

# Swordfish (2016)

*Xiphias gladius*



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## STOCK STATUS OVERVIEW

Jurisdiction	Stock	Fisheries	Stock status	Indicators
Commonwealth	Indian Ocean	IOTC, WTBF	Sustainable	Spawning stock biomass, fishing mortality
Commonwealth	South-West Pacific Ocean	ETBF, WCPFC	Undefined	Spawning stock biomass, fishing mortality

ETBF Eastern Tuna and Billfish Fishery (CTH), IOTC Indian Ocean Tuna Commission (CTH), WCPFC Western and Central Pacific Fisheries Commission (CTH), WTBF Western Tuna Billfish Fishery (CTH)

## STOCK STRUCTURE

Swordfish in the Indian and Pacific Oceans are considered to be two distinct biological stocks and are managed as such under separate regional fisheries management organisations. In the Indian Ocean, genetic research has indicated the presence of a single biological stock with the markers used[1]. In the Pacific Ocean, genetic studies have suggested the presence of several biological stocks[2], although the degree of genetic variation among these stocks is low[3]. Electronic tagging has indicated that there may be limited connectivity between eastern and western parts of the Tasman and Coral Seas[4,5]. Although considered to be a single biological stock, two sub-stocks are currently assessed in the Pacific Ocean: the South-west Pacific stock and the North Pacific stock. Only the South-west Pacific stock is relevant to Australia, and status is reported at the management unit level (that is, for the South-west Pacific Ocean). The Indian Ocean biological stock falls under the jurisdiction of the Indian Ocean Tuna Commission; and the Western and central Pacific Ocean stock falls under the jurisdiction of the Western and Central Pacific Fisheries Commission. These two commissions are intergovernmental organisations established to manage a number of highly migratory fish species.

Here, assessment of stock status is presented at the biological stock level—Indian Ocean; and at the management unit level—South-west Pacific Ocean.

## STOCK STATUS

**Indian Ocean** The Indian Ocean biological stock is fished by Australian fishers endorsed to fish in the Western Tuna and Billfish Fishery (Commonwealth), and numerous other international jurisdictions. The assessments undertaken by the Indian Ocean

Tuna Commission take into account information from all jurisdictions.

In the Indian Ocean, the most recent assessment[6] estimates that biomass in 2013 was 74 per cent of the unfished level. The biological stock is not considered to be recruitment overfished[7]. This assessment also estimated that fishing mortality in 2013 was below the level associated with maximum sustainable yield (MSY) (34 per cent of fishing mortality at MSY; range 28–40 per cent). This level of fishing mortality is unlikely to cause the biological stock to become recruitment overfished[7].

Based on the evidence provided above, the Indian Ocean biological stock is classified as a **sustainable stock**.

**South-West Pacific Ocean** The South-west Pacific Ocean management unit is fished by Australian fishers endorsed to fish in the Eastern Tuna and Billfish Fishery (Commonwealth), and numerous other international jurisdictions. The assessments undertaken for the Western and Central Pacific Fisheries Commission (WCPFC) take into account information from all jurisdictions.

At the time of the most recent assessment[2], there was significant uncertainty around the growth and maturity schedules for South-west Pacific Ocean Swordfish and two alternate growth and maturity schedules (Hawaiian and Australian) were used to represent this uncertainty. The assessment models selected across both schedules estimated that current (2007–10) spawning biomass of the Swordfish management unit ranged from 27–55 per cent of initial unfished spawning biomass and was above the level that would produce MSY (115–254 per cent of the spawning biomass at MSY)[8]. The management unit is therefore not considered to be recruitment overfished[9].

However, the assessment results for fishing mortality differed substantially depending on the alternate growth and mortality schedules. Under the Hawaiian schedule, fishing mortality was estimated to be below the level associated with MSY (40–70 per cent MSY), while under the Australian schedule fishing mortality was estimated to be above the level associated with MSY (106–177 per cent MSY). The WCPFC Scientific Committee was unable to determine which growth schedule was more reliable. The assessment of the current level of fishing pressure is therefore considered to be too uncertain to use for status determination[9].

Based on the evidence provided above, the South-west Pacific Ocean management unit is classified as an **undefined stock**.

## BIOLOGY

Swordfish biology[10,11]

Species	Longevity / Maximum Size	Maturity (50 per cent)
Swordfish	30+ years; 4 550 mm <u>FL</u>	Females ~4.4 years; ~1 815 mm <u>FL</u> Males: ~1 years; ~1 200 mm <u>FL</u> (Fork length is measured from the lower jaw for Swordfi <u>SH</u> )

## DISTRIBUTION



Distribution of reported commercial catch of Swordfish

**TABLES**

Commercial Catch Methods	Commonwealth
Danish Seine	✓
Demersal Longline	✓
Gillnet	✓
Hand Line, Hand Reel or Powered Reels	✓
Pelagic Gillnet	✓
Pelagic Longline	✓
Pole and Line	✓
Purse Seine	✓
Trolling	✓
Various	✓

Fishing methods	Commonwealth
<b>Commercial</b>	
Gillnet	✓
Hand Line, Hand Reel or Powered Reels	✓

Pelagic Longline	✓
Pole and Line	✓
Purse Seine	✓
Trolling	✓
Various	✓
<b>Recreational</b>	
Hand Line, Hand Reel or Powered Reels	✓

<b>Management Methods</b>	
	<b>Commonwealth</b>
<b>Commercial</b>	
Area restrictions	✓
Catch limits	✓
Gear restrictions	✓
Individual transferable quota	✓
Limited entry	✓
<b>Recreational</b>	
Bag limits	✓

<b>Active Vessels</b>	
	<b>Commonwealth</b>
	39 Vessel in ETBF, 2 Vessel in WTBF,

ETBF Eastern Tuna and Billfish Fishery(CTH)

WTBF Western Tuna Billfish Fishery(CTH)

<b>Catch</b>	
	<b>Commonwealth</b>
<b>Commercial</b>	1150t in ETBF, 41522t in IOTC, 18940t in WCPFC, 220t in WTBF,
<b>Indigenous</b>	Unknown
<b>Recreational</b>	Unknown

ETBF Eastern Tuna and Billfish Fishery (CTH), IOTC Indian Ocean Tuna Commission (CTH), WCPFC Western and

Central Pacific Fisheries Commission (CTH), WTBF Western Tuna Billfish Fishery (CTH),

**a Commonwealth – Recreational** The Australian Government does not manage recreational fishing in Commonwealth waters. Recreational fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters, under its management regulations.

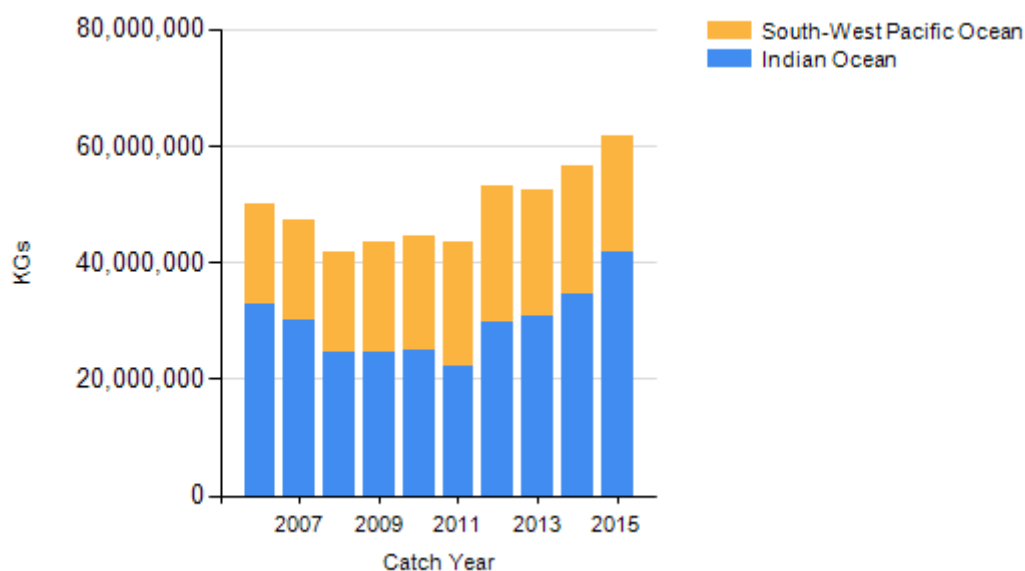
**b Recreational** Recreational and Indigenous fishing sectors in the Indian Ocean are South Australia, Victoria and Western Australia. Recreational sectors in the Pacific Ocean are New South Wales, Queensland and Tasmania. A tick indicates that a measure exists in at least one of these jurisdictions.

**c Commonwealth – Indigenous** The Australian Government does not manage non-commercial Indigenous fishing in Commonwealth waters, with the exception of the Torres Strait. In general, non-commercial Indigenous fishing in Commonwealth waters is managed by the state or territory immediately adjacent to those waters.

**d Commercial (catch)** Catches reported for the Indian Ocean Tuna Commission and Western and Central Pacific Fisheries Commission are for 2014, the most recent year available; data for ETBF and WTBF are for 2015.

**e Commercial (catch)** WCPFC catches are for the entire south Pacific Ocean (south of the equator).

## CATCH CHART



Commercial catch of Swordfish - note confidential catch not shown

## EFFECTS OF FISHING ON THE MARINE ENVIRONMENT

- Following completion of ecological risk assessments (levels 1–3) in the Western Tuna and Billfish Fishery (Commonwealth) (WTBF), no species were identified as high risk[12]. In the Eastern Tuna and Billfish Fishery (Commonwealth) (ETBF), a combined total of nine species were identified as being at high risk or precautionary high risk. This is the priority list of species for attention under the ETBF ecological risk management strategy; it includes two species of sunfish, four species of shark, two species of cetacean and one species of marine turtle[13,14].
- No target species, ecological communities or habitats were assessed to be at high risk from the effects of fishing in the ETBF or the WTBF[12–14].
- Australia implements regulations to minimise the environmental impact of fisheries for tuna and tuna-like species on pelagic ecosystems, specifically on seabirds, sea turtles and sharks[15,16].

- Australia has prohibited shark finning in longline fisheries managed by the Commonwealth and has also prohibited the use of wire leaders in these fisheries, to reduce fishery impacts on sharks[15,16].
- Both the Indian Ocean Tuna Commission[17] and the Western and Central Pacific Fisheries Commission[18] have passed conservation and management measures that are broadly consistent with each other and with Australia's domestic requirements.

#### ENVIRONMENTAL EFFECTS on Swordfish

- The distribution and abundance of tuna, and possibly billfish, can be affected by environmental factors[19,20]. For example, seasonal changes in the abundance of Bigeye Tuna and Yellowfin Tuna on the east coast of Australia are linked to the expansion and contraction of the East Australian Current[21].

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