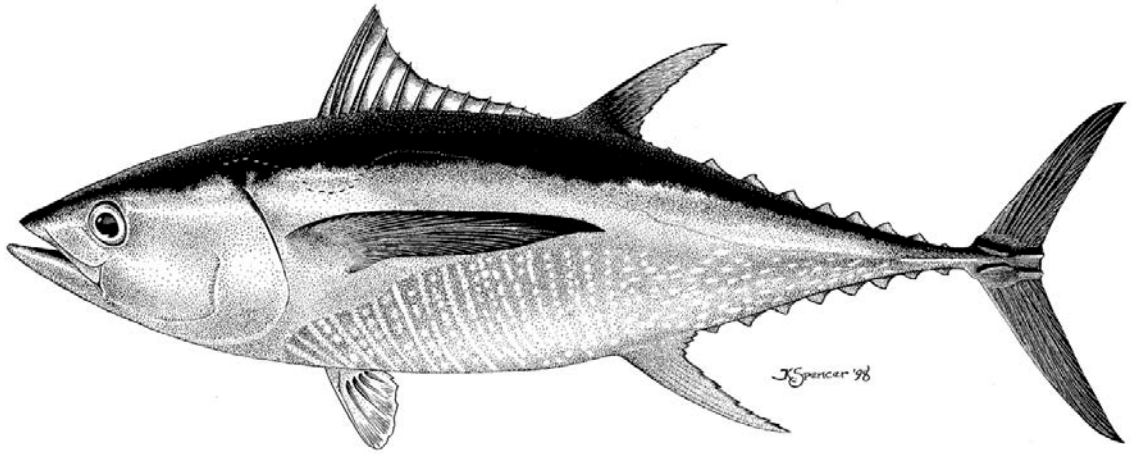
STATUS OF YELLOWFIN TUNA IN THE EASTERN PACIFIC OCEAN IN 2012

UPDATE OF 2012 STOCK ASSESSMENT

January 1975 – December 2012



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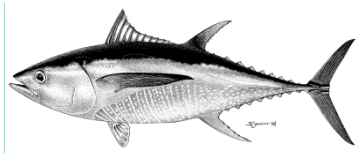
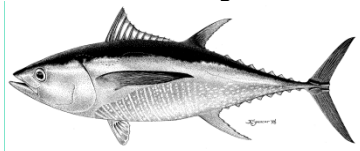
Outline



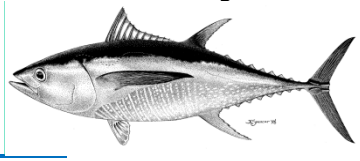
- Fishery data updates
- Stock assessment
  - Model assumptions
  - Results (fishing mortality, recruitment, biomasses)
  - Stock status (base case)
  - Stock-recruitment sensitivity analysis (steepness = 0.75)
  - Population projections (*status quo* and F_{MSY})
- Summary conclusions

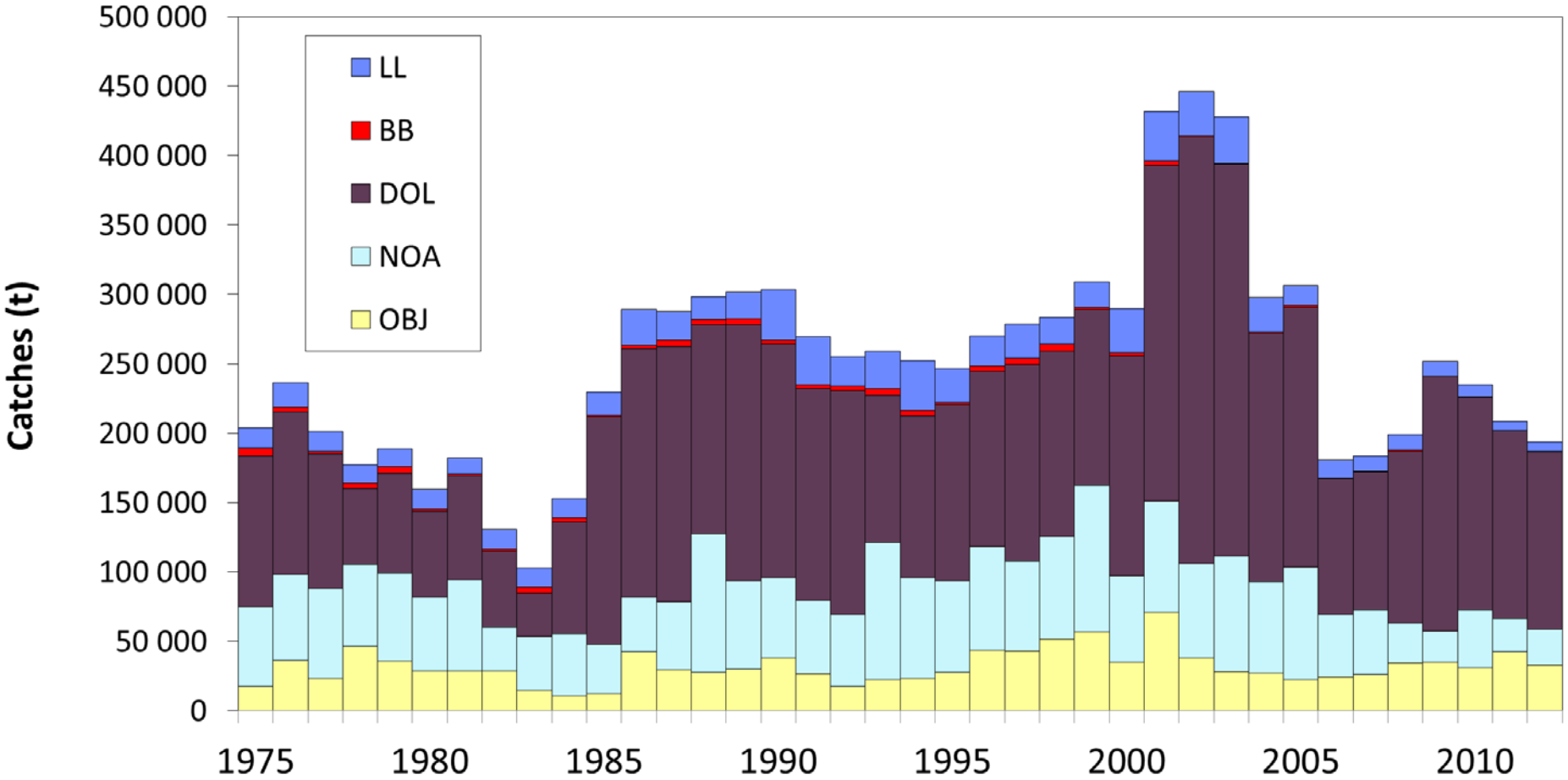
New or updated data



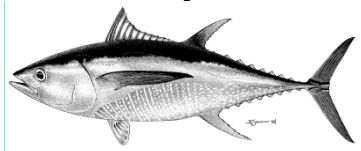
- Surface fisheries
  - Catch, CPUE and size-frequency data updated and new data for 2012 .
- Longline fisheries
  - New or updated longline catch data: China (2009, 2010), Chinese Taipei (2010-2011), Japan (2009-2011), Korea (2011), the United States (2010-2011) and Vanuatu (2005-2011)
  - New or updated CPUE data available for Japan (2008-2011)
  - New or updated longline size-frequency for Japan (2006-2011)

Total catches





Model assumptions



2012 update assessment = same model as in SAC3

- Fishery definitions: 16 fisheries
- Data weighting: the CV of the southern LL fishery was fixed (0.2), others estimated (NOA, DEL)
- Growth modeling: Richards curve, L2 and variance of length-at-age are fixed
- 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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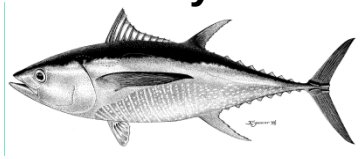
YFT fishery definitions



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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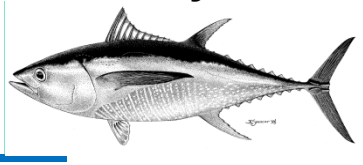
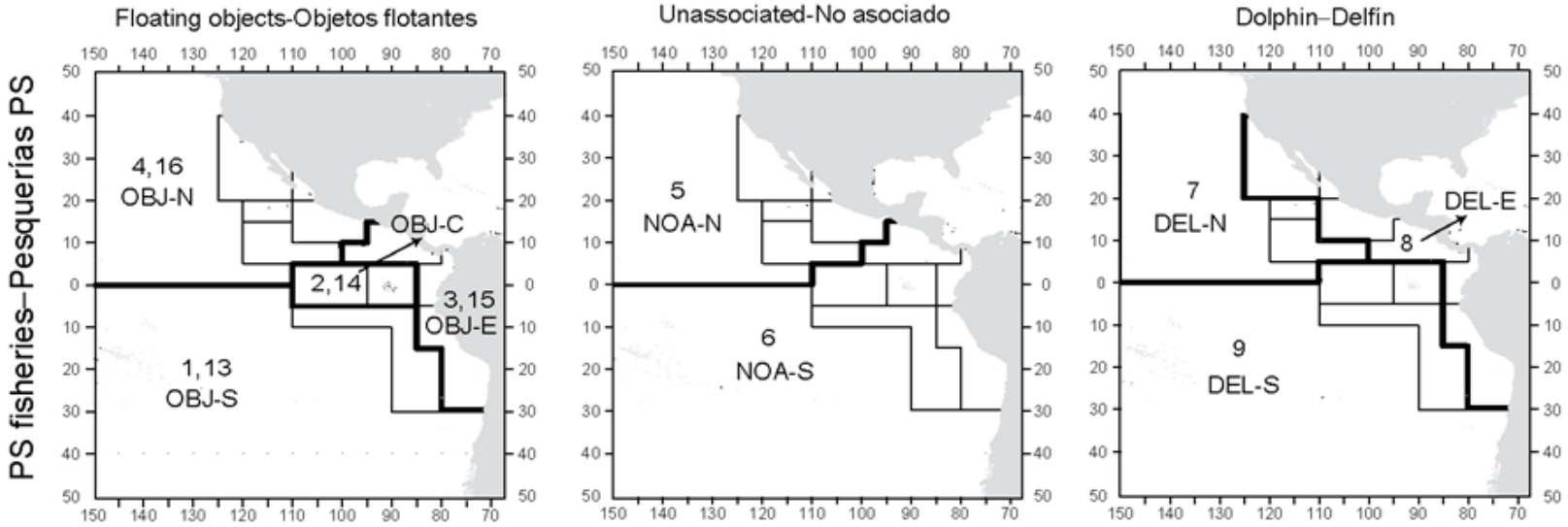
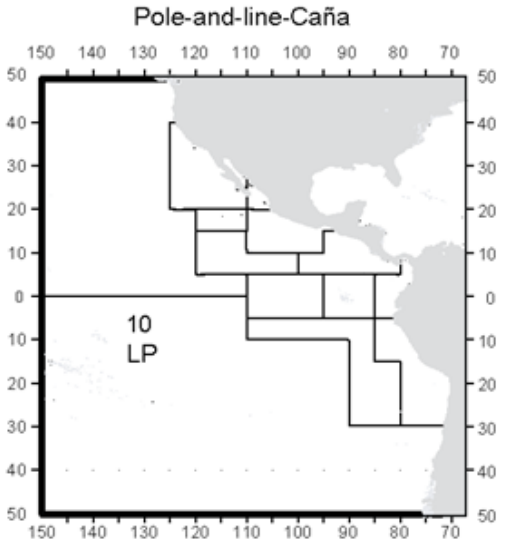
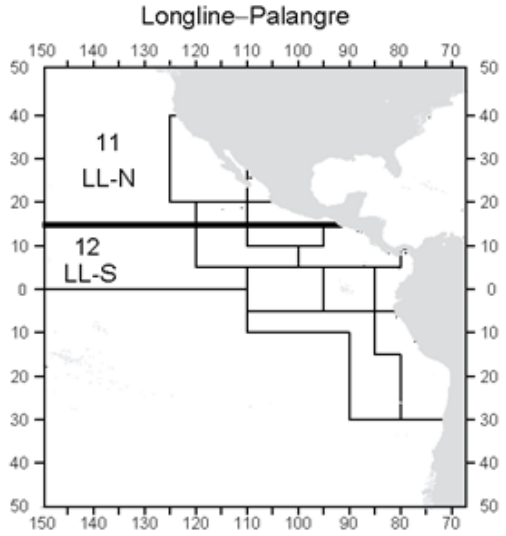
YFT fishery definitions

Fishery data









__ IATTC length-frequency sampling areas

__ fishery definition areas

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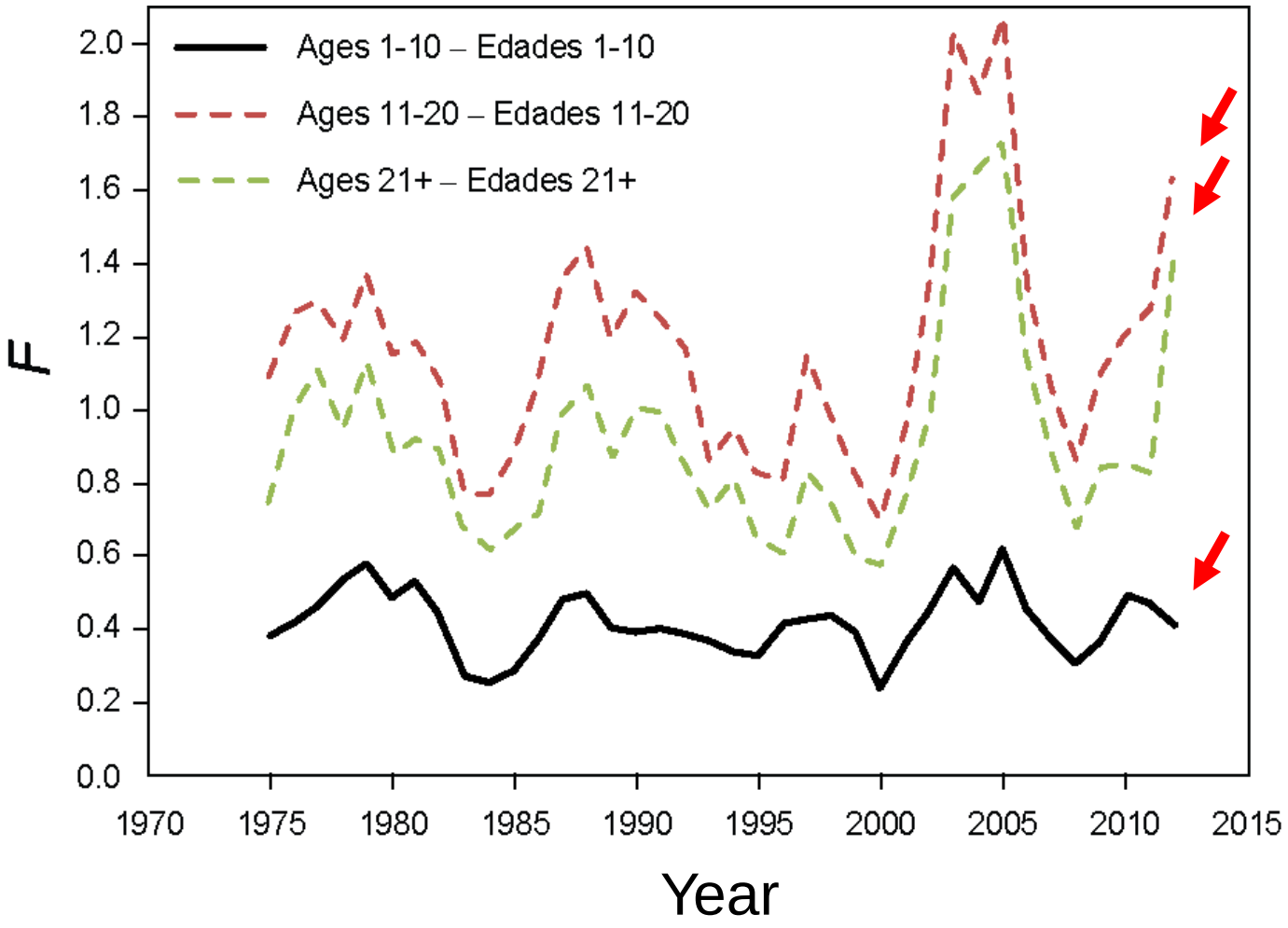
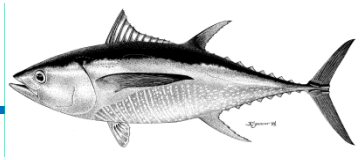
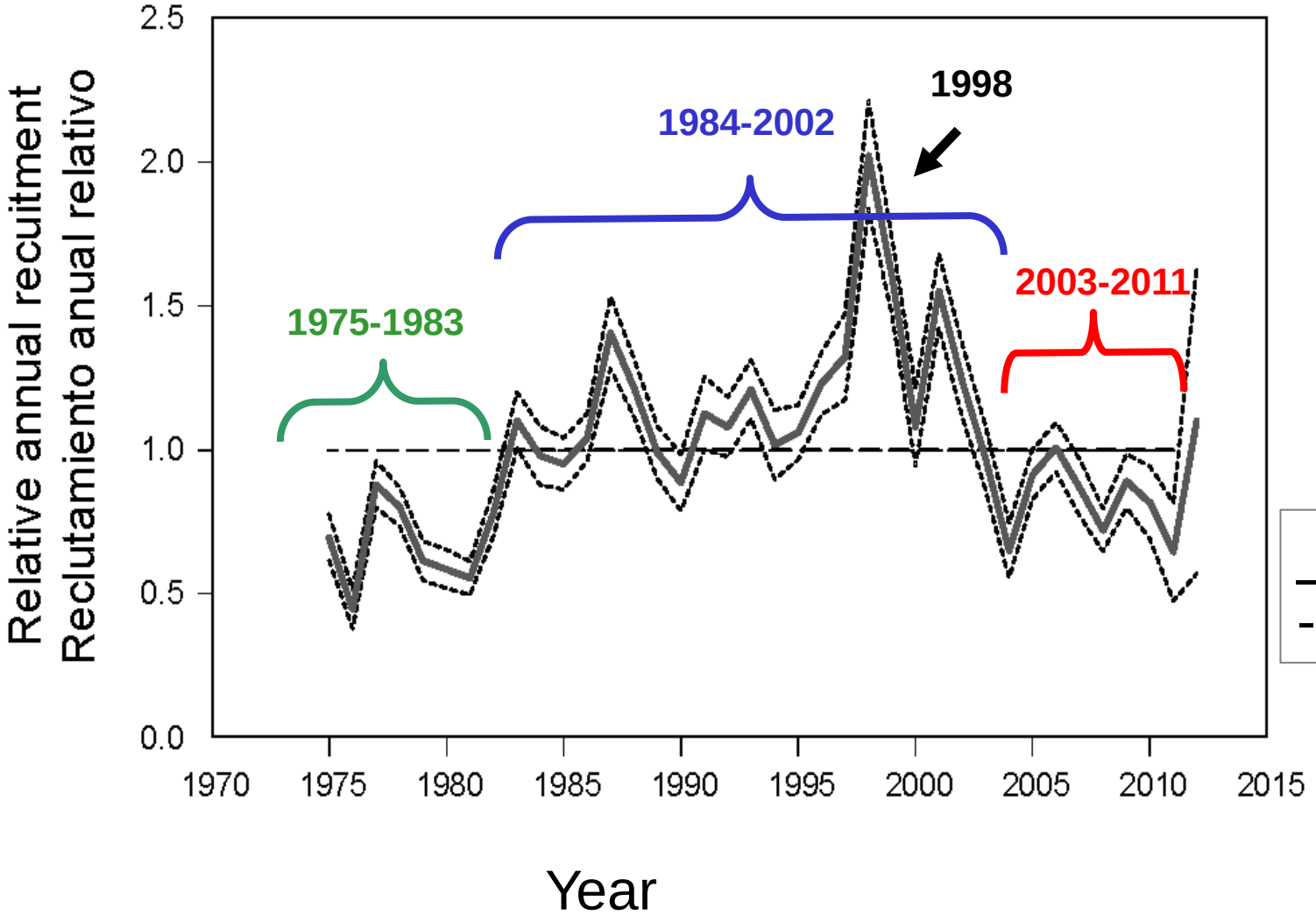
Fishing mortality

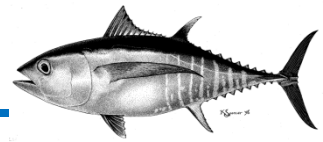


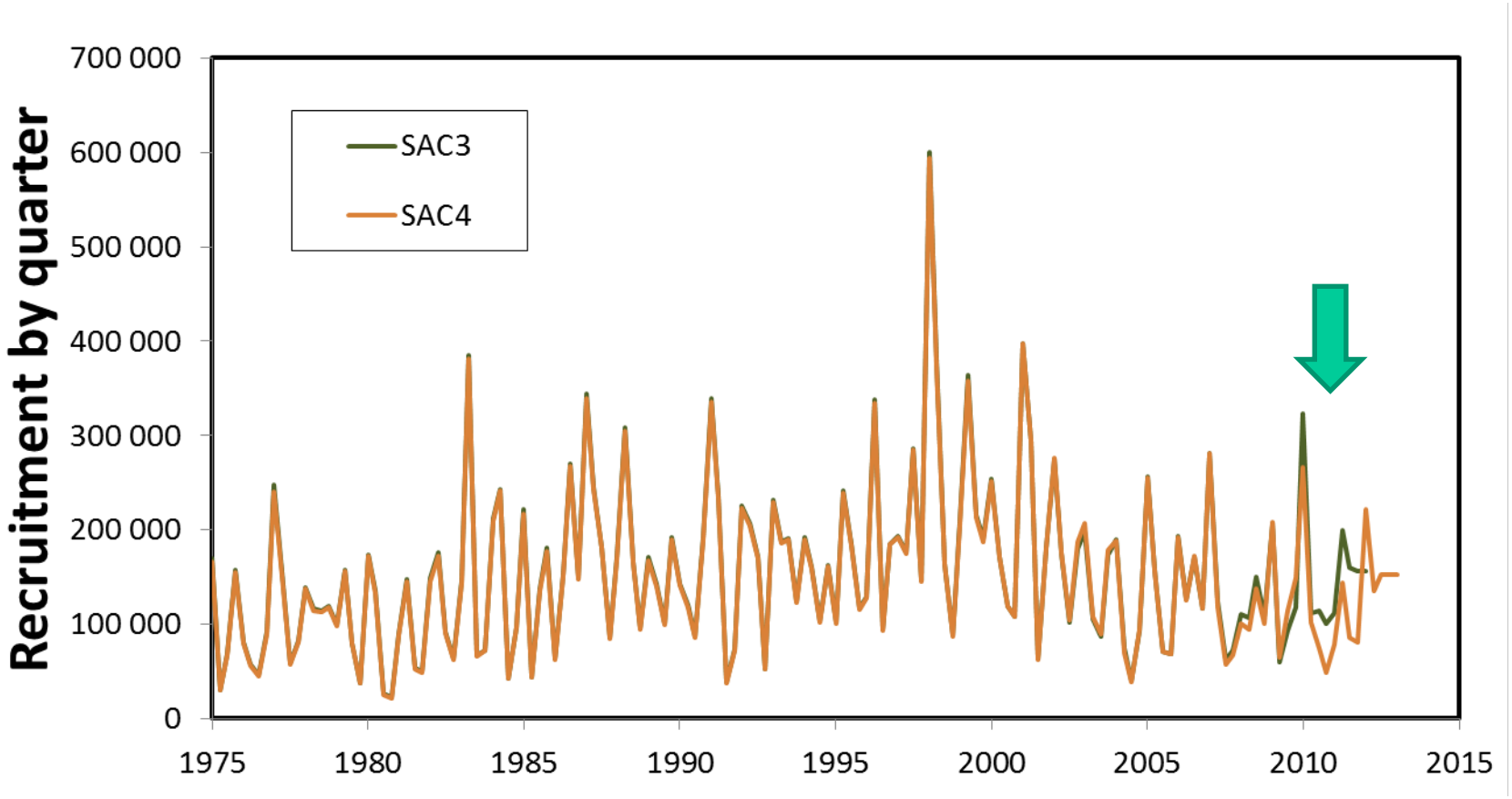
Recruitment



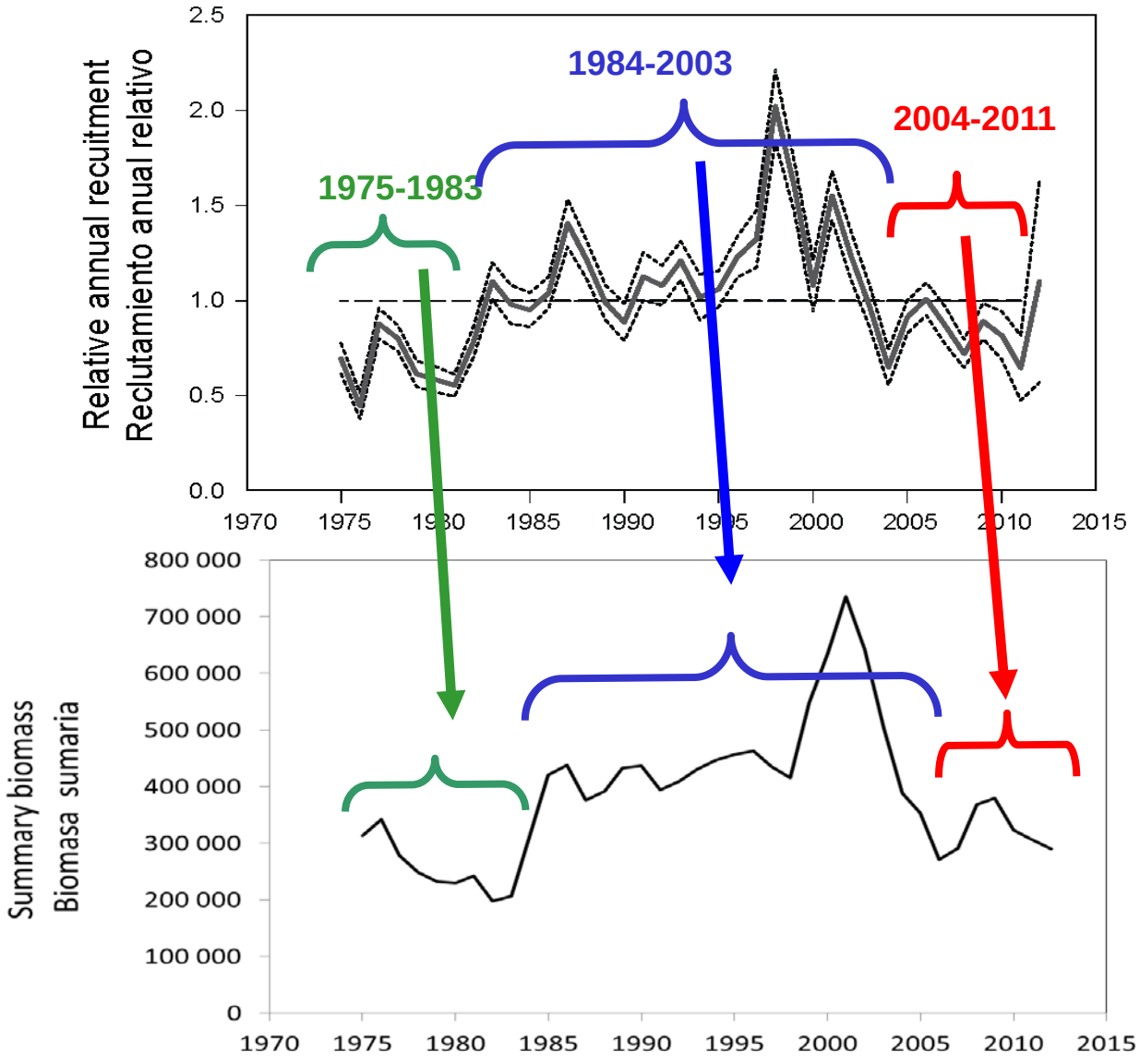


Recruitment

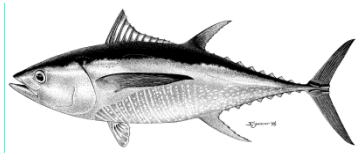


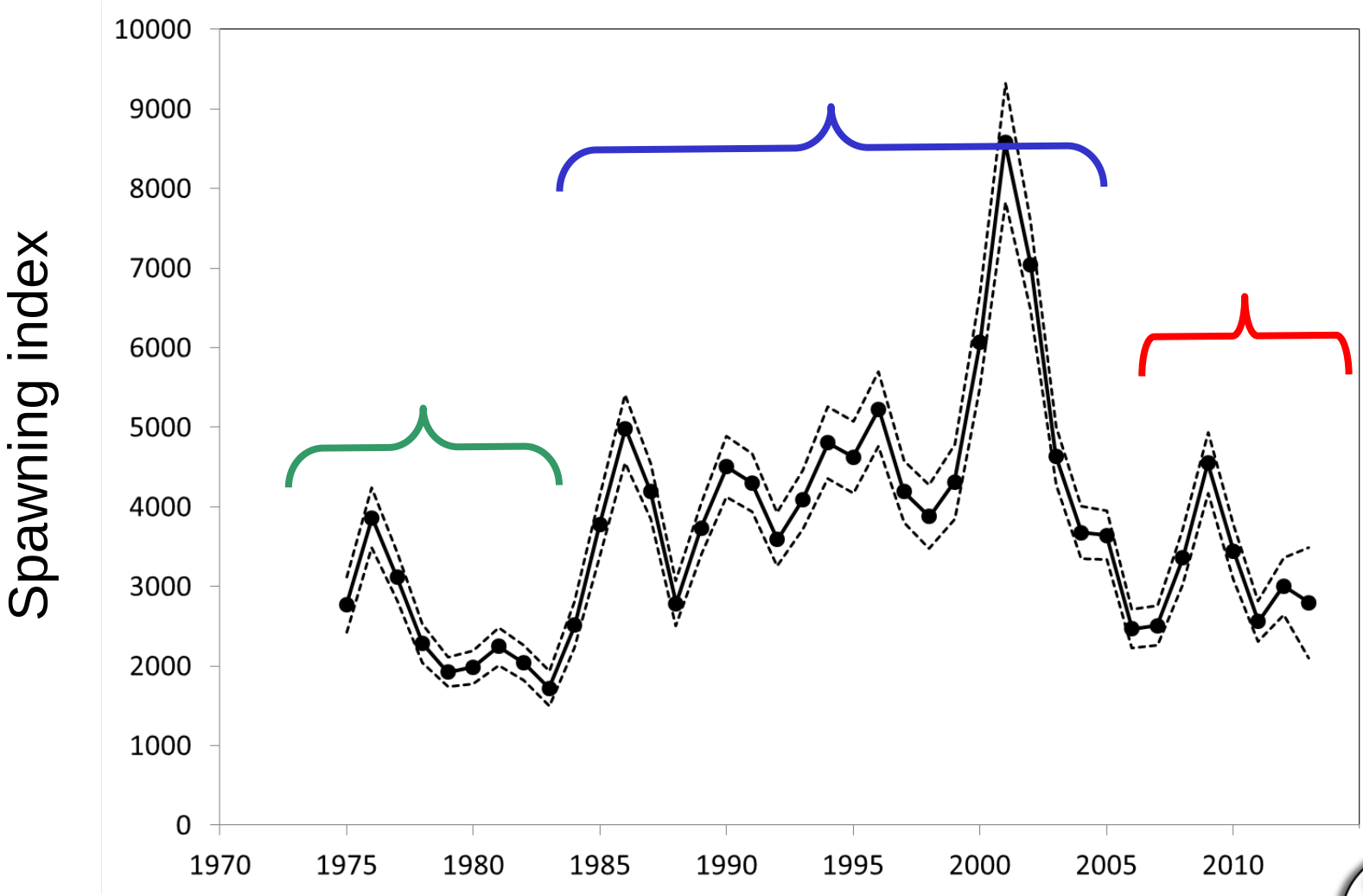


Summary biomass



Spawning biomass





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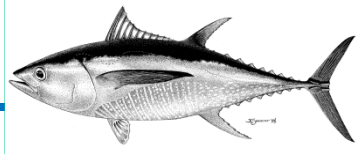
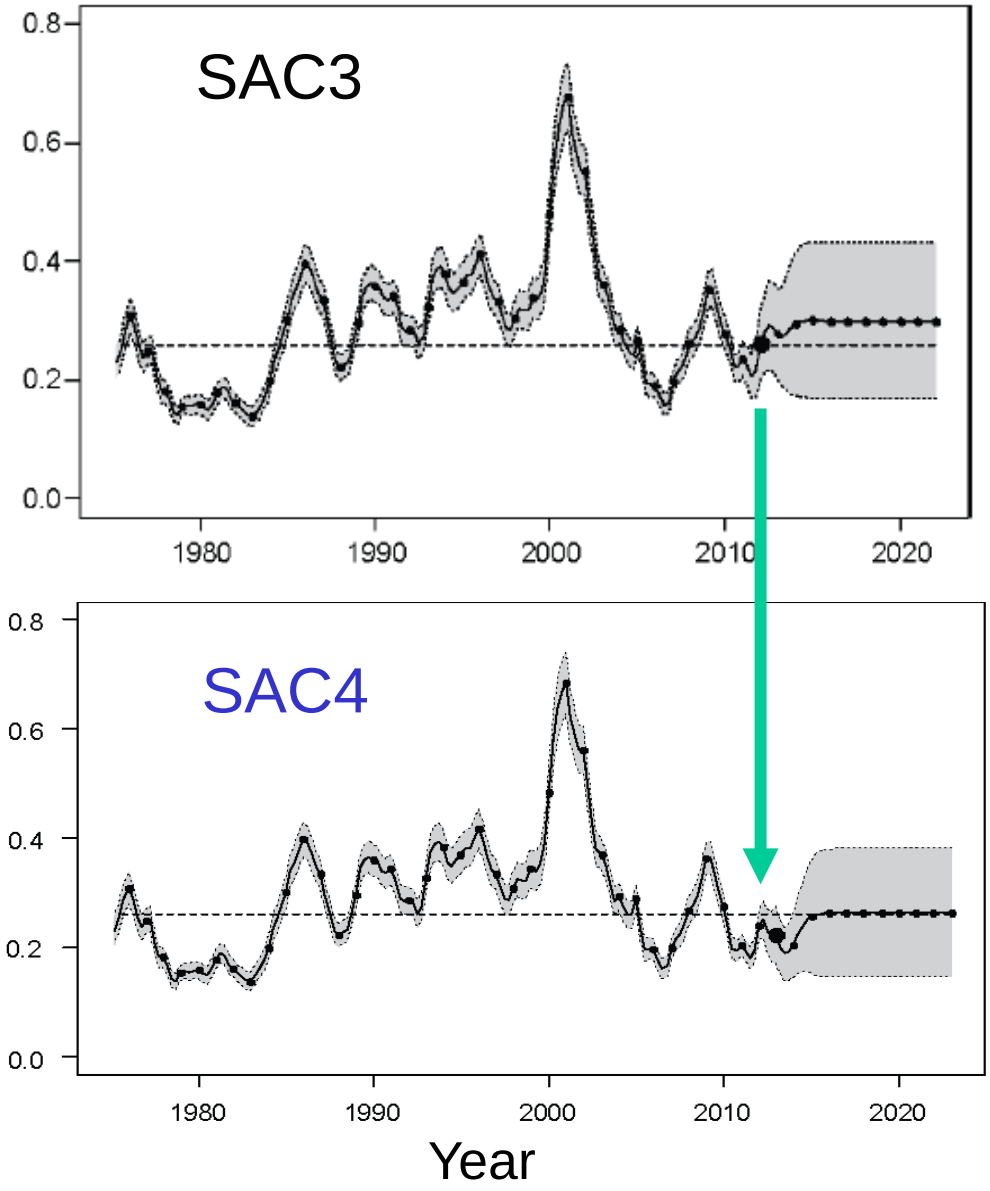
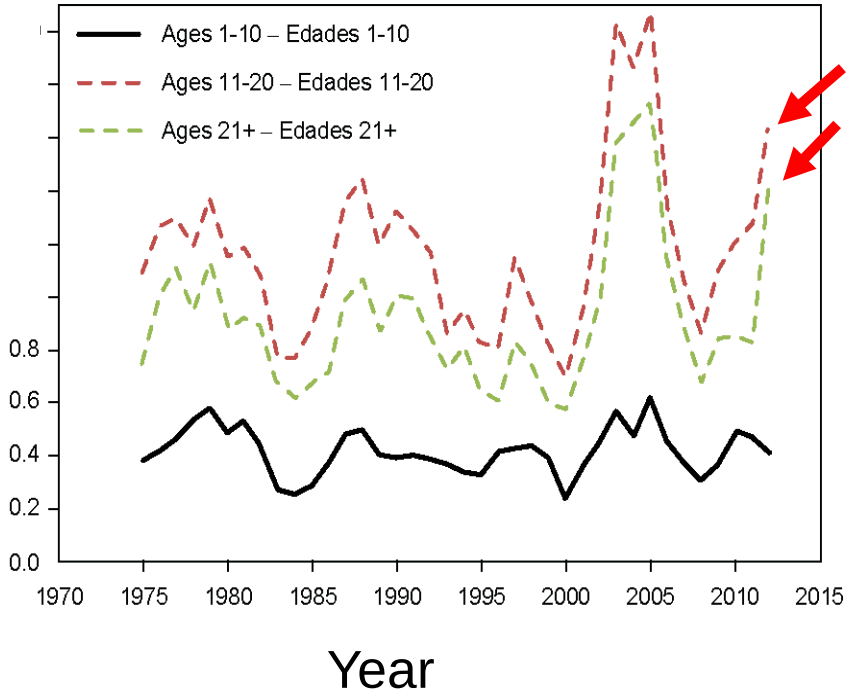
Spawning Biomass Ratio (SBR)

Stock status (base case)

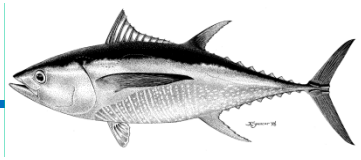


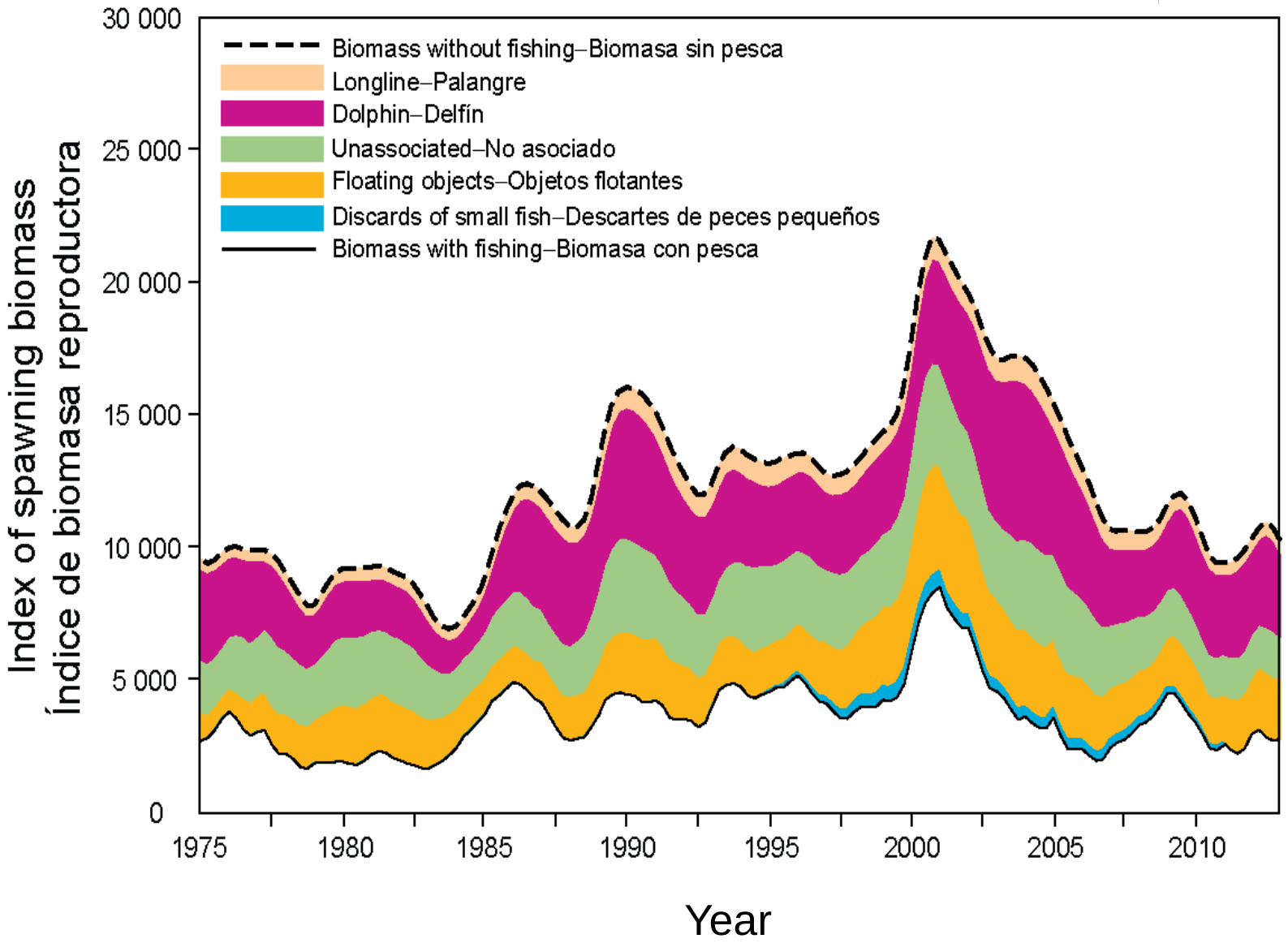




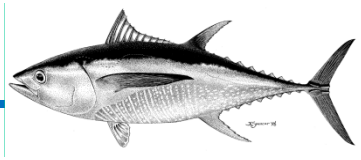
Fishery impact

Results (base case)





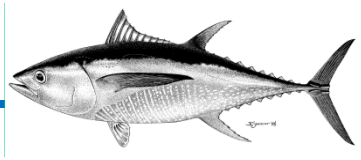
Management quantities

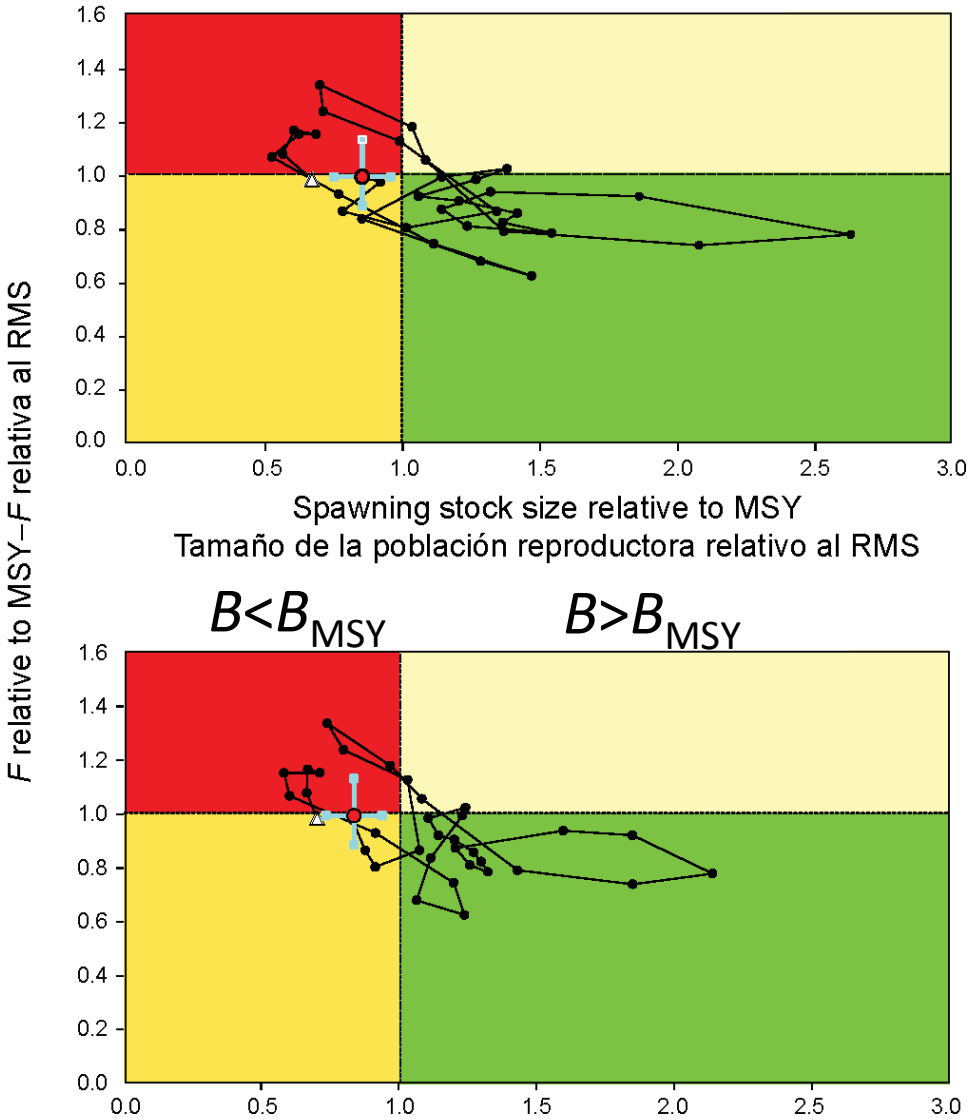


YFT	Base case Caso base
MSY-RMS	258,836
B_{MSY}- B_{RMS}	349,480
S_{MSY}- S_{RMS}	3,269
B_{MSY}/B_0- B_{RMS}/B_0	0.32
S_{MSY}/S_0- S_{RMS}/S_0	0.26
C_{recent}/MSY- C_{recent}/RMS	0.75
B_{recent}/B_{MSY}- B_{recent}/B_{RMS}	0.83
S_{recent}/S_{MSY}-S_{recent}/S_{RMS}	0.85
F multiplier-Multiplicador de F	1.01

Phase plots (targets)

Stock status (base case)

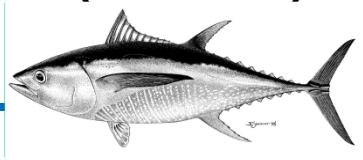


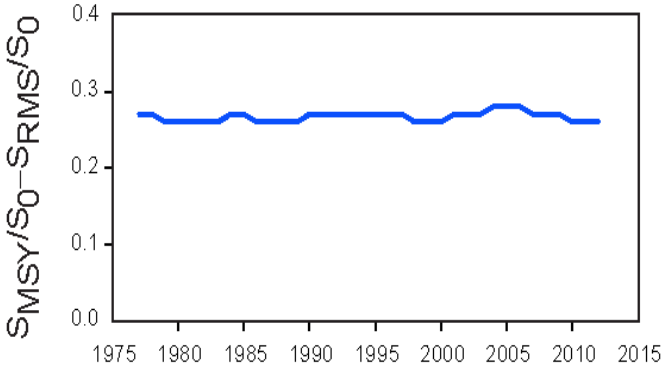


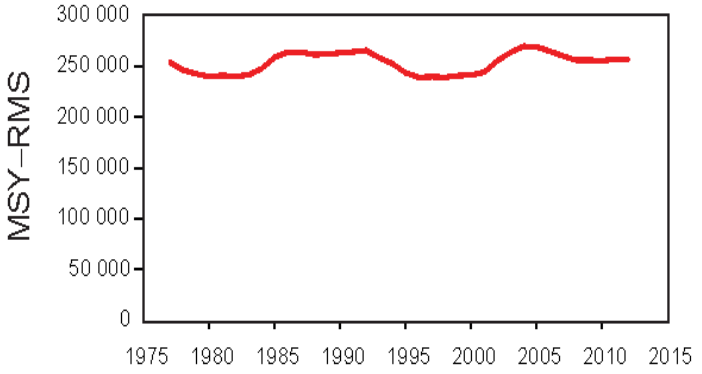
Biomass age 3+ quarters / B_{MSY}

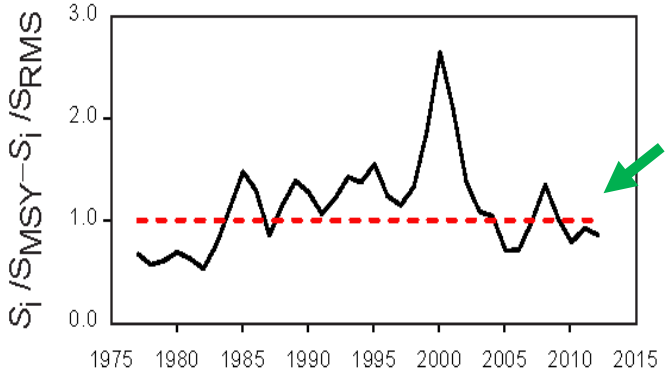
Time varying indicators

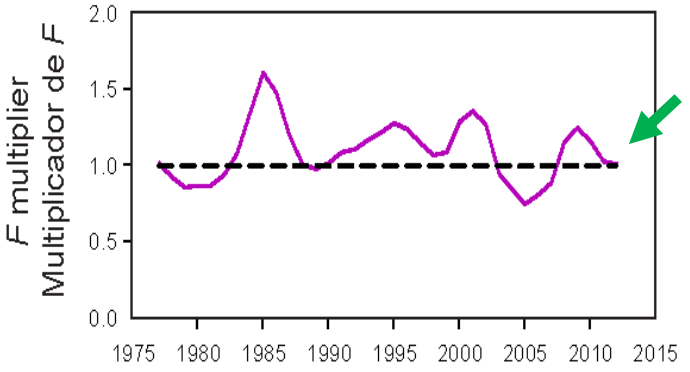
Stock status (base case)



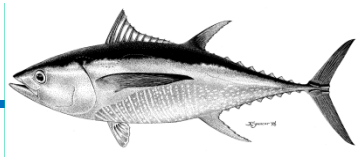






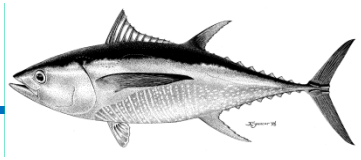


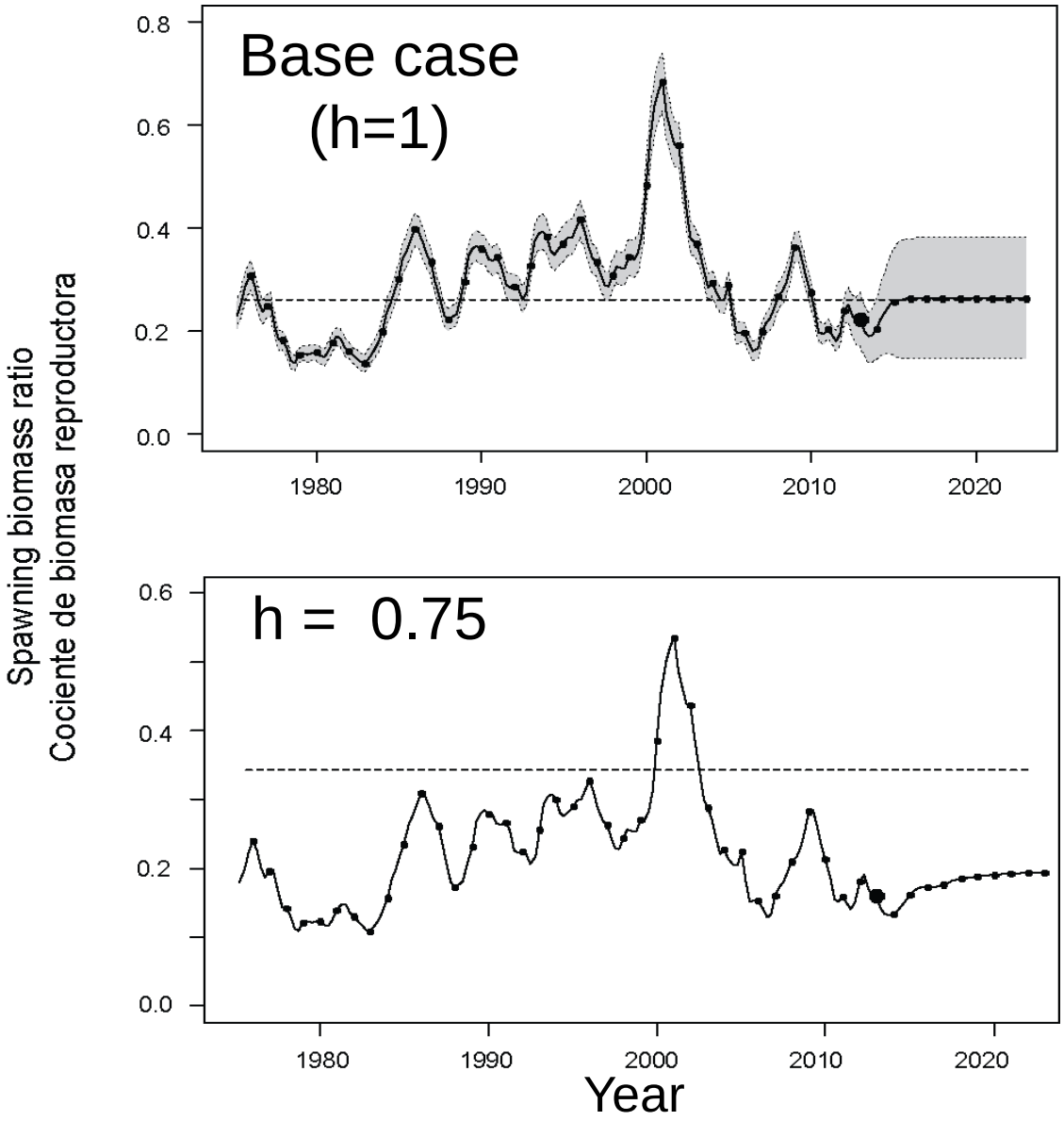
Management quantities



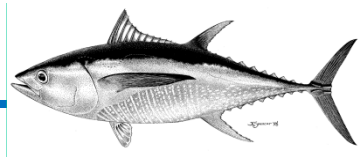
YFT	Base case Caso base	$h = 0.75$
MSY-RMS	258,836	278,453
B_{MSY}- B_{RMS}	349,480	535,094
S_{MSY}- S_{RMS}	3,269	5,715
B_{MSY}/B_0- B_{RMS}/B_0	0.32	0.36
S_{MSY}/S_0- S_{RMS}/S_0	0.26	0.34
C_{recent}/MSY- C_{recent}/RMS	0.75	0.70
B_{recent}/B_{MSY}- B_{recent}/B_{RMS}	0.83	0.48
S_{recent}/S_{MSY}-S_{recent}/S_{RMS}	0.85	0.46
F multiplier-Multiplicador de F	1.01	0.64

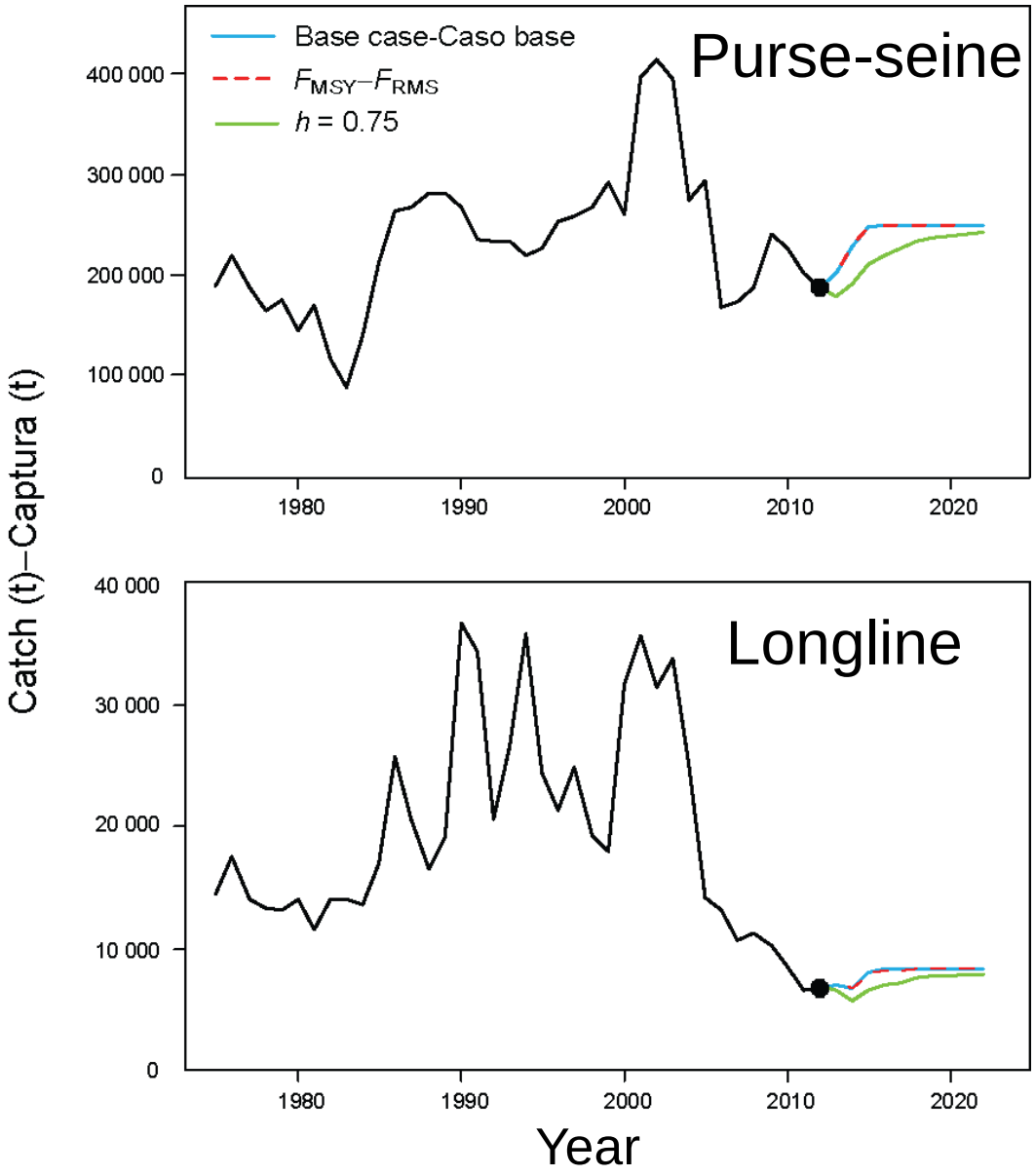
Spawning Biomass Ratio (SBR)



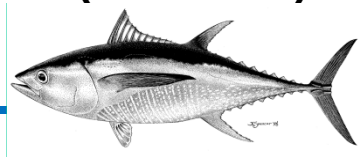


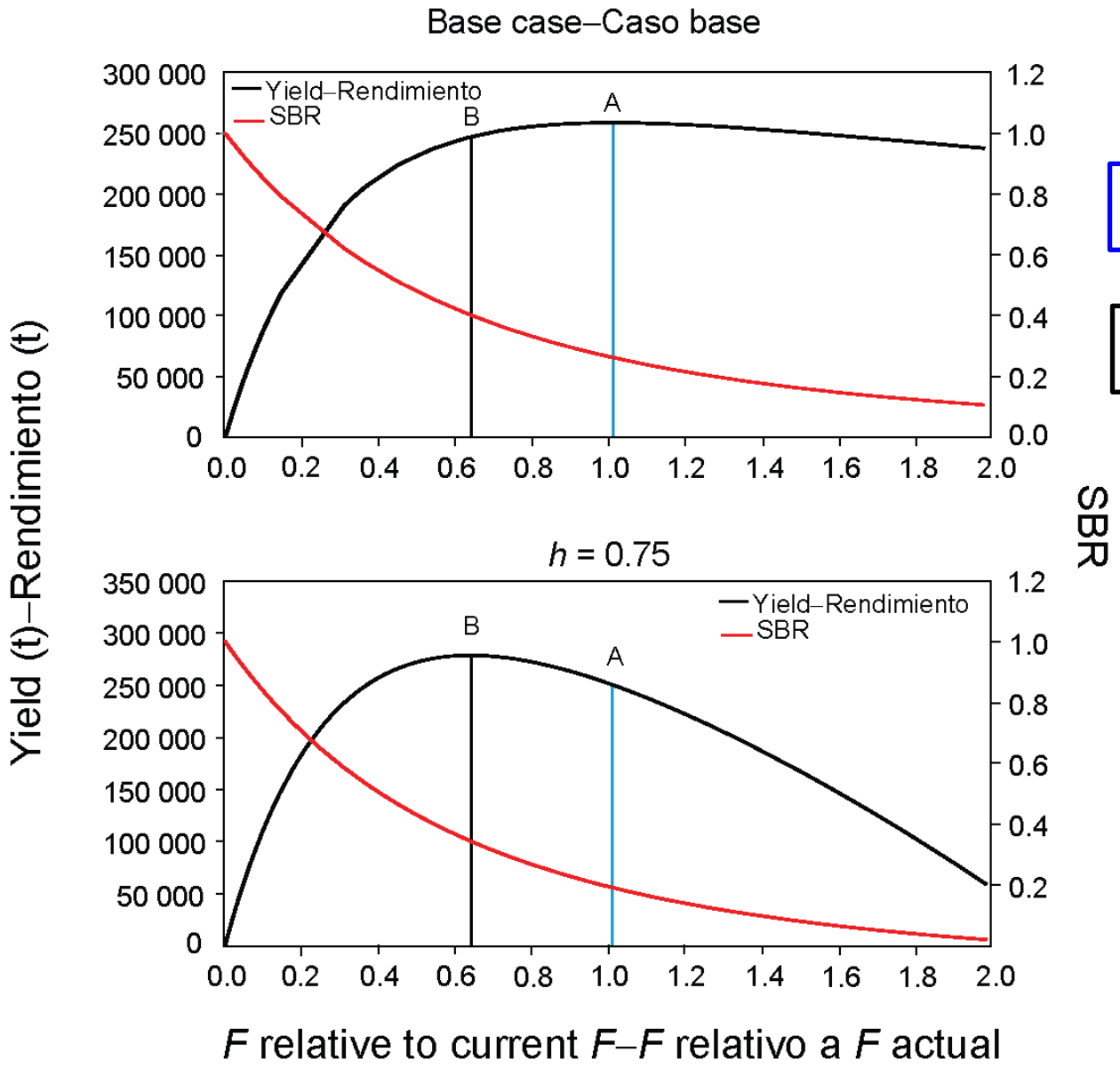
Projected catches – *Status quo* (F_{cur})





Yield





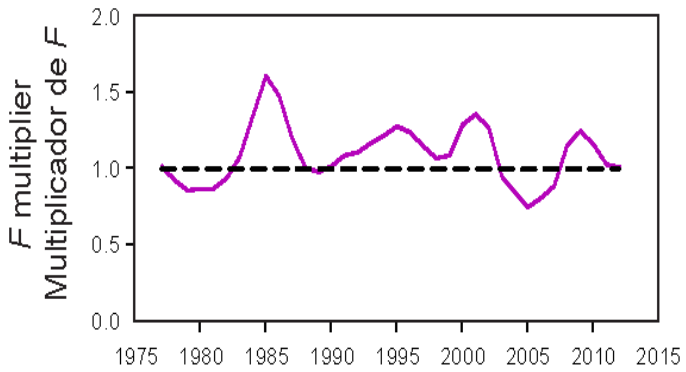
A- F_{MSY}, base case

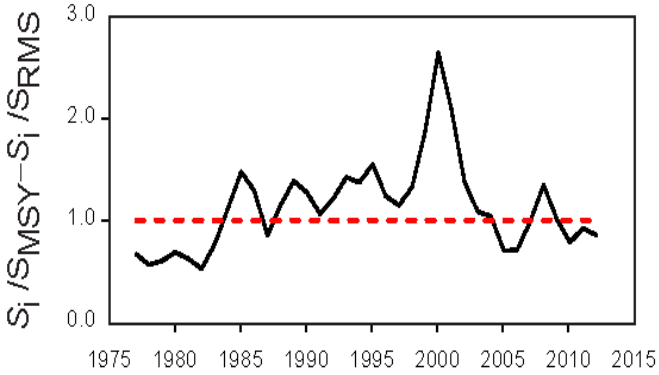
B - F_{MSY}, h=0.75

Summary: key results

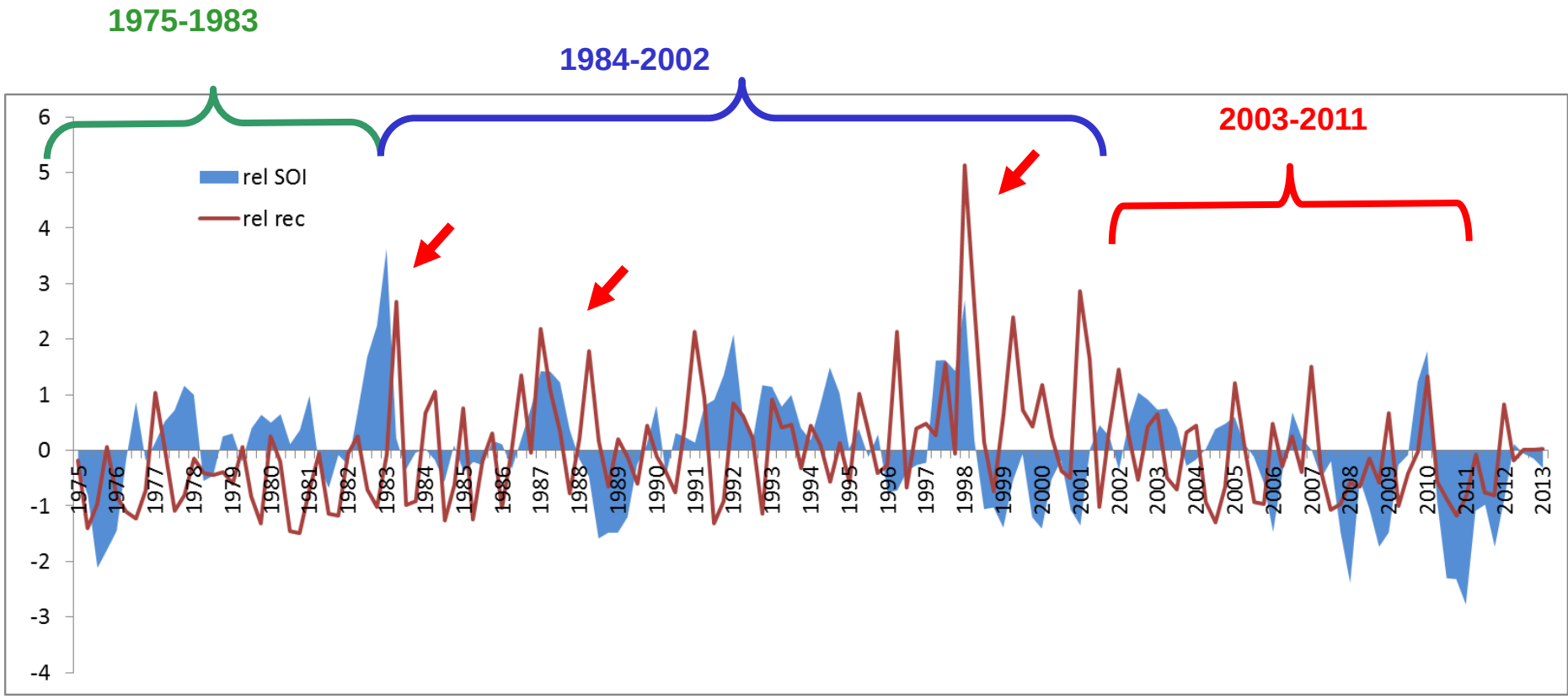
- The recent **fishing mortality** rates are estimated to be around those corresponding to the MSY($F_{recent} \cong F_{MSY}$)

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



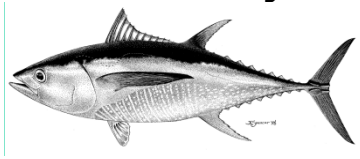


Potential environmental effects



Plausible Sensitivities and Uncertainties
- lessons from previous assessments

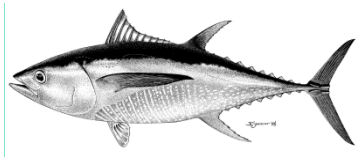
Summary



- 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})

Future directions



- A new model will be produced incorporating the recommendations of the external review panel.