



# **FFA Target Reference Points and MEY in the Western and Central Pacific Purse Seine Fishery**

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# Background

- WCPO purse seine fishery one of the world's largest and most valuable fisheries
  - Average annual catch 1.9 million metric tonnes (2012-16)
  - Value of annual catch \$3.3 billion
- Predominate species skipjack (*Katsuwonus pelamis*)
  - 75-80% of the total PS catch
  - Purse seine fishery accounts for around 80% of WCPO skipjack catch
- Western and Central Pacific Fisheries Commission
  - Adopted a LRP for the skipjack stock at  $20\%SB_{F=0}$  in 2013
  - Agreed to an *i*TRP for the skipjack stock of  $50\%SB_{F=0}$ , the first, and so far only, tuna stock in the region for which a target reference point of any kind has been agreed.



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# Background

- Key objective proposed for the purse seine fishery within the WCPFC 2<sup>nd</sup> Management Objectives Workshop was to “maximise economic yield from the fishery”.
- In 2016 WPCFC accepted a suggested initial list of performance indicators for tropical purse-seine fisheries including “maximising economic yield from the fishery” for the purpose of the evaluation of harvest control rules.
- Recent effort levels and MEY
  - Previous studies indicate that significant reductions in purse seine effort (from then prevailing levels which were significantly lower than 2012 levels) will lead to significant increases in rents.
  - Equilibrium at the  $\bar{I}TRP$  is estimated to be achieved under purse seine effort levels around 5% lower than 2012 levels.
  - Studies appear to support proposition that the skipjack  $\bar{I}TRP$  is set too low from an economic viewpoint.
- PNA significantly increased purse seine fishery access fees revenue from around \$160 million, or 7% of the value of the catch taken in their waters, in 2011 to around \$450 million in 2016 (or 20% of the catch value). This indicates significant rents are being generated under current effort levels.



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# Background

- Study uses stock assessment projections and a bioeconomic model to examine how well the skipjack /TRP adopted by the WCPFC aligns with the objective of maximising the economic yield generated by the WCPO purse seine fishery.
- Consideration given to variations and uncertainties in three key determinants of the level of economic rents generated and the level of effort that is associated with MEY.
  - The uncertainty as to the degree of hyperstability in catch rates.
  - The uncertainty of the response of global tuna prices to changes in catch from the fishery
  - The variation in tuna prices and fishing costs over time



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## Description of analysis

- Skipjack, yellowfin and bigeye stock assessment projection models used to estimate annual steady state catch under a range of purse seine effort levels. For skipjack done under two assumptions with regard to the catch rate/stock size relationship - zero hyperstability and extreme hyperstability.
- Rents generated in the purse seine fishery under steady state catch for a given level of effort are then estimated using a bioeconomic model.
  - Using price/costs reflecting 2013, 2014 and 2015 levels
  - Two assumptions with regard to the effect of changes in catch levels on prices:
    1. That WCPO purse seine catch and fish prices are dependent (prices increase by 0.53% for every 1% increase in catch)
    2. and that they are independent.

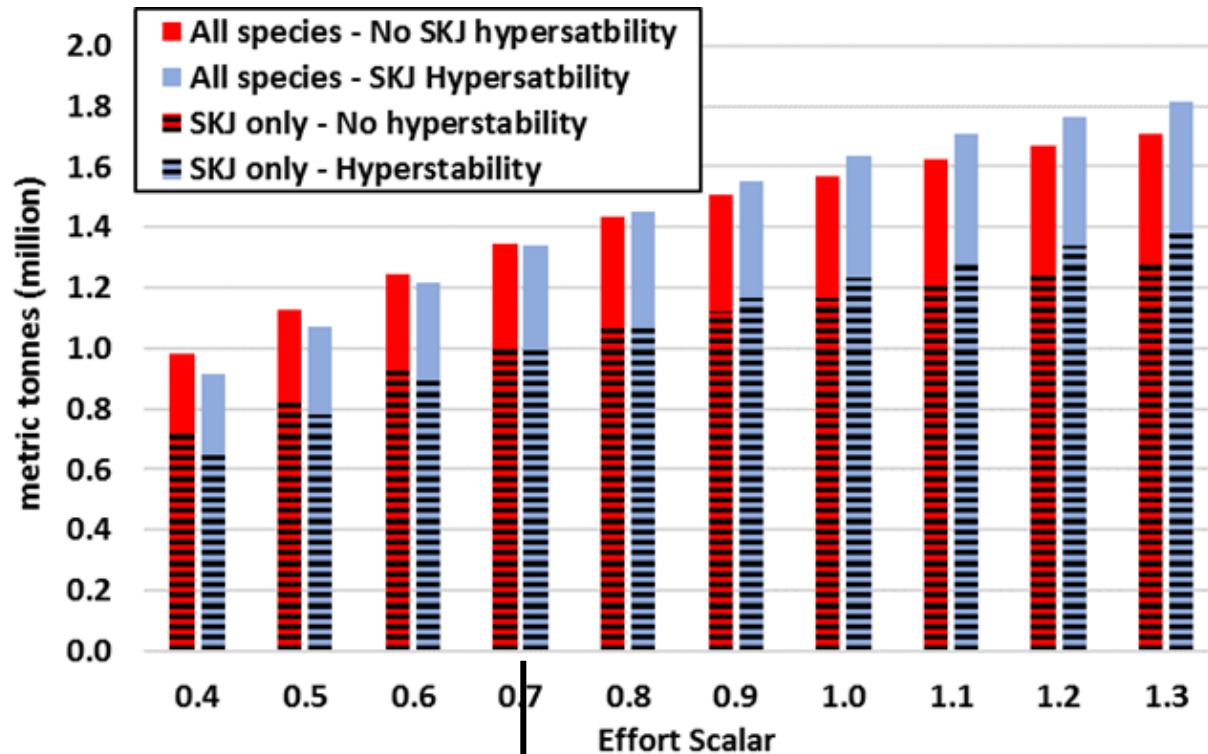




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# Results

## Skipjack and total catch under different effort scalars



Catch greater if no SKJ hyperstability

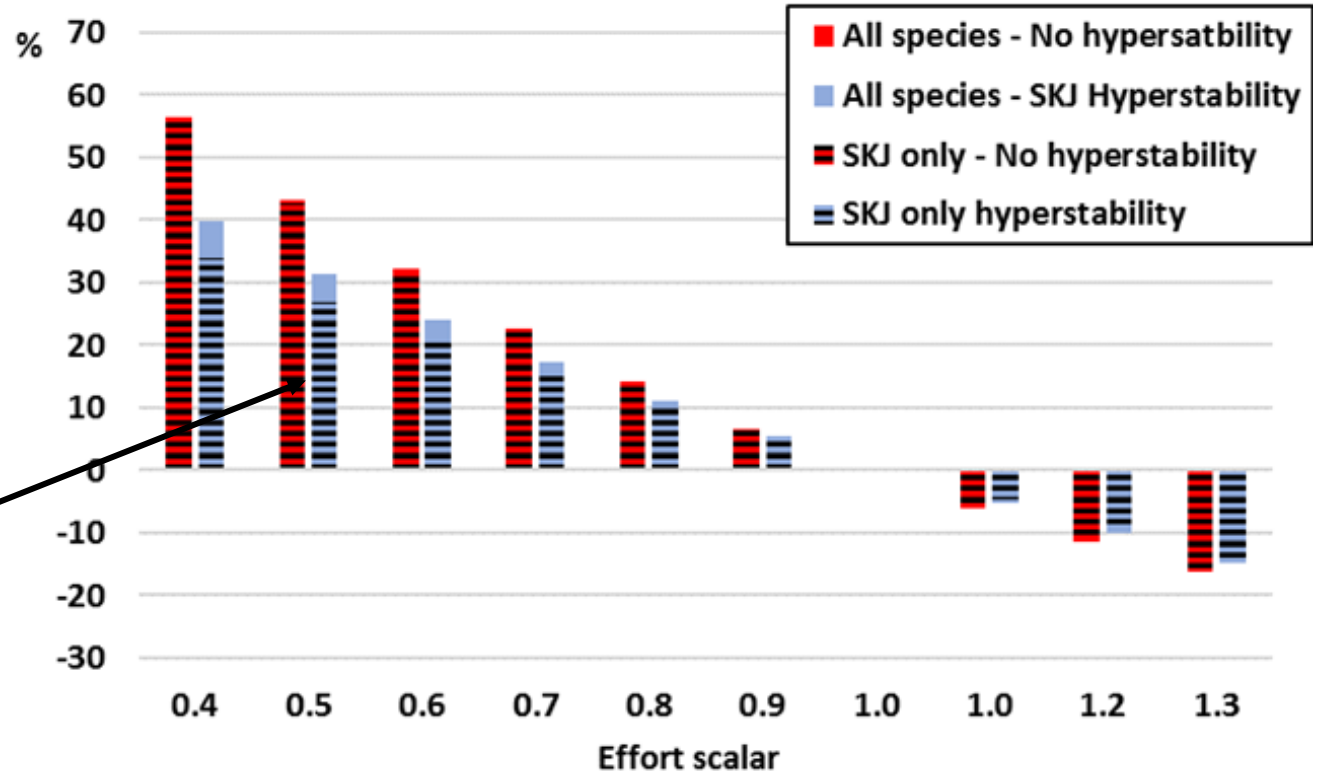
Catch greater with SKJ hyperstability



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# Results

## Change in skipjack and total CPUE compared with 2012 effort (effort scalar =1)



50% Effort Reduction

SKJ CPUE increases by  
27% Hyperstability

43% No Hyperstability

Total CPUE increases by  
32% Hyperstability

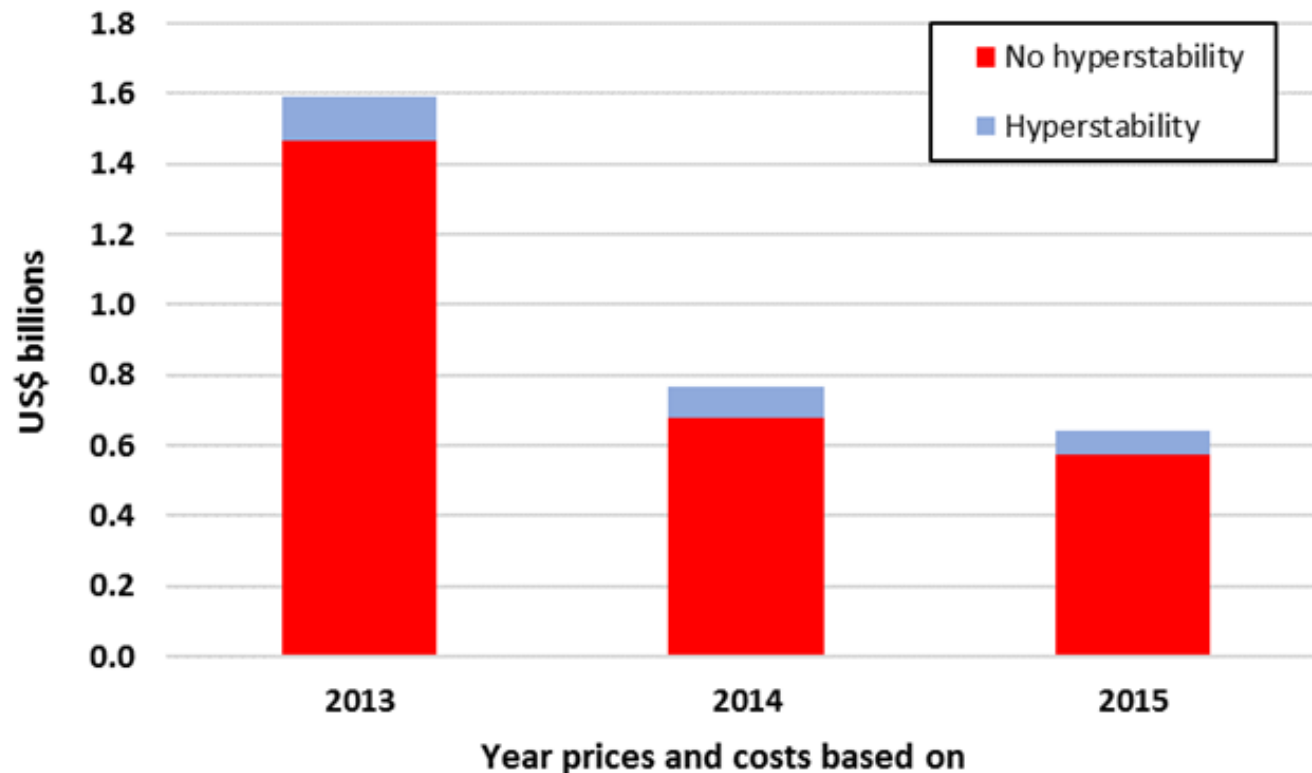
43% No Hyperstability



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# Results

**Fishery rent under 2012 effort with different prices/costs and skipjack CPUE hyperstability**



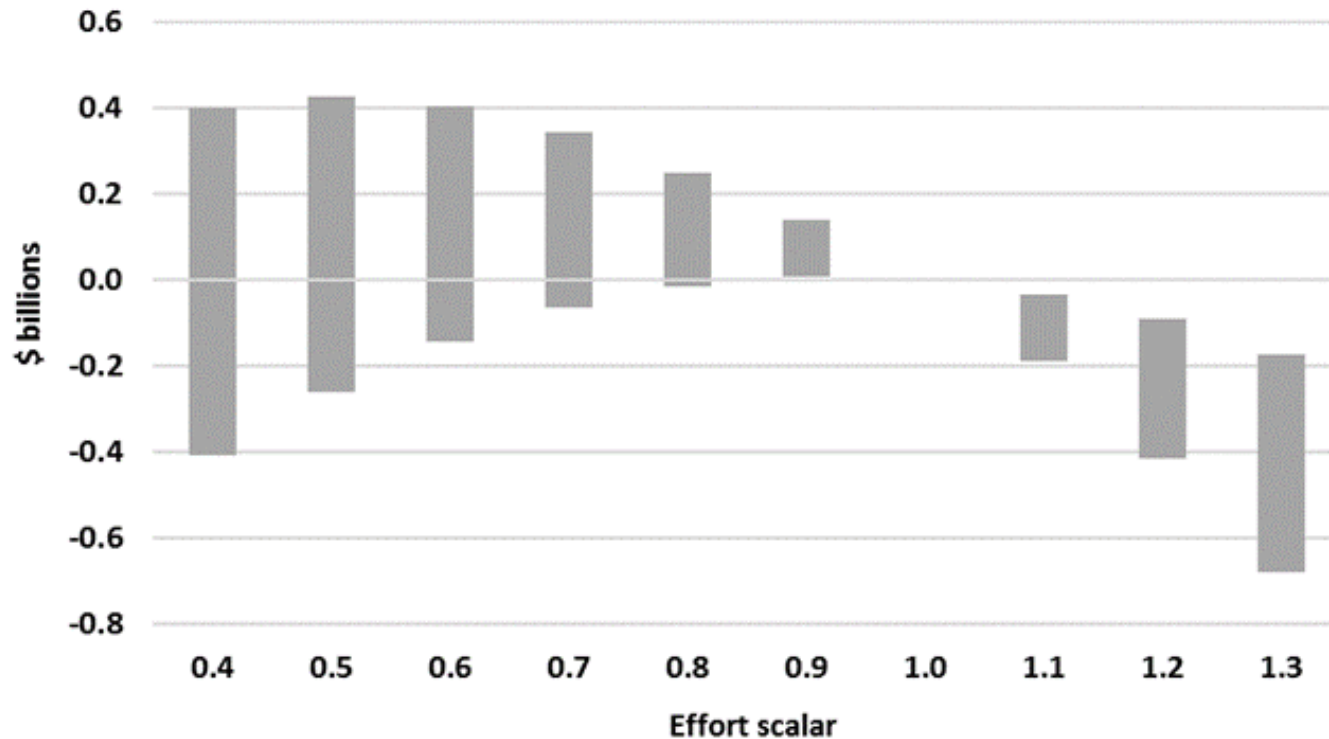




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# Results

## Range of additional rents under different effort scalar

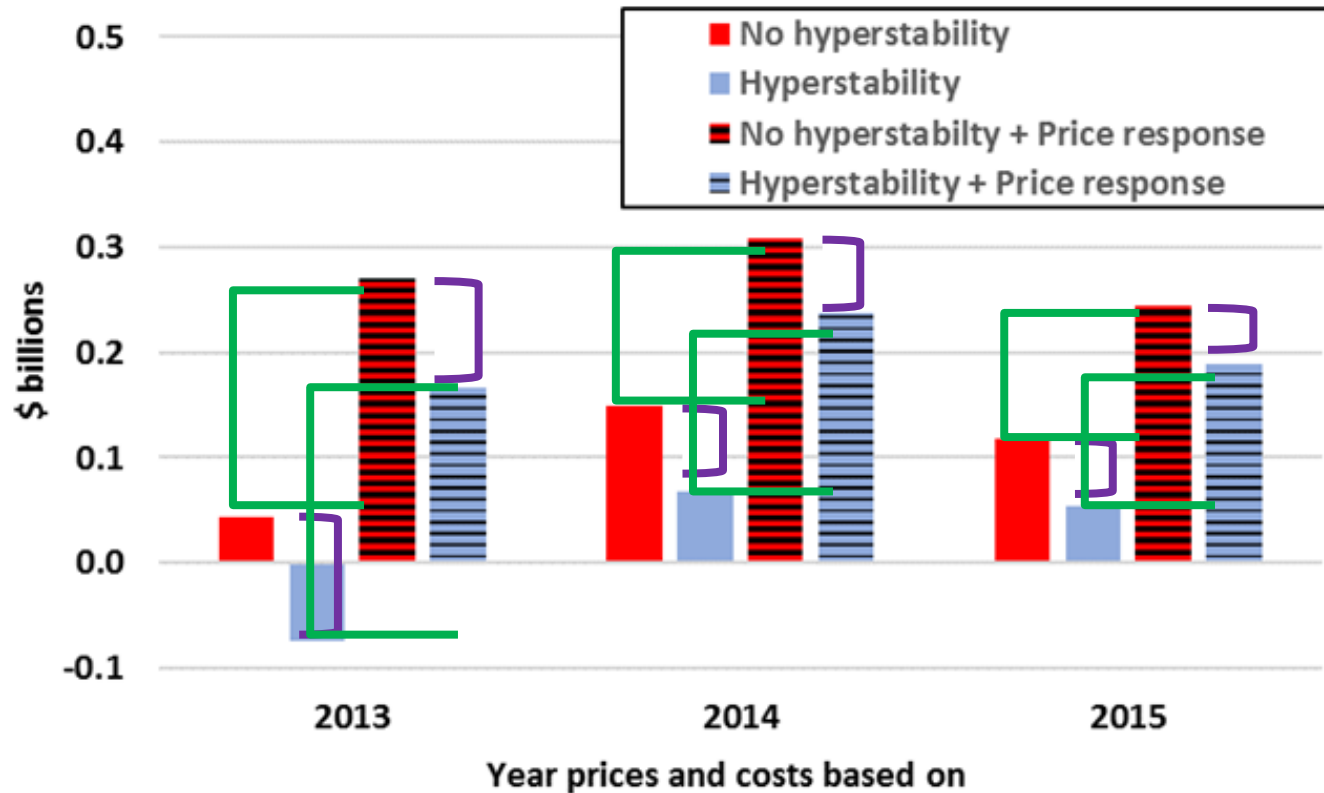




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# Results

- **Fishery rent under a 30% effort reduction and different prices/costs, skipjack CPUE hyperstability and price response**



Under different hyperstability assumptions difference in rents generated \$50-110m

Under different price response assumptions difference in rents generated \$130-240m



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## Discussion

- WCPO purse seine fishery is likely to generate significant rents under 2012 effort levels.
- Reductions in effort are likely to lead to higher rents and will move effort in the fishery toward that associated with MEY.
- However, variations associated with prices/costs and the uncertainties with regard to the degree of hyperstability price responses mean that the level of effort associated with MEY is itself both variable and uncertain and could be anywhere between 5% to 50% lower than 2012 levels.
- SPC-OFP found that effort levels 5% below 2012 levels would achieve the  $\bar{r}$ TRP which mirrors the top of the range of effort levels under which MEY was achieved. At this effort level it is estimated that steady state rents in the fishery will be between \$640 million and \$1.6 billion.



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## Discussion

- Two other options were canvassed by WPCFC 40% and 60% of  $SB_{F=0}$ .
  - Estimated level of purse seine effort associated with a 40%  $SB_{F=0}$  /TRP is between 35% and 49% higher than 2012 levels (depending on hyperstability). Results indicate such an increase would lead to significantly lower levels of rent in the fishery and move it further from the level of effort associated with MEY. Nevertheless, under some circumstances the fishery will likely continue to generate rents at this level of effort, and under some scenarios these will remain significant.
  - With regard to a skipjack /TRP 60%  $SB_{F=0}$  estimated level of purse seine effort associated with it is between 32% and 39% lower than 2012 levels. Results indicate such a reduction could result in significant gains in fishery rent (up to \$400 million), but that significant losses (up to \$150 million) may also occur. That is, while such a cut could move effort in the fishery to the level of effort associated with MEY it could also result in effort being around 60% lower than the MEY level.



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# Summary

- Achieving the agreed skipjack  $iTRP$  of  $50\%SB_{F=0}$  will likely result in the purse seine fishery generating significant rents although the associated level of effort may be greater than the MEY level.
- Achieving the lower  $iTRP$  of  $40\%SB_{F=0}$  would likely lead to a reduction in fishery rents.
- Achieving the higher  $iTRP$  of  $60\%SB_{F=0}$  may lead to increases in rents but requires significant cuts in effort and there is considerable uncertainty to the magnitude of the additional rents that could be generated, including the possibility that rents will decline.
- The WCPFC agreed position of setting the  $iTRP$  at  $50\%SB_{F=0}$  appears reasonably aligned to the objective of maximising economic yield given the inherent variations and uncertainties in determining the level of effort associated with MEY.