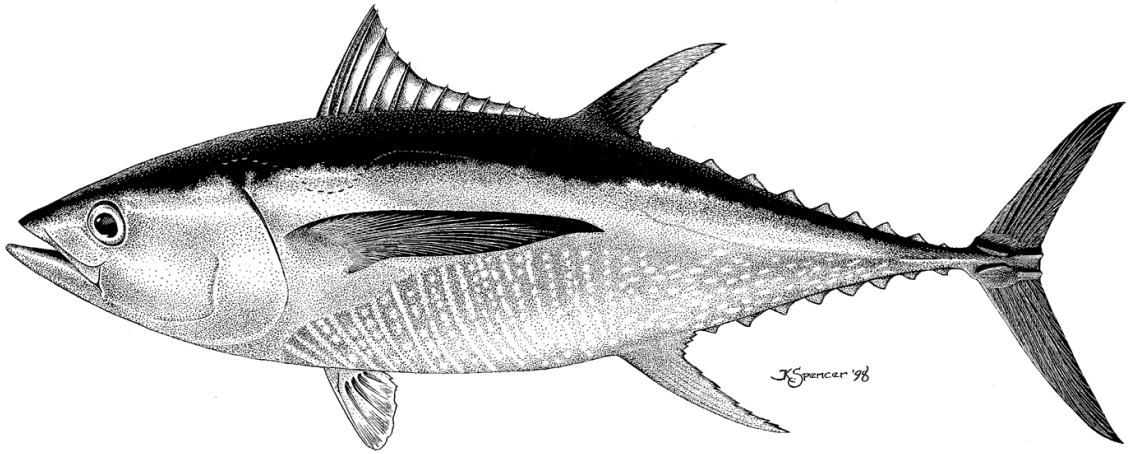
STATUS OF YELLOWFIN TUNA IN THE EASTERN PACIFIC OCEAN IN 2014

UPDATE OF 2014 STOCK ASSESSMENT

Document SAC-06-06

January 1975 – December 2014



6th Meeting of the Scientific Advisory Committee
La Jolla, 11-15 May 2015

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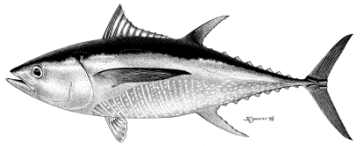
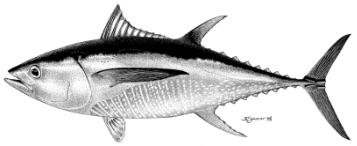
Outline



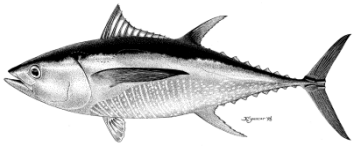
- Fishery data updates
- Stock assessment
  - Model assumptions
  - Results (fishing mortality, recruitment, biomasses)
  - Stock status (base case)
  - Stock-recruitment sensitivity analysis (steepness = 0.75)
  - Population projections (*status quo* and F_{MSY})
- Summary conclusions
- Future directions

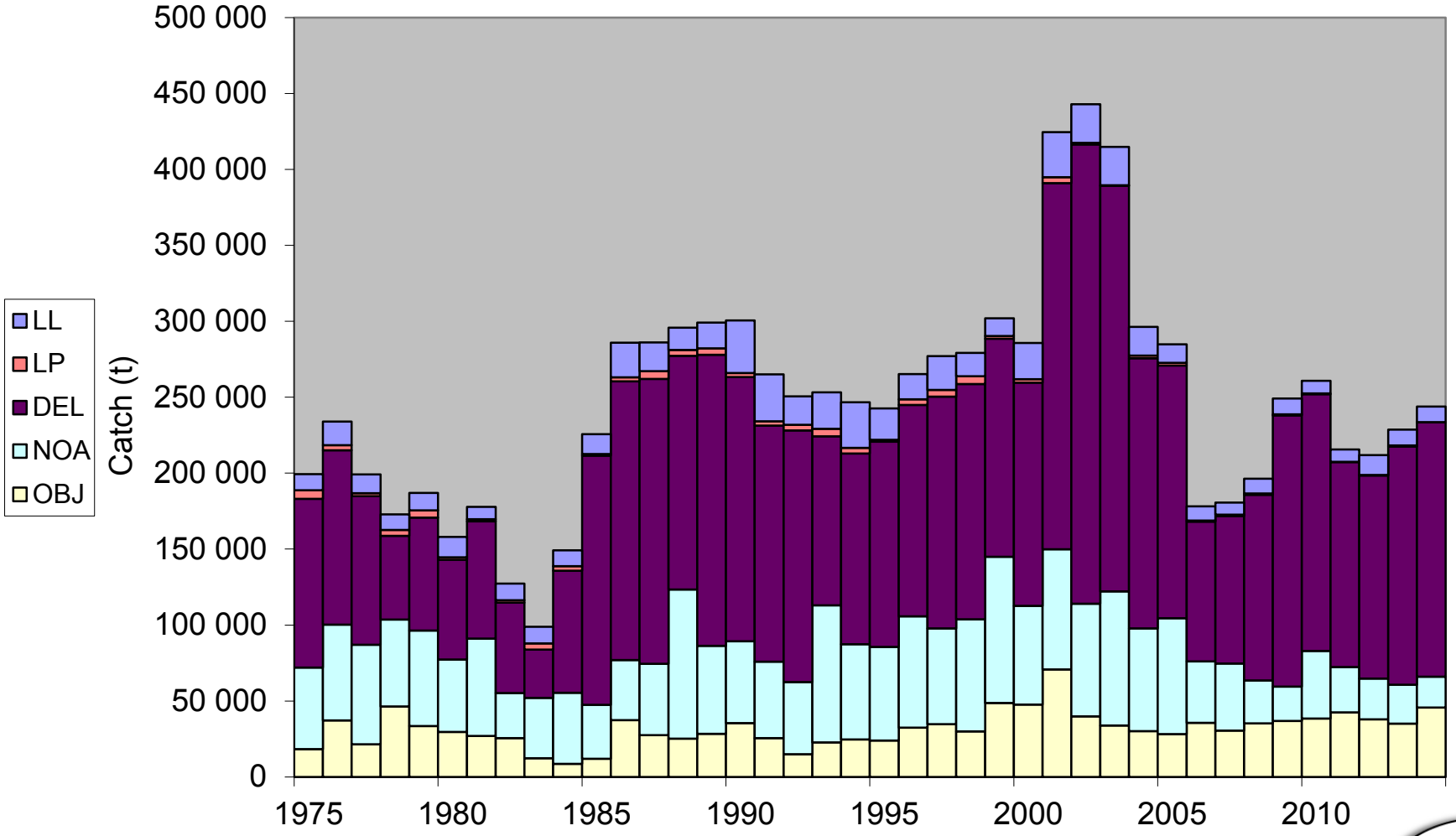
New or updated data



- Surface fisheries
  - Catch, CPUE and size-frequency recent data updated and new data for 2013.
- Longline fisheries
  - New or updated longline catch data: China (2013), Chinese Taipei (2011-2012), Japan (2008-2013), Korea (2013), US (2012-2013), French Polynesia (2013) and Vanuatu (2013-2014)
  - 2014 longline catch data available from monthly reports Japan
  - New or updated CPUE data available for Japan (2008-2013)
  - New or updated longline size-frequency for Japan (2011-2013)

Total catches





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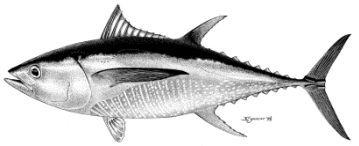

Model assumptions

2014 update assessment = same model as in SAC5

- Fishery definitions: 16 fisheries
- Data weighting: the CV of the southern LL fishery was fixed (CV=0.2), others estimated (NOA, DEL)
- Growth: Richards curve with fixed parameters
- Natural mortality: sex-specific
- Modeling of catchability and selectivity:
  - Catchability coefficients for 5 CPUE time series are estimated (NOA-N, NOA-S, DEL-N, DEL-I, LL-S)
  - Selectivity curves for 11 of the 16 fisheries are estimated (F9 DEL-S mirrors F12 LL-S)
  - Logistic selectivity for LL-S and DEL-S, and dome-shape for other fisheries (except discards)

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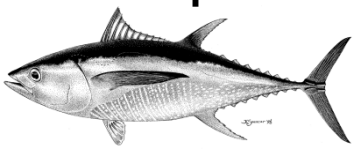
YFT fishery definitions



Defined based on:

- *gear type* (purse seine, pole and line, and longline)
- *purse-seine set type* (sets on schools associated with floating objects, free schools, dolphin-associated schools)
- *area* (IATTC length-frequency sampling area or latitude)
- *discards*

TABLE A. Fisheries defined for the stock assessment of yellowfin tuna in the EPO. PS = purse seine; LP = pole and line; LL = longline; OBJ = floating objects; NOA = unassociated fish; DEL = dolphin. The sampling areas are shown in Figure A.

Fishery	Gear type	Set type	Region	Sampling areas
1	PS	OBJ	South	11-12
2	PS	OBJ	Central	7, 9
3	PS	OBJ	Inshore	5-6, 13
4	PS	OBJ	North	1-4, 8, 10
5	PS	NOA	North	1-4, 8, 10
6	PS	NOA	South	5-7, 9, 11-13
7	PS	DEL	North	2-3, 10
8	PS	DEL	Inshore	1, 4-6, 8, 13
9	PS	DEL	South	7, 9, 11-12
10	LP		All	1-13
11	LL		North	N of 15°N
12	LL		South	S of 15°N
Discard fisheries				
13	PS	OBJ	South	11-12
14	PS	OBJ	Central	7, 9
15	PS	OBJ	Inshore	5-6, 13
16	PS	OBJ	North	1-4, 8, 10

10 surface fisheries

2 longline fisheries

4 discard fisheries

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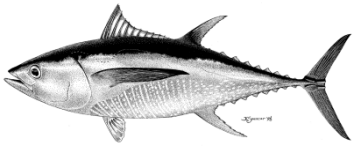
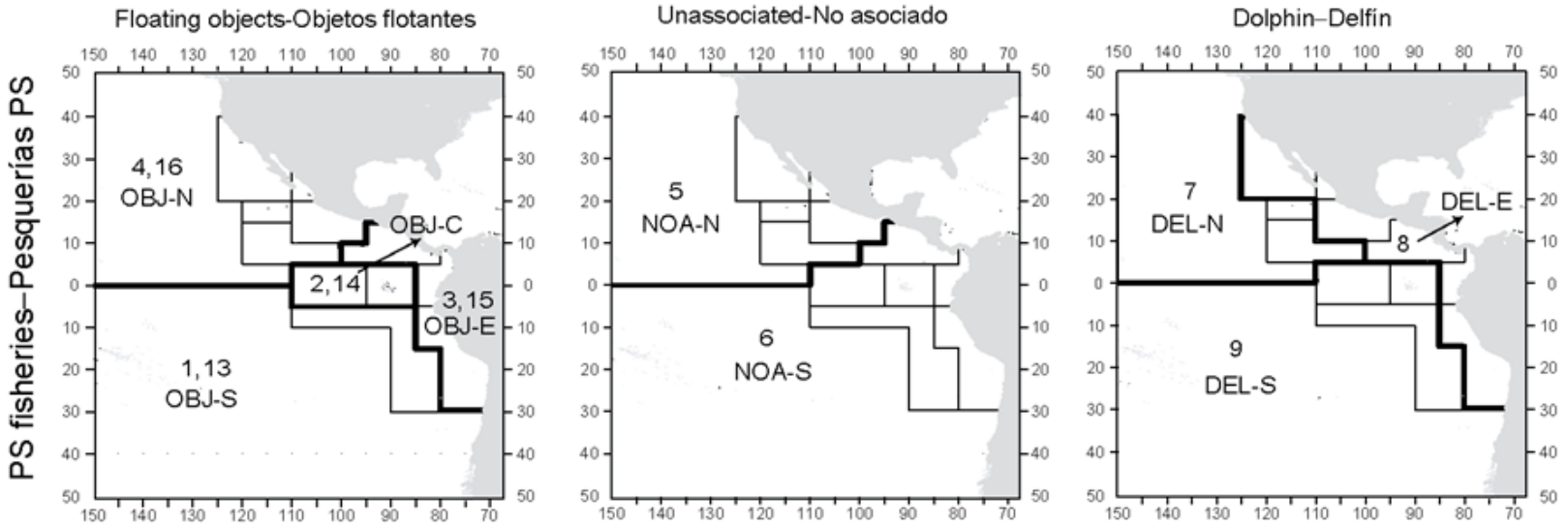
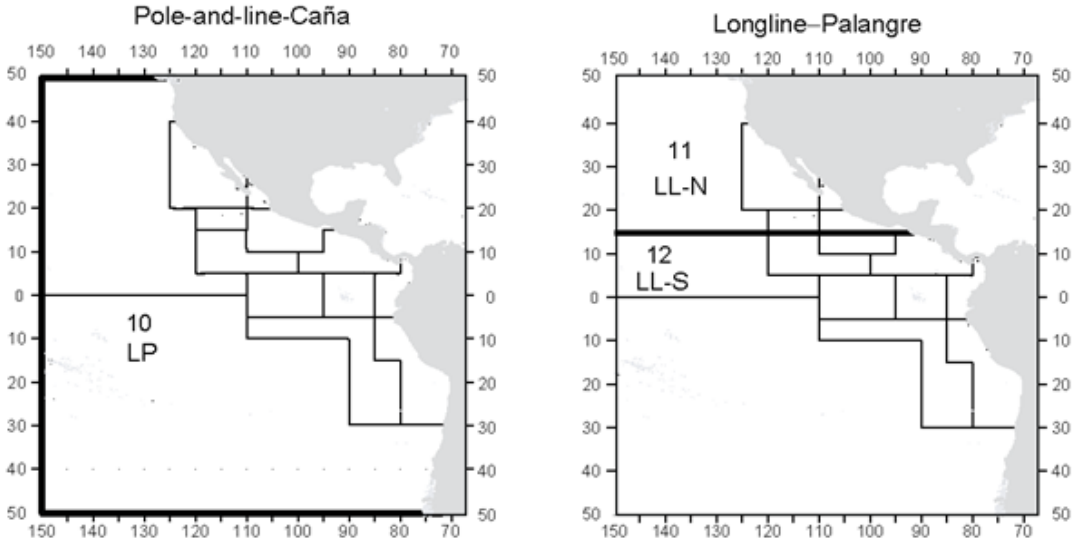
YFT fishery definitions



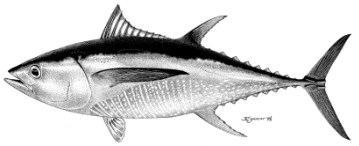


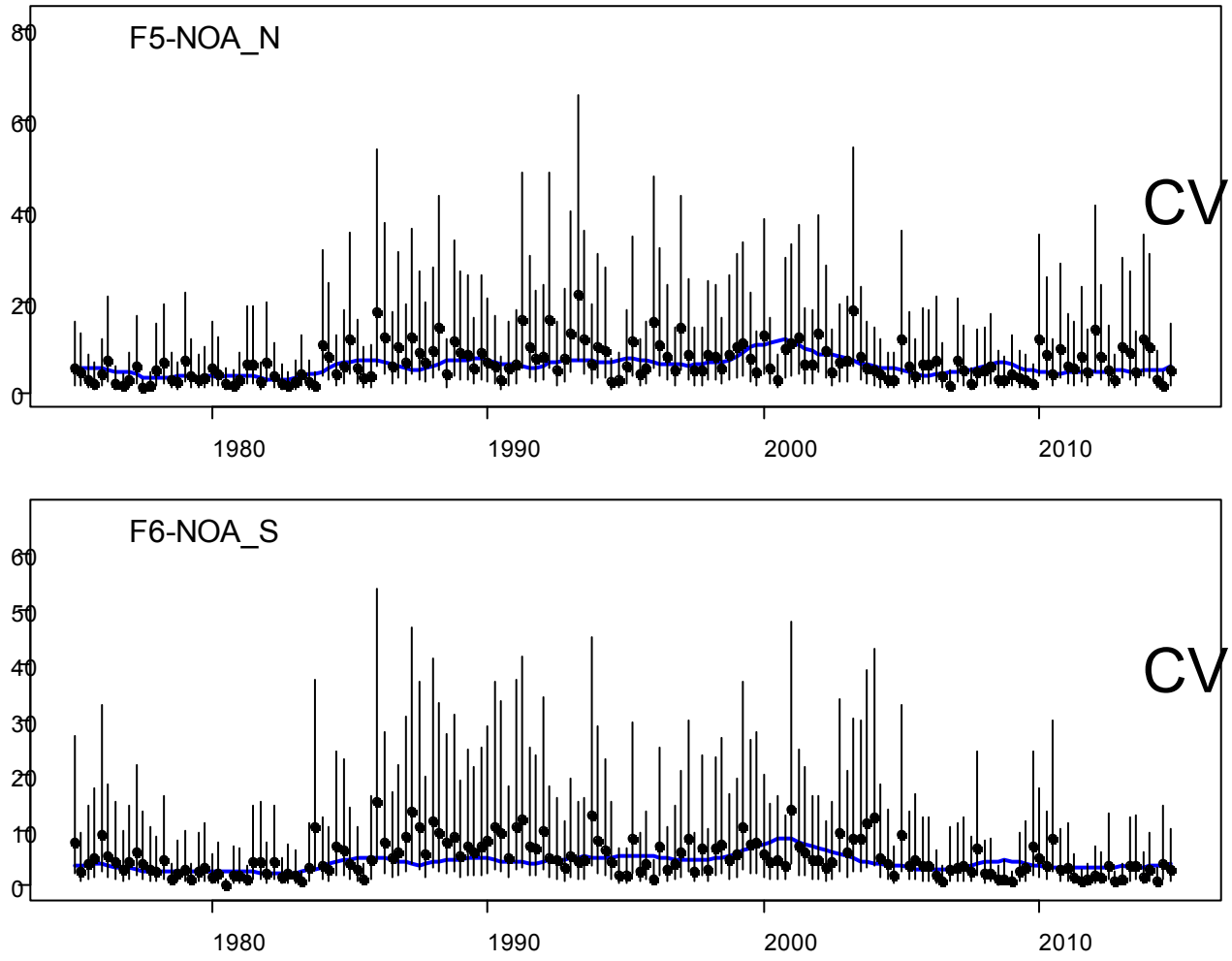


__ IATTC length-frequency sampling areas

__ fishery definition areas

Fit to CPUE – NOA fisheries

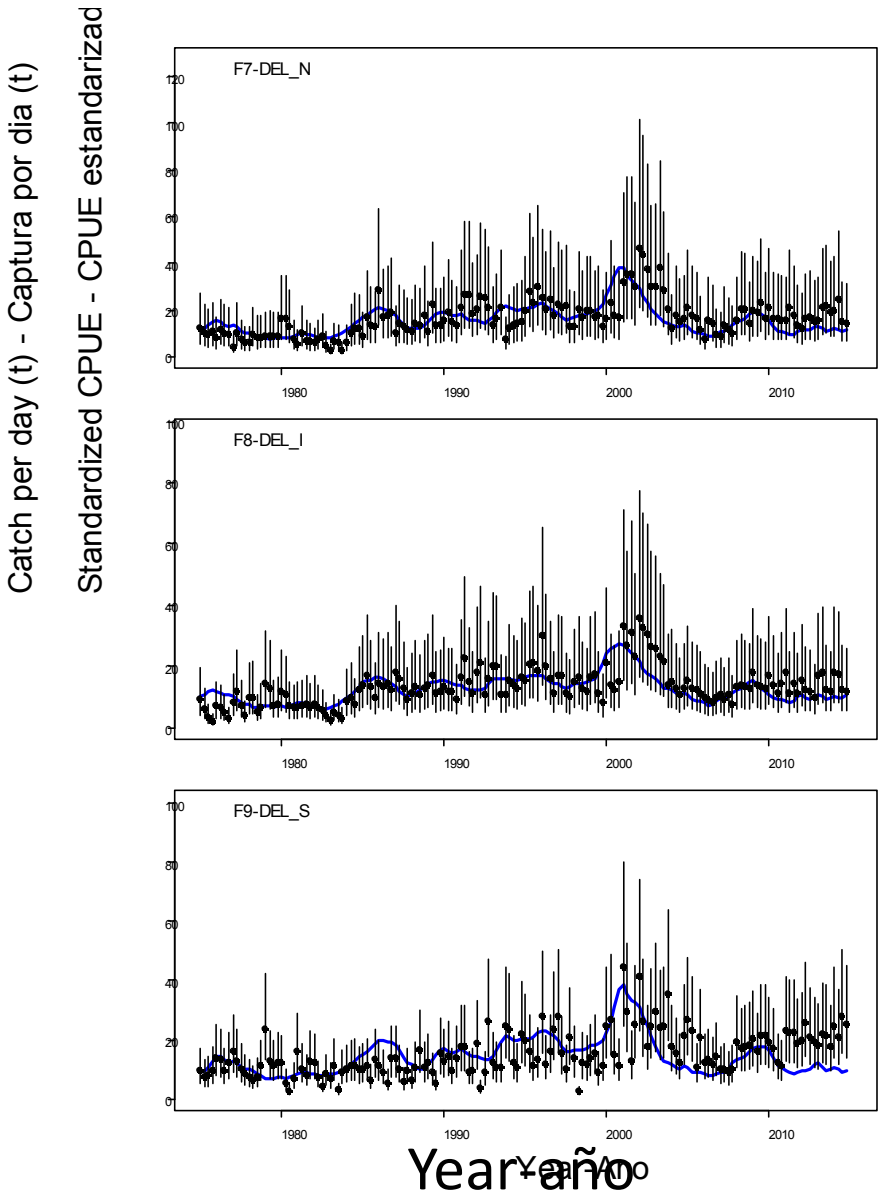




CV = 0.3 + 0.26

CV = 0.3 + 0.34

Fit to CPUE – DEL fisheries

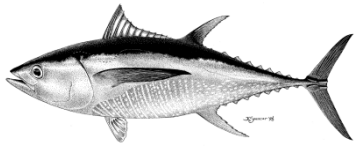


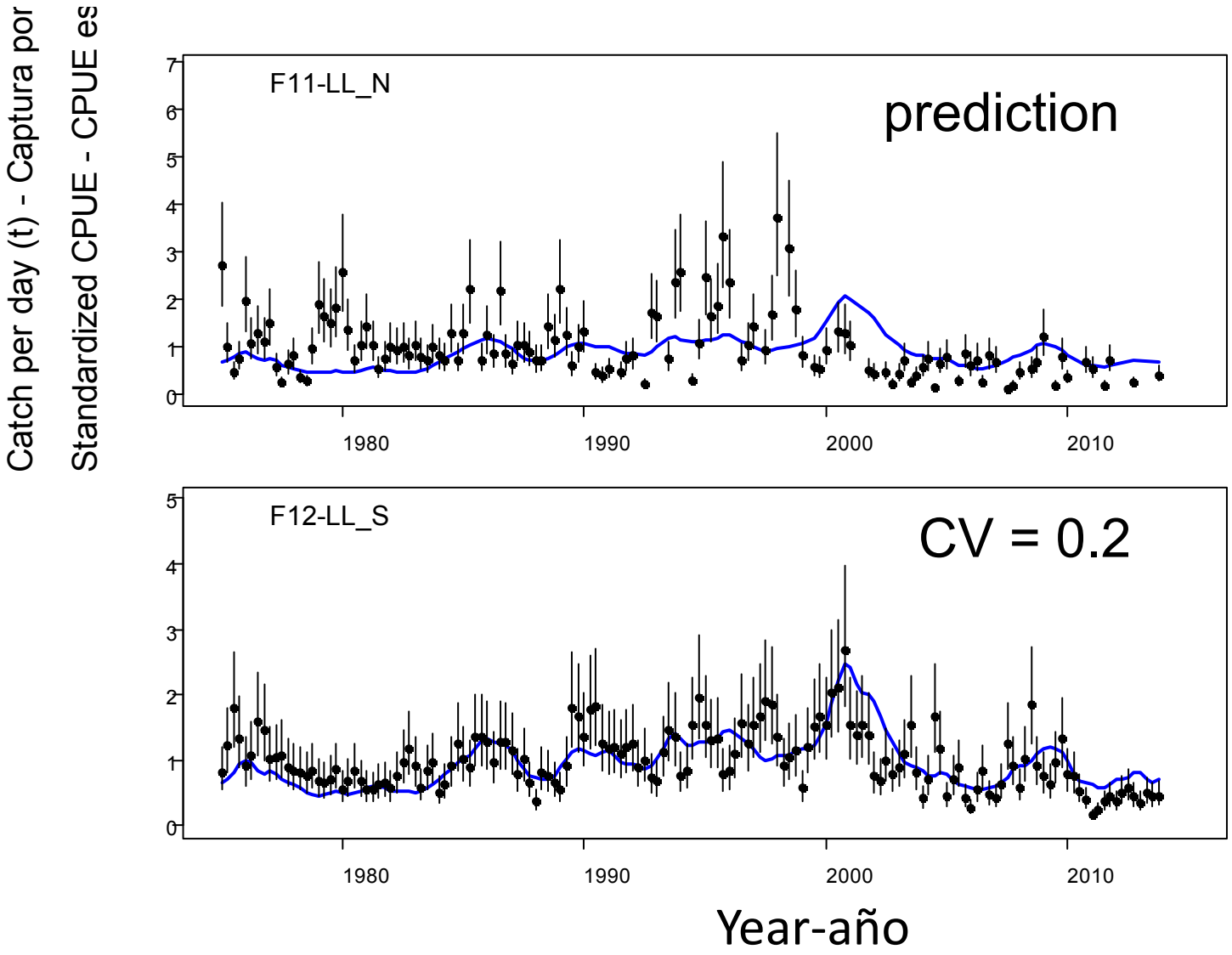
CV = 0.3 + 0.10

CV = 0.3 + 0.096

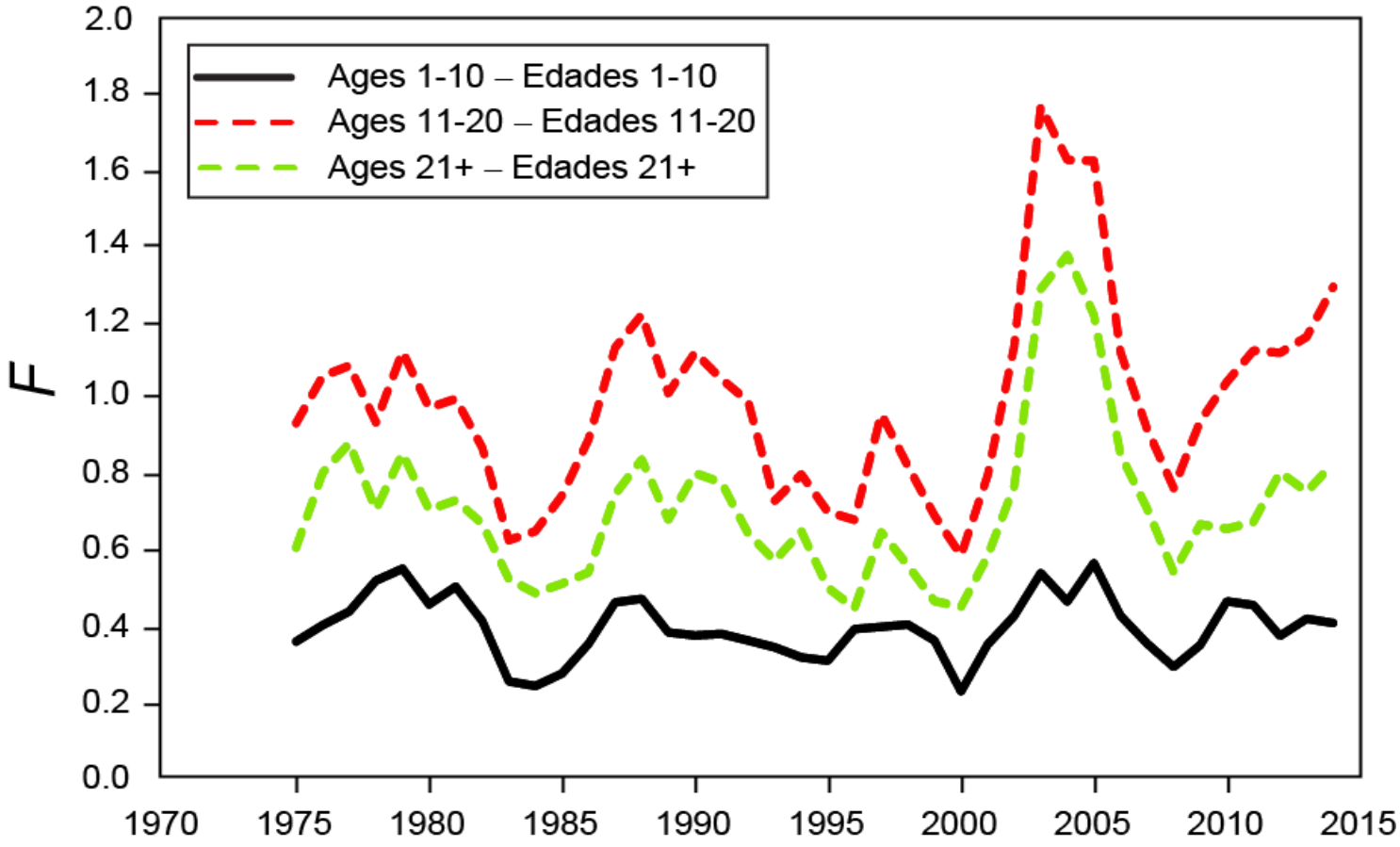
prediction

Fit to CPUE – LL fisheries

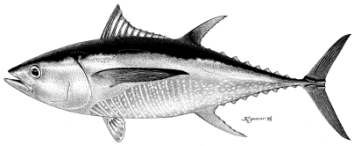


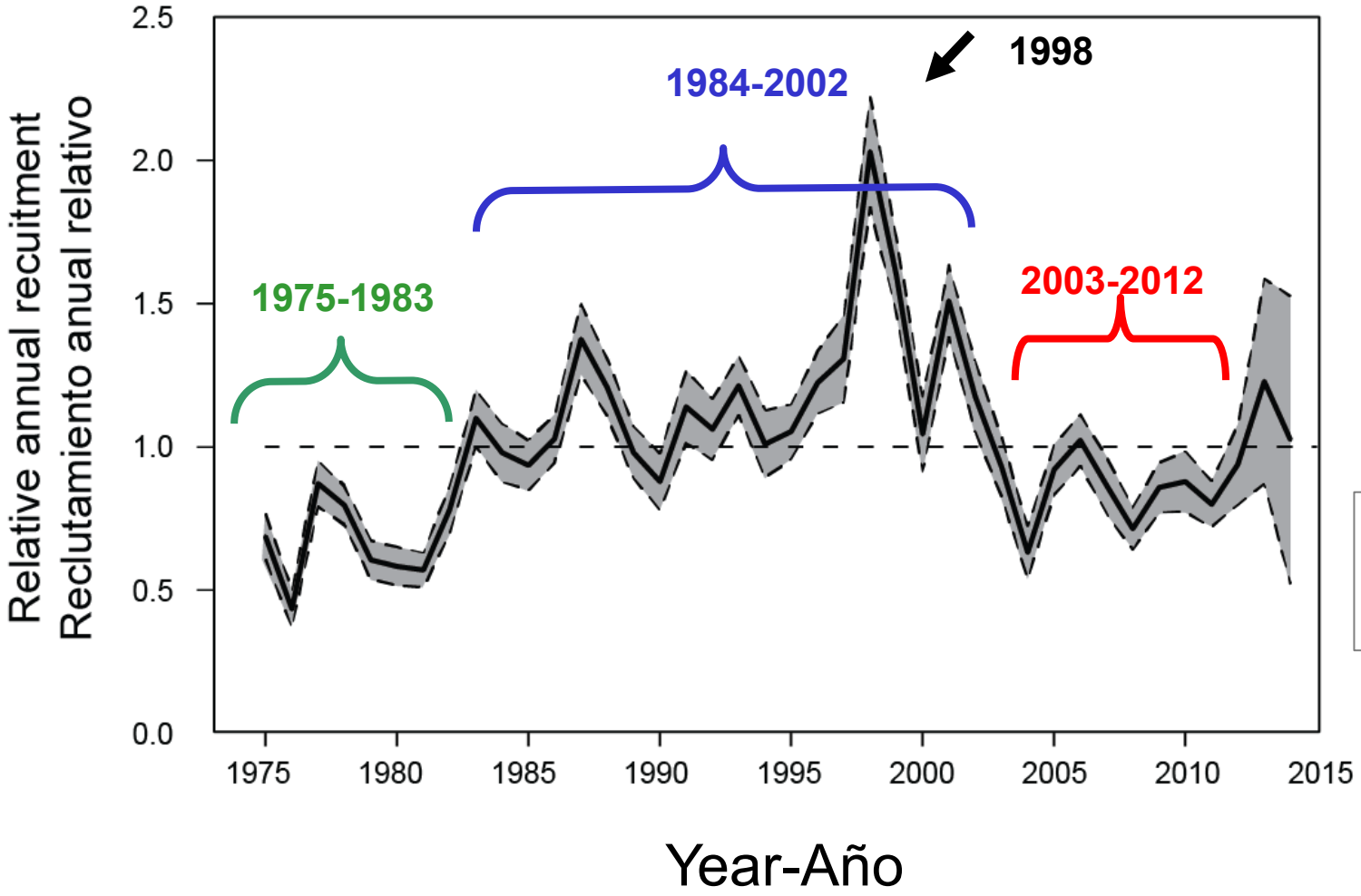


Fishing mortality

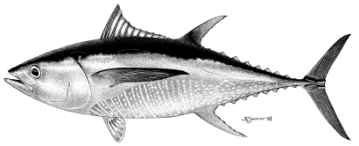


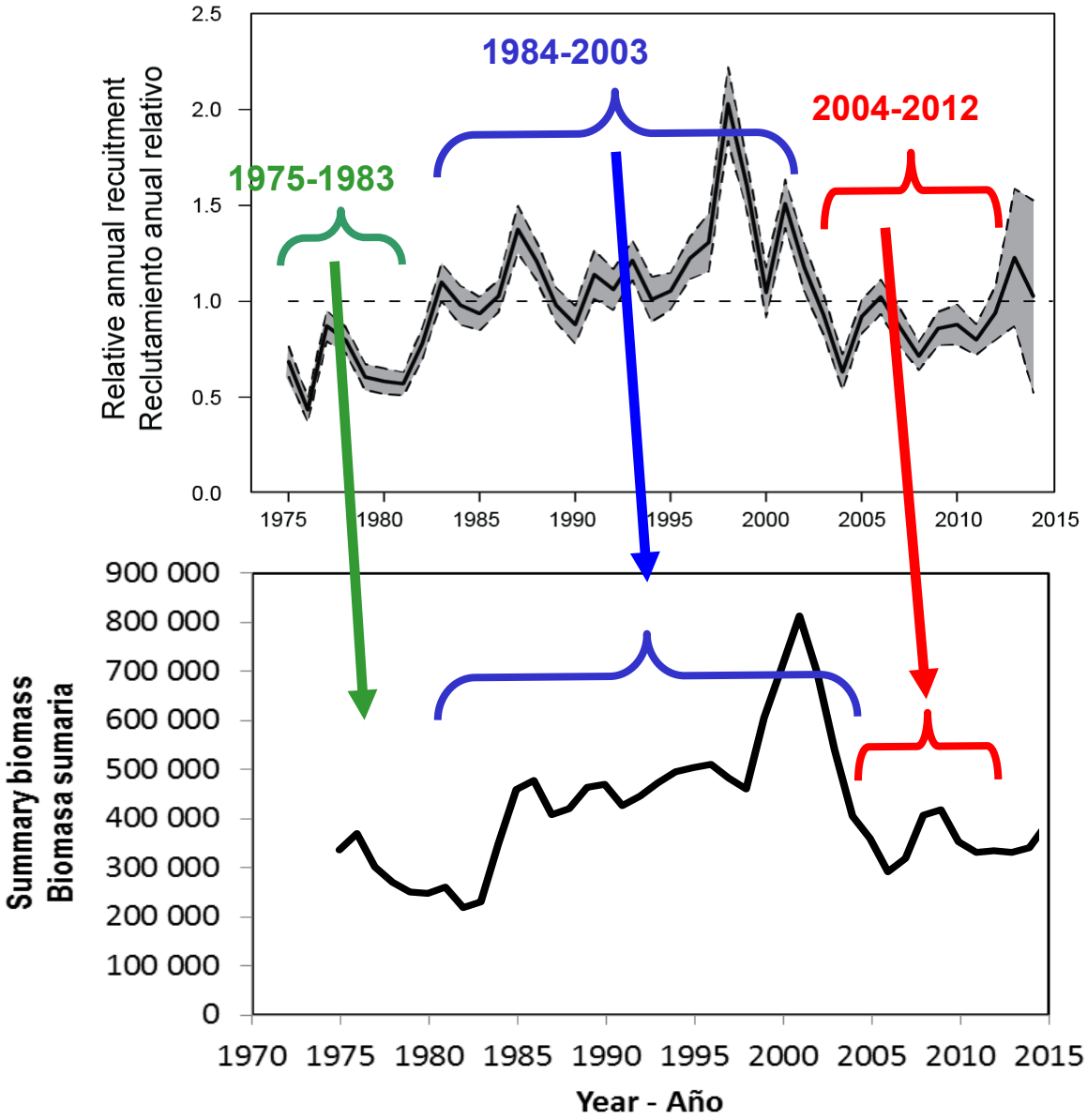
Recruitment





Summary biomass





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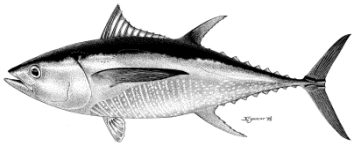
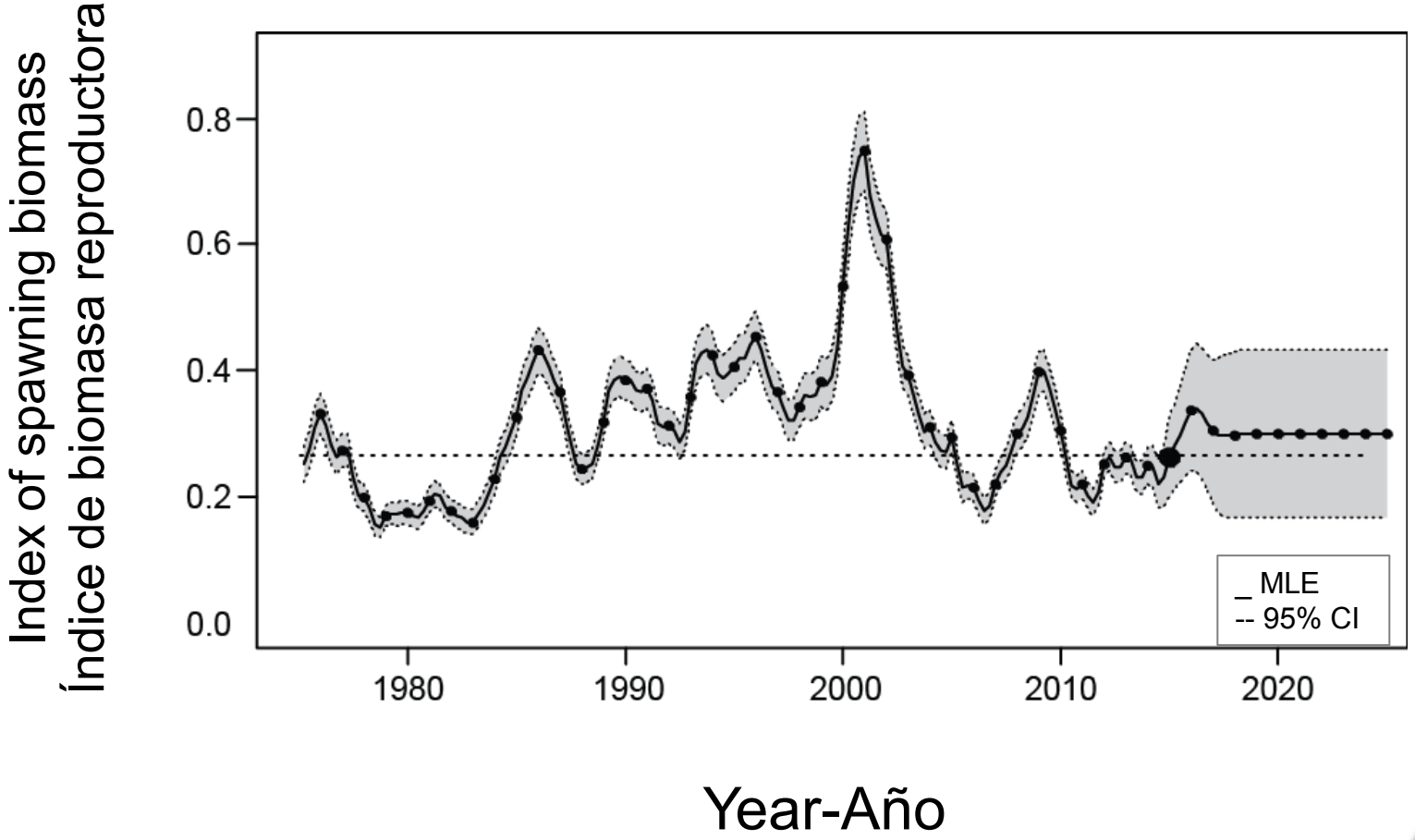
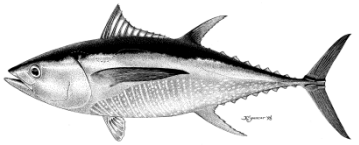
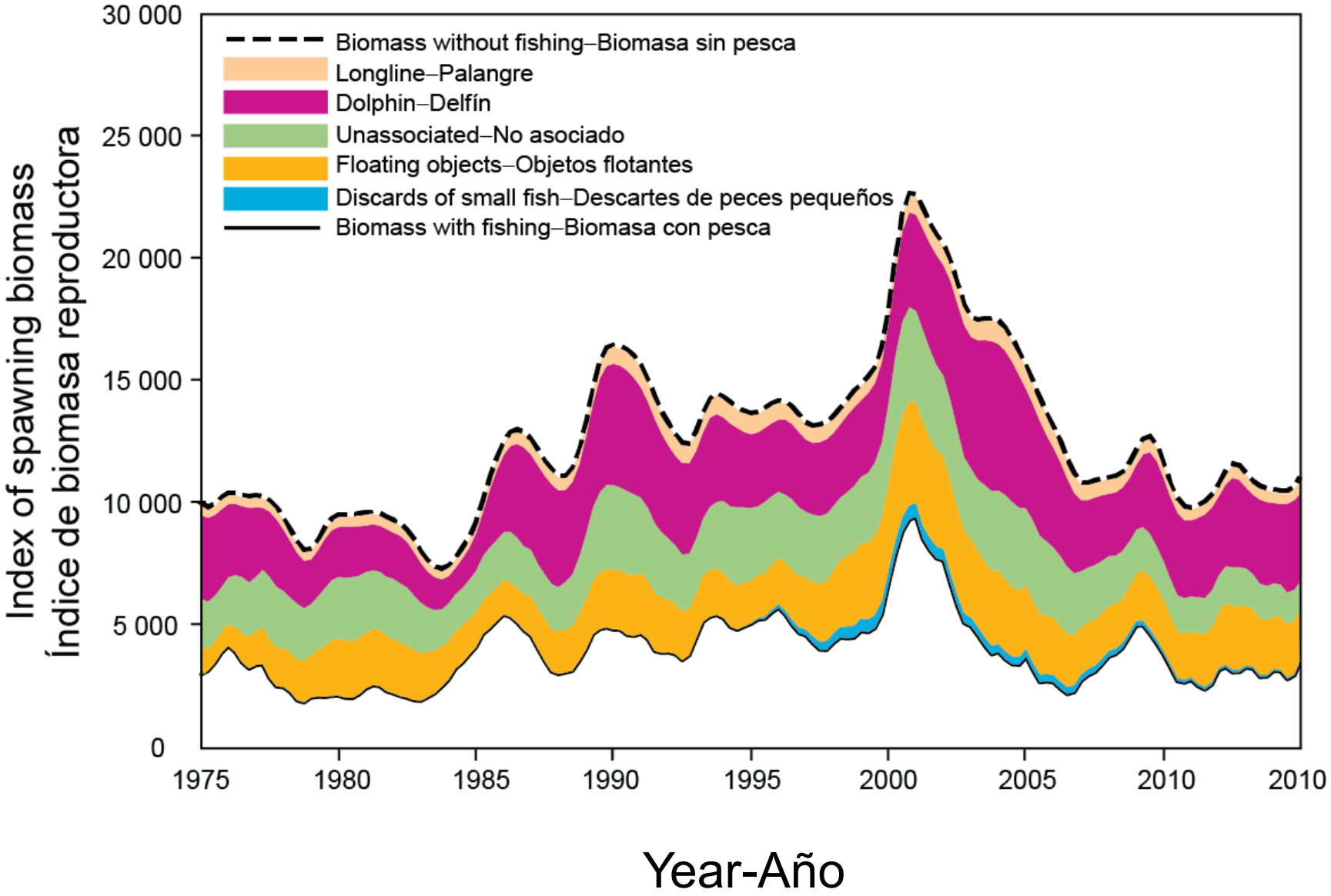
Spawning biomass



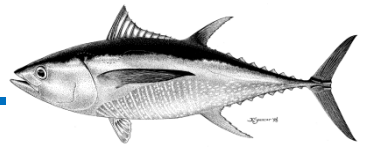


Fishery impact



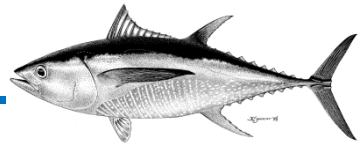


Management quantities

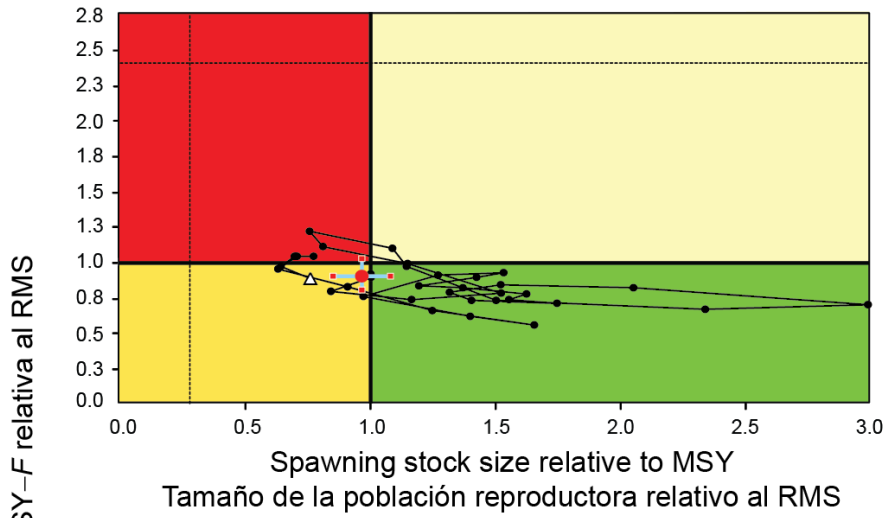


YFT	Base case Caso base
MSY-RMS	275,258
B_{MSY}- B_{RMS}	368,336
S_{MSY}- S_{RMS}	3,469
B_{MSY}/B_0- B_{RMS}/B_0	0.32
S_{MSY}/S_0- S_{RMS}/S_0	0.27
C_{recent}/MSY- C_{recent}/RMS	0.86
B_{recent}/B_{MSY}- B_{recent}/B_{RMS}	1.12
S_{recent}/S_{MSY}-S_{recent}/S_{RMS}	0.99
F multiplier-Multiplicador de F	1.11

Phase plots



Interim limit reference point



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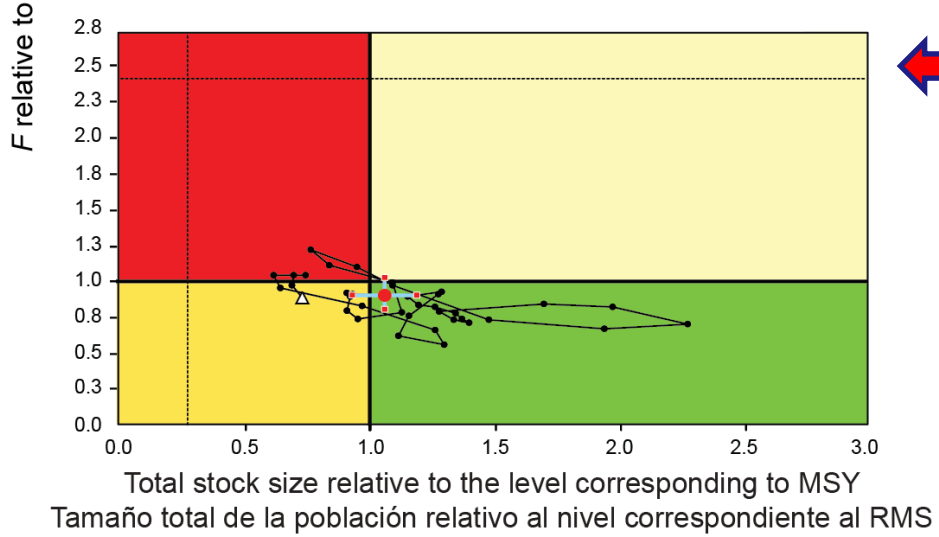
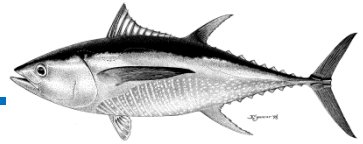
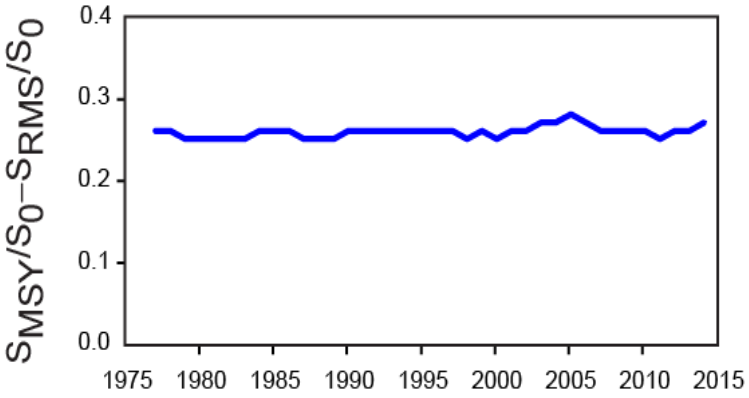
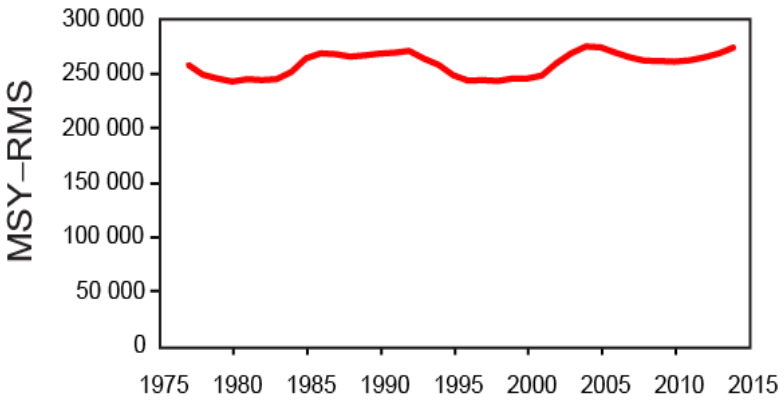
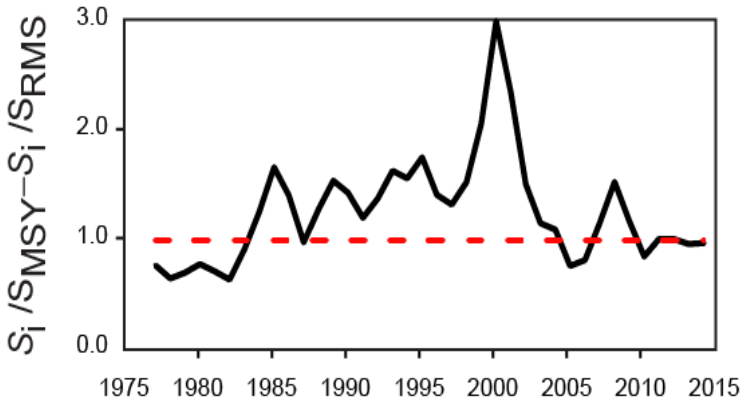


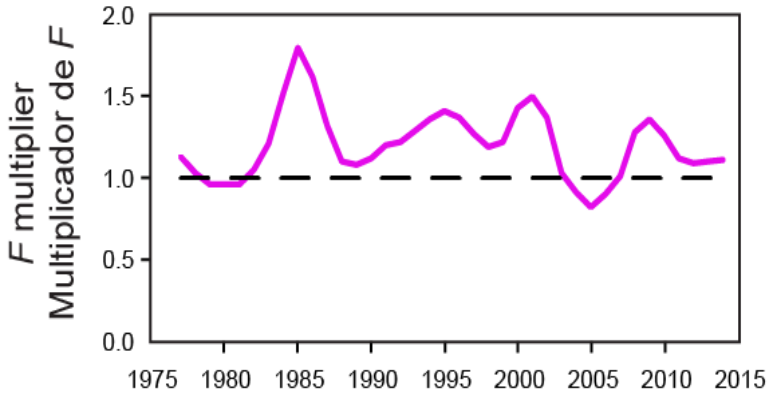
Time varying indicators



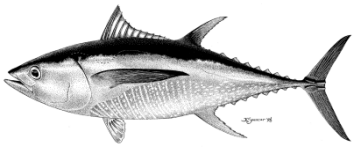








Management quantities



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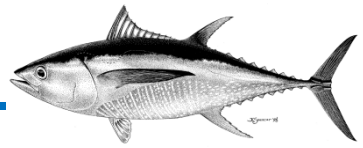
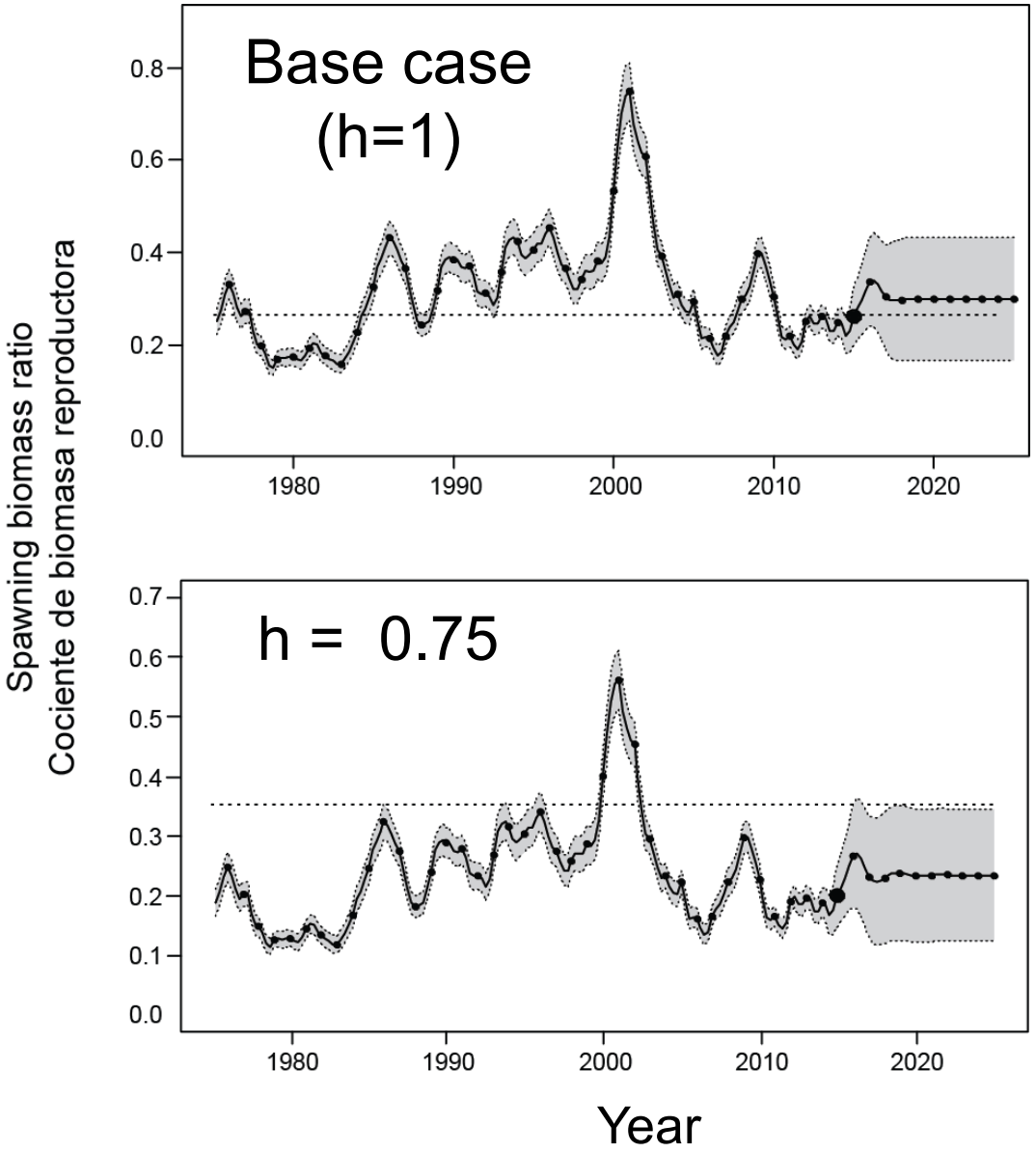
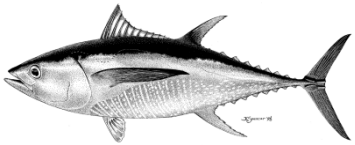
MSY-RMS	275,258	297,677
B_{MSY}- B_{RMS}	368,336	556,279
S_{MSY}- S_{RMS}	3,469	5,990
B_{MSY}/B_0- B_{RMS}/B_0	0.32	0.37
S_{MSY}/S_0- S_{RMS}/S_0	0.27	0.35
C_{recent}/MSY- C_{recent}/RMS	0.86	0.80
B_{recent}/B_{MSY}- B_{recent}/B_{RMS}	1.12	0.73
S_{recent}/S_{MSY}-S_{recent}/S_{RMS}	0.99	0.57
F multiplier-Multiplicador de F	1.11	0.71

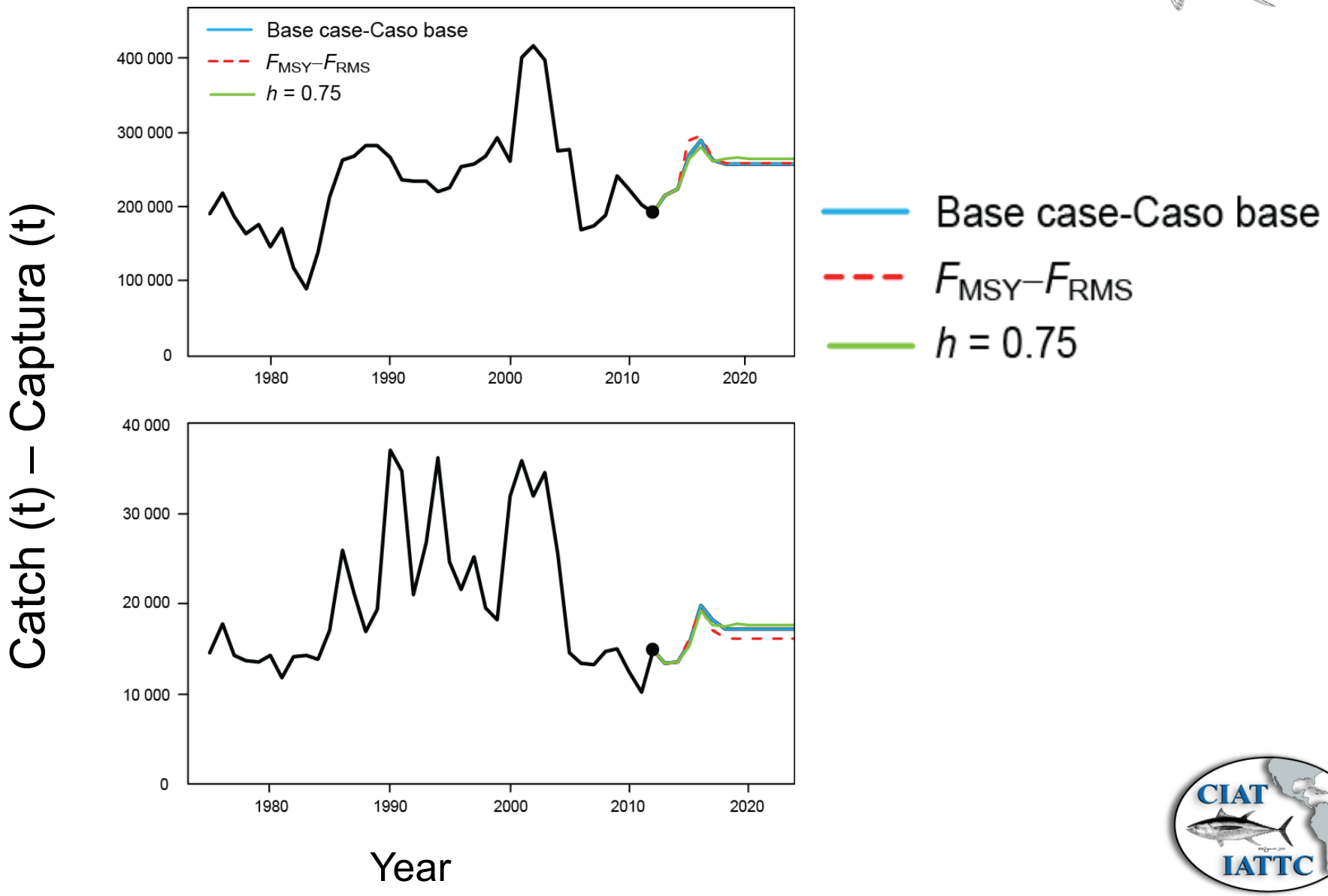
Spawning Biomass Ratio (SBR)



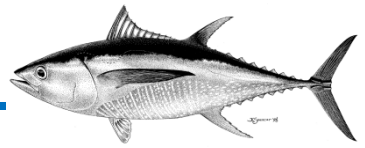


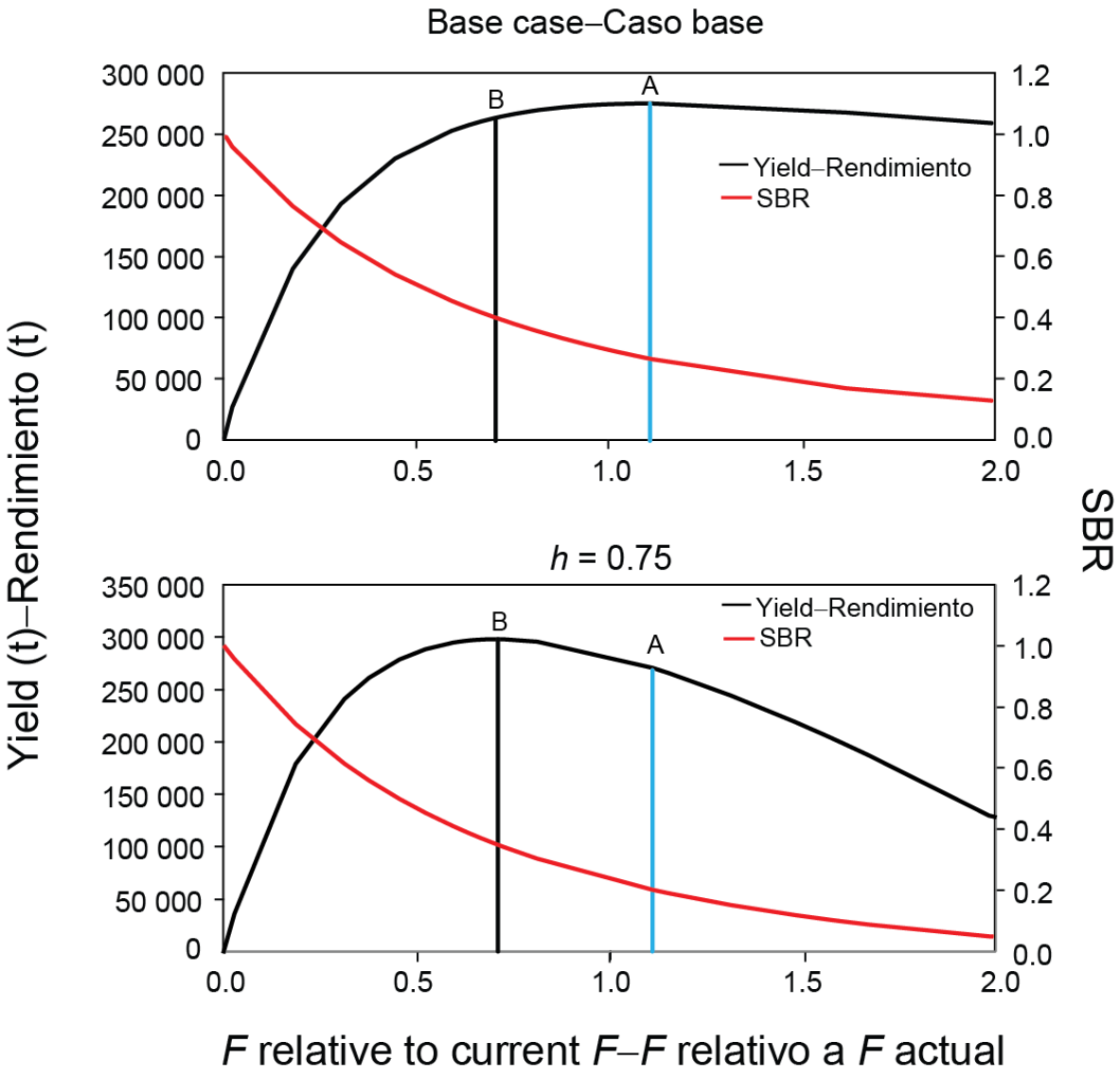
Projected catches – *Status quo* (F_{cur})





Yield





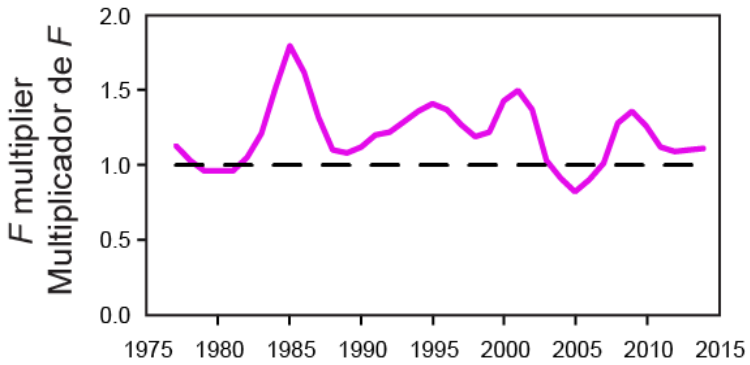
A- F_{MSY}, base case

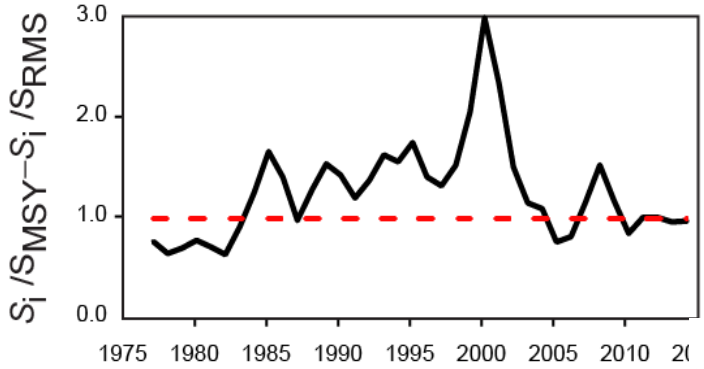
B - F_{MSY}, h=0.75

Summary: key results

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

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

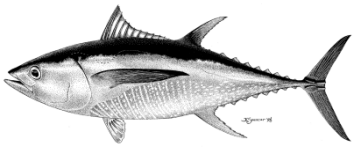




Plausible Sensitivities and Uncertainties

lessons from previous assessments and research

Summary



- 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)
- 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})
- Results are sensitive to the weighting given to the size composition data

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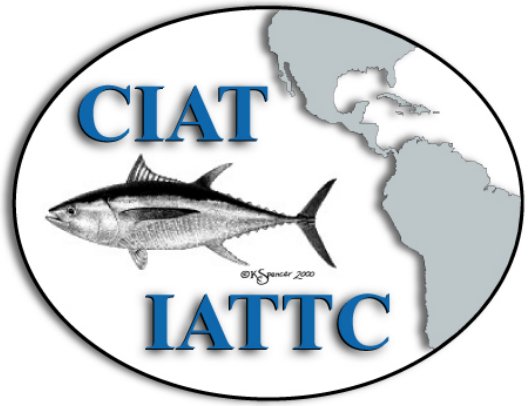
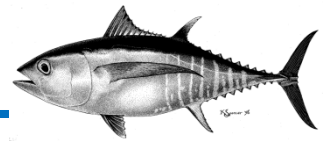
Thank you

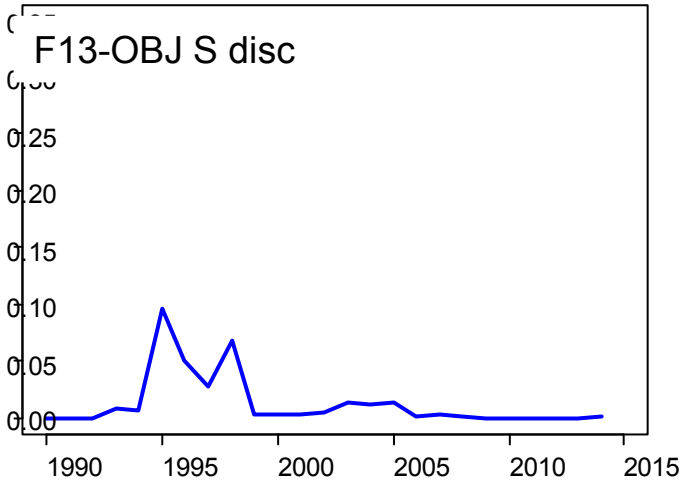


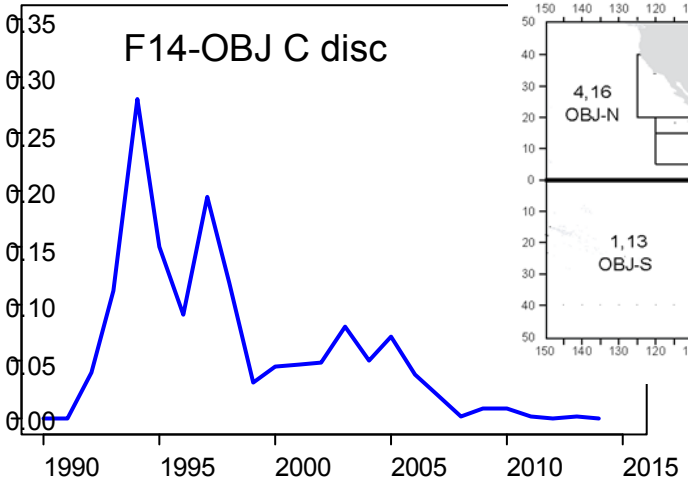
Extra slides

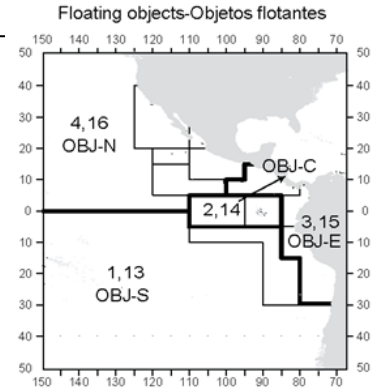
Discards OBJ

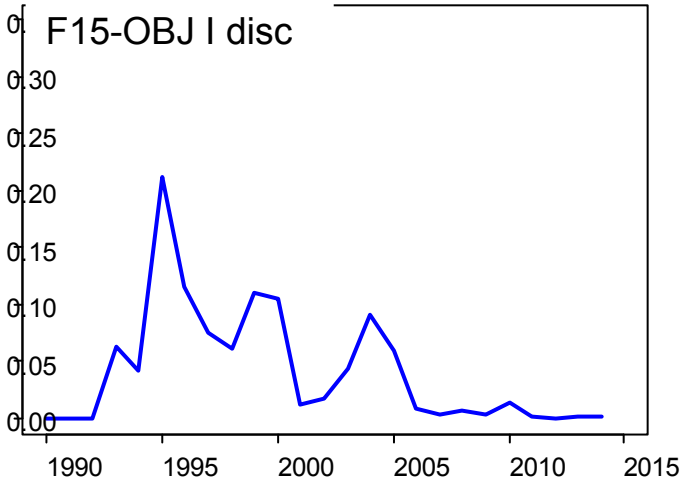


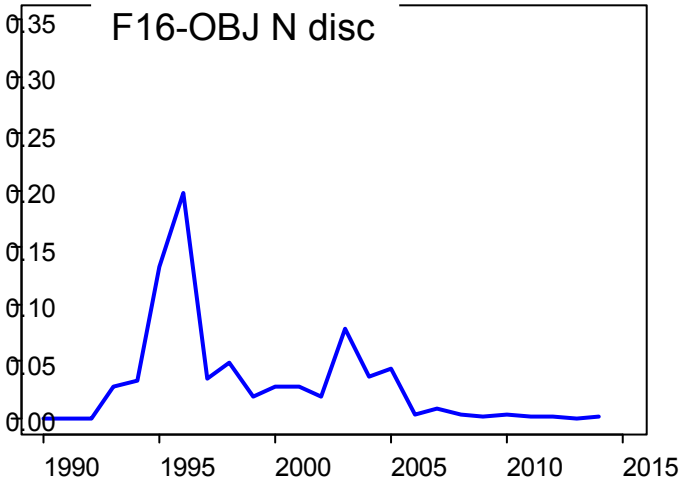
Discard proportions/Proporcion











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