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Summary of bycatch in WCPFC longline fisheries at a regional scale, 2003–2023

WCPFC-SC21-2025/ST-WP-09

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Executive Summary

The Western and Central Pacific Fisheries Commission (WCPFC) has a responsibility to assess the impact of fishing on non-target species. In this report, we estimate the bycatch of the longline fishery operating in the WCPFC Convention Area for the period 2003 to 2023 . The estimates cover the full range of finfish, billfish, shark and ray, marine mammal and sea turtle species that have been recorded in longline observer data. The estimates do not cover domestic longline fisheries in the west-tropical sector of the WCPFC Convention Area, or former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

It is difficult to obtain reliable estimates of WCPO longline catches from observer data, given the low levels and imbalanced nature of observer coverage, and additionally the low coverage of available aggregate effort data disaggregated by hooks between floats prior to 2010. Observer coverage has been particularly low in the north west Pacific. As such, the catch estimates for this region, and consequently the catch estimates for the WCPFC Convention Area as a whole, are unlikely to be reliable and should be viewed in that context.

The catch rate models do not appear to adequately capture targeting behaviour, or spatial variation in catch rates more generally. There may be sufficient observer data to consider explicitly capturing spatial variation in catch rate models in future iterations of this work, given the recent increases in spatial coverage of available observer data.

The Scientific Committee is invited to:

- Note that the catch estimates should be interpreted as the catch that would have been recorded by observers with 100% coverage of fishing effort;
- Note the refinements to the taxonomic resolution of catch estimates for marine mammals;
- Note the refinements to the definitions of fleets used to estimate catch rates and catch;
- Note the difficulties in robust estimation of longline catches from observer data, particularly for rarely caught species, given the low levels and imbalanced nature of observer coverage, and for some years the low coverage of available *L BEST HBF* data;
- Note that earlier work suggests that the trends in estimated catch rates are more reliable than the magnitudes of the estimated catches;
- Note that enhancement of the level and spatial coverage of observers through human and electronic monitoring approaches would improve the estimation of the catch rate models and catches.

1 Introduction

WCPFC has responsibilities to assess the impact of fishing and environmental factors on non-target species and species belonging to the same ecosystem or dependent upon or associated with the target stocks (Article 5d), to minimize catch of non-target species (Article 5e), to protect biodiversity (Article 5f), and to adopt, when necessary, Conservation and Management Measures (CMMs) for non-target species to ensure the conservation of such species (Article 6c).

Stock assessments have been undertaken for a range of species that are incidentally caught in WCPO longline fisheries, including silky shark (*Carcharhinus falciformis*, Carcharhinidae; Clarke et al., 2018) and oceanic whitetip shark (*Carcharhinus longimanus*, Carcharhinidae; Tremblay-Boyer et al., 2019). The WCPFC is also contributing to an open resource that focuses on bycatch mitigation and management in oceanic tuna and billfish fisheries: the Bycatch Management Information System (BMIS – https://www.bmis-bycatch.org/; Fitzsimmons et al., 2015).

A number of Conservation and Management Measures (CMMs) have been implemented for non-target species, including:

- A resolution has been taken to encourage avoiding the capture of all non-target fish species and encourage prompt release to the water, unharmed (Resolution 2005-03); and
- CMMs have been implemented for billfishes (CMM 2010-01 for north Pacific striped marlin; *Kajikia audax*, Istiophoridae), and on species of special interest: sea turtles (CMM 2008-03, 2018-04), sharks (CMM 2010-07, CMM 2014-05, CMM 2019-04, CMM 2022-04), oceanic whitetip shark (CMM 2011-04), whale sharks (*Rhincodon typus*, Rhincodontidae, CMM 2012-04), silky sharks (CMM 2013-08), cetaceans (CMM 2011-03), seabirds (CMM 2018-03) and mobulid rays (CMM 2019-05).

Most of these CMMs encourage better reporting rates for non-target species. CMM 2007-01 requires 5% observer coverage of effort in longline fisheries under the jurisdiction of the Commission.

Additionally, in recent years there has been routine estimation of estimates of bycatch in longline and purse seine fisheries operating in the WCPFC Convention Area (e.g., Peatman and Nicol, 2023), with seabird bycatch estimates generated separately through WCPFC Project 68 (Peatman et al., 2019). This report provides updated catch estimates covering the period 2003 to 2023 for WCPO longline fisheries, complementing equivalent estimates for the large-scale tropical purse seine fishery (Peatman et al., 2024).

2 Data and methods

The data and methods used in this study were based on those of Peatman et al. (2023). A summary of the methodology is provided here, with an emphasis on aspects that have been revised and improved

relative to the previous iteration. The overall approach was to fit catch rate models to available observer data, use these models to estimate catch rates for aggregate longline effort data, and then to apply the catch rates to effort to obtain catch estimates.

Estimated catches were generated for species, or groups of species, (referred to as "estimation groups") covering the full range of finfish, shark, marine mammal and sea turtle species observed in longline catches. However, reported catches were used where available, i.e. for albacore (*Thunnus alalunga*, Scombridae), bigeye (*Thunnus obesus*, Scombridae), skipjack (*Katsuwonus pelamis*, Scombridae) and yellowfin tuna (*Thunnus albacares*, Scombridae), and for all billfish species. The estimation groups were initially defined by Peatman et al. (2018), with consideration of ease of accurate species-level identifications during fishing operations and frequency of occurrence. Where possible, species-level estimation groups were used for species of special interest, i.e., marine mammals, sea turtles and WCPFC key shark species. Estimation groups were not mutually exclusive, with observed catches mapped to estimation groups using the most detailed available taxonomic classification. Seabird catches are not included here, as they have been estimated and reported separately through WCPFC Project 68 (Peatman et al., 2019).

In this iteration, the estimation groups of marine mammals were refined to allow monitoring of catches at finer taxonomic resolutions. The new estimation groups were defined with consideration of the recommendations from Miller (2023), along with the frequency of observation of captures. The updated estimation groups for marine mammals were: a species-specific group for false killer whale (*Pseudorca crassidens*, Delphinidae); the remaining 'blackfish' species, including Risso's dolphin (*Grampus griseus*, Delphinidae), short-finned pilot whales (*Globicephala macrorhynchus*, Delphinidae), long-finned pilot whales (*Globicephala melas*, Delphinidae), unspecified pilot whales (Globicephala spp.), killer whales (*Orcinus orca*, Delphinidae), pygmy killer whales (*Feresa attenuata*, Delphinidae) and melon-headed whales (*Peponocephala electra*, Delphinidae); a family-level group for dolphins (Delphinidae); a parvorder level group for toothed whales (Odontoceti); an infraorder level group for pinnipeds; a generic whale group, including baleen whales (Mysticeti); and, a marine mammals group. The number of observed sets and caught individuals for the marine mammal estimation groups are provided by 'species code' in Table 1. The resulting estimation groups are provided in Table 2.

The catch estimates cover longline fishing from 2003 to 2023 in the WCPFC Convention Area (WCPFC-CA), including the region overlapping the IATTC Convention Area. Catch estimates do not include catches from the domestic longline fisheries of the Philippines, Vietnam and Indonesia, referred to in this report as "west-tropical domestic fisheries", as SPC holds little representative observer data for these fisheries. Catch estimates also do not include former shark-targeted longline fisheries in the Papua New Guinea (PNG) and Solomon Islands (SB) EEZs as these fisheries are not included in aggregate longline catch and effort data held by SPC.

2.1 Definition of longline fleets

In previous iterations, longline fleets were defined on the basis of flag, with the exception of Japanese vessels operating in New Zealand's EEZ through the joint-venture scheme which were included as a distinct fleet. In this iteration, Japanese longline effort was further split between the distant-water fleet ("JPDW"), and the coastal and offshore fleets (referred to in this report as "JPCS"). Observer coverage was attributed to each component based on gross registered tonnage (GRT; Satoh et al., 2024), i.e., $\geq$ 120 GRT – JPDW, < 120 GRT – JPCS. Additionally, Taiwanese longline effort was split between the distant-water fleet ("TWDW") and the offshore fleet ("TWOS"), using data fields recently added to the Pacific Community's observer data holdings.

2.2 Coverage of available data

From 2003 to 2006, coverage of HBF-specific longline aggregate catch and effort (*L BEST HBF*) data varied between 25 and 35% of total longline aggregate (*L BEST*) effort (Figure 1). From 2006 onwards the coverage of *L BEST HBF* data increased, and since 2014 has remained above 75%.

CCMs were required by 30 June 2012 to achieve 5% coverage in each longline fishery under the jurisdiction of the Commission as stipulated in WCPFC CMM 2007-01. In this study observer coverage is defined as the proportion of total reported hooks accounted for by trips with an observer onboard, and for which observer data are available in SPC observer data holdings. Observer coverage over the whole Convention Area was relatively consistent varying from 1 to 2% from 2003 to 2010 (Figure 2). Observer coverage increased from 2011 onwards, reaching 6% in 2018. Longline fishing effort was deployed widely throughout the WCPFC-CA from 2003 to 2023 (Figure 3). However, observer coverage has not been distributed evenly across the WCPFC-CA. From 2003 to 2023, observer coverage was generally highest in the region around Hawaii, and generally lowest in the north-west Pacific (Figure 4). Observer coverage was more widespread from 2015 onwards (Figure 4).

2.3 Estimation of HBF for *L BEST* data

We used random forest classification models to predict HBF for *L BEST* effort data with no HBF information, trained on *L BEST HBF* (HBF-specific) catch and effort data (following Tremblay-Boyer and Neubauer, 2019; Ducharme-Barth and Vincent, 2020). The models were fitted using the R package 'randomForest' (Liaw and Wiener, 2002), using 500 decision trees with 4 covariates selected at random at each node. HBF classes were defined as bins of 5: 1 to 5, 6 to 10 etc. The covariates used to predict HBF class were flag, year, month, 5° latitude band, 5° longitude band, effort (thousand hooks), the total reported catch (numbers) of tuna, billfish and shark species, and, catch proportions (by number) of albacore, bigeye, yellowfin, swordfish, marlins, and sharks. The reported HBF-specific dataset was randomly split into a training dataset used to train the model, with 90% of the total records, and a testing dataset used to assess predictive performance, with the remaining 10% of the records. Uncertainty in predicted HBF for each record was incorporated by taking random draws from the

multinomial distribution defined by the predicted class probabilities from the classification algorithm. The effort-weighted mean of reported HBF for each HBF class was used when estimating catch rates and catches. Set depth was inferred from HBF, with a HBF $\leq$ 10 defined as shallow set and a HBF $>$ 10 defined as deep set, to allow for separation of estimated longline catch estimates by set depth.

2.4 Catch rate models

Generalised Estimating Equations (GEEs) were used to model catch rates, in order to account for correlation between observations within observer trips. Catch rate models were fitted to observer data for each of the 50 estimation groups. Models were fitted using the R package *geepack* (Højsgaard et al., 2006) in R v4.4.1 (R Core Team, 2024). Models were constructed with two assumed correlation structures: an "exchangeable" correlation structure, where residuals from observations from the same observer trip are correlated, with a shared correlation parameter for all observer trips; and, a simpler "independence" correlation structure, assuming independence between residuals within trips. The preferred correlation structure was selected using correlation information criterion values. Poisson-like error structures were used where possible, with a two-stage delta-lognormal modelling approach implemented if necessary to account for zero-inflation. Error structures and correlation structures used to estimate catches are provided in Table 2.

Explanatory variables included in the models were: year, sea-surface temperature (SST) and HBF, included as cubic splines; and categorical variables for flag, and the species composition cluster for the *L BEST* strata. The year effect was modelled as a spline rather than a categorical variable to prevent over-fitting to temporal variation in catch rates, i.e. smoothing of year effects. SST and HBF were included as splines to account for potential non-linearity in effects on catch rates. Species composition cluster was included to account for the effects of fishing strategy and targeting on catch composition.

The specification of the Poisson-like models was:

$$E[Y_{ij}] = \mu_{ij} \qquad\qquad Var[Y_{ij}] = \phi\mu_{ij}$$

$$\ln(\mu_{ij}) = \ln(thooks_{ij}) + \beta_0 + \beta_1 cluster_{ij} + \beta_2 flag_{ij} + f_1(year_{ij}) + f_2(HBF_{ij}) + f_3(SST_{ij})$$

where Y_{ij} denotes observed catch rate (individuals per thousand hooks), subscripts i and j refer to observer trip and set number respectively, f_n represent natural cubic splines and ϕ is a variance inflation parameter.

The specification of the presence-absence component of delta-lognormal models was:

$$E[P_{ij}] = \gamma_{ij} \qquad\qquad Var[P_{ij}] = \phi\gamma_{ij}(1-\gamma_{ij})$$

$$\ln\left(\frac{\gamma_{ij}}{1-\gamma_{ij}}\right) = \beta_0 + \beta_1 cluster_{ij} + \beta_2 flag_{ij} + f_1(year_{ij}) + f_2(HBF_{ij}) + f_3(SST_{ij})$$

and the specification of the positives-component (i.e. catch rate when present) was:

$$E[N_{ij}] = \eta_{ij} \qquad\qquad Var[Y_{ij}] = \sigma^2$$

$$\ln(\eta_{ij}) = \beta_0 + \beta_1 cluster_{ij} + \beta_2 flag_{ij} + f_1(year_{ij}) + f_2(HBF_{ij}) + f_3(SST_{ij})$$

where P_{ij} denotes whether individuals from the estimation group were caught and N_{ij} denotes the observed catch rate (numbers per '000 hooks). The overall estimated mean catch rate ζ_{ij} is then $\zeta_{ij} = \gamma_{ij}\eta_{ij}$.

All explanatory variables were retained in catch rate models regardless of statistical significance, though noting that all terms were significant for most models. We did not include, or test for, interactions between explanatory variables. Other variables have been demonstrated to have a strong effect on catch rates of species caught in longline fisheries, including inter alia the diurnal phase when gear is set or soaking, and the shape and size of hooks (e.g. Bigelow et al., 2006; Gilman et al., 2006, 2008). However, explanatory variables could only be included if they were available in aggregate catch and effort datasets held by SPC, or available in external datasets that could be linked back to aggregate data (e.g. oceanographic variables).

2.5 Catch estimation

A simulation modelling framework was used to estimate catches. The WCPFC Convention Area was split into three regions to allow spatially disaggregated summaries of estimated catches: north, $\geq 10°$N; tropical $\geq 10°$S and $< 10°$N; and, south, $< 10°$S. First, the effort dataset for catch estimation was generated by aggregating HBF–specific effort surfaces to a resolution of year, SST, HBF, catch composition cluster, flag and region. SSTs were mean monthly values per 5° grid, rounded to the nearest third of a °C. For each catch rate model, 1,000 random draws of parameters were taken from the multivariate normal distribution defined by the vector of mean parameter values $\boldsymbol{\beta}$ and their covariance matrix $\boldsymbol{\Sigma}$, $N_k(\boldsymbol{\beta}, \boldsymbol{\Sigma})$ where k is the number of estimated parameters. The random draws of parameter values were then used to generate 1,000 estimated catch rates for each record in the effort dataset. Estimated catches were then obtained by taking the product of the catch rates and the effort. The estimated catches were then aggregated to a variety of resolutions, for example species types (Table 2), and summary statistics computed, e.g. medians and 95% confidence intervals. Reported catches were assumed to be known without error.

The natural catch unit for the estimation of longline catches is numbers of individuals. Estimated catch numbers were also converted to weight using estimates of average weight. The estimates of average weight were based on either direct measurements of whole weight (where available), or using length measurements and length weight parameters to estimate weight. It is not clear to what extent available length measurements are representative of catches. For example, downwards bias in length measurements might be expected if larger individuals are cut off the line. As such, the estimates of

catch numbers are likely to be more reliable than catch weight estimates.

3 Results

The accuracy of the predictive model of HBF was considered adequate. HBF was estimated with a classification accuracy of 67% for the testing dataset and predictions accurate to ± one HBF class for 91% of records in the testing dataset (Table 3). Uncertainty in the overall proportions of inferred shallow-set and deep-set effort was reduced from 2011 onwards, when HBF information was more widely available in aggregate longline effort data (Figures 6 and 7).

Annual catch estimates (individuals) for teleosts (excluding billfish), billfish, sharks and rays, marine mammals and turtles are provided in Figure 8 and Table A.1. It is important to note that the catch estimates do not include catches of the west-tropical domestic fisheries, or shark fisheries that are not covered in aggregate longline effort data (see Section 2). The (inferred) depth of setting had a strong effect on the compositions of catches (Figure 9). Catch rates of tropical tuna and albacore were higher for deep sets compared with shallow sets, and the opposite true for the remaining species types (i.e. billfish, other teleosts, elasmobranchs, sea turtles and marine mammals). Estimation-group specific catch estimates are provided in Figures 10 to 16 and Tables A.3 to A.16. This includes tables of estimates of catches in metric tonnes for teleosts (Table A.6 to A.8), billfish (Table A.10) and elasmobranchs (Table A.13 & A.14).

Here we briefly summarise the trends in catches, focussing on estimation groups with model-based estimates.

Estimated catches of teleosts (excluding tropical tuna, albacore and billfish) increased from 2004 through to 2010, then declined through to 2021 before stabilising (Figure 8). This trend was largely driven by mahi mahi (*Coryphaena hippurus*, Coryphaenidae, Figure 10), which accounted for 25% of total teleost catch (excluding tropical tuna, albacore and billfish). Temporal trends in catch rates vary between the teleost taxa, e.g., an increasing trend through to the late 2010s for longsnouted lancetfish (*Alepisaurus ferox*, Alepisauridae) followed by a decline, in contrast to a declining trend in opah (*Lampris guttatus*, Lampridae).

Catches of elasmobranchs remained relatively stable from 2003 to 2011, before decreasing through to 2023 (Figure 8). The trend in overall elasmobranch catch was largely driven by catches of blue shark (*Prionace glauca*, Carcharhinidae), which accounted for 56% of total elasmobranch catch. Estimated catches of silky shark increased from 2003 through to 2012, before declining sharply in 2013, followed by a more gradual continuing decline. Catches of oceanic whitetip, (unspecified) thresher sharks and porbeagle (*Lamna nasus*, Lamnidae) demonstrated declining trends, and pelagic stingray (*Pteroplatytrygon violacea*, Dasyatidae) an increasing trend though with some variability. Hammerhead sharks, shortfin mako (*Isurus oxyrinchus*, Lamnidae), longfin mako (*Isurus paucus*, Lamnidae) and bigeye thresher (*Alopias superciliosus*, Alopiidae) demonstrated increasing trends in

the 2000s, followed by declining trends in the 2010s.

The total estimated catch of sea turtles had relatively wide 95% confidence intervals, with evidence of declines in catches from 2015 onwards (Figure 8). This trend in overall sea turtle catch was largely driven by olive ridley turtle (*Lepidochelys olivacea*, Cheloniidae), which accounted for 53% of total estimated catches of sea turtles, though green turtle exhibited similar trends (*Chelonia mydas*, Cheloniidae, Figure 15). Estimated catches of leatherback turtle (*Dermochelys coriacea*, Dermochelyidae also declined in 2016, having displayed an increasing trend from 2008 to 2012.

The total estimated catches of marine mammals also had wide 95% confidence intervals, particularly pre–2015. However, there was an apparent decline in estimated catches from 2014 onwards, though with considerable uncertainty (Figure 8). It was not possible to explore temporal trends in catches of individual marine mammal estimation groups due to the wide 95% confidence intervals.

4 Discussion

This report presents updated estimates of longline catches across the full range of finfish, sharks and rays, sea turtles and marine mammals caught in WCPFC-CA longline fisheries. The analysis was complicated by the coverage of available observer data, and for some years the coverage of HBF-specific aggregate data. The catch estimates presented here must be viewed in the context of the limitations of the dataset, and the methodology used to obtain the estimates.

Observer coverage for some key longline fleets has been limited for the time period considered, with particularly low available observer coverage in the north west Pacific. As such, the catch estimates for this region, and consequently the catch estimates for the WCPFC Convention Area as a whole, are unlikely to be reliable.

Reported catches from aggregate longline catch data were used in this study where available, i.e. for albacore, bigeye, yellowfin, skipjack and billfish species. The reported catches are included in tables of catch estimates to give context to estimates for the other taxa. Peatman and Nicol (2020) compared reported catches to estimates generated using the modelling approach outlined in Section 2. These comparisons suggested that the trends in predicted catches through time are more accurate than the magnitude of the estimates.

COVID-19 impacted the ability of observer programmes to place observers on longliners operating in the WCPO, resulting in a reduction in observer coverage rates in 2020 and 2021 (Figure 2). Additionally, available observer coverage in 2020 and 2021 was more patchy than for the period 2015 onwards. However, observer coverage rates were higher, with more comprehensive spatial coverage, in 2020 and 2021 than for the early part of the analysed time period (Figure 2 and 5), and the overall observer coverage rates in 2023 had recovered to pre-COVID levels.

In this iteration, we increased the taxonomic resolution of marine mammal estimation groups as

requested by WCPFC SC17 (Anon., 2021), with seven estimation groups compared to the single estimation group used previously (Peatman and Nicol, 2023). In theory, this should allow for more meaningful monitoring of temporal trends in catches of marine mammal taxa. However, due to the relative paucity of observed captures of marine mammals, the imprecision in catch estimates precludes detection of any trends in catches through time.

In this iteration, the distant-water fleets of Japan and Taiwan were considered separately to their other fleet segments. This update was motivated by the recent availability of fleet category information for Taiwanese vessels in the observer dataset, along with the high contribution of these fleets to the total longline effort in the analysed dataset (44% from 2003 to 2023). At a species-type resolution, the estimates of catches for teleosts were reasonably insensitive to the change, based on visual comparisons with estimates from Peatman and Nicol (2023). Estimated catches of sea turtles, and to a less extent elasmobranchs, were more sensitive to the change in fleet definitions, with a resulting reduction in estimated catches. This appears to reflect both a reduction in the estimated proportion of shallow-set effort, which has relatively high catch rates of elasmobranchs and sea turtles, as well as differences in estimated catch rates for the different fleet sectors.

Olive ridley turtle catch estimates had a peak of c. 17,000 individuals in 2009, and represented c. 60% of total estimated catches of olive ridley, green, loggerhead and leatherback turtles over the time period considered. This is almost double the estimate of 35%, obtained from the Common Oceans initiative focussing on sea turtle mitigation effectiveness (Common Oceans, 2017). This suggests that the proportional contribution of olive ridley to overall sea turtle catches in this report may be overestimated.

Residual diagnostics indicated a lack of fit for a range of log-normal components of catch rate models, and relatively strong spatial patterns in residuals for a range of both delta-lognormal and Poisson models. This appears to reflect the inability of the catch rate models to adequately capture both targeting behaviour and spatial variation in catch rates more generally. Observer coverage in the longline fishery had increased in the period prior to COVID-19, coupled with an increase in spatial coverage both in general and for some of the key longline fleets operating in the region. There may be sufficient observer data to consider explicitly capturing spatial variation in catch rate models in future iterations of this work. Additionally, multi-model inference has recently been gaining traction in catch reconstructions (e.g., Neubauer et al., 2023). At this stage, we have favoured maintaining a more simple approach. It appears likely that future iterations of this work will need to incorporate data from electronic monitoring systems, and this will probably require more fundamental changes to the estimation approach, e.g., to account for differing taxonomic resolutions of identifications.

Catch indices do not necessarily provide an accurate proxy for trends and/or absolute levels of mortalities resulting from the catch and release of individuals. For example, 90% of the observed captures of marine mammals in the analysed dataset were categorised as alive at vessel. Time series of catches may be particularly misleading for species with no-retention policies either through domestic

or regional measures, for example shark species. Catch indices could be converted to time series of mortalities using available observer data and assumptions regarding discard mortality (e.g. Harley et al., 2015; Tremblay-Boyer et al., 2019).

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- Note the refinements to the definitions of fleets used to estimate catch rates and catch;
- Note the difficulties in robust estimation of longline catches from observer data, particularly for rarely caught species, given the low levels and imbalanced nature of observer coverage, and for some years the low coverage of available *L BEST HBF* data;
- Note that earlier work suggests that the trends in estimated catch rates are more reliable than the magnitudes of the estimated catches;
- Note that enhancement of the level and spatial coverage of observers through human and electronic monitoring approaches would improve the estimation of the catch rate models and catches.

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Tables

Table 1: Sets with capture records, and total individuals caught, by species code per marine mammal estimation group. This includes all observed sets in the initial observer data extracts (i.e., pre-filtering).

Estimation group	Species code	Common name	Scientific name	Sets	Individuals
False killer whale	FAW	False killer whale	Pseudorca crassidens	249	269
'Blackfish'	DRR	Risso's dolphin	Grampus griseus	83	85
'Blackfish'	SHW	Short-finned pilot whale	Globicephala macrorhynchus	56	58
'Blackfish'	MEW	Melon-headed whale	Peponocephala electra	21	22
'Blackfish'	KPW	Pygmy killer whale	Feresa attenuata	8	8
'Blackfish'	KIW	Killer whale	Orcinus orca	6	9
'Blackfish'	GLO	Pilot whales nei	Globicephala spp	1	1
Dolphins	DBO	Bottlenose dolphin	Tursiops truncatus	65	68
Dolphins	RTD	Rough-toothed dolphin	Steno bredanensis	63	67
Dolphins	DLP	Dolphins nei	Delphinidae	32	34
Dolphins	DBZ	Indo-Pacific bottlenose dolphin	Tursiops aduncus	21	24
Dolphins	DSI	Spinner dolphin	Stenella longirostris	19	19
Dolphins	DPN	Pantropical spotted dolphin	Stenella attenuata	14	15
Dolphins	DST	Striped dolphin	Stenella coeruleoalba	14	14
Dolphins	DCO	Common dolphin	Delphinus delphis	10	10
Dolphins	DDU	Dusky dolphin	Lagenorhynchus obscurus	2	2
Dolphins	DSP	Spotted dolphins nei	Stenella spp	2	2
Dolphins	DWP	Pacific white-sided dolphin	Lagenorhynchus obliquidens	2	2
Dolphins	DCZ	Long-beaked common dolphin	Delphinus capensis	1	1
Dolphins	FRD	Fraser's dolphin	Lagenodelphis hosei	1	1
Toothed whales	ODN	Toothed whales nei	Odontoceti	87	92
Toothed whales	MEP	Beaked whales nei	Mesoplodon spp	12	13
Toothed whales	DWW	Dwarf sperm whale	Kogia sima	6	6
Toothed whales	PYW	Pygmy sperm whale	Kogia breviceps	6	6
Toothed whales	SPW	Sperm whale	Physeter macrocephalus	6	7
Toothed whales	BBW	Blainville's beaked whale	Mesoplodon densirostris	4	5
Toothed whales	BCW	Cuvier's beaked whale	Ziphius cavirostris	3	3
Toothed whales	SPP	Spectacled porpoise	Phocoena dioptrica	2	3
Toothed whales	TGW	Ginkgo-toothed beaked whale	Mesoplodon ginkgodens	2	2
Pinnipeds	SEA	Antarctic fur seal	Arctocephalus gazella	731	912
Pinnipeds	SGF	Guadalupe fur seal	Arctocephalus townsendi	11	13
Pinnipeds	SMH	Hawaiian monk seal	Neomonachus schauinslandi	4	4
Pinnipeds	SXX	Seals nei	Otariidae, phocidae	3	3
Pinnipeds	CSL	California sea lion	Zalophus californianus	2	2
Pinnipeds	SEK	South african fur seal	Arctocephalus pusillus	2	2
Pinnipeds	SXQ	Fur seals nei	Arctocephalus spp	2	2
Pinnipeds	NSL	New zealand sea lion	Phocarctos hookeri	1	1
Pinnipeds	SNP	Northern elephant seal	Mirounga angustirostris	1	1
Pinnipeds	SSF	Subantarctic fur seal	Arctocephalus tropicalis	1	1
Pinnipeds	SSL	Steller sea lion	Eumetopias jubatus	1	1
Whales	WLE	Whale (unidentified)	Cetacea	59	62
Whales	HUW	Humpback whale	Megaptera novaeangliae	10	11
Whales	BRW	Bryde's whale	Balaenoptera edeni	2	2
Whales	SIW	Sei whale	Balaenoptera borealis	2	2
Whales	BLW	Blue whale	Balaenoptera musculus	1	1
Whales	FIW	Fin whale	Balaenoptera physalus	1	1
Marine mammals	MAM	Aquatic mammals nei	Cetartiodactyla	35	39

Table 2: Estimation groups, their species type, catch rate model structure (delta-lognormal or poisson) and correlation structure for the delta and positive model components.

Estimation group	Scientific name	Species type	Model structure	Delta	Positives
Skipjack	*Katsuwonus pelamis*	Tropical tunas & albacore	delta-lognormal	exchangeable	exchangeable
Albacore	*Thunnus alalunga*	Tropical tunas & albacore	delta-lognormal	exchangeable	exchangeable
Yellowfin	*Thunnus albacares*	Tropical tunas & albacore	delta-lognormal	independence	exchangeable
Bigeye	*Thunnus obesus*	Tropical tunas & albacore	delta-lognormal	exchangeable	exchangeable
Wahoo	*Acanthocybium solandri*	Other teleosts	delta-lognormal	independence	exchangeable
Lancetfishes	*Alepisauridae*	Other teleosts	poisson	–	independence
Longsnouted lancetfish	*Alepisaurus ferox*	Other teleosts	delta-lognormal	independence	exchangeable
Pomfrets	*Bramidae*	Other teleosts	delta-lognormal	exchangeable	exchangeable
Mahi mahi	*Coryphaena hippurus*	Other teleosts	delta-lognormal	exchangeable	independence
Escolars	*Gempylidae*	Other teleosts	delta-lognormal	exchangeable	exchangeable
Lampriformes	Lampriformes	Other teleosts	poisson	–	independence
Opah	*Lampris guttatus*	Other teleosts	delta-lognormal	exchangeable	exchangeable
Sunfish	*Molidae*	Other teleosts	poisson	–	independence
Slender sunfish	*Ranzania laevis*	Other teleosts	delta-lognormal	independence	independence
Scombrids	*Scombridae*	Other teleosts	delta-lognormal	exchangeable	exchangeable
Great barracuda	*Sphyraena barracuda*	Other teleosts	delta-lognormal	exchangeable	exchangeable
Barracudas	*Sphyraenidae*	Other teleosts	poisson	–	exchangeable
Marine fishes	Teleosts	Other teleosts	delta-lognormal	exchangeable	independence
Indo-Pacific sailfish	*Istiophorus platypterus*	Billfish	delta-lognormal	exchangeable	exchangeable
Black marlin	*Makaira indica*	Billfish	poisson	–	exchangeable
Blue marlin	*Makaira nigricans*	Billfish	delta-lognormal	exchangeable	exchangeable
Shortbill spearfish	*Tetrapturus angustirostris*	Billfish	delta-lognormal	independence	exchangeable
Striped marlin	*Tetrapturus audax*	Billfish	poisson	–	exchangeable
Swordfish	*Xiphias gladius*	Billfish	delta-lognormal	exchangeable	exchangeable
Bigeye thresher	*Alopias superciliosus*	Elasmobranchs	delta-lognormal	independence	exchangeable
Thresher sharks	*Alopiidae*	Elasmobranchs	delta-lognormal	exchangeable	independence
Silky shark	*Carcharhinus falciformis*	Elasmobranchs	delta-lognormal	independence	independence
Oceanic whitetip shark	*Carcharhinus longimanus*	Elasmobranchs	delta-lognormal	independence	independence
Elasmobranchs	Elasmobranchii	Elasmobranchs	delta-lognormal	independence	exchangeable
Shortfin mako	*Isurus oxyrhinchus*	Elasmobranchs	poisson	–	independence
Longfin mako	*Isurus paucus*	Elasmobranchs	poisson	–	exchangeable
Mako sharks	*Isurus* spp	Elasmobranchs	poisson	–	exchangeable
Porbeagle shark	*Lamna nasus*	Elasmobranchs	delta-lognormal	independence	exchangeable
Mobulid rays	*Mobulidae*	Elasmobranchs	poisson	–	exchangeable
Blue shark	*Prionace glauca*	Elasmobranchs	delta-lognormal	independence	exchangeable
Pelagic stingray	*Pteroplatytrygon violacea*	Elasmobranchs	delta-lognormal	independence	exchangeable
Hammerhead sharks	*Sphyrnidae*	Elasmobranchs	delta-lognormal	exchangeable	exchangeable
Loggerhead turtle	*Caretta caretta*	Sea turtles	poisson	–	exchangeable
Green turtle	*Chelonia mydas*	Sea turtles	poisson	–	exchangeable
Sea turtles	*Chelonioidea*	Sea turtles	poisson	–	exchangeable
Leatherback turtle	*Dermochelys coriacea*	Sea turtles	poisson	–	independence
Hawksbill turtle	*Eretmochelys imbricata*	Sea turtles	poisson	–	exchangeable
Olive ridley turtle	*Lepidochelys olivacea*	Sea turtles	poisson	–	exchangeable
'Blackfish'	'Blackfish'	Marine mammals	poisson	–	exchangeable
Whales	Cetacea	Marine mammals	poisson	–	exchangeable
Marine mammals	Cetacea & Pinnipedia	Marine mammals	poisson	–	independence
Dolphins	Delphinidae	Marine mammals	poisson	–	exchangeable
Toothed whales	Odontoceti	Marine mammals	poisson	–	exchangeable

Table 2: Estimation groups, their species type, catch rate model structure (delta-lognormal or poisson) and correlation structure for the delta and positive model components. *(continued)*

Estimation group	Scientific name	Species type	Model structure	Delta	Positives
Pinnipeds	Pinnipedia	Marine mammals	poisson	–	exchangeable
False killer whale	*Pseudorca crassidens*	Marine mammals	poisson	–	exchangeable

Table 3: Comparison of observed (rows) and predicted (columns) hooks-between-float class for the testing (*L BEST HBF*) dataset. Cells are highlighted grey, with bold type, where predicted HBF equals observed HBF.

Observed HBF	1	6	11	16	21	26	31	36	41	46	51	56	61
1	**1552**	228	35	32	54	4	2	1	0	2	0	0	0
6	282	**1459**	343	158	99	16	1	3	0	0	0	0	0
11	81	343	**1732**	967	151	32	10	5	1	0	0	0	0
16	69	168	401	**6359**	716	176	34	10	2	0	0	0	0
21	30	68	107	727	**2853**	488	93	11	2	0	0	0	0
26	17	20	48	181	562	**2728**	416	78	12	5	0	1	0
31	0	3	13	50	76	467	**1010**	169	30	4	0	0	0
36	2	1	2	13	14	132	260	**447**	52	2	0	0	0
41	1	3	1	3	3	17	57	104	**85**	6	1	0	0
46	1	2	1	10	5	10	23	42	19	**23**	0	0	0
51	0	0	0	4	5	5	5	10	7	2	**2**	0	0
56	1	0	0	0	0	5	4	6	1	0	0	**13**	0
61	0	0	0	0	0	0	0	5	1	0	0	2	**0**

Figures

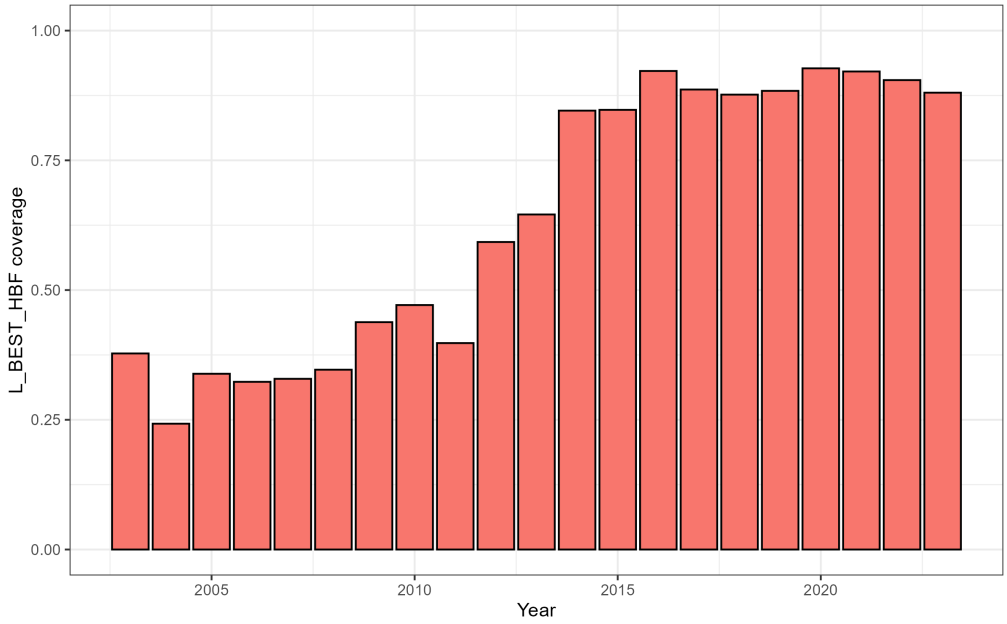


Figure 1: Overall annual coverage of *L BEST HBF* aggregate data (proportion of number of hooks) across the WCPFC-CA. Effort from west-tropical domestic fisheries was excluded.

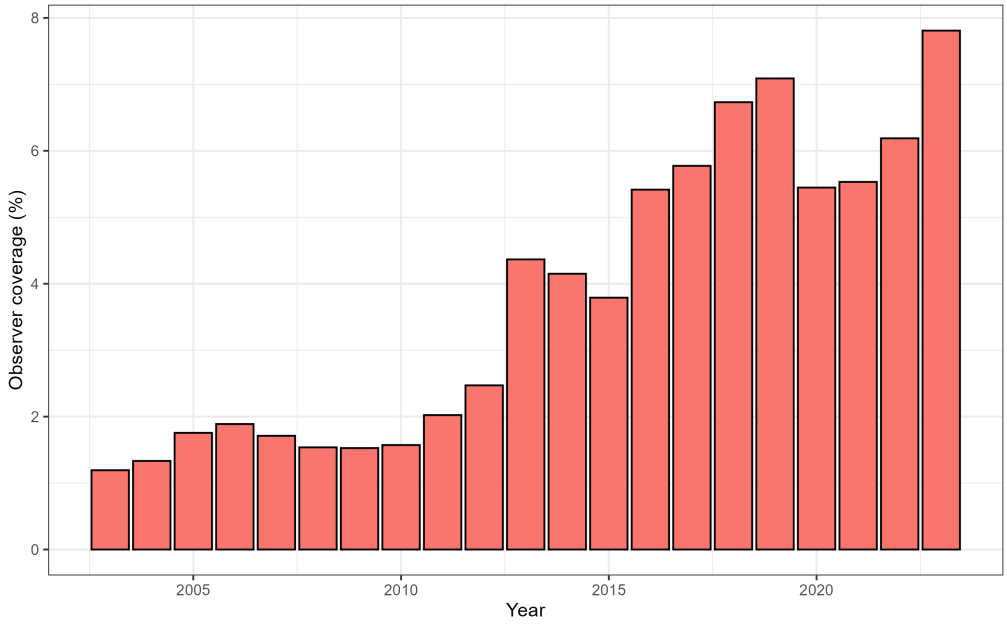
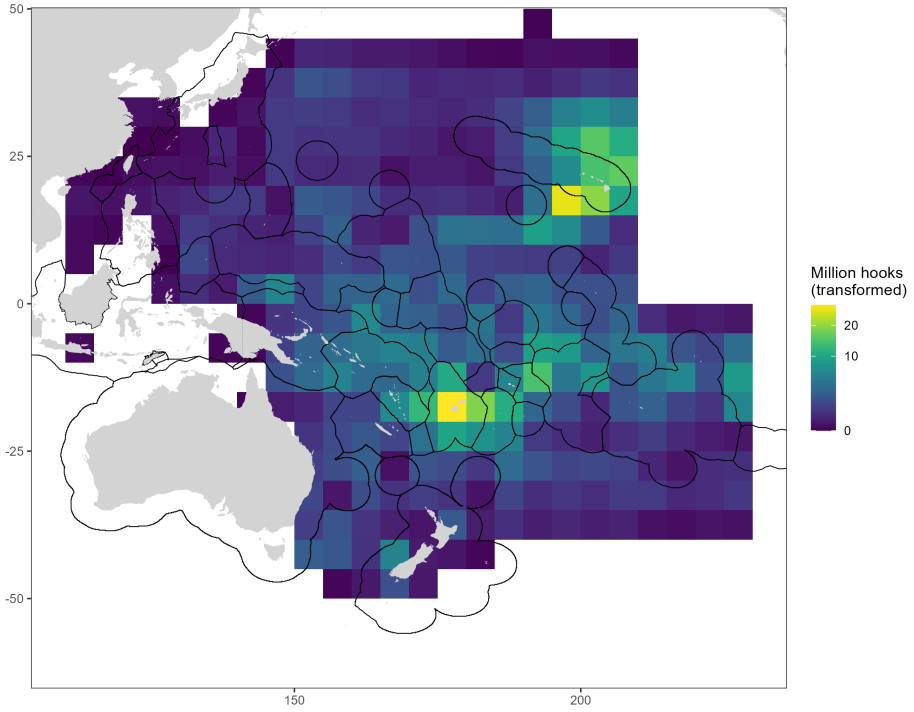
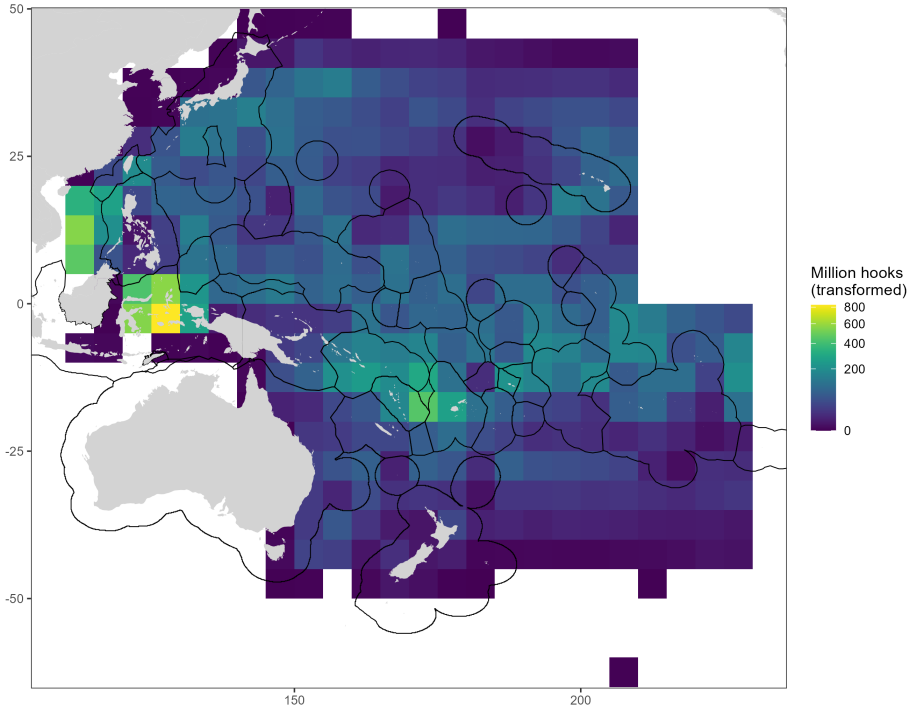


Figure 2: Overall annual observer coverage (proportion of number of hooks) of longline fleets in the WCPFC-CA. Effort from west-tropical domestic fisheries was excluded.

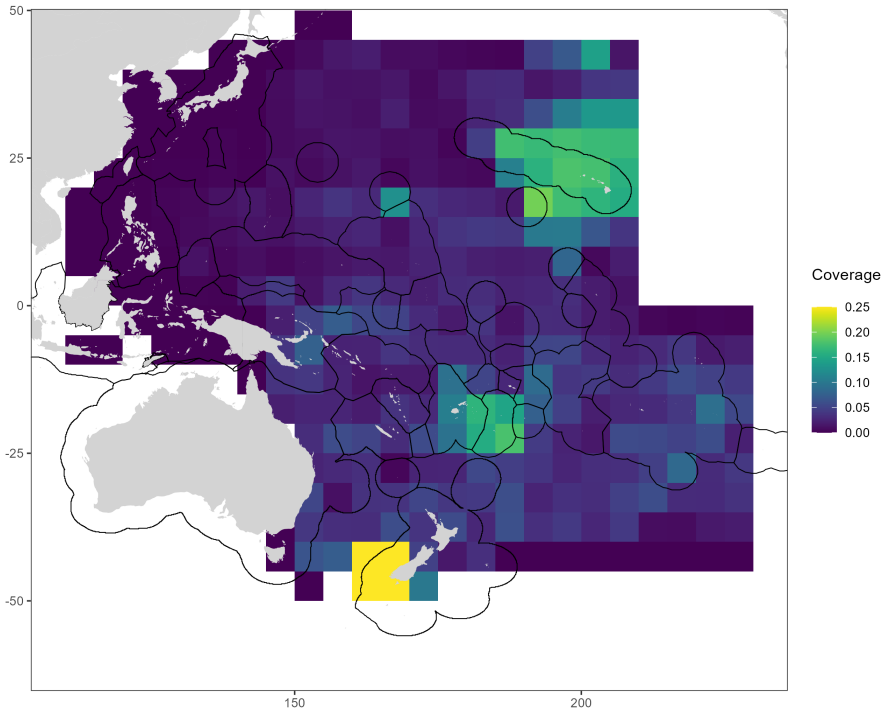


(a) Observed effort

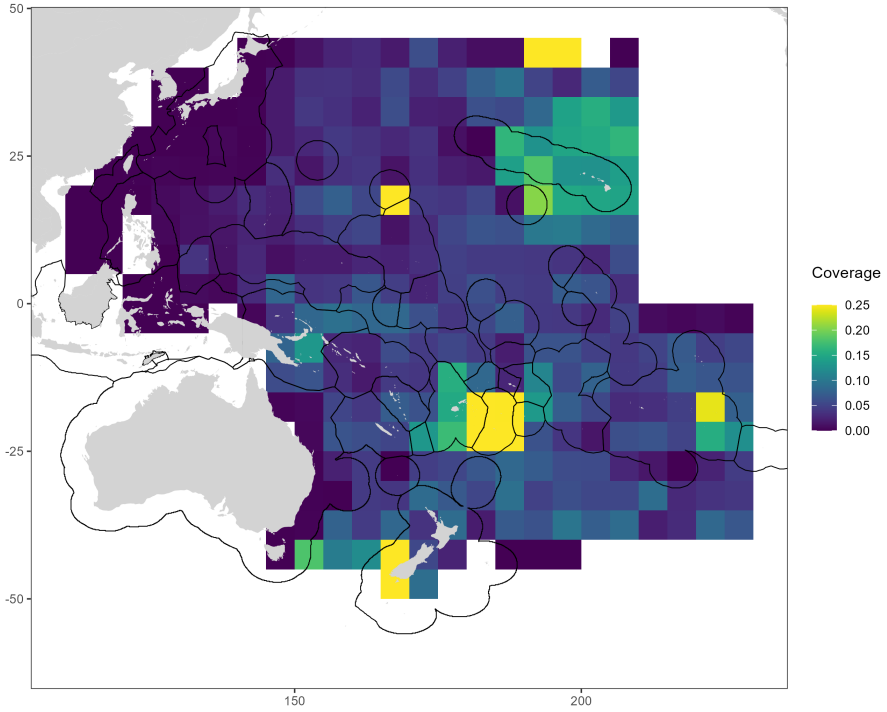


(b) Reported effort

Figure 3: (a) Observed and (b) total reported longline fishing effort in '000 hooks from 2003 to 2023 in the WCPFC-CA. Note that colour scales are different for the two panels, and a square root transformation was applied.

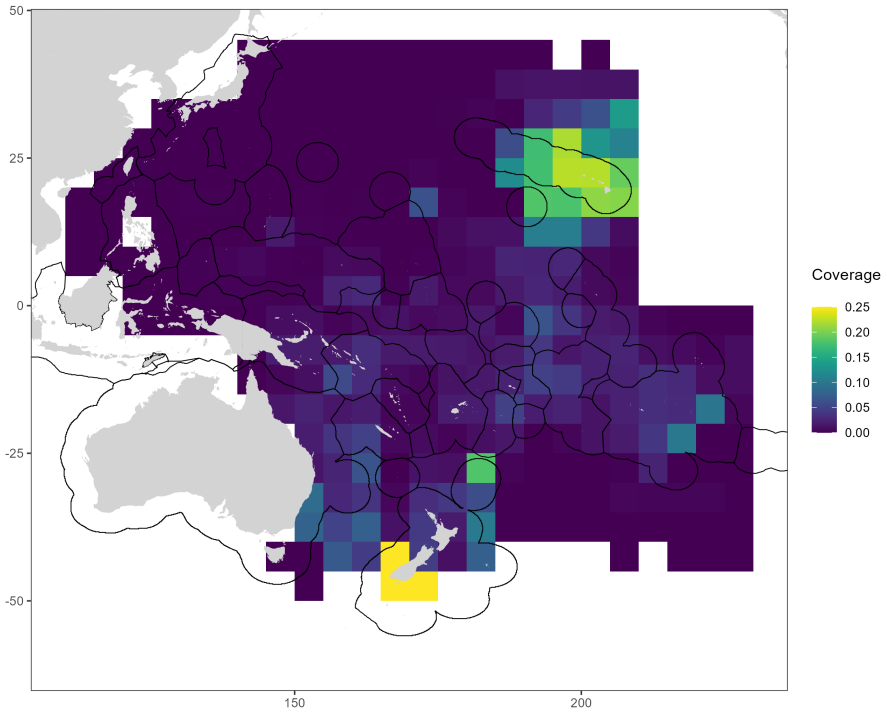


(a) 2003 - 2023

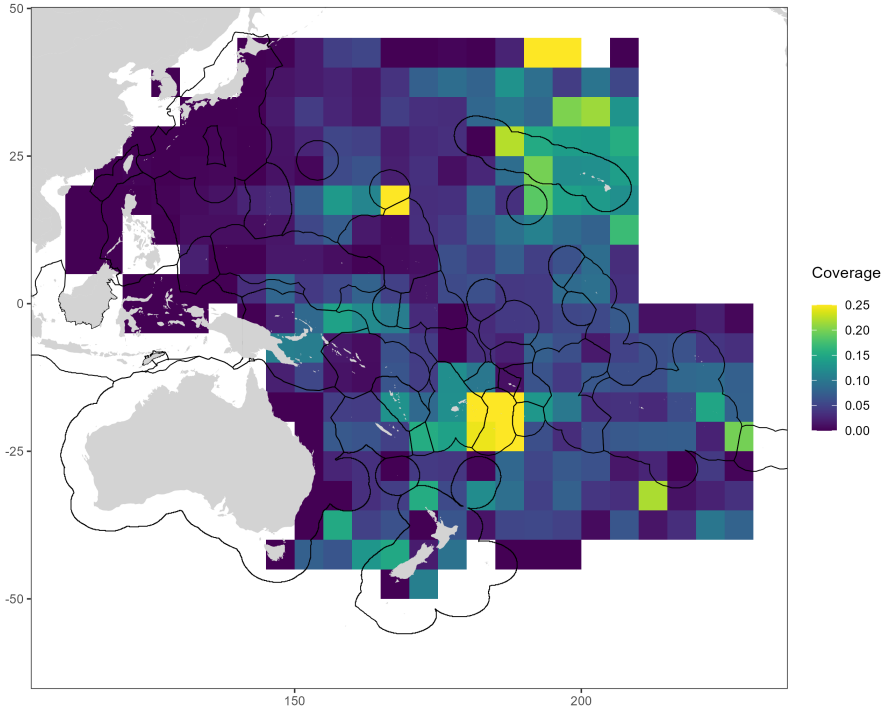


(b) 2015 - 2023

Figure 4: Observer coverage (proportion of hooks) of longline fleets in the WCPFC-CA from a) 2003 to 2023 and b) 2015 to 2023. Coverage was capped at 25% to facilitate interpretation.



(a) 2003 - 2012



(b) 2020 - 2023

Figure 5: Observer coverage (proportion of hooks) of longline fleets in the WCPFC-CA from a) 2003 to 2012 and b) 2020 to 2023. Coverage was capped at 25% to facilitate interpretation.

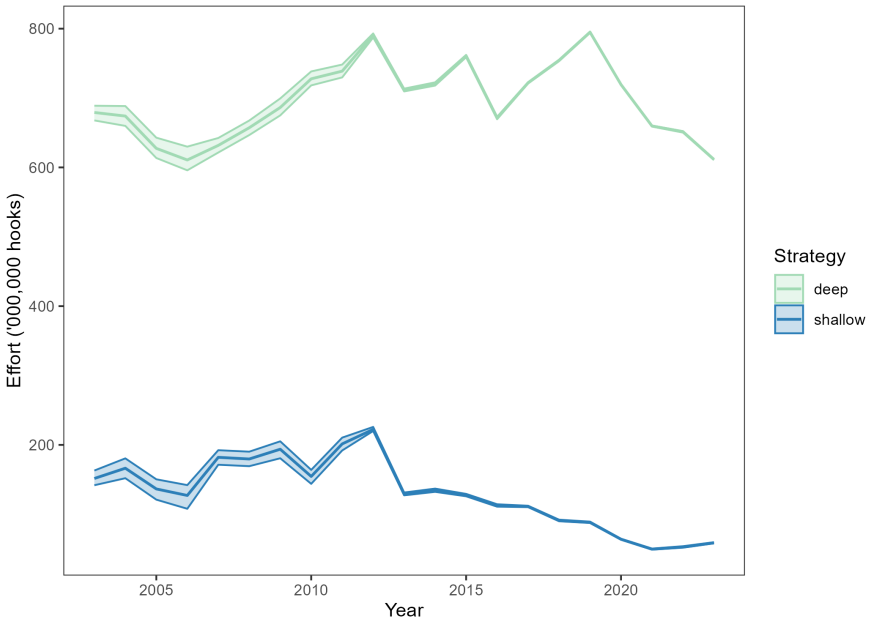


Figure 6: Estimated total annual effort of longline fleets in the WCPFC-CA by 'fishing strategy' ($\leq$ 10 HBF – shallow; $>$ 10 HBF – deep). Effort from west-tropical domestic fisheries was excluded.

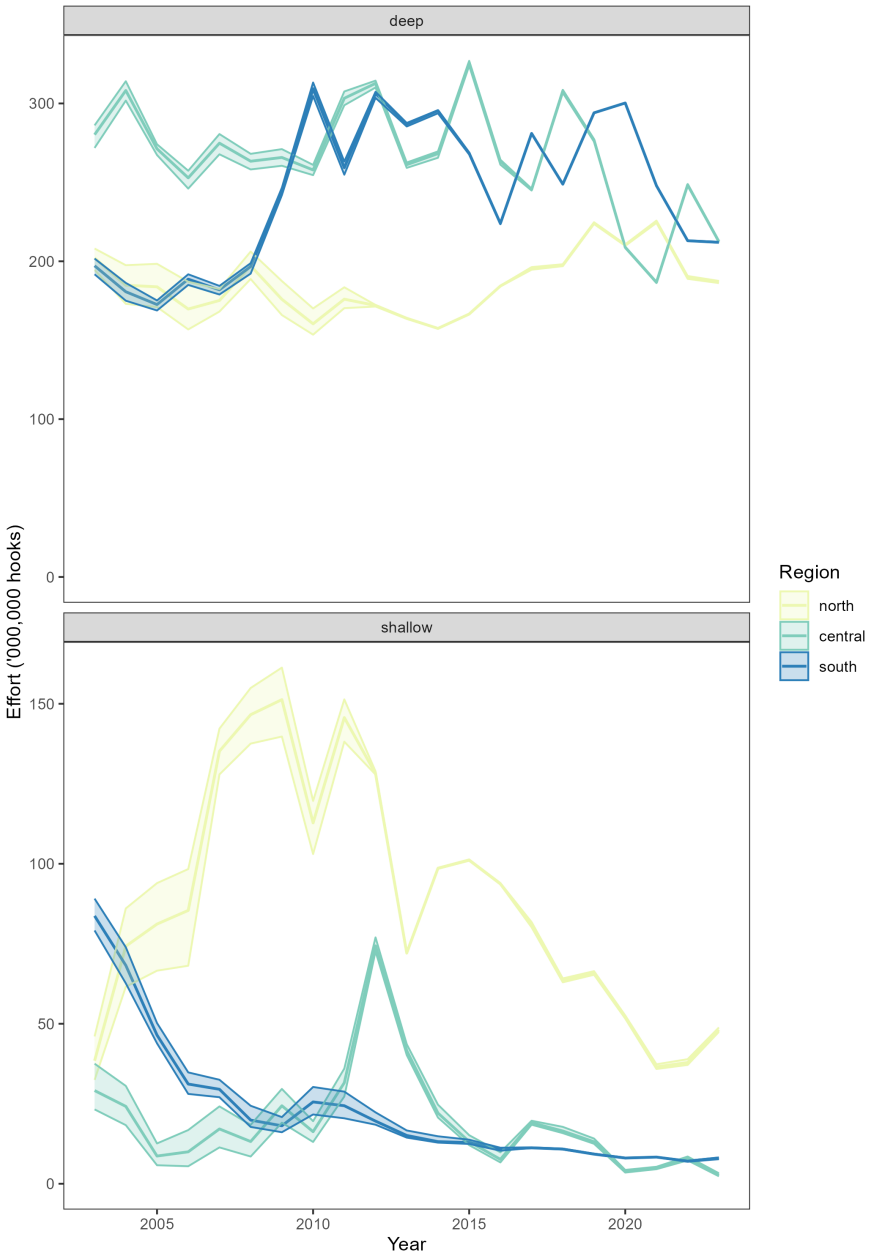


Figure 7: Estimated total annual effort of longline fleets in the WCPFC-CA by region and 'fishing strategy' ($\leq$ 10 HBF – shallow; $>$ 10 HBF – deep). Effort from west-tropical domestic fisheries was excluded.

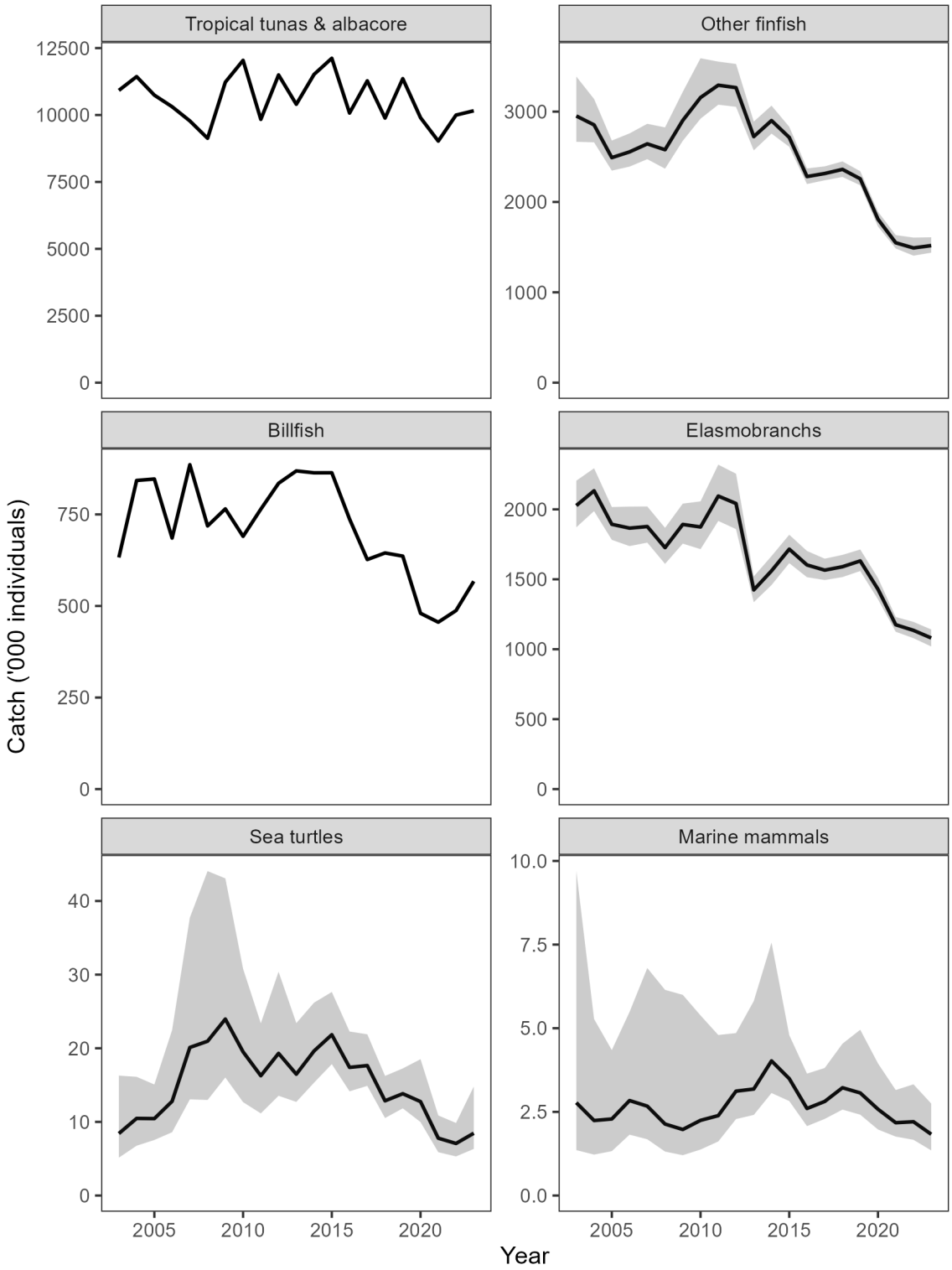


Figure 8: Total estimated annual catch ('000 individuals; grey region provides 95% CIs) for the WCPO longline fishery by species type. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands. Reported catches were used where available, covering tropical tuna, albacore and billfish and were assumed to be known without error.

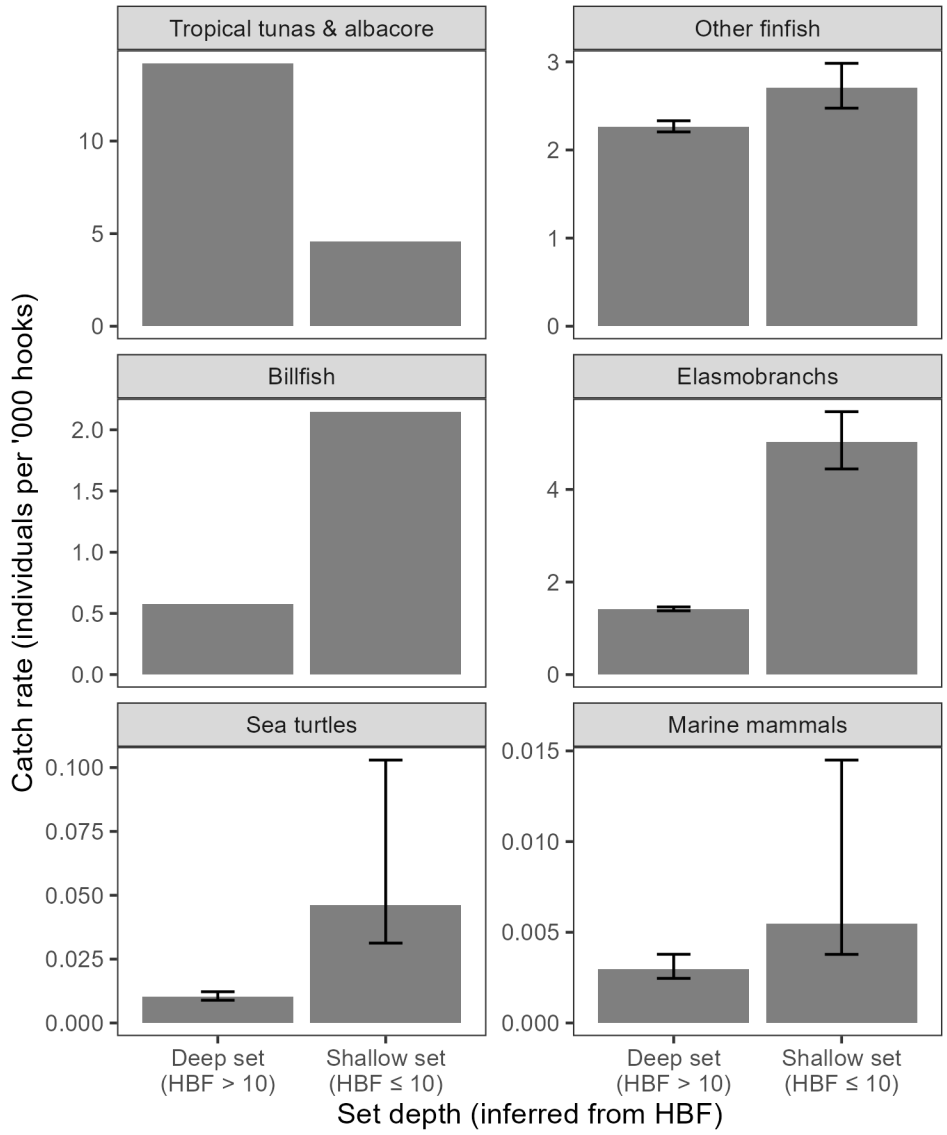


Figure 9: Estimated average catch rates (individuals per '000 hooks, 95% confidence intervals in parentheses) for the WCPO longline fishery from 2019 to 2023, by species type and set depth inferred from hooks between floats. Teleosts excludes tropical tuna, albacore and billfish species. Reported catch and effort from hook-between-floats specific aggregate data were used to calculate catch rates for tropical tuna, albacore and billfish.

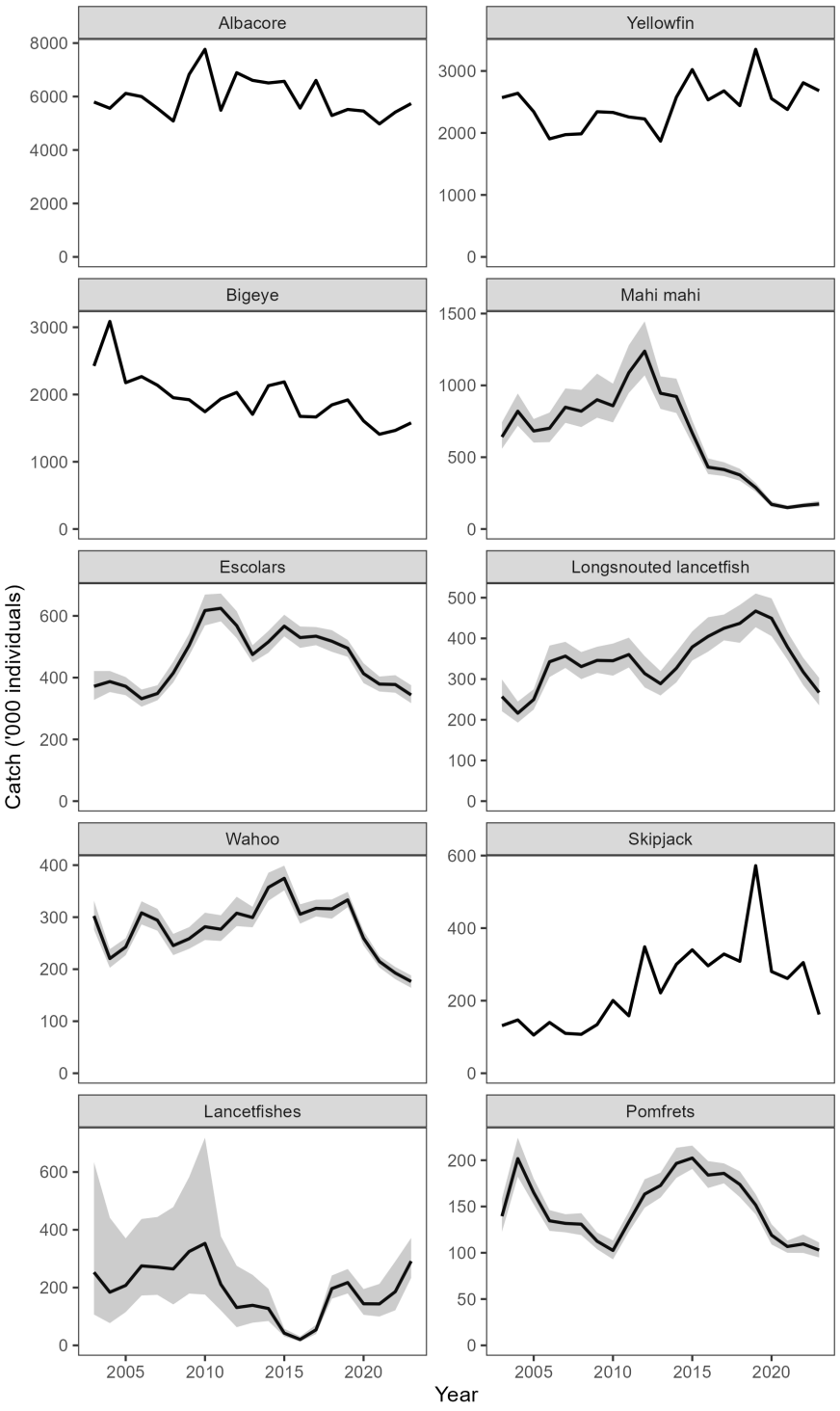


Figure 10: Total estimated annual catch for selected teleost estimation groups ('000 individuals; grey region provides 95% CIs) for the WCPO longline fishery. This figure includes estimation groups ranked 1 to 10 in terms of total estimated teleost catch over the time series (see Figure 11 for the remaining teleost estimation groups). Billfish catches are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands. Reported catches were used where available, covering tropical tuna and albacore.

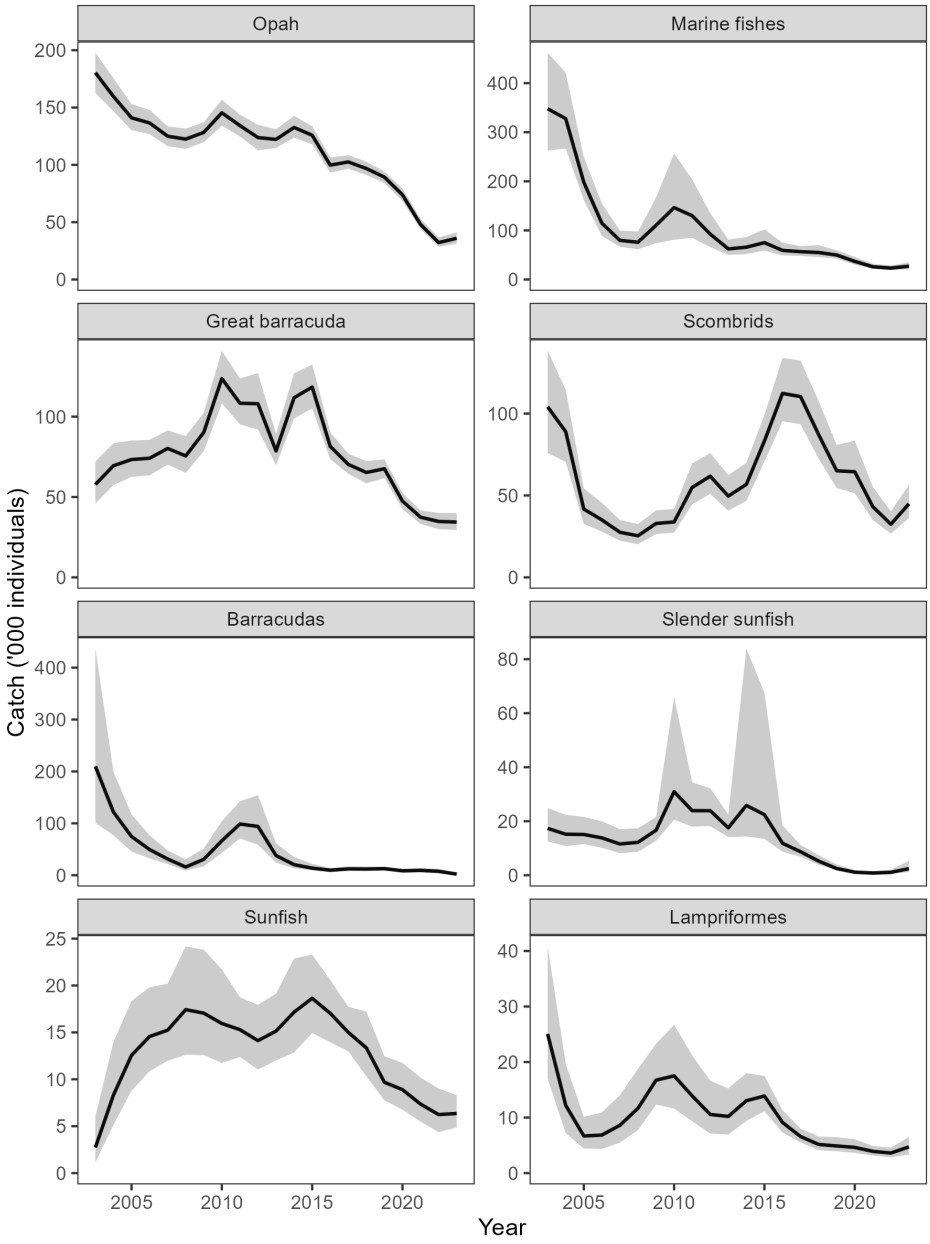


Figure 11: Total estimated annual catch for selected teleost estimation groups ('000 individuals; grey region provides 95% CIs) for the WCPO longline fishery. This figure includes estimation groups ranked 11 to 18 in terms of total estimated teleost catch over the time series (see Figure 10 for the remaining teleost estimation groups). Billfish catches are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

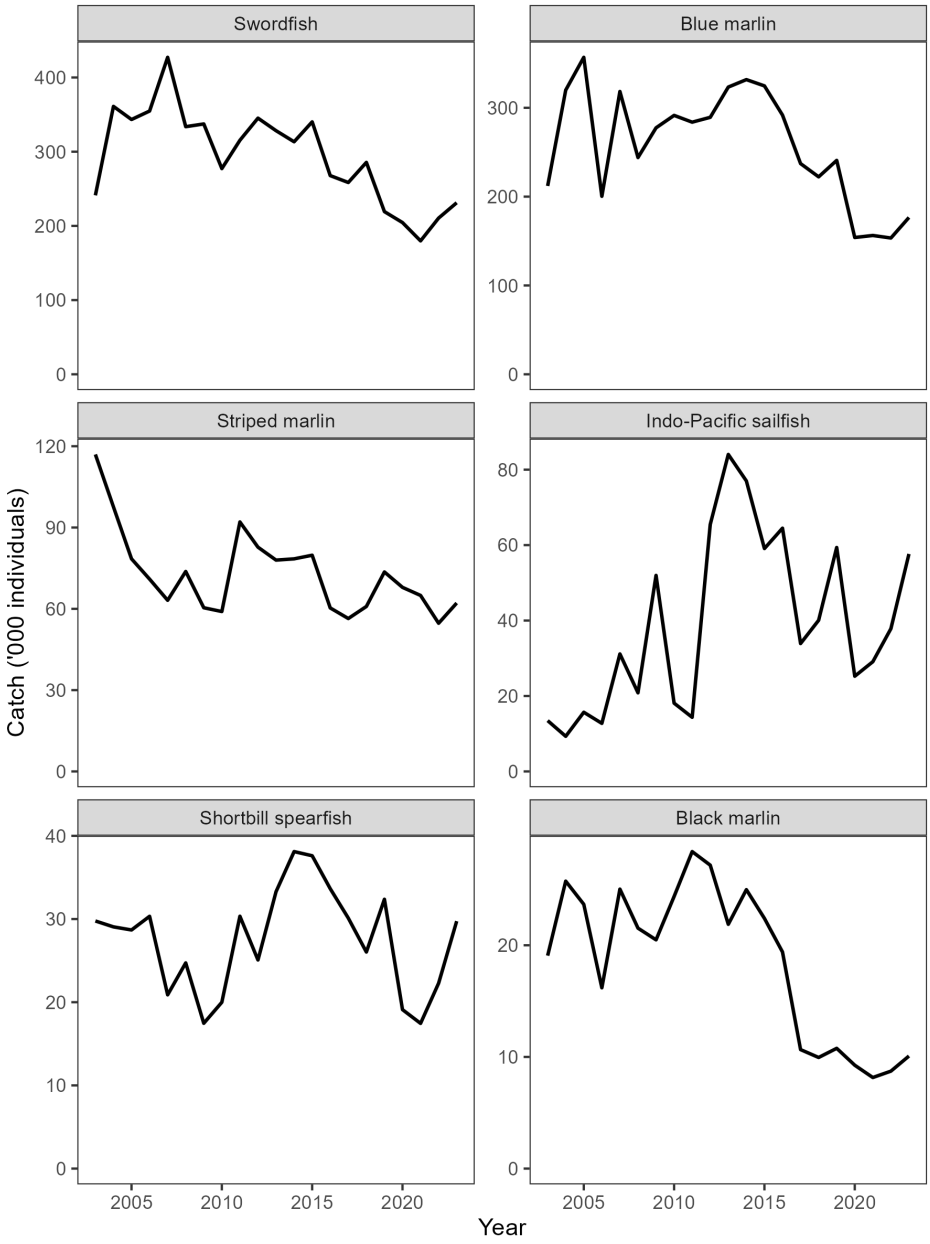


Figure 12: Total annual catch for billfish estimation groups ('000 individuals) for the WCPO longline fishery. Catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands. Reported catches were used for all billfish estimation groups.

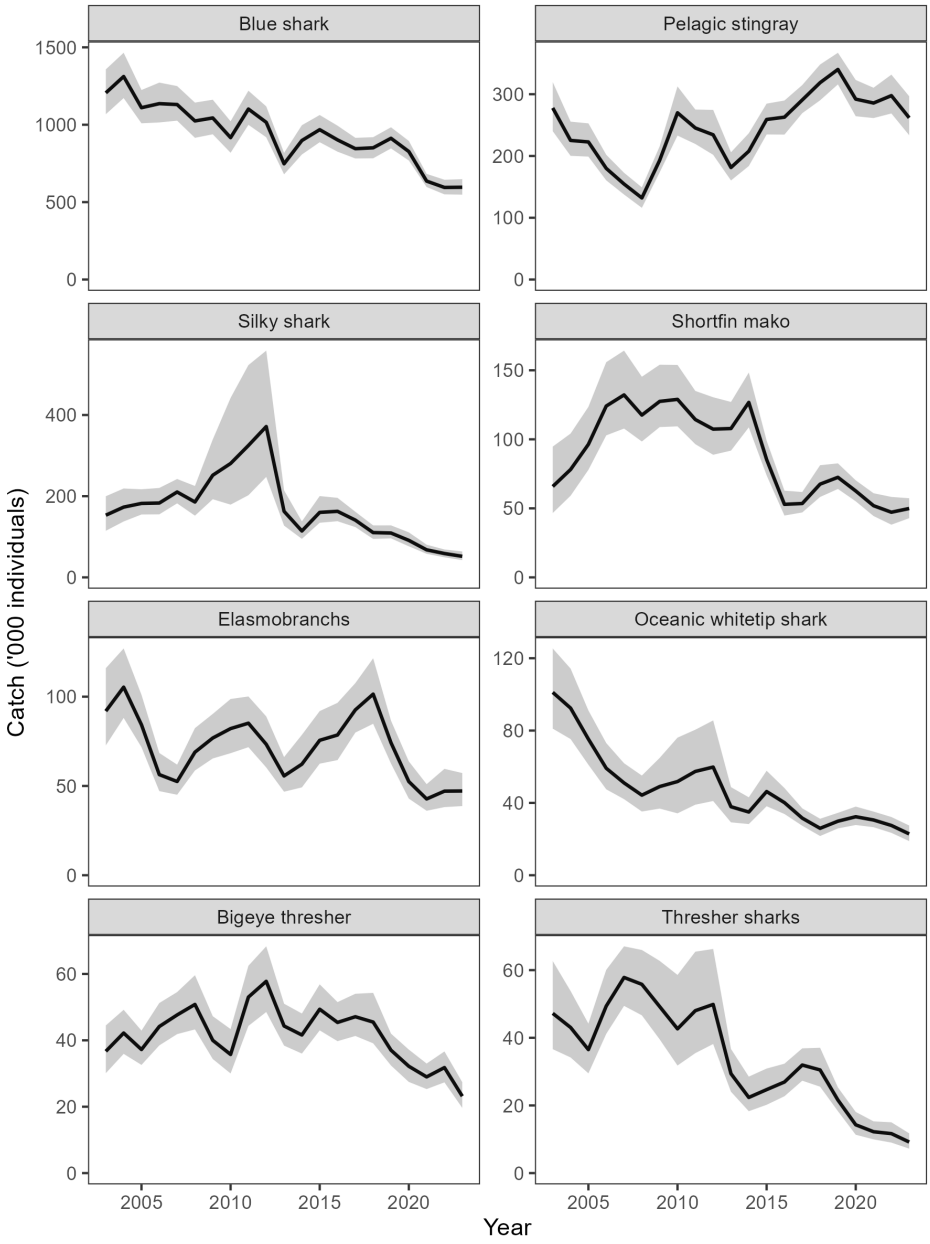


Figure 13: Total estimated annual catch for selected elasmobranch estimation groups ('000 individuals; grey region provides 95% CIs) for the WCPO longline fishery. This figure includes estimation groups ranked 1 to 8 in terms of total estimated elasmobranch catch over the time series (see Figure 14 for the remaining elasmobranch estimation groups). Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

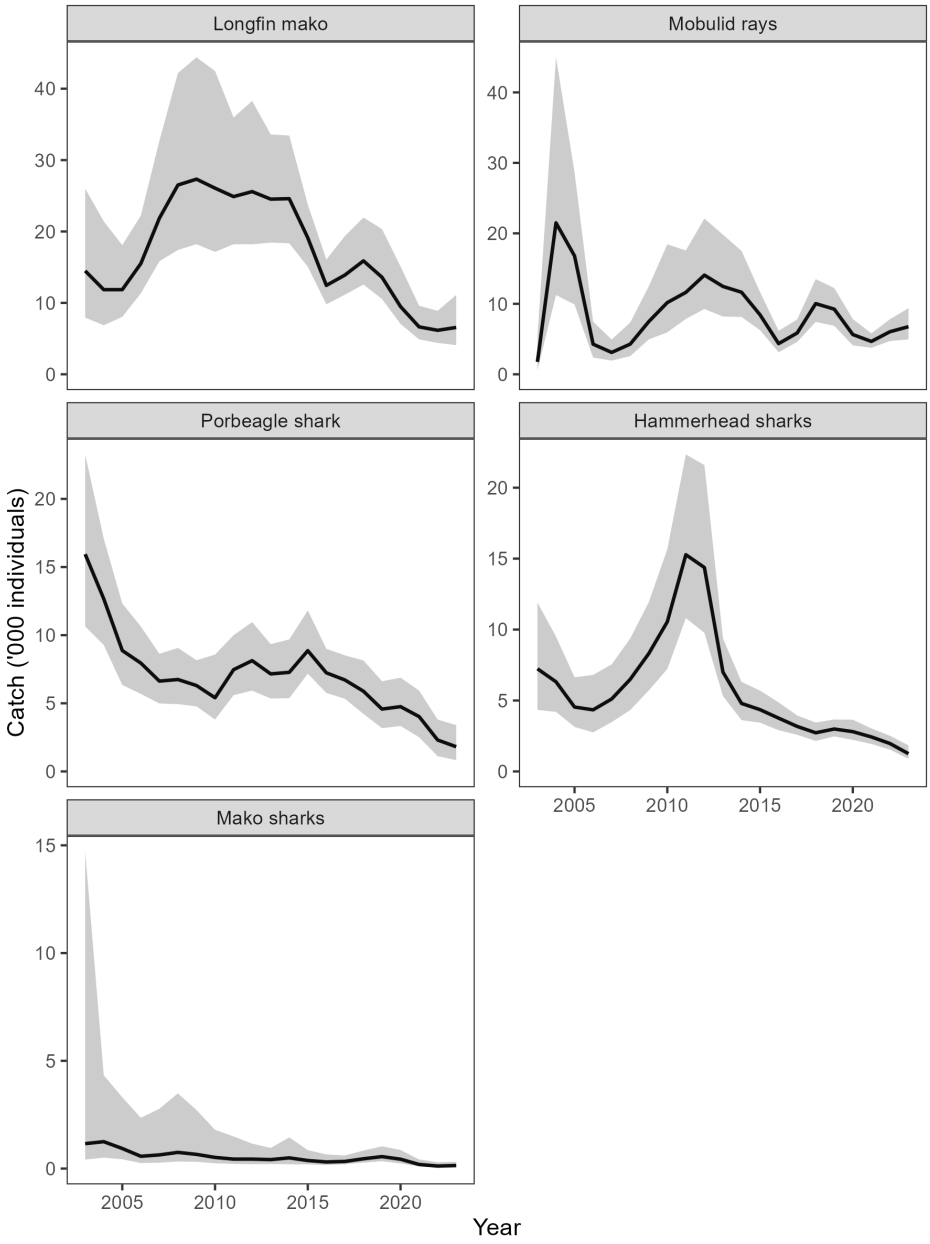


Figure 14: Total estimated annual catch for selected elasmobranch estimation groups ('000 individuals; grey region provides 95% CIs) for the WCPO longline fishery. This figure includes estimation groups ranked 9 to 13 in terms of total estimated elasmobranch catch over the time series (see Figure 13 for the remaining elasmobranch estimation groups). Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

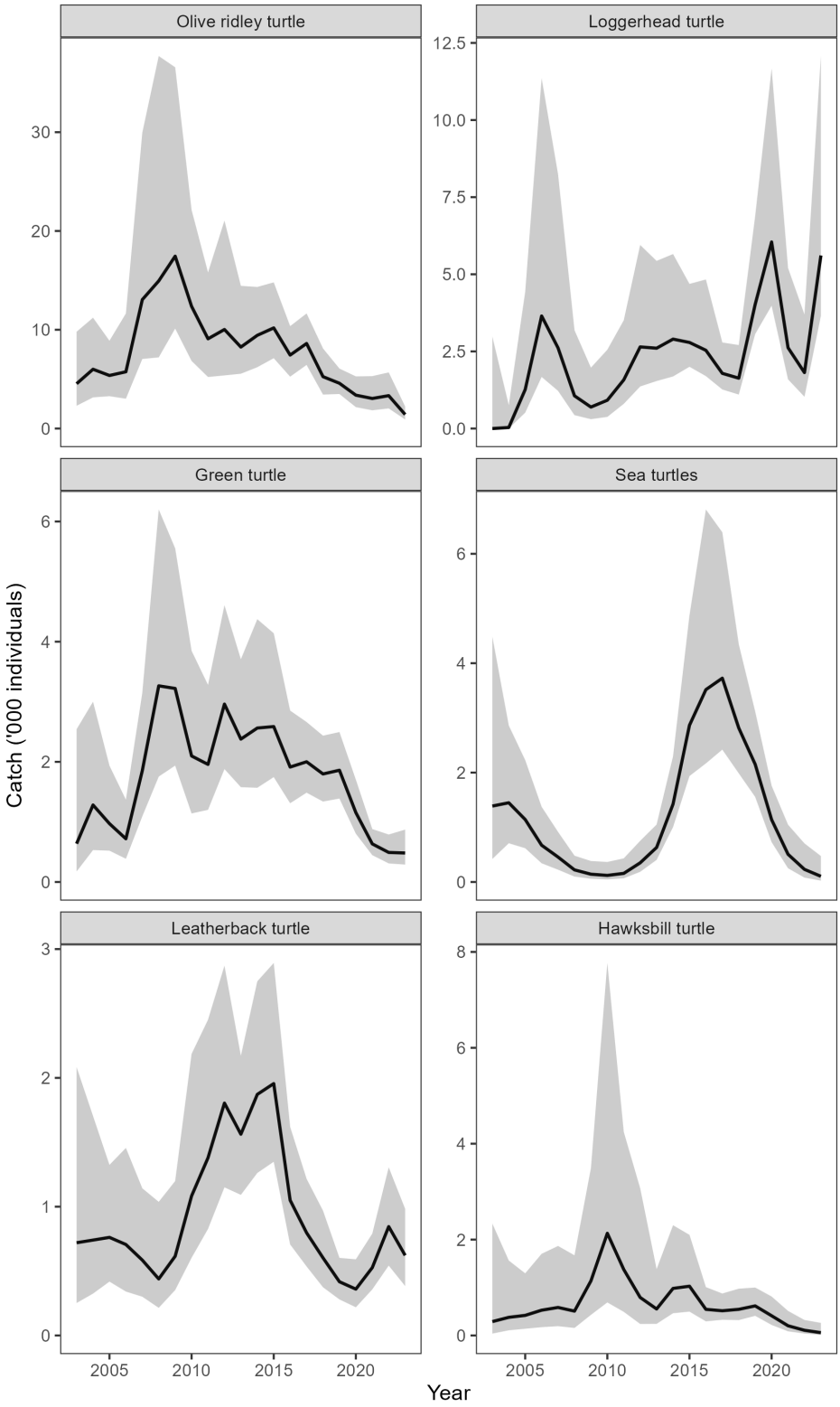


Figure 15: Total estimated annual catch for sea turtle estimation groups ('000 individuals; grey region provides 95% CIs) for the WCPO longline fishery. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

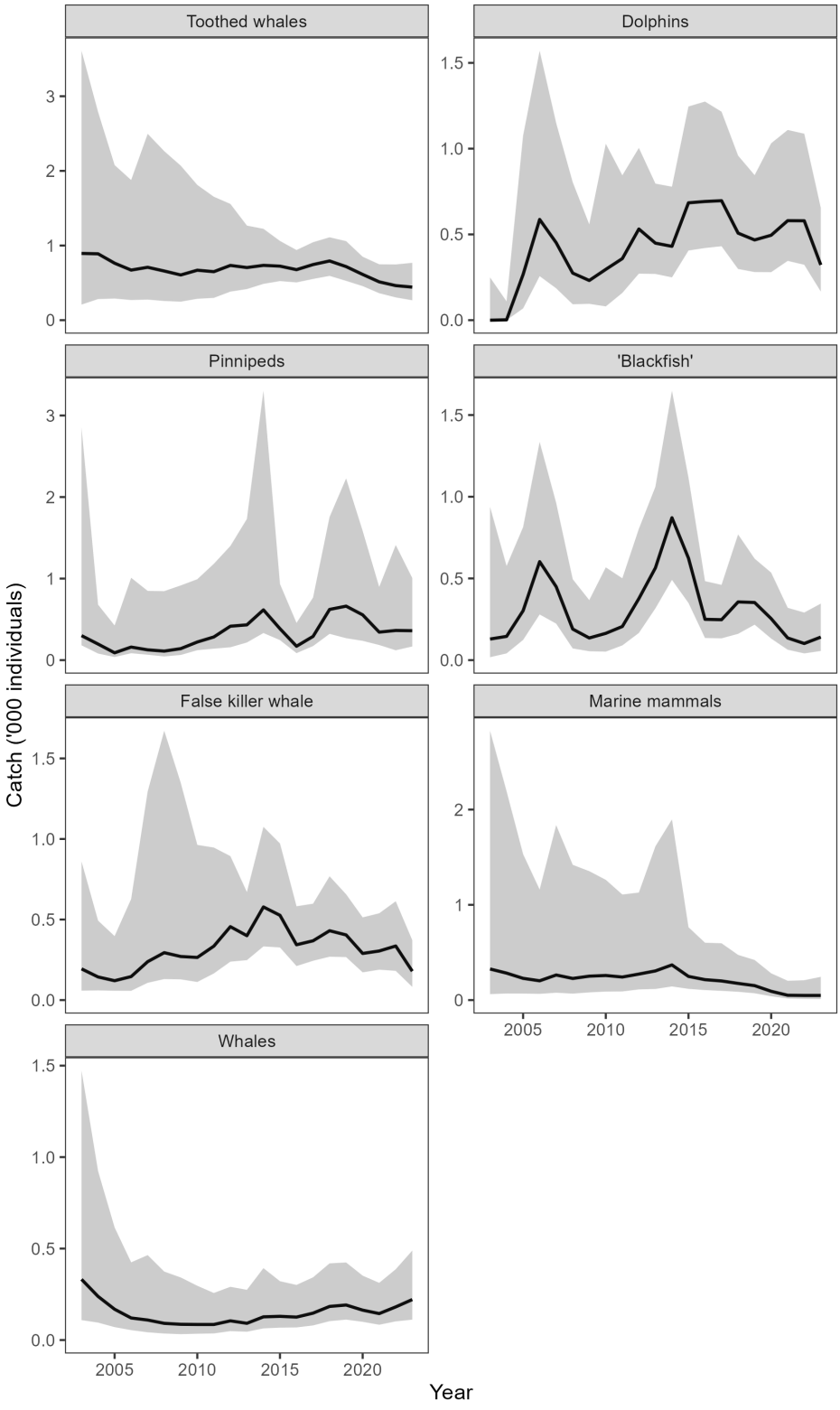


Figure 16: Total estimated annual catch for marine mammal estimation groups ('000 individuals; grey region provides 95% CIs) for the WCPO longline fishery. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Appendix

A Tables of estimated catches

Table A.1: Estimated annual catch ('000 individuals, 95% confidence intervals in parentheses) for the WCPO longline fishery by species type. Teleosts excludes tropical tuna, albacore and billfish species. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Tropical tunas & albacore	Billfish	Teleosts	Elasmobranchs	Sea turtles	Marine mammals
2003	10,900	632 (632-632)	2,950 (2,670-3,390)	2,030 (1,870-2,200)	8.42 (5.15-16.3)	2.77 (1.36-9.70)
2004	11,400	843 (843-843)	2,850 (2,660-3,140)	2,130 (1,990-2,290)	10.5 (6.77-16.1)	2.24 (1.22-5.27)
2005	10,700	847 (847-847)	2,490 (2,350-2,680)	1,890 (1,780-2,020)	10.4 (7.54-15.1)	2.29 (1.33-4.35)
2006	10,300	685 (685-685)	2,550 (2,390-2,760)	1,870 (1,740-2,020)	12.8 (8.60-22.5)	2.84 (1.82-5.49)
2007	9,780	886 (886-886)	2,640 (2,470-2,870)	1,880 (1,760-2,020)	20.1 (13.1-37.7)	2.67 (1.68-6.80)
2008	9,130	719 (719-719)	2,580 (2,370-2,830)	1,730 (1,610-1,870)	21.0 (13.0-44.1)	2.14 (1.31-6.15)
2009	11,200	765 (765-765)	2,900 (2,680-3,220)	1,890 (1,760-2,040)	24.0 (16.0-43.1)	1.97 (1.21-6.00)
2010	12,000	690 (690-690)	3,160 (2,920-3,590)	1,870 (1,720-2,060)	19.5 (12.7-30.8)	2.25 (1.38-5.38)
2011	9,840	764 (764-764)	3,290 (3,080-3,550)	2,100 (1,920-2,320)	16.3 (11.2-23.4)	2.39 (1.62-4.80)
2012	11,500	835 (835-835)	3,270 (3,050-3,530)	2,040 (1,860-2,250)	19.3 (13.5-30.4)	3.12 (2.29-4.85)
2013	10,400	869 (869-869)	2,720 (2,570-2,890)	1,420 (1,340-1,520)	16.5 (12.7-23.4)	3.18 (2.41-5.81)
2014	11,500	864 (864-864)	2,900 (2,760-3,070)	1,560 (1,460-1,670)	19.6 (15.3-26.2)	4.02 (3.06-7.56)
2015	12,100	864 (864-864)	2,710 (2,610-2,830)	1,720 (1,620-1,820)	21.8 (17.8-27.6)	3.49 (2.82-4.79)
2016	10,100	737 (737-737)	2,280 (2,200-2,370)	1,600 (1,510-1,700)	17.4 (14.2-22.3)	2.60 (2.07-3.64)
2017	11,300	627 (627-627)	2,320 (2,240-2,390)	1,570 (1,490-1,650)	17.6 (14.9-21.9)	2.81 (2.29-3.81)
2018	9,890	645 (645-645)	2,360 (2,280-2,450)	1,590 (1,520-1,670)	12.9 (10.5-16.2)	3.22 (2.57-4.54)
2019	11,400	636 (636-636)	2,260 (2,190-2,340)	1,630 (1,560-1,710)	13.8 (11.8-17.3)	3.07 (2.42-4.95)
2020	9,900	480 (480-480)	1,810 (1,730-1,890)	1,430 (1,360-1,510)	12.8 (9.98-18.5)	2.58 (1.97-3.95)
2021	9,030	456 (456-456)	1,550 (1,490-1,630)	1,170 (1,130-1,230)	7.79 (5.89-10.9)	2.18 (1.76-3.15)
2022	10,000	487 (487-487)	1,490 (1,410-1,610)	1,130 (1,080-1,200)	7.07 (5.31-9.85)	2.21 (1.67-3.32)
2023	10,200	567 (567-567)	1,520 (1,440-1,610)	1,080 (1,020-1,140)	8.46 (6.33-14.8)	1.83 (1.35-2.75)

Table A.2: Estimated average catch rates (individuals per '000 hooks, 95% confidence intervals in parentheses) for the WCPO longline fishery from 2019 to 2023, by species type and set depth inferred from hooks between floats. Teleosts excludes tropical tuna, albacore and billfish species. Reported catch and effort from hook-between-floats specific aggregate data were used to calculate catch rates for tropical tuna, albacore and billfish. Catch rates do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Species group	Deep set (HBF $>$ 10)	Shallow set (HBF $\leq$ 10)
Tropical tunas & albacore	14.20	4.59
Billfish	0.58	2.15
Teleosts	2.26 (2.20-2.33)	2.71 (2.47-2.98)
Elasmobranchs	1.42 (1.38-1.46)	5.03 (4.44-5.68)
Sea turtles	0.0103 (0.00891-0.0122)	0.0461 (0.0313-0.103)
Marine mammals	0.00296 (0.00246-0.00379)	0.00548 (0.00378-0.0145)

Table A.3: Estimated annual catch for selected teleost estimation groups ('000 individuals, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. This table includes estimation groups ranked 1 to 6 in terms of total estimated teleost catch over the time series (see Table A.4 and A.5 for the remaining teleost estimation groups). Catches of billfish species are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Albacore	Yellowfin	Bigeye	Mahi mahi	Escolars	Longsnouted lancetfish
2003	5,790	2,570	2,420	641 (559-743)	372 (328-421)	257 (221-299)
2004	5,560	2,640	3,090	820 (719-943)	387 (353-421)	216 (193-245)
2005	6,120	2,340	2,180	682 (602-766)	372 (343-402)	250 (225-275)
2006	6,000	1,900	2,270	702 (605-811)	332 (306-361)	343 (305-382)
2007	5,560	1,970	2,140	848 (739-979)	349 (327-375)	356 (327-392)
2008	5,080	1,990	1,950	820 (710-968)	415 (385-452)	331 (300-366)
2009	6,830	2,340	1,920	900 (775-1,080)	504 (471-542)	346 (315-379)
2010	7,770	2,330	1,740	858 (743-1,010)	617 (569-669)	345 (308-387)
2011	5,490	2,260	1,930	1,090 (947-1,280)	624 (582-672)	360 (329-402)
2012	6,890	2,230	2,030	1,240 (1,070-1,450)	568 (528-615)	314 (279-356)
2013	6,610	1,870	1,710	945 (836-1,060)	475 (449-505)	289 (260-319)
2014	6,510	2,580	2,130	923 (808-1,050)	516 (481-551)	327 (292-367)
2015	6,570	3,020	2,190	669 (595-755)	567 (534-604)	379 (346-417)
2016	5,570	2,530	1,670	431 (382-491)	530 (496-566)	405 (368-452)
2017	6,600	2,680	1,670	414 (369-465)	534 (505-564)	425 (395-459)
2018	5,290	2,440	1,850	376 (336-419)	518 (484-554)	437 (389-482)
2019	5,520	3,350	1,920	288 (260-321)	495 (468-522)	467 (427-510)
2020	5,460	2,550	1,610	172 (153-193)	413 (382-447)	449 (406-498)
2021	4,980	2,380	1,410	149 (136-164)	379 (355-404)	379 (348-416)
2022	5,420	2,810	1,470	164 (148-180)	378 (351-408)	317 (285-352)
2023	5,740	2,680	1,580	174 (155-197)	344 (317-375)	267 (236-303)

Table A.4: Estimated annual catch for selected teleost estimation groups ('000 individuals, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. This table includes estimation groups ranked 7 to 12 in terms of total estimated teleost catch over the time series (see Table A.3 and A.5 for the remaining teleost estimation groups). Catches of billfish species are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Wahoo	Skipjack	Lancetfishes	Pomfrets	Opah	Marine fishes
2003	302 (276-332)	131	253 (107-634)	140 (123-159)	180 (163-198)	348 (262-462)
2004	220 (203-239)	147	184 (77.1-441)	202 (182-224)	160 (147-175)	328 (267-421)
2005	243 (227-260)	105	208 (115-370)	165 (152-180)	141 (130-153)	198 (162-249)
2006	308 (286-330)	140	275 (173-437)	135 (124-146)	137 (127-148)	115 (89.1-155)
2007	294 (274-316)	110	271 (175-444)	132 (122-142)	125 (116-134)	79.7 (66.6-99.5)
2008	245 (227-268)	107	264 (142-479)	131 (119-143)	122 (114-132)	75.9 (61.7-97.8)
2009	259 (239-281)	134	325 (179-582)	113 (104-122)	128 (120-137)	110 (74.0-166)
2010	282 (256-309)	201	353 (176-718)	103 (92.9-113)	145 (134-157)	146 (80.9-257)
2011	277 (254-304)	158	211 (121-378)	133 (123-144)	134 (125-144)	130 (85.0-204)
2012	308 (283-339)	349	131 (63.0-275)	163 (149-179)	124 (113-135)	92.6 (66.1-135)
2013	299 (281-320)	222	139 (78.5-244)	173 (160-186)	122 (115-131)	62.3 (50.0-81.1)
2014	357 (332-385)	300	128 (84.3-196)	197 (181-213)	133 (124-143)	65.9 (52.0-86.6)
2015	375 (352-399)	340	42.3 (31.0-57.6)	202 (191-216)	126 (118-134)	75.0 (59.1-102)
2016	306 (288-325)	296	20.3 (12.7-30.8)	184 (170-199)	99.8 (93.1-106)	59.4 (49.2-75.0)
2017	317 (301-333)	329	53.7 (39.3-71.2)	186 (175-197)	103 (96.7-108)	56.7 (48.2-68.0)
2018	316 (297-334)	309	196 (161-242)	174 (160-188)	96.8 (91.3-103)	55.0 (45.8-69.9)
2019	333 (319-349)	572	217 (180-264)	152 (141-163)	89.3 (84.1-94.2)	49.9 (42.7-59.6)
2020	259 (246-274)	280	144 (106-195)	119 (109-131)	73.8 (68.6-79.2)	36.9 (30.3-46.0)
2021	215 (203-225)	261	144 (99.9-213)	107 (100-113)	48.0 (44.1-52.8)	26.0 (21.7-31.9)
2022	193 (181-204)	305	186 (122-290)	110 (99.8-120)	32.2 (28.6-36.6)	23.3 (19.0-28.4)
2023	176 (164-188)	162	291 (234-372)	103 (95.0-111)	36.0 (31.3-41.0)	27.1 (21.3-34.9)

Table A.5: Estimated annual catch for selected teleost estimation groups ('000 individuals, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. This table includes estimation groups ranked 13 to 18 in terms of total estimated teleost catch over the time series (see Table A.3 and A.4 for the remaining teleost estimation groups). Catches of billfish species are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Great barracuda	Scombrids	Barracudas	Slender sunfish	Sunfish	Lampriformes
2003	57.8 (45.9-72.2)	104 (76.0-138)	210 (101-437)	17.3 (12.5-24.9)	2.73 (1.16-6.02)	25.0 (17.0-40.8)
2004	69.5 (57.5-83.4)	88.9 (70.5-114)	122 (77.2-199)	15.2 (10.8-22.4)	8.32 (5.14-14.0)	12.2 (7.20-19.7)
2005	73.3 (62.5-85.1)	41.7 (32.7-54.3)	74.7 (45.7-117)	15.1 (11.6-21.6)	12.6 (8.80-18.4)	6.68 (4.42-10.1)
2006	74.1 (63.5-85.5)	35.1 (27.9-45.6)	49.5 (32.6-77.0)	13.8 (10.2-20.0)	14.6 (10.9-19.8)	6.85 (4.36-10.9)
2007	80.2 (70.2-91.5)	27.5 (22.4-35.0)	31.3 (21.6-47.7)	11.6 (8.16-17.1)	15.2 (12.0-20.2)	8.61 (5.50-14.0)
2008	75.6 (65.1-87.8)	25.4 (20.3-32.6)	15.8 (8.82-30.6)	12.2 (8.67-17.4)	17.4 (12.6-24.2)	11.7 (7.74-18.8)
2009	90.2 (78.6-102)	32.9 (26.5-40.9)	30.7 (17.5-51.6)	16.7 (12.8-21.6)	17.1 (12.6-23.8)	16.7 (12.3-23.3)
2010	124 (108-141)	33.8 (27.3-41.8)	66.5 (43.1-104)	30.9 (20.6-65.9)	15.9 (11.7-21.7)	17.5 (11.6-26.7)
2011	108 (95.2-124)	54.9 (44.6-69.6)	98.7 (70.8-142)	23.9 (18.0-34.4)	15.3 (12.4-18.7)	13.9 (9.33-21.2)
2012	108 (92.0-127)	61.8 (51.0-75.9)	94.0 (58.7-154)	23.9 (18.2-32.2)	14.1 (11.0-17.9)	10.6 (7.13-16.6)
2013	78.6 (69.9-89.1)	49.6 (40.7-62.4)	37.9 (24.3-61.4)	17.6 (14.2-22.4)	15.1 (12.0-19.1)	10.2 (6.94-15.2)
2014	112 (98.9-127)	56.8 (46.8-69.9)	20.4 (13.2-35.0)	25.8 (14.3-84.0)	17.2 (12.9-22.9)	13.0 (9.40-18.0)
2015	118 (105-132)	83.3 (70.7-99.2)	13.6 (9.45-22.0)	22.4 (13.5-67.5)	18.6 (14.9-23.3)	13.9 (11.1-17.5)
2016	81.5 (73.6-90.3)	112 (95.3-134)	9.64 (6.69-14.0)	11.8 (8.73-18.5)	17.0 (14.0-20.6)	9.12 (7.34-11.3)
2017	70.3 (64.5-76.8)	110 (93.5-132)	12.1 (8.80-17.2)	8.70 (6.83-11.2)	15.0 (13.0-17.7)	6.58 (5.52-8.00)
2018	65.3 (58.5-72.4)	87.2 (72.5-108)	11.9 (8.75-16.9)	5.24 (3.88-7.41)	13.3 (10.3-17.2)	5.16 (4.13-6.58)
2019	67.6 (61.8-73.4)	65.1 (54.6-80.8)	12.6 (9.40-16.7)	2.47 (1.76-3.99)	9.68 (7.75-12.5)	4.89 (3.93-6.46)
2020	47.4 (42.5-52.5)	64.5 (51.4-83.4)	8.49 (5.91-12.5)	1.12 (0.695-1.84)	8.89 (6.77-11.7)	4.63 (3.64-6.10)
2021	37.4 (33.3-41.7)	43.1 (35.0-55.1)	9.30 (6.30-14.0)	0.822 (0.498-1.43)	7.36 (5.49-10.2)	3.92 (3.16-4.89)
2022	34.8 (30.0-40.0)	32.4 (26.7-40.3)	7.53 (4.87-12.5)	1.07 (0.626-2.00)	6.24 (4.37-9.01)	3.62 (2.83-4.58)
2023	34.4 (29.6-40.0)	44.9 (36.2-56.4)	2.15 (1.08-4.46)	2.43 (1.17-5.31)	6.36 (4.87-8.29)	4.72 (3.34-6.52)

Table A.6: Estimated annual catch for selected teleost estimation groups ('000 tonnes, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. This table includes estimation groups ranked 1 to 6 in terms of total estimated teleost catch numbers over the time series (see Table A.7 and A.8 for the remaining teleost estimation groups). Catches of billfish species are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Albacore	Bigeye	Yellowfin	Mahi mahi	Escolars	Longsnouted lancetfish
2003	83.5	82.8	67.3	2.92 (2.54-3.38)	1.87 (1.65-2.12)	0.820 (0.711-0.951)
2004	80.8	97.4	68.4	3.64 (3.20-4.15)	1.90 (1.73-2.08)	0.686 (0.611-0.769)
2005	86.3	78.7	58.2	3.02 (2.66-3.38)	1.78 (1.64-1.92)	0.798 (0.724-0.878)
2006	87.3	83.0	55.3	3.07 (2.65-3.53)	1.64 (1.51-1.78)	1.08 (0.965-1.21)
2007	81.4	80.7	53.7	3.65 (3.20-4.19)	1.72 (1.61-1.87)	1.12 (1.03-1.23)
2008	78.2	76.4	53.9	3.47 (3.00-4.08)	2.00 (1.85-2.18)	1.04 (0.946-1.15)
2009	100	75.5	66.3	3.77 (3.26-4.52)	2.61 (2.43-2.82)	1.11 (1.01-1.21)
2010	116	67.3	62.8	3.75 (3.25-4.40)	3.32 (3.06-3.60)	1.10 (0.990-1.23)
2011	83.1	73.0	62.2	4.67 (4.09-5.46)	3.16 (2.95-3.41)	1.13 (1.04-1.26)
2012	103	81.5	58.8	5.20 (4.51-6.05)	2.92 (2.71-3.19)	1.00 (0.898-1.13)
2013	97.6	63.9	46.3	4.03 (3.59-4.52)	2.44 (2.30-2.61)	0.929 (0.839-1.03)
2014	91.4	73.5	59.6	3.95 (3.48-4.47)	2.74 (2.53-2.94)	1.05 (0.938-1.17)
2015	94.2	75.3	69.4	2.86 (2.54-3.21)	2.90 (2.71-3.10)	1.20 (1.10-1.31)
2016	82.1	59.7	60.4	1.83 (1.63-2.08)	2.61 (2.44-2.81)	1.29 (1.17-1.43)
2017	101	64.6	68.6	1.77 (1.59-1.98)	2.75 (2.59-2.90)	1.36 (1.26-1.46)
2018	85.6	70.5	65.8	1.61 (1.44-1.78)	2.49 (2.32-2.67)	1.40 (1.25-1.54)
2019	90.3	66.5	78.4	1.23 (1.11-1.36)	2.43 (2.28-2.57)	1.53 (1.40-1.67)
2020	79.9	53.6	55.2	0.742 (0.665-0.831)	2.08 (1.92-2.25)	1.49 (1.34-1.65)
2021	73.1	51.3	56.9	0.635 (0.580-0.699)	1.79 (1.67-1.91)	1.25 (1.15-1.37)
2022	84.0	53.8	67.7	0.690 (0.622-0.757)	1.71 (1.58-1.84)	1.01 (0.913-1.11)
2023	88.4	58.3	61.0	0.748 (0.668-0.842)	1.59 (1.46-1.75)	0.888 (0.789-1.00)

Table A.7: Estimated annual catch for selected teleost estimation groups ('000 tonnes, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. This table includes estimation groups ranked 7 to 12 in terms of total estimated teleost catch numbers over the time series (see Table A.6 and A.8 for the remaining teleost estimation groups). Catches of billfish species are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Opah	Wahoo	Skipjack	Marine fishes	Lancetfishes	Pomfrets
2003	4.88 (4.41-5.36)	3.15 (2.88-3.44)	1.02	2.69 (2.01-3.67)	0.350 (0.148-0.878)	0.219 (0.190-0.252)
2004	4.35 (3.99-4.79)	2.28 (2.10-2.46)	0.996	2.57 (2.04-3.39)	0.255 (0.107-0.611)	0.328 (0.294-0.369)
2005	3.86 (3.57-4.19)	2.51 (2.35-2.68)	0.693	1.47 (1.18-1.90)	0.288 (0.160-0.513)	0.268 (0.244-0.298)
2006	3.78 (3.51-4.09)	3.18 (2.96-3.39)	0.837	0.872 (0.664-1.20)	0.381 (0.239-0.606)	0.214 (0.194-0.234)
2007	3.46 (3.22-3.69)	3.01 (2.81-3.21)	0.623	0.612 (0.506-0.784)	0.375 (0.242-0.616)	0.209 (0.191-0.227)
2008	3.39 (3.16-3.64)	2.50 (2.33-2.72)	0.617	0.571 (0.457-0.755)	0.366 (0.196-0.663)	0.208 (0.186-0.230)
2009	3.56 (3.33-3.81)	2.64 (2.44-2.85)	0.743	0.858 (0.570-1.31)	0.450 (0.248-0.807)	0.178 (0.162-0.196)
2010	4.05 (3.74-4.37)	2.91 (2.66-3.19)	1.10	1.13 (0.617-2.00)	0.490 (0.244-0.997)	0.170 (0.152-0.191)
2011	3.73 (3.47-3.99)	2.82 (2.59-3.08)	1.09	1.03 (0.660-1.64)	0.293 (0.168-0.524)	0.222 (0.202-0.243)
2012	3.44 (3.14-3.76)	3.12 (2.87-3.43)	2.04	0.780 (0.545-1.15)	0.182 (0.0874-0.382)	0.272 (0.244-0.301)
2013	3.40 (3.20-3.65)	3.07 (2.88-3.27)	1.24	0.503 (0.396-0.667)	0.192 (0.109-0.338)	0.282 (0.257-0.307)
2014	3.70 (3.45-3.98)	3.66 (3.40-3.94)	1.59	0.516 (0.404-0.689)	0.177 (0.117-0.271)	0.312 (0.284-0.343)
2015	3.51 (3.29-3.74)	3.81 (3.57-4.05)	1.75	0.579 (0.446-0.800)	0.0586 (0.0430-0.0800)	0.321 (0.298-0.346)
2016	2.78 (2.59-2.96)	3.12 (2.94-3.30)	1.72	0.438 (0.357-0.564)	0.0282 (0.0176-0.0427)	0.274 (0.251-0.300)
2017	2.86 (2.70-3.02)	3.26 (3.11-3.42)	2.30	0.426 (0.358-0.517)	0.0745 (0.0545-0.0988)	0.279 (0.259-0.298)
2018	2.70 (2.55-2.87)	3.24 (3.05-3.42)	1.91	0.414 (0.342-0.529)	0.272 (0.224-0.335)	0.263 (0.240-0.288)
2019	2.50 (2.35-2.63)	3.44 (3.30-3.60)	2.96	0.364 (0.311-0.438)	0.302 (0.250-0.367)	0.209 (0.193-0.228)
2020	2.07 (1.92-2.22)	2.70 (2.56-2.85)	1.97	0.262 (0.214-0.330)	0.200 (0.147-0.270)	0.162 (0.147-0.179)
2021	1.34 (1.23-1.47)	2.24 (2.12-2.35)	1.94	0.181 (0.151-0.224)	0.199 (0.139-0.295)	0.137 (0.126-0.147)
2022	0.899 (0.797-1.02)	1.99 (1.87-2.11)	2.15	0.168 (0.138-0.207)	0.258 (0.169-0.403)	0.148 (0.132-0.164)
2023	1.00 (0.873-1.14)	1.83 (1.71-1.95)	1.20	0.192 (0.151-0.249)	0.404 (0.324-0.515)	0.135 (0.123-0.148)

Table A.8: Estimated annual catch for selected teleost estimation groups ('000 tonnes, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. This table includes estimation groups ranked 13 to 18 in terms of total estimated teleost catch numbers over the time series (see Table A.6 and A.7 for the remaining teleost estimation groups). Catches of billfish species are reported separately. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Scombrids	Sunfish	Great barracuda	Barracudas	Lampriformes	Slender sunfish
2003	5.46 (3.97-7.30)	0.264 (0.111-0.587)	0.275 (0.217-0.344)	1.29 (0.622-2.68)	0.222 (0.151-0.362)	0.0923 (0.0666-0.132)
2004	4.66 (3.68-6.05)	0.875 (0.539-1.47)	0.326 (0.268-0.393)	0.741 (0.470-1.21)	0.108 (0.0638-0.174)	0.0808 (0.0574-0.119)
2005	2.17 (1.70-2.84)	1.31 (0.907-1.91)	0.345 (0.294-0.401)	0.452 (0.279-0.709)	0.0591 (0.0391-0.0894)	0.0803 (0.0615-0.115)
2006	1.82 (1.44-2.38)	1.50 (1.11-2.06)	0.348 (0.297-0.403)	0.299 (0.196-0.465)	0.0605 (0.0385-0.0964)	0.0736 (0.0541-0.106)
2007	1.42 (1.15-1.81)	1.67 (1.29-2.19)	0.376 (0.328-0.431)	0.189 (0.130-0.286)	0.0761 (0.0486-0.124)	0.0616 (0.0434-0.0908)
2008	1.31 (1.05-1.69)	1.89 (1.37-2.58)	0.357 (0.306-0.416)	0.0947 (0.0528-0.183)	0.103 (0.0683-0.166)	0.0649 (0.0462-0.0924)
2009	1.70 (1.37-2.12)	1.84 (1.36-2.55)	0.421 (0.366-0.480)	0.184 (0.105-0.309)	0.148 (0.109-0.205)	0.0887 (0.0679-0.115)
2010	1.73 (1.39-2.15)	1.73 (1.27-2.36)	0.573 (0.500-0.655)	0.397 (0.257-0.618)	0.155 (0.103-0.236)	0.165 (0.110-0.351)
2011	2.81 (2.27-3.58)	1.66 (1.34-2.06)	0.506 (0.443-0.579)	0.593 (0.426-0.859)	0.123 (0.0824-0.187)	0.127 (0.0958-0.183)
2012	3.15 (2.59-3.90)	1.55 (1.20-2.00)	0.505 (0.430-0.594)	0.572 (0.359-0.939)	0.0932 (0.0629-0.147)	0.127 (0.0967-0.171)
2013	2.56 (2.09-3.23)	1.58 (1.25-2.00)	0.370 (0.328-0.419)	0.231 (0.148-0.375)	0.0901 (0.0613-0.135)	0.0935 (0.0753-0.119)
2014	2.95 (2.43-3.65)	1.81 (1.35-2.38)	0.517 (0.457-0.588)	0.123 (0.0794-0.211)	0.115 (0.0830-0.159)	0.138 (0.0763-0.447)
2015	4.29 (3.64-5.12)	1.95 (1.56-2.47)	0.552 (0.491-0.617)	0.0818 (0.0567-0.132)	0.123 (0.0983-0.155)	0.119 (0.0716-0.359)
2016	5.72 (4.82-6.85)	1.69 (1.37-2.04)	0.386 (0.348-0.427)	0.0579 (0.0404-0.0838)	0.0805 (0.0648-0.100)	0.0630 (0.0465-0.0983)
2017	5.64 (4.77-6.82)	1.50 (1.30-1.77)	0.334 (0.306-0.365)	0.0731 (0.0529-0.104)	0.0581 (0.0487-0.0705)	0.0463 (0.0363-0.0597)
2018	4.45 (3.69-5.53)	1.40 (1.09-1.79)	0.308 (0.276-0.342)	0.0723 (0.0530-0.103)	0.0455 (0.0364-0.0581)	0.0279 (0.0206-0.0394)
2019	3.33 (2.77-4.16)	0.987 (0.791-1.26)	0.322 (0.293-0.350)	0.0761 (0.0567-0.101)	0.0431 (0.0347-0.0569)	0.0131 (0.00939-0.0212)
2020	3.32 (2.65-4.31)	0.872 (0.664-1.15)	0.225 (0.201-0.249)	0.0512 (0.0355-0.0752)	0.0408 (0.0321-0.0538)	0.00596 (0.00370-0.00980)
2021	2.23 (1.81-2.85)	0.709 (0.530-0.974)	0.179 (0.159-0.200)	0.0564 (0.0382-0.0848)	0.0345 (0.0278-0.0431)	0.00437 (0.00265-0.00758)
2022	1.66 (1.36-2.07)	0.629 (0.444-0.898)	0.165 (0.143-0.190)	0.0460 (0.0299-0.0761)	0.0319 (0.0250-0.0404)	0.00572 (0.00333-0.0107)
2023	2.31 (1.86-2.91)	0.643 (0.497-0.845)	0.164 (0.141-0.190)	0.0130 (0.00654-0.0272)	0.0416 (0.0295-0.0575)	0.0129 (0.00623-0.0282)

Table A.9: Estimated annual catch of billfish by estimation group ('000 individuals, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Swordfish	Blue marlin	Striped marlin	Indo-Pacific sailfish	Shortbill spearfish	Black marlin
2003	241	212	117	13.5	29.8	19.1
2004	361	320	97.6	9.31	29.1	25.7
2005	343	357	78.4	15.7	28.7	23.7
2006	355	200	71.0	12.7	30.3	16.2
2007	427	318	63.1	31.2	20.9	25.0
2008	334	244	73.8	20.8	24.7	21.5
2009	337	277	60.4	52.0	17.5	20.5
2010	277	291	59.0	18.1	20.0	24.4
2011	315	284	92.1	14.3	30.3	28.4
2012	345	289	82.7	65.5	25.1	27.2
2013	328	323	78.0	84.0	33.3	21.9
2014	313	332	78.4	77.0	38.1	25.0
2015	340	325	79.8	59.1	37.6	22.4
2016	268	292	60.3	64.5	33.6	19.4
2017	258	237	56.4	33.9	30.1	10.7
2018	286	222	60.9	40.1	26.0	9.95
2019	219	241	73.6	59.4	32.4	10.8
2020	204	154	67.9	25.2	19.1	9.26
2021	180	156	64.9	29.1	17.5	8.16
2022	211	153	54.7	37.8	22.3	8.72
2023	231	177	62.1	57.7	29.7	10.1

Table A.10: Estimated annual catch of billfish by estimation group ('000 tonnes, 95% confidence intervals in parentheses where relevant) for the WCPO longline fishery. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Swordfish	Blue marlin	Striped marlin	Black marlin	Indo-Pacific sailfish	Shortbill spearfish
2003	13.8	11.7	5.26	0.860	0.254	0.391
2004	20.0	18.6	4.41	1.48	0.184	0.362
2005	18.9	20.8	3.73	1.40	0.282	0.371
2006	20.2	12.7	3.39	0.781	0.237	0.379
2007	24.2	17.1	3.04	1.09	0.854	0.280
2008	19.9	13.0	3.47	1.04	0.500	0.335
2009	18.3	14.3	2.74	1.01	0.874	0.224
2010	16.0	14.7	2.75	1.24	0.308	0.297
2011	17.2	14.5	3.57	1.06	0.255	0.442
2012	19.8	14.6	3.76	1.20	1.09	0.347
2013	17.7	15.3	3.22	1.05	1.22	0.458
2014	18.3	15.6	3.11	1.20	1.07	0.486
2015	20.1	16.0	3.39	1.07	0.956	0.485
2016	16.4	13.7	2.61	0.827	1.10	0.458
2017	17.6	13.4	2.55	0.545	0.684	0.430
2018	18.3	12.3	2.51	0.467	0.756	0.384
2019	13.5	11.8	2.80	0.554	0.824	0.421
2020	14.1	7.81	2.75	0.494	0.408	0.241
2021	12.4	7.54	2.63	0.345	0.452	0.218
2022	12.5	7.54	2.26	0.403	0.618	0.281
2023	13.1	7.01	2.57	0.454	0.900	0.370

Table A.11: Estimated annual catch of selected elasmobranchs by estimation group ('000 individuals, 95% confidence intervals in parentheses) for the WCPO longline fishery. This table includes estimation groups ranked 1 to 7 in terms of total estimated elasmobranch catch over the time series (see Table A.12 for the remaining elasmobranch estimation groups). Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Blue shark	Pelagic stingray	Silky shark	Shortfin mako	Elasmobranchs	Oceanic whitetip shark	Bigeye thresher
2003	1,210 (1,070-1,360)	278 (240-319)	153 (115-200)	65.8 (46.6-94.7)	91.9 (72.8-116)	101 (81.1-125)	36.7 (30.1-44.5)
2004	1,310 (1,170-1,460)	225 (200-256)	173 (138-219)	78.1 (59.1-104)	105 (88.1-127)	92.4 (75.3-114)	42.2 (35.9-49.2)
2005	1,110 (1,010-1,220)	223 (199-253)	182 (155-217)	96.3 (77.9-123)	84.2 (71.7-101)	75.3 (61.1-91.1)	37.2 (32.6-42.9)
2006	1,140 (1,010-1,270)	180 (161-202)	183 (155-220)	124 (103-156)	56.4 (47.1-68.5)	59.2 (47.5-73.1)	44.2 (38.5-51.2)
2007	1,130 (1,030-1,250)	155 (138-173)	210 (182-242)	132 (108-164)	52.5 (45.1-61.9)	51.1 (42.1-61.9)	47.6 (41.9-54.5)
2008	1,020 (916-1,140)	132 (116-149)	186 (152-225)	118 (98.4-145)	68.9 (58.7-82.4)	44.3 (35.2-55.1)	50.8 (43.3-59.6)
2009	1,040 (938-1,160)	193 (174-216)	252 (193-340)	127 (109-154)	76.9 (65.4-90.3)	49.0 (36.9-64.9)	40.0 (34.4-47.3)
2010	917 (819-1,020)	270 (233-313)	281 (179-442)	129 (109-154)	82.1 (68.3-98.7)	51.8 (34.2-76.1)	35.7 (30.0-43.4)
2011	1,100 (1,000-1,220)	245 (219-275)	325 (202-523)	114 (96.5-135)	85.1 (71.7-100)	57.4 (39.0-80.5)	53.0 (44.3-62.5)
2012	1,020 (919-1,120)	234 (202-275)	372 (248-559)	107 (88.8-130)	73.3 (60.4-88.9)	59.8 (41.1-85.6)	57.8 (48.5-68.3)
2013	747 (680-818)	181 (160-206)	163 (128-214)	108 (91.8-127)	55.6 (46.8-66.2)	37.9 (29.3-48.7)	44.3 (38.4-51.0)
2014	898 (808-997)	208 (184-237)	114 (94.9-138)	127 (109-148)	62.2 (49.2-78.6)	35.0 (28.3-43.1)	41.6 (36.0-48.1)
2015	968 (887-1,060)	259 (235-285)	160 (135-200)	85.3 (73.9-99.0)	75.6 (62.5-91.9)	46.3 (38.2-57.8)	49.4 (43.0-56.9)
2016	902 (826-994)	263 (235-290)	163 (138-196)	52.9 (44.8-62.8)	78.5 (64.5-96.5)	40.2 (33.9-48.2)	45.4 (39.7-51.5)
2017	845 (782-915)	291 (269-315)	141 (124-162)	53.5 (47.1-61.8)	92.6 (79.9-108)	31.6 (27.4-37.0)	47.1 (41.3-54.0)
2018	851 (783-919)	319 (290-348)	110 (94.7-128)	67.5 (58.2-81.2)	101 (84.8-121)	25.9 (21.7-31.2)	45.5 (39.1-54.3)
2019	913 (847-983)	340 (316-367)	109 (96.1-128)	72.5 (64.1-82.6)	74.2 (62.5-86.5)	29.9 (25.9-34.5)	37.0 (32.4-42.0)
2020	827 (769-895)	292 (264-323)	91.2 (76.6-111)	62.6 (55.1-70.3)	52.5 (42.9-63.7)	32.3 (27.8-37.9)	32.2 (27.5-37.2)
2021	636 (598-682)	286 (261-310)	67.8 (58.1-80.5)	51.9 (44.4-60.9)	42.7 (36.1-51.0)	30.5 (26.6-35.2)	29.0 (25.3-33.0)
2022	595 (550-645)	298 (269-332)	58.7 (49.5-68.7)	47.2 (38.2-58.3)	47.1 (38.2-59.6)	27.5 (23.4-32.2)	31.8 (27.3-36.6)
2023	596 (548-648)	262 (234-297)	51.9 (42.5-63.8)	49.9 (42.9-57.3)	47.2 (38.7-57.2)	22.9 (18.9-27.5)	23.2 (19.7-27.4)

Table A.12: Estimated annual catch of selected elasmobranchs by estimation group ('000 individuals, 95% confidence intervals in parentheses) for the WCPO longline fishery. This table includes estimation groups ranked 8 to 13 in terms of total estimated elasmobranch catch over the time series (see Table A.11 for the remaining elasmobranch estimation groups). Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Thresher sharks	Longfin mako	Mobulid rays	Porbeagle shark	Hammerhead sharks	Mako sharks
2003	47.2 (36.6-62.7)	14.5 (7.94-26.0)	1.76 (0.603-5.31)	15.9 (10.6-23.3)	7.23 (4.34-11.9)	1.16 (0.417-14.7)
2004	43.1 (34.2-53.8)	11.9 (6.87-21.4)	21.5 (11.3-45.0)	12.7 (9.28-17.1)	6.32 (4.20-9.51)	1.25 (0.506-4.33)
2005	36.5 (29.5-44.2)	11.9 (8.04-18.1)	16.8 (9.91-28.6)	8.87 (6.35-12.3)	4.54 (3.14-6.63)	0.932 (0.434-3.31)
2006	49.4 (41.2-60.1)	15.5 (11.3-22.2)	4.27 (2.38-7.47)	7.95 (5.69-10.6)	4.34 (2.75-6.80)	0.571 (0.256-2.35)
2007	57.8 (49.4-67.0)	21.9 (15.8-32.7)	3.10 (1.94-4.93)	6.63 (4.99-8.63)	5.11 (3.48-7.54)	0.635 (0.275-2.77)
2008	55.8 (46.6-66.0)	26.5 (17.4-42.2)	4.28 (2.58-7.33)	6.75 (4.94-9.06)	6.49 (4.33-9.37)	0.752 (0.328-3.49)
2009	49.2 (39.5-62.7)	27.3 (18.2-44.4)	7.47 (4.95-12.5)	6.30 (4.78-8.16)	8.31 (5.71-11.9)	0.659 (0.316-2.72)
2010	42.6 (31.8-58.6)	26.1 (17.1-42.5)	10.2 (5.96-18.4)	5.41 (3.81-8.57)	10.5 (7.22-15.7)	0.518 (0.246-1.80)
2011	48.0 (35.5-65.5)	24.9 (18.2-36.0)	11.6 (7.85-17.6)	7.47 (5.60-10.0)	15.3 (10.8-22.3)	0.439 (0.219-1.49)
2012	49.9 (38.2-66.2)	25.6 (18.2-38.3)	14.1 (9.27-22.1)	8.13 (5.93-11.0)	14.4 (9.77-21.6)	0.440 (0.204-1.16)
2013	29.4 (24.0-36.7)	24.5 (18.4-33.6)	12.5 (8.20-19.8)	7.16 (5.35-9.34)	7.00 (5.31-9.37)	0.416 (0.212-0.958)
2014	22.4 (18.3-28.5)	24.6 (18.4-33.4)	11.6 (8.14-17.5)	7.27 (5.38-9.68)	4.79 (3.62-6.31)	0.497 (0.200-1.45)
2015	24.7 (20.2-30.9)	19.1 (15.1-23.8)	8.44 (6.26-11.7)	8.86 (7.18-11.8)	4.35 (3.44-5.70)	0.373 (0.193-0.857)
2016	26.9 (22.7-32.3)	12.4 (9.81-16.1)	4.35 (3.13-6.17)	7.24 (5.76-9.00)	3.76 (2.91-4.87)	0.307 (0.164-0.657)
2017	31.9 (27.3-36.9)	13.9 (11.1-19.4)	5.86 (4.60-7.77)	6.71 (5.34-8.52)	3.17 (2.58-3.94)	0.331 (0.202-0.608)
2018	30.5 (25.5-37.1)	15.9 (12.6-21.9)	10.0 (7.44-13.5)	5.89 (4.23-8.15)	2.72 (2.15-3.45)	0.454 (0.276-0.834)
2019	21.6 (18.3-25.3)	13.6 (10.5-20.3)	9.24 (6.88-12.2)	4.58 (3.17-6.62)	2.99 (2.47-3.66)	0.555 (0.341-1.03)
2020	14.3 (11.3-18.1)	9.48 (7.05-15.1)	5.64 (4.10-7.83)	4.75 (3.34-6.88)	2.80 (2.23-3.64)	0.435 (0.239-0.863)
2021	12.2 (9.97-15.3)	6.64 (4.89-9.59)	4.66 (3.76-5.80)	4.03 (2.51-5.93)	2.43 (1.93-3.03)	0.191 (0.0977-0.422)
2022	11.7 (9.02-15.0)	6.16 (4.40-8.89)	6.04 (4.72-7.81)	2.31 (1.12-3.81)	1.97 (1.54-2.52)	0.117 (0.0530-0.294)
2023	9.19 (7.22-11.7)	6.56 (4.09-11.1)	6.76 (4.95-9.38)	1.81 (0.828-3.40)	1.25 (0.892-1.84)	0.141 (0.0649-0.314)

Table A.13: Estimated annual catch of selected elasmobranchs by estimation group ('000 tonnes, 95% confidence intervals in parentheses) for the WCPO longline fishery. This table includes estimation groups ranked 1 to 7 in terms of total estimated elasmobranch catch numbers over the time series (see Table A.14 for the remaining elasmobranch estimation groups). Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Blue shark	Bigeye thresher	Shortfin mako	Silky shark	Pelagic stingray	Elasmobranchs	Oceanic whitetip shark
2003	37.9 (33.5-42.6)	3.46 (2.83-4.19)	2.46 (1.74-3.53)	2.09 (1.57-2.71)	2.24 (1.94-2.59)	2.42 (1.92-3.05)	1.55 (1.24-1.90)
2004	41.1 (36.9-45.7)	3.87 (3.28-4.52)	2.91 (2.20-3.86)	2.28 (1.82-2.86)	1.88 (1.65-2.15)	2.68 (2.24-3.22)	1.42 (1.16-1.73)
2005	35.8 (32.7-39.3)	3.41 (2.99-3.95)	3.54 (2.86-4.52)	2.44 (2.08-2.89)	1.85 (1.63-2.12)	2.13 (1.81-2.53)	1.17 (0.958-1.40)
2006	36.4 (32.8-40.5)	4.09 (3.55-4.74)	4.51 (3.74-5.66)	2.48 (2.11-2.98)	1.45 (1.29-1.63)	1.45 (1.20-1.75)	0.935 (0.747-1.14)
2007	35.8 (32.7-39.6)	4.48 (3.92-5.11)	4.80 (3.92-5.96)	2.85 (2.46-3.29)	1.25 (1.11-1.40)	1.35 (1.16-1.58)	0.821 (0.672-1.01)
2008	32.6 (29.3-36.3)	4.80 (4.09-5.64)	4.25 (3.56-5.26)	2.52 (2.06-3.05)	1.04 (0.913-1.19)	1.75 (1.49-2.06)	0.714 (0.565-0.902)
2009	33.1 (29.9-36.7)	3.84 (3.29-4.56)	4.61 (3.93-5.57)	3.35 (2.59-4.52)	1.54 (1.37-1.73)	1.98 (1.70-2.30)	0.789 (0.596-1.04)
2010	29.4 (26.4-32.6)	3.41 (2.86-4.13)	4.65 (3.94-5.56)	3.90 (2.51-6.12)	2.05 (1.76-2.38)	2.18 (1.83-2.60)	0.847 (0.568-1.22)
2011	35.5 (32.3-39.2)	5.08 (4.23-6.03)	4.14 (3.49-4.89)	4.41 (2.79-7.07)	1.91 (1.69-2.16)	2.20 (1.86-2.58)	0.926 (0.634-1.30)
2012	32.7 (29.7-35.9)	5.59 (4.68-6.63)	3.89 (3.21-4.73)	5.02 (3.36-7.50)	1.84 (1.58-2.16)	1.90 (1.57-2.29)	0.944 (0.661-1.34)
2013	24.3 (22.2-26.5)	4.23 (3.65-4.89)	3.90 (3.32-4.60)	2.20 (1.74-2.89)	1.40 (1.24-1.59)	1.48 (1.25-1.76)	0.601 (0.467-0.772)
2014	28.7 (26.0-31.8)	3.93 (3.38-4.57)	4.58 (3.92-5.35)	1.53 (1.28-1.84)	1.61 (1.42-1.82)	1.65 (1.30-2.09)	0.559 (0.451-0.695)
2015	30.9 (28.4-33.8)	4.55 (3.96-5.25)	3.08 (2.67-3.58)	2.10 (1.77-2.61)	2.09 (1.90-2.30)	2.00 (1.67-2.44)	0.716 (0.596-0.880)
2016	29.2 (26.8-32.1)	4.20 (3.66-4.77)	1.91 (1.62-2.27)	2.18 (1.85-2.62)	2.08 (1.86-2.30)	2.13 (1.75-2.63)	0.636 (0.534-0.763)
2017	27.7 (25.7-29.9)	4.33 (3.80-4.96)	1.93 (1.69-2.23)	1.92 (1.70-2.21)	2.19 (2.03-2.38)	2.57 (2.22-2.99)	0.507 (0.440-0.590)
2018	28.0 (25.8-30.2)	4.04 (3.47-4.81)	2.43 (2.10-2.93)	1.47 (1.26-1.70)	2.52 (2.29-2.77)	2.69 (2.24-3.21)	0.395 (0.332-0.472)
2019	30.1 (28.0-32.3)	3.32 (2.90-3.76)	2.60 (2.30-2.97)	1.48 (1.31-1.73)	2.65 (2.46-2.86)	2.05 (1.72-2.38)	0.466 (0.408-0.533)
2020	27.1 (25.3-29.3)	2.88 (2.45-3.34)	2.24 (1.97-2.52)	1.27 (1.07-1.55)	2.17 (1.97-2.39)	1.47 (1.21-1.78)	0.512 (0.442-0.599)
2021	21.1 (19.9-22.6)	2.59 (2.24-2.96)	1.86 (1.60-2.19)	0.958 (0.819-1.14)	2.11 (1.93-2.30)	1.21 (1.02-1.44)	0.483 (0.419-0.556)
2022	19.8 (18.4-21.4)	2.75 (2.36-3.19)	1.70 (1.37-2.10)	0.809 (0.682-0.949)	2.32 (2.10-2.59)	1.24 (1.01-1.56)	0.426 (0.363-0.499)
2023	19.5 (18.0-21.2)	2.02 (1.71-2.39)	1.79 (1.54-2.06)	0.705 (0.575-0.865)	2.04 (1.82-2.31)	1.27 (1.04-1.54)	0.357 (0.297-0.433)

Table A.14: Estimated annual catch of selected elasmobranchs by estimation group ('000 tonnes, 95% confidence intervals in parentheses) for the WCPO longline fishery. This table includes estimation groups ranked 8 to 13 in terms of total estimated elasmobranch catch numbers over the time series (see Table A.13 for the remaining elasmobranch estimation groups). Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Mobulid rays	Longfin mako	Thresher sharks	Hammerhead sharks	Porbeagle shark	Mako sharks
2003	0.269 (0.0914-0.811)	0.989 (0.535-1.82)	1.09 (0.836-1.45)	0.374 (0.223-0.616)	0.246 (0.163-0.361)	0.0753 (0.0272-0.957)
2004	3.19 (1.68-6.63)	0.784 (0.448-1.46)	0.846 (0.676-1.05)	0.324 (0.216-0.486)	0.194 (0.143-0.263)	0.0813 (0.0329-0.282)
2005	2.51 (1.47-4.25)	0.791 (0.530-1.22)	0.782 (0.635-0.944)	0.235 (0.164-0.343)	0.137 (0.0995-0.190)	0.0606 (0.0282-0.215)
2006	0.641 (0.353-1.12)	1.06 (0.757-1.54)	1.02 (0.844-1.23)	0.223 (0.142-0.351)	0.125 (0.0902-0.168)	0.0371 (0.0166-0.153)
2007	0.470 (0.293-0.752)	1.52 (1.08-2.39)	1.20 (1.02-1.41)	0.258 (0.177-0.372)	0.104 (0.0779-0.135)	0.0413 (0.0179-0.181)
2008	0.650 (0.391-1.10)	1.85 (1.18-3.04)	1.29 (1.07-1.53)	0.323 (0.218-0.467)	0.107 (0.0788-0.143)	0.0489 (0.0213-0.227)
2009	1.13 (0.759-1.85)	1.96 (1.28-3.24)	1.10 (0.889-1.36)	0.413 (0.289-0.591)	0.0987 (0.0752-0.127)	0.0429 (0.0206-0.177)
2010	1.56 (0.910-2.83)	1.84 (1.19-3.07)	0.993 (0.732-1.33)	0.542 (0.374-0.812)	0.0864 (0.0611-0.142)	0.0337 (0.0160-0.117)
2011	1.77 (1.19-2.67)	1.71 (1.22-2.50)	1.06 (0.794-1.44)	0.765 (0.542-1.10)	0.119 (0.0887-0.159)	0.0286 (0.0143-0.0970)
2012	2.18 (1.43-3.44)	1.80 (1.25-2.74)	1.19 (0.912-1.58)	0.714 (0.491-1.06)	0.130 (0.0954-0.175)	0.0286 (0.0133-0.0753)
2013	1.93 (1.26-3.07)	1.71 (1.26-2.41)	0.714 (0.583-0.885)	0.355 (0.269-0.466)	0.113 (0.0848-0.147)	0.0271 (0.0138-0.0623)
2014	1.76 (1.25-2.66)	1.71 (1.24-2.34)	0.536 (0.430-0.725)	0.238 (0.180-0.310)	0.114 (0.0847-0.154)	0.0324 (0.0130-0.0942)
2015	1.22 (0.910-1.68)	1.27 (0.990-1.61)	0.560 (0.463-0.724)	0.220 (0.173-0.285)	0.139 (0.112-0.192)	0.0243 (0.0126-0.0557)
2016	0.648 (0.467-0.916)	0.843 (0.660-1.12)	0.731 (0.611-0.865)	0.188 (0.147-0.244)	0.114 (0.0905-0.143)	0.0200 (0.0107-0.0427)
2017	0.914 (0.714-1.20)	0.970 (0.765-1.42)	0.855 (0.729-0.989)	0.162 (0.131-0.198)	0.106 (0.0846-0.135)	0.0216 (0.0132-0.0396)
2018	1.49 (1.11-2.00)	1.04 (0.807-1.57)	0.695 (0.582-0.845)	0.140 (0.110-0.176)	0.0951 (0.0685-0.130)	0.0296 (0.0180-0.0543)
2019	1.40 (1.05-1.86)	0.917 (0.703-1.45)	0.562 (0.475-0.669)	0.153 (0.127-0.188)	0.0744 (0.0517-0.107)	0.0361 (0.0222-0.0673)
2020	0.876 (0.641-1.21)	0.654 (0.477-1.10)	0.426 (0.339-0.540)	0.145 (0.116-0.187)	0.0776 (0.0549-0.113)	0.0283 (0.0156-0.0562)
2021	0.735 (0.592-0.916)	0.454 (0.331-0.688)	0.383 (0.306-0.478)	0.126 (0.100-0.156)	0.0638 (0.0399-0.0959)	0.0124 (0.00636-0.0275)
2022	0.916 (0.718-1.18)	0.402 (0.287-0.597)	0.362 (0.278-0.471)	0.101 (0.0792-0.130)	0.0366 (0.0179-0.0609)	0.00764 (0.00345-0.0191)
2023	0.998 (0.732-1.38)	0.439 (0.273-0.787)	0.276 (0.215-0.351)	0.0648 (0.0466-0.0948)	0.0290 (0.0133-0.0547)	0.00921 (0.00423-0.0205)

Table A.15: Estimated annual catch of sea turtles by estimation group ('000 individuals, 95% confidence intervals in parentheses) for the WCPO longline fishery. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Olive ridley turtle	Loggerhead turtle	Green turtle	Sea turtles	Leatherback turtle	Hawksbill turtle
2003	4.54 (2.31-9.80)	<0.001 (<0.001-2.98)	0.638 (0.175-2.54)	1.39 (0.422-4.48)	0.720 (0.252-2.08)	0.289 (0.0399-2.33)
2004	6.00 (3.15-11.2)	0.0340 (0.00172-0.755)	1.28 (0.532-3.00)	1.45 (0.708-2.86)	0.741 (0.325-1.70)	0.378 (0.108-1.56)
2005	5.37 (3.28-8.88)	1.26 (0.515-4.42)	0.971 (0.521-1.94)	1.14 (0.618-2.23)	0.762 (0.418-1.32)	0.419 (0.140-1.30)
2006	5.74 (3.02-11.6)	3.65 (1.67-11.4)	0.719 (0.387-1.37)	0.672 (0.343-1.37)	0.706 (0.341-1.46)	0.527 (0.174-1.70)
2007	13.0 (7.04-29.9)	2.61 (1.22-8.24)	1.85 (1.09-3.15)	0.456 (0.225-0.915)	0.585 (0.301-1.14)	0.585 (0.194-1.87)
2008	14.9 (7.21-37.7)	1.06 (0.434-3.19)	3.26 (1.75-6.20)	0.222 (0.0993-0.481)	0.439 (0.215-1.04)	0.508 (0.157-1.67)
2009	17.4 (10.1-36.6)	0.696 (0.304-1.97)	3.22 (1.94-5.55)	0.143 (0.0599-0.383)	0.615 (0.353-1.20)	1.14 (0.430-3.49)
2010	12.4 (6.84-22.1)	0.917 (0.377-2.55)	2.10 (1.14-3.85)	0.121 (0.0476-0.366)	1.08 (0.604-2.19)	2.13 (0.690-7.77)
2011	9.08 (5.22-15.8)	1.58 (0.800-3.51)	1.96 (1.20-3.28)	0.157 (0.0682-0.432)	1.38 (0.828-2.45)	1.38 (0.493-4.25)
2012	10.0 (5.38-21.0)	2.65 (1.36-5.95)	2.96 (1.88-4.61)	0.350 (0.187-0.752)	1.80 (1.15-2.87)	0.793 (0.241-3.07)
2013	8.25 (5.55-14.4)	2.60 (1.54-5.43)	2.38 (1.58-3.71)	0.632 (0.405-1.05)	1.56 (1.09-2.17)	0.553 (0.243-1.38)
2014	9.43 (6.21-14.3)	2.90 (1.69-5.66)	2.56 (1.57-4.37)	1.42 (1.00-2.30)	1.87 (1.26-2.75)	0.982 (0.464-2.30)
2015	10.2 (7.12-14.8)	2.79 (2.00-4.69)	2.59 (1.75-4.14)	2.87 (1.94-4.87)	1.96 (1.35-2.89)	1.03 (0.498-2.10)
2016	7.44 (5.25-10.4)	2.54 (1.70-4.83)	1.91 (1.31-2.85)	3.52 (2.17-6.81)	1.05 (0.707-1.62)	0.545 (0.294-1.01)
2017	8.61 (6.44-11.6)	1.79 (1.27-2.79)	2.00 (1.49-2.66)	3.73 (2.42-6.39)	0.797 (0.536-1.22)	0.515 (0.328-0.875)
2018	5.25 (3.44-8.11)	1.63 (1.10-2.71)	1.80 (1.34-2.44)	2.82 (1.99-4.35)	0.603 (0.374-0.969)	0.545 (0.321-0.976)
2019	4.58 (3.50-6.07)	4.02 (3.06-6.88)	1.86 (1.39-2.50)	2.15 (1.56-3.12)	0.417 (0.280-0.603)	0.617 (0.410-1.00)
2020	3.38 (2.17-5.28)	6.05 (3.98-11.7)	1.15 (0.804-1.70)	1.14 (0.730-1.76)	0.360 (0.219-0.591)	0.412 (0.220-0.813)
2021	3.04 (1.85-5.30)	2.62 (1.60-5.20)	0.634 (0.447-0.881)	0.507 (0.252-1.05)	0.527 (0.358-0.790)	0.202 (0.0867-0.512)
2022	3.33 (2.04-5.68)	1.81 (1.03-3.70)	0.492 (0.309-0.790)	0.231 (0.0804-0.706)	0.845 (0.543-1.30)	0.108 (0.0413-0.323)
2023	1.42 (0.915-2.23)	5.61 (3.66-12.1)	0.483 (0.290-0.872)	0.104 (0.0249-0.474)	0.622 (0.384-0.983)	0.0586 (0.0121-0.262)

Table A.16: Estimated annual catch of marine mammals by estimation group ('000 individuals, 95% confidence intervals in parentheses) for the WCPO longline fishery. Estimated catches do not cover west-tropical domestic fisheries and former shark-targeted fisheries in the EEZs of Papua New Guinea and Solomon Islands.

Year	Toothed whales	Dolphins	Pinnipeds	'Blackfish'	False killer whale	Marine mammals	Whales
2003	0.894 (0.209-3.61)	<0.001 (<0.001-0.249)	0.301 (0.182-2.85)	0.129 (0.0179-0.938)	0.194 (0.0589-0.860)	0.326 (0.0627-2.83)	0.332 (0.109-1.47)
2004	0.889 (0.283-2.79)	0.00214 (<0.001-0.109)	0.197 (0.0812-0.680)	0.145 (0.0414-0.576)	0.144 (0.0602-0.493)	0.283 (0.0695-2.19)	0.238 (0.0954-0.923)
2005	0.763 (0.290-2.08)	0.266 (0.0689-1.08)	0.0900 (0.0380-0.425)	0.302 (0.124-0.814)	0.120 (0.0582-0.397)	0.228 (0.0688-1.53)	0.168 (0.0708-0.615)
2006	0.671 (0.270-1.88)	0.587 (0.257-1.57)	0.160 (0.0852-1.01)	0.603 (0.280-1.33)	0.146 (0.0578-0.627)	0.203 (0.0656-1.16)	0.121 (0.0542-0.425)
2007	0.708 (0.276-2.50)	0.451 (0.186-1.15)	0.126 (0.0666-0.849)	0.449 (0.223-0.961)	0.239 (0.108-1.29)	0.263 (0.0776-1.84)	0.109 (0.0425-0.464)
2008	0.659 (0.257-2.26)	0.274 (0.0928-0.804)	0.111 (0.0449-0.846)	0.190 (0.0717-0.495)	0.294 (0.131-1.67)	0.227 (0.0681-1.42)	0.0913 (0.0357-0.374)
2009	0.606 (0.248-2.07)	0.231 (0.0954-0.558)	0.141 (0.0639-0.916)	0.136 (0.0544-0.367)	0.270 (0.129-1.35)	0.251 (0.0811-1.35)	0.0860 (0.0323-0.342)
2010	0.669 (0.287-1.81)	0.296 (0.0803-1.03)	0.222 (0.122-0.992)	0.164 (0.0521-0.568)	0.265 (0.113-0.963)	0.258 (0.0896-1.26)	0.0851 (0.0346-0.297)
2011	0.650 (0.299-1.65)	0.359 (0.159-0.844)	0.284 (0.141-1.18)	0.206 (0.0903-0.501)	0.335 (0.165-0.947)	0.242 (0.0909-1.11)	0.0851 (0.0362-0.257)
2012	0.733 (0.383-1.56)	0.531 (0.271-1.00)	0.416 (0.158-1.40)	0.377 (0.166-0.803)	0.456 (0.239-0.893)	0.273 (0.112-1.13)	0.105 (0.0489-0.291)
2013	0.705 (0.417-1.27)	0.449 (0.270-0.796)	0.433 (0.217-1.73)	0.565 (0.317-1.06)	0.400 (0.248-0.670)	0.306 (0.117-1.61)	0.0915 (0.0455-0.274)
2014	0.734 (0.487-1.22)	0.430 (0.250-0.778)	0.616 (0.333-3.30)	0.871 (0.491-1.65)	0.578 (0.333-1.07)	0.369 (0.143-1.90)	0.127 (0.0638-0.393)
2015	0.724 (0.524-1.06)	0.684 (0.406-1.25)	0.385 (0.246-0.933)	0.624 (0.350-1.12)	0.526 (0.327-0.972)	0.248 (0.118-0.765)	0.130 (0.0678-0.321)
2016	0.676 (0.506-0.939)	0.692 (0.421-1.27)	0.170 (0.0861-0.456)	0.250 (0.135-0.483)	0.343 (0.211-0.582)	0.214 (0.105-0.602)	0.125 (0.0691-0.301)
2017	0.745 (0.552-1.04)	0.696 (0.431-1.22)	0.291 (0.173-0.767)	0.247 (0.133-0.461)	0.368 (0.244-0.598)	0.201 (0.0974-0.596)	0.147 (0.0800-0.343)
2018	0.793 (0.594-1.11)	0.507 (0.299-0.959)	0.622 (0.323-1.76)	0.356 (0.161-0.769)	0.431 (0.269-0.768)	0.175 (0.0875-0.474)	0.184 (0.103-0.419)
2019	0.718 (0.527-1.06)	0.468 (0.281-0.845)	0.662 (0.269-2.23)	0.353 (0.217-0.621)	0.404 (0.267-0.657)	0.152 (0.0719-0.421)	0.192 (0.112-0.424)
2020	0.613 (0.457-0.850)	0.495 (0.280-1.03)	0.555 (0.237-1.58)	0.254 (0.132-0.535)	0.290 (0.172-0.513)	0.0923 (0.0403-0.281)	0.163 (0.0997-0.352)
2021	0.513 (0.362-0.748)	0.580 (0.346-1.11)	0.343 (0.186-0.897)	0.136 (0.0637-0.320)	0.305 (0.189-0.539)	0.0507 (0.0166-0.203)	0.145 (0.0838-0.313)
2022	0.463 (0.305-0.746)	0.579 (0.323-1.09)	0.364 (0.121-1.41)	0.102 (0.0414-0.291)	0.336 (0.182-0.613)	0.0486 (0.0129-0.208)	0.181 (0.102-0.387)
2023	0.443 (0.267-0.768)	0.322 (0.167-0.655)	0.361 (0.168-1.01)	0.141 (0.0561-0.346)	0.179 (0.0820-0.372)	0.0487 (0.0112-0.244)	0.221 (0.112-0.489)