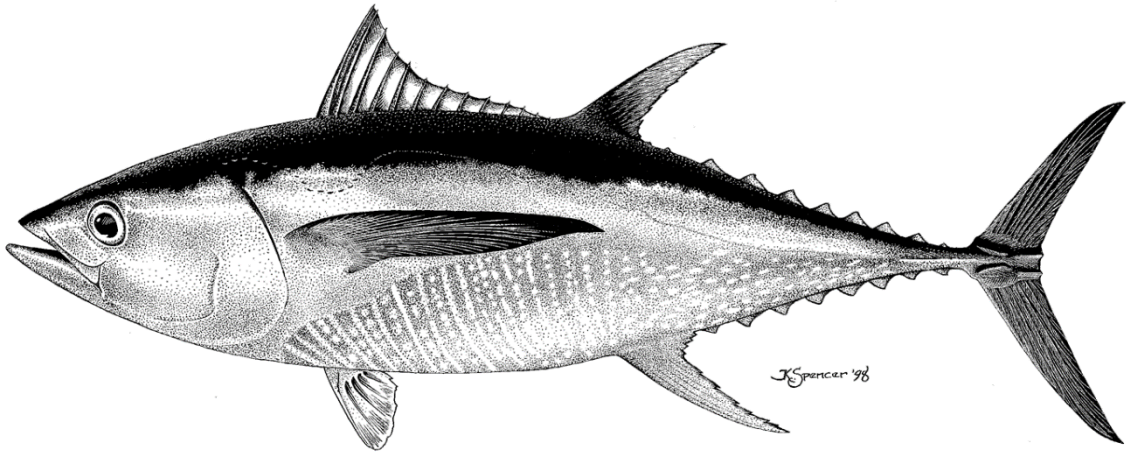
STATUS OF YELLOWFIN TUNA IN THE EASTERN PACIFIC OCEAN IN 2016

CONDICIÓN DEL ATÚN ALETA AMARILLA EN EL OCÉANO PACÍFICO ORIENTAL EN 2016

Update assessment

SAC-08-04b

January 1975 – December 2016



7th Meeting of the Scientific Advisory Committee

La Jolla, 08-12 May 2017

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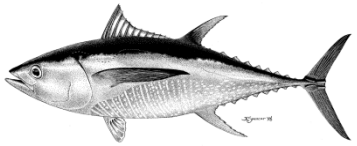
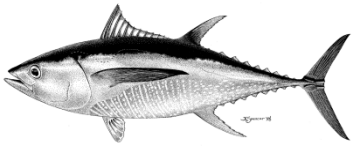
Outline



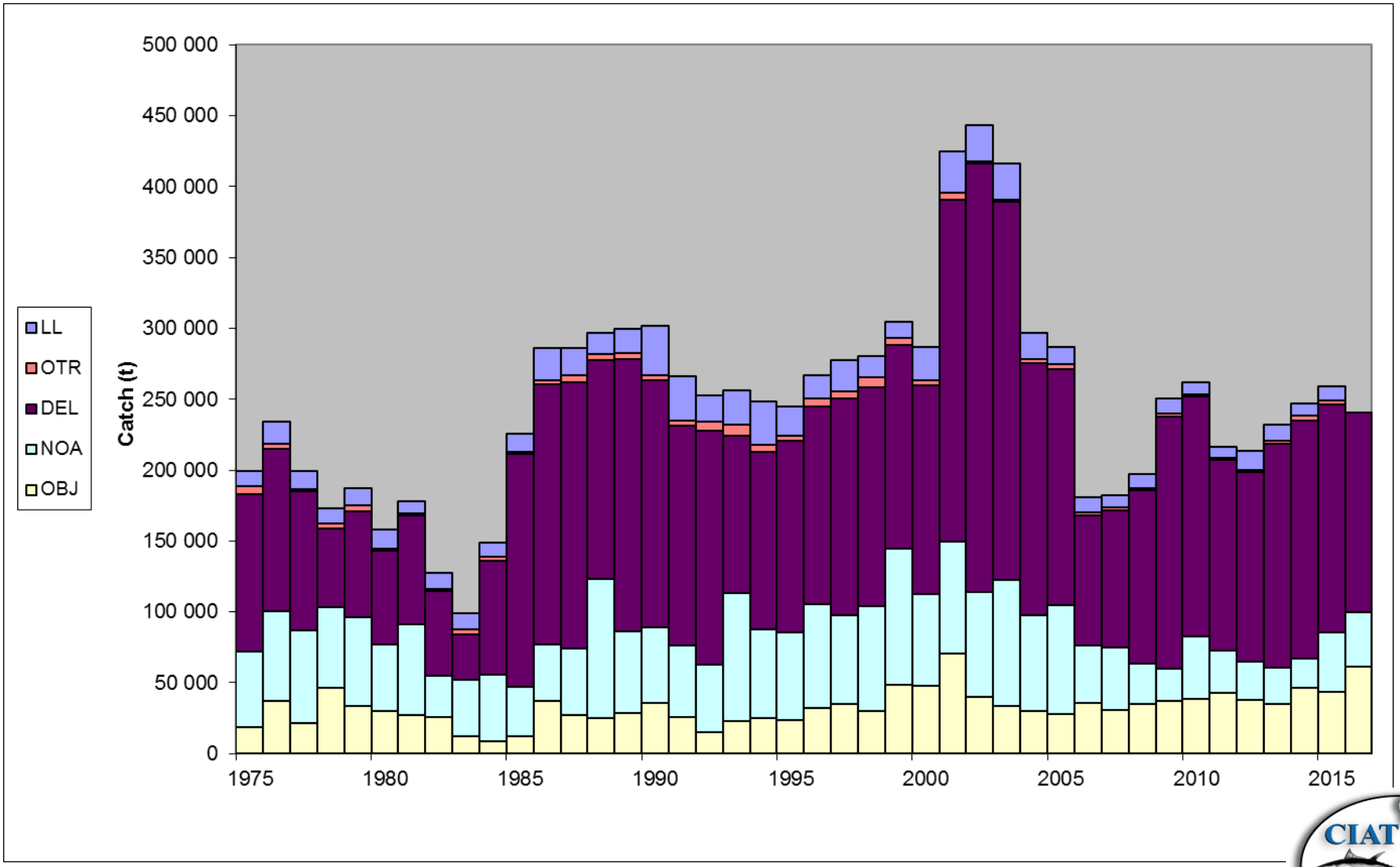
- Update stock assessment
  - Fishery data updates
  - Model assumptions
  - Results (fits, recruitment, biomass and fishing mortality)
  - Stock status (Kobe plots and management quantities)
- Summary conclusions
- Future directions



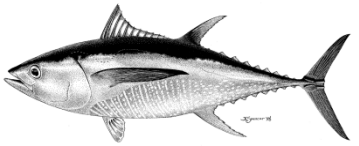
New or updated data

- 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 are available for China (2015), Japan (2013-2015), Korea (2015), Chinese Taipei (2013-2015), the United States (2014-2015), French Polynesia (2015), Vanuatu (2015), and other nations (2014-2015)
  - 2016 longline catch data available from monthly reports: Japan
  - New or updated CPUE data available for Japan (2014-2016)
  - New commercial size-frequency data for Japan (2013-2014)

Total catches



Model assumptions



Update assessment: the 2016 assessment uses the same model as in SAC7:

- One stock is assumed for the whole EPO
- Fishery definitions: 16 fisheries + 2 surveys
- Growth: Richards curve with fixed parameters
- Natural mortality: sex-specific
- Stock-recruitment function: B-H with h=1.0 (base-case model) and h=0.75 (sensitivity)
- Modeling of catchability and selectivity:
  - Catchability coefficients for 5 CPUE time series are estimated (NOA-N, NOA-S, DEL-N, DOL-E, LL-S)
  - Selectivity curves for 11 of the 16 fisheries are estimated (F9 DEL-S mirrors F12 LL-S) and for the 2 longline “surveys”
  - Logistic selectivity for LL-S and DEL-S, and dome-shaped for other fisheries (except discards) and “surveys”

New SS output report

Fishery data

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SS Output

www.iattc.org/Meetings/Meetings2017/SAC08/YFTbase1/SS_output.html 150% Search

Home | Bio | Sel | Timeseries | RecDev | S-R | Catch | SPR | Index | Numbers | CompDat | LenComp | A@LComp | Yield | Data

EPO Yellowfin 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 yellowfin 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: Sat Apr 22 09:15:35 2017

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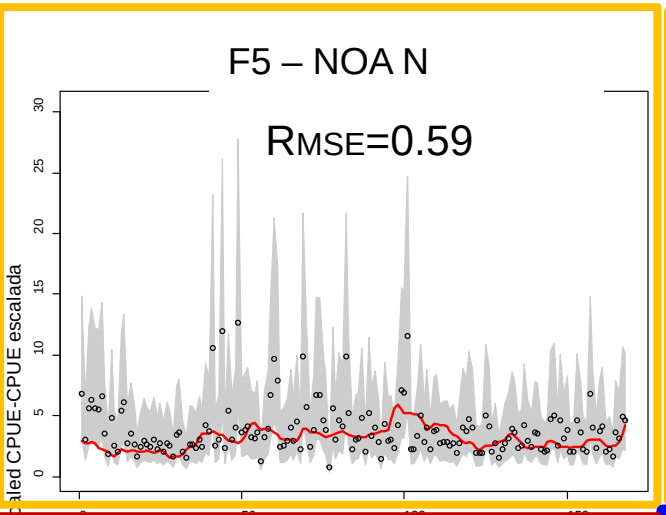
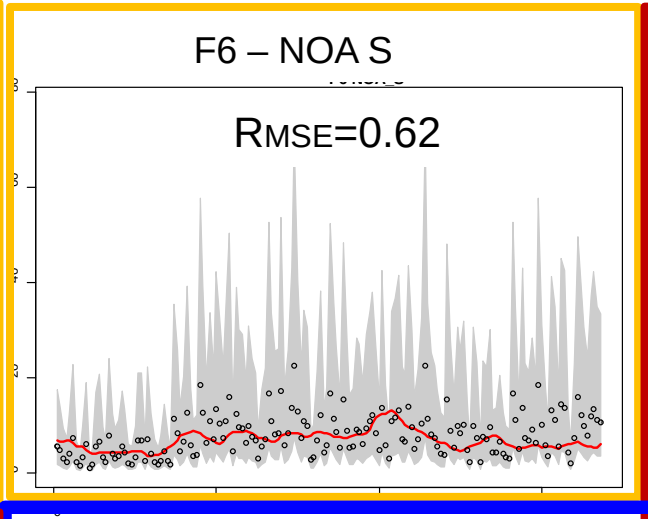
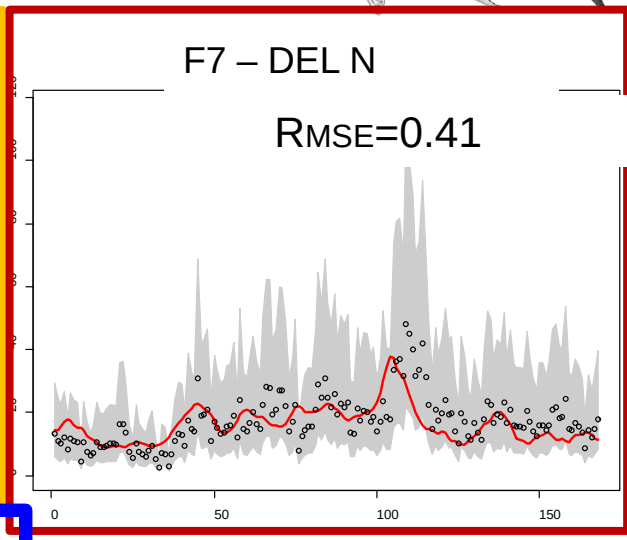
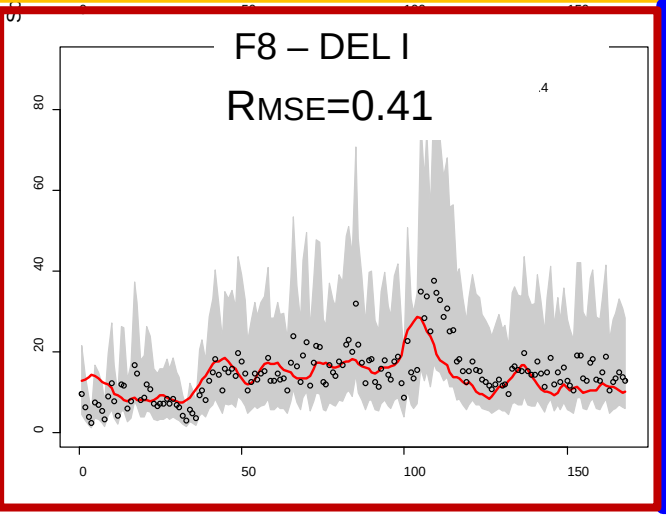
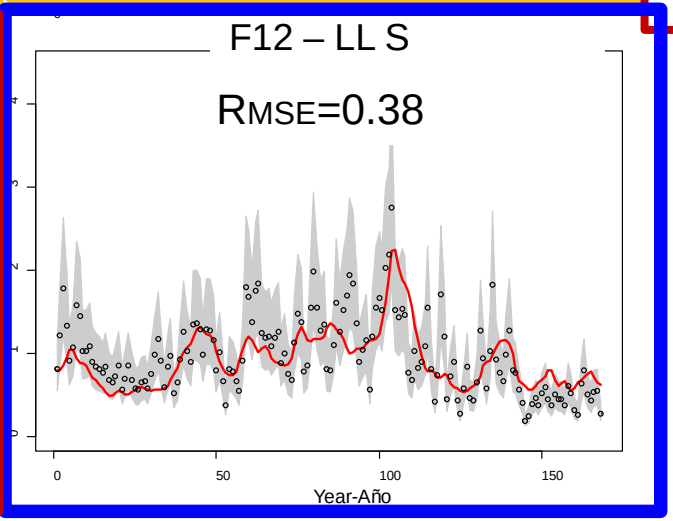
Fit to CPUE









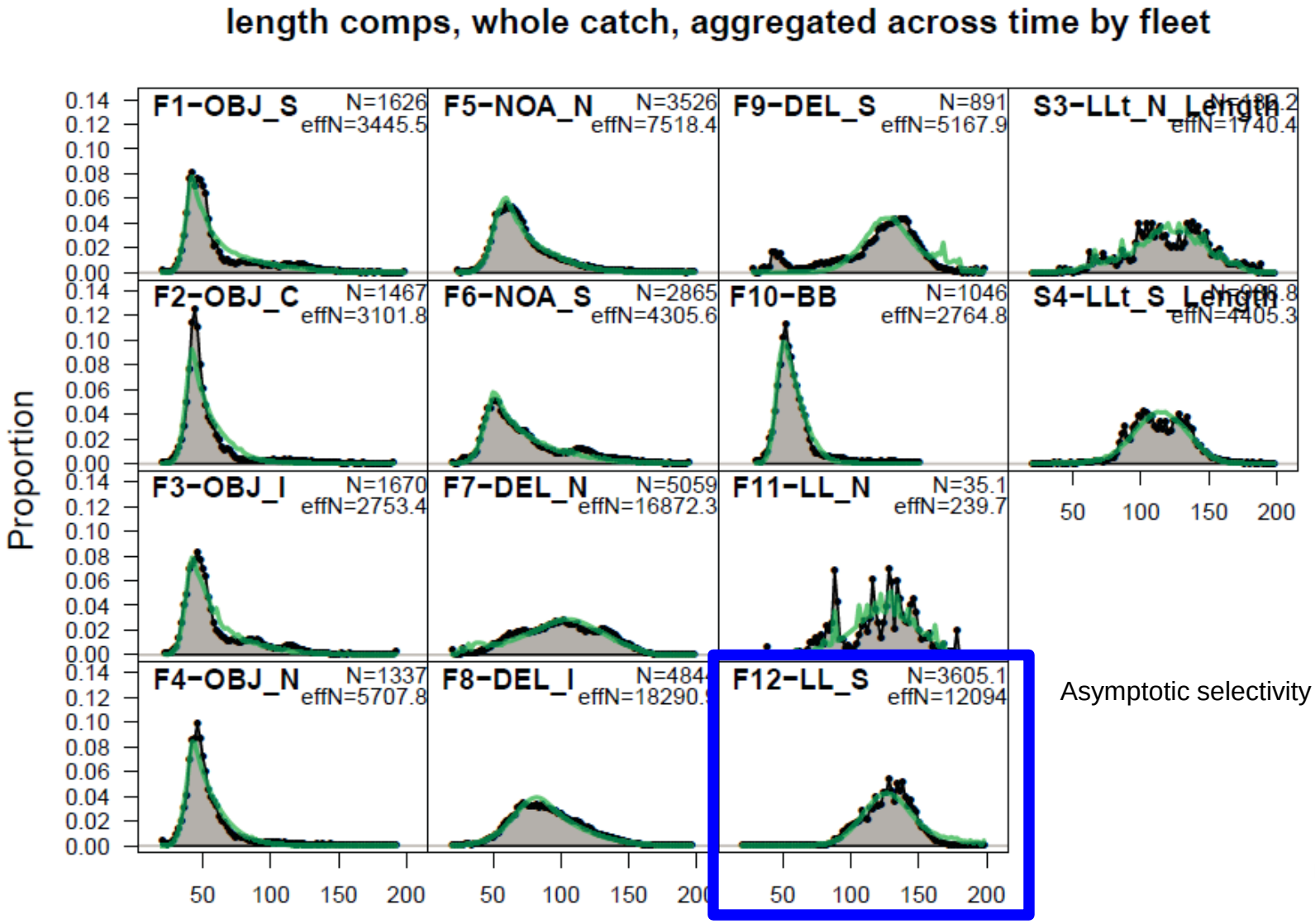


NOA

DEL

LL

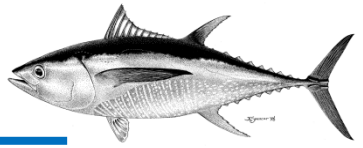
Fit to length compositions

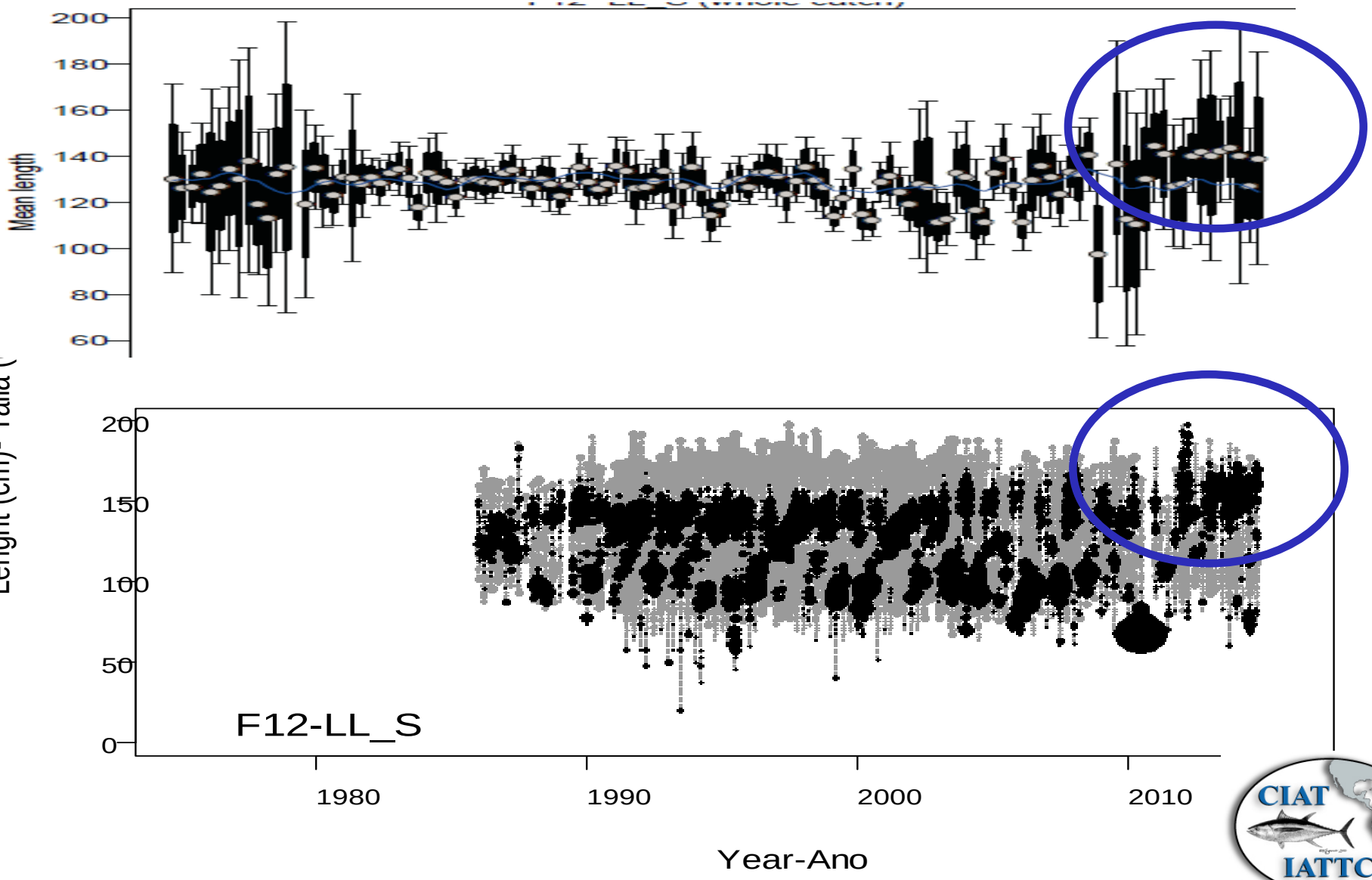


Asymptotic selectivity

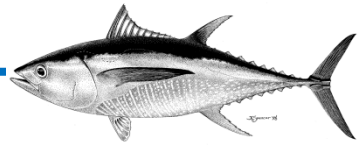
Fit to length compositions

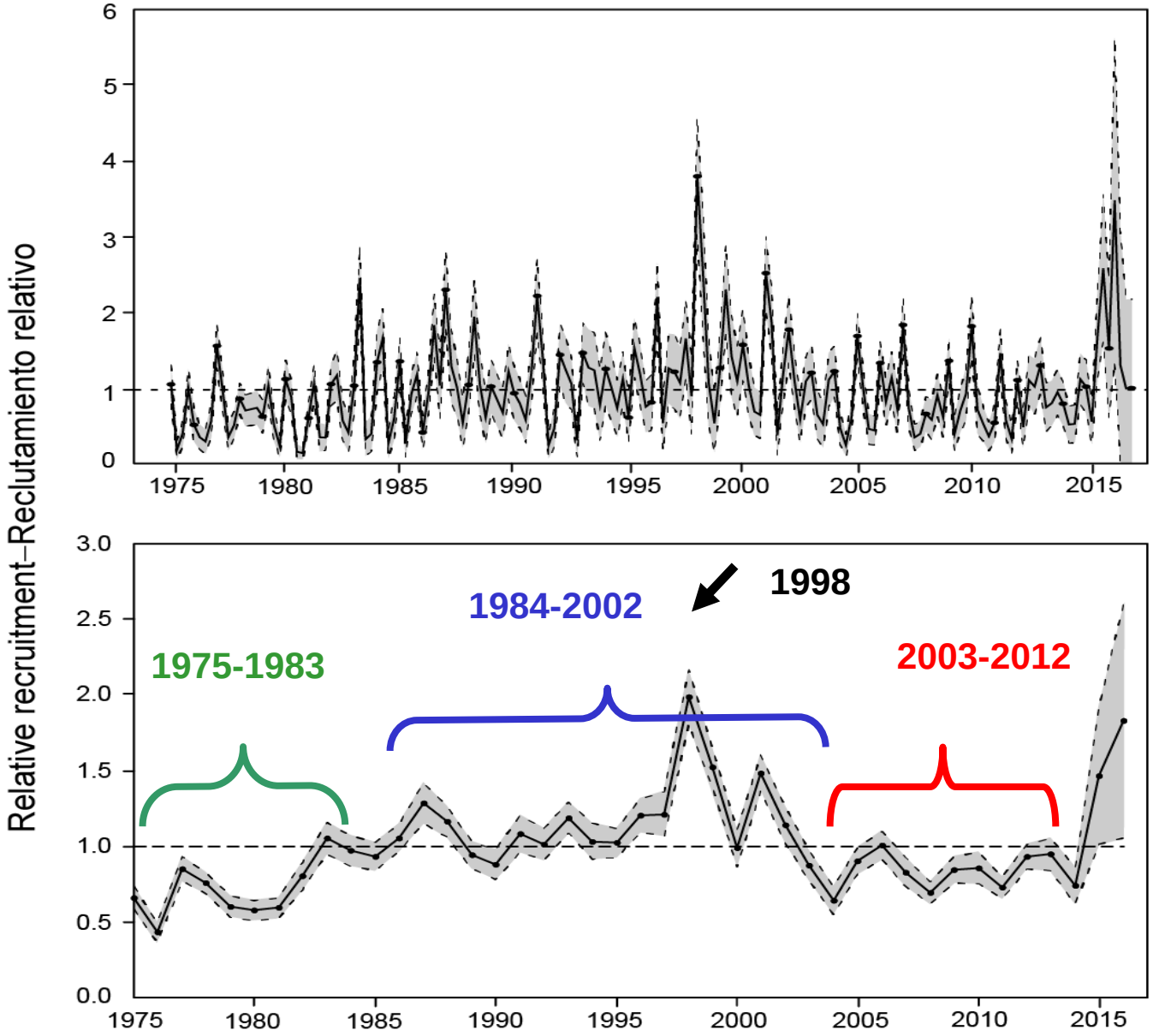
Ajustes a la composición de tallas





Recruitment





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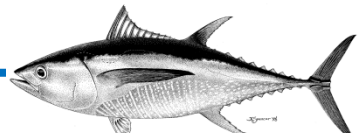
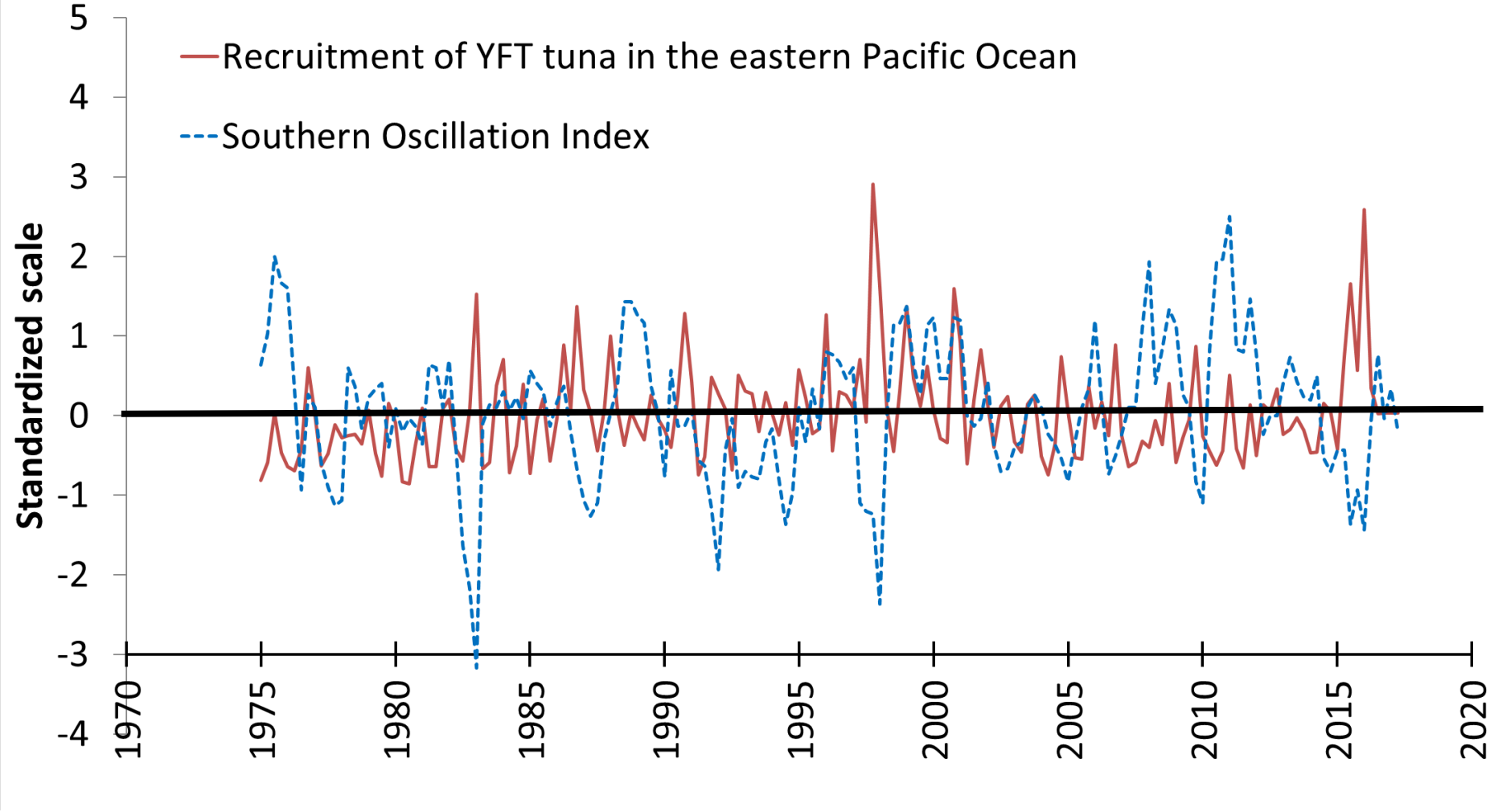
Recruitment and environment





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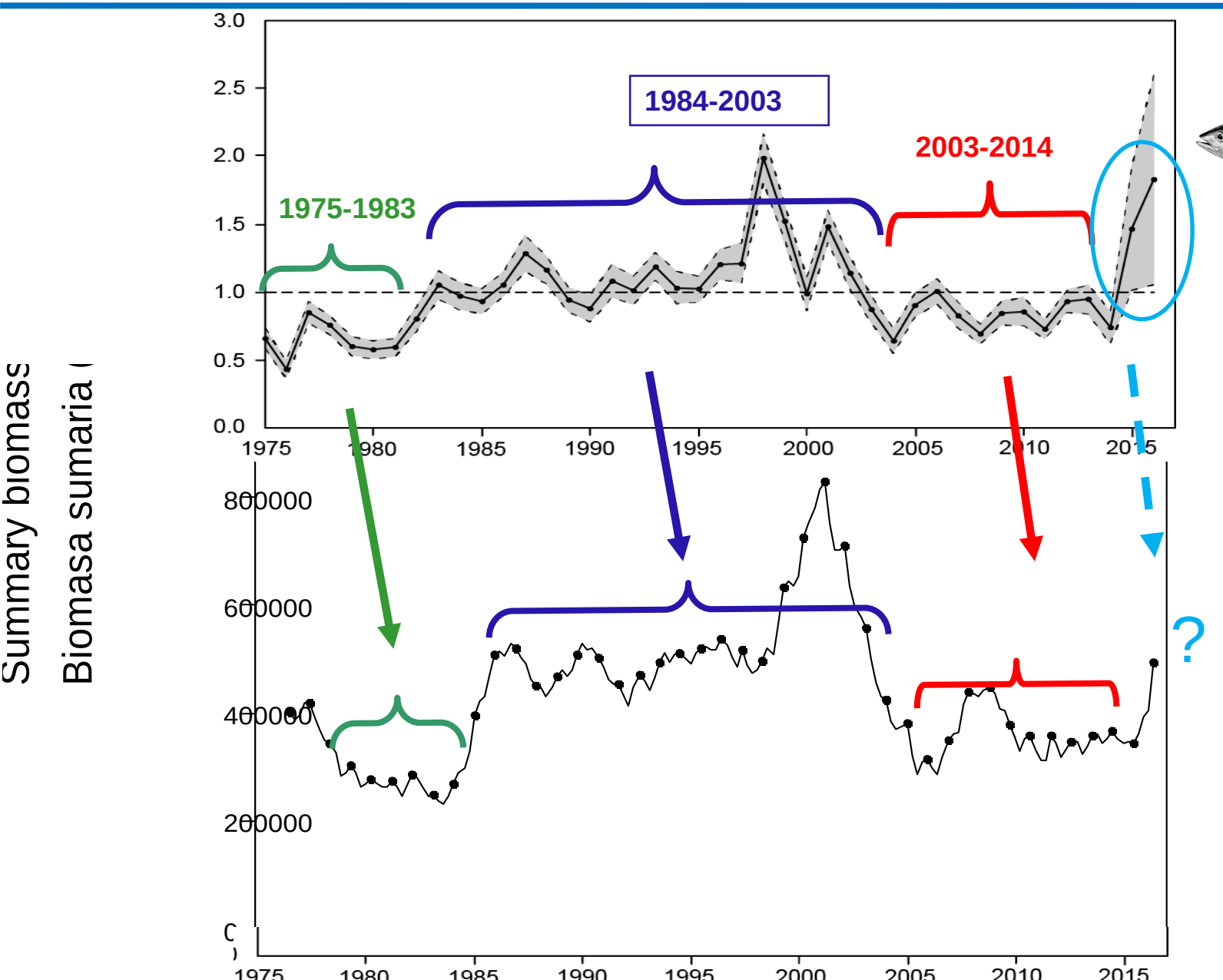
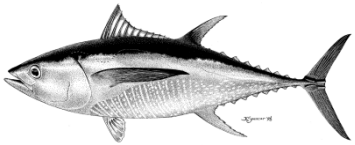
Summary biomass

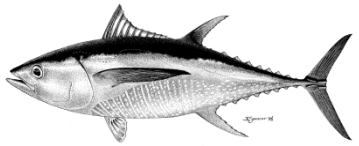


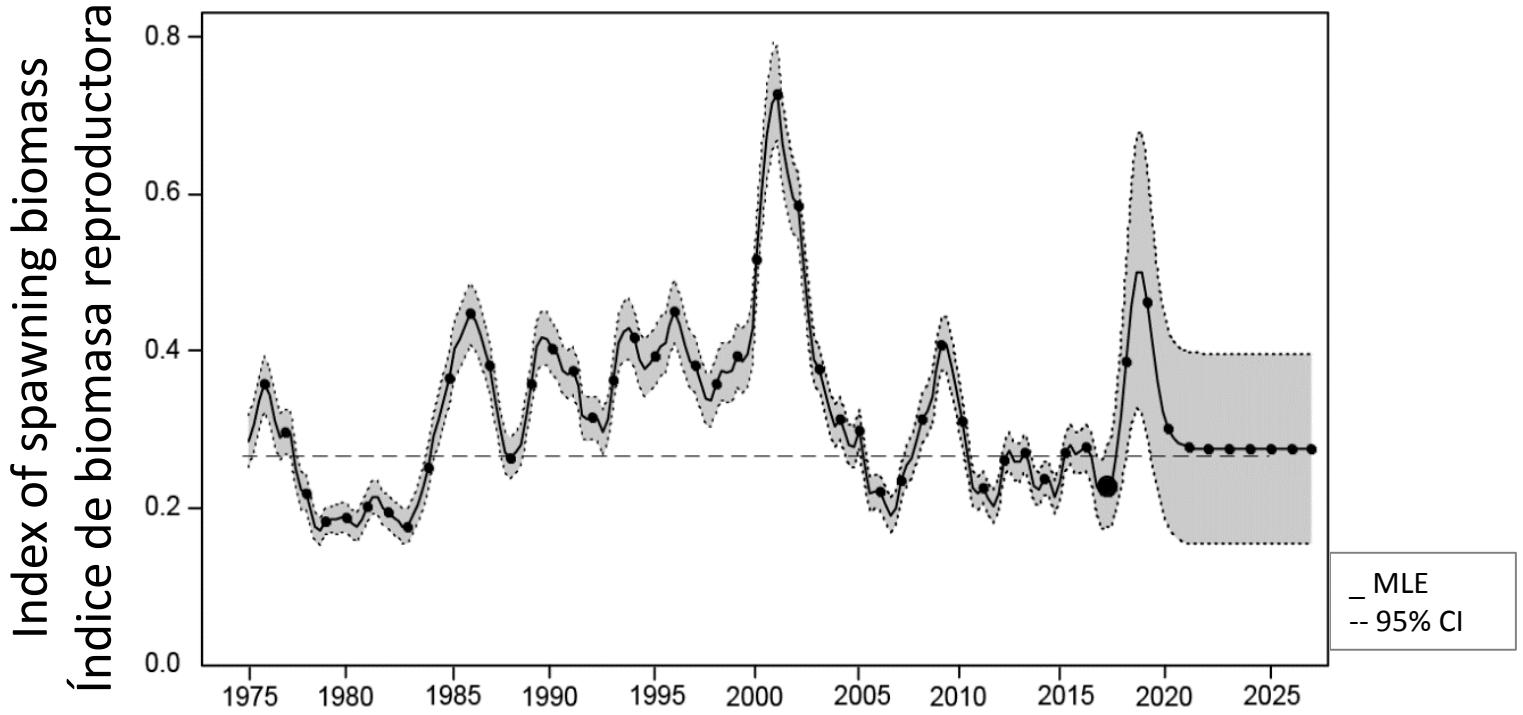


Summary biomass

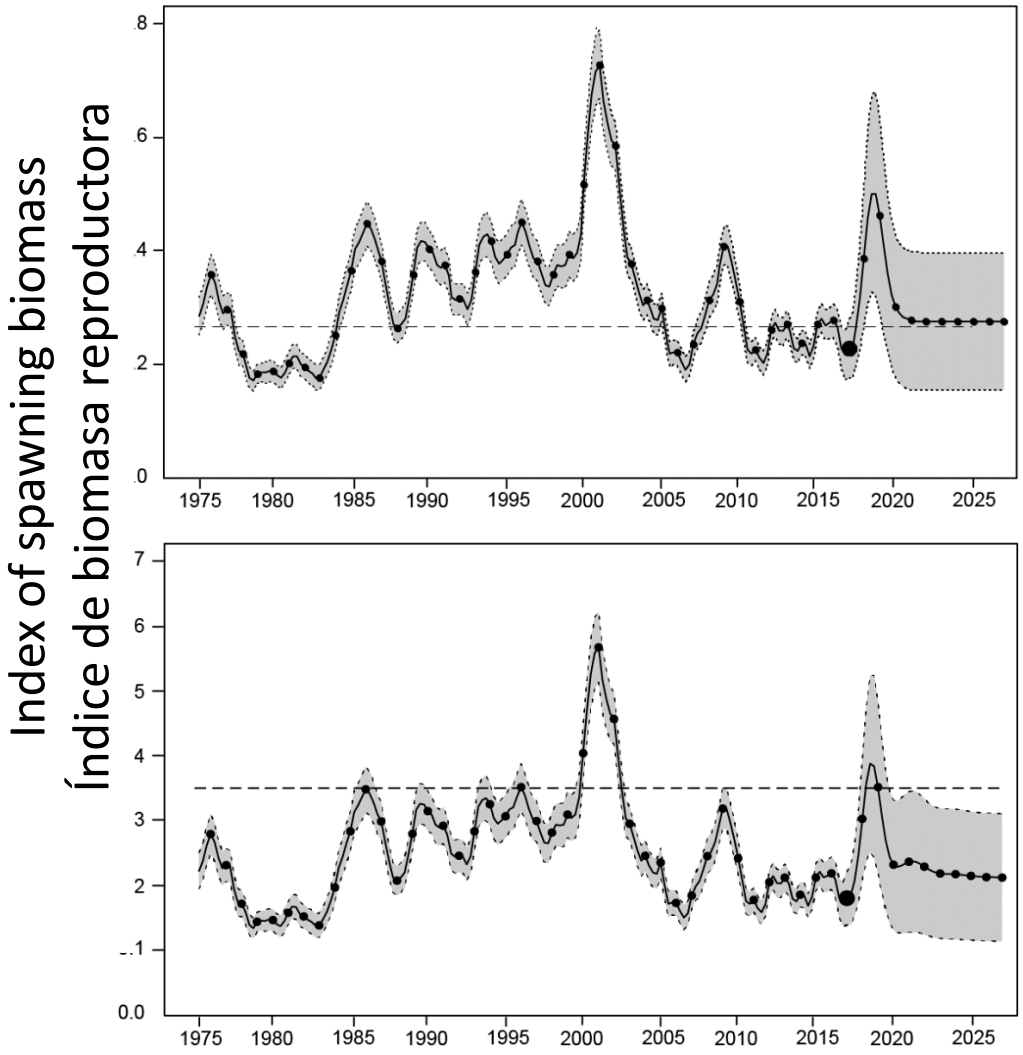
Biomasa sumaria (

Spawning biomass



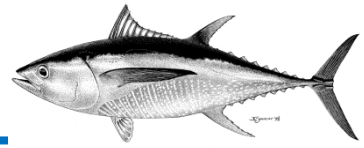


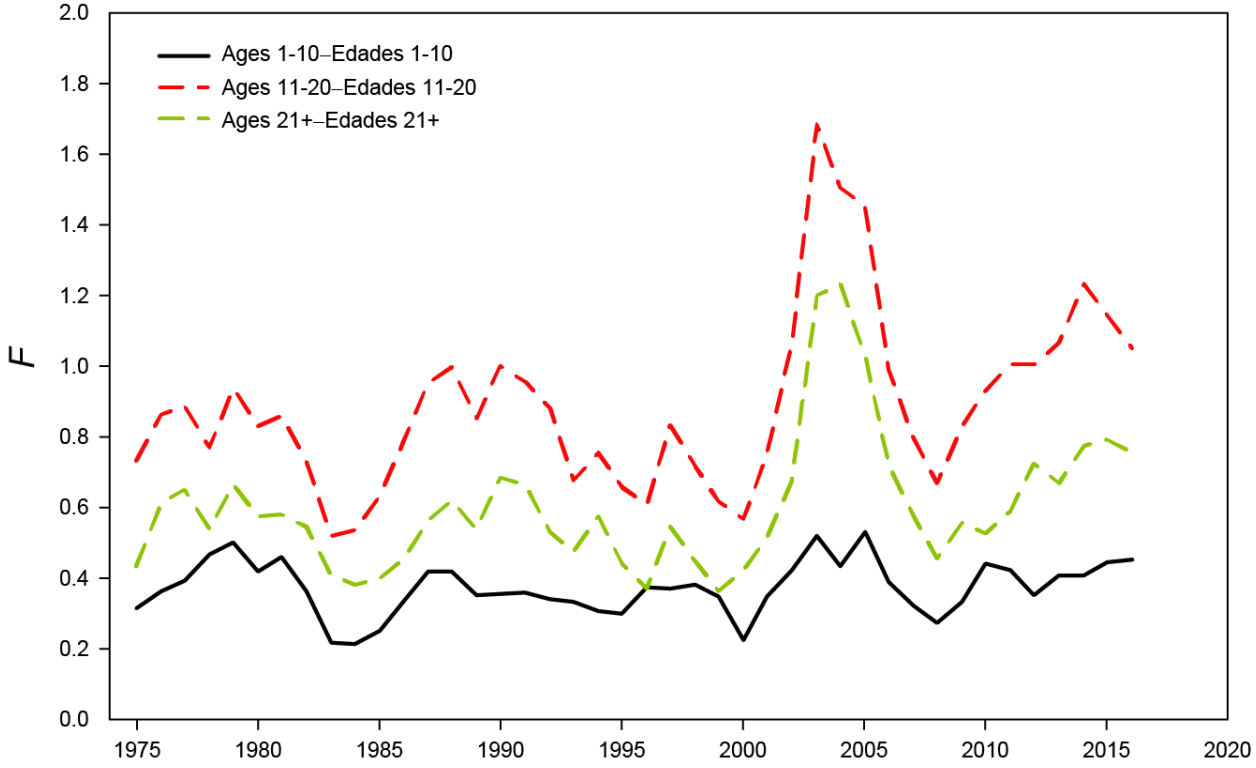
Spawning biomass



_ MLE
-- 95% CI

Fishing mortality

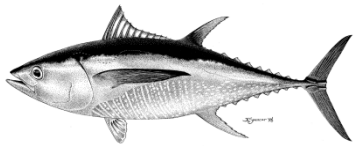


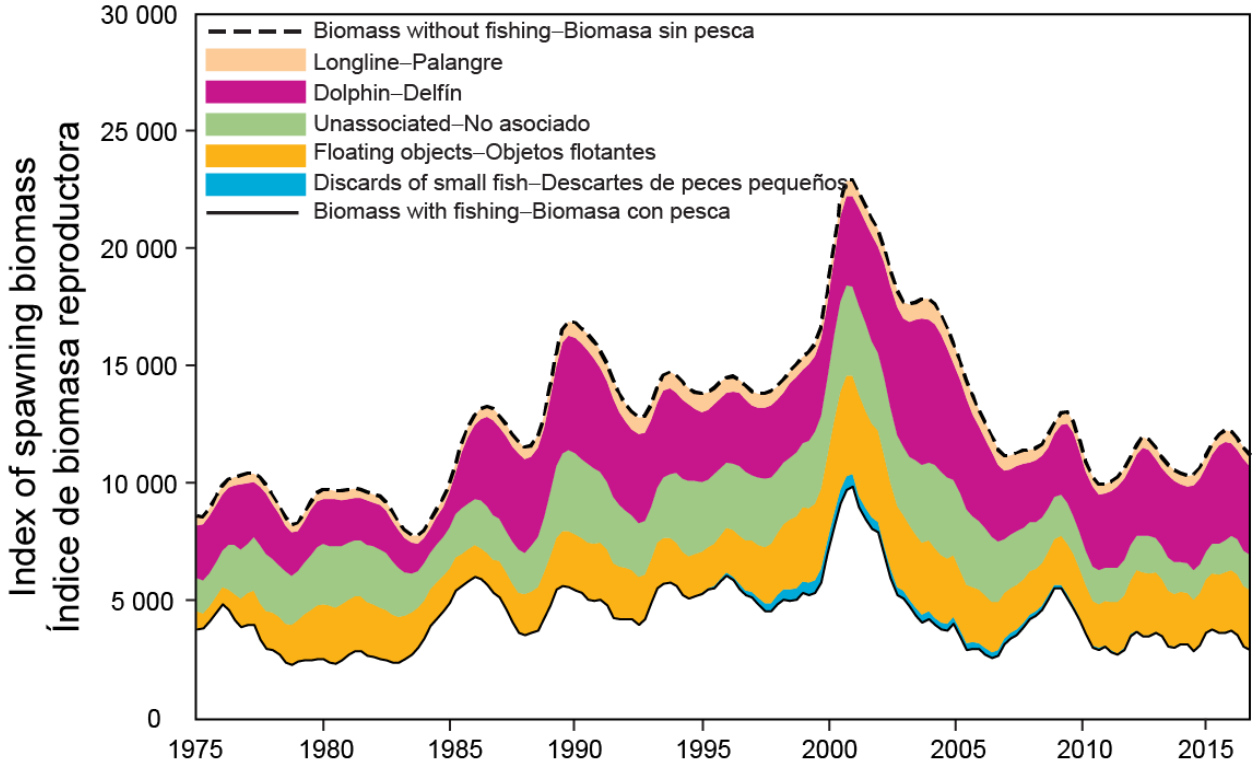


Average annual fishing mortality (*F*) by age groups, by all gears, of yellowfin tuna recruited to the fisheries of the EPO.

Mortalidad por pesca (F) anual media, por grupo de edad, por todas las artes, de atún aleta amarilla reclutado a las pesquerías del OPO.

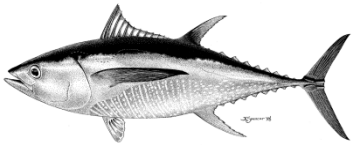
Fishery impact



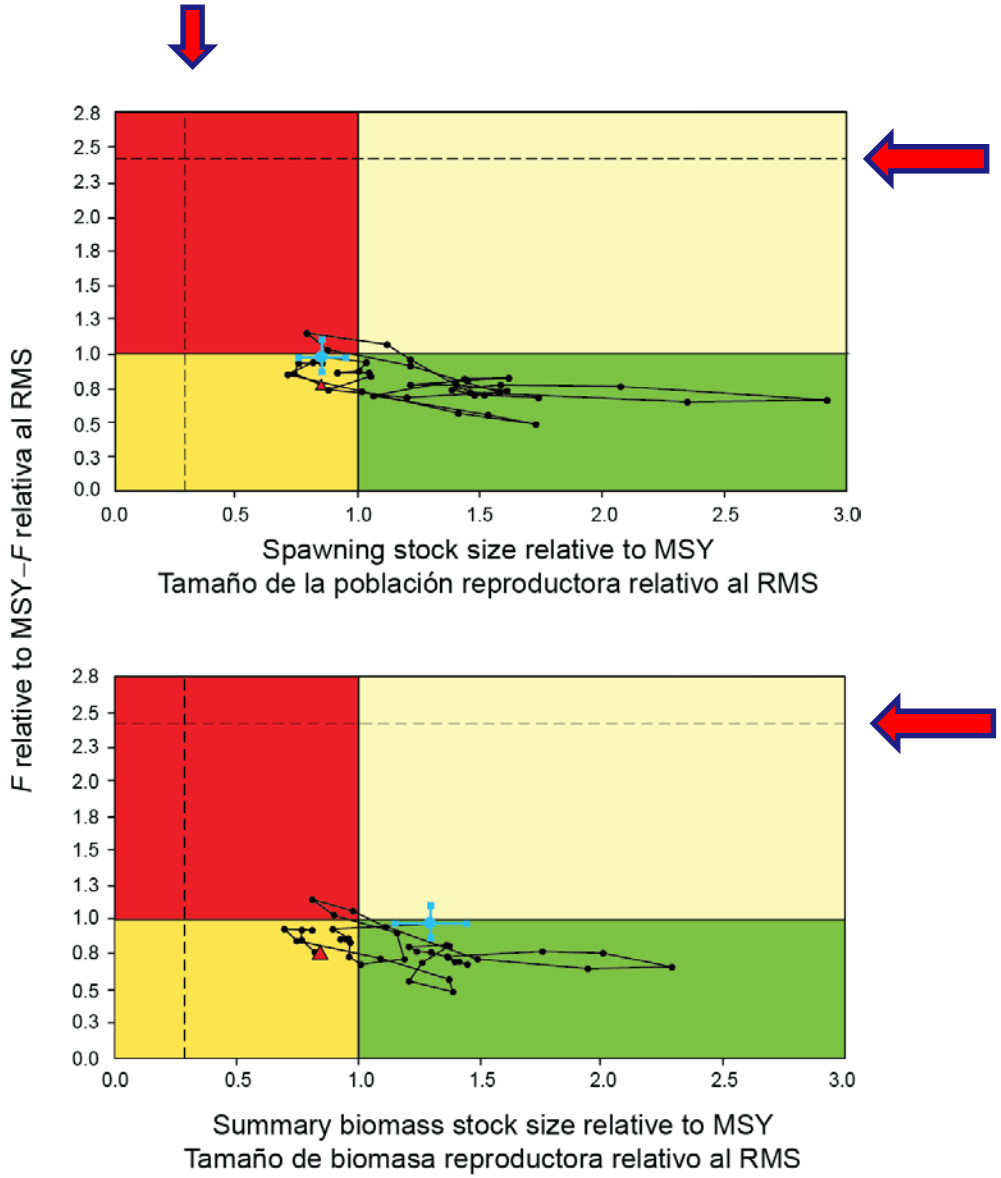


Spawning biomass of a simulated population never exploited(- - -), predicted by the stock assessment model (__), and portions of the impact attributed to each fishing method.
Biomasa reproductora de una población simulada nunca explotada , la que predice el modelo de evaluación y efecto atribuido a cada método de pesca

Kobe plots

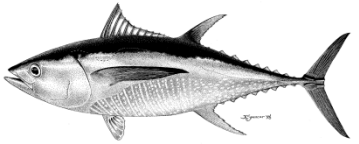


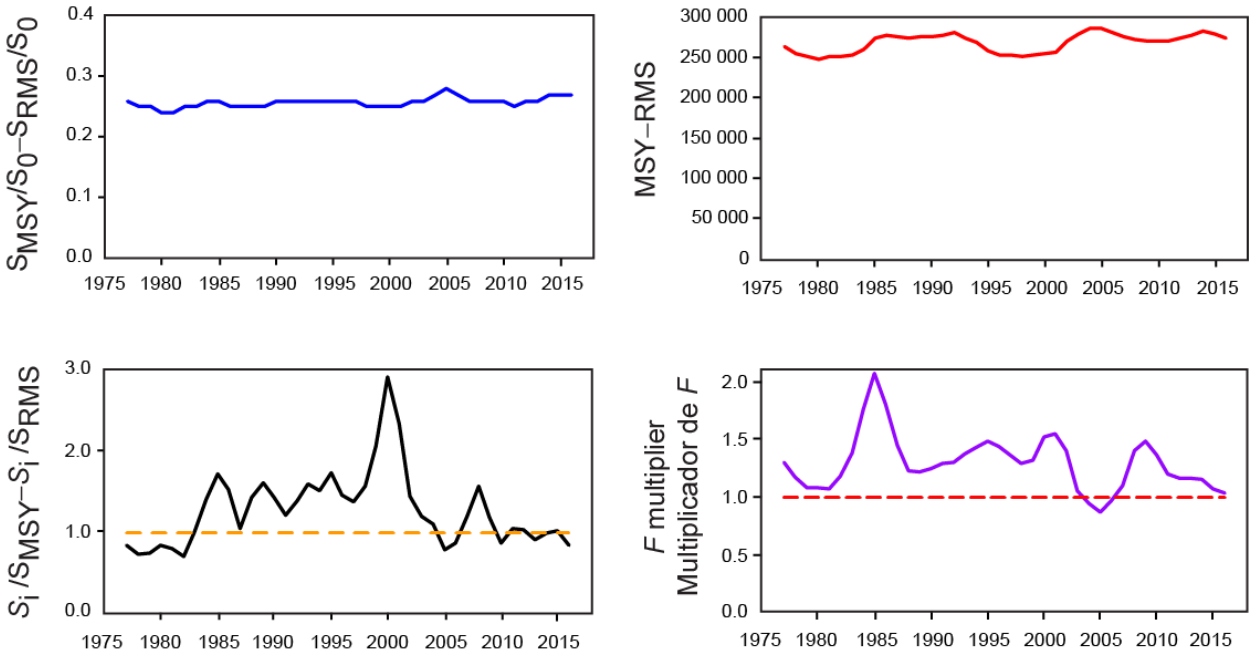
Interim limit reference points



Time varying indicators

Stock status – base case

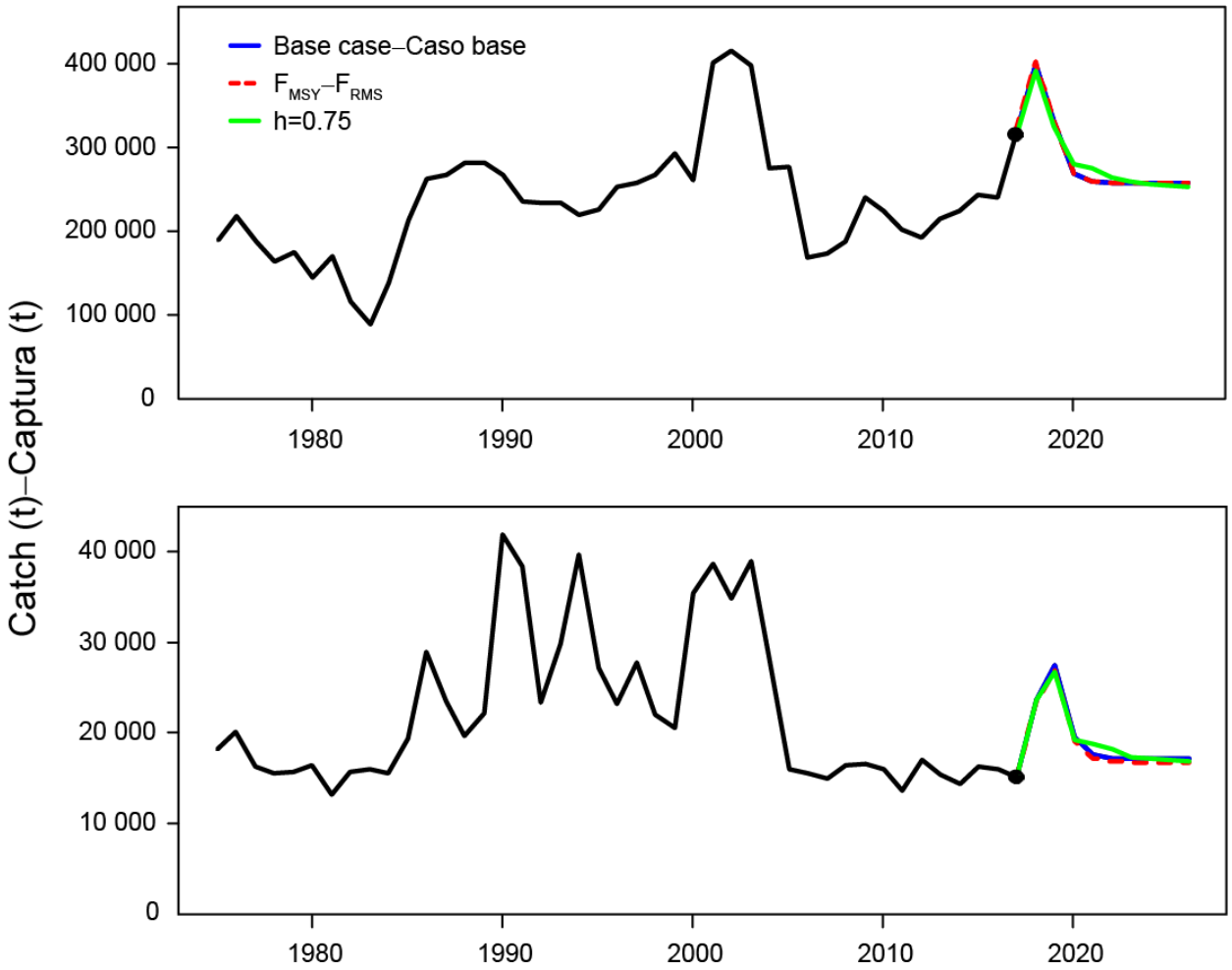




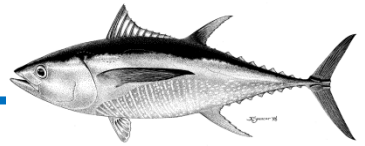
MSY-related quantities calculated using the average age-specific fishing mortality for each year

Cantidades relacionadas con el RMS calculadas a partir de la mortalidad por pesca media por edad para cada año.

Projected catches



MSY and related quantities

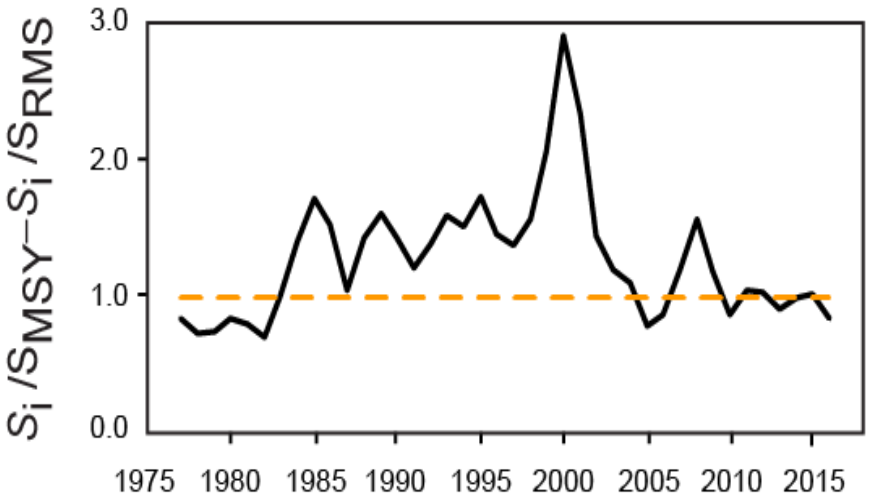


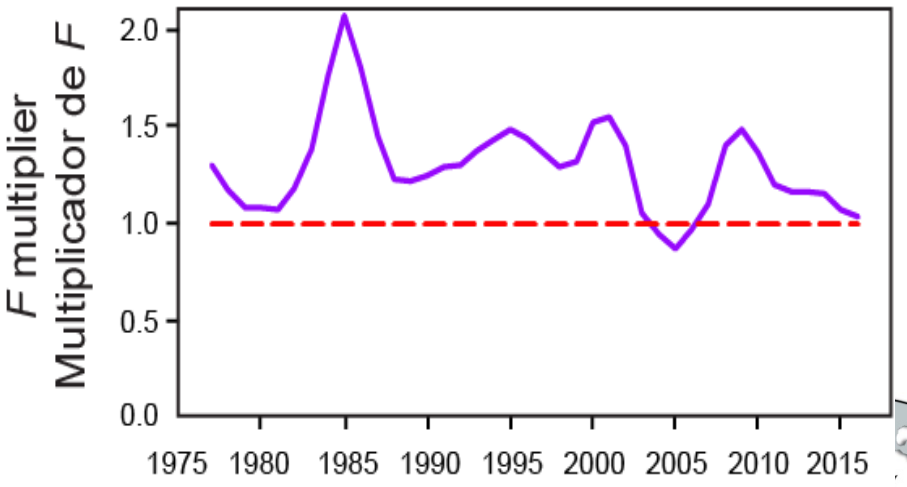
YFT	Base case Caso base	h = 0.75
MSY-RMS	274,960	290,578
B_{MSY}- B_{RMS}	380,496	564,435
S_{MSY}- S_{RMS}	3,624	6,093
B_{MSY}/B_0- B_{RMS}/B_0	0.32	0.37
S_{MSY}/S_0- S_{RMS}/S_0	0.27	0.35
C_{recent}/MSY- C_{recent}/RMS	0.93	0.88
B_{recent}/B_{MSY}- B_{recent}/B_{RMS}	1.30	0.87
S_{recent}/S_{MSY}-S_{recent}/S_{RMS}	0.86	0.51
F multiplier-Multiplicador de F	1.03	0.66

Summary: key results

- The recent levels of **spawning biomass** are estimated to be below at those corresponding to the MSY
- ($S_{recent} < S_{MSY}$)

- The recent **fishing mortality** rates are estimated to be slightly below those corresponding to the MSY, so Fmultiplier > 1
- $F_{recent} < F_{MSY}$





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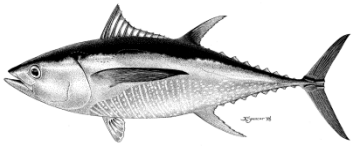
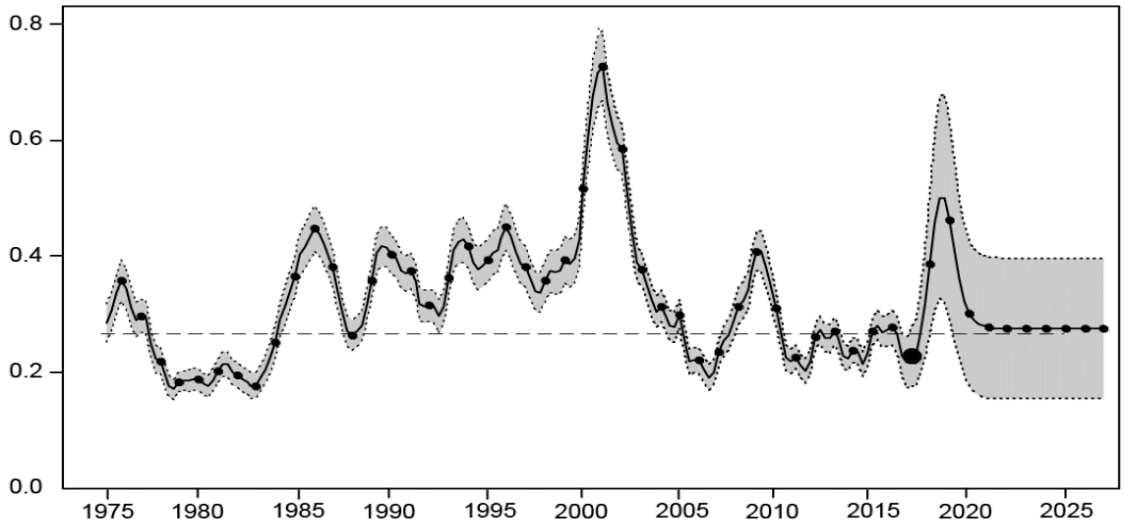
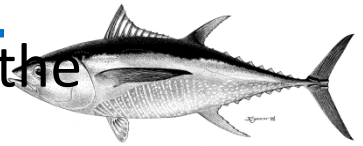
Summary: key points



- There have been three, different productivity regimes since 1975, and the levels of maximum sustainable yield (MSY) and the biomasses corresponding to the MSY may differ among the regimes.
- The recruitment of 2015 and 2016 are high, the population and catches are expected to increase in the next year or two
- At current fishing mortality levels, and average recruitment, SBR is predicted to stabilize slightly above SBR at MSY

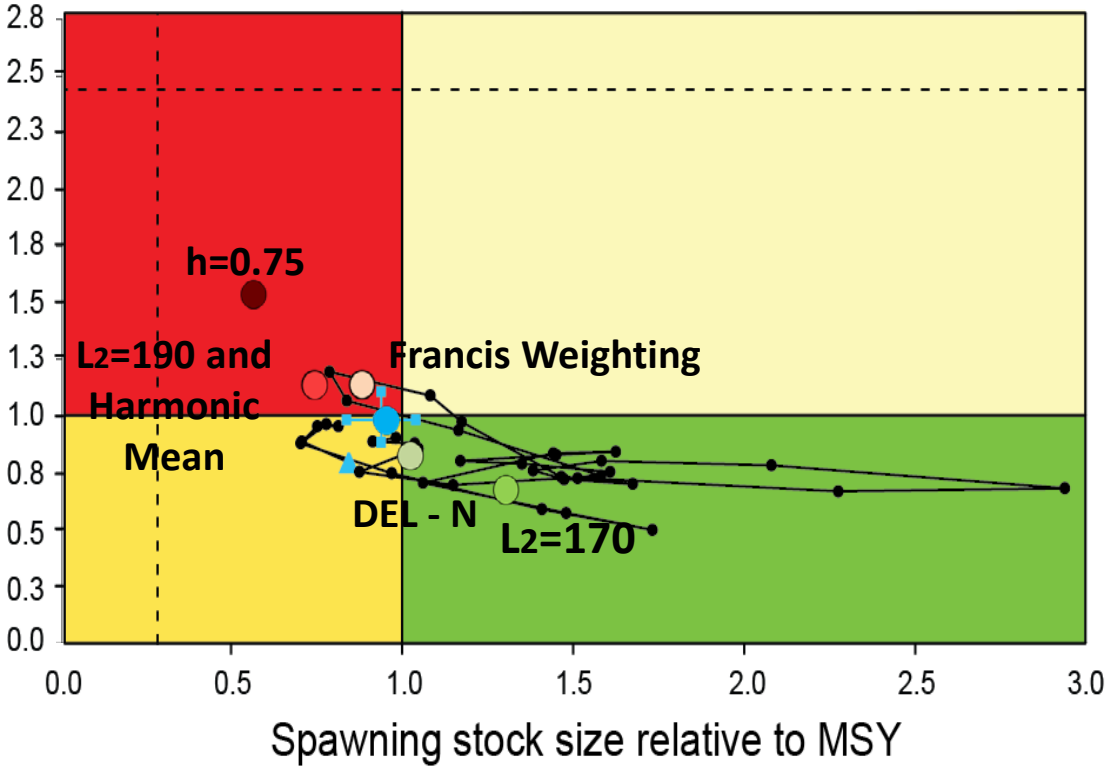


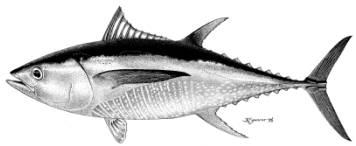
Summary: key points



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
- Relative weight assigned to the indices of relative abundance
- Weighting assigned to the size composition data





Summary: key points

Lessons from this assessments and previous research

- Results are more **pessimistic** with:
  - The inclusion of a stock-recruitment relationship
  - Higher values of the average size of the oldest fish (L_2 > 182 cm)
  - Lower rates of adult natural mortality (M)
  - Reweigthing of the size-composition data

- Results are more **optimistic** with:
  - Lower values of the average size of the oldest fish (L_2 < 182 cm)
  - Higher rates of adult natural mortality (M)
  - Fitting to CPUE DEL-N as main index of abundance (S_{recent}>S_{MSY})

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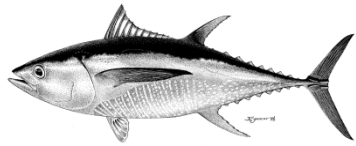
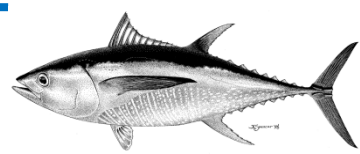
Future directions: priorities in future research for improving the yellowfin stock assessment:



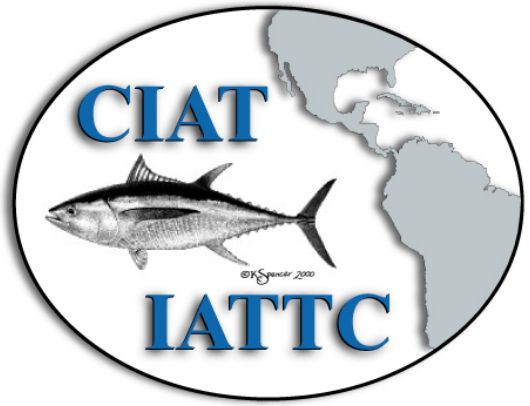
- Implementation of time-variant selectivity, mainly for the purse-seine fisheries on floating objects.
- Exploration of alternative assumptions about stock structure within the assessment model.
- Analysis of changes in spatial distribution of effort for the Southern longline fishery, and whether they invalidate the use of the CPUE of this fishery as the main abundance index in the assessment model.

Future directions: priorities in research

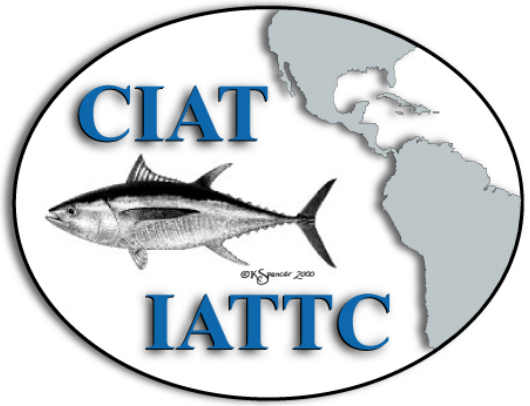


- Implementation of a large-scale tagging program to address hypotheses about stock structure and regional differences in life-history parameters and depletion.
- Improved estimates of growth, particularly for older fish.
- Fine-tuning of the weights of the different data sets that are fitted to the assessment model.
- Refinement of fisheries definitions within the assessment model.

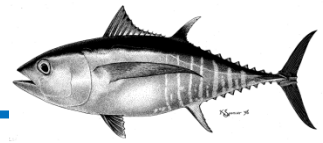
Questions?

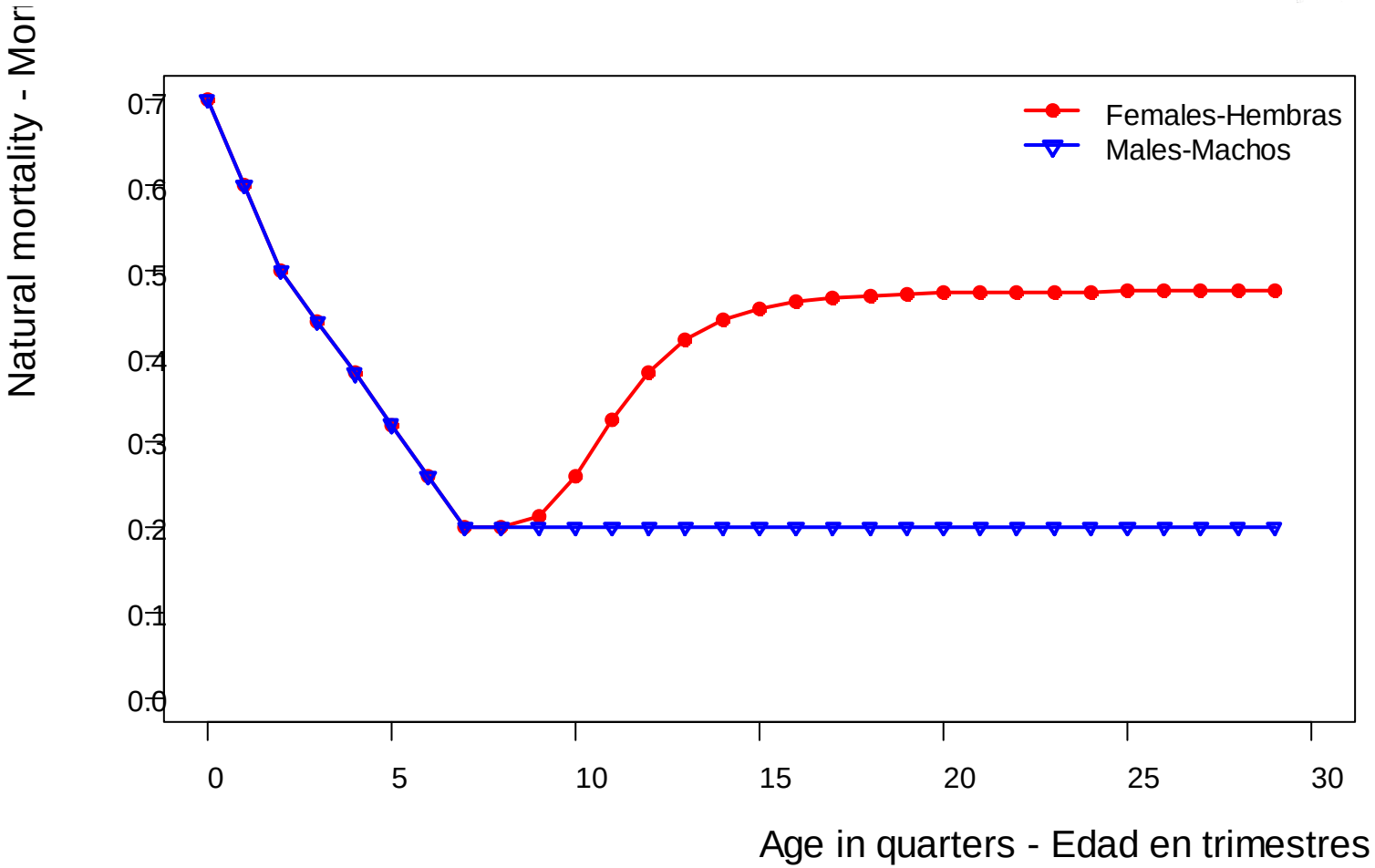


Extra

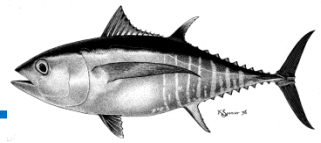


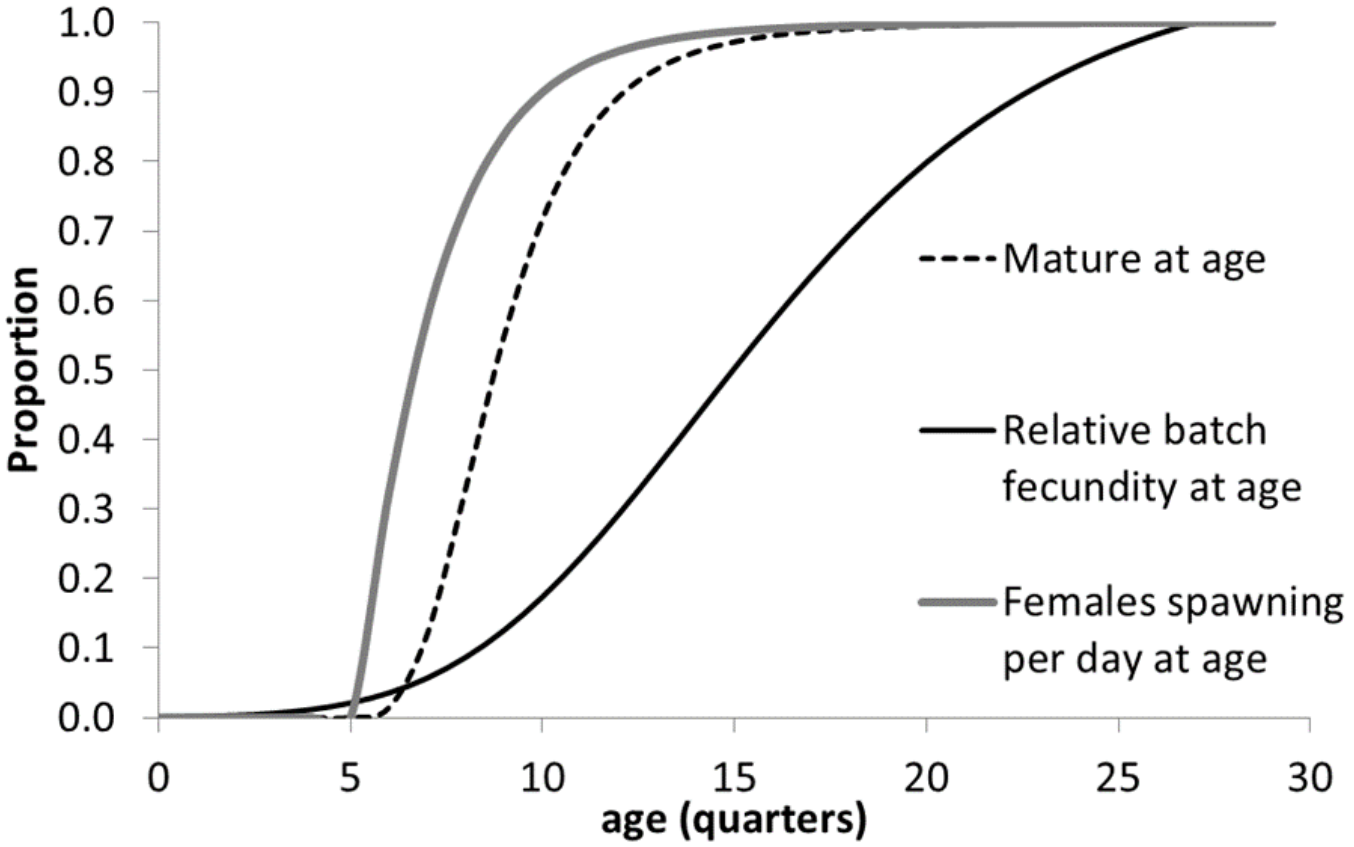
Mortality at age by sex





Reproductive biology at age





Based on:
Schaefer, K.M. (1998) Reproductive biology of yellowfin tuna (*Thunnus albacares*) in the eastern Pacific Ocean. Bulletin of the Inter-American Tropical Tuna Commission 21:201-273.