



Leopard coral grouper (*Plectropomus leopardus*) management in the Great Barrier Reef Marine Park, Australia

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The Great Barrier Reef Marine Park (GBRMP) is a multiple use marine protected area managed by the Great Barrier Reef Marine Park Authority (GBRMPA), a Commonwealth Statutory Authority. The GBRMP spans 345,400 km² adjacent to the Queensland east coast, is 2300 km long, and contains 2900 reefs.

Leopard coral grouper (*Plectropomus leopardus*) are targeted by the Queensland Coral Reef Fin Fish (CRFF) fishery, which uses hook-and-line and speargun (recreational) throughout the GBRMP. The CRFF fishery is managed by the Queensland Department of Primary Industries and Fisheries. Most of the leopard coral grouper taken in this fishery is exported for the Asian live food fish trade.

Many coral reef fish may form spawning aggregations on the Great Barrier Reef (GBR) (Russell 2001). A key target species in the CRFF fishery that is known to form spawning aggregations on the GBR is the leopard coral grouper. Leopard coral grouper are known to move to and from spawning aggregations on the reefs they inhabit, rather than moving large distances between reefs (Davies 2000). More information is needed on the movement of leopard coral grouper to spawning aggregations, including the distances they travel and the possibility of their using corridors between interconnected reefs. Despite a lack of specific information, the best available information is used for management. New measures have been adopted recently. In 2004, the Queensland Fisheries (Coral Reef Fin Fish) Management Plan 2003 introduced a package of fisheries management tools, including a commercial total allowable catch (TAC), revised size limits, revised recreational bag limits, and spawning season closures.

A commercial TAC of 1350 t is applied to coral trouts generally (*Plectropomus* spp.) and is currently set at the level of catch taken by the commercial fishing sector in 1996, which is thought to represent full exploitation of the fish stocks across the GBR.

The recreational bag limit is applied to coral trouts generally and is currently set at seven fish in possession per person. The biologically precautionary minimum legal size limit on the take of leopard coral grouper by commercial and recreational fishers is 38 cm in total length. The size limit is based on information about size at maturity, which is about 32 cm, and size at sex change from female to male, which occurs at about 42 cm (Mapstone et al. 2004). Even though the size limit is set to ensure that most fish spawn at least once before recruiting to the fishery, this does not prevent the take of larger, older male fish. The excessive take of such fish could cause skewed sex ratios, sex change at a smaller size, and sperm limitation in the stock.

To protect the main spawning time for most CRFF fishery species, three nine-day spawning season closures occur over the new moons in October, November and December each year. These closures cover all CRFF fishery species, and possession of any CRFF fishery species is prohibited during these times. Placing a seasonal closure on only one CRFF fishery species or species group may not adequately protect those species, and is also difficult to enforce. The seasonal spawning closures are based on the peak spawning time for leopard coral grouper, being the new moon phases of the spring and summer months on the GBR. Leopard coral grouper was chosen as an indicator species because this is the key target species in the CRFF fishery, and more information was available for this species than for other species targeted by the fishery. Studies of the spawning behaviour of leopard coral grouper on the GBR indicate that for several days on either side of the spring new moons they aggregate to spawn (at dusk) (Samoilys and Squire 1994; Samoilys 1997; Zeller 1997).

There is some anecdotal information on reef fish spawning aggregations from fishers with a historical background in the CRFF fishery. Some fishers speak of large catches of certain species at particular locations and times in the past. However, this is not overly apparent in the commercial fishing log-

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book records. This could be due to inaccurate logbook reporting of catch and effort, that logbook reporting is not specific to particular reefs, and species misidentification. It is likely that some fishers actively fish spawning aggregations on the GBR, whilst others are not aware of the locations and may accidentally fish them at times.

Because the CRFF fishery operates in a World Heritage marine protected area, a higher level of conservation-based legislative requirements are in place under the Great Barrier Reef Marine Park Act 1975. The Australian government recently introduced an unprecedented conservation initiative to better protect the GBRMP. The GBRMP was re-zoned in July 2004, resulting in an increase in the size of no-fishing areas from 4.5% to 33% of the total park size. The re-zoning was designed to protect representative examples of the biodiversity of the GBRMP; closures cover all habitat types described in 70 different bioregions. The amount of reefal area (reef and shoal habitat), the area predominantly used by the CRFF fishery to target leopard coralgroupers, now closed to fishing is about 30%.

The GBRMPA is aware of several hundred possible fish spawning aggregation sites throughout the GBRMP. However, most of these sites are known only from anecdotal information, and only a few of these sites have been validated using in-water visual surveys or catch sampling. The validated sites were considered in the re-zoning of the GBRMP, and the anecdotal sites were considered only for supporting ecosystem information. Considering it is likely that leopard coralgroupers form aggregations on most reefs on the GBR, the 30%

protection of all reefal habitats gives confidence that many spawning aggregation sites for this species are afforded some protection from fishing. However, this is not the case for other CRFF fishery species that may move large distances to spawning aggregations sites yet to be identified, and therefore some of these sites may not be protected from fishing.

Two key spawning aggregation sites for leopard coralgroupers, at Scott Reef and Elford Reef, offshore from Cairns, have been monitored during the key spawning months of September, October and November each year for the past 15 years (Samoilys et al. unpublished). The October new moon is the peak time leopard coralgroupers have visited the aggregation sites. These two sites have been fished at varying levels over this time. Under the new zoning of the GBRMP, Scott Reef has been zoned as a Marine National Park (green zone), which prohibits fishing, and Elford Reef has been zoned as a Conservation Park (yellow zone), which allows limited line fishing. This has created a very valuable and unique research and monitoring opportunity to examine the impacts of the rezoning, such as documenting over time the changes in numbers of leopard coralgroupers visiting the aggregation sites during the October new moon on these two reefs. Preliminary site assessments one year after the re-zoning of Scott Reef as a green zone have shown that the numbers of leopard coralgroupers visiting the spawning aggregation site have increased. In contrast, the numbers of leopard coralgroupers visiting the Elford Reef spawning aggregation site have remained relatively constant (Fig. 1). However, it is too soon after the re-zoning to conclusively determine if the re-

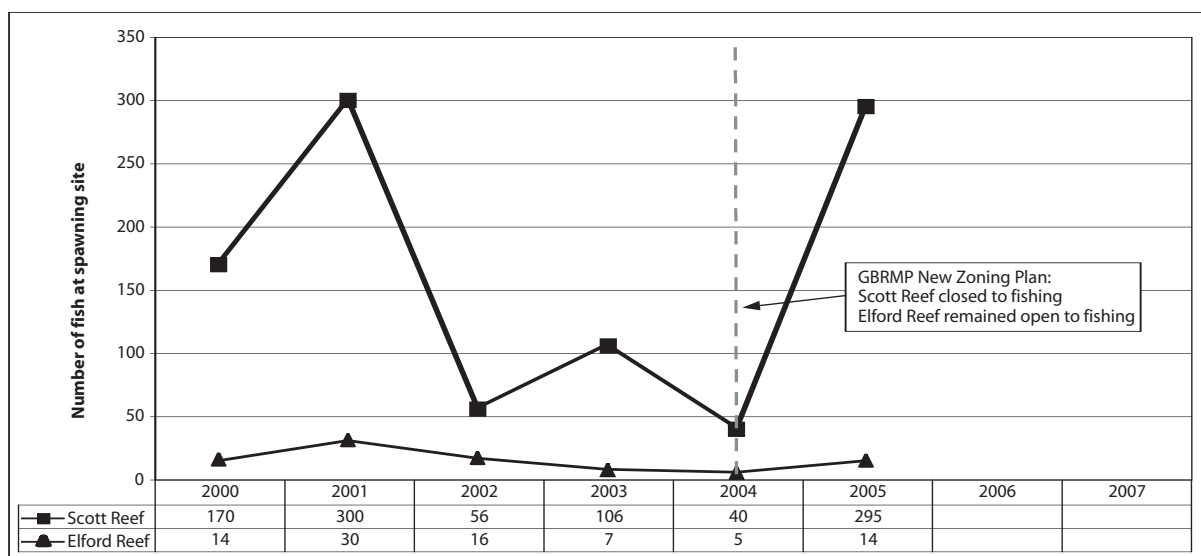


Figure 1. Leopard coralgroupers numbers at Scott Reef and Elford Reef spawning aggregation sites during October new moon, 2000 to 2005.

zoning has affected the number of fish visiting these spawning aggregation sites. These sites will be monitored over time to help determine this.

The management measures on the GBR are exceptional in that a precautionary approach has been taken, to a certain extent, to ensure the long-term sustainability of the reef fish resources. This is preferable to the many situations around the world in which management measures, such as spawning season closures, were introduced only after it was found that spawning aggregations were in decline.

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