

## **POTENTIAL ALTERNATIVES FOR ESTABLISHING AN ESTIMATE OF MSY FOR THE NORTHERN SUBPOPULATION OF NORTHERN ANCHOVY**

### **Background**

The Pacific Fishery Management Council developed Amendment 13 to the Coastal Pelagic Species (CPS) Fishery Management Plan (FMP) to comply with the 2007 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson Act), using the associated advisory guidelines for National Standard One. In 2011, NOAA Fisheries reviewed and approved Amendment 13.

In an amended complaint filed with the U.S. District Court for the Northern District of California in February 2012, the environmental advocacy organization Oceana alleged that the CPS Plan, as amended by Amendment 13, violated the Magnuson Act by failing to describe optimum yield or maximum sustainable yield (MSY) for several species, failing to appropriately account for scientific uncertainty, and failing to use the best available science; violated the National Environmental Policy Act for failure to prepare a new environmental impact statement; and violated the Endangered Species Act for failure to engage in a Section 7 consultation. On April 14, 2013, the District Court issued an order granting summary judgment in favor of federal defendants on all allegations except for failure to describe MSY for the northern subpopulation of northern anchovy; this decision was remanded back to the Secretary for action consistent with the Court's order. On April 17, the Court entered a final judgment in this case.

The central feature of Amendment 13 was to establish mechanisms and control rules for setting annual catch limits and other associated harvest limits for the stocks in the CPS FMP. Most of these mechanisms were built on biological benchmarks already included in the Plan through Amendment 8 (establishment of the CPS FMP) and Amendment 10, including a description of MSY or a reasonable proxy thereof. Citing a lack of information, the original FMP did not specify MSY for the northern subpopulation of northern anchovy. In developing Amendment 13, the Council considered an alternative for adding MSY for the northern subpopulation of northern anchovy to the CPS Plan (MSY is described for all other stocks, excluding krill, in the plan). However, at the time of Council action on Amendment 13 (June 2010), an appropriate MSY had not been determined and the Council added language to the FMP that explicitly deferred this decision to the specification process for monitored stocks.

In November 2010, although harvest specifications for the monitored stocks were adopted, including an OFL, ABC, ACL and ACT for the northern subpopulation of northern anchovy, an MSY for the northern subpopulation was not formally adopted.

## **Proposed Action— Establish an Estimate of MSY**

The proposed action is to formally establish a reasonable estimate of MSY or MSY proxy for this stock by the Council. As noted by the Scientific and Statistical Committee (SSC) in a November 2010 statement, reference points such as MSY for monitored CPS stocks are difficult to determine due to limited data to estimate biomass and productivity.

## **Potential Alternatives for Estimating MSY**

During the Amendment 13 development process, the CPS Management Team (CPSMT) compiled what limited information on the subpopulation existed, including estimates of biomass, catch over time, stock productivity and other available scientific information. Based on the available information, the CPSMT provided two alternative methods for developing an OFL, that could also be considered as MSY alternatives. Although the MT recognized that both of the alternatives had inherent issues, it was determined that based on the biology of the species, results of the vulnerability analysis for CPS stocks in the California Current ecosystem (Patrick et al. 2009) and the relatively low recent catch and expected continued low catch for this subpopulation, they provided reasonable approaches given the lack of available information.

Additionally, the SSC reviewed and discussed the information compiled by the MT at their November 2010 meeting. They also provided a potential alternative for the proposed action, based on the default fishing mortality rate ( $F_{MSY}$ ) value used for Pacific mackerel.

### **1. MSY Alternative: Biomass based**

Included in the information assembled by the CPSMT were two estimates of biomass: (1) a selected midpoint from a range of egg and larval production estimates from the 1970s (Richardson 1981) and (2) an estimate from an acoustic survey conducted by researchers at the Southwest Fisheries Science Center (Zwolinski et al, unpublished). This alternative would use this information to estimate a reasonable MSY value.

The approach previously proposed by the CPSMT using this method averaged these two estimates and then reduced this value to account for the uncertainty in the estimates. Specifically, they took the average of the estimates from the biomass estimates in the 1970s (102,000 mt) and 2008 (159,800 mt), which is approximately 130,000 mt and applied an 80 percent reduction (similar to other CPS stocks). This approach equates to a MSY of 26,000 mt.

### **2. MSY Alternative: Catch-based**

Under this alternative, a MSY would be based on recent and average catch of the stock over time. The approach proposed by the MT using this method was to first develop a reasonable acceptable biological catch (ABC)/annual catch level (ACL) based recent catch levels and then calculate a MSY value from the previously determined ACL level. For example, under this approach, using an ABC/ACL of 3,000 mt (a value three times higher than the highest recent catch to allow for some modest increase in landings) and

the default harvest control rule for monitored stocks in reverse, equates to an MSY of 12,000 mt. The default harvest control for monitored stocks sets the ABC/ACL at only 25 percent the MSY/Overfishing level.

However, because the northern subpopulation of northern anchovy has been very lightly fished in recent times (average catch over last ten years is 230 mt) with inconsistent effort and landings, the MT noted that the time series of catch is likely a highly uncertain indicator of stock status.

### **3. $F_{MSY}$ alternative:**

Although not formally adopted at the November 2010 Council meeting, the Council received a recommendation from the SSC regarding a potential  $F_{MSY}$  for the northern subpopulation of northern anchovy. This was a  $F_{MSY}$  of 0.3, which was ultimately used in the calculation of the adopted OFL. This value (the default fishing mortality rate for Pacific mackerel) was considered appropriate by the SSC because they suggested northern anchovy are likely to be as productive as Pacific mackerel for which there is much greater understanding of productivity and biology.

## **Conclusion**

The National Marine Fisheries Service believes that adopting the SSC's recommendation above is a prudent way forward for the establishment of an estimate of MSY. The best available information appears to indicate that an  $F_{MSY}$  of 0.3 for the northern subpopulation of northern anchovy when applied over the long term is a reasonably proxy for maintaining MSY. However we also recommend that as new information becomes available that this value be reevaluated.

## **References**

Patrick, S. W., p. Spencer, O. Ormseth, J. cope, J. Field, D. Kobayashi, T. Gedamke, E.Cortes, K. Bigelow, W. Overhotz, J. Link, and P. Lawson.. 2009. Use of productivity and susceptibility indices to determine the vulnerability of a stock: with example applications to six U.S. fisheries. NOAA Tech. Memo. NMFS-F/SPO-101. 117 p.

Richardson, S. L. 1981. Spawning biomass and early life of northern anchovy, *Engraulis mordax*, in the northern subpopulation off Oregon and Washington. Fish. Bull. 78:855-876.

Zwolinski et al, Southwest Fisheries Science Center. 2010. Unpublished data from acoustic-trawl survey.