

## PEARL TABLE 2

Pearl shell catch and effort in Zone 1 since the 1993 quota increase.

YEAR	WILD STOCK QUOTA	NO. OF CULTURE SHELLS	NO. OF MOP SHELLS	TOTAL SHELLS	DIVE HOURS	CULTURE SHELLS/HR	MOP SHELLS/HR	TOTAL SHELLS/HR
1993	115,000	79,465	0	79,465	2,395	33.2	0	33.2
1994	115,000	132,316 <sup>1</sup>	0	132,316	6,291	21.0	0	21.0
1995	115,000	121,312 <sup>1</sup>	0	121,312	6,247	19.4	0	19.4
1996	115,000	80,163	0	80,163	5,013	16.0	0	16.0
1997	115,000	110,348	0	110,348	9,494	11.6	0	11.6
1998	115,000	108,056	0	108,056	6,094	17.7	0	17.7
1999	115,000	90,414 <sup>2</sup>	0	90,414	4,789	18.9	0	18.9
2000	115,000	66,772 <sup>2</sup>	0	66,772	5,893	11.3	0	11.3
2001	115,000	68,931 <sup>2</sup>	0	68,931	9,480	7.3	0	7.3
2002	55,000	29,126 <sup>2</sup>	0	29,126	2,729	10.7	0	10.7
2003	45,000 <sup>3</sup>	22,131 <sup>2</sup>	0	22,131	1,647	13.4	0	13.4
<b>2004</b>	<b>45,000</b>	<b>0</b>	<b>0<sup>4</sup></b>	<b>0</b>	<b>0</b>			

1. Management arrangements in 1994 and 1995 allowed fishing of quota a year ahead. Licensees who utilised this option took a quota reduction in subsequent years.
2. Hatchery stock used during 1999–2003 reduced the need for wild-stock shell.
3. In 2003, the 115,000 Zone 1 quota was still maintained, however only 45,000 could be caught from wild stock due to hatchery shell substitution.
4. In 2004, no wild-stock quota taken as only hatchery oysters used.

## Beche-de-mer Fishery Status Report

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### FISHERY DESCRIPTION

Beche-de-mer, also known as sea cucumbers or trepang, are in the Phylum Echinodermata, Class Holothuroidea. They are soft-bodied, elongated animals that usually live with their ventral surface in contact with the benthic substrate or buried in the substrate. The Western Australian beche-de-mer fishery is based in the northern half of the state, from Exmouth Gulf to the Northern Territory border. It is a hand-harvest fishery, with animals caught principally by diving, and a smaller amount by wading. There are six target species caught commercially in Western Australia, however 99% of the catch is sandfish (*Holothuria scabra*).

### Governing legislation/fishing authority

Fisheries Notice no. 366 – Prohibition for commercial fishers unless otherwise endorsed for shellfish, coral, starfish, urchins and beche-de-mer

Fishing Boat Licence Conditions

Australian Government *Environment Protection and Biodiversity Conservation Act 1999* (Wildlife Trade Order)

### Consultation process

Department–industry meetings

### Boundaries

The beche-de-mer fishery is permitted to operate throughout Western Australian waters with the exception of marine parks, reserves and sanctuaries and a number of specific closures around Cape Keraudren, Cape Preston and Cape Lambert, the Rowley Shoals and the Abrolhos Islands.

### Management arrangements

The developing fishery for beche-de-mer is managed through input controls including limited entry, maximum number of divers, species-dependent minimum legal size limits, and gear restrictions.

Access to the fishery is limited to the six operators holding a fishing boat licence endorsement to take beche-de-mer. Beche-de-mer may only be harvested by hand or diving by licensed commercial fishers who currently hold a permit and who operate from a licensed fishing boat which is endorsed to take beche-de-mer. Aboriginal communities may be granted a non-transferable exemption to fish. There was one Aboriginal community with an exemption to harvest beche-de-mer but they have not been actively collecting and their exemption expired on 30 April 2005.

The maximum number of divers (per endorsed fishing boat licence) allowed to dive for beche-de-mer at any one time is four, with a maximum number of crew (six) allowed on the vessel.

# North Coast Bioregion

There are six target species of beche-de-mer harvested in Western Australia. At present the legal minimum lengths for these commercial beche-de-mer species are based on the Northern Territory's minimum sizes, which have been set based on size at sexual maturity. The species and minimum size limits are:

<i>Holothuria scabra</i> (sandfish)	16 cm
<i>Holothuria noblis</i> (white teatfish)	32 cm
<i>Holothuria whitmaei</i> (black teatfish)	26 cm
<i>Thelenota ananas</i> (prickly redfish)	30 cm
<i>Actinopyga echninitis</i> (deep-water redfish)	12 cm
<i>Holothuria atra</i> (lolly fish)	15 cm

A comprehensive ESD assessment of this fishery has determined that performance should be reported annually against measures relating to the breeding stocks of beche-de-mer.

## Research summary

Current research is focused on reporting of annual catch and effort statistics, and in 2004 a daily catch and effort logbook was trialled. The logbook trial achieved its goals of obtaining species-specific, fine-scale catch and effort data and appropriate environmental information such as depth fished. Despite legal minimum lengths being in place for six species, the logbook trial found that 99.9% of the catch was *Holothuria scabra*. Useful estimates of average size caught were also obtained, and significant differences in average size caught were found between stocks (0.5 kg in the Pilbara, and 1 kg in the Kimberley). This result suggests that a review of LMLs for sandfish in Western Australia is required. Further logbook testing is planned in 2005.

## RETAINED SPECIES

**Commercial production (season 2004):**  
81 tonnes (live weight)

### Landings

In 2004 the total beche-de-mer catch was 80.9 t live weight (Beche-de-mer Table 1), which was the lowest catch since development of the fishery began and 33% lower than the 2003 catch of 122 t. The maximum catch of 382 t was recorded in 1997 during the early years of the fishery.

### Fishing effort/access level

Because there is insufficient wading data available, reported effort is based on diving only. Only two licensed vessels fished for beche-de-mer in 2004, reducing effort by more than 50% when compared to 2003 (Beche-de-mer Table 1). In 2004 total effort was 103 block days or 470 crew days. This was the lowest effort level since the beginning of the fishery.

### Catch rate

The catch rate for beche-de-mer (diving only) was 143 kg/crew day, which was similar to 2003. The highest catch rates occurred in the first three years of the fishery, with a significant drop in 1998 and 1999, and have since levelled out at around 125–145 kg/crew day.

**Recreational component:**

Nil

## STOCK ASSESSMENT

**Assessment complete:**

Preliminary

Annual catch and effort statistics show that catch rates are stable, despite a varying level of effort (e.g. 470 crew days in 2004 compared to 1,019 in 2003). A biomass dynamics model indicated that the maximum sustainable yield for the currently fished stocks is around 110 t. Catches for the last five years have mostly been below this.

**Breeding stock levels:**

Adequate

Breeding stock levels appear adequately protected by the imposed size limits; however, an analysis of size at maturity is required for sandfish (*Holothuria scabra*) stocks in Western Australia to verify that the size limits are correct.

*The initial performance measures for the fishery relate to breeding stock maintenance as indicated by catches remaining in the range 50–150 t and catch rate remaining above 80 kg/crew day. Both measures were met in 2004.*

## NON-RETAINED SPECIES

**Bycatch species impact:**

Negligible

There are currently no bycatch species known to be taken in this fishery. Given the selective method of fishing used (diving or wading, collection by hand only), the minimal level of interaction with other species is likely to be maintained.

**Protected species interaction:**

Negligible

There are currently no protected species known to be taken in this fishery.

## ECOSYSTEM EFFECTS

**Food chain effects:**

Negligible

This fishery harvests only a small amount of sandfish per annum. The effect from this harvesting on the rest of the ecosystem, given that the catch is spread over a wide region, would be insignificant. In addition, predation on the beche-de-mer is relatively infrequent due to the toxins present in their body tissues. It is highly unlikely these animals are a major diet for higher-order predators due to these toxins acting as an effective defence system.

**Habitat effects:**

Negligible

Divers collect beche-de-mer as they drift over the bottom; there is minimal impact on the habitat as divers are highly selective in their fishing effort and no fishing gear or lines contact the seabed. The vessels work during the day and anchor at night, usually further inshore where they are protected from the open ocean which is subject to higher seas and wind. Most fishers are mindful of the habitat they choose to anchor over, so they avoid more diverse bottom habitat.

There are some areas where fishers can access beche-de-mer by wading through the shallow water mangrove lagoons and estuaries. This is a minor component of the fishery. This method may be applied in areas of the Kimberley that are accessible and prone to extreme tidal movements. Wading usually occurs on soft sandy substrates with minimal impact on these habitats.

## SOCIAL EFFECTS

Up to 36 fishers can be employed in the fishery, based on 6 endorsements each with a maximum of 6 crew, although in 2004 only two vessels were working. Additional individuals are employed for the processing of the product. These activities are mostly located in remote areas of the Kimberley and Pilbara regions.

## ECONOMIC EFFECTS

**Estimated annual value (to fishers) for year 2004:**  
**\$1.2 million**

The estimated annual value was \$1.2 million, based on an average product price of \$15/kg.

## BECHE-DE-MER TABLE I

Catch, effort and CPUE of sandfish (*Holothuria scabra*) in the beche-de-mer fishery, 1995–2004.

YEAR	LIVE WT (t) (all methods)	BLOCK DAYS (all methods)	CREW DAYS (all methods)	KG/BLOCK DAY (diving only)	KG/CREW DAY (diving only)
1995	92.7	187	737	734.5	175.6
1996	257.3	228	945	1060.0	249.0
1997	382.1	452	1852	928.2	222.2
1998	309.7	569	2565	601.8	135.0
1999	175.7	378	1757	496.2	106.4
2000	82.9	132	607	630.3	134.7
2001	90.1	152	663	605.5	137.6
2002	87.1	152	535	681.0	124.8
2003	122.4	213	1019	694.7	146.2
<b>2004</b>	<b>80.9</b>	<b>103</b>	<b>470</b>	<b>652.4</b>	<b>143.0</b>

## Wetline Fishing

This assessment, which utilised the CAES database, indicates that more than a quarter (29%) of the state's wetline catch during 2003/04 was reported from this bioregion, which includes waters off both the Kimberley and Pilbara coasts. The top 12 species comprised Spanish mackerel (*Scomberomorus commerson*) 435 t, ruby snapper (*Etelis carbunculus*) 58 t, giant threadfin (*Eleutheroyema tetradactylum*) 43 t, goldband snapper (*Pristipomoides multidens*) 26 t, grey mackerel (*Scomberomorus semifasciatus*) 12 t, grey-banded cod (*Epinephelus*

## FISHERY GOVERNANCE

**Target catch range:** **50–150 tonnes**  
 This target catch range is preliminary, noting that this is a developing fishery.

### New management initiatives (2004/05)

Trials of a daily logbook are continuing, with the intention that ultimately this will replace the compulsory monthly return. Implementation of this is planned to coincide with the 2007 review of the fishery.

## EXTERNAL FACTORS

The remoteness of the currently fished stock and the large tidal ranges are natural barriers to uncontrolled expansion of fishing of beche-de-mer. Marine park planning processes may also impact on the potential extent of the fishery in the Pilbara region.

*septemfasciatus*) 11 t, blacktip shark (*Carcharhinus* spp.) 8 t, unspecified shark 7 t, spangled emperor (*Lethrinus nebulosa*) 6 t, cod (*Epinephelus* spp.) 6 t, red emperor (*Lutjanus sebea*) 6 t and pink snapper (*Pagrus auratus*) 5 t.

An interim management plan for the troll fishery for mackerel (details of which are reported on pp. 161–166) commenced in August 2004, which will preclude mackerel from the wetline catch after that date. The majority of threadfin were taken by net fishers south of the Kimberley Gillnet and Barramundi Managed Fishery. Most other species are taken by line fishing off the Pilbara coast.