



GOBIERNO DE CHILE
SUBSECRETARÍA DE PESCA

Stock assessment and current status of the Chilean stock of jack mackerel

Science Working Group, SPRFMO.
3rd International Meeting.
Reñaca, Chile.
April, 2007

Data: time frame 1975 - 2005

- Catch at age matrixes by zone (including URSS data)
- Weight at age matrixes
- Landings by zone (including URSS catches taken off Chile + China)
- Biomass from acoustic surveys (1997-2005)
- Age composition of acoustic biomass
- Spawning biomass from eggs surveys (DEPM) (1999-2001 y 2003-2005)
- Other
 - Maturity at age

Edad	2	3	4	5	6	7	8	9	10	11	12
Prop. Madurez	0	0.04	0.5	0.96	1	1	1	1	1	1	1

- $M = 0.23$

$$-\ln P(q | data) = -\sum_i L(i) - p(q^{ac}) - p(R)$$

Method

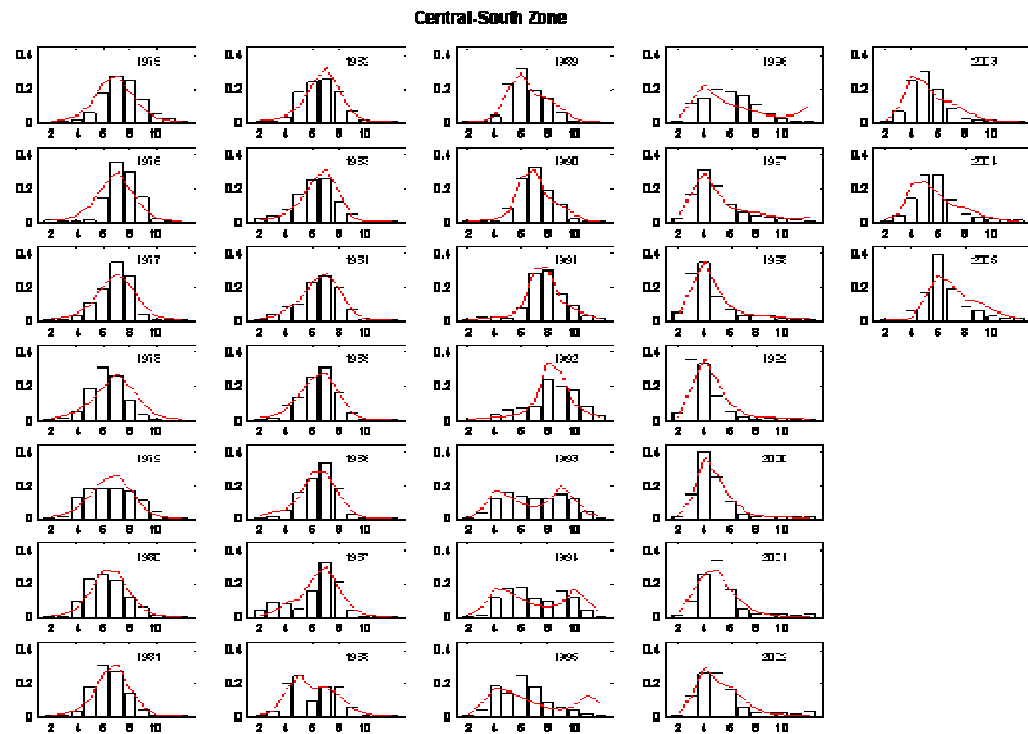
■ Statistical catch at age model (Bayesian approach)

- Objective function: minimization log likelihood

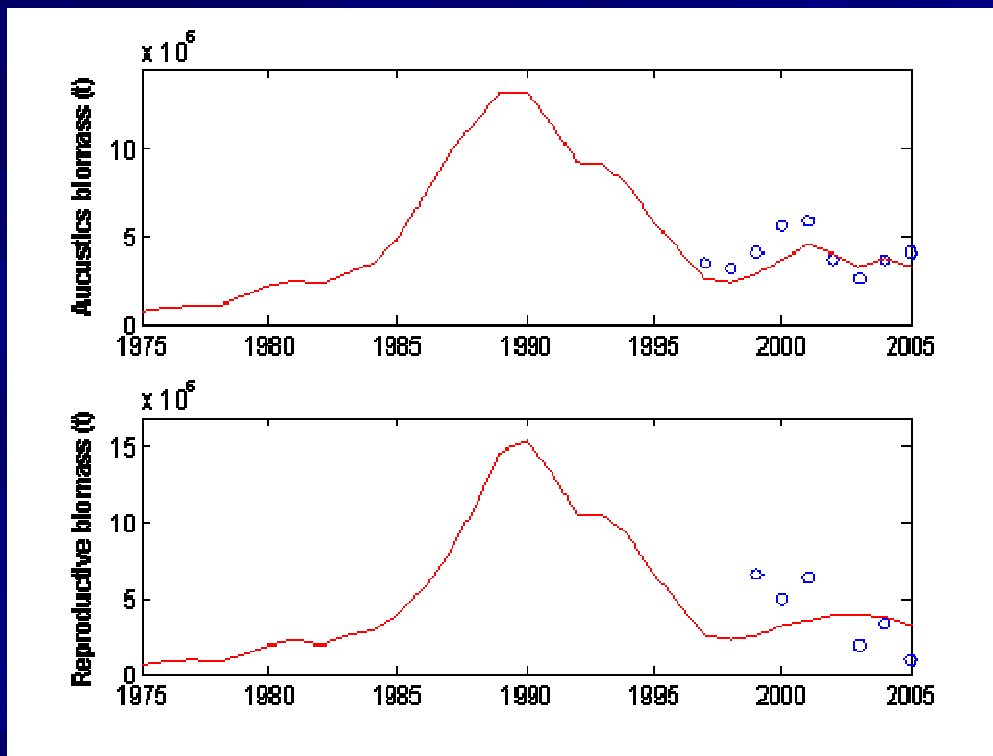
$$-\ln P(q | data) = -\sum_i L(i) - p(q^{ac}) - p(R)$$

- Assume error in catch at age, landings, indices
- 106 parameters are estimated
- Selectivity patterns by fleet and time period
- Independent biomass estimates: relative indices

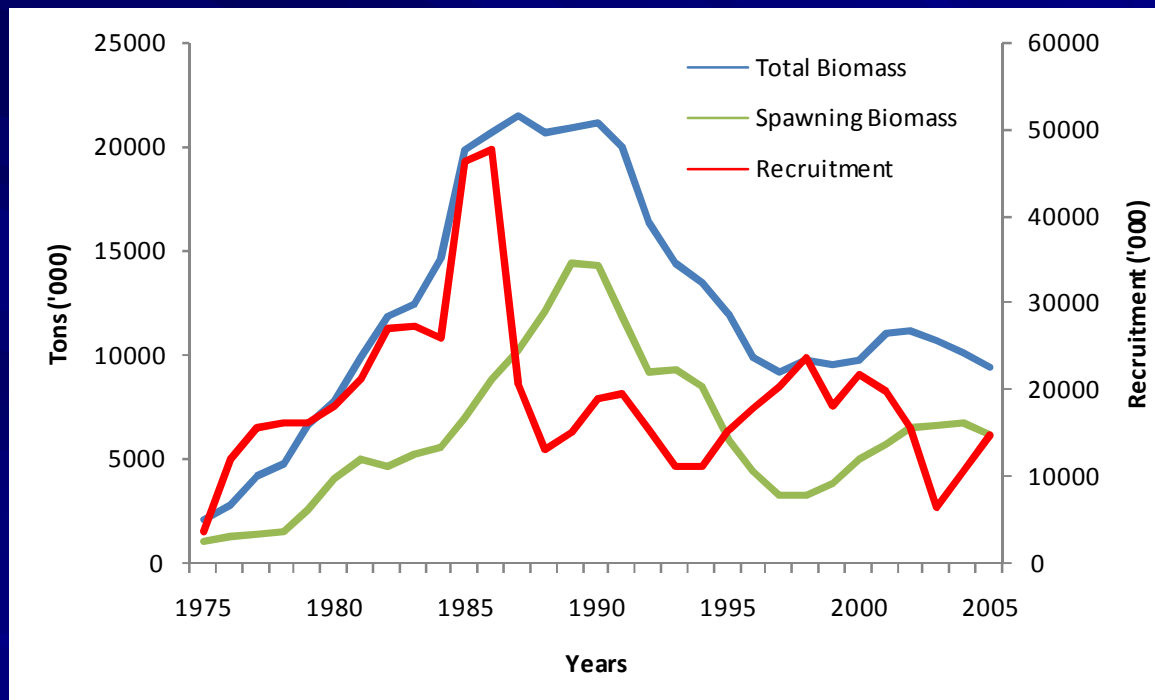
Model fit: Central-south zone



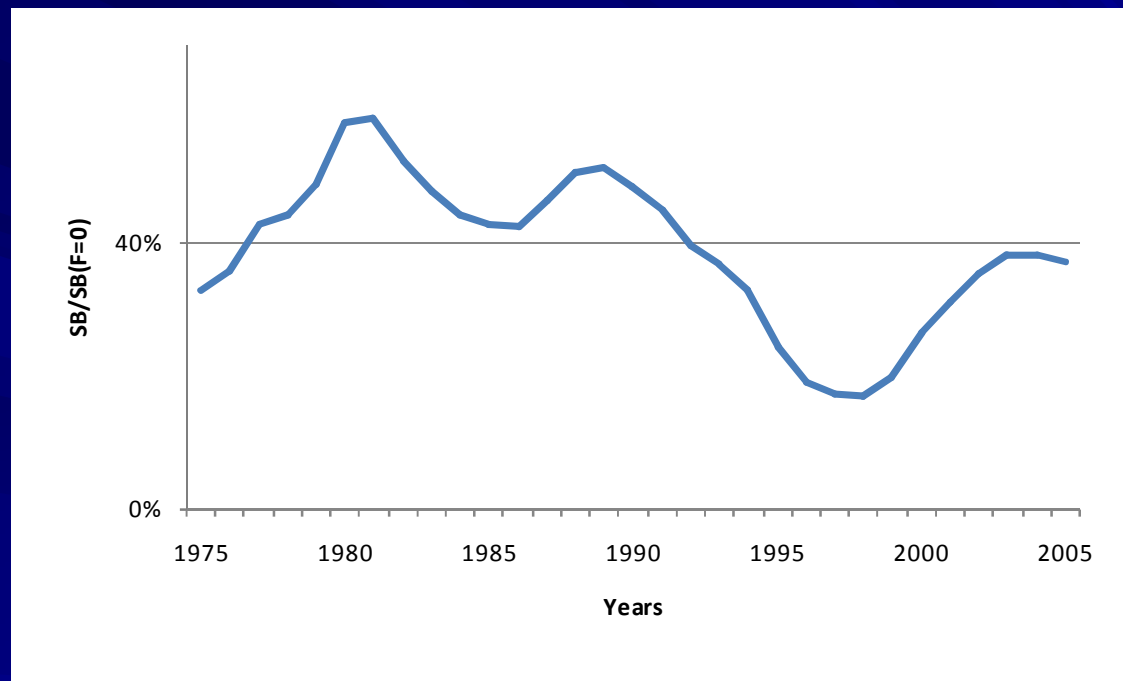
Model fit: Biomass indices



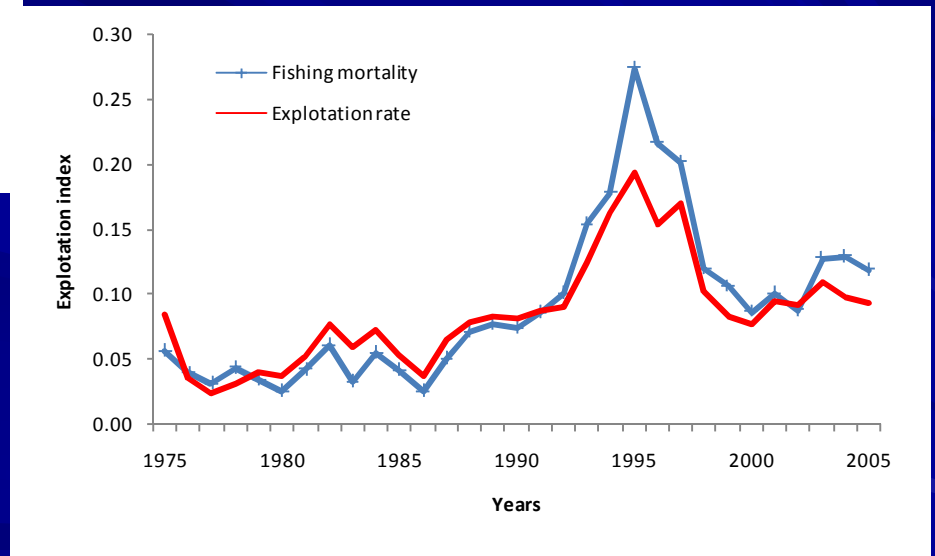
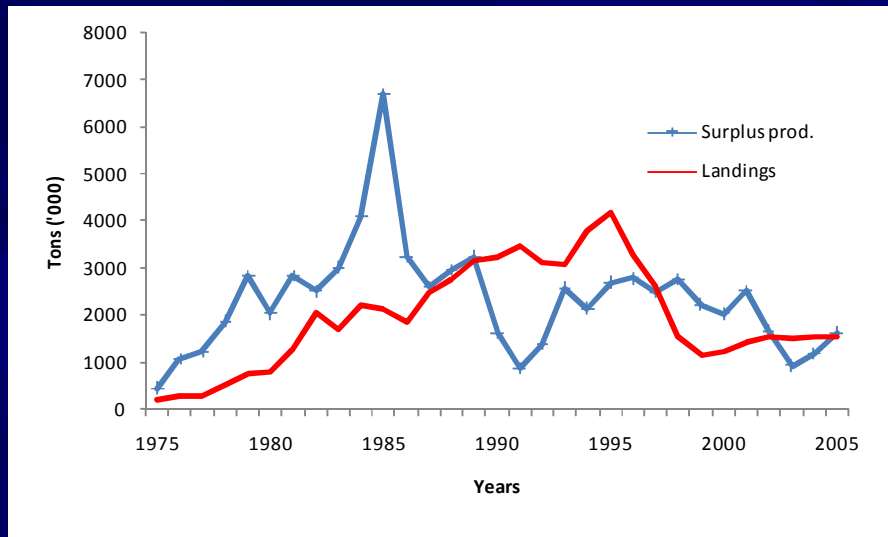
Stock indicators



Stock indicators



Exploitation indicators



Stock status: fully exploited

- Decrease of the fishing mortality as consequence of strong regulations (catch decrease, fleet size decrease).
- Present mortality by fishing close to the target (BRP) ($F_{40\%SBR}=0.22$; $F_{current}=0.25$).
- Surplus production leveled by total landings.
- Current spawning biomass close to 40% which would have existed without exploitation (SBR) ($\approx 35\%$).