Agenda Item I.2.b
Attachment 2
June 2013

PACIFIC MACKEREL (*Scomber japonicus*) BIOMASS PROJECTION ESTIMATE FOR USA MANAGEMENT

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Submitted to

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May 2013

Introduction

Pacific mackerel stock assessments are typically conducted annually, in accordance with Pacific Fishery Management Council (Council) operating procedures. Full assessments are conducted every three years, with update assessments conducted in the intervening years. In June 2011, the Council recommended foregoing an updated assessment in 2012, acknowledging 1) very low catches relative to biomass and allowable harvest, 2) absence of a conservation concern resulting from fishing pressure or other reasons, and 3) limited amount of data available on which to base an assessment. In June 2012, the Council based annual management specifications on the prior year's assessment. This change to a multiple-year assessment approach is consistent with the Southwest Fisheries Science Center's (SWFSC) suggestion as an efficient way to approach stock assessments for the CPS species.

Based on recommendations from the Scientific and Statistical Committee (June 2012 Briefing Book Item F.2.b, Supplemental SSC Report) and from the Coastal Pelagic Species Management Team (November 2012 Briefing Book Item F.4.b, Supplemental CPSMT Report 2), we present here a catch-only projection estimate, based on the 2011 full stock assessment.

Methods

Detailed methods for the base case model *XA* are described in the 2011 stock assessment (Agenda Item I.2.b, Electronic Attachment 1). The projection model scenario was parameterized as forecasted catch for the two fisheries included in the model (commercial and recreational) in future years of interest, i.e., beyond the terminal year of the 2011 assessment. Other details about the projection estimate are as follows:

- Forecasted catch for 2013-14 fishing year was 3,000 mt and 500 mt for the commercial and recreational fisheries, respectively, i.e., amounts slightly higher than landed catch observed over the last few years.
- No other parameterization changes were made to the assessment model.
- The 3-year forecasted estimate of stock biomass is higher than the terminal year estimate of the assessment model, i.e., in the absence of any measurable fishing pressure, the stock is hypothesized to have increased in size over this timeframe. Although forecasted recruitment estimates are acknowledged to be uncertain in model projections, there is general recognition that Pacific mackerel abundance appears to be increasing.

Management Specification Outputs
Pacific mackerel Harvest Control Rule (HCR) formulas are shown here:

B (age 1+, mt)	Cutoff (mt)	Fraction	Distribution	HG (mt)
	18,200	0.3	0.7	

Harvest Formula Parameters	Value			
Biomass (1+, mt)				
P* (probability of overfishing)	0.45	0.40	0.30	0.20
$Buffer_{Pstar}$	0.95577	0.91283	0.82797	0.73861
F_{MSY}	0.3			
Fraction	0.3			
Cutoff (mt)	18,200			
Distribution (U.S.)	0.7			

Harvest specifications from June 2011 and June 2012 are shown below, and are based on the Pacific mackerel stock biomass (age 1+) estimate of 211,126 mt. These HCR outputs were used as the basis for management decisions guiding the 2011-12 as well as the 2012-13 fishing years.

	MT
Biomass	211,126
OFL=Biomass*Fmsy*Distribution	44,336
$ABC_{0.45}$ = Biomass*$buffer_{0.45}$*Fmsy*Distribution	42,375
$ABC_{0.40}$ = Biomass*$buffer_{0.40}$*Fmsy*Distribution	40,472
$ABC_{0.30}$ = Biomass*$buffer_{0.30}$*Fmsy*Distribution	36,709
$ABC_{0.20}$ = Biomass*$buffer_{0.20}$*Fmsy*Distribution	32,747
HG = (Biomass - Cutoff) * Fraction * Distribution	40,514

Harvest specifications associated with the 2013-14 projection estimate are shown below, and are based on a Pacific mackerel stock biomass (age 1+) estimate of 272,932 mt .

	MT
Biomass	272,932
OFL=Biomass*Fmsy*Distribution	57,316
$ABC_{0.45}$ = Biomass*$buffer_{0.45}$*Fmsy*Distribution	54,781
$ABC_{0.40}$ = Biomass*$buffer_{0.40}$*Fmsy*Distribution	52,320
$ABC_{0.30}$ = Biomass*$buffer_{0.30}$*Fmsy*Distribution	47,456
$ABC_{0.20}$ = Biomass*$buffer_{0.20}$*Fmsy*Distribution	42,334
HG = (Biomass - Cutoff) * Fraction * Distribution	53,494

Research Recommendations

1. Pacific mackerel maturity study.
    a. Maturity schedule used in stock assessments is being re-evaluated (last research effort was conducted over 20 years ago).
    b. Timeline: overall study began in summer 2009; data collection phase ended in fall 2012 (700 specimens); laboratory analysis phase will end in spring/summer 2013; preliminary results available in fall 2013.
2. Pacific mackerel age and growth study.
    a. 1^{st}-year growth will be evaluated experimentally using laboratory setting (critical information for age determination efforts and ultimately, age composition development in stock assessments).
    b. Timeline: overall study to begin summer 2013; data collection phase will end in summer/fall 2014; laboratory analysis phase will end in fall 2014; preliminary results available in winter 2014.