Discussion and Analysis of Management Alternatives for an Interim Revision to the Pacific Sardine Allocation Framework within the Coastal Pelagic Species Fishery Management Plan

I. Introduction

Purpose: Implement an interim[1] allocation framework that seeks optimal use of the annual Pacific sardine harvest guideline with minimal impacts on any sector of the West Coast sardine fishing industry and fishing communities.

Need: This action addresses recent problems which have occurred as a result of the current allocation framework.

Description of Purpose and Need

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.

The Coastal Pelagic Species Management Team (CPSMT) generally agreed that (measurable) implications of alternative allocation schemes used to partition the Pacific sardine harvest guideline largely involve socioeconomic considerations, given 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 the CPS Fishery Management Plan [FMP]). 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 2003. These initiatives should provide useful information that could be incorporated into considerations of longer-term allocation measures.

In summary, there is a compelling need to prevent socioeconomic problems in 2003 and there is not a resource sustainability concern. 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 the CPSMT recognized that a more detailed analysis that meets long-term goals may require substantial work and subsequent, time demands on researchers. In this regard, the CPSMT strongly advised that the revisions to the current allocation scheme discussed here be considered strictly temporary measures that address emergency-related issues associated with early closures to fisheries based on quota stipulations. The CPSMT further concurred the interim measures (i.e., re-allocation regulations) be considered for the current fishing year (2003) and potentially 2004. The CPSMT advised that a longer-term allocation scheme should be in place prior to the 2005 fishing year.

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

Background

The current allocation formula 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 Pt. Piedras Blancas). This formula was incorporated into federal management from existing California state law. At the time of the FMP's implementation, this was considered a status quo action 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. 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 the current allocation formula 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. Sufficient amounts of the sardine harvest guideline remained to satisfy all users.

- 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.

- 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 operate 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. Landings in all sectors are driven by domestic and international market forces. 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.

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.

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.

II. Management Alternatives Considered

In developing alternative management measures for an interim change to the Pacific sardine allocation formula the CPSMT started from an initial suite of alternatives proposed 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. As described below, the CPSMT settled on a set of alternatives that could most practicably provide for consideration of an interim change that could be implemented in 2003.

The alternatives *initially* reviewed by the CPSMT are:

1. Status quo.
2. No allocation – institute a coastwide harvest guideline.
3. 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.

Sub-alternatives for initial allocation
   a. 33% to the north, 66% to the south.
   b. 50% to the north, 50% to the south.

4. 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 initial allocation
   a. 33% to the north, 66% to the south.
   b. 50% to the north, 50% to the south.

In analyzing these initial alternatives, some alternatives were eliminated and other alternatives were developed. The full range of alternatives considered by the CPSMT 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, Coastal Pelagic Species Advisory Subpanel (CPSAS), and Council. Opportunity for public comment was provided and public input was considered.

The CPSMT alternatives put forward for Council consideration are:

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 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 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 coastwide reallocation.

Summary of Impacts

Alternative 1 (status quo) – With a 10% increase in harvest from 2002, the northern subarea would close in late-August. Reallocation (50-50) would occur on October 1, the Monterey fishery would likely reopen, but Oregon and Washington would be shut down the remainder of the year. Approximately 9,847 mt of the coastwide harvest guideline would not be caught by the end of the season. Southern California would gain about 2,501 mt, Northern California would forego 2,240 mt and Oregon/Washington would forego 10,108 mt.

Alternative 2 (start year with 66-33 allocation, subarea line to 39° N latitude, September [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest from 2002, the coastwide fishery closes early in November. This does not impact the Oregon/Washington fishery, which, generally, closes in October due to weather. The fishery would reopen coastwide on December 1, but approximately 3,321 mt of the coastwide harvest guideline would remain at the end of the year. Southern California would forego 1,117 mt and Northern California would forego 2,204 mt.

Alternative 3 (start year with 66-33 allocation, subarea line to 39° N latitude, September [80-20] reallocation, and December [coastwide] reallocation) – With a 10% harvest increase, the Oregon/Washington fishery closes in late-September. Both California fisheries close in late December. All of the coastwide harvest guideline would be harvested. Southern California would gain about 2,276 mt, Northern California would gain 209 mt and Oregon/Washington would forego 2,485 mt.

Alternative 4 (start year with 66-33 allocation, subarea line not changed, September [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest, the northern subarea would close in late-August. Reallocation (50-50) would occur on September 1, the Monterey fishery would likely reopen, close again in mid-November, and reopen in December; Oregon and Washington would be shut down the remainder of the year. Approximately 1,482 mt of the coastwide harvest guideline would not be caught by the end of the season. Southern California would gain about 2,501 mt, Northern California would forego 1,966 mt and Oregon/Washington would forego 2,017 mt.

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

Table 2-1. Options for restructuring the 2003 sardine allocation framework (based upon 2002 landings inflated by an assumed expansion of 10% for each sector).

		S. CA		N. CA		OR/WA		Coastwide OY	
		Early Close	Gained or (Foregone) harvest (mt)	Early Close	Gained or (Foregone) harvest (mt)	Early Close	Gained or (Foregone) harvest	Achieved ?	Amount left (mt)
1.	Status Quo	N	2,501	Y	(2,240)	Y	(10,108)	N	9,847
2.	(Pt Arena, Sept. 50-50, Dec. coastwide)	Y	(1,117)	Y	(2,204)	N	0	N	3,321
3.	(Pt. Arena, Sept. 80-20, Dec. coastwide)	Y	2,276	Y	209	Y	(2,485)	Y	0
4.	(Sept. 50-50, Dec. coastwide)	Y	2,501	Y	(1,966)	Y	(2,017)	N	1,482

III. Affected Environment

As noted above, this interim action is not anticipated to have positive or negative biological impacts or create resource conservation concerns. Impacts are anticipated to be isolated to trade-offs among harvest opportunity provided to each of the three fishery sectors and attainment of the annual harvest guideline.

Comprehensive information on the affected environment may be found in Appendix A and Appendix D to the CPS FMP[2]. The California Current is the eastern boundary of the North Pacific great subtropical anticyclonic gyre. At the northern extreme, subarctic water is entrained to flow equatorward. The great shifts in ocean climate at the decadal to century scale control the eastern boundary along the coasts of Washington, Oregon, California and Baja California. The California Current and the subarctic entrained waters are known as the "Transition" zone. The mixing of these waters with the seasonal coastal wind driven upwelling yield highly structured waters with patches of high nutrient and high productivity. High nutrient levels result from a winter buildup of regenerated nutrients and new nutrients from a shoaling thermocline, an influx of high-nutrient, subarctic water and small coastal intrusions of newly upwelled water. Pelagic fish species dominate the exploitable biomass of the system, with major concentrations of anchovy and squid close to the coastline ranging offshore to the habitats of sardine and jack mackerel. The California Current ecosystem is essentially a region of transport, coastal jets, divergence, and upwelling. None of the stocks managed under the CPS FMP are considered overfished.

Seasonal and interannual environmental variability within the California Current ecosystem are associated with variations in the Pacific Basin atmospheric pressure systems, which control the local winds and Ekman transport, and affect flows of the equatorward California Current, the poleward undercurrent, and the inshore countercurrent. Variations on time scales of several years to decades are associated with alterations in the tropical and Aleutian pressure systems, (i.e., the El Niño southern oscilation [ENSO] phenomenon and the Pacific Decadal Oscillation [PDO]). ENSO and PDO events markedly alter flow and temperature of currents in the California Current.

Anchovy, sardine, hake, jack mackerel, and Pacific mackerel achieve the largest populations in the California current region as well as in other major eastern boundary currents. These populations are key to the trophic dynamics of the entire California Current ecosystem. Anchovy and sardines are the only fish in the ecosystem that consume large quantities of primary production (phytoplankton), all five of the species are significant consumers of zooplankton. All five species of fish, particularly mackerels and hake, and also squid are important predators of the early stages of fish. The juvenile stages of squid and all five species of finfish, and in many cases the adults, are important as forage for seabirds, pinnipeds, cetaceans, and other fish.

Trophic interactions between CPS and higher-trophic-level fish are poorly understood, and it is unknown if populations of individual predaceous fish are enhanced or hindered by large populations of CPS. It is not known if the value of CPS as forage to adult predators outweighs the negative effects of predation by CPS on larvae and juveniles of predator fish species plus competitive removal of phytoplankton, zooplankton, and other fish.

Essential Fish Habitat

A complete description of CPS essential fish habitat (EFH) may be found in Appendix D of the CPS FMP. In determining EFH for CPS, the estuarine and marine habitat necessary to provide sufficient production to support maximum sustainable yield and a healthy ecosystem were considered. Using presence/absence data, EFH is based on a thermal range bordered within the geographic area where a managed species occurs at any life stage, where the species has occurred historically during periods of similar environmental conditions, or where environmental conditions do not preclude colonization by the species. The specific description and identification of EFH for CPS finfish accommodates the fact the

2/ Unless stated, appendices cited in Section 3 refer specifically to appendices to the CPS FMP, not the current EA/RIR document.

geographic range of all species varies widely over time in response to the temperature of the upper mixed layer of the ocean, particularly in the area north of 39° N latitude. This generalization is probably also true for market squid, but few data are available. Adult CPS finfish are generally not found at temperatures colder than 10° C or warmer than 26° C. Preferred temperatures (including minimum spawning temperatures) are generally above 13° C. Spawning is most common at 14° C to 16° C.

Predators

Northern anchovy, Pacific sardine, and market squid are probably important as forage to a long list of fish, birds, and mammals, including threatened, endangered, and depleted species (Morejohn et al. 1978). Some of the more important squid predators are king salmon, coho salmon, lingcod, rockfish, harbor seals, California sea lions, sea otters, elephant seals, Dall's porpoise, sooty shearwater, Brandt's cormorant, rhinoceros auklet, and common murre.

Coastal pelagic species are eaten by several species of marine mammals, dependence on CPS varies by age from predator to predator. A great deal of information is available about the diets of adult marine mammals, and the total amount of CPS eaten per year has been estimated for a few. It is not currently possible, however, to estimate the total amount of CPS used as forage by all marine mammals in the California Current ecosystem or the size of CPS populations necessary to sustain predator populations. Some of the species, such as the Pribilof population of the northern fur seal, are listed as depleted, but a local stock at San Miguel Island is not depleted.

Pelagic schooling fish are key components of marine food webs and primary prey of many seabirds. CPS are important to seabirds because of their abundance near the sea surface, relatively small size, fusiform shape, and dense concentration. Seabird populations of the California Current ecosystem and other eastern boundary currents are large relative to areas not driven by large-scale coastal upwelling.

Coastal pelagic species are consumed by a large number of seabirds off the coasts of California, Oregon, and Washington. Availability of anchovies is known to directly affect the breeding success of pelicans, terns, gulls, and auks. It is likely that many predators of anchovies will also eat sardines as the sardine population increases. Owing to their size and occurrence near the surface, Pacific mackerel are likely to be important to seabirds, especially in Southern California. Pacific mackerel have been observed in the diet of pelican. Adult jack mackerel are probably less important to seabirds, because of their large size and relatively deep schooling habits. Studies of seabird diet during autumn, however, when small jack mackerel are near shore and more available, may indicate their seasonal importance as forage. Recent increased abundance of sardines off Southern California was followed by increased breeding success and abundance of brown pelicans.

Fishing Industry

The sardine fishery was first developed in response to demand for food during World War I. Landings increased from 1916 to 1936, and peaked at over 700,000 mt. The Pacific sardine supported the largest fishery in the western hemisphere during the 1930s and 1940s, with landings along the coast in British Columbia, Washington, Oregon, California, and Mexico. The fishery declined, beginning in the late 1940s and with some short-term reversals, to extremely low levels in the 1970s. There was a southward shift in the catch as the fishery decreased, with landings ceasing in the northwest in 1947 through 1948, and in San Francisco in 1951 through 1952. Sardine were primarily used for reduction to fish meal, oil, and as canned food, with small quantities taken for live bait. An extremely lucrative dead bait market developed in central California in the 1960s.

In the early 1980s, sardine began to be taken incidentally with Pacific (chub) mackerel and jack mackerel in the Southern California mackerel fishery and primarily canned for pet food, although some were canned for human consumption. As sardine continued to increase in abundance, a directed fishery was reestablished.

Coastal pelagic species of finfish landed by the roundhaul fleet (fishing primarily with purse seine or lampara nets) are sold as relatively high volume/low value products (e.g., Pacific mackerel canned for pet

food, Pacific sardine frozen and shipped to Australia to feed penned tuna or to Japan for longline bait, and Northern anchovy reduced to meal and oil). In addition to fishing for CPS finfish, many of these vessels fish for market squid, Pacific bonito, bluefin tuna, and Pacific herring.
Other vessels target CPS finfish in small quantities, typically selling their catch to specialty markets for relatively high prices. During the period 1993 through 1997, these included:

- Approximately 18 live bait vessels in Southern California and two vessels in Oregon and Washington that landed about 2,000 mt per year of CPS finfish (mostly Northern anchovy and Pacific sardine) for sale to recreational anglers.

- Roundhaul vessels that take a maximum of 1,000 mt to 3,000 mt per year of Northern anchovy that are sold as dead bait to recreational anglers.

- Roundhaul and other mostly small vessels that target CPS finfish (particularly Pacific mackerel and Pacific sardine) for sale in local fresh fish markets or canneries.

In Oregon, Pacific sardine is managed as a developmental fishery. In 2001, the number of permits was increased from 15 to 20. Permit stipulations include: permit is not transferable; logbook is required; observers are allowed on board; a grate must be place over the hold to sort out larger fish; renewal of the permit is subject to meeting minimum annual landing requirements of five landings of sardines of at least 500 pounds each, or one landing of at least 5,000 pounds.

In Washington, sardines are currently managed under Emerging Commercial Fishery provisions as a trial commercial fishery. The Washington Fish and Wildlife Commission first approved a trial ocean purse seine sardine fishery in 2000, and the fishery has occurred for the last three years. As part of the trial fishery regulations, Washington Department of Fish and Wildlife (WDFW) requires fishers to pay for, and carry at-sea observers, primarily to collect bycatch information. Bycatch has been recorded in terms of species, amount, and condition; observers noted whether the fish were released or landed, and whether the fish were alive, dead, or in poor condition. Permits in a trial emerging fishery, by law, may not be limited. However, WDFW is currently pursuing moving the fishery to limited entry. In 2002, WDFW issued 35 permits and 19 vessels made landings. The majority of the catch was accounted for by 13 vessels. In 2002, Washington's trial fishery was managed to a state harvest guideline of 15,000 mt.

Community Dependence

To be completed.

IV. Analysis of Management Alternatives

As noted above, this interim action is not anticipated to have adverse biological impacts or create resource conservation concerns. Impacts are anticipated to be isolated to trade-offs among harvest opportunity provided to each of the three fishery sectors and attainment of the annual harvest guideline. Analysis of the environmental impacts of the Pacific sardine harvest control rule are available in the CPS FMP.

Anticipated Impacts in Terms of Attainment of the Harvest Guideline and Foregone Harvest

In developing and analyzing the management alternatives, the CPSMT used an analytical tool that forecasted how the various alternatives would impact the three fishing sectors. The analysis provided expected yields to each fishing sector for each of the alternatives, based on 2002 landing statistics. Inputs included average landings by month and area and maximum landings by month and area. Generally speaking, the two areas (north and south) include three fishing sectors – Southern California, Northern California, and Pacific Northwest. Under certain of the alternatives (Alternative 3 and its variations), the area "south" includes Southern and Northern California, and the area "north" includes Oregon and Washington. Under all other alternatives, "south" represents Southern California and "north" represents Northern California, Oregon and Washington.

This approach provides information regarding the amount of the annual harvest guideline likely to be left unharvested at the end of the year, as well as the amount of harvest opportunity gained or foregone by each sector under the various alternatives. As noted in Section I, for this interim management measure, these two issues are the central focus of the analysis – (1) how to ensure achievement of the coast-wide harvest guideline, while (2) minimizing detrimental economic impacts on the various fishery sectors. The former is measured by how much of the harvest guideline remains at the end of the year and the latter in terms of how much harvest opportunity is foregone by a given sector and the timing and duration of subarea closures.

Initially, three different landings utilization scenarios were reviewed. Each scenario provided insight into how the 2003 fishing season would be expected to progress based on landing statistics observed in 2002. The first was based on average monthly landings for each of the three sectors. The second was based on maximum monthly landings for each of the three sectors. The third was based on average monthly landings in each of the California fisheries and maximum monthly landings in the Pacific Northwest; this was premised on the assumption that California fisheries are generally stable, whereas Oregon and Washington fisheries are expanding. The scenarios were reviewed to ensure they would provide a realistic analysis of potential impacts and if they should be used to compare impacts of the alternatives.

In regard to maximum versus average monthly landings, it was noted that in California the squid fishery will heavily influence sardine landings. If squid is available, sardine landings are likely to be in accord with recent averages. If squid is not available sardine landings will likely approach recent maximum landings.

It was also noted the scenario premised on average landings coastwide is probably not representative of how the fishery will operate in the future. Notably, because the northern fishery is still expanding and market disruptions (domoic acid, VHS) that dampened the southern fishery might not repeat during the 2003 fishery. Also, a scenario premised on average landings is more risk-prone, because the likelihood of exceeding the projections is greater than under the maximum-based scenarios.

Conversely, using combined maximum landings for all areas might misrepresent the potential fishery in Southern California, which has not caught the available harvest in recent years. For example, combining maximum monthly landings for Southern California results in approximately 64,000 mt annual landings, whereas recent annual landings in this area have not exceeded 49,000 mt. However, without a clear reason it might be inconsistent to use one standard in one area and a different standard in a second area.

In deciding which were the most appropriate scenarios the CPSMT concluded that, generally, the various sardine fisheries would operate in 2003 much the same as in 2002. In the analysis, to provide for possible fishery expansion, projections for 2003 would be based on 2002 landings plus 10%. Expansion could occur in the Pacific Northwest, because these fisheries have experienced major expansion in recent years and are expected to see continued expansion in 2003. Expansion in California fisheries was premised on squid availability, market increases, decrease in domoic acid and VHS impacts. Thus, two scenarios emerged:

Scenario I 2002 as a baseline; and
Scenario II 2002 + 10% to account for potential expansion.

The decision analysis tool was revised to enable comparison of these two scenarios for each of the management alternatives. Three qualitative criteria were considered in analyzing the various alternatives. Under the two scenarios, (1) how often did a subarea use up their allocation prior to the reallocation date, resulting in closure of the fishery in that sector, (2) which alternatives are better at ensuring full use of available annual harvest guideline, and (3) what are the impacts (in foregone harvest opportunity relative to the status quo or no action alternative) on the three sectors?

As noted in Section II, the CPSMT started from an initial suite of alternatives proposed 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. The narrative below describes how the CPSMT's proposed alternatives evolved from the initial alternatives. For clarity, the CPSMT alternatives are in bold typeface.

After reviewing several of the initial alternatives under both scenarios it became obvious that impacts under 2002 + 10% would be similar to 2002 baseline conditions. Thus, the analysis focused only on a comparison of the qualitative impacts of the various alternatives under Scenario II (2002 landings + 10%).

The various initial alternatives are presented to demonstrate that a full range of alternatives was analyzed in developing the set of alternatives the CPSMT provided to the Council.

Anticipated impacts for the full range of alternatives are ("full range" equates to the initial set of alternatives as well as variations developed by the CPSMT):

Alternative 1 (status quo) – With a 10% increase in harvest from 2002, the northern subarea would close in late-August. Reallocation (50-50) would occur on October 1, the Monterey fishery would likely reopen, but Oregon and Washington would be shut down the remainder of the year. Approximately 9,847 mt of the coastwide harvest guideline would not be caught by the end of the season. Southern California would gain about 2,501 mt, Northern California would forego 2,240 mt and Oregon/Washington would forego 10,108 mt.

Alternative 2 (no allocation – coastwide harvest guideline) – With a 10% increase in harvest from 2002 the coastwide fishery closes early in December. This does not impact the Oregon/Washington fishery, which, generally, closes in October due to weather. The coastwide harvest guideline in achieved and, generally, no sector gains or foregoes harvest opportunity. However, Southern California and Northern California fisheries would be closed prior to the end of their typical season which runs through January or February of the following year.

Alternative 3A (start year with 66-33 allocation, subarea line to 39° N latitude, September [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest from 2002, the coastwide fishery closes early in November. This does not impact the Oregon/Washington fishery, which, generally, closes in October due to weather. The fishery would reopen coastwide on December 1, but approximately 3,321 mt of the coastwide harvest guideline would remain at the end of the year. Southern California would forego 1,117 mt and Northern California would forego 2,204 mt.

Alternative 3B (start year with 50-50 allocation, subarea line to 39° N latitude, September [50-50]

reallocation, and December [coastwide] reallocation) – With a 10% harvest increase the impacts are the same as under Alternative 3A.

Alternative 4A (start year with 66-33 allocation, subarea line not changed, September [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest, the northern subarea would close in late-August. Reallocation (50-50) would occur on September 1, the Monterey fishery would likely reopen, close again in mid-November, and reopen in December; Oregon and Washington would be shut down the remainder of the year. Approximately 1,482 mt of the coastwide harvest guideline would not be caught by the end of the season. Southern California would gain about 2,501 mt, Northern California would forego 1,966 mt and Oregon/Washington would forego 2,017 mt.

Alternative 4B (start year with 50-50 allocation, subarea line not changed, September [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest from 2002 the Northern California and Oregon/Washington fisheries would close in late-October and remain closed in November. The Northern California fishery would likely resume December 1. The Southern California fishery would not close. Approximately 279 mt of the coastwide harvest guideline would remain uncaught. Southern California would gain about 2,501 mt, Northern California would forego 2,692 mt and Oregon/Washington would forego 87 mt.

The Council also requested information on effects of changing the reallocation date to August 1 –

Under 4Ai (modified to start year with 66-33 allocation, subarea line not changed, **August** [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest from 2002 the northern subarea (both Monterey and Oregon/Washington) would close in late-September. Southern California would not close early. Approximately 8,093 mt of the coastwide harvest guideline would not be caught by the end of the season. Southern California would gain about 2,501 mt, Northern California would forego 8,627 mt and Oregon/Washington would forego 1,967 mt.

Given the apparent severe impacts on the Northern California fishery from an August 1 reallocation date, consideration of the August 1 reallocation date within the other alternatives was not considered further.

In an effort to develop alternatives that would maximize attainment of the annual harvest guideline and minimize sectoral impacts, the CPSMT developed two modified alternatives, titled 3Aii and 3Aiii –

Alternative 3Aii (start year with 66-33 allocation, subarea line to 39° N latitude, September [**coastwide**] reallocation) – With a 10% harvest increase the impacts are the same as under Alternative 2. That is, coastwide harvest guideline in achieved and, generally, no sector gains or foregoes harvest opportunity. However, Southern California and Northern California fisheries would be closed prior to the end of their typical season which runs through January or February of the following year.

Alternative 3Aiii (start year with 66-33 allocation, subarea line to 39° N latitude, September [**80-20**] reallocation, and December [coastwide] reallocation) – With a 10% harvest increase, the Oregon/Washington fishery closes in late-September. Both California fisheries close in late December. All of the coastwide harvest guideline would be harvested. Southern California would gain about 2,276 mt, Northern California would gain 209 mt and Oregon/Washington would forego 2,485 mt.

From this qualitative review it can be seen that no alternative is not without some impact on either attainment of the coastwide harvest guideline or foregone sectoral fishing opportunity or both. It should be noted that given the short season of the Oregon/Washington fishery, closure of this fishery prior to October (when weather generally closes the fishery) could have a significant impact on dependent communities. Closure of the Southern California fishery in November or early December could also have community impacts, because the peak season for the San Pedro-based CPS fleet runs from the Fall months through January or February. In addition, representatives from the Pacific Northwest sector

remarked that, under status quo, shutting down production for more than a week would result in the loss of their labor force making it impossible to restart after the reallocation on October 1.

The CPSMT discussed potential impacts from having no allocation (i.e., a coastwide harvest guideline). There is concern that this could result in a derby fishery, with associated negative consequences. It was also perceived as a very radical change from the current fishery and, hence, not practicable without a comprehensive analysis of impacts.

The CPSMT also noted the 10% estimated increase in landings is a conservative estimate. Oregon and Washington fisheries could easily expand more than 10% in 2003. This would likely accelerate the impacts of the proposed allocation alternatives.

One critical basis of this analysis is the relatively stable harvest guideline. That is, available harvest in 2003 is very similar to what was available in 2002. If available harvest were to decline (e.g., in response to a decrease in sea surface temperature) the predicted impacts noted above would likely not be accurate, but could be predictably more severe.

The CPSMT discussed the practicality of implementing the various alternatives to prevent problems from occurring in 2003. Considerations included controversy (e.g., no allocation) and the need to change regulations mid-season (e.g., harvest guideline already allocated 66-33). The CPSMT concluded:

> While alternatives 3B and 4B seem to provide a relatively even distribution of impacts, they may not be practicable in that they call for a 50-50 initial subarea allocation.
>
> Alternative 4Ai (notably, the August 1 reallocation) would severely impact the Northern California fishery.
>
> Alternative 2 (no allocation) is highly controversial.

The CPSMT also discussed the idea of establishing a "set aside" at the outset of the fishing season. This amount would be taken off the top of the harvest guideline and held in trust to be used by a sector if they reached their subarea harvest guideline prior to a reallocation date. While this idea may have merits, and be practicable in the future, it did not seem possible for the 2003 season.

Finally, the CPSMT selected a suite of alternatives that seem to provide a balance between achieving the harvest guideline and minimizing sectoral impact, and are practicable for implementation in 2003. These selected alternatives will be provided to the CPSAS and Council at the March Council meeting and will be the basis for a regulatory amendment to be implemented during the 2003 sardine season.

The CPSMT set of alternatives put forward for Council consideration are:

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 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 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 coastwide reallocation.

These correspond to initial alternatives 1, 3A, 3Aiii, and 4A described above.

Summary of Impacts. Note that Table 1 (below) displays this narrative information and additional detail for the "full range" of alternatives.

> **Alternative 1** (status quo) – With a 10% increase in harvest from 2002, the northern subarea would close in late-August. Reallocation (50-50) would occur on October 1, the Monterey fishery would likely reopen, but Oregon and Washington would be shut down the remainder of the year.

Approximately 9,847 mt of the coastwide harvest guideline would not be caught by the end of the season. Southern California would gain about 2,501 mt, Northern California would forego 2,240 mt and Oregon/Washington would forego 10,108 mt.

Alternative 2 (start year with 66-33 allocation, subarea line to 39° N, September [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest from 2002, the coastwide fishery closes early in November. This does not impact the Oregon/Washington fishery, which, generally, closes in October due to weather. The fishery would reopen coastwide on December 1, but approximately 3,321 mt of the coastwide harvest guideline would remain at the end of the year. Southern California would forego 1,117 mt and Northern California would forego 2,204 mt.

Alternative 3 (start year with 66-33 allocation, subarea line to 39° N, September [80-20] reallocation, and December [coastwide] reallocation) – With a 10% harvest increase, the Oregon/Washington fishery closes in late-September. Both California fisheries close in late December. All of the coastwide harvest guideline would be harvested. Southern California would gain about 2,276 mt, Northern California would gain 209 mt and Oregon/Washington would forego 2,485 mt.

Alternative 4 (start year with 66-33 allocation, subarea line not changed, September [50-50] reallocation, and December [coastwide] reallocation) – With a 10% increase in harvest, the northern subarea would close in late-August. Reallocation (50-50) would occur on September 1, the Monterey fishery would likely reopen, close again in mid-November, and reopen in December; Oregon and Washington would be shut down the remainder of the year. Approximately 1,482 mt of the coastwide harvest guideline would not be caught by the end of the season. Southern California would gain about 2,501 mt, Northern California would forego 1,966 mt and Oregon/Washington would forego 2,017 mt.

Anticipated Impacts in Terms of Producer Surplus and Producer Profits

The economic analysis of alternative allocation schemes used to partition the Pacific sardine harvest guideline estimates the incremental change in producer surplus/private profit (PS) for each fishery sector when comparing each of the proposed allocation alternatives to the status quo. The procedure used estimates both the distributional changes and total changes in PS under each option. Specifically, the year-end projected landings for each fishery sector under each alternative are subtracted from the corresponding projected year-end landings under the status quo. The differences in landings are multiplied by an estimate of PS per metric ton for each fishery sector to obtain estimates of the change in sectorial PS. The sectoral changes in PS are summed to obtain an estimate of the total change in PS associated with the option. The measures of PS are derived from processor cost and earnings data that were voluntarily provided by industry members.

Given that the allocation alternative is to be a short-run, interim measure, it was assumed that there will be no significant changes in the basic operations of sardine processors during its term. There was not expected to be any significant changes in investment, or other restructuring by processors that would alter the costs of operations during the period of the selected action. Under these circumstances, all but the variable costs of sardine processing (in particular, the costs of labor, energy/utilities, raw fish, and other inputs that vary directly with the quantities of sardines processed) were considered fixed over the time horizon of the action, and therefore, would not effect estimates of PS, i.e., only the, variable costs of processing sardines were used in the calculations of PS. Producer surplus was calculated as the difference between gross revenue from the sales of processed sardine products, and the total variable cost of producing those products. This aggregate estimate was divided by the total quantity of processed product sold to get a weighted average, per unit measure of PS which was then used to estimate the incremental changes in PS associated with the proposed allocation alternatives.

It was assumed that each of the inputs are traded in perfectly competitive markets, and, therefore, their private cost will be equal to their social opportunity cost. Under this assumption, there will be no difference in measures of producer surplus and private profit. In other words the profits realized from sardine processing are the same as the net benefits to the nation. Estimates of the incremental changes in PS relative to the status quo were positive for each of the allocation alternatives (Table 2).

Table 1. Summary of options for restructuring the 2003 sardine allocation framework (Based upon 2002 landings inflated by 10% for every sector)

		REGION											
CPSMT Alternatives	Initial Alternatives	S. CA		N. CA		OR/WA		Coastwide HG		How close to closure prior to reallocation?			Do-able in 2003?
		Early Close	Impact - gain or (loss)(mt)	Early Close	Impact - gain or (loss)(mt)	Early Close	Impact - gain or (loss)(mt)	Achieved?	Remaining (mt)	South (mt)	North (mt)	As of	
Alternative 1	Status Quo	N	2,501	Y	(2,240)	Y	(10,108)	N	9,847	31,986	0	end of Sep	
	No Allocation	Y	1	Y	0	Y	0	Y	0	n/a	n/a	n/a	N
Alternative 2	3a (66/33 Pt Arena)	Y	(1,117)	Y	(2,204)	N	0	N	3,321	31,040	3,012	end of Aug	
	3aii (Coastwide - Sep 1)	Y	1	Y	0	N	0	Y	0	31,040	3,012	end of Aug	N
Alternative 3	3aiii (80/20 on Sep 1)	Y	2,276	Y	209	Y	(2,485)	Y	0	31,040	3,012	end of Aug	
	3b (50/50 Pt Arena)	Y	(1,117)	Y	(2,204)	N	0	N	3,321	12,556	21,497	end of Aug	N
Alternative 4	4a (66/33 Sep Re-all)	N	2,501	Y	(1,966)	Y	(2,017)	N	1,482	36,459	0	end of Aug	
	4ai (66/33 Aug Re-all)	N	2,501	Y	(8,627)	Y	(1,967)	N	8,093	41,344	18,097	end of July	
	4b (50/50 Sep Re-all)	N	2,501	Y	(2,692)	Y	(87)	N	279	17,974	16,078	end of Aug	N

Table 2. Estimated changes in producer surplus/private profits (PS) from proposed West Coast, sardine harvest guideline allocation alternatives. Full suite of alternatives displayed, CPSMT recommended are shaded.

	Regional Impact			
	Southern CA	Northern CA	OR & WA	Total
1. Option: Status Quo (2002 Landings + 10%, 66/33, Pt. Piedras Blancas, Re-all Oct 1)				
Projected Landings (mt)	53,856	14,060	33,145	101,061
Estimated PS				$15,375,972
Option: No Allocation (HG available coastwide all year)				
Projected Landings (mt)	51,356	16,299	43,253	110,908
Change from Status Quo (mt)	(2,500)	2,239	10,108	9,847
Change in PS				$2,315,725
2. Option: 3a (66/33, Pt. Arena, Re-all Sep 1, coastwide Dec 1)				
Projected Landings (mt)	50,239	14,095	43,253	107,587
Change from Status Quo (mt)	(3,618)	35	10,108	6,526
Change in PS				$2,058,657
Option: 3aii (66/33, Pt. Arena, coastwide Sep 1)				
Projected Landings (mt)	51,356	16,299	43,253	110,908
Change from Status Quo (mt)	(2,500)	2,239	10,108	9,847
Change in PS				$2,315,725
3. Option: 3aiii (66/33, Pt. Arena, Re-all 80/20 Sep 1, coastwide Dec 1)				
Projected Landings (mt)	53,631	16,508	40,767	110,907
Change from Status Quo (mt)	(225)	2,449	7,622	9,846
Change in PS				$1,987,184
Option: 3b (50/50, Pt. Arena, Re-all Sep 1, coastwide Dec 1)				
Projected Landings (mt)	50,239	14,095	43,253	107,587
Change from Status Quo (mt)	(3,618)	35	10,108	6,526
Change in PS				$2,058,657
4. Option: 4a (66/33, Pt. Piedras Blancas, Re-all Sep 1, coastwide Dec 1)				
Projected Landings (mt)	53,856	14,334	41,236	109,426
Change from Status Quo (mt)	0	274	8,091	8,365
Change in PS				$2,007,161
Option: 4ai (66/33, Pt. Piedras Blancas, Re-all Aug 1, coastwide Dec 1)				
Projected Landings (mt)	53,856	7,672	41,286	102,815
Change from Status Quo (mt)	0	(6,387)	8,141	1,754
Change in PS				$1,645,606
Option: 4b (50/50, Pt. Piedras Blancas, Re-all Sep 1, coastwide Dec 1)				
Projected Landings (mt)	53,856	13,607	43,166	110,629
Change from Status Quo (mt)	0	(453)	10,021	9,568
Change in PS				$2,441,499

Appendix A -- Displays of Fishing Seasons Under the Various Alternatives

INPUT HG: 110,908 <--- 2003 HG

STATUS QUO (66/33, Pt. Piedras Blancas, Re-all Oct 1) **U.S. HG= 110,908**

2002 Landings + 10% **Initial Subarea HG= 73,939 36,969**

	REGION LANDINGS			SUBAREA LANDINGS			ALLOC AVAILABLE (Month Start)				
Month	SC 2002	NC 2002	OW 2002	South	North		South	North			
Jan	5,250	249	0	5,250	249	Jan	73,939	36,969			
Feb	8,435	1,232	0	8,435	1,232	Feb	68,689	36,721			
Mar	6,990	178	0	6,990	178	Mar	60,254	35,488			
Apr	5,658	71	0	5,658	71	Apr	53,264	35,311			
May	2,257	1	0	2,257	1	May	47,605	35,239			
Jun	692	1	3,450	692	3,451	Jun	45,348	35,238			
Jul	3,322	362	13,329	3,322	13,691	Jul	44,656	31,788			
Aug	4,875	2,934	15,163	4,875	18,097	Aug	41,334	18,097	South	North	
Sep	4,473	0	0	4,473	0	Sep	36,459	0	**31,986**	**0**	**<---- HG remaining Sep 30**
Oct	4,190	6,188	1,204	4,190	7,392	Oct	15,993	15,993	<---- Reallocate 50:50 on Oct 1		
Nov	3,674	2,473	0	3,674	2,473	Nov	11,803	8,601			
Dec	4,039	371	0	4,039	371	Dec	8,129	6,128			
Total	53,856	14,060	33,145	53,856	47,205		**4,090**	**5,757**	**<---- HG Remaining Season End**		
Status Quc	51,355	16,299	43,253								
Impact	**2,501**	**2,240**	**10,108**								

NO ALLOCATION (HG available coastwide all year) **U.S. HG= 110,908**

2002 Landings + 10%

	REGION LANDINGS					ALLOC AVAILABLE (Month Start)	
Month	SC 2002	NC 2002	OW 2002	U.S. Landings		U.S.	
Jan	5,250	249	0	5,498	Jan	110,908	
Feb	8,435	1,232	0	9,668	Feb	105,410	
Mar	6,990	178	0	7,168	Mar	95,742	
Apr	5,658	71	0	5,730	Apr	88,574	
May	2,257	1	0	2,258	May	82,845	
Jun	692	1	3,450	4,143	Jun	80,586	
Jul	3,322	362	13,329	17,013	Jul	76,444	
Aug	4,875	3,324	17,179	25,379	Aug	59,431	
Sep	4,473	2,079	8,091	14,643	Sep	34,052	
Oct	4,190	6,188	1,204	11,582	Oct	19,409	
Nov	3,674	2,473	0	6,147	Nov	7,827	
Dec	1,539	141	0	1,679	Dec	1,680	
Total	51,356	16,299	43,253	110,908		**0**	**<---- HG Remaining Season End**
Status Quc	51,355	16,299	43,253				
Impact	**1**	**0**	**0**				

3A (66/33, Pt. Arena, Re-all Sep, Coastwide Dec 1)

2002 Landings + 10%

	REGION LANDINGS			SUBAREA LANDINGS	
Month	SC 2002	NC 2002	OW 2002	South	North
Jan	5,250	249	0	5,498	0
Feb	8,435	1,232	0	9,668	0
Mar	6,990	178	0	7,168	0
Apr	5,658	71	0	5,730	0
May	2,257	1	0	2,258	0
Jun	692	1	3,450	693	3,450
Jul	3,322	362	13,329	3,684	13,329
Aug	4,875	3,324	17,179	8,199	17,179
Sep	4,473	2,079	8,091	6,552	8,091
Oct	4,190	6,188	1,204	10,378	1,204
Nov	57	39	0	96	0
Dec	4,039	371	0	4,410	0
Total	50,239	14,095	43,253	64,334	43,253
Status Quc	51,355	16,299	43,253		
Impact	**1,117**	**2,204**	**0**		

U.S. HG= 110,908

Subarea HG= 73,939 36,969

	ALLOC AVAILABLE (Month Start)				
	South	North			
Jan	73,939	36,969			
Feb	68,440	36,969			
Mar	58,773	36,969			
Apr	51,605	36,969			
May	45,875	36,969			
Jun	43,617	36,969			
Jul	42,924	33,520	South	North	
Aug	39,240	20,191	**31,040**	**3,012**	**<---- HG remaining Aug 31**
Sep	17,026	17,026	<---- Reallocate 50:50 on Sep 1		
Oct	10,474	8,935			
Nov	96	7,731	**0**	**7,731**	**<---- HG remaining Nov 30**
Dec	7,731		<---- Open coastwide Dec 1		
	3,321		**<---- HG Remaining Season End**		

3A2 (66/33, Pt. Arena, Coastwide Sep 1)

2002 Landings + 10%

	REGION LANDINGS			SUBAREA LANDINGS	
Month	SC 2002	NC 2002	OW 2002	South	North
Jan	5,250	249	0	5,498	0
Feb	8,435	1,232	0	9,668	0
Mar	6,990	178	0	7,168	0
Apr	5,658	71	0	5,730	0
May	2,257	1	0	2,258	0
Jun	692	1	3,450	693	3,450
Jul	3,322	362	13,329	3,684	13,329
Aug	4,875	3,324	17,179	8,199	17,179
Sep	4,473	2,079	8,091	6,552	8,091
Oct	4,190	6,188	1,204	10,378	1,204
Nov	3,674	2,473	0	6,147	0
Dec	1,539	141	0	1,679	0
Total	51,356	16,299	43,253	67,655	43,253
Status Quc	51,355	16,299	43,253		
Impact	**1**	**0**	**0**		

U.S. HG= 110,908

Subarea HG= 73,939 36,969

	ALLOC AVAILABLE (Month Start)				
	South	North			
Jan	73,939	36,969			
Feb	68,440	36,969			
Mar	58,773	36,969			
Apr	51,605	36,969			
May	45,875	36,969			
Jun	43,617	36,969			
Jul	42,924	33,520	South	North	
Aug	39,240	20,191	**31,040**	**3,012**	**<---- HG remaining Aug 31**
Sep	34,052		<---- Open coastwide Sep 1		
Oct	19,409				
Nov	7,827				
Dec	1,680				
	0		**<---- HG Remaining Season End**		

3A3 (66/33, Pt. Arena, Re-all 80/20 Sep 1, Coastwide Dec 1)

2002 Landings + 10%

	REGION LANDINGS			SUBAREA LANDINGS	
Month	SC 2002	NC 2002	OW 2002	South	North
Jan	5,250	249	0	5,498	0
Feb	8,435	1,232	0	9,668	0
Mar	6,990	178	0	7,168	0
Apr	5,658	71	0	5,730	0
May	2,257	1	0	2,258	0
Jun	692	1	3,450	693	3,450
Jul	3,322	362	13,329	3,684	13,329
Aug	4,875	3,324	17,179	8,199	17,179
Sep	4,473	2,079	6,810	6,552	6,810
Oct	4,190	6,188	0	10,378	0
Nov	3,674	2,473	0	6,147	0
Dec	3,814	350	0	4,164	0
Total	53,631	16,508	40,767	70,140	40,767
Status Quc	51,355	16,299	43,253		
Impact	**2,276**	**209**	**2,485**		

U.S. HG=	**110,908**				
Subarea HG=	**73,939**	**36,969**			
	ALLOC AVAILABLE (Month Start)				
	South	North			
Jan	73,939	36,969			
Feb	68,440	36,969			
Mar	58,773	36,969			
Apr	51,605	36,969			
May	45,875	36,969			
Jun	43,617	36,969			
Jul	42,924	33,520	South	North	
Aug	39,240	20,191	**31,040**	**3,012**	**<---- HG remaining Aug 31**
Sep	27,242	6,810	<--- reallocate 80:20 Sep 1		
Oct	20,690	0			
Nov	10,312	0	**4,164**	**0**	**<---- HG remaining Nov 30**
Dec	4,165		<---- Open coastwide Dec 1		
	1		**<---- HG Remaining Season End**		

3B (50/50, Pt. Arena, Re-all Sep 1, Coastwide Dec 1)

2002 Landings + 10%

	REGION LANDINGS			SUBAREA LANDINGS	
Month	SC 2002	NC 2002	OW 2002	South	North
Jan	5,250	249	0	5,498	0
Feb	8,435	1,232	0	9,668	0
Mar	6,990	178	0	7,168	0
Apr	5,658	71	0	5,730	0
May	2,257	1	0	2,258	0
Jun	692	1	3,450	693	3,450
Jul	3,322	362	13,329	3,684	13,329
Aug	4,875	3,324	17,179	8,199	17,179
Sep	4,473	2,079	8,091	6,552	8,091
Oct	4,190	6,188	1,204	10,378	1,204
Nov	57	39	0	96	0
Dec	4,039	371	0	4,410	0
Total	50,239	14,095	43,253	64,334	43,253
Status Quc	51,355	16,299	43,253		
Impact	**1,117**	**2,204**	**0**		

U.S. HG=	**110,908**				
Subarea HG=	**55,454**	**55,454**			
	ALLOC AVAILABLE (Month Start)				
	South	North			
Jan	55,454	55,454			
Feb	49,956	55,454			
Mar	40,288	55,454			
Apr	33,120	55,454			
May	27,391	55,454			
Jun	25,132	55,454			
Jul	24,439	52,004	South	North	
Aug	20,755	38,676	**12,556**	**21,497**	**<---- HG remaining Aug 31**
Sep	17,026	17,026	<---- Reallocate 50:50 on Sep 1		
Oct	10,474	8,935			
Nov	96	7,731	**0**	**7,731**	**<---- HG remaining Nov 30**
Dec	7,731		<---- Open coastwide Dec 1		
	3,321		**<---- HG Remaining Season End**		

4A (66/33, Pt. Piedras Blancas, Re-all Sep 1, Coastwide Dec 1)

2002 Landings + 10%

U.S. HG= 110,908

Initial Subarea HG= 73,939 36,969

	REGION LANDINGS			SUBAREA LANDINGS			ALLOC AVAILABLE (Month Start)				
Month	SC 2002	NC 2002	OW 2002	South	North		South	North			
Jan	5,250	249	0	5,250	249	Jan	73,939	36,969			
Feb	8,435	1,232	0	8,435	1,232	Feb	68,689	36,721			
Mar	6,990	178	0	6,990	178	Mar	60,254	35,488			
Apr	5,658	71	0	5,658	71	Apr	53,264	35,311			
May	2,257	1	0	2,257	1	May	47,605	35,239			
Jun	692	1	3,450	692	3,451	Jun	45,348	35,238			
Jul	3,322	362	13,329	3,322	13,691	Jul	44,656	31,788	South	North	
Aug	4,875	2,934	15,162	4,875	18,097	Aug	41,334	18,097	**36,459**	**0**	**<---- HG remaining Aug 31**
Sep	4,473	2,079	8,091	4,473	10,170	Sep	18,230	18,230	<---- Reallocate 50:50 on Sep 1		
Oct	4,190	6,188	1,204	4,190	7,392	Oct	13,757	8,060			
Nov	3,674	668	0	3,674	668	Nov	9,566	668	**5,892**	**0**	**<---- HG remaining Nov 30**
Dec	4,039	371	0	4,039	371	Dec	5,892		<---- Open coastwide Dec 1		
Total	53,856	14,334	41,236	53,856	55,569		**1,482**		**<---- HG Remaining Season End**		
Status Quo	51,355	16,299	43,253								
Impact	**2,501**	**1,966**	**2,017**								

4A1 (66/33, Pt. Piedras Blancas, Re-all Aug 1, Coastwide Dec 1)

2002 Landings + 10%

U.S. HG= 110,908

Initial Subarea HG= 73,939 36,969

	REGION LANDINGS			SUBAREA LANDINGS			ALLOC AVAILABLE (Month Start)				
Month	SC 2002	NC 2002	OW 2002	South	North		South	North			
Jan	5,250	249	0	5,250	249	Jan	73,939	36,969			
Feb	8,435	1,232	0	8,435	1,232	Feb	68,689	36,721			
Mar	6,990	178	0	6,990	178	Mar	60,254	35,488			
Apr	5,658	71	0	5,658	71	Apr	53,264	35,311			
May	2,257	1	0	2,257	1	May	47,605	35,239			
Jun	692	1	3,450	692	3,451	Jun	45,348	35,238	South	North	
Jul	3,322	362	13,329	3,322	13,691	Jul	44,656	31,788	**41,334**	**18,097**	**<---- HG remaining Jul 31**
Aug	4,875	3,324	17,179	4,875	20,504	Aug	29,715	29,715	<---- Reallocate 50:50 on Aug 1		
Sep	4,473	1,883	7,328	4,473	9,211	Sep	24,840	9,212			
Oct	4,190	0	0	4,190	0	Oct	20,367	0			
Nov	3,674	0	0	3,674	0	Nov	16,177	0	**12,503**	**0**	**<---- HG remaining Nov 30**
Dec	4,039	371	0	4,039	371	Dec	12,503		<---- Open coastwide Dec 1		
Total	53,856	7,672	41,286	53,856	48,959		**8,093**		**<---- HG Remaining Season End**		
Status Quo	51,355	16,299	43,253								
Impact	**2,501**	**8,627**	**1,967**								

4B (50/50, Pt. Piedras Blancas, Re-all Sep 1, Coastwide Dec 1)

2002 Landings + 10%

	REGION LANDINGS			SUBAREA LANDINGS	
Month	SC 2002	NC 2002	OW 2002	South	North
Jan	5,250	249	0	5,250	249
Feb	8,435	1,232	0	8,435	1,232
Mar	6,990	178	0	6,990	178
Apr	5,658	71	0	5,658	71
May	2,257	1	0	2,257	1
Jun	692	1	3,450	692	3,451
Jul	3,322	362	13,329	3,322	13,691
Aug	4,875	3,324	17,179	4,875	20,504
Sep	4,473	2,079	8,091	4,473	10,170
Oct	4,190	5,739	1,117	4,190	6,856
Nov	3,674	0	0	3,674	0
Dec	4,039	371	0	4,039	371
Total	53,856	13,607	43,166	53,856	56,773
Status Quc	51,355	16,299	43,253		
Impact	**2,501**	**2,692**	**87**		

U.S. HG= 110,908

Initial Subarea HG= 55,454 55,454

	ALLOC AVAILABLE (Month Start)				
	South	North			
Jan	55,454	55,454			
Feb	50,204	55,205			
Mar	41,769	53,973			
Apr	34,779	53,795			
May	29,121	53,724			
Jun	26,863	53,723			
Jul	26,171	50,272	South	North	
Aug	22,849	36,582	**17,974**	**16,078**	<---- amount remaining Aug 31
Sep	17,026	17,026	<---- Reallocate 50:50 on Sep 1		
Oct	12,553	6,856			
Nov	8,363	0	**4,689**	**0**	**<---- HG remaining Nov 30**
Dec	4,689		<---- Open coastwide Dec 1		
	279		**<---- HG Remaining Season End**		