

# Spanish Mackerel Fishery Status Report 2004

## INTRODUCTION

Spanish mackerel are found throughout tropical and subtropical waters of the Indo-west Pacific, from Africa to Fiji. In Australian waters, they are found from Geographe Bay in Western Australia, throughout northern Australian waters and down the east coast to the south coast of New South Wales.

The NT fishery is based on the capture of the narrow-banded Spanish mackerel (*Scomberomorus commerson*) by way of lures or baited lines. The commercial troll fishery area comprises all waters seaward of the Northern Territory coast extending to the outer limit of the Australian Fishing Zone (AFZ). Spanish mackerel are also landed as an incidental catch during pelagic shark fishing and finfish trawl operations, with catch limits set for these sectors. In 2004 there were 19 active commercial licences operating in the fishery

The Spanish Mackerel Fishery is managed under a catch-sharing arrangement with other user groups which include commercial, recreational, Fishing Tour Operator and traditional Indigenous stakeholders. The wider community also has an interest in the way our Spanish mackerel resources are used, conserved and enhanced to ensure the quality of the fishery is preserved for future generations.

Historically, there were significant landings of Spanish mackerel taken by the Taiwanese gillnet fleet off northern Australia between 1974 and 1986, with annual catches perhaps as high as 1,000 tonnes in the late 1970s. Catches by foreign fishing vessels stabilised to between 400 and 500 tonnes through the late 1970s and early 1980s. Since the mid 1990s the fishery has stabilised as a small, tightly controlled Territory-based troll fishery. Possession limits have been implemented for the recreational sector.

In 2003 the Spanish Mackerel Fishery received the highest level of export accreditation against the Australian Government's *Guidelines for the Sustainable Management of Fisheries* under

the *Environment Protection and Biodiversity Conservation Act* (EPBC Act). As the management arrangements for this fishery are recognised by the Australian Government to be operating in a sustainable manner, the fishery is therefore exempted from export regulations for a period of five years.

## PROFILE OF THE FISHERY

### Commercial

#### Area

Licensees in the Spanish Mackerel Fishery may fish in Northern Territory waters seaward of coast and river mouths, to the outer limit of the AFZ.

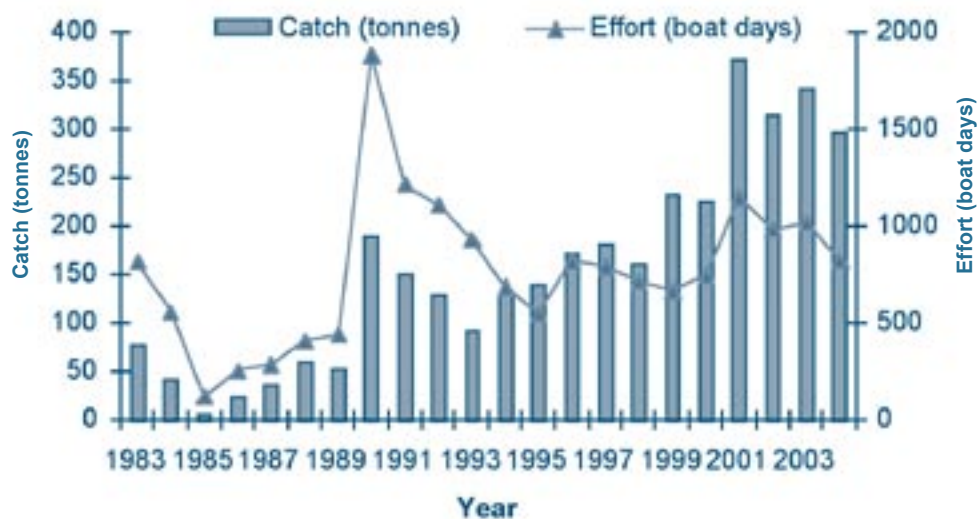
The principal fishing areas include waters near Bathurst Island, New Year Island, northern and western Groote Eylandt, the Gove Peninsula, the Wessel Islands, the Sir Edward Pellew Group and suitable fishing grounds on the western and eastern mainland coasts. Fishing generally takes place in coastal areas around reef, headlands and shoals.

#### Fishing Method

Fishers may operate from a mother boat with up to two dories and use any number or combination of troll lines, floating handlines and rod and lines. It is common for fishers to troll two to four lines behind a dory and up to eight lines from a mother boat.

Most commercial fishers purchase bait for their fishing operations. However, a small number of operators (less than five) fish for bait under a restricted bait net entitlement. Bait fish, usually garfish, harvested under this entitlement may only be used for the commercial fishing of Spanish mackerel.

Additionally, a small amount of Spanish mackerel are taken by pelagic gillnet, and demersal trawl methods as used respectively in the Shark and Finfish Trawl fisheries.



**Figure 1.** Catch and effort for the commercial Spanish Mackerel Fishery, 1983 to 2004.

### Catch

The key **target species** is the narrow-barred Spanish mackerel, *Scomberomorus commerson*.

The Spanish mackerel catch for the troll fishery in 2004 declined to 297 tonnes, from the 2003 catch level of 343 tonnes (Figure 1), similar to the 2002 catch of 316 tonnes, and less than the 2001 peak of 373 tonnes. The changes in annual total catches largely reflect effort, which in turn reflect causes as varied as prices, wind strengths and crew availability (a complaint in several fisheries). In the Shark Fishery, 26 tonnes of Spanish mackerel were landed (increasing from 13 tonnes the previous year), while the Finfish Trawl Fishery landing of Spanish mackerel decreased from 1.9 tonnes in 2003, to just 985 kg in 2004.

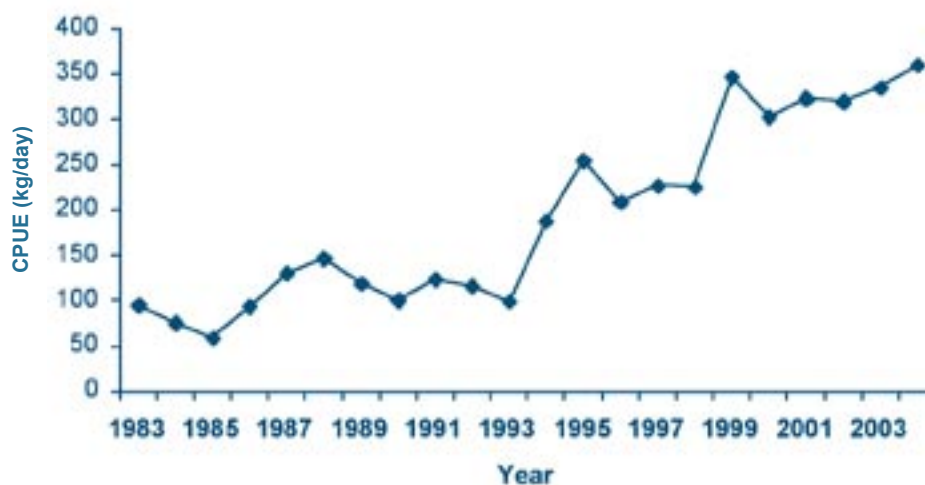
The only **byproduct species** in the troll fishery in 2004 was wahoo (*Acanthocybium solandri*), with a landing of 112 kg. In previous years, landings have included small amounts of other mackerels (ie. mackerels of other species within the genus *Scomberomorus*), trevallies (Carangidae) and cods (Family Serranidae, including coral trouts *Plectropomus* spp.). In 2004, *Scomberomorus commerson* were 99.96% of the landed catch. The capture

method in this fishery (usually heavy troll lines) means that other species that are not retained for sale are usually returned to the water alive.

Readers should note that a revision of conversion ratios was implemented in the 2003 Status Reports, as well as minor method changes and corrections to data extractions. These revisions resulted in substantial changes, relative to previous years' reports, to the estimated catch, effort and catch per unit for the time series presented in the 2003 and now in the 2004 Status Reports. As catch values are calculated from product in the form it is landed, past catch values are unaffected by the conversion ratio changes.

### Effort

Effort (in boat days fished) in the commercial troll fishery for Spanish mackerel has shown a slight declining trend in recent years (Figure 1), with a reduction of 19% in 2004 to 828 boat days, from 1022 boat days in 2003, and substantially less than the 2001 high value of 1155 boat days. Effort levels since 2001 have been higher than the average effort for the late 1990s, with the peak value (1887 days) achieved in 1990.



**Figure 2.** CPUE for the commercial Spanish Mackerel Fishery, 1983 to 2004.

### Catch Rates

The Catch Per Unit of Effort (CPUE) for the commercial fishery for Spanish mackerel (Figure 2) has increased slightly over the past five years following a general increase that occurred during the 1990s. CPUE has recently been at a level around twice or more of that seen in the 1980s. This trend may reflect both growth in efficiency in fishing operations, as well as recovery of the Spanish mackerel population from historical over-fishing by the licensed Taiwanese-Australia joint venture fishery of the 1970s and 1980s.

### Marketing

Spanish mackerel are usually filleted on board the mother vessel soon after capture. Some mackerel are processed as trunks. Trunks (whole fish from which the head, viscera and tail have been removed), are convenient for processing later into cutlets or fillets. The catch is frozen after processing and stored onboard. The catch may be unloaded to barges that service remote ports or delivered directly to the major ports of Darwin and Gove.

### Recreational Sector

#### Area

Highly prized as a sport and table fish, most Spanish mackerel taken by recreational fishers are from waters within easy reach of the major coastal population centres of Darwin, Nhulunbuy

and Borroloola. Surveys of recreational anglers in 1995 and 2000 found that most (47%) of the targeted effort for game fish (e.g. mackerel) occurred in the Nhulunbuy area.

#### Fishing Method

Fishing gear and methods employed by recreational fishermen targeting Spanish mackerel are similar to those found in the commercial sector. Lures and baits are trolled in the vicinity of reefs, headlands and shoals, or baited lines are used for casting or drifting into mackerel schools. Many recreational anglers use berley, which is diced and continuously tossed from the fishing vessel to entice mackerel. A proportion of the catch is also taken when fishing for other species and these fishing methods can vary.

#### Catch

FISHCOUNT, a general population survey conducted in 1995, estimated the total recreational catch of all mackerel to be around 24,500 individuals. Almost all of these fish were harvested, giving a harvest of approximately 170 tonnes. The proportion of Spanish mackerel within the recreational mackerel catch was not identified.

In 2000, the National Recreational Fishing Survey found that the annual Northern Territory catch of all mackerel by the recreational sector

to be 25,233 individuals, slightly higher than the FISHCOUNT survey conducted in 1995. Over half of the mackerel catch was not identified to species. However, during recent survey work done with recreational fishers, 49% of the mackerel catch was thought to be Spanish mackerel. The survey results also indicated that the average weight of Spanish mackerel was estimated to be approximately 5.9kg, coupled with an estimated release mortality of 54%. This provided an estimated harvest by the recreational sector of 62.2 tonnes, which also included the Fishing Tour Operator (FTOs) catch component of 9.7 tonnes.

### Effort

In 1995, targeted game fishing accounted for only a small amount (2%) of the total recreational fishing effort, over 37,000 hours. In 2000, targeted game fishing increased to nearly 8% of the total recreational fishing effort, over 139,313 hours.

### Fishing Tour Operator Sector

#### Area

Fishing guides can fish in all areas of the fishery. Since 1995, the most active areas have been in the vicinity of the Cobourg Peninsula and around islands to the north of the Gove Peninsula.

#### Fishing Method

Fishing gear and methods employed by FTO clients targeting Spanish mackerel are similar to those found in the recreational and commercial sector. Lures and baits are trolled in the vicinity of reefs, headlands and shoals, or baited lines are used for casting or drifting into mackerel schools. Trolling accounts for most of the fishing effort, although casting has been used more frequently since 1998.

#### Catch

In 2004, the catch of Spanish mackerel has more than trebled since 1994, with 3370 fish caught and 898 (27%) retained. Total harvest from the Spanish mackerel resource including

estimated fishing mortality of released fish (see recreational sector above for details) is estimated to be 2225 fish. With regards to FTO captures of other mackerel species in 2004, 1206 were caught with 338 fish retained (28%).

### Effort

Targeted game fishing by FTOs is a small component of the industry. Just over 845 trips targeting game fish were taken by Fishing Tour Operators in 2004. This is over double the number of game fishing trips undertaken in 1995. Although the number of total trips has increased over this period, the proportion of game fishing trips has remained relatively stable at 14% of all fishing trips.

In 2004, FTO clients expended over 13,485 hours on targeted game fishing activities, and this was more than double the number of hours recorded in 1995. The proportion of targeted game fishing hours has increased slightly to 10% since 1995.

### Indigenous Sector

Only a very few (1,400) individual mackerel captures were reported during the 2000 Indigenous Fishing Survey of Northern Australia and specific types of species were not recorded.

### Non-retained Species (Bycatch)

The commercial fishery catches vary little apart from its primary target and almost all bycatch items are returned alive to the water. Monitoring of the commercial fishery identified very low levels of bycatch and no interaction with endangered or protected species. During 2004, bycatch was recorded during six observer trips, in which a total of 1162 Spanish mackerel were taken. The bycatch comprised fish of four main species: 23 giant trevally, 16 barracuda, 11 trevally and 24 various tuna species.

None of the bycatch was retained as byproduct, and the majority of the fish were observed to be alive at the time of release with a reasonable chance of survival.

Besides various mackerel species, the majority of other species caught by the recreational sector during targeted game fishing are trevally and queenfish. Most of these fish are retained, with a harvest rate of over 83%. Other minor species caught also have a high retention rate of 78%.

### Threatened Species Interaction

Due to the highly targeted nature of the troll fishing method, interaction with threatened species is highly unlikely. No interaction with threatened species was observed or reported during 2004.

### Eco-system Impact

The fishing gear and targeted nature of fishing operations observed in the fishery have minimal impact on the eco-system.

### Social Impact

The social value of the commercial Spanish Mackerel Fishery is mostly derived from the employment and economic activity generated by fishing operations. The fishery has a total of 19 licences. A vessel typically operates with a skipper and two crew members, and most processing is undertaken on-board (and therefore very limited processing of catch occurs ashore). Although some fish is processed for further sale and consumption locally, most Spanish mackerel is sold interstate.

Spanish mackerel is a highly regarded sport and food fish by the recreational and, to a lesser extent, the Fishing Tour Operator sectors.

### Economic Impact

At the point of first sale in 2004, the value of the catch from the commercial Spanish Mackerel Fishery was \$1.76 million, down from \$1.83 million in 2003. The catch of Spanish mackerel species effectively represented the total catch value for the fishery. While total economic return from the fishery was lower, in line with reduced catches and effort, there was a 10% increase in return per tonne, reflecting improved demand and effective marketing strategies by fishers.

The recreational fishing sector also contributed to the Northern Territory's economy, especially with regards to the service and tackle industries.

## STOCK ASSESSMENT

### Monitoring

Monitoring of the mackerel troll fishery comprises two main elements. The first of these is a logbook system which provides catch and effort information. In addition, research staff, as well as fishers, regularly monitor catches on board commercial vessels, measuring the fish and obtaining biological information such as sex and maturity. Details of fishing effort and strategy are also recorded. Some fishers also routinely provide length measurements of the fish taken. In 2004, six monitoring trips were undertaken.

### Stock Assessment Methods and Reliability

Various stock assessment methods have been applied to the NT Spanish Mackerel Fishery. Age-structured models using the available time series of catch and effort have provided the best results but even those assessments are considered to be only moderately reliable.

Stock assessment of Spanish mackerel in the NT has proved quite problematic. Assessments in 1997 and 2000 (Walters and Buckworth 1997; unpublished) and 2003 (Buckworth, 2004) noted that the fishery has been recovering from over-fishing by the Taiwan-Australia joint venture fishery of the 1970s and 1980s, but without better information on harvest rates or abundance, the real impact of the fishery cannot be ascertained. In addition to the geographic relationships of stocks being finely divided, it is difficult to estimate the size of Spanish mackerel stocks as they are not amenable to survey by trawling or gill net or even by air, and are difficult to capture uninjured for tagging. As they are strongly schooling fish, catch rates are poor indicators of abundance. In the absence of more information for alternative assessments, the approximate equilibrium catch of the Taiwanese

fleet (450 tonnes per year) has been taken as indicative of the sustainable annual yield.

Conservative management (chiefly with measures to contain fishing effort) was adopted using this sustainable yield estimate as a management limit, to provide protection of the resource.

The assessment workshops of 1997 and 2000 (Walters and Buckworth, 1997, unpublished) underlined the need for better information on harvest rates, but pointed out that the NT stocks of Spanish mackerel are now close to being fully utilised. A workshop held in August 2000 suggested that the Spanish Mackerel Fishery is probably just below or nearing sustainable catch levels. It also cautioned that while there were strong management measures to contain commercial fisheries, if the NT follows world trends, the room for growth was likely to be taken up by guided fishing and fishing charters. The North American experience has seen explosive growth in this area, as there are no ceilings on the number of participants, with a substantial increase in their share of the catch.

Sampling of Spanish mackerel during 1991-93 (described above) produced age composition information indicating a very high apparent annual mortality rate of more than 75% for Spanish mackerel aged six years and older. Subsequent analysis of data on catches taken during the Taiwanese fishery (1974-1986), in conjunction with Northern Territory domestic catches, suggested that the lack of older fish in the age structure data resulted from overfishing by the Taiwanese fishery, and that the recovering Northern Territory population of Spanish mackerel is nearing optimum catch levels. Much of the uncertainty in the current assessment reflects inaccuracies in the catch and effort time series from the Taiwanese fleet.

### Current Harvest Status

Recent assessments indicate that the Northern Territory Spanish Mackerel Fishery is currently fished at or near the optimum level.

### Future Assessment Needs

It has been recognised that assessment based on time series of CPUE as an index of abundance or biomass in schooling species such as Spanish mackerel is unreliable. Assessments based on monitoring of harvest rates through tagging would be much more informative (Buckworth, 2004). Use of tag-based monitoring would overcome the lack of confidence in the accuracy of the early catch data time series.

## RESEARCH

### Summary to Date

Research programs for the Spanish Mackerel Fishery seek to improve knowledge of stock structure and harvest rates and other information required for fishery assessment and management. Co-operative research with the commercial and recreational sectors, as well as other fisheries research and management agencies, contributes to the success of these projects.

An FRDC-funded project initiated in 1992 and 1993 examined the age composition of the commercial Spanish mackerel catch, based on the examination of growth patterns from fish otoliths (ear bones) and length composition of the catch. That study found that Spanish mackerel in the catch varied in age between one and 11 years, but most of the catch was about 100 cm (length to caudal fork) on average and between three and six years old, indicating that Northern Territory Spanish mackerel are not fully subjected to commercial fishing until they are around five years old. Size at age was quite variable, females were the largest fish in the catch and, for any given age, the females were usually larger than the males.

A study aimed at describing the geographic structure of the Spanish mackerel stocks across Australia's north was completed in 2002. NT Fisheries, Queensland Department of Primary Industries and Fisheries (QDPIF), Western Australia Department of Fisheries and the University of Queensland collaborated to

examine the spatial stock structure of northern and western Australia's Spanish mackerel. That study used three stock discrimination methods: genetics, parasite loadings and otolith chemistry.

This FRDC-funded work showed that Spanish mackerel in the Top End are not highly migratory but are actually divided into a mosaic of separate adult groups, so that these fish do not mix much on scales as little as 100 km. Thus very few fish from Cape Wessel, for example, would mix with fish from Groote Eylandt, or from the Darwin region. Distinct genetic stocks were identified on the east coast and across northern and western Australia, with a distinct stock lying between, in the Torres Strait area. Fish sampled from Kupang (Indonesia) were also quite distinct. There may be some mixing between these stock units, but they certainly have distinctive seasonal migration and historical fishing patterns. This means that analysis of catch information and management must take into account or be robust to these fine scales. Several refereed articles are anticipated from this work.

### **Incorporation into Management**

Fisheries staff review results of all research programs annually. If research determines significant changes in any aspect of the fishery, a review of the management arrangements is undertaken.

### **Current Research**

A project to develop a new approach for tagging an aggressive predatory fish such as Spanish mackerel commenced in 2001, with funding from the Northern Territory Research and Development Trust Fund. Methods have been developed to "tag" Spanish mackerel by DNA fingerprinting techniques without the need to actually catch the fish. A special hook, the "Genetag Hook", has been designed to

remove a very small piece of tissue for DNA fingerprinting, causing minimal damage to the fish. Subsequent DNA screening of tissue samples from the catch will reveal those which have been "tagged" before. Using this technique it will be possible to quite accurately determine harvest rates for monitoring the state of the fishery.

Subsequent to the success of the pilot work described above, the project *GENETAG: Genetic mark-recapture for real-time harvest rate monitoring. Pilot studies in northern Australia Spanish mackerel fisheries* was commenced, and supported by the FRDC. This project is a collaboration between the Department of Primary Industry, Fisheries and Mines (DPIFM), QDPIF, and commercial and recreational fishing groups. It aims to refine the tissue sampling method, develop efficient genetic screening methods and implement the genetic tagging approach at the fishery scale. The project has seen the genetic tagging of more than a 1000 fish, the implementation of tissue sampling techniques with a 75% success rate, the development of protocols for preservation and storage of samples, as well as DNA extraction, identification and matching protocols. The project has been expanded to include combined conventional/genetic tagging, with a panel of expert anglers tagging more than 400 fish in 2004. The first recapture of a gene-tagged fish (ie. a fish that was gene-tagged and subsequently gene-tagged again six weeks later), was detected in genetic screening during 2004. It is anticipated that the first estimates of harvest rates will be available from the study during 2005 and 2006.

### MANAGEMENT/GOVERNANCE

#### Management

##### Objective

The overall objective is to ensure the long-term sustainability of the fishery by maintaining landings within acceptable ranges. The management framework seeks to maintain all landings of Spanish mackerel at or below 450 tonnes per annum. A review of management arrangements will commence should estimated aggregate landings by all sectors reach 405 tonnes (being 90% of the estimated yield) or total fishery catch declines by 30% over 12 months. Catch shares have been established for all sectors in ensuring the optimal utilisation of Spanish mackerel resources. Should the estimated catch share by a stakeholder group(s), either commercial or recreational, vary by more than 20% over 12 months, a review of the management regime will commence (see Table 1).

Current arrangements also seek to ensure the sustainability of by product taken in the Spanish Mackerel Fishery by maintaining its contribution to less than 10% of the total catch.

These objectives are achieved by the *Spanish Mackerel Fishery Management Plan*, primarily through reducing commercial participation rates to extremely low levels, further effort reduction programs, the monitoring of catches and through regular reviews of management plans.

##### History

Until the early 1970s, the holder of a general fishing licence could land and sell fish, including Spanish mackerel. Throughout the 1970s, management arrangements were refined, with the taking of Spanish mackerel restricted to the holder of net and line licences.

A Taiwanese gill net fleet commenced fishing for pelagic species, including Spanish mackerel, in 1974. Overall catches from the AFZ peaked at 10,000 tonnes per year (processed weight), with shark, tuna and mackerel being the main

species. The foreign fishing fleet was permitted to fish within 12 nautical miles of the Northern Territory coast until 1978, at which time they were excluded from waters adjacent to Arnhem Land and the Wessel Islands. Foreign fishing vessels were excluded from the Gulf of Carpentaria in the following year. Net lengths were restricted during 1986 in response to declining shark catch rates and concerns about the incidental capture of dolphins. These controls resulted in the conclusion of foreign fishing operations in northern Australian waters, late in that year.

With the passage of fisheries legislation in 1980, the Net and Line licence was superseded and commercial mackerel fishers were issued with a Reef and Mackerel licence. In 1984, the licensing scheme was further refined, with pelagic, inshore reef fish or offshore reef fish fishery endorsements allowing trolling as a permitted fishing method to take Spanish mackerel. Fishers were encouraged to operate under a pelagic fishery endorsement when targeting Spanish mackerel.

The Commonwealth Government managed all fish species in northern Australian waters beyond three nautical miles of the coast, until 1988. The Northern Territory Government assumed responsibility for the management of Spanish mackerel at this time for all waters adjacent to the Northern Territory coast to the outer boundary of the AFZ.

A ceiling on the number of licences in the pelagic fishery was introduced in 1990. A public announcement on 1 April 1991 advised that the landing of Spanish mackerel by other than the holder of a pelagic endorsement might not be recognised in any future allocation of fishing entitlements.

With the declaration of the Spanish Mackerel Fishery in 1991, only those licensees able to demonstrate a reliance on the fishery maintained

access. Consequently, the number of licences was reduced to 28. An active licence reduction scheme was introduced in 1993 with new entrants required to either surrender two pre-existing licences or acquire a licence previously issued on the surrender of two licences.

A periodic review of the Spanish Mackerel Fishery continued in 2004.

### Current issues

Overall landings of Spanish mackerel and by-product species remain within agreed ranges.

Incidental landings of Spanish mackerel in the pelagic Shark Fishery and Finfish Trawl Fishery continue to be monitored.

### Future plans

Recommendations from the Spanish Mackerel Fisheries Management Advisory Committee (SMFMAC) were incorporated into a new draft management plan which was released for public comment in mid-2004. As a result of consultations undertaken, a new management plan for the fishery has been drafted and will come into effect in January 2005. A gazette notice detailing the respective catch shares for each sector of the Spanish Mackerel Fishery was endorsed by the Minister for Primary Industry and Fisheries on 20 December 2004. Catch share allocations for each sector will be reviewed annually to ensure catches are maintained within agreed parameters (see Table 1).

The Spanish Mackerel Fishery received export exempt accreditation under the Australian Government's *Environment Protection and Biodiversity Conservation Act 1999*. The Fisheries Group has committed to: undertaking a compliance risk assessment of the fishery, report on yearly results of observer surveys conducted, continue to seek out alternative cost-effective fishery independent sampling techniques, and undertake risk assessment for byproduct and/or bycatch species should

its contribution to the total catch change. The Fisheries Group will continue to monitor the size composition of the commercial catch of Spanish mackerel and will introduce additional management measures if the catch composition shifts to pre-mature fish.

A desktop study will be undertaken during 2005 to determine the circumstances leading to the increase in Spanish mackerel catches by the commercial Shark Fishery sector. Appropriate intra and inter sectorial share arrangements are to be examined in consultation with stakeholders in anticipation of future breaches of allocation percentage integrity. The SMFMAC is to make recommendations to the Director of Fisheries on appropriate management arrangements to address any changes in catch shares.

### Compliance

Compliance activities associated with the Spanish Mackerel Fishery management arrangements are undertaken by the NT Marine and Fisheries Enforcement Section (MFES), under the *NT Fisheries Act 1988*.

In 2004 there were no significant compliance issues for this fishery.

### Consultation, Communication and Education

The SMFMAC was formed to provide a collaborative group to make recommendations on the future management of the Spanish Mackerel Fishery.

Notable achievements of the Advisory Committee to date include formulating management arrangements that led to the initial *Spanish Mackerel Fishery Management Plan* and subsequent review. These measures saw the introduction of a target Total Allowable Catch and sector shares into the fishery, continuation of the licence reduction scheme and recommendations for the reduction of the incidental byproduct of Spanish mackerel in other commercial fisheries.

Regular consultation occurs between the Fisheries Group, the Northern Territory Troll Line Fisherman's Association, the Northern Territory Seafood Council, the Amateur Fishermen's Association of the Northern Territory and other extractive stakeholders to discuss matters of concern within the fishery.

### **Prepared by**

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### **References**

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Walters, C. J. and Buckworth, R C (1997). Shark and Spanish Mackerel stocks assessed. Northern Territory Fishing Industry Council Newsletter, July 1997. 8(2), 14-15.

**Table 1.** Management strategies for the Spanish Mackerel Fishery.

Objective	Performance Indicator	Trigger Point	Management Action
Ensure the sustainability of Spanish mackerel stocks.	Estimated catch by all sectors does not exceed the estimated sustainable yield of Spanish mackerel.	Aggregate landings by all sectors reach 90% of the sustainable yield (by whole weight) and/or total fishery catch declines by 30% over the calendar year (by whole weight).	Management arrangements for the Spanish Mackerel Fishery will be reviewed by SMFMAC. Management regime to be implemented to ensure that aggregate landings by all sectors do not exceed estimated sustainable yield.
	Genetic studies indicate discrete Spanish mackerel stock(s).	Discrete Spanish mackerel stocks identified.	SMFMAC to review and make recommendations on appropriate management response to ensure the sustainability of discrete Spanish mackerel stocks.
	Sustainable yield estimates are reviewed annually.	Annual review.	Continue existing research and review alternative yield estimate methodologies annually.
Optimal utilisation of Spanish mackerel.	Estimated catch share (as a percentage of total aggregate landings, by whole weight) for all sectors remains unchanged.	Estimated catch share by a stakeholder group(s) (commercial or recreational) changes (increase or decrease) over the calendar year by more than 20% (by whole weight).	Undertake a desktop study to determine the circumstances leading to the increase/decline in catch share arrangements. SMFMAC to make recommendations to the Director of Fisheries on appropriate management arrangements to address any changes in catch shares.
Ensure the sustainability of byproduct taken in the Spanish Mackerel Fishery.	Byproduct in the Spanish Mackerel Fishery increases significantly.	Byproduct in the Spanish Mackerel Fishery increases to 10% of the total catch over the calendar year (whole weight).	SMFMAC to make recommendations to the Director of Fisheries on appropriate management arrangements to address any changes and reduce byproduct levels.
Ensure the sustainability of bycatch taken in the Spanish Mackerel Fishery.	Bycatch in the Spanish Mackerel Fishery increases significantly.	Bycatch in the Spanish Mackerel Fishery increases to 10% of the total catch over the calendar year (whole weight).	SMFMAC to make recommendations to the Director of Fisheries on appropriate management arrangements to address any changes and reduce bycatch levels.
Minimise effects of fishing operations on endangered/threatened/protected species/communities.	Endangered/threatened/protected species/communities are identified in NT waters.	Impacts are observed by commercial fishers or fisheries observers.	Threat abatement plan implemented.