



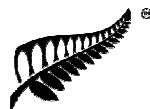
SPC  
Secretariat  
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## Purse seine fishing value during the FAD closure

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## Approach

Fishery performance during the FAD<sup>1</sup> closure period and outside of the FAD closure period were compared, between 2009 and 2013, to evaluate the possible impacts that the closures may have had on vessel economics. This was explored through analyses of purse seine vessels irrespective of where they fished within the tropical WCPO.

A summary of fishery performance by month and set type during years with monthly FAD closures (2009-2013) was undertaken. This specifically aimed to evaluate observed differences in CPUE and catch value under three different circumstances:

- a. when vessels were fishing FADs (non-closure months only);
- b. when vessels were fishing free schools during FAD closure months ('forced' free school fishing);  
and
- c. when vessels were fishing free schools during non-closure months (opportunistic free school fishing).

The key information used in the analyses were the monthly distributions of purse seine effort by set type and fleet; purse seine catch composition, both catch by species and fish size from pooled foreign and domestic samples, as determined from paired grab and spill sampling data used to correct for observer selectivity bias (SC8-ST-WP-03 (Rev. 1)); and recent Bangkok prices (2013 average price; Table A1) for common weight-based cannery pricing categories for skipjack, yellowfin, and bigeye.

## Fishery value during years with monthly FAD closures, 2009-2013

Analysis of the catch size structure revealed that fish are larger from unassociated sets, both inside and outside the FAD closure (Figure 1, Figure 2). By combining catch size composition information by species, set-type and month with cannery information, it was possible to estimate the value of a metric ton of fish caught while FAD and free school fishing, during FAD closure and non-closure months. This analysis estimated higher value per ton for unassociated sets (Table A2).

The economic impact of reduced CPUE on unassociated sets is partially offset by increased catch value per ton for these sets which have larger fish in the catch. Based on recent prices (USD) and catch rates, the average catch value per day fished while FAD fishing was estimated at \$49,719, compared to \$37,662 while free school fishing outside FAD closure months and \$34,788 for free school catch during FAD closure months (Table A2). In most but not all countries the catch per unit effort (CPUE) declined during the FAD closure. Overall the CPUE declined by approximately 25% during the FAD closure (Figure 3 right). The difference in value of FAD day is driven by the large difference between CPUE for associated sets vs unassociated sets. Pooling sets inside and outside the FAD closure to assess the impact of the FAD closure on vessels results in an average CPUE of 31.4 tons per day outside the closure and 23.9 tons during the closure. The resulting value estimates were lower during the FAD closure (Figure 3 left). The comparison of catch value during and outside the FAD closure suggests vessels are

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<sup>1</sup> FADs as described here include natural logs and artificial FADs consistent with the WCPFC and PNA definitions of FADs.

experiencing a decline in catch value of about \$6,202 (15%) per day during (but not necessarily as a result of) the FAD closure.

During the years prior to the implementation of FAD closures, lower catch rates have frequently been observed during months selected for the closure. This observation was made in many Pacific Island countries waters on their flagged fleets, despite the fact that Pacific Island State flagged vessels may, and do, fish on FADs during closure months. This suggests that lower catch rates observed during closure months in the years 2009-2013 probably result from seasonality in catch rates, as FAD closure months are less successful fishing months in general, and lower catch rates are not exclusively an effect of the FAD closure itself.

Catch rates on FADs have increased slightly over the period 2000-2013. Catch rates on free schools have declined slightly from 2003 to 2013 (Figure 4). During years with monthly FAD closures (2009-2013), the catch per set is higher for FAD sets than for free school sets. There is little difference between free school sets inside and outside the FAD closure. The difference between FAD and free school catch rates was small prior to 2004 and increased after 2005. The low CPUE in 2011 appeared to be related to an extended La Niña event, which may have had negative effects on skipjack recruitment.

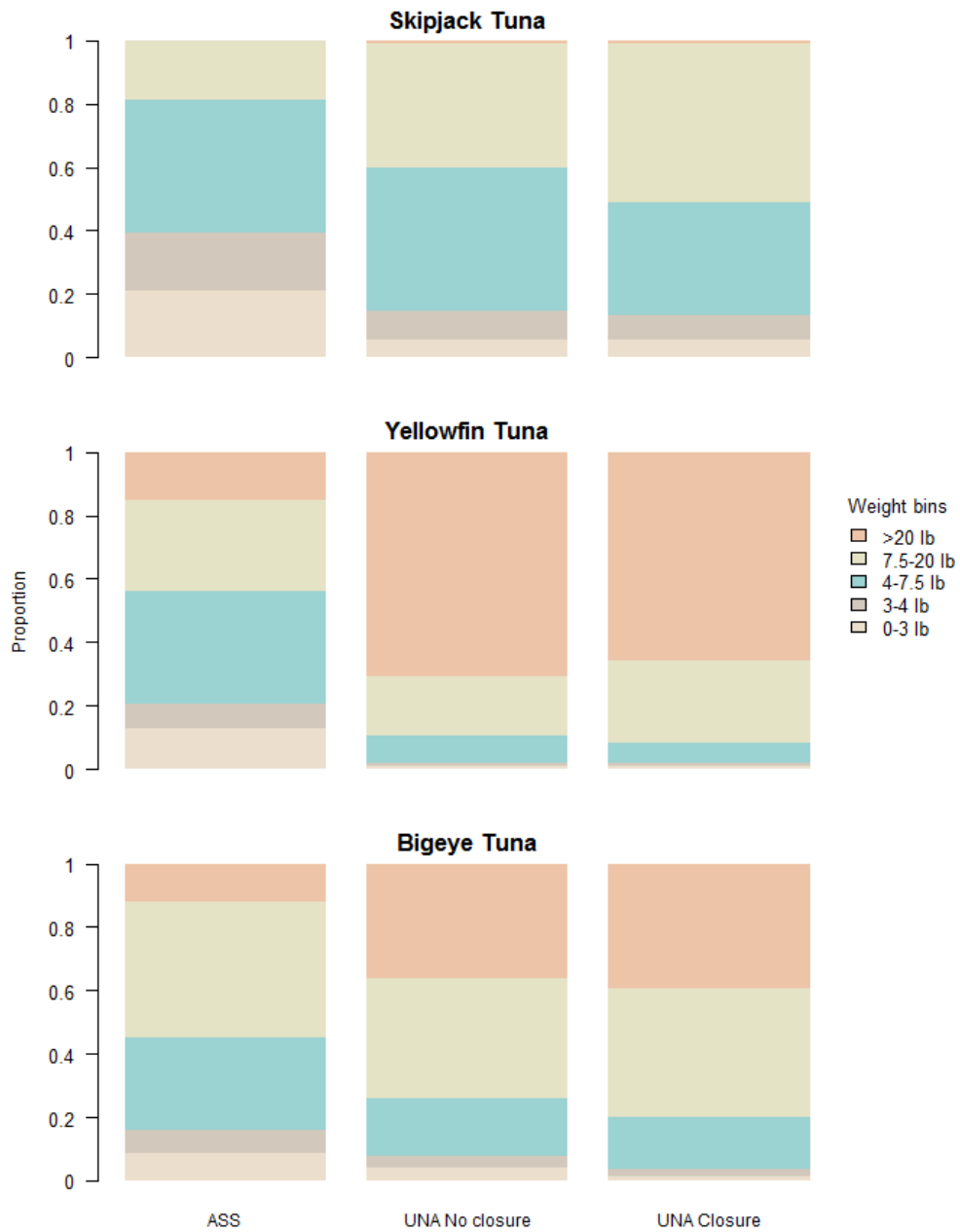


Figure 1: The proportional breakdown of catch in weight by species and market category for associated sets, unassociated during non-closure periods, and free schools during closure periods (2009-2013). Shading indicates the main cannery categories and the pricing bins used in this analysis.

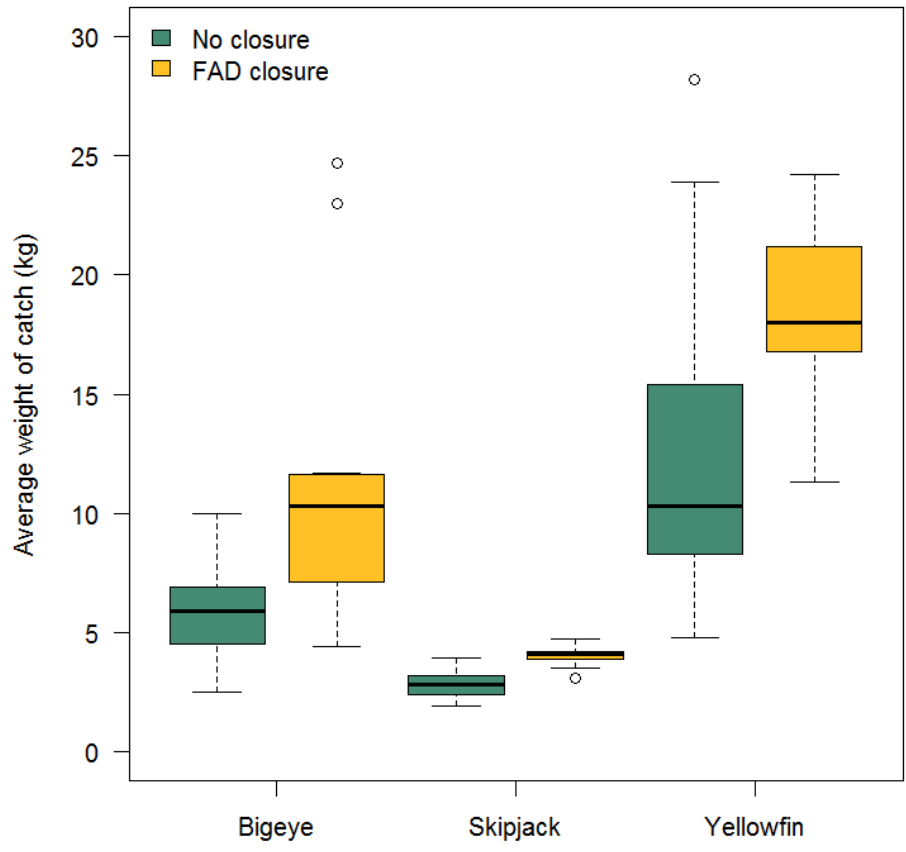


Figure 2: The average weight of individual tuna caught in purse seine gear during and outside the FAD closure.

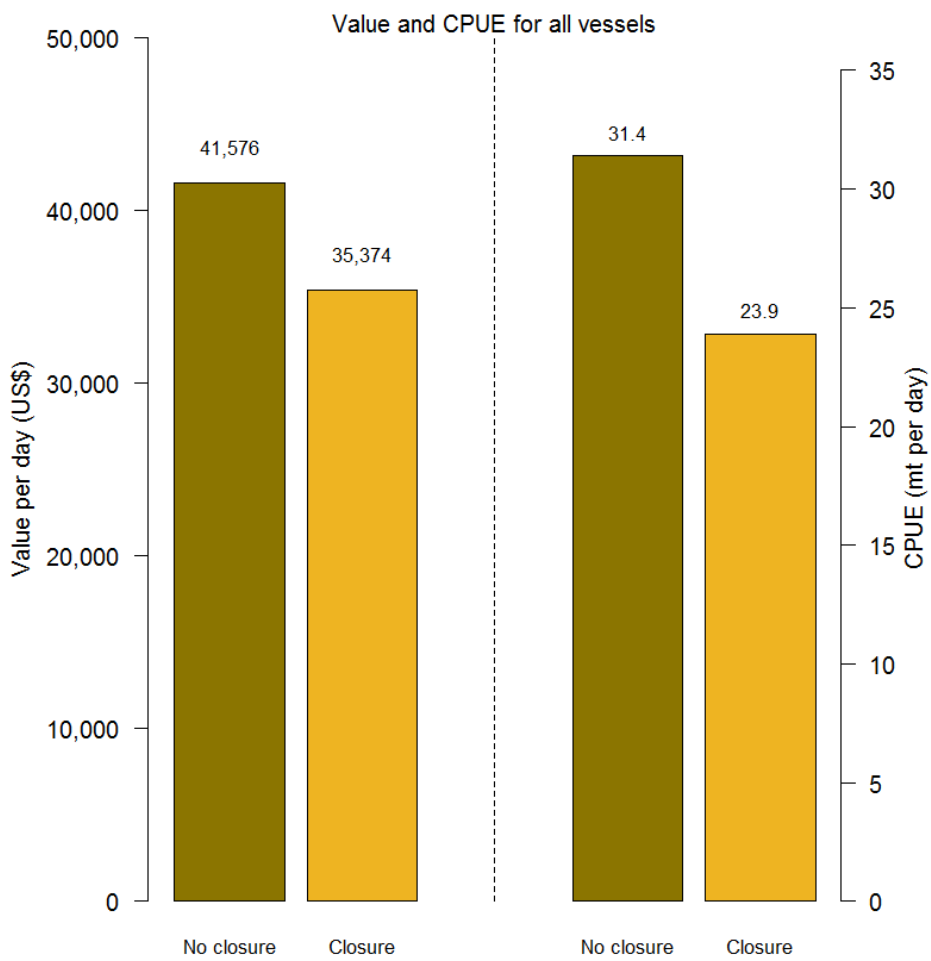
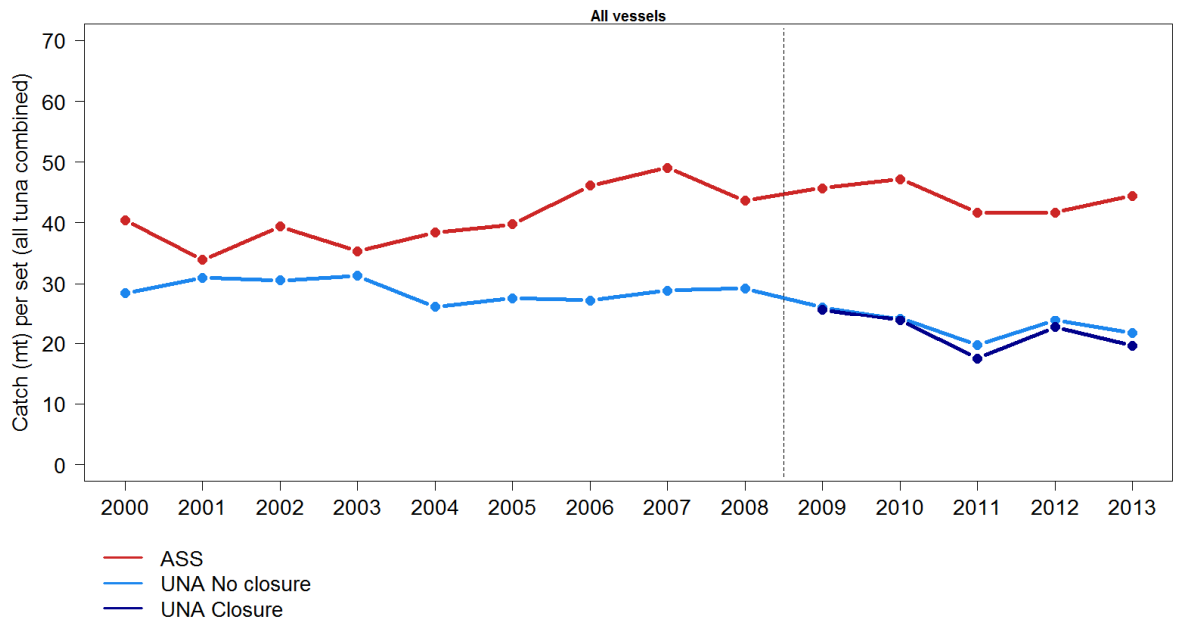


Figure 3: Average catch weight per day and catch value during closure months (Closure) and non-closure months (No closure).



**Figure 4: Fleet-specific catch rates for sets on FADs (red), free schools during non-closure months (light blue), and free schools during closure months (dark blue) by year prior to (2000-2008) and after (2009-2013) the implementation of FAD closure periods.**

## Appendix

Table A1: Cannery market categories and prices (USD/mt) used in analyses. Values obtained from average 2014 Bangkok weight-based pricing.

Cannery category		Bigeye	Skipjack	Yellowfin
0-3 lb	(0-1.4 kg)	1075	1075	1075
3-4 lb	(1.4-1.8 kg)	1175	1175	1175
4-7.5 lb	(1.8-3.4 kg)	1325	1325	1325
7.5-20 lb	(3.4-9.1 kg)	1375	1375	2050
>20 lb	(>9.1 kg)	1375	1375	2150

Table A2: Estimates of average landed value of a metric ton (left), catch in weight per day (center), and the resulting landed value per day (right) for all fish caught on FADs, caught on free schools during non-closure months, and caught on free schools during closure months from 2009-2013. Values are based on recent catch prices (Table A1).

	Value per ton (US\$)	Catch per day (t)	Value per day (US\$)
ASS	1,324	37.5	49,719
UNA no closure	1,482	25.4	37,662
UNA closure	1,478	23.5	34,788
<b>No Closure all sets</b>	<b>1,324</b>	<b>31.4</b>	<b>41,576</b>
<b>Closure all sets</b>	<b>1,480</b>	<b>23.9</b>	<b>35,374</b>