

A draft MSE process for the Indian Ocean albacore

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Management strategy evaluation (MSE)

2. Performance measures

1. Management goals (objectives)



5&6&7 Simulation performance test

4. Management procedure

Model error

Harvest
Control Law

Stock assessment,
Model
development
Parameter update

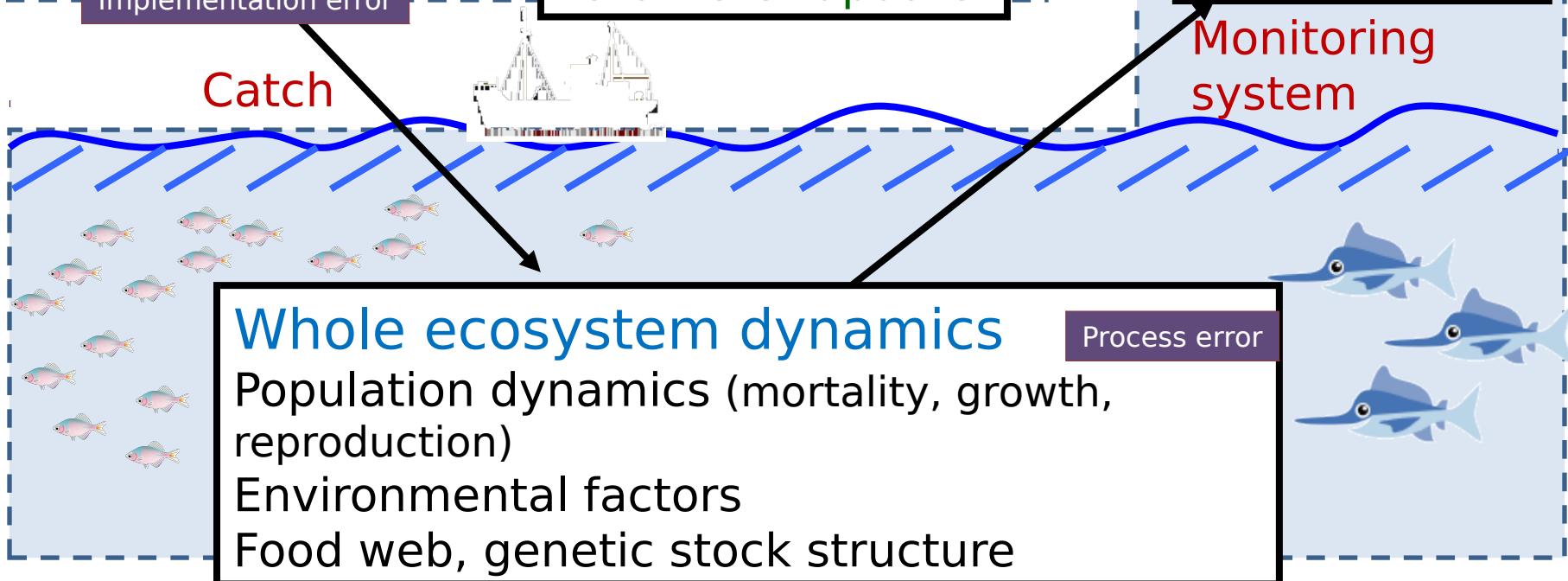
3. Operating
model

Data Observation error
Catch, CAL,
CPUE etc

Monitoring
system

Implementation error

Catch



Whole ecosystem dynamics

Process error

Population dynamics (mortality, growth,
reproduction)

Environmental factors

Food web, genetic stock structure

	General comments	ALB	YFT/BET/SKJ
1. Objectives	<u>To be specified</u>		
2. Performance measures	<u>To be specified</u> Need probabilistic description of reference points and possible actions when attained $P(B > B_{msy})$ and $P(\min(B) > B_{msy})$ should be greater than 80 and 95%, respectively? $P(B < B_{limit})$ and $P(\min(B) < B_{limit})$ should be smaller than 10 and 5%, respectively? Probs for F as well. Total catch=maximized; Catch variability=minimized		
3.1 OMs (stock)	<u>To be specified</u> <ul style="list-style-type: none"> Reference cases Robustness trials 	Based on ASMP/SS3 ? Non-spatial (aggregated)	Three independent SS3/MFCL-like models? Spatial (migration, recruitments allocation)
3.2 OMs (fishery)	<u>To be specified</u> Need "implementation error" ?	No consider interaction of fishery?	Consider realistic "multi-stock fisheries"
4.1 MP (SA)	As simple as possible at the initial stage	ASPIC, then ASMP/SS3 (Catch, CPUE, length)	ASPIC, then SS3/MFCL (Catch, CPUE, length, tag)
	<ul style="list-style-type: none"> Model-free control based on catch for last XX years (current situation) 		

MSE for ALB	Reference trials	Robustness trials
Population dynamics	Age-structured (0-8 yr; sex ratio 1:1)	
#Areas	1 (aggregated)	
Conditioning	SS3: Kitakado et al. (2012)	

3.1 OMs: Population dynamics

Natural mortality (external)	M=0.2207 (/year), M=0.3, 0.4	High predation years?
Growth formula (external)	VB: Lee and Yeh (2007)	
Weight-Length (external)	Lee and Kuo (1988)	
Age-at-maturity (age-specific, external)	0 (Age<=3), 0.25 (Age=4), 0.5 (Age =5), 0.75 (Age=6) and 1 (Age>=7)	
S-R (B-H)	h=0.8 (h=0.6, 0.7, 0.9)	
Recruitment deviations	SD: sigmaR=0.2, 0.4, 0.6 Auto-correlation: rho=0, 0.5?	Bad recruitment years?
Recruitment assignment	Season 4 (October to December)	
Selectivity	As estimated in SS3	

MSE for ALB	Reference trials	Robustness trials
3.2 OMs: Fishery (to generate future data)		
#Fisheries (quarterly)	5 (JPNLL, TWNLL, KORLL, PS, ...)	
Catch (implementation)	Random but unbiased error	Overly caught by some fisheries
Catch (allocation)	Depends on discussion in allocation?	
Catch (report)	Random but unbiased error	Severe under-reporting
#Surveys (CPUE)	3 (JPNLL, TWNLL, KORLL)	
STD_CPUE	Random and unbiased error Random but biased error (constant bias)	
	Issue arisen (how to follow recent inconsistent trends in CPUE between JPN and TWN?)	CPUE may not be proportional to the stock status (biased, systematic change due to target changes)
	Uncertainty due to temp change in catchability (change in gear efficiency, standard errors improvement?)	
Length data (not at this stage)	2cm bins (Neff: means of past years)	

MSE for ALB	Description
4. Management Procedures	
4.1 Stock assessment	(In the initial step) Surplus production model [every 3 years??]
	(In the future) ASMP/SS3/MFCL (should not be same with OMs?)
4.2 Harvest control rules	Model-free control based on catch for last XX years (current situation)
	See biomass trend in the previous five years and discount XX % Increase YY %
	Some familiar methods such as Fmsy
	Tuning of F for next XX years to meet targets (shown in item 2) using the SA model
	Invent catch limit algorithms based on a simple SA (future work)
Outcome presentation with beautiful graphics	