

Demersal Gillnet and Longline Fisheries Status Report

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FISHERY DESCRIPTION

There are two managed fisheries using vessels that deploy demersal gillnets or demersal longlines with power-hauled net reels along the south and lower west coasts. These are the Joint Authority Southern Demersal Gillnet and Demersal Longline Fishery (JASDGDLF) and the West Coast Demersal Gillnet and Demersal Longline Interim Managed Fishery (WCDGDLF). The majority of operators use demersal gillnets and the fisheries primarily target shark, with a scalefish component in the catch. The three main shark species targeted by fishers on both the south and west coasts are the dusky whaler shark (*Carcharhinus obscurus*), whiskery shark (*Furgaleus macki*) and gummy shark (*Mustelus antarcticus*). The two fisheries are reported together here because extensive past research indicates that they share this key series of unit stocks. The sandbar or thickskin shark (*Carcharhinus plumbeus*) is also targeted by commercial fishers on the west coast.

Governing legislation/fishing authority

South Coast

Joint Authority Southern Demersal Gillnet and Demersal Longline Management Plan 1992
Joint Authority Southern Demersal Gillnet and Demersal Longline Managed Fishery Licence

West Coast

West Coast Demersal Gillnet and Demersal Longline Interim Management Plan 1999
West Coast Demersal Gillnet and Demersal Longline Interim Managed Fishery Permit

Consultation process

WA Demersal Net and Hook Fisheries Management Advisory Committee
Department–industry meetings

Boundaries

The Joint Authority Southern Demersal Gillnet and Demersal Longline Fishery covers the waters from latitude 33° S to the WA/SA border. For the purposes of management, the fishery is composed of two zones. Zone 1 extends from latitude 33° S around the coast as far as longitude 116°30' E, and Zone 2 from 116°30' E to the WA/SA border (129° E).

The West Coast Demersal Gillnet and Demersal Longline Interim Managed Fishery extends north from latitude 33° S to a line drawn north of North West Cape (114°06' E). However, shark fishing has been prohibited between Steep Point (26°30' S) and North West Cape since 1993.

Management arrangements

The south and west coast fisheries are controlled through two similar management plans.

The JASDGDLF was declared a limited entry fishery in 1988 and is managed under a Joint Authority with the Australian Government. This fishery is managed primarily through effort controls in the form of time/gear units. One unit allows a fisher to use one 'net' for one month. This management strategy was introduced in 1992 and net length has been modified to reduce effort in a series of stages through to 2000/01 (see *State of the Fisheries Report 2000/2001*). All JASDGDLF units now permit the use of either 270 m of demersal gillnet (15 or 20 mesh-drop) or 90 demersal longline hooks for one month.

The WCDGDLF is currently managed as a limited entry fishery, under an interim management plan introduced in 1997. Under the interim plan, the fishery is managed using effort controls in the form of time/gear units, with each unit allowing a net length of 540 m. Implementation of the full management plan is currently awaiting the outcomes of legal challenges to the proposed unit allocation.

Research summary

Major FRDC-funded studies of the shark fishery on the south and west coasts of Western Australia, undertaken over the period 1993/94 to 1998/99, provided a detailed basis for managing the fishery. The extensive information from these studies was incorporated in two FRDC final reports, and the data sets incorporated into the Department of Fisheries' research data records. A further three-year FRDC-funded project focusing on the sandbar (thickskin) shark component of the fishery is due for completion in late 2004. Age-specific exploitation rates and biological data from this sandbar shark research have been incorporated into a preliminary demographic analysis, to determine the likely response of the stock to current levels of exploitation.

Research monitoring of the fishery involves analysis of CAES data and biological sampling of commercial catches. In 2002/03 a new computer program was written which reapportioned incorrectly reported catches from earlier seasons using modified criteria to account for improved species identification and reporting in recent years.

These research data are used to provide the status report on the fishery.

RETAINED SPECIES

Commercial production (season 2002/03)

All sharks 1,244 tonnes

Key species 847 tonnes

Landings

The total shark catch of 1,244 t from these fisheries in 2002/03 comprised 875 t from the JASDGDLF and 369 t from the WCDGDLF, made up as follows:

SPECIES	JASDGDLF	WCDGDLF
Dusky whaler*	182 t	95 t
Gummy shark*	380 t	27 t
Whiskery shark*	133 t	30 t
Sandbar shark [†]	30 t	134 t
Other shark	150 t	83 t
Total shark	875 t	369 t

* Original key target species subject to stock assessment.

[†] Sandbar (known locally as thickskin) shark was not reported separately prior to 2001/02, but has emerged as an important commercial species on the west coast and is the subject of a research project that commenced in July 2000.

Variations from the previous year in catches for the key species are described below under 'Stock assessment'.

In addition to these shark landings, approximately 13–20% of the overall demersal gillnet and longline catch is composed of finfish species that are retained for sale. In 2002/03, scalefish landings totalled 130 t in the JASDGDLF and 89 t in the WCDGDLF. For a detailed breakdown of catch species composition in the two south coast zones and the west coast fishery, see Demersal Gillnet and Longline Tables 1 and 2. The historical annual catches of the key target shark species are shown in Demersal Gillnet and Longline Figure 1 (for sandbar shark, also see Northern Shark Figure 1).

Apart from the two dedicated fisheries, sharks are also caught by other commercial fishers and these catches are reported here because of their importance to an understanding of the true harvest rates. During 2002/03, vessels licensed in other managed fisheries operating in the same overall area (i.e. between North West Cape and the South Australian border) reported catches of sharks and rays totalling 16 t. An additional 179 tonne catch of sharks and rays was taken by 'wetline' vessels without access to managed fisheries.

Fishing effort/access level

There were 57 licences in the JASDGDLF in 2002/03, 24 in Zone 1 and 33 in Zone 2, although only 8 Zone 1 vessels (2 fewer than in 2001/02) and 24 Zone 2 vessels (4 more than in 2001/02) reported active fishing returns during the year. There were 26 licences in the WCDGDLF in 2002/03, although only 12 (2 fewer than in 2001/02) reported active fishing returns during the year.

Data validation procedures that were implemented last year continue to provide a more reliable record of catch and effort than was previously available and therefore a higher degree of confidence in the assessment of the status of the stocks. Because in previous years, data were not validated according to these same procedures, catch and effort data presented in this and the previous report are not comparable to data provided in earlier status reports. The revised data indicate that effort had been previously over-estimated for these fisheries, particularly in the years leading up to the implementation of the JASDGDLF management plan in 1988. The effort expended in 2002/03 was:

JASDGDLF: 160,250 kilometre gillnet hours
(Zone 1: 39,524; Zone 2: 120,726)

WCDGDLF: 57,317 kilometre gillnet hours

Effort is expressed as standardised kilometre gillnet hours and takes into account the historically small amount of longline effort still employed in the fisheries (Demersal Gillnet and Longline Figure 2). Effort in the JASDGDLF increased by 5.7% in 2002/03, while that in the WCDGDLF increased by 3.5%.

While this method of combining gillnet and longline effort into a single measure of effort will continue, an increase in the use of longlines on the west coast has been sufficient to change the dynamics of the fishery. As such, the trends in longline catch effort alone are also provided in this report (Demersal Gillnet and Longline Figure 3). Two spikes in catch and effort in the WCDGDLF are evident. The 1997/98 effort of around 400,000 hooks was targeted towards neonate dusky shark and scalefish, with a resulting shark catch of about 50 t. By contrast, the 2003/04 effort of 250,000 hooks was targeted towards adult sharks and resulted in a shark catch of 170 t. This dramatic increase in catch, despite the fact that the effort expended was considerably less than the 400,000 hooks deployed in 1997/98, highlights the need for changes in targeting practices to be documented and standardised in the fishery database.

Catch rate

See 'Stock Assessment' below.

Recreational component:

< 5%

The estimated recreational catch between Augusta and Kalbarri, from a Department of Fisheries recreational trailer-boat survey conducted in 1996/97 (Sumner and Williamson 1999), was 3,700 sharks, with a further 3,500 released. This total catch included wobbegong species, of which 1,000 were kept. Assuming that the species caught recreationally are similar to those taken by the commercial fishery, at an average weight of 5 kg per shark, then the west coast recreational take of sharks at the time of the survey would have been about 15–20 t, or approximately 4% of the west coast commercial shark catch in that year.

Recreational effort on the west coast has increased since 1996/97 so it is likely that the catch of shark has also increased. A recreational fishing survey of the west coast region

commencing in 2005 will determine whether the catch of sharks and rays has increased since 1996/97.

STOCK ASSESSMENT

Assessment complete:

Yes (key species)

Stock assessment is carried out for the four main shark species caught by the fishery. A summary for three of these species is presented here, with that for sandbar shark presented in the Northern Shark Fisheries report (pp. xx-xx).

Dusky whaler: The total catch of dusky sharks in the JASDGDLF and WCDGDLF during 2002/03 was 276.9 t, 17.1% higher than last year. The catch in Zone 1 of the southern fishery was 100.4 t, 4% less than last year, and in Zone 2 was 81.2 t, 12.9% more than last year. The most obvious change was in the WCDGDLF, where the catch increased by 35.3 t or 58.9%. Catch rates decreased by 11% in Zone 1 of the JASDGDLF and increased by 7.6% and 53.5% in Zone 2 and the WCDGDLF respectively. Dusky shark CPUE also increased by 8.8% in 2002/03. Since the demographic analysis was completed in the mid-1990s, ongoing monitoring of the dusky shark stock has largely involved examination of catch rate data from the target fisheries. However, because the relative contribution of neonates to the fisheries' catch appears to have declined and catches of older juveniles have increased since exploitation rates were measured in the mid-1990s, analysis of CPUE data for this species has become complicated. Further complicating the ongoing assessment of the status of this stock has been the increased targeting of large dusky sharks by 'wetline' hook methods for the value of their fins, both within and outside the managed shark fisheries. Not only has the reported wetline catch of dusky shark (recorded as 'bronze whaler') outside the target fisheries doubled since the mid-1990s but it is believed that a significant proportion of demersal gillnet vessels' large hook-caught sharks are being included within their reported gillnet catch. This artificial inflation of the gillnet catch seriously biases the gillnet fishery's historical catch rate data, and provides an overly optimistic trend in the CPUE for recent years. The apparent decline in catch rates of neonates throughout south-western Australia strongly suggests that the size of the breeding population has been depleted and recruitment has declined. There is thus a strong possibility that there are fewer adult females pupping over a smaller geographic range. This view is supported by the most recent stock assessment of dusky sharks, which concluded that the demersal gillnet fisheries' catch of primarily neonate (first year) sharks was sustainable as long as mortality of sharks older than 6 years was less than 4%. Department of Fisheries research data show that there is a continuing bycatch of adult dusky sharks in other fisheries and mortality from entanglement in plastic packing straps. Thus the collective mortality of dusky sharks beyond that generated by the managed shark fisheries remains a major cause for concern.

Whiskery shark: The combined catch of whiskery sharks in the JASDGDLF and WCDGDLF during 2002/03 was 163.1 t, a 5.2% decrease from the previous year. Landings declined by 7.6% in Zone 1, by 4.3% in Zone 2 and by 1.2% in the WCDGDLF. The effective area catch rate declined by 12.4% in 2002/03 and, regionally, catch rates decreased by 14.3%, 8.8% and 4.5% in Zone 1, Zone 2 and the WCDGDLF respectively. The model indicates that the biomass of whiskery sharks in 1975, when catch and effort reporting began, was 99% of its

unexploited (virgin) level, with 99% confidence that it was between 96% and 100%. Estimated total biomass declined steadily between 1975/76 and 1993/94, after which the rate of decline slowed and is now almost stable. Since 1996/97, the estimated rate of biomass decline has averaged 1.2% per year and was only 0.9% in 2002/03. Based on the latest data, current whiskery shark biomass is estimated to be higher than previously calculated at between 33.7% and 36.3% of virgin level, with a best estimate of 35.1%. Mature female biomass is also estimated to be higher than previously thought at 21.8% (with 95% confidence that it is between 20.6% and 22.8%), and is calculated to have increased by 1.6% since 2001/02, the second year running that mature female biomass has increased.

At the 2002/03 level of effort, the risk assessment model estimated that the probability of the stock being at its target level of 40% of virgin biomass by 2010 was 30.3% and the probability that biomass would increase was only 24.4%, significantly less than last year's estimate of 41.9%. Even though biomass was calculated to be higher than previously determined, these results demonstrate that increased fishing efficiency, albeit within the current management constraints, is seriously undermining the chances of rebuilding the whiskery shark stock. Additional management measures are therefore required to ensure that the temperate demersal gillnet and longline fishery can demonstrate that it is harvesting this stock in a sustainable manner.

Gummy shark: The total catch of gummy sharks increased by 48 t in 2002/03 to 407.1 t, the highest catch since 1992/93 and outside the acceptable range for this season (250–350 t). The total catch was 13% higher than in 2001/02, which together with the 45% increase between 2000/01 and 2001/02 appears indicative of a healthy stock. This is supported by a further 13.4% increase in the catch rate of gummy shark following the 39.3% increase in the previous year. Nonetheless, despite this apparent increase in abundance of gummy shark, there is a possibility that increased targeting of effort towards this species may be providing an over-optimistic interpretation of the trends. Because the most recent modelling of gummy shark population was in 1997/98, a new assessment that incorporates the catch and effort data since that time needs to be conducted.

Exploitation status: **Dusky whaler and whiskery sharks over-exploited**

Gummy sharks fully exploited

Breeding stock levels: **Dusky whaler declining**

Gummy shark adequate

Whiskery shark increasing

NON-RETAINED SPECIES

Bycatch species impact: **Low**

The catch composition of the fishery has been examined in detail for the period 1994 to 1999 (McAuley and Simpfendorfer 2003). There is some discarded bycatch of unsaleable species of sharks, rays and scalefish. Following ESD risk assessment of these fisheries, all impacts on bycatch species are considered to be low.

Protected species interaction:

Low–negligible

The rates of capture of protected species were very low throughout the fishery (McAuley and Simpfendorfer 2003). Marine mammals were caught at a rate of just over 1 per 10,000 km gillnet hours, seabirds at 4 captures per 100,000 km gillnet hours and turtles at 1 capture per 100,000 km gillnet hours.

The numbers of white sharks (*Carcharodon carcharias*) and grey nurse sharks (*Carcharias taurus*) caught are small (< 20/yr and < 80/yr respectively) and a high proportion of these are released alive.

The likelihood of this fishery significantly impacting the viability of populations of protected species is low.

ECOSYSTEM EFFECTS

Food chain effects:

Not assessed

Habitat effects:

Negligible

The level of effort is such that the gear is deployed infrequently over approximately 40% of the fisheries' area and the physical impact of the gear on the bottom is minimal. Demersal gillnet and longline fishing are not permitted between Steep Point (26°30' S) and a line drawn north of North West Cape (114°06' E), or within 3 nautical miles of the Abrolhos Islands baselines.

SOCIAL EFFECTS

Estimated employment during 2002/2003 was 50 skippers and crew in the JASDGLF and 20 in the WCDGLF.

ECONOMIC EFFECTS

Estimated annual value (to fishers) for year 2002/03

\$5.5 million

<i>JASDGDLF</i> :	\$3.3 million (shark and scalefish) \$875,000 (shark fins)*
<i>WCDGDLF</i> :	\$950,000 (shark and scalefish) \$350,000 (shark fins)*

* As fishers do not specify the value of fins on their catch returns, fin values were calculated at an average of 3% of sharks' whole weight and value was conservatively estimated using a price of \$35/kg. Categories of shark which do not have saleable fins were excluded from fin valuation.

FISHERY GOVERNANCE

Acceptable catch range:

Key species 725–1,175 tonnes

Previously, acceptable annual catch ranges for the key species were based on 10-year averages. The acceptable ranges for dusky sharks have now been revised to reflect the more recent status of the stocks. Catch ranges for dusky shark changed for 2003/04 to reflect the need for lower catches of this species, which are subject to exploitation in other fisheries. The acceptable ranges for gummy shark increased to reflect the healthier status of this stock. As with dusky shark, the sandbar shark stock is more resilient to exploitation when only a narrow range of ages are targeted. The acceptable catch range for sandbar has therefore been reduced as a precaution due to the increased targeting of adults by longliners at the northern end of the *WCDGDLF*. The acceptable ranges are as follows, noting that the lower limit for sandbar shark is not specified and has thus not been included in the overall range for key species provided above:

Whiskery shark	175–225 t (same as previously)
Dusky whaler	200–300 t (previously 300–400 t)
Gummy shark	350–450 t (previously 250–350 t)
Sandbar shark	< 200 t (previously < 250 t)

Catches of whiskery shark remain close to, but below, the acceptable range, reflecting their over-exploited status despite the fact that the stock is slowly increasing. The catch of dusky shark is within the revised acceptable range. Proposed management changes (see 'New management initiatives' below) are expected to alleviate current pressures and allow a lower, sustainable catch. The catches of gummy and sandbar sharks are both within the revised acceptable ranges.

New management initiatives (2003/04)

In response to the International Plan of Action for the Conservation and Protection of Sharks released in 1999 by the Food and Agricultural Organisation of the United Nations (FAO) due to concern over the increase in shark catches and the consequences for shark populations, a National Plan of Action has been developed to address those issues specific to Australian shark species and fisheries.

A discussion paper (Fisheries Management Paper no. 180) outlining potential strategies to deal with a variety of sustainability concerns, primarily the significant levels of latent effort and the poor status of the dusky shark stock, will be released in July 2004. This paper is the starting point from which future changes to management arrangements for the temperate shark fisheries within Western Australian waters will be developed, in conjunction with stakeholders. Once the public comments received on this discussion paper have been considered, the Minister will make a decision on the most appropriate measures to ensure sustainability of the temperate shark fishery resources.

In addition to ongoing monitoring of catch and effort data from the demersal gillnet and longline fisheries, collection of the following data should be considered as a high priority in the short to medium term:

- Updated dusky shark age-specific harvest rates from a new tagging project.
- Improved shark catch data, with emphasis on correct species identification and accurate reporting of shark catch from other commercial, recreational and charter fishing sectors.
- Size/age composition of the demersal gillnet and longline fisheries' catch.
- Fishery-independent monitoring (employing commercial fishing techniques), which has the potential to mitigate many of the problems associated with the use of fishery-dependent CPUE data.

Other issues with lower priority include the development of a new model and updated stock assessment advice for gummy sharks and research into the biology and ecology of high conservation-value species such as grey nurse sharks.

EXTERNAL FACTORS

The level of demersal gillnet and demersal longline exploitation of dusky whaler sharks was assessed as sustainable in 1998 (using 1994/95 exploitation rates), provided the exploitation of mature animals did not exceed 1% annually. Continued observed and anecdotal evidence suggests that significant numbers of large dusky whaler sharks have been taken over the past 5–10 years by fishers operating outside the target fisheries. Unpublished catch data from Australian Government-managed pelagic longline vessels and other WA-licensed vessels support this conclusion. There is thus an urgent need to quantify the take of breeding dusky whaler sharks by these sectors to determine to what extent this catch contributes to the apparent decline in dusky whaler breeding stocks.

DEMERSAL GILLNET AND LONGLINE TABLE 1

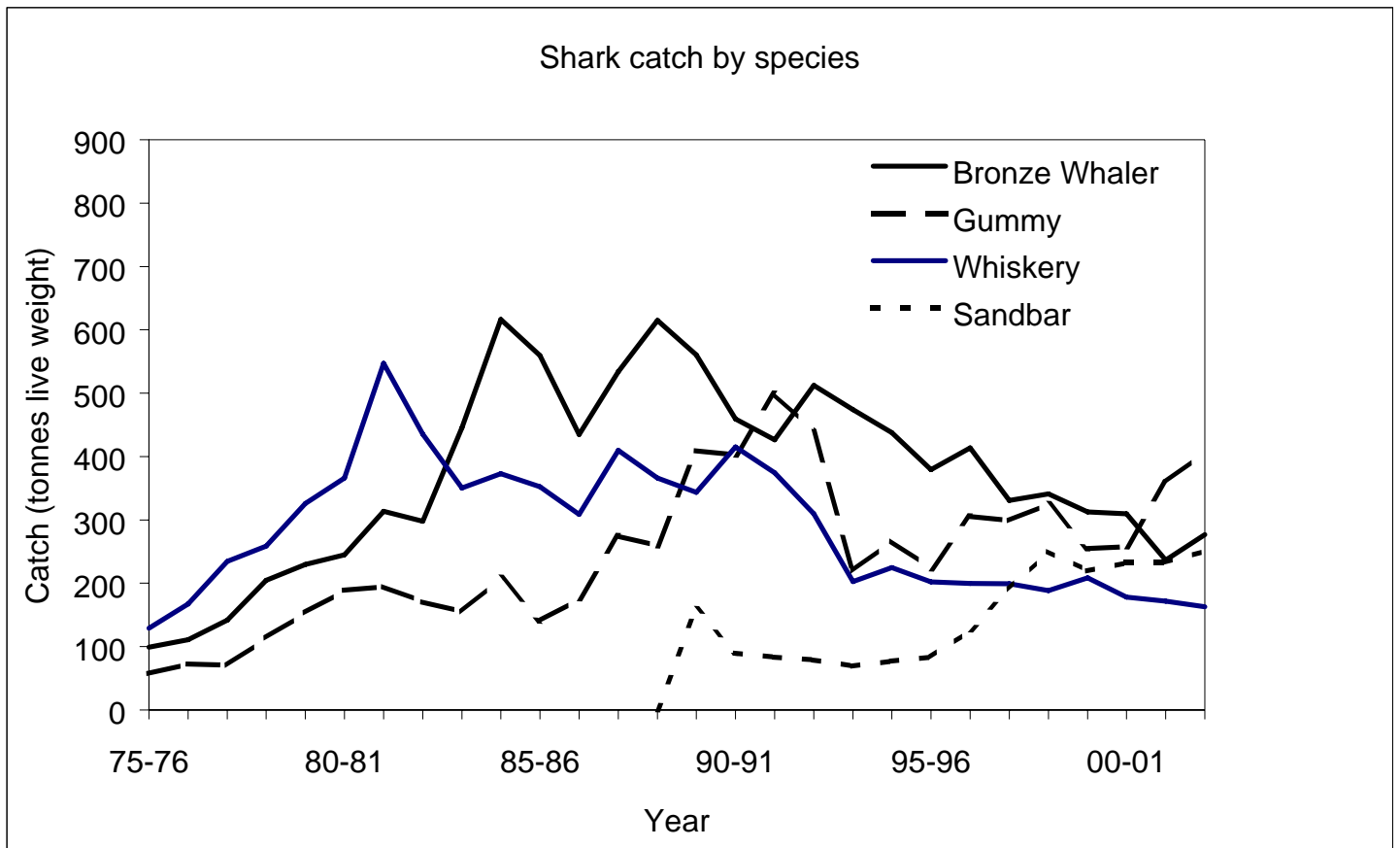
Shark catch species composition for the demersal gillnet and longline fisheries (JASDGDLF and WCDGDLF), 2002/03.

Species		Catch (tonnes)				
		JASDGDLF			WCDGDLF	State Total
		Zone 1	Zone 2	Total		
Gummy	<i>Mustelus antarcticus</i>	31	349	380	27	407
Dusky	<i>Carcharhinus obscurus</i>	101	81	182	95	277
Sandbar (thickskin)	<i>Carcharhinus plumbeus</i>	29	< 1	30	134	164
Whiskery	<i>Furgaleus macki</i>	69	64	133	30	163
Hammerhead	Sphyrnidae	12	24	36	21	57
Wobbegong	Orectolobidae	27	5	32	22	54
Blacktip	<i>Carcharhinus</i> spp.	7	< 1	7	27	34
School	<i>Galeorhinus galeus</i>	0	14	14	0	14
Shovelnose rays	Rhinobatidae,	0	0	0	6	6
	Rhynchobatidae					
Skates and rays		<1	4	4	0	4
Copper	<i>Carcharhinus brachyurus</i>	0	0	0	4	4
Pencil	<i>Hypogaleus hyugaensis</i>	<1	2	2	0	0
Other sharks		32	22	54	4	58

DEMERSAL GILLNET AND LONGLINE TABLE 2

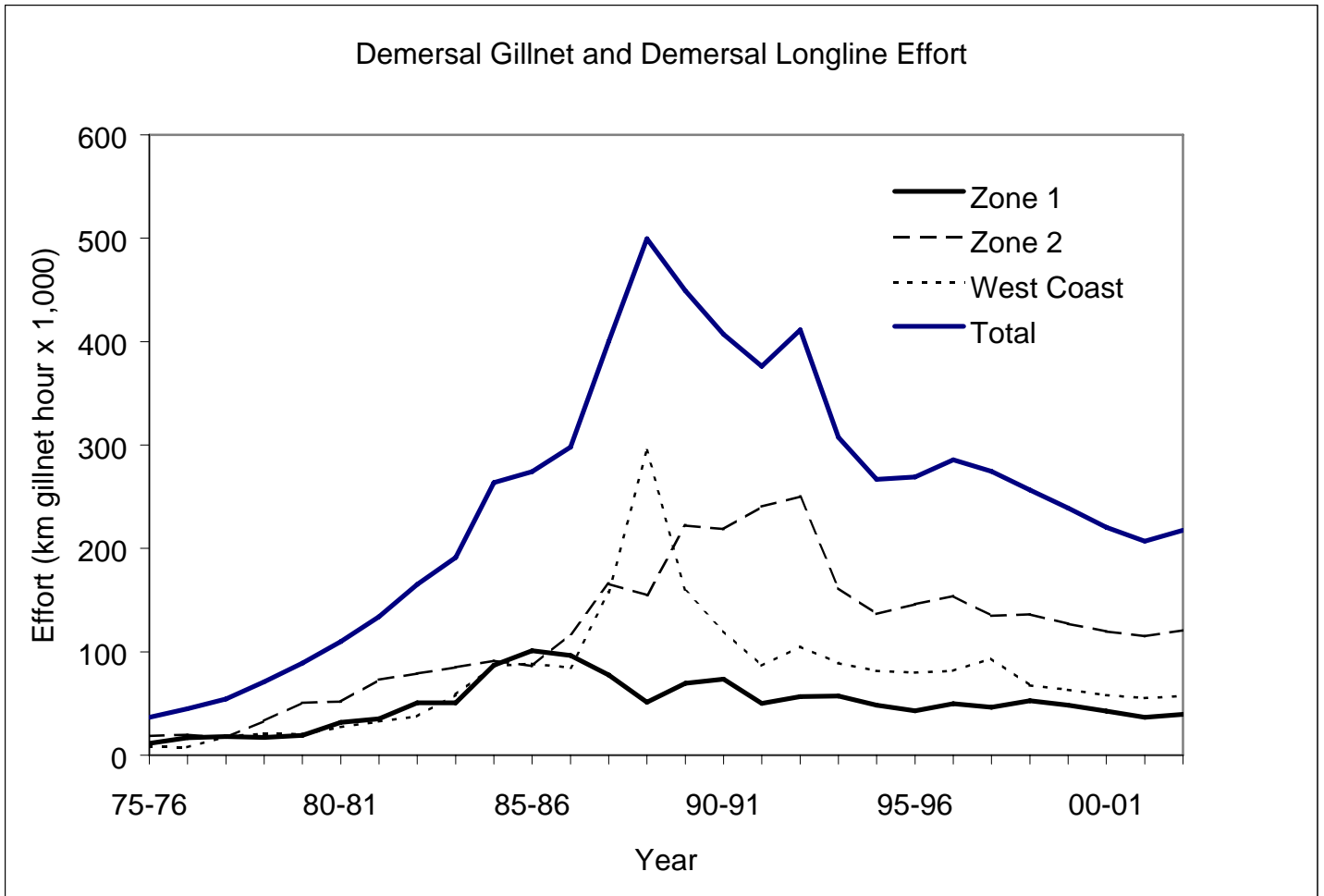
Scalefish catch species composition for the demersal gillnet and longline fisheries (JASDGDLF and WCDGDLF), 2002/03.

Species		Catch (tonnes)				Fishery Total
		JASDGDLF			WCDGDLF	
		Zone 1	Zone 2	Total		
Queen snapper	<i>Nemadactylus valenciennesi</i>	9	24	33	6	39
Blue groper	<i>Achoerodus gouldii</i>	9	15	24	4	28
Dhufish	<i>Glaucosoma hebraicum</i>	7	1	8	14	22
Pink snapper	<i>Pagrus auratus</i>	2	5	7	13	20
Samson fish	<i>Seriola hippos</i>	2	1	3	11	14
Sweetlip emperor	<i>Lethrinus miniatus</i>	0	0	0	11	11
Mulloway	<i>Argyrosomus hololepidotus</i>	0	0	0	8	8
Redfish	<i>Centroberyx</i> spp.	1	3	4	0	4
Leatherjacket	Monacanthidae	0	4	4	0	4
Boarfish	Pentacerotidae	<1	3	3	0	3
Other scalefish		35	8	43	20	63



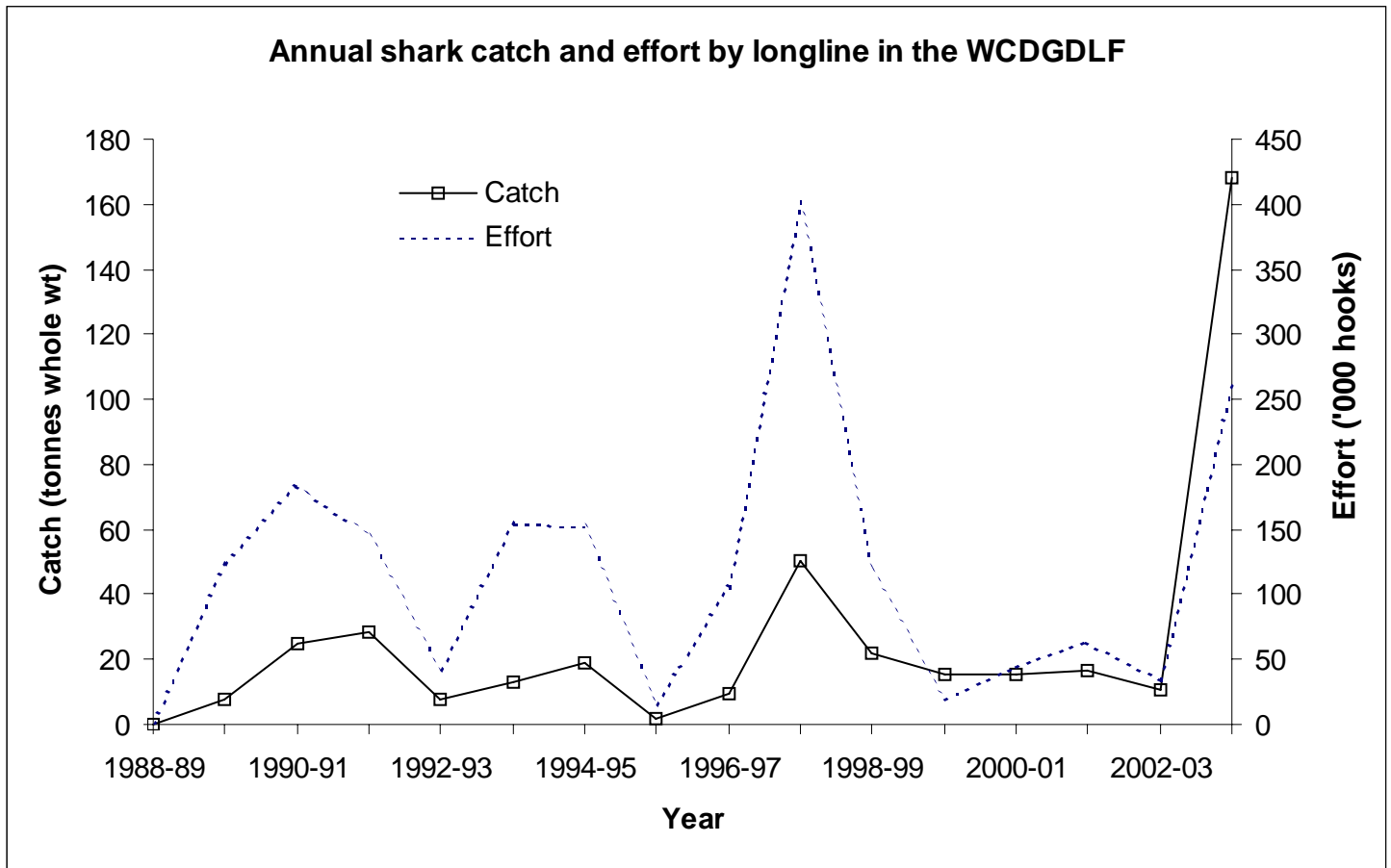
DEMERSAL GILLNET AND LONGLINE FIGURE 1

Annual catches of target shark species in the demersal gillnet and longline fisheries (JASDGDLF and WCDGDLF) for the period 1975/76 to 2002/03.



DEMERSAL GILLNET AND LONGLINE FIGURE 2

Effort in the demersal gillnet and longline fisheries (JASDGDLF and WCDGDLF) for the period 1975/76 to 2002/03.



DEMERSAL LONGLINE CATCH AND EFFORT FIGURE 3

Catch and effort by longline in the WCDGDLF for the period 1988/89 to 2003/04.