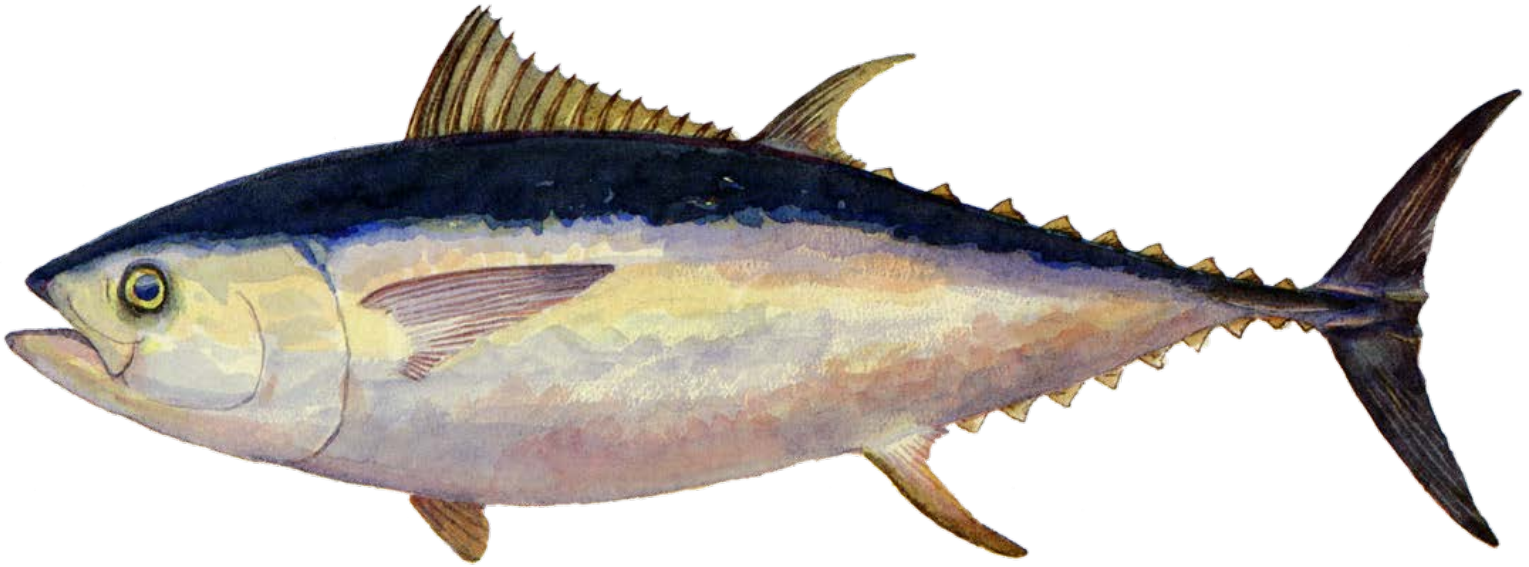
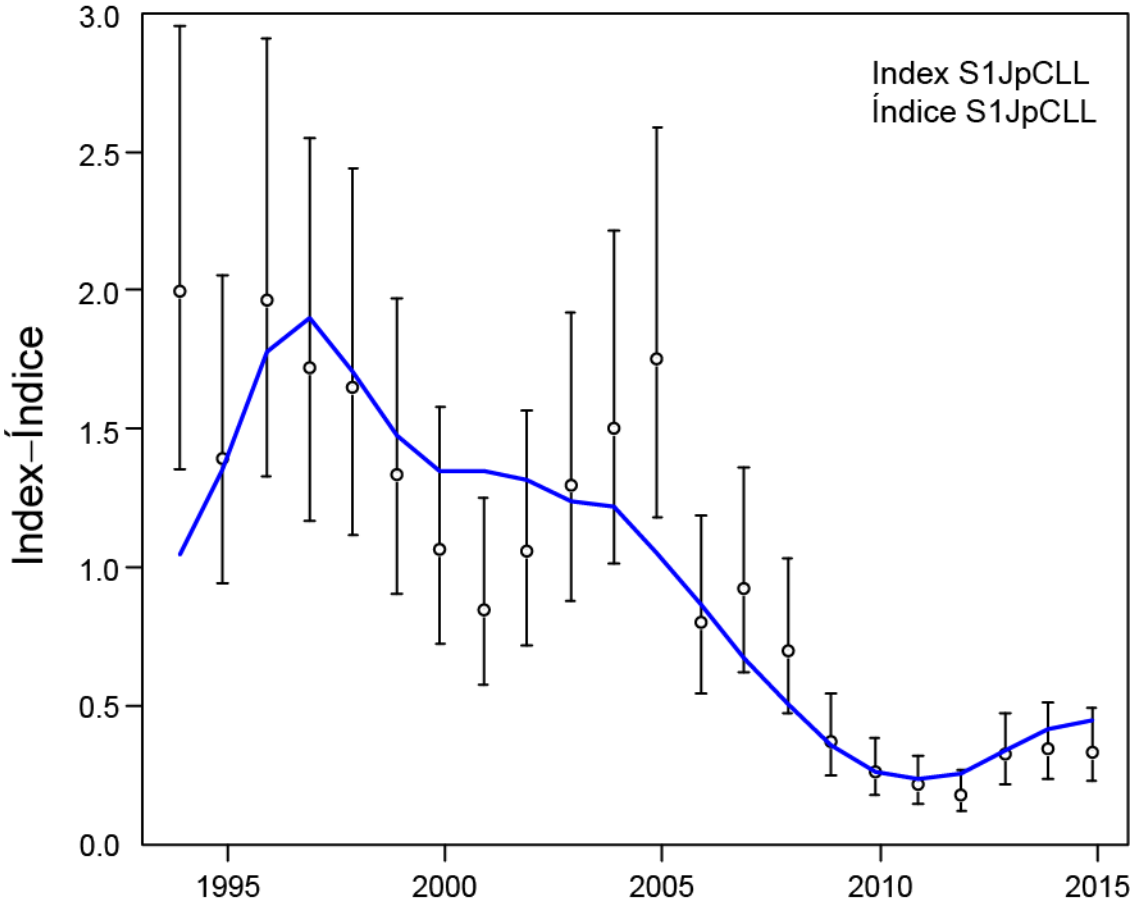
Updated assessment and management of Pacific bluefin tuna



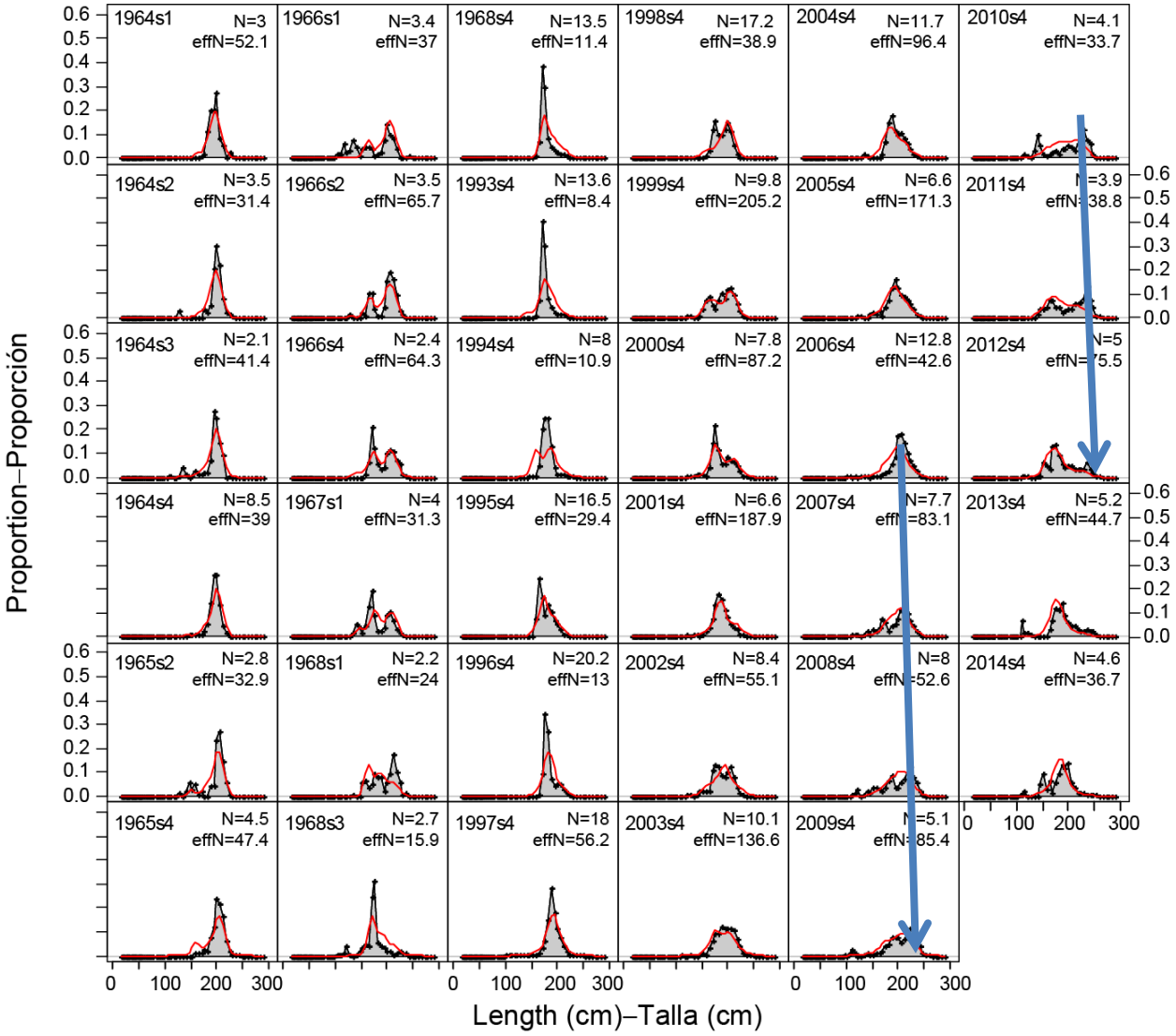
ISC assessment

- New assessment developed by the ISC bluefin tuna working group.
- Substantial improvement over previous assessments
- Management implications are generally the same: the stock is at very low levels, and the fishing mortality is higher than any reasonable reference point.
- Substantial management action has already been taken on both sides of the Pacific Ocean
- The assessment indicates that these actions are adequate.
- Still some issues with the model fit
- Uncertainty about the relationship between recruitment and spawning stock size.
- Here we investigate
  - the robustness of the results to these issues
  - discuss the management implications

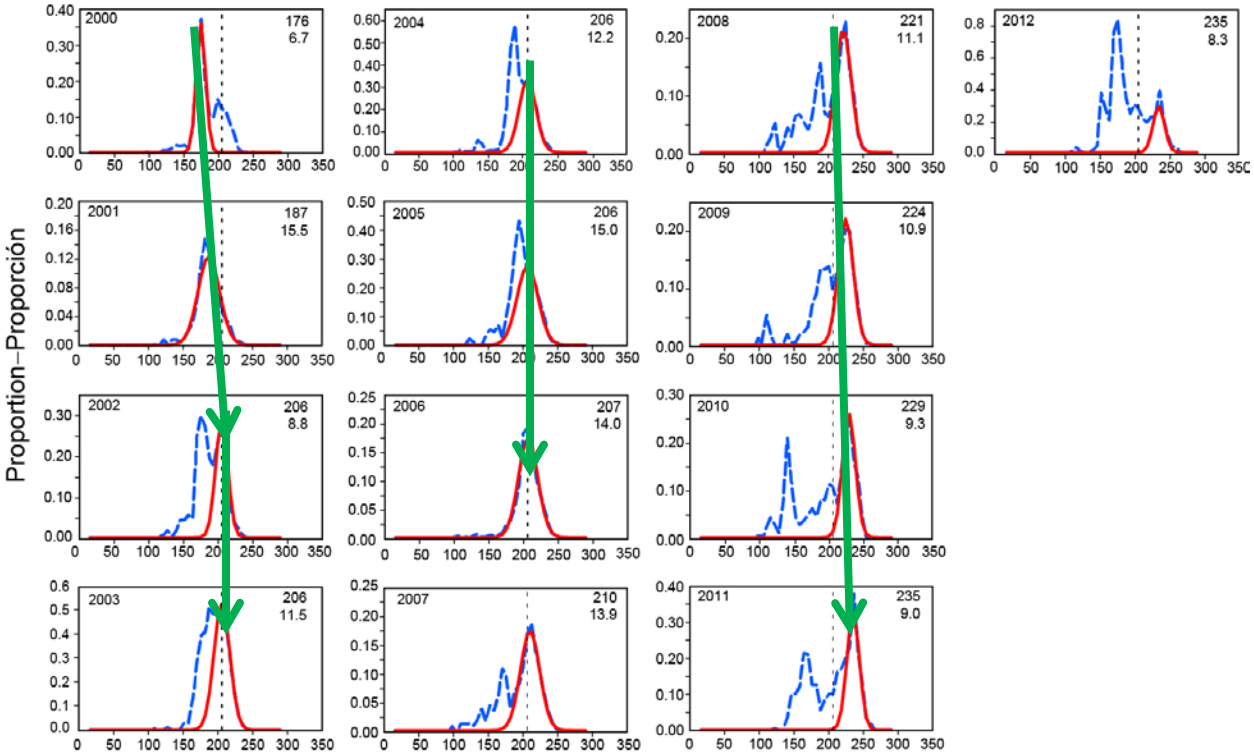
Fit to Japanese longline CPUE



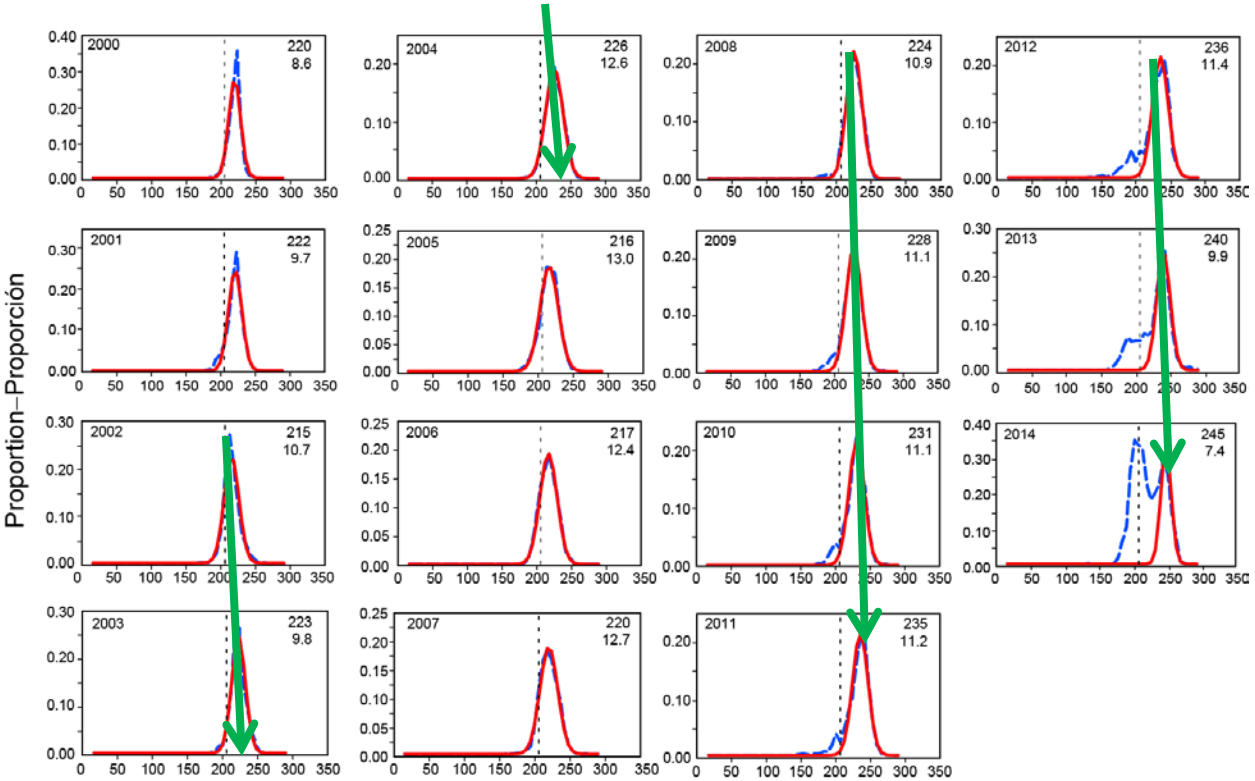
Fit to Japanese Longline length composition



Strong cohorts in the Japanese longline length composition data



Strong cohorts in the Chinese Taipei longline length composition data



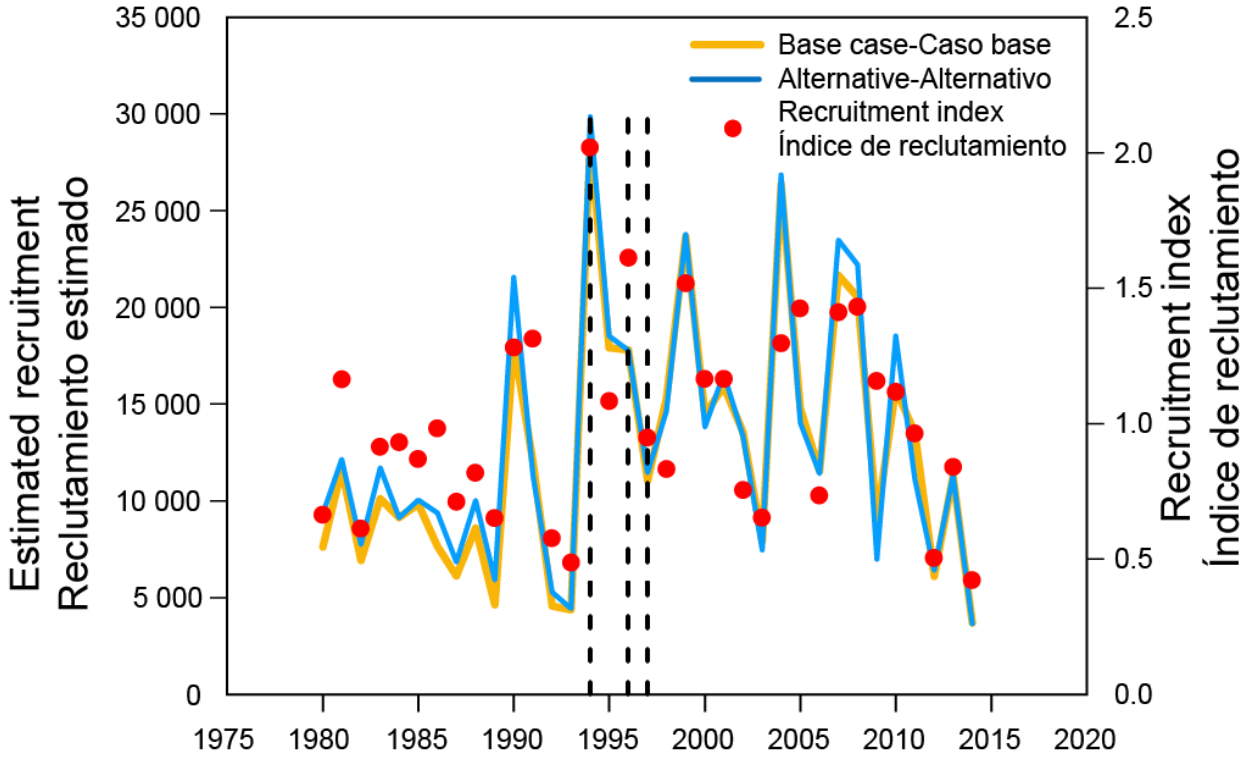
Longline length composition data

- Strong cohort enters the Japanese fishery in 2000
- After 2002 the peak of the mode representing this cohort no longer grows
- Cohort can be seen moving through the Chinese Taipei longline data starting in 2002, at a size slightly larger than that seen in the Japanese longline data in the same year.
- After 2004 the peak of the mode representing this cohort no longer grows
- A second strong cohort appears to enter the Japanese longline fishery starting in 2002, with a mode at about 176 cm, and may be accompanied by another cohort in 2003, recruited at about the same size of 176 cm.
- These cohorts appear to grow through the fishery all the way until the last year of data in 2012, with a mode at about 235 cm.
- A strong cohort can be seen moving through the Chinese Taipei fishery, starting in 2006 at a slightly larger size (217 cm) than seen in the Japanese fishery (207 cm) in the same year.
- However, the mode in 2012 is about the same for both fisheries.
- Other cohorts can be seen entering the Japanese fishery in recent years, including 2007 and 2010.
- A strong cohort can be seen in the Chinese Taipei fishery in 2014, but it is not clear whether this is the same cohort seen entering the Japanese fishery in 2010.

Strong cohorts

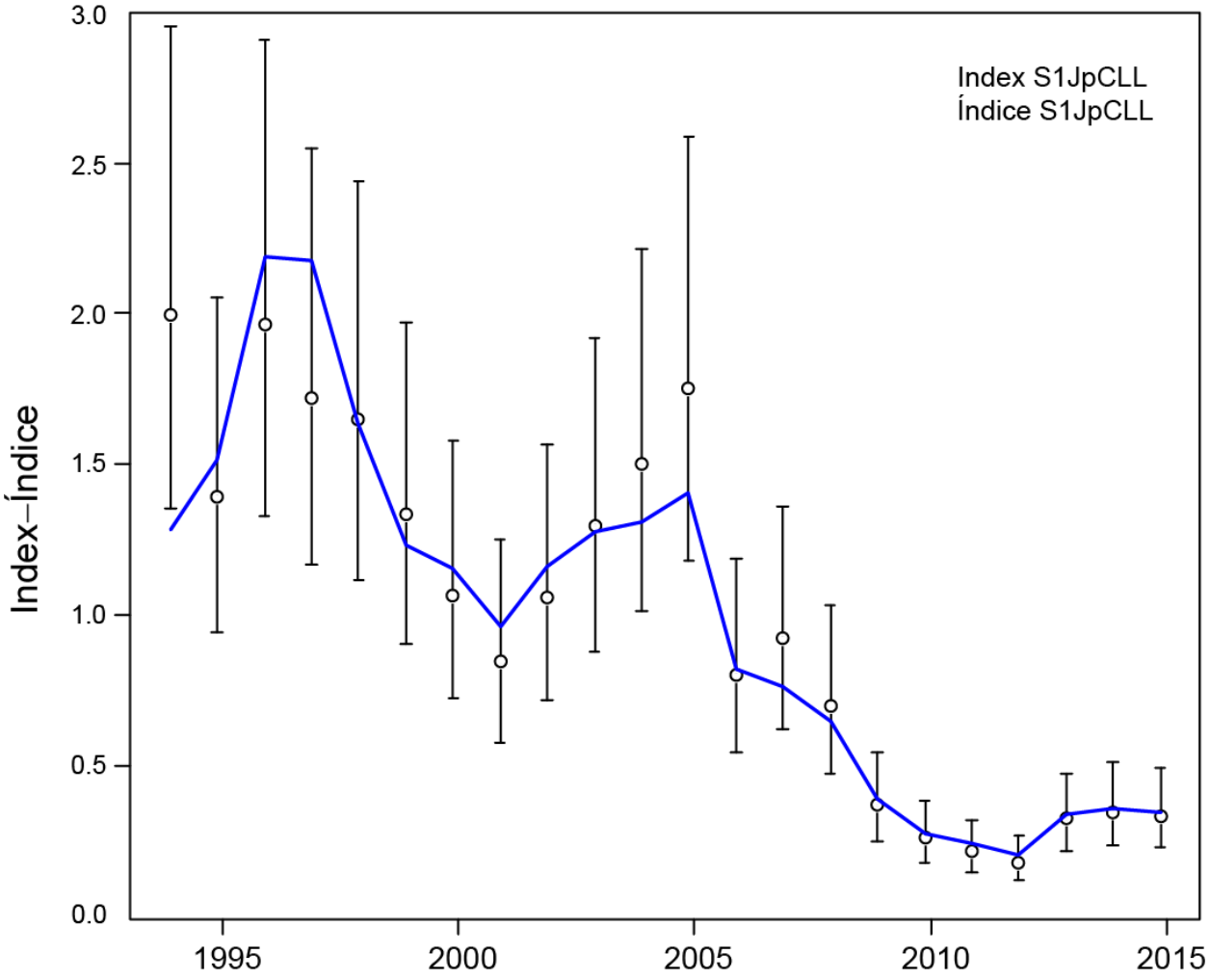
- The large cohorts enter the Japanese longline fishery at around 176 cm, or about six years of age.
- Mapping the fish back to their year of birth, the strong cohorts of 2000, 2002, and 2003 relate to years of birth of 1994, 1996, and 1997, respectively.

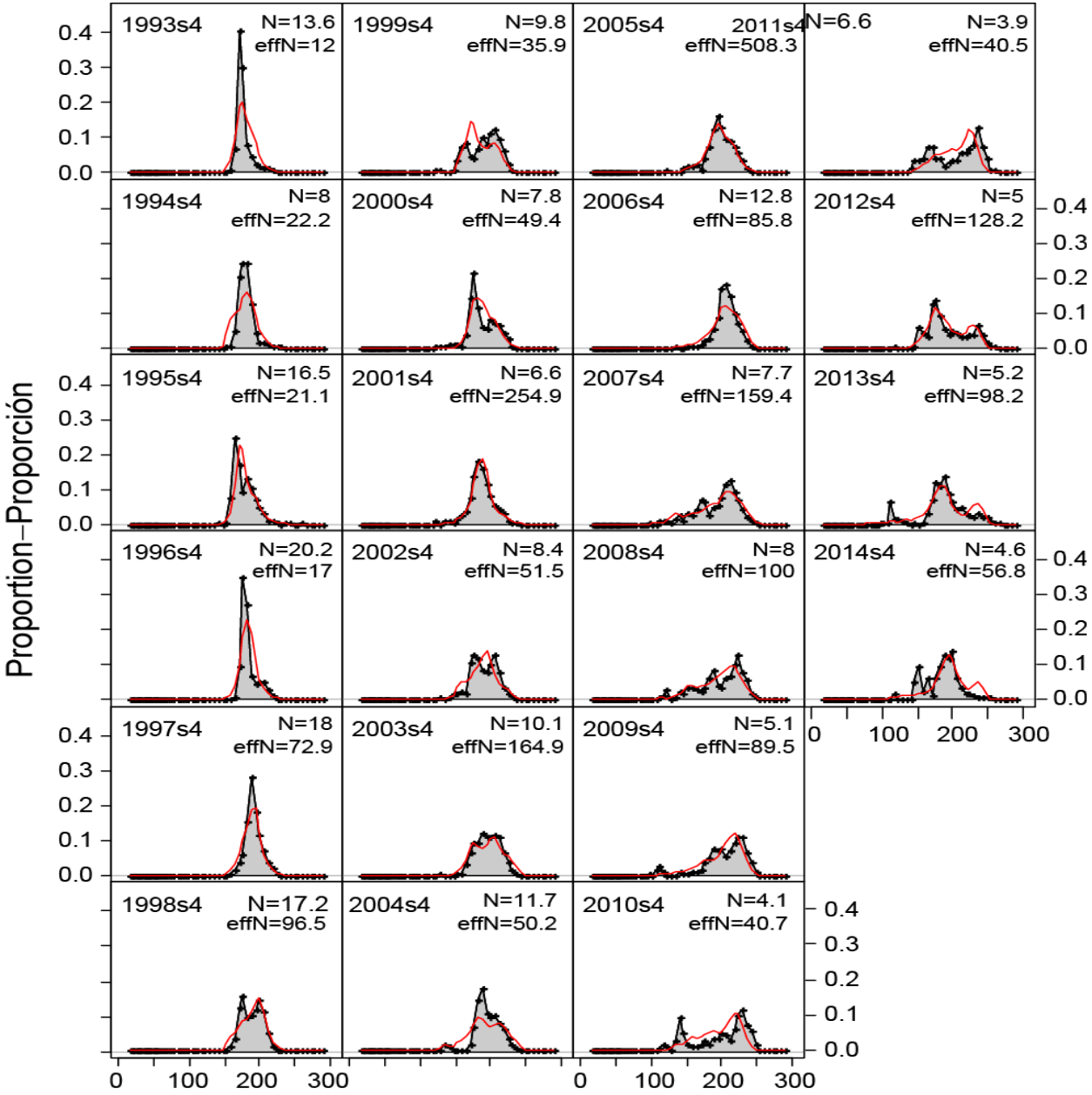
Strong cohorts vs troll index



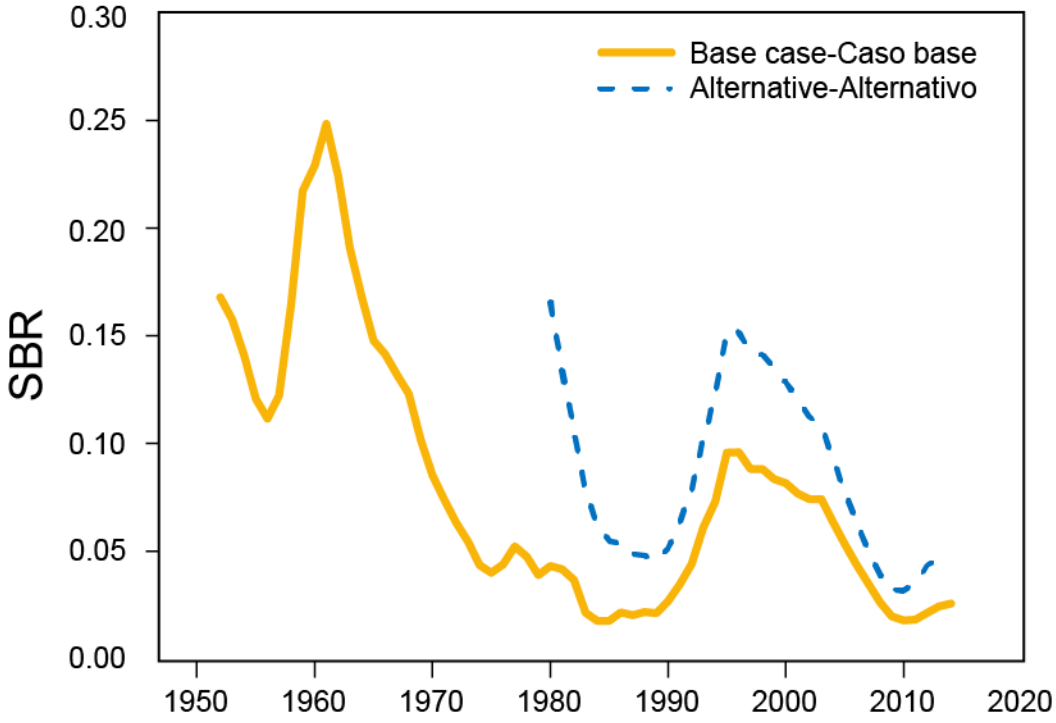
Alternative assessment

- Starts in 1980
- Estimates growth
- Time-varying selectivity for the Japanese longline fishery

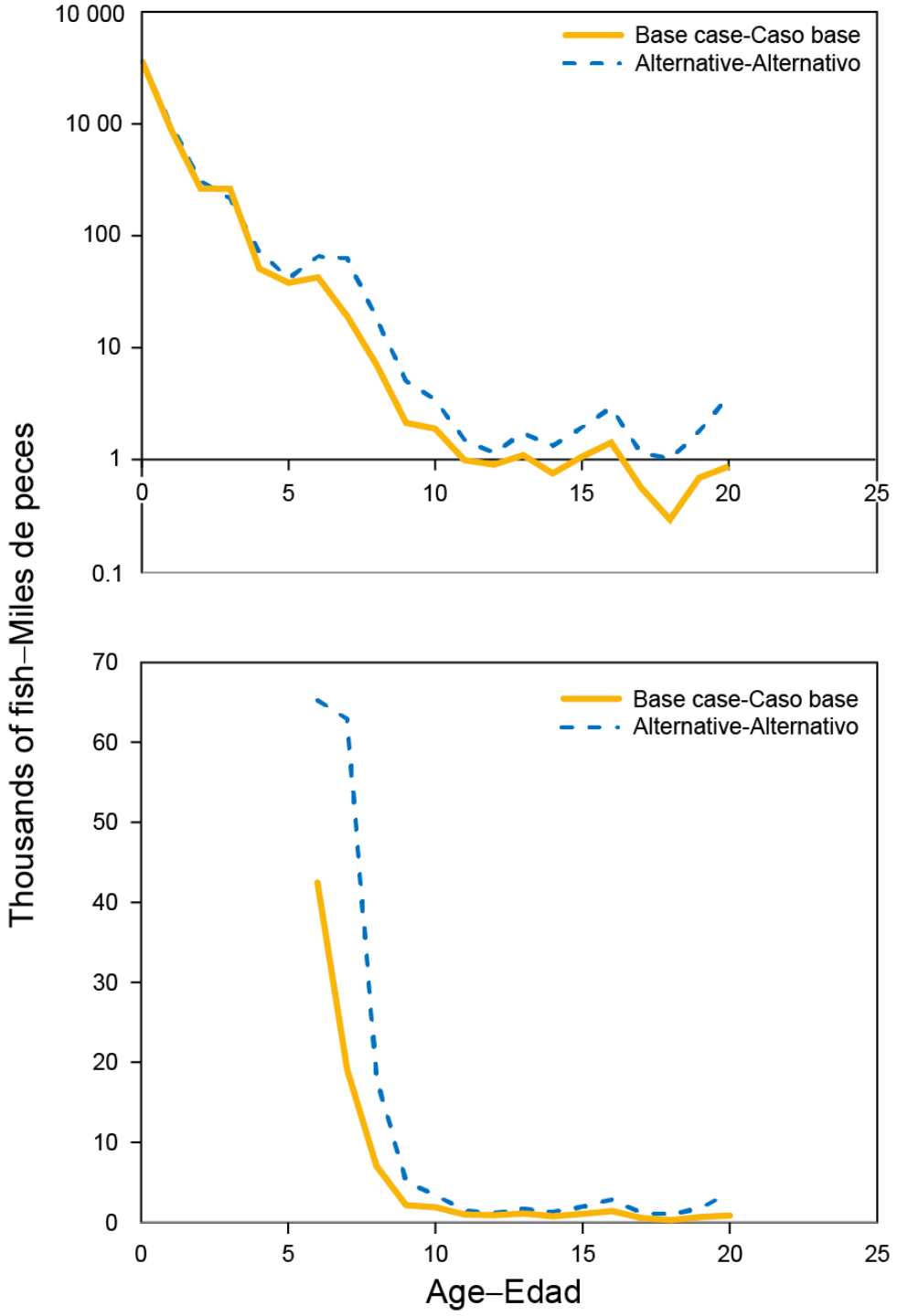

Index S1JpCLL
Índice S1JpCLL
Index–Índice
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1995
2000
2005
2010
2015


Proportion–Proporción
1993s4 N=13.6 effN=12
1999s4 N=9.8 effN=35.9
2005s4 2011s4 N=6.6 effN=508.3
N=3.9 effN=40.5
1994s4 N=8 effN=22.2
2000s4 N=7.8 effN=49.4
2006s4 N=12.8 effN=85.8
2012s4 N=5 effN=128.2
1995s4 N=16.5 effN=21.1
2001s4 N=6.6 effN=254.9
2007s4 N=7.7 effN=159.4
2013s4 N=5.2 effN=98.2
1996s4 N=20.2 effN=17
2002s4 N=8.4 effN=51.5
2008s4 N=8 effN=100
2014s4 N=4.6 effN=56.8
1997s4 N=18 effN=72.9
2003s4 N=10.1 effN=164.9
2009s4 N=5.1 effN=89.5
1998s4 N=17.2 effN=96.5
2004s4 N=11.7 effN=50.2
2010s4 N=4.1 effN=40.7
0.0
0.1
0.2
0.3
0.4
0
100
200
300

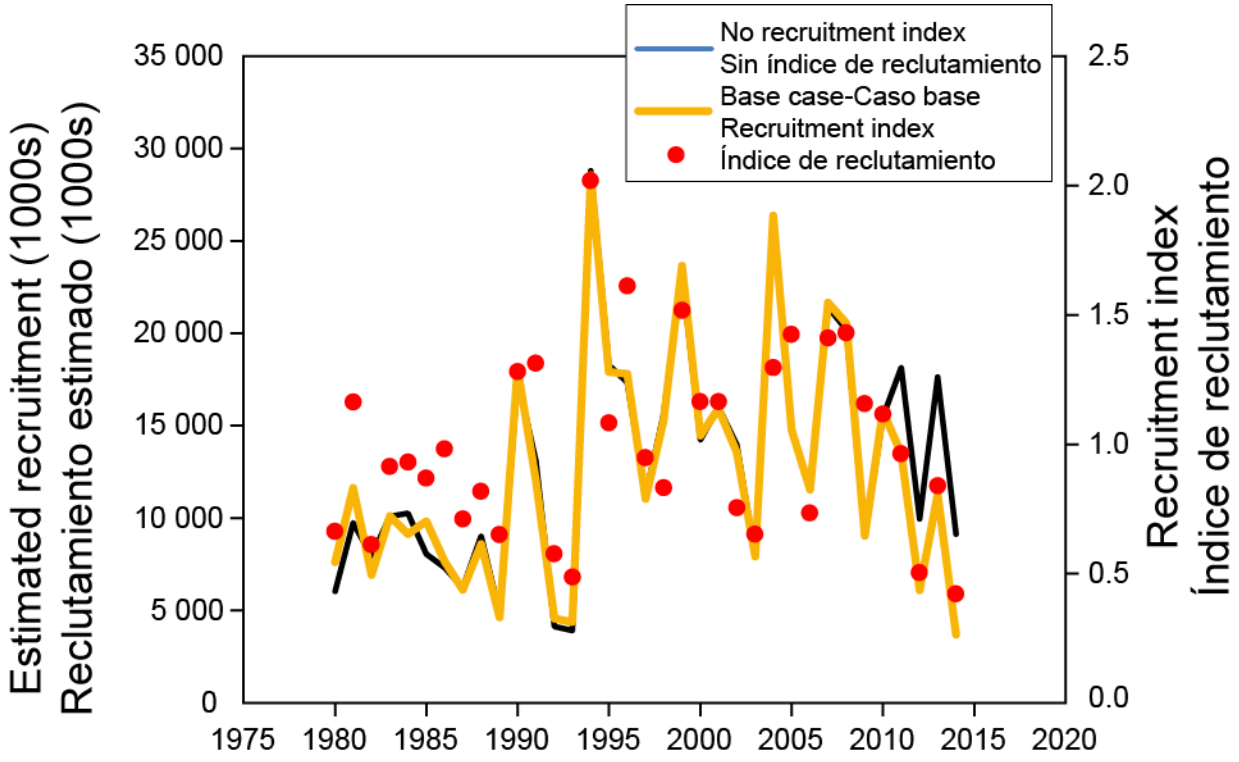
SBR comparison



Final age structure comparison



Adequacy of recruitment index



Conclusions

- Alternative assessment is more optimistic, but supports the general conclusion that the stock is at very low levels and the fishing mortality is higher than any reasonable reference point.
- The main concerns about the stock are
  - the extremely low levels of spawning biomass
  - uncertainty about how recruitment is related to the spawning biomass
  - two out of the last three recruitments are at the lowest levels observed since 1980 according to the index of recruitment based on troll CPUE
- It is recommended that further action be taken to protect the spawning population.