

# British Indian Ocean Territory - Biodiversity Action Plan

## Yellowfin Tuna

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### SUMMARY

**Taxonomy:** Kingdom: Animalia; Phylum: Chordata; Class: Actinopterygii; Order: Scombriformes; Family: Scombridae; Species: *Thunnus albacares*

**Distribution:** Pantropical

**Description:** Yellowfin tuna (*Thunnus albacares*) are large torpedo-shaped fish with yellow flanks and finlets and long yellow anal and dorsal fins. Yellowfin can grow over two metres in length, weigh up to 200 kilograms and live for nine years. They are a highly mobile species, often migrating across oceans, and are found throughout the Atlantic, Indian and Pacific Oceans. They form mixed species schools with other tunas like skipjack (*Katsuwonus pelamis*) and juvenile bigeye (*Thunnus obesus*).

**IUCN Red List status:** Near Threatened

**Local trend:** Decreasing

**Threats:** The major threat to yellowfin tuna is overfishing. In the Indian Ocean, the yellowfin tuna stock is currently classified as '*overfished and subject to overfishing*' by the Indian Ocean Tuna Commission (IOTC). Juvenile yellowfin tuna are also increasingly caught as bycatch as they associate with adult skipjack tuna, which themselves are targeted by purse seine fishers.

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### DISTRIBUTION

**Global:** Found globally in all tropical and subtropical waters

**Local:** Historical fisheries records from British Indian Ocean Territory (BIOT) show that yellowfin tuna were ubiquitous across the territory. The highest catch rates of yellowfin by the historical longline fishery – which targeted large, mature individuals – occurred between September and December, possibly indicating an influx of individuals into BIOT during these months. However, there was significant inter annual variation in catches, possibly linked to climatic variation. Furthermore, purse seine fishers, which generally caught smaller yellowfin, only targeted BIOT during November and December, again, possibly indicating a greater number of yellowfin present in BIOT during this period.

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## STATUS

**Population estimate:** 30% of unfished levels

**Trend:** Decreasing

**IUCN Status:** Near Threatened

**Text:** Since 2015, the Indian Ocean yellowfin tuna stock has been classified as '*overfished and subject to overfishing*' by the IOTC, albeit with varying degrees of certainty. In the 2018 stock assessment, this classification was given with 94% certainty. It has been estimated that a 25% reduction in catch (of the 2017 total catch) is needed in order to give the stock a chance to recover by 2027.

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## ECOLOGY

**Habitat & diet:** Yellowfin tuna are schooling epipelagic fish that predominantly inhabit the oceans mixed surface layer. Juvenile yellowfin tuna often form mixed schools with skipjack tuna and juvenile bigeye tuna and are mainly limited to surface tropical waters. Larger fish inhabit surface and sub-surface waters. Tagging studies have shown yellowfin tuna predominantly stay within in the top 50m of the water column at night and between 50m and 300m during the day<sup>1</sup>. Yellowfin tuna are also known to undertake deeper dives, sometimes over 1,000m, presumably to forage on deep-water squids and meso-pelagic fishes<sup>1</sup>. Vertical movement behaviour is restricted by the depth of the thermocline, their physiological tolerance to suboptimal ambient temperatures and dissolved oxygen concentrations. Yellowfin have a thermal preference for 20°C to 26°C but do have the ability to conduct short dives into cooler water when feeding<sup>2</sup>. Their horizontal movement ecology in the Indian Ocean is not well understood, although a large IOTC scale tagging project<sup>3</sup> showed significant horizontal movements of individuals. It has previously been hypothesised that tuna undertake a cyclical migration pattern across the West Indian Ocean<sup>4</sup>. Yet, the importance of oceanic islands as residency areas for pelagic megafauna is being revealed in the Atlantic<sup>5</sup> and the Pacific<sup>6</sup>.

Yellowfin tuna feed upon a large diversity of mesopelagic fishes, crustaceans and cephalopods.

**Reproduction & life history:** In the Indian Ocean, both male and female yellowfin tuna mature at approximately 100 cm, or 3 to 5 years old. Spawning occurs year-round but with a peak between December and March. The main spawning grounds are believed to be in the equatorial area (0-10°S)

west of 75°E, with secondary spawning grounds off of Sri Lanka, the Mozambique Channel and to the west of Australia<sup>7</sup>.

**Taxonomy & Popn structure:** Yellowfin tuna are one of eight species within the *Thunnus* tuna clade and are closely related to bigeye tuna.

Yellowfin tuna are found across large areas of the tropical Atlantic, Indian and Pacific Oceans. Their high dispersal potential and inter-ocean current connectivity meant that yellowfin tuna were originally classified as a globally panmictic stock. Yet, recent genetic studies have indicated that genetic variation exists between all three oceans, suggesting a more nuanced population structure<sup>8</sup>. In the Indian Ocean, Yellowfin tuna are considered as a single stock.

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## THREATS

### 5.4.1 Intentional Use: subsistence/small scale (species being assessed is the target) LOW

Yellowfin tuna are a target species by the Morale, Welfare and Recreation (MWR) run fishery on Diego Garcia. The fishery's annual catches of yellowfin tuna vary, with 1.7 to 3.6 tonnes landed annually between 2012 and 2016. In this period, the mean length of yellowfin tuna caught was 73cm, with the vast majority landed likely to be sexually immature individuals<sup>9</sup>.

Yellowfin tuna are also incidentally caught by visiting yachts that fish outside the exclusion zone within the waters of the MPA, but not within Strict Nature Reserves. This is not deemed to be a major threat to the population.

### 5.4.2 Intentional Use: large scale (species being assessed is the target) MEDIUM

All commercial and industrial fishing is strictly prohibited within BIOT's exclusive economic zone. However, a three-year BIOT compliance review concluded that illegal multi-purpose fishing vessels poses significant threat to the BIOT EEZ, with vessels targeting the edge of the EEZ and the high seas surrounding it. Furthermore, there is also growing evidence of fishing gears, such as drifting fish aggregation devices, gillnets and longlines, travelling through the MPA, potentially bringing yellowfin tuna and other fish out of the MPA and into fishing areas. However, the impact of these drifting gears are currently not well understood.

Yellowfin tuna in BIOT are part of the Indian Ocean stock, which is currently estimated to be at 30% of unfished levels and classified as '*overfished and subject to overfishing*'<sup>7</sup>. There is some evidence of residency behaviour by yellowfin tuna elsewhere<sup>5,6</sup>, but it is unclear how this plays out in BIOT. Thus, based on our current understanding of the movement of yellowfin tuna in the Indian Ocean, BIOT yellowfin are likely to be significantly impacted by processes in the wider Indian Ocean.

### 5.4.4 Unintentional effects: large scale (species being assessed is not the target) MEDIUM

Illegal fishing poses a significant threat to the BIOT ecosystem. Historically, these fishers have targeted sharks and reef fish, although pelagic species such as tunas and billfishes are opportunistically caught.

Citation: Curnick, D. British Indian Ocean Territory Biodiversity Action Plan: Yellowfin Tuna. Prepared by Bangor University for the BIOT Administration, FCO, King Charles Street, London.

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## RELEVANT POLICIES AND LEGISLATION

- International:** Yellowfin tuna stocks are managed primarily by regional fisheries management organisations (RFMOs). In the case of the Indian Ocean, that is the IOTC. The IOTC set catch limits and conservation measures (if necessary) in order to sustainability manage the stock. However, in 2015 the IOTC science committee recommended that a 20% reduction in catches was needed to give the stock a 50% chance of recovery by 2024. Yet, in 2017, the first year this catch reduction was applied, total catch increased by 3%. It is now recommended that a 25% reduction in catches is required<sup>10</sup>.
- Local:** Yellowfin tuna are generally protected within the BIOT EEZ as a result of the prohibition of all commercial and industrial fishing within the territory. The landing of yellowfin tuna in the Diego Garcia recreational fishery also requires additional data to be recorded, such as numbers caught and their respective lengths.

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## MANAGEMENT NOTES

Preventing over-fishing is probably the most pressing management issue facing yellowfin tuna in the Indian Ocean. However, it is unclear what impact the BIOT MPA is and will have on this regional issue. Regional stock management at the IOTC level is therefore be the most effective means of achieving this goal. As such, BIOT should support the reduction of catch limits and other conservation measures within the IOTC to enable the stock recover.

Research into the reproductive and spatial behaviour of yellowfin tuna within the BIOT MPA is urgently needed to establish if any evidence of short- or long-term residency by yellowfin tuna can be demonstrated, and if so, for which age groups within the population. Such studies would enable a more detailed assessment of the BIOT MPA as a conservation management strategy for this species. As such, a yellowfin tuna tagging programme, consisting of both electronic and conventional tagging, should be a priority research activity within BIOT. Given the substantial inter- and intra- annual variation in yellowfin tuna abundance and distribution within the BIOT MPA, large sample sizes will be needed to detect long-term and seasonal trends.

There are also growing calls to ban the landing of yellowfin tuna within the recreational fishery, at least seasonally if not completely. The efficacy and practicality of such policies should be assessed alongside a quantification of the recreational fishery's ecological footprint, and not just for yellowfin tuna. Furthermore, efforts should be made to educate and involve stakeholders on Diego Garcia, particularly those who engage in fishing activities, to raise awareness, engagement and appreciation of marine biodiversity and conservation benefits.

## SPECIES ACTION PLAN

PROPOSED ACTION	OUTCOME(S)	TIME FRAME	PROPOSED START	PRIORITY	LEAD
<b>POLICY &amp; LEGISLATION</b>					
Maintain representation and active participation in IOTC meetings and working parties	Meeting minutes	Ongoing	Ongoing	HIGH	BIOTA / MRAG
Ensure data is collated and fed into global conventions e.g. CMS / CITES	1 database produced	Ongoing	Ongoing	HIGH	BIOTA / ALL
<b>MANAGEMENT</b>					
Establish systems and protocols to implement collection and analysis of samples and data from illegal fishing seizures and recreational fishery	Sampling protocols developed and implemented	1 year	September 2019	Medium	BIOTA / Environment Officers / Senior Fisheries Protection Officers (SFPO) / ZSL
Review current data collection processes within the recreational fishery	1 report produced and updated process implemented, if required.	1 year	June 2020	Medium	BIOTA
<b>RESEARCH &amp; MONITORING</b>					
Assess the feasibility of having a tuna tagging programme in the recreational fishery	1 report produced	2 years	Ongoing	HIGH	ZSL
Map movement of yellowfin tuna within the BIOT MPA using electronic tracking technology	50 fish electronically tagged	3 years	June 2020	High	ZSL
Ground truth tuna species distribution models	Updated species distribution	3-5 years	TBD	Medium	Bertarelli

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in BIOT using non-invasive methods (such as echo-sounders) to build up a picture of fish densities over space and time	maps				Programme in Marine Science Researchers
Monitor changes in yellowfin tuna population indices in adjacent fisheries	1 academic paper published	5 years	Ongoing	High	ZSL
Contribute to the regional efforts to establish the connectivity of yellowfin tuna across the Indian Ocean (genetics / isotopes)	BIOT data provided to IOTC	3 years	June 2020	Medium	BPMS
<b>COMMUNICATION &amp; AWARENESS RAISING</b>					
Raise awareness, engagement and appreciation amongst the DG community of marine biodiversity and conservation.	An engagement workshop run on Diego Garcia	1 month	September 2020	Medium	EO / ZSL
Work with MWR and island personnel to develop and install signage at the marina offering information on ongoing research in BIOT and guidance on best practice for handling and releasing yellowfin tuna.	1 sign installed	2 months	September 2020	Low	EO

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## REFERENCES

1. Schaefer, K. M., Fuller, D. W. & Aldana, G. Movements, behavior, and habitat utilization of yellowfin tuna (*Thunnus albacares*) in waters surrounding the Revillagigedo Islands Archipelago Biosphere Reserve, Mexico. *Fish. Oceanogr.* (2014). doi:10.1111/fog.12047
2. Boyce, D. G., Tittensor, D. P. & Worm, B. Effects of temperature on global patterns of tuna and billfish richness. *Mar. Ecol. Prog. Ser.* (2008). doi:10.3354/meps07237
3. Murua, H., Eveson, J. P. & Marsac, F. The Indian Ocean Tuna Tagging Programme: building better science for more sustainability. *Fish. Res.* 1–6 (2015).
4. Pearce, J. *A review of the British Indian Ocean Territory fisheries conservation and management zone tuna fishery, 1991 - 1995.* (1996).
5. Richardson, A. J. *et al.* Residency and reproductive status of yellowfin tuna in a proposed large-scale pelagic marine protected area. *Aquat. Conserv. Mar. Freshw. Ecosyst.* (2018). doi:10.1002/aqc.2936
6. Boerder, K., Bryndum-Buchholz, A. & Worm, B. Interactions of tuna fisheries with the Galápagos marine reserve. *Mar. Ecol. Prog. Ser.* (2017). doi:10.3354/meps12399
7. IOTC. Report of the 20th Session of the IOTC Working Party on Tropical Tunas. *October 1–131* (2018).
8. Grewe, P. M. *et al.* Evidence of discrete yellowfin tuna (*Thunnus albacares*) populations demands rethink of management for this globally important resource. *Sci. Rep.* (2015). doi:10.1038/srep16916
9. Mees, C. C. *UK (British Indian Ocean Territory) National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2017.* Indian Ocean Tuna Commission (2017).
10. Rattle, J. *A case study on the management of yellowfin tuna by the Indian Ocean Tuna Commission Blue Marine Foundation.* (2019).