ISSN: 1562-5206

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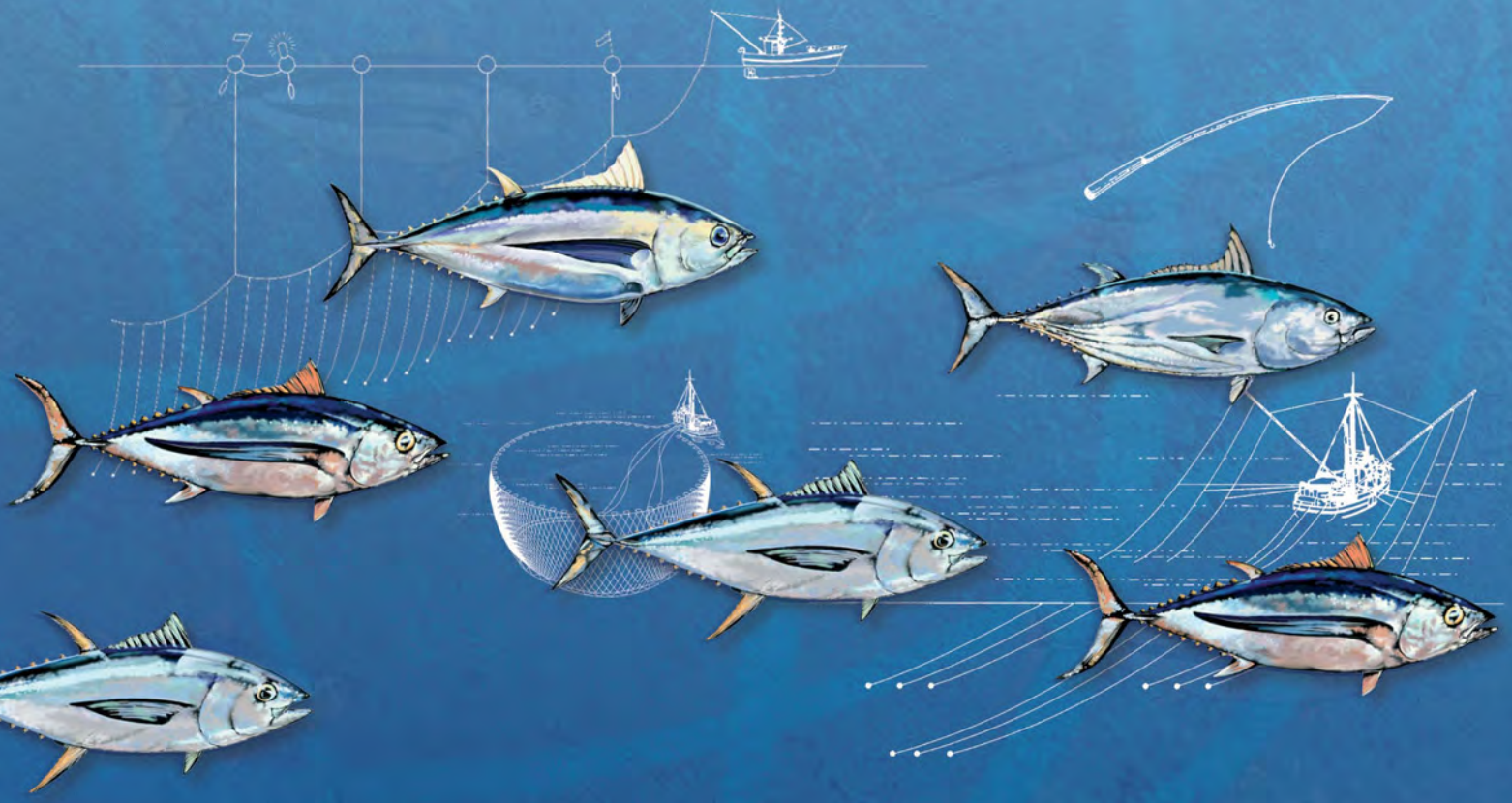
SECRETARIAT OF THE PACIFIC COMMUNITY
SECRÉTARIAT GÉNÉRAL DE LA COMMUNAUTÉ DU PACIFIQUE

Division of Fisheries, Aquaculture and Marine Ecosystems

THE WESTERN AND CENTRAL PACIFIC TUNA FISHERY:

2011 OVERVIEW AND STATUS OF STOCKS

Shelton Harley, Peter Williams, Simon Nicol, and John Hampton



Oceanic Fisheries Programme

Tuna Fisheries Assessment Report N °12

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Tuna Fisheries Assessment Report No. 12

Original text: English

Secretariat of the Pacific Community Cataloguing-in-publication data

Harley, S. J.

The western and central Pacific tuna fishery: 2011 overview and status of stocks / Shelton Harley, Peter Williams, Simon Nicol and John Hampton

(The Western and Central Pacific Tuna Fishery - Overview and Status of Stocks, no. 12 / Secretariat of the Pacific Community)

ISSN: 1562-5206

1. Tuna fisheries — Pacific Ocean.

2. Tuna populations — Pacific Ocean.

I. Harley, S. J. II. Williams, Peter Gordon III. Nicol, Simon IV. Hampton, John

V. Title VI. Secretariat of the Pacific Community VII. Series

639.277 830995 ACCR2

ISBN: 978-982-00-0603-4

ISSN: 1562-5206

Acknowledgements: We are grateful to the member countries of the Pacific Community and the fishing nations involved in the western and central Pacific tuna fishery for their cooperation in the provision of fishery data used in this report. Regional fisheries research and monitoring carried out by the Oceanic Fisheries Programme are currently funded by numerous sources, including the Australian Agency for International Development (AusAID), the New Zealand Aid Programme, the Government of France, and the European Community project, Scientific Support for the Management of Coastal and Oceanic Fisheries (SciCOFish).

Prepared for publication and printed at
the Secretariat of the Pacific Community
Noumea, New Caledonia, 2013.

Contents

Preface

Tuna fisheries assessment reports provide current information on the tuna fisheries of the western and central Pacific Ocean and the fish stocks (mainly tuna) that are impacted by them. The information provided in this report is summary in nature, but a list of references (mostly accessible via the Internet) is included for those seeking further details.

This report focuses on the main tuna stocks targeted by the fishery — skipjack tuna (Katsuwonus pelamis), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*), and South Pacific albacore tuna (*T. alalunga*).

The report is in three main parts: the first section provides an overview of the fishery, with emphasis on developments during the past few years; the second summarises the most recent information on the status of the stocks; and the third summarises information concerning the interaction between the tuna fisheries and other associated and dependent species. The data used in compiling the report are those which were available to the Oceanic Fisheries Programme (OFP) at the time of publication and are subject to change as improvements continue to be made to recent and historical catch statistics from the region. The fisheries statistics presented will usually be complete to the end of the year prior to publication; however, some minor revisions to statistics may be made for recent years from time to time. The stock assessment information presented is the most recent available.

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For further information, including a complete online French version of this report, see the OFP webpage: http://www.spc.int/oceanfish/.

1 The western and central Pacific tuna fishery

The tuna fishery in the western and central Pacific Ocean (WCPO), encompassed by the Convention Area of the Western and Central Pacific Fisheries Commission (WCP–CA) (Figure 1), is a diverse fishery ranging from small-scale, artisanal operations in the coastal waters of Pacific states to large-scale, industrial purse-seine, pole-and-line and longline operations in the exclusive economic zones of Pacific states as well as in international waters (high seas). The main species targeted by these fisheries are skipjack tuna (*Katsuwonus pelamis*), yellowfin tuna (*Thunnus albacares*), bigeye tuna (*T. obesus*) and albacore tuna (*T. alalunga*).

The current fishery characterisation includes significant revisions to the historical catch estimates from Indonesia that have yet to be verified, and new estimates from Vietnam. This new information has not yet been included in the stock assessments, so comparisons between recent catches and estimated sustainable yields require caution. Further, the figures in this report will differ slightly from those reported in the Tuna Fishery Yearbook 2011 (4 November 2012) due to updates and new data received since then.

Annual total catches of the four main tuna species (skipjack, yellowfin, bigeye and albacore) in the WCP–CA increased steadily during the 1980s as the purse-seine fleet expanded, and remained relatively stable during most of the 1990s until the sharp increase in catch in 1998. Over the past seven years, there has been an upward trend in total tuna catch, primarily due to increases in purse-seine fishery catches (Figure 2 and Table 1). The provisional total WCP–CA tuna catch for 2011 was estimated at 2,323,047 tonnes (t), the lowest annual catch since 2006. This was 175,205 t lower than the 2010 catch (2,498,252 t) and 280,299 t lower than the record catch in 2009 (2,603,346 t). In 2011, the purse-seine fishery accounted for an estimated 1,543,140 t (66% of the total catch, and the lowest catch for this fishery since 2006), with pole-and-line taking an estimated 274,105 t (12%), the longline fishery an estimated 274,105 t (12%), and the remainder (10%) taken by troll gear and a variety of artisanal gear, mostly in eastern Indonesia and the Philippines. The WCP–CA tuna catch for 2011 represented 79% of the total Pacific Ocean catch of 2,923,196 t, and 56% of the global tuna catch (the provisional estimate for 2011 is 4,167,990 t).

The 2011 WCP–CA catch of skipjack (1,557,588 t — 67% of the total catch) was the lowest since 2006 and reflects the low catch rates from the purse-seine fishery in the second half of 2011 (Table 2). The WCP–CA yellowfin catch for 2011 (479,403 t — 21%) was the lowest since 2002 due to the lowest purse-seine catches since 1997 (the highest was in 2008: 574,825 t). The WCP–CA bigeye catch for 2011 (159,479 t — 7%) was the highest since 2004 due to the increased purse-seine catches in 2011. The 2011 WCP–CA albacore catch (126,577 t — 5%) was the fourth highest on record, but included a drop in the longline catches from the South Pacific stock from the highs in 2009–2010.

The 2011 purse-seine catch of 1,543,140 t was the lowest catch for this fishery since 2006 (Figure 3 and Table 1).[1] The 2011 purse-seine skipjack catch (1,202,373 t — 77% of the total skipjack catch) was the lowest since 2006. The 2011 purse-seine catch of yellowfin tuna (268,013 t) was the lowest since 1996. The provisional purse-seine catch estimate for bigeye tuna for 2011 (72,424 t) was the highest since 2004 and 45% of the total 2011 bigeye catch. It is important to note that this figure will be revised once all observer data for 2011 have been received and processed.

The 2011 longline catch of 264,772 t was around 5% lower than the highest on record (2009 — 279,012 t) (Figure 4 and Table 1). The provisional bigeye catch (75,986 t) for 2011 was the lowest since 2001. The yellowfin catch for 2011 (94,148 t) was the highest since 1981.

The overall pole-and-line catches were subject to significant revision due to the new catch estimates from Indonesia. The 2011 pole-and-line catch of 274,105 t was the highest since 2007, and the second highest annual catch for this fishery in the past ten years (Figure 5 and Table 1). Skipjack tends to account for the majority of the catch (~70–80% in recent years, but typically more than 85% of the total catch in tropical areas), and albacore (8–20% in recent years) is taken by the Japanese coastal and offshore fleets

1 The current fishery characterisation includes significant revisions to the species-specific purse-seine catch estimates which have resulted in reduced catch estimates for skipjack tuna and increases for yellowfin and bigeye tuna.

in the temperate waters of the northern Pacific Ocean. Yellowfin tuna (5–10%) and a small component of bigeye tuna (1–6%) make up the remainder of the catch. The Japanese distant-water and offshore and the Indonesian fleets account for most of the WCP–CA pole-and-line catch.

The 2011 troll albacore catch in the South Pacific of 3,119 t was 45% higher (~1000 t) than the 2010 catch, which was the second lowest since 1984. The New Zealand troll fleet (165 vessels catching 1,790 t in 2009) and the United States troll fleet (four vessels catching 237 t in 2009) typically account for most of the albacore troll catch, with minor contributions coming from other fleets.

2 Status of tuna stocks

The sections below provide a summary of the recent developments in fisheries for each species and the results from the most recent stock assessments. A summary of the important biological reference points for the four stocks is provided in Table 3.

2.1 Skipjack tuna

The 2011 WCP–CA skipjack catch of 1,557,588 t was the lowest since 2006 and 13% lower than the record high in 2009 (Figure 6 and Table 4). As has been the case in recent years, the main determinant in the overall catch of skipjack is catch taken in the purse-seine fishery (1,202,373 t in 2011 — 77%). The next highest proportion of the catch was taken by pole-and-line gear (203,294 t — 13%) and 'unclassified' gear in the domestic fisheries of Indonesia, the Philippines and Japan (145,906 t — 9%). The longline fishery accounted for much less than 1% of the total catch.

The majority of the skipjack catch is taken in equatorial areas, and most of the remainder is taken in the seasonal home-water fishery of Japan. The domestic fisheries in Indonesia (purse-seine, pole-and-line and unclassified gear) and the Philippines (e.g. ring-net and purse-seine) account for the majority of the skipjack catch in the western equatorial portion of the WCP–CA.

The dominant mode of the WCP–CA skipjack catch (by weight) typically falls in the size range between 40 cm and 60 cm, corresponding to 1–2+ year-old fish (Figure 6). For pole-and-line the fish typically range between 40 and 55 cm, while for the domestic fisheries of Indonesia and the Philippines they are much smaller (20–40 cm). It is typically found that skipjack taken in unassociated schools are larger than those taken in associated schools.

2.1.1 Stock assessment

The most recent assessment of skipjack in the WCPO was conducted in 2011 and included data from 1972 to 2010.

While estimates of fishing mortality for skipjack have increased over time, current fishing mortality rates for skipjack tuna are estimated to be about one-third the level of fishing mortality associated with maximum sustainable yield (F_{MSY}). Therefore, overfishing is not occurring (i.e. $F_{CURR} < F_{MSY}$) (Figure 7). Estimated recruitment shows an upward trend over time, but estimated biomass is declining over time to about 60% of the level predicted in the absence of fishing. Nevertheless, recent spawning biomass levels are estimated to be well above the SB_{MSY} level.

Based on these results, the WCPFC Scientific Committee noted that if recent fishing patterns continue, catch rate levels are likely to decline and catch should decrease as stock levels are fished down to MSY levels. Due to the rapid change of the fishing mortality and biomass indicators relative to MSY in recent years, increases

of fishing effort should be monitored. The commission should consider developing limits on fishing for skipjack to limit the declines in catch rate associated with further declines in biomass.

2.2 Yellowfin tuna

The WCPC-CA yellowfin catch decreased 12% in 2011 to 479,403 t, primarily as a result of decreased purse-seine catches. Total catches were 17% lower than the record high in 2008 (574,825 t) (Figure 8 and Table 5). The remainder of the yellowfin tuna catch comes from the pole-and-line fishery and the domestic Indonesian and Philippines 'other' gear. In recent years, the yellowfin longline catch has ranged from 80,000 t to 96,000 t, which is well below catches taken in the late 1970s to early 1980s (90,000–120,000 t). The purse-seine catch of yellowfin tuna is almost four times the longline catch.

As with skipjack, the great majority of the yellowfin catch is taken in equatorial areas by large purse-seine vessels, and a variety of gear in the Indonesian and Philippine fisheries. The domestic surface fisheries of the Philippines and Indonesia take large numbers of small yellowfin in the range 20–50 cm. In the purse-seine fishery, smaller yellowfin are caught in log and FAD sets than in unassociated sets. A major portion of the purse-seine catch by weight is adult (> 100 cm) yellowfin tuna, to the extent that the purse-seine catch (by weight) of adult yellowfin tuna is usually higher than the longline catch, which was the case in 2008, where exceptional catches of large yellowfin in the size range 120–130 cm were experienced in the purse-seine fishery.

2.2.1 Stock assessment

The most recent assessment of yellowfin tuna in the WCPO was conducted in 2011 and included data from 1952 to 2010.

Fishing mortality has increased in recent years, but is still estimated to be below F_{MSY}, indicating that overfishing is not occurring (Figure 9). Both biomass and recruitment have declined gradually over the duration of the fishery, but spawning biomass levels are estimated to still be above SB_{MSY}, so the stock is not considered to be in an overfished state. This optimism at the stock level must be tempered by the patterns observed at the subregional level within the stock assessment. Patterns of exploitation and fishery impacts are not the same across the entire model region, with much higher fishery impacts estimated for Region 3, western equatorial Pacific. This region, from which ~81% of catches are taken, is at least fully exploited, with no potential for increased catches. The WCPFC Scientific Committee reiterated early advice that there be no increase in fishing mortality in the western equatorial Pacific.

2.3 Bigeye tuna

The WCP–CA 2011 bigeye tuna catch was 159,479 t, which is an increase of about 16% over 2010 levels, but much closer to the levels observed for the period 2005–2009. Longline bigeye catches have fluctuated between 73,700 t and 96,000 t since 2002, but the 2011 longline catch (75,896 t) was the second lowest in the past ten years (Figure 10 and Table 6). The provisional WCP–CA purse-seine bigeye catch for 2011 was estimated to be 72,424 t, which was a large (38%) increase on the relatively low level of catch in 2010. This is due to the increase in FAD sets in 2011 over 2010. The WCP–CA pole-and-line fishery has generally accounted for between 4,600 t and 9,800 t of bigeye catch annually over the past ten years. Estimates of catches for the Indonesian and Philippines domestic fisheries have recently been revised down to slightly lower levels than for the pole-and-line fishery.

The majority of the WCP–CA catch is taken in equatorial areas, both by purse seine and longline, but with some longline catch in sub-tropical areas (e.g. east of Japan and off the east coast of Australia). In the equatorial areas, much of the longline catch is taken in the central Pacific, contiguous with the important traditional bigeye longline area in the eastern Pacific.

As with skipjack and yellowfin tuna, the domestic surface fisheries of the Philippines and Indonesia take large numbers of small bigeye in the range 20–50 cm. The longline fishery clearly accounts for most of the catch (by weight) of large bigeye in the WCP–CA. This is in contrast to large yellowfin tuna, which (in addition to the longline gear) are also taken in significant amounts from unassociated (free-swimming) schools in the purse-seine fishery and in the Philippines handline fishery. Large bigeye are very rarely taken in the WCPO purse-seine fishery and only a relatively small amount comes from the handline fishery in the Philippines. Bigeye sampled in the longline fishery are predominantly adult fish with a mean size of ~130 cm FL (range 80–160 cm FL).

2.3.1 Stock assessment

The most recent assessment of bigeye tuna in the WCPO was conducted in 2011 and included data from 1952 to 2010.

Fishing mortality is estimated to have increased through time, particularly in recent years, and current levels are far in excess of F_{MSY} level ($F_{CURR} > F_{MSY}$). Therefore, overfishing is occurring (Figure 11). The biomass of spawners is estimated to have declined over the duration of the fishery and is now approaching SB_{MSY}, and there is a possibility that bigeye tuna is already in an overfished state. The model estimates that recent catches have been sustained by higher-than-average levels of recruitment, which have also maintained biomass above the SB_{MSY} level.

The WCPFC Scientific Committee recommended a reduction of at least 32% in fishing mortality from the average levels for 2006–2009 to return the fishing mortality rate to F_{MSY}. It was considered too early to quantitatively conclude whether the WCPFC Conservation and Management Measure (CMM2008-01) has reduced fishing mortality for bigeye tuna to the levels stated in the objective of the measure. Data for 2009 and 2010 have been incorporated into the stock assessments, but the data for these years are incomplete and estimates of fishing mortality in the final year of the model (2010) are particularly uncertain.

2.4 South Pacific albacore tuna

The South Pacific albacore catch in 2011 (72,654 t) was 18% lower than the record high in 2010 (89,021 t) (Figure 12 and Table 7). This decrease was driven by decreased longline catches, which data suggest was a function of reduced catch rates rather than reduced effort. Longline fishing has accounted for most of the catch of this stock (> 75% in the 1990s, but > 90% in recent years). The troll catch, covering a season spanning November to April, has generally been in the range of 3,000–8,000 t, although it has averaged around to 2,500 t over the past five years.

The longline catch is widely distributed in the South Pacific, but with catches concentrated in the western part of the Pacific. Much of the increase in catches is attributed to catches taken by Chinese-Taipei and Chinese vessels fishing north of 20°S. The Pacific Island domestic longline fleet catch is restricted to latitudes 10°–25°S. Troll catches are distributed in New Zealand's coastal waters, mainly off the South Island, and along the sub-tropical convergence zone (STCZ). Less than 20% of the overall South Pacific albacore catch is usually taken east of 150°W.

The longline fishery takes adult albacore, mostly in the narrow size range 90–105 cm, and the troll fishery takes juvenile fish in the range 45–80 cm. Juvenile albacore also appear in the longline catch from time to time.

2.4.1 Stock assessment

The most recent stock assessment for South Pacific albacore tuna was undertaken in 2012 and was based on data from 1960 to 2011. For this assessment a single model run (a reference case) was chosen to show trends in stock size, but the Scientific Committee reached conclusions regarding stock status, sustainable yields, and subsequent management advice based on the median outcomes from a large number of model runs.

The assessment indicates that fishing mortality on adult fish has increased considerably over the past decade, but that overall estimates of fishing mortality are well below F_{MSY}. Therefore, overfishing is not occurring (Figure 13). Spawning biomass levels remain well above SB_{MSY}, so the stock is not in an overfished state. Nevertheless, the current level of longline catch is estimated to be having a considerably higher impact on the portion of the stock vulnerable to the longline fishery. The assessment indicates that the current level of impact is about 70% for fish of the sizes taken in the northern longline fisheries, having increased sharply in recent years.

Given the recent expansion of the fishery and recent declines in exploitable biomass available to longline fisheries, and given the importance of maintaining catch rates, the WCPFC Scientific Committee recommended that longline fishing mortality be reduced if the Commission wishes to maintain economically viable catch rates.

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3 Ecosystem considerations

The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean has identified ecosystem issues as an important element of the principles for conservation and management of the tuna resource in the WCP–CA. This section of the report provides a brief summary of the information available from the WCP–CA tuna fishery concerning associated and dependent species, including information on the species composition of the catch from the tuna fisheries and an assessment of the impact of the fishery on these species. It is important to note that most of these species have received limited attention to date and, consequently, it is possible to provide an assessment of the impact of the fishery for a few species only. The section also includes a summary review of recent and current research that is being undertaken to learn more about the relationship between the main tuna species and the pelagic ecosystem.

3.1 Catch composition

The tuna fisheries of the WCPO principally target four main tuna species: skipjack, yellowfin, bigeye and albacore tuna. However, the fisheries also catch a range of other species in association with these. Some of the associated species are of commercial value (by-products), while many others are of no value and are discarded. There are also incidents of the capture of species of ecological and/or social significance ('protected species'), including marine mammals, sea turtles and some species of shark (e.g. whale sharks).

The information concerning the catch composition of the main tuna fisheries in the WCPO comes largely from the various observer programmes operating in the region. Overall, catches from unassociated and associated purse-seine sets are dominated by tuna species (99.6% and 98.4%, respectively), and there has been limited interaction with protected species (Figure 14). Most of the observed interactions involved unidentified species of marine mammals, and few mortalities have been recorded.

Species composition of the catch has also been estimated for three main longline fisheries operating in the WCPO: the western tropical Pacific (WTP) shallow-setting longline fishery, the WTP deep-setting longline fishery, and the western South Pacific (WSP) albacore fishery. While estimates are uncertain due to the low level of observer coverage, some general conclusions are possible. The main tuna species account for 44%, 71% and 69% of the total catch (by weight) of the three fisheries respectively (Figure 14). Blue shark was in the top four-ranked species in the catch composition of all three fisheries. The WTP shallow fishery has a higher proportion of non-tuna species in the catch, principally shark and billfish species, while opah (moonfish) represents a significant component of the WSP albacore longline catch. There are also considerable differences in the species composition of the billfish catch in the three fisheries while, overall, the WTP shallow and WSP albacore fisheries catch a higher proportion of surface-orientated species than does the WTP deep-setting fishery.

Interactions with seabirds and marine mammals were very low in all three longline fisheries. Catches of five species of marine turtles were observed in the equatorial longline fishery, although the observed encounter rate was very low and most of the turtles caught were alive at the time of release.

3.2 Impact of catches

In addition to the main tuna species, annual catch estimates for the WCPO in 2011 are available for the main species of billfish (swordfish [20,855 t], blue marlin [18,195 t], striped marlin [4,174 t] and black marlin [2,444 t]). For blue and black marlin these figures represent a small decline from 2010, while for striped marlin and swordfish they represent small increases that occurred in both the North and South Pacific. Catches of other associated species have not been accurately quantified.

In 2011, stock assessments were undertaken for several other species taken in WCPO tuna fisheries. The conclusions of the assessments are provided below:

Southwest Pacific striped marlin: The southwest Pacific striped marlin assessment results indicate that the stock is fully exploited, and is not experiencing overfishing but may be overfished. The WCPFC Scientific Committee noted that recent catches are close to MSY, recent fishing mortality is slightly below F_{MSY}, and recent spawning biomass is slightly below SB_{MSY}. The recent catch increase is driven in part by increases in catch in the northern area of the stock area that is not subject to the current CMM for this stock.

North Pacific striped marlin: The stock is overfished and experiencing overfishing. Reducing fishing mortality would likely increase spawning stock biomass and may improve the chances of higher recruitment.

Oceanic whitetip shark: Despite the data limitations going into the assessment and the wide range of uncertainties considered, all of the accepted model runs indicate that the WCPO oceanic whitetip shark stock is currently overfished and overfishing is occurring relative to commonly used MSY-based reference points and depletion-based reference points. Management measures to reduce fishing mortality and to rebuild spawning biomass have been agreed to under CMM 2011-04, but mitigation to avoid capture is recommended. Given the bycatch nature of most of the fishery impacts, mitigation measures provide the best opportunity to improve the status of the WCPO oceanic whitetip shark stock.

In 2013, stock assessments are planned for blue shark (both southern and northern hemispheres), silky shark, and southwest Pacific swordfish.

3.3 Tuna tagging

Large-scale tagging experiments are required to provide the level of information (fishery exploitation rates and population size) necessary for tuna stock assessments of tropical tunas in the western and central Pacific Ocean. Tagging data have the potential to provide much information of relevance to stock assessment, either by way of stand-alone analyses or, preferably, through integration with other data directly in the stock assessment model. Tuna tagging has been a core activity of the Oceanic Fisheries Programme for the last 30 years, with tagging campaigns occurring in the 1970s, 1990s and, most recently, since 2006. This most recent campaign has now tagged and released over 366,000 tuna in the equatorial western and central Pacific Ocean with over 61,000 reported recaptures (Figure 15). A summary of tag releases and recoveries is provided in Table 8.

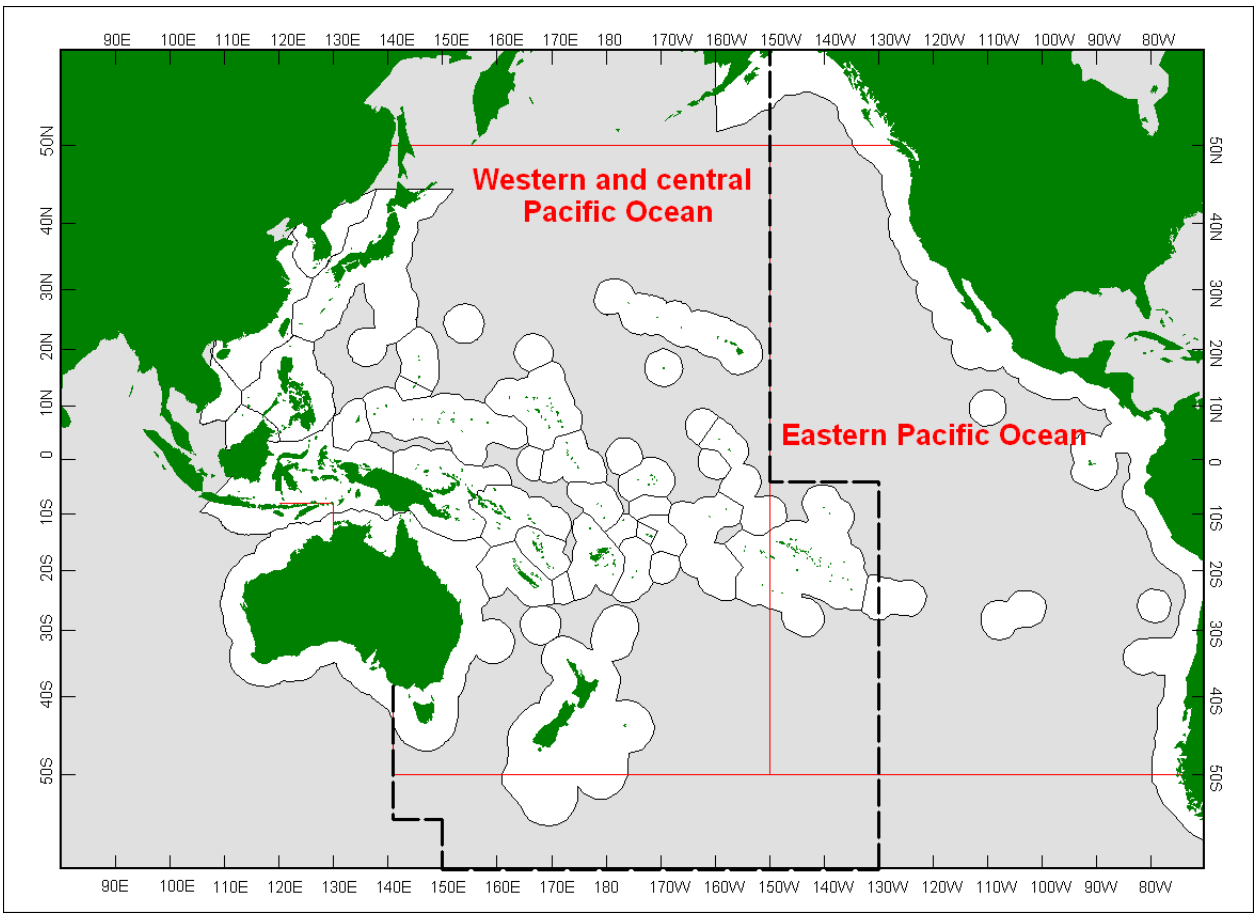

Figure 1: The western and central Pacific Ocean (WCPO), the eastern Pacific Ocean (EPO) and the WCPFC Convention Area boundary (WCP–CA in dashed lines).

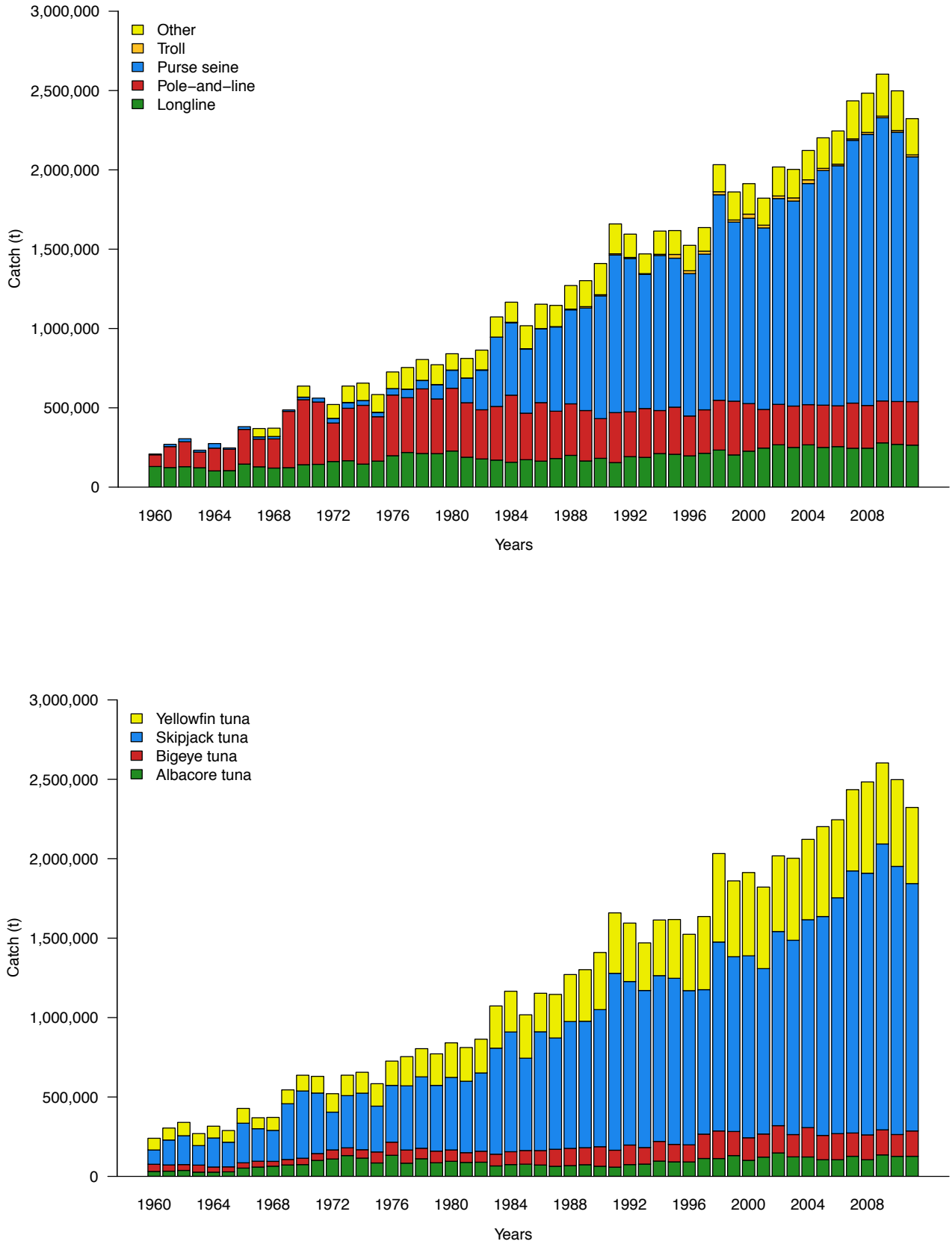

Figure 2: Catch (metric tonnes) by gear (top) and species (bottom) for the western and central Pacific region, 1960–2011. Note: data for 2011 are preliminary.

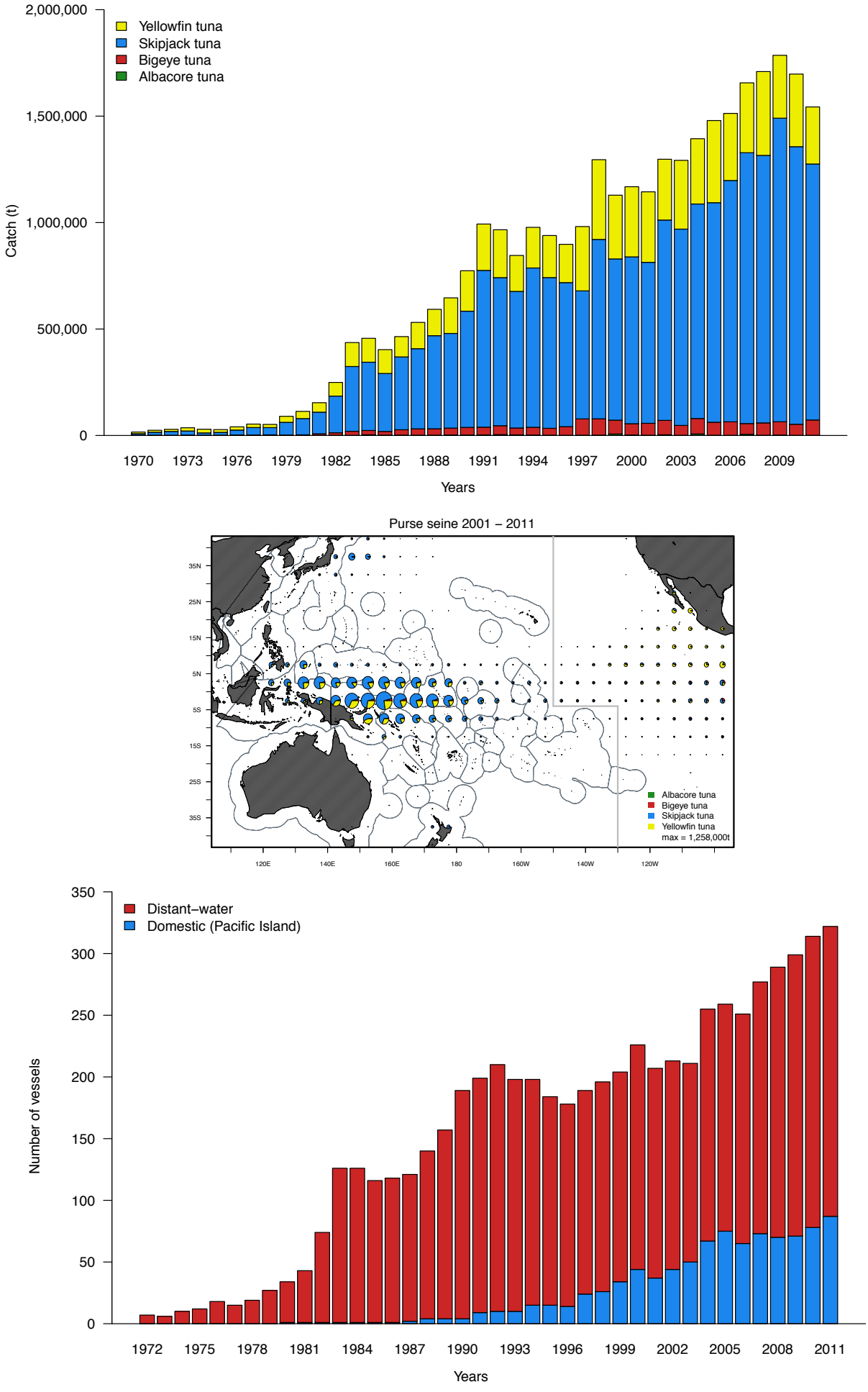

Figure 3: Time series of catch (t) (top), recent spatial distribution of catches (middle), and fleet sizes (bottom) for the purse-seine fishery in the western and central Pacific Ocean (WCPO).

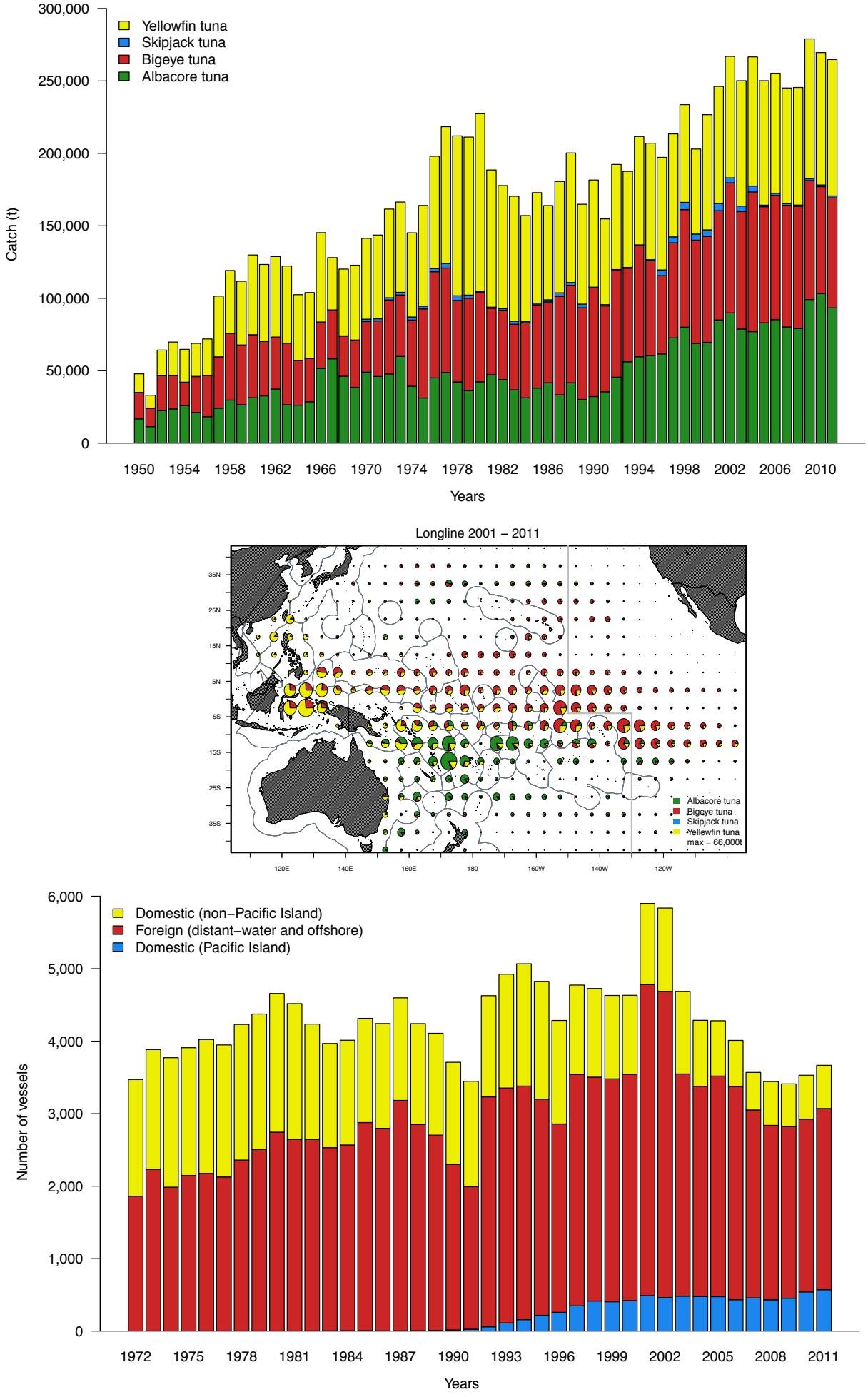

Figure 4: Time series of catch (t) (top), recent spatial distribution of catches (middle), and fleet sizes (bottom), for the longline fishery in the western and central Pacific Ocean (WCPO).

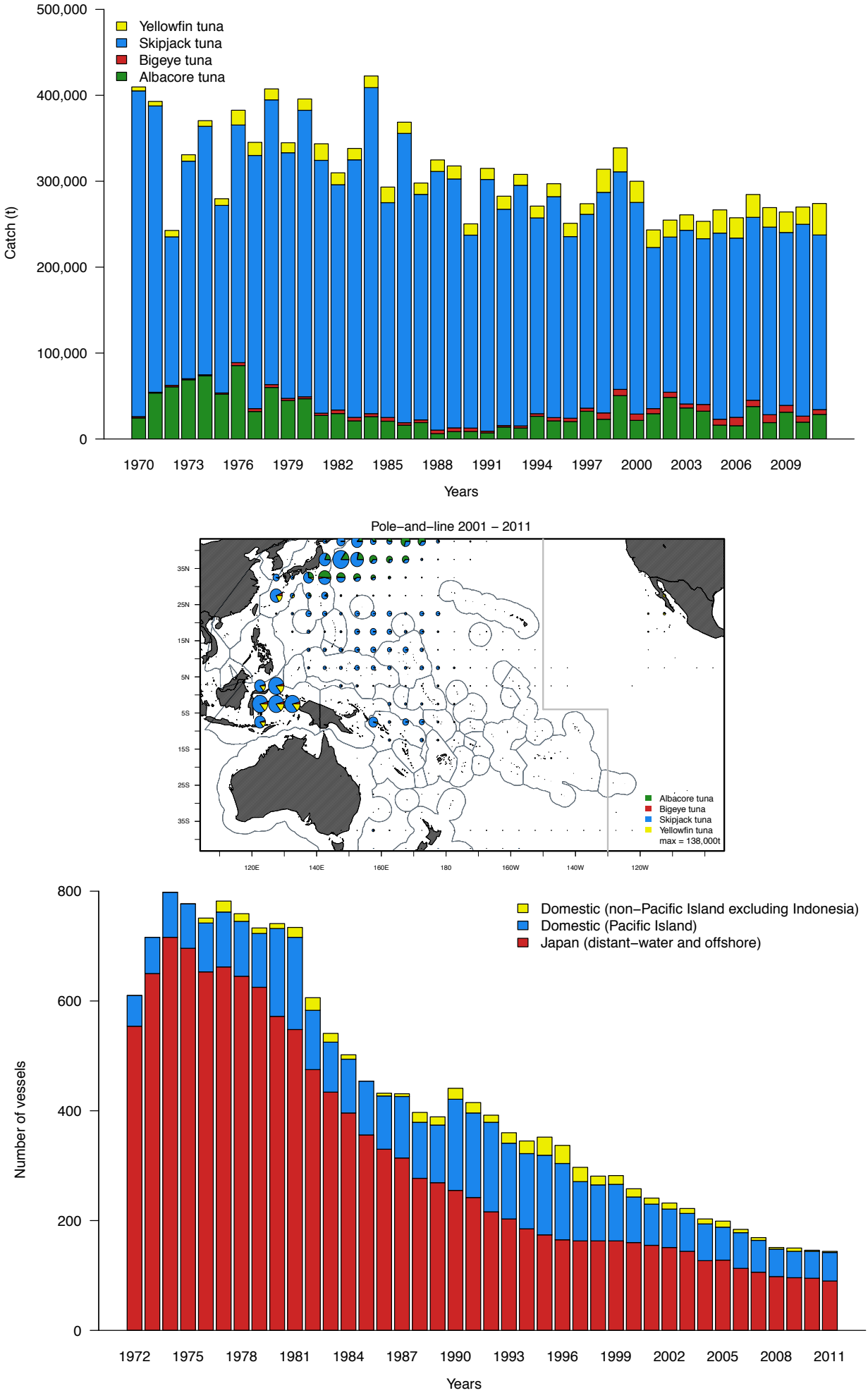

Figure 5: Time series of catch (t) (top), recent spatial distribution of catches (middle), and fleet sizes (bottom), for the pole-and-line fishery in the western and central Pacific Ocean (WCPO).

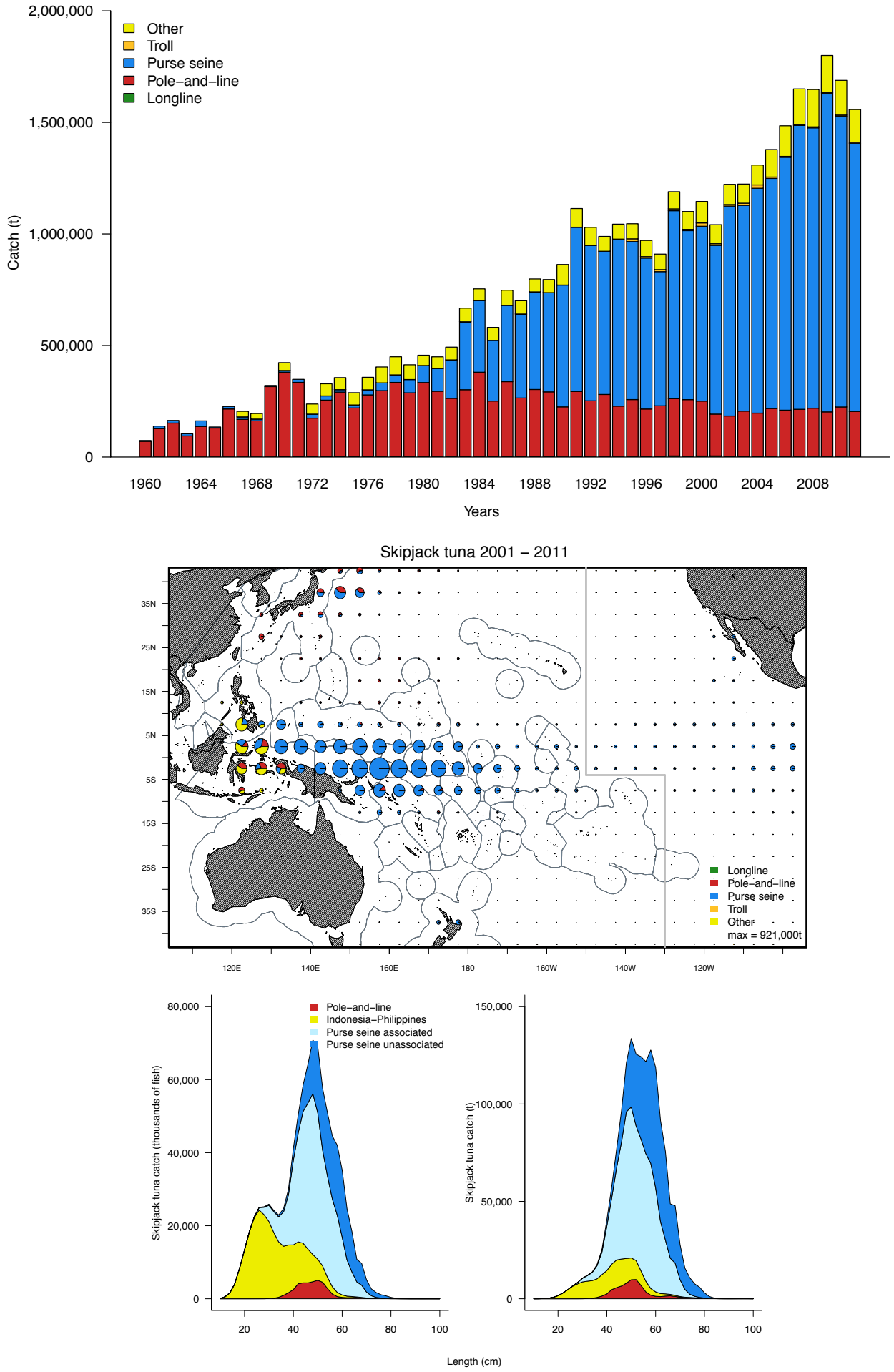

Figure 6: Time series (top), recent spatial distribution (middle), and size composition (bottom) of skipjack tuna catches (t) by gear for the western and central Pacific Ocean (WCPO).

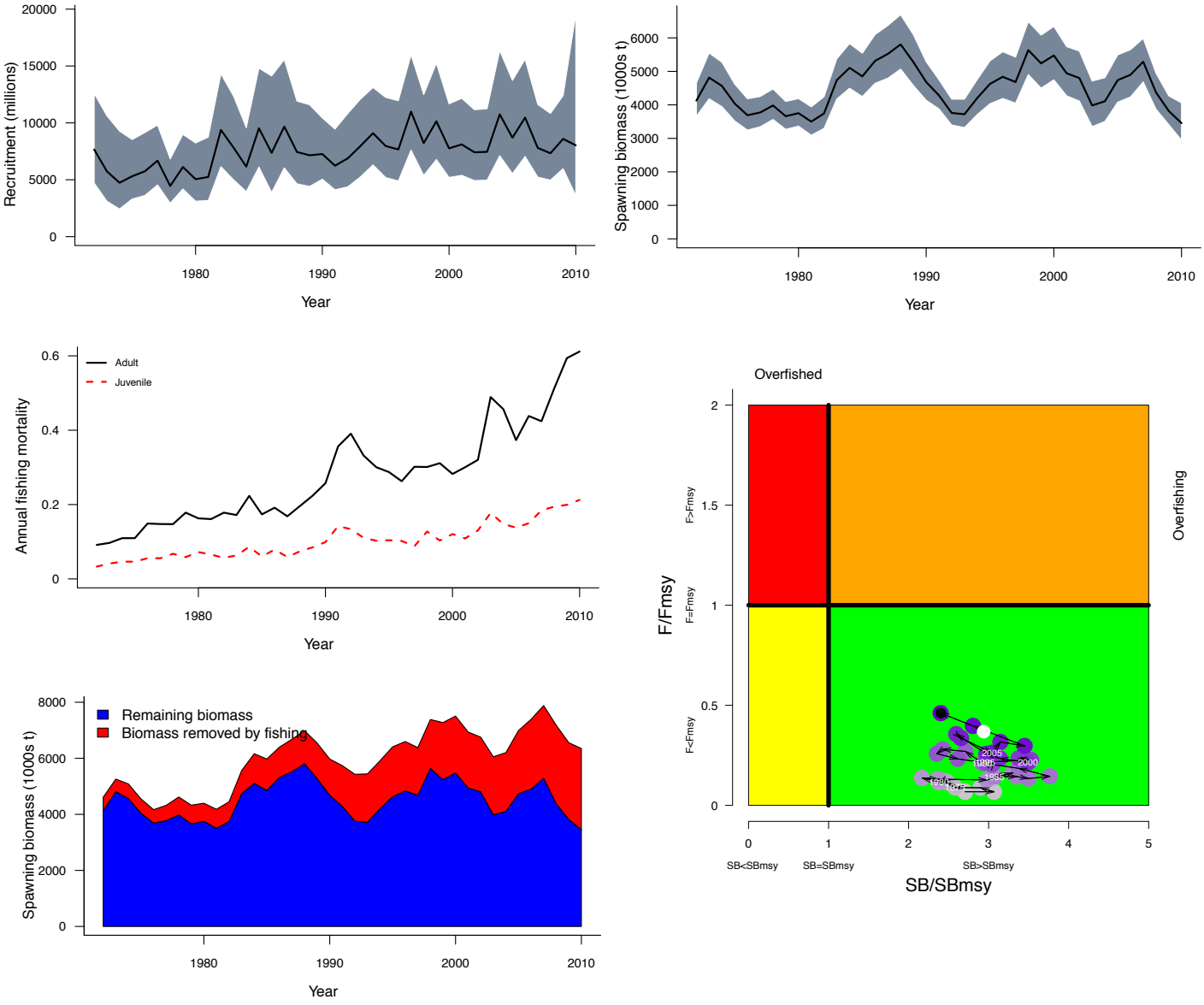

Figure 7: Estimated recruitment (top left), spawning biomass (top right), fishing mortality (middle left), stock status (middle right) and estimated spawning biomass with [blue] and without [red] fishing (bottom left) from the 2011 skipjack tuna stock assessment.

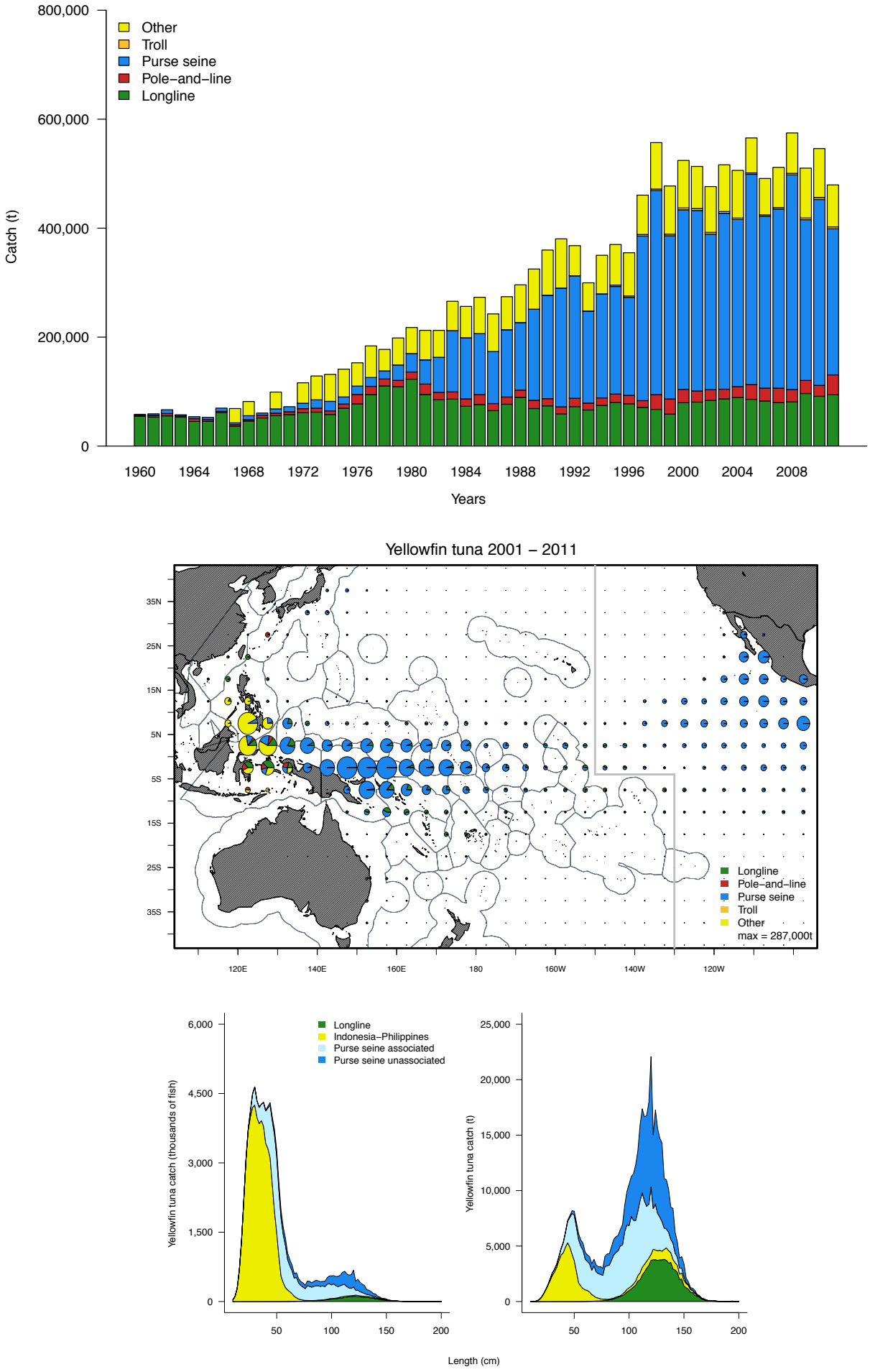

Figure 8: Time series (top), recent spatial distribution (middle), and size composition (bottom) of yellowfin tuna catches (t) by gear for the western and central Pacific Ocean (WCPO).

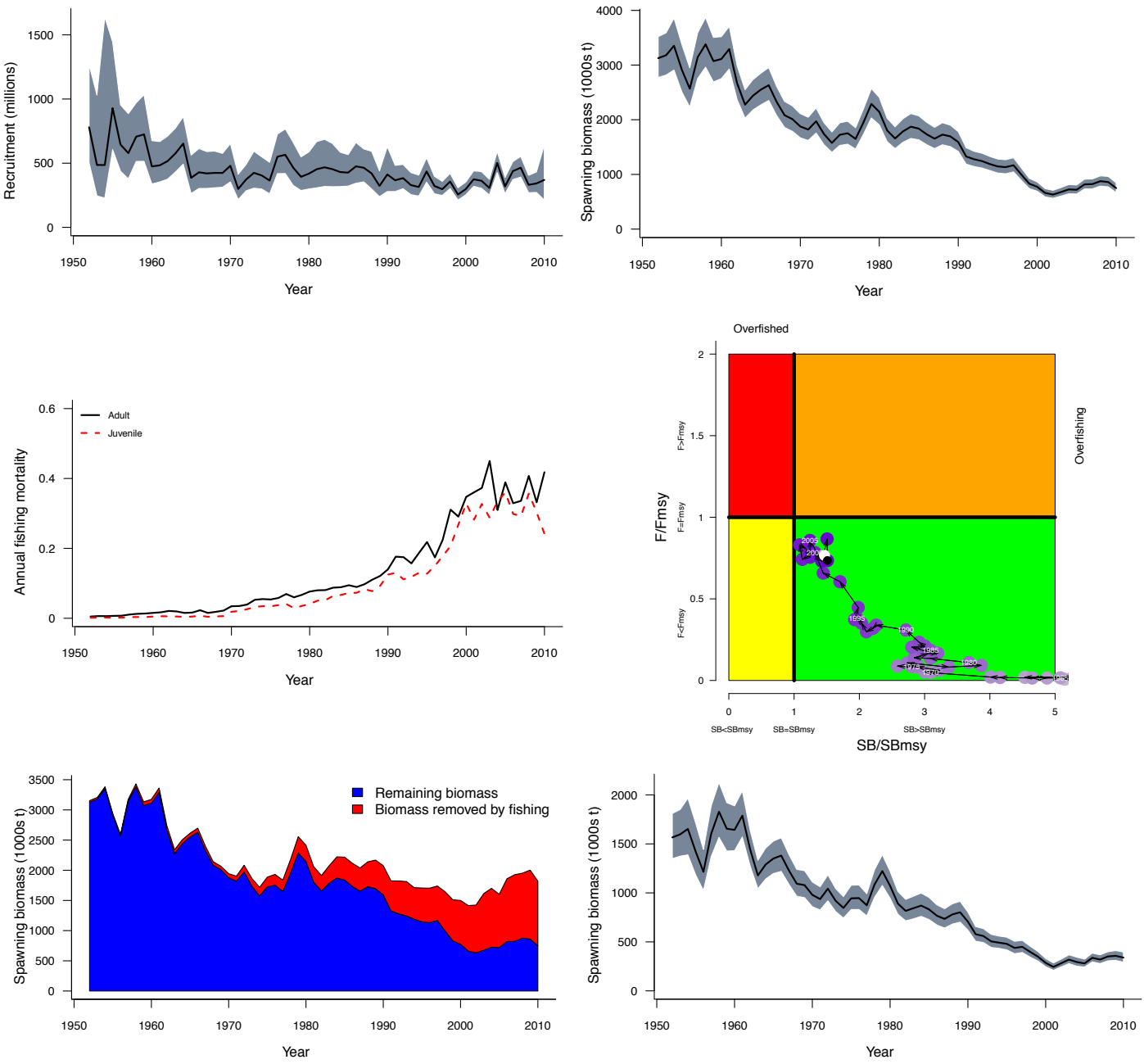

Figure 9: Estimated recruitment (top left), spawning biomass (top right), fishing mortality (middle left), stock status (middle right), estimated spawning biomass with [blue] and without [red] fishing (bottom left), and spawning biomass for the western equatorial region (bottom right) from the 2011 yellowfin tuna stock assessment.

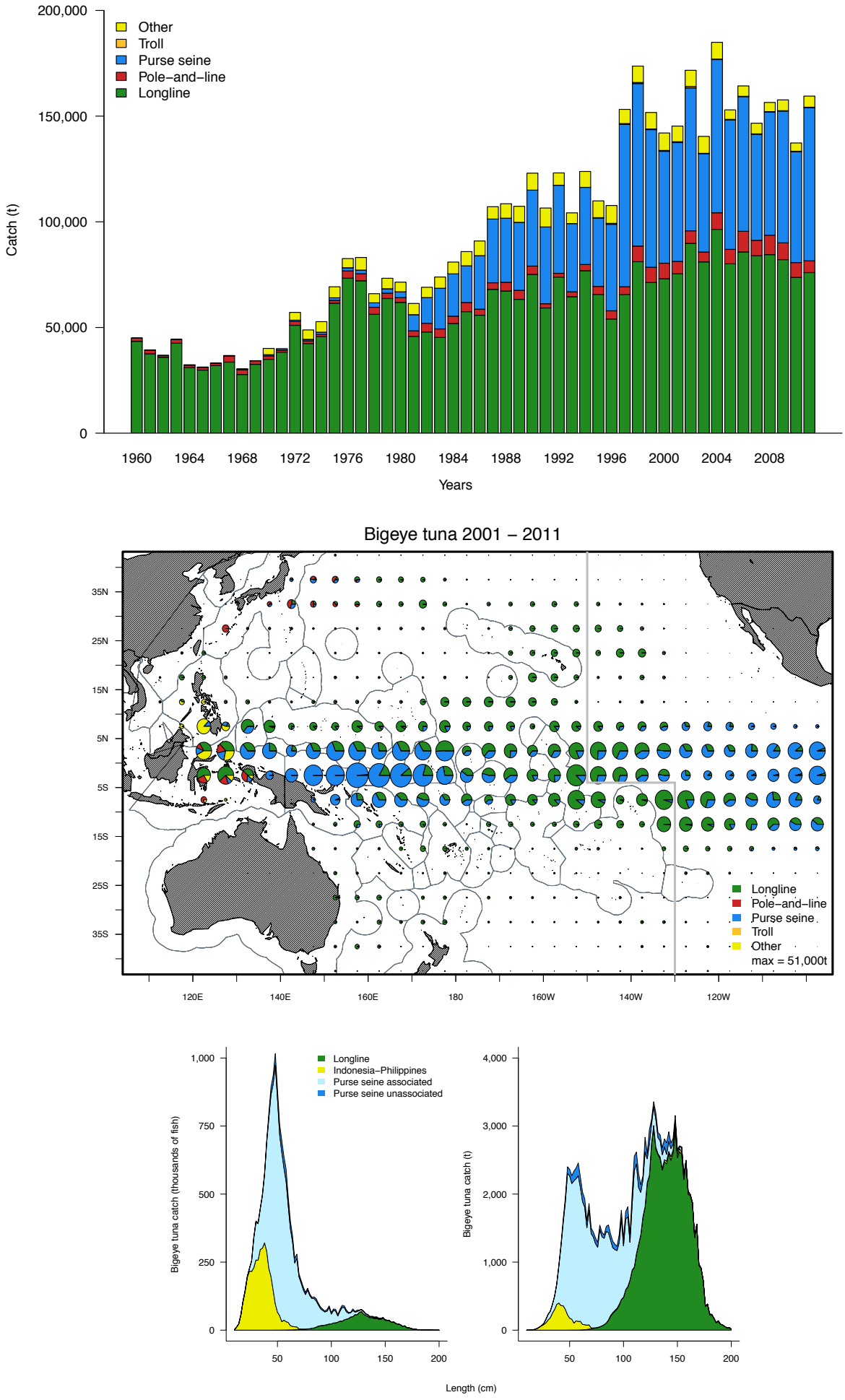

Figure 10: Time series (top), recent spatial distribution (middle), and size composition (bottom) of bigeye tuna catches (t) by gear for the western and central Pacific Ocean (WCPO).

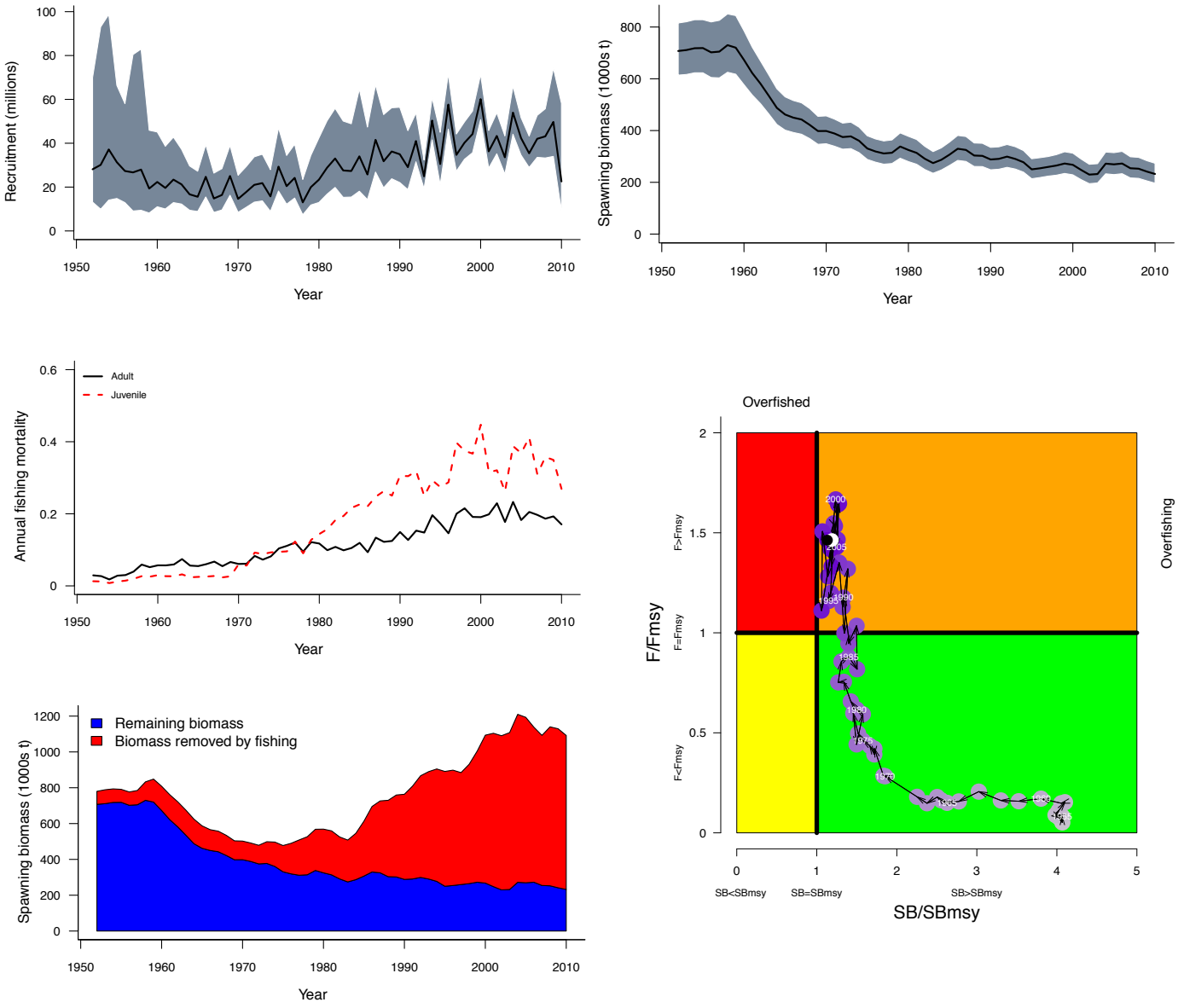

Figure 11: Estimated recruitment (top left), spawning biomass (top right), fishing mortality (middle left), stock status (middle right), and estimated spawning biomass with [blue] and without [red] fishing (bottom left) from the 2011 bigeye tuna stock assessment.

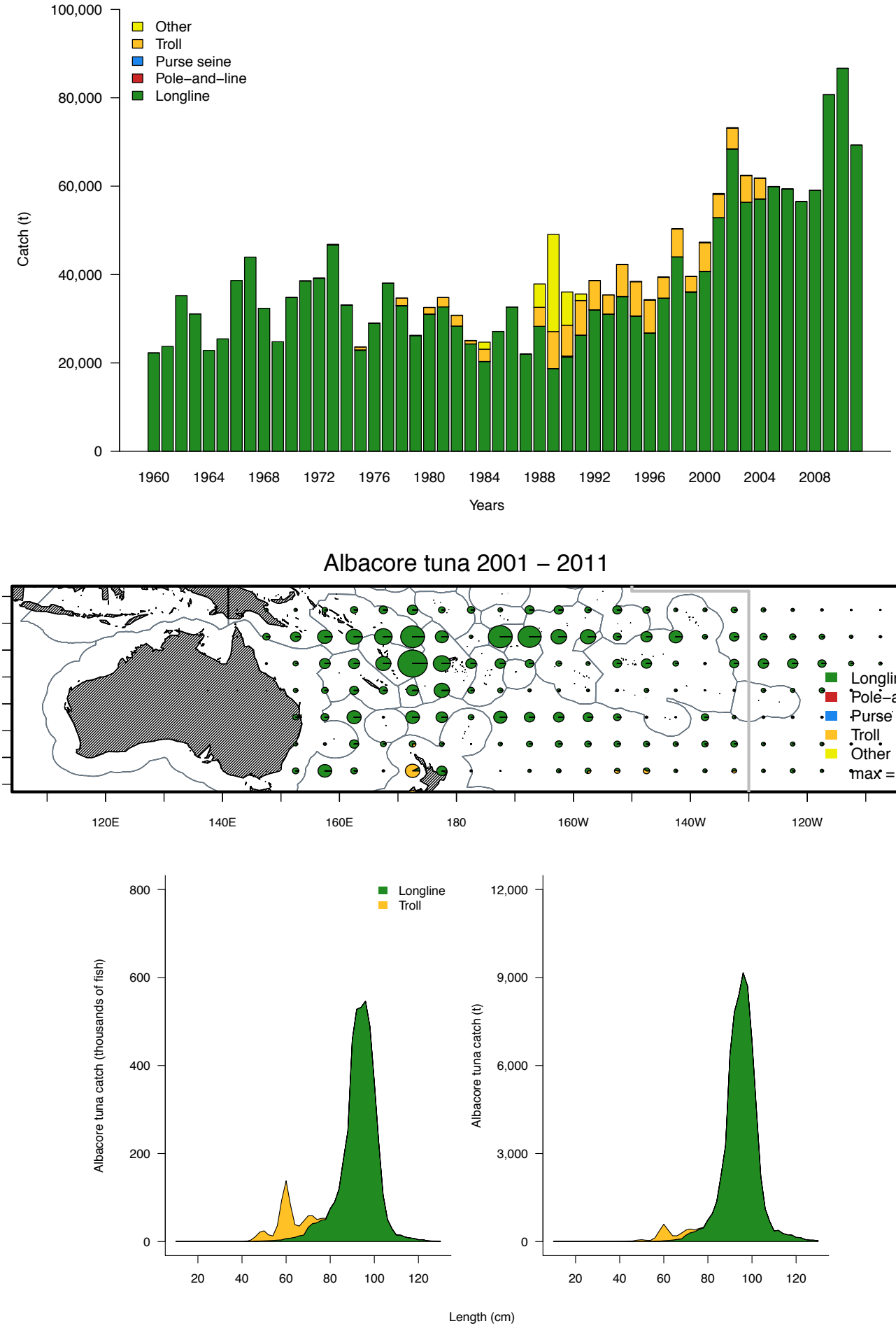

Figure 12: Time series (top), recent spatial distribution (middle), and size composition (bottom) of South Pacific albacore tuna catches (t) by gear for the western and central Pacific Ocean (WCPO).

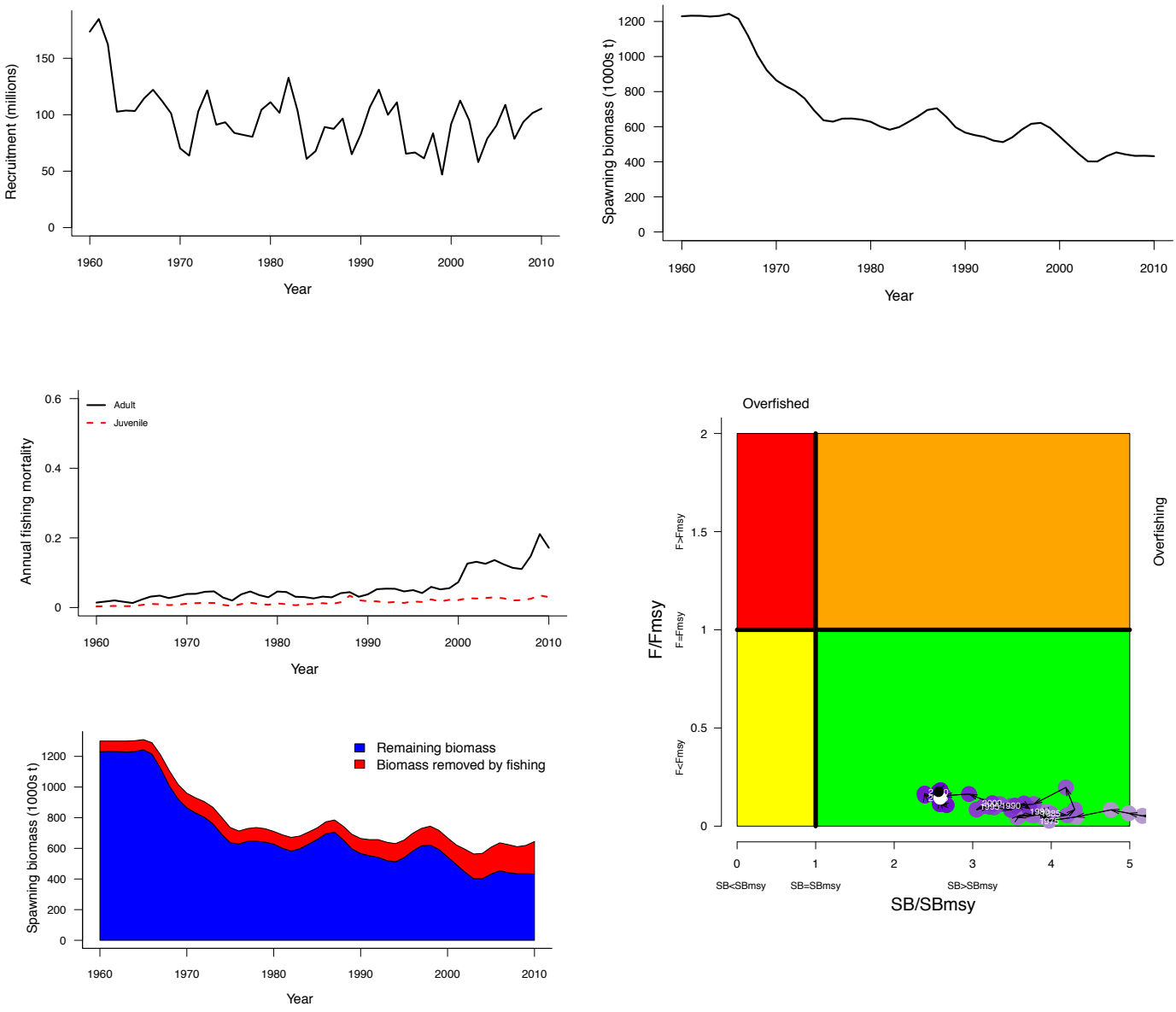

Figure 13: Estimated recruitment (top left), spawning biomass (top right), fishing mortality (middle left), stock status (middle right), and estimated spawning biomass with [blue] and without [red] fishing (bottom left) from the 2012 South Pacific albacore tuna stock assessment.

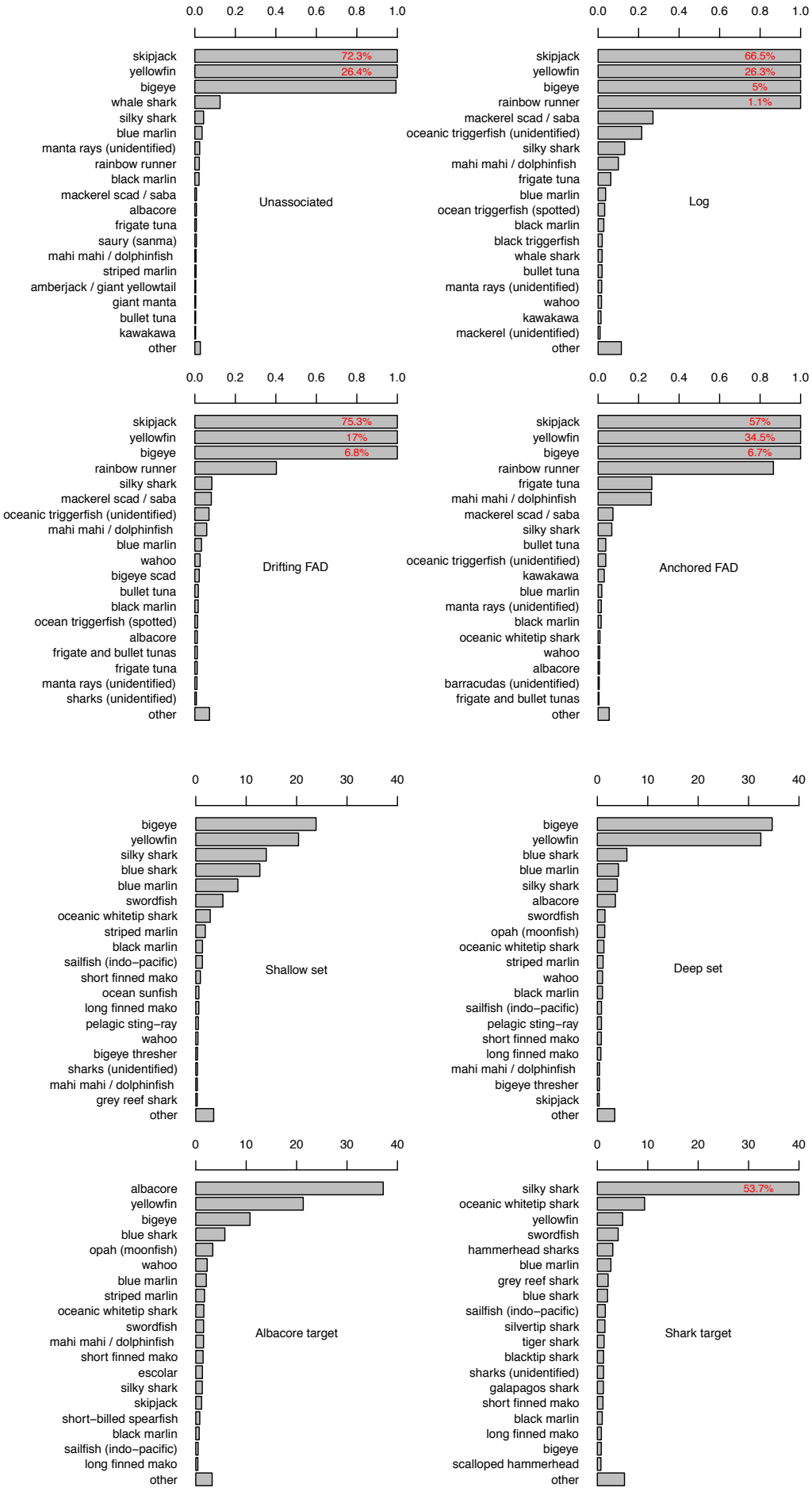

Figure 14: Catch composition of the various categories of purse-seine (top) and longline (bottom) fisheries operating in the WCPO based on observer data.

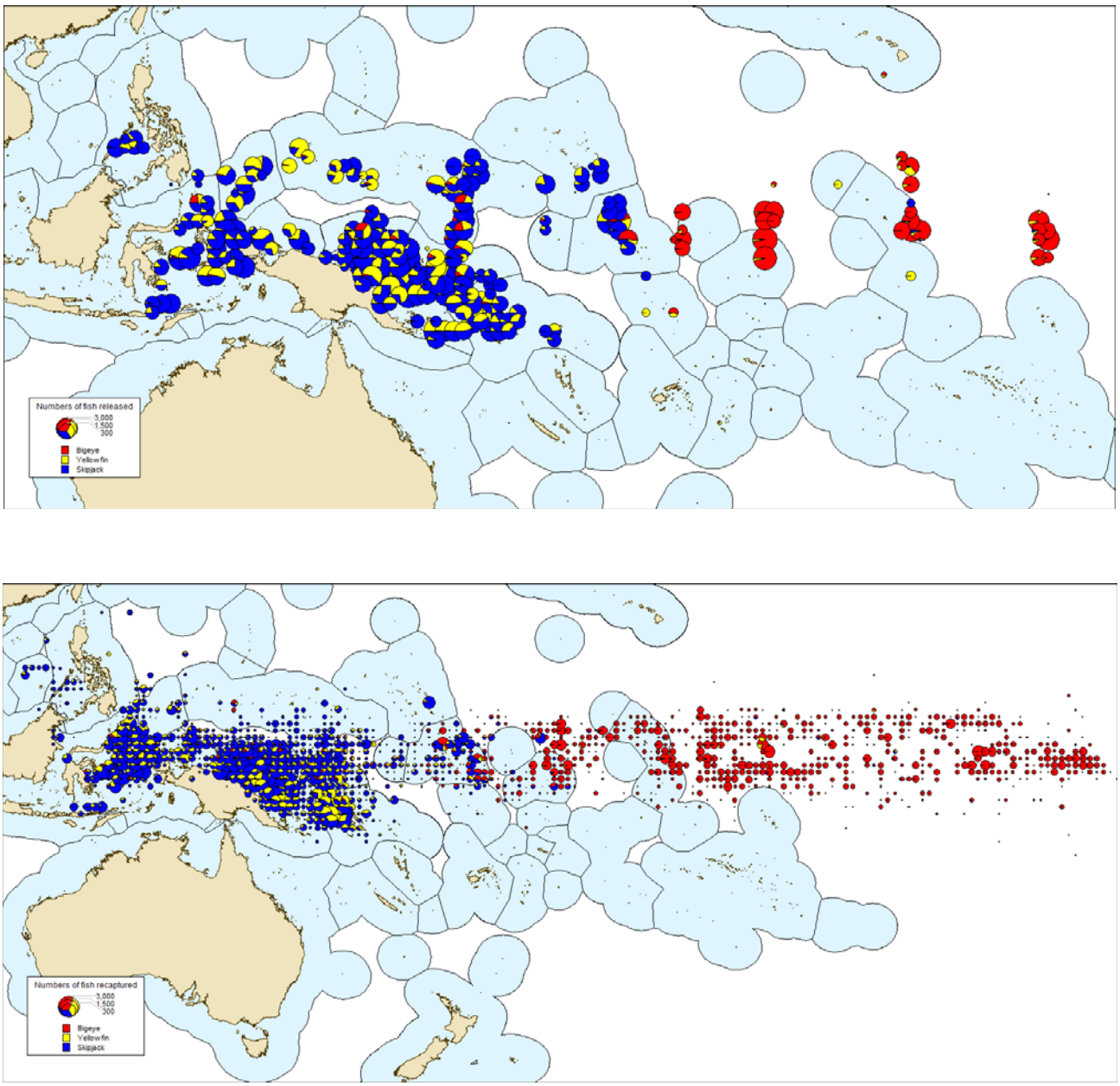

Figure 15: Tag releases (top) and recaptures (bottom) by species from the recent Pacific Tuna Tagging Programme (PTTP).

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1 All WCPFC documents can be obtained by visiting the WCPFC website (www.wcpfc.int) and navigating to the meeting where the document was presented, e.g. WCPFC-SC6-GN-WP-1 can be found on the webpage of documents presented to the 6th session of the Scientific Committee. (http://www.wcpfc.int/meetings/2010/6th-regular-session-scientific-committee)

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Table 1: Catch (metric tonnes) by gear for the western and central Pacific region, 1960–2011. Note: data for 2011 are preliminary.

Year	Longline	Pole-and-line	Purse seine	Troll	Other	Total
1960	129,874	73,800	5,224	-	31,195	240,093
1961	123,330	132,070	14,540	-	34,536	304,476
1962	128,804	157,412	18,875	-	34,947	340,038
1963	122,263	98,628	11,934	-	36,795	269,620
1964	102,481	143,323	29,012	-	41,334	316,150
1965	103,955	134,621	8,621	-	41,727	288,924
1966	145,278	218,900	16,913	-	46,993	428,084
1967	128,047	174,774	14,508	5	52,006	369,340
1968	120,136	183,954	15,143	14	52,327	371,574
1969	122,806	354,784	9,483	-	57,703	544,776
1970	141,360	409,754	16,222	50	69,633	637,019
1971	143,625	392,914	24,511	-	68,925	629,975
1972	161,533	242,745	29,030	268	87,209	520,785
1973	166,399	330,841	36,269	484	103,281	637,274
1974	145,192	370,499	29,548	898	109,578	655,715
1975	164,049	279,663	27,685	646	111,669	583,712
1976	198,013	382,627	40,770	25	104,582	726,017
1977	218,413	345,257	53,491	621	136,322	754,104
1978	212,059	407,482	52,040	1,686	131,084	804,351
1979	211,221	344,799	90,102	814	124,684	771,620
1980	227,707	395,746	113,264	1,489	102,645	840,851
1981	188,516	343,584	153,907	2,118	123,315	811,440
1982	177,765	309,802	249,233	2,552	124,409	863,761
1983	170,385	338,181	436,511	949	127,088	1,073,114
1984	157,072	422,512	456,465	3,124	126,690	1,165,863
1985	172,886	293,206	403,253	3,468	144,604	1,017,417
1986	163,964	368,730	464,461	2,284	153,694	1,153,133
1987	180,581	297,935	531,140	2,350	133,813	1,145,819
1988	200,281	324,805	592,610	4,671	148,481	1,270,848
1989	164,878	317,802	646,442	8,687	163,829	1,301,638
1990	181,591	250,390	773,729	7,219	196,934	1,409,863
1991	154,805	314,979	993,149	8,004	188,156	1,659,093
1992	192,364	282,598	966,311	6,844	146,840	1,594,957
1993	187,553	307,966	845,646	4,612	124,526	1,470,303
1994	211,638	271,071	977,650	7,493	146,462	1,614,314
1995	207,042	297,106	939,173	23,585	150,516	1,617,422
1996	197,234	251,053	897,905	17,807	160,522	1,524,521
1997	213,450	273,844	981,357	18,732	148,946	1,636,329
1998	233,645	313,968	1,295,422	19,099	170,528	2,032,662
1999	202,973	338,832	1,128,758	13,476	176,635	1,860,674
2000	226,730	299,976	1,168,429	25,845	192,174	1,913,154
2001	246,221	243,337	1,144,443	17,329	170,328	1,821,658
2002	266,963	254,785	1,297,472	16,129	182,838	2,018,187
2003	250,160	260,875	1,292,289	19,875	179,895	2,003,094
2004	266,581	253,330	1,393,992	23,445	184,771	2,122,119
2005	250,167	266,663	1,479,329	13,293	192,651	2,202,103
2006	255,328	257,485	1,512,944	10,098	209,591	2,245,446
2007	245,129	284,564	1,656,445	9,249	239,652	2,435,039
2008	245,509	269,304	1,709,352	11,740	247,724	2,483,629
2009	279,012	264,246	1,785,627	9,894	264,567	2,603,346
2010	269,578	270,004	1,697,608	11,320	249,742	2,498,252
2011	264,772	274,105	1,543,140	12,404	228,626	2,323,047

Table 2: Catch (metric tonnes) by species for the four main tuna species taken in the western and central Pacific region, 1960–2011. Note: data for 2011 are preliminary.

Year	Albacore tuna	Bigeye tuna	Skipjack tuna	Yellowfin tuna	Total
1960	31,463	45,025	89,938	73,667	242,053
1961	32,922	39,380	156,736	75,438	306,437
1962	37,602	36,868	181,624	83,944	342,000
1963	26,815	44,346	122,703	75,756	271,583
1964	26,687	32,391	182,918	74,154	318,114
1965	28,735	31,333	155,221	73,635	290,889
1966	52,284	33,187	249,514	93,099	430,050
1967	58,822	36,749	204,842	68,927	371,307
1968	64,213	30,424	195,085	81,852	373,542
1969	72,106	34,360	351,025	87,285	546,745
1970	74,350	40,099	423,380	99,190	638,989
1971	100,737	43,225	380,815	105,198	631,946
1972	109,655	57,143	237,777	116,210	522,757
1973	131,149	48,848	328,582	128,695	639,247
1974	115,162	52,765	356,198	131,590	657,689
1975	84,651	69,267	288,558	141,236	585,687
1976	132,947	82,604	357,550	152,916	727,993
1977	83,171	83,112	403,905	183,916	756,081
1978	111,161	65,999	449,690	177,501	806,329
1979	86,007	73,290	413,779	198,544	773,599
1980	95,156	71,448	456,596	217,651	842,831
1981	88,095	61,377	449,532	212,436	813,421
1982	89,496	69,024	492,826	212,415	865,743
1983	65,988	73,886	667,403	265,837	1,075,097
1984	74,540	80,952	753,969	256,402	1,167,847
1985	77,060	85,909	581,317	273,131	1,019,402
1986	71,757	90,929	747,826	242,621	1,155,119
1987	63,645	107,149	700,817	274,208	1,147,806
1988	67,948	108,548	798,339	296,013	1,272,836
1989	73,533	107,336	795,700	325,069	1,303,627
1990	63,872	123,017	863,148	359,826	1,411,853
1991	58,322	106,524	1,113,834	380,413	1,661,084
1992	74,452	123,130	1,029,433	367,942	1,596,949
1993	77,496	104,242	988,854	299,711	1,472,296
1994	96,461	123,820	1,043,771	350,262	1,616,308
1995	91,750	109,899	1,045,724	370,049	1,619,417
1996	91,140	107,711	970,755	354,915	1,526,517
1997	112,900	153,184	909,607	460,638	1,638,326
1998	112,465	173,674	1,189,457	557,066	2,034,660
1999	131,066	151,726	1,100,482	477,400	1,862,673
2000	101,171	142,029	1,145,613	524,341	1,915,154
2001	121,561	145,295	1,041,466	513,336	1,823,659
2002	147,793	171,691	1,222,323	476,380	2,020,189
2003	122,949	140,411	1,223,454	516,280	2,005,097
2004	122,343	184,919	1,308,800	506,057	2,124,123
2005	105,135	152,959	1,378,374	565,635	2,204,108
2006	104,986	164,296	1,484,948	491,216	2,247,452
2007	126,701	146,665	1,650,123	511,550	2,437,046
2008	104,966	156,467	1,647,371	574,825	2,485,637
2009	135,476	157,679	1,799,991	510,200	2,605,355
2010	126,393	137,302	1,688,473	546,084	2,500,262
2011	126,577	159,479	1,557,588	479,403	2,325,058

Table 3: Biological reference points from the latest stock assessments for South Pacific albacore, bigeye, skipjack, and yellowfin tunas. All biomasses are in tonnes (t). B_0 is the average estimated unfished biomass; B_{CURR} is the average biomass over the last 3-4 years; MSY is the maximum sustainable yield based on recent patterns of fishing; F_{CURR}/F_{MSY} is the ratio of recent fishing mortality to that which will support the MSY; and SB_{CURR}/SB_{MSY} is the ratio of recent spawning biomass to that which will support the MSY.

	S. Pacific albacore	Bigeye	Skipjack	Yellowfin
B_0	1,131,000	1,432,000	6,147,000	3,740,000
B_{CURR}	1,028,983	623,121	5,018,049	1,881,625
MSY	99,085	76,760	1,503,600	538,800
$F_{CURR/FMSY}$	0.21	1.46	0.37	0.77
SB_{CURR}/SB_{MSY}	2.56	1.19	2.94	1.47

Table 4: Skipjack tuna catch (metric tonnes) by gear type for the western and central Pacific region, 1960–2011. Note: data for 2011 are preliminary.

Year	Longline	Pole-and-line	Purse seine	Troll	Other	Total
1960	-	70,428	3,728	-	15,782	89,938
1961	-	127,011	11,693	-	18,032	156,736
1962	4	152,387	11,674	-	17,559	181,624
1963	-	94,757	9,592	-	18,354	122,703
1964	5	137,106	25,006	-	20,801	182,918
1965	11	129,933	4,657	-	20,620	155,221
1966	52	215,600	10,949	-	22,913	249,514
1967	124	168,846	10,942	-	24,930	204,842
1968	83	162,379	7,694	-	24,929	195,085
1969	130	315,795	5,030	-	30,070	351,025
1970	1,608	379,074	7,483	-	35,215	423,380
1971	1,475	333,284	13,627	-	32,429	380,815
1972	1,544	172,827	18,038	-	45,368	237,777
1973	1,861	253,217	19,069	-	54,435	328,582
1974	2,124	289,202	10,850	-	54,022	356,198
1975	1,919	218,271	13,349	-	55,019	288,558
1976	2,096	276,582	22,765	-	56,107	357,550
1977	3,127	294,641	34,897	-	71,240	403,905
1978	3,233	331,401	33,827	-	81,229	449,690
1979	2,179	285,859	59,599	-	66,142	413,779
1980	632	333,457	76,337	12	46,158	456,596
1981	756	294,292	101,575	17	52,892	449,532
1982	1,015	262,244	172,402	64	57,101	492,826
1983	2,144	299,762	304,408	154	60,935	667,403
1984	870	379,474	320,809	284	52,532	753,969
1985	1,108	250,010	272,339	146	57,714	581,317
1986	1,439	336,695	342,214	219	67,259	747,826
1987	2,329	262,467	376,320	168	59,533	700,817
1988	1,937	301,031	437,224	299	57,848	798,339
1989	2,507	289,706	444,603	244	58,640	795,700
1990	363	224,592	545,963	176	92,054	863,148
1991	885	292,950	736,326	148	83,525	1,113,834
1992	432	251,717	695,665	168	81,451	1,029,433
1993	573	280,066	641,606	175	66,434	988,854
1994	379	227,921	748,338	228	66,905	1,043,771
1995	598	257,147	708,098	12,298	67,583	1,045,724
1996	3,935	211,408	676,510	6,514	72,388	970,755
1997	4,070	225,612	601,372	9,218	69,335	909,607
1998	5,030	256,691	842,396	8,316	77,024	1,189,457
1999	4,208	253,244	757,304	5,660	80,066	1,100,482
2000	4,559	246,300	783,541	15,005	96,208	1,145,613
2001	5,059	187,490	756,148	7,536	85,233	1,041,466
2002	3,450	180,618	940,966	6,796	90,493	1,222,323
2003	3,824	202,154	922,157	9,721	85,598	1,223,454
2004	4,051	192,936	1,007,703	15,118	88,992	1,308,800
2005	1,084	216,643	1,031,183	6,302	123,162	1,378,374
2006	1,528	208,622	1,133,624	3,987	137,187	1,484,948
2007	1,175	212,913	1,272,241	3,598	160,196	1,650,123
2008	817	218,325	1,256,422	4,572	167,235	1,647,371
2009	1,225	201,219	1,426,024	4,251	167,272	1,799,991
2010	1,190	223,290	1,303,739	4,705	155,549	1,688,473
2011	1,264	203,294	1,202,373	4,751	145,906	1,557,588

Table 5: Yellowfin tuna catch (metric tonnes) by gear type for the western and central Pacific region, 1960–2011. Note: data for 2011 are preliminary.

Year	Longline	Pole-and-line	Purse seine	Troll	Other	Total
1960	55,020	1,872	1,438	-	15,337	73,667
1961	53,166	3,259	2,777	-	16,236	75,438
1962	55,547	4,225	6,975	-	17,197	83,944
1963	53,185	2,071	2,277	-	18,223	75,756
1964	45,247	5,074	3,647	-	20,186	74,154
1965	45,493	3,434	3,752	-	20,956	73,635
1966	61,654	2,192	5,844	-	23,409	93,099
1967	36,083	3,125	3,416	-	26,303	68,927
1968	46,070	2,706	6,991	-	26,085	81,852
1969	51,627	5,166	3,880	-	26,612	87,285
1970	55,806	4,606	7,845	-	30,933	99,190
1971	57,766	5,248	9,290	-	32,894	105,198
1972	61,175	7,465	10,064	-	37,506	116,210
1973	62,291	7,458	15,118	-	43,828	128,695
1974	58,116	6,582	17,451	-	49,441	131,590
1975	69,462	7,801	12,944	-	51,029	141,236
1976	77,570	17,186	15,394	-	42,766	152,916
1977	94,414	15,257	16,175	-	58,070	183,916
1978	110,329	12,767	15,004	-	39,401	177,501
1979	109,043	11,638	28,298	-	49,565	198,544
1980	122,875	13,168	33,850	9	47,749	217,651
1981	94,665	19,270	44,420	16	54,065	212,436
1982	84,988	13,835	64,115	54	49,423	212,415
1983	86,187	13,266	112,512	51	53,821	265,837
1984	73,036	13,558	112,271	67	57,470	256,402
1985	76,265	18,156	112,024	69	66,617	273,131
1986	65,019	13,074	95,394	62	69,072	242,621
1987	76,812	13,243	123,494	48	60,611	274,208
1988	89,400	13,433	123,843	76	69,261	296,013
1989	68,908	15,169	167,168	73	73,751	325,069
1990	73,917	13,103	189,850	68	82,888	359,826
1991	59,224	12,921	217,840	51	90,377	380,413
1992	72,508	15,225	224,863	98	55,248	367,942
1993	66,244	12,698	168,860	141	51,768	299,711
1994	74,779	13,743	190,790	101	70,849	350,262
1995	80,407	15,063	197,508	2,570	74,501	370,049
1996	77,682	15,479	179,872	2,636	79,246	354,915
1997	71,081	12,362	302,123	2,838	72,234	460,638
1998	67,450	26,935	374,564	2,806	85,311	557,066
1999	58,645	27,869	299,472	3,162	88,252	477,400
2000	79,536	24,658	329,538	3,343	87,266	524,341
2001	80,752	20,479	331,127	3,716	77,262	513,336
2002	83,828	19,743	285,592	3,172	84,045	476,380
2003	86,499	17,955	322,947	3,101	85,778	516,280
2004	89,118	20,206	306,596	2,706	87,431	506,057
2005	85,904	27,007	386,010	2,508	64,206	565,635
2006	82,835	23,653	315,235	2,607	66,886	491,216
2007	79,853	26,570	328,324	2,854	73,949	511,550
2008	81,180	22,705	393,857	2,903	74,180	574,825
2009	96,551	23,918	295,163	3,024	91,544	510,200
2010	91,379	20,112	341,144	3,611	89,838	546,084
2011	94,148	36,632	268,013	3,674	76,936	479,403

Table 6: Bigeye tuna catch (metric tonnes) by gear type for the western and central Pacific region, 1960–2011. Note: data for 2011 are preliminary.

Year	Longline	Pole-and-line	Purse seine	Troll	Other	Total
1960	43,467	1,500	58	-	-	45,025
1961	37,517	1,800	63	-	-	39,380
1962	35,895	800	173	-	-	36,868
1963	42,540	1,800	6	-	-	44,346
1964	30,989	1,143	231	-	28	32,391
1965	29,848	1,254	201	-	30	31,333
1966	31,984	1,108	9	-	86	33,187
1967	33,632	2,803	61	-	253	36,749
1968	27,757	2,272	191	-	204	30,424
1969	32,571	1,675	52	-	62	34,360
1970	34,965	1,589	577	-	2,968	40,099
1971	38,359	931	692	-	3,243	43,225
1972	51,040	1,762	651	-	3,690	57,143
1973	42,412	1,258	729	-	4,449	48,848
1974	45,653	1,039	1,086	-	4,987	52,765
1975	61,488	1,334	1,233	-	5,212	69,267
1976	73,325	3,423	1,502	-	4,354	82,604
1977	72,083	3,325	1,750	-	5,954	83,112
1978	56,237	3,337	2,094	-	4,331	65,999
1979	63,704	2,540	2,080	-	4,966	73,290
1980	61,857	2,278	2,748	-	4,565	71,448
1981	45,823	2,596	7,660	-	5,298	61,377
1982	47,886	4,108	12,155	-	4,875	69,024
1983	45,270	4,055	19,241	-	5,320	73,886
1984	51,889	3,465	20,005	-	5,593	80,952
1985	57,501	4,326	17,357	-	6,725	85,909
1986	55,804	2,865	25,311	-	6,949	90,929
1987	68,042	3,134	30,121	-	5,852	107,149
1988	67,250	4,125	30,335	-	6,838	108,548
1989	63,316	4,298	32,150	-	7,572	107,336
1990	75,141	3,918	35,921	-	8,037	123,017
1991	59,237	1,991	36,331	-	8,965	106,524
1992	73,873	1,757	41,679	-	5,821	123,130
1993	64,553	2,331	32,291	-	5,067	104,242
1994	76,851	2,951	36,496	-	7,522	123,820
1995	65,649	3,776	32,390	145	7,939	109,899
1996	54,027	3,864	40,942	432	8,446	107,711
1997	65,656	3,611	76,794	412	6,711	153,184
1998	81,123	7,380	76,908	507	7,756	173,674
1999	71,286	7,212	65,110	316	7,802	151,726
2000	73,053	7,366	52,942	397	8,271	142,029
2001	75,388	5,901	56,194	408	7,404	145,295
2002	89,791	5,952	67,611	713	7,624	171,691
2003	81,043	4,640	46,558	142	8,028	140,411
2004	96,445	7,823	72,493	232	7,926	184,919
2005	80,110	6,851	61,286	220	4,492	152,959
2006	85,719	9,781	63,721	157	4,918	164,296
2007	83,931	7,296	50,198	187	5,053	146,665
2008	84,473	9,202	58,248	212	4,332	156,467
2009	82,108	7,916	62,363	175	5,117	157,679
2010	73,698	7,027	52,395	275	3,907	137,302
2011	75,986	5,540	72,424	267	5,262	159,479

Table 7: Albacore tuna catch (metric tonnes) by gear type for the south Pacific Ocean, 1960–2011. Note: data for 2011 are preliminary.

Year	Longline	Pole-and-line	Purse seine	Troll	Other	Total
1960	22,248	45	-	-	-	22,293
1961	23,742	-	-	-	-	23,742
1962	35,219	-	-	-	-	35,219
1963	31,095	16	-	-	-	31,111
1964	22,824	-	-	-	-	22,824
1965	25,455	-	-	-	-	25,455
1966	38,661	-	-	-	-	38,661
1967	43,952	-	-	5	-	43,957
1968	32,368	-	-	14	-	32,382
1969	24,805	-	-	-	-	24,805
1970	34,775	100	-	50	-	34,925
1971	38,530	100	-	-	-	38,630
1972	39,131	122	-	268	-	39,521
1973	46,705	141	-	484	-	47,330
1974	33,039	112	-	898	-	34,049
1975	22,849	105	-	646	-	23,600
1976	28,957	100	-	25	-	29,082
1977	38,019	100	-	621	-	38,740
1978	32,890	100	-	1,686	-	34,676
1979	26,162	100	-	814	-	27,076
1980	30,972	101	-	1,468	-	32,541
1981	32,694	-	-	2,085	5	34,784
1982	28,347	1	-	2,434	6	30,788
1983	24,309	-	-	744	39	25,092
1984	20,340	2	-	2,773	1,589	24,704
1985	27,138	-	-	3,253	1,937	32,328
1986	32,641	-	-	2,003	1,946	36,590
1987	21,979	9	-	2,134	930	25,052
1988	28,288	-	-	4,296	5,283	37,867
1989	18,738	-	-	8,370	21,968	49,076
1990	21,304	245	-	6,975	7,538	36,062
1991	26,292	14	-	7,805	1,489	35,600
1992	32,014	11	-	6,578	65	38,668
1993	30,998	74	-	4,296	70	35,438
1994	34,998	67	-	7,164	89	42,318
1995	30,508	139	-	7,716	104	38,467
1996	26,763	30	-	7,410	156	34,359
1997	34,657	21	-	4,679	133	39,490
1998	43,970	36	-	6,280	85	50,371
1999	35,955	138	-	3,447	74	39,614
2000	40,642	102	-	6,455	139	47,338
2001	52,855	37	-	5,253	199	58,344
2002	68,411	18	-	4,661	150	73,240
2003	56,351	12	-	5,984	130	62,477
2004	57,024	110	-	4,614	123	61,871
2005	59,897	29	-	3,503	137	63,566
2006	59,343	29	-	2,884	188	62,444
2007	56,500	17	-	2,014	60	58,591
2008	59,093	12	-	3,502	160	62,767
2009	80,680	21	-	2,031	211	82,943
2010	86,678	14	-	2,139	190	89,021
2011	69,281	21	-	3,119	233	72,654

Table 8: Total of bigeye, skipjack, and yellowfin tuna tagged during the three major tropical tuna tagging projects in the western and central Pacific region. Separate EEZ results are provided for any region with more than 10,000 releases in any single programme. SSAP – Skipjack Survey and Assessment Programme (1977-1981); RTTP – Regional Tuna Tagging Programme (1989-1992); and PTTP – Pacific Tuna Tagging Programme (2006-present).

	PTTP		RTTP		SSAP	
EEZ	**Releases**	**Recoveries**	**Releases**	**Recoveries**	**Releases**	**Recoveries**
Fiji		3	5,004	528	28,988	2,659
Federated States of Micronesia	24,761	2,438	11,782	1,774	8,791	320
Indonesia	40,418	6,630	8,959	3,260	-	49
Kiribati	33,968	2,969	34,532	3,275	5,212	418
New Zealand		2	-	3	15,026	1,000
Papua New Guinea	180,967	24,178	44,758	3,738	9,675	1,073
French Polynesia			-	1	29,692	128
Palau	7,304	247	7,495	150	8,663	114
Solomon Islands	56,515	8,179	15,472	2,321	7,275	597
Other	16,900	16,936	23,666	2,367	48,958	602
TOTAL	360,833	61,582	151,668	17,417	162,280	6,960

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