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EVALUATION OF THE EFFECT OF RESOLUTION C-04-09

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1. INTRODUCTION

The [2004 Resolution on the Conservation of Tuna in the eastern Pacific Ocean \(Resolution C-04-09\)](#) called for restrictions on purse-seine effort and longline catches for 2004: a 6-week closure during the third OR fourth quarter of the year for purse-seine fisheries, and longline catches are not to exceed 2001 levels. We investigate the effectiveness of this management measure.

2. METHODS

To assess the utility of these management actions, we projected the population forward 5 years, assuming that these conservation measures were not implemented. We started the projections in 2004 to include the first year of the management measure. To approximate the choices of fishing nations, it was assumed that the 6-week closure occurred in the third and fourth quarters for bigeye tuna and yellowfin tuna respectively. For the longline catch for which longline catch was restricted in 2004, the ratio of catch in 2003 to catch in 2004 was used to increase the effort to represent no restrictions.

Bigeye tuna: Quarterly effort for each year in the future and for 2004 was set equal to the effort in 2004 adjusted to remove the effect of the conservation measures. The effort for purse seine in the **third** quarter was increased by 86% and the southern longline fishery effort was increased by 39% for all years.

Yellowfin tuna: Quarterly effort for each year in the future and for 2004 was set equal to the effort in 2004 adjusted to remove the effect of the conservation measures. The effort for purse seine in the **fourth** quarter was increased by 86% and the southern longline fishery effort was increased by 39% for all years.

3. RESULTS

The spawning biomass for bigeye tuna at the end of 2004 under the management restrictions is about 14% higher than if no restrictions had been implemented (Tables 1 and 2). However, the spawning biomass is still below and will remain below (under average conditions) the level required to support AMSY (Figure 1). The spawning biomass will decline even further if no restrictions were implemented.

If no restrictions were implemented the catch of bigeye tuna in 2004 would have been 12% higher for purse seine and 30% higher for longline. However, it is predicted that by 2007, the catches based on the lower effort due to the restrictions would be higher than under the unrestricted effort (Tables 1 and 2).

The spawning biomass for yellowfin tuna at the end of 2004 under the management restrictions is about 12% higher than if no restrictions had been implemented (Tables 3 and 4).

If no restrictions had been implemented the catch of yellowfin tuna in 2004 would have been 9% higher for purse seine and 36% higher for longline. However, it is predicted that by 2006, the purse seine catches under restricted effort would be higher than without the restrictions (Tables 1 and 2). Catches in the longline fishery are predicted to remain lower under the restricted effort than would have been the case without the restrictions.

Table 1. Bigeye spawning biomass and catch (t) compared between the current effort levels, which are restricted by Resolution C-04-09, and effort levels adjusted to represent no restrictions.

Year	End of year spawning biomass		Basecase catch		No restrictions catch	
	Base case	No restrictions	Purse seine	Longline	Purse seine	Longline
2004	2848	2504	67808	31918	75967	41527
2005	2923	2210	63557	44041	66835	49234
2006	2945	1995	57193	43646	57091	43319
2007	2777	1738	54521	41540	53380	37997
2008	2608	1582	51380	38808	50831	34013
2009	2510	1511	51537	37373	50925	32275

Table 2. Bigeye spawning biomass and catch adjusted to represent no restrictions as a ratio of those quantities estimated under current effort levels, which are restricted by resolution C-04-09.

Year	End of year spawning biomass	Purse-seine catch	Longline catch
2004	0.88	1.12	1.30
2005	0.76	1.05	1.12
2006	0.68	1.00	0.99
2007	0.63	0.98	0.91
2008	0.61	0.99	0.88
2009	0.60	0.99	0.86

Table 3. Yellowfin spawning biomass and catch (t) compared between the current effort levels, which are restricted by resolution C-04-09, and effort levels adjusted to represent no restrictions.

Year	End of year spawning biomass		Basecase catch		No restrictions catch	
	Base case	No restrictions	Purse seine	Longline	Purse seine	Longline
2004	7104	6369	270477	24499	293845	33329
2005	7659	6532	276478	15621	279732	18734
2006	7183	6038	286070	16820	275465	19028
2007	7073	6007	274225	15148	260963	16722
2008	7087	6013	269458	15253	259468	16977
2009	7087	6014	269882	15271	259655	16984

Table 4. Yellowfin spawning biomass and catch adjusted to represent no restrictions as a ratio of those quantities estimated under current effort levels, which are restricted by resolution C-04-09.

Year	End of year spawning biomass	Purse-seine catch	Longline catch
2004	0.90	1.09	1.36
2005	0.85	1.01	1.20
2006	0.84	0.96	1.13
2007	0.85	0.95	1.10
2008	0.85	0.96	1.11
2009	0.85	0.96	1.11

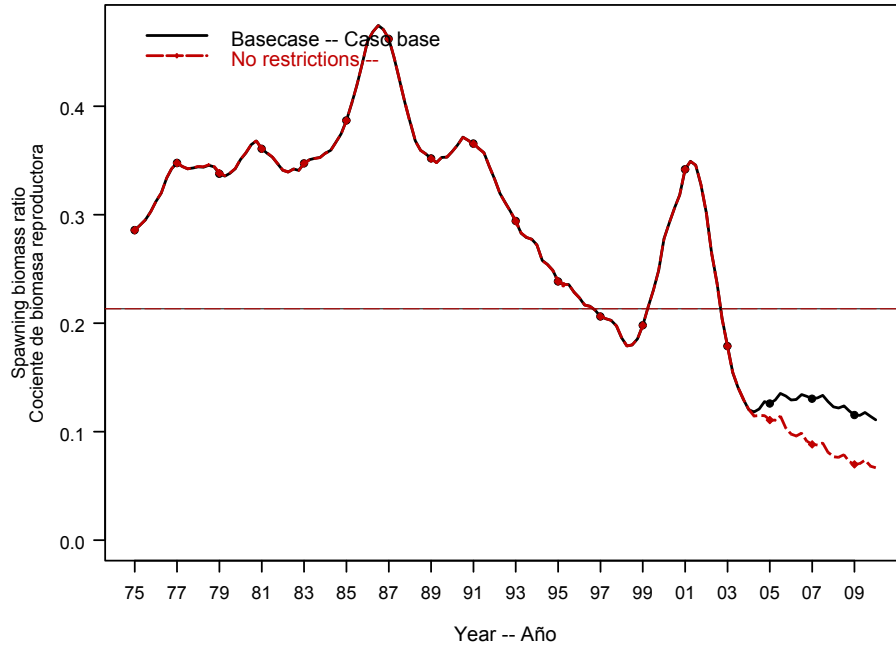


Figure 1. Maximum likelihood estimates of the projected spawning biomass ratios (SBRs) of bigeye tuna, with effort for 2004 and average catchability for 2002 and 2003 (“Basecase”) and with purse-seine effort in the third quarter increased by 86% and effort increased in all quarters by 39% for the southern longline fishery to approximate the effect of no restrictions (“No restrictions”). The horizontal line indicates the SBR_{AMSY} (0.21).

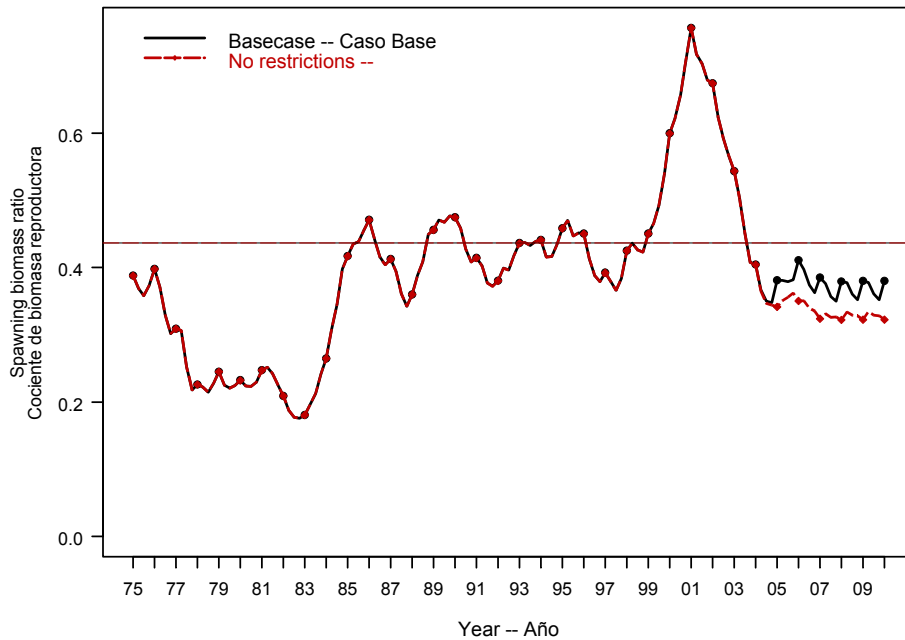


Figure 2. Maximum likelihood estimates of the projected spawning biomass ratios (SBRs) of yellowfin tuna, with effort for 2004 and average catchability for 2002 and 2003 (“Basecase”) and with purse-seine effort in the fourth quarter increased by 86% and effort increased in all quarters by 39% for the southern longline fishery to approximate the effect of no restrictions (“No restrictions”). The horizontal line indicates the SBR_{AMSY} (0.44).