COMMISSION
SIXTEENTH REGULAR SESSION
Port Moresby, Papua New Guinea
5 – 11 December 2019

USING PIMPLE SOFTWARE TO EXPLORE SKIPJACK PERFORMANCE INDICATORS

WCPFC16-2019-11
19 November 2019

SPC-OFP

Oceanic Fisheries Programme, The Pacific Community

Executive Summary

To assist in the communication of the harvest strategy evaluation results an interactive software tool has been developed: Performance Indicators and Management Procedures Explorer (PIMPLE) (OFP, 2019). The aim of the tool is to facilitate the interactive exploration of the evaluation results, thereby making it easier to compare and evaluate the relative performance of candidate management procedures.

To help stakeholders use PIMPLE, two reference sheets have been produced. One summarises the currently available performance indicators used in the skipjack evaluations, the other has an overview of how to use PIMPLE including the different plot types that are available. These reference sheets complement the existing user guide and are included in this report.

Acknowledgments

We gratefully acknowledge funding for this work from the New Zealand Ministry of Foreign Affairs and Trade (MFAT) funded project "Pacific Tuna Management Strategy Evaluation"; In addition we thank the Center for High Throughput Computing (CHTC UW-Madison) for generously providing access to their computing resources.

References

OFP (2019). Using performance indicators to select a management procedure for skipjack. Technical Report WCPFC16-2019-10, Port Moresby, Papau New Guinea, 5–11 December 2019.

Performance Indicators for WCPO Skipjack

{Team MSE} SPC-OFP

What are Performance Indicators?

Performance indicators are used to evaluate how well candidate management procedures (MPs) are expected to perform in relation to fishery management objectives.[1] They can be used to select a preferred MP from a range of candidates, where the preferred MP is the one that is most likely to achieve the objectives.

Interpreting Performance Indicators

Performance indicators should be used to compare the *relative* performance of the candidate MPs, i.e. "MP A outperforms MP B on performance indicator X". An important factor is the *trade-offs* between the indicators because some candidate MPs will score highly on some indicators but less well on others.

Currently available Performance Indicators

There are currently 7 performance indicators calculated for WCPO skipjack. It is anticipated that more will be added in the future. Apart from $SB/SB_{F=0}$, the larger the value of the indicator, the better the MP is thought to be performing. The average value of each indicator is calculated over three different time periods: short-term (2016-2024), medium-term (2025-2033) and long-term (2034-2042).

Name	Performance Indicator	Range	Notes
	Biological		
$SB/SB_{F=0}$	$SB/SB_{F=0}$	0 - 1	A higher value is not necessarily better. Ideally, the value should be above the LRP and close to the TRP. Note that it is possible to use *PI 1* and *PI 8* to measure how close $SB/SB_{F=0}$ is to the LRP and TRP respectively.
PI 1. Prob. above LRP	Probability of $SB/SB_{F=0} > LRP$	0 - 1	The higher the value, the smaller the chance of falling below the LRP. For example, a value of 1 means that there is no chance of falling below the LRP and a value of 0.9 means that there is a 10% chance of falling below the LRP. WCPFC has agreed that risks higher than 20% would lead to an MP being rejected.
	Economic		
PI 3. Catch (rel. to 2013-2015)	Catch relative to the average catch in 2013-2015.[2]	0 - X	A value of 1 means the catch is the same as the average catch in 2013-2015.
PI 4. CPUE (rel. to 2010)	CPUE relative to the CPUE in 2010.[3]	0 - X	A value of 1 means the CPUE is the same as the CPUE in 2010.
PI 6. Catch stability	Based on the average annual catch variability.[2]	0 - 1	The higher the value, the more stable the catches or effort, meaning that they are less variable over time. A value of 1 means the catches or effort do not change over time. A low value means the catches or effort vary relatively strongly over time compared to the other MPs.
PI 7. Effort stability	Based on the average annual effort variability.[3]	0 - 1	
PI 8. Proximity to TRP	The average distance of $SB/SB_{F=0}$ from the TRP.	0 - 1	The higher the value, the closer $SB/SB_{F=0}$ is to the TRP on average. A value of 1 means that $SB/SB_{F=0}$ is exactly at the TRP. If $SB/SB_{F=0}$ is above or below the TRP, the value of the indicator will be less than 1.

[1] An MP comprises the data collection process, the estimation model and the harvest control rule (HCR). When testing candidate HCRs the MP is considered as a whole.
[2] Calculated for different model areas and fisheries.
[3] Only calculated for the purse seine fisheries in model areas 2, 3 and 5 (excl. associated purse seine in area 5).

PIMPLE Reference Guide

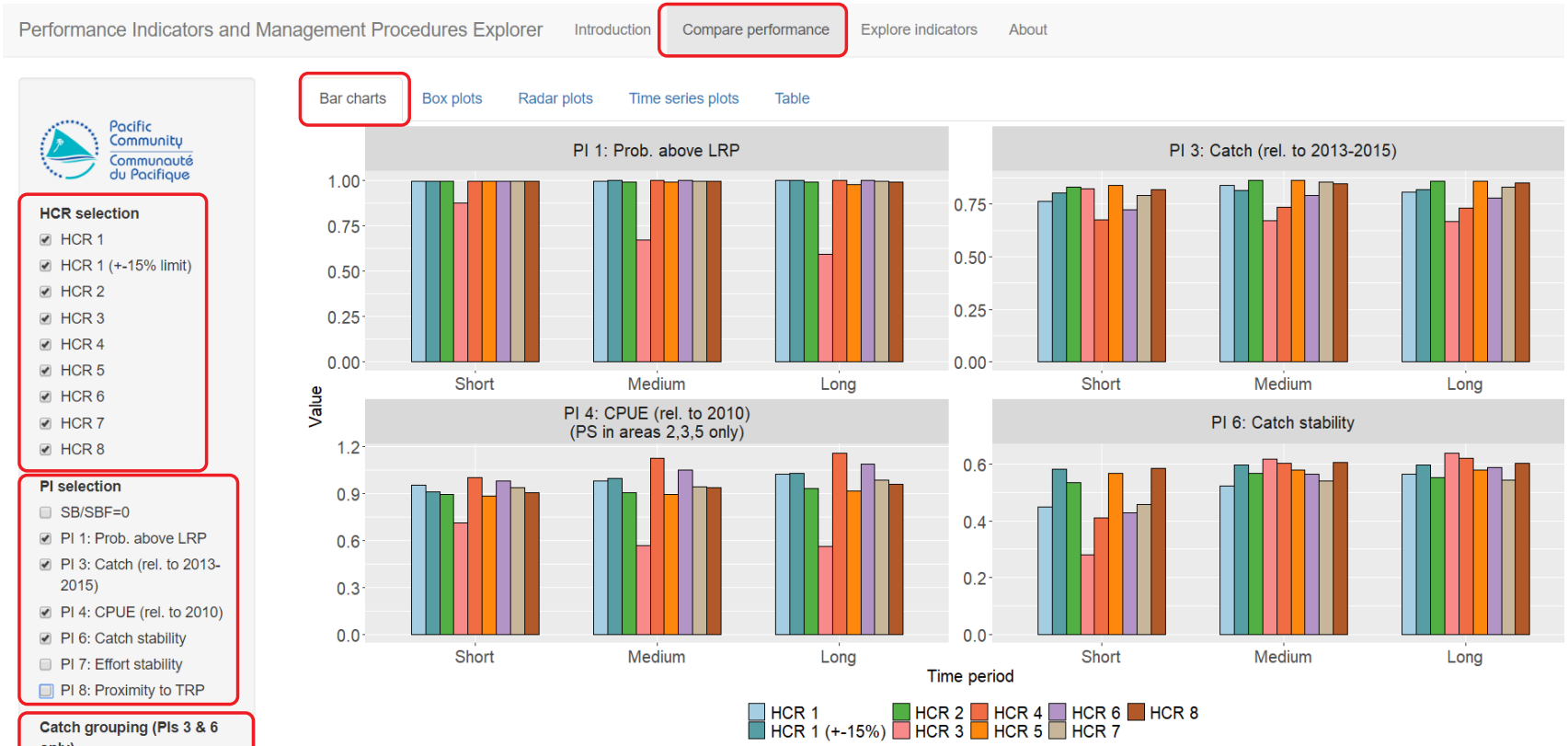
{Team MSE} SPC-OFP

What is PIMPLE?

The Performance Indicators and Management Procedures Explorer (PIMPLE) is a tool for comparing the relative performance of alternative candidate management procedures (MPs) and harvest control rules (HCRs).[1] The relative performance of the MPs and HCRs can be explored by analysing performance indicators (PIs), using a range of plots and tables. Different PIs can be prioritised and the trade-offs between them identified. PIMPLE can be accessed online at: **https://ofp-sam.shinyapps.io/pimple/**.

Using PIMPLE

Use the **Compare performance** tab to compare MPs and HCRs across all PIs. For a more detailed look at individual indicators use the **Explore indicators** tab.



Subtabs of the **Compare performance** tab have different plot types, e.g. **Bar charts**.

Select MPs and HCRs to help identify those most likely to achieve your objectives.

Select PIs to focus on those with the highest priority.

Some PIs have grouping options. For example, it is possible to group catch based indicators by model area and fishery.

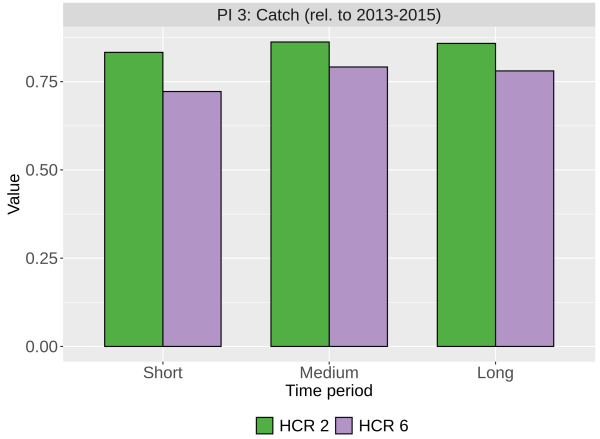
[1] An MP comprises the data collection process, the estimation model and the harvest control rule (HCR). When testing candidate HCRs the MP is considered as a whole.

PIMPLE Reference Guide - The Plots

{Team MSE} SPC-OFP

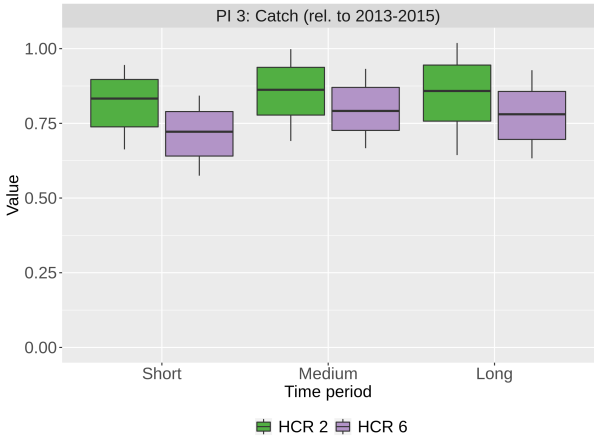
Bar Charts

- Shows the average (median) value of each indicator.
- The higher the bar, the better the average relative performance for that indicator.
- Useful for quickly comparing the average indicator values between different MPs and HCRs.
- Does not give any information about uncertainty (the range of indicator values).

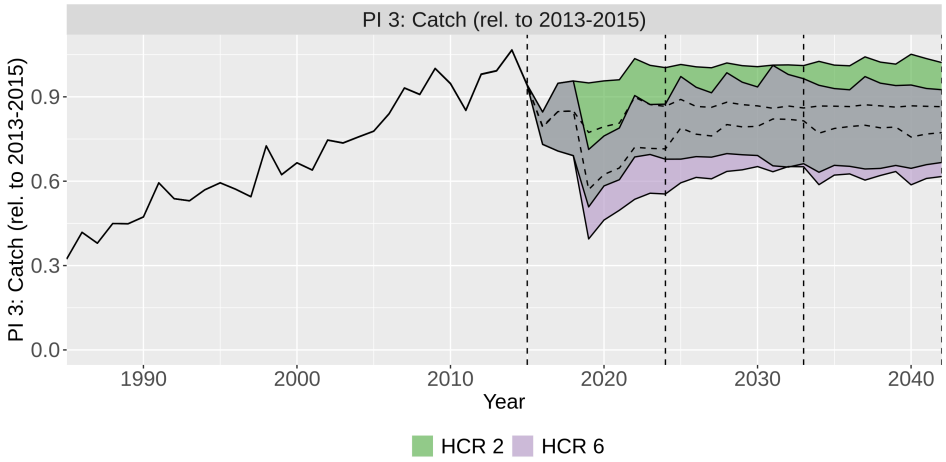


Box Plots

- Shows the range of indicator values in each time period.
- Box contains 60% and whiskers show 90% of the range of values.
- Horizontal line is the average value (same as the height of the bar charts).
- The bigger the box, and the longer the whiskers, the less certain we are about the indicator value.
- It is preferred to have low uncertainty, so the smaller the box the better.



Time Series Plots



- Shows the range of indicator values over time.
- Envelope contains 80% of the range of values.
- The wider the envelope, the less certain we are about the indicator value.
- Dashed line shows the average (median) value.

Radar Plots

- Compares the performance of MPs and HCRs across a selection of indicators.
- The relative average values of each indicator is shown.
- Can be useful for providing a quick overview of the relative performance.
- Does not give any information about uncertainty (the range of indicator values).
- Become difficult to interpret when more than two MPs or HCRs are compared.
- For more detailed inspection other plot types may be better.