APPENDIX 4

PACIFIC SARDINE ALLOCATION

Excerpt (sections 1 and 2) from: *Allocation of the Pacific Sardine Harvest Guideline – Regulatory Amendment for the Coastal Pelagic Species Fishery Management Plan, Including Environmental Assessment, Regulatory Impact Review, and Initial Regulatory Flexibility Analysis.* April 2003.

This regulatory amendment was submitted to National Marine Fisheries Service on April 28, 2003. These excerpts are provided for informational purposes. The full document is available on the Council website www.pcouncil.org. Hard copies are available from the Council office, see contact information on the cover page of this document.

Section 1 – Purpose and need for the regulatory amendment.

Purpose: Implement an interim[1/] allocation framework that seeks optimal use of the annual Pacific sardine harvest guideline to benefit all sectors of the West Coast sardine fishing industry and fishing communities.

Proposed Action: The Pacific Fishery Management Council is recommending National Marine Fisheries Service (NMFS) implement a regulatory amendment to: (1) change the definition of Subarea A and Subarea B by moving the geographic boundary between the two areas from 35°40' N latitude to 39° N latitude, (2) move the date when Pacific sardine that remains unharvested is reallocated to Subarea A and Subarea B from October 1 to September 1, (3) change the percentage of the unharvested sardine that is reallocated to Subarea A and Subarea B from 50% to both subareas to 20% to Subarea A and 80% to Subarea B, and (4) reallocate all unharvested sardine that remains on December 1 coast wide.

Need: Problems for Resolution

Critical to any environmental assessment (EA) is the degree to which the alternative management actions have biological and/or socioeconomic impacts on the affected environment. The affected environment germane to this EA is the West Coast population of Pacific sardine, the ecosystem in which they reside, the various regional harvesting and processing sectors, and the communities dependent on the sardine resource. The critical consideration for this proposed action is the distinction between biological and economic effects of the various management alternatives.

Information in this EA was developed and analyzed by the Council's Coastal Pelagic Species Management Team (CPSMT). Council recommendations to NMFS are based on CPSMT analysis, advice of the Coastal Pelagic Species Advisory Subpanel (CPSAS), and public comment.

In developing this analysis, the CPSMT generally agreed that (measurable) implications of alternative allocation schemes used to partition the Pacific sardine harvest guideline largely involve socioeconomic considerations, given that the current recommended yield is generated from analysis based on the dynamics of a single, coast-wide population. Moreover, the CPSMT is confident the sardine harvest guideline control rule provides an appropriate means to manage the sardine fishery (see Section 1.2.3). However, in the future, the CPSMT suggests that biological-based implications of different allocation schemes be further evaluated, at least in qualitative terms, to provide management some guidance regarding how the operations of the sectoral fisheries might impact the dynamics of the sardine population at-large. For example, research on coastwide abundance of sardine and a CPS stock assessment review (STAR) process will occur in 2004. These initiatives should provide useful information that could be incorporated into considerations of longer-term allocation measures.

In summary, recent assessments generally indicate the sardine population off the U.S. Pacific Coast has responded relatively well to levels of exploitation over the last several years. That is, in the short-term, overall fishing practices are in accordance with concerns related to resource sustainability.

Currently, there is an immediate need to prevent socioeconomic problems that are likely to occur under the current allocation framework. Therefore, development of an interim management measure for allocation of the coastwide harvest guideline is being pursued, and analysis of alternatives will focus on economic information. It is the intent of the Council to follow this action with a more comprehensive development of a longer-term allocation mechanism that would entail a more detailed analysis of alternative allocation frameworks in terms of socioeconomic and biological impacts. It is important to note that a more detailed

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1/ Interim measures are being considered for 2003 and 2004 (and potentially 2005). The intent is to develop a longer-term allocation scheme after this action is completed.

analysis, to meet longer-term allocation needs, may require substantial work and subsequent time demands on researchers and managers. In this regard, the CPSMT strongly advised that the revisions to the current allocation scheme discussed in this EA be considered strictly temporary measures that address emergency-related issues associated with early closures to fisheries based on quota stipulations. The Council concurred and recommends the interim measures be considered for 2003 and 2004, with possible extension to the 2005 fishing season.

The proposed action is consistent with FMP objectives (see Section 5)–it seeks to promote efficiency and profitability in the fishery, including stability of catch and aims to ensure the optimum yield (OY) is achieved. The proposed action is also consistent with recently implemented Amendment 10 to the CPS FMP (68*FR*3819). Amendment 10 established a maximum fleet capacity for the CPS limited entry fishery, allows the transfer of limited entry permits, and establishes criteria for issuing new permits if economic or resource conditions indicate that such permits would be beneficial. One element of the proposed action would move the management subarea line from 35°40' N latitude (Point Piedras Blancas) to 39° N latitude (Point Arena). This action would make the management subarea line and the limited entry fishery line complementary. This should provide additional stability to all sectors of the sardine fishery by explicitly dividing the harvest guideline among the limited entry fishery and open access fishery[2/]. See Section 5 for more information on the consistency of the proposed action with the CPS FMP and the Magnuson-Stevens Act.

Background

The current allocation framework partitions the annual harvest guideline 66% to the southern subarea and 33% to the northern subarea. Nine months after the January 1 start of the fishery (i.e., October 1), the remaining harvest guideline is pooled and re-allocated 50%-50% to each subarea. The current subarea line is 35° 40' N latitude (approximately Point Piedras Blancas). This formula was incorporated into federal management from existing California state law. The state law was designed to balance fishing opportunity between the Southern California-based fishery ("South") and Monterey-based fishery ("North"). At the time of the FMP's implementation, this was considered a status quo action (as the sardine fishery occurred, principally, in California) with no environmental impacts. No alternative allocation formulae were considered. The FMP does not preclude additional allocations based on other geographic areas or other factors developed under the authority of the FMP and provides for allocation matters to be addressed under the socioeconomic point-of-concern framework. Currently, the southern subarea primarily includes the fleet based in San Pedro and Los Angeles, California; the northern subarea includes fisheries off Monterey, California; Oregon; and Washington.
With expansion of the Pacific sardine fishery into the Pacific Northwest, the northern area allocation is now shared by Monterey, Oregon, and Washington-based fisheries. Concern has been expressed that the current allocation framework does not provide optimal harvest opportunity to these respective fisheries. For example, under the current allocation framework (and given status quo harvest levels), there is a high likelihood the northern area fisheries will attain their portion of the annual harvest guideline prior to the scheduled October 1 reallocation, which (as described below) effectively causes premature closure of the Pacific Northwest fishery. Specific socioeconomic concerns include:

- Pacific Northwest fisheries generally finish operations in October, because weather and ocean conditions make fishing difficult or impossible for purse seine gear and less productive because sardine schools are harder to locate. In 2002, the northern area allocation was reached, and the fishery closed on September 14, 2002 (67*FR*58733). Due to concern over community impacts resulting from this closure, NMFS promulgated an emergency rule to re-allocate the unused amount of the coastwide harvest guideline on September 26, 2002 (67*FR*60601). That is, emergency action was taken to reallocate before October 1, 2002. The express purpose of this emergency rule was to avoid unnecessary economic hardship. At the time of the emergency action, sufficient amounts of the sardine harvest guideline remained to satisfy all users. At the end of the year, the harvest guideline had not been attained (approximately 17,400 metric tons (mt) remained unharvested). Had the reallocation occurred earlier,

2/ North of 39° N latitude the federal fishery is an open access fishery. However, Oregon and Washington actively limit participation in fisheries off their coasts.

avoiding the September 14 closure, there likely would have been a net gain in harvest and producer surplus.

- Monterey area fisheries target squid (when available) during the first half of the year and begin to target sardine around August, with their season running through January or February of the following year. Concern has been expressed that harvest opportunity for the Monterey fishery could be preempted by the Pacific Northwest fishery. The existing allocation system (as incorporated from the former California state management system) was designed to prevent the Southern California fishery from preempting the fishery in Monterey. However, the development of significant fisheries off Oregon and Washington has changed the harvesting dynamics. Additional fishing opportunity could be provided to the northern fisheries without adverse impacts on southern fisheries at current harvest guideline levels.

- The harvest control rule for Pacific sardine is environmentally-based and tuned to the importance of sardine within the ecosystem. It is based on the best available science, and the annual harvest guideline is set at a sustainable level. A principle goal of the CPS FMP is to ensure full utilization of the annual coastwide harvest guideline. However, in recent years as much as 59,000 mt of the harvest guideline was left unharvested at the end of the season. Concern has been expressed that this foregone harvest opportunity could be exacerbated by the current allocation formula, and could result in an unnecessary impact to the coastwide fishery and loss in net national benefit.

Each of the three sectors operates over a unique schedule. Generally, Southern California starts harvesting sardine January 1 and increases steadily throughout the year; Northern California starts in August (tied to market squid availability) and increases through January or February of the following year; and Oregon and Washington have a much more abbreviated season, which starts in June and ends in October. Because these sectors operate on very different schedules, annual allocations help to ensure that each sector receives a reasonable fishing opportunity. Exvessel landings in all sectors are driven by domestic and international market forces for sardines, as well as the availability and markets for other species of economic benefit to sardine vessels and processors. The Northern California fishery is also influenced by availability of market squid and adverse weather. The Pacific Northwest fishery is affected by sardine availability and adverse weather. Figure 1 displays the seasonal structure of the three regional sectors.

Pacific Sardine Harvest Guideline Formula

The following excerpt from the CPS FMP Environmental Impact Statement (EIS) reviews the environmentally-based formula for determining the annual allowable harvest (harvest guideline; also known as OY) for the Pacific sardine fishery. Information is excerpted from page EIS-9 and Appendix B, Section 4 of the CPS FMP. This information is provided to bolster the Council's finding that the proposed action does not pose an environmental risk. That is, the proposed action is not expected to change the nature of the fishery, a fishery which is managed sustainably under a conservative, environment-based harvest control rule.

> *For CPS, an maximum sustainable yield (MSY) control rule is defined to be a harvest strategy that provides biomass levels at least as high as the F_{MSY} approach while also providing relatively high and relatively consistent levels of catch. By definition, candidate MSY control rules for CPS take the F_{MSY} policy as a lower bound in terms of biomass and catch. This means that any candidate MSY control rule must provide biomass levels that are at least as high as those from the F_{MSY} policy while also providing relatively high and consistent levels of catch.*
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> *The definition of an MSY control rule for CPS is compatible with National Standard 1, but more conservative and more general. According to National Standard 1 (50 CFR §600.210) an MSY control rule is "a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY." Similarly, MSY stock size in National Standard 1 "means the long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate units, that would be achieved under an MSY control rule in which the fishing mortality rate is constant." The definition of an MSY control rule for CPS is more general, because it includes the definition in National Standard 1. The definition for CPS is more conservative, because the focus for CPS is oriented primarily towards stock biomass levels at least as high as the MSY stock size. In the definition for CPS, "relatively high and consistent catch levels" are important, and MSY*

is used as a lower bound. The primary focus on biomass, rather than catch, is appropriate for CPS, because most species (Pacific sardine, northern anchovy, and market squid) are very important in the ecosystem for forage. MSY control rules for CPS (e.g., for sardine) are superior to the F_{MSY} approach in economic, social, and ecological terms. However, the F_{MSY} approach serves as a lower bound (with respect to biomass and catch) in their definition, and adjustments can be made to account for stock biomass, precision of biomass estimates and data, statistical characteristics in recruitment patterns (e.g., runs of years with good or bad recruitment), and other characteristics of the stock and fishery.

Sardine are important as forage to a large number of birds, marine mammals, and fish predators (including endangered species) although few data are available, because of the scarcity of sardine, until recently. Decisions about harvest formula options and the definition of overfishing for sardine must, therefore, consider sardine as forage. Forage and ecosystem-related goals and objectives are included in this FMP.

Of all CPS, sardine productivity is most strongly affected by environmental variation. Favorable and unfavorable periods or "regimes" for sardine tend to occur in cycles of about 60 years. This means that periods of low abundance for sardine are probably inevitable, even in the absence of a fishery.

It is important to remember that sardine productivity changes substantially in response to long term environmental variation. Favorable conditions for sardine are characterized by warm sea surface temperatures in the Southern California Bight while unfavorable conditions are characterized by cold sea surface temperatures. This means that the best MSY control rule in a particular year might depend on ocean conditions.

For Pacific sardine, MSY control rule options are analyzed using a species and fishery- specific simulation model. The general approach is to simulate the stock and fishery over a long period of time and using a large number of MSY control rule parameter values. Results are used to find MSY control rules and control rule parameters that give good results for most measures of performance.

Options for Pacific sardine and Pacific (chub) mackerel are based on the general formula

$$H=(BIOMASS-CUTOFF) \times FRACTION$$

where H is the harvest level, BIOMASS is the estimated stock biomass, CUTOFF is the lowest level of estimated biomass at which directed harvest is allowed, and FRACTION is an exploitation rate parameter. In some cases, it is useful to define a maximum harvest level (MAXCAT) so that total harvest never exceeds MAXCAT. MSY control rule parameters might be constant from year to year or might change, depending on environmental conditions or conditions in the fishery. Most CPS are transboundary resources distributed off Mexico, the U.S., and Canada. It is, therefore, necessary to adjust harvest levels for U.S. fisheries in proportion to the biomass in U.S. waters. This is typically done by multiplying the overall acceptable biological catch (ABC) from the MSY control rule by an estimate of the percentage of the stock in U.S. waters.

For sardine, the Council chose a harvest control rule that provides biomass and catch levels comparable to or better than the deterministic equilibrium F_{MSY} projected for other options and because it has a CUTOFF of 150,000 mt. This option was chosen, because it best achieves the FMP goals and objectives of preventing overfishing, providing adequate forage for dependent species, and promoting stability of catch. FRACTION, the variable tied to sea surface temperature, provides an element of environmental sensitivity in recognition of the sensitivity of the sardine biomass to changes in ocean temperature.

In general, the sea surface temperature (SST) used for determining FRACTION has been declining since the inception of federal management. If this trend continues, a swift reduction of catch from 15% of the available biomass to 5% (based on how FRACTION is applied in the harvest guideline formula) could occur. To gauge the importance of this issue, the CPSMT reviewed the development and application of the harvest guideline formula. Three issues of concern were discussed: (A) the quality of the contemporary versus historical entries in the SST time series; (B) the availability of alternative temperature time series for use in the harvest

control rule; and (C) reevaluation of the functional relation between sardine productivity (e.g., recruitment and abundance) and oceanographic conditions.

A. Contemporary versus Historical Scripps Pier Sea Surface Temperatures

The basis for the time series of sardine-environment is the relationship between the Scripp's Institution of Oceanography ([SIO]; La Jolla, California) pier SST and age 1-5 biomass of sardines in the period 1930-1990. The CPSMT is exploring ways to ensure application of the FRACTION range (5% to 15%) is flexible enough to prevent over harvest without unnecessarily burdening the fishery. In the future, the CPSMT may revise the relationships based on new ideas and data. In particular, some have expressed concern that the SIO pier is central to the California-Baja California fisheries' reduced population of Pacific sardines in this time period, the current population range is now several times as great, reaching into Alaska and prominent in British Columbia, Canada.

B. Better Temperature Time Series

There are now several data sets of temperatures representing large portions of the ocean. The California Cooperative Oceanic Fisheries Investigations (CalCOFI) time series have been compared to the SIO Pier SST data set and found to be comparable. There are also shore station and air temperature time series throughout the range of Pacific sardine and some method of assembly could be adapted for use in a regulatory control rule.

C. Environmental Influence

There are also compendia describing environmental influences on sardine recruitment. For example, 20 environmental mechanisms have been proposed as controlling factors for regulating sardine growth. The Pacific sardine stock covered by the FMP ranges along the entire West Coast of North America. Functional solutions to sardine production have not been fully developed. While the mechanisms appear plausible, the current level of biological oceanography effort, fisheries oceanography commitment, and physical oceanography approaches have not led to definitive conclusions about sardine production.

Based on this consideration and review, the CPSMT concluded:

1. The current harvest control rule for sardine is sound and based on good analyses.
2. The SIO pier SST data set constitutes a reliable data source.
3. A stepped (gradual) transition from 15% to 5% might be a useful management tool for managing a dynamic fishery.

Future Considerations

In the future, when information becomes available, some biological questions relating to allocation and differential impacts on the coastwide resource from the three fishing sectors that could be evaluated generally include:

- Impacts to the coastwide population from a fishery that targets older, mature fish.
- Impacts to the coastwide population from a fishery that targets younger, immature fish.
- Recent indications of changes in maturity rates (i.e., delayed maturity) in the southern fishery resulting from density-dependent factors.
- Potential refinements to the Pacific sardine assessment and/or harvest control rule in response to new biological information.

Future biological information will include NMFS research surveys off the Pacific Northwest scheduled for summer 2003 and a STAR scheduled for spring 2004.

NMFS-Southwest Fisheries Science Center (SWFSC) will conduct sardine acoustic trawl and Continuous Underway Fish Egg Sampler (CUFES) surveys off the coast of Oregon and Washington in July 2003 and January-February 2004 (acoustic-trawl only). These surveys are designed to fill major gaps in knowledge of

sardine populations, by measuring the age structure and reproductive rates, and assessing the extent the fishery is dependent on migration and on local production of sardine. The objective of the surveys is to estimate the biomass present at these two times of the year, with the ratio of the two values providing an estimation of the relative proportion, as well as size/age structure of the sardine stock, which is hypothesized to over-winter off the coast of Oregon and Washington.

A CPS STAR workshop is scheduled for May 2004. The goals and objectives for the CPS assessment and review process are: ensure that CPS stock assessments provide the kinds and quality of information required by all members of the Council family; satisfy the Magnuson-Stevens Act and other legal requirements; and provide a well-defined, Council oriented process that helps make CPS stock assessments the "best available" scientific information and facilitates use of the information by the Council. In this context, "well-defined" means: based on a detailed calendar, with explicit responsibilities for all participants, and provides specified outcomes and reports; emphasizes external, independent review of CPS stock assessment work; increases understanding and acceptance of CPS stock assessment and review work by all members of the Council family; identifies research needed to improve assessments, reviews, and fishery management in the future; and uses assessment and review resources effectively and efficiently. The CPS STAR process will be used in crafting alternatives for a longer-term allocation framework and information for Pacific sardine management in 2005.

As data become available, this information, along with more robust economic information on producer profit and surplus, will be considered in crafting longer-term management alternatives for annual allocation of the Pacific sardine harvest guideline. As noted, it is expected that once an interim measure is in place, the Council will embark on an amendment to the CPS FMP.

Scoping Summary

The Council process offers many opportunities to determine the scope of the action and the likely environmental consequences that merit analysis and disclosure. This work is carried out by advisory bodies and at Council meetings, which are open to the public. The preceding background discussion and Section 4 describe how the proposed action analyzed in this document evolved with direction from the Council and development by various advisory bodies, in particular the CPSMT and CPSAS. Section 7.2 of this document lists public meetings where issues and analyses contained in this regulatory amendment were developed, analyzed, and adopted. This regulatory amendment and the proposed action were developed over the course of 10 meetings of the Council and its advisory bodies. Opportunity for public comment was provided at each of these meetings. The Council received approximately 50 letters from the public about this issue. Approximately 8 and 18 members of the public provided testimony to the Council at the March and April 2003 meetings, respectively.

A notice of availability for the public review draft of the regulatory amendment was distributed via email and U.S. post on March 19, 2003. The public review document was posted on the Council website and distributed via email, fax, and U.S. post on March 25, 2003. Final Council action occurred on April 10, 2003. The intent of the Council is for this action to be implemented in time to prevent premature closure of northern subarea sardine fisheries prior to reallocation of the harvest guideline (i.e., some time in August 2003). Thus, given the time necessary for the federal rulemaking process, this schedule required final Council action in April 2003.

Section 2 – Management alternatives for allocating Pacific sardine.

As noted above, the current FMP allocation framework partitions the annual harvest guideline 66% to the southern subarea and 33% to the northern subarea. Nine months after the January 1 start of the fishery (i.e., October 1) the remaining harvest guideline is pooled and re-allocated 50-50 to each subarea. The current subarea line is 35°40' N latitude (approximately Point Piedras Blancas).

In developing alternative management measures for an interim change to the allocation framework, the CPSMT started from an initial suite of management measures provided by the Council in November 2002. The Council gave discretion to the CPSMT to develop the most appropriate set of alternatives, including development of new alternatives. Through the analysis described in Section 4, the CPSMT settled on a suite

of alternatives that could most practicably provide for consideration of an interim change that could be implemented in 2003.

The management measures initially reviewed by the CPSMT were:

- Status quo.
- No allocation – institute a coastwide harvest guideline.
- Move northern boundary of southern subarea from 35°40' N latitude to 39° N latitude, change reallocation date from October 1 to September 1 (or August 1), and provide for December 1 reallocation to a coastwide harvest guideline.
- Change reallocation date from October 1 to September 1 or (August 1), and provide for December 1 reallocation to a coastwide harvest guideline.

Sub-alternatives for the initial allocation were also considered.

- 33% to the north, 66% to the south.
- 50% to the north, 50% to the south.

In analyzing these initial management alternatives, some alternatives were eliminated and other alternatives were developed. The full range of alternatives considered is described in Section 4 along with the rationale for eliminating particular alternatives. A key consideration was – what are the most practicable alternatives for implementation in 2003 to prevent adverse fishery impacts? These alternatives and analyses were developed during public meetings of the CPSMT, CPSAS, and Council. Opportunity for public comment was provided, and public input was considered at each of these meetings.

In March 2003, from the initial management measures listed above, five alternatives were adopted by the Council for public review:

Alternative 1	Status quo.
Alternative 2	Move subarea line to 39° N latitude, change reallocation date to September 1 (50% to the south and 50% to the north), add December 1 coastwide reallocation.
Alternative 3	Move subarea line to 39° N latitude, change reallocation date to September 1 (80% to the south and 20% to the north), add December 1 coastwide reallocation.
Alternative 4	Do not change subarea line, change reallocation date to September 1 (50% to the south and 50% to the north), add December 1 coastwide reallocation.
Alternative 5	Move subarea line to 39° N latitude, reallocate the remaining harvest guideline coastwide on September 1.

At the April 2003 Council meeting, the Council selected Alternative 3 as their preferred alternative, i.e., the proposed action that would be recommended to NMFS. The Council recommends this revised allocation regime be in effect for the 2003 and 2004 fishing seasons, and could be extended to 2005 if the 2005 harvest guideline were at least 90% of the 2003 harvest guideline.

The Council discussed several reasons and considerations for recommending the proposed action (not in priority order) –

The proposed action should eliminate or, at least, greatly reduce risk of early closure of the northern subarea fishery, with minimal risk of early closure for the traditional California fisheries. Recently, the southern fishery has been constrained by markets and the coastwide harvest guideline has not been achieved since implementation of federal management. Moreover, current (as of April 2003) landings information from Southern California indicate lower landings than the same period during 2001 and 2002.

This action should provide considerable gains in producer surplus in Pacific Northwest fisheries, which report strong markets, increasing demand, and higher product prices than in California. It is also expected to provide considerable increases in Pacific Northwest employment and income, while resulting in no to minimal risk of disruption to other fishery sectors.

This action is consistent with FMP objectives. It recognizes the historic dependence of California fisheries and is not anticipated to have significantly impact nor disrupt the limited entry fishery. Thus, the proposed action should help to ensure stability in the southern sector while fostering a strong northern fishery at the peak of the season.

The Council acknowledges that the harvest guideline could dramatically decrease if sea surface temperature continues to decline. The Council accepts this as a low probability risk during the duration of this interim measure.

The Council notes that biological concerns about the proposed action are limited because the U.S. coastwide harvest will continue to be constrained by a risk-averse and environmentally-sensitive harvest control rule.

The interim nature of this recommendation acknowledges the potential for a decrease in available harvest by limiting its application to 2003 and 2004, and possibly 2005.

This action provides management stability for the short term (2003 and 2004), while a longer-term allocation framework is developed.

The Council anticipates new biological and economic information collections will provide the basis for developing a longer-term allocation. To that end, the Council fully supports increased research and is endeavoring to ensure science and management are based on the best available scientific information.

Alternative 1 (No Action)

Alternative 1 is the status quo (no action alternative). This alternative would maintain the current allocation framework. In Section 4, the status quo alternative is used to compare the relative impacts of the proposed action and alternative management actions.

Alternative 3 (Proposed Action)

Alternative 3 was selected by the Council as the proposed action. Under this proposed action, the management subarea line would be changed from 35°40' N latitude (Point Piedras Blancas, California) to 39° N latitude (Point Arena, California); on January 1 the harvest guideline would be initially allocated 66% to the southern subarea and 33% to the northern subarea; on September 1, the unused amount of the harvest guideline would be pooled and reallocated 80% to the southern subarea and 20% to the northern subarea; on December 1 the remaining unused harvest guideline would be reallocated coastwide.

Other Possible Alternatives

Under Alternative 2, the management subarea line would be changed from 35°40' N latitude (Point Piedras Blancas) to 39° N latitude (Point Arena); on January 1 the harvest guideline would be initially allocated 66% to the southern subarea and 33% to the northern subarea; on September 1, the unused amount of the harvest guideline would be pooled and reallocated 50% to the southern subarea and 50% to the northern subarea; on December 1 the remaining unused harvest guideline would be reallocated coastwide.

Under Alternative 4, the subarea line would remain 35°40' N latitude (Point Piedras Blancas); on January 1 the harvest guideline would be initially allocated 66% to the southern subarea and 33% to the northern subarea; on September 1, the unused amount of the harvest guideline would be pooled and reallocated 50% to the southern subarea and 50% to the northern subarea; on December 1 the remaining unused harvest guideline would be reallocated coastwide.

Under Alternative 5, the management subarea line would be changed from 35°40' N latitude (Point Piedras Blancas) to 39° N latitude (Point Arena); on January 1 the harvest guideline would be initially allocated 66% to the southern subarea and 33% to the northern subarea; on September 1, the unused

amount of the harvest guideline would be pooled and reallocated coastwide and be equally available to all sectors for the remainder of the year.

Other Options Considered in Developing Alternatives

The complete range of alternatives considered is evaluated and compared in Section 4. This includes reasons why the rejected alternatives were not considered reasonable alternatives for addressing the problems described in Section 1.2.1.

The following table displays relative impacts of the five alternatives; impacts include early closure of a sector, gained or foregone harvest by sector, and un-attained coastwide harvest guideline.

TABLE 2-1. Options for restructuring the 2003 sardine allocation framework.

	Southern CA		Northern CA		OR/WA		Coastwide OY	
	Early Close	Landings (mt) Gained or Foregone Relative to Status Quo*	Early Close	Landings (mt) Gained or Foregone Relative to Status Quo*	Early Close	Landings (mt) Gained or Foregone Relative to Status Quo*	Achieved?	Amount left (mt)
1. Status Quo	N	0	Y	0	Y	0	N	9,847
2. (Pt. Arena, Sept. 50-50, Dec. coastwide)	Y	-3,618	Y	35	N	10,108	N	3,321
3. (Pt. Arena, Sept. 80-20, Dec. coastwide)	Y	-225	Y	2,449	Y	7,622	Y	0
4. (Sept. 50-50, Dec. coastwide)	Y	0	Y	274	Y	8,091	N	1,482
5. (Pt. Arena, Sept. reallocate coastwide)	Y	-2,500	Y	2,239	N	10,108	Y	0

* Status quo represents landings made in 2002 expanded by a 10% assumed growth.