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PRELIMINARY YELLOWFIN OUTCOMES UNDER THE WCPFC MIXED FISHERY HARVEST STRATEGY APPROACH

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Revision 1: Value in Table 1 corrected. Proportion of mean catch by weight (2020-2022) of bigeye in 'Other' fisheries changed from 0.31 to 0.15.

[1] Oceanic Fisheries Programme of the Pacific Community

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Executive Summary

Under the WCPFC mixed fishery framework, there is no management procedure (MP) that explicitly considers the stock status of yellowfin and manages the associated fisheries. Instead, the fisheries that catch yellowfin are primarily managed through the MPs of bigeye, skipjack, and South Pacific albacore. However, it is still necessary to evaluate likely outcomes for the yellowfin stock and to assess the probability of achieving management objectives for yellowfin.

Evaluations of likely outcomes for yellowfin tuna are conducted using 30-year, stochastic, effort-based projections conducted across a grid of 144 operating models. Results are presented in terms of the same performance indicators used to evaluate candidate bigeye MPs.

Outcomes for yellowfin tuna under the combined measures of the skipjack MP, the South Pacific albacore MP, and potential MPs for bigeye tuna, based on 30 year stochastic projections across the yellowfin tuna OM grid, show:

- the stock of yellowfin tuna is expected to remain above the limit reference point (LRP) with greater than 80% probability;
- the management objective of maintaining the yellowfin stock around 2012-2015 average depletion levels cannot be met;
- for longline fisheries, the choice of bigeye target reference point (TRP) had the greatest impact on expected catches of yellowfin, with longline or FAD favoured harvest control rules (HCRs) having lesser impact;
- catches of yellowfin in purse seine fisheries were more stable, but are slightly higher for the upper bigeye TRP option.

These preliminary evaluations demonstrate that the proposed WCPFC mixed fishery harvest strategy approach is expected to maintain the stock of yellowfin tuna within safe biological limits. However the current management objective to maintain the stock around the 2012-2015 average depletion level cannot be achieved.

We invite SC22 to:

- endorse the approach outlined here to evaluate outcomes for yellowfin under the proposed WCPFC mixed fishery approach;
- note that under the adopted MPs for skipjack and South Pacific albacore, and potential MPs for bigeye tuna, yellowfin is expected to remain above the LRP with high probability;
- note that current management objective for yellowfin cannot be achieved for the range of bigeye TRPs currently under consideration;
- provide feedback on the information provided, and in particular on the performance indicators used to demonstrate expected outcomes for yellowfin, and
- note that the evaluations presented here can be updated and resubmitted for BMW02.

1 Introduction

WCPFC12 agreed to a workplan for the adoption of harvest strategies for WCPO skipjack, bigeye, yellowfin and South Pacific albacore (WCPFC21 Summary Report, attachment 16). Under the proposed mixed fishery approach, single-stock management procedures (MPs) are being developed for skipjack, South Pacific albacore and bigeye, with the MPs defining fishing levels in the purse seine and pole and line fisheries as well as 'other' fisheries (skipjack), the southern longline fishery (longlines operating south of 10°S - South Pacific albacore) and the tropical longline (TLL) fishery (longlines operating between 20°N and 10°S - bigeye). An interim skipjack MP was adopted in 2022 (WCPFC, 2022) and an interim South Pacific albacore MP was adopted in 2025 (WCPFC, 2025b). The bigeye MP is scheduled for adoption in 2026. The fisheries controlled by each MP was based upon the proportion of mean catch of the four main tuna stocks (Table 1).

Under the WCPFC mixed fishery framework, there is no MP that explicitly considers the stock status of yellowfin and manages the associated fisheries. Instead, the fisheries that catch yellowfin are primarily managed through the MPs of bigeye, skipjack, and South Pacific albacore. However, it is still necessary to evaluate likely outcomes for the yellowfin stock and assess the probability of achieving the agreed yellowfin management objectives. It will, therefore, be necessary to develop a management strategy evaluation (MSE) framework for yellowfin to perform those evaluations.

Table 1: *Proportion of mean catch by weight (2020-2022) in the WCPFC-CA (south of the equator for albacore) of the four main tuna stocks by fishery. 'Other' fisheries are the domestic fisheries of Vietnam, Indonesia and the Philippines. The figures include catches in archipelagic waters. Colours relate to the single-stock MP under which each fishery falls under the proposed mixed fishery framework: blue = skipjack, red= bigeye, green = South Pacific albacore. Northern longline is potentially aligned with NP albacore management*

Stock	Tropical longline	Southern longline	Northern longline	Pole and line	Purse seine	Troll	Other
Skipjack	0	0	0	0.09	0.83	0	0.08
South Pacific Albacore	0.12	0.81	0	0	0	0.07	0
Bigeye	0.27	0.05	0.06	0.01	0.45	0	0.15
Yellowfin	0.08	0.02	0.01	0.03	0.55	0	0.31

WCPFC21 supported a sequenced approach to the adoption of target reference points (TRPs) for bigeye and yellowfin, whereby the Commission first addresses the TRP for bigeye and then evaluates its implications for achieving management objectives for yellowfin (WCPFC, 2024). In the absence of an agreed TRP for yellowfin, the evaluations are presented in relation to the default management objective of CMM 2025-02 (WCPFC, 2025a) of the average spawning biomass depletion ratio for the period 2012 to 2015.

Previous analyses to determine likely outcomes for bigeye and yellowfin tuna under the TT-CMM (SPC-OFP, 2025) indicate it may not be possible to achieve current management objectives for bigeye and yellowfin simultaneously.

2 Methods

2.1 Operating models

Outcomes for yellowfin under the combination of measures resulting from the MPs for skipjack, South Pacific albacore and bigeye tuna have been evaluated across a grid of 144 operating models (OMs, Scott et al., 2026c). SC21 recommended that the initial yellowfin tuna OM reference set be constructed around the 2023 yellowfin stock assessment grid, consistent with the approach used for the other key tuna species. The OMs for yellowfin incorporate uncertainty in growth, natural mortality, steepness, tag mixing period, recruitment variation and effort creep.

2.2 Projection framework

Stochastic, effort-based projections for a thirty year period were conducted across the OM grid. Ten projections were run for each OM with future recruitment determined from a random sample of historical deviates. Fishery specific effort levels were set consistent with the interim skipjack MP, the interim albacore MP and four illustrative MP scenarios from the bigeye evaluations (Scott et al., 2026b). Given the numerous aspects of the bigeye MP to still be agreed, evaluations were conducted for a reduced subset of MP designs to demonstrate stock outcomes under plausible yet contrasting MP options. Projections were conducted for the "TLL including Hawaiian longline fleet" bigeye scenario, for which the bigeye MP controls all of the TLL fisheries. The four illustrative bigeye MP scenarios are described in Table 2 and the projected stock status is shown in Figure 10.

MP 13 was designed for the bigeye stock to achieve the lower TRP with a threshold probability of 50%. MP 18 was designed for the bigeye stock to achieve the upper TRP was a threshold probability of 70%. Two pairs of HCRs were considered within each MP: 'FAD favoured' and 'longline favoured', where both attempted to achieve the same stock outcomes for bigeye while distributing management responsibility differently between longline and purse seine fisheries.

Table 2: *Bigeye MP scenarios defining fishing levels for tropical longline in the yellowfin projections*

Bigeye MP	**HCR pair**	**Target reference point**	**Threshold %**
13	FAD favoured	0.94 x $SB/SB_{2012-2015}$	50%
13	longline favoured	0.94 x $SB/SB_{2012-2015}$	50%
18	FAD favoured	1.06 x $SB/SB_{2012-2015}$	70%
18	longline favoured	1.06 x $SB/SB_{2012-2015}$	70%

The OMs were conditioned on data up to 2021 so that the MSE projections start from 2022. Between 2022 and 2024, catch and effort data are available but were not used in the OM conditioning. These years of the projection are referred to as the transient period. However, for the yellowfin projections, we assumed that all MPs were operational during the entire projection period, starting in 2022, removing the requirement to make assumptions about catch and effort during the transient period. We note that catches for some fisheries, in particular domestic fisheries of Indonesia and the

Philippines, show considerable variability for this transient period. Future evaluations of outcomes for yellowfin should include observed catches for the transient period where possible.

The skipjack MP defines fishing levels of the tropical purse seine fishery, the pole and line fisheries and domestic fisheries of Vietnam, Indonesia and the Philippines operating outside archipelagic waters. For the yellowfin projections, the future effort of these fisheries was fixed at levels consistent with their skipjack MP baseline levels. Future pole and line fisheries effort was fixed at 2001-2004 average levels. Total future purse seine (FAD-associated and free-school) effort was fixed at 2012 levels. The future effort of the domestic fisheries was fixed at the 2016-2018 average level, including the fisheries operating in archipelagic waters.

The South Pacific albacore MP sets the albacore catch limit for the southern longline fisheries. The future effort of this fishery is fixed at a level consistent with South Pacific albacore achieving the TRP under the adopted South Pacific albacore MP (effort approximately 10% higher than 2019-2021 levels).

The northern longline fisheries are a small component of the yellowfin fishery, catching around 1% of the yellowfin between 2020 and 2022 (Table 1). The future effort of these fisheries was set to the average effort of 2019-2021.

These fishery-specific effort configurations are consistent with the settings used for the bigeye MP evaluations presented in Scott et al. (2026b) with further methodological details found in Scott et al. (2026a).

2.3 Performance Indicators

Relative performance of the candidate MPs is evaluated by comparing calculated performance indicators. The results were evaluated against the same performance indicators used for bigeye tuna, with yellowfin-specific changes where necessary:

1. Stock status ($SB/SB_{F=0}$) in the WCPO, (measured as $SB_{\text{latest}}/SB_{F=0}$, i.e. SB in year y relative to the average $SB_{F=0}$ in years y-10 to y-1);
2. Probability that $SB/SB_{F=0}$ is above the Target Reference Point (calculated as the average spawning biomass depletion ratio for the period 2012 to 2015);
3. Probability that $SB/SB_{F=0}$ is above the Limit Reference Point, noting that the WCPFC requires the probability to be greater than 0.8;
4. Expected yellowfin catch, reported separately for longline and purse seine;
5. Expected vulnerable biomass, as a proxy for catch rates, reported separately for longline and purse seine. Here it is calculated as relative to the average vulnerable biomass in the period 2019-2021.
6. Catch variability, reported separately for longline and purse seine;
7. Effort variability, reported separately for longline and purse seine;

8. F relative to F_{MSY}; and
9. MSY.

Performance indicators for effort variability and MSY are not yet available, pending ongoing development of the MSE framework, but will be developed and presented for future analyses.

Where performance indicators are presented separately for longline and purse seine fisheries, the longline results relate to all longline fisheries in the WCPO and purse seine results relate to all purse seine (FAD-associated and free school) fisheries in the WCPO.

3 Results

A brief summary of the results are presented here using box and bar plots in the three different time periods (short-, medium- and long-term). The box and whiskers of the box plots show the 60th and 95th percentile ranges respectively. The larger the box and the longer the whiskers, the greater the uncertainty in the expected values.

3.1 Stock status

The expected $SB/SB_{F=0}$ of yellowfin under the four illustrative bigeye MPs in each time period is shown in Figure 1 as box plots. The median long-term value of $SB/SB_{F=0}$ under each MP sits between the TRP and the LRP. The MPs designed for bigeye to hit the lower TRP (i.e., higher longline effort) result in a more depleted yellowfin stock. Between the FAD favoured (FF) and longline favoured (LF) MPs, the stock status is slightly lower with the longline favoured HCR pair.

Generally, there is little difference between the results in different time periods. This is because, under the bigeye MP, stock status of bigeye is maintained around target levels with, consequently, little or no change in total longline effort.

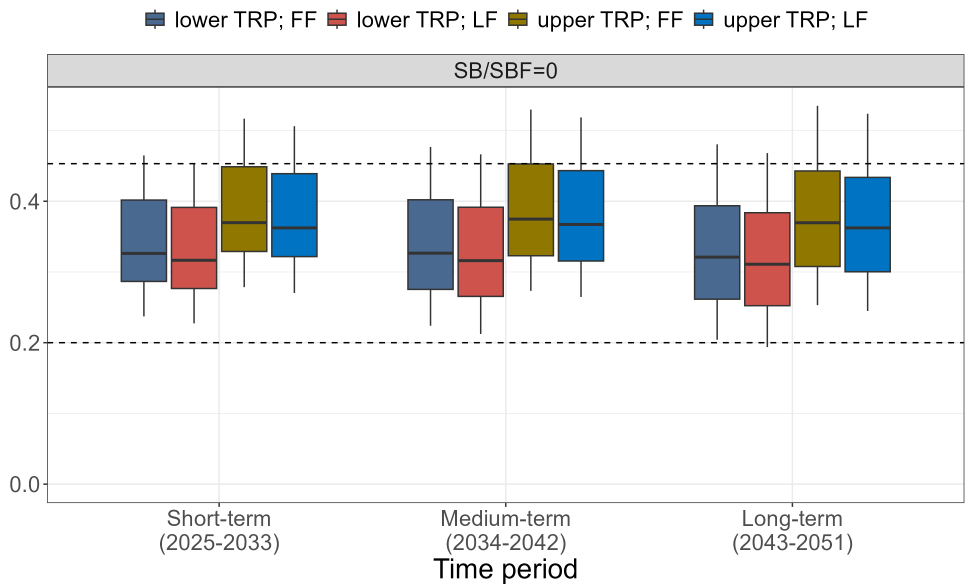

Figure 1: Box plots of $SB/SB_{F=0}$ under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period. The dashed horizontal lines are at the average $SB/SB_{F=0}$ from 2012 to 2015 of 0.434 and the limit reference point of 0.2.

3.2 Probability above the LRP and TRP

The expected probabilities of being above the LRP and TRP of each MP in each time period are shown in Figure 2 and Figure 3. The results are also presented in Tables 3, 4 and 5 in the appendix, separated by time period. All of the illustrative bigeye MPs resulted in a probability of being above the LRP of at least 95% (Table 5) . The WCPFC specifies that an adopted harvest strategy should have a probability of being above the LRP of at least 80%.

Under the TT-CMM, the current management objective for yellowfin tuna is to maintain the stock around the average spawning biomass depletion ratio from 2012 to 2015. Noting that recent analyses indicate that it may not be possible to achieve this management objective simultaneously for both bigeye and yellowfin, the probability of the yellowfin stock status being above the target was between 9% and 25% across the illustrative MPs.

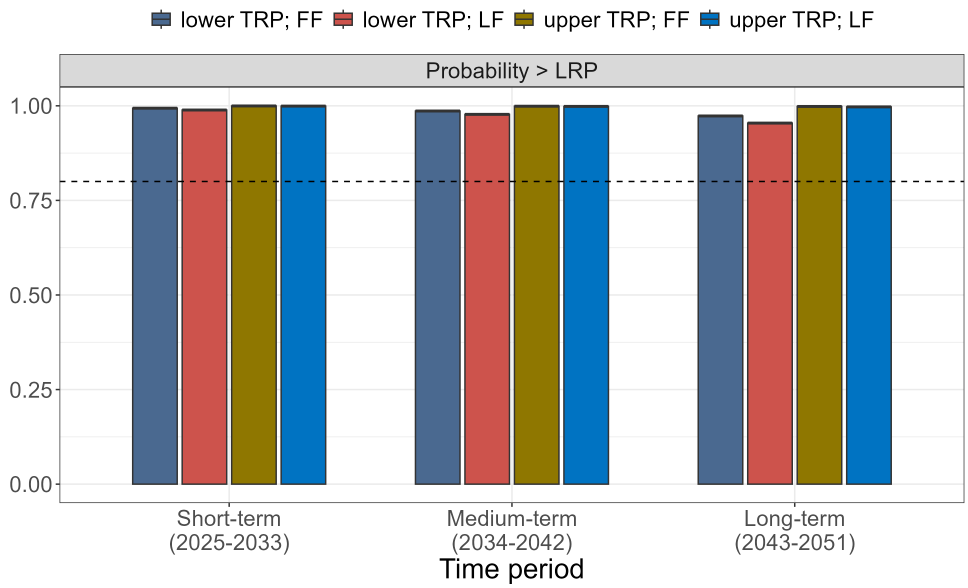

Figure 2: Probability of yellowfin $SB/SB_{F=0}$ in the WCPFC-CA being above the Limit Reference Point under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period. The dashed horizontal line is at 0.8, the minimum probability required by WCPFC.

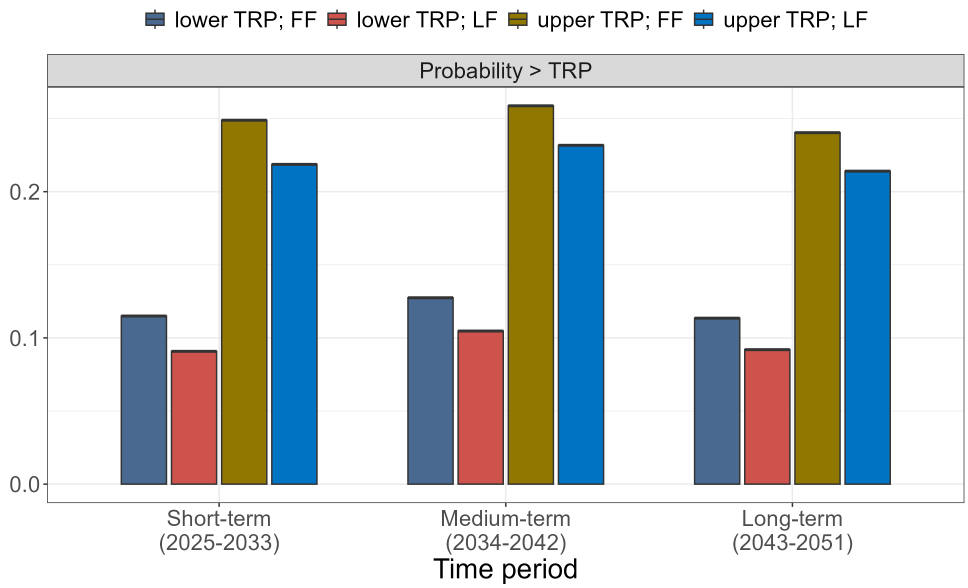

Figure 3: Probability of yellowfin $SB/SB_{F=0}$ in the WCPFC-CA being above the Target Reference Point under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period.

3.3 Longline catch and catch variability

The expected catches of the longline fisheries are shown in Figure 4. The results are also presented in Tables 6, 7 and 8 in the appendix, separated by time period.

There is a clear difference between the expected longline catches of yellowfin under bigeye MPs designed to achieve either the upper or lower bigeye TRP. For the lower TRP scenarios, longline catches of yellowfin are significantly higher due to the substantial increase in longline effort allowed under those MPs. We note these projected yellowfin longline catches are greater than any historical catch observed in the fishery. The MP designed for bigeye to achieve it's upper TRP results in lower yellowfin catches for the longline fisheries in all time periods compared to those from achieving the lower TRP.

The HCR pair (FAD favoured or longline favoured) has a smaller effect on the expected yellowfin catches. Nevertheless, the difference between the FAD favoured and longline favoured MPs is approximately 22 000 tonnes for the upper TRP MP and 25 000 tonnes for the lower TRP MP.

Catch variability is measured as the absolute change in catch between years (Figure 5). Interpreting uncertainty around the variability can be challenging so for clarity this indicator is presented as a bar chart of median values instead of a box plot.

When operating under effort controls with a relatively stable stock status, catch variability scales with catch. For this reason, the MPs designed for bigeye to achieve it's lower TRP result in higher catch variability.

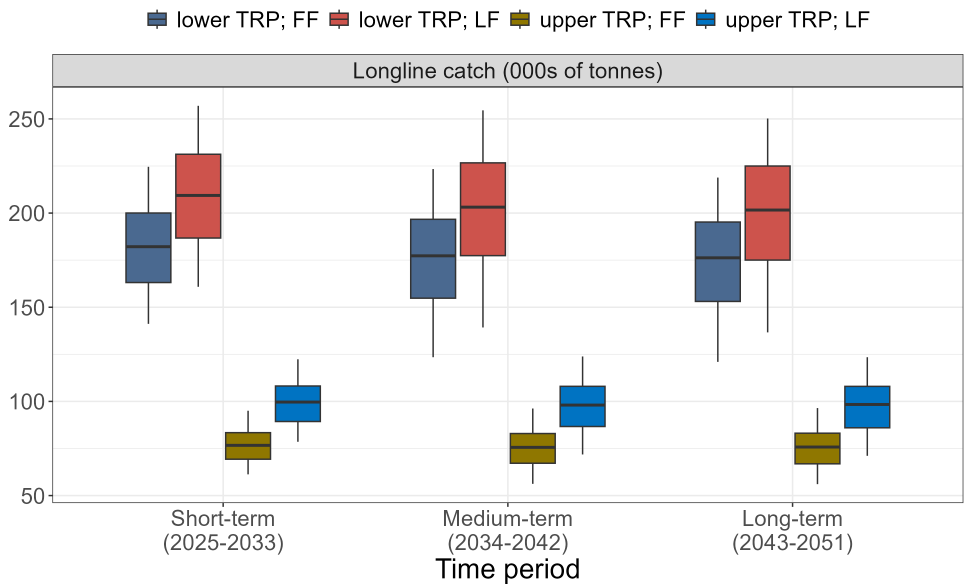

Figure 4: Box plots of expected annual catch (000s of tonnes) taken by all longline fisheries under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period. The whiskers show the 95th percentile range, the box shows the 60th percentile range, and the solid horizontal line is the median value.

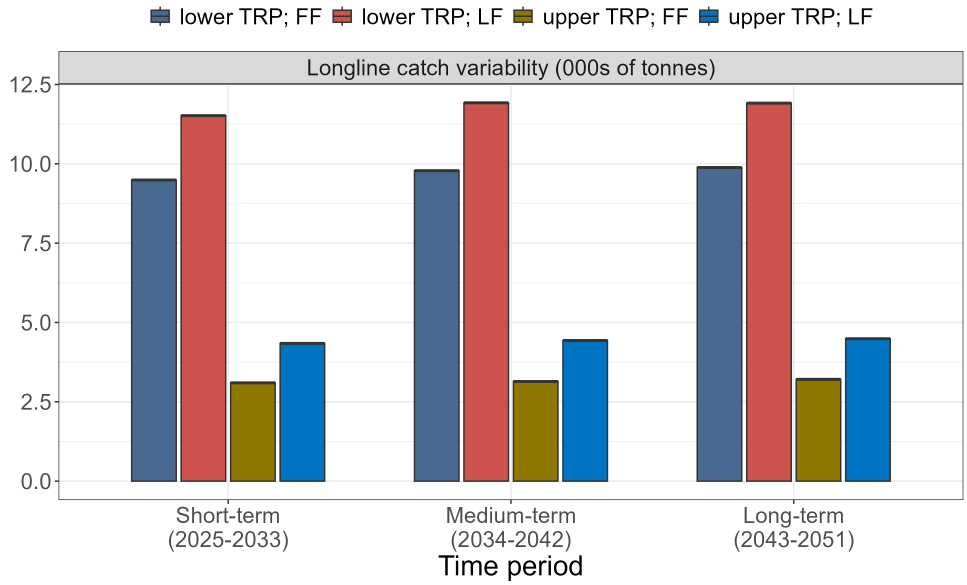

Figure 5: Bar chart of expected median catch variability (000s of tonnes) of all longline fisheries under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period.

3.4 Purse seine catch and catch variability

The expected catches of the purse seine fisheries are shown in Figure 6. The results are also presented in Tables 9, 10 and 11 in the appendix, separated by time period.

There is little difference between the expected purse seine catches of yellowfin under the different bigeye MPs. This is likely because total purse seine effort was fixed at 2012 levels and because, under the alternative MPs there is relatively little change in the yellowfin vulnerable biomass for purse seine fisheries.

The differences between purse seine catch variability was also minimal. The variability was slightly lower under the MPs with a longline favoured HCR pair.

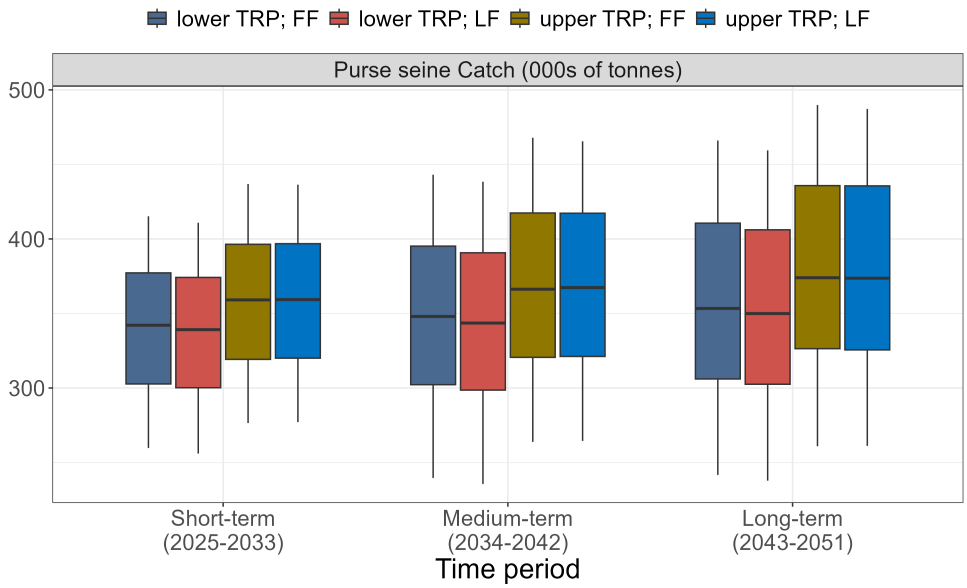

Figure 6: Box plots of expected annual catch (000s of tonnes) taken by the purse seine fisheries (FAD-associated and free school) under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period. The whiskers show the 95th percentile range, the box shows the 60th percentile range, and the solid horizontal line is the median value.

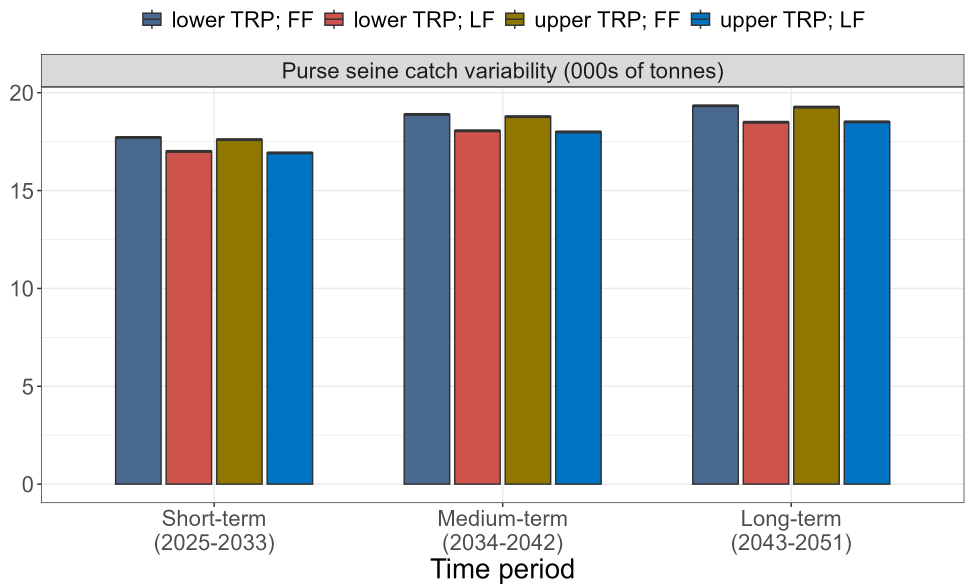

Figure 7: Bar chart of expected median catch variability (000s of tonnes) of all purse seine fisheries under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period.

3.5 Vulnerable biomass

Vulnerable biomass is the total biomass that is available to a fishery through the selection pattern and is considered to be a proxy for catch rates (Figure 8 and 9). We present vulnerable biomass relative to the average vulnerable biomass in 2019-2021. The results are also presented in Tables 6 – 11 in the appendix, separated by time period.

In all cases the index is less than 1, indicating the expected future vulnerable biomass is lower than the 2019-2021 average level for both the longline fisheries managed through the bigeye MP and the purse seine fisheries. The purse seine fishery selects smaller individuals, whereas the longline fishery selects larger individuals (Scott et al., 2026c), giving rise to the differences in expected vulnerable biomass between these fisheries.

For the longline fisheries, the HCR pair (FAD favoured or longline favoured) makes a small difference to the expected vulnerable biomass, with the longline favoured scenarios causing a slightly lower vulnerable biomass. The vulnerable biomass is slightly lower for the MPs designed for bigeye to achieve the lower TRP.

For the purse seine fisheries, the HCR pair (FAD favoured or longline favoured) makes a negligible difference to the expected vulnerable biomass. The vulnerable biomass is slightly lower for the MPs designed for bigeye to achieve the lower TRP.

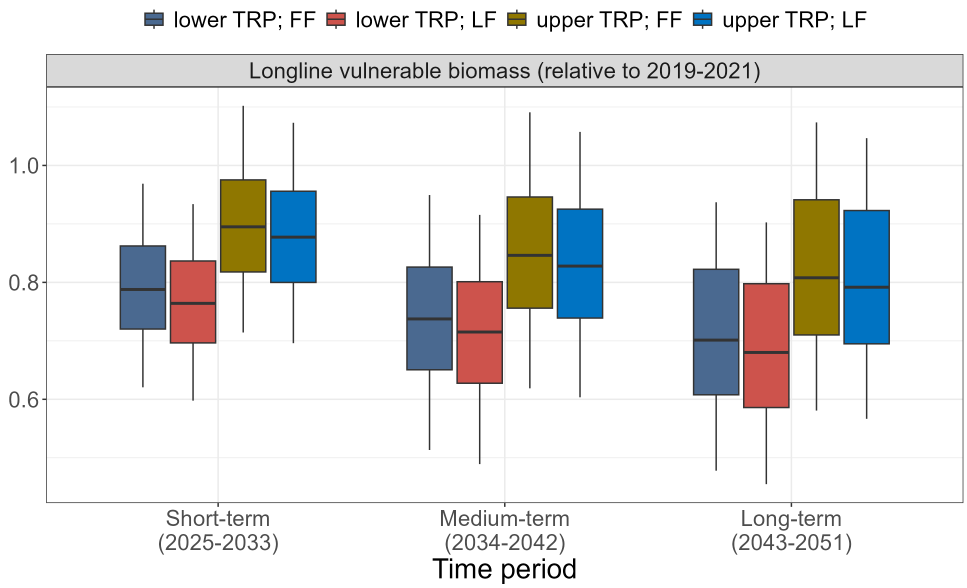

Figure 8: Box plots of expected vulnerable biomass, relative to the average level in 2019-2021, of the longline fisheries under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period.

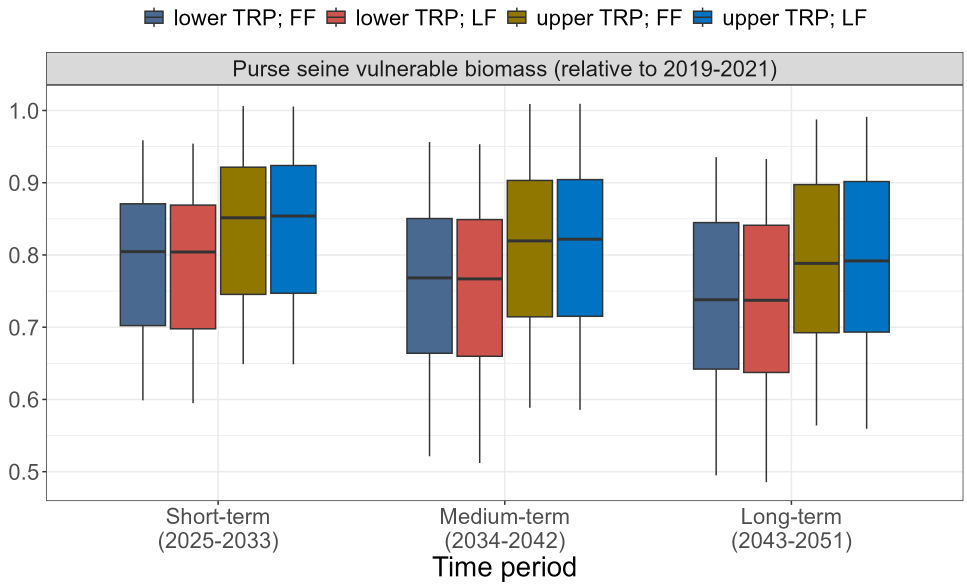

Figure 9: Box plots of expected vulnerable biomass, relative to the average level in 2019-2021, of the purse seine fisheries (FAD-associated and free-school) under four potential bigeye MPs (FF = FAD favoured HCR pair, LF = longline favoured HCR pair) in each time period.

3.6 Conclusions

Outcomes for yellowfin tuna under the combined measures of the skipjack MP, the South Pacific albacore MP, and potential MPs for bigeye tuna, based on 30 year stochastic projections across the

yellowfin tuna OM grid, show:

- the stock of yellowfin tuna is expected to remain above the LRP with greater than 80% probability;
- the management objective of maintaining the yellowfin stock around 2012-2015 average depletion levels cannot be met;
- for longline fisheries, the choice of bigeye TRP had the greatest impact on expected catches of yellowfin, with longline or FAD favoured HCRs having lesser impact;
- catches of yellowfin in purse seine fisheries were more stable, but are slightly higher for the upper bigeye TRP option.

These preliminary evaluations demonstrate that the proposed WCPFC mixed fishery harvest strategy approach is expected to maintain the stock of yellowfin tuna within safe biological limits. However the current management objective to maintain the stock around the 2012-2015 average depletion level cannot be achieved.

We invite SC22 to:

- endorse the approach outlined here to evaluate outcomes for yellowfin under the proposed WCPFC mixed fishery approach;
- note that under the adopted MPs for skipjack and South Pacific albacore, and potential MPs for bigeye tuna, yellowfin is expected to remain above the LRP with high probability;
- note that current management objective for yellowfin cannot be achieved for the range of bigeye TRPs currently under consideration;
- provide feedback on the information provided, and in particular on the performance indicators used to demonstrate expected outcomes for yellowfin, and
- note that the evaluations presented here can be updated and resubmitted for BMW02.

Acknowledgements

We gratefully acknowledge funding for this work from the New Zealand Ministry of Foreign Affairs and Trade (MFAT) funded project "Sustainable Pacific Fisheries".

Declaration of generative AI and AI-assisted technologies

No AI technologies were used in the preparation of this paper.

4 Appendix

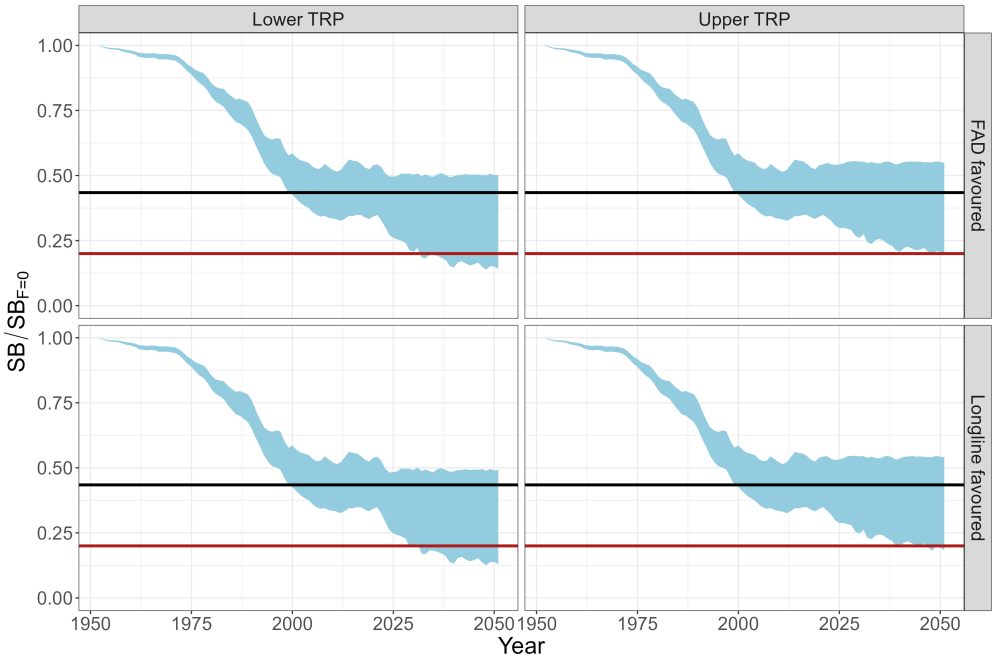

Figure 10: Projected yellowfin stock status ($SB/SB_{F=0}$) under four example bigeye MP scenarios: lower TRP and FAD favoured (top left), upper TRP and FAD favoured (top right), lower TRP and longline favoured (bottom left), and upper TRP and longline favoured (bottom right). Black horizontal line shows the average stock status ($SB/SB_{F=0}$) between 2012 and 2015 (0.434). Red horizontal line shows the limit reference point (0.2).

Table 3: Biological performance indicators in the **short**-term (2025-2033) under four illustrative bigeye MPs. $SB/SB_{F=0}$ is defined in Section 2.3. The value shown is the median, or the probability. Values in parenthesis are the 95th percentile range.

MP (target)	HCR pair	Probability above LRP	Probability above TRP	SB/SBF=0
MP 13 (lower)	FF	0.99	0.11	0.33 (0.24-0.46)
MP 13 (lower)	LF	0.99	0.09	0.32 (0.23-0.45)
MP 18 (upper)	FF	1	0.25	0.37 (0.28-0.52)
MP 18 (upper)	LF	1	0.22	0.36 (0.27-0.51)

Table 4: Biological performance indicators in the **medium**-term (2034-2042) under four illustrative bigeye MPs. $SB/SB_{F=0}$ is defined in Section 2.3. The value shown is the median, or the probability. Values in parenthesis are the 95th percentile range.

MP (target)	HCR pair	Probability above LRP	Probability above TRP	SB/SBF=0
MP 13 (lower)	FF	0.99	0.13	0.33 (0.22-0.48)
MP 13 (lower)	LF	0.98	0.1	0.32 (0.21-0.47)
MP 18 (upper)	FF	1	0.26	0.37 (0.27-0.53)
MP 18 (upper)	LF	1	0.23	0.37 (0.26-0.52)

Table 5: Biological performance indicators in the **long**-term (2043-2051) under four illustrative bigeye MPs. $SB/SB_{F=0}$ is defined in Section 2.3. The value shown is the median, or the probability. Values in parenthesis are the 95th percentile range.

MP (target)	HCR pair	Probability above LRP	Probability above TRP	SB/SBF=0
MP 13 (lower)	FF	0.97	0.11	0.32 (0.2-0.48)
MP 13 (lower)	LF	0.95	0.09	0.31 (0.19-0.47)
MP 18 (upper)	FF	1	0.24	0.37 (0.25-0.53)
MP 18 (upper)	LF	1	0.21	0.36 (0.24-0.52)

Table 6: Longline fishery performance indicators in the **short**-term (2025-2033) under four illustrative bigeye MPs. The value shown is the median and the 95th percentile range is in parenthesis. Catch is measured in thousands of tonnes. Vulnerable biomass is relative to the average vulnerable biomass in 2019 – 2021.

MP (target)	HCR pair	Longline catch	Longline catch variability	Longline vulnerable biomass
MP 13 (lower)	FF	182.15 (141.18-224.57)	9.49	0.79 (0.62-0.97)
MP 13 (lower)	LF	209.37 (160.85-256.95)	11.52	0.76 (0.6-0.93)
MP 18 (upper)	FF	76.67 (61.27-95.05)	3.1	0.89 (0.71-1.1)
MP 18 (upper)	LF	99.65 (78.56-122.37)	4.34	0.88 (0.7-1.07)

Table 7: Longline fishery performance indicators in the **medium**-term (2034-2042) under four illustrative bigeye MPs. The value shown is the median and the 95th percentile range is in parenthesis. Catch is measured in thousands of tonnes. Vulnerable biomass is relative to the average vulnerable biomass in 2019 – 2021.

MP (target)	HCR pair	Longline catch	Longline catch variability	Longline vulnerable biomass
MP 13 (lower)	FF	177.3 (123.47-223.38)	9.78	0.74 (0.51-0.95)
MP 13 (lower)	LF	203.15 (139.26-254.54)	11.92	0.72 (0.49-0.92)
MP 18 (upper)	FF	75.6 (56.23-96.23)	3.14	0.85 (0.62-1.09)
MP 18 (upper)	LF	98.05 (71.83-123.86)	4.43	0.83 (0.6-1.06)

Table 8: Longline fishery performance indicators in the **long**-term (2043-2051) under four illustrative bigeye MPs. The value shown is the median and the 95th percentile range is in parenthesis. Catch is measured in thousands of tonnes. Vulnerable biomass is relative to the average vulnerable biomass in 2019 – 2021.

MP (target)	HCR pair	Longline catch	Longline catch variability	Longline vulnerable biomass
MP 13 (lower)	FF	176.24 (120.99-218.85)	9.88	0.7 (0.48-0.94)
MP 13 (lower)	LF	201.61 (136.65-250.21)	11.91	0.68 (0.45-0.9)
MP 18 (upper)	FF	75.78 (56.07-96.47)	3.21	0.81 (0.58-1.07)
MP 18 (upper)	LF	98.37 (71.11-123.46)	4.49	0.79 (0.57-1.05)

Table 9: Purse seine fishery performance indicators in the **short**-term (2025-2033) under four illustrative bigeye MPs. The value shown is the median and the 95th percentile range is in parenthesis. Catch is measured in thousands of tonnes. Vulnerable biomass is relative to the average vulnerable biomass in 2019 – 2021.

MP (target)	HCR pair	Purse seine catch	Purse seine catch variability	Purse seine vulnerable biomass
MP 13 (lower)	FF	342.11 (259.75-415.2)	17.71	0.8 (0.6-0.96)
MP 13 (lower)	LF	339.15 (256-410.86)	17	0.8 (0.59-0.95)
MP 18 (upper)	FF	359.12 (276.48-436.87)	17.6	0.85 (0.65-1.01)
MP 18 (upper)	LF	359.33 (277.13-436.41)	16.92	0.85 (0.65-1.01)

Table 10: Purse seine fishery performance indicators in the **medium**-term (2034-2042) under four illustrative bigeye MPs. The value shown is the median and the 95th percentile range is in parenthesis. Catch is measured in thousands of tonnes. Vulnerable biomass is relative to the average vulnerable biomass in 2019 – 2021.

MP (target)	HCR pair	Purse seine catch	Purse seine catch variability	Purse seine vulnerable biomass
MP 13 (lower)	FF	347.98 (239.62-443.09)	18.89	0.77 (0.52-0.96)
MP 13 (lower)	LF	343.56 (235.62-438.37)	18.06	0.77 (0.51-0.95)
MP 18 (upper)	FF	366.28 (263.84-467.88)	18.78	0.82 (0.59-1.01)
MP 18 (upper)	LF	367.36 (264.49-465.52)	17.99	0.82 (0.59-1.01)

Table 11: Purse seine fishery performance indicators in the **long**-term (2043-2051) under four illustrative bigeye MPs. The value shown is the median and the 95th percentile range is in parenthesis. Catch is measured in thousands of tonnes. Vulnerable biomass is relative to the average vulnerable biomass in 2019 – 2021.

MP (target)	HCR pair	Purse seine catch	Purse seine catch variability	Purse seine vulnerable biomass
MP 13 (lower)	FF	353.35 (241.64-466.02)	19.33	0.74 (0.49-0.94)
MP 13 (lower)	LF	349.94 (237.84-459.42)	18.49	0.74 (0.49-0.93)
MP 18 (upper)	FF	373.97 (260.9-489.85)	19.26	0.79 (0.56-0.99)
MP 18 (upper)	LF	373.66 (261.17-487.23)	18.51	0.79 (0.56-0.99)

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