Stock assessment of swordfish (*Xiphias gladius*) in the Indian Ocean by ASPIC (1980-2008)

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We attempted an Age-Structured Production Model Including Covariates (ASPIC ver. 5.05) was applied to a stock assessment of swordfish in the Indian Ocean (1980-2008). Using standardized CPUE (Japan, Taiwan and Ra Leunion) (Fig 1), ASPIC analyses for 6 scenarios were conducted. Results are shown in Table 1.

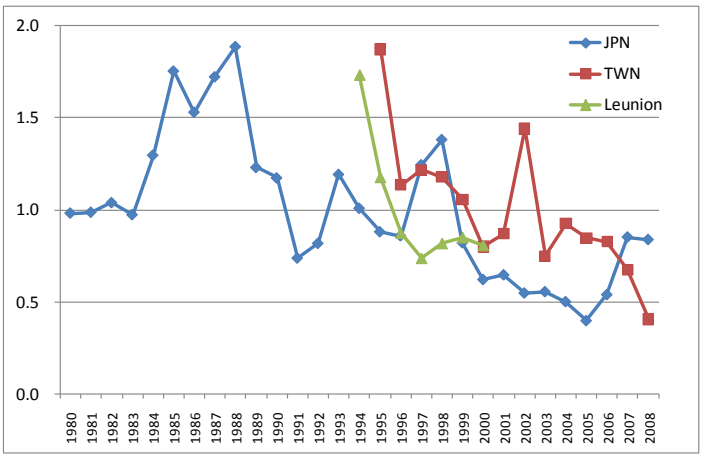


Fig 1. Three standardized AI (Abundance Index) (Japan, Taiwan and Ra Reunion) used in the stock assessment by ASPIC. AI is scaled by its average value.

Table 1 Summary of 6 scenarios for the ASPIC analyses

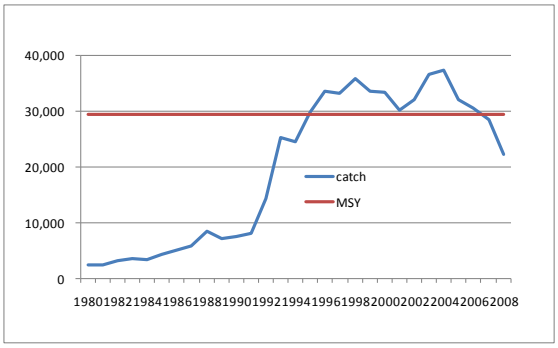
6 scenarios

Scenario	CPUE	R2 (%) (CPUE)	RMSE	MSY(t)	B(ratio) Total biomass	F(ratio)	Rate
1	J+T	J:0.50 T:0.61	0.0731	29,090	1.125	0.706	2nd best
2	J	J:0.51	0.0744	32,090	1.345	0.545	3rd best
3	T	Not converged					
4	J+T+L	J:0.50 T:0.56 L:050	0.0687	29,420	1.128	0.699	Best
5	J+L	Not converged					
6	T+L						

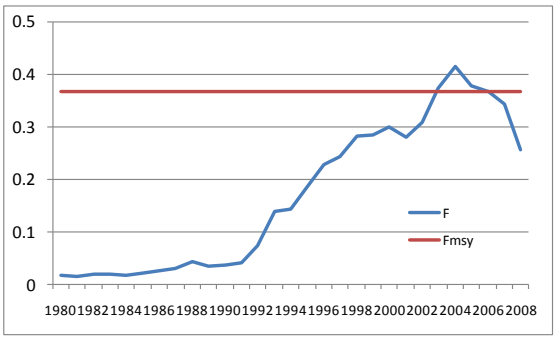
It was resulted that scenario 4 was the best, i.e., for 2008, MSY=29,420 t, F=0.257, F(MSY)=0.368, F(ratio)=0.699, TB(Total Biomass)=83,200t, TB(MSY)=73,759t, B(ratio)=1.128.

Fig 2 shows results of the stock assessment by ASPIC and Fig 3 shows future projection for 10 years (2009-2019) by 5 catch scenarios.

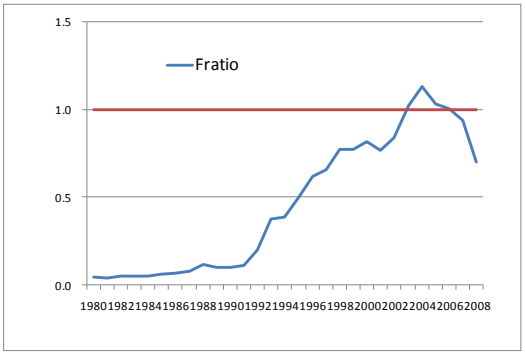
Based on these results, the current status of the stock is under fishing status due to the low catch level in 2008, however the total biomass is the close its MSY level. Under the current level of the catch, the stock will be continued to keep under the MSY (22,335 t).



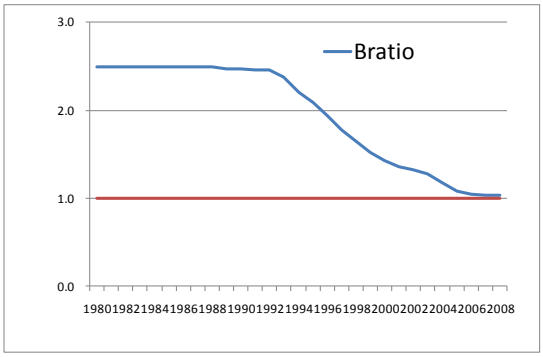
Catch vs. MSY



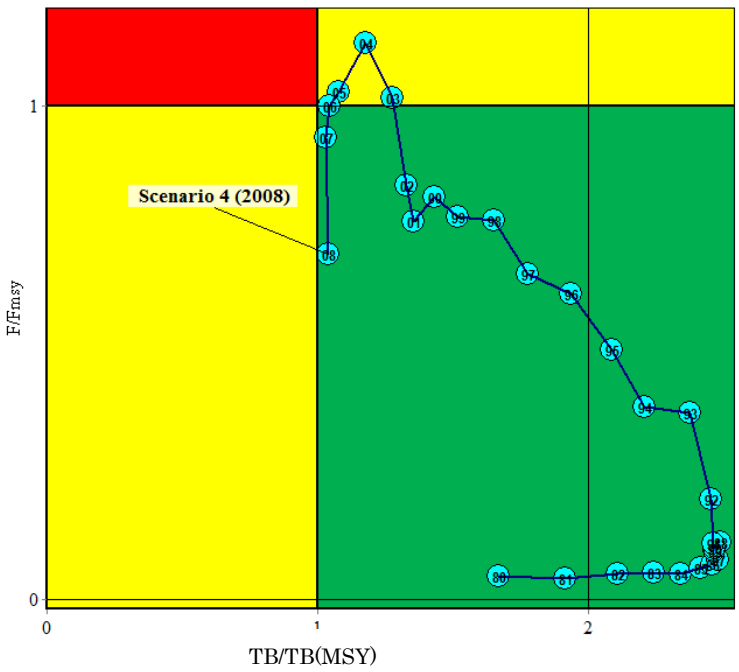
F vs. F(MSY)



F ratio

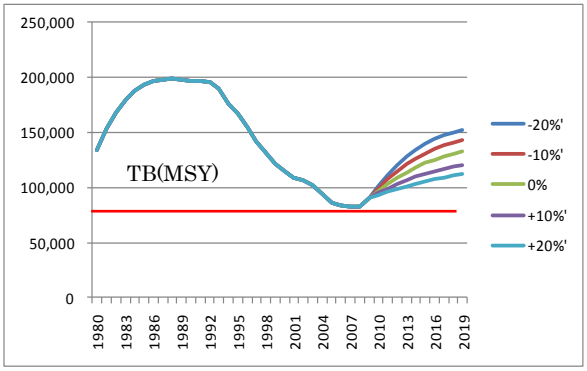


B ratio

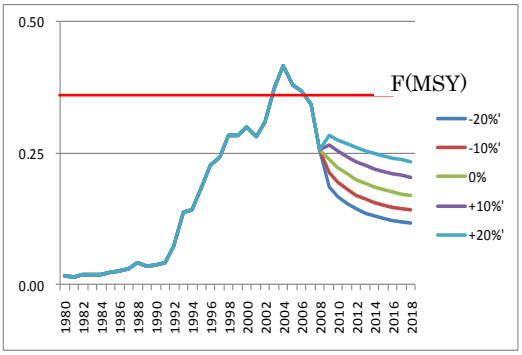


Stock trajectory (Kobe diagram)

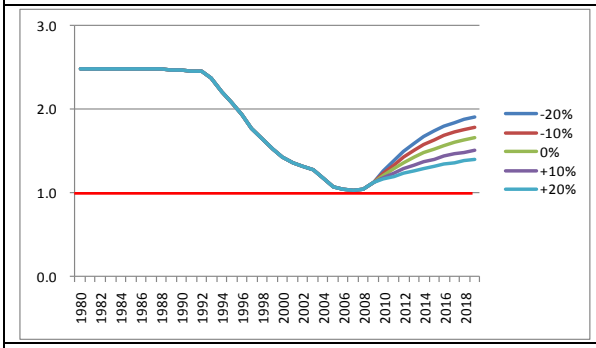
Fig 3. Results of the stock assessment by ASPIC



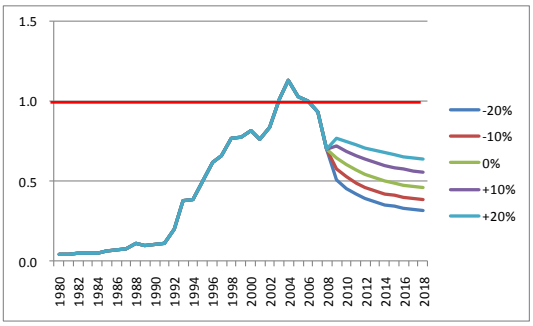
Total biomass



F



TB ratio



F ratio

Future projection (2009-2019) by 5 catch scenarios
(+20%, +10%, 0%, -10%, -20%) of the 2008 catch (22,335t)