

## COASTAL PELAGIC SPECIES MANAGEMENT TEAM REPORT ON CONSIDERATION OF LONG-TERM SARDINE HARVEST ALLOCATION

The Coastal Pelagic Species Management Team (CPSMT) recently met to discuss issues related to long-term sardine harvest allocation. The CPSMT has reviewed the problem statement and allocation alternatives developed by the CPSAS, along with the Council's direction to consider the types of analyses that would be necessary to change the current management scheme in a fishery management plan (FMP) or regulatory amendment. As requested, this report will summarize current and needed research on the sardine stock and will highlight biological and economic issues the CPSMT views as pertinent to analyzing allocation alternatives.

### Sardine Biology and Harvest Allocation

The Pacific sardine population has increased in biomass and geographic range along the West Coast of North America for the past 30 years. For management purposes, there are considered to be two stocks, one in Mexico's Gulf of California and the other along the Pacific coast from Baja California to British Columbia. While differences have been observed in the size and age compositions of the population at the northern and southern extremes of the coastal stock, there currently is no definitive information available regarding exact positions or migrations of the northern and southern stocks and further, no realistic management scheme that has been field-tested regarding managing a segmented fishery. Early stock composition work was done when the total biomass and geographic distribution was quite limited.

The Pacific sardine population is well-studied off southern and central California through California Cooperative Oceanic Fisheries Investigations (CalCOFI) cruises, which began in 1951. The April CalCOFI cruise, critical to indirect estimation of spawning stock biomass, spans from San Diego to San Francisco and offshore 200 to 300 miles. The Canadian Department of Fisheries and Oceans has conducted swept area surveys around Vancouver Island for the past several years. No fishery-independent surveys currently exist for the Oregon-Washington area. Port samples of biological data are taken by the states of California, Oregon, and Washington and thus, time series of size and age compositions for the U.S. directed sardine fisheries are available. However, scientists have only a very limited understanding of population dynamics (e.g., biomass and migration) for the stock, and available information on coastwide biomass and distribution will be inadequate for addressing detailed spatial allocation options.

One potential biological concern is there may be two interbreeding sub-stocks off the West Coast – one that spawns in cooler waters off California (and northern Baja) in the spring, and another that spawns in warmer waters off Mexico (and southern California) in summer. If, for example, the southern stock grows rapidly and matures at relatively young ages and the northern stock grows more slowly and generally matures at older ages, then the joint productivity could be curtailed by harvest guidelines that do not account for these dynamics in some fashion. Another potentially problematic scenario would be if high biomass associated with the northern stock translated to harvest guidelines that ultimately, resulted in recruitment overfishing in the south and near the coast: similarly, the impact of a heavily exploited fishery at the northern limits could materially curtail the egg production in the spawning area. In other words, there are potentially negative impacts of differential harvest rates on age groups north to south. Over-harvest of older, high fecundity fish to the north may affect biomass and productivity (at least for the short-term), but long-term effects on stock productivity are strictly unknown at this time. Conversely, a large portion of smaller, partially immature sardine (ages 0- and 1 year) is taken by the southern California fishery. Over-harvest of immature fish could have numerical implications for future spawning stock abundance. It is not possible to quantify these consequences, given the limited understanding scientists currently have regarding this species' distribution and seasonal migration habits along the West Coast.

For the coming year, scientists at the Southwest Fisheries Science Center are proposing to conduct (offshore) direct and indirect sampling of adult fish in waters off the Pacific Northwest during July, when fishing pressure is typically the highest. These results will be compared to a similar (offshore and coastal) survey that is conducted in January, in efforts to examine the proportion of sardines that are hypothesized

to migrate southward for spawning in the ensuing spring. Eventually, it maybe necessary to explore the genetic composition of the stocks and methods for determining the presence of these stocks in areas where migration and mixing are possible, although there are no research plans currently underway to accomplish this goal.

### Socioeconomic Analyses

An economic analysis of north-south sardine allocation options should focus on the economic values of the incremental production of sardine products, under each allocation option, as measured by changes in short-run profits to producers (Regulatory Flexibility Act [RFA]), and changes in net benefits to the nation (producer surplus) (Regulatory Impact Review [RIR]). The problem is to determine, for the northern and southern sectors of the fishery, the relative harvests of sardine, the quantities of the different processed products, the revenue received for these products and the costs of producing the products under each allocation alternative, and to then calculate the change in short-run profitability and producer surplus from the status quo (no action alternative). The analysis should encompass processors since it is anticipated that differences in net economic values between the two sectors are mainly determined at the exprocessor level. Consumer surplus, the analog of profits to the consuming sector, will not be considered since final product markets are mainly overseas, and therefore, benefits do not accrue to domestic consumers.

This analysis will obviously require detailed, representative cost and earnings data for the sardine harvesters and processors that comprise each fishery sector. An effort will soon be underway to collect these data for sardine harvesters through a coastwide cost-earnings survey of the CPS purse seine fleet. There are no plans to conduct cost-earnings surveys of processors at this time, which as indicated above, could severely constrain the analysis. In the event that cost data are not available on a timely basis, the analysis would focus on the revenue differences between the two sectors (assume no difference in costs) at the harvesting level (exvessel revenues from the [Pacific Coast Fisheries Information Network [PacFIN] data base) and the processing level (value of exports).

The impact of allocation alternatives on CPS fishing communities should also be taken into account (community impacts, NS-8 requirement). Community impacts can be evaluated using various economic impact "multipliers" to gauge the affects of allocation options on the level of economic activity within a particular area, i.e., evaluating the impact (say increase or decrease) to economic activity in a given area associated with different allocation schemes (say increasing or decreasing landings) in that. Some of the applicable multipliers necessary for such an evaluation are available in the Council's "Draft Communities Document" and from the West Coast Fisheries Economic Assessment Model.

Limiting rapid expansion of capacity in the northern fishery should also be explored. Notably, what will happen to this harvesting and processing capacity if sardine availability to the northern fishery ebbs? The Council has recently invested over two years in developing Amendment 10, which established a capacity goal for the CPS limited entry fishery. Is there a similar concern for over-developing capacity in the Pacific Northwest?

### General Issues

A central question remains, what management regime provides the Council flexibility to fully achieve the available harvest, while ensuring conservation of the resource and equitable access to the fishery coastwide? Is it preferable to "hardwire" an allocation in the FMP, rather than building a flexible system that conserves the resource and generally provides an approach for achieving optimum yield. There are at least four "moving targets" in this fishery, (1) the population biomass, which can vary considerably when measured on a decadal scale; (2) distribution of a target stock (both north-south and onshore-offshore), which varies seasonally and yearly; (3) a mobile CPS fleet, some of which moves among management sub-areas; and (4) international market forces. The CPSMT recommends the FMP be made more flexible in order to accommodate these dynamics without regular FMP amendments.

Another outstanding issue that remains unresolved is whether an allocation change would require an FMP or regulatory amendment? Generally, the analytical requirements would be similar, but an FMP amendment would take longer due to public review requirements. To facilitate work on analysis of these allocation considerations, NMFS needs to determine if an FMP amendment or regulatory amendment is required. Guidance from NMFS on use of the FMP's "socioeconomic point of concern" framework is also needed.

Finally, if at all possible, the CPSMT requests the CPSAS narrow the number of options that have been currently tabled for analysis.

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**Appendix** - Allocation language excerpted from the CPS FMP:

2.1.4 Allocation

In addition to other requirements in this FMP, the Council will consider the following factors when considering direct allocation of the resource:

1. Present participation in and dependence on the fishery, including alternative fisheries.
2. Historical fishing practices in, and historical dependence on, the fishery.
3. Economics of the fishery.
4. Agreements or negotiated settlements between the affected participants in the fishery.
5. Potential biological impacts on any species affected by the allocation.
6. Consistency with the Magnuson-Stevens Act national standards.
7. Consistency with the goals and objectives of this FMP.

Modification of a direct allocation cannot be designated as "routine" unless the specific criteria for the modification have been established in the regulations.

PFMC  
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