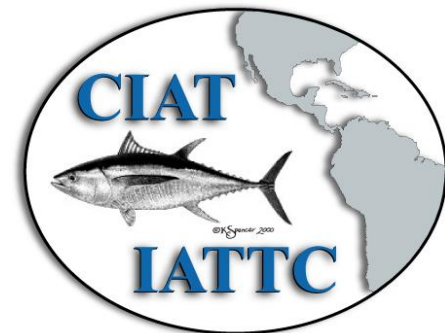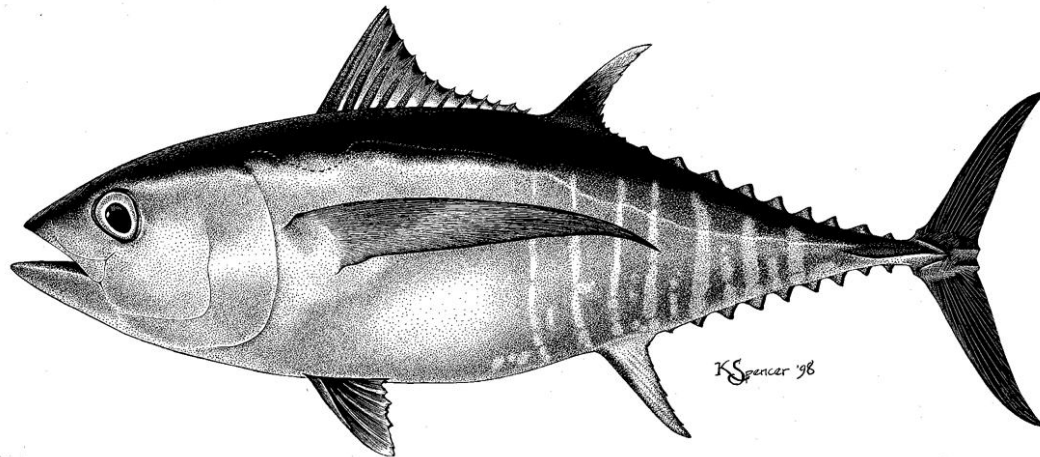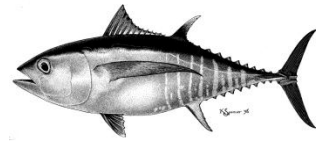# STOCK ASSESSMENT OF BIGEYE TUNA IN THE EASTERN PACIFIC OCEAN: UPDATE
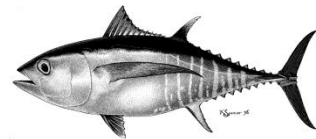
January 1975 – December 2010

Outline

- Stock assessment (base case model)

  - Fishery data updates

  - Model assumptions

  - Results (fishing mortality, recruitment, biomasses, others)

  - Stock status (base case)

  - Simulations (effect of resolutions, *status quo* and F_{MSY})

- Stock-recruitment sensitivity analysis (steepness = 0.75)

- Summary conclusions

# New or updated data

- ## Surface fisheries

  - Catch, CPUE and size-frequency data updated to include new data for 2010 and revised data for earlier years

- ## Longline fisheries

  - New or updated longline catch data: French Polynesia (2009), Japan (2008-2010), Korea (2009) and USA (2008-2009)

  - 2010 longline catch data available from monthly reports: China, French Polynesia, Korea, USA, Vanuatu

  - New or updated CPUE data available for Japan (2008-2010)

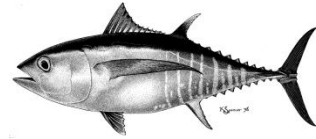 - New or updated longline size-frequency data available for Japan (2007-2009)
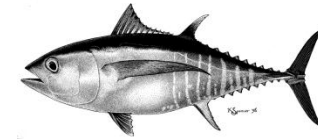
Total catches
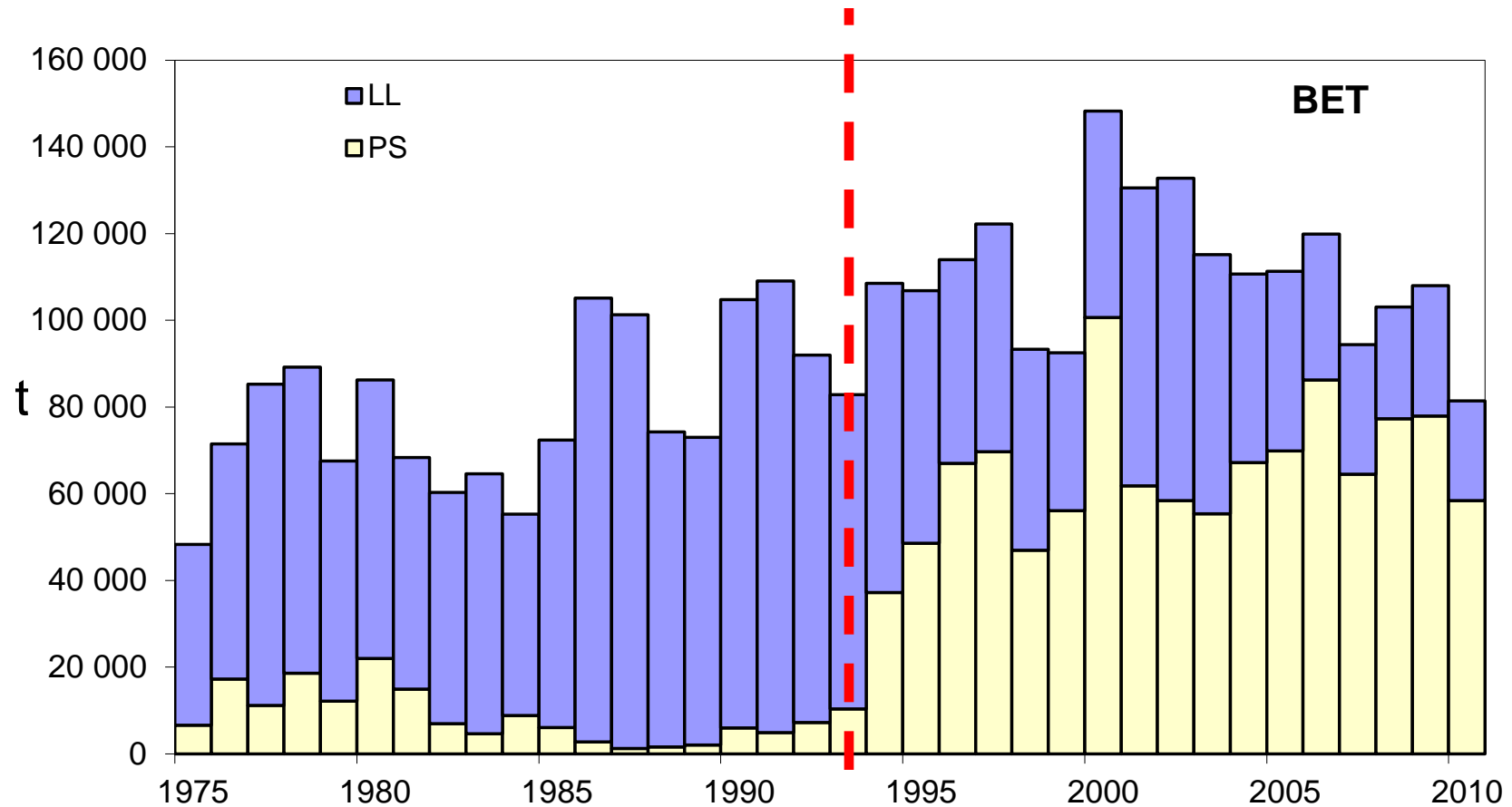
Expansion of FAD fishery

Model assumptions

- Same model as in SAC1 (improved after External Review in May 2010)

- Fishery definitions: New spatial definitions of logline fisheries (4 fisheries)

- Data weighting: the CV of the southern LL fishery was fixed (0.15) rather than estimated

- Growth modeling: Richards curve, L2 fixed, variance of length-at-age estimated rather than fixed

- Modeling of catchability and selectivity:
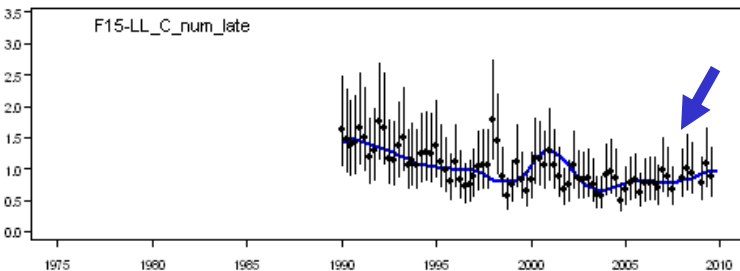 - Two time blocks for all LL fisheries
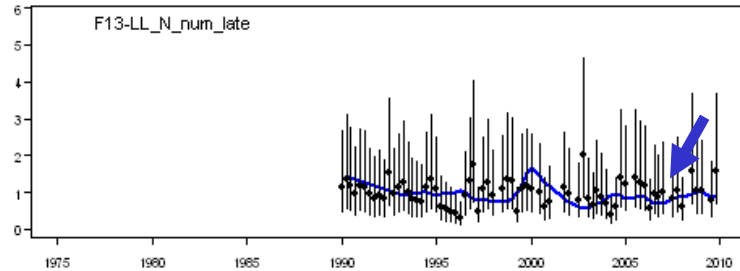 - Early dome, late asymptotic selectivities

Fit to CPUE – Late LL fisheries
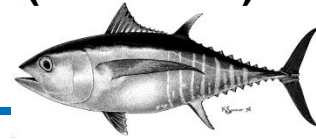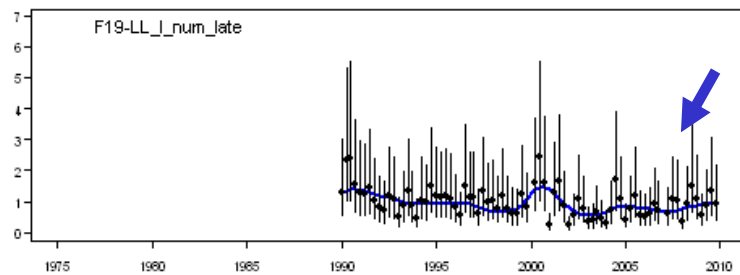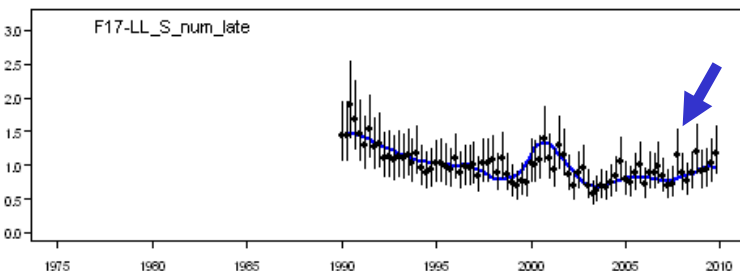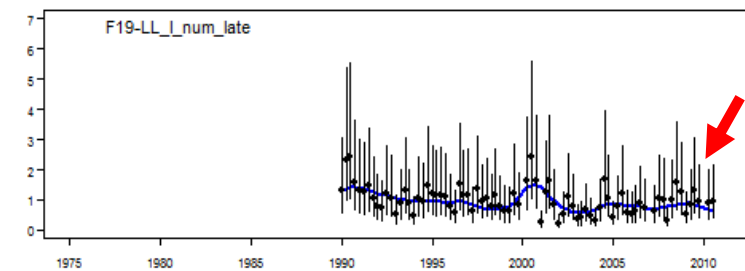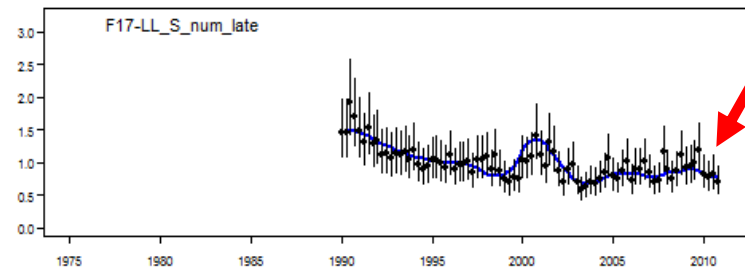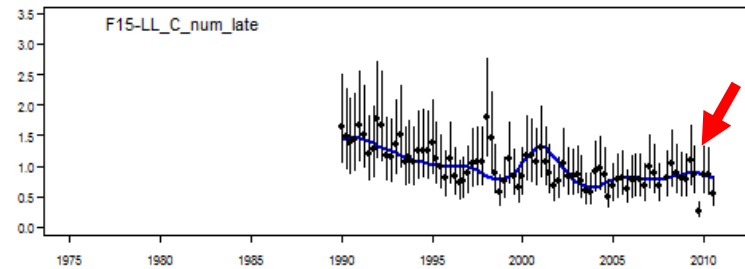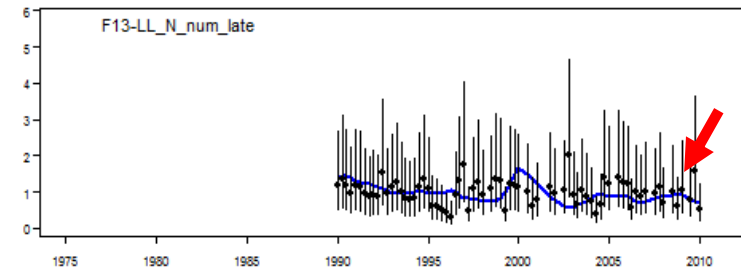
Age-specific fishing mortality
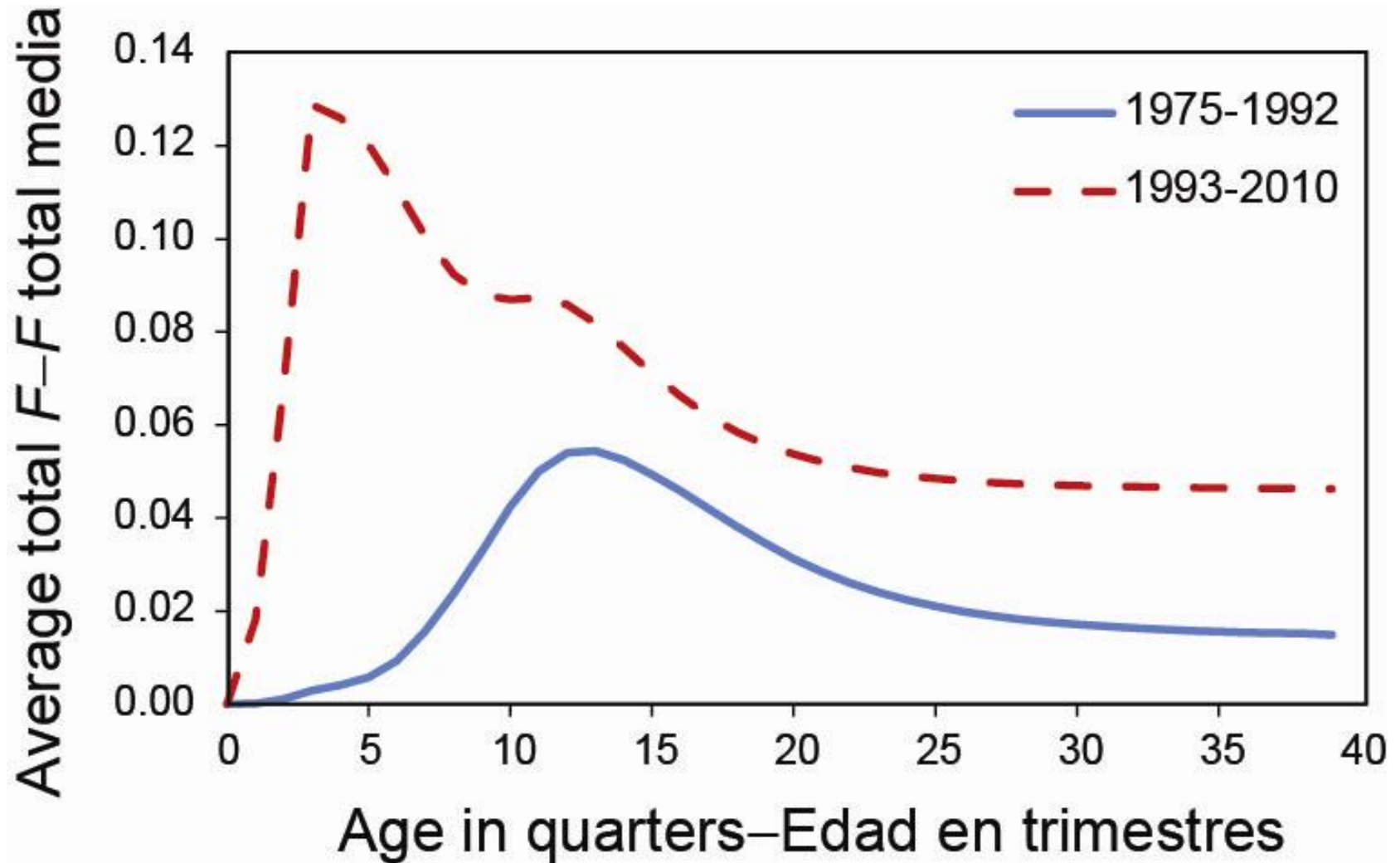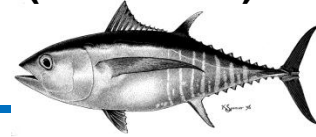
Fishing mortality
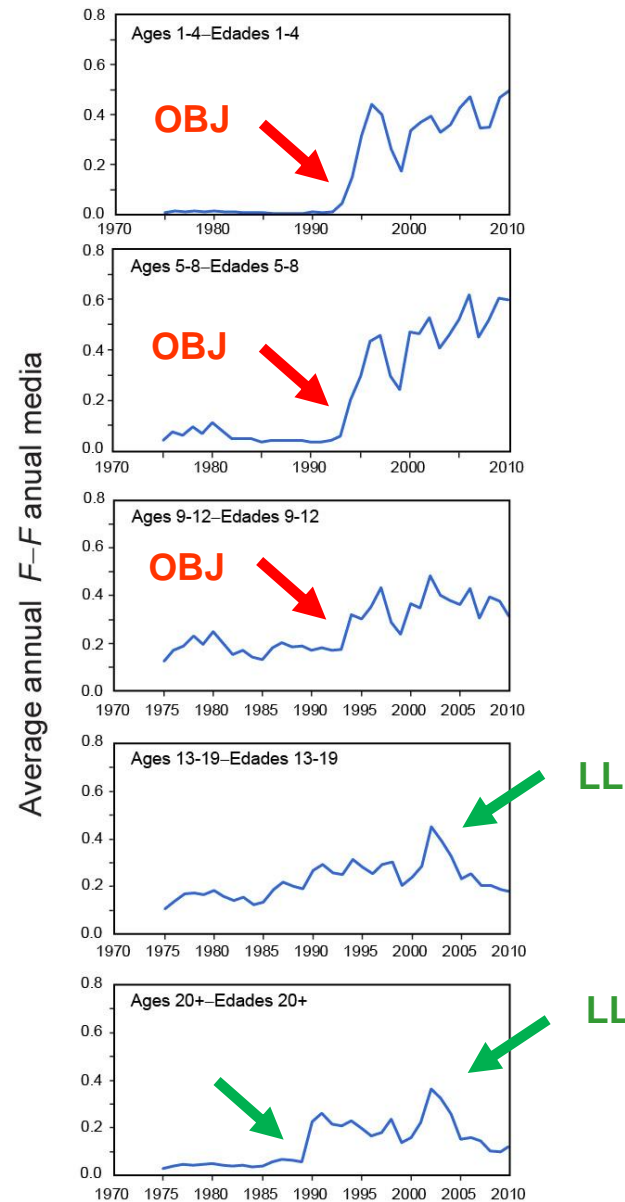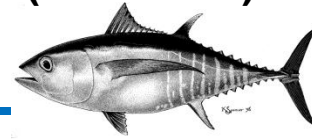
Recruitment
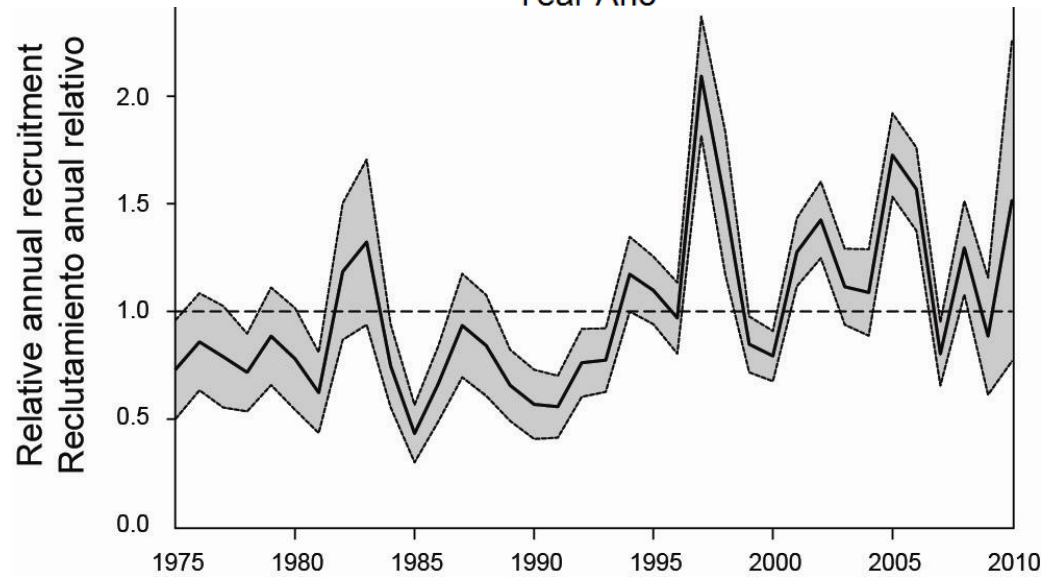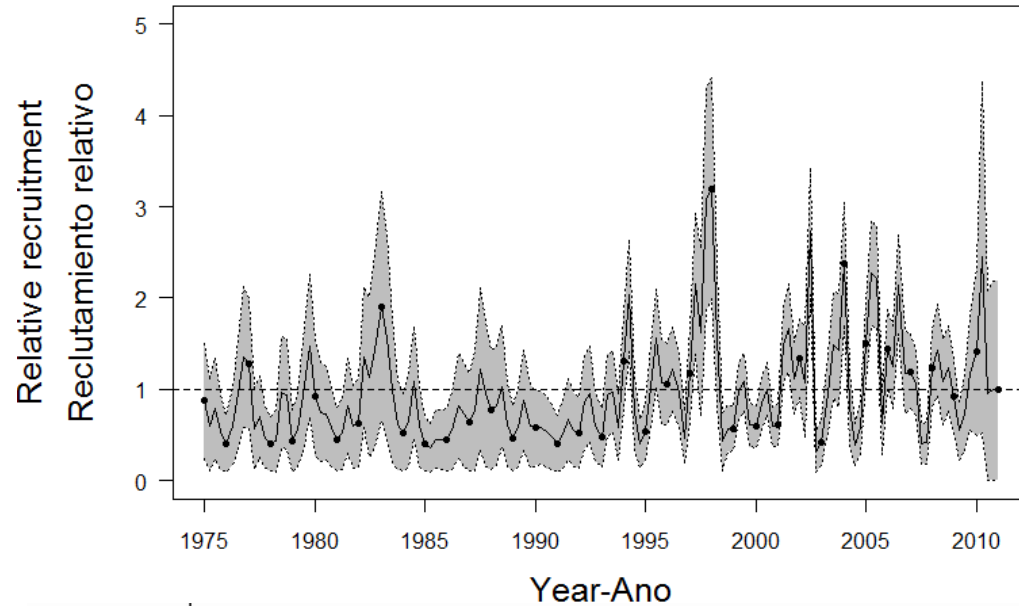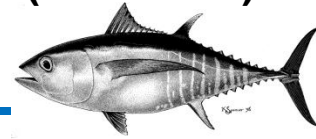
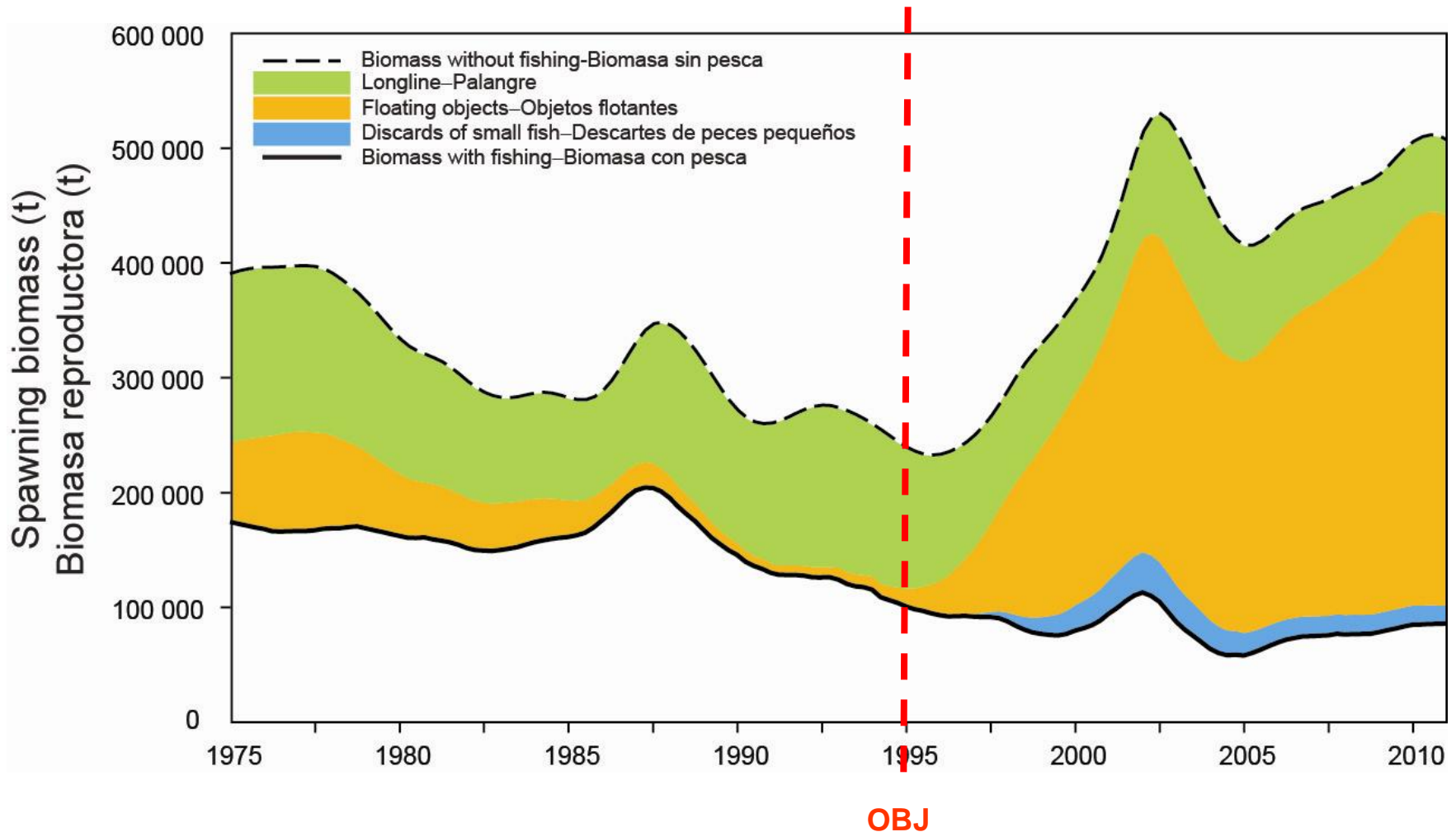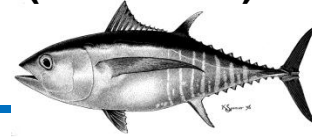# Spawning Biomass Ratio (SBR)
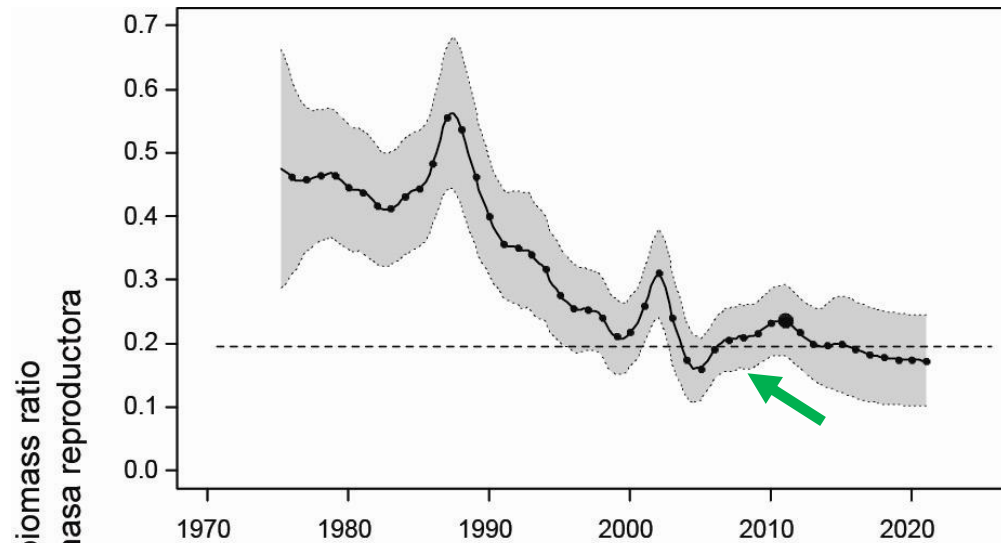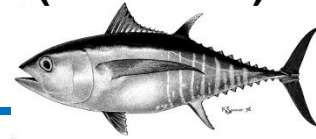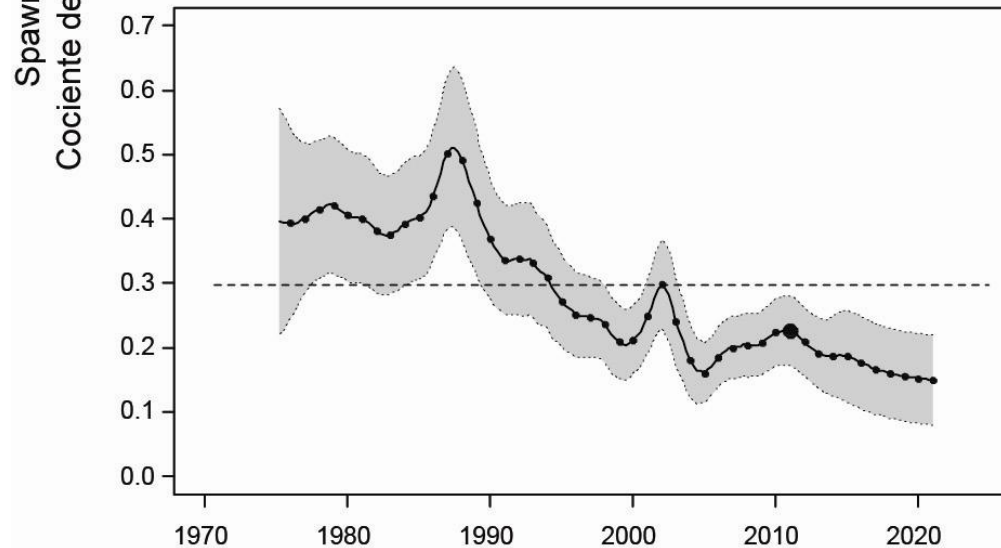
Base case
(h=1)

h = 0.75

Fishery impact

Time varying indicators
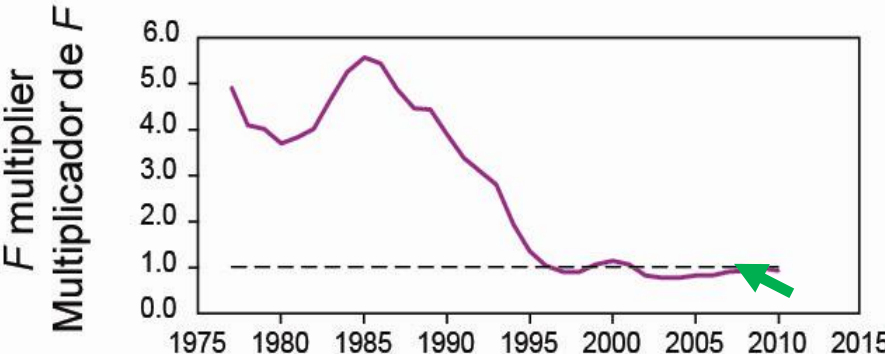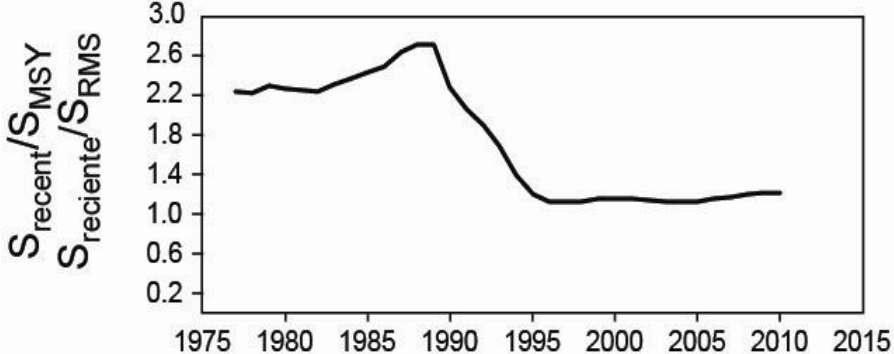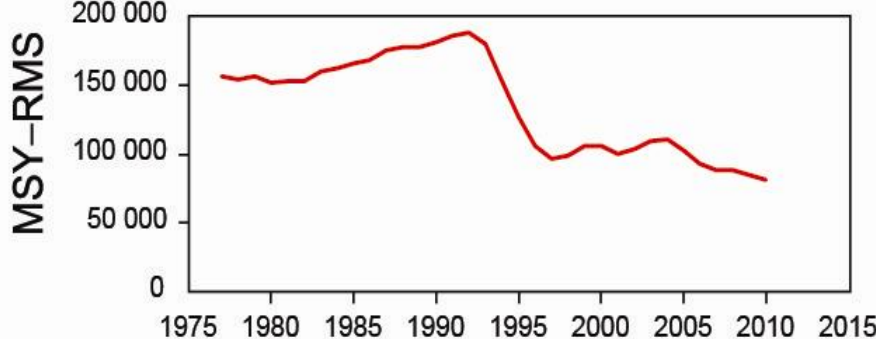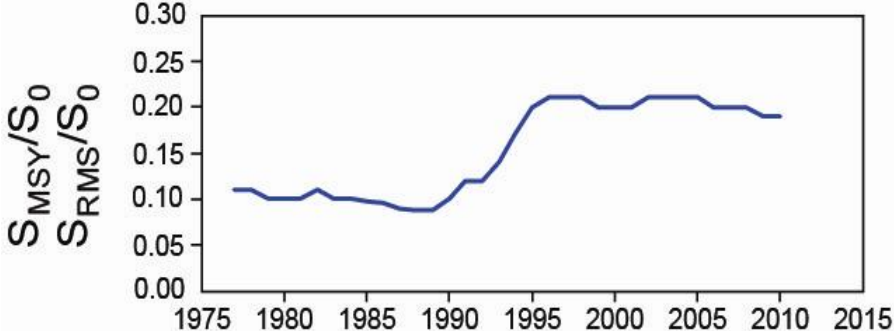
Phase plots
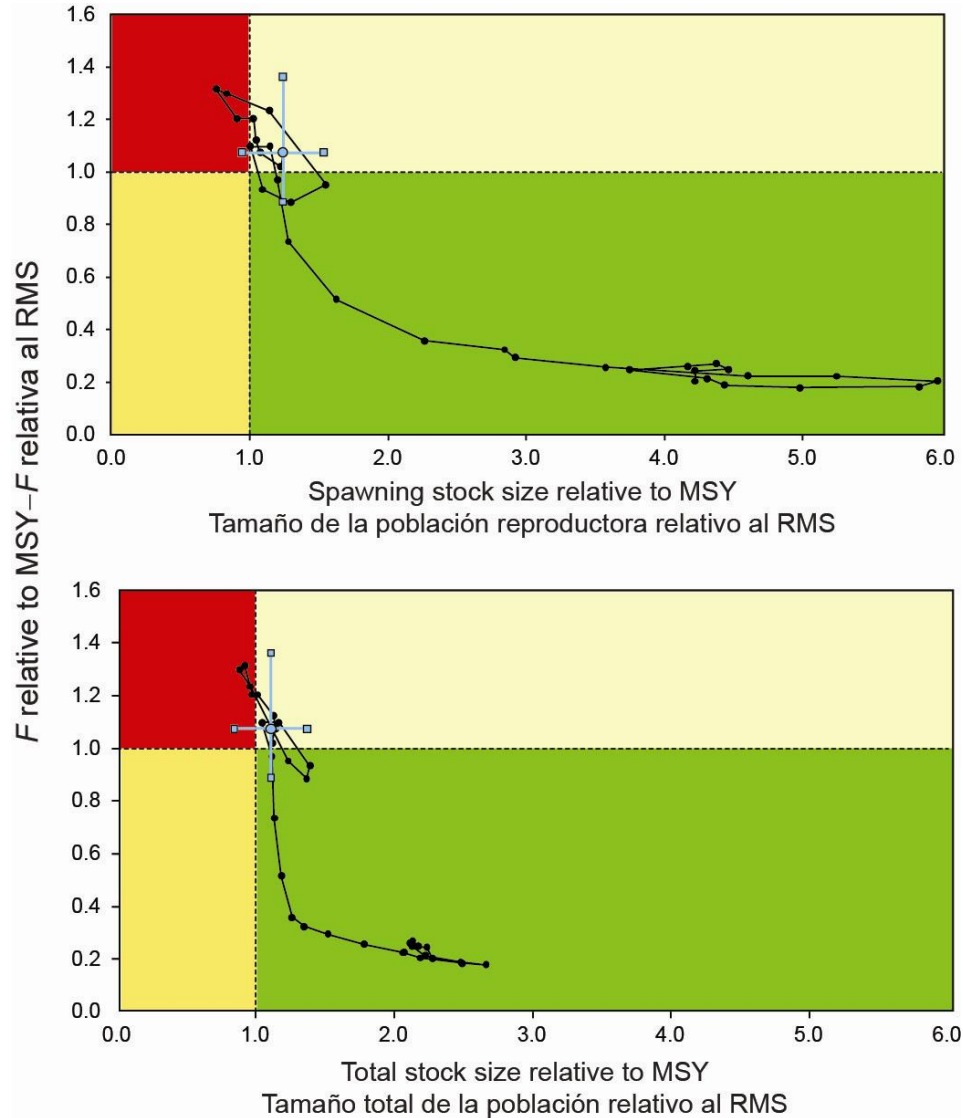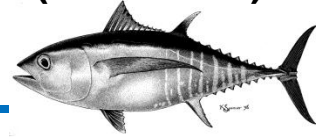
Management quantities
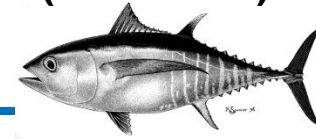
	Base case – Caso base	$h = 0.75$
MSY–RMS	80,963	77,473
$B_{MSY} - B_{RMS}$	311,247	547,291
$S_{MSY} - S_{RMS}$	70,509	137,670
C_{recent}/MSY—$C_{reciente}$/RMS	1.08	1.13
$B_{recent}/B_{MSY} - B_{reciente}/B_{RMS}$	1.11	0.75
$S_{recent}/S_{MSY} - S_{reciente}/S_{RMS}$	1.21	0.77
$B_{MSY}/B_{F=0} - B_{RMS}/B_{F=0}$	0.24	0.33
$S_{MSY}/S_{F=0} - S_{RMS}/S_{F=0}$	0.19	0.30
F multiplier—Multiplicador de F	0.93	0.65

CIAT
IATTC

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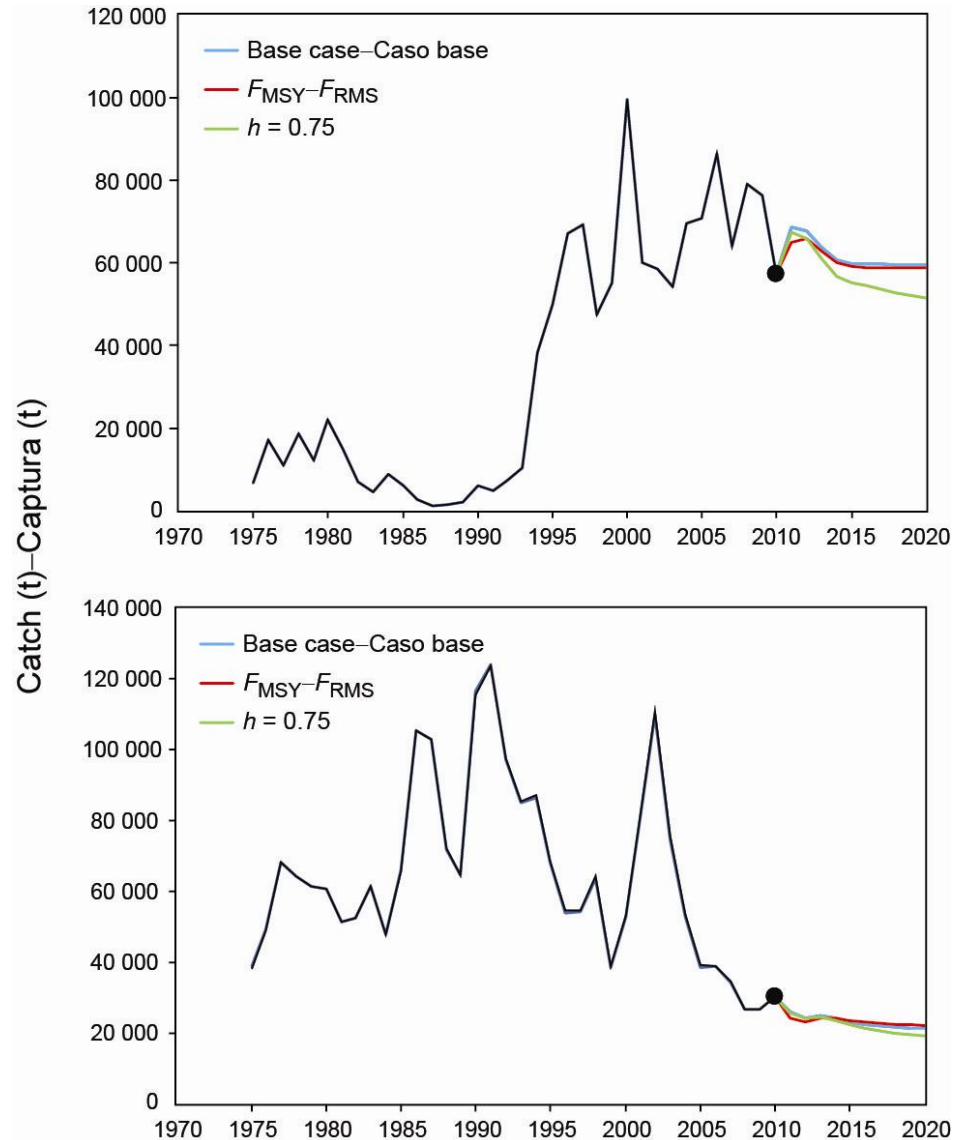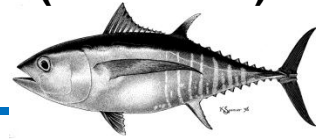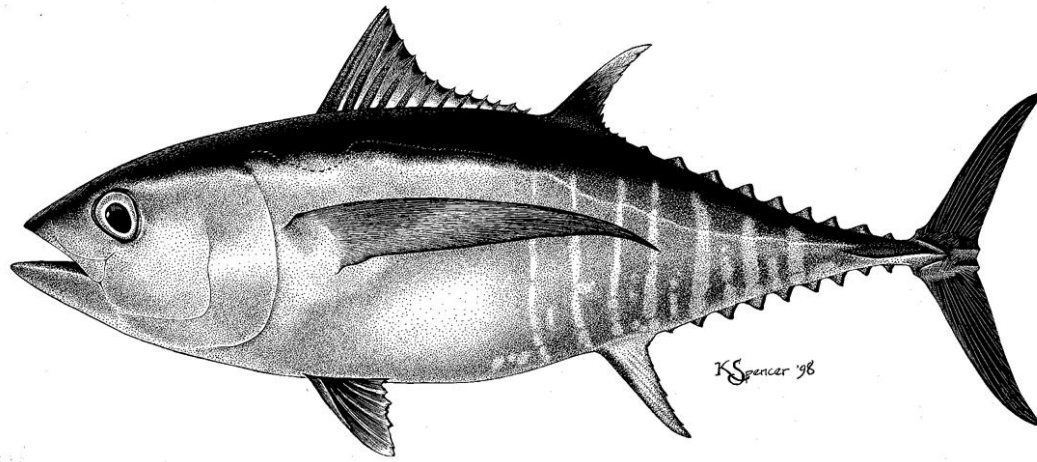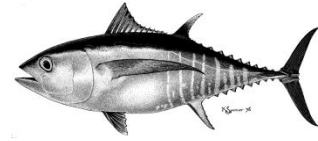
Summary

Summary: key results

- Current biomass level is low compared to average unexploited conditions
- But there are signs of a recent recovery trend from a historic low in 2004.
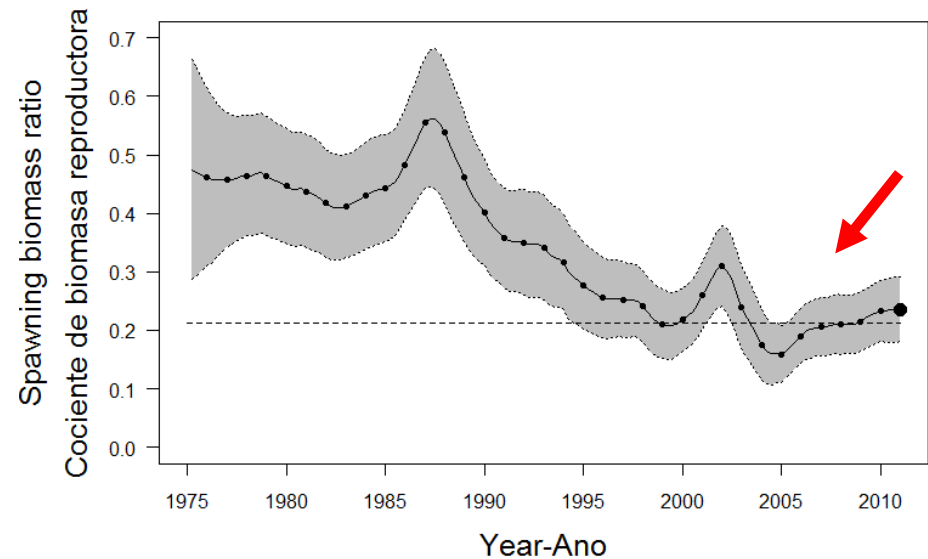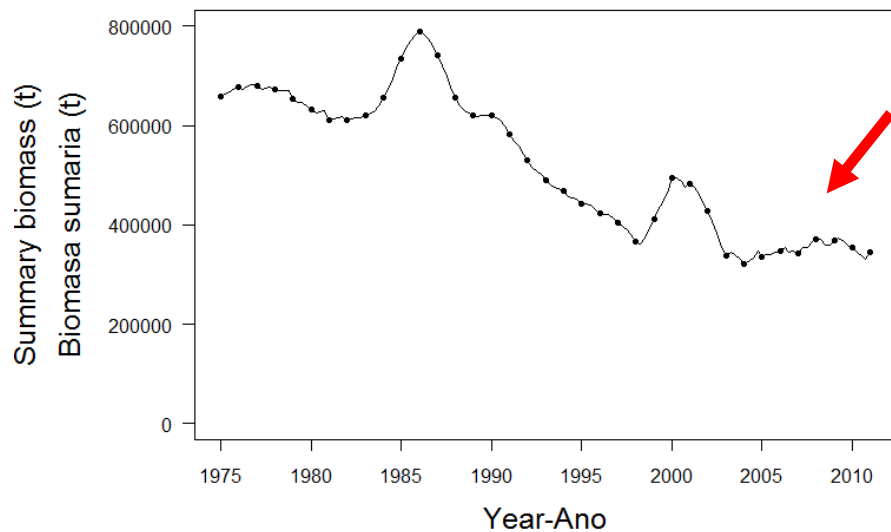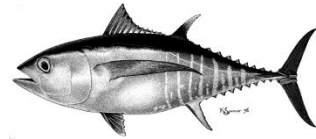
Summary: key results (cont.)

- The recent fishing mortality rates are estimated to be slightly above the level corresponding to MSY ($F_{recent} > F_{MSY}$)

- The recent levels of spawning biomass are estimated to be above the level corresponding to MSY ($S_{recent} > S_{MSY}$)

Summary: key results (cont.)
from SAC1

- However, these interpretations are highly sensitive about the following assumptions:

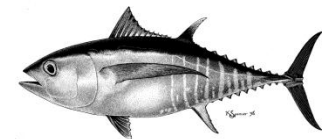 - Steepness of stock-recruitment relationship
  - Average size of the oldest fish in the population (L_2)
  - Adult natural mortality levels
  - Historic period of the bigeye exploitation
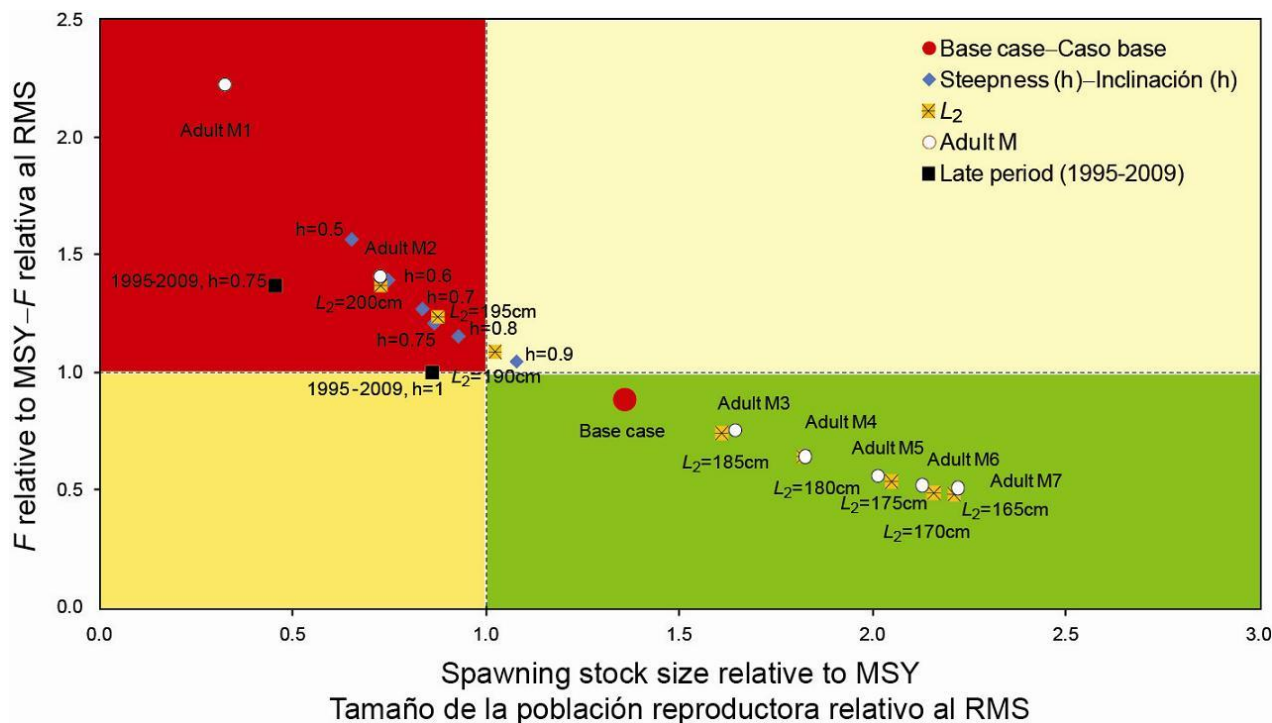
Plausible Sensitivities and Uncertainties from SAC1

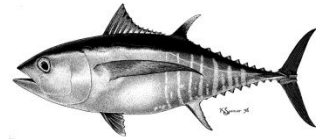- Results are more **pessimistic** with:

  - The inclusion of a stock-recruitment relationship
  - Higher values of the average size of the oldest fish ($L_2 > 185$ cm)
  - Lower rates of adult natural mortality (M)
  - If only the late period of the fishery (1995-2009) is used in the assessment

- Results are more **optimistic** with:

  - Lower values of the average size of the oldest fish ($L_2 < 185$ cm)
  - Higher rates of adult natural mortality (M)

CIAT

IATTC

What is robust
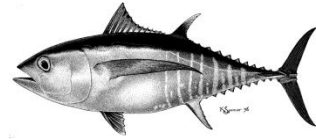
- The recent increasing trend since 2004

Questions?