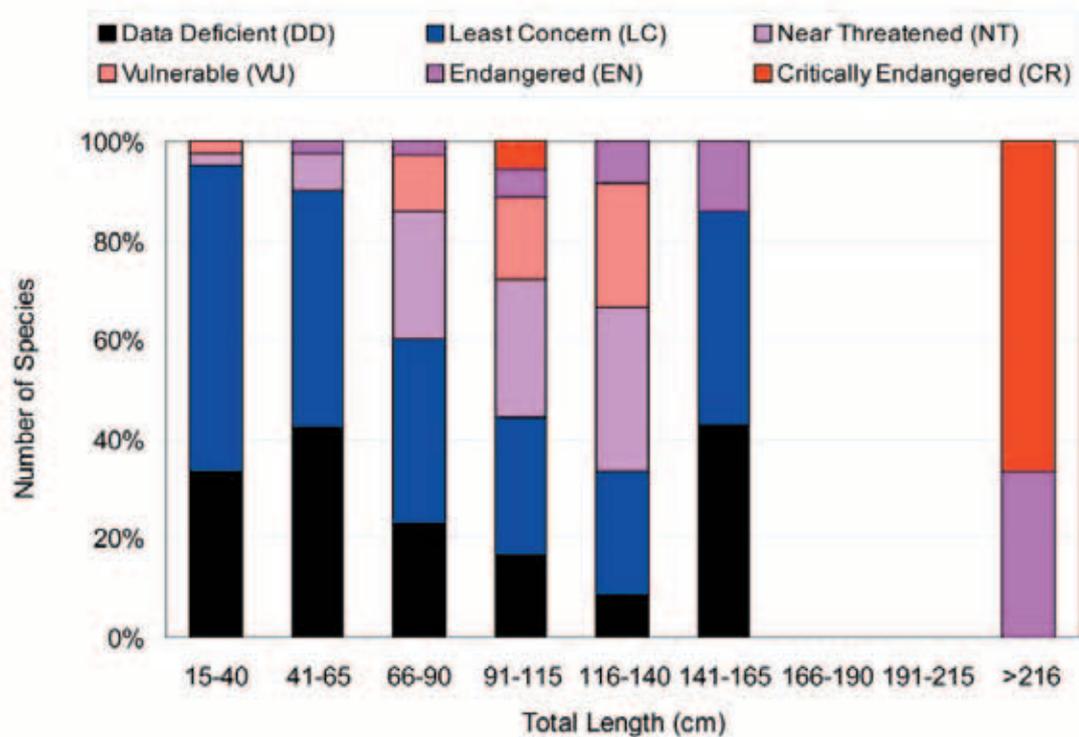
Experts came from a range of academic institutions, NGOs and governments, all continents, and with expertise in fisheries, taxonomy, biology and molecular perspectives. We were also joined and/or assisted by Kent Carpenter and Simon Stuart (IUCN/Conservation International), Janice Chanson (CI) and Claudine Gibson and Sarah Valenti (Shark SG), who variously facilitated, supported, advised and funded

key aspects of the meeting. Their assistance was very much appreciated and contributed significantly to the workshop outcomes. The total cost of the meeting was a little over US\$30,000, of which US\$20,000 came from the United States contribution to IUCN and US\$10,000 from HKU.

Summary of Outcomes

The results of the workshop, combined with the 22 species currently red listed, show several clear outcomes in terms of categories assigned, threatening factors, and future steps (see Table below).

- Threatened species (VU, EN and CR) are more likely to be larger than smaller groupers.
- Twenty percent of all categorized species (i.e. all except DD) are threatened, with a further 19% of categorized species listed as NT.
- Near Threatened (NT) species are generally among larger fish and, with the exception of size class 141-165 cm TL (N=7 fish), increase with body size in a manner similar to threatened species. This suggests that attempts should be made to further investigate NT species.
- At least 50% of the threatened species spawn in aggregations. Many groupers do not aggregate, so this finding may be noteworthy.
- Many species were data-poor/data deficient (DD), even commercially important species.
- Least concern (LC) and data deficient (DD) species are found in all but the largest size category of fishes (3 fish and all vulnerable). A number of workshop participants felt that the assessments for some LC species should have been left at DD and that their inclusion in LC may distract from further attention towards them.



Conservation status of 161 groupers by size class (total length in cm), according to IUCN Red Listing criteria (2001)

The categories used to classify the majority of threatened species were those relating to changes in abundance over time, with A2 most frequently invoked; an observed, estimated, inferred or suspected population size reduction of 30% over the last 10 years or three generations, whichever is the longer, where the reduction or its causes may not have ceased OR may not be understood OR may not be reversible, based mainly on (b) an index of abundance appropriate to the taxon or (d) actual or potential levels of exploitation. A few species were listed under criterion B or D for limited geographic range or restricted distribution (See: http://www.iucnredlist.org/info/categories_criteria2001).

Several major threatening factors identified applied to many of the species listed as VU, EN or CR (see Table below). These were overfishing, lack of management or lack of effective management, poor protection of outer reef habitats, few/no marine protected areas, and poor to no protection of spawning aggregations/aggregating species. Several species were naturally uncommon or had a very limited geographic range but were also exploited. For a few species, degraded coral reefs may be a threatening process, especially in Southeast Asia.

The current dearth of management and likely growth in demand for seafood, especially for favoured and valuable species of reef fishes, such as groupers, do not auger well for this family of fishes. Lack of effective management is due to either the absence of a fishery management culture in general, as in Southeast and East Asia, including for groupers, as well as to the practical problems of managing species in deep waters in general. Even with controls in place, the latter are unlikely to survive release if caught in error, even if they are part of a multi-species fishery management plan. The vulnerability of deeper water species and the lack of protection of the deep outer reef habitat, in general, need further examination, particularly since many of the more shallow species have few remaining natural refuges where fishing does not occur and fishery expansion views deep reefs as good potential fishing grounds. Exploitation (fishery) information is almost entirely lacking on a number of commercially significant species, especially in Asia and the Pacific, and there is little prospect for improved management in the near to mid-term future in many places, including most species listed as threatened or near threatened.

Comments on the red-listing procedure adopted and lessons learned

The workshop provided valuable training in the organization and running of large numbers of global red list assessments. Important lessons were learned about the need for careful prior preparation and post-workshop wrap-up, about the actual red listing process when dealing with many species, and about the assessment process itself.

- There should be a category in the DEM (IUCN Data Entry Module) for 'deep outer reef slope' habitat that is not only applicable to coral reefs but to any reef slope areas. We had a problem with the absence of this category and it is probably an important habitat to flag for fish, as it is likely a last refuge for many species, and may be the only habitat for some. This habitat is increasingly being targeted as shallow waters become overfished, and is not typically included in MPA designations. A recommendation has been made to the IUCN to include this category in the DEM.

- All larger DD and LC species should be the immediate focus of more data-gathering, especially in Southeast Asia and the Pacific islands.
- For threatened species, fishery exploitation is the major threatening process and needs to be the focus of future activities, given that exploitation is expected to grow and prospects for improved management are considered to be poor in most places.
- Species that aggregate to spawn need more protection if the aggregations are targeted.

Details of threatened groupers (VU, EN, CR).

For full listing of all groupers, see website <http://www.hku.hk/ecology/GroupersWrasses/iucnsg/index.html>

SPECIES	STATUS	NATURAL RARITY	EXPLOITATION	HABITAT	RANGE	CB
<i>Cromileptes altivelis</i>	VU A4cd	Yes	High value alive, and unmanaged	Reefs in Asia degraded	SE Asia	
<i>Epinephelus akaara</i>	EN A2d	No	Heavily exploited and highly valued; unmanaged; taken as juveniles	Rocky reefs	E. Asia	
<i>Epinephelus albomarginatus</i>	VU A2d		Fished, declines in size/ catches noted	Coral or rocky reefs	Limited in S. Africa, Mozambique	
<i>Epinephelus bruneus</i>	VU A4d	No but limited distribution	Unmanaged	Rocky reefs and mud bottom	Korea, Japan, China, Taiwan	
<i>Epinephelus drummondhayi</i>	CR A2d+3d	Not abundant	Deepwater fishery, overfished and little managed	Offshore rocky, reefs, often deep	SE USA	
<i>Epinephelus flavolimbatus</i>	VU A2d+3d	Not common in Caribbean	Heavily fished with little effective management	Deeper reefs	Southern USA, Brazil, Caribbean	Yes
<i>Epinephelus gabriellae</i>	VU B1ab(v)	Yes	Unmanaged and increased pressure	Rocky bottoms	Extremely limited	
<i>Epinephelus itajara</i>	CR A2d	Not common	Various fishing pressures, some protection	Mangroves, bays, high relief rock	Trop W. Atlantic, Caribbean, E. Pacific, parts W. Africa	Yes
<i>Epinephelus lanceolatus</i>	VU A2d	Uncommon	Some	Caves, reefs, estuaries	Widespread	
<i>Epinephelus marginatus</i>	EN A2d	Common	Heavy pressure, only protection is MPAs in Mediterranean	Rocky substrates	West Africa, W. Europe, Mediterranean, parts of Brazil	Yes
<i>Epinephelus nigritus</i>	CR A2d+3d	Not common	Deep-water fisheries, not effectively managed	Rocky bottom	Mainly SE USA, northern Cuba	
<i>Epinephelus niveatus</i>	VU A2d+3d	No	Heavily fished, management not very effective	Deeper reefs	S. USA, Caribbean, S. America	Yes
<i>Epinephelus striatus</i>	EN A2ad	Once common, now rare in places	Heavily targeted at aggregations and little managed	Shallow coral reefs	Caribbean, tropical W. Atlantic	Yes
<i>Mycteroperca fusca</i>	EN B1ab(v)	Once common locally, now rare	Targeted and unmanaged	Rocky reefs	Very limited: Madeira, Azores, nearby islands	Yes
<i>Mycteroperca interstitialis</i>	VU A2d+3d	Not naturally common	Affected by fisheries with little management	Coral and rocky reefs	Mainly Caribbean	Yes
<i>Mycteroperca jordani</i>	EN A2d+3d	Once common, now rare	Intensively fished	Rocky reefs and kelp beds	Limited range in E. Pacific	Yes
<i>Mycteroperca olfax</i>	VU D2	Once common only locally	Fished with declines, no species-specific management	Rocky reefs	Limited to Galapagos and environs	
<i>Mycteroperca rosacea</i>	VU A2ad+4ad	Formerly abundant species	Fishing impacts and not managed	Rocky areas	Limited range to Gulf Mexico, Mexico	Yes
<i>Plectropomus areolatus</i>	VU A4d	Not uncommon	Heavily fished and highly valued alive; not managed	Lagoons and outer coral reefs	Wide range but scattered. Coral triangle, Red Sea, Australia, Pacific.	Yes
<i>Plectropomus laevis</i>	VU A2d+4d	Naturally rare	Fished and little managed	Outer coral reef slopes	Widespread but scattered distribution	Prob

CB = Congregatory behaviour = Spawning aggregation

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OBSERVATIONS OF SPAWNING IN THE LEATHER BASS, *DERMATOLEPIS DERMATOLEPIS*, (near Cocos Island, Costa Rica)

Brad Erisman and Talina Konotchick of the Scripps Institution of Oceanography are collaborating with Steve Drogin and Shmulik Blum on a project to describe the mating patterns of *Dermatolepis dermatolepis* at Cocos Island, Costa Rica. To the best of our knowledge, this research constitutes the first descriptions of spawning behavior in this species. It is important to note that these fish aggregate all year round, not only during the spawning season. Initial observations were made by Talina, who documented a spawning aggregation of *D. dermatolepis* from a 3-person submersible on 27 November 2006 at a seamount known as Everest. The aggregation consisted of 70-75 adults gathered above the top of the seamount at a depth of c. 50 m. Spawning was observed from 1627-1630 h, when subgroups of 22 to 32 fish separated from the main aggregation and performed brief, vertical spawning rushes above the seamount. A few minutes prior to spawning the aggregation rose 3-4 m above the seamount to a depth of approximately 45 m. The vertical spawning rushes were estimated at 3-4 m, which means that gametes were released at depths of 41-42 m below the surface.

Shmulik Blum, the submarine pilot, and Steve Drogin, the primary owner of the submarine, have continued to monitor the aggregation since the initial observations made in November. According to their reports, *D. dermatolepis* spawned at Everest almost every afternoon between 1600 and 1830, from November 25th 2006 to February 18th 2007 (when observations ceased), and spawning occurred within subgroups of 10-30 fish. Brad Erisman will visit Cocos Island in April 2007 to gather more data on *D. dermatolepis* spawning patterns and to document aggregations of another resident grouper, *Mycteroperca olfax*.

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A BRIEF IMPRESSION OF THE CHANGES IN GROUPEL DIVERSITY OF THE SOUTH CHINA SEA AS MIRRORED IN THE FISH MARKETS OF HONG KONG AND GUANGZHOU (from 1969 to 2007)

My visit to Hong Kong for the IUCN-sponsored workshop for global red-list assessment of groupers in February provided the opportunity to visit fish markets all over Hong Kong island and the Kowloon peninsula. Thanks to Yvonne Sadovy and her able student Allen To, I was able to see many live and fresh groupers, and I collected tissue samples for our tissue bank at the South African Institute for Aquatic Biodiversity in Grahamstown, and took photos for the World Atlas of Groupers which is in preparation.

My first visit to Hong Kong was in 1969. At the time, I was concentrating on examination of *Mustelus* (smoothhound sharks) for my PhD research, but I also saw lots of groupers and met William Chan, Senior Research Officer of the Fisheries Research Division of the Agriculture and Fisheries Department. Mr Chan knew much about sharks and had just published a book, *Marine Fishes of Hong Kong - Part I*, that featured 23 commonly-encountered grouper species. I was impressed with Mr Chan's knowledge of the local fish fauna and wished I could have stayed longer to improve my knowledge of these fishes.



Phil Heemstra (camera in hand) on the hunt for groupers in a live reef fish market in Hong Kong.
Photo: Yvonne Sadovy.

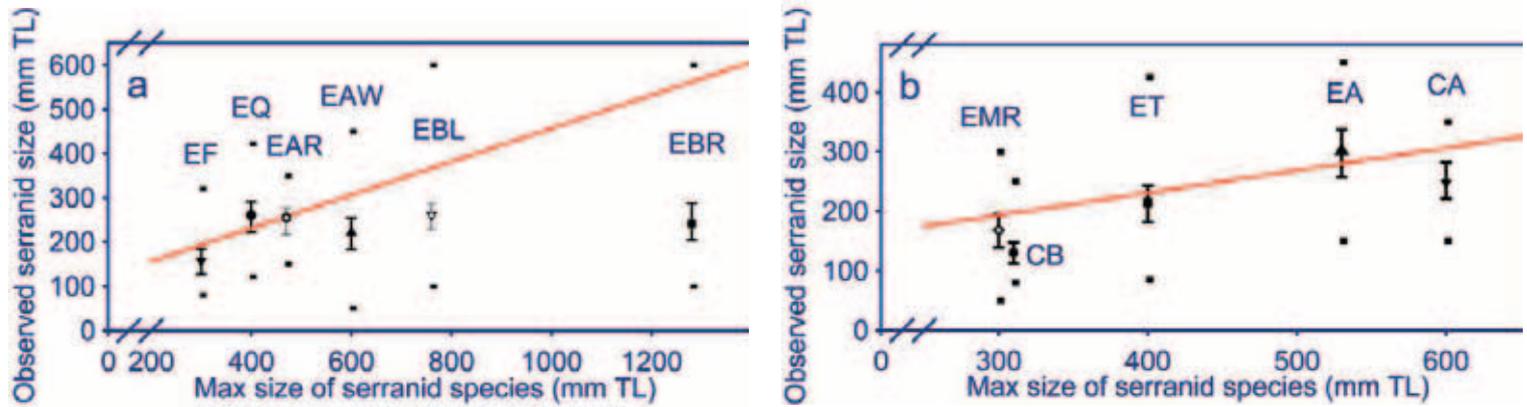
In 1988, I made another brief visit to Hong Kong, after a three-month grouper-research visit to Taiwan, but Mr Chan had left the Fisheries Research Division, and the knowledge or interest in fish diversity seemed to have gone with him.

In 2007, I also saw lots of live and fresh groupers in the markets of Hong Kong and Guangzhou, but there were only 14 species (*Epinephelus awoara*, *E. malabaricus*, *E. coioides*, *E. fuscoguttatus*, *E. lanceolatus*, *E. bleekeri*, *E. coeruleopunctatus*, *E. ongus*, *E. chlorostigma*, *E. areolatus*, *E. cyanopodus*, *Cephalopholis boenack*, *Cromileptes altivelis* and *Plectropomus leopardus*) that were common in the markets. Although several of these species are spawned and/or reared in captivity, the harvesting of groupers in the wild goes on unabated, as the demand and price of groupers have not declined; and the decline in diversity observed in the markets is characteristic of a fauna that is over-exploited.

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SERRANIDS ON SALE IN HONG KONG

Hong Kong is one of the largest markets for the live reef fish trade, and a study was conducted to describe the local live serranid fish trade supplying the city and its surrounds. Surveys and interviews were conducted in local markets to examine species composition and sizes on retail sale. Two major markets were visited twice weekly from November 2004 to January 2006 inclusive, for a total of 100 surveys. Frequently sold species are shown in the figure below, and it is apparent that many individuals in the retail sector are sexually immature, particularly those species that attain larger maximum sizes (see below). Also noteworthy was the relatively low numbers of larger serranids in market samples in general.



Observed sizes of 11 serranids recorded on retail sale in two Hong Kong markets (November 2004 - January 2006) and probably caught locally, plotted against their maximum known length (median \pm 1st and 3rd quartile, range). The solid lines represent the estimated 50% maturity size relationship. (a) *Epinephelus fasciatus* (EF), *Epinephelus quoyanus* (EQ), *Epinephelus areolatus* (EAR), *Epinephelus awoara* (EAW), *Epinephelus bleekeri* (EBL), *Epinephelus bruneus* (EBR). (b) *Epinephelus merra* (EMR), *Cephalopholis boenak* (CB), *Epinephelus trimaculatus* (ET), *Epinephelus akaara* (EA), *Cephalopholis argus* (CA). (Source: Max length from www.fishbase.org; 50% maturity size estimated from Wyanski *et al.* 1999; Chan and Sadovy 2000; Fennessy and Sadovy 2002; Bertocini *et al.* 2003; Pears *et al.* 2006; To and Sadovy unpubl. data)

References

- Bertocini, A.A., Machado, F.L., Hostim-Silva, M. and Barreiros, J.P. 2003. Reproductive biology of dusky grouper *Epinephelus marginatus*. *Brazilian Archives of Biology Technology* **46**: 378-381.
- Chan, T.T.C. and Sadovy, Y. 2002. Reproductive biology, age and growth in the chocolate hind, *Cephalopholis boenak* (Bloch, 1790), in Hong Kong. *Marine and Freshwater Research* **53**: 791-803.
- Fennessy, S.T. and Sadovy, Y. 2002. Reproductive biology of a diandric protogynous hermaphrodite, the serranid *Epinephelus andersoni*. *Marine and Freshwater Research* **53**(2): 147-158.
- Wyanski, D.M., White, D.B. and Barans, C.A. 2000. Growth, population age structure, and aspects of the reproductive biology of snowy grouper, *Epinephelus niveatus*, off North Carolina and South Carolina. *Fishery Bulletin* **98**: 199-218.
- Pears, R.J., Choat, J.H., Mapstone, B.D., Begg, G.A. 2006. Demography of a large grouper, *Epinephelus fuscoguttatus*, from Australia's Great Barrier Reef: implications for fishery management. *Marine Ecology Progress Series* **307**: 259-272.

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REPRODUCTIVE PATTERNS IN THE LEOPARD GROUPEL, *MYCTEROPERCA ROSACEA*, IN THE GULF OF CALIFORNIA, MEXICO

The leopard grouper, *Mycteroperca rosacea*, is the most heavily targeted species of grouper in the Gulf of California, and increased fishing effort is correlated with dramatic population declines in this species over the past two decades (Sala *et al.* 2003). For the most part, these declines are attributed to the widespread overexploitation of spawning aggregations by commercial and recreational fishers throughout the Gulf. Attempts at conserving remaining populations of *M. rosacea* have been impeded by a number of factors, including a lack of biological information on the species, unsustainable daily catch limits, and poor enforcement of regulations.

Brad Erisman and Philip Hastings of the Scripps Institution of Oceanography have been collecting data on the reproductive patterns of the *M. rosacea* since 1998. Histological, demographic, and behavioral data all indicate that *M. rosacea* is functionally gonochoric (Erisman *et al.* 2007a). There is no histological evidence of post-maturation sex change, although some juveniles do pass through an immature bisexual phase of gonadal development prior to reaching sexual maturity as a male or female. The size range, average body size, and size at sexual maturity of males and females are similar. Finally, adults spawn in groups of 6-40 fish, and no evidence of pair spawning or male territoriality has been found. To date, a gonochoric sexual pattern has only been diagnosed for one other grouper, *Epinephelus striatus* (Sadovy and Colin 1995).

In 2005, Brad collaborated with Michele Buckhorn of the University of California, to describe the spawning patterns of *M. rosacea* at Loreto, BCS, Mexico (Erisman *et al.* 2007b). Similar to many other large groupers, *M. rosacea* formed spawning aggregations of several hundreds of individuals, and these aggregations were located only at specific sites. Spawning occurred on a daily basis from April through June and did not coincide with specific lunar phases. Although the movement patterns of specific individuals were not tracked, large numbers of fish were present at spawning aggregation sites throughout the spawning season. Courtship occurred throughout the day, but spawning was limited to the evening hours before dark. From their observations and those from past investigations (Hobson 1965; Parrish 1992), it appears that aggregating behavior in adult *M. rosacea* occurs throughout the year, and large feeding aggregations are very common during the summer and autumn months.

The sexual and behavioral patterns of leopard groupers have important implications for management. Since *M. rosacea* do not change sex, their population dynamics may respond quite differently to certain fishing practices than protogynous groupers and may be less adversely affected by traditional size and catch-limit regulations (Alonzo and Mangel 2005). However, the extensive duration of spawning aggregations and the propensity to aggregate year-round increases the vulnerability of this species to overfishing. Policies that limit harvests from both feeding and spawning aggregations are needed for proper management of *M. rosacea* fisheries in the Gulf of California.

References

- Alonzo, S.H., Mangel, M. 2005. Sex-change rules, stock dynamics, and the performance of spawning-per-recruit measures in protogynous stocks. *Fisheries Bulletin* **103**: 229-245.
- Erisman, B.E., Rosales-Casián, J.A., Hastings, P.A. 2007a. Evidence of gonochorism in a grouper, *Mycteroperca rosacea*, from the Gulf of California, Mexico. *Environmental Biology of Fish*: In press.
- Erisman, B.E., Buckhorn, M.L., Hastings, P.A. 2007b. Spawning patterns in the leopard grouper, *Mycteroperca rosacea*, in comparison with other aggregating groupers. *Marine Biology*: In press.
- Hobson, E.S. 1965. Diurnal-nocturnal activity of some inshore fishes in the Gulf of California. *Copeia* **1965**: 291-302.
- Parrish, J.K. 1992. Levels of diurnal predation on a school of flat-iron herring, *Harengula thrissina*. *Environmental Biology of Fish* **34**: 257-263.
- Sala, E., Aburto-Oropeza, O., Reza, M., Paredes, G., López-Lemus, L.G. 2004. Fishing down coastal food webs in the Gulf of California. *Fisheries* **29**: 19-25.

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ENDANGERED CORAL REEF FISH SEIZED IN INDONESIA: HUMPHEAD WRASSE HEADED FOR HONG KONG (Underwatertimes.com News Service, 12th July 2006)

Manado, Indonesia: Indonesian airport authorities seized 36 humphead wrasse (*Cheilinus undulatus*), the third seizure of this endangered fish species in the country this year alone. The live fish, harvested in Indonesia, were destined for Hong Kong. "Indonesia remains a major supplier to Hong Kong and other end-use markets, which drive demand for this high-value reef fish," said TRAFFIC Southeast Asia Regional Director, James Compton.

Prized as a delicacy and served in high-end restaurants, the humphead wrasse can sell for over US\$100 per kilogram in the market place. Hong Kong represents the largest known consumer market for this species, although upscale eateries in Malaysia, Singapore and mainland China are also known to offer servings of the electric blue fish. Found among the coral reefs across Southeast Asia, the Western Pacific and the Indian Ocean, the humphead wrasse can grow to over two metres long, weigh up to 190 kg and live for more than 30 years. The trade in this species, however, is selective, with smaller-sized individuals, including many juveniles, preferred over full-grown adults because the flesh is considered more tender. Smaller fish are better suited to the restaurant trade that prefers to serve whole fish. The species is typically traded live.

Indonesia allows an annual export of 8,000 individual humphead wrasse - and harvest is only permitted in specified areas, including Papua, Maluku, East Nusa Tenggara and West Nusa Tenggara. "The challenge for Indonesia is to develop a workable strategy for monitoring the trade and improving law enforcement," Compton added, "otherwise the fishery cannot be managed for the long-term benefits of local and national interests." Indonesian representatives recently joined authorities from Hong Kong, China, Malaysia, Papua New Guinea and the Philippines to discuss the international humphead wrasse trade. Participants attending the workshop - co-organized by WWF, TRAFFIC and IUCN - agreed to develop science-based guidelines for sustainable resource use of the humphead wrasse, as well as to promote regional co-operation and increased awareness among the fisheries industry and consumers on the trade. "Co-operation between countries and by the relevant fisheries and management authorities within source countries is key to the successful implementation of a CITES listing for the humphead wrasse," said Dr Yvonne Sadovy of the University

of Hong Kong and Chair of the IUCN Groupers & Wrasses Specialist Group. “If the species is sustainably managed and traded, then the situation is win-win,” Sadovy stressed. “Traders can continue their business, consumers can eat the fish, and fish populations can once again be healthy for all to enjoy.”

The humphead wrasse is listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). This means international trade in the species is possible only with valid CITES permits. The CITES Appendix II listing helps supply and consumer countries to ensure that the trade in the species is both legal and sustainable. At the time of the news release (July 2006), Hong Kong had not implemented the CITES Appendix II-listing for humphead wrasse, and this species could be legally imported. However, according to Pauline Tong (Agriculture Conservation and Fisheries Department, Hong Kong Special Administrative Region), the Protection of Endangered Species of Animals and Plants Ordinance, Cap. 586, came into operation on 1 December 2006 with immediate effect. Under the Ordinance, the import, introduction from the sea, export, re-export or possession in Hong Kong of endangered species, including humphead wrasse, requires a licence. For possession of existing stocks already in Hong Kong at the time of the ordinance’s promulgation, a grace period of six months is provided for. Specimens imported after the commencement of the new Ordinance are not subject to the grace period and a possession licence is required. The requirement of an import licence only applies to live humphead wrasse; for fish imported in the form of chilled specimens, only a valid export permit from the place of export is required.



A humphead wrasse on display in a live reef fish market in Hong Kong. Photo: Yvonne Sadovy.

UPDATE (provided by Yvonne Sadovy)

Between 1st December 2006 and mid-March 2007, there was one seizure of an illegally-imported shipment of humphead wrasse involving chilled fish from Indonesia. From 1st December 2006 to 31st January 2007, 19 import licences were issued by Hong Kong authorities for the import of this fish. However, because about 60% of humphead wrasses imported into Hong Kong are re-exported to mainland China, and because the mainland authorities do not issue import permits and have still not determined how they will implement the CITES regulation, this means that a large proportion of humphead wrasse are not legally sold in their final country of destination (mainland China). On 8-10th April, Yvonne attended a TRAFFIC meeting in Guangzhou, southern China, to present background material to Chinese Customs officers and to train them in species identification and implementation problems. She also presented results from trade and field studies on the species: http://www.humpheadwrasse.info/AC22_Final.pdf; http://www.humpheadwrasse.info/IUCN_underwater_final_report_2006.pdf. The complexity of local laws means that enforcing CITES for this species is a problem, but there are ongoing discussions on the matter and Yvonne will update us if there is any progress.

INFORMATION ON *EPINEPHELUS DIACANTHUS* FROM INDIAN SEAS

Epinephelus diacanthus (spinycheek grouper) has a restricted distribution, occurring in the Gulf of Oman, and off the coasts of Pakistan, India and Sri Lanka. This article summarizes available information on this species from India.

Fishery: *E. diacanthus* is one of the most common groupers on the west coast, (8-33% of all groupers landed), but is less common on the east coast where it contributes less than 5% to grouper landings. In Kerala state (southwest coast), the proportion of *E. diacanthus* in total grouper catches goes up to about 72% (Tables 1 & 2).

Table 1: Landings (in mt, rounded off) of *Epinephelus diacanthus* and other species of groupers (pooled for all gears) along the west coast maritime states of India during 2001-2005.

STATE	YEAR	<i>E. DIACANTHUS</i>	OTHER GROUPERS	TOTAL GROUPERS	% OF <i>E. DIACANTHUS</i>
GOA	2001	0	572	572	0
	2002	1	1279	1280	0.1
	2003	0	784	784	0
	2004	0	738	738	0
	2005	3	238	241	1.2
GUJARAT	2001	0	3517	3517	0
	2002	68	1595	1663	4.1
	2003	7	924	931	0.8
	2004	16	2135	2151	0.7
	2005	0	2636	2636	0
KARNATAKA	2001	94	4858	4953	1.9
	2002	370	6699	7069	5.2
	2003	40	1450	1490	2.7
	2004	25	2198	2223	1.1
	2005	5	5473	5478	0.1
KERALA	2001	3346	3282	6629	50.5
	2002	6739	2648	9387	71.8
	2003	1872	2472	4345	43.1
	2004	1269	4516	5784	21.9
	2005	720	3079	3798	18.9
MAHARASHTRA	2001	437	5584	6021	7.3
	2002	540	3157	3697	14.6
	2003	650	4681	5331	12.2
	2004	488	3303	3791	12.9
	2005	533	3562	4095	13
Total	2001	3878	17813	21691	17.9
	2002	7718	15377	23096	33.4
	2003	2570	10310	12880	20
	2004	1798	12889	14688	12.2
	2005	1261	14988	16249	7.8
Grand total		17225	71378	88603	19.4
Annual mean		3445	14276	17721	
SD		2583	2823	4457	

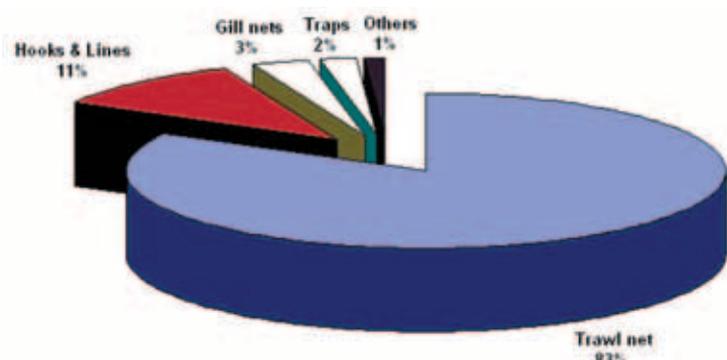


Epinephelus diacanthus. Photo: J.E. Randall

Table 2. Landings (in mt, rounded off) of *Epinephelus diacanthus* and other species of groupers (pooled for all gears) along the east coast maritime states of India during 2001-2005.

STATE	YEAR	<i>E. DIACANTHUS</i>	OTHER GROUPERS	TOTAL GROUPERS	% OF <i>E. DIACANTHUS</i>
ANDHRA PRADESH	2001	10	5	66	15.8
	2002	0	30	30	0.7
	2003	7	54	61	12
	2004	0	105	105	0.2
	2005	19	108	127	14.7
ORISSA	2001	6	9	14	40.4
	2002	0	7	7	0
	2003	0	37	37	0
	2004	8	10	18	45
	2005	0	0	0	100
PONDICHERY	2001	0	13	13	0
	2002	0	1	1	0
	2003	0	8	8	0
	2004	0	69	69	0
	2005	0	15	15	0
TAMIL NADU	2001	21	4096	4117	0.5
	2002	81	2294	2374	3.4
	2003	93	3804	3897	2.4
	2004	60	3270	3331	1.8
	2005	76	1874	1950	3.9
WEST BENGAL	2001	0	3	3	0
	2002	0	34	34	0
	2003	0	0	0	100
	2004	0	0	0	0
	2005	0	0	0	0
Total	2001	37	4176	4213	0.9
	2002	81	2366	2446	3.3
	2003	100	3903	4003	2.5
	2004	68	3454	3522	1.9
	2005	95	1997	2092	4.5
Grand total		381	15895	16276	2.3
Mean		76	3179	3255	
SD		25	956	943	

The species is abundant in the 'kalava' grounds off the southwest coast of India, characterized by uneven rocky outcrops and coralline areas forming extensive, prominent ridges. Off this coast, *E. diacanthus* occurs at a depth range of 60-150 m. It is mainly caught in shrimp trawls, fish trawls, handlines and traps, although small numbers also occur in other gears, such as drift nets, dol nets, purse seines, trammel nets, cast nets and stake nets (see below).



Gear-wise contribution of *Epinephelus diacanthus* to the grouper fishery in India.

Overall catch rate is about 2-12 kg/h with an average of 4 kg/h. Recent years have shown a declining trend in biomass per recruit of this species. At most of the major landing centres, increases in effort are not accompanied by a corresponding increase in catches of *E. diacanthus*. However, extension of fishing into deeper areas, mainly by vessels targeting shrimps and cephalopods, has resulted in unexpectedly high landings of *E. diacanthus* along some areas of the West coast.

Fishing season: The fishing season extends from August to March, with peak landings during August and December, and with a secondary peak during January to March.

Size range: Though sizes up to 550 mm TL have been recorded, the main size range in the fishery is 100-240 mm TL, mainly represented by the 0 year age class. Juveniles of *E. diacanthus* are caught in great numbers and the absence of adults during the fishing season suggests that juveniles might prefer shallower waters of 30-60 m, possibly for feeding, and might migrate as adults to deeper waters where they are less available to the fishery.

Population dynamics: Heavy fishing mortality ($1.75Y^{-1}$) has been estimated for the species along the west coast. Recruitment to the fishery occurs during May-September, with a peak in August. Asymptotic length (L_{∞}) ranges from 455 to 502 mm TL, K is estimated at $0.45Y^{-1}$ and natural mortality estimates range from $0.76-1.16Y^{-1}$. Length at first capture is about 119 mm. The length-weight relationship for females is: $\log W = -1.3056 + 2.6117 \log L$ based on specimens ranging in total length from 200 to 550 mm TL. The fact that the exploitation ratio ($E=0.6$) is much higher than E_{max} (0.48), indicates high fishing pressure on *E. diacanthus*. The fishing of this species along most of the west coast needs to be restricted as indiscriminate catching of juveniles is going on unabated.

Spawning period: Prolonged, with two peaks, one during May-June and the other during September-October.

Mariculture potential: At present *E. diacanthus* is not listed among the finfish species having potential for mariculture in India.

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ALERT ON FISHING (Press item: Manila Bulletin dated 4 April 2007)

UNITED ARAB EMIRATES – Stocks of hammour [grouper species] are declining due to overfishing off the coast of Ajman, the Ministry of Environment and Water has warned. The Ministry's Water Creatures Research Center conducted a study of around 15,000 fish in the waters of the UAE. The study was launched following concerns the fish were being caught illegally. Landing hammour is banned unless the fish are greater than 45 centimeters in length.

Abdullah Khalifa Al Kumaiti, director of the Ministry of Environment and Water in Ajman, said: "The report came following illegal fishing operations in Ajman. They are done by a group of Asian fishermen who are not concerned about the protection of the fish stocks. There can be a decline of up to 70 percent of hammour population in the next five years if the current situation continues."

Abdullah Sultan Hasan, the ministry's observer at Ajman Fish Market, said: "The situation requires an immediate action. This should include severe fines to contain this illegal fishing. Fishermen ignore signs and warning posters that we place at Ajman Port and Fish Market."

A NEW AND ELSEWHERE RARE SERRANIDAE RECORD FROM BRAZIL

As part of research work for the long-awaited Brazilian Reef Fish book (to be released by 2009), Alfredo Carvalho-Filho (Fish Bizz Ltd.) found during his research on *Serranus atrobranchus*, that the pictures he had were quite different from the material he had examined at MZUSP (Museu de Zoologia da Universidade de São Paulo). *Serranus atrobranchus* has so far three known populations (Gulf of Mexico, Venezuela and Guiana, and Southern Brazil). At least two species of *Serranus* are characterized by the presence of a black lanceolate mark on the inner surface of the opercle: *S. atrobranchus* and *S. fuscus*. The latter, described by Poey in 1861 as *Centropristis fuscus*, was changed to *S. fuscus* by Jordan & Eigenmann (1890) and then subsequently to *Prionodes fuscus* by Jordan & Evermann (1896). So many changes and uncertainties prompted Robins & Starck (1961) in their review of *Serranus* to examine the few (two!) specimens available. The similarity in color pattern to *Centropristis ocyurus* led Robins & Starck (1961) to retain *fuscus* in *Centropristis*, valid nowadays as *Centropristis fuscus* Poey, 1861.



Serranus fuscus. Photo: Luciano Fischer.



Serranus atrobranchus. Photo: Athila Bertoncini Andrade.

A paper is being prepared to suggest the change of *Centropristis fuscula* back to *Serranus fuscus* as in Poey's first description, based on personal communications between Drs Carvalho-Filho and Robins, which not only confirmed the validity of the species pictured above (*C. fuscula*), but also supported the idea of changing the genus. In addition, a paper concerning the presence of a large deep-water population of *S. fuscus* in South-Eastern and Southern Brazil is being prepared by Alfredo Carvalho-Filho, Luciano Fischer and Athila Bertoncini Andrade. Comments on this taxonomic tangle will be appreciated and should be sent to Alfredo Carvalho-Filho at alfie@telnet.com.br.

Athila Bertoncini (Andrade athilapeixe@gmail.com)

ANOTHER OLD FISH

A few years ago (December 2001) I was fortunate enough to take a collecting trip to Okinawa, Japan, in search of grouper tissues for my ongoing systematic survey. After overcoming the initial shock and awe of the abundance and diversity of species for sale, I began to more closely examine the species composition in the market. Following the auction of the high dollar items (tunas, mola mola, and various billfish) I was allowed to browse through the remaining lots of fish that largely consisted of various reef species.



The fish for sale were dominated by groupers and parrotfishes. As I browsed through the market, I realized that one species was dominating the grouper catch above all others. The white-streaked grouper, *Epinephelus ongus*, was present in incredibly high numbers. For seven days at the market, there were no fewer than 198 and up to 398 *E. ongus* for sale. The specimens for sale ranged from the near-maximum reported size to the smallest one could effectively catch without the use of ichthyocides.

Left: An indication of the range of sizes (142-315 mm SL for the entire study) of *Epinephelus ongus* for sale in a fish market in Okinawa, Japan. The upper specimen was aged at 19 years. Photo: M. Craig.

A brief online literature search confirmed that there was little-to-no information available on the life-history of this species. With the assistance of my hosts at the University of Ryukyu, we thus made it a priority to obtain as many samples as possible in order to extract otoliths, stomachs and gonads for study.

Thanks to the help of two undergraduate assistants from the University of San Diego, I was able to piece together a preliminary analysis of the age and growth of this species. Consistent with other recent studies, *E. ongus* reaches surprisingly old ages despite its relatively small maximum size (40 cm TL). Specimens collected ranged from 1 to 20 years in individuals ranging from 142-315 mm SL (176-382 mm TL). The age structure was typical of many other fish, with most individuals occupying the 2-6 year age classes (bottom third of whole age distribution). Growth in the species was also typical of other grouper species, with rapid growth in year one followed by an asymptotic slowing in later years. Sizes of the year one age class indicated that *E. ongus* may reach 150 mm SL during its first year.

We were also able to assay a few stomachs that had identifiable contents as well as a few gonad samples that were suitable for histological sectioning. The diet of *E. ongus* appears typical of other small grouper species and includes crabs, shrimp, octopi, and fishes. These species indicate that the species is likely to be a crepuscular feeder. While our analysis of gonad samples was extremely limited (N = 12), our results are consistent with protogyny. In addition, the female gonads examined had thickened walls and muscle bundles, characteristics of gonads that have previously spawned. From this, it is apparent that individuals are capable of spawning by at least age three (~170 mm SL).



Juvenile *E. ongus*. 65 mm SL Photo: J. Randall.

It was startling to note that this species was being heavily fished across such a wide range of size classes. Compounding the intensive fishing pressure associated with harvesting for consumption, *E. ongus* is also a popular component of the aquarium trade. When the fish are small (age one and below; <150 mm SL) they have brilliant yellow fins making them attractive to the ornamental fish trade.

While its small size and relatively early onset of sexual maturity would seem to indicate that this species could be capable of sustaining intensive fishing pressure, it is readily apparent that *E. ongus* is exploited throughout all of its post-settlement life cycle, which is of particular concern. This highlights the urgent need to obtain abundance estimates for this species in the wild as well as to obtain comprehensive catch statistics throughout its range (Indo-Pacific, from East Africa to the Ryukyu and Marshall Islands). The results from this study will appear in Ichthyological Research in early 2007 (see recent publications section for citation).

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A SELECTION OF RECENT PUBLICATIONS

- Arvedlund, M. Iwao, K., Brolund, M.T., Takemura, A. 2006. Juvenile *Thalassoma amblycephalum* Bleeker (Labridae, Teleostei) dwelling among the tentacles of sea anemones: A cleanerfish with an unusual client? *J. Exp. Mar. Biol. Ecol.* **329**: 161–173.
- Craig, M.T., Pondella, D.J., Lea, R.N. 2006. New records of the flag cabrilla, *Epinephelus labriformis* (Serranidae: Epinephelinae), from the Pacific Coast of Baja California, Mexico, and San Diego, California, USA, with notes on the distribution of other groupers in California. *Calif. Fish Game.* **92**(2): 91-97.
- Craig, M.T., Hastings, P.A., Pondella, D.J., Robertson, D.R., Rosales-Casián, J.A. 2006. Phylogeography of the flag cabrilla *Epinephelus labriformis* (Serranidae): implications for the biogeography of the Tropical Eastern Pacific and the early stages of speciation in a marine shore fish. *J. Biogeogr.* **33**(6): 969–979.
- Craig, M. T. 2007. Preliminary observations on the life history of the white-streaked grouper, *Epinephelus ongus* (Serranidae), from Okinawa, Japan. *Ichth. Res.* **54**(1): 81-84.
- Craig, M.T., Hastings, P.A. 2007. A molecular phylogeny of the groupers of the subfamily Epinephelinae (Serranidae) with a revised classification of the Epinephelini. *Ichth. Res.* **54**(1): 1-17.
- Craig, M. T., P. Wirtz, P. Bartsch, and P. Heemstra. 2007. Redescription and validation of *Alphesthes afer* (Bloch 1793) as an amphi-Atlantic grouper species. *Cybium.* **30**(4): 327-331.
- Dulčić, J., Matić-Skoko, S., Paladin, A.; Kraljević, M. 2006. Age, growth and mortality of brown comber, *Serranus hepatus* (Linnaeus, 1758) (Pisces: Serranidae), in the eastern Adriatic (Croatian coast). *J. Appl. Ichthyol.* **23**(2): 195-197.
- Erisman, B.E., Rosales-Casián, J.A., Hastings, P.A. 2007. Evidence of gonochorism in a grouper, *Mycteroperca rosacea*, from the Gulf of California, Mexico. *Env. Biol. Fish.* In press.
- Erisman, B.E., Buckhorn, M.L., Hastings, P.A. 2007. Spawning patterns in the leopard grouper, *Mycteroperca rosacea*, in comparison with other aggregating groupers. *Mar. Biol.* In press DOI 10.1007/s00227-007-0623.
- Fennessy, S.T. 2006. Reproductive biology and growth of the yellowbelly rockcod *Epinephelus marginatus* (Serranidae) from South-East Africa. *Afr. J. Mar. Sci.* **28**(1): 1 -11.
- Frisch, A., van Herwerden, L. 2006. Field and experimental studies of hybridization between coral trouts, *Plectropomus leopardus* and *Plectropomus maculatus* (Serranidae), on the Great Barrier Reef, Australia. *J. Fish Biol.* **68**(4): 1013–1025.
- Maggio, T., Andaloro, F., Arculeo, M. 2006. Genetic population structure of *Epinephelus marginatus* (Pisces, Serranidae) revealed by two molecular markers. *Ital. J. Zool.* **73**(3): 275–283.
- Mabuchi, K., Miya, M., Azuma, Y., Nishida, M. 2007. Independent evolution of the specialized pharyngeal jaw apparatus in cichlid and labrid fishes. *BMC Evol Biol.* **7**: 10-16.
- Mallela, J., Roberts, C., Harrod, C., Goldspink, C. R. 2007. Distributional patterns and community structure of Caribbean coral reef fishes within a river-impacted bay. *J. Fish Biol.* **70**(2): 523–537.
- Manolakou, P., Lavranos, G. and Angelopoulou, A. 2006. Molecular patterns of sex determination in the animal kingdom: a comparative study of the biology of reproduction. *Repr. Biol. Endocr.* **4**: 59-72.
- Nemeth, R.S., Blondeau, J., Herzlieb, S. Kadison, E. 2007. Spatial and temporal patterns of movement and migration at spawning aggregations of red hind, *Epinephelus guttatus*, in the U.S. Virgin Islands. *Env. Biol. Fish.* **78**(4): 365-381.
- Pears, R. J., Choat, J. H., Mapstone, B. D., Begg, G. A. 2006. Demography of a large grouper, *Epinephelus fuscoguttatus*, from Australia's Great Barrier Reef: implications for fishery management. *Mar. Ecol. Progr. Ser.* **307**: 259-272.
- Puebla, O., Bermingham, E., Guichard, F., Whiteman, E. 2007. Colour pattern as a single trait driving speciation in Hypoplectrus coral reef fishes? *Proc. Biol. Sci.* **274**(1615): 1265-71.
- Sakai, S., Kuniyoshi, H., Yoshida, M., Fukui, Y, Hashimoto, H. Gushima, K. 2006. Social control of terminal phase transition in primary males of the diandric wrasse, *Halichoeres poecilopterus* (Pisces: Labridae). *J. Ethol.* **25**(1): 57-61.
- Scales, H., Balmford, A., Manica, A. 2007. Impacts of the live reef fish trade on populations of coral reef fish off northern Borneo. *Proc. Roy. Soc. Biol. Sci.* **274**(1612): 989-994.

- Smith, W.L. and Craig, M. T. 2007. Widely casting the percomorph net: The importance of broad taxonomic sampling in the search for the placement of serranid and percoid fishes. *Copeia*. **2007**(1): 35–55.
- Tuset, V. M., Rosin P. L., Lombane, A. 2006. Sagittal otolith shape used in the identification of fishes of the genus *Serranus*. *Fish. Res.* **81**(2-3): 316-325.
- van Herwerden, L., Choat, J.H., Dudgeon, C.L., Carlos, G., Newman, S.J., Frisch, A., van Oppen, M. 2006. Contrasting patterns of genetic structure in two species of the coral trout *Plectropomus* (Serranidae) from east and west Australia: introgressive hybridisation or ancestral polymorphisms. *Mol Phylogenet. Evol.* **41**(2): 420-35.
- Yaakub, S.M., Bellwood, D.R., Herwerden, L., Walsh, F.M. 2006. Hybridization in coral reef fishes: introgression and bi-directional gene exchange in *Thalassoma* (family Labridae). *Mol Phylogenet. Evol.* **40**(1): 84-100.
- Zorica, B., Sinovčić, G., Pallaoro, A., Čikeš Keč, V. 2006. Reproductive biology and length-weight relationship of painted comber, *Serranus scriba* (Linnaeus, 1758), in the Trogir Bay area (middle-eastern Adriatic). *J. Appl. Ichthy.* **22**(4): 260–23.