

Comisión Interamericana del Atún Tropical
Inter-American Tropical Tuna Commission



STATUS OF BIGEYE TUNA IN THE EASTERN PACIFIC OCEAN (SAC-09-05)
Update Assessment: 1975-2017

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9th Meeting of the Scientific Advisory Committee La Jolla, California USA, 14-18 May 2018

Outline



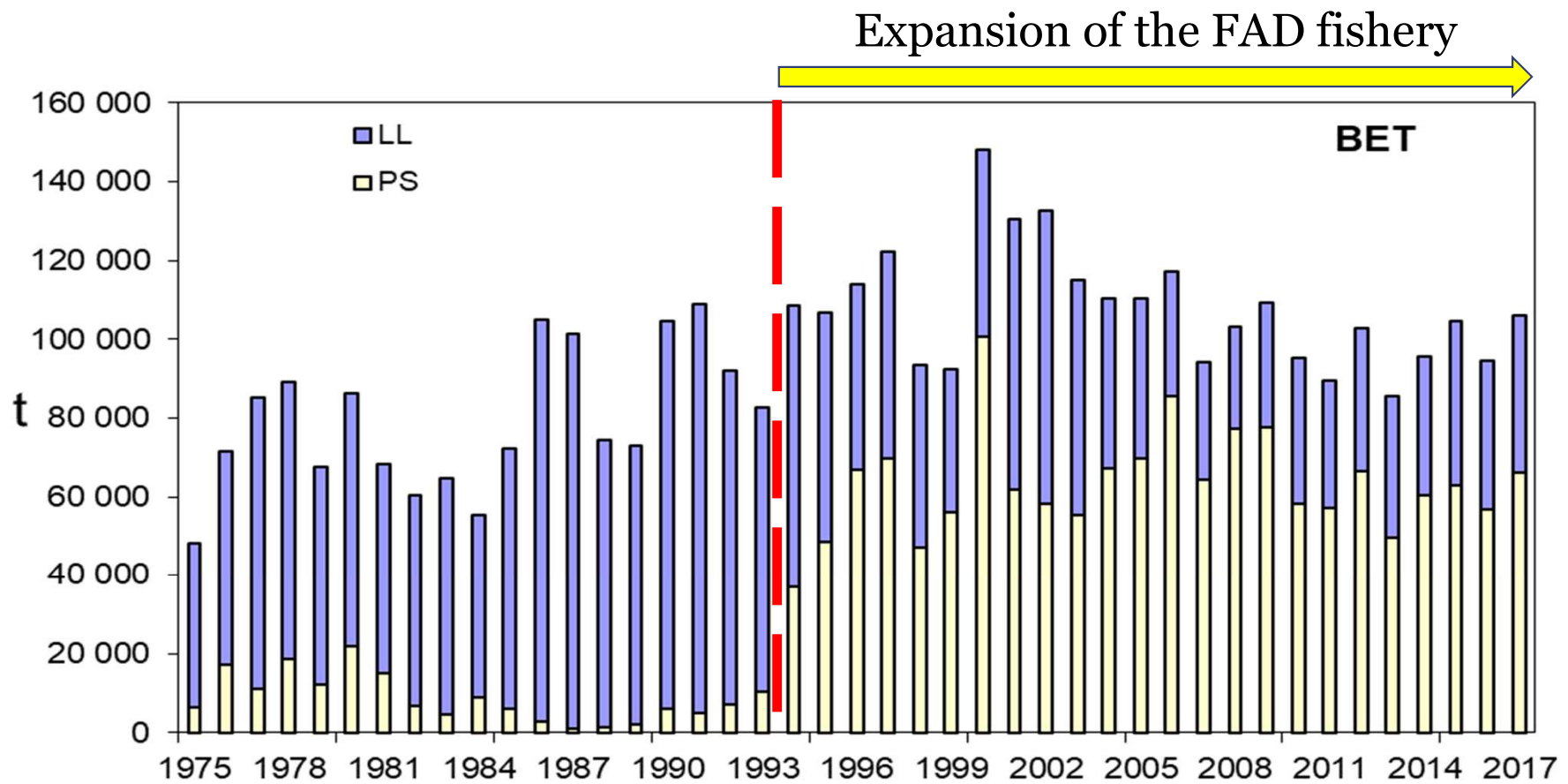
- Update stock assessment (base case model)
 - Fishery data updates
 - Model assumptions
 - Results (model fits, recruitment, biomass and fishing mortality)
 - Stock status (Kobe plots and management quantities)
- Sensitivity analysis
 - Stock-recruitment relationship (steepness, $h = 0.75$)
- Summary

New or updated data



- Surface fisheries
 - Catch, CPUE and size-frequency data updated to include new data for 2017 and revised data for earlier years
- Longline fisheries
 - New or updated longline catch data: China (2016-2017), Japan (2015-2017), Korea (2016-2017), Chinese Taipei (2014-2017), the United States (2015-2016), French Polynesia (2016), Vanuatu (2017) and other nations (2014-2016)
 - 2017 longline catch data available from monthly reports: China, Japan, Chinese Taipei, and Korea
 - New or updated CPUE data were available for Japanese longline fleets (2015-2017)
 - New or updated Japanese longline size-frequency data were also available for commercial (2014-2015) and training (2014 and 2016) vessels.

Total catches



Model assumptions



- Base case: same model used in previous assessment
 - No relationship between stock and recruitment (steepness $h = 1$)
 - Growth curve from integrated analysis of otolith and tagging data
 - Indices of abundance: CPUE for Central and Southern longline fisheries
 - Selectivities: Asymptotic size-based selectivity curves for Central and Southern longline fisheries which catch larger bigeye
 - Down-weighted size composition data for all fisheries ($\lambda = 0.05$)
- Sensitivity analysis
 - Stock-recruitment relationship (steepness, $h = 0.75$)

Reminder: new SS output report



[Home](#) [Bio](#) [Sel](#) [Timeseries](#) [RecDev](#) [S-R](#) [Catch](#) [SPR](#) [Index](#) [Numbers](#) [CompDat](#) [LenComp](#) [A@LComp](#) [Yield](#) [Data](#)

EPO Bigeye Tuna 2018 Base Case Assessment

The assessment was conducted using [Stock Synthesis \(SS\)](#). These web pages provide information created automatically by the [R4SS](#) program. They also provide the SS output files and files used to run the stock assessment. The information contained in these web pages and files, or any content derived from them, should not be publically redistributed without the permission of the IATTC.

[IATTC bigeye tuna stock assessment document](#)

[The SS output is also available as a pdf](#)

[SS model files in zip archive](#)

[SS output files in zip archive](#)

Home

SS version: SS-V3.23b-safe-win64;_11/05/2011;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_10

r4ss info:

Version: 1.30.1

Date: 2018-02-02

Built: R 3.4.2; ; 2018-02-07 19:11:32 UTC; windows

RemoteType: github

RemoteHost: <https://api.github.com>

RemoteRepo: r4ss

RemoteUsername: r4ss

RemoteRef: master

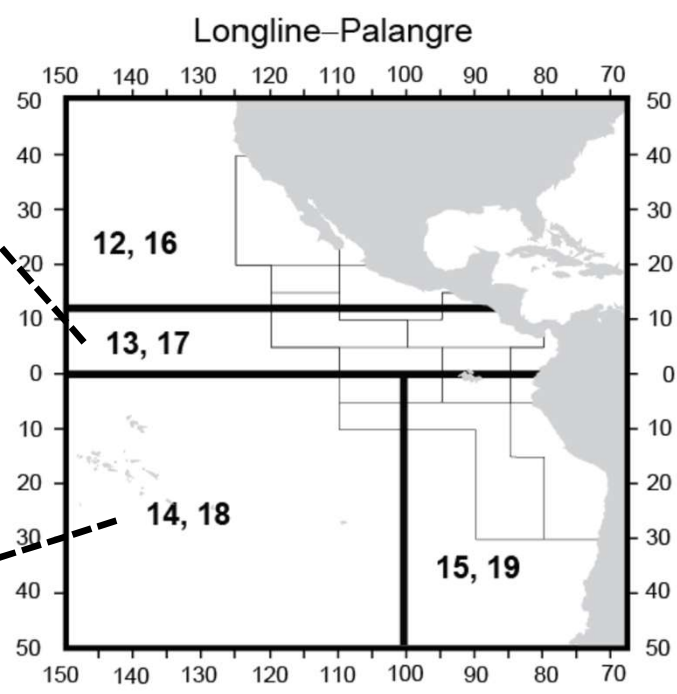
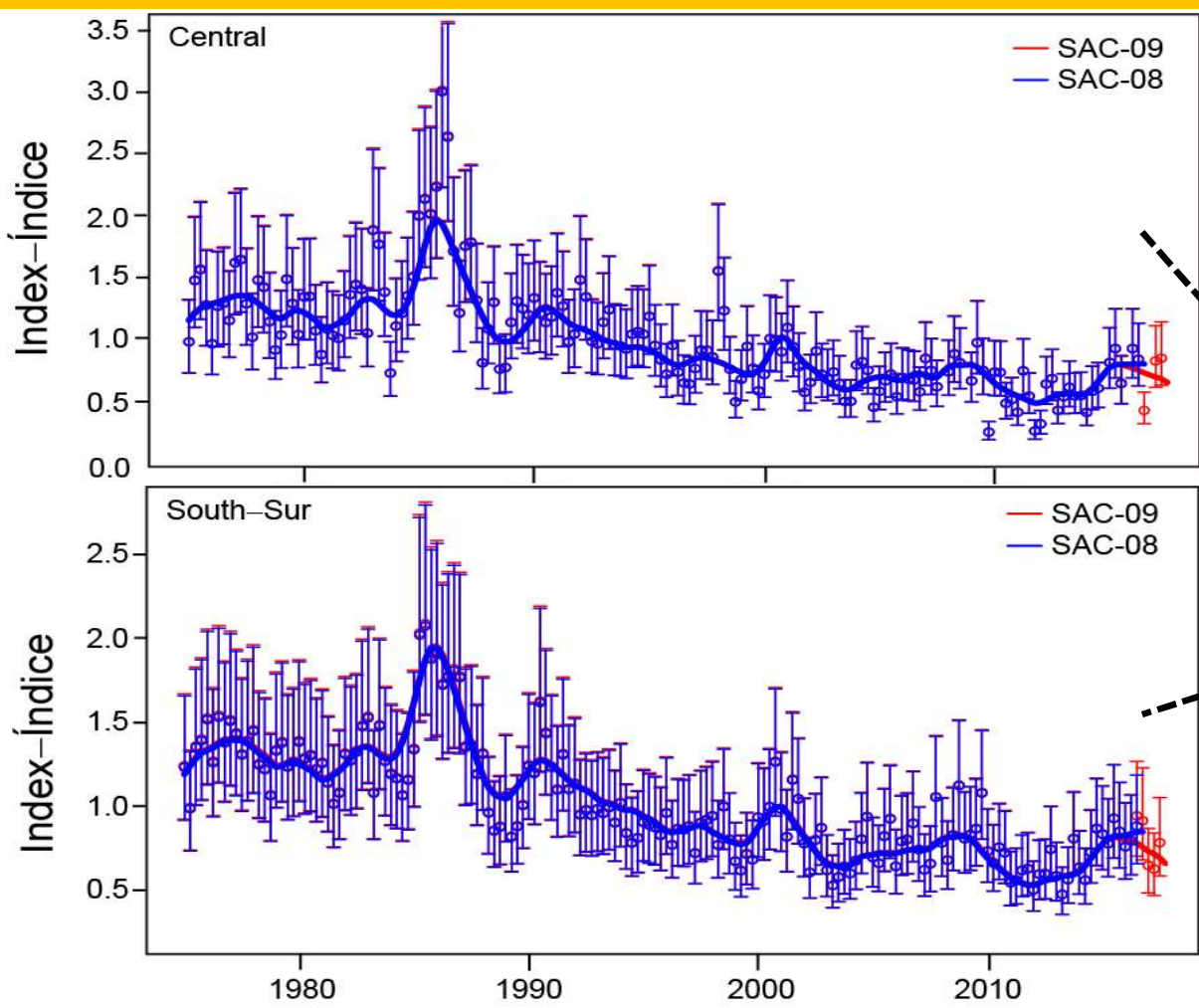
RemoteSha: eac99584b097fce61483b91d202be2404443f5e2

Starting time of model: Sun Apr 15 16:00:16 2018

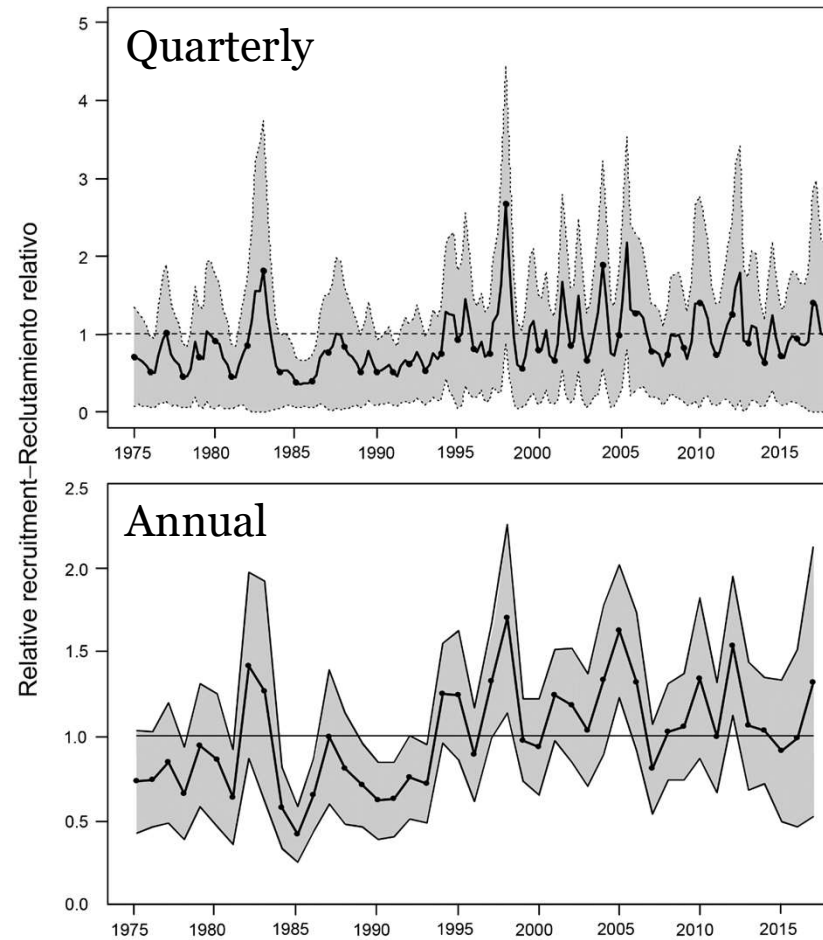
Warnings (from file warnings.sso):



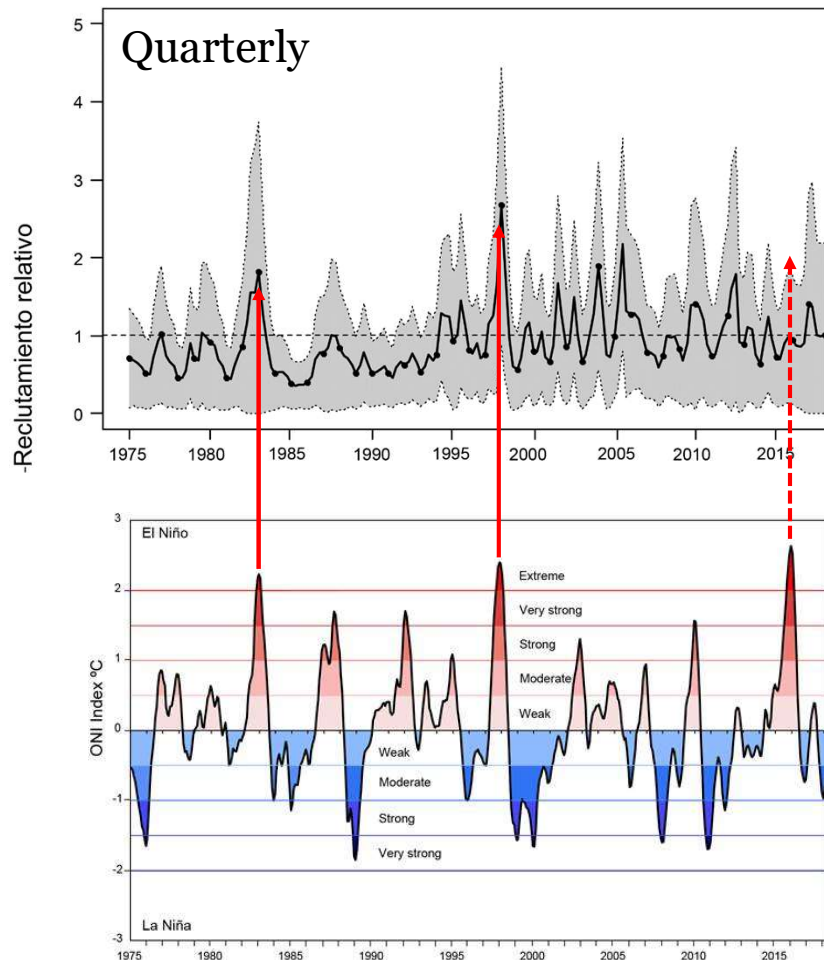
Model fit to JPN longline CPUE (base case)



Recruitment (base case)

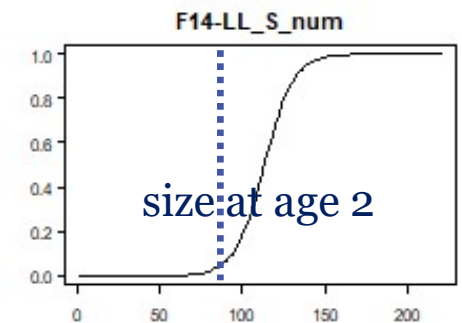
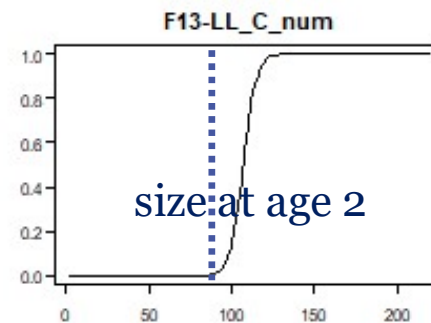


Recruitment (base case)



Another strong recruitment in 2016?

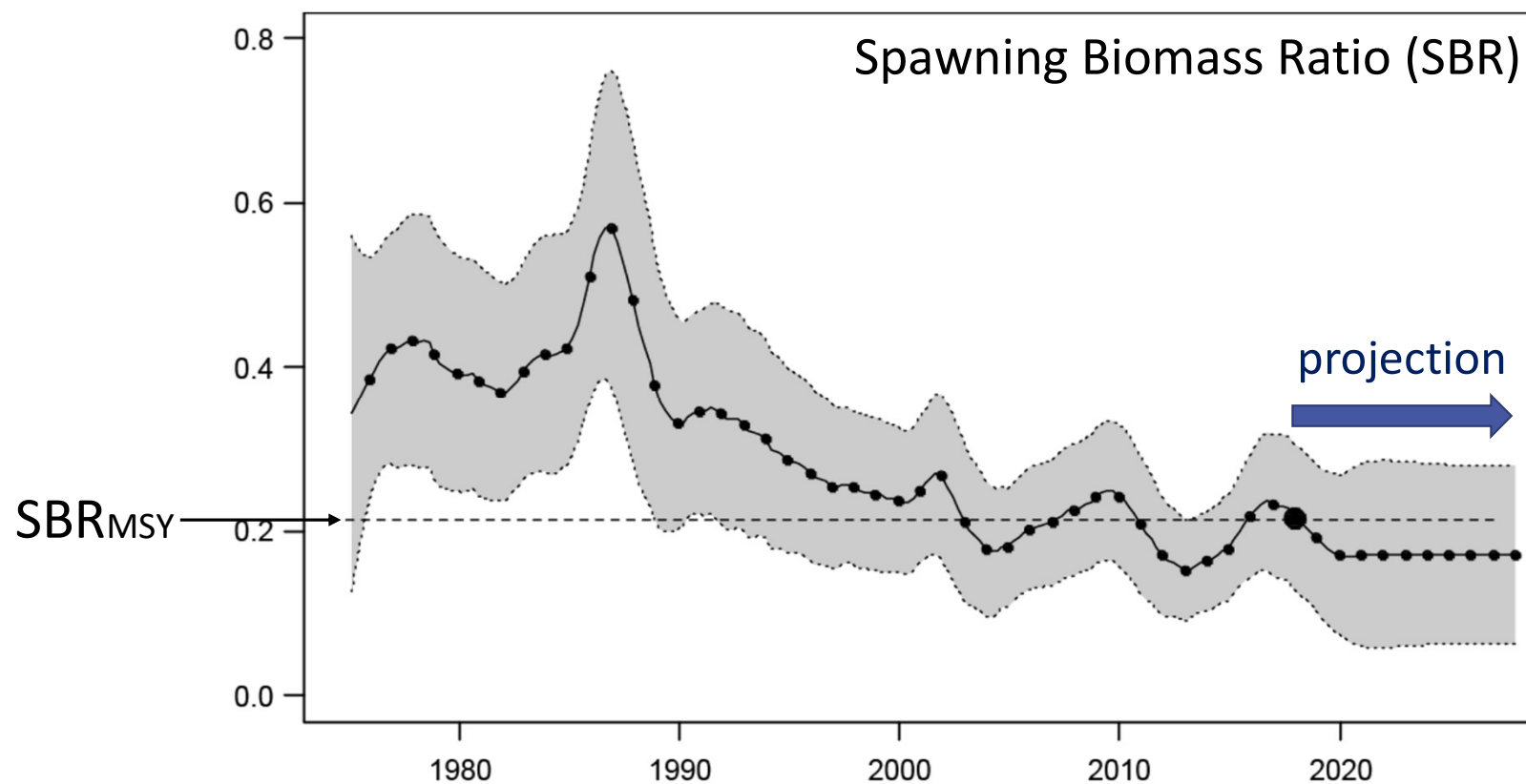
We don't know yet because the signal still cannot be seen in LL CPUE data.



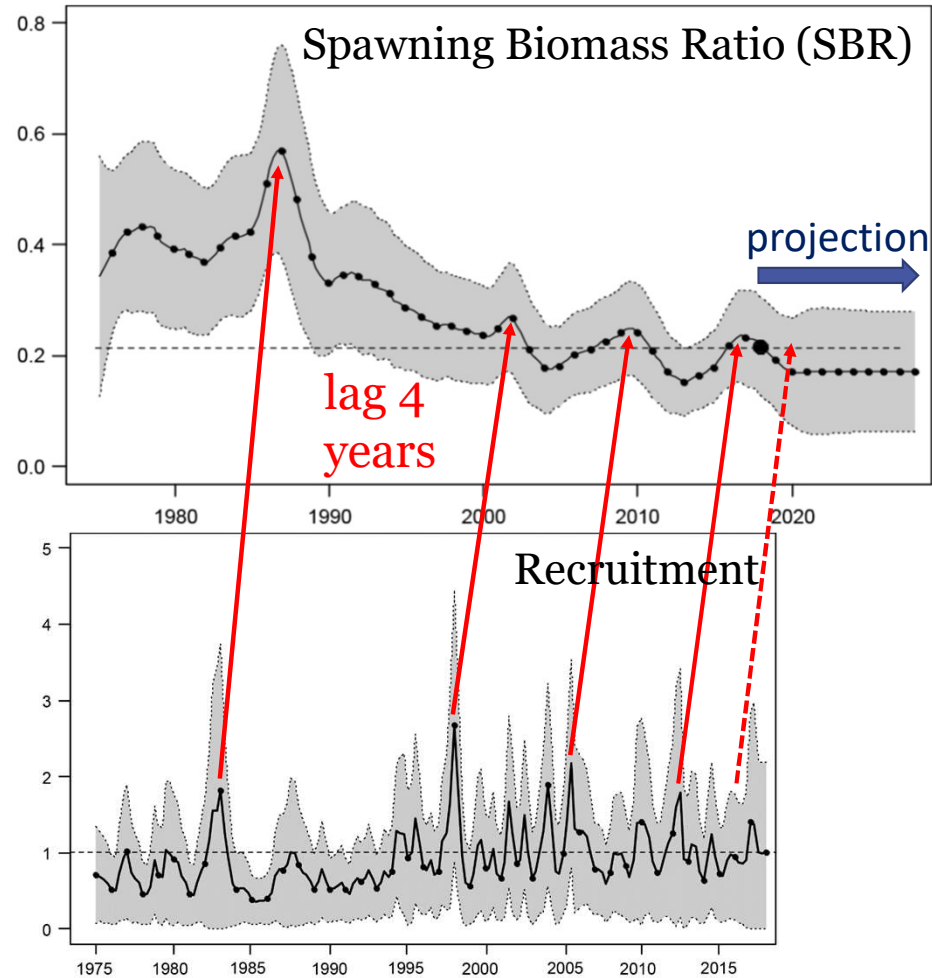
Data from NOAA; Figure by Chris Patnode



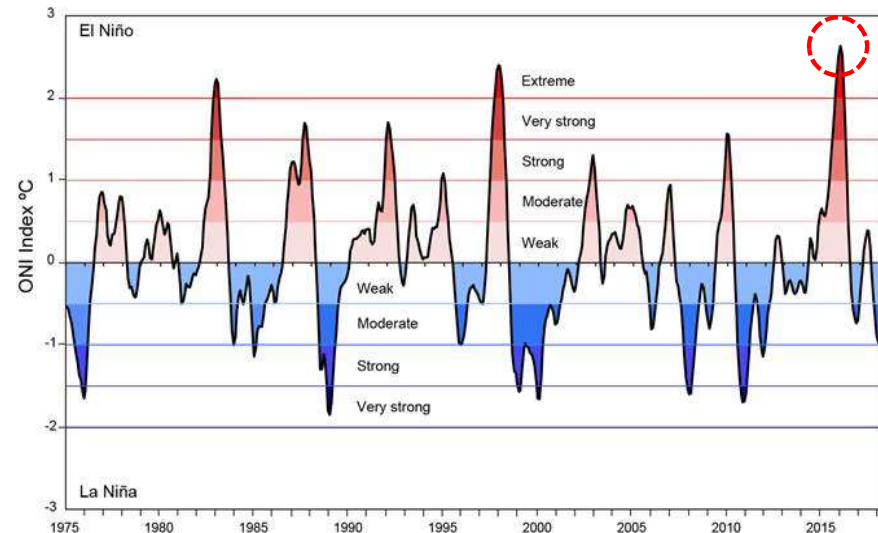
Spawning Biomass Ratio (base case)



Spawning Biomass Ratio (base case)

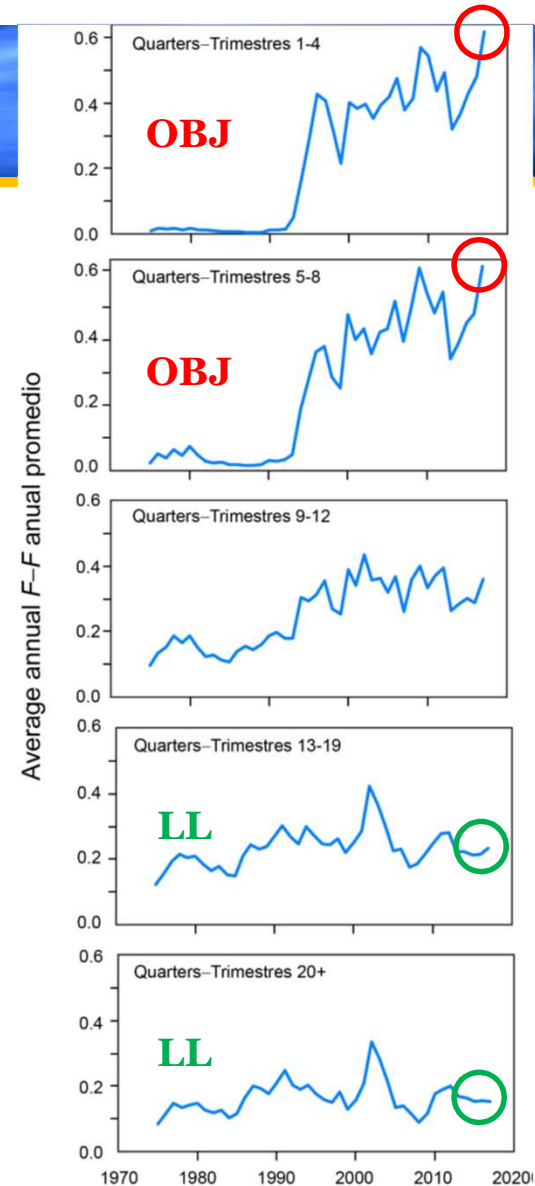


- Considering that the effect of the 2016 El Niño's on recruitment has not shown up in the assessment yet, **future SBR is probably underpredicted by the model.**

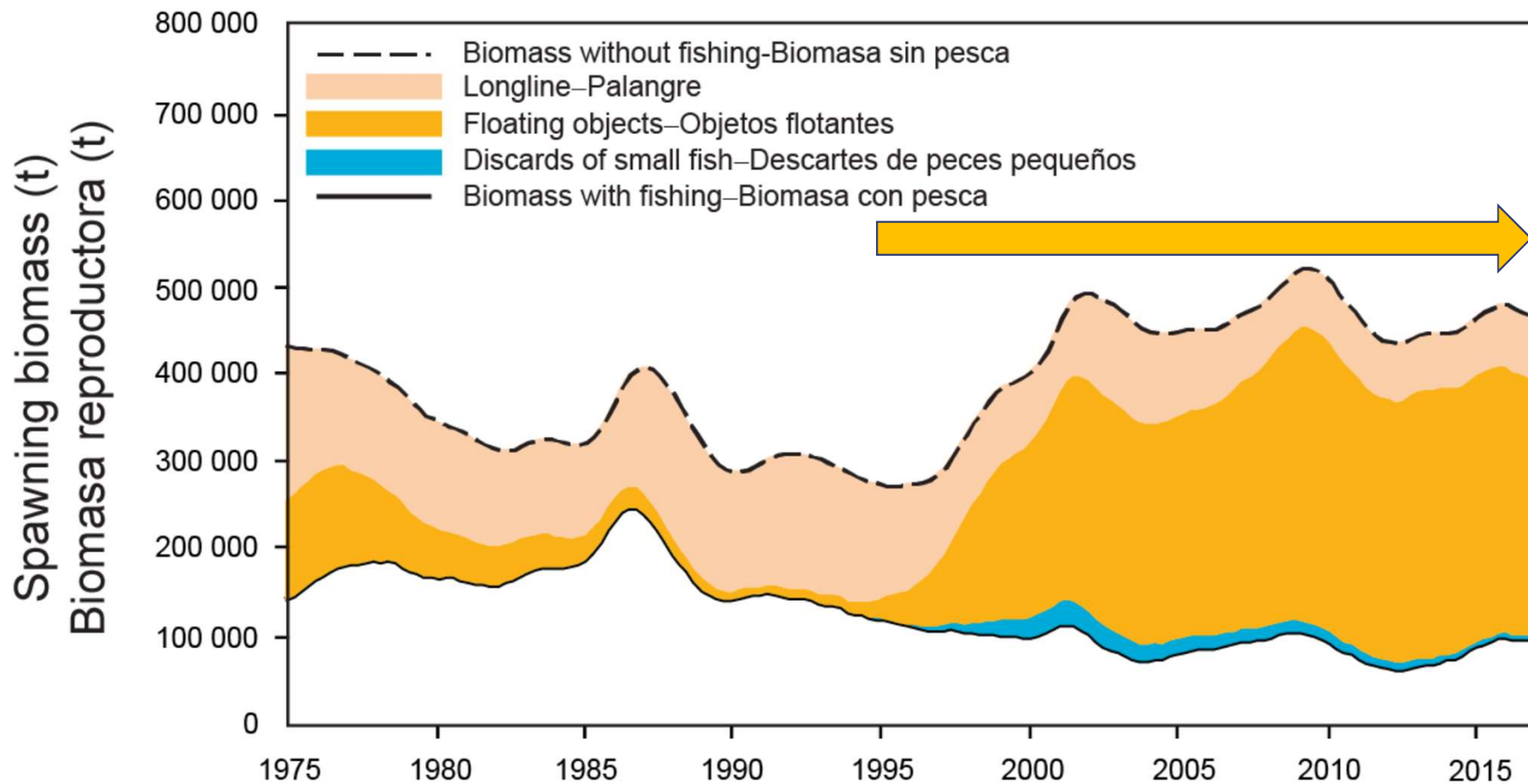


Fishing mortality (base case)

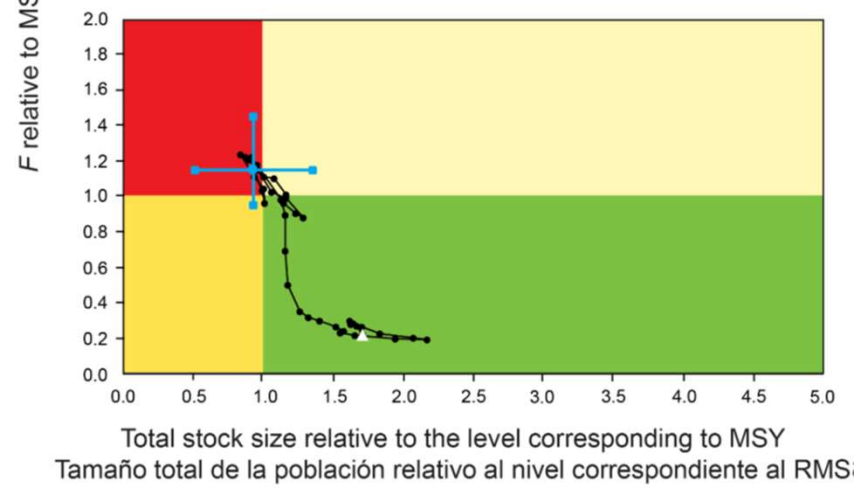
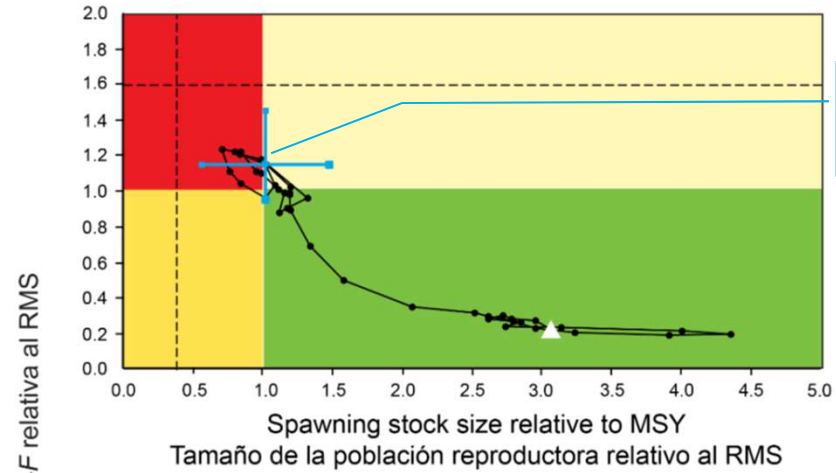
- Fishing mortality rates for young fish (quarters 1-8; caught by **OBJ**) reached the historical high level in 2017
- While those for old fish (quarters 13+; caught by **LL**) varied minimally since 2013



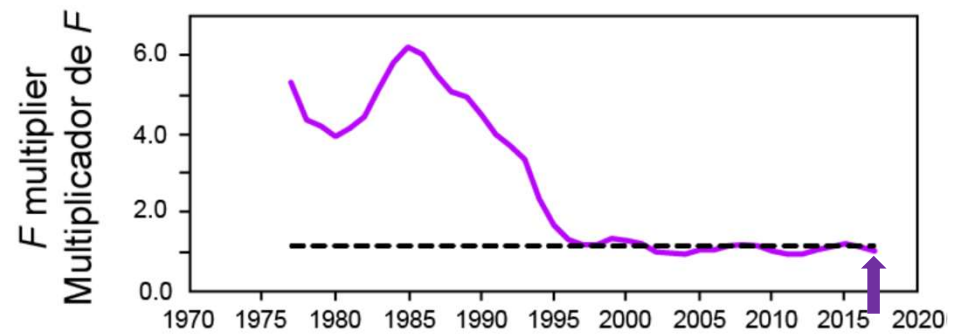
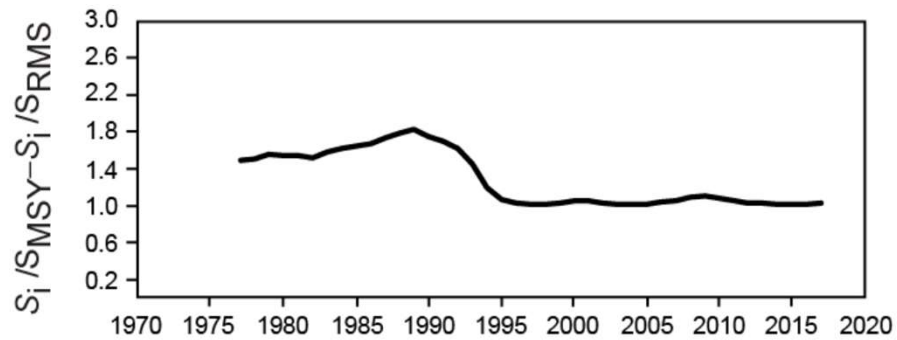
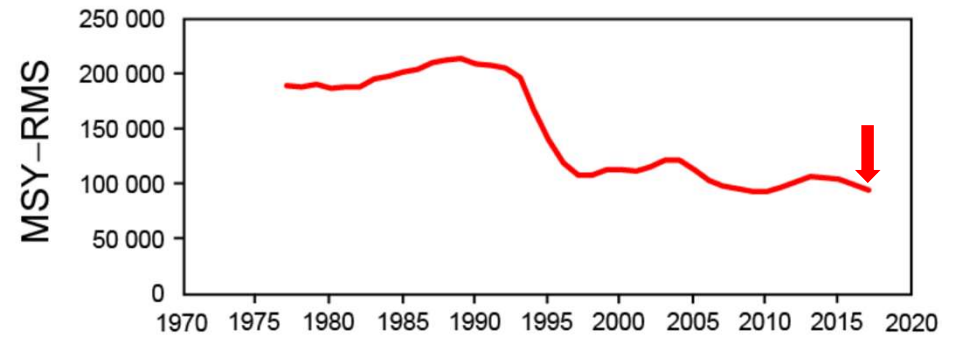
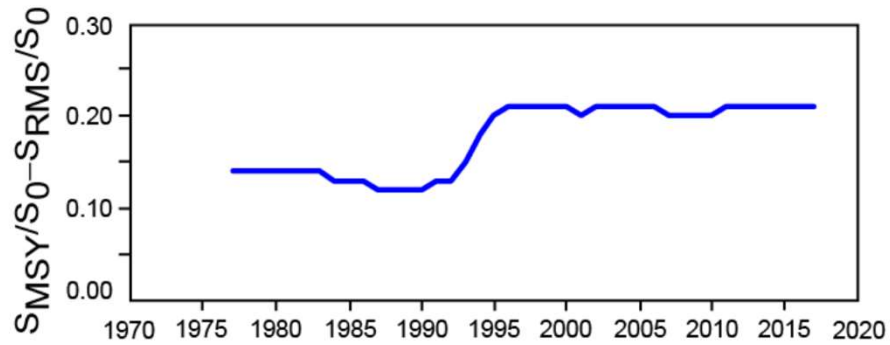
Fishery impact plot (base case)



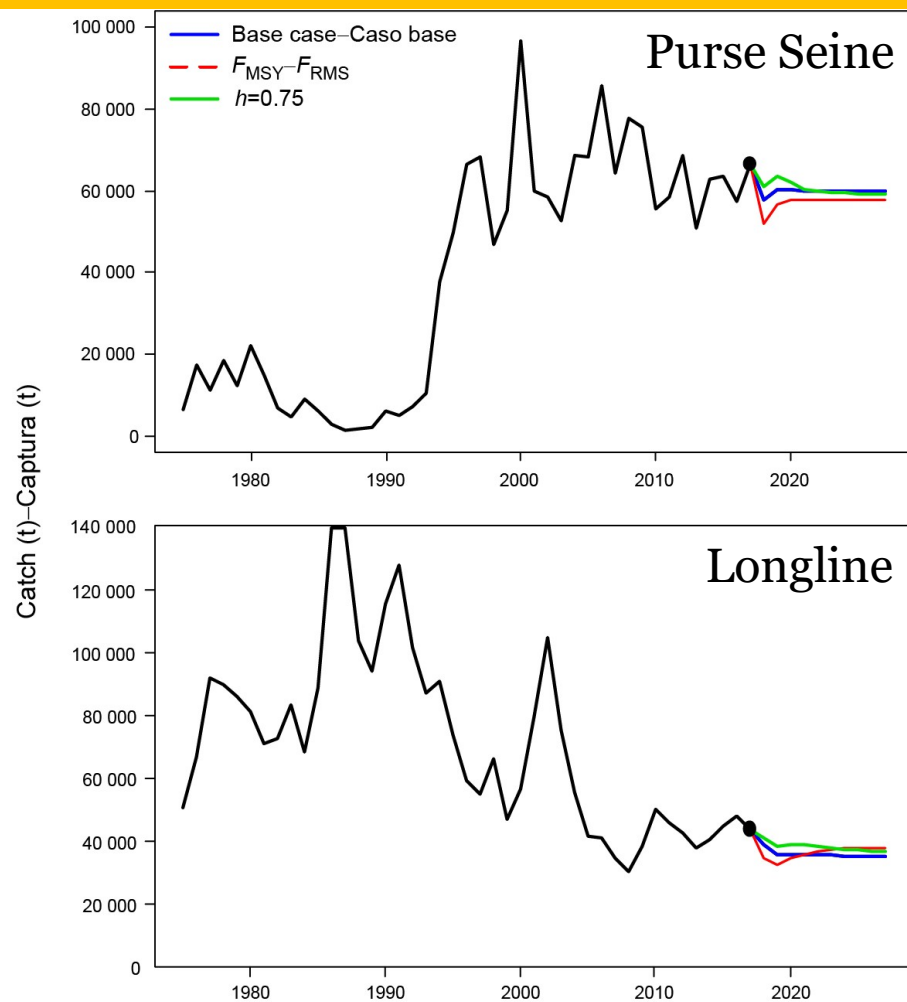
Kobe plot (base case)



Time-varying indicators



Projected catches – Status quo (F_{cur})



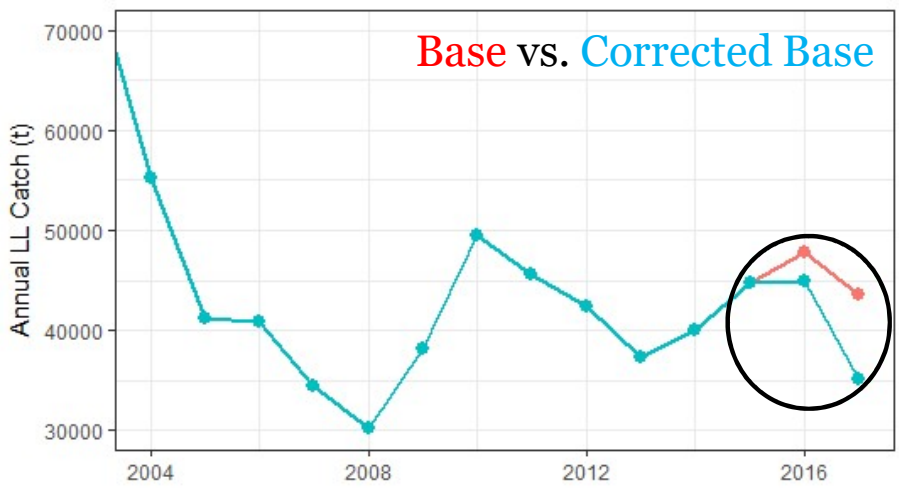
Management quantities



	Base case- Caso base	$h = 0.75$
MSY-RMS	95,491	97,766
$B_{MSY} - B_{RMS}$	371,078	718,860
$S_{MSY} - S_{RMS}$	93,329	200,723
$B_{MSY}/B_0 - B_{RMS}/B_0$	0.26	0.33
$S_{MSY}/S_0 - S_{RMS}/S_0$	0.21	0.30
$C_{recent}/MSY - C_{recent}/RMS$	1.15	1.13
$B_{recent}/B_{MSY} - B_{recent}/B_{RMS}$	0.91	0.85
$S_{recent}/S_{MSY} - S_{recent}/S_{RMS}$	1.02	0.92
F multiplier-Multiplicador de F	0.87	0.80



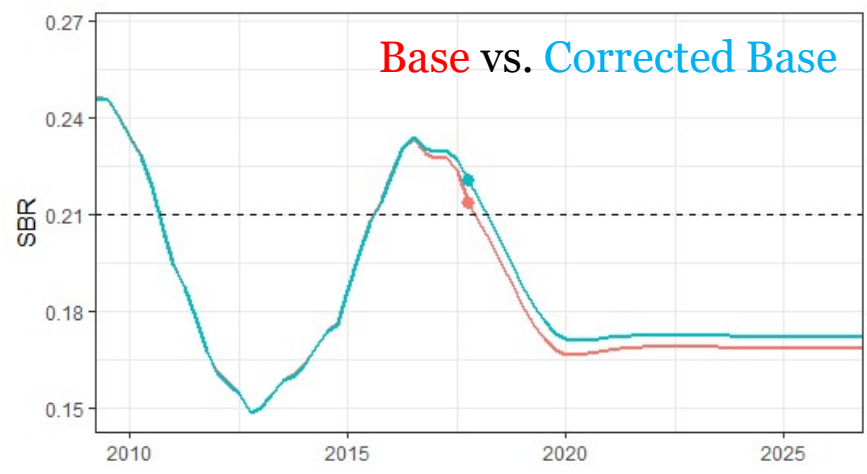
LL catch correction



Catch correction was submitted by one member country after the assessment period

After the data correction, the stock status is estimated to be slightly more optimistic

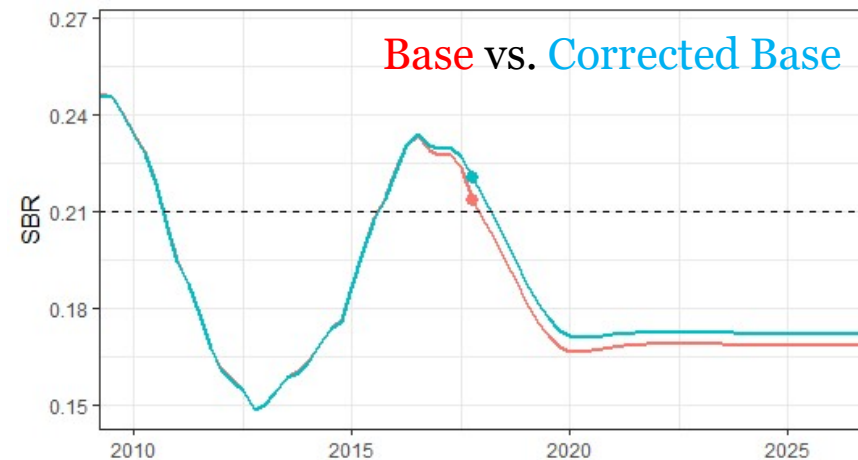
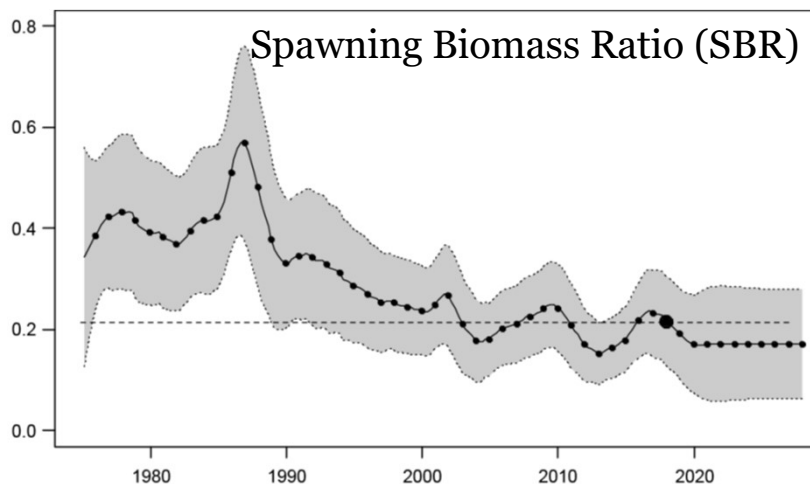
	Base	Corrected Base
MSY-RMS	95,491	92,986
$B_{MSY} - B_{RMS}$	371,078	365,669
$S_{MSY} - S_{RMS}$	93,329	92,404
$B_{MSY}/B_o - B_{RMS}/B_o$	0.26	0.25
$S_{MSY}/S_o - S_{RMS}/S_o$	0.21	0.21
$C_{recent}/MSY - C_{recent}/RMS$	1.15	1.10
$B_{recent}/B_{MSY} - B_{recent}/B_{RMS}$	0.91	0.94
$S_{recent}/S_{MSY} - S_{recent}/S_{RMS}$	1.02	1.06
F multiplier-Multiplicador de F	0.87	0.89



Summary: key results



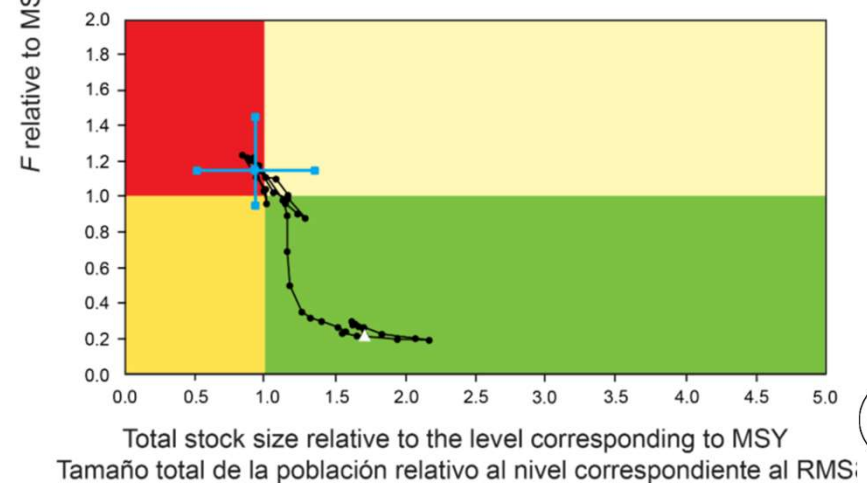
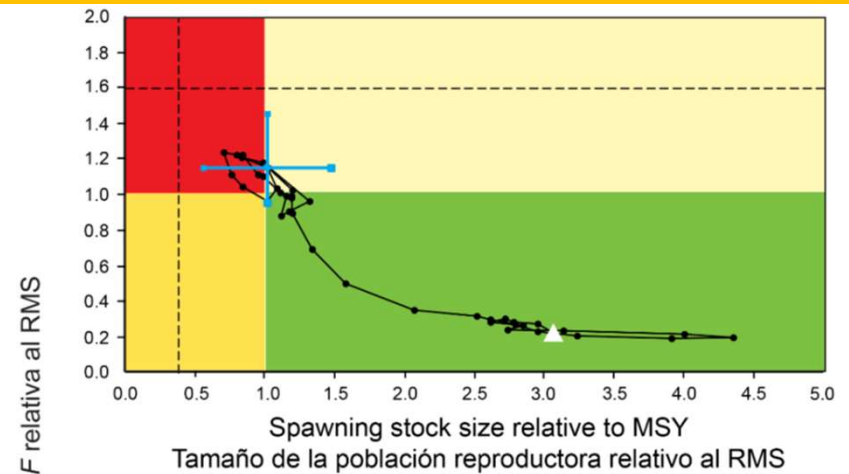
- SBR gradually declined to a historically low level of 0.15 in 2013
- SBR is estimated to have increased markedly, from 0.15 in 2013 to 0.23 at the start of 2016, due mainly to the strong recruitment in 2012
- SBR is estimated to have decreased to 0.21/0.22 in 2017, due mainly to the decrease in the CPUE of the longline fisheries for bigeye after 2016
- At current fishing mortality levels and average recruitment for the future, SBR is predicted to drop below SBR at MSY



Summary: key results (cont.)



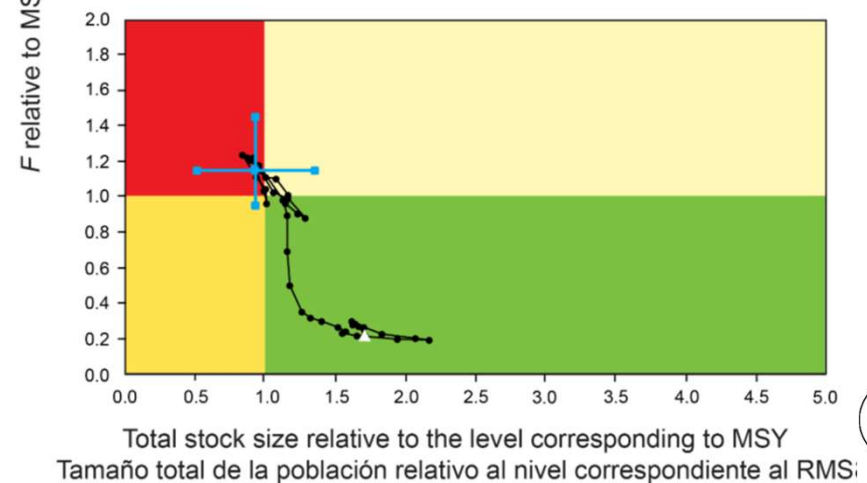
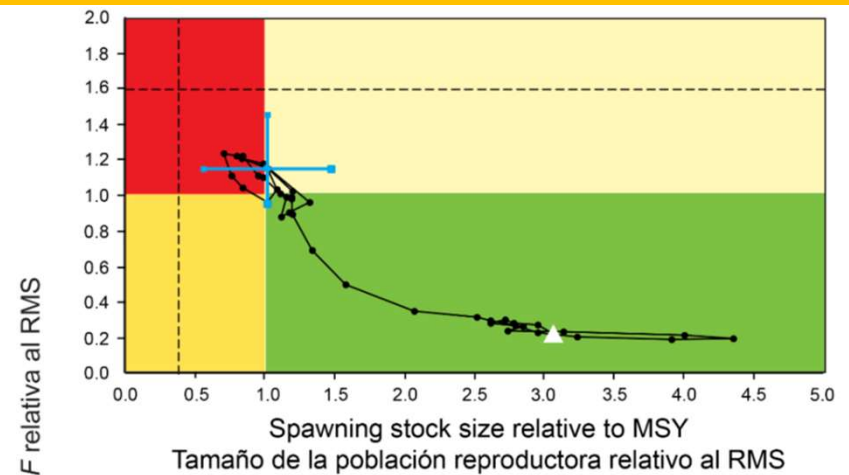
- The recent levels of spawning biomass are estimated to be **above** the MSY level ($S_{\text{recent}} > S_{\text{MSY}}$): **not overfished**
- The recent fishing mortality rates are estimated to be **above** the level corresponding to MSY ($F_{\text{recent}} > F_{\text{MSY}}$): **overfishing was occurring**



Summary: key results (cont.)



- The terminal year estimates are very uncertain (low precision)
- Proposed limit reference points of 0.38 SMSY and 1.6 FMSY have not been exceeded
- A detailed investigation of stock assessment uncertainty and the proposed plan to improve the assessment will be presented by Mark in the next presentation



Backup slides

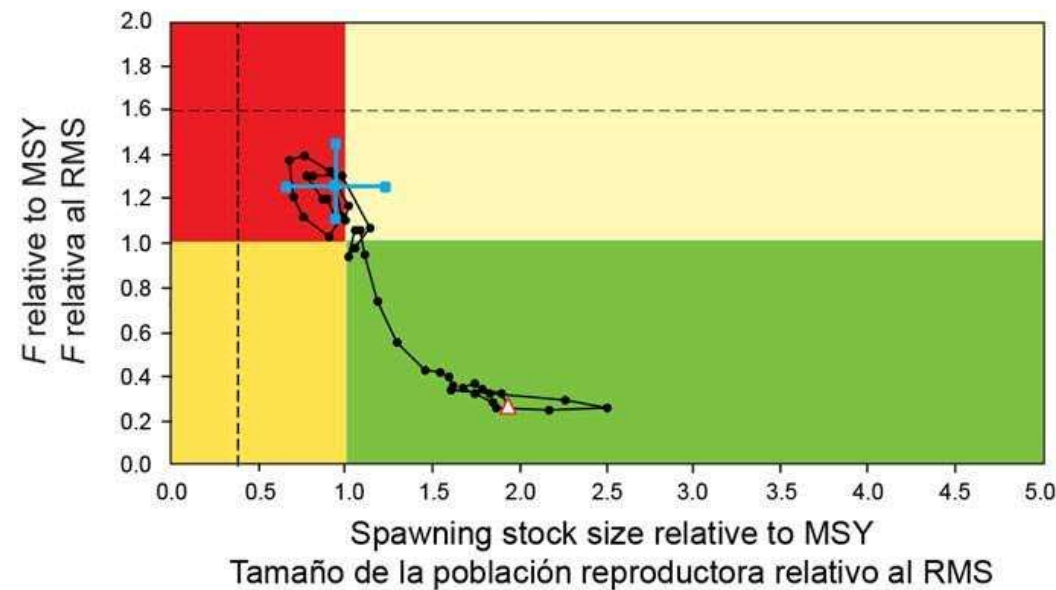
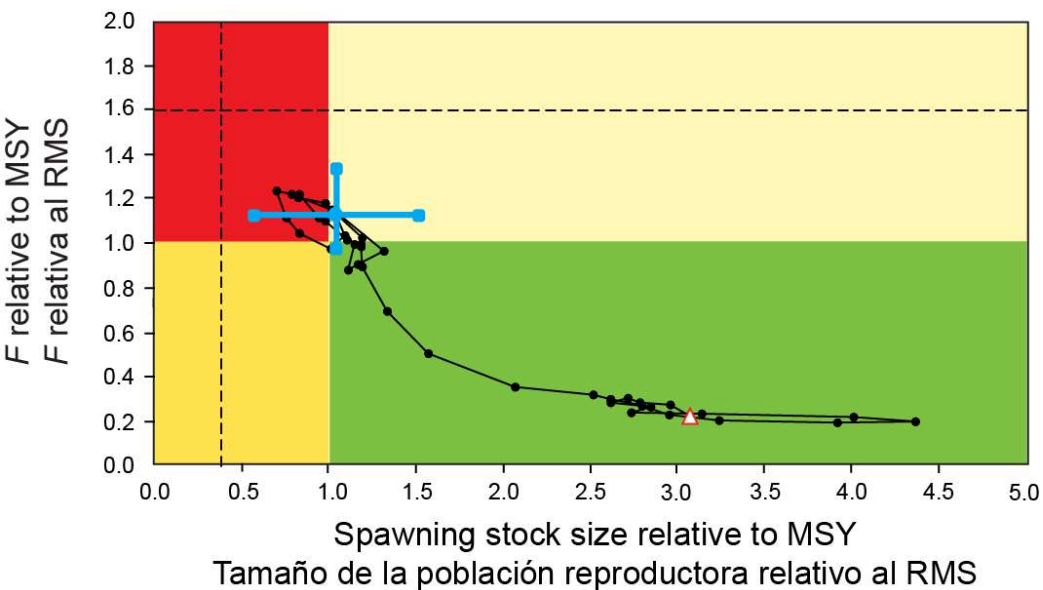


Link to the EPO Bigeye Tuna 2018 Base Case Assessment:

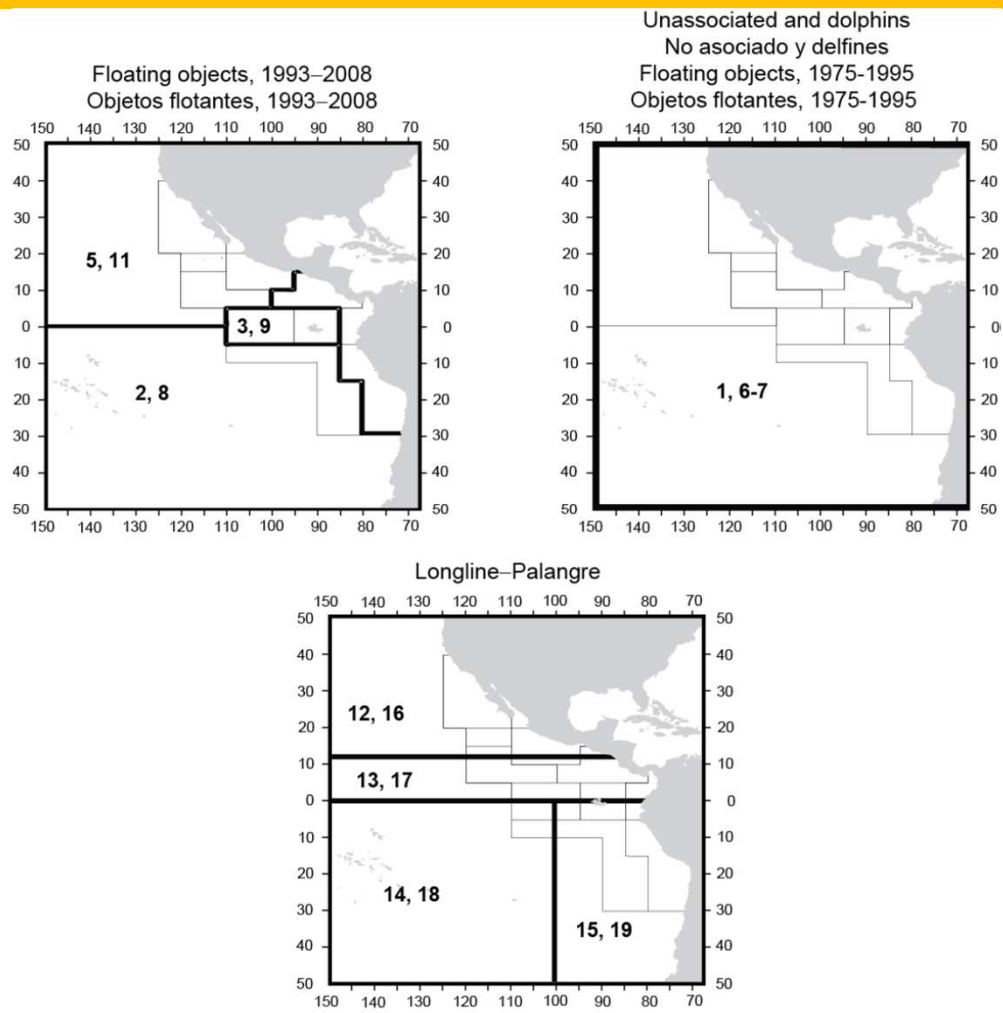
http://www.iattc.org/StockAssessments/2018/BETWebPage/SS_output.html



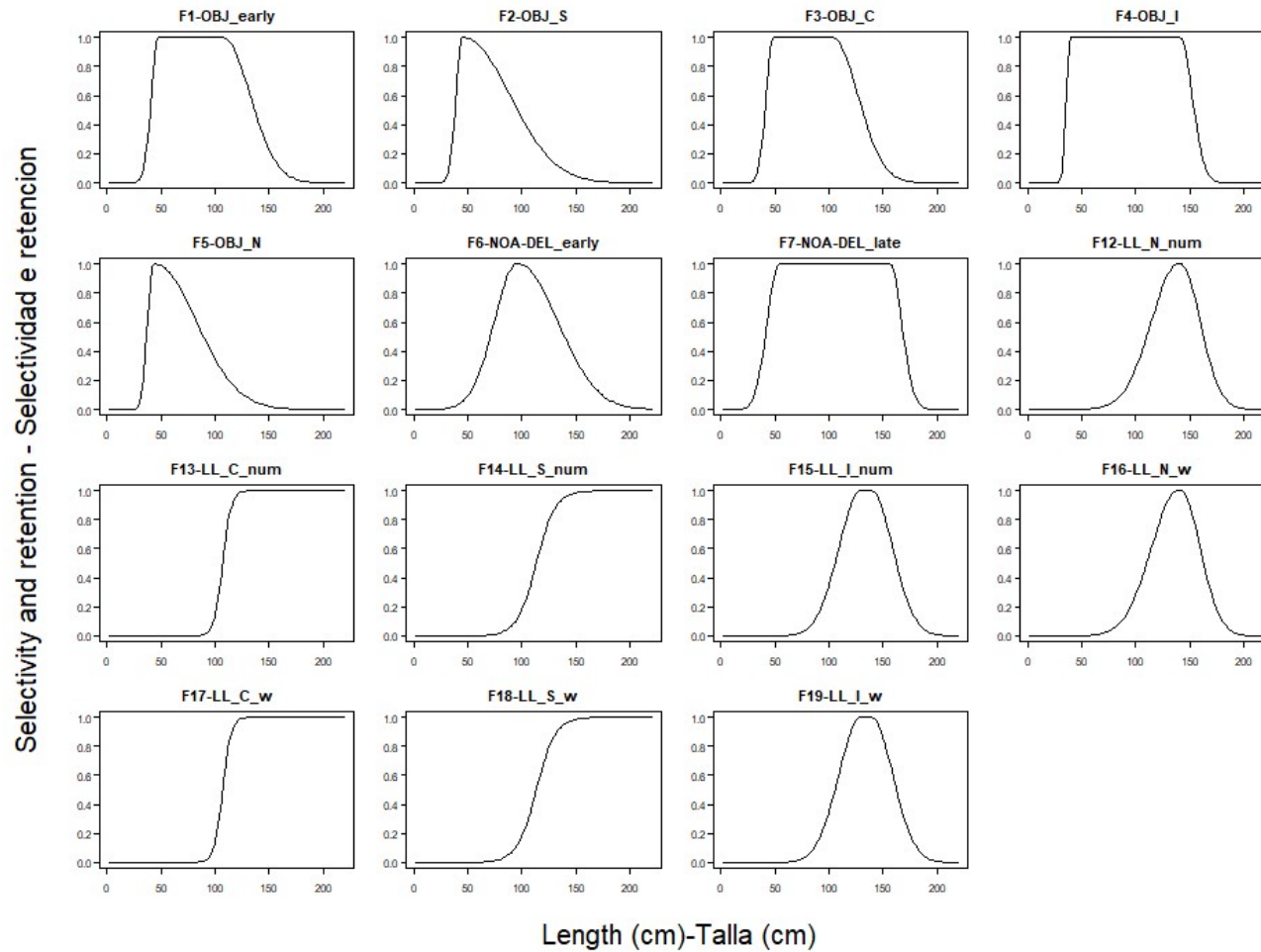
Kobe plots (Corrected Base and $h = 0.75$)



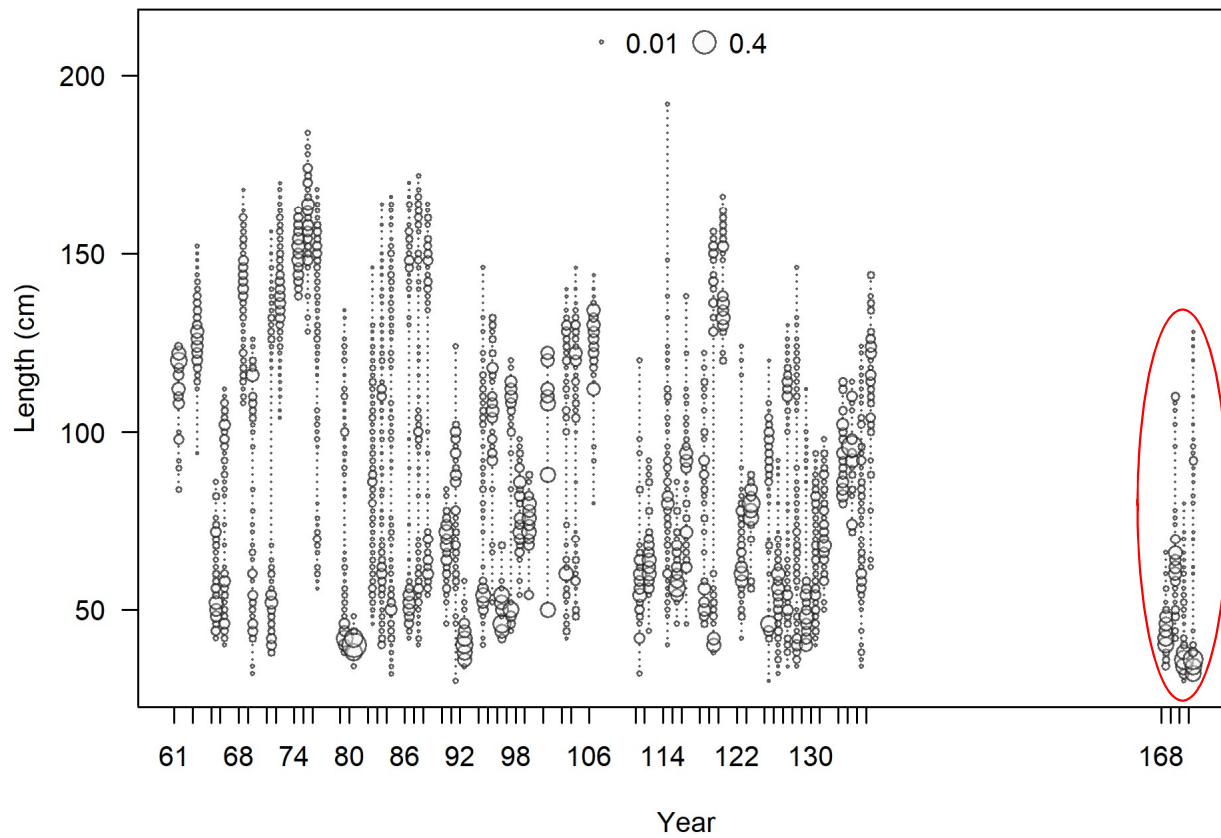
Fisheries map



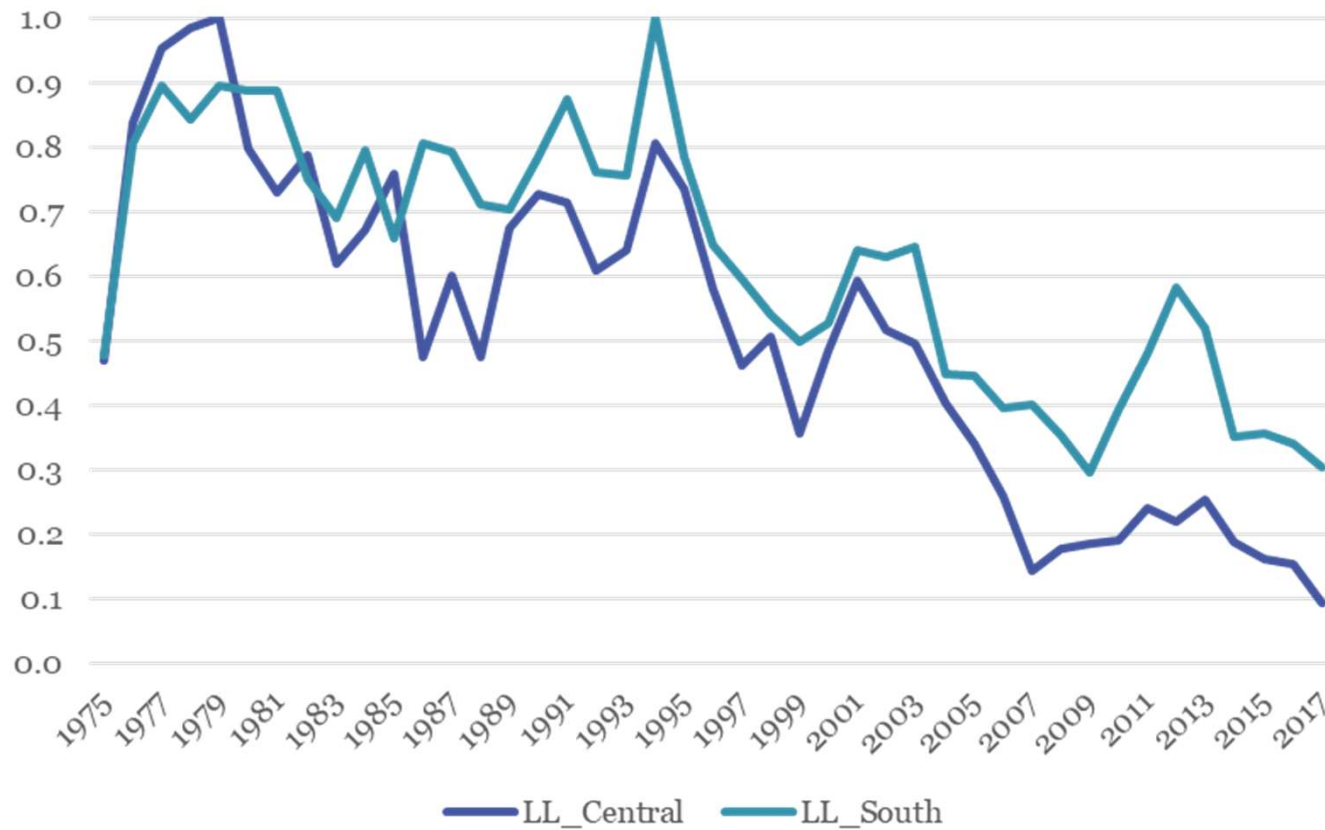
Selectivity curves



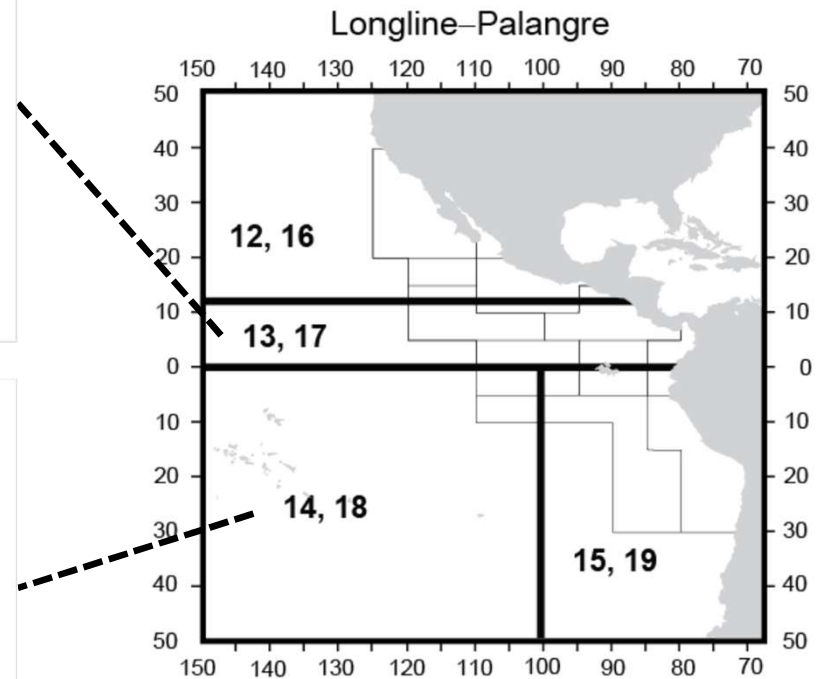
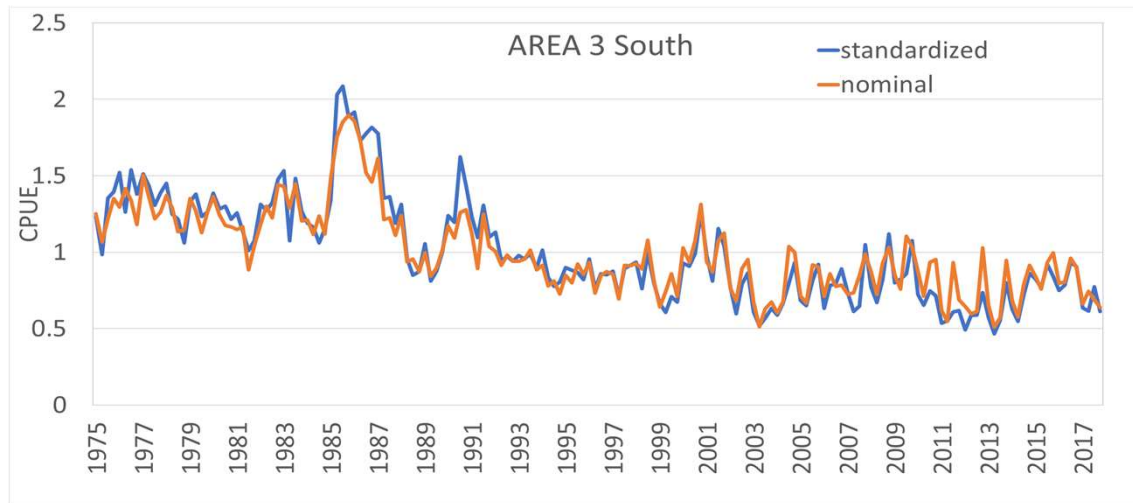
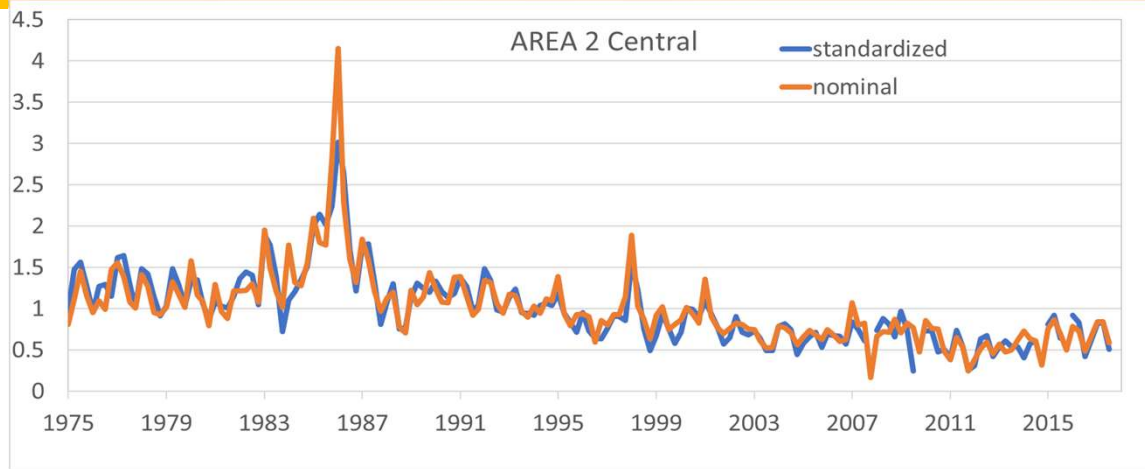
Length-comp data for F7 (NOA-DEL)



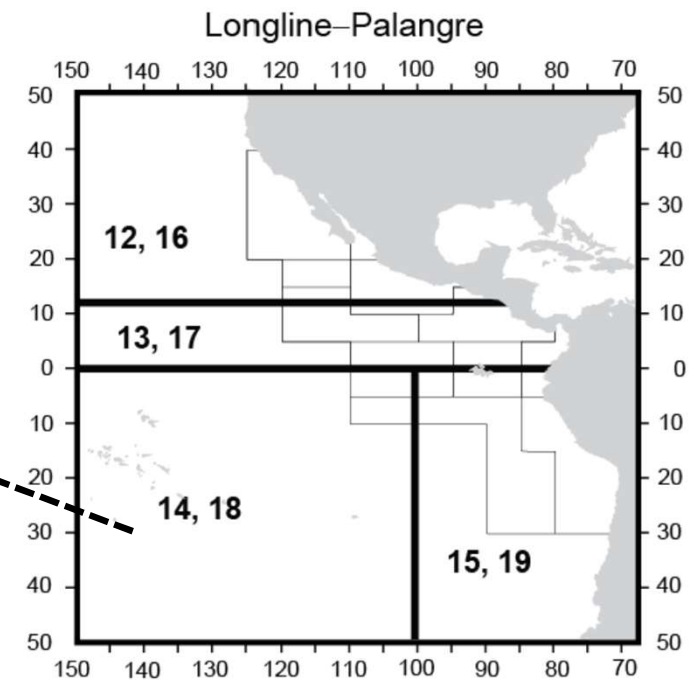
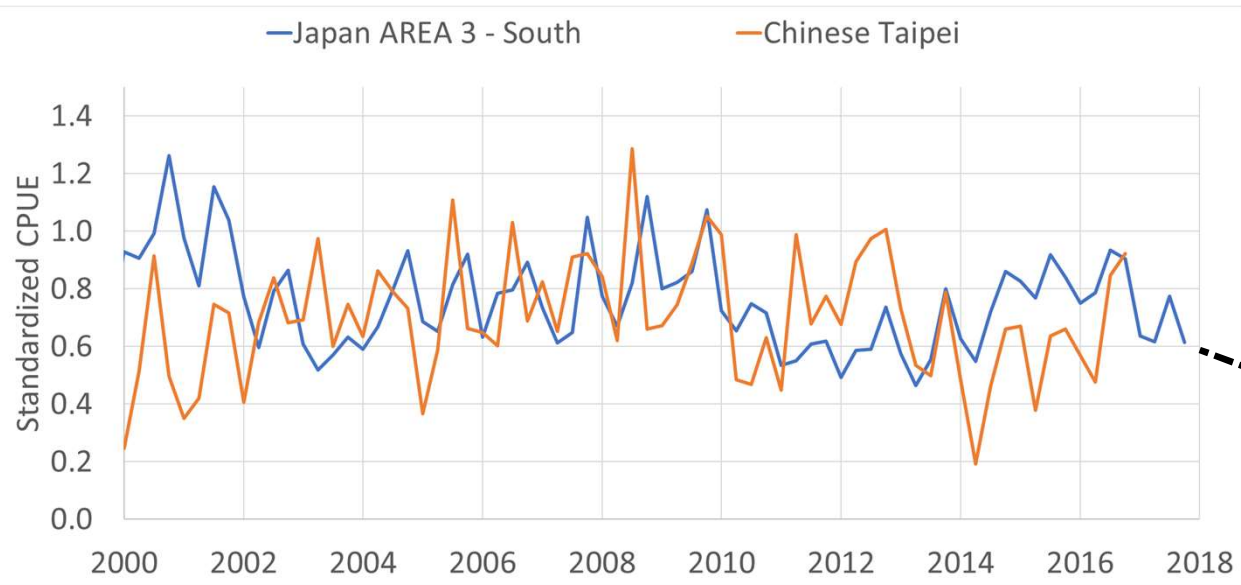
Coverage of the two LL CPUE datasets



JPN longline CPUE (nominal and standardized)



Standardized CPUE



Annual fishing effort

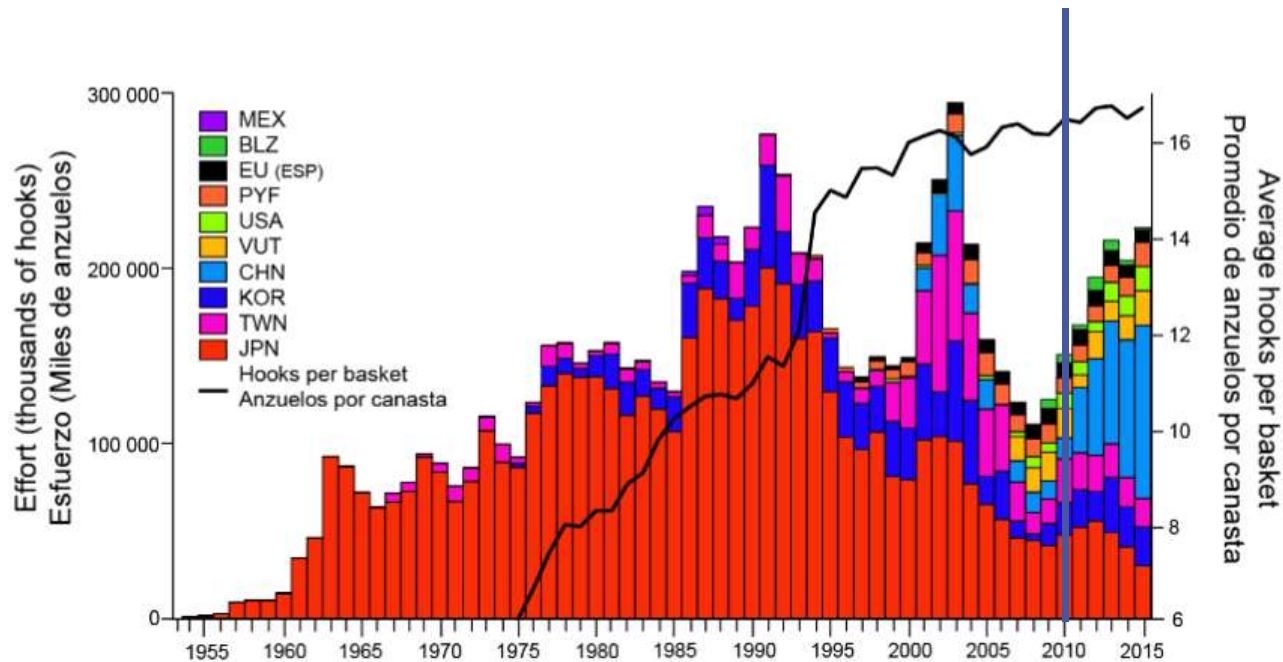


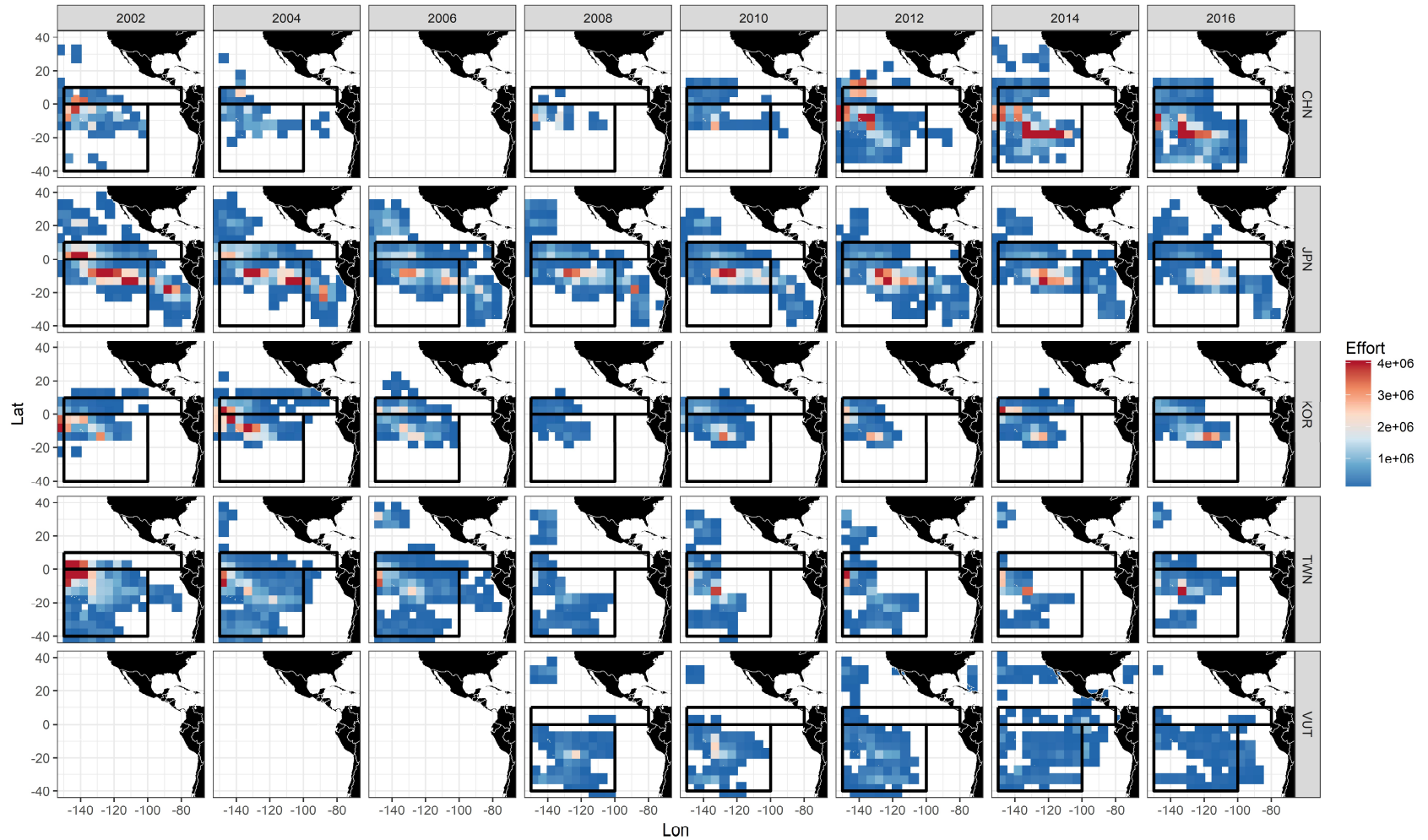
FIGURE 1. Annual fishing effort, in thousands of hooks, in the large-scale tuna longline fishery, by CPC (left y-axis), and annual average number of hooks per basket for the Japanese longline fleet (right y-axis), in the eastern Pacific Ocean, 1953-2015.

FIGURA 1. Esfuerzo de pesca anual, en miles de anzuelos, en la pesquería atunera palangrera a gran escala, por CPC (eje Y izquierdo), y número promedio de anzuelos por canasta para la flota palangrera japonesa (eje Y derecho) en el Océano Pacífico oriental, 1953-2015.

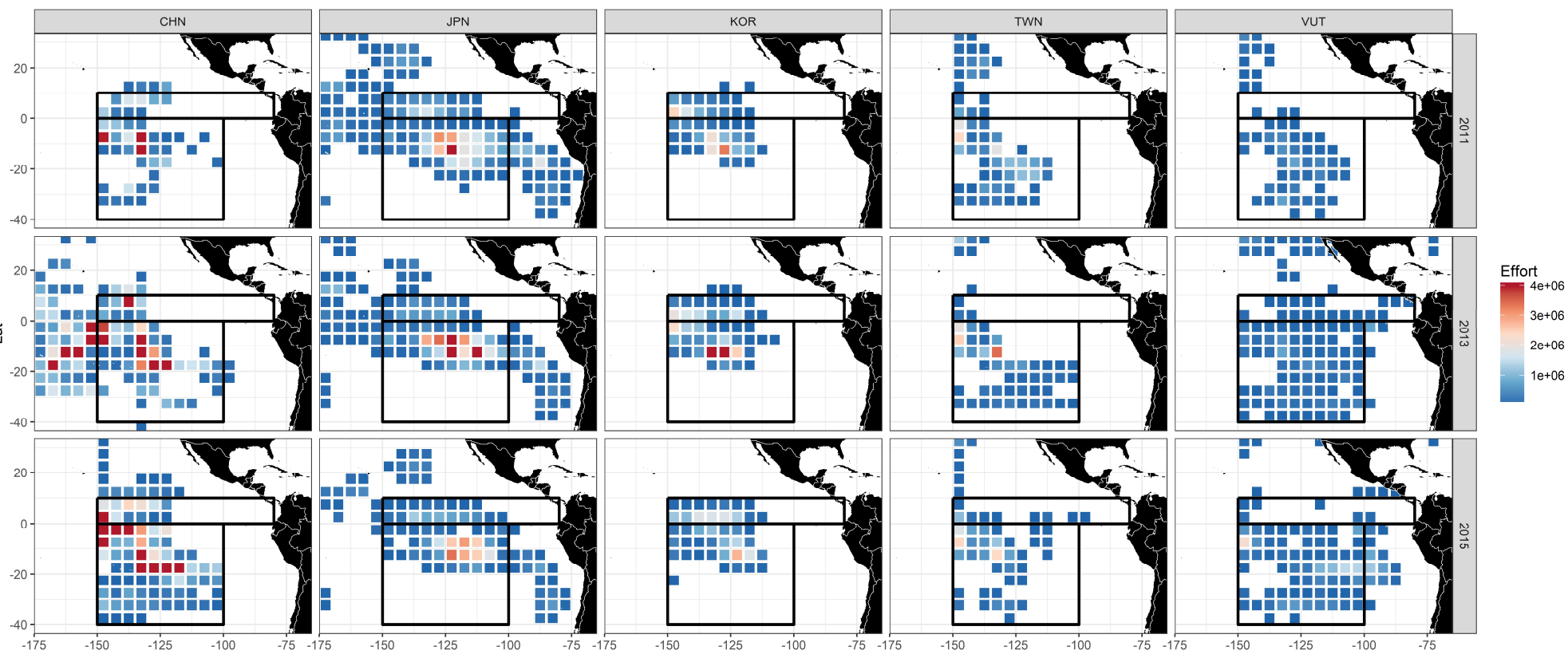
Griffith & Duffy 2018
SAC-o8-o7b



Distribution of effort (Hooks -2002-2016)



Distribution of effort (number of hooks)



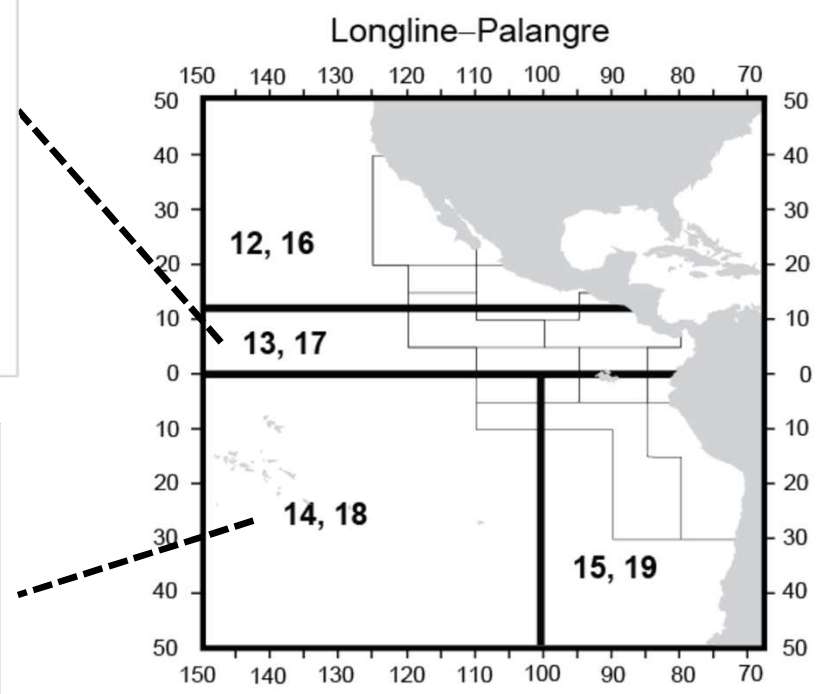
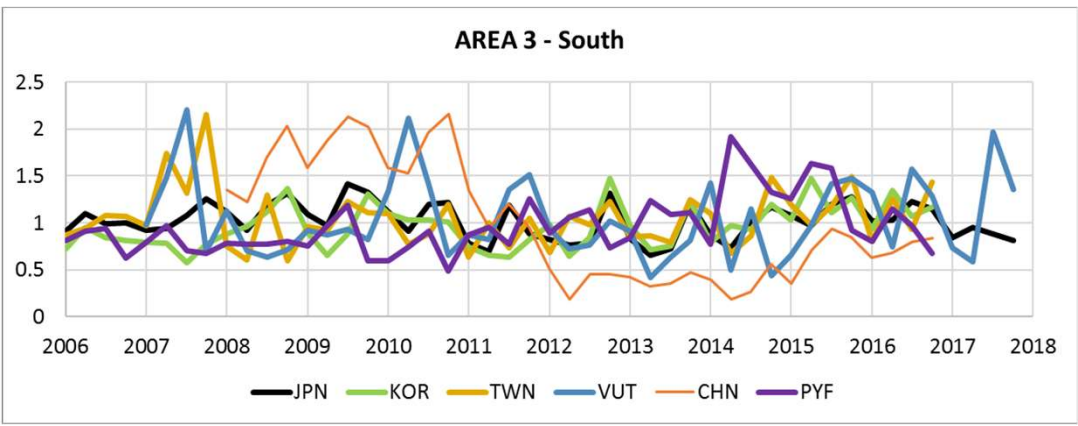
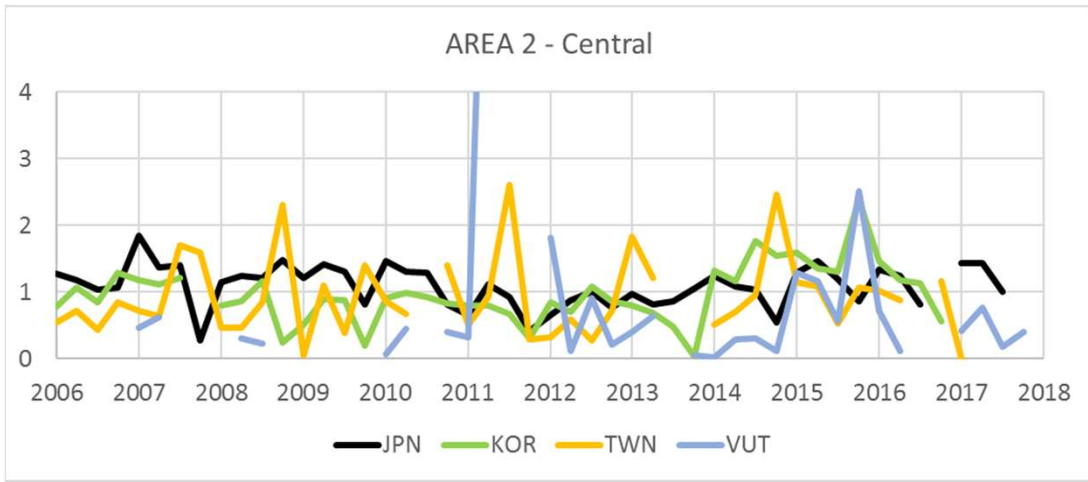
Area 3	CHN	JPN	KOR	PYF	TWN	VUT
Effort	202%	100%	43%	31%	50%	31%
Catch Rate	45%	100%	115%	27%	84%	41%





Nominal longline CPUE several flags

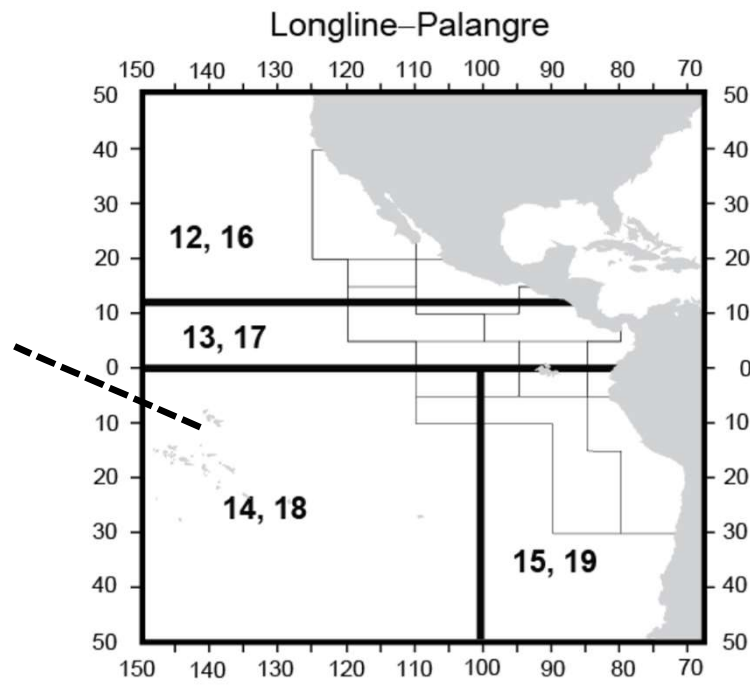
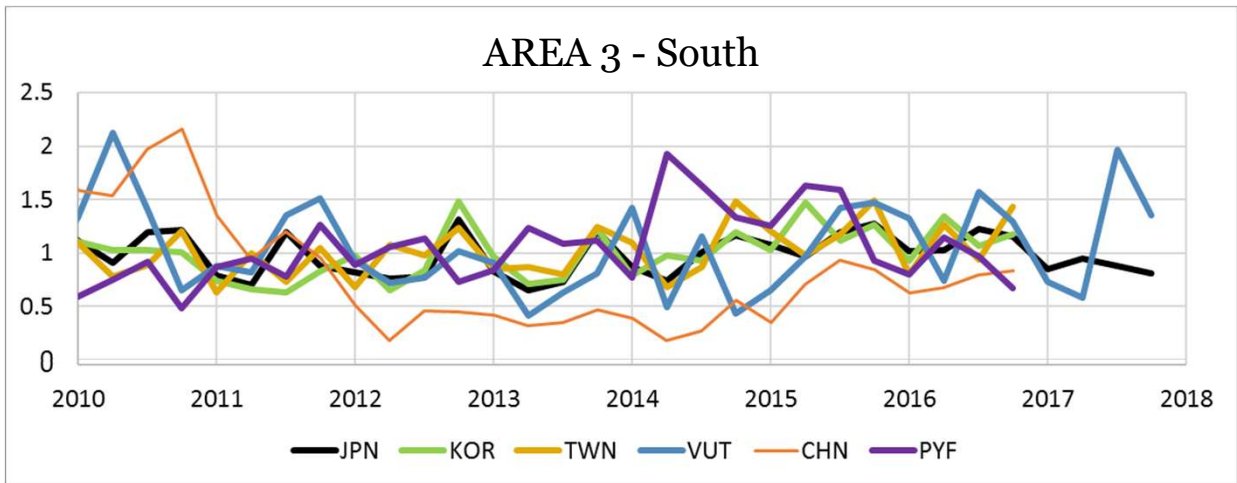
CPUE (numbers / hooks re-scaled)



Nominal longline CPUE several flags



CPUE (numbers / hooks re-scaled)



Relative effort and BET catch rate (2010-2017)

Area 3	CHN	JPN	KOR	PYF	TWN	VUT
Effort	202%	100%	43%	31%	50%	31%
Catch Rate	45%	100%	115%	27%	84%	41%



Retrospective Pattern (corrected base case)

