

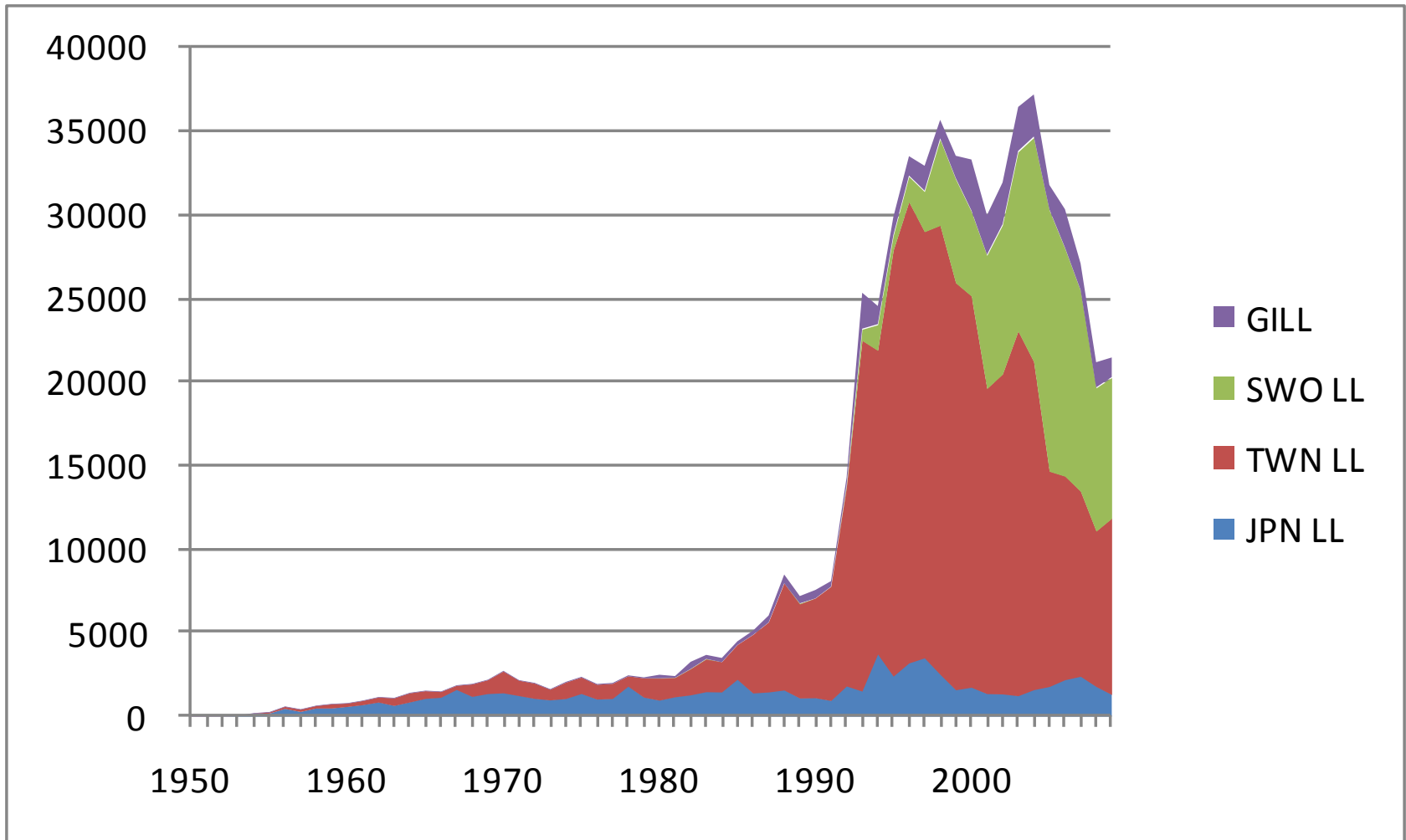
Results of ASPIC Whole Indian Ocean

Addendum 2

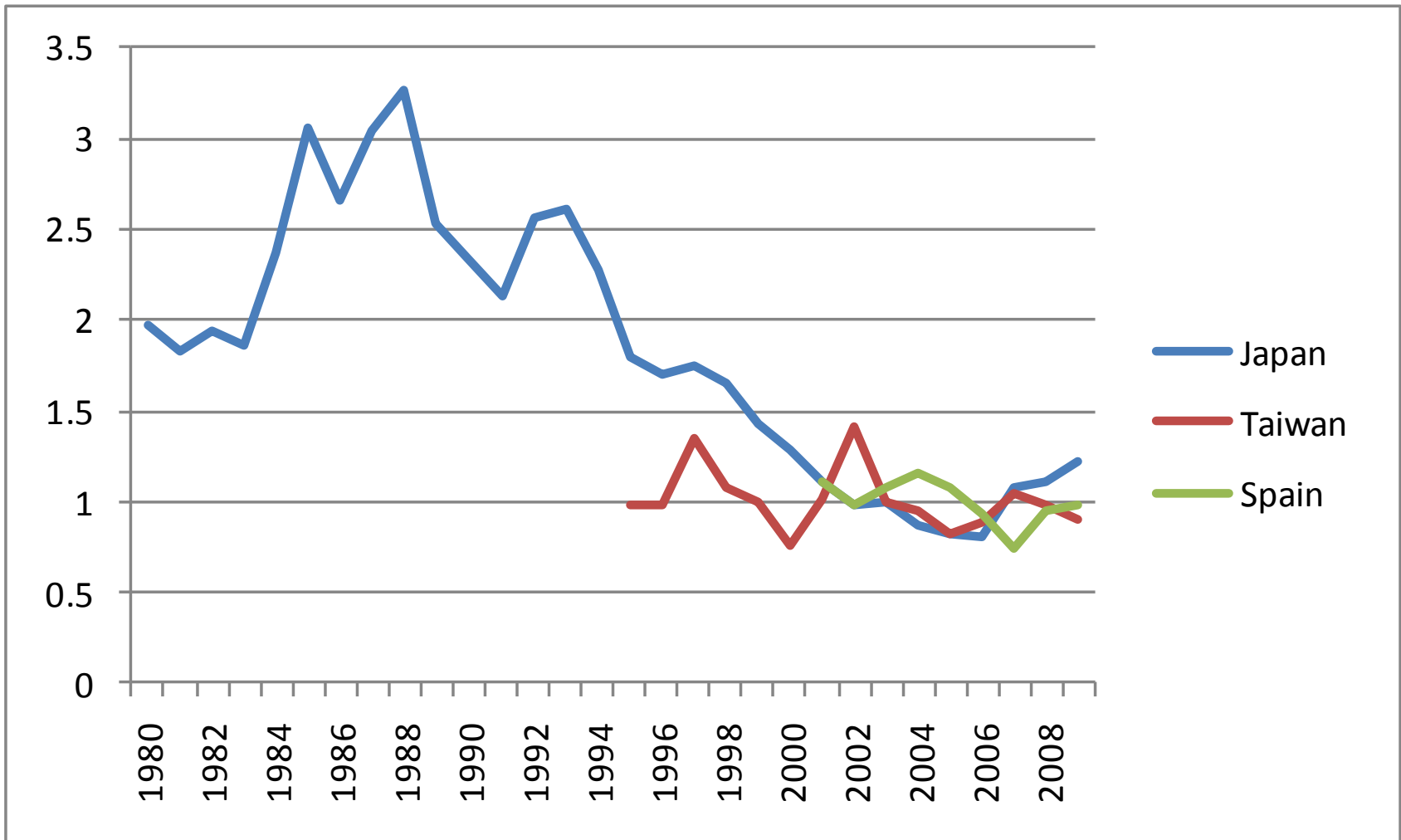
IOTC-2011-WPB09-18

(Nishida, Kitakado and Wang)

4 Fleets (catch)



4 STD CPUE indices (scaled)



A Stock-Production Model Incorporating Covariates (ASPIC)

- **Prager, M. (2004)** User's Manual for ASPIC: A Stock-Production Model Incorporating Covariates (ver. 5) and auxiliary programs, Population Dynamics Team, Center for Coastal Fisheries and Habitat Research, National Oceanic and Atmospheric Administration, 101 Pivers Island Road, **Beaufort**, North Carolina 28516 USA: National Marine Fisheries Service Beaufort Laboratory Document BL-2004-01

Results of 9 runs

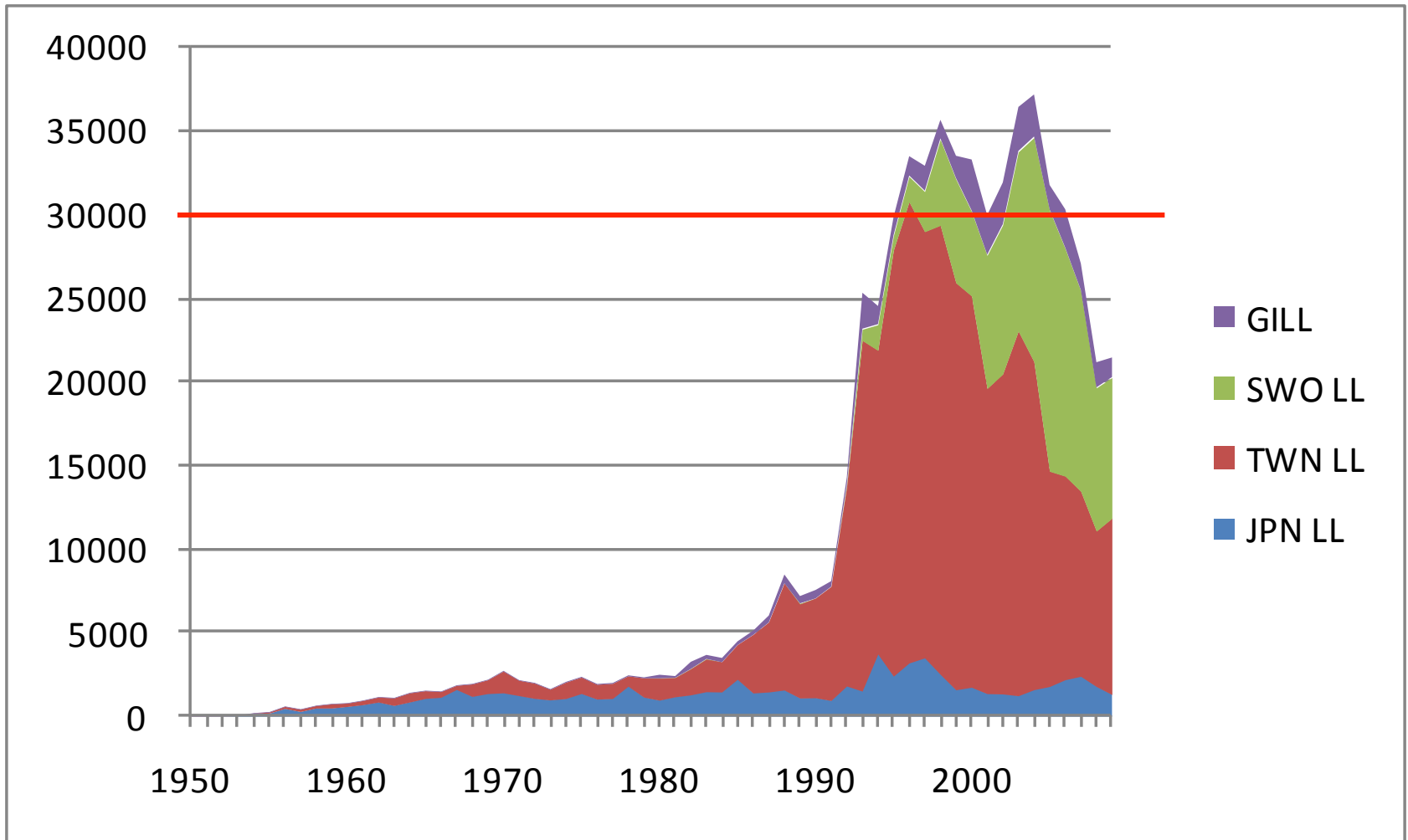
Run	Area used in GLM	Period	CPUE (figures represent R ²)			MSY 1000 t	TB ratio	F ratio	MSE	Comments
			Japan	Spain	Taiwan					
1	Lat + Long	1950	0.76			30.2	1.27	0.59	0.0027	Higher MSE
2		-	0.76	-0.04		29.3	1.25	0.63	0.0036	Spain CPUE did not fit well
3		2010	NC		NC					No convergence
4			NC	NC	NC					
5	Original 4 regions	1980	0.68			29.8	1.37	0.54	0.0031	Higher MSE →
6	Lat + Long	-	0.86			30.0	1.21	0.63	0.0018	<u>LAT LONG BETTER FIT</u> BEST RUN
7		2010	0.86	-0.18		29.4	1.16	0.66	0.0019	Spain low R ²
8			NC		NC					No convergence
9			NC	NC	NC					

GOOD NEWS x2 better

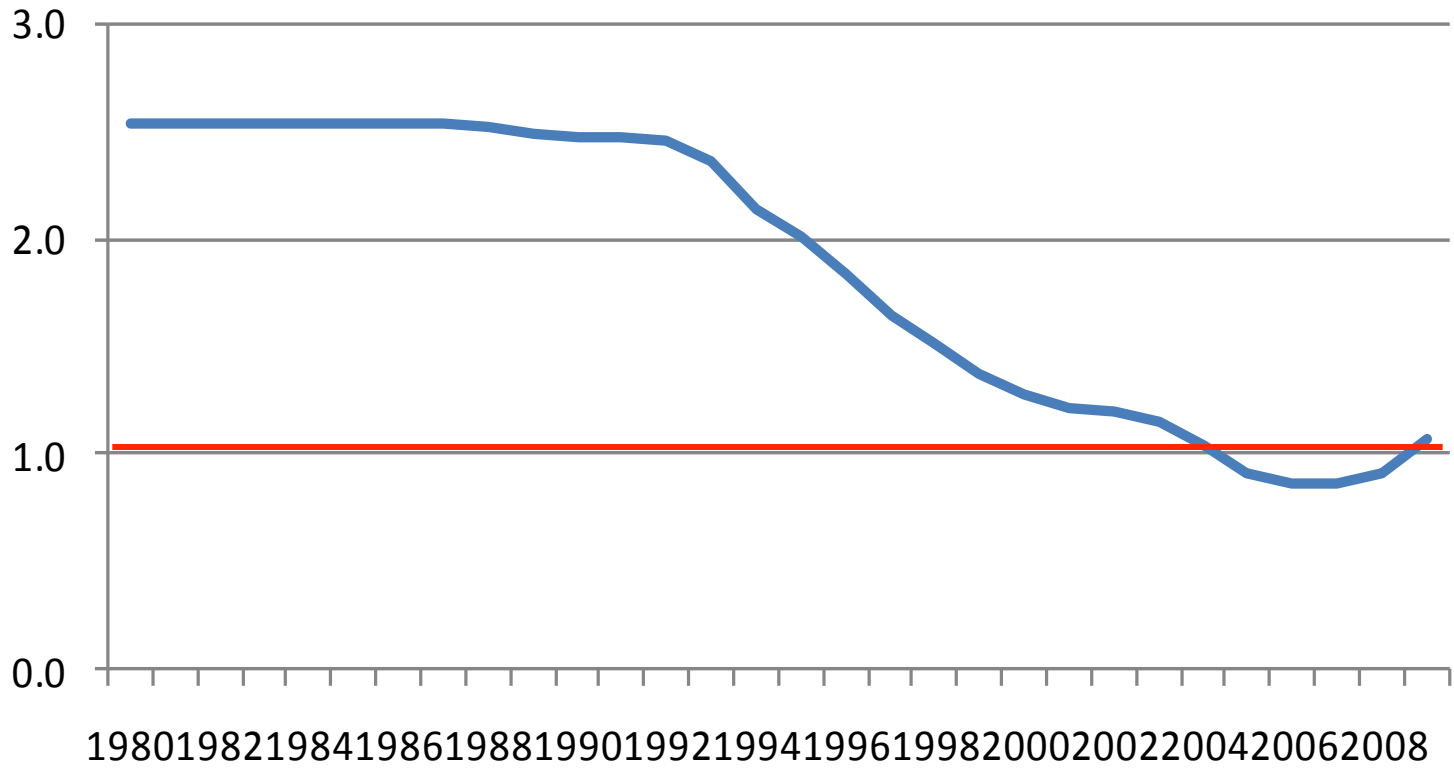
Original 4 regions

LAT LONG BETTER FIT

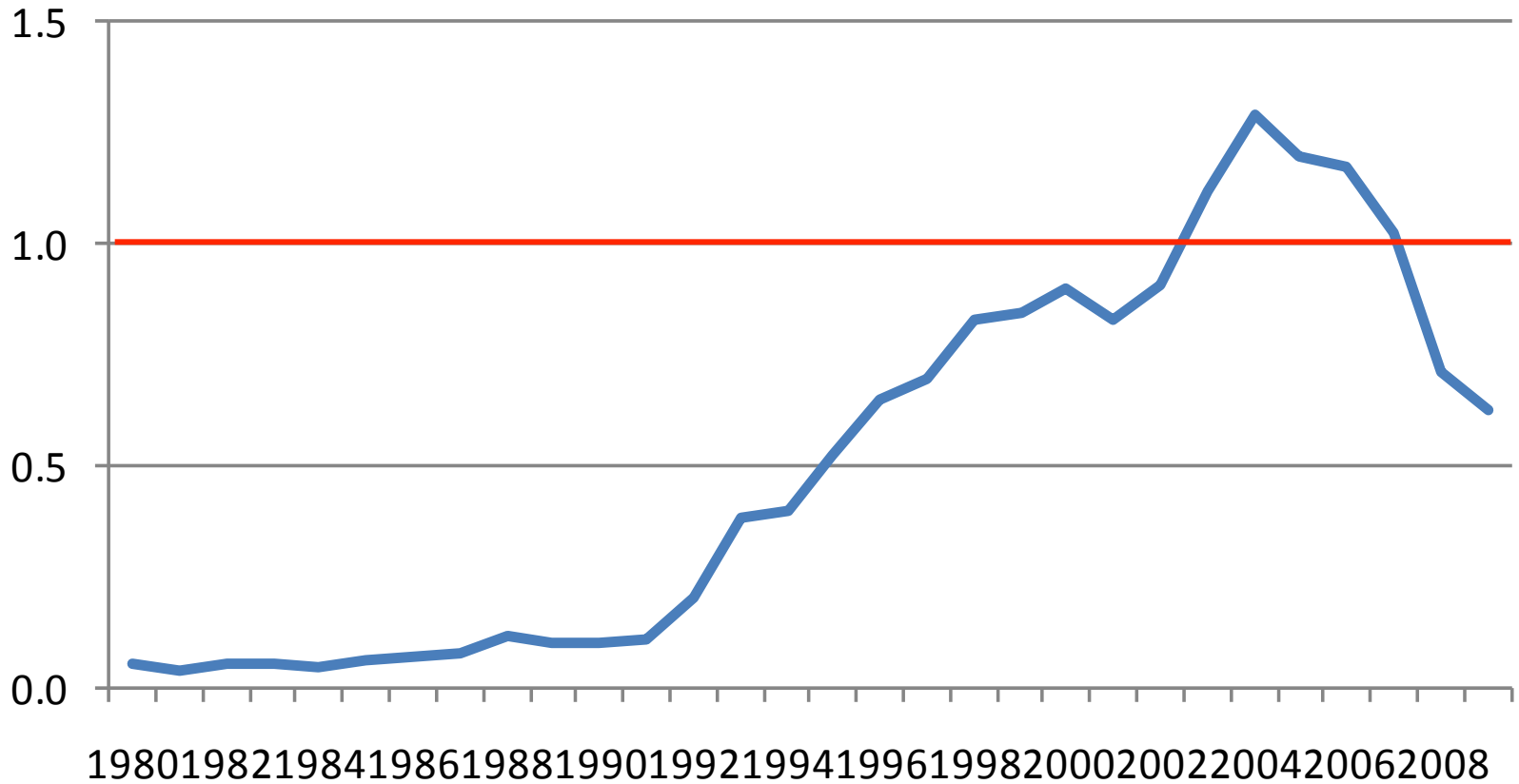
4 Fleets (catch)



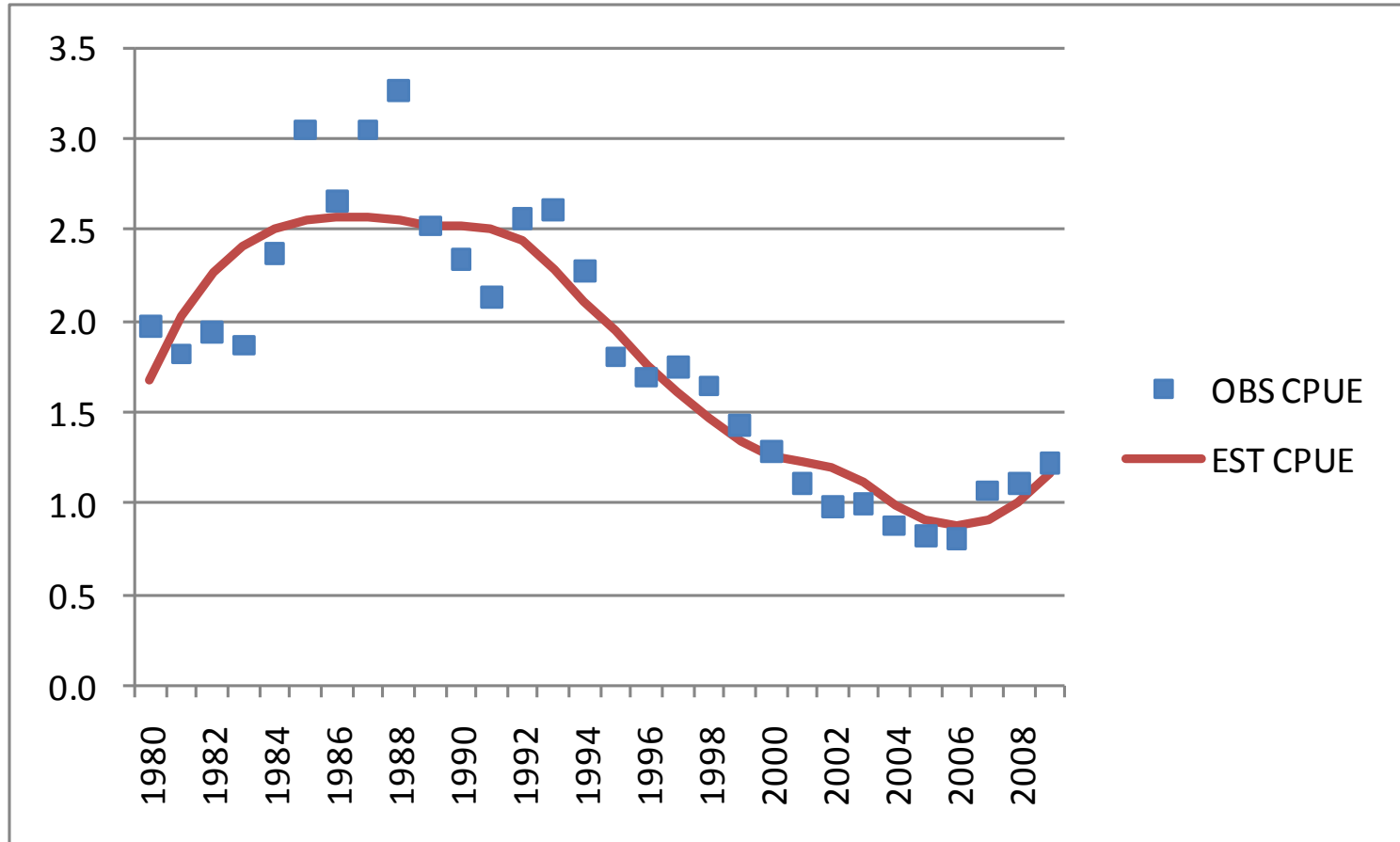
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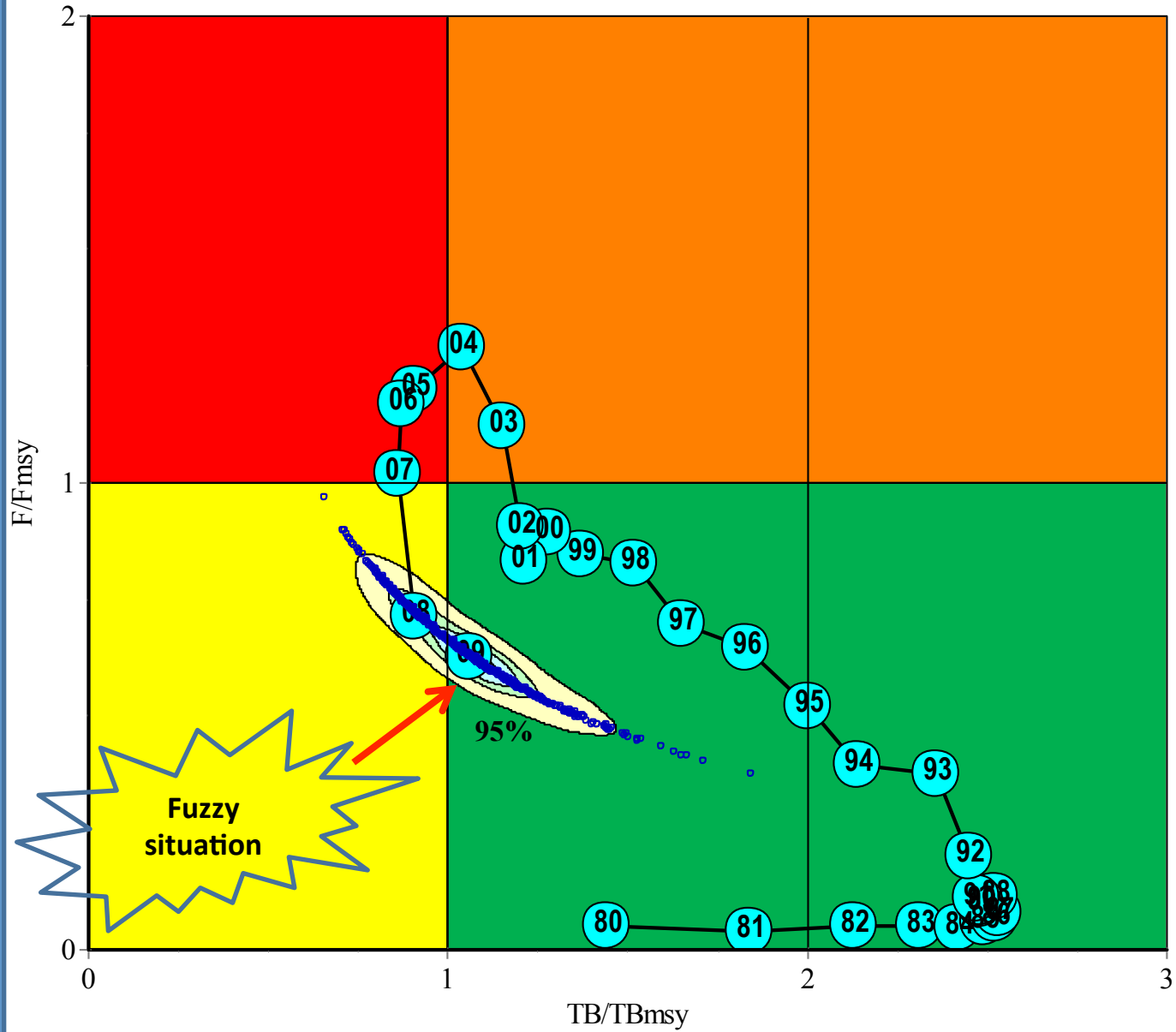
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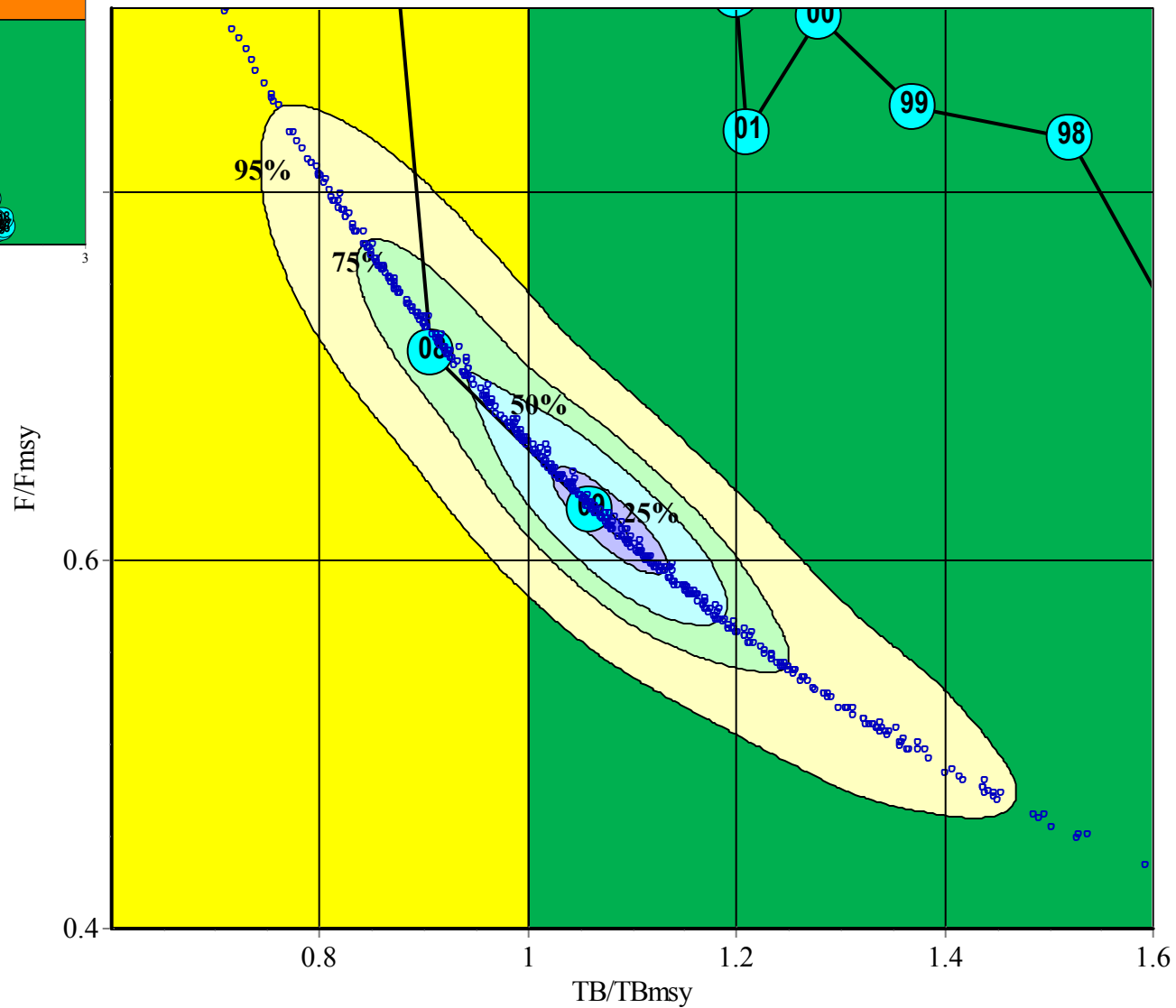
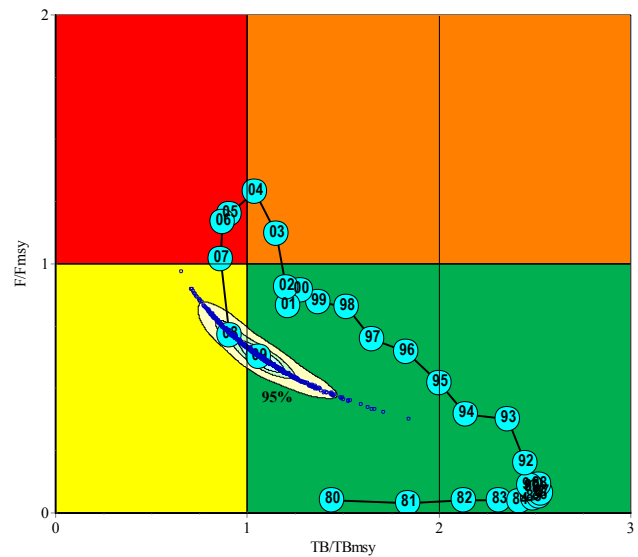


Residuals

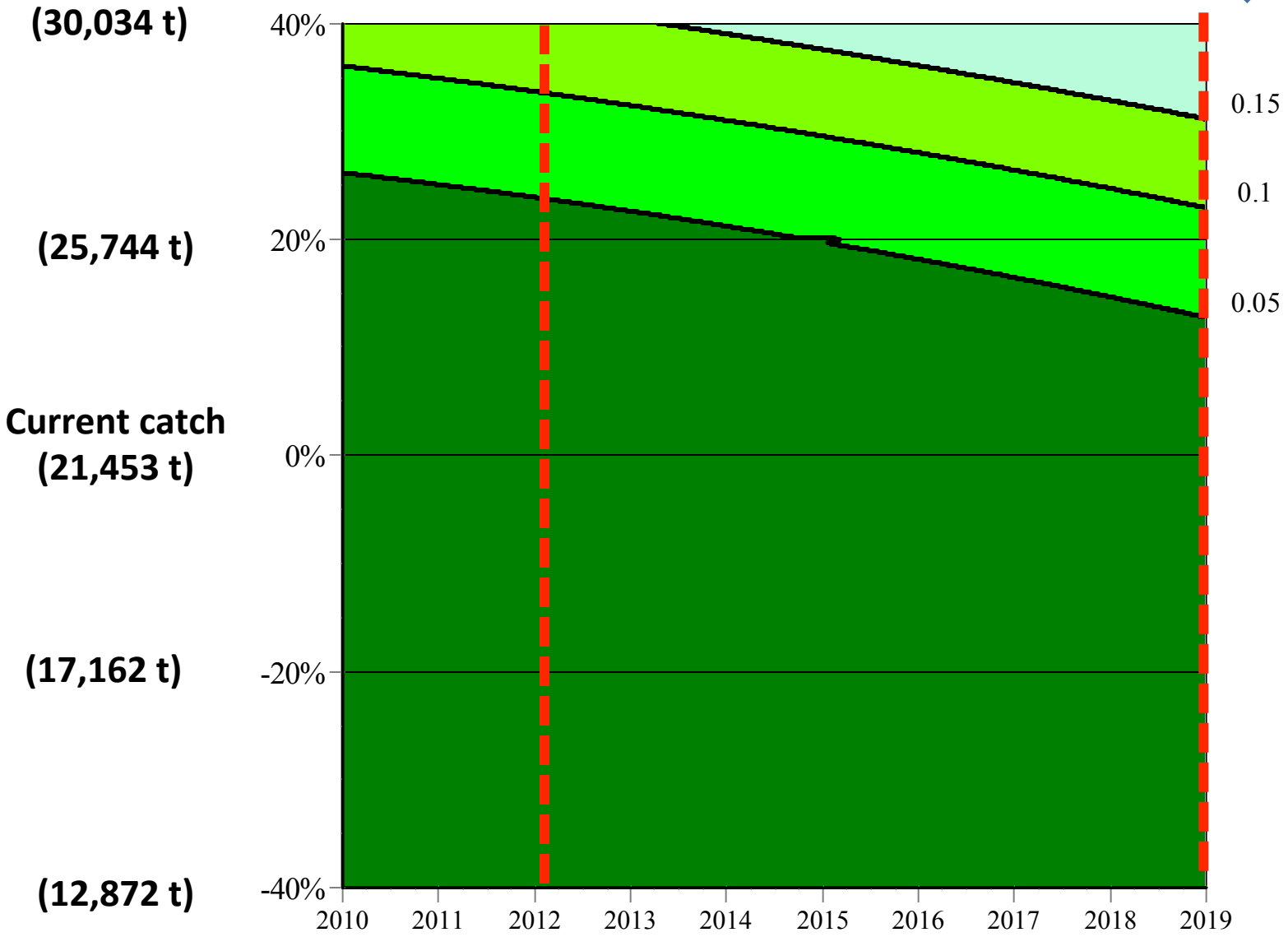


Stock
projectory
(Kobe plot 1)
(Run 6)





(Run 6) Probability to exceed TBmsy (very low)



(Run 6) Probability to exceed Fmsy (very low)

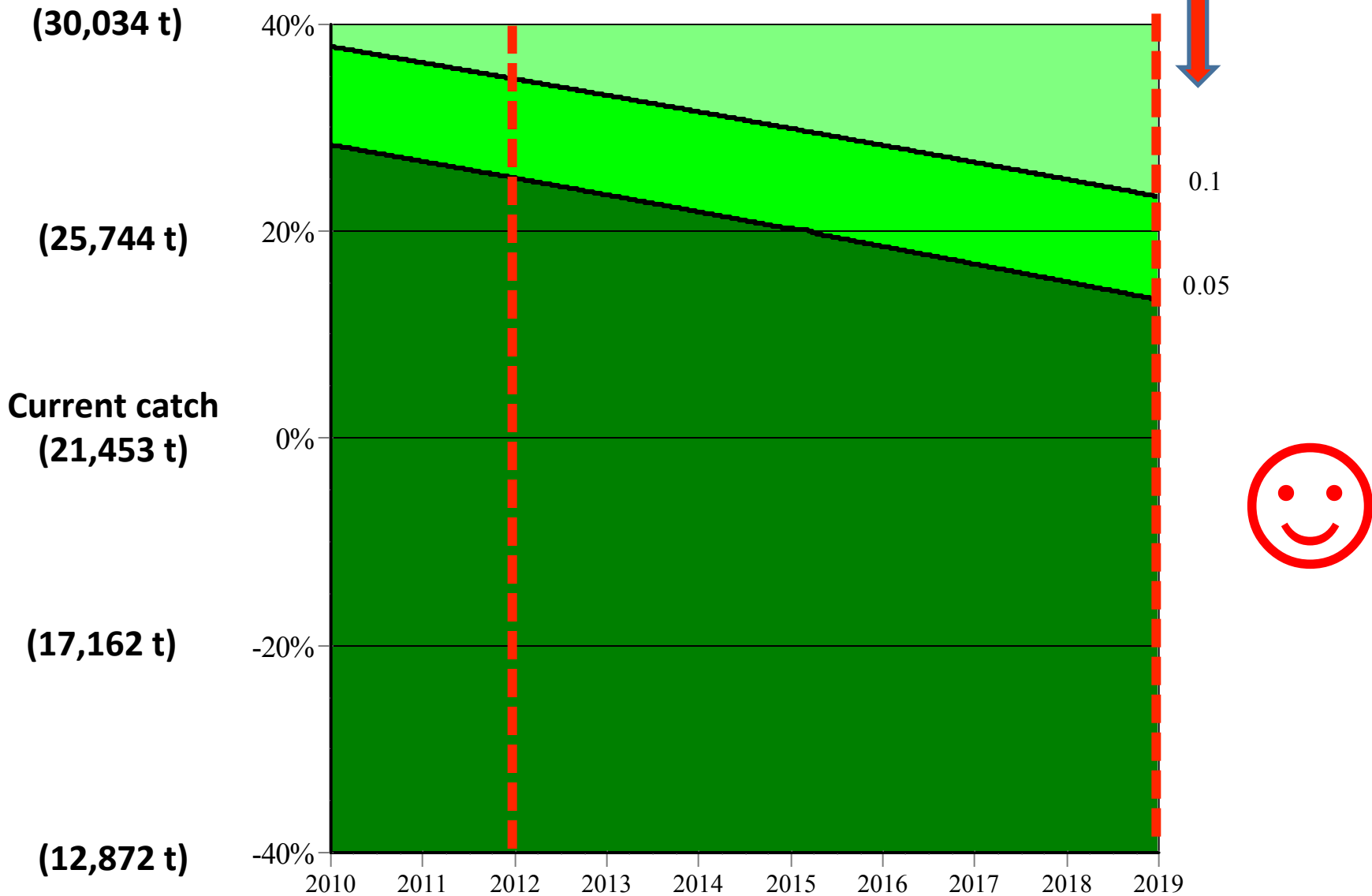


Table 1. Aggregate Indian Ocean Stock status summary table (ASPIC)

Management Quantity	Aggregate Indian Ocean	SW Region Only
Most recent catch estimate (t)	21,453	6,579
Mean catch over last 5 years (t)	26,350	7,801
MSY (1000 t)	29.9	8.6
(80%CI)	(28.7-30.9)	(8.2-8.9)
Current Data Period	1980-2009	1980-2009
F(Current)/F(MSY)	0.63	0.85
(80% CI)	(0.54-0.74)	(0.73-1.05)
B(Current)/B(MSY)	1.21	0.97
(80% CI)	(1.06-1.36)	(0.79-1.12)
SB(Current)/SB(MSY)	NA	NA
B(Current)/B(0)	0.53	0.58
(80% CI)	(0.41-0.67)	(0.40-0.77)
SB(Current)/SB(0)	NA	NA
B(Current)/B(Current, F=0)	?	?
SB(Current)/SB(Current, F=0)	NA	NA

Table 1. Kobe 2 Strategy Matrix for SW Indian Ocean

	Constant Catch Level (relative to 2009)				
Probability	60%	80%	100%	120%	140%
B(2012) <B(MSY)	0	0	0.00	0.00	0.12
F(2012) >F(MSY)	0	0	0	0	0.13
B(2019) <B(MSY)	0	0	0	0.00	0.27
F(2019) >F(MSY)	0	0	0	0	0.28

Table 2. Kobe 2 Strategy Matrix for whole Indian Ocean

	Constant Catch Level (relative to 2009)				
Probability	60%	80%	100%	120%	140%
B(2012) <B(MSY)	0	0	0.00	0.12	0.12
F(2012) >F(MSY)	0	0	0	0	0.13
B(2019) <B(MSY)	0	0	0	0.00	0.26
F(2019) >F(MSY)	0	0	0	0	0.28