

Northern Shark Fisheries

Management Summary

The 'northern shark fisheries' comprise the State-managed WA North Coast Shark Fishery (Pilbara/western Kimberley) and the Joint Authority Northern Shark Fishery (eastern Kimberley). Operators in both fisheries mostly operate demersal longlines to target sharks.

Joint Authority Northern Shark Fishery (JANSF): The commercial take of shark in Western Australian waters east of 123°45' E longitude (Koolan Island) is controlled by a joint authority arrangement between the Commonwealth and the State of Western Australia gazetted in February 1995. In this arrangement, the State is given control of the JANSF on behalf of the WA Fisheries Joint Authority (WAFJA), whose members include the State and Commonwealth Ministers for Fisheries.

The *Offshore Constitutional Settlement 1995* specifies that the use of pelagic gillnets, demersal gillnets and demersal longlines to commercially take sharks and rays (class Chondrichthyes) and bony fish (class Osteichthyes) is to be managed by the Joint Authority under Western Australian law.

The Department has conducted a review of shark fishing operations in the JANSF and a management proposal was circulated for stakeholder comment in early 2003. The Joint Authority has since approved the drafting of legislation based on the proposal and arrangements will be implemented by way of a gear prohibition order pursuant to Section 43 of the *Fish Resources Management Act 1994*. It is intended that the gear prohibition apply to the use of demersal gillnets, pelagic gillnets, demersal longlines and net hauling devices in Western Australian waters east of 123°45' E longitude. The Section 43 order is considered to be an interim management arrangement, and will give the WAFJA an opportunity to consider the longer-term management of the JANSF.

Recognised JANSF operators will be permitted to use either demersal longlines or pelagic gillnets, although the Department is considering phasing out pelagic gillnets in the future. Input controls such as hook limits and restrictions on lengths of pelagic gillnet will also be introduced. The take of mackerel by JANSF operators will also be prohibited unless JANSF operators hold a licence to operate in the proposed mackerel fishery.

WA North Coast Shark Fishery (WANCSF): The Western Australian-controlled sector of the northern shark fisheries is managed by way of an order made under section 43 of the *Fish Resources Management Act 1994*. The order was gazetted in May 1993 and applies to all Western Australian waters off the north coast, from longitude 114°06' E (North West Cape) to 123°45' E (Koolan Island). The order prohibits the use of shark longlines, shark droplines, pelagic gillnets and powered hauling devices.

There are eight operators entitled to fish in the WANCSF with shark gear by way of a fishing boat licence condition which permits the use of gear (primarily longline gear) fitted with

metal traces. The Department intends to review and update the management arrangements for the WANCSF similar to the arrangements implemented in the JANSF and may also consider widening the gear prohibition to apply to any type of longline.

The WA Demersal Net and Hook Fisheries Management Advisory Committee includes a representative from the northern shark fisheries. The MAC met on 8 and 21 August 2002 to specifically discuss the National Plan of Action for the Conservation and Management of Sharks, which was adopted by State, Territory and Commonwealth representatives on the Shark Assessment Group in late 2002.

The Department of Fisheries is involved in a cooperative approach to shark research by agencies across northern Australia, including CSIRO and the Northern Territory and Queensland fisheries agencies. Given the level of national and international concerns about shark conservation and the overlap of stocks with over exploited Indonesian stocks, it is likely there will be continuing pressure to review and further constrain the exploration of sharks and related species in these fisheries.

A draft application has been submitted for the northern shark fisheries as part of Environment Australia's ecological sustainability reporting process under the *Environment Protection and Biodiversity Conservation Act 1999*. A final application is being developed which will be submitted to EA in 2004.

Governing Legislation/Fishing Authority

Fisheries Notice no. 476 (Section 43 order)

Fisheries Notice no. 602 (Section 43 order)

Condition 127 on a Fishing Boat Licence

Consultation Process

WA Demersal Net and Hook Fisheries Management

Advisory Committee

Department–industry meetings as required

Research Summary

Research to monitor the status of northern shark stocks has been undertaken as an extension of the south and west coast shark research project. A three-year research project funded by the FRDC began in July 2000 and will provide an improved understanding of these fisheries and of northern shark stocks generally. An EA/FRDC-funded research project examining the sustainability of Australia's tropical sharks and rays, which began in 1999, will also help to improve our understanding of the impacts of various fishing sectors which exploit elasmobranchs across the northern half of Australia. This project involves researchers from CSIRO, the Department of Fisheries' shark research section, the Northern Territory Department of Business, Industry and Resource Development and the Queensland Department of Primary Industries. Phase 2 of this project, which aims to fill some of the information gaps identified during Phase 1, began in July 2002 and is scheduled for completion in June 2005.

NORTH COAST BIOREGION

The following status report is a summary of the material that was generated for the application submitted to meet the requirements of the Commonwealth's EPBC legislation. This was largely prepared based on CAES data provided by industry and a knowledge of tropical shark stocks from preliminary research data and the scientific literature.

Northern Shark Fisheries Status Report

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FISHERY DESCRIPTION

Boundaries and access

Western Australia manages fishing for shark by longline or dropline from longitude 114°06' E to 123°45' E (the WANCSF). Longline and gillnet fishing for shark from longitude 123°45' E to the WA/NT border is managed by Joint Authority between Western Australia and the Commonwealth (the JANSF). Gillnet fishing is not permitted west of longitude 123°45' E or within 12 nautical miles of the coast east of longitude 123°45' E. A total of 13 fishers have licensed access to one or more of these zones.

Owing to the small number of operators in the JANSF, confidentiality arrangements do not permit the publication of catch and effort data from this fishery on their own. Therefore, as the principal methods and some target species are common to the JANSF and WANCSF, these data have been combined and the two regions are considered as a single northern shark fishery for assessment purposes.

Main fishing methods

Primarily shark dropline and shark longline. During 2001/02, two vessels reported using gillnets in the JANSF.

RETAINED SPECIES

Commercial production (season 2001/02): 456 tonnes

Landings

The total shark catch by the two fisheries of 456 t during 2001/02 represents a 67% increase from the previous season. This total included 185 t of 'blacktip' (a name used to describe several species of the family Carcharhinidae) and 72 t of sandbar sharks. The dramatic increase (293%) in the catch of 'blacktip' shark species is a result of additional effort in the Kimberley region, where the Australian blacktip (*Carcharhinus tilstoni*) and spot-tail shark (*Carcharhinus sorrah*) are more common. In 2001/02, the northern shark fisheries retained only 3 t of scalefish species. For a more detailed breakdown of catch species composition, see Northern Shark Table 1. Annual catches since 1994/95 are shown in Northern Shark Figure 1.

In addition to the catch by the two dedicated fisheries, sharks are also caught by other commercial sectors. During 2001/02, vessels licensed in other managed fisheries operating in the area between North West Cape and the WA/NT border reported

catches of shark and ray totaling 87 t. A further wetline/longline catch of 83 t of shark and ray was taken by vessels without access to managed fisheries. The combined 'external' catch of 170 t is 86% higher than the previous season and is greater than one-third of the landings from the dedicated shark fisheries, making the total catch of sharks in this region 626 t.

Fishing effort

Because longlining is the primary fishing method in the northern shark fisheries, effort is standardised in terms of hook days. The standardised effort measure used is the number of longline or dropline hooks multiplied by the number of fishing days. In previous years, gillnet effort data in the JANSF were converted using a fixed conversion rate based on the net-to-hook ratio used in the management of the temperate demersal gillnet and longline fisheries, which is 3 m of net to 1 hook. However, because comparative longline and gillnet catch and effort data are available for 2001/02, the longline CPUE of sharks has been used to convert gillnet effort into the longline equivalent effort from the gillnet catch for this and previous years.

In 2001/02, the total fishing effort was 501,489 hook days expended by 9 vessels, which represents an increase of 91% over the previous year (Northern Shark Figure 2). Unlike previous years, effort was evenly distributed between the two fisheries. Given the continued high value of shark fins and the increasingly full-time operation of vessels, effort in this fishery is likely to rise further in coming years.

Catch rate

There is no clear trend in the catch rate data (Northern Shark Figure 2). This is probably due to the large number of species caught and the lack of consistent fishing practices used over time in these fisheries.

Recreational component:

Not assessed

Stock assessment completed:

Preliminary

A preliminary stock assessment of the fisheries' main target species, the sandbar shark (*Carcharhinus plumbeus*), has been conducted using a demographic model that incorporates empirically measured age-specific exploitation rates and biological data to determine the likely response of the stock to current levels of fishing mortality. Whilst there is currently some uncertainty regarding the biological parameters used in this analysis (particularly the reproductive periodicity), the model indicates that at current levels of exploitation, the rate of population growth (r) is positive and the stock should continue to replace itself. Even under the most pessimistic scenario (that the species has a three-year reproductive cycle and that exploitation rates are underestimated by 35%), exploitation appears to be sustainable, although the rate of population growth under these circumstances is low ($r = 0.006 \text{ yr}^{-1}$). The model also indicates that if the current age structure of the catch remains the same, the stock can most likely withstand a 61% increase in catch before the population will begin to decline. Updated biological parameters and exploitation rates will be available at the conclusion of the current FRDC-funded research project in June 2004.

Exploitation status: Under-exploited

Breeding stock levels: Adequate

NON-RETAINED SPECIES

Bycatch species impact: Low

The fisheries have some scalefish catch which is generally retained for sale. There is some discarded bycatch of unsaleable species of sharks, stingrays and scalefish which the risk assessment has rated as a low to negligible risk.

Protected species interaction: Low

The northern shark fisheries have been rated as having a generally low risk of interacting with protected elasmobranchs and other protected species.

Sharks and rays: Because these fisheries generally operate some distance offshore, they pose a negligible risk to the speartooth shark (*Glyphis* sp. A) and the freshwater sawfish (*Pristis microdon*), which have primarily inshore, estuarine and riverine distributions. The white shark (*Carcharodon carcharias*) and the grey nurse shark (*Carcharias taurus*) rarely occur north of North West Cape and the whale shark (*Rhincodon typus*) is extremely unlikely to be caught by longline or dropline gear.

Turtles: No turtle captures have been observed or reliably reported in the northern shark fisheries and as the amount of gear used is small relative to the fisheries' operational area, the risk of interaction is low.

Billfish: The limited billfish bycatch in the northern shark fisheries is insufficient to impact breeding stocks.

Cetaceans: Given that pelagic gillnets are to be phased out following the introduction of the new management plan for the JANSF, the risk of interaction with cetaceans will be negligible.

ECOSYSTEM EFFECTS

Food chain effects: Negligible

Given the relatively small amount of total catch taken by this fishery, which is spread across a large number of species, each of which has a wide diet, the fishery is likely to be currently having only a negligible impact on trophic interactions within this region.

Habitat effects: Negligible

The principal types of fishing gear (dropline and longline) are set so that they are only in intermittent contact with the seabed, and their physical impact on the seabed is minimal.

SOCIAL EFFECTS

Estimated direct employment in the northern shark fleet during 2001/02 was approximately 30 fishers.

ECONOMIC EFFECTS

Estimated annual value (to fishers) for year (2001/02):
\$1.3 million

The combined value of the catch from the two managed sectors was approximately \$1.3 million (including the estimated value of shark fins). As fishers do not specify the value of fins on their catch returns, fin weight was calculated at an average of 3% of sharks' whole weight and value was estimated using a price of \$45/kg. During the 2001/02 season, shark fins maintained their value of between \$25 and \$120/kg depending on fin size and species, however the lower fin value than has been used in previous years reflects a higher catch of smaller, lower-value sharks. Categories of shark which do not have saleable fins were excluded from fin valuation.

FISHERY GOVERNANCE

Acceptable catch range: Sandbar sharks < 117 tonnes

Owing to the large number of elasmobranch species caught in these fisheries, it is not feasible to formally assess every one. Because the effects of fishing are likely to be detectable in the primary target catch first, the catch of sandbar sharks is considered as a suitable proxy for monitoring the catch of secondary species.

The maximum acceptable annual sandbar shark catch in the northern shark fisheries of 117 t was derived from the mean reported catches from 2000/01 and 2001/02 (which the model results suggest are sustainable) plus an allowance of 50%.

EXTERNAL FACTORS

A significant quantity of sharks are caught in the State's northern bioregion as by-product by vessels licensed to fish for other target species. This factor, in addition to the multi-species nature of the tropical shark fisheries, will make formal stock assessment of the minor species caught in these fisheries particularly difficult.



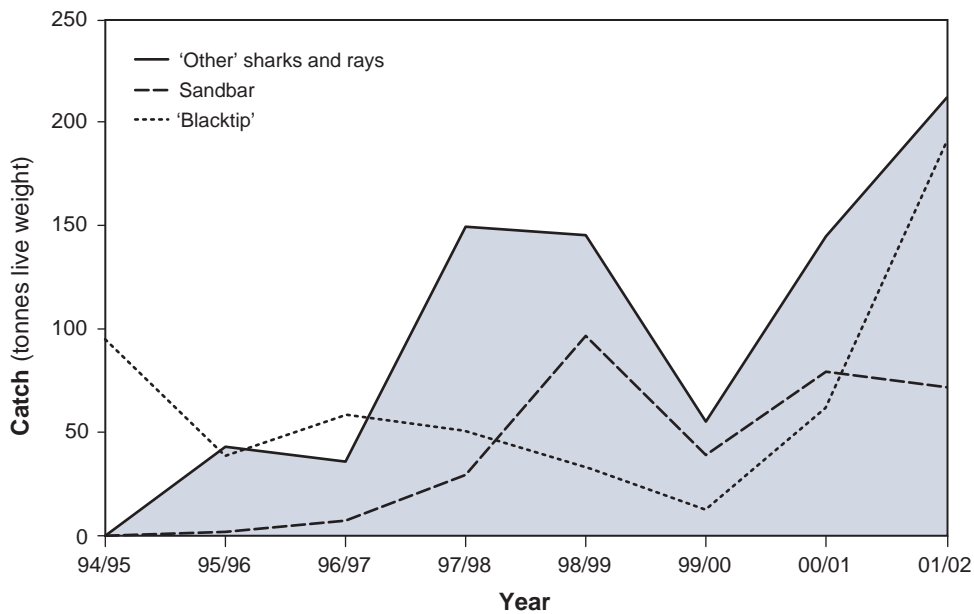
NORTH COAST BIOREGION

NORTHERN SHARK TABLE I

Catch species composition for the northern shark fisheries (WANCSF and JANSF), 2001/02.

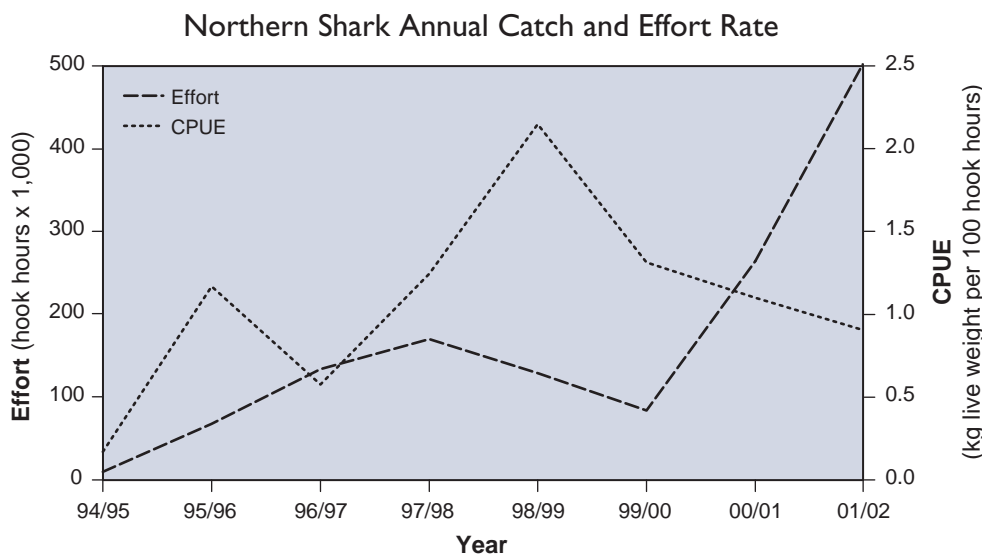
SPECIES		CATCH (tonnes)
Elasmobranchs		
Blacktip shark	<i>Carcharinus</i> spp.	185
Sandbar (thickskin) shark	<i>Carcharinus plumbeus</i>	72
Hammerhead shark	Sphyrnidae	43
Tiger shark	<i>Galeocerdo cuvier</i>	37
Lemon shark	<i>Negaprion acutidens</i>	26
Pigeyside shark	<i>Carcharinus amboinensis</i>	25
Shovelnose rays		11
Bronze whaler shark	<i>Carcharinus obscurus</i>	6
Grey reef shark	<i>Carcharinus amblyrhynchos</i>	6
Skates and rays		< 1
Other sharks		45
Total shark		456
Scalefish		3

Northern Shark Annual Catch



NORTHERN SHARK FIGURE I

Annual landings for the northern shark fisheries (WANCSF and JANSF) for the period 1994/95 to 2001/02.



NORTHERN SHARK FIGURE 2

Annual effort and catch rates of all sharks and rays for the northern shark fisheries (WANCSF and JANSF) for the period 1994/95 to 2001/02.

SOUTH COAST BIOREGION

REGIONAL MANAGEMENT OVERVIEW

The major fisheries of the south coast bioregion are the Abalone, Demersal Gillnet and Longline and South Coast Purse Seine Managed Fisheries. The first two of these also extend to the west coast, but are reported under the region where their main activity is focused. Other fisheries include the beach net fishery for salmon and a crustacean trap fishery which primarily targets southern rock lobsters but also catches various species of deep-water crab, as well as western rock lobsters in the Augusta area. There is also a commercial fishery operating in a number of estuaries on the south coast. A trawl fishery for scallops has been more active in recent years following a very high scallop catch in 2000.

A key management step in 2002/03 was the implementation of new management arrangements for the South Coast Estuarine Fishery. The South Coast Estuarine Fishery (Interim) Management Plan 2001 was gazetted in January 2002 and came into force on 1 July 2002. Implementation involved a familiarisation meeting with industry, and regularly responding to industry queries about the details of the arrangements. Further development of management arrangements for the demersal gillnet and longline (shark) fisheries has been another key focus. The shark fisheries (both the south and west coast components) have been engaged in a strict process of effort

reduction and exploitation rate control over the last five years to rebuild the biomass of the major shark stocks. However, the threat of over-exploitation and the potential for activation of latent effort remain important issues in both the western and southern demersal gillnet and longline fisheries. Growing national and international concerns about shark conservation are also likely to maintain pressure for further measures to protect sharks and restrict catches.

There was a substantial increase in vessels 'gearing up' to target deep-sea crabs (particularly snow crabs) on the south coast in 2002. As a result, the Minister for Fisheries prohibited the take of snow crabs in this area while research on the species is completed, and management arrangements for a comprehensive south coast crustacean fishery, including all rock lobster and crab fisheries, are further developed.

The wetline fishery in the south coast bioregion is the smallest of the regional wetline fisheries and fishing activity is focused around Albany, Bremer Bay and Esperance.

REGIONAL COMPLIANCE AND COMMUNITY EDUCATION OVERVIEW

Commercial fishery compliance inspections on the south coast are conducted by Fisheries Officers working out of offices