



3rd WORKSHOP ON CONNECTING THE IOTC SCIENCE AND MANAGEMENT PROCESSES (SMWS03)

THE SCIENCE PROCESS AND INTERPRETATION OF SCIENTIFIC ADVICE

KOBE PLOTS and K2MSM

INDIAN OCEAN TUNA COMMISSION
Secretariat

(Presented by David T. Wilson)



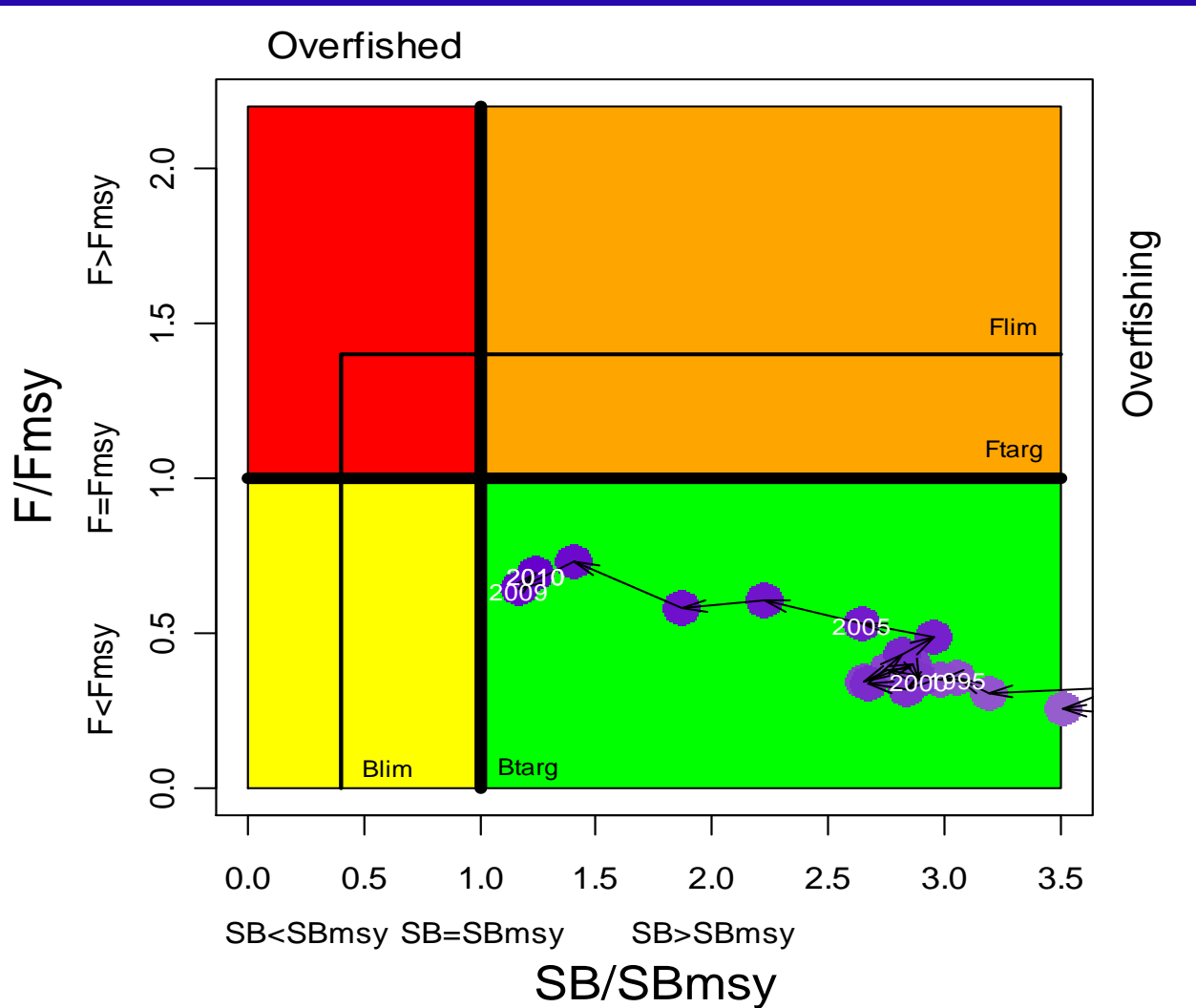
Kobe Plots & Kobe II Management Strategy Matrices (K2MSM)

What is a **Kobe Plot** and a **Kobe II Management Strategy Matrix (K2MSM)** and where did they originate?

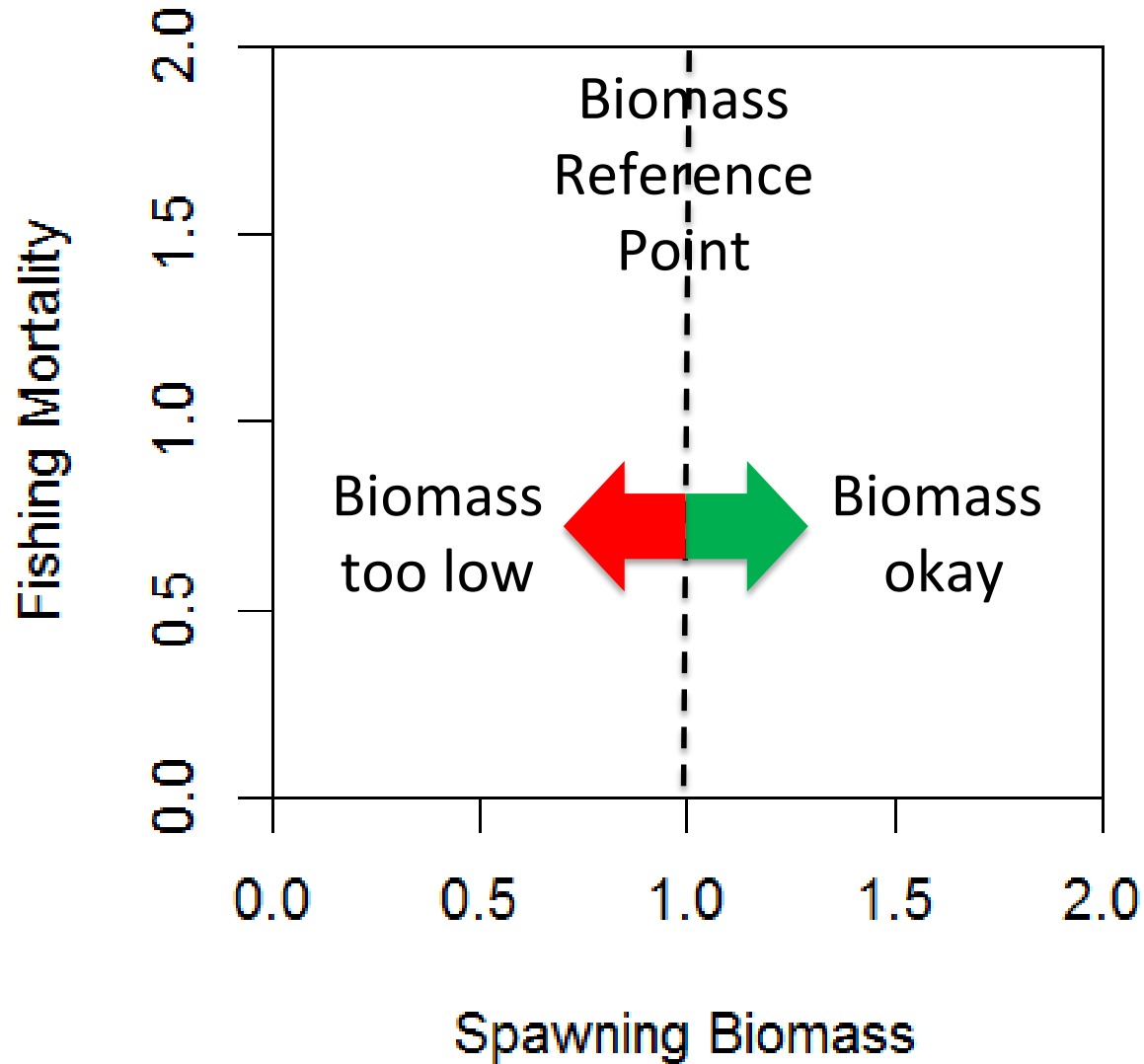
- 1) **KOBE PROCESS:** The joint tuna Regional Fisheries Management Organization process, also known as the 'Kobe process', which sought to harmonise the activities of the five tuna-RFMOs. First held in **Kobe**, Japan in January 2007 - **Introduced 'Phase Plots'**
- 2) In April 2009, the second joint meeting of tuna regional fisheries management organizations, known as **Kobe II**, was held in San Sebastian, Spain - **Introduced Decision Matrices**
- 3) In July 2011, the third joint meeting of tuna regional fisheries management organizations, known as Kobe III, was held in La Jolla, California in the United States - **Introduced ..?..Hence the process stalled**

Kobe Plots & Kobe II Management Strategy Matrices (K2MSM)

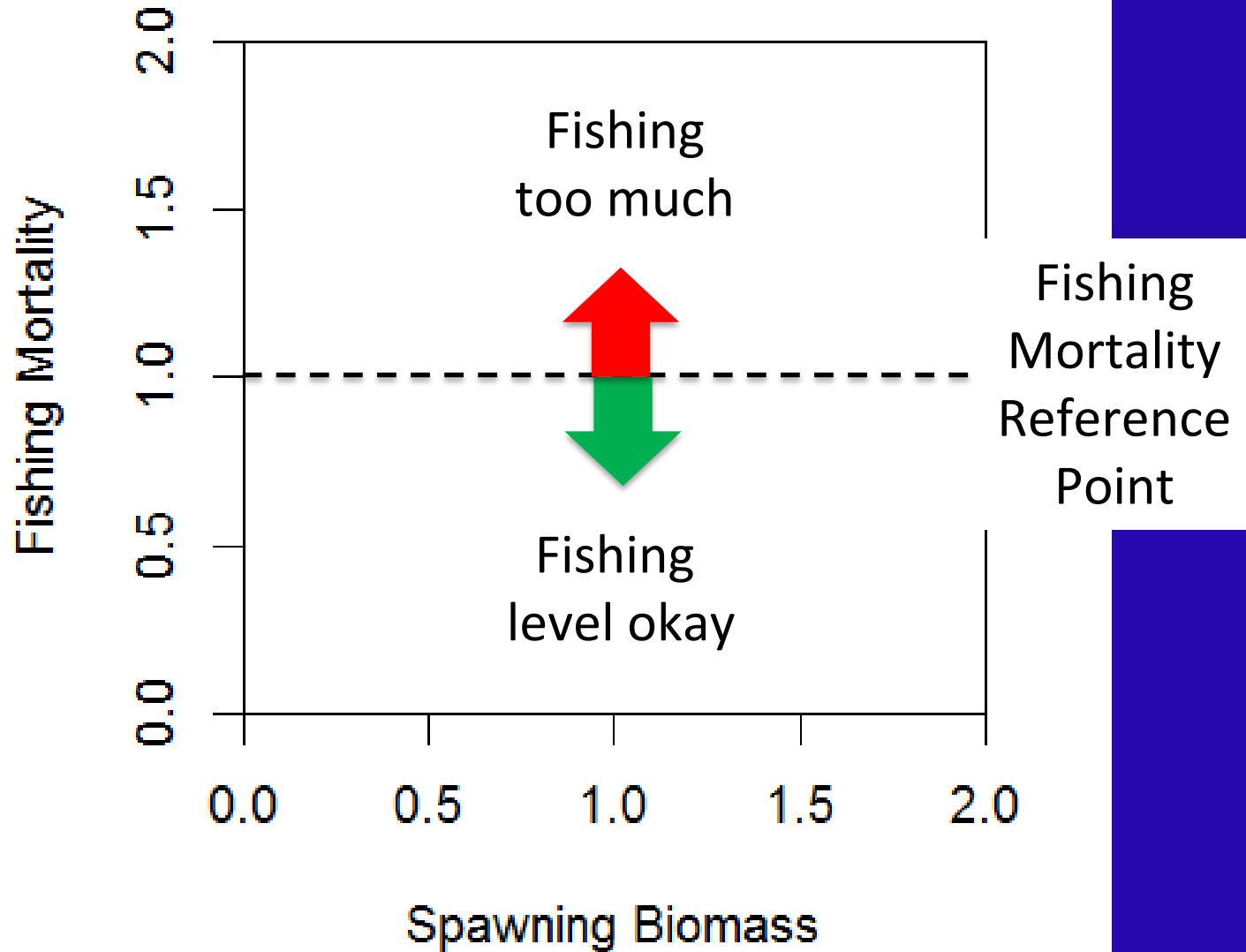
What is a Kobe Plot?



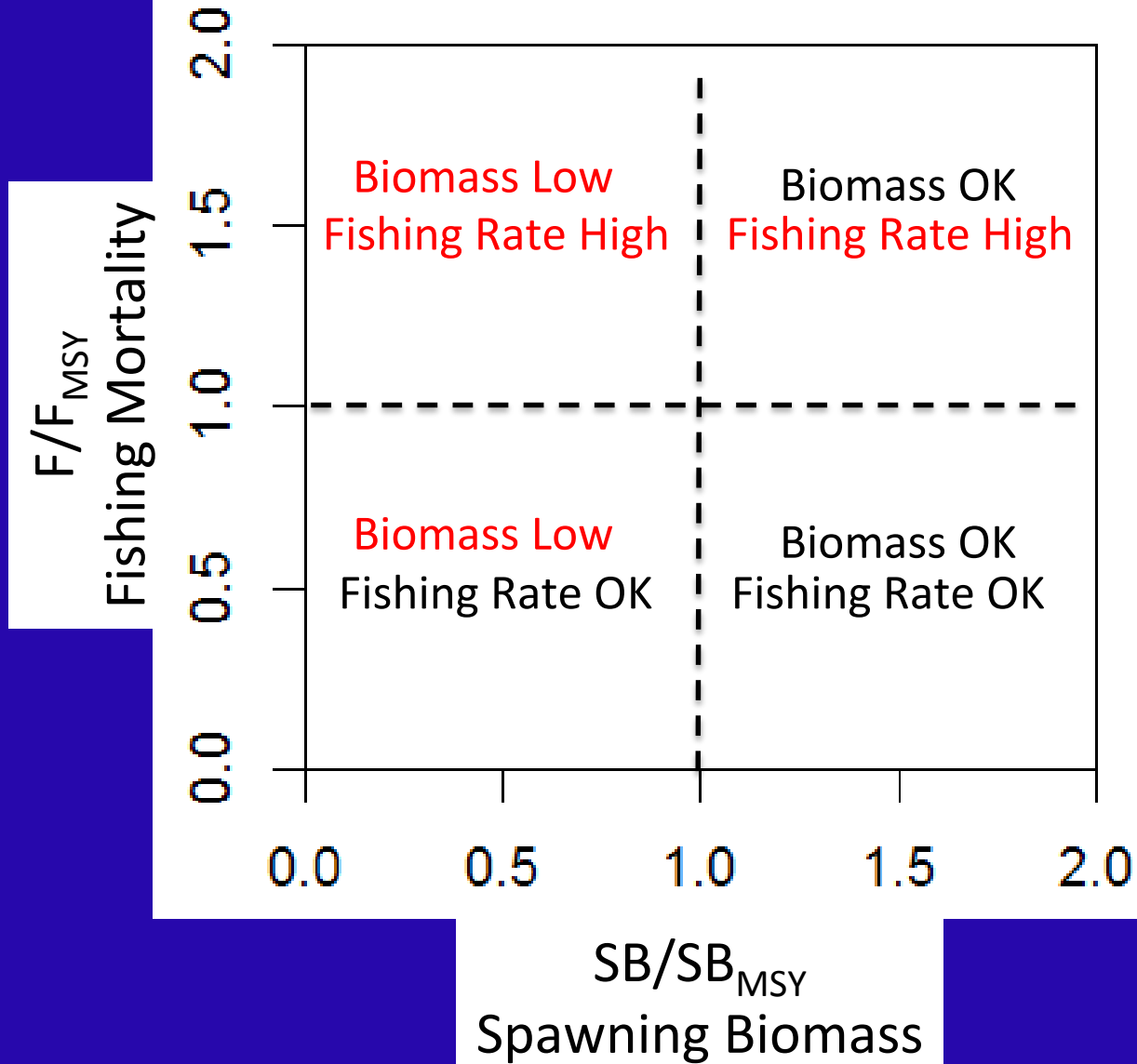
The Kobe Plot



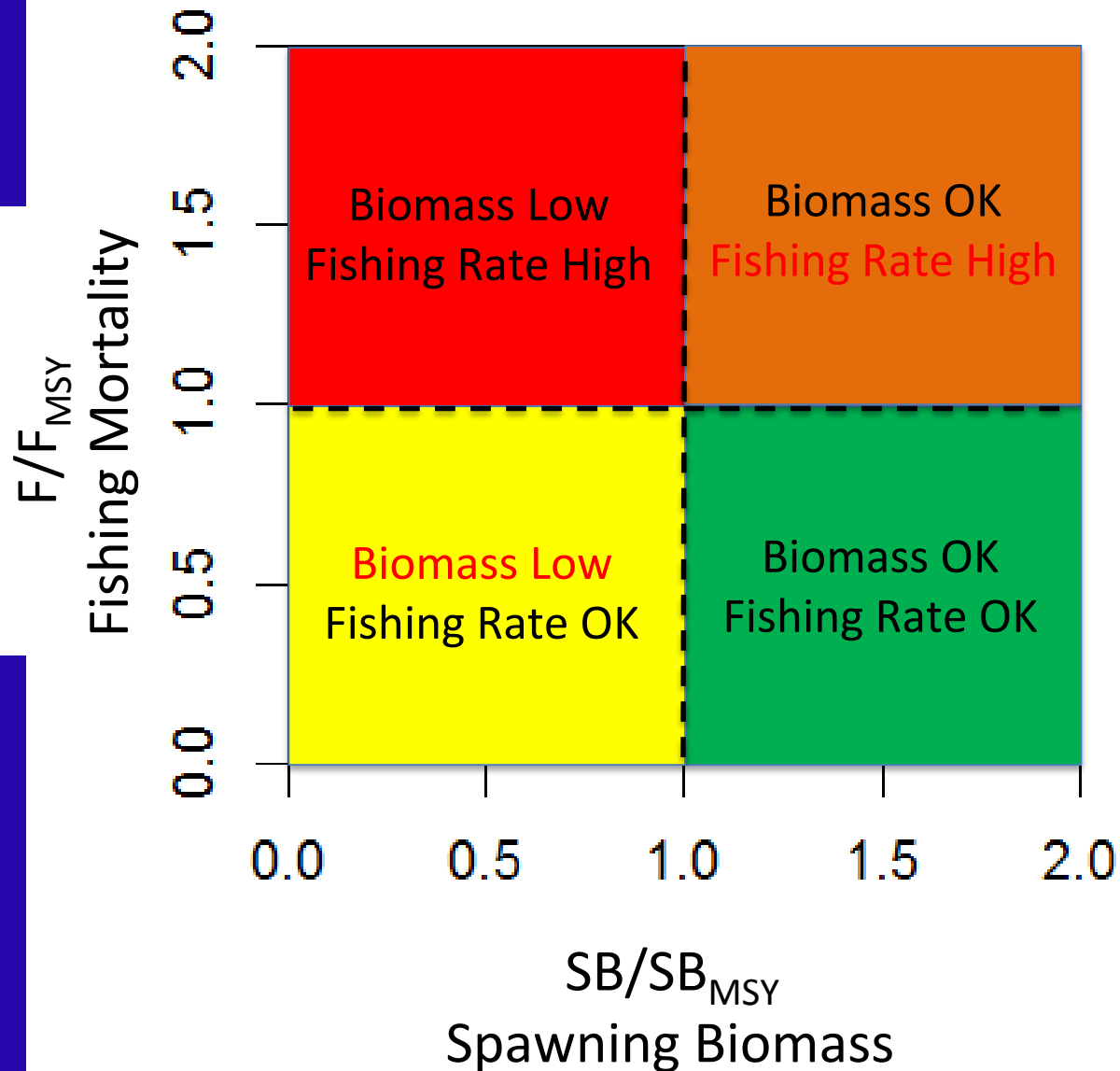
The Kobe Plot



The Kobe Plot

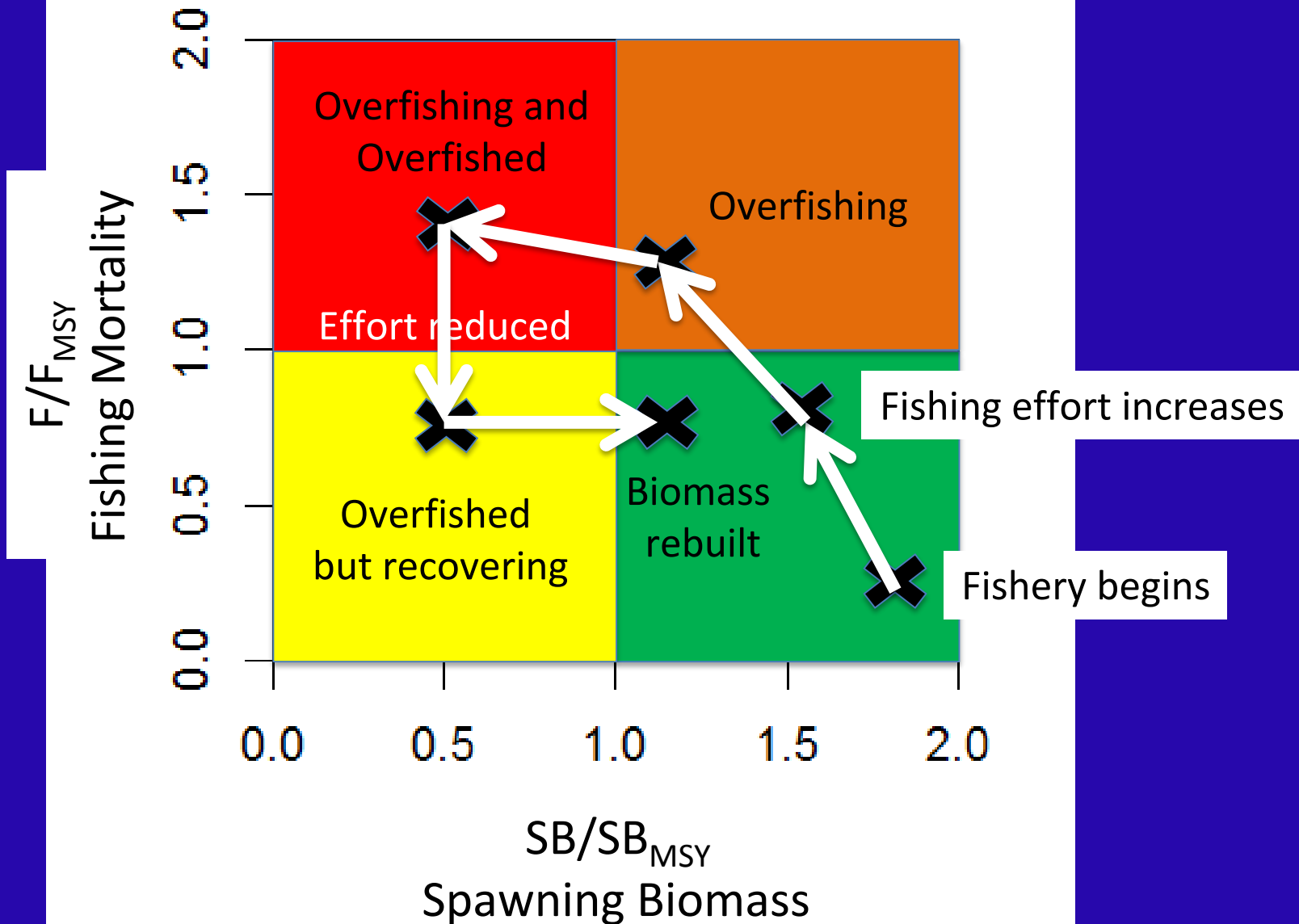


The Kobe Plot

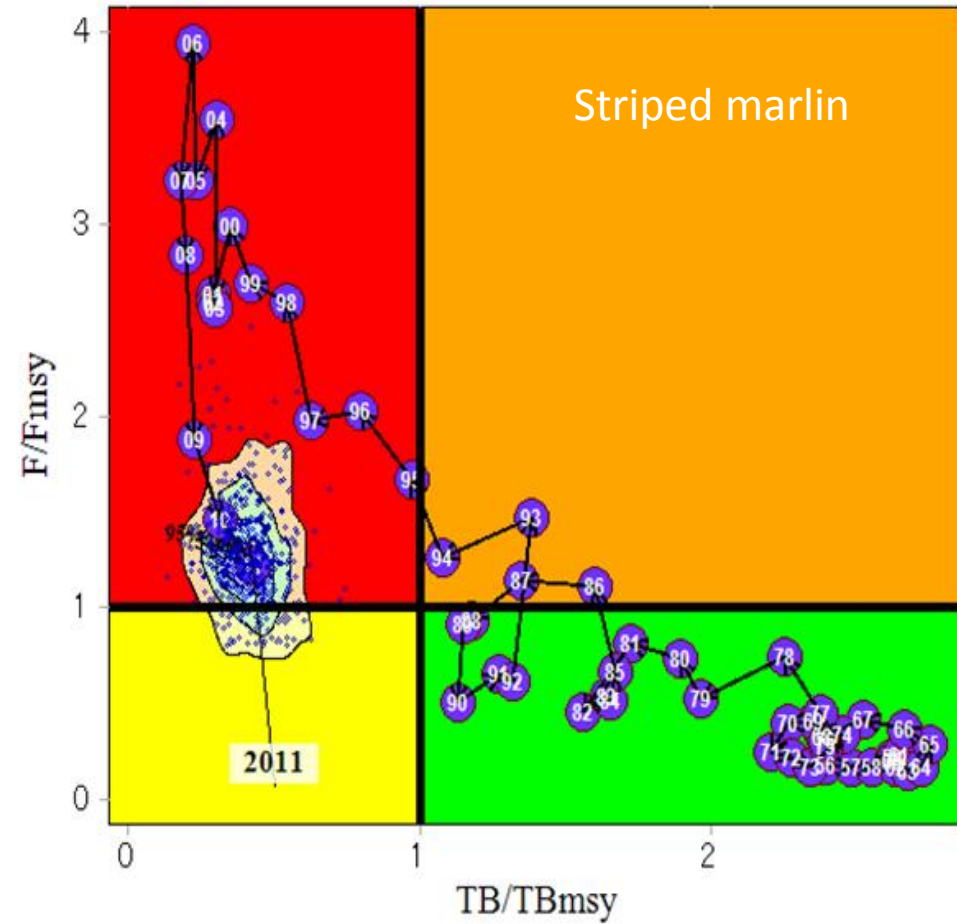
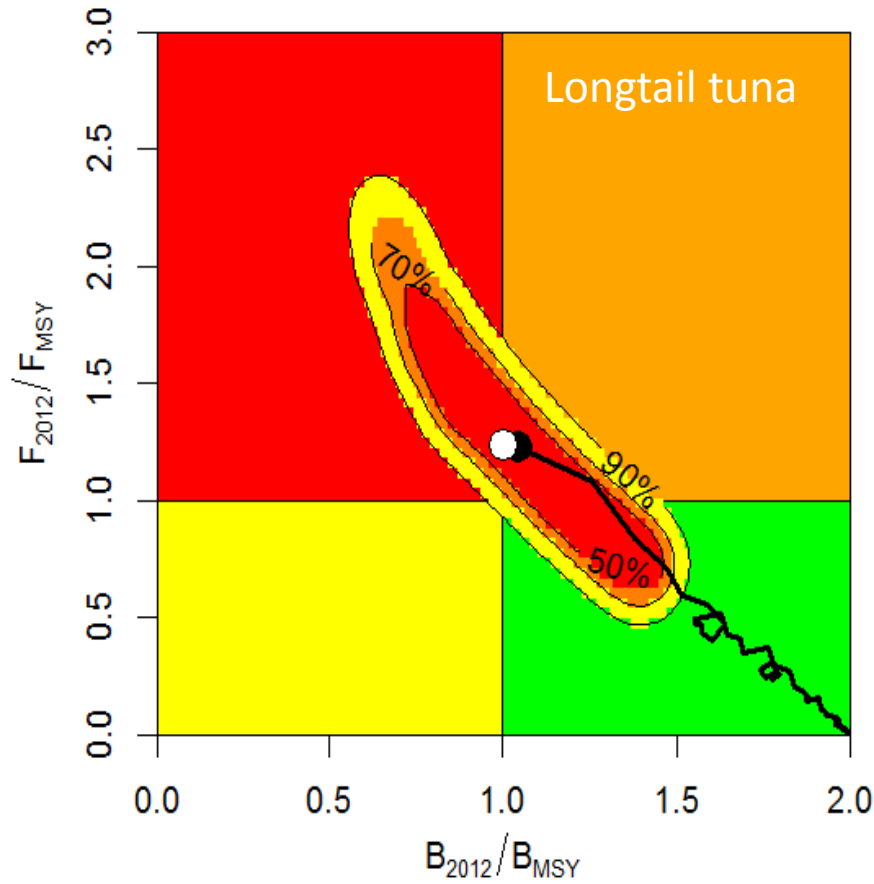


The Kobe Plot

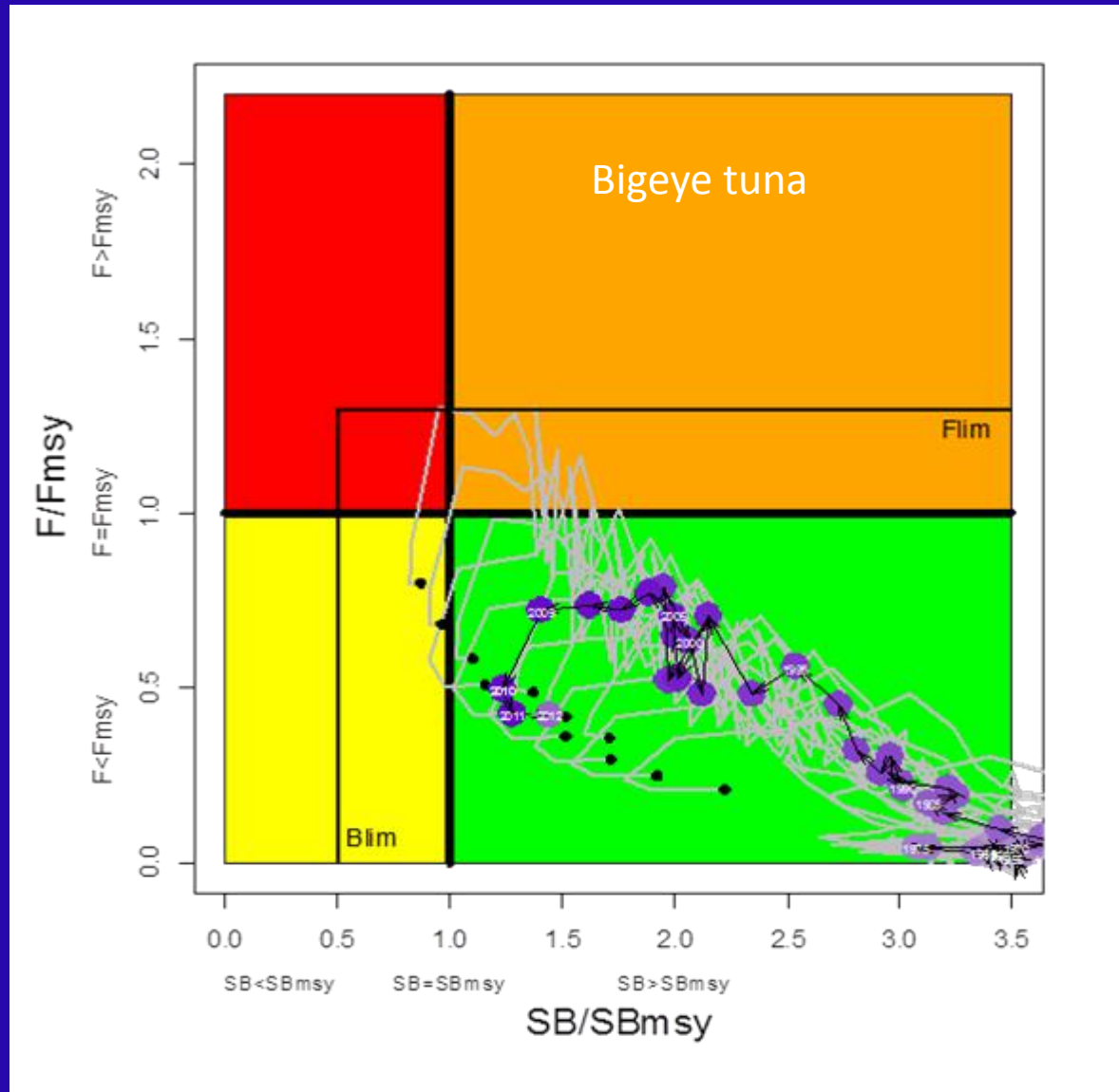
A common fishery story



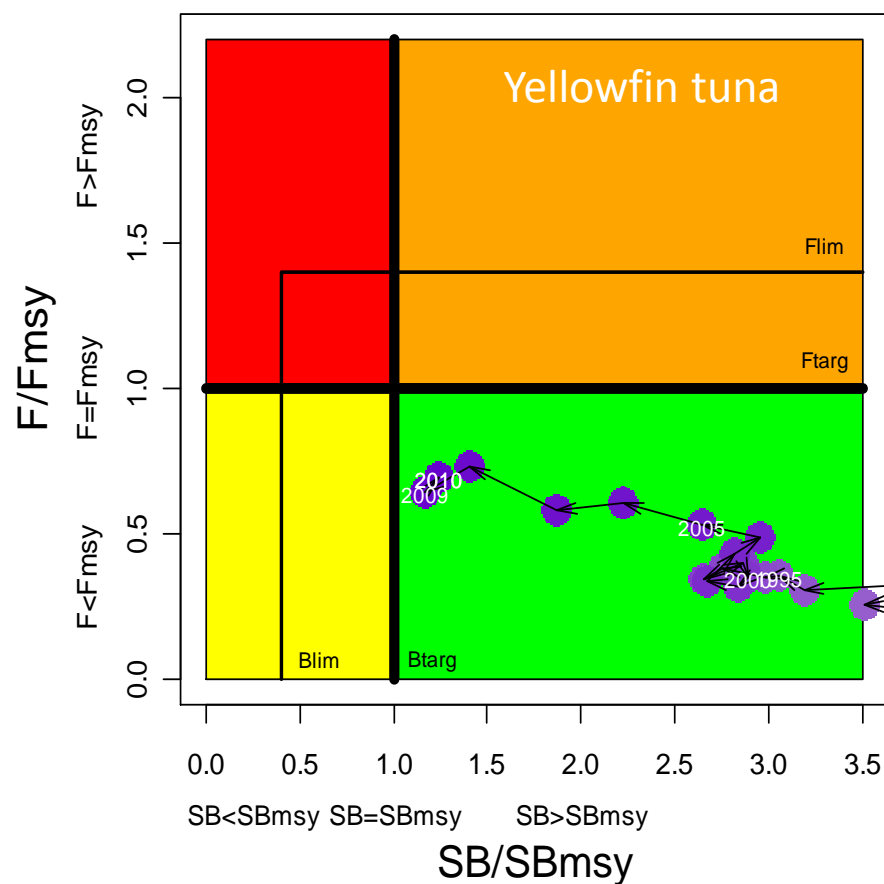
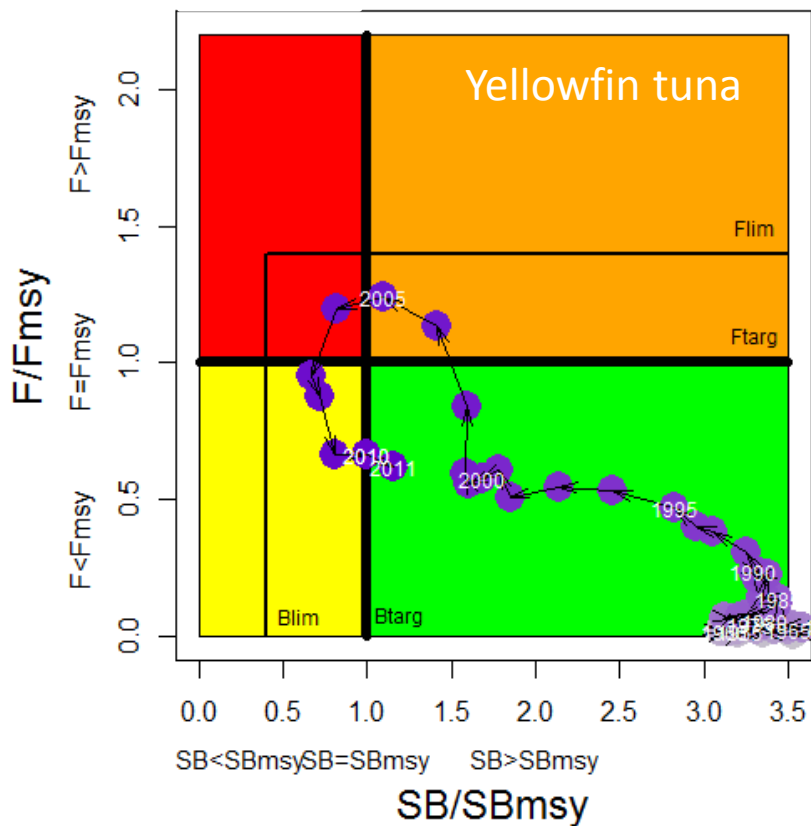
Kobe plots (variations)



Kobe plots (variations)



Kobe plots (variations)





Kobe plots

(Target and Limit Reference Points)

RESOLUTION 13/10 ON INTERIM TARGET AND LIMIT REFERENCE POINTS AND A DECISION FRAMEWORK

Table 1. Interim target and limit reference points

Stock	Target Reference Point	Limit Reference Point
Albacore	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.40 F_{MSY}$
Bigeye tuna	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.50 B_{MSY}; F_{LIM} = 1.30 F_{MSY}$
Skipjack tuna	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.50 F_{MSY}$
Yellowfin tuna	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.40 F_{MSY}$
Swordfish	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.40 F_{MSY}$



Kobe II Management Strategy Matrices (K2MSM)

Species: Aggregated Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of violating the MSY-based reference points for nine constant catch projections (average catch level from **YYYY–YYYY** (**xx,xxx** t), $\pm 10\%$, $\pm 20\%$, $\pm 30\%$ and $\pm 40\%$) projected for 3 and 10 years.

Reference point and projection timeframe	Alternative catch projections (relative to the average catch level from YYYY–YYYY) and probability (%) of violating MSY-based target reference points ($B_{\text{targ}} = B_{\text{MSY}}$; $F_{\text{targ}} = F_{\text{MSY}}$)								
	60%	70%	80%	90%	100%	110%	120%	130%	140%
	(catch t)	(catch t)	(catch t)	(catch t)	(catch t)	(catch t)	(catch t)	(catch t)	(catch t)
$B_{2016} < B_{\text{MSY}}$	9	13	19	28	40	53	65	82	86
$F_{2016} > F_{\text{MSY}}$	3	6	30	56	81	91	98	99	100
$B_{2023} < B_{\text{MSY}}$	0	0	1	3	14	41	87	100	100
$F_{2023} > F_{\text{MSY}}$	0	0	5	67	92	98	99	100	100

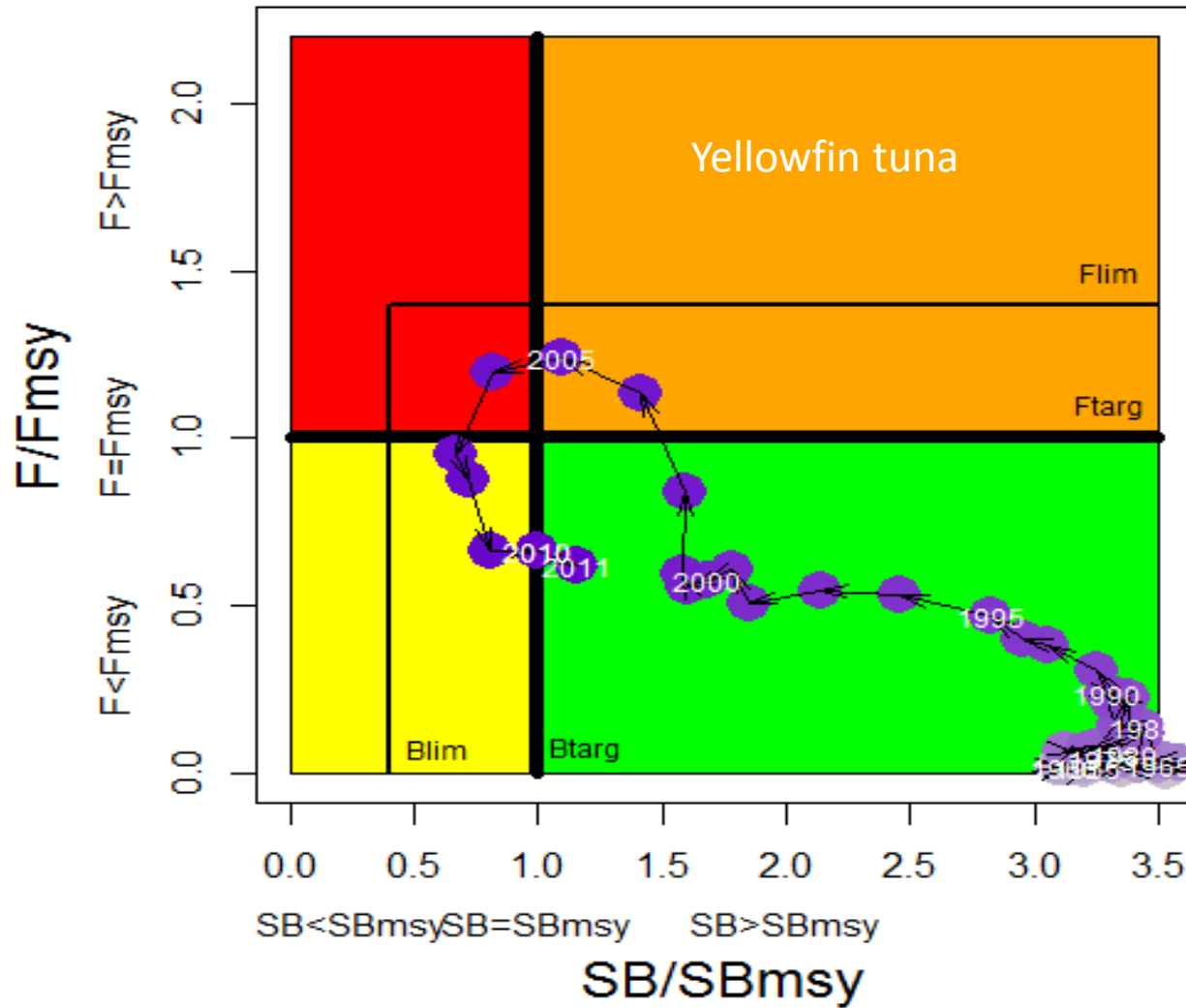
Kobe plots

RESOLUTION 13/10 ON INTERIM TARGET AND LIMIT REFERENCE POINTS AND A DECISION FRAMEWORK

Table 1. Interim target and limit reference points

Stock	Target Reference Point	Limit Reference Point
Albacore	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.40 F_{MSY}$
Bigeye tuna	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.50 B_{MSY}; F_{LIM} = 1.30 F_{MSY}$
Skipjack tuna	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.50 F_{MSY}$
Yellowfin tuna	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.40 F_{MSY}$
Swordfish	$B_{MSY}; F_{MSY}$	$B_{LIM} = 0.40 B_{MSY}; F_{LIM} = 1.40 F_{MSY}$

Target and Limit Reference Points



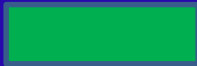


Kobe II Management Strategy Matrices (K2MSM)

Species: Aggregated Indian Ocean assessment Kobe II Strategy Matrix. Probability (percentage) of violating the MSY-based reference points for nine constant catch projections (average catch level from **YYYY–YYYY** (**xx,xxx** t), $\pm 10\%$, $\pm 20\%$, $\pm 30\%$ and $\pm 40\%$) projected for 3 and 10 years.

Reference point and projection timeframe	Alternative catch projections (relative to the average catch level from YYYY–YYYY) and probability (%) of violating MSY-based target reference points ($B_{\text{targ}} = B_{\text{MSY}}$; $F_{\text{targ}} = F_{\text{MSY}}$)								
	60% (catch t)	70% (catch t)	80% (catch t)	90% (catch t)	100% (catch t)	110% (catch t)	120% (catch t)	130% (catch t)	140% (catch t)
$B_{2016} < B_{\text{MSY}}$	9	13	19	28	40	53	65	82	86
$F_{2016} > F_{\text{MSY}}$	3	6	30	56	81	91	98	99	100
$B_{2023} < B_{\text{MSY}}$	0	0	1	3	14	41	87	100	100
$F_{2023} > F_{\text{MSY}}$	0	0	5	67	92	98	99	100	100
Reference point and projection timeframe	Alternative catch projections (relative to the average catch level from YYYY–YYYY) and probability (%) of violating MSY-based limit reference points ($B_{\text{lim}} = 0.4 B_{\text{MSY}}$; $F_{\text{lim}} = 1.4 F_{\text{MSY}}$)								
	60% (catch t)	70% (catch t)	80% (catch t)	90% (catch t)	100% (catch t)	110% (catch t)	120% (catch t)	130% (catch t)	140% (catch t)
$B_{2016} < B_{\text{Lim}}$	4	6	8	14	20	23	40	45	65
$F_{2016} > F_{\text{Lim}}$	3	6	15	15	20	33	45	67	100
$B_{2023} < B_{\text{Lim}}$	0	0	0	6	24	26	49	74	100
$F_{2023} > F_{\text{Lim}}$	0	0	0	10	22	45	67	96	100



Why are Kobe Plots and K2MSM important for IOTC policy makers to understand?

- For stocks whose assessed status is in the lower right (green) quadrant of the Kobe Plot, aim at maintaining the stocks within this quadrant with a high probability

- For stocks whose assessed status is in the upper right (orange) quadrant of the Kobe Plot, aim at ending overfishing with high probability in as short a period as possible

- For stocks whose assessed status is in the lower left (yellow) quadrant of the Kobe plot, aim at rebuilding these stocks in as short a period as possible

- For stocks whose assessed status is in the upper left quadrant (red), aim at ending overfishing with a high probability and at rebuilding the biomass of these stocks in as short a period as possible
