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Yellowfin Tuna Fisheries in New Zealand and the Southwest Pacific Ocean

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[1] Blue Water Marine Research Ltd (Report prepared for the New Zealand Marine Research Foundation)

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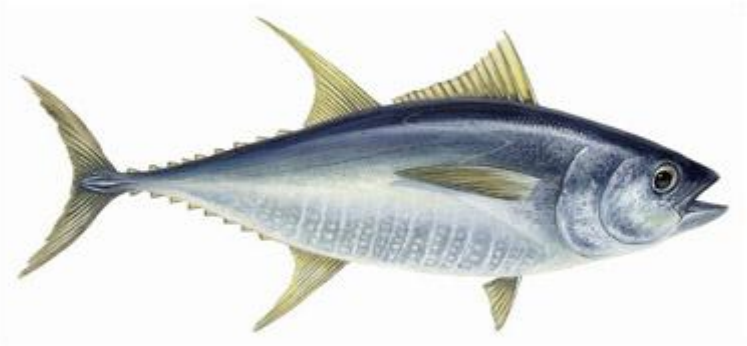

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Yellowfin Tuna Fisheries in New Zealand and the Southwest Pacific Ocean

New Zealand Marine Research Foundation Project Objectives

Overall Objective:

1. To describe and explain trends in Yellowfin Tuna catch in New Zealand waters.

Specific Objectives:

1. To use available catch records from New Zealand Sport Fishing Council (NZSFC) clubs and commercial fishers to describe trends in the availability and abundance of Yellowfin Tuna in New Zealand.
2. To look for catch trends in the rest of the Western Pacific that may be similar or different to those in New Zealand.
3. To summarise Western and Central Pacific Fisheries Commission views on the status of the Yellowfin stock and current management measures.
4. To discuss the trends observed and what management action may be required in the future.

Description of the sport fishery

Yellowfin tuna has been an important target and bycatch species for New Zealand recreational fishers for 30 years. It has been a major component of the sport fishery in East Northland, Bay of Plenty and occasionally as far south as Hawke Bay on the North Island east coast and Kawhia on the west coast.

Except in the eastern Bay of Plenty, the predominant fishing method is trolled lures. However, when the tuna are plentiful they surround "meatballs" of anchovy, pilchard and other bait fish in the eastern Bay of Plenty and are targeted by various methods including live bait, cubing – in which cut baits are drifted into the meatballs – spinning and jigging. In this situation, where the tuna were closely aggregated, multiple hookups and captures were common in the past.

Yellowfin catches are characterized by fluctuations in abundance and size from year to year. The New Zealand Sport Fishing Council (NZSFC) produces a yearbook with New Zealand line class records and catch totals for their 59 affiliated clubs. These data show trends in catch by season. Combined catch records of clubs affiliated to NZSFC recorded more than 1000 yellowfin for 12 out of 13 seasons between 1987–88 and 2000–01. Over 2000 yellowfin were landed in the three seasons from 1994–95 to 1996–97 (Figure 1). Anecdotal information suggests that many more yellowfin are landed but not recorded in good seasons. Many of these would be under 25 kg and considered small. There have been surveys to estimate national recreational harvest but there are doubts about the accuracy of some of these, especially for specialist fishing for species like yellowfin.

In productive years the first yellowfin are caught in the Bay of Plenty in November or early December and the season runs into April (Figure 2).

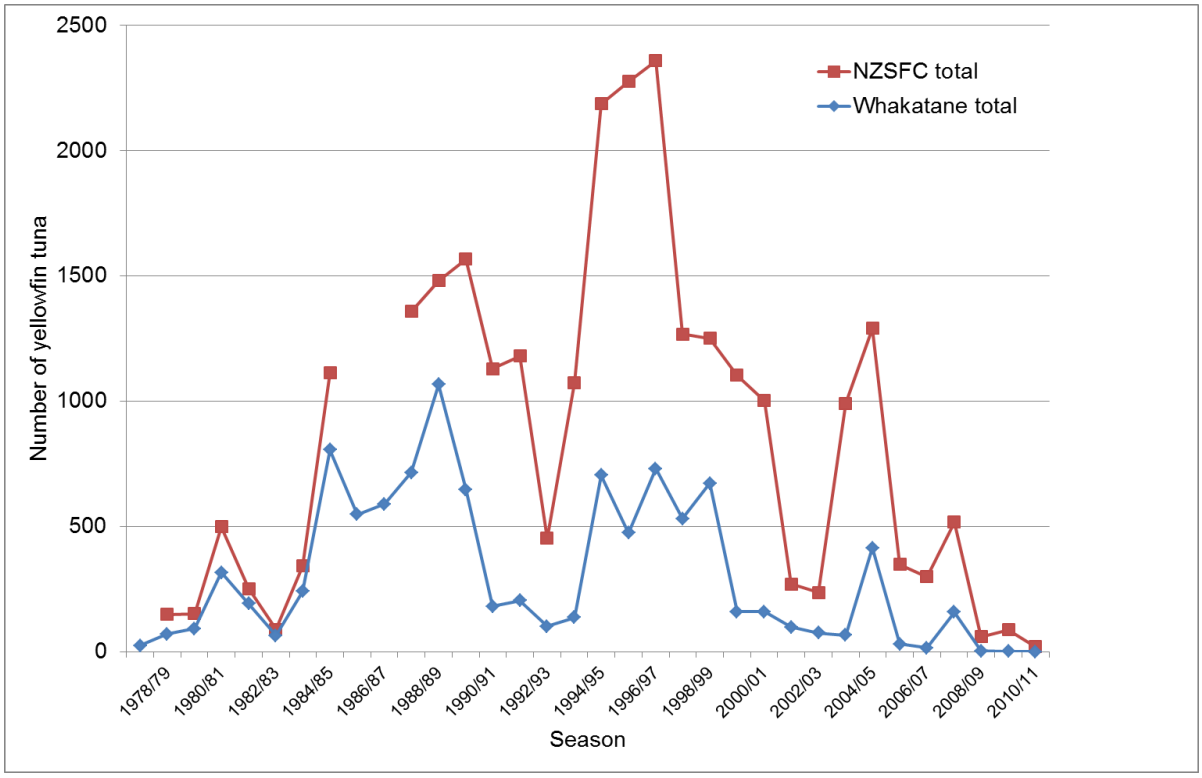

Figure 1: Yellowfin catch per season for all New Zealand Sport Fishing Council Clubs and for one of those clubs the Whakatane Sportfishing Club.

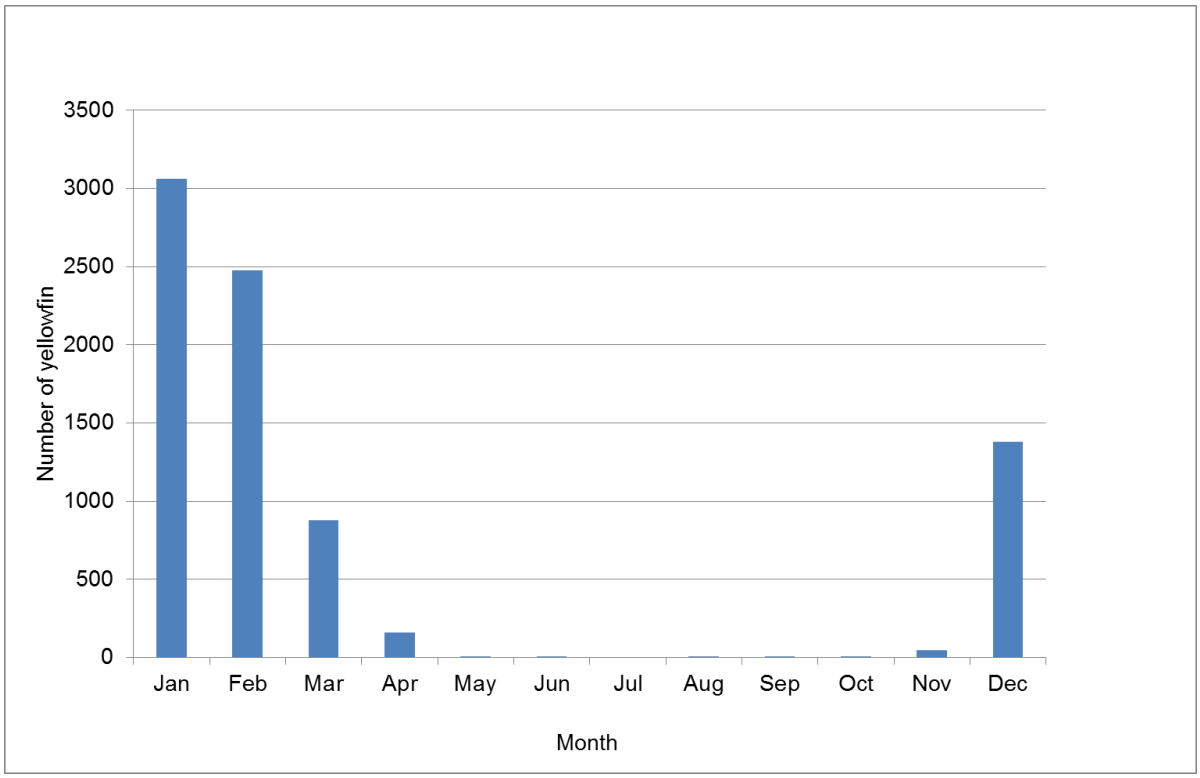

Figure 2: Yellowfin catch per month recorded in Whakatane Sportfishing Club records for 1979 to 2011 combined.

Individual yellowfin weights were captured from Whakatane Sportfishing Club records of all fish presented to their weigh station and published in their annual yearbook. This is a reasonably complete record of catch by all club members and visiting anglers from affiliated clubs. The combined weight distribution across all seasons shows 50% of fish were between 20 and 31 kg with an overall average (mean) of 27.4 kg (s.d. 9.85 kg) and median of 25.2 kg (Figure 3). Accurate weights were recorded for 99% of these tuna, with less than 1% of the weights estimated prior to tag and release.

The early season yellowfin are often large fish of 40–60 kg, with more abundant "school" tuna of 15–30 kg fish moving inshore several weeks after the first arrivals (Figure 4). The season off Gisborne and Hawke Bay is shorter, commencing later and ending earlier, generally around the end of February, depending on water temperature. Off east and west Northland, although the catch is generally more sporadic and mostly a bycatch of the billfish fishery, the season is longer, commencing in December and lasting through May.

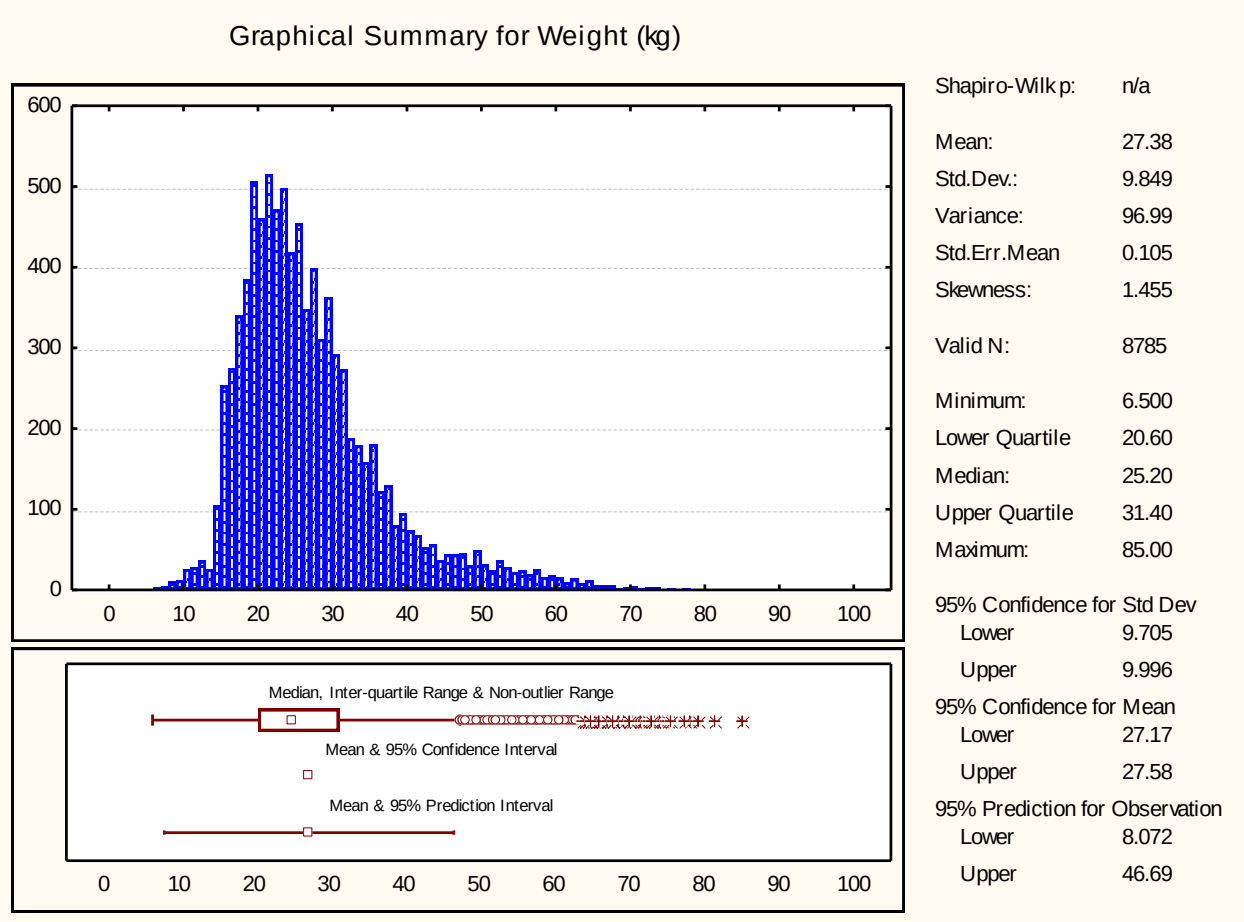

Figure 3: Weight distribution (1 kg bins) of yellowfin tuna landed and tagged by recreational fishers and listed in the Whakatane Sportfishing Club records from 1981 to 2011.

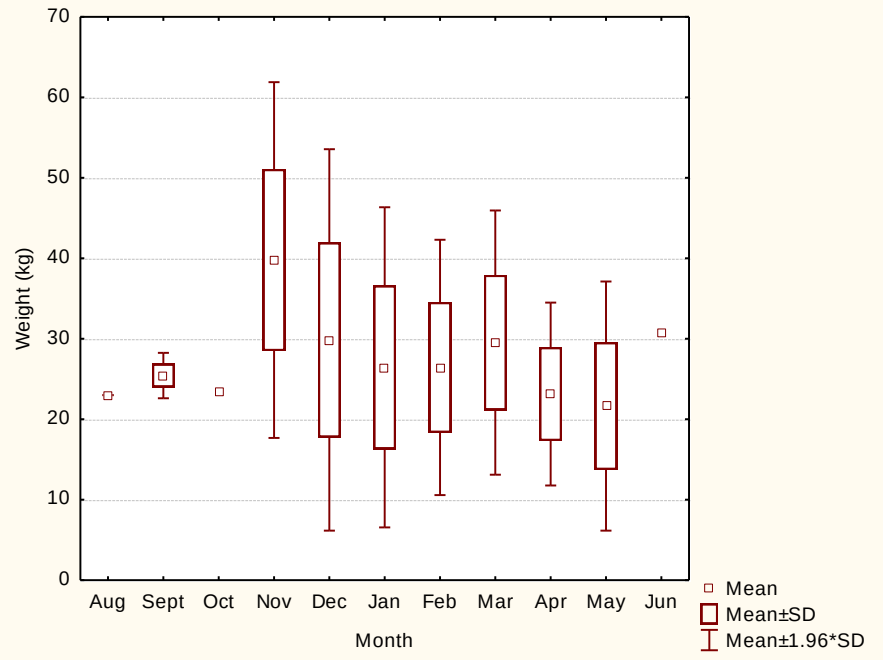

Figure 4: Average weight (kg) of yellowfin tuna landed and tagged by recreational fishers and listed in the Whakatane Sportfishing Club records.

The individual fish weights of yellowfin from the Whakatane club records has been summed into five year time steps to show shifts in size and numbers caught over time (Figure 5). In the late 1980s there were large numbers of fish across a broad range of sizes. In the early 1990s a lot of the fish landed were 20 to 30 kg with few larger fish (green triangles, Figure 5). Smaller fish were landed in the late 1990s with a few up to 40 kg. Since then numbers have declined. While there are some large fish caught the number of 18 to 30 kg fish had declined by the late 2000s (orange circles, Figure 5).

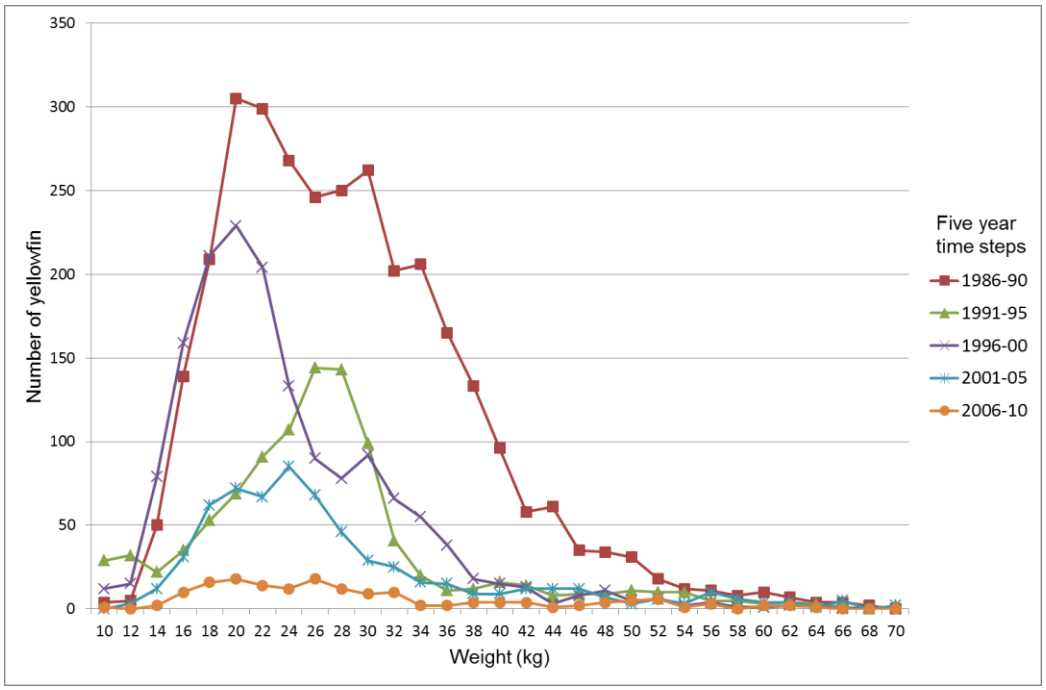

Figure 5: Number of yellowfin by weight (2 kg) from Whakatane club records combined in five year time steps (Note detailed catch records for 1990 and 1993 are missing).

Historically, the yellowfin catch in the Bay of Plenty has always varied from one season to the next. However, looking at five year time steps of accumulated number of yellowfin caught by weight it appears that the yellowfin fishery has shown progressive declines over the last 20 years (Figure 5).

The national landed recreational harvest was estimated at 15,000 yellowfin, 4,000 marlin, and 1,500 mako sharks in the 1999–2000 telephone diary survey. Because the sample size was small for these species these estimates are highly uncertain. In the 1999–00 season NZSFC clubs recorded 1,112 yellowfin, 1,516 marlin, and 736 mako landed or tagged. While the 2000 telephone diary survey estimates are considered to be at the high end of the range for a number of species, these figures do indicate that club records only represent part of the yellowfin catch that year.

To some degree there is extensive overlap between the recreational tuna and billfish fisheries. The season, fishing methods and areas overlap. Fishers targeting marlin will catch yellowfin and vice versa. The annual striped marlin catch in NZSFC records increased in the early 1990s and stayed relatively high. Yellowfin catch also peaked in the 1990s but has been in sharp decline since 2004–05 (Figure 6).

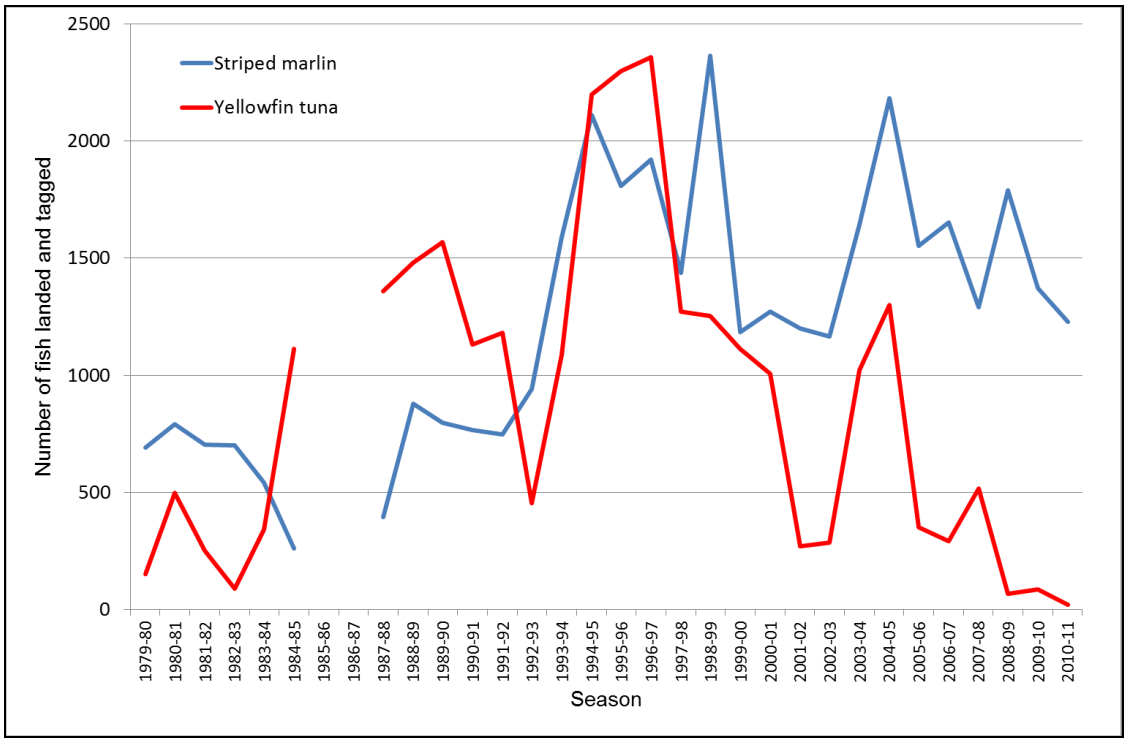

Figure 6: National recorded catch of striped marlin and yellowfin tuna by season by New Zealand Sport Fishing Council clubs. Note NZSFC yearbook did not record catches in 1985-86 and 1986-87.

Commercial catch of yellowfin tuna in New Zealand

Commercial catches in New Zealand waters are a small fraction of overall catch in the Pacific. Catch by distant water longliners of yellowfin tuna began in 1962. Catches through the 1960s averaged 283 t around New Zealand. Yellowfin were not a target species for these fleets and catches remained small and seasonal. Domestic tuna longline vessels began targeting bigeye tuna in 1990/91 in northern waters and a target commercial troll fishery operated for a few years. Catches of yellowfin increased with increasing longline effort, but while yellowfin availability fluctuated dramatically between years, catches have declined (Figure 7). More recently, the size of the domestic longline fleet has also declined significantly. In 2002 the number of domestic surface longliners peaked at 151. In 2011 the number actively fishing was 42.

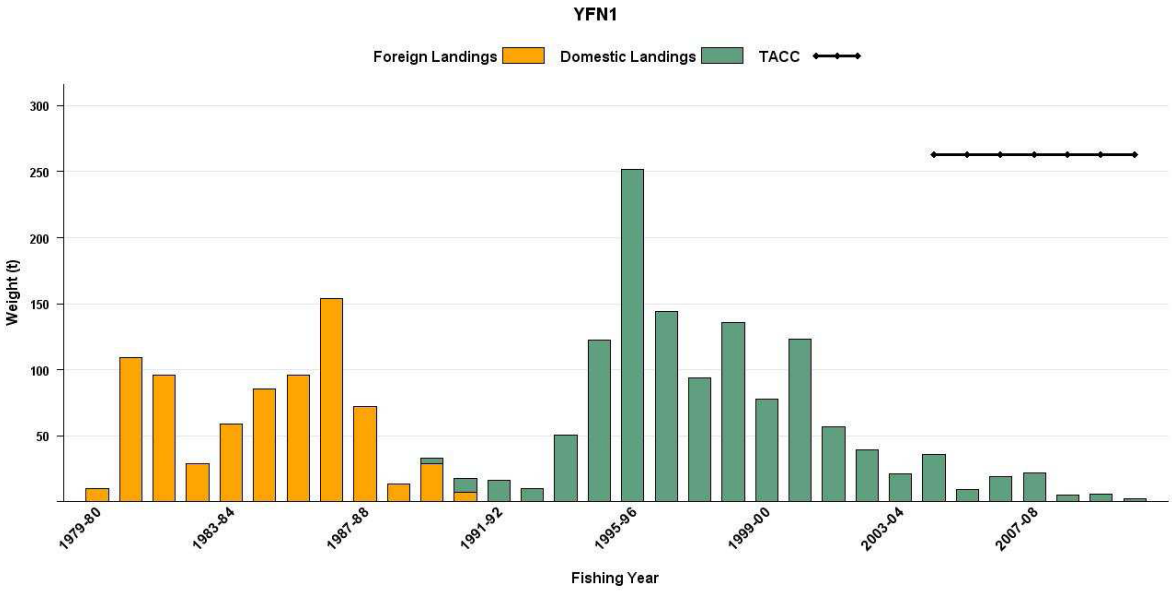

Figure 7: Yellowfin catch by foreign licensed (orange) and New Zealand vessels (green) from 1979-80 to 2010-11 within New Zealand waters.[i]

The New Zealand longline fishery targets swordfish, bigeye and southern bluefin tuna during autumn (April to June) and winter (July to September). There is some overlap with the sport fishery in northern New Zealand during spring (October to December) and summer (Jan-March) when yellowfin should be present (Figure 8)[ii]. If yellowfin were present in New Zealand they should show up in the longline catch records, as they have since the early 1960s. However, domestic longliners are not taking a significant number of fish in recent years, showing a similar decline in catch to that in the recreational yellowfin fishery (Figure 7).[i]

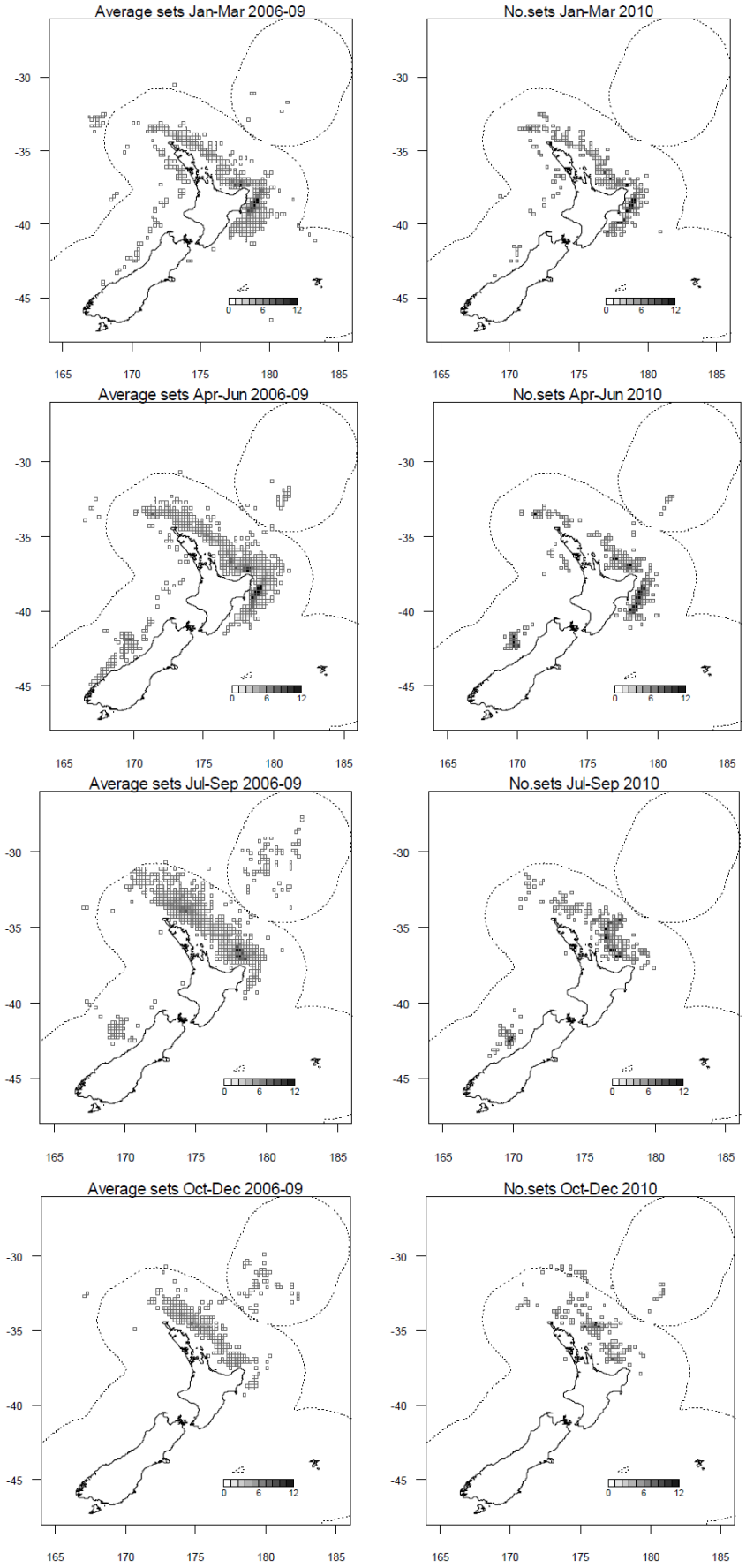

Figure 8: Distribution of effort (number of sets per 1/5 degree square) for the domestic longline fleet by quarter-year for 2006-2009 (average) and 2010 (actual).[ii]

Commercial catch in the western and central Pacific

Longline catch peaked in the late 1970s and appears not to have any trend over the last 30 years. This is unexpected because effort has increased significantly (see below). Purse seine catch has expanded enormously, but even this catch is thought to be under reported due to bad estimation of yellowfin in skipjack target catch and discarding of small yellowfin.

The uncertainty associated with catch reporting is a serious problem in some tuna fisheries. The WCPFC has rules and penalties for unreported catch because it is a vital component for stock and assessment as well as developing and monitoring management measures.

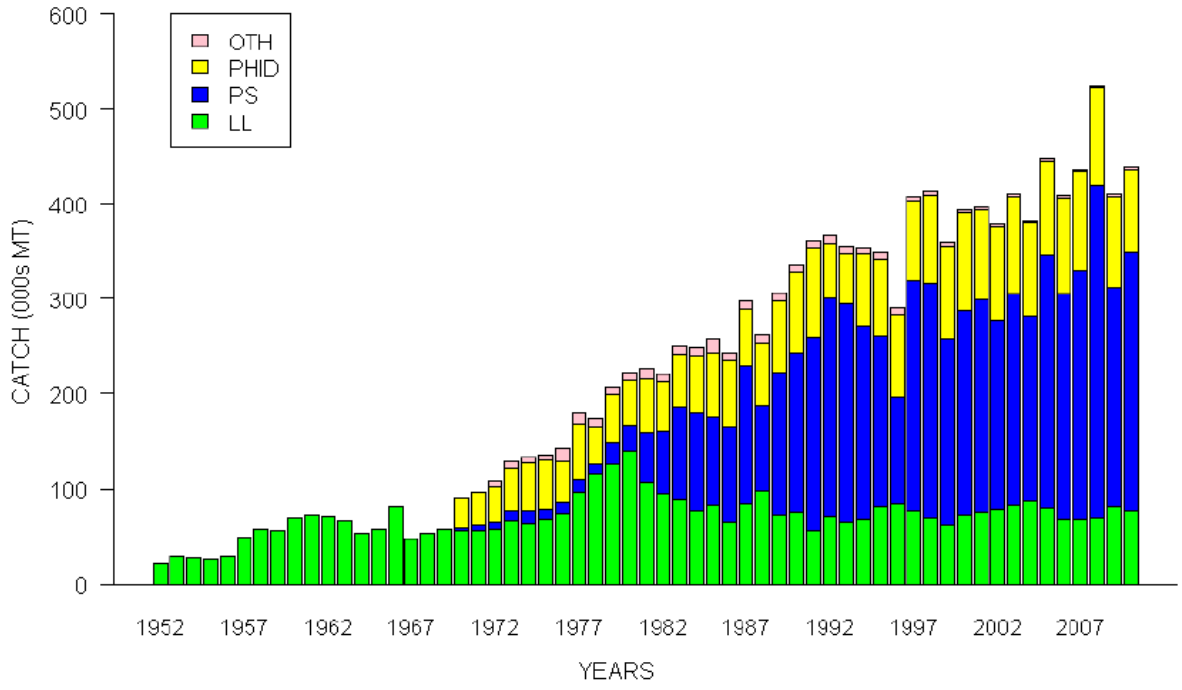

Figure 9. Total annual catches (1000s mt) of yellowfin from the WCPO by fishing method from 1952 to 2010. Longline (green), purse seine (blue), Philippines and Indonesia (Yellow).[iii]

Most yellowfin catch in the western Pacific comes from tropical waters (10° S to 10° N). This is in area 3 (from the stock assessment) with very little purse seine catch (green this time) coming from areas 5 and 6 in the southwest Pacific (Figure 10). New Zealand is part of the Pacific with relatively low yellowfin catch, which over the last 10 years has largely come from longline. Some of the largest longline catch (blue dots) in Area 6 come from the area north of New Zealand, from Solomons, Vanuatu and Fijian waters and a pocket of international water between them (Figure 10).

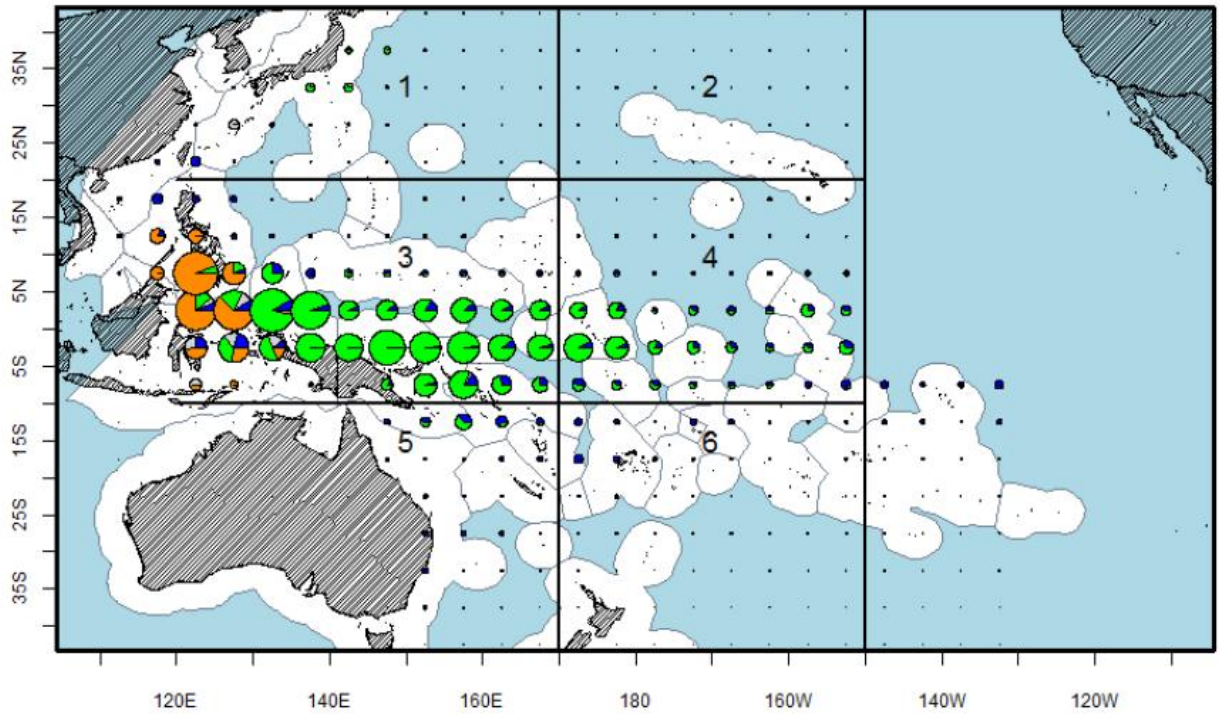

Figure 10. Distribution of cumulative WCPFC yellowfin tuna catch from 2000 - 2009 by 5 degree squares of latitude and longitude and fishing gear; longline (blue), purse-seine (green), pole-and-line (grey) and other (principally Indonesia and Philippines, dark orange). The grey lines indicate the spatial stratification of the assessment models.[iii]

In order to look at changes in fishing effort in areas close to New Zealand we assessed trends in longline catch and effort. We found that there has been a dramatic increase in the number of hooks set by decade in the western central Pacific as a whole (Figure 11)[iv]. This figure, produced by the Secretariat of the Pacific Community (SPC) Oceanic Fisheries Programme, shows some of the highest effort in the 2000 to 2009 plot in areas north of New Zealand. This demonstrates that it is important to get information from the region of interest over the history of the fishery in order to help understand the trends observed. It is noteworthy to see the large increase in longline effort across the Pacific in the 2000s (Figure 11) but almost no increase in reported longline catch of yellowfin for that period (Figure 9).

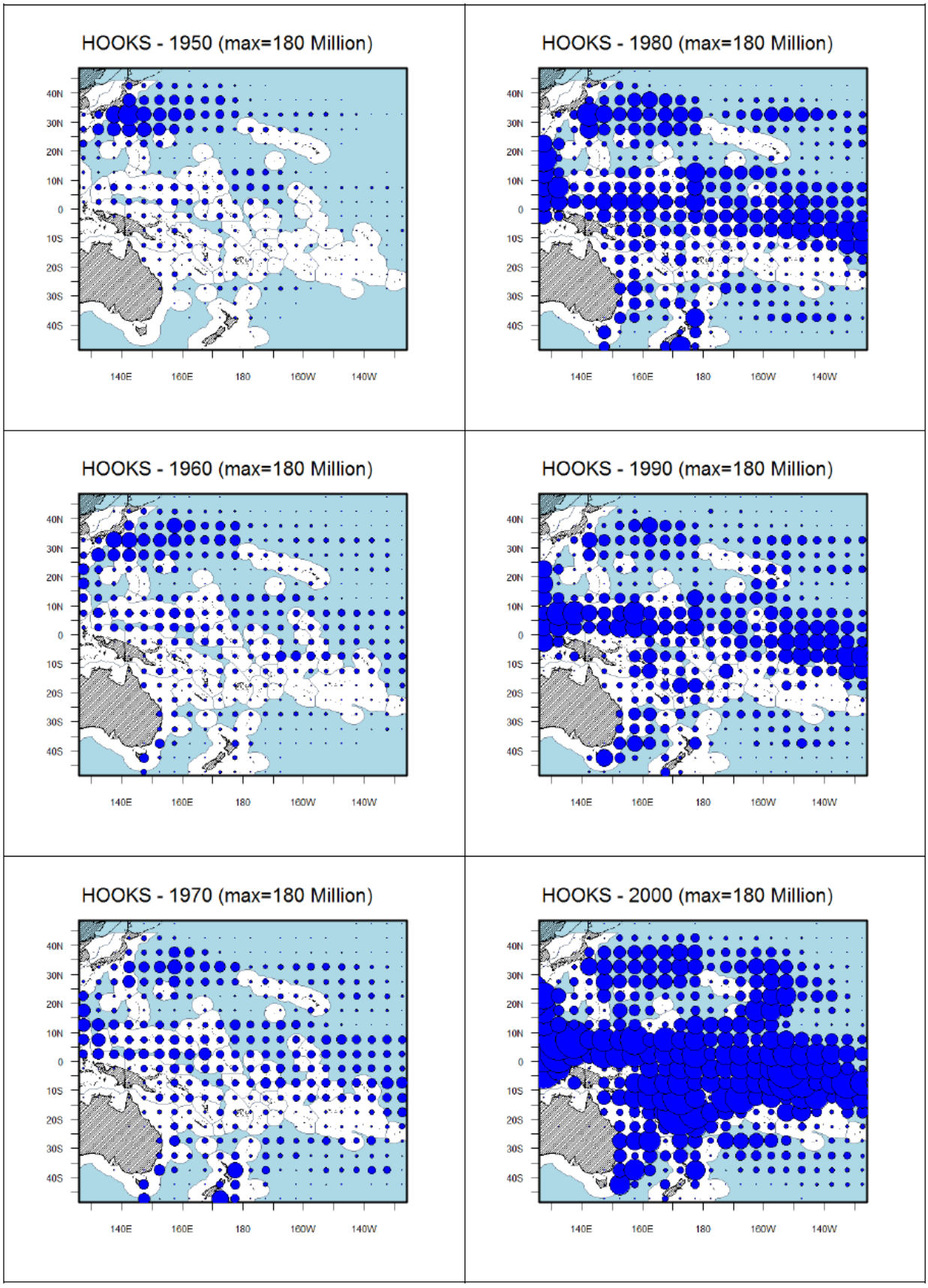

Figure 11: Distribution of total longline effort by decade from the 1950s to the 2000s. The largest circle represents 180 million hooks set in that 5x5 degree square during the decade.[iv]

Figure 12 shows yellowfin catch in tonnes by longline by year for the Pacific Island countries (PICs) to the north of New Zealand. Also plotted is the reported catch of yellowfin (numbers of fish) by NZSFC clubs. Catches of 6000t by our northern neighbours generally are associated with poor catches in the New Zealand sport fishery. The exceptions were 2004 and 2005 which were about average in New Zealand and above average in the PICs in 2004.

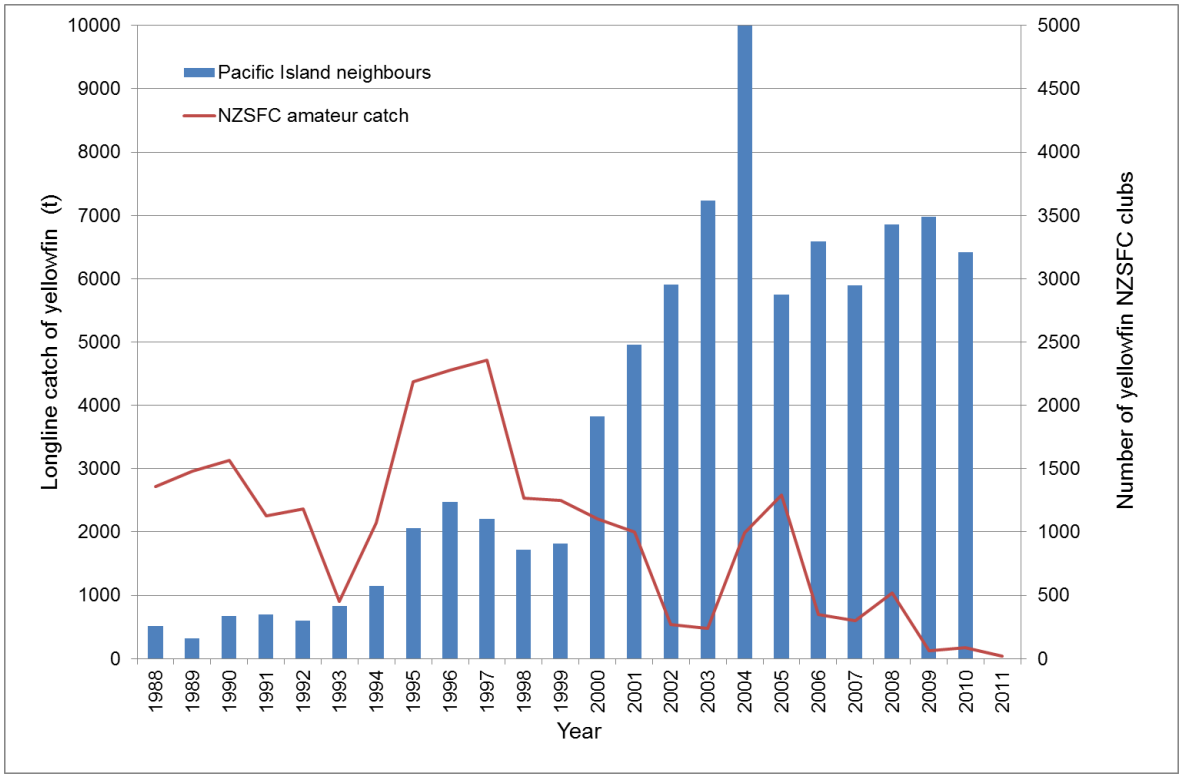

Figure 12: Catch of yellowfin by year from Pacific Island Countries to the north of New Zealand from WCPFC Tuna Fishery Yearbook (blue columns, left scale in tonnes) and the annual catch of yellowfin recorded by sport fishing clubs in New Zealand (red line, right scale in numbers of fish) 1988 to 2011.

Also available are summary tables of catch for the main species by 5 degree square by month and year. These include catch estimates from all countries and longline fleets but excludes some information where there are less than 3 vessels fishing in a time area cell (5x5° x month). One of the areas that stands out as having a large increase in effort and catch is the Fiji Basin which can be captured within the boundaries of 10° to 20° S and 170° E to 180° (Figure 13).

The Fiji Basin has part of the Vanuatu EEZ on the west, the Fiji EEZ in the east and a large pocket of international waters in between. The following data includes catch from the international waters of the Fiji Basin. Albacore tuna is a major target species in this area so we assessed at trends for albacore as well as yellowfin.

There has been a steady increase in the total catch of albacore and yellowfin in the Fiji Basin since 1992 (Figure 14). The pattern is similar to that seen in Figure 12 with an increase in catch during the 1990s and a steep increase in yellowfin catch in 2000.

Figure 13: Map of the western central Pacific showing numbered pockets of international water (orange) and location of the Fiji Basin area used in Figures 14 &15, also the area north of New Zealand used in Figure 16 (blue rectangles).

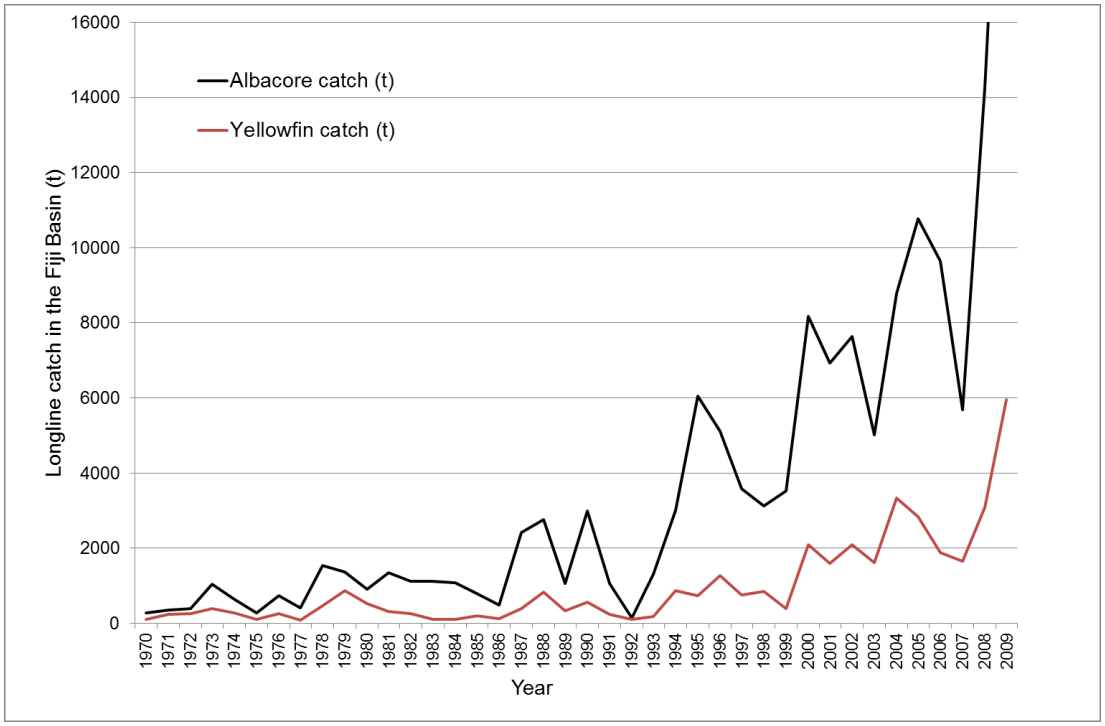

Figure 14: Annual catch of albacore and yellowfin tuna by year from the Fiji Basin area 1970 to 2009.[v]

Catch has increased in this region but has this affected abundance in that area? Here we have used numbers of fish caught per thousand hooks set in the Fiji Basin. Some years catch rates were higher for both albacore and yellowfin in the early 1970s, but since 1990 there have been fluctuations but no consistent trend in raw CPUE despite large increases in fishing effort, up to 90 million hooks per year (Figure 15).

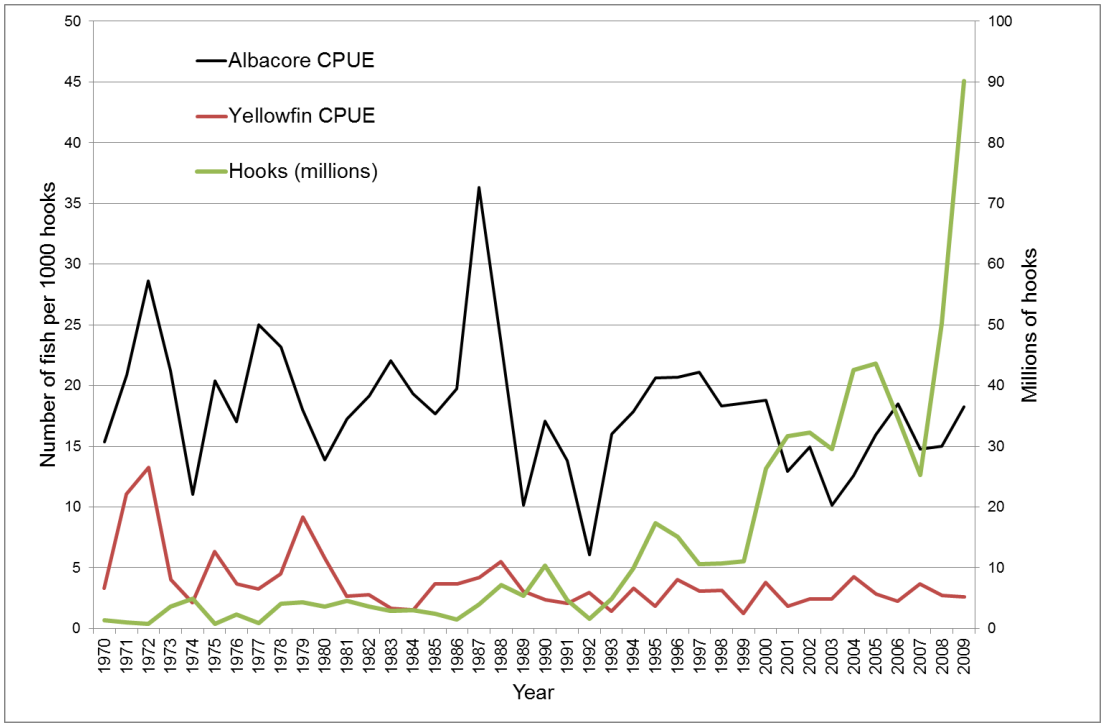

Figure 15: Longline catch per unit effort (fish per 1000 hooks) in the Fiji Basin 1979 to 2009.[v]

Increasing effort and catch of yellowfin in the area north of New Zealand has not decreased longline catch rates in the Fiji Basin, a possible source of summer yellowfin in New Zealand (see tagging section). We calculated individual catch rates for each month for each year for each 5x5^{o} square. There was no obvious progression of high yellowfin catch rates south in spring toward New Zealand, even in the best years. What was evident is that there is little fishing effort directly north of New Zealand in October and November and many cells were blank. This makes it hard to track areas of high catch rates prior to fish arriving in New Zealand. (Figure 16). Peak fishing effort for the years 2000 to 2009 is between June and September with yellowfin catch peaking in August (Figure 16). These vessels are generally targeting albacore and bigeye at this time of the year.

What was noted is that there were generally higher catch rates in a lot of 5x5^{o} squares in the years when catch was high in the New Zealand sport fishery. There may be some yellowfin coming to New Zealand every year but possibly New Zealand only receives significant numbers as an "overflow" when abundance is high in other areas.

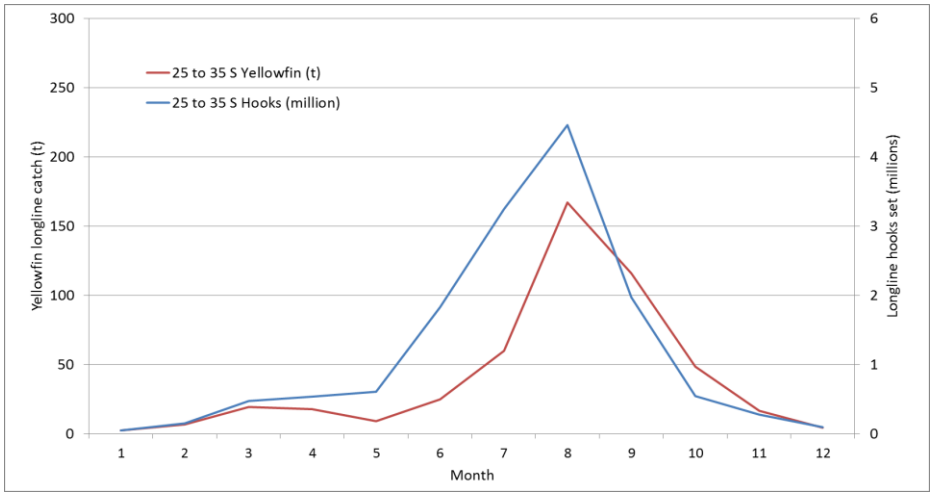

Figure 16: Average annual (2000-2009) longline catch of yellowfin (tonnes) and number of hooks set (millions) by month between 25° and 35° S in the New Zealand region.[v]

The longline catch rates calculated by month and latitude for the years 2000 to 2009 show a peak in seasonal abundance moving north. Peaks move from: 25 ° S in April; 20 ° S in May; 15° S in June; and 10 ° S in June and July (Figure 17). A southward progression is less obvious with possibly a shoulder on 20 ° S catch rates in August and fish moving through 30 ° and 35 ° S in October. Another peak is evident during January in the 35 ° S band (which is a 5 ° band 30 ° to 35 ° S that just reaches northern NZ) (Figure 17). Weaker southerly movement could contribute to the lower abundance seen in New Zealand for most years since 2002.

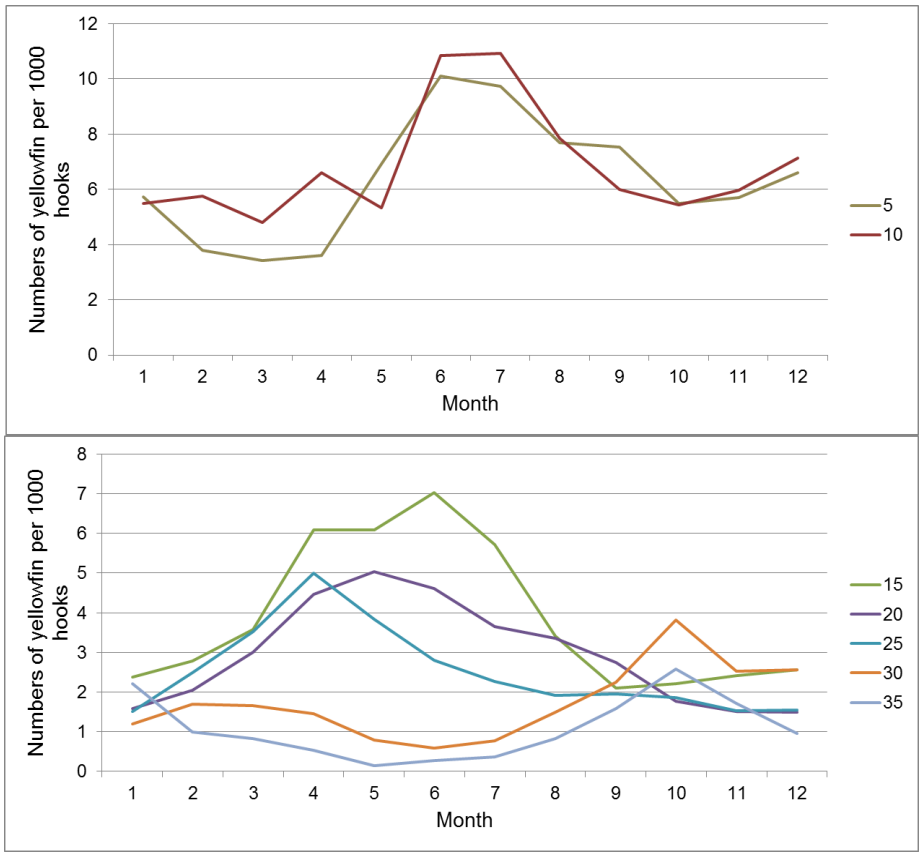

Figure 17: Average monthly longline catch rates (yellowfin per 1000 hooks) by latitude band in the SW Pacific (2000-2009) for equatorial waters 0 -10° S (top) and 10 - 35° S (bottom).[v]

New Zealand and Australian Yellowfin Tuna Tagging

Yellowfin were not officially part of the New Zealand tag and release programme until 2001-02, although there was some tagging prior to this. Over 1200 yellowfin have been tagged and released providing eight long distance recaptures of yellowfin tuna tagged in New Zealand. Four of these have come from international waters in the mid-Tasman Sea northwest of New Zealand (Figure 18). Also, two fish were recaptured off New South Wales more than a year after release. Time at liberty for these fish ranged from 7 months to 1 year 8 months. The overall recapture rate is 1.2%.[v]

Over 36,000 yellowfin tuna have been tagged and released by Australian anglers with 638 recaptures between 1974 and 2010. They show that most yellowfin don't move more than a few hundred miles, even after long periods at liberty. They have a tendency to remain near the continental shelf on the Australian east coast. Only a few have left Australian waters, with none recaptured as far east as New Zealand.

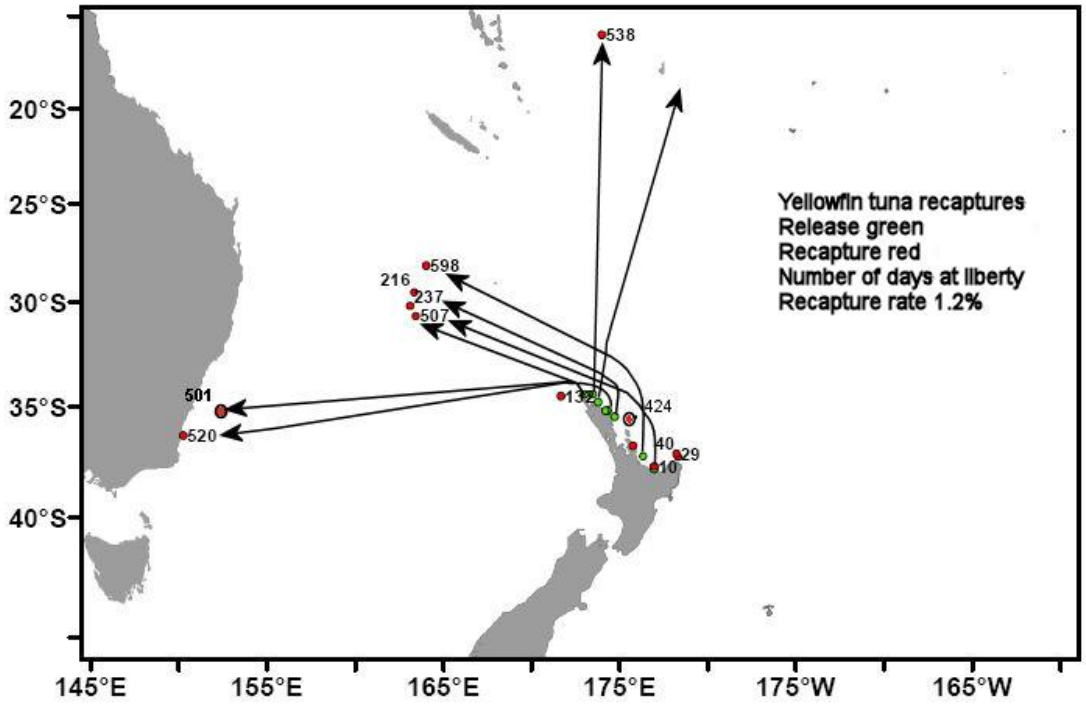

Figure 18: Recaptures of New Zealand tagged Yellowfin Tuna with days at liberty by recapture location.[vi]

A summary report of gamefish tagging in Australia states "yellowfin have a tendency to remain near the continental shelf on the east coast for extended periods….over the last five years 49 tagged yellowfin have been recaptured, 47 of which were within 400 nautical miles of their release locations, and 42 within 250 miles. These fish had been at liberty for between one and 2,239 days (6 years), with an average of 445 days." Their recapture rate is 2.1%. [vi]

Investigation of range contraction

One possible explanation for the decline of yellowfin in New Zealand is that the natural range of the population has reduced or contracted as the population size has reduced. The concept is that when abundance is high and things are getting crowded in preferred areas, fish are more likely to look for suitable habitat elsewhere and migrate from the core. The picture is a little complicated with tuna as they are mobile and may prefer a particular water mass which may also move. Also, local fishing patterns may cause differences in abundance in similar habitats. The Secretariat of the Pacific Community (SPC) presented an initial assessment of range contraction using standardised longline catch rates [iv]. The patterns of CPUE increases and decreases between the 1960s and 2000s which cross a threshold are shown (Figure 19)[iv]. Grey circles where CPUE in both decades was higher than the threshold, red circles represent expansion (lower in 1960s to higher in 2000s), and blue circles represent 'contraction' (higher in 1960s to lower than the threshold in 2000s).

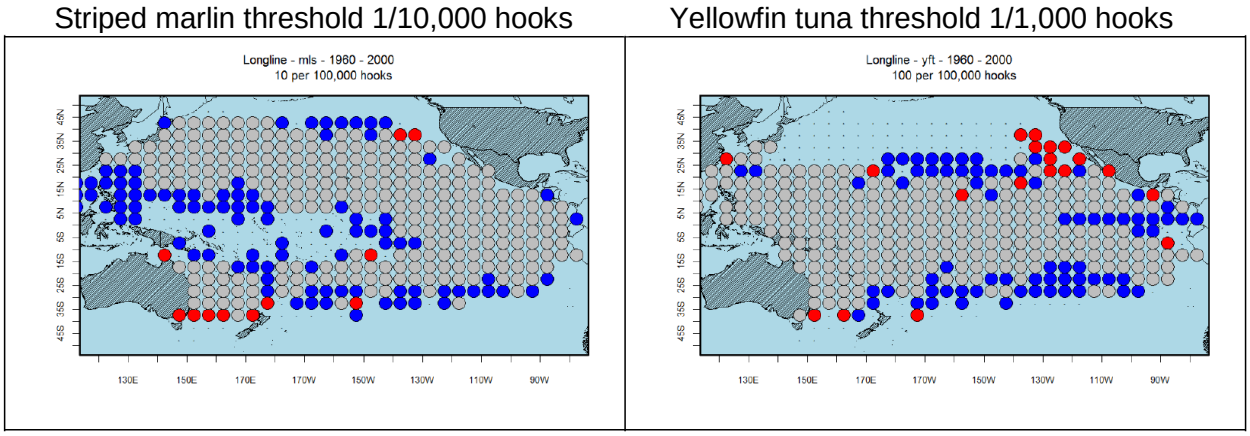

Figure 19: A comparison of longline CPUE between the 1960s and the 2000s showing 5° x 5° squares with expansion (red) and contraction (blue) with respect to the CPUE thresholds for striped marlin (left) and yellowfin (right).[iv]

It is apparent that most change is at the outside of the ranges of each species rather than in the core of the abundance. Striped marlin distribution has a horseshoe shape, with low abundance in the warm equatorial western and central Pacific, and some decreased abundance both at the cool northern and southern boundaries and the central warm boundaries. The exception is some expansion south near Australia and New Zealand (Figure 19). The core areas for yellowfin are the equatorial tropics (Figure 10) and there has been decreased abundance in cooler waters to the south and north including around New Zealand. The exception is the NE Pacific. While yellowfin CPUE has declined in higher latitudes SPC found that the rate of change was no different to the rate of change seen in core areas, so concluded that the analysis provided no strong evidence for range contraction in yellowfin. However, refinement of the analysis is proposed, with a graduate student currently working on the range contraction as part of a PhD.

Yellowfin stock assessment

Stock assessments of the single Western and Central Pacific stock of yellowfin tuna (west of 150° W) are undertaken by the Oceanic Fisheries Programme (OFP) of SPC. No assessment is possible for yellowfin within the New Zealand fisheries waters. The yellowfin stock assessment model is age and spatially structured, with 6 regions (Figure 10). Data on catch, effort, size composition and tag recaptures used in the model are classified by 24 fisheries and quarterly time periods from 1952 through 2010.[iii]

Trends in biomass are generally consistent with the underlying trends in recruitment which was relatively high but declined during the 1950s and 1960s. It then remained relatively constant during the 1970s and 1980s, declined steadily from the early 1990s and recovered somewhat in the mid-2000s (Figure 20). Results show a moderate level of stock-wide depletion, although the stock remains higher than 35 – 40 % of virgin biomass, the selected reference point. According to the model, deletion is highest in the equatorial region 3, lower in regions 1, 5, and 6 and minimal in region 2 (Figure 10). New Zealand is in region 6.

Current spawning stock biomass is less than half what it was in 1980 and fishing mortality is 3 or 4 times the 1980 level, but is not yet overfished (Figure 20).

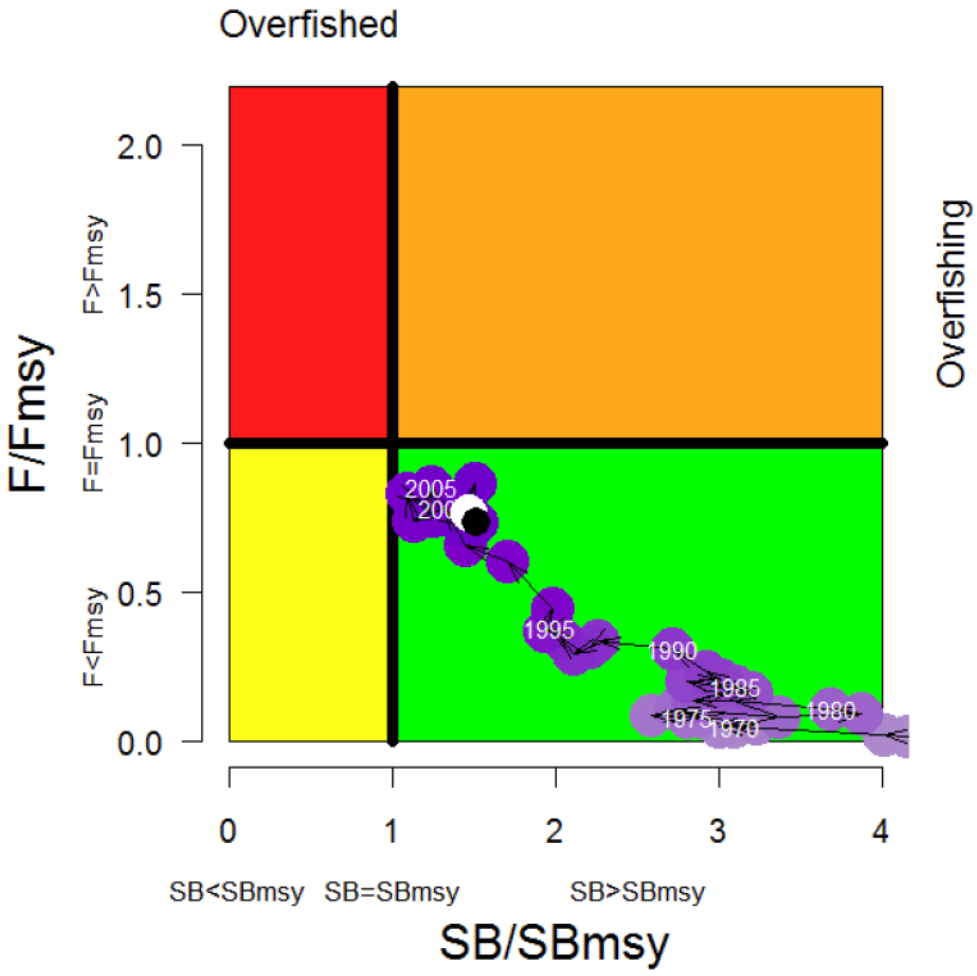

Figure 20: Trend in annual stock status by year (purple circles) from the 2011 stock assessment, showing spawning stock biomass (SB) relative to biomass at maximum sustainable yield (x-axis) and fishing mortality relative to fishing mortality at maximum sustainable yield (y-axis). Black lines are reference points, black circle is stock status for 2010.[iii]

Comment on fisheries management measures

A reduction in longline fishing effort to better manage the albacore fishery in the Southwest Pacific would also reduce longline yellowfin catch in the region. Restrictions on bigeye, yellowfin and skipjack fishing effort will be implemented across the Commission area. Even with all new measures locked in place and enforced it seems unlikely that these alone will restore the New Zealand yellowfin fishery.

Indications of range contraction could be a sign that the yellowfin stock as a whole is being more severely impacted than the stock assessments suggest. In particular, high rates of adult mortality by purse seine and longline and significant juvenile mortality in the FAD purse seine fishery, reduce overall productivity of the stock. The total catch of yellowfin in New Zealand, even at its peak, was a tiny fraction of the catch in the rest of the Western and Central Pacific. The collapse of the New Zealand fishery should be viewed as a "canary in the mine" and act as a warning other countries that all is not well.

Summary

Yellowfin tuna was one of the most frequently landed gamefish, with a major target fishery in the Bay of Plenty during the 1980s and 1990s. Often the large fish (40 to 60 kg) are the first to arrive. As the water warms, during summer, schools of smaller fish (10 to 30 kg) arrive over the continental shelf. It is the absence of these smaller yellowfin, which has been the main cause of the decline in the recreational fishery.

The commercial fisheries in New Zealand target swordfish, bigeye and southern bluefin tuna using longline, and skipjack tuna using purse seine. The purse seine fishery overlaps with the summer yellowfin fishery but the bycatch is very small in New Zealand. The longline fishery does take yellowfin but it is not usually a target species. Most of the longline fishing effort is in autumn and winter, after the yellowfin season. Despite this the commercial catches have also declined to very low levels in recent years.

Most of the yellowfin catch is taken by purse seiners fishing in the western tropical Pacific, north of 10^{o} South. In the southwest Pacific (south of 10^{o} S) longline effort and catch of yellowfin increased gradually during the 1990s then dramatically in 2000 just prior to the major decline in the New Zealand fishery. In particular catch and effort in the Fiji Basin for all fleets rose sharply in the year 2000. Yellowfin catch in this relatively small area rose from about 800 t to 2,000 t per year in the early 2000s and appears to have reached 6,000 t in 2009 (SPC public access database).

If tuna stocks in the Fiji Basin, directly north of New Zealand, have declined since the 1990s then we would expect to see a decline in catch per unit effort (CPUE) in that area. There was no decline seen in raw longline CPUE (number of yellowfin caught per 1000 hooks) over the last 20 years in this area, which has seen the largest expansion in longline fishing effort. Also the year with the highest catch by our Pacific Island neighbours (10,000 t in 2004) was a reasonable year in the New Zealand sport fishery, followed by a reasonable season in 2005.

There is longline fishing effort in subtropical waters between New Zealand and our Pacific Island neighbours (25^{o} to 35^{o} S) but this is seasonal and appears to target albacore and bigeye tuna from July to September. Peak yellowfin catch rates in this band of water north of New

Zealand are in October as fish move through but overall fishing effort appears to be low in these bands during October (4% of annual effort), November (2%) and December (1%).

Yellowfin tagged in New Zealand have moved into the Fiji Basin and also show a link with the North Tasman Sea. While two fish tagged in New Zealand have been recaptured in Australia, none of the hundreds of recaptures of Australian tagged fish have been made in New Zealand. While capable of long distance migrations, this and other tagging studies, show that yellowfin may be less "highly migratory" than previously thought and they may stay for some time in areas of suitable habitat.

Yellowfin tuna have been caught in New Zealand waters since the 1960s. Their numbers have always fluctuated from year to year, but catches have been very low since 2005. The once thriving sport fishery has all but vanished. There is circumstantial evidence that an increase in tuna longline fishing effort in the subtropical SW Pacific is a factor in this decline. This is most evident with a sharp increase in the number of longline hooks set and yellowfin caught in 2000, which was followed by reduced abundance in New Zealand waters. The significant increase in purse seine catch in equatorial waters may also be reducing stocks and the population pressures that "push" fish to the edge of the natural range. In exceptional years, with high overall abundance, we may again see yellowfin "pushed" as far south as New Zealand. Although Pacific yellowfin are very productive, it appears unlikely that high overall abundance can be achieved with the current fishing pressure across the stock as a whole.

The western Pacific stock shows a moderate level of stock-wide depletion. According to the 2011 stock assessment model, depletion is highest in the equatorial region 3, lower in regions 1, 5, and 6 and minimal in region 2. There has been a significant increase in catch and fishing mortality in the last 20 years, which has seen the stock approach, but not crossed into an overfished state. The assessment estimates a slight increase in the adult yellowfin abundance in 2010 but is still half the level estimated for 1990.

New Zealand fishers are very concerned about the continued rapid expansion of longline effort in the southwest Pacific. Robust conservation and management measures and reporting requirements need to be implemented and enforced. Work investigating range contraction tuna and billfish species should continue.

About the New Zealand Marine Research Foundation

The New Zealand Marine Research Foundation was officially launched on 23 September 1999, at the Bay of Islands Swordfish Club in Paihia, after many years of planning and fund raising.

They aim to sponsor research on aquatic plants and animals, and interactions between people and marine ecosystems to the benefit of all New Zealanders, including participants in ocean recreation.

The New Zealand Sport Fishing Council provides logistical support and one-off funding for particular projects. In addition there is an annual donation by each member of affiliated clubs.

Major projects like the striped marlin satellite tagging received over $150,000 through grants from other Trusts, namely Castle Trust, Green Thistle, Lion Foundation, Marlin Sports, NZ Community Trust, Perry Foundation and Pub Charity. Also, substantial help came from the Enterprise Motor Group, the NZ Sport Fishing Council, Massey University, University of Auckland and Stanford University, USA.

As the New Zealand Sport Fishing Council fund raising initiative www.LegaSea.co.nz gains traction the momentum and work of the Foundation will be further bolstered by contributions from the public.

There are increasing numbers of supporters who are grateful for the resolve and commitment of the New Zealand Marine Research Foundation for making this crucial research structure possible.

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References

[i] Anon (2011). Yellowfin Tuna Plenary Report, New Zealand Ministry for Primary Industries. 22 p.

[ii] Anon (2011). New Zealand Country Report to WCPFC, New Zealand Ministry for Primary Industries. 22 p.

[iii] Langley, A., Hoyle, S., and Hampton, J. (2011). Stock assessment of yellowfin tuna in the western and central Pacific Ocean. Report to the Western and Central Pacific Fisheries Commission Scientific Committee WCPFC-SC7-2011/SA-WP-03. 134pp.

[iv] Anon (2011). Consideration of range contraction in tropical tunas in the western and central Pacific Ocean. Report to the Western and Central Pacific Fisheries Commission Scientific Committee WCPFC-SC7-2011/SPTBF9/IP.2. 17 p.

[v] Anon (2011). Western and Central Pacific Fisheries Commission, Public domain aggregated catch/effort data.

[vi] Holdsworth, J., Sal, P. (2009). New Zealand billfish and gamefish tagging 2007-08. *New Zealand Fisheries Assessment Report 2009/26*. 27 p.