Comments on
Initial Analyses Related to Evaluating Parameter Value Choices for Pacific Sardine
Agenda Item I.1.b
Attachment 2
Hurtado-Ferro and Punt, April 2013

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I was the last biologist to sample sardines at the canneries in Monterey and Moss Landing so I probably have a different perspective on the sardine fishery than many fisheries biologists. I saw the rows of recently shut down canneries and went through the abandoned cannery buildings and warehouses. I went fishing with and talked to the small number of old, and not so old fishermen, who survived the collapse of the sardine fishery by fishing squid, herring and anchovy. I worked on CPS species for the three decades it took for sardine to recover sufficiently to become a major fishery again. What happens when a major fishery is shut down is very real to me.

In my opinion, the probable candidates for management of sardine include four options (6, 9, 10, and 14). To evaluate these four options I have ranked what I believe to be the top performance measures of interest to the economics of the fishery and the top performance measures from an ecosystem perspective.

In descending order of importance the top three economic performance measures in Table 5 of Agenda Item I.1.b are:

OPTION	6 (HG-J)	9	10	14
1. % No catch	2.65%	7.01%	16.33%	2.24%
2. % Catch<50,000t	30.43%	37.28%	43.78%	26.48%
3. Median catch	102.16	92.73	94.80	116.9

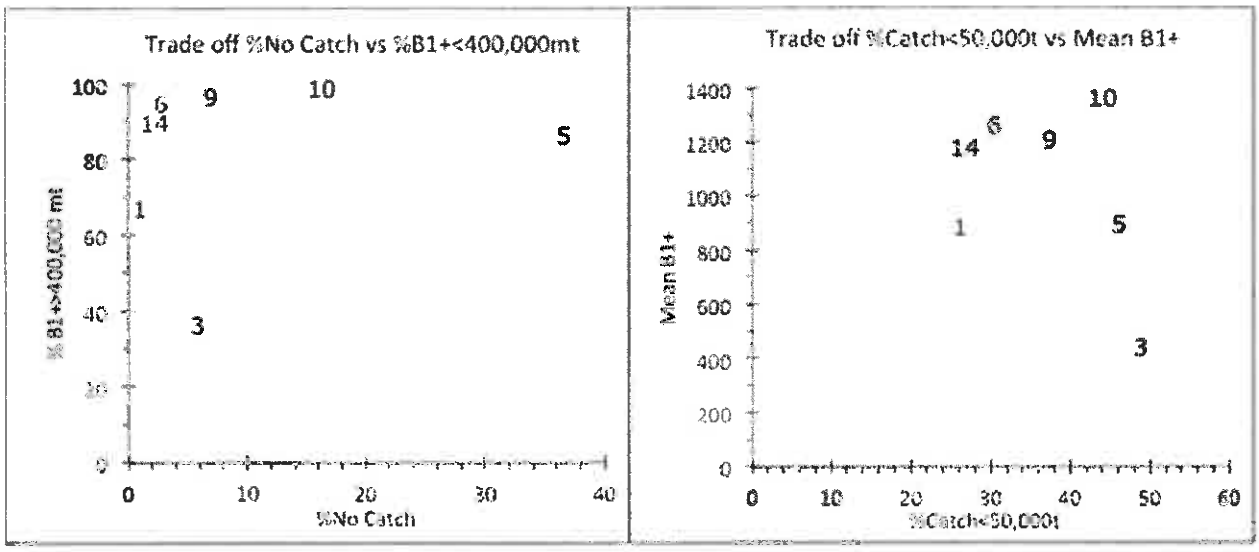
From my perspective option 14 is the best option from an economic viewpoint as it scores highest on all three performance measures. Option 6 is a close second. Option 10 is clearly the worst option as it results in no catch in 1 year out of 6. Any management option that closes down a fishery with this frequency certainly cannot be termed sustainable. Option 9 closes the fishery 1 year in 14, option 6 closes the fishery 1 year in 38 and option 14 closes the fishery 1 year in 45. Option 14 has the highest median catch and the lowest percentage of years with catch less than 50,000 mt; option 6 is again second followed by option 9 with option 10 a distant fourth.

On the ecosystem side, in my opinion, the three most important performance measures are:

OPTION	6 (HG-J)	9	10	14
1. %B1+>400	94.83%	97.15%	98.47%	90.43%
2. Mean B1+	1259	1216	1369	1181
3. Mean SSB	978	923	1082	908

Option 10 comes out the highest in all three performance measures but only marginally for some performance measures. Option 6 is second in two measures and option 9 is second in one measure. Option 14 is last in all three measures.

To compare the trade offs between the most important economic and ecological performance measures in Table 5 of the Initial Analysis I have plotted the same options used in the Additional Sensitivity Analyses (Agenda Item I.1.b Supplemental Attachment 4: April 2012)



In the first trade off, options 6, 9, 10 and 14 all maintain the %B1+ biomass above 400,000 mt more than 90% of the time Options 6. 9 and 14 also maintain the fishery more than 90% of the time. Option 10 is best at maintaining the biomass but it scores poorly in maintaining the fishery. Option 1 is best at maintaining the fishery but it scores poorly in maintaining the biomass.

The second trade off shows that options 6, 9, 10 and 14 all keep the mean biomass at a high level and option 10 is somewhat better than the other three. Note that all four of these options have mean biomass above the 70% depletion level. This is with the 1,655,000 unfished biomass estimate. Option 10 has the highest average depletion level (83%) and

option 6 is second (76%). With regards to keeping the %Catch<50,000t at higher levels, option 14 and option 1 are the best followed closely by option 6. Options 9 and 10 have a fishery less than 50,000 mt 37% and 43%% of the time.

Based on the above trade offs I would consider options 14 and 6 to have the best balance of characteristics. Option 14 is slightly more favorable to economics and option 6 is slightly more favorable to the ecosystem. Option 10 has the highest score for the ecosystem performance measures but it is a poor performer with the economic performance measures. Options 1 and 14 have the highest scores for the economic performance measures; but option one scores poorly with the ecosystem measures. Option 9 has about the same ecosystem scores as options 14 and 6, but it performs poorly with the economic performance measures.