Update on operational longline observer data required under resolution C-19-08 and a preliminary assessment of data reliability for estimating total catch for bycatch species in the eastern Pacific Ocean

Shane Griffiths[1], Cleridy Lennert-Cody[1], Brad Wiley[1], and Leanne Fuller[1]

[1]Inter-American Tropical Tuna Commission, 8901 La Jolla Shores Dr, La Jolla CA 92037, United States.

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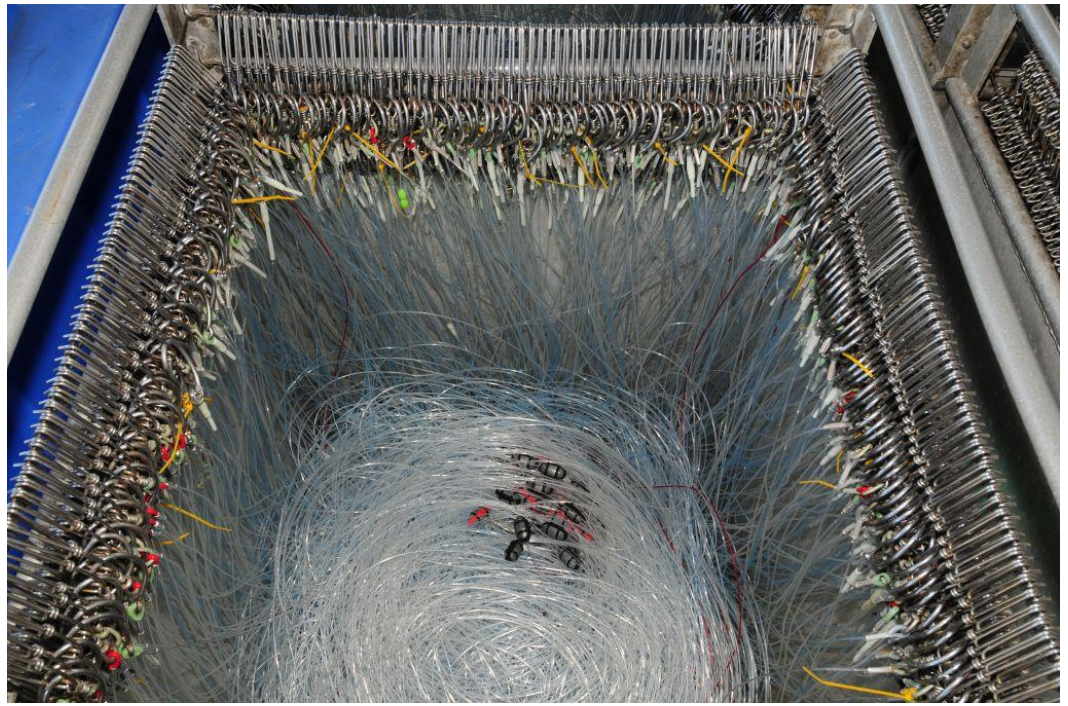
Outline

- Update of operational longline observer data received by IATTC to 2020
- Summary of observer coverage of EPO longline fleets in 2020
- Assessment of data from 5% observer coverage for estimating total catch of bycatch species
- Conclusions



IATTC responsibilities

- IATTC mandated to ensure the sustainability of EPO tuna fisheries

1. Antigua Convention

- **Article II**, Objective: "*…to ensure the long-term conservation and sustainable use of the fish stocks covered by this Convention*."
- **Article VII (f)** "*…adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing…*"

2. IATTC Resolutions and Strategic Science Plan

- Bycatch conservation since 2003 (C-03-08), elasmobranchs (C-05-03, C-11-10, C-15-04, C-16-05, C-19-05, C-19-06), seabirds (C-10-02, C-11-02) and sea turtles (C-19-04)
- 5-year Strategic Science Plan (SSP): Objective 4 - Ecological impacts of fisheries

Longline fisheries in the EPO

- Primarily target BET, YFT, ALB and SWO

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- Also catch non-target species that are retained (billfish/sharks) or discarded/released (sea turtles)

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- Primarily target BET, YFT, ALB and SWO
- Also catch non-target species that are retained (billfish/sharks) or discarded/released (sea turtles)
- Operational level LL data required to develop indices of abundance for stock assessment, and total catch estimates for bycatch species for reporting and assessment (e.g. ecological risk assessment).

IATTC Resolution C-19-08

Replaced C-11-08 regarding observers on longline vessels >20m LOA

- Re-affirmed the requirement for CPCs to collect and report operational longline observer data starting in 2013
- Commission endorsement of minimum data standards for longline observer data previously approved by the SAC, including one option of standards harmonized with WCPFC standards
- Established a standardized format for annual summary reporting of LL observer coverage rates and longline effort (no. of hooks or effective fishing days)

Longline data submissions

- 9 CPCs, 1131 fishing trips, 30,415 sets, and 1,248,478 catch records
- Data range submitted 1–8 years

CPC	2013	2014	2015	2016	2017	2018	2019	2020
BLZ	NR[2]	NR[2]	P	P	P	P	NR[3]	
CHL							NA[1]	NA[1]
CHN								
CRI							NR[2]	
ECU								
EU (Portugal)	NR	NR	NR		NR	NR		
EU (Spain)	NR	NR	NR	NR				
FRA								
GTM	NR[2]	NR[2]	NR[2]	NR[2]	NA	NA	NA	
JPN	NR[1]	NR[1]						
KOR								
MEX								
NIC					NA[1]			
PAN								
PER	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]		
SLV	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	NA[1]	
TWN								
USA								
VEN					NA[1]	NA[1]	NA[1]	NA[1]
VUT								

Longline data submissions

- 9 CPCs, 1131 fishing trips, 30,415 sets, and 1,248,478 catch records
- Data range submitted 1–8 years
- 2.9–16.3% observer coverage in 2020
- Coverage by 4 reporting CPCs < 5%
- 9 qualifying CPCs have not reported
- Further details in **SAC-12-04**

CPC	Annex A Summary submitted?	% Observer coverage reported 2020
BLZ		
CHL	NA	
CHN	Y	4.86% preliminary(# hooks)
CRI		
ECU	Y	5.66% (effective days fishing)
EU	Y	3.80% (effective days fishing)
FRA		
GTM		
JPN	Y	5.97% (effective days fishing)
KOR	Y	2.87% preliminary (effective days fishing)
MEX	Y	6.17% (effective days fishing)
NIC		
PAN		
PER		
SLV		
TWN	Y	0.6% preliminary, 10.6% projected
USA	Y	16.31% (# hooks)
VEN	NA	
VUT		

Assessment of LL data for estimating total catch

- 4 CPCs chosen as case studies (named CPC1, CPC2, CPC3, CPC4)
- Data for 2016–2018 used for analysis
- Operational LL data compared to Task 2 data “the truth” (total catch and effort at 5 x 5 by month)

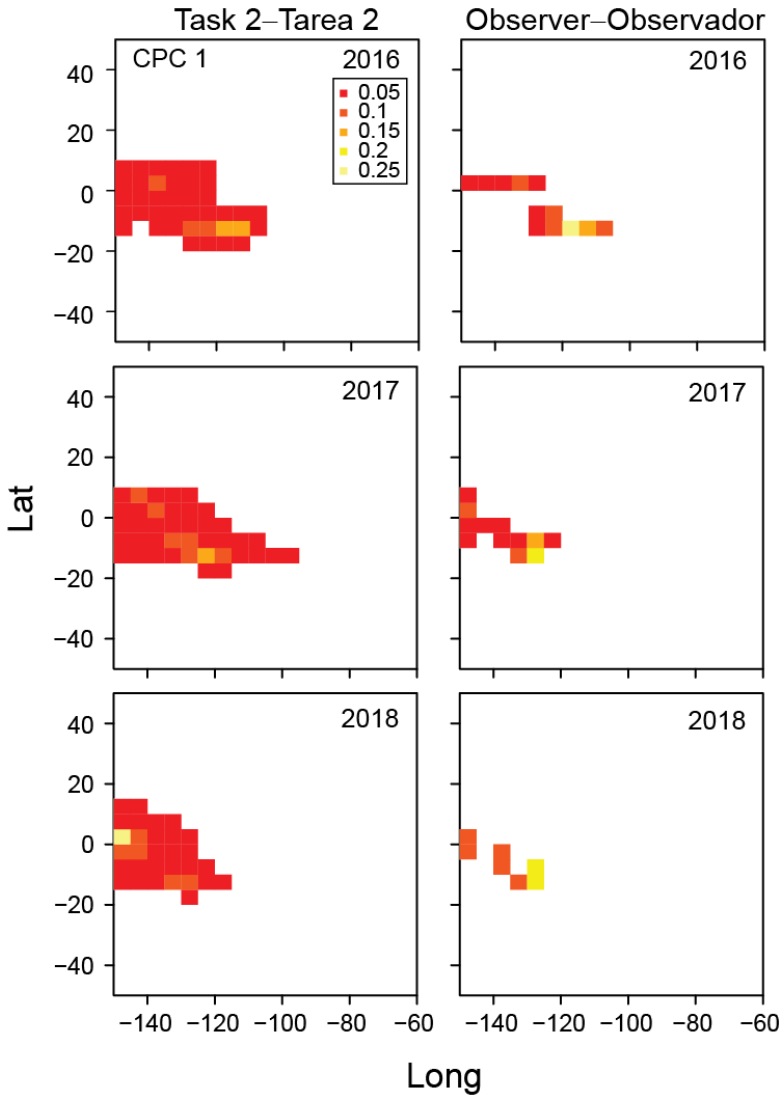
$$\textbf{\textit{Effective}}\ coverage = \frac{Sum\ of\ hooks\ in\ observed\ sets}{Sum\ of\ hooks\ in\ Task\ 2\ data}$$

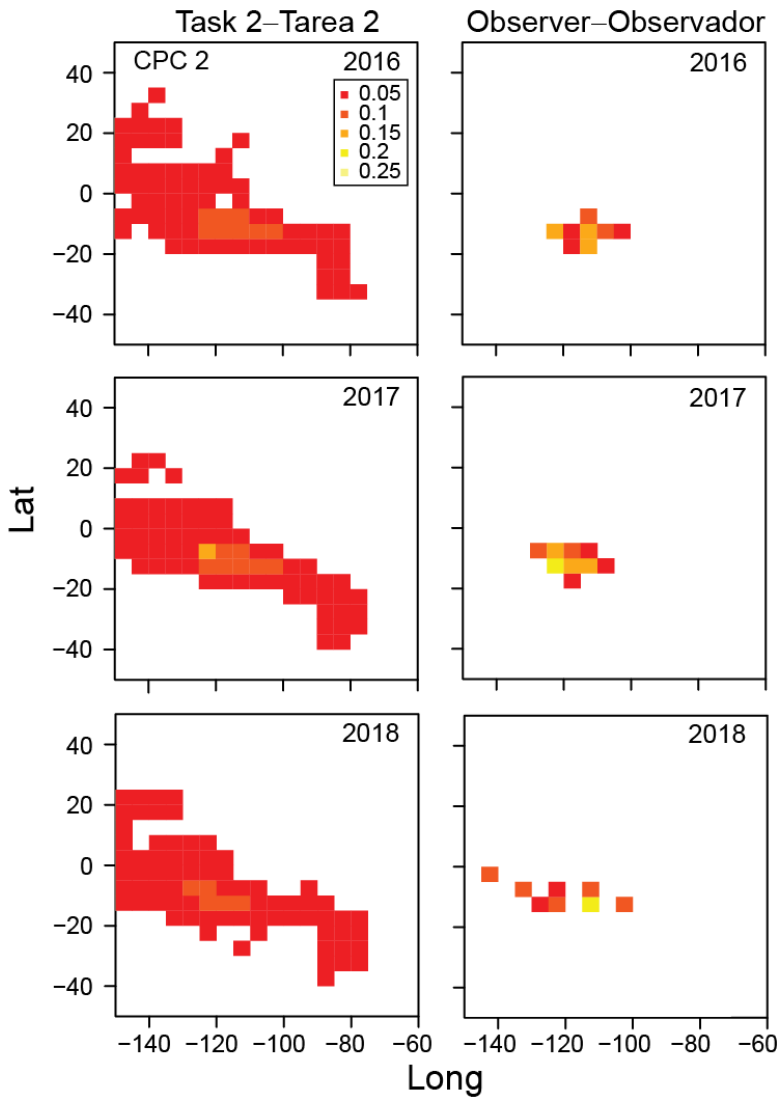
$$\textbf{\textit{Actual}}\ coverage = \frac{Sum\ of\ actual\ hooks\ observed\ in\ observed\ sets}{Sum\ of\ hooks\ in\ Task\ 2\ data}$$

- Annual catch estimates for bigeye and yellowfin tunas, used as examples

Spatial distribution of effort

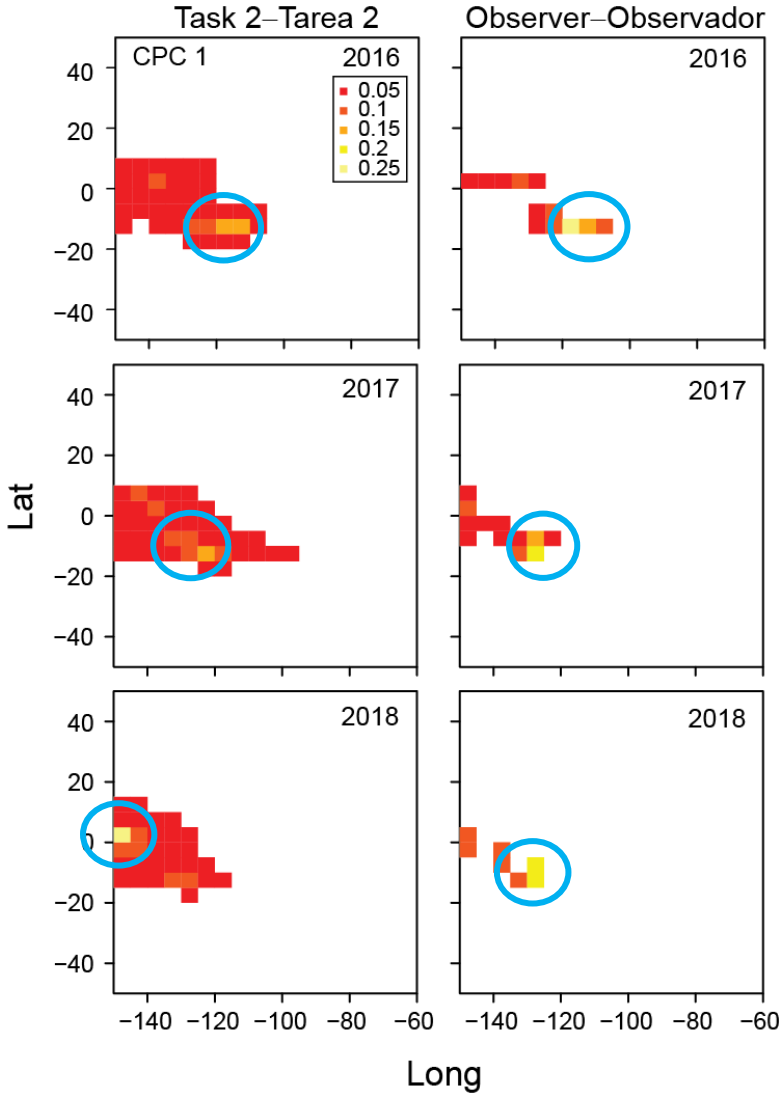
- CPC1 and CPC2

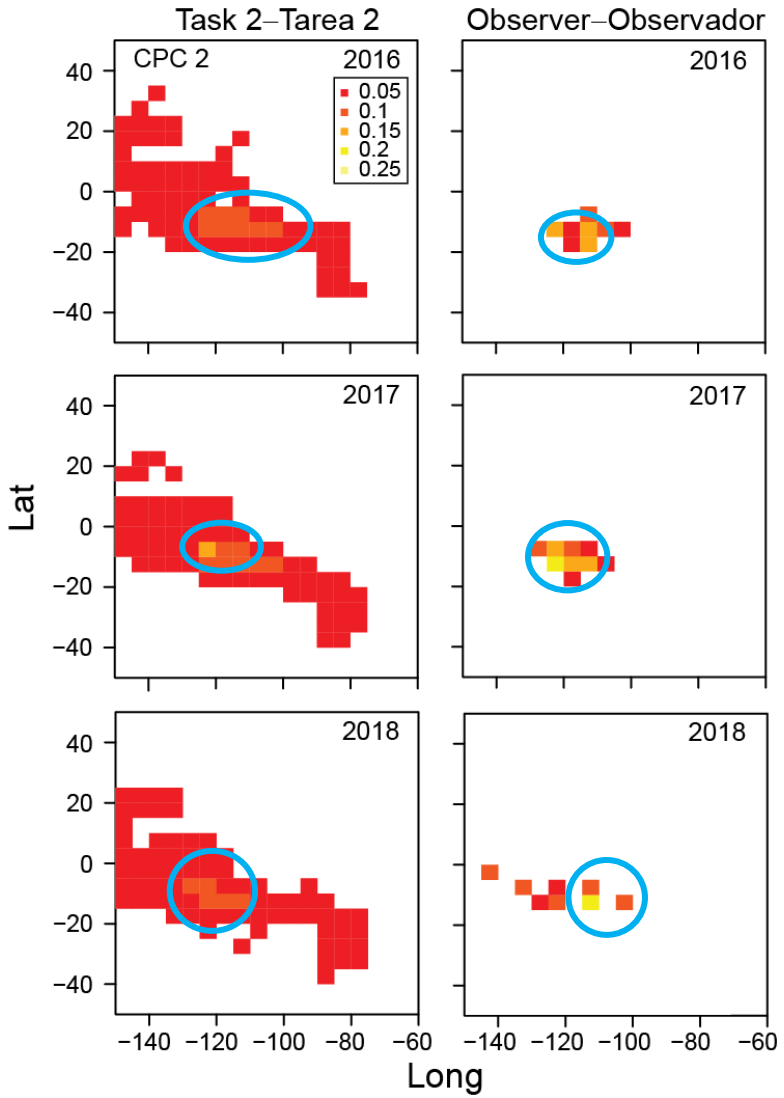




Spatial distribution of effort - Hotspots

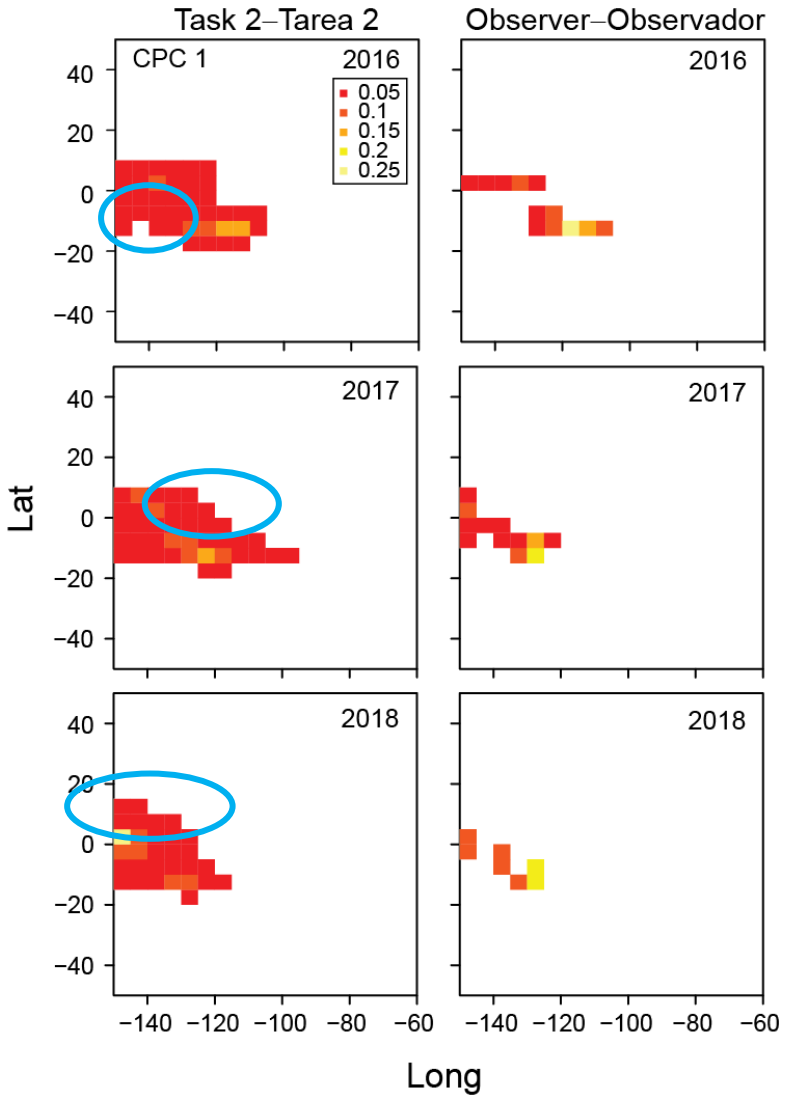
- Mismatch of high effort ‘hotspots’ by both CPCs

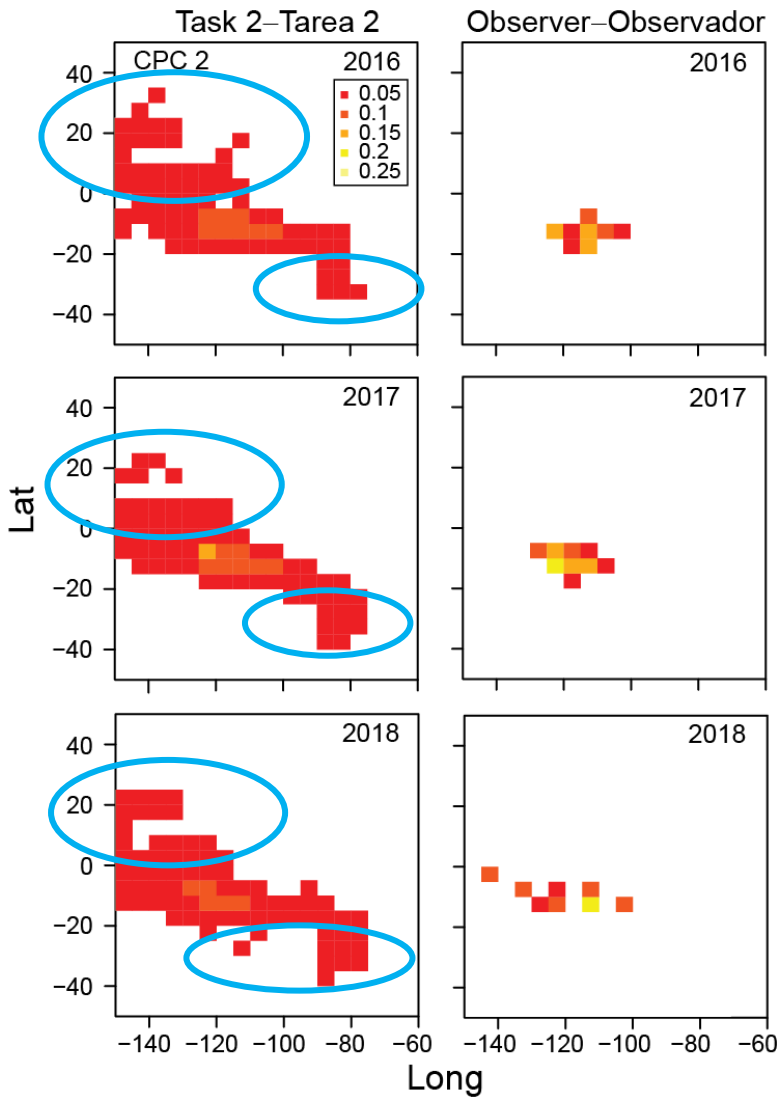




Spatial distribution of effort

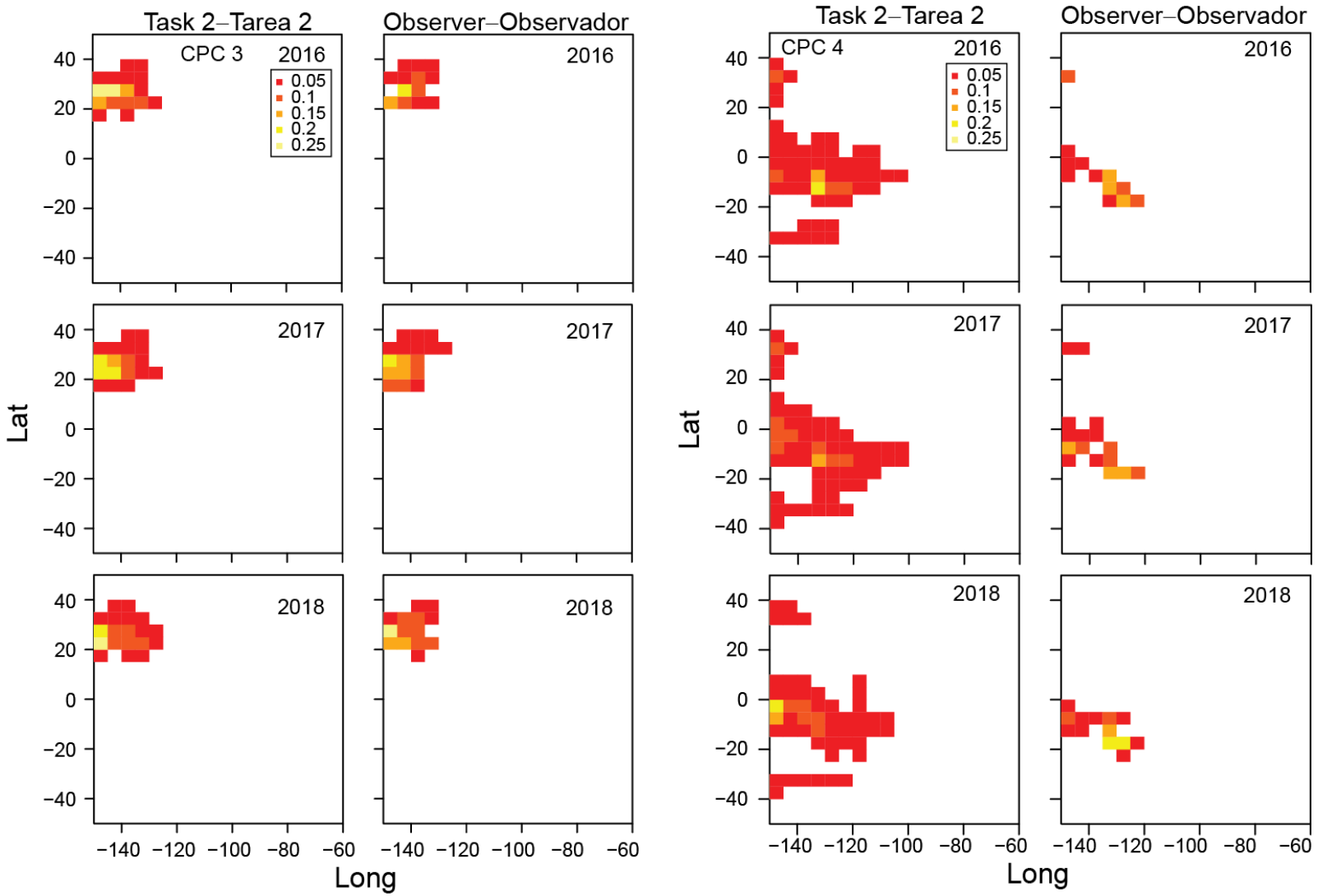
- Full spatial extent of sets not well represented by both CPCs





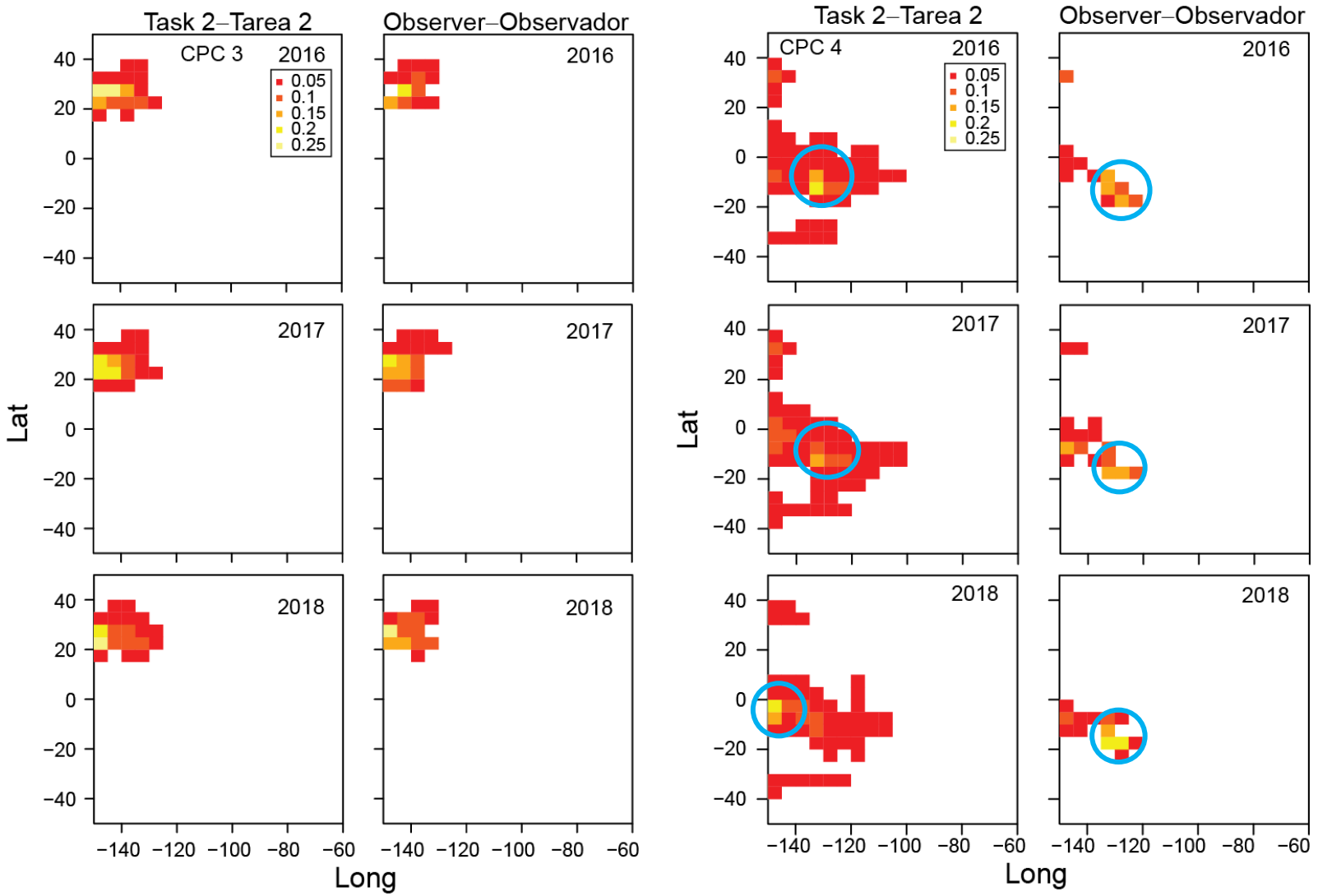
Spatial distribution of effort

- CPC3 and CPC4



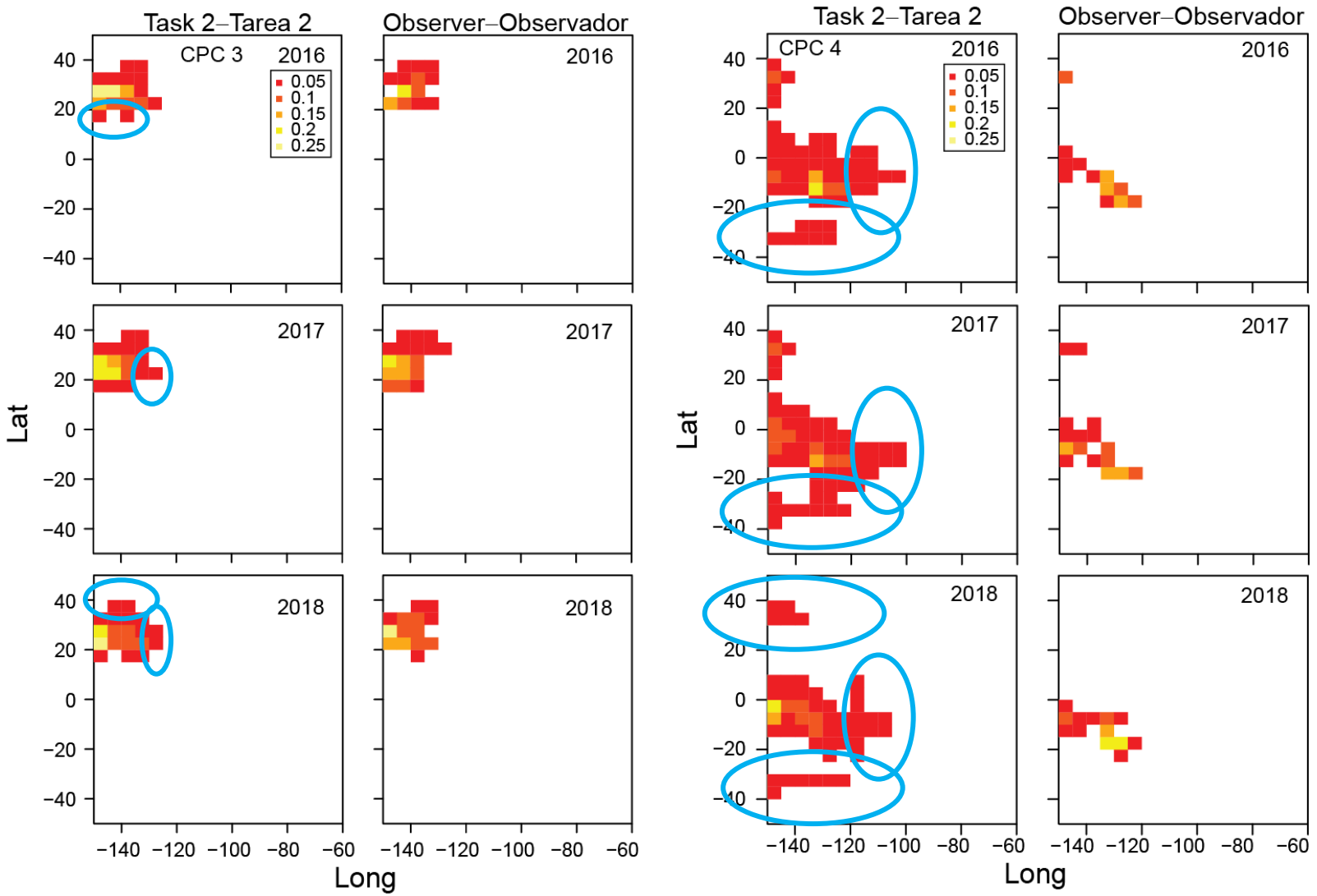
Spatial distribution of effort - Hotspots

- Mismatch of high effort ‘hotspots’ by CPC4



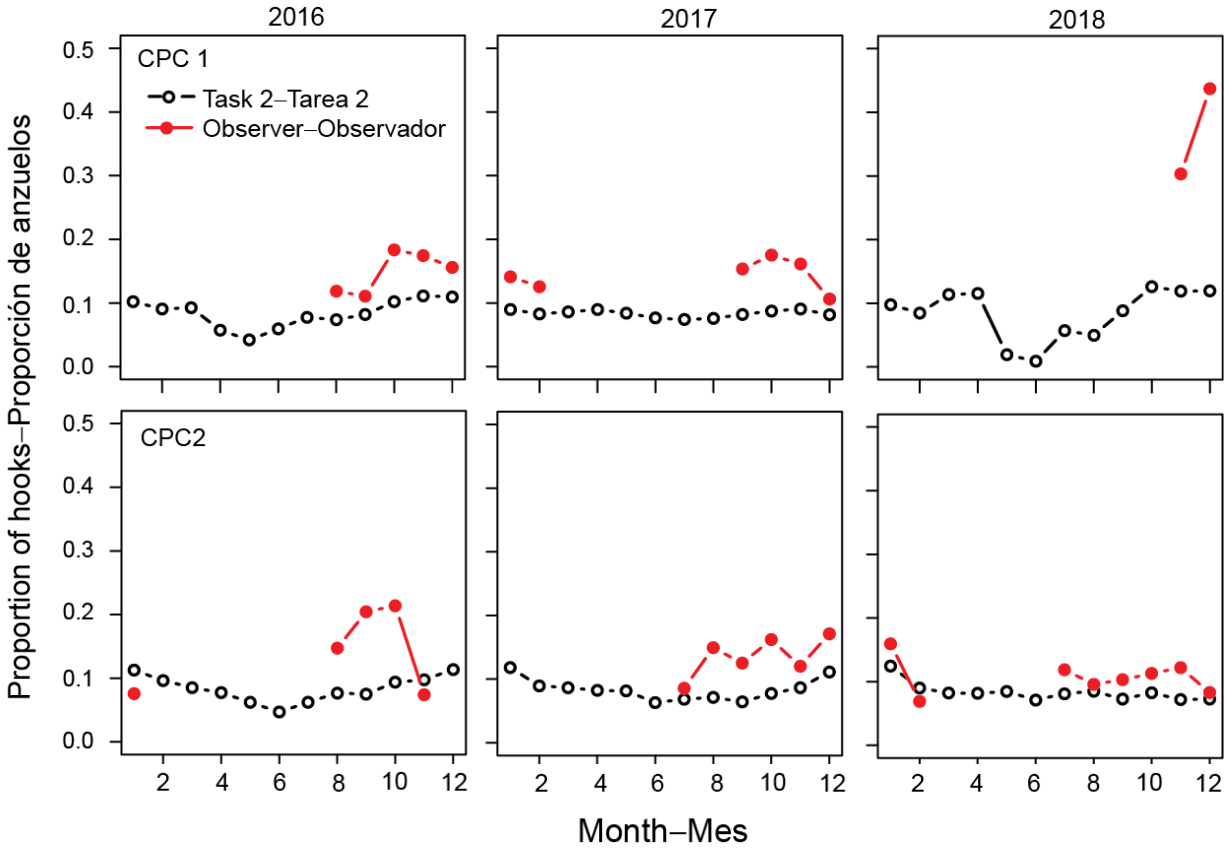
Spatial distribution of effort

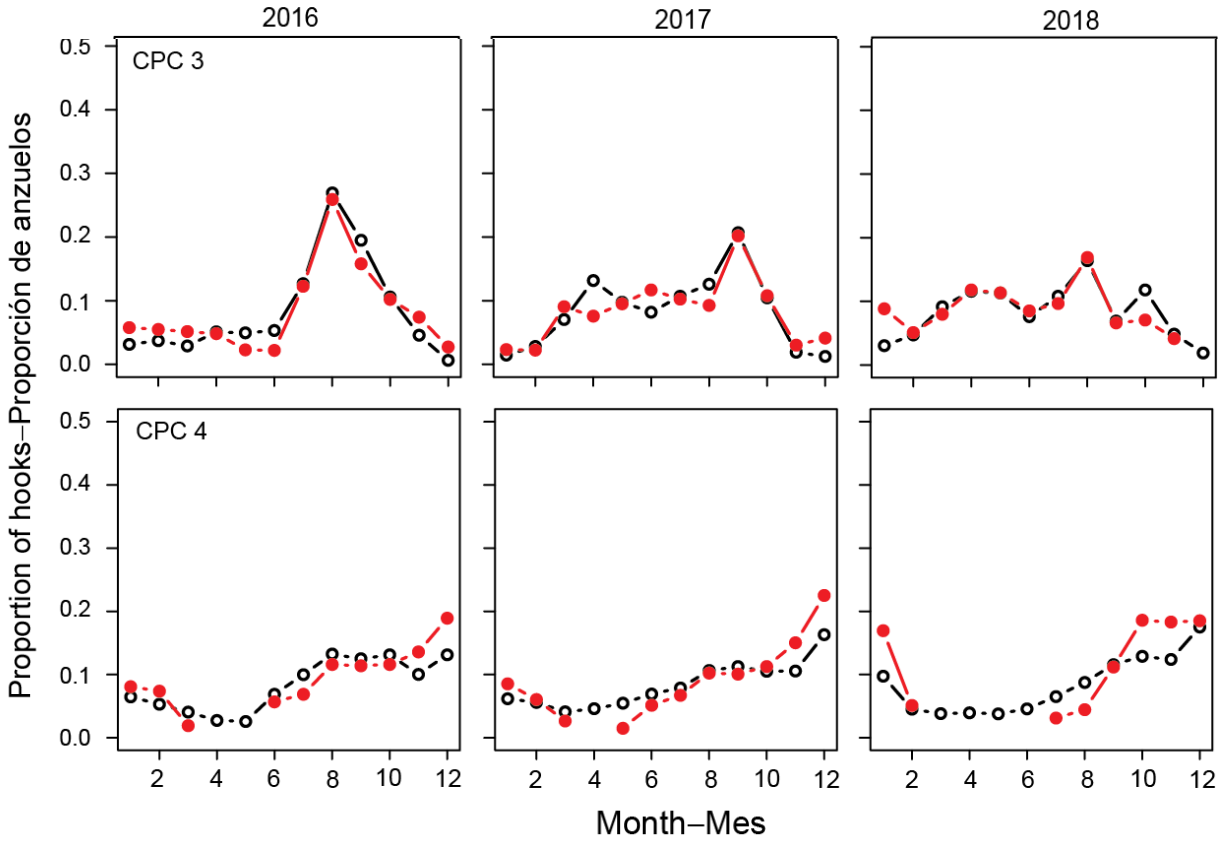
- Full spatial extent of sets not well represented by CPC4



Temporal distribution of effort

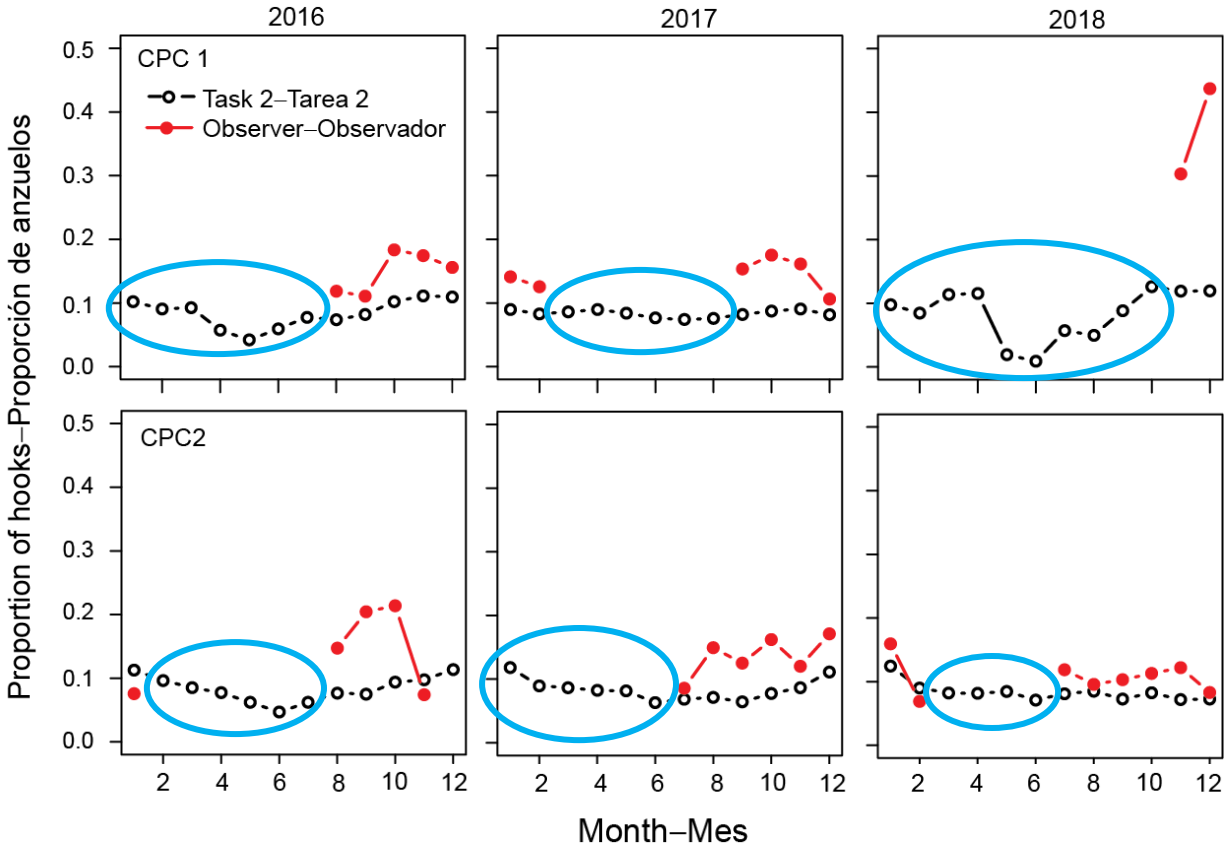
- Proportion of hooks in observed sets relative to that of Task 2 was often over- or under-represented (excluding months with < 3 vessels)

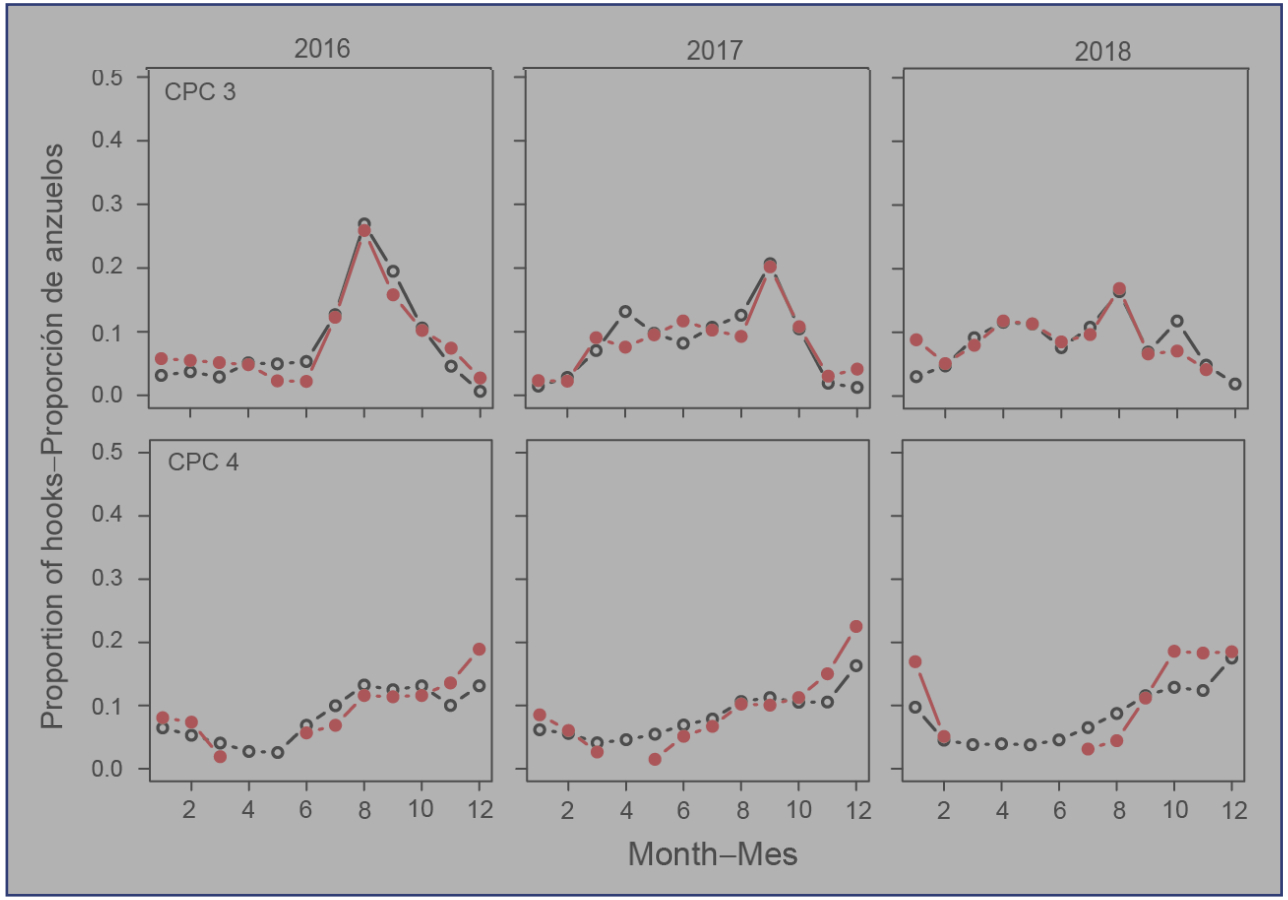




Temporal distribution of effort

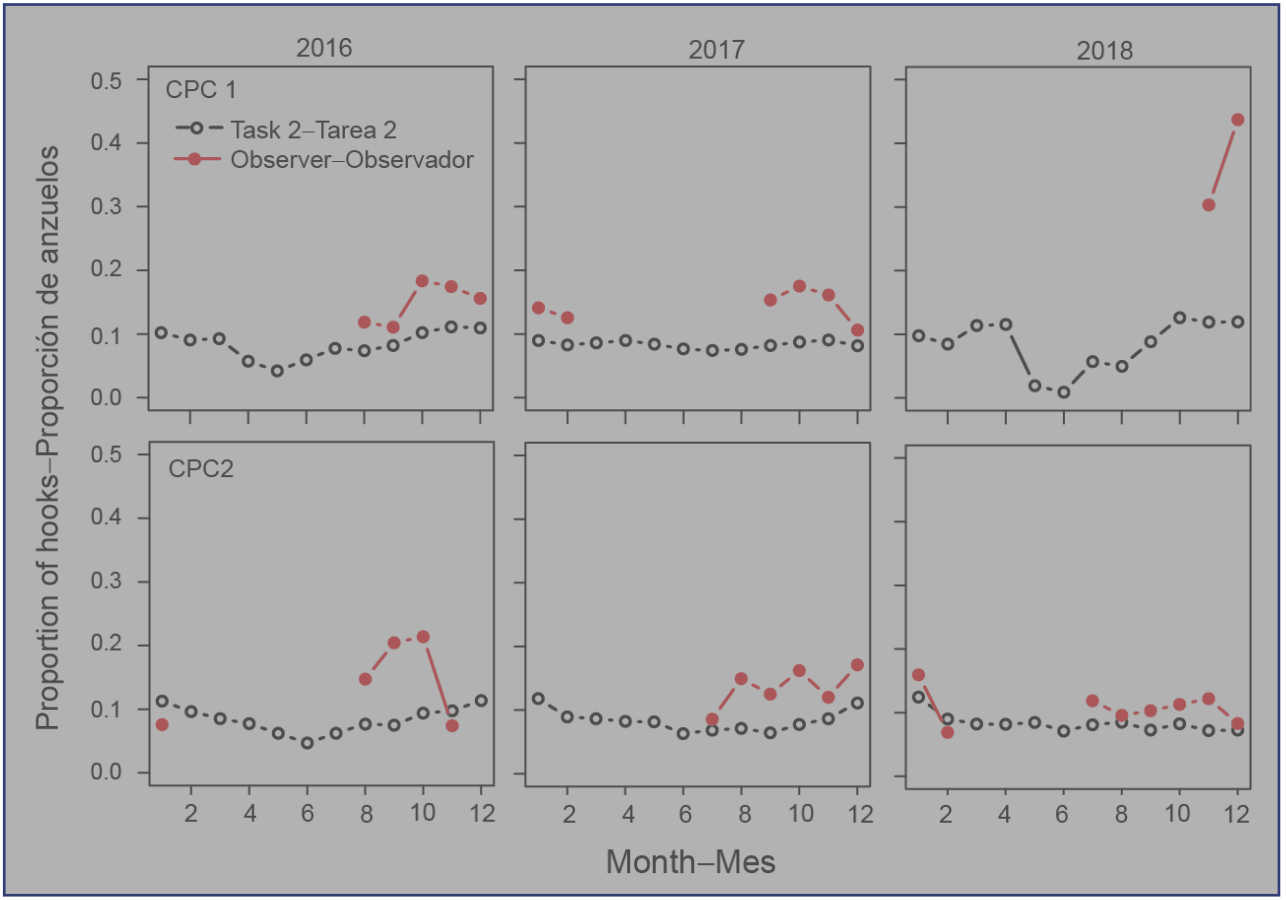
- Many months not observed for CPC1 and CPC2
- Or, less than 3 vessels carried an observer

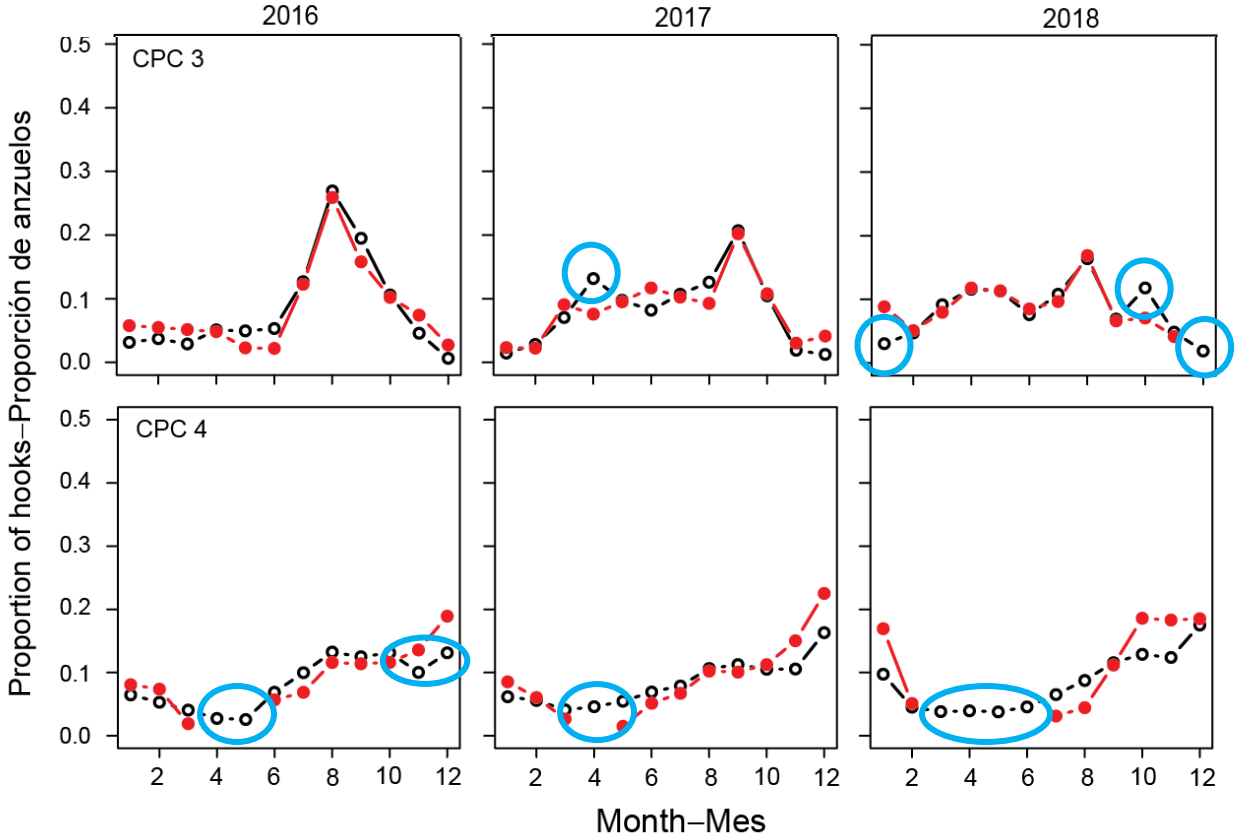




Temporal distribution of effort

- Some months not observed (or < 3 vessels sampled) for CPC4, less so for CPC3
- Proportion of observed hooks over- or under-represented for CPC4





Temporal distribution of effort

- Many months represented by < 3 vessels

CPC	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Effective Coverage	Actual coverage
CPC1														
2016	2	2	1	0	0	1	2	4	3	4	6	3	6%	5%
2017	3	3	2	0	0	0	0	2	3	5	3	5	4%	3%
2018	0	0	1	0	0	0	0	1	1	2	7	10	4%	3%
CPC2														
2016	3	2	1	1	1	1	2	5	8	9	4	2	7%	6%
2017	2	1	1	2	1	2	5	5	6	6	6	7	9%	7%
2018	5	4	2	1	0	2	4	3	3	4	5	3	7%	5%
CPC3														
2016	7	9	10	9	3	3	16	26	17	13	9	4	20%	20%
2017	5	6	13	13	14	18	11	12	27	20	8	14	20%	20%
2018	12	11	12	16	14	10	12	21	10	8	6	2	20%	20%
CPC4														
2016	5	4	4	1	2	4	4	5	5	5	7	9	14%	8%
2017	5	5	4	1	4	5	7	8	8	11	13	13	18%	10%
2018	12	8	2	1	1	1	3	4	9	13	12	10	19%	11%

BET catch estimates from observer data

- BET catch estimated from observer data generally less than Task 2 data
- Ratio of BET catch to Task 2 closest for CPC3 and farthest for CPC4

CPC	Task 2 catch	Estimated catch (95% CI)	Ratio
CPC1			
2016	**149,553**	**132,543 (125,498; 139,819)**	**0.89**
2017	149,349	142,226 (133,089; 151,825)	0.95
2018	**116,225**	**97,465 (91,072; 103,957)**	**0.84**
CPC2			
2016	**179,843**	**154,717 (146,816; 162,591)**	**0.79**
2017	**135,212**	**117,904 (112,975; 122,839)**	**0.87**
2018	**113,373**	**85,685 (80,295; 91,173)**	**0.76**

CPC	Task 2 catch	Estimated catch (95% CI)	Ratio
CPC3			
2016	**51,240**	**46,630 (43,826; 49,509)**	**0.91**
2017	64,752	64,075 (61,147; 67,164)	0.99
2018	56,121	56,779 (54,137; 59,589)	1.01
CPC4			
2016	**106,402**	**48,542 (44,231; 53,035)**	**0.46**
2017	**107,526**	**49,799 (46,055; 53,630)**	**0.46**
2018	**88,652**	**27,393 (25,013; 29,974)**	**0.31**

YFT catch estimates from observer data

- Estimated YFT catches relative to Task 2 were variable (ratios 0.56-1.26)
- Task 2 catch mostly fell outside 95% CIs for the estimated catch

CPC	Task 2 catch	Estimated catch (95% CI)	Ratio
CPC1			
2016	**36,007**	**27,635 (24,652; 30,691)**	**0.78**
2017	**38,199**	**30,205 (25,886; 34,652)**	**0.79**
2018	**37,179**	**32,420 (28,628; 36,542)**	**0.87**
CPC2			
2016	**38,684**	**34,964 (31,472; 38,626)**	**0.90**
2017	34,909	34,442 (31,760; 37,244)	0.99
2018	**34,754**	**40,312 (35,477; 45,554)**	**1.17**

CPC	Task 2 catch	Estimated catch (95% CI)	Ratio
CPC3			
2016	6,085	7,022 (6,040; 8,061)	1.15
2017	**13,305**	**15,962 (14,769; 17,200)**	**1.20**
2018	**8,738**	**10,389 (9,516; 11,265)**	**1.19**
CPC4			
2016	**25,426**	**14,120 (12,390; 15,954)**	**0.56**
2017	**23,121**	**16,606 (14,735; 18,534)**	**0.72**
2018	**22,035**	**12,365 (11,052; 13,742)**	**0.56**

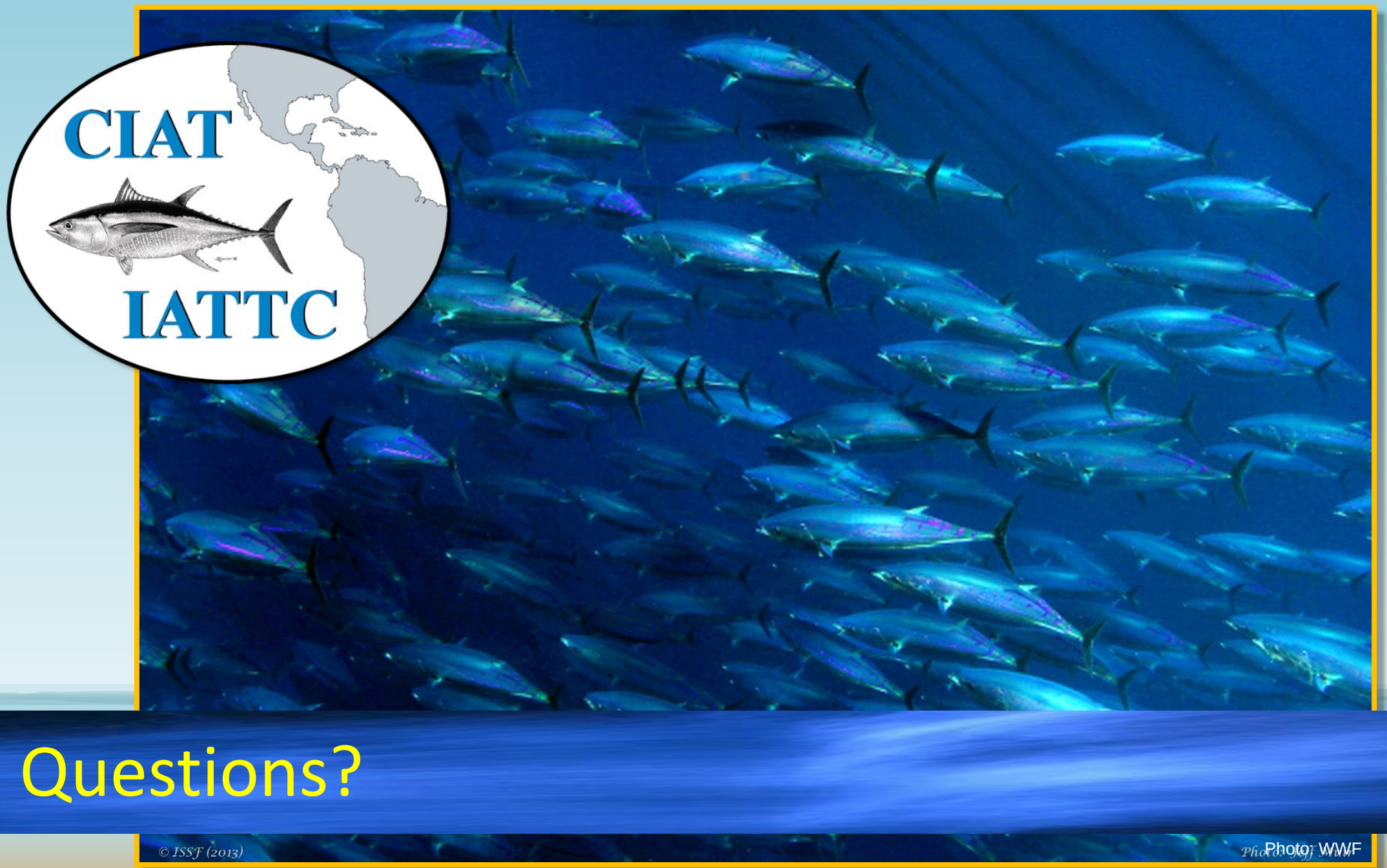
Conclusions

- Submission of over 1 million data records since 2019 shows a clear commitment by CPCs to improve data provision for the longline fleet
- However, for 3 of the 4 CPCs, spatial and temporal distribution of observed sets is clearly not representative of their fleet
- 5% observer data not adequate to estimate total catch of relatively data-rich target species (BET & YFT).
- May be due to several factors:
  - Low overall observer coverage
  - Imbalanced distribution of observed sets in space and time, relative to the fleet
  - Partial coverage of all hooks in a set

Conclusions

- Catch estimates for less frequently caught bycatch species (based on data from 5% observer coverage) are unlikely to be reliable.
- Based on the results of this study and of Wang et al. (2020) analyzing observer data from the Chinese longline fleet, the staff recommends at least 20% observer coverage is required to obtain sufficient data to estimate total catch for the more commonly-caught bycatch species
- Possible cost-effective options for improving bycatch data provision:
  - Electronic monitoring (see Román et al. 2021; **EMS-01-01**)
  - Submission of set-by-set logbook data, including bycatch species (**SAC-12-09**)
  - However, these options should not completely replace human observers

Wang et al. (2021) An evaluation of observer monitoring program designs for Chinese tuna longline fisheries in the Pacific Ocean using computer simulations. Env. Sci. Poll. Res. 28:12628-12639



Questions?

Photo: WWF