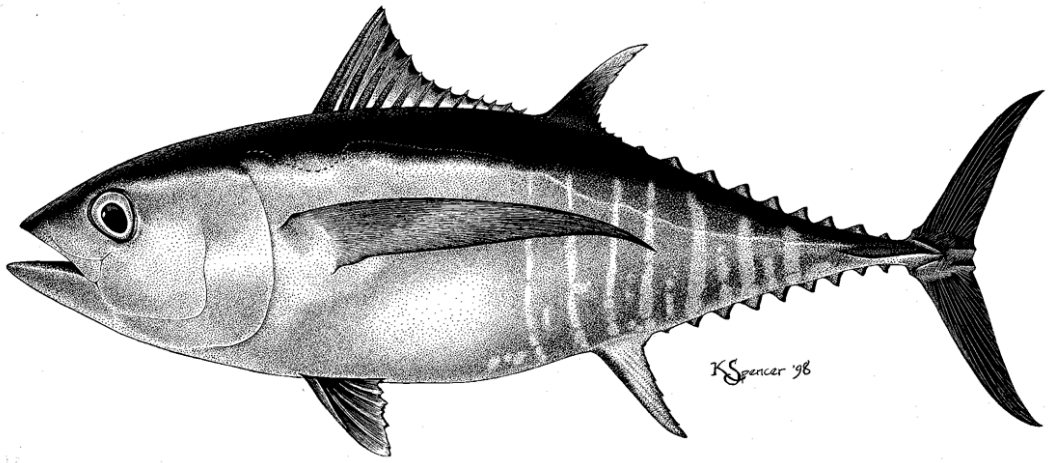
STATUS OF BIGEYE TUNA IN THE EASTERN PACIFIC OCEAN IN 2016

Update assessment

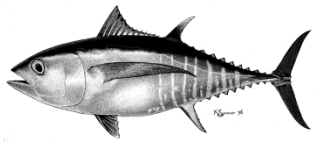
January 1975 – December 2016



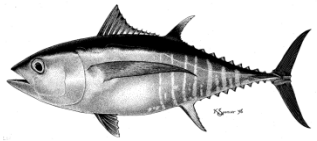
8th Meeting of the IATTC Scientific Advisory Meeting

La Jolla, California (USA), 8-12 May 2017

Outline



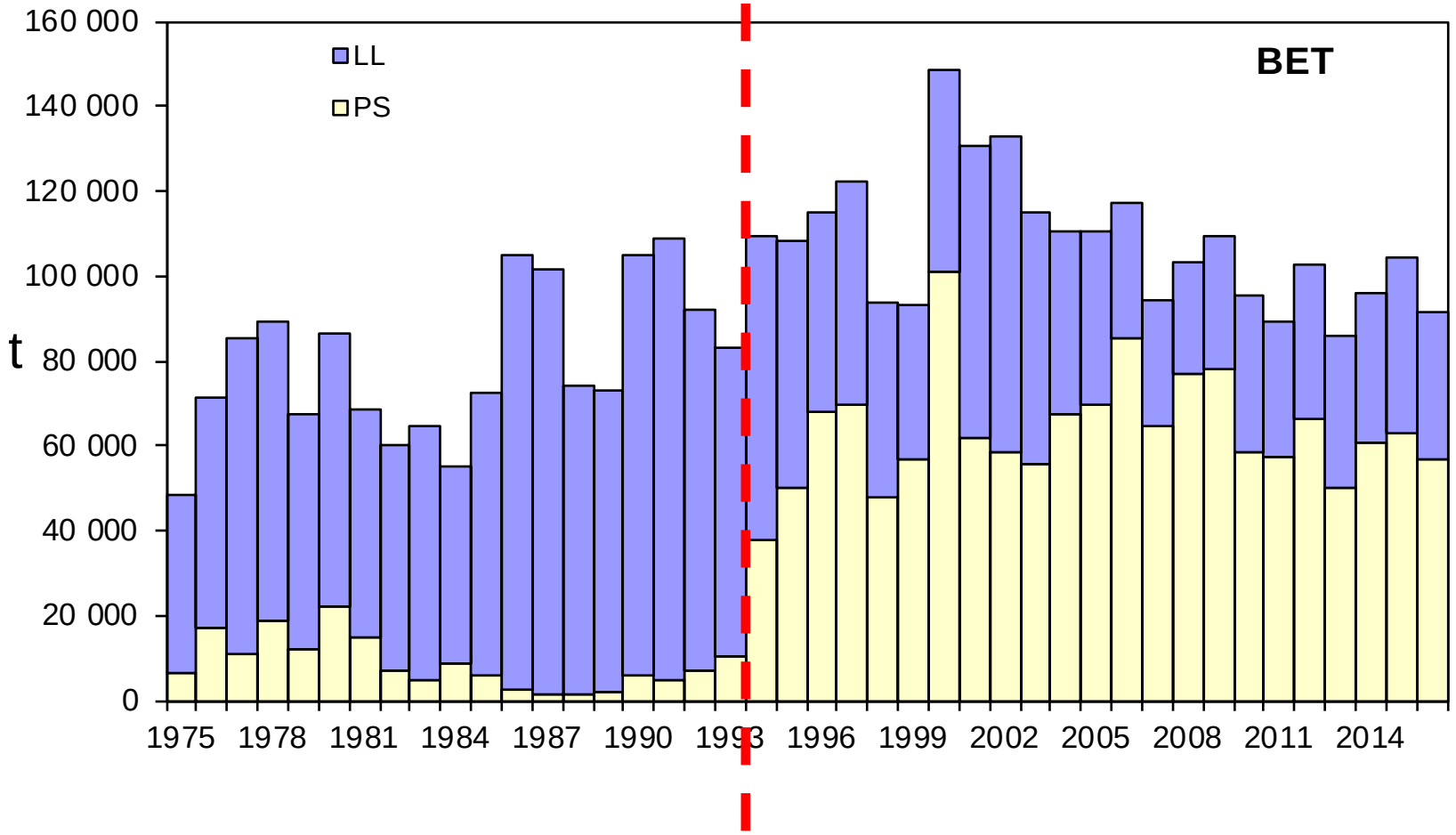
- Update stock assessment (base case model)
  - Fishery data updates
  - Model assumptions
  - Results (model fits, recruitment, biomass and fishing mortality)
  - Stock status (Kobe plots and management quantities)
- Sensitivity analysis
  - Stock-recruitment relationship (steepness, $h = 0.75$)
- Summary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



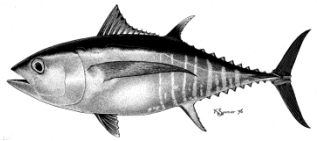
New or updated data

- Surface fisheries
  - Catch, CPUE and size-frequency data updated to include new data for 2016 and revised data for earlier years
- Longline fisheries
  - New or updated longline catch data: China (2015), Chinese Taipei (2013-2015), Japan (2013-2015), Korea (2015), US (2014-2015), French Polynesia (2015), Vanuatu (2015) and other nations (2014-2016)
  - 2016 longline catch data available from monthly reports: China, Chinese Taipei, Japan and Korea
  - New or updated CPUE data available for Japan (2014-2016)
  - New commercial size-frequency data for Japan (2013-2015)

Total catches



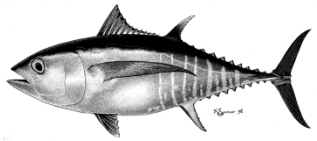
Expansion of FAD fishery



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 selectivities 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 2017 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

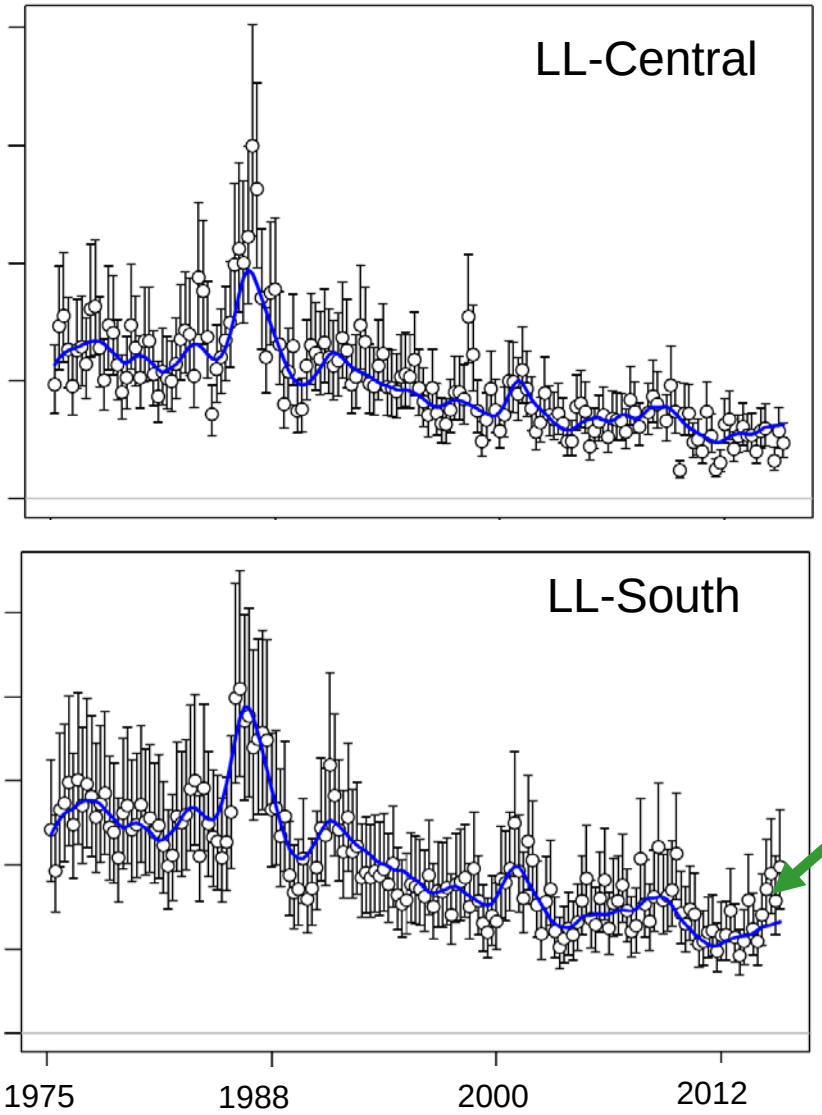
SS version: SS-V3.23b-safe-win64;_11/05/2011;_Stock_Synthesis_by_Richard_Methot_(NOAA)_using_ADMB_10

Starting time of model: Tue Apr 18 16:10:36 2017

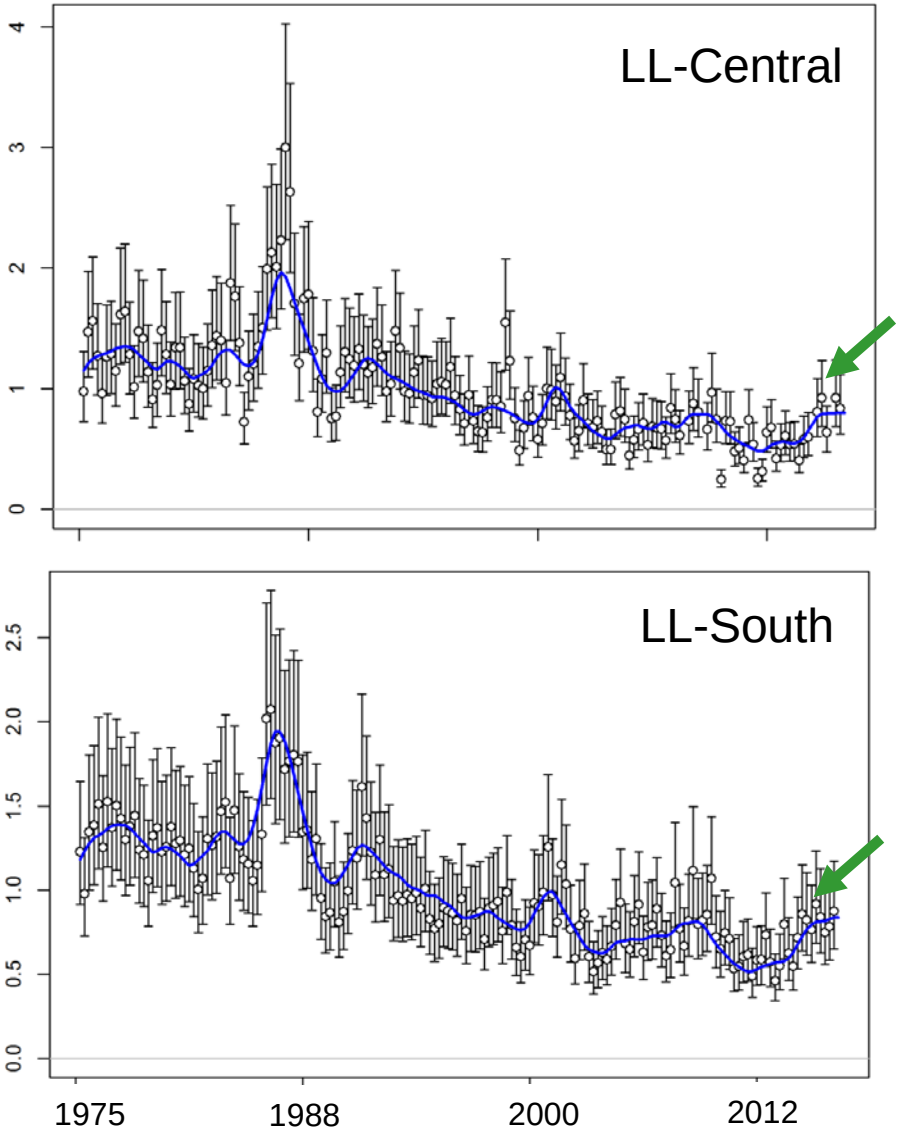
Warnings (from file warnings.sso):

Model fit to CPUE data

Previous assessment

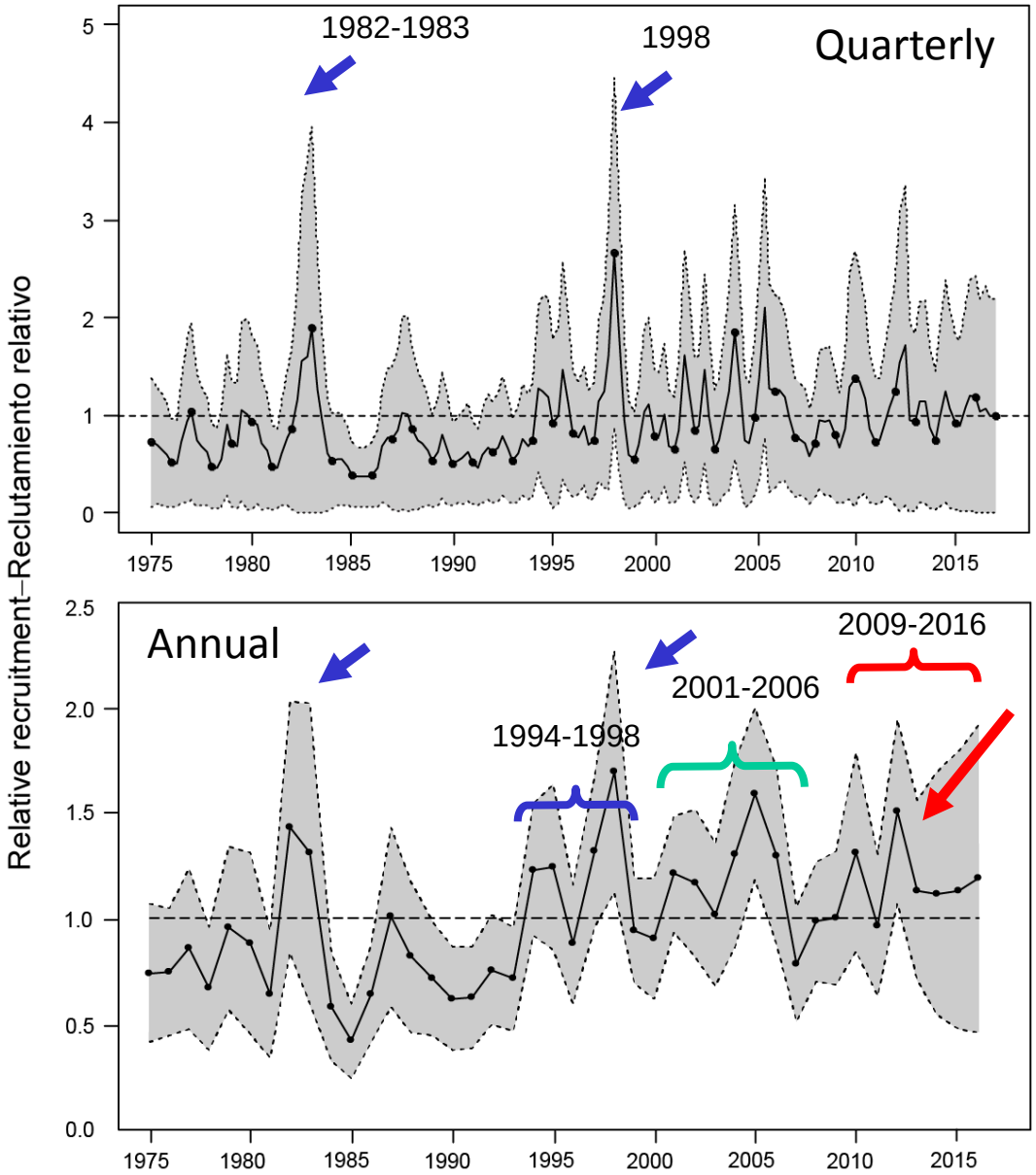


SAC8



Recruitment

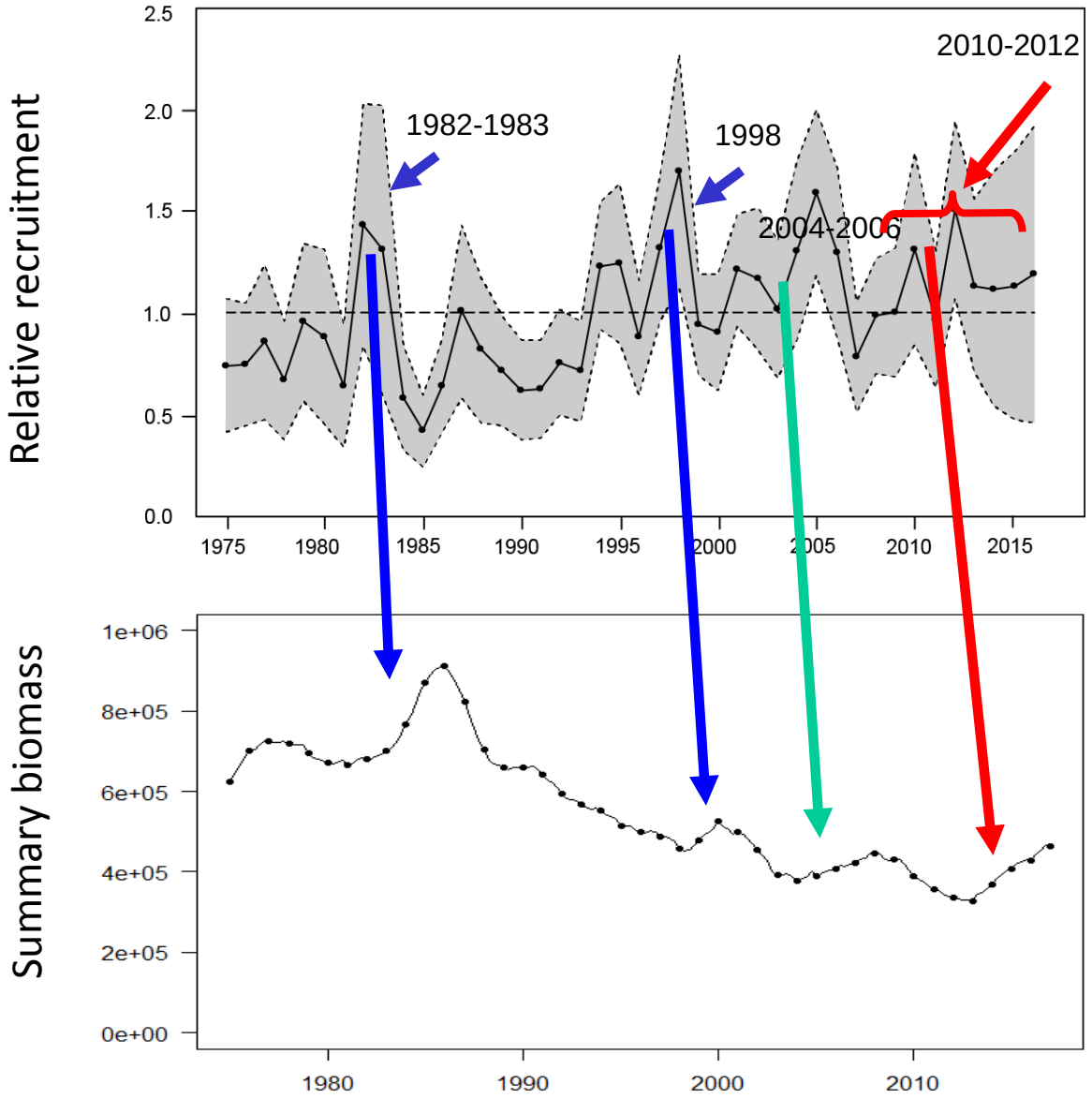
Results (base case)



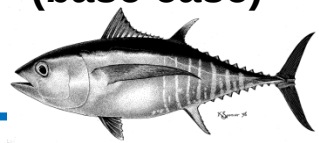
2010, 2012

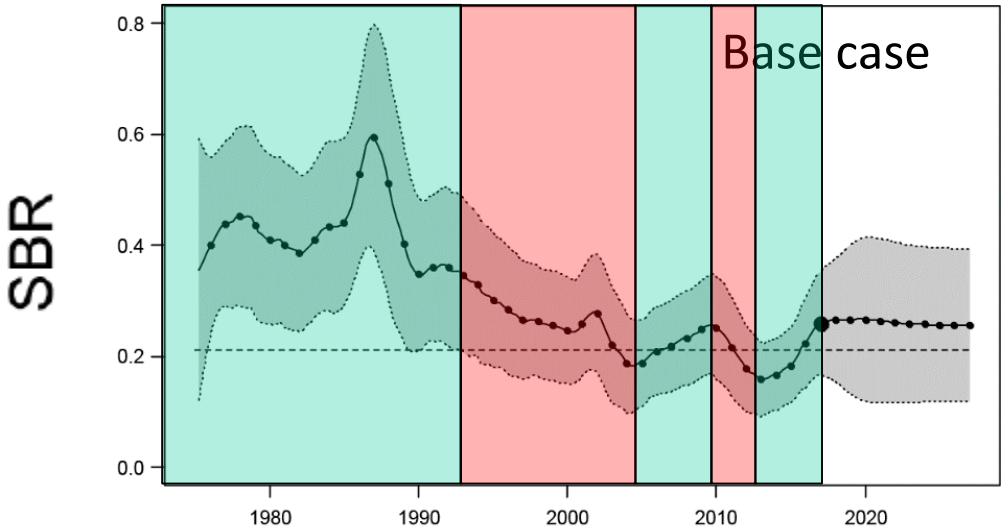
Summary biomass

Results
(base case)



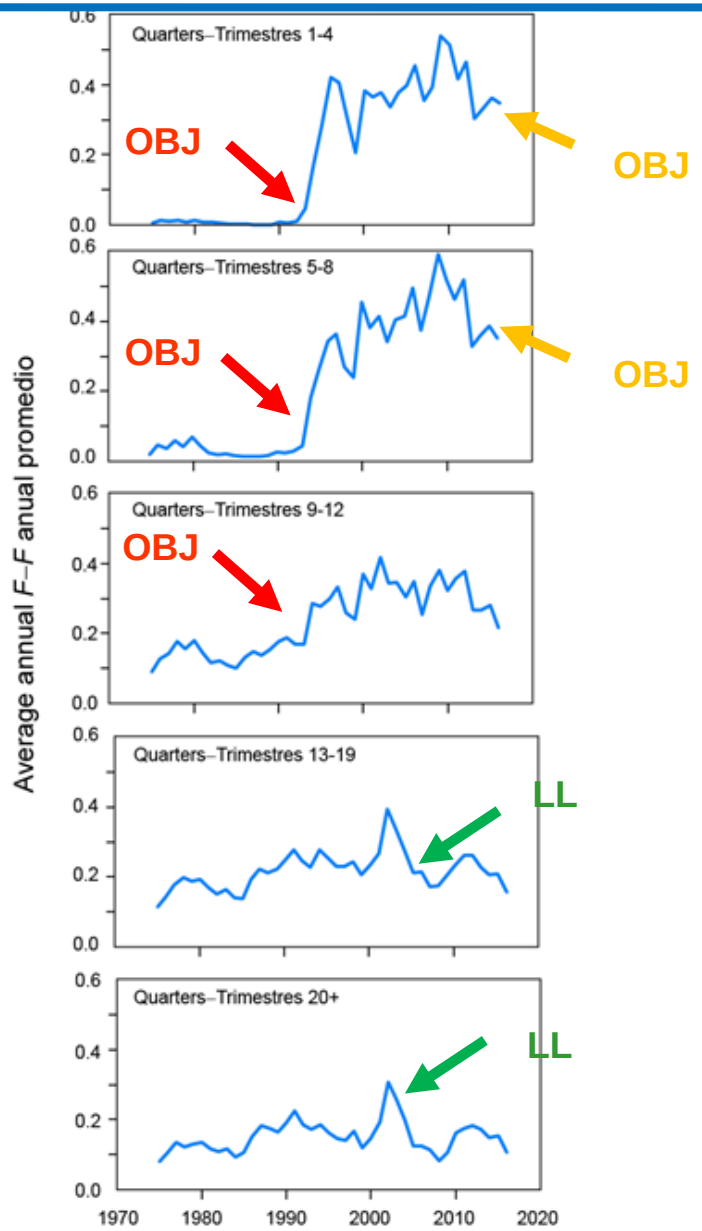
Spawning Biomass Ratio (SBR)





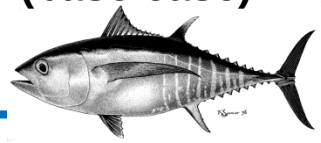
Fishing mortality (F)

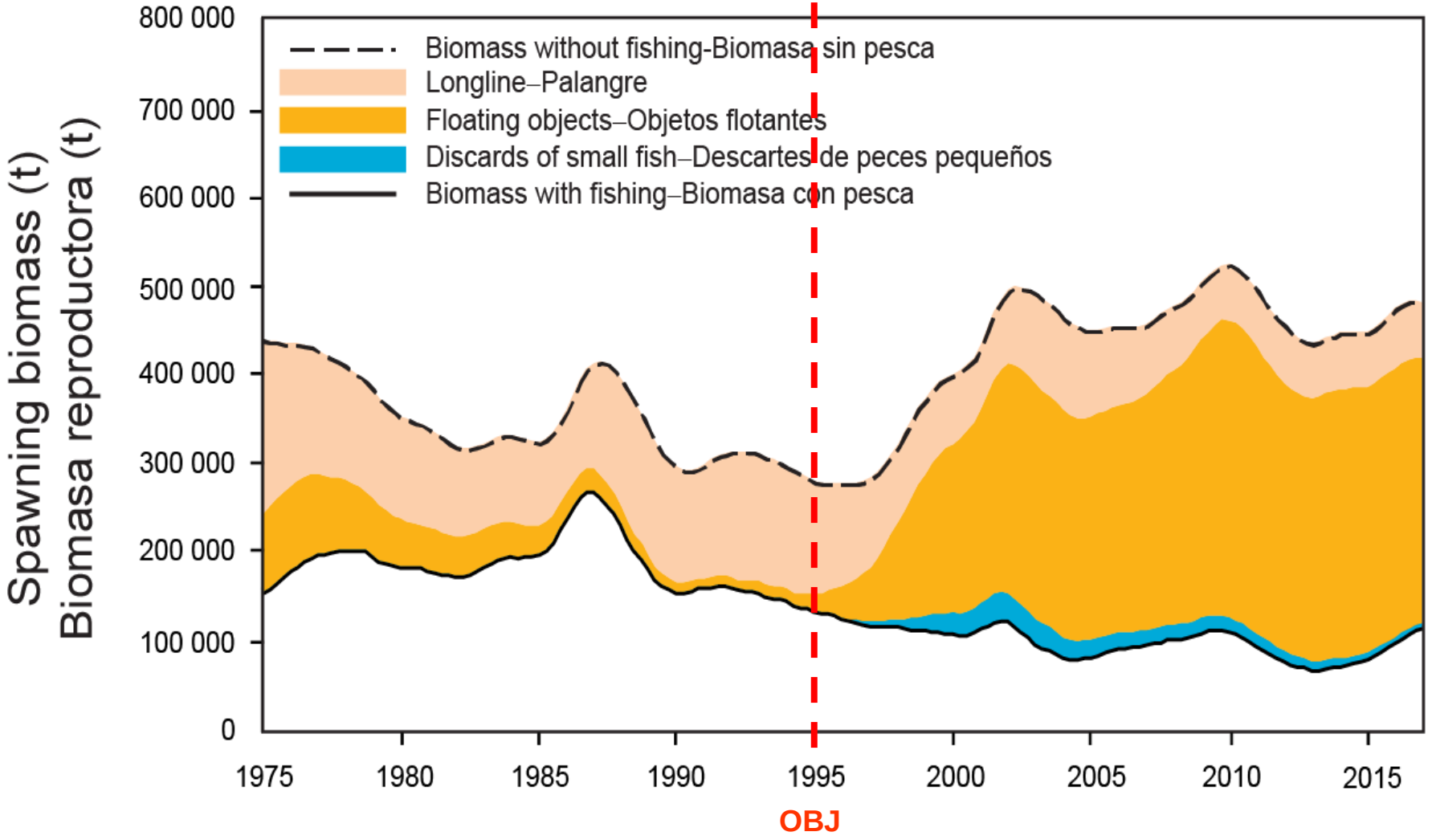
Results
(base case)



Fishery impact

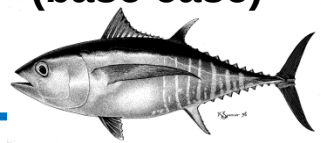
Results
(base case)

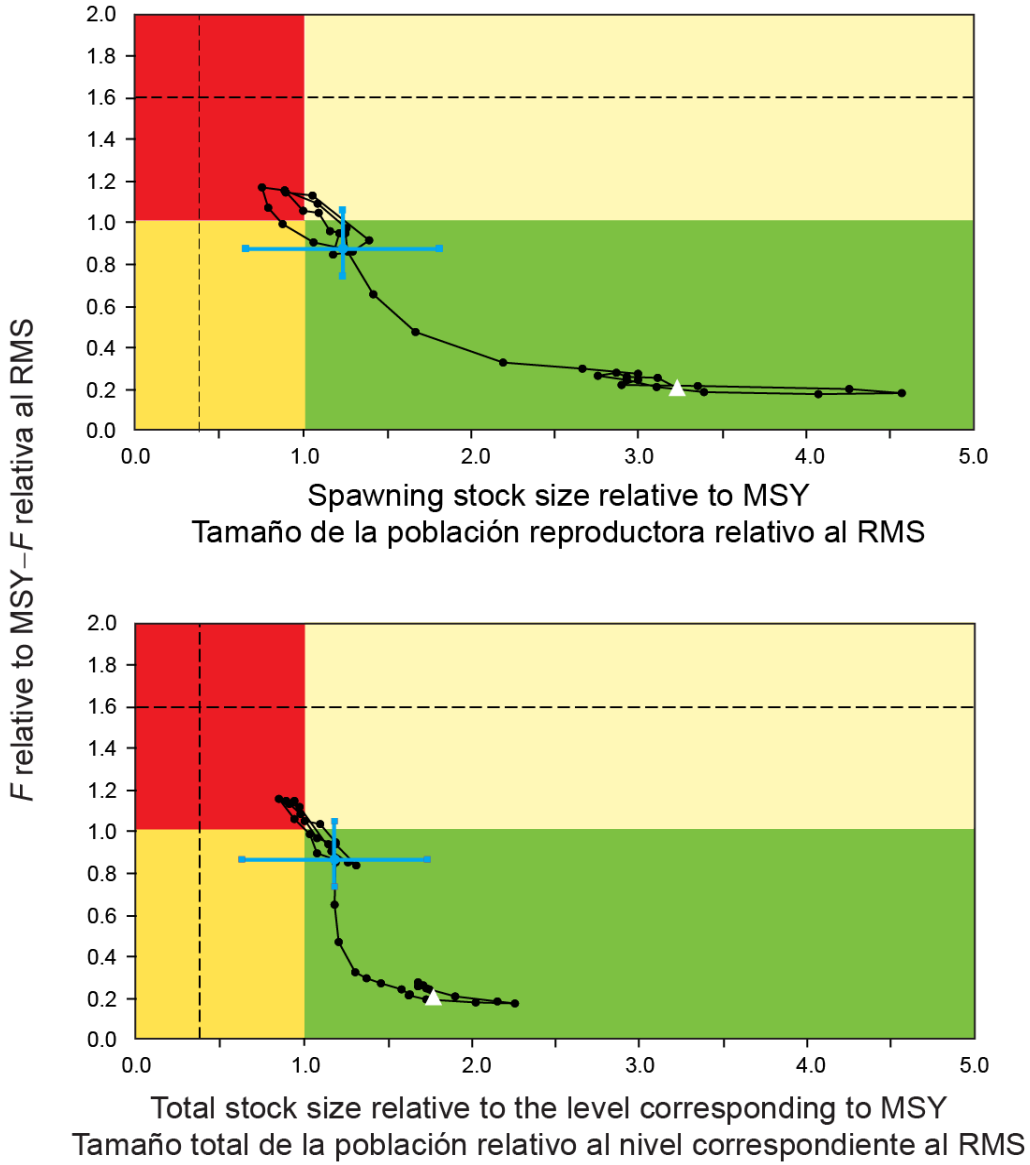




Target and Limit Kobe plot

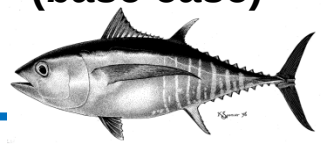
Stock status (base case)

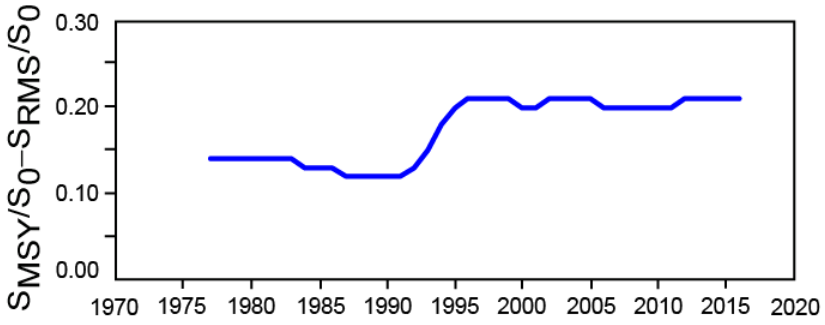


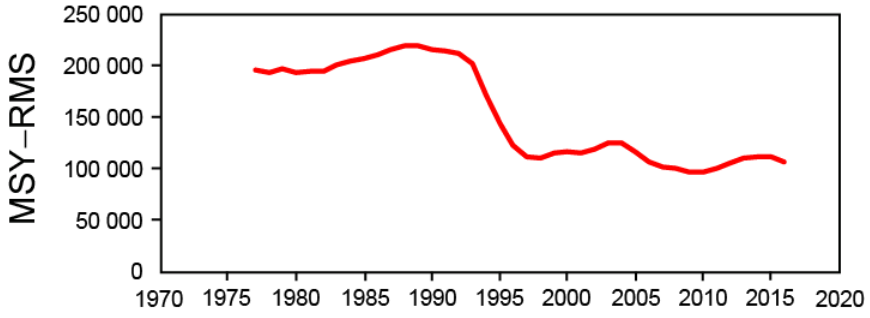


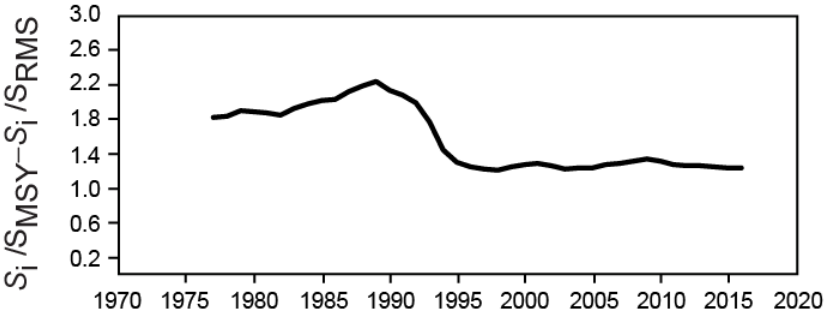
Time varying indicators

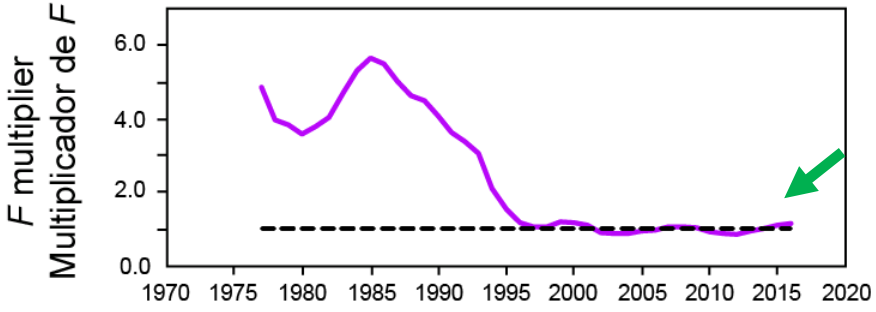
Stock status (base case)



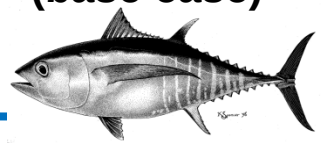






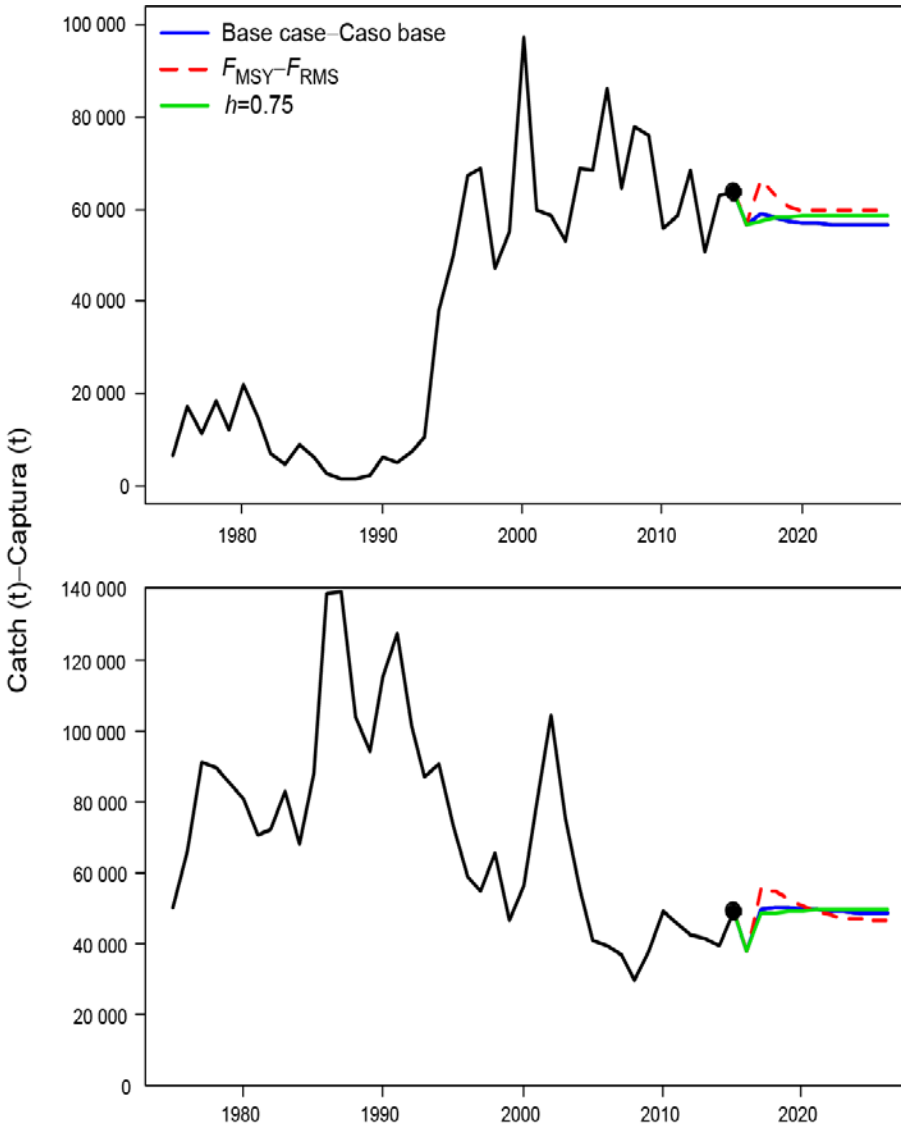


Management quantities



	Base case- Caso base	h = 0.75
MSY-RMS	106,201	108,635
B_{MSY}- B_{RMS}	391,298	748,975
S_{MSY}- S_{RMS}	96,360	207,133
B_{MSY}/B_0- B_{RMS}/B_0	0.26	0.34
S_{MSY}/S_0- S_{RMS}/S_0	0.21	0.30
C_{recent}/MSY- C_{recent}/RMS	0.89	0.87
B_{recent}/B_{MSY}- B_{recent}/B_{RMS}	1.18	1.02
S_{recent}/S_{MSY}-S_{recent}/S_{RMS}	1.23	1.04
F multiplier-Multiplicador de F	1.15	1.05

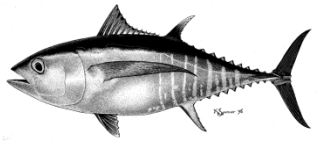
Projected catches – *Status quo* (F_{cur})



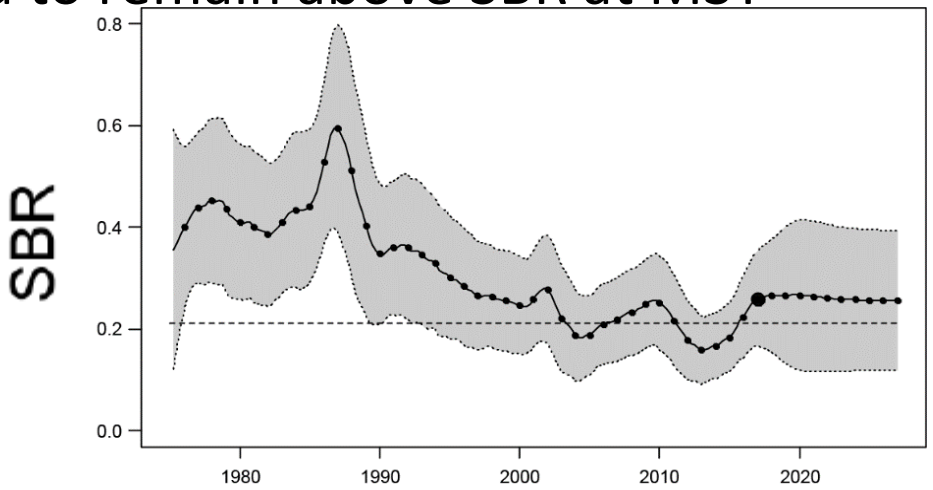
PS

LL

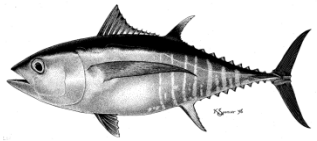
Summary: key results



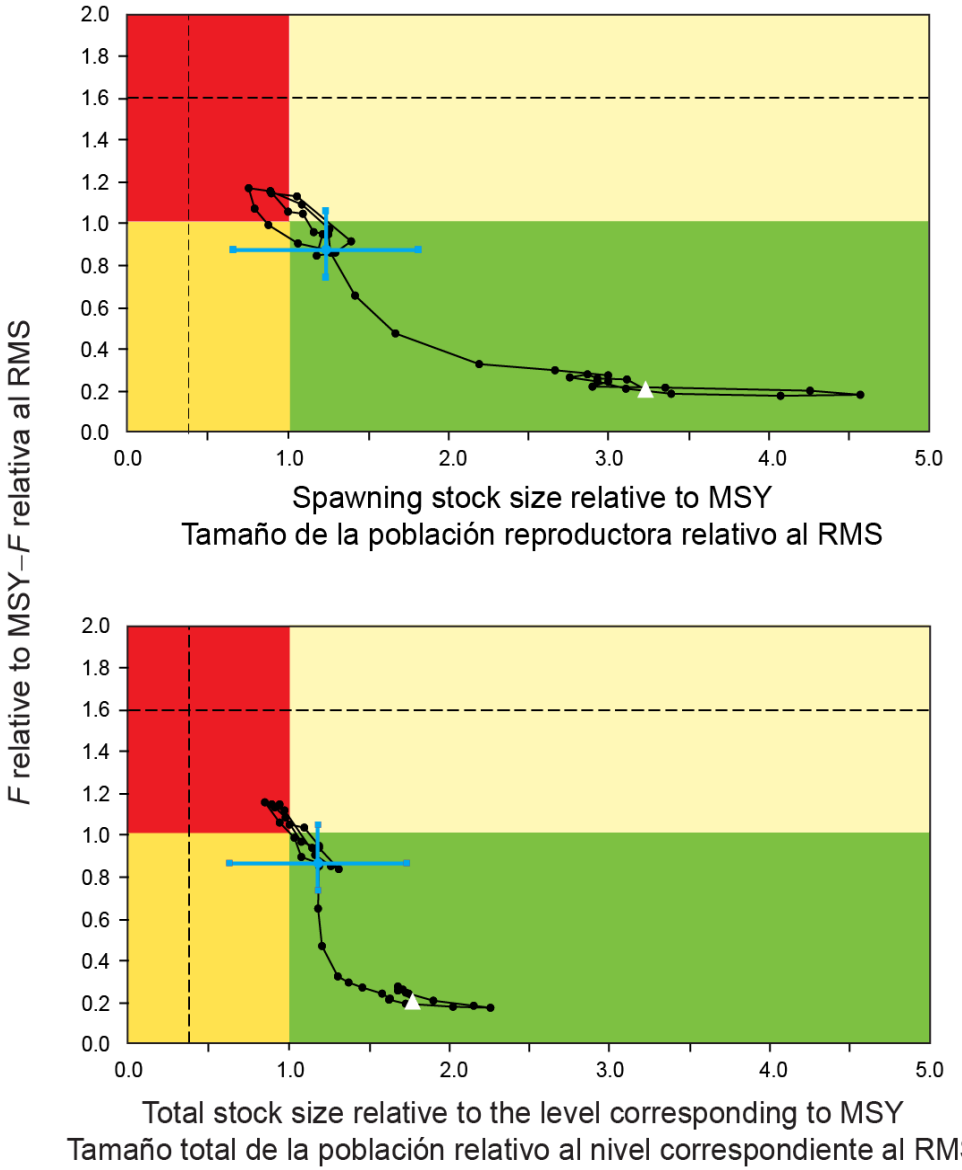
- Population decline observed since the early 1990s ceased around 2005 following IATTC conservation resolutions
- The recent decline since 2010 may be related to series of below average recruitments coinciding with strong La Nina events (since 2007)
- The recent improvement since 2012 is driven by a recent increase in the longline CPUE data
- At current fishing mortality levels, and average recruitment, SBR is predicted to remain above SBR at MSY



Summary: key results (cont.)

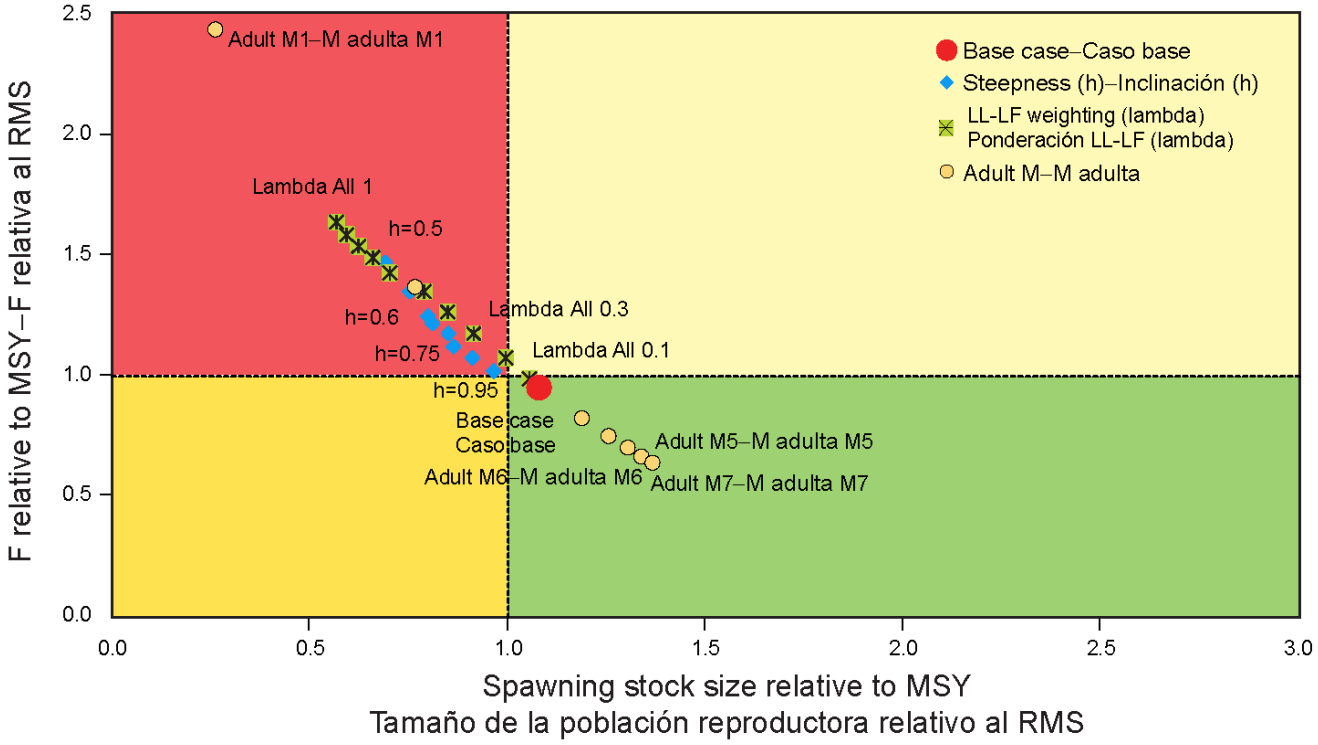


- The recent levels of spawning biomass are estimated to be above the MSY level ($S_{recent} > S_{MSY}$), not overfished
- The recent fishing mortality rates are estimated to be below the level corresponding to MSY ($F_{recent} < F_{MSY}$), overfishing not taking place
- But the recent estimates are uncertain (low precision)
- Proposed limit reference points of 0.38 S_{MSY} and 1.6 F_{MSY} have not been exceeded

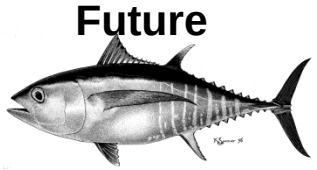


Summary: key results (cont.)

- However, these interpretations are highly sensitive about the following assumptions:
  - Steepness of stock-recruitment relationship
  - Average size of the oldest fish (L_2)
  - Natural mortality levels
  - Weighting assigned to the size composition data



Future work



- Investigate increase in LL CPUE (JPN collaboration)
- Investigate sources of model misspecification responsible for the two-regime recruitment shift
- Improve estimates of natural mortality (*M*)
- Growth curve (more flexible curve)
- Weighting of the different data sets
- Fishery definitions
- Stock structure
  - Improve spatial structure in current EPO model
  - How to incorporate available tagging data
  - Continuing collaboration with SPC on Pacific-wide assessment

CIAT IATTC

Questions?