



## MESSAGE FROM THE CHAIRS

### Greetings All!

After a long hiatus, we have finally assembled another newsletter for the Groupers & Wrasses IUCN Specialist group. This would not have possible without the leadership of Áthila Bertoncini, who formatted and compiled all of your contributions, Allen To and João Pedro Barreiros, we are most grateful for everybody's efforts.

Áthila has also been busy updating our website and has created an email account for all future contributions to our newsletter. If you have something that you would like to share or see highlighted in the newsletter, please email to [gwsig.iucn@gmail.com](mailto:gwsig.iucn@gmail.com). Any type of article may be submitted including short reviews of recent publications or general grouper/wrasse news. With your help, we can regain momentum and activity for the GWSG as we gear up towards our workshop in November.

Our next workshop to re-assess groupers is scheduled for November, 2016, in Azores. We have finalized dates to fall between 16 and 21 November and a tentative list of about 25 attendees including two official IUCN workshop facilitators; more information will be circulated shortly when we have information on final funds available. We will shortly begin to pull together information from membership and beyond so that it can be summarized prior to the meeting to make the workshop more efficient. Since our assessments in 2007, a lot has been published on the life history, fisheries and population status of many of our species. We would ask that you send any publications or unpublished data that you are willing to share to one of us ([matthew.craig@noaa.gov](mailto:matthew.craig@noaa.gov), [yjsadovy@hku.hk](mailto:yjsadovy@hku.hk)).

We hope you enjoy this latest newsletter!

Yvonne Sadovy and Matthew Craig  
Co-Chairs

Know about the most valuable species in the live reef food fish trade, the humphead wrasse, on page 12.



Picture by Yvonne Sadovy

Dr. Erisman brings news on spawning and movement patterns of the Gulf Grouper, on page 14.



Picture by David Castro



## This Issue:

Recovery of spawning aggregations .....02

Pondoland MPA provides refuge for depleted serranid stocks, enhancing fisheries.....03

Evidence from tagging study suggested that MPAs could protect reproductive populations.....05

Characterization of the Goliath grouper *Epinephelus itajara* fishery of southern Belize for conservation planning.....06

Empowering communities to take proactive management actions...07

### In the spotlight!

*Cephalopholis argus*.....08

Lack of specific management measures for the Nassau grouper in Mexico.....09

The first ever success of the Humphead Wrasse (*Cheilinus undulatus*) hatchery in captivity in China.....10

The Pacific Goliath grouper.....11

The challenges of IUU for the CITES II listed HHW.....12

Landings of the Atlantic Goliath grouper, *Epinephelus itajara*, in Brazil.....13

Spawning and movement patterns of the endangered Gulf Grouper in Mexico.....14

Future Events.....15

GWSG Members.....16

Groupers and Wrasses Art Gallery.....17

Editorial .....18

# Recovery of spawning aggregations

## Signs of recovery of a multi-species grouper spawning aggregation: lessons learned and implications for monitoring and management

Evidence of initial recovery of a multi-species grouper spawning aggregation is reported in Palau, western Pacific, over a 5-year period. The aggregations of squaretailed coral grouper (*Plectropomus areolatus*), camouflage (*Epinephelus polyphekadion*), and brown-marbled (*E. fuscoguttatus*) groupers are located in a no-take marine protected area (MPA) known as Ebiil at an outer reef channel in Western Palau. Fishermen interviews indicated declines in many of the grouper aggregations (Sadovy 2007). The Ebiil MPA had been under protection for many years with occasional enforcement, and had been monitored sporadically since the 1990s. However, due to inconsistent and inappropriate monitoring protocols it was impossible to follow changes in numbers of aggregating groupers and detect outcomes of protection. Seasonal management (i.e. months during which the groupers could not be caught) covered all spawning months for the camouflage and brown-marbled groupers, and all except one for the squaretailed coral grouper.

In 2009, a robust underwater visual census (UVC) protocol was applied through collaboration between the 'Science and Conservation of Fish Aggregations' (www.SCRFA.org) and the Palau Conservation Society (PCS and SCRFA 2010, Colin et al., 2003), supported by the Coral Reef Research Foundation and funded by the Packard Foundation. This protocol ensured that the

whole aggregation was monitored to include all three species. In 2014, a second survey was conducted during June and July, peak months. Enforcement at the MPA during the grouper reproductive improved considerably during the 5-year interim period and protection from fishing was also introduced in August for the squaretail coral grouper. The 2014 survey revealed that numbers of the two *Epinephelus* species showed no change since 2009, while those of the squaretail coral grouper increased by about 60%.

Different responses in abundance across the three grouper species were unexpected but are fully consistent with differences in their life history. The squaretailed coral grouper lives less than 15 years and matures in 2-4 years (Rhodes et al., 2013), the camouflage grouper lives more than 20 years and takes >4 years to mature (Rhodes et al., 2011), while the brown-marbled grouper lives more than 40 years and takes >9 years to fully mature (Pears et al. 2006). Given these time frames, the squaretail coral grouper is expected to be the first to show signs of population recovery. The study showed the importance of understanding aspects of grouper life history in the interpretation of observations and also highlighted the need for a long-term commitment in aggregation protection. A follow-up, third survey on the multi-species grouper spawning aggregations is recommended by 2020.

Yvonne Sadovy de Mitcheson<sup>1</sup>  
Asap Bukurrou<sup>2</sup>  
yjsadovy@hku.hk

<sup>1</sup>Swire Institute of Marine Sciences and School of Biological Sciences, The University of Hong Kong, Pok Fu Lam Road, Hong Kong

<sup>2</sup>Palau International Coral Reef Centre, P. O. Box 7086, Koror, Palau 96940

### References

**Colin PJ, Sadovy, Y Domeier ML** 2003. Manual for the Study and Conservation of Reef Fish Spawning Aggregations [www.scrfa.org/images/stories/pdf/methodsmanual/MM\\_documenting\\_aggregations.pdf](http://www.scrfa.org/images/stories/pdf/methodsmanual/MM_documenting_aggregations.pdf)

**Pears RJ, Choat JH, Mapstone BD, Begg GA** 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

**Rhodes KL, Taylor BM, McIlwain JL** 2011. Detailed demographic analysis of an *Epinephelus polyphekadion* spawning aggregation and fishery. Marine Ecology Progress Series 421:183–198

**Rhodes KL, Taylor BM, Wichimel, CB, Joseph E, Hamilton RJ, GR Almany GR** 2013. Reproductive biology of squaretail coral grouper *Plectropomus areolatus* using age-based techniques. Journal of Fish Biology 82:1333–1350

**PCS & SCRFA**, 2010. Enhanced Monitoring of Grouper Spawning Aggregation at Ebiil Channel: Final Technical Report [www.scrfa.org/images/stories/pdf/scrfa/ebiil\\_final\\_report\\_2010\\_without\\_section\\_2\\_educational\\_materials.pdf](http://www.scrfa.org/images/stories/pdf/scrfa/ebiil_final_report_2010_without_section_2_educational_materials.pdf)

**Sadovy Y** 2007. Report on current status and exploitation history of reef fish spawning aggregations in Palau. [www.scrfa.org/images/stories/pdf/scrfa/palau\\_interview\\_report.pdf](http://www.scrfa.org/images/stories/pdf/scrfa/palau_interview_report.pdf) 40 pages

To know more about Ebiil Conservation Area: [www.palauconservation.org/cms/images/stories/resources/pdfs/EbiilConservationArea.pdf](http://www.palauconservation.org/cms/images/stories/resources/pdfs/EbiilConservationArea.pdf)

The Ebiil team 2014 | Asap Bukurrou (left), Stanley Shea (right) and Yvonne Sadovy (centre) just back from an underwater survey at Ebiil.



# Pondoland MPA provides refuge for depleted serranid stocks, enhancing fisheries

## A decade of monitoring in a marine protected area provides valuable insight into grouper conservation

Stuart Dunlop<sup>1</sup>  
Jade Maggs<sup>1</sup>  
sdunlop@ori.org.za

In June 2004 a large marine protected area (MPA), known as the Pondoland MPA, was established in the South-West Indian Ocean off the coast of South Africa (Fig.1). This MPA covers approximately 1380 km<sup>2</sup> of scattered reef and sand habitat, from the shoreline to the 1000m

isobath beyond the continental shelf edge. Within this MPA is a large ~650 km<sup>2</sup> no-take zone which is fully protected from all forms of offshore (vessel based) exploitation, including industrial fishing such as trawling and longlining. The objectives of this area

<sup>1</sup>Oceanographic Research Institute  
PO Box 10712 Marine Parade  
Durban 4056 South Africa

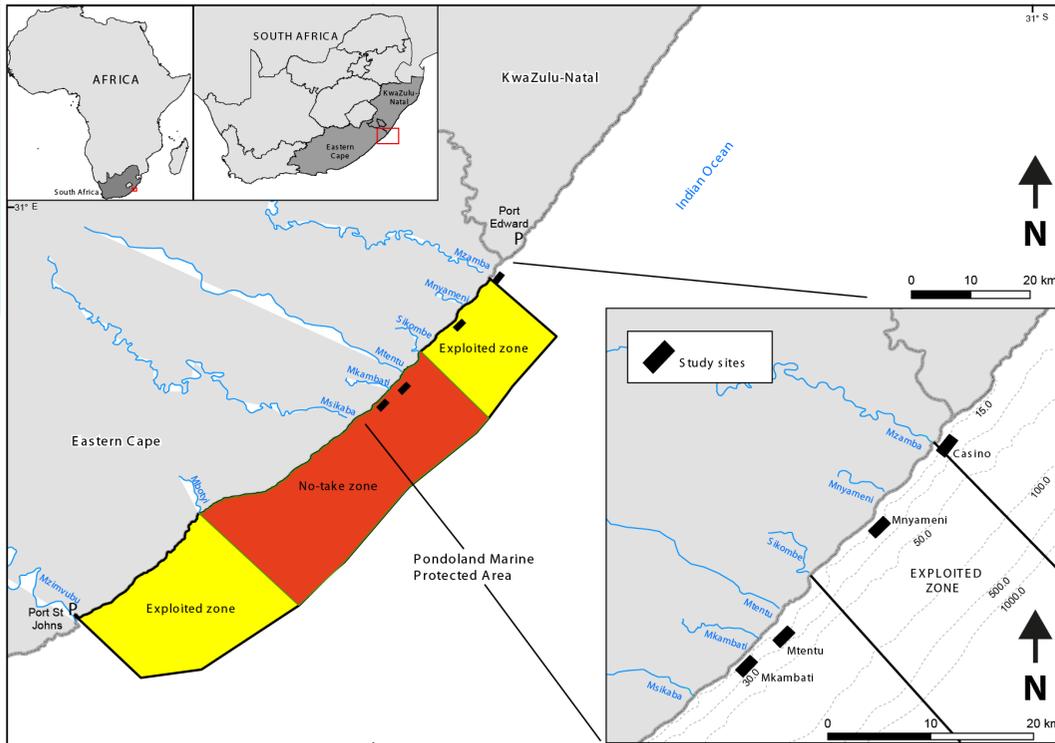


Figure 1. Map of the Pondoland MPA showing offshore zonation. Red shading represents the restricted no-take zone for all vessel-based exploitation. Yellow shading represents the controlled use zone where certain types of exploitation are permitted.

closure were to conserve biodiversity and rebuild important reef fish stocks, which have been depleted by overfishing. Following proclamation of the MPA, the Oceanographic Research Institute (ORI) based in Durban, South Africa established a monitoring programme, which was designed to evaluate the benefits of the area closure to vulnerable reef fish species. Part of the monitoring included standardised research fishing, which was used to collect catch-per-unit-effort (CPUE) and length frequency data for important fish species occurring between 10 and 30 m depth of water within and outside of the MPA (see Maggs et al. 2013a). In addition, fish movement within and outside of the MPA was investigated by means of a tag-recapture experiment (Maggs et al. 2013b). Selected species were tagged during the fishing surveys with plastic dart tags (Hallprint Pty Ltd, Australia), each marked with a unique alpha-numeric code and contact details (ORI

Cooperative Fish Tagging Project; Dunlop et al. 2013). From 2006 to 2016, 1438 serranids (seven species) were recorded in the controlled angling surveys (CAS) (Maggs and Mann 2016). These were *Epinephelus marginatus* (n=514), *E. andersoni* (n=474), *E. rivulatus* (n=443), *E. malabaricus* (n=3), *Cephalopholis sonnerati* (n=2), *E. albomarginatus* (n=1) and *Acanthistius sebastoides* (n=1). Interesting comparative results between the no-take zone and the adjacent exploited area were observed. Overall, CPUE of serranids caught in the no-take area (0.76 fish/angler/hour) was very similar to the exploited area (0.78 fish/angler/hour). This result was unexpected as most serranids are vulnerable to overfishing. However, on further investigation of the CPUE for the three most commonly caught species, *E. marginatus* was clearly more abundant in the no-take zone (1.04 fish/angler/hour) compared to the exploited area (0.48 fish/angler/

hour). In contrast, both *E. andersoni* and *E. rivulatus* were more abundant in the exploited area (0.91 fish/angler/hour and 0.81 fish/angler/hour) than in the no-take zone (0.55 fish/angler/hour/ and 0.54 fish/angler/hour) respectively.

This result is surprising as both species are heavily targeted by anglers in exploited areas of South Africa. It is possible that these two species have similar life histories, such as a faster growth rate, which makes them more resilient to overfishing. Furthermore, there is some evidence that suggests that both species have a roaming/pioneer movement strategy which could account for more individuals being caught in the exploited area. Despite there being a higher abundance of *E. andersoni* and *E. rivulatus* in the exploited area, length frequencies of all three species reach larger body sizes in the no-take area, which is strongly indicative of the protection provided by the no-take zone (Fig.2). In total 978 serranids have been tagged and released, of which 248 (25%) have been recaptured (Maggs and Mann 2016). If multiple recaptures are included, the overall recapture rate is 41%. Individual recapture rates (including multiple recaptures) for *E. marginatus* (51%), *E. andersoni* (44%), and *E. rivulatus* (24%) were exceptionally high, indicating a high degree of residency among these heavily targeted species. Besides resident behaviour within individual home ranges, which is typical of these reef-associated species, it was found that these species also undertook longer-distance movements of more than 1000 m (5% of all recaptures). These movements ranged from 1-490 km, often taking the fish well beyond the borders of the MPA into

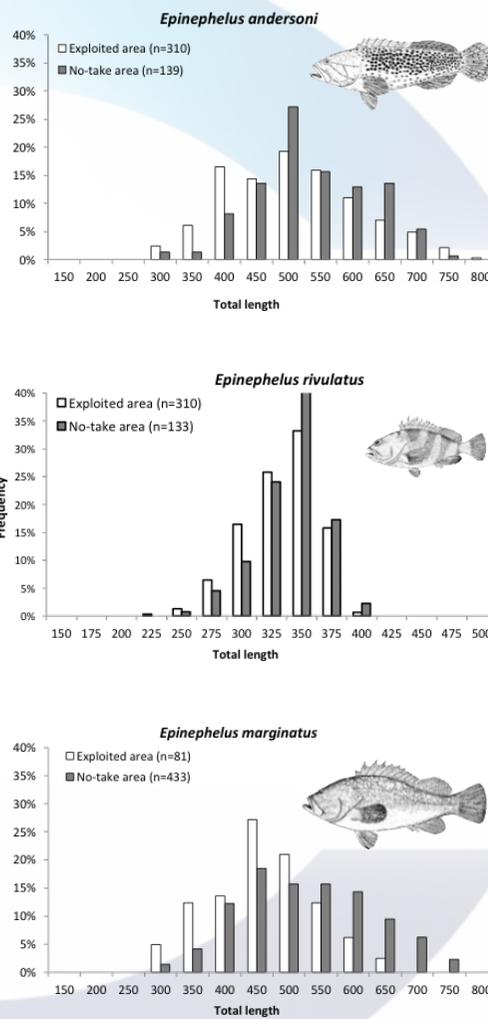
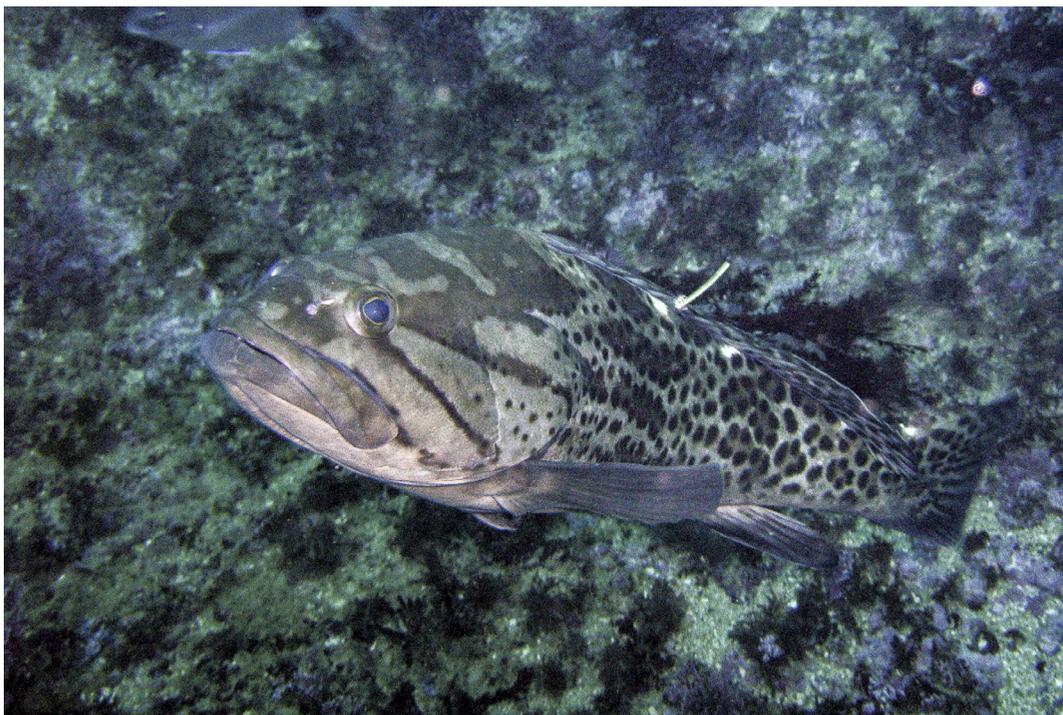


Figure 2. A comparison of length frequency distributions between the no-take zone and the exploited area of the Pondoland Marine protected Area for the three most abundant serranid species caught during the controlled angling surveys.



## References

- Dunlop SW, Mann BQ & Van Der Elst RP 2013. A review of the Oceanographic Research Institute's Cooperative Fish Tagging Project: 27 years down the line. African Journal of Marine Science 35: 209-221.
- Maggs JQ, Mann BQ & Cowley PD 2013a. Contribution of a large no-take zone to the management of vulnerable reef fishes in the South-West Indian Ocean. Fisheries Research 144: 38-47.
- Maggs JQ, Mann BQ & Cowley PD 2013b. Reef fish display station-keeping and ranging behaviour in the Pondoland Marine Protected Area on the east coast of South Africa. African Journal of Marine Science 35: 183-194.
- Maggs JQ & Mann BQ 2016. Ten years (2006-2016) of monitoring the effectiveness of the Pondoland MPA in protecting offshore reef-fish. Oceanographic Research Institute, Unpublished Report No. 329, Durban.

Figure 3. A tagged *Epinephelus andersoni* (endemic to south-east Africa) in the Pondoland Marine Protected Area, South Africa | Picture by Pam Le Noury.

adjacent fished areas. Interestingly, all these long-distance movements were in a north-easterly direction. Of fish tagged in the no-take zone of the MPA, eight *E. marginatus* were recaptured between 149 km and 335 km from their original capture locality. Similarly, three *E. andersoni* were recaptured between 76 km and 411 km away. To date no *E. rivulatus* originally tagged in the no-take area have been recaptured beyond the borders of the no-take area. Considering that all of the above species are normally highly resident, these recaptures are quite remarkable and have greatly added to our knowledge on the movement behaviour of these serranids. Furthermore, the movements of fish from the MPA no-take zone northward to become available to the fishery indicate some measure of the potential of the Pondoland MPA to enhance adjacent fisheries. In conclusion, monitoring in the Pondoland MPA has

provided convincing evidence that the no-take zone is providing refuge for depleted serranid stocks, thereby achieving its primary objectives and establishing the basis for the enhancement of adjacent fisheries. Little evidence exists of spawning among the serranid species caught in the no-take zone, but this area clearly provides temporary protection to adults before migrating northward to spawning grounds. Future research in the Pondoland MPA should focus on population connectivity including the northward migration of the region's key reef fishes and the spawning potential within the no-take zone itself. Considering the strong possibility of ontogenetic habitat shift into deeper water, research should also be conducted on the abundance and size structure of key fishery species on the deeper reef habitat within the no-take zone.

## Evidence from tagging study suggested that MPAs could protect reproductive populations.

### Home range estimates for squaretail coralgrouper, *Plectropomus areolatus*

Evidence from a tagging study on aggregating grouper suggested that Marine Protected Areas (MPAs) of moderate scale (10s of km<sup>2</sup>) that include aggregation sites, migratory corridors and adjacent home range habitats could protect reproductive populations. In a 4-month study in Pohnpei, 15 squaretail coralgrouper (*Plectropomus areolatus*) (Rüppell 1830) were captured at the spawning aggregation site located within the Kehpara Marine Sanctuary (KMS). Acoustic tags were applied to all of these fish. Searches were made 8 – 10 hours daily during the study period, using on-board acoustic receiver and omni-directional hydrophone. About one-third of Pohnpei's total reef area (153 km<sup>2</sup>) was searched throughout the period. GPS readings were

recorded for all sighting locations of tagged fish. Six out of the 15 fish were successfully tracked in the study period. Among these six fish, four (3 males and 1 female) were found in coral-rich outer reef areas at 10 – 50 m depth and within 0.02 – 1.4 km of the aggregation. Another male was located inside the lagoon on a coral-rich patch reef (~ 25 m in diameter) 6 km northeast of the aggregation. One female was located 23 km north of the aggregation. Analyses indicated that fish maintained individual home ranges of 0.004–0.12 km<sup>2</sup> (0.048 ± 0.018 km<sup>2</sup>). For *P. areolatus* in Pohnpei, findings from this study suggested that about 40% of the KMS reproductive population could be protected with a 40 – 50 km<sup>2</sup> MPA.



N. Hutchinson<sup>1</sup>  
Kevin L. Rhodes<sup>2</sup>  
neihutch-amb1@yahoo.com

<sup>1</sup>Marine and Freshwater Fisheries Research Institute, DPI Queenscliff Centre, PO Box 114, Queenscliff, VIC 3225, Australia

<sup>2</sup>College of Agriculture, Forestry and Natural Resource Management, The University of Hawaii at Hilo, 200W. Kawili St, Hilo, HI 96720, USA

#### References

Hutchinson N & Rhodes KL 2010 Home range estimates for squaretail coral grouper, *Plectropomus areolatus* (Rüppell 1830) Coral Reefs (2010) 29:511–519 DOI 10.1007/s00338-010-0584-7

*Plectropomus areolatus* | Picture by Gianemilio Rusconi.

# Characterization of the Goliath grouper *Epinephelus itajara* fishery of southern Belize for conservation planning

## Declining catches, mean size and abundance of Belize's Goliath groupers are investigated

The Goliath grouper *Epinephelus itajara* (Lichtenstein, 1822) is an integral part of traditional coastal fisheries in Belize; however, recent anecdotal reports suggest declining catches, mean size and abundance, particularly of large adults. Quantifying Goliath grouper abundance in the waters of Belize is an important first step in developing management plans that can protect stocks of the species as well as local fishing communities. To characterize the benefits these bring to the status of the Goliath grouper in southern Belize, we used a 2 yr market survey, fishery-dependent data collection and passive tagging. Reductions in mean size, age or size at sexual maturity within populations, or accelerated rates of growth, are often responses of populations to overfishing (Grift et al. 2003, Olsen et al. 2004, 2005). These changes reflect efforts by populations to maintain reproductive output in compensation for the loss of spawning stock, particularly larger, more fecund females (Sadovy 2005). To gauge whether such changes are occurring, some preliminary estimates of size distribution, growth and size at sexual maturity are needed. In addition, targeting management appropriately, details of the fishery are generally required, including documentation of size at capture, fishing gears and targeted areas.

The primary objective of the present study was to establish a baseline record for the Goliath grouper fishery in southern Belize where no quantitative information currently exists. To accomplish this, we used a combination of market assessments, anecdotal fisher information, fisheries-dependent collections, and tag recapture to assess the size structure of the Goliath grouper stocks in southern Belize.

Additional fieldwork and market data from northern Belize are needed to provide data for the development of a national management plan for Goliath grouper. Meanwhile, continued dialogue with stakeholders, including trans-boundary fishers, towards a temporary management solution, such as slot limits, with continued market monitoring may allow more stringent measures to be adopted under an adaptive management agreement. Regardless, it is now apparent that some level of management for the species is needed if populations

are to persist in southern Belize. Moreover, human health concerns in association with the elevated mercury levels found in many Goliath grouper—both juveniles and adults—sampled from southern Belize (Evers et al. 2009) may provide further impetus to curb fishing pressure and protect this species. Further inaction and continued habitat loss will likely result in the demise of the species and further erode this fishery in southern Belize.



Picture by Rachel T. Graham.



Rachel T. Graham<sup>1</sup>  
Kevin L. Rhodes<sup>2</sup>  
Dan Castellanos<sup>3</sup>  
rachel@maralliance.org

<sup>1</sup>Wildlife Conservation Society (WCS),  
PO Box 37, Punta Gorda, Belize  
<sup>2</sup>The University of Guam, UOG Station,  
Mangilao 96923, Guam  
<sup>3</sup>BlueBelize, 139 Front Street, Punta  
Gorda, Belize

### References

- Evers DC, Graham RT, Perkins CR, Michener R, Divoll T 2009. Mercury concentrations in the Goliath grouper of Belize: an anthropogenic stressor of concern. *Endang Species Res* 7:249–256.
- Grift RE, Rijnsdorp AD, Barot S, Heino M, Dieckmann MH 2003. Fisheries-induced trends in reaction norms for maturation in North Sea plaice. *Mar Ecol Prog Ser* 257:247–257.
- Olsen EM, Heino M, Lilly GR, Morgan MJ, Brattey J, Ernande B, Dieckmann U 2004. Maturation trends indicative of rapid evolution preceded the collapse of northern cod. *Nature* 428:932–935
- Olsen EM, Lilly GR, Heino M, Morgan MJ, Brattey J, Dieckmann U 2005. Assessing changes in age and size at maturation in collapsing populations of Atlantic cod (*Gadus morhua*). *Can J Fish Aquat Sci* 62:811–823.
- Sadovy Y 2005. The threat of fishing to highly fecund fishes. *J Fish Biol* 59:90–108.

Picture by Rachel T. Graham.

# Empowering communities to take proactive management actions

## Dispersal of Grouper Larvae Drives Local Resource Sharing in a Coral Reef Fishery

In many tropical nations, fisheries management requires a community-based approach because small customary marine tenure areas (CMT) define the spatial scale of management (Johannes 2002). However, the fate of larvae originating from a community's tenure is unknown, and thus the degree to which a community can expect their management actions to replenish the fisheries within their tenure is unclear (Russ 2002, Sale et al. 2005). Furthermore, whether and how much larval dispersal links tenure areas can provide a strong basis for cooperative management (Palumbi 2004, White & Costello 2011). Using genetic parentage analysis, we measured larval dispersal from a single, managed spawning aggregation of squaretail coral grouper (*Plectropomus areolatus*) and determined its contribution to fisheries replenishment within five community tenure areas up to 33 km from the aggregation at Manus Island, Papua New Guinea. Within the community tenure area containing the aggregation, 17%–25% of juveniles were produced by the aggregation. In four adjacent tenure areas, 6%–17% of juveniles were from the aggregation. Larval dispersal kernels predict that 50% of larvae settled within 14 km

of the aggregation. These results strongly suggest that both local and cooperative management actions can provide fisheries benefits to communities over small spatial scales.

We quantified how larvae dispersing from a coral grouper FSA contribute to recruitment to five CMT areas. We found that 17%–25% of recruitment to the CMT area that contains the sampled FSA came from that same FSA and that in each of the four adjacent CMT areas, 6%–17% of recruitment was from the sampled FSA. Finally, the two best-fit dispersal kernels based on these data predict that 50% of larvae settled within 14 km of the FSA. Our study highlights how restricted larval dispersal could allow communities to benefit from efforts to protect spawning stock, even when management units are small. Our results therefore suggest that use of small MPAs to protect critical areas such as spawning aggregations can be defensibly justified on the basis of direct local benefits (Hamilton et al. 2011). Ultimately, our results can empower and incentivize communities to take proactive management actions, both independently and in coordination with their neighbors.

Glenn R. Almany<sup>1</sup> Richard J. Hamilton<sup>3</sup>  
Michael Bode<sup>4</sup> Manuai Matawai<sup>5</sup> Tapas  
Potuku<sup>6</sup> Pablo Saenz-Agudelo<sup>7,8</sup> Serge  
Planes<sup>7,9</sup> Michael L. Berumen<sup>9</sup> Kevin L.  
Rhodes<sup>10</sup> Simon R. Thorrold<sup>11</sup> Garry R.  
Russ<sup>1,2</sup> & Geoffrey P. Jones<sup>1,2</sup>  
glenn.almany@jcu.edu.au

<sup>1</sup>Australian Research Council Centre of  
Excellence for Coral Reef Studies

<sup>2</sup>School of Marine and Tropical Biology  
James Cook University, Townsville,  
Queensland 4811, Australia

<sup>3</sup>Indo-Pacific Division, The Nature  
Conservancy, 245 Riverside Drive, West  
End, Queensland 4101, Australia

<sup>4</sup>Australian Research Council Centre of  
Excellence for Environmental Decisions,  
School of Botany, The University of  
Melbourne, Parkville, Victoria 3010,  
Australia

<sup>5</sup>Manus Field Office, The Nature  
Conservancy, P.O. Box 408, Lorengau,  
Manus Province, Papua New Guinea

<sup>6</sup>Kavieng Field Office, The Nature  
Conservancy, P.O. Box 522, Kavieng,  
New Ireland Province, Papua New  
Guinea

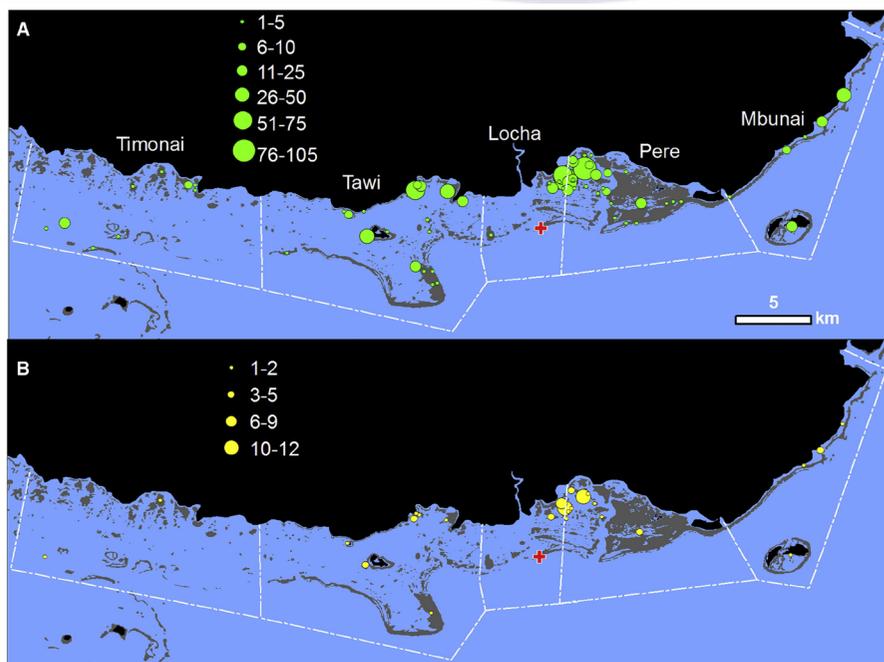
<sup>7</sup>USR 3278, EPHE-CNRS, Centre de  
Recherches Insulaires et Observatoire  
de l'Environnement, BP 1013, 98729  
Moore'a, French Polynesia

<sup>8</sup>Red Sea Research Center, King  
Abdullah University of Science and  
Technology, 23955-6900 Thuwal,  
Kingdom of Saudi Arabia

<sup>9</sup>Laboratoire d'Excellence "CORAIL," BP  
1013 Papetoai, 98729 Moore'a, French  
Polynesia

<sup>10</sup>College of Agriculture, Forestry and  
Natural Resource Management, The  
University of Hawaii at Hilo, Hilo, HI  
96720, USA

<sup>11</sup>Department of Biology, Woods Hole  
Oceanographic Institution, Woods Hole,  
MA 02543, USA



Location and Abundance of Sampled and Assigned Juveniles. Spatial patterns of coral grouper (*Plectropomus areolatus*) (A) juvenile sample collection and (B) juvenile parentage assignments. Green (A) and yellow (B) circles are scaled to the number of juveniles. Adults were sampled from a single fish spawning aggregation (red cross), and juveniles were collected from 66 individual reefs (green circles in A). *Extracted from the original article.*

To know more about Dispersal of  
grouper larvae and references in  
the text: <http://dx.doi.org/10.1016/j.cub.2013.03.006>

## In the spotlight!

### *Cephalopholis argus* Schneider 1801

Peacock grouper (E), mérou celeste (F), cherna pavo real (S)

#### Maximum Recorded Size

50 cm TL

#### Population Trend

Stable

#### Population

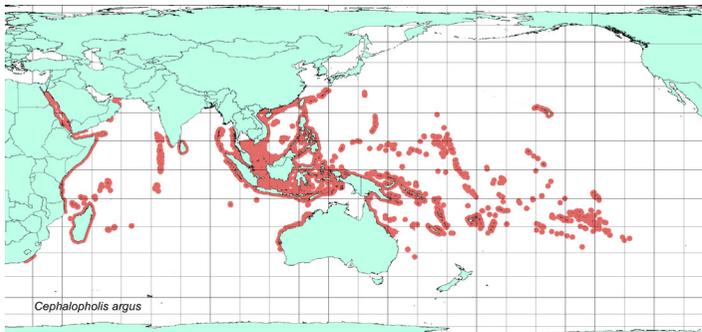
Despite noted declines in fisheries locally, such as in the Maldives, the species is generally abundant throughout its range. Studies in the GBR Australia, the Seychelles and American Samoa reported fish densities at between 1.7 and 14.8 fish per 1,000 m<sup>2</sup>. Since introduction to Hawaii, the species has established large populations.



Picture by Allen To | shot in Kadavu archipelago | Fiji

#### Distribution

The most widely distributed of the groupers, occurring from the Red Sea to South Africa, extending east to French Polynesia and the Pitcairn group, south to Lord Howe Island and north to southern Japan. Introduced to the Hawaiian Islands in the 1950s.



Source of information: Craig M, de Mitcheson YS, Heemstra PC 2012. Groupers of the World: a Field and Market Guide. 356 p. Boca Raton: CRC Press.

#### Habitat and ecology

The species occurs in a variety of habitats but is most commonly associated with exposed reef-front habitats in depths of up to 40 m. It is a crepuscular feeder and feeds on fishes and crustaceans. Its demography is highly plastic and shows great variation over its distributional range, for example the estimated maximum longevity ranges from 14 – 40 years. The species occurs in social groups comprising a single male with several females. Social groups comprising one dominant male and up to 12 females has been reported in the Gulf of Aqaba.

#### Major Threat

Fishing is the primary known threat and this species is taken by both the chilled and live fish trades. Marketing of this species, however, is often difficult due to its association with ciguatera poisoning in many places.

#### 2008 IUCN Red List Status

Least Concern

# Lack of specific management measures for the Nassau grouper in Mexico

## Changes in Management Plans undermine conservation efforts

In 2012, the Mexican fishery authority proposed a management plan (MP) for the red grouper (*Epinephelus morio*), and 14 grouper species with its fishery, in waters of the Yucatan Peninsula (Southern Gulf of Mexico and Mexican Caribbean). Among the most important remarks on this MP was to extend the grouper ban from one month (15 February to 15 March), as established since 2005 (DOF 2005), to two months (January 15 to March 14) each year for the red grouper and 14 grouper associated species off the Southern Gulf of Mexico. Another remark on the MP was to consider a concurrent grouper ban of two months (January 1 to February 28), with emphasis on protecting the Nassau grouper (*Epinephelus striatus*) in the Mexican Caribbean.

According to Mexican legal regulations, in order to make official any state or federal action (such as a ban or modification), it is necessary that the authority announce details of the regulation as an agreement and published it in the Official Journal of the Federation (DOF in Spanish). Unfortunately, despite being proposed in 2012 the MP was not approved until it was published and removed in the DOF as an agreement in 2014. In the meantime, the old one-month ban applied during 2013, 2014, and 2015. Early in 2015, the fishery authority published another agreement announcing

the two-months ban period, but instead of being from January 15 to March 14 (as proposed in the MP) was established from February 1 to March 31 and applied during 2016 for all grouper species in the Southern Gulf of Mexico and Mexican Caribbean (DOF 2015). In this published agreement, the special ban period (January 1 to February 28) proposed by the MP for the Nassau grouper in the Mexican Caribbean was not considered. Early in 2016, when the new ban period (February 1 to March 31) was still in place, various cooperative fishermen leaders in the Yucatan convinced the federal fishery authority to modify the new ban in place. Thus, another official agreement was published in a rush in the DOF but indicating an amendment to the ban which would end on March 11; with the remaining two weeks being relocated during the period of 15 December 2016 to January 3 of 2017. This official agreement also announced the grouper ban as of 2017 would be from February 1 to March 31. These administrative changes in the original MP, the modifications to the ban, and the apparent inertia from the fishery authority, severely undermine any conservation measure not only for the Nassau grouper but also for all groupers in waters off the Yucatan Peninsula. Consequently, the future for an effective regulation on the grouper fishery and conservation under the current scenario is uncertain.

Alfonso Aguilar-Perera  
alfaguilar@gmail.com

Departamento de Biología Marina,  
Universidad Autónoma de Yucatán,  
México

### References

**DOF: 26/01/2005.** ACUERDO por el que se establece veda para la captura de todas las especies de mero en las aguas de jurisdicción federal del Golfo de México correspondientes al litoral de los estados de Campeche, Yucatán y Quintana Roo.

**DOF: 25/11/2014.** ACUERDO por el que se da a conocer el Plan de Manejo Pesquero de Mero (*Epinephelus morio*) y especies asociadas en la Península de Yucatán.

**DOF: 24/02/2015.** ACUERDO por el que se modifica el similar por el que se establece veda para la captura de todas las especies de mero en las aguas de jurisdicción federal del Golfo de México correspondientes al litoral de los estados de Campeche, Yucatán y Quintana Roo, publicado el 14 de febrero de 2007.

**DOF: 11/03/2016.** ACUERDO por el que se modifica el similar por el que se establece veda para la captura de todas las especies de mero en las aguas de jurisdicción federal del Golfo de México correspondientes al litoral de los estados de Campeche, Yucatán y Quintana Roo, publicado el 14 de febrero de 2007.



Picture by Stanley Shea | shot in St. Maarten.

# The first ever success of the Humphead Wrasse (*Cheilinus undulatus*) hatchery in captivity in China

Research team is looking for funding to develop important strategic research components.

After eight years of trials, the research team from Hainan University finally obtained fertilized eggs (about 5.37 kg) from 16 broodstock of the humphead wrasse through natural spawning, consisting of 11 females (average body weight 11.5 kg / fish) and 5 males (average body weight 34.2 kg / fish). The broodstock were reared in floating cages in Sanya City (Hainan Province) and spawned daily for 14 days from late-May to early-June in 2014 (Fig. 1). Water temperatures were around 26-29 °C during the spawning period.



Fig. 1. Floating cages for holding broodstock of the humphead wrasse in Sanya, Hainan Province, China. Picture by Min Liu.

The average diameter of the fertilized eggs was about 630 µm, and the embryos took 15-17 hours to hatch under 26-29 °C (Fig. 2). The fertilized eggs were collected from the floating cages daily and the average total length (TL) of the newly-hatched larvae was about 1.3 mm (Fig. 3). The newly-hatched larvae were transferred into ponds; the larvae first fed on small organisms such as protozoan instead of rotifers. The larvae completed their metamorphosis at Day 25-27 and shifted from pelagic to benthic habitats. The growth rate of the humphead wrasse was relatively slow; the average size was about 6.2 mm TL at Day 23 after hatching and 37.0 mm TL at Day 131 (Figs. 4). Currently more than 1,000 juveniles survive and are kept in indoor tanks (Fig. 5); they feed on minced fresh fish and crab meats. A major challenge in the culture of this species is the

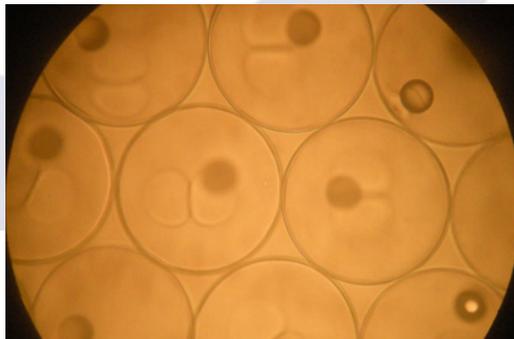


Fig. 2-3. Above, fertilized eggs at two-cell stage with average diameter of 630 µm and on the left, newly-hatched larva with total length of 1.31 mm. Picture by Guohua Chen.

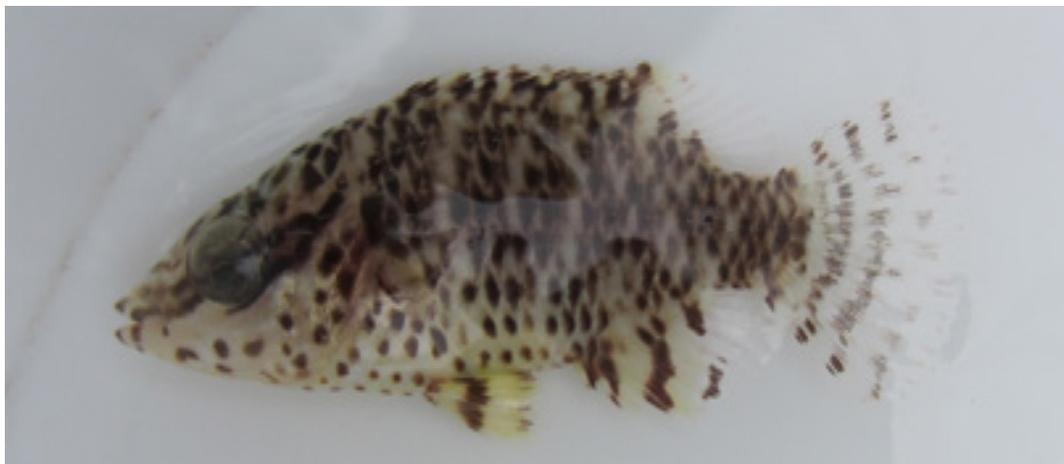


Fig. 4. A juvenile (Day 131 after hatching, 40 mm TL) of the humphead wrasse reared from a fertilized egg in Sanya, Hainan Province, China. Picture by Min Liu.

Min Liu<sup>1</sup>  
Guohua Chen<sup>2</sup>  
minliuxm@xmu.edu.cn  
chguh3240@aliyun.com

<sup>1</sup>College of Ocean and Earth Sciences,  
Xiamen University, Xiamen, Fujian  
Province, China

<sup>2</sup>Ocean College, Hainan University,  
Haikou, Hainan Province, China

small size of mouth in post-hatch juveniles.

This is the first ever success of the humphead wrasse hatchery conducted in captivity in China. The research team will further work on the nutrient requirements of the broodstock, enhancement of fertilization rates, first feeding feeds, etc. The research team is looking for more funding to continue the project.

Fig 5. Juveniles of the humphead wrasse are currently reared in tanks in Sanya, Hainan Province, China. Picture by Min Liu.



## The Pacific Goliath grouper

### A brief review of new research on the Pacific Goliath grouper (*Epinephelus quinquefasciatus*)

In 2008, Craig et al. recognized the Pacific Goliath grouper as a distinct species (*Epinephelus quinquefasciatus*) from its Atlantic sister species (*Epinephelus itajara*). Because the two species were treated as one, and all life history data stock information was extrapolated from work on the Atlantic Goliath grouper, very little is known about the Pacific Goliath grouper. Over the past several years, I have been compiling information on the Pacific Goliath grouper with the help of several people including Gustavo Castellanos (WWF, Colombia), Ross Robertson (STRI, Panama), and Brad Erisman (Univ. of Texas, USA). What we have found is rather surprising and points to an overall positive evaluation of the species stock.

Pacific Goliath grouper have a known distribution from the Gulf of California to Peru, although as with many fishes having this range, they are naturally rare at the extremes of this range. Having a reliance upon mangrove habitat for juvenile settlement, populations of the Pacific Goliath grouper are expected to be higher in areas with abundant mangroves. It is therefore not surprising that we have found active fisheries for Pacific Goliath grouper in Panama and Colombia (Panama City, Panama, and

Buena Ventura, Colombia), two ports within range of large mangrove areas. We were surprised by frequent landings of the species with individuals up to ~2 m total length. While we have not analyzed all of the data as yet, the oldest individual aged was 13 years old (186 cm total length). This is slightly larger than the average size of 13 year old Atlantic grouper reported by Bullock et al. (1992; 162 cm for males and 165 cm for females) in the Atlantic and may indicate a faster growth rate for Pacific Goliath grouper. The year-round presence of these fish in major fishing ports in a promising sign for the population of Pacific Goliath grouper if landings can be used as a proxy for abundance. In both Panama and Colombia, landings of the species appear to be opportunistic rather than targeted. In Colombia this is particularly promising. Colombia's Pacific coast has long stretches of undeveloped mangrove habitat and the per capita consumption of fish is among the lowest in Central and South America. If the demand continues to remain low, landings of Pacific Goliath grouper remain sporadic and opportunistic, and the coastline remains undeveloped, this may indicate that Colombia's Pacific coast can act as a refuge for the species.

Matthew T. Craig  
matthew.craig@noaa.gov

Research Geneticist  
NOAA - National Marine Fisheries Service  
Southwest Fisheries Science Center  
8901 La Jolla Shores Drive  
La Jolla, CA 92037 - USA

#### References

**Bullock LH, Murphy MD, Godcharles MF & Mitchell, ME** 1992. Age, growth, and reproduction of jewfish *Epinephelus itajara* in the eastern Gulf of Mexico. Fisheries Bulletin 90, 243–249.

**Craig MT, Graham RT; Torres RA; Hyde JR; Freitas MO; Ferreira BP; Hostim-Silva M; Gerhardinger LC; Bertoncini AA & Robertson, DR** 2008. How many species of Goliath grouper are there? Cryptic genetic divergence in a threatened marine fish and the resurrection of a geopolitical species. Endangered Species Research. p.1-8.



Removing otoliths from a large Pacific Goliath grouper head. Picture by Brad Erisman.

# The challenges of IUU for the CITES II listed HHW

## The Napoleon fish, the largest labrid in the world, shows promising recovery signs in protected areas

The Napoleon or humphead wrasse (HHW), *Cheilinus undulatus*, is the largest labrid in the world, reported to exceed 1.5 m and over 150 kg. It fits several definitions of megafauna (e.g. exceptionally large for the taxon and exceeding 100 kg), and like many terrestrial megafauna, is highly susceptible to exploitation (Sadovy et al. 2003). The species is listed as Endangered on the IUCN Red List and is one of the most valuable species in the live reef food fish trade (LRFFT), a luxury seafood trade centred in Hong Kong and Mainland China (Fig. 1). In 2004 it was listed on the Convention on International Trade in Endangered Species of Flora and Fauna (CITES) Appendix II (which requires exports to be sustainable) because of heavy targeting for this luxury trade; the species can fetch in excess of 600 US\$/kg at retail (Michael Fabinyi, Beijing) and is highly profitable for traders.

While international trade in the species has declined somewhat in Hong Kong in recent years, a joint TRAFFIC/IUCN study demonstrated that most individuals likely enter the city illegally (TRAFFIC/IUCN 2016). Moreover, given that imports into Mainland China are not reported or accounted for by permits (as required under CITES), the tens of thousands of fish estimated from interviews and market surveys to be on sale there are all likely to be illegal, unmonitored and unregulated (IUU). Currently, the



Fig. 1. Frozen humphead wrasse sold in a Malaysian supermarket. Picture by Allen To.

major source countries for this species are Indonesia (which has an export quota of < 2000 fish annually) and the Philippines (which does not legally export any CITES II listed species at present, although this regulation is under review). Malaysia also exports HHW to Hong Kong but most of these are reportedly smuggled over the border from the Philippines. Most of the fish in trade are caught as small juveniles and grown out to market (or 'plate' size of about 500-800g) before export. More recently, a trade in frozen HHW has been identified with even chilled fish gaining good market prices (Fig. 2). A sustainable management approach was developed in collaboration with FAO (Sadovy et al., 2007). We have now completed studies to determine the effect of protection in Indonesia on HHW abundance in the field, while work is ongoing in Hong Kong to understand the business and trade networks. Six study sites in Indonesia were monitored both shortly after the CITES listing and 5 to 7 years later. The results suggest recovery in protected areas or where fishing stopped and further declines in abundance with ongoing fishing (Yvonne Sadovy de Mitcheson and Santi Suharti, in prep; RTHK podcast 2014). Trade networks in Hong Kong appear to involve some organized crime links, while imports by Hong Kong vessels are largely uncontrolled and unmonitored. The Hong Kong government is aware of this IUU and is tightening its surveillance. Some of this work is being funded by the CITES Secretariat and the findings will be presented at upcoming CITES meetings.

Live humphead wrasse taken in Hong Kong live fish outlet. Picture by Yvonne Sadovy.

Yvonne Sadovy de Mitcheson  
yjsadovy@hku.hk

<sup>1</sup>Swire Institute of Marine Sciences and School of Biological Sciences, The University of Hong Kong, Pok Fu Lam Road, Hong Kong

### References

- RTHK podcast 2014:** Where Does Our Fish Come From? <http://goo.gl/16mpbR>
- Sadovy Y, Kulbicki M, Labrosse P, Letourneur Y, Lokani P & Donaldson TJ 2003.** The humphead wrasse, *Cheilinus undulatus*: synopsis of a threatened and poorly known giant coral reef fish. *Reviews in Fish Biology and Fisheries* 13 (3):327-364.
- Sadovy Y, Punt AE, Cheung W, Vasconcellos M. & Suharti S 2007.** Stock Assessment Approach for the Napoleon fish, *Cheilinus undulatus*, in Indonesia: a tool for quota-setting for data-poor fisheries under CITES Appendix II Non-Detriment Finding requirements. *FAO Fisheries Circular*. No. 1023 Rome, FAO, 71 p
- TRAFFIC/IUCN 2016. HUMPHEAD (NAPOLEON) WRASSE** *Cheilinus undulatus* trade into and through Hong Kong. <http://goo.gl/xyJpC1>

To know more about the Napoleon wrasse, visit our GWSG special page at <http://goo.gl/ba1tZr>

# Landings of the Atlantic Goliath grouper, *Epinephelus itajara*, in Brazil

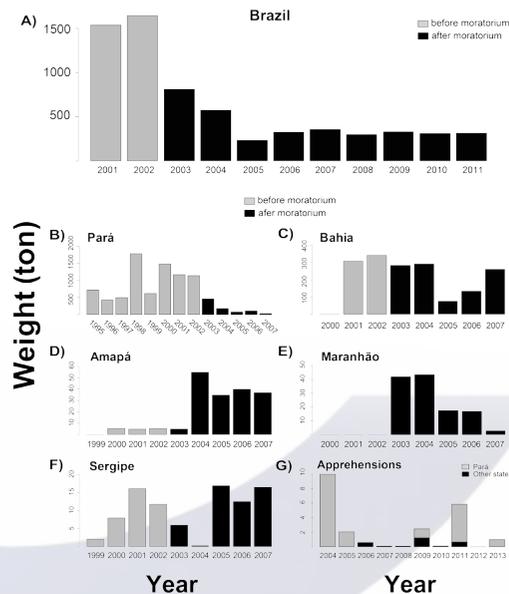
## Despite prohibition for over ten years, fishing continues

The Atlantic Goliath grouper, *Epinephelus itajara* (Lichtenstein, 1822) is one of the largest groupers (2.5 m length and > 400 kg) and one of the most endangered in the Atlantic Ocean. The species is often a target of recreational, small-scale commercial and subsistence fisheries (Sadovy & Eklund, 1999). In Brazil, the decrease of Goliath grouper catches led managers to establish a precautionary five-year moratorium on fishing of the species in 2002.

We documented commercial landings and prices of Goliath grouper before and after the moratorium establishment in Brazil, published in governmental fisheries landing reports. Apprehensions by surveillance agencies were also described. We verified a reduction of 70% in catches after moratorium establishment, however annual catches kept an average of 393 tons and showed no declines in recent years, contrary to expected. The commercial value showed a general increase in price per Kg after 2002. To circumvent the scrutiny, Goliath grouper has been mischaracterized by filleting and being sold as other Epinephelinae species. Poaching is observed mainly in the state of Pará which also reported the highest catches before and after the moratorium establishment.

Worryingly, results of this survey cannot reflect the amount of poached Goliath groupers, which is believed to be higher, because fishermen process fishes

before landing to avoid detection. Poaching might be undermining the recovery of the species contrary to the intention of the fishing moratorium, which was renewed in 2007 and again in 2013 and is expected to end by 2018.



(A) Total volume of Goliath grouper catches per year in Brazil. Landings of five most representative States: (B) Pará; (C) Bahia; (D) Amapá; (E) Maranhão and (F) Sergipe. (G) poaching apprehensions in Brazil. *Extracted from the original article.*



Vinicius J. Giglio<sup>1</sup>, Áthila A. Bertoncini<sup>2,3</sup>, Beatrice P. Ferreira<sup>4</sup>, Maurício Hostim-Silva<sup>3,5</sup>, Matheus O. Freitas<sup>3,6</sup>  
 vj.giglio@gmail.com  
 athilapeixe@gmail.com

<sup>1</sup>Programa de Pós-Graduação em Ecologia, Universidade Federal do Rio de Janeiro  
<sup>2</sup>Programa de Pós-Graduação em Ciências Biológicas (Biodiversidade Neotropical), Universidade Federal do Estado do Rio de Janeiro  
<sup>3</sup>Instituto Meros do Brasil  
<sup>4</sup>Departamento de Oceanografia, Universidade Federal de Pernambuco  
<sup>5</sup>Centro Universitário Norte do Espírito Santo, Universidade Federal do Espírito Santo  
<sup>6</sup>Programa de Pós-Graduação em Zoologia, Universidade Federal do Paraná

### References

Sadovy Y & Eklund A 1999. Synopsis of Biological Data on the Nassau Grouper, *Epinephelus striatus*, and the Jewfish, *E. itajara*. FAO Fisheries Synopsis, Washington

To know more about this study read full paper Landings of Goliath grouper, *Epinephelus itajara*, in Brazil: despite prohibited over ten years, fishing continues. *Natureza & Conservação* (2014) 12(2):118–123

Dr. Sampaio from UFAL, measures a 1.9m Goliath grouper stranded in Barra Grande, Brazil | Picture by Áthila Bertoncini.

# Spawning and movement patterns of the endangered Gulf Grouper in Mexico

## Telemetry results revealed that tagged individuals exhibited seasonal residency

The Gulf Grouper (*Mycteroperca jordani*) is a large-bodied (reaches lengths of 2 m) apex predator endemic to the Gulf of California, Mexico. Once the most important grouper to regional fisheries, widespread overfishing has reduced population abundance to less than 1% of historical levels, rendering the Gulf Grouper as endangered throughout its geographic range (Sáenz-Arroyo et al. 2005; Craig et al. 2008). Despite these declines, no species-specific harvest restrictions exist for commercial fisheries, and recreational fishers are allowed to legally harvest two Gulf Grouper per day by hook and line or spearfishing while free-diving (Dennis 2015). Moreover, almost no information exists on their life history, ecology, and behavior. Nowadays, the no-take marine reserve at Cabo Pulmo National Marine Park (CPNP), located at the southern tip of the Baja California peninsula, is the only location where large numbers of Gulf Grouper can be consistently observed (Aburto-Oropeza et al. 2011), offering the rare opportunity to study this species and assist conservation efforts. In 2014, researchers from the Gulf of California Marine Program at Scripps Institution of Oceanography (Tim Rowell, Octavio Aburto), the University of Texas at Austin (Brad Erisman), Cabo Pulmo Divers (David Castro), El Centro para la Biodiversidad Marina y la Conservación A.C. (Juan Cota-Nieto), and California State University Northridge (Mark Steele) teamed up with Park Director Carlos Godinez to study patterns of movement, habitat usage, residency, and spawning behavior of Gulf Grouper inside and outside CPNP. The

project utilizes a variety of techniques and approaches, including ongoing visual surveys to monitor abundance and spawning behavior, an array of acoustic telemetry receivers to monitor movement patterns of 20 tagged grouper among reefs within the park, and an array of acoustic data loggers strategically placed at potential spawning sites to monitor patterns of sound production in relation to courtship and spawning.

Initial telemetry results revealed that tagged individuals exhibited seasonal residency at the reefs of Los Morros and El Bajo for one to four months starting in November 2014 (Rowell et al. 2015). As of March 2015, none of the tagged individuals had returned to the reefs; however, acoustic recordings and diver surveys in May 2015 identified the return of Gulf Grouper to a specific site within the park, which was soon confirmed as a spawning aggregation. Following the full moon in May, male Gulf Grouper were observed pair spawning with females at Los Morros in the late afternoon and evening hours before sunset (Figure 1). Male sound production was recorded and identified in direct association courtship and spawning (i.e. gamete release), allowing for the use of passive acoustic recordings to monitor temporal and seasonal patterns of spawning. These results indicate that CPNP offers, at minimum, seasonal protection for a susceptible population of Gulf Grouper, serves as the only known location of a protected spawning aggregation, and functions as a refuge and frontline for the conservation and restoration of this iconic species.

Brad Erisman  
Marine Science Institute, University  
of Texas at Austin, 750 Channel View  
Drive, Port Aransas, TX 78373 USA  
berisman@utexas.edu

### References

- Aburto-Oropeza O, Erisman B, Galland GR, Mascareñas-Osorio I, Sala E, Ezcurra E** 2011. Large recovery of fish biomass in a no-take marine reserve. *PLoS One* 6(8): e23601
- Craig MT, Choat JH, Ferreira B, Bertoncini AA, Rocha L, Heemstra PC** 2008. *Mycteroperca jordani*. The IUCN Red List of Threatened Species. Version 2015.2. [www.iucnredlist.org](http://www.iucnredlist.org). downloaded on 20 May 2016
- Dennis MH** 2015. Status review of the Gulf Grouper (Z). National Marine Fisheries Service-West Coast Division, Protected Resources Division. 73 pp.
- Rowell TJ, Cota Nieto JJ, Castro Arvizu DI, Steele MA, TinHan TT, Erisman B** 2015. Seasonal residency of Gulf Grouper within Cabo Pulmo National Park. *DataMares*. InteractiveResource. <http://dx.doi.org/10.13022/M38C79>
- Sáenz-Arroyo A, Roberts CM, Torre J, Cariño-Olvera M** 2005. Using fishers' anecdotes, naturalists' observations and grey literature to reassess marine species at risk: the case of the Gulf grouper in the Gulf of California, Mexico. *Fish and Fisheries* 6:121–133



A sequence of a male (left) and female (right) Gulf Grouper separating just below the surface shortly after completing a spawning rise | Photos David Castro.

# Future events

## 2016 Ecological and Evolutionary Ethology of Fishes

When: from 14 to 16 June 2016

Where: Tallahassee, Florida (USA)

Visit: [marinelab.fsu.edu/eeef/](http://marinelab.fsu.edu/eeef/)



## 13th International Coral Reef Symposium

When: from 19 to 24 June 2016

Where: Honolulu, Hawai'i (USA)

Visit: [sgmeet.com/icrs2016](http://sgmeet.com/icrs2016)



## VI Congreso Ibérico de Ictología

When: from 21 to 24 June 2016

Where: Murcia, Spain

Visit: [www.um.es/sibic6/](http://www.um.es/sibic6/)



## International Meeting on Marine Research 2016

When: from 14 to 15 July 2016

Where: Peniche, Portugal

Visit: [www.immr.ipleiria.pt](http://www.immr.ipleiria.pt)



## IUCN World Conservation Congress

When: from 1 to 10 September 2016

Where: Hawai'i (USA)

Visit: [www.iucnworldconservationcongress.org](http://www.iucnworldconservationcongress.org)



## International Grouper Workshop

When: from 07 to 08 October 2016

Where: Bodrum, Turkey

Visit: [www.epipopgen.com](http://www.epipopgen.com)



## Meeting of the Groupers and Wrasses Specialist Group

When: November 2016

Where: Azores (Faial Island)

Contact: [gwsig.iucn@gmail.com](mailto:gwsig.iucn@gmail.com)



## 69th GCFI - Grand Cayman Island

When: from 07 to 11 November 2016

Where: Grand Cayman

Visit: [www.gcfi.org](http://www.gcfi.org)



## XXII Congresso Brasileiro de Ictologia

When: from 29 January to 03 February 2017

Where: Porto Seguro, Brazil

Visit: [www.ebi2017.com.br](http://www.ebi2017.com.br)



## 6th International Conference on Biodiversity

When: from 20 to 21 July 2017

Where: Chicago, USA

Visit: [biodiversity.conferenceseries.com](http://biodiversity.conferenceseries.com)

## The World Conference on Marine Biodiversity (WCMB)

When: from 20 to 23 May 2018

Where: Montréal, Canada

Visit: [wcmb2018.org](http://wcmb2018.org)



# GWSG Membership | 2013-2016 Quadrennium

Dr. Alfonso Aguilar-Perera	 Mexico	Universidad Autónoma de Yucatán	alfaguilar@gmail.com
Dr. Allen To	 Hong Kong	WWF-Hong Kong	allenwlto@yahoo.com
Mr. Andy Cornish	 China	Fishery consultant	andy_cornish@yahoo.com
Dr. Annadel Salvio Cabanban	 Philippines	Marine Biology consultant	annadel.cabanban@gmail.com
Mr. Armin Tuz	 Mexico	CINVESTAV	armin.tuz@correo.uady.mx
Dr. Athila Bertoncini	 Brazil	Univ. Fed. do Estado do RJ - UNIRIO	athilapeixe@gmail.com
Dr. Barry Russell	 Australia	Charles Darwin University	barry.russell@nt.gov.au
Dr. Beatrice Padovani-Ferreira	 Brazil	Universidade Federal de Pernambuco	beatrice@ufpe.br
Mr. Being Yeeting	 New Caledonia	Secretariat of the Pacific Community	BeingY@spc.int
Dr. Brad Erisman	 USA	Scripps Institution of Oceanography	berisman@ucsd.edu
Dr. Christopher Koenig	 USA	Florida State University	koenig@bio.fsu.edu
Dr. Dave Pollard	 Australia	Department of Ichthyology at the Australian Museum	dave-pollard@bigpond.com
Dr. David Bellwood	 Australia	James Cook University	david.bellwood@jcu.edu.au
Dr. David Fairclough	 Australia	Dept. of Fisheries, Research Division	david.fairclough@fish.wa.gov.au
Dr. Edwin Grandcourt	 UAE	Abu Dhabi Environment Agency	egradcourt@ead.ae
Dr. Enric Sala	 Spain	National Geographic Society	esala@ngs.org
Mr. Felipe Sosa-Cordero	 Mexico	ECOSUR-Chetumal	efesosa@yahoo.com.mx
Ms. Graciela Garcia-Moliner	 Puerto Rico	Caribbean Fishery Management Council	graciela.garciamoliner@gmail.com
Mr. Jan Robinson	 Seychelles	Seychelles Fishing Authority	jrobinson@sfa.sc
Dr. Joao Pedro Barreiros	 Portugal	Univ. dos Açores and ImarAçores	joaopedro@uac.pt
Dr. John Choat	 Australia	James Cook University	john.choat@jcu.edu.au
Mr. Kevin Rhodes	 USA	University of Hawaii at Hilo	klrhodes_groupier@yahoo.com
Prof. Kwang-Tsao Shao	 Taiwan	Institute of Zoology, Taiwan	zoskt@gate.sinica.edu.tw
Mr. Li Shu Chen	 Taiwan	Taiwan Government	lschen@mail.nmmst.gov.tw
Dr. Luiz Rocha	 USA	California Academy of Sciences	LRocha@calacademy.org
Dr. Matthew Craig (co-chair)	 USA	University of San Diego	matthew.craig@noaa.gov
Dr. Mauricio Hostim-Silva	 Brazil	Univ. Fed. do Espírito Santo – UFES	mhostim@gmail.com
Dr. Melita Samoilys	 Kenya	Cordio East Africa	melita.samoilys@gmail.com
Dr. Michel Kulbicki	 France	IRD-Inst. de Recherche pour le Dévelop.	michel.kulbicki@univ-perp.fr
Dr. Min Liu	 China	University of Xiamen	minliuxm@xmu.edu.cn
Ms. Monica Brick Perez	 Brazil	Oceana Brazil	MonicaBrickPeres@yahoo.com.br
Mr. Pat Colin	 Palau	Coral Reef Research Foundation	crrfpalau@gmail.com
Prof. Patrice Francour	 France	University of Nice	francour@unice.fr
Dr. Pedro Afonso	 Portugal	IMAR - University of the Azores	afonso@uac.pt
Dr. Phil Heemstra	 South Africa	South African Inst. for Aquatic Biodiv.	P.Heemstra@saiab.ac.za
Dr. Rekha Nair	 India	Central Mar. Fisheries Research Inst.	rekhacmfri@gmail.com
Mr. Robert Myers	 USA	Seaclicks / Coral Graphics	robmyers1423@gmail.com
Dr. Robert Warner	 USA	University of California, Santa Barbara	warner@lifesci.ucsb.edu
Mr. Santi Suharti	 Indonesia	LIPI	santi_rs02@yahoo.com
Dr. Sean Fennessy	 South Africa	SAAMBR/SEAWORLD/ORI	seanf@ori.org.za
Dr. Thierry Brulé	 Mexico	CINVESTAU-IPN Unidad Merida	tbrule@mda.cinvestav.mx
Mr. William Cheung	 Canada	Fish. Centre, Univ. of British Columbia	w.cheung@fisheries.ubc.ca
Dr. Yvonne Sadovy (co-chair)	 Hong Kong	University of Hong Kong	yjsadovy@hku.hk

# Groupers & Wrasses Art Gallery

Send your visual art work for our next newsletter!



This fine indian ink drawing depicting the dusky grouper, *Epinephelus marginatus*, was prepared by Dr. João Pedro Barreiros for a publication in 1994. Dr. Barreiros is a passionate scientist, who lives in the Azores (Portugal) and has a talent for painting/drawing arts. He also plays the guitar.

# Editorial GWSG Newsletter Issue 13



## Co-chairs

Yvonne Sadovy de Mitcheson & Matthew Craig

## Co-editors

Allen To, Áthila Bertoncini, João Pedro Barreiros

## Design

Áthila Bertoncini

## Publisher

Instituto Meros do Brasil



Rua Benjamin Constant, 67 Conj. 1104, Centro, Curitiba PR Brazil 80.060-020

## Contributions

[gwsg.iucn@gmail.com](mailto:gwsg.iucn@gmail.com)

## Contributors to this issue

Alfonso Aguilar, Allen To, Áthila Bertoncini, Brad Erisman, Gianemilio Rusconi, Guohua Chen, João Pedro Barreiros, Matthew Craig, Min Liu, Rachel Graham, Pam Le Noury, Stanley Shea, Stuart Dunlop, Vinícius Giglio, Yvonne Sadovy de Mitcheson

## Webpage

[www.iucn.org/ssc/grouperswrasses](http://www.iucn.org/ssc/grouperswrasses)

ISSN 2518-3613