

Workshop for Global Red List Assessments of Groupers Family Serranidae; subfamily Epinephelinae

FINAL REPORT

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(24 pages)

Introduction

The groupers (Family Serranidae; Subfamily Epinephelinae) comprise about 160 species globally in the tropics and sub-tropics. 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 is needed to examine the sub-family as a whole and set conservation and management priorities as indicated. The Serranidae is also a priority family for the Global Marine Species Assessment. This report summarizes the outcomes of the first complete red listing assessment for groupers conducted by the Groupers and Wrasses IUCN Specialist Group (GWSG) at a workshop in Hong Kong.

The Workshop for Global Red List Assessments of Groupers took place 7-11 February, 2007, at the Robert Black College of the University of Hong Kong (HKU). The 5-day workshop was designed to complete red list assessments for all grouper species. Of a total of 161 grouper species globally, only 22 are included on the IUCN Red List with a currently valid assessment; several need to be reassessed and the remaining 100+ have never been assessed. The aim of the workshop, therefore, was to assess 139 groupers to complete all 161 species.

The workshop had 23 participants, including many highly respected grouper experts, coming from eleven countries (see cover photo of participants). All members of the GWSG were invited in circulation. In the preparation phase we were greatly assisted by the experience of Claudine Gibson and Sarah Valenti from the Shark SG, and for guidance in facilitation from Janice Chanson of Conservation International. Kent Carpenter and Simon Stuart (IUCN/Conservation International) variously assisted in the development and running of the workshop. Experts came from a range of academic institutions, NGOs and governments, all continents, and with expertise in fisheries, taxonomy, biology and molecular perspectives.

In preparation for the workshop, species assignments were circulated to participants in October, 2006, with approximately 10 species assigned to each expert. SG member Kevin Rhodes started to populate the SIS DEM and to circulate species geographic distribution maps supplied by Kent. Instructions were supplied to participants following advice from the Shark SG (Appendix 1 for Instructions and Appendix 2 for details of participants). It was decided to do DEM information entry at the workshop for ease and consistency since none of the participants had had experience with the new format. Currently, GWSG assessments are entered into the 'old' Word format. At HKU we assembled files of readily available references and reports for each species to make these accessible for consultation at the workshop; these were combined with the extensive set of publications already in the SG files.

Following the workshop, assessments were double-checked and returned to evaluators for final signoff. Assessments will appear in the 2007 and 2008 IUCN Red List postings and will be compiled for publications (see Appendices 3 and 4 for Red List categories of all groupers). In addition, information was provided to Mala Ram of IUCN for the 6 groupers included in the Sampled Red List Index and feedback provided on regional grouper assessments conducted in 2006 in Madagascar by Conservation International. Outcomes were also made immediately available for the GMSA.

In addition to compiling information for a grouper status publication, shorter articles will be submitted to both scientific journals and for popular articles. A press release was prepared by participants following the workshop and received quite wide coverage (Appendix 5). On the basis of the outcomes of the workshop, recommendations for further actions are being

considered by the GWSG and will be submitted to the SSC Marine Conservation Sub-Committee and IUCN Global Marine Programme as relevant. Details of the workshop were posted on the GWSG website for reference following the press release.

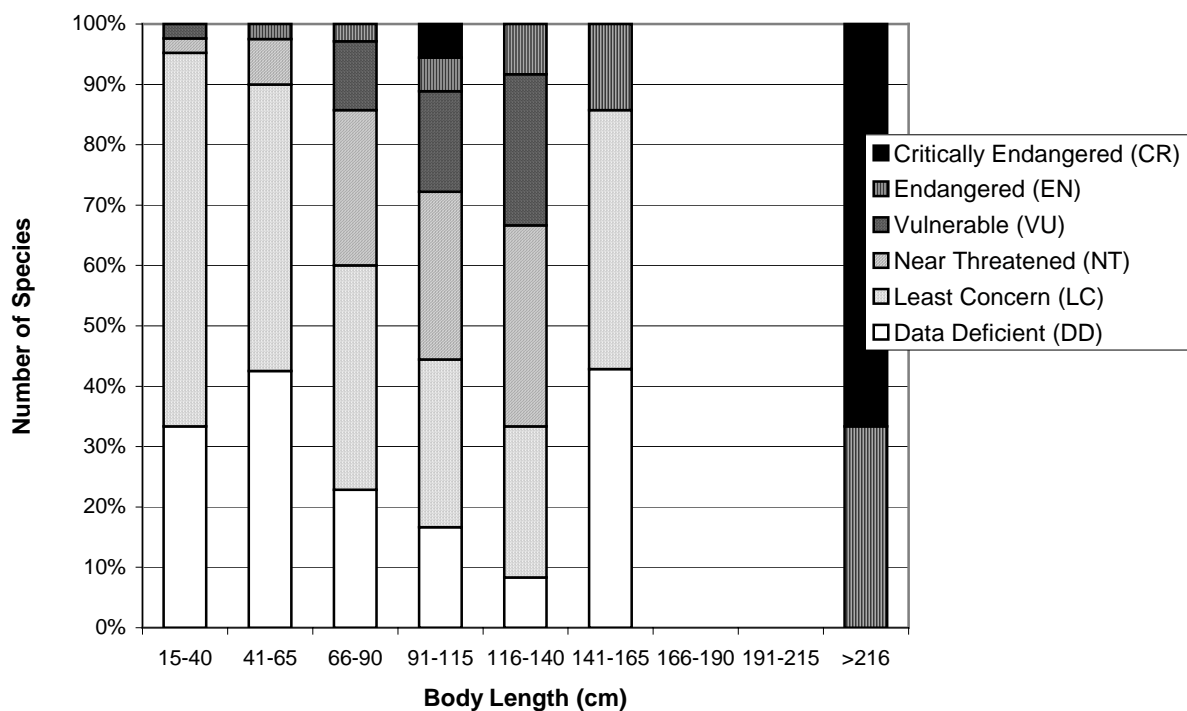
Summary of Results of Outcomes

The results of the workshop, combined with the 22 current listing, are shown in Figure 1, plotted by fish size (see also Appendices 3 and 4). In summary, there were several clear outcomes from the combined red list assessments in terms of categories assigned, threatening factors, and future steps. We also learned valuable lessons on the red listing process and the preparation of workshops intended to assess large species numbers. Many valuable unpublished sources of literature and ongoing studies came to light.

Summary and Threats

1. Threatened species (VU, EN and CR) are more likely to be larger than smaller groupers.
2. Twenty percent of all categorized species (i.e. all except DD) are threatened, with a further 19% of categorized species listed as NT.
3. Near Threatened species (NT) are generally among larger fish and, with the exception of size class 141-165 cm Total Length (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.
4. At least 50% of the threatened species spawn in aggregations. Many groupers do not aggregate so this finding may be noteworthy.
5. Many species were data-poor or deficient, even commercially important species.

Figure 1: Conservation status of 161 groupers by size class (total length in cm) According to IUCN Red Listing criteria (2001)



6. 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.

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 $\geq 30\%$ 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 (http://www.iucnredlist.org/info/categories_criteria2001).*

Several major threatening factors identified applied to many of the species listed as VU, EN or CR (Appendix 3). These were overfishing, lack of management or lack of effective management, poor protection of outer reef habitats, few, if any 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 as 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, needs further examination particularly since many of the more shallow species have few remaining natural refuges where fishing does not occur and fishery expansion views the deep reef 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.

For the 139 assessments, the 4.5 working day period assigned was necessary in addition to good prior preparation and clear guidelines established in the initial plenary. To optimise use of time, participants were divided into two groups for regional-based assessments and came together for plenaries at the start and end of the workshop. Given the number of species involved, prior preparation is needed to produce complete species information summaries and, if possible, these should be ready for transfer to DEM format, if not already so formatted.

Clear guidelines should be discussed for default positions where there is no consensus on a particular species assessment, and an understanding established regarding conservativeness, or otherwise, of decisions (i.e. not to list in a threatened category unless the information is clear or there is broad consensus). It was felt that DD should be considered the default relative to LC in borderline cases, because LC listings could detract attention from species so listed.

Specific advice for future red-listing workshops dealing with large numbers of species:

1. Thorough species information compilations must all be completed ahead of time.
2. Dedicated staff are needed to enter data and experienced facilitators to run the sessions throughout and to keep people focused and on-time. Facilitators must keep neutral.
3. Ensure that all relevant DEM boxes are completed during the workshop; e.g. we missed congregatory types of behaviour and had to add them in later.
4. Have a person knowledgeable with the taxon and IUCN procedures dedicated to follow-up after the workshop, to ensure that all references are in the correct format, text makes sense, rationale reflects the information provided and that there are no obvious errors, inconsistencies or omissions.
5. After follow-up (4 above) it is important to circulate the finalized assessments once more to participants to ensure signoff and to double check details with assessors.
6. Avoid listing as LC unless most people agree with. DD should be the default when there are insufficient data or in borderline cases. Alternatively, other guidelines can be established but these should be made clear before assessments begin.
7. There should be a category in the DEM 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 this is probably an important habitat to flag for fish.

Next steps

The combined assessments enabled a first ever overview of the groupers and will assist the SG in planning further work. In particular, the following areas were identified as priorities:

1. All larger DD and LC species should be the immediate focus of more data-gathering, especially in Southeast Asia and the Pacific islands.
2. 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.
3. Certain habitats may need special attention. For example, the deep outer reef slope habitat is likely a last refuge for many species, and may be the only habitat for some, is increasingly targeted as shallow waters become overfished, and is not typically included in MPA designations. Moreover, the category could be included in the DEM.
4. Species that aggregate to spawn need more protection if the aggregations are targeted.

Funding and acknowledgements

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APPENDIX 1

Completing Red List Assessments for Groupers

(modified from chondrichthyan guidelines produced by the Shark Specialist Group)

The aim of the February 2007 workshop is to complete global Red List assessments for all groupers (Epinephelinae) not yet assessed or that need to be reassessed (about 110 species).

At the workshop, participants will work in groups to complete species assessments. In the past the Groupers & Wrasses Specialist Group has completed Red List assessments using the Word format Red List Questionnaire (already circulated). At this workshop, all assessments will be entered into the IUCN's Data Entry Module (DEM), which contains the same sections as the Word format questionnaire. Kevin Rhodes will populate the DEM with preliminary information prior to the workshop while each group at the workshop will have a data recorder to enter the required information for each assessment into the DEM. In the meantime, you can use the old Word format questionnaire, and the notes below, to collect information needed for assessments.

The success of the workshop will depend on the thorough preparation of materials beforehand. Each of you has been asked to collect information from the published literature and from contacts and informal sources to enable as detailed an assessment as possible to be prepared for each species (approx 10 species each). You are entirely responsible for the species assigned to you. If more than one person is assessing a species, you are responsible for coordinating efforts of data collection for that species between yourselves.

Please bring all of your information, data and reference materials to the workshop for completing the assessments (hard copy or electronically). Information is required on the Distribution, Population, Habitat and Ecology, Threats and Conservation Actions, to support the category being assigned to a species (see below). You will also need to pay special attention to collecting fishery related data for commercially exploited species. **This latter can take time because it will often require requests for data from unpublished sources or from fishery reports, so please address it soon.** Please see below for details of the type of information required under each of these headings and be sure to bring all details of personal communications with you.

You can use the 'old' Word format questionnaire to prepare information on your selected species, or use the format indicated below for guidance. *In either case, be sure to bring an electronic version of the text because this can then be copied and pasted into the DEM at the workshop.* You can refer to the IUCN website for the detailed definitions of the categories and criteria that will help you decide such things as 'area of occurrence', decline criteria, etc. Please insert references in the text as appropriate (see: [www... http://www.iucnredlist.org/info/categories_criteria](http://www.iucnredlist.org/info/categories_criteria)).

To help summarize information in a way that will be useful for the DEM, please ALSO complete the LIFE HISTORY TABLE inserted at the end of these guidelines, for each species.

Information required for each assessment

Common name: Any local names from your particular region and the language, as well as internationally accepted names such as FAO – try to at least include standard French, Spanish and English names.

Taxonomy: Information on any taxonomic issues related to the species. For example, if there is a possibility of the species under assessment belonging to a species-complex, or if taxonomic resolution is pending etc.

General Information

This is the main text of the assessment. Please bring with you all the information available on the headings below for each species.

Distribution (Geographic Range Information): Information on specific important habitats, e.g. an area known to be an important spawning or nursery ground. If you are using the Geographic Range Criterion (Criteria B1 or B2) to list a threatened species, please indicate the ‘extent of occurrence’ or ‘area of occupancy’ here. Also include a summary of the global distribution and the appropriate citations here. Indicate the upper and lower depth limits and depth zone e.g. abyssal (4000-6000m).

Population: Anything known on population sizes, abundance (rare, scarce, common, etc), and the degree of fragmentation. Also need to note any trends in abundance over time. For exploited species estimates of catch per unit of effort (CPUE) can be used as proxies for abundance. Data can also come from underwater visual census estimates (UVC). Remember that landings data alone may not be very useful without some measure of fishing effort.

Habitat and Ecology: Anything relating to the species’ biology that is relevant to the assessment. Document habitat and depth range information (e.g. This species is demersal on the continental shelf at depths of...), size information, reproductive biology, age, growth, diet, trophic dynamics etc. Detail is good here and **everything must be referenced** as appropriate. We **must** complete the life history table, with every entry being **referenced**. If no information is available on a particular section of the table then state ‘**Unknown**’. (Please see Life History Table below).

Threats: Document any known, probable or potential threats – e.g. fisheries, trade, habitat destruction, pollution, mariculture. Please be specific about the types of fisheries (i.e. fishery name and type, gear, target species etc.). Document information such as declining or increasing CPUE trends and other fisheries data, as this is the section where fisheries data should be discussed. If the situation appears to be improving, please give details here. Indicate if you suspect that the species may be captured in the future in fisheries that are known to be expanding (eg globally expanding deepwater fisheries; extension of live reef fish trade). Indicate whether the

species is involved in mariculture and whether juveniles are caught from the wild for 'grow-out' or 'fattening' or there is hatchery production, or both. Include also whether the species is part of chilled or live fisheries, aquarium or food. Are many of the fish landed thought to be in the juvenile size range? Are spawning aggregations targeted?

Conservation Actions: Distinguish between **those in existence**, (e.g. protected species status, protected areas that encompass part or all of a species' range), and **those required** in the future (or immediately!). This is important to help us identify the action required for the future. Include here fishery management measures.

Countries of occurrence: Every country of occurrence needs to be listed. Specify whether a species presence is confirmed, possible, or if it occurs as a vagrant.

Aquatic occurrence: List the FAO Fishing Areas (see: <http://www.oceansatlas.org/servlet/CDSServlet?status=ND0zMTA2JmN0b19pbmZvX3ZpZXdfc2l6ZT1jdG5faW5mb192aWV3X2Z1bGwmNj1lbiYzMz0qJmM3PWtvcw~~>).

Red Listing: The assessment category should be selected based on the above information

The assessment category and criteria: Select the appropriate assessment category and as many of the criteria as apply. This is a preliminary assessment and will be discussed further at the workshop.

Rationale: It is very important that you **justify** why the species has been assigned to the particular category in this section. Include a summary of the information relevant to the region and pick out the main trends, threats, life history characteristics that lead to the assessment. If a species is NT give the reasons why it may become threatened in the future. It is also useful to say (especially in the case of DD species, what research action should be taken and to describe recommended conservation or management measures. The purpose of the rationale is to act as a **concise** stand-alone summary, briefly summarizing the main evidence i.e. like an **abstract** for the whole assessment.

It would be very useful here to identify further work that is needed to improve assessment.

Literature References: Please bring the citations for each of your references in full to the workshop. Cite the author and year where appropriate throughout text. Personal communications should be dated and recorded in this section with name and affiliation, if possible. References which you know are sources of info for a particular species but which you did not directly cite in your assessment should also be listed.

Authority files: The Authority files will be completed after the main documentation of the assessment (under the 'General Information' heading) has been entered. The information entered into the Authority files should be based on the text of the assessment. For example, if habitat destruction by bottom trawling or dynamite fishing is selected as a threat to the species, then the impact of this should be

described in the ‘Threats’ section. **All authority files and instructions are shown at the end of the blank word format Red List Questionnaire.** Copies will also be distributed at the workshop.

Habitat preferences: For the **Habitats Authority File** we use a points score system (suitable, moderately suitable, unsuitable, undefined) to indicate the preferred habitat of each species.

Major threats: For the **Major Threats Authority File** – you will be asked to indicate which threats apply. Please note that directed fisheries fall under ‘3. Harvesting [hunting/gathering]’ and habitat loss/degradation from the effects of fishing fall under ‘1. Habitat loss/degradation, 1.3. Extraction, 1.3.2. Fisheries.’ In the Authority File, ‘Point 4. Accidental mortality’ encompasses bycatch. If you know a particular threat occurs but lack details of it, use the ‘Unknown’ subheading under a higher threat heading. For example, if you know that accidental mortality is a threat to the species but the causes of this accidental mortality are unknown use ‘4. Accidental mortality, 4.4. Unknown.’ Where there is no available information on threats use ‘12. Unknown.’

Conservation measures: For the **Conservation Actions Authority File**, please indicate any conservation or management measures that are currently in place **as well as any which you recommend.**

Utilisation: How the species is utilized. E.g. flesh marketed for human consumption, use in Chinese medicine, aquarium, live, chilled, etc.

General points on applying the categories and criteria

Data Quality and Uncertainty

Generally, you will need to decide whether the value you have, even if an estimate/inference lies above or below a particular threshold. We lack info from many countries on many species in terms of distribution, population numbers and trends, etc, but the criteria **do not** require precise information (see below). Only when data are very uncertain should the Data Deficient category be applied. Taxa that are poorly known can often be assigned a threat category on the basis of background information concerning the deterioration of their habitat and/or other causal factors. It is likely that information is only available, such as for exploitation, from a few countries so you have to decide whether the patterns evident, if any, from limited data might apply more globally.

Criteria A (population decline criterion)

Since it is difficult to quantify precisely the size of populations, changes in indices of abundance (such as catch per unit effort or UVC data) may be used to infer changes in population size. The key statistic for population decline is related to the generation period of a species. The decline may have taken place in the past, or be projected into the future (for example where the decline is likely to take place if current mortality rates are not altered). Criterion A can readily be applied to a range of population data derived from catch rates and fisheries-independent field research. However, this criterion does not always lead to equally robust assessments of extinction risk, which also depend partly upon the life history of the species. Refer to the guidelines for applying this criterion to widely distributed or multiple populations. You may need to carefully evaluate fisheries data. Remember that you are doing global assessments so

will need to search broadly for data sources. Don't forget that the FAO statistics are available for several groupers identified to species level.

Precautionary Principle

The criteria require the precautionary principle to be used. For example, where a population decline is known to have taken place (e.g. as a result of fisheries), but no management has been applied to change the pressures on the population, the decline is assumed to be likely to continue in the future. If fisheries are known to be underway, but no information is available on changes in CPUE, data from similar fisheries elsewhere may be used by informed specialists to extrapolate likely population trends. Where no life history data are available, the demographics of a very closely related species may be used to estimate demographic parameters (age at maturity etc.).

LIFE HISTORY TABLE

Life history parameters (where known or estimated; please state where unknown; please indicate data source in the table)

Age at first sexual maturity (years) **	female:	
	male:	
Size at first sexual maturity (total length cm)**	female:	
	male:	
Longevity (years)		
Maximum size (total length cm)		
Average reproductive age (years)*		
Spawning mode (group/pair spawn; spawning aggregations?)		
Reproductive seasonality (how many months per year)		
Sex change parameters (sex ratio fished and unfished, size of sex change, type of hermaphroditism, etc.)		
Annual rate of population increase		
Natural mortality		

* This is the generation period required when using the IUCN decline criterion.

** if sex is unknown, indicate this

APPENDIX 2

Workshop Participants, Affiliations and Contact Details

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APPENDIX 3

Details of all Threatened Groupers (VU, EN, CR)

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	
		No	Heavily exploited and highly valued. Unmanaged. Taken as juveniles	Rocky reefs	E. Asia	
<i>Epinephelus akaara</i>	EN A2d		Fished, declines in size/catches noted	Coral or rocky reefs	Limited in S. Africa	
<i>Epinephelus albomarginatus</i>	VU A2d	No but distribution limited	Unmanaged	Rocky reefs and mud bottom	Korea, Japan, China, Taiwan	
<i>Epinephelus bruneus</i>	VU A4d	Not abundant	Deepwater fishery, overfished and little managed.	Offshore rocky reefs, often deep	SE USA	
<i>Epinephelus drummondhayi</i>	CR A2d+3d	Not common in Caribbean	Heavily fished with little effective management	Deeper reefs	Southern USA, Brazil, Caribbean	Yes
<i>Epinephelus flavolimbatus</i>	VU A2d+3d	Yes	Unmanaged and increased pressure	Rocky bottoms	Extremely limited	
<i>Epinephelus gabiellae</i>	VU B1ab(v)	Not common	Various fishing pressures, some protection	Mangroves, bays, high relief rock	Tropical w. Atlantic, Caribbean, E. Pacific, parts W. Africa	Yes
<i>Epinephelus itajara</i>	CR A2d	Uncommon	Some	Caves, reefs, estuaries	Widespread	
<i>Epinephelus lanceolatus</i>	VU A2d	Common	Heavy pressure, only protection is MPAs in Mediterranean	Rocky substrates	West Africa. W. Mediterranean and part of Brazil	Yes
<i>Epinephelus marginatus</i>	EN A2d	Not common	Deep-water fisheries, not effectively managed	Rocky bottom	Mainly SE USA and northern Cuba	
<i>Epinephelus nigritus</i>	CR A2d+3d	No	Heavily fished and management not very effective	Deeper reefs	Southern USA, Caribbean, S. America	Yes
<i>Epinephelus niveatus</i>	VU A2d+3d	Once common, now rare in places	Heavily targeted at aggregations and little managed	Shallow coral reefs	Caribbean and tropical western Atlantic	Yes
<i>Epinephelus striatus</i>	EN A2ad	Once common locally, now rare	Targetted and unmanaged	Rocky reefs	Very limited: Madeira, Azores and nearby islands	Yes
<i>Mycteroperca fusca</i>	EN B1ab(v)	Not naturally common	Affected by fisheries with little management	Coral and rocky reefs	Mainly Caribbean	Yes
<i>Mycteroperca interstitialis</i>	VU A2d+3d	Once common, now rare	Intensively fished	Rocky reefs and kelp beds	Limited range in E. Pacific	Yes
<i>Mycteroperca jordani</i>	EN A2d+3d					

<i>Mycteroperca olfax</i>	VU D2	Once common only locally	Fished with declines and no species specific management	Rocky reefs	Limited to Galapagos and environs	
<i>Mycteroperca rosacea</i>	VU A2ad+4ad	Formerly an 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 and Pacific.	Yes
<i>Plectropomus laevis</i>	VU A2d+4d	Naturally rare	Fished and little managed	Outer coral reef slopes	Widespread but scattered distribution	Probably

CB = Congregatory behaviour = Spawning aggregation

APPENDIX 4

Full listing of Red List status for all groupers. Species already on the Red List are indicated in column 3 – only current listings are included i.e. conducted within the last 10 years. All others were assessed during the February workshop. Species submitted for the 2007 red list are indicated and all remaining species will be submitted for the 2008 red list release.

SPECIES	STATUS	ALREADY ON RED LIST*	SUBMITTED TO RED LIST OFFICE FOR 2007 RED LIST
<i>Epinephelus drummondhayi</i>	CR A2d + 3d	X	
<i>Epinephelus itajara</i>	CR A2d	X	
<i>Epinephelus nigritus</i>	CR A2d + 3d	X	
<i>Mycteroperca fusca</i>	EN B1ab(v)		X
<i>Mycteroperca jordani</i>	EN A2d + 3d		X
<i>Epinephelus striatus</i>	EN A2ad	X	
<i>Epinephelus akaara</i>	EN A2d	X	
<i>Epinephelus marginatus</i>	EN A2d	X	
<i>Epinephelus gabiellae</i>	VU B1ab(v)		X
<i>Plectropomus areolatus</i>	VU A4d		X
<i>Mycteroperca rosacea</i>	VU A2ad + 4AD		X
<i>Cromileptes altivelis</i>	VU A4cd		X
<i>Mycteroperca interstitialis</i>	VU A2d + 3d		X
<i>Epinephelus bruneus</i>	VU A4d		X
<i>Epinephelus flavolimbatus</i>	VU A2d + 3d		X
<i>Epinephelus niveatus</i>	VU A2d + 3d		X
<i>Mycteroperca olfax</i>	VU D2		X
<i>Plectropomus laevis</i>	VU A2d + 4d		X
<i>Epinephelus albomarginatus</i>	VU A2d A2d	X	
<i>Epinephelus lanceolatus</i>	VU A2d	X	
<i>Cephalopholis hemistiktos</i>	NT		
<i>Epinephelus diacanthus</i>	NT		
<i>Epinephelus socialis</i>	NT		
<i>Epinephelus polylepis</i>	NT		
<i>Plectropomus leopardus</i>	NT	X	
<i>Mycteroperca prionura</i>	NT		
<i>Plectropomus oligacanthus</i>	NT		
<i>Epinephelus polyphekadion</i>	NT	X	
<i>Epinephelus bleekeri</i>	NT		
<i>Epinephelus andersoni</i>	NT	X	
<i>Epinephelus quernus</i>	NT	X	
<i>Epinephelus morio</i>	NT	X	
<i>Mycteroperca venenosa</i>	NT	X	
<i>Epinephelus coioides</i>	NT	X	
<i>Epinephelus fuscoguttatus</i>	NT	X	
<i>Epinephelus cifuentesi</i>	NT		
<i>Mycteroperca tigris</i>	NT	X	
<i>Epinephelus malabaricus</i>	NT	X	

Plectropomus pessuliferus	NT	
Epinephelus aeneus	NT	
Epinephelus daemeli	NT	X
Mycteroperca bonaci	NT	
Cephalopholis spiloparaea	LC	
Cephalopholis leopardus	LC	
Cephalopholis microprion	LC	
Alphestes multiguttatus	LC	
Epinephelus hexagonatus	LC	
Cephalopholis boenak	LC	
Cephalopholis urodeta	LC	
Gonioplectrus hispanus	LC	
Alphestes immaculatus	LC	
Cephalopholis nigri	LC	
Cephalopholis oligosticta	LC	
Cephalopholis panamensis	LC	
Cephalopholis cyanostigma	LC	
Epinephelus spilotoceps	LC	
Epinephelus ongus	LC	
Cephalopholis cruentata	LC	
Epinephelus merra	LC	
Alphestes afer	LC	
Cephalopholis fulva	LC	
Cephalopholis formosa	LC	
Epinephelus irroratus	LC	X
Paranthias colonus	LC	
Paranthias furcifer	LC	
Epinephelus quoyanus	LC	
Epinephelus fasciatus	LC	
Cephalopholis miniata	LC	
Epinephelus stictus	LC	
Epinephelus areolatus	LC	
Cephalopholis polleni	LC	
Epinephelus rivulatus	LC	
Epinephelus howlandi	LC	
Variola albimarginata	LC	
Epinephelus macrospilos	LC	
Cephalopholis sexmaculata	LC	
Epinephelus labriformis	LC	
Epinephelus trimaculatus	LC	
Epinephelus longispinis	LC	
Anyperodon leucogrammicus	LC	
Epinephelus miliaris	LC	
Cephalopholis argus	LC	
Epinephelus maculatus	LC	
Cephalopholis sonnerati	LC	
Epinephelus coeruleopunctatus	LC	

Epinephelus adscensionis	LC	
Epinephelus poecilonotus	LC	
Triso dermatopterus	LC	
Epinephelus radiatus	LC	
Epinephelus tuamotuensis	LC	X
Epinephelus morrhua	LC	
Epinephelus analogus	LC	
Epinephelus chlorostigma	LC	
Epinephelus guttatus	LC	
Mycteroperca acutirostris	LC	
Epinephelus flavocaeruleus	LC	
Mycteroperca rubra	LC	
Variola louti	LC	
Mycteroperca phenax	LC	
Dermatolepis inermis	LC	
Epinephelus septemfasciatus	LC	
Epinephelus acanthistius	LC	
Epinephelus multinotatus	LC	
Dermatolepis dermatolepis	LC	
Epinephelus mystacinus	LC	
Epinephelus cyanopodus	LC	
Mycteroperca microlepis	LC	
Plectropomus maculatus	LC	
Mycteroperca xenarcha	LC	
Epinephelus tukula	LC	
Epinephelus ergastularius	LC	
Cephalopholis polyaspila	LC	
Epinephelus clippertonensis	LC	X
Epinephelus trophis	DD	
Epinephelus chlorocephalus	DD	X
Cephalopholis aitha	DD	
Epinephelus sexfasciatus	DD	
Epinephelus timorensis	DD	X
Epinephelus bontoides	DD	
Cephalopholis aurantia	DD	
Epinephelus fasciatomaculosus	DD	
Epinephelus lebretonianus	DD	X
Epinephelus faveatus	DD	
Epinephelus bilobatus	DD	
Epinephelus melanostigma	DD	
Epinephelus stoliczkae	DD	
Cephalopholis taeniops	DD	
Cephalopholis igarashiensis	DD	
Epinephelus heniochus	DD	
Epinephelus erythrurus	DD	
Saloptia powelli	DD	
Epinephelus polystigma	DD	
Epinephelus corallicola	DD	

Epinephelus perplexus	DD		X
Epinephelus amblycephalus	DD		
Epinephelus retouti	DD		
Gracila albomarginata	DD		
Epinephelus summana	DD		
Epinephelus goreensis	DD		
Epinephelus niphobles	DD		
Aethaloperca rogae	DD		
Epinephelus awoara	DD	X	
Epinephelus undulatostratus	DD		X
Epinephelus darwinensis	DD		X
Epinephelus undulosus	DD		
Epinephelus tauvina	DD		
Epinephelus costae	DD		
Epinephelus epistictus	DD		
Epinephelus indistinctus	DD		X
Epinephelus octofasciatus	DD		
Epinephelus posteli	DD		
Plectropomus punctatus	DD		
Mycteroperca cidi	DD		
Epinephelus haifensis	DD		
Epinephelus suborbitalis	DD		X
Epinephelus magniscuttis	DD		
Epinephelus latifasciatus	DD		
Epinephelus caninus	DD		
Cephalopholis nigripinnis	DD		
Epinephelus exsul	DD		
Dermatolepis striolata	DD	X	

* Note that *Epinephelides armatus* is listed as NT under Serranidae on the IUCN Red List but is not included here since its taxonomic status is uncertain in relation to the sub-family Epinephelinae.

APPENDIX 5

GWSG Press Release

Twenty coral reef fishes threatened with extinction

For immediate release

Hong Kong, 2007 (IUCN) - Twenty species of grouper, a globally important group of 162 coral reef food fishes, are threatened with extinction unless management or conservation measures are introduced.

This was the conclusion of a panel of twenty experts from 10 countries at a recent conservation summit convened to assess the status of groupers worldwide. Groupers are the basis of the multi-million dollar live reef fish market of the sea food trade centred in Hong Kong, where consumers can pay up to US\$50 per kg for this delicacy. Groupers are also the most valuable commercial fishes in the fresh fish markets of the tropics and sub-tropics.

The workshop, held at the Department of Ecology & Biodiversity of the University of Hong Kong, is ground-breaking: *“this is the first time that fishery data and population information for groupers have been globally and systematically assessed using IUCN criteria, with the worrying result that twenty species are threatened”*, said Dr. Yvonne Sadovy, Chair of the IUCN Grouper and Wrasse Specialist Group and Associate Professor at HKU, who organized the workshop. *“The results highlight the urgent need for better fishery management, more effective marine protected areas (MPAs) and more research on these important but vulnerable species”* she added.

“The workshop forms part of a growing focus on the problems of overfishing, and conservation concerns for fishes in general, and will contribute to a massive new initiative, the Global Marine Species Assessment, led by the World Conservation Union (IUCN) and Conservation International. *“We aim to examine the conservation status of all fishes, globally”*, says Kent Carpenter, of Old Dominion University, Virginia, USA.

The need to better protect outer and deep reef fish populations and habitats, and the spawning (reproductive) aggregations of these species, was identified as being particularly important for a number of the threatened grouper species assessed. Outer and deep reef habitats are often not included in MPAs, and protection of spawning aggregations—critical to the maintenance of exploited populations of many threatened groupers are rarely incorporated in fishery management plans; they can rapidly be eliminated by uncontrolled fishing. The increasing international trade of these reef fishes poses a major threat because of the insatiable demand (and resulting high prices) for groupers.

The workshop outcome serves as yet another reminder of the logical need to limit exploitation levels to the speed with which fish populations reproduce. The threatened groupers are naturally vulnerable to overfishing, and if fish populations continue to decline, this can threaten food security and livelihoods in source countries, as well as the species concerned. The listing of these species as threatened also reflects the widespread failure to successfully manage fisheries associated with coral reefs.

“Groupers are some of the oldest fishes on coral reefs – some groupers may be more than 50 years old – and several do not reach maturity until late in life, making them particularly vulnerable to fishing before they are able to reproduce” says Matthew Craig of the Hawaii Institute of Marine Biology. Add to this the fishing pressure on the spawning aggregations of adults, the targeting of juveniles for food and for capture-based mariculture and the ongoing loss of reef habitat worldwide, and there seems little opportunity for unmanaged populations to be replenished.

As just one example, two species of coral trout grouper (*Plectropomus areolatus* and *P. laevis*), mainstays of the live reef food fish trade in Hong Kong, and both species that aggregate for spawning, were listed as Vulnerable based on the IUCN Red List criteria. Although currently these species are seen in local Hong Kong markets, the heavy and unmanaged fishing pressure that they are exposed to is rapidly reducing populations and will continue to do so unless their fisheries are controlled. Groupers are so prized in Hong Kong and southern China, and so depleted on many coral reefs

of SE Asia, that they are imported alive by air or sea, from as far away as south Pacific and the Indian Ocean.

And it is not just the live fish trade that threatens grouper species. In North and South America, heavy fishing for these highly desired food fish also poses a significant threat. As just one example, the Nassau grouper (*Epinephelus striatus*) is listed as Endangered; yet this was once one of the most commonly landed groupers in the islands of the western Atlantic.

While it has virtually disappeared from most Caribbean reefs, the species continues to be fished in many parts of its range and receives little effective management protection anywhere.

“Without conservation efforts, everybody loses: the loss of such species will affect not only fishermen and traders in source countries but also the local and international traders, and the people who like to eat them,” said Dr. Sadovy.

Notes for editors

Photos and additional information are available from: yjsadovy@hku.hk; Tel: 2299 0603 or Kent Carpenter kcarpent@odu.edu

The **IUCN Red List threat categories** are the following, in descending order of threat:

- *Extinct or Extinct in the Wild*;
- *Critically Endangered, Endangered and Vulnerable*: species threatened with global extinction;
- *Near Threatened* : species close to the *threatened* thresholds or that would be threatened without ongoing specific conservation measures;
- *Least Concern* : species evaluated with a low risk of global extinction;
- *Data Deficient* : no evaluation because of insufficient data.

The World Conservation Union (IUCN)

The World Conservation Union is the world’s largest conservation network. The Union brings together 82 States, 111 government agencies, more than 800 non-governmental organizations (NGOs), and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership. The Union’s mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. The World Conservation Union is a multicultural, multilingual organisation with 1000 staff located in 62 countries. Its headquarters are in Gland, Switzerland.
<http://www.iucn.org/>

The IUCN Red List of Threatened Species

The IUCN Red List is widely recognized as the most comprehensive source of information on the global conservation status of plant and animal species and can be used as a tool for measuring and monitoring changes in the status of biodiversity and our knowledge of the taxa. Red Lists are among the most widely used tools available to conservationists worldwide for focusing attention on species of conservation concern. They are an essential basis to enable management priorities to be targeted and for monitoring the long-term success of management and conservation initiatives. The assessments evaluate the conservation status of individual species, identify threatening processes affecting them and, if necessary, propose recovery objectives for their populations.
<http://www.iucn.org/themes/ssc/red-lists.htm>

The IUCN Groupers and Wrasses Specialist Group (GWSG)

The GWSG was formed in 1998 in response to concerns that a number of larger reef fishes in the grouper and wrasse families are particularly vulnerable to fishing because of their biological characteristics, such as slow reproductive rates and delayed sexual maturity, and needed more attention from specialists to assess their conservation status. The GWSG comprises 35 of the top grouper and wrasse experts from 20 countries. The GWSG, through its membership, is extensively involved in research, management and outreach activities. In addition to the recent workshop, the GWSG has for many years been working for the better management of one of the largest of all reef fish species, the giant Napoleon fish or Humphead wrasse (*Cheilinus undulatus*), which was listed on CITES (Convention on International Trade in Endangered Species) Appendix II in October 2004. This was a significant listing inasmuch as it was the first commercial food fish to be so-listed. The SG is now working closely with FAO (United Nations Food & Agriculture Organization) and with the Indonesian government (Indonesia is the major exporter of the species) to develop a sustainable management plan for the species. [www.http://www.hku.hk/ecology/GroupersWrasses/iucnsg/index.html](http://www.hku.hk/ecology/GroupersWrasses/iucnsg/index.html) (Species section)

www.humpheadwrasse.info

PRESS COVERAGE/MEDIA PICKUP

http://www.wwf.org.hk/eng/involved/membership/aboutlife_latest_issues.php -
SEE MAGAZINE PAGE 4

<http://www.sciencedaily.com/upi/index.php?feed=Science&article=UPI-1-20070322-12072400-bc-switzerland-grouper.xml>

‘Apple Daily’ - Hong Kong 13th March, 2007 (IN Chinese)

CNN story

http://www.cnn.com/2007/WORLD/asiapcf/03/25/asia.fish.reut/index.html?eref=rss_latest

Other articles

<http://news.google.co.uk/news?hl=en&ned=uk&q=grouper+conservation+international>

<http://www.jonesbahamas.com/?c=47&a=12154>

Taiwan Environmental Information Center and its email newspaper at 27th March 200 (in Chinese) <http://e-info.org.tw/node/20902>

Submitted by Georgina Bustamante

[<mailto:gbustamante@bellsouth.net>] to GCFINet.

Conservation International's web site at

http://www.conservation.org/xp/news/press_releases/2007/032107.xml