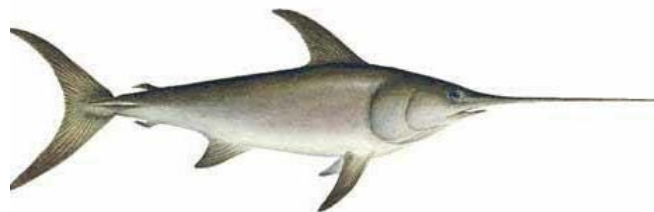
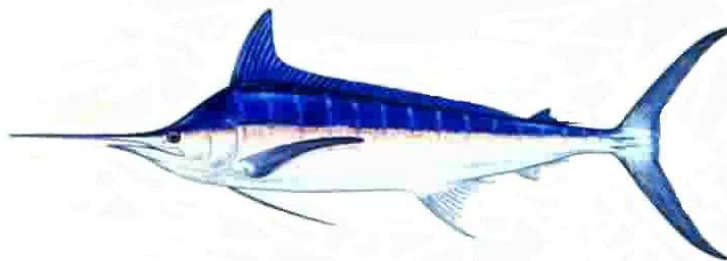




Production model analyses of maximum sustainable yield-based reference points for the North Pacific swordfish stocks

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reference points for the North Pacific swordfish stocks**

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Abstract

Production model analyses of maximum sustainable yield-based reference points were conducted in 2009 and 2010 to assess the status of the Western and Central (WCPO) and the Eastern Pacific (EPO) swordfish stocks in the North Pacific. Estimates of maximum sustainable yield-based reference point from the Bayesian surplus production models for the two swordfish stocks and their variability were summarized for review by the ISC Billfish Working Group. Reference points for the WCPO stock were taken from the 2009 stock assessment. Reference points for the EPO stock were taken from the 2010 stock assessment update which included an updated time series of swordfish catches in the Eastern Pacific Ocean.

Methods and Results

In 2009, the ISC Billfish Working Group conducted stock assessments of the Western and Central (WCPO) and the Eastern Pacific (EPO) swordfish stocks in the North Pacific (Figure 1). Bayesian production models were fit to catch and standardized catch per unit effort data for both stocks (Brodziak and Ishimura 2010). The production model results included estimates of the maximum sustainable yield (MSY), the harvest rate to produce MSY (H_{MSY}), and the exploitable biomass to produce MSY (B_{MSY}). Mean estimates of H_{MSY} , B_{MSY} , and MSY along with their coefficient of variation and 80% credibility interval were taken from the estimated posterior distributions and summarized for the WCPO swordfish stock (Table 1).

The EPO swordfish results from the 2009 assessment (Brodziak and Ishimura 2010) did not include some swordfish catches in the southern portion of Sub-Area 2 (Figure 1). As a result, the stock assessment of the EPO swordfish stock was updated in 2010 to include the full time series of swordfish catches in Sub-Area 2; results of the updated assessment were reported in Brodziak (2010). Mean estimates of H_{MSY} , B_{MSY} , and MSY along with their coefficient of variation and 80% credibility interval were taken from the estimated posterior distributions and summarized for the EPO swordfish stock (Table 1).

References

Brodziak, J. 2010. Update of the Production Model Assessment of the Eastern Pacific Swordfish Stock (*Xiphias gladius*) in 2010. International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific/Billfish WG, ISC/10/BILLWG-1/02, 31 p.

Brodziak, J. and G. Ishimura. 2010. Stock assessment of North Pacific swordfish (*Xiphias gladius*) in 2009. Pacific Islands Fish. Sci. Cent., Natl. Mar. Fish. Ser., NOAA, Honolulu, HI 96822-2326. Pacific Islands Fish. Sci. Cent. Admin. Rep. H-10-01.

Table 1. Estimates of the annual harvest rate to produce MSY (H_{MSY} , boldface), the exploitable biomass to produce MSY (B_{MSY} , metric tons in boldface) and maximum sustainable yield (MSY, metric tons in boldface) along with their coefficients of variation (CV%) and 80% credibility intervals (below in parentheses) for the Western and Central (WCPO) and Eastern Pacific (EPO) swordfish stocks in the North Pacific Ocean.

Swordfish Stock	H_{MSY} (yr^{-1})	B_{MSY} (thousand mt)	MSY (thousand mt)
WCPO	0.25 (24%) (0.17, 0.33)	57.3 (21%) (41.9, 72.7)	14.4 (14%) (11.8, 17.0)
EPO	0.15 (36%) (0.08, 0.22)	33.0 (25%) (22.4, 43.6)	5.0 (38%) (2.6, 7.4)

Figure 1. The 2009 stock assessment of the North Pacific swordfish population conducted by the ISC Billfish Working Group included a Western and Central Pacific stock (WCPO, Sub-Area 1) and an Eastern Pacific stock (EPO, Sub-Area 2).

