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# Scientific Monitoring of Longline Fishing off Western Australia



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**A new study reveals that longlines catch a remarkable array of sharks and fish in addition to the tuna and swordfish landed for sale at overseas markets.**

For the first time, scientifically trained observers have been placed on Australian vessels using pelagic longline gear to catch tuna and swordfish off Western Australia. The longliners operate in the open ocean, with trips ranging from a few days to several weeks. Their longlines consist of about 1200 baited hooks attached to a mainline that is suspended from buoys floating at the sea surface. They are deployed each evening and retrieved the next day. The catch is air-freighted fresh to the USA and lucrative sashimi markets in Japan.

The independent observers collected biological samples and data from the catches. The information is used in scientific research that underpins conservation and management of the fishery and marine resources.



Longline deployment

## Covering Australia's fishing zone and beyond

Observers monitored 13 longline trips during April 2003 – June 2004 (Figure 1). The trips involved 104 daily operations, which deployed a total of 134 755 hooks and caught 3593 fish and other animals. This represented 4% of the total fishing effort reported by

Australian longliners off Western Australia over the same period. Some longliners travelled over 1000 nautical miles from port, where water depths exceed 3000 metres. Longline hooks range down to several hundred metres below the ocean's surface.

## Bycatch

The observers identified 46 different species in the longline catches, a diverse mixture of surface- and deep-dwelling fish and other animals. Many of the species, such as mahi mahi, live in the sunlit surface waters. Other species, like lancetfish and swordfish, prefer

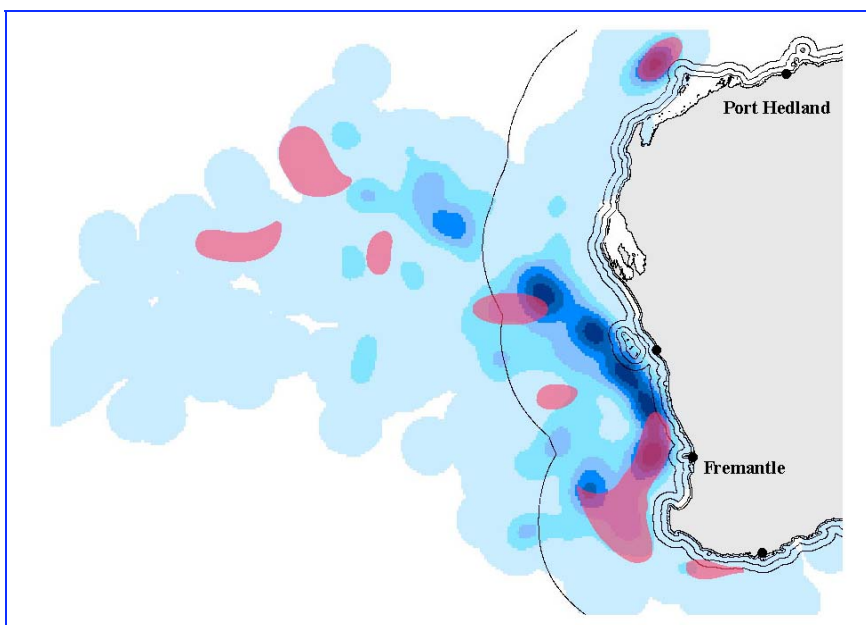


Figure 1. Distribution of observer coverage (pink areas) and Australian longline fishing (shaded blue according to intensity).

## Key findings

- Bycatch species outnumbered commercial target species.
- Most bycatch was alive when longlines were retrieved and was released alive.
- Seabirds and turtles were rare. They were all released alive.
- Catch rates of crocodile sharks were unusually high.
- Observers need to be placed on longliners fishing near the coast to improve estimates of the catches of sharks and other bycatch.

much deeper depths during the day. They are caught on longlines when they migrate to surface waters at night.

More than half the animals caught were “bycatch”. The bycatch included species like stingrays, which do not have markets, and several species, like mahi mahi, which are sold locally. Sharks dominated the bycatch (Figure 2). Blue shark, were the most frequently caught species. Their catch rates exceeded those of commercially valuable target species, such as broadbill swordfish and bigeye tuna.

### Most bycatch released alive

Most bycatch species were alive when longlines were retrieved and the animals were released without being brought on board the vessel. For example, 95% of the blue shark were alive (Figure 3); 90% of the live blue shark were released by crewmembers freeing the hook or cutting the line. Other species of interest included dusky shark (of the 37 caught, 97% were alive when longlines were retrieved), striped marlin (83% of 29), sailfish (38% of 24) and black marlin (50% of 8). Survival after release will vary with the animal’s condition, the prevalence of scavengers that might attack released animals and environmental conditions.

### Catches of marine wildlife are rare

The observers reported five turtles (two leatherback turtle, two loggerhead turtle and an Olive Ridley turtle). All were released alive by crewmembers.

Seabirds, such as shearwaters, petrels and albatrosses, often followed the vessels as they retrieved their longlines. Shearwaters were occasionally snagged in branchlines during hauling. However, they escaped or were released unharmed by crewmembers. No seabirds were reported killed, probably because fishers are not allowed to deploy longlines during the day in southern waters. In those areas seabirds sometimes dive for baits as longlines are being deployed.



Sea turtle

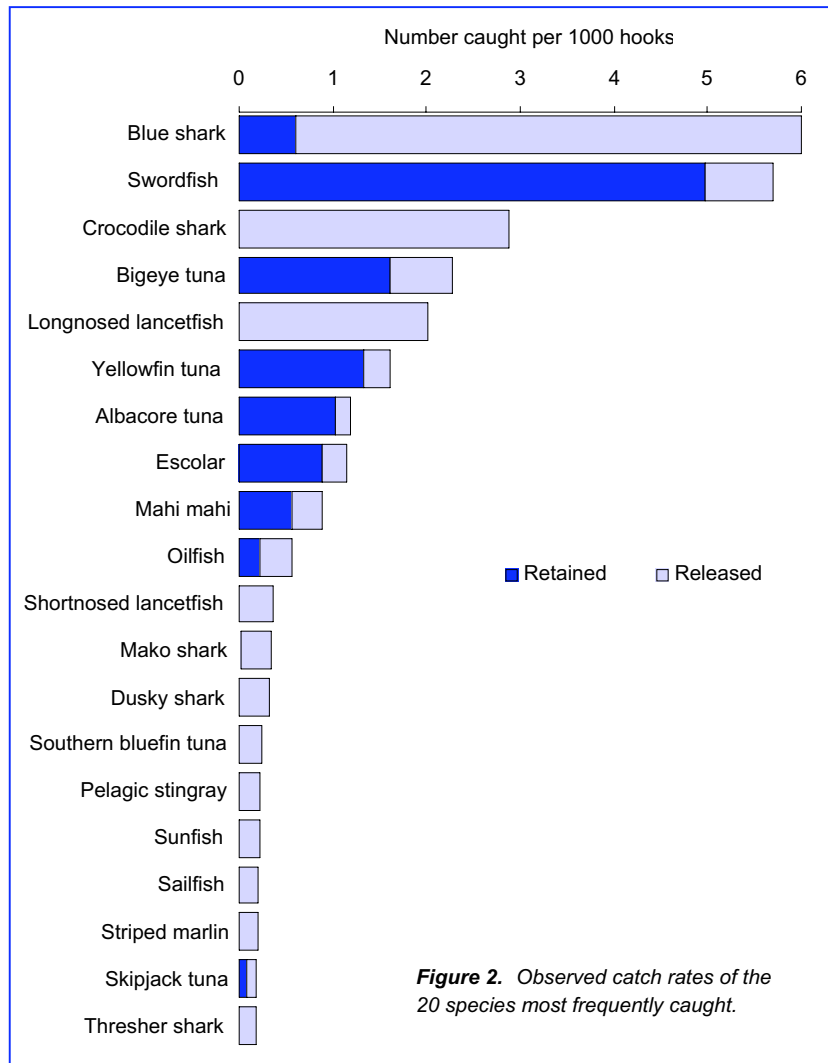


Figure 2. Observed catch rates of the 20 species most frequently caught.

### What on earth is a “crocodile shark”?

Longliners off Western Australia frequently catch crocodile sharks. *Pseudocarcharius kamoharai* are actually a species of shark. A ferocious mouth of teeth set on powerful jaws, with a habit of snapping when removed from the water, are their only similarity to true crocodiles.



Crocodile sharks are found in oceanic waters of tropical and temperate areas around the world.

Crocodile shark [AFMA Observer Program]

They migrate to surface waters at night, but live in deeper waters—600 m or more—during the day where they are known to damage deep-sea phone cables. They also feed on small deep-sea fish, squid and shrimp.

Crocodile sharks grow to just over one metre in length, but their pups are a whopping 40 cm at birth. They practice “uterine oophagy” where pups in the uterus eat eggs and other embryos. They have 2–4 pups per litter and are believed to be extremely slow growing.

The observer data show that crocodile sharks were the third most frequently caught species off Western Australia. They are quite rare in longline catches in other parts of the world. More information is needed on crocodile sharks from the Australian fishery and the broader Indian Ocean to determine whether they are vulnerable to current levels of fishing.

## Shark interactions

Dusky and sandbar sharks support another fishery in Western Australia and there is concern that the additional pressure of longline catches may harm those species. Observers reported 37 dusky and 8 sandbar sharks. They were released alive except for one dusky shark. The dusky and sandbar sharks were caught near the coast in northern waters off Exmouth. More observer trips are required to obtain accurate estimates of shark catches in coastal waters further south.

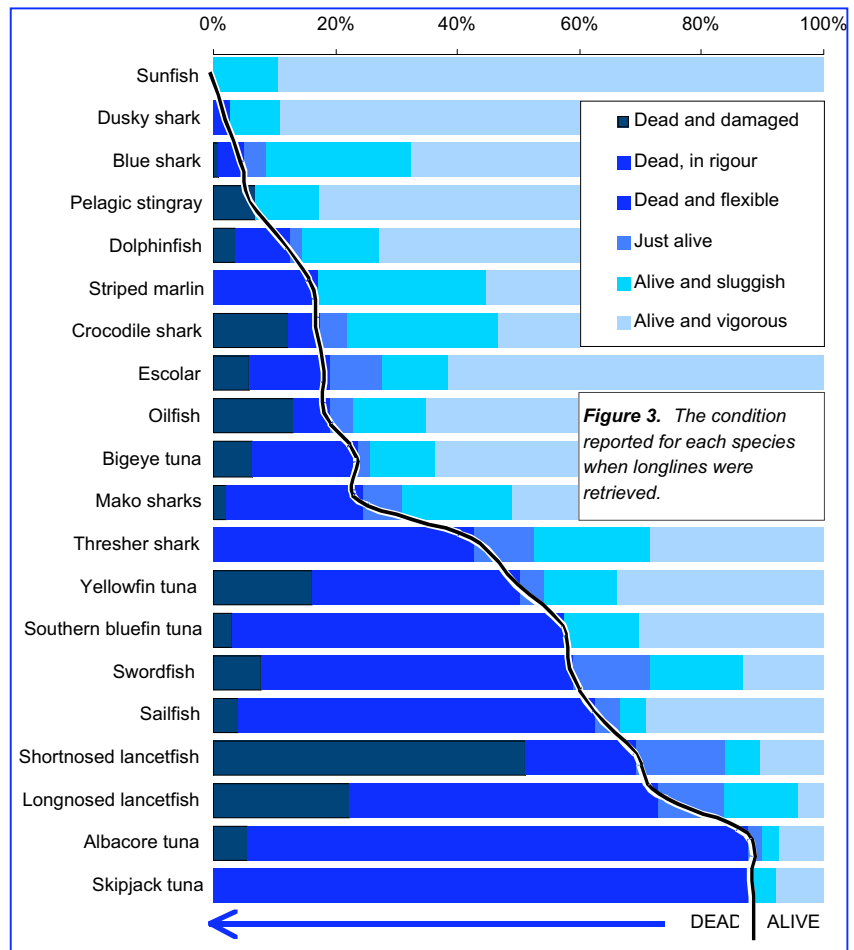


Blue shark

## Further research

The results are of immediate value in revealing a low rate of interaction of protected species with longline fishing gear. Continued monitoring is required to determine whether interaction rates vary with the season or area, and that protected species are released unharmed. The data on bycatch levels are timely for ecological risk assessments that are identifying pelagic fish communities and species that may be endangered by fishing. Furthermore, there are indications that several commercial species, such as bigeye tuna and swordfish, are now overfished in the broader Indian Ocean. The analysis of size data and biological samples collected by observers will help to reduce uncertainties in assessments, thereby supporting management actions that are required to stabilize and rebuild the stocks.

The data collected to date are inadequate for making scientifically based conclusions on the condition of populations of rare species. The scientific monitoring program is to be



continued for another year, providing an opportunity to determine coverage levels and develop sampling methods for a routine program that will cost-effectively meet the fishery's conservation and management requirements. Please contact [peter.ward@brs.gov.au](mailto:peter.ward@brs.gov.au) (ph. 02 6272-4163) for further information.

## More information

Copies of this pamphlet can be downloaded from <http://affashop.gov.au/product.asp?productid=12842> <http://www.brs.gov.au/fisheries> provides a link to the Fisheries and Marine Sciences section and various Bureau of Rural Sciences (BRS) publications, including the *Fishery Status Reports* series, which are authoritative assessments of the status of each Commonwealth-managed fishery.

<http://www.afma.gov.au> provides details of management arrangements for Commonwealth fisheries, including activities of the Western Tuna and Billfish Fishery Management Advisory Committee (WTBF MAC).

<http://www.fishbase.org> and <http://www.elasmo-research.org>

provide descriptions of many fish species, including crocodile sharks.

<http://www.iotc.org> provides fishery statistics, details of regional assessments of tuna and billfish resources and information about tuna fishing in the Indian Ocean.

## Acknowledgements

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Albatross