



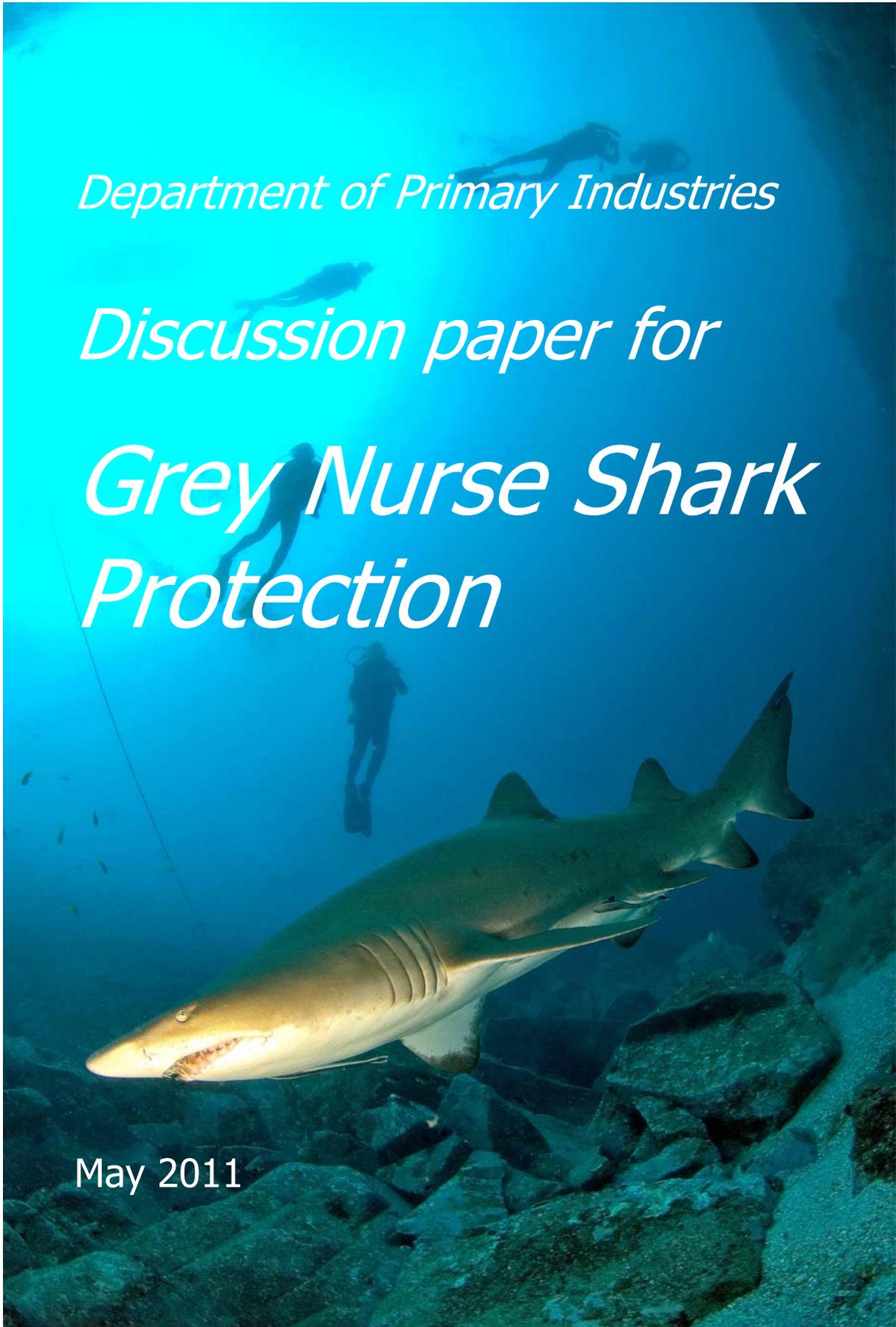
Primary
Industries

Department of Primary Industries

Discussion paper for

*Grey Nurse Shark
Protection*

May 2011



Introduction

Grey nurse sharks are a 'critically endangered' species listed under the NSW *Fisheries Management Act 1994* and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

Despite their fierce appearance, grey nurse sharks are not considered dangerous to humans. They are a long lived, late maturing species with a very low reproductive rate (maximum of 2 pups every 2 years). Grey nurse sharks form aggregations, generally in sand filled gutters, overhangs or caves in areas of rocky reef. Individuals spend long periods of time in close proximity to aggregation sites and also move between these sites.



A grey nurse shark aggregation at Fish Rock; research suggests bait fishing over aggregations is likely to hook grey nurse.

Grey nurse shark management is inherently contentious. Hook and line fishing has been identified as the major threat to the species survival and is the largest source of grey nurse shark mortality; causing approximately 12 known mortalities per annum. "Hook and line fishing in areas important for the survival of threatened fish species" was listed as a Key Threatening Process affecting grey nurse sharks in 2002 by the NSW Fisheries Scientific Committee.

Grey nurse sharks are susceptible to accidental hooking at aggregation sites and while moving between sites. Accidental hooking can result in direct mortality from injuries and infection, and can

also cause non-fatal injuries that may impair feeding and reproductive ability.

Grey nurse sharks occur in shallow inshore coastal waters that are subject to significant recreational and commercial fishing activity, and proposals to mitigate fishing impacts on grey nurse shark are perceived as a threat to access by commercial and recreational fishers.

The large placid nature of grey nurse sharks combined with their aggregating behaviour also underpin a major dive tourism industry, resulting in high levels of community awareness and concern about grey nurse shark interactions with hook and line fishing gear.

Both fishing and diving industries contribute significantly to the economies of many coastal communities, raising concerns about economic impacts associated with any changes to management arrangements.



Even small hooks can cause fatal injuries; this juvenile grey nurse shark died after accidental hooking on recreational gear.

Background

Critical habitat was declared at ten sites along the NSW coast in 2002 and special fishing and diving rules were introduced. The critical habitat sites and rules have not been reviewed since their declaration and a range of issues have been identified with the management of fishing and diving at these sites in the intervening period.

During 2010, the former NSW Government reviewed fishing arrangements at Fish Rock/ Green Island (near South West Rocks) and North/South Solitary Islands (near Coffs Harbour) on the NSW North Coast in response to recent scientific research highlighting the impact of bait fishing in proximity to grey nurse shark aggregations^{1,2}.

The reviews concluded with new fishing rules being implemented at these sites in January and March 2011 respectively. The rules were contentious, and there was criticism at the time that there had been inadequate community consultation. The NSW Government subsequently revoked the closures and committed to a further three months consultation to provide additional opportunity for the community to have a say in the decision making process.

This discussion paper has been prepared to form the basis for community consultation on the future of grey nurse shark protection arrangements in NSW. The paper reviews the conservation history and status of grey nurse sharks and sets out some of the current issues related to their protection and conservation in NSW.

Conservation History

Grey nurse sharks were listed as a protected fish in NSW in November 1984. In October 1999 the NSW Government listed the grey nurse shark as a 'vulnerable' species on the threatened species schedules of the *Fisheries Management Act 1994*. In April 2000, the status of grey nurse sharks was upgraded to 'endangered' and further upgraded to 'critically endangered' in September 2008 by the NSW Fisheries Scientific Committee based on further scientific evidence of their decline.

In 2002, the Commonwealth Government prepared the first grey nurse shark national recovery plan. Substantial progress has been made in implementing the plan including increased protection of aggregation sites and significant advances in scientific understanding of grey nurse shark movements, reproduction, population size, and impacts of fishing and diving.

In December 2002, ten aggregation sites on the New South Wales' coast assessed as being essential for the survival of grey nurse sharks were declared as 'critical habitat'. Special fishing and diving rules were put in place to reduce impacts on grey nurse sharks.

Expansion of the NSW marine protected areas network since 2002 has resulted in many of the critical habitat sites being incorporated into marine park sanctuary zones. However, some important aggregation sites remain unprotected or partially protected.

A major legal challenge relating to the adequacy of grey nurse shark protection in the NSW Ocean Trap and Line commercial fishery was held in 2007;

culminating in new commercial fishing rules including prohibitions on bait fishing at many key aggregation sites.

A new approach to the management of the NSW Beach Meshing (Bather Protection) Program was adopted in 2008, incorporating changes to reduce the impact of the program on threatened species including grey nurse sharks.

In 2008, the Commonwealth Government commissioned a major population estimation project that was published in 2010, providing one of the most comprehensive assessments of the grey nurse shark population available to date³.

Finally, intensive research has been undertaken on developing an artificial breeding program for grey nurse sharks with the first stage of research concluding in 2010. At this time the program is on hold.

Notwithstanding the progress made to date, recreational hook and line fishing with bait is still allowed at some of the largest and most significant grey nurse shark aggregation sites in NSW. Research has shown that fishing with bait in close proximity to grey nurse sharks represents a high risk of accidental hooking.



Image courtesy of Sea World Research and Rescue Foundation
Interactions between fishers and grey nurse sharks can result in a range of injuries. This animal could not feed after being gaffed. The gaff was removed by divers in a rescue operation.

Current Conservation Status

Considerable effort has gone into determining the size of the grey nurse shark population over the last decade. Total population size has been the subject of much debate, with a range of views held in the community about its size and whether it is declining, static or recovering. Anecdotal reports suggest populations have increased since the mid-1980's.

Population viability analysis modelling suggests that the total east Australian population needs to be larger than 3500 - 7100 for optimal long term persistence⁴. A population size of greater than 5000 is considered desirable for long term persistence in many taxonomic groups⁵. Grey nurse sharks are unlikely to be downgraded from their critically

endangered status while the population is below a threshold of 5000 individuals.

Research completed since 2003 using a range of different methods have derived population estimates from as low as 443 to as high as 2142 individuals^{3,6}. The most recent estimate commissioned by the Commonwealth Government suggests the total population size is less than 1500 individuals³. This also concurs with genetic analysis that suggests the population size is between 1000 – 1500 individuals⁷.

All of the population estimates to date are lower than the minimum optimal population size of 5000 required for long term persistence, and modelling suggests that the population is likely to be declining under current levels of known fishing mortality⁸.

Critical Habitat

Critical habitat and associated fishing and diving rules were declared at the following aggregation sites in 2002:

- Julian Rocks (Byron Bay),
- Fish Rock (South West Rocks),
- Green Island (South West Rocks),
- The Pinnacle (Forster),
- Big and Little Seal Rocks (South of Forster),
- Little Broughton Island (North of Port Stephens),
- Magic Point (Maroubra – Sydney),
- Bass Point (Shellharbour),
- Tollgate Islands (Batemans Bay),
- Montague Island (Narooma)

Critical habitat extends 200 m from a relevant natural feature and is surrounded by a further buffer zone extending to a total of 1000 m.

Critical habitat fishing rules permit the use of bait and/or wire trace from drifting boats, but prohibit their use from anchored or moored vessels. These methods of fishing are now thought to result in a high risk of accidentally hooking grey nurse sharks.

Spearfishing is not affected by critical habitat regulations, although special spearfishing rules exist at some grey nurse shark sites such as Fish Rock.

Critical habitat diving rules prohibit night diving, blocking entrances to caves and gutters, feeding, touching, chasing or harassing sharks, as well as a ban on using underwater scooters and electronic shark repelling devices. A voluntary Code of Conduct with similar rules has been developed for diving with grey nurse sharks at other sites that are not declared critical habitats.

Fishing

In 2010, research was published that concluded that the proportion of sharks that have been hooked at least once has not declined and that the current protection measures have not succeeded in reducing hooking rates¹. During this research, grey nurse sharks at Fish Rock recorded the highest

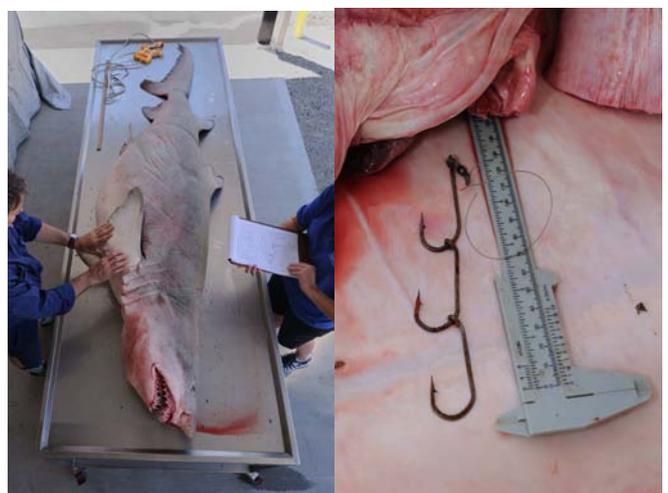
occurrence of retained fishing gear of 25 sites studied.

Most research records externally visible fishing hooks. Actual rates of hooking are likely to be higher. Necropsies have shown that many grey nurse sharks have been hooked internally despite having no externally visible hooks. In many cases fishers may not know they have accidentally hooked a grey nurse shark if it breaks the fishing line before being seen. Grey nurse sharks often survive accidental hooking, however even large adult sharks can die or suffer debilitating injuries from small hooks depending on hooking location.



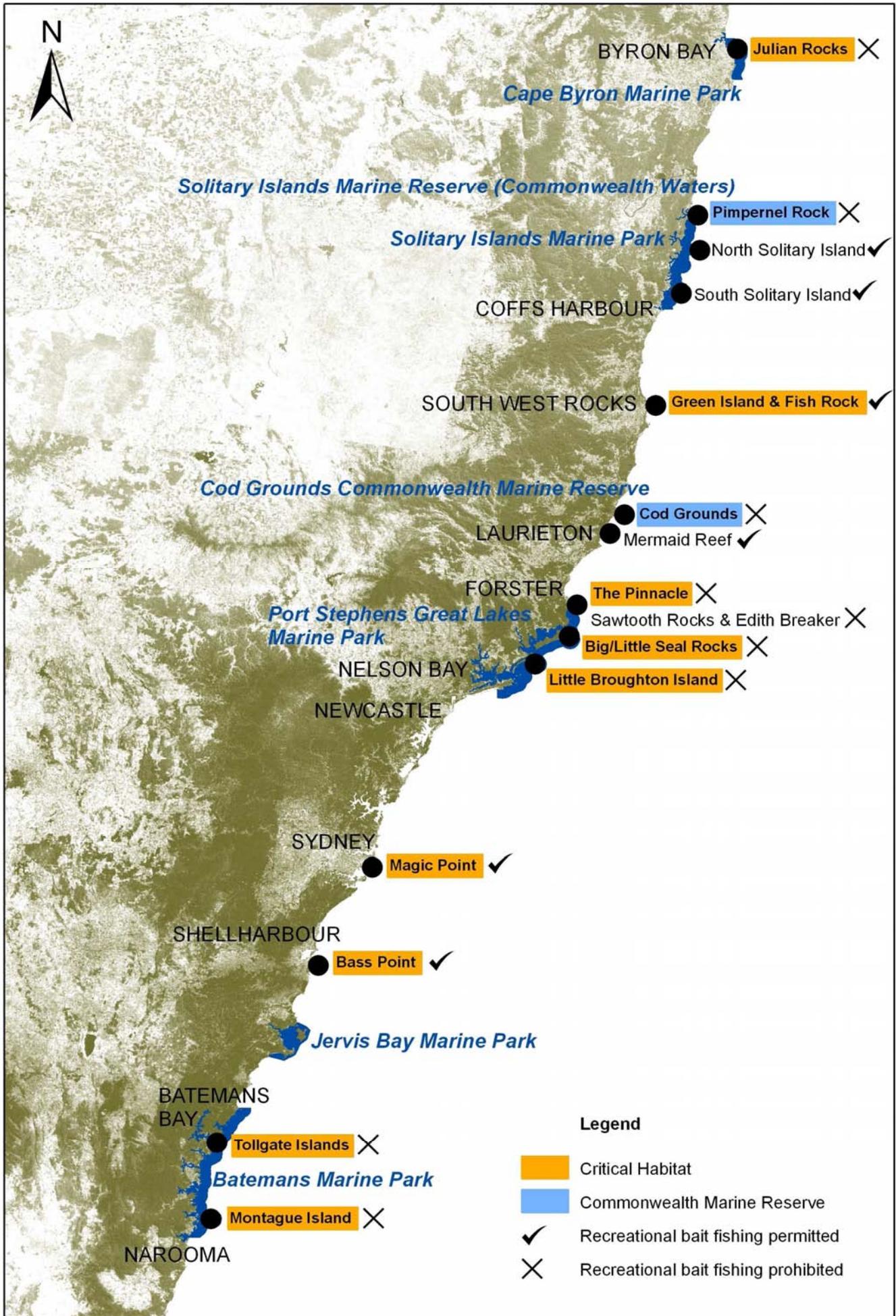
Grey nurse sharks interact with a wide range of gear; this shark was foul hooked by a knife jig and carries other hooks and line.

During 2009 – 2010, NSW DPI scientists used underwater video cameras to observe the behavioural response of grey nurse sharks to a range of recreational fishing gear including deep and shallow lure trolling and bait fishing. The research has shown no sign of grey nurse sharks responding to towed lures, suggesting they may have no direct attraction. However, grey nurse sharks readily took all types of bait tested with no obvious time-of-day preference. Overall, 177 (22%) of 800 baits used in the experiments were taken by grey nurse sharks².



Nov 2010 - This sexually mature female grey nurse shark died after ingesting gang hooks that blocked the oesophagus.

Critical Habitat and other key grey nurse aggregation sites along the NSW coast



The research indicates that bait fishing in proximity to grey nurse sharks presents a high risk of accidental hooking at all times of the day and night. Bait fishing was assessed as a high risk in the environmental impact assessment of the commercial line fishing sector in 2006, and commercial fishers have ceased bait fishing at critical habitat sites since 2007.

The management approach for grey nurse sharks in NSW has increasingly moved towards mitigating the impacts of medium and high risk activities. Significant progress has been made in the commercial fishing sector however similar changes have not occurred in the recreational sector.

SCUBA diving

Several studies into the behavioural response of grey nurse sharks to SCUBA divers have been undertaken since critical habitat was declared. Some of the studies have found that grey nurse sharks exhibit behavioural changes if approached closely or by large numbers of divers^{9,10}. These behavioural changes include less time spent milling and more time spent actively swimming. This can be accompanied by jaw gaping and tail cracking. These behaviours appear to be short-lived and return to normal once the divers leave.

No evidence of site abandonment has been documented from SCUBA diving and the largest study to date found no effects from SCUBA diving on whole-of-site movements of grey nurse sharks across 15 sites studied, with no sharks leaving sites in response to SCUBA divers¹¹.

Research into diver compliance with the rules has also been conducted and concluded that diver compliance with the voluntary Code of Conduct is generally high, particularly in the dive charter sector with large client groups, but that more education is required to reduce the impact of recreational divers¹⁰.

Finally, dive sites that receive high visitation rates can suffer damage to soft corals and other benthic organisms from fin strikes, handling/touching, and from impacts associated with poor diver buoyancy control. There is a concern that over time this can degrade the quality of grey nurse shark habitat at intensively dived sites.

General issues

Several other issues have been identified with the current critical habitat arrangements since they were declared. The critical habitat site at Bass Point has been identified in reports by NSW DPI scientists as not warranting continued recognition as critical habitat based on the limited occupancy and utilisation of the site by grey nurse sharks. The current critical habitat rules at this site have also been identified as an impost to the operation of

underwater scooters from safe launching areas at Bushrangers Bay adjacent to Bass Point.

Conversely, major aggregations of grey nurse sharks have been identified at sites such as Mermaid Reef near Laurieton³ that are currently not protected. In addition, other sites such as South Solitary Island near Coffs Harbour have previously been recommended for recognition and listing as critical habitat¹².

For the six critical habitat sites that have been incorporated into marine parks, overlaying marine park zones over critical habitat has resulted in complex and inconsistent rules, with redundant regulations existing at many of these sites. The complex boundaries and rules between marine park zones and critical habitat at some sites have reduced the communities' ability to interpret and comply with rules. They have also considerably complicated the production of advisory materials such as boat ramp signage, brochures, and maps.

Most of the critical habitat regulations applying to commercial fishing are now redundant as new rules have applied in the Ocean Trap and Line fishery since 2007 that prohibit medium and high risk fishing methods, including bait fishing, at grey nurse shark critical habitat sites. These rules provide a much higher level of protection than that established by the critical habitat regulations however they do not apply to recreational fishers.



The aggregating behaviour of grey nurse sharks underpins a significant eco-tourism industry in NSW.

Discussion

Issues around grey nurse shark management are contentious and a range of views exist about the best way to manage activities that impact on grey nurse sharks, and the level of protection required for the species.

In 2003 the NSW Government commissioned an independent scientific review that recommended 1500 m sanctuary zones around aggregation sites. These blanket recommendations were not implemented as a large number of sites were under review as part of the marine parks process.

The Queensland and Commonwealth governments have protected key aggregation sites within their jurisdictions, with 1200 m sanctuaries implemented at key aggregation sites in Queensland, and 500 m and 1000 m sanctuaries introduced in Commonwealth waters offshore from NSW at Pimpernel Rock and the Cod Grounds respectively.

The 2007 Administrative Appeals Tribunal case into grey nurse protection included a comprehensive review of protection measures on a site-by-site basis¹². The decision provided context for the rules subsequently applied in the commercial fishing sector. These vary between sites, but in general consist of 500 – 1000 m zones where medium and high risk commercial line fishing methods are prohibited. Low risk methods such as spinning and trolling have continued. This has resulted in different rules between the commercial and recreational fishing sectors.

At some sites such as Pimpernel Rock, SCUBA diving activities require a permit. While diving at critical habitat sites is regulated by enforceable sanctions, other sites are self-regulated by voluntary compliance with a Code of Conduct.

The lack of consistency in the rules has been identified as an issue by stakeholder groups and was also recognised during the Administrative Appeals Tribunal case in 2007, and more recently during the review of the national recovery plan.

Options for increased protection

There are many options available to provide increased protection for grey nurse sharks. We are interested in your views on changes that could be introduced to improve the current level of protection.

You are invited to make a submission on the issues raised in this discussion paper and options to respond to them. In particular, your views are invited on future management arrangements for the protection and recovery of grey nurse sharks. You are also encouraged to provide your views on the social and economic costs associated with different management options.

Want to comment?

Commercial fishers, recreational fishers, SCUBA divers, conservationists, scientists, government and non-government organisations and the broader community are invited to have their say.

A submission form can be downloaded from:

www.dpi.nsw.gov.au/fisheries

Written submissions should be marked "Grey Nurse Shark Submissions" and posted to:

NSW Department of Primary Industries
Locked Bag 1
Nelson Bay NSW 2315; or

Faxed to: (02) 4916 3880; or

Emailed to:

fisheries.threatenedspecies@dpi.nsw.gov.au

Submissions close on Friday August 26 2011.

What happens next?

A scientific review of grey nurse shark protection arrangements will also be undertaken parallel to the community consultation process. The outcomes from the community consultation and scientific review will be used to inform the development of future management arrangements for grey nurse shark protection in NSW.

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- 12 Administrative Appeals Tribunal, 2007. AATA 1876. Nature Conservation Council of NSW Inc Applicant vs. Minister for Environment and Water Resources