

ALLOCATION OF THE PACIFIC SARDINE HARVEST GUIDELINE

**AMENDMENT 11 TO THE COASTAL PELAGIC SPECIES FISHERY MANAGEMENT
PLAN**

PRELIMINARY ALTERNATIVES ANALYSIS

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1.0 INTRODUCTION

1.1. *The Proposed Action*

The proposed action is to implement a comprehensive, long-term allocation framework to apportion the annual Pacific sardine harvest guideline among the various sectors of the sardine fishery. The Pacific sardine resource is healthy and abundant, supporting fisheries in California (Los Angeles harbor area and Monterey Bay area), in Oregon (Port of Astoria), and Washington (ports of Westport and Ilwaco). When considering the impacts of the proposed action on the human environment, the context is sardine stocks in the West Coast exclusive economic zone (EEZ), harvesters and processors of the sardine resource on the West Coast, and the fishing communities within which they reside.

The purpose of the proposed action is to foster optimal resource utilization and equitably allocate harvest opportunity.

1.2. *Why the Proposed Action is Needed*

The Council adopted the CPS FMP in 1998. The CPS FMP was implemented by NMFS in December 1999 (64 FR 69888). The original Pacific sardine allocation formula in the FMP partitioned 33% of the annual harvest guideline to the northern subarea (“Subarea A”) and 66% to the southern subarea (“Subarea B”). Nine months after the January 1 start of the fishery (i.e., October 1), the remaining harvest guideline was pooled and re-allocated 50%–50% to each subarea. The original boundary between the two subareas was 35° 40' N lat. (approximately Point Piedras Blancas, California, see Figure 1). 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 the 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.

As the Pacific sardine biomass expanded, fisheries developed in the Pacific Northwest. With this expansion, under the original formula, the northern area allocation was shared by Monterey-, Oregon-, and Washington-based fisheries. Oregon and Washington fishery interests expressed concern to the Council that the original allocation framework did not provide optimal harvest opportunity to the respective fishery sectors. Each of the three sectors operates over a unique schedule. Generally, Southern California starts harvesting sardine January 1 and harvest increases steadily throughout the year; Northern California starts in August (tied to market squid availability) and harvest 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. Ex-vessel 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 (for example, market squid). The Northern California fishery and Pacific Northwest fishery are also affected by adverse weather.

In April 2003, the Council recommended to NMFS an interim framework for allocating sardine. The revised allocation system: (1) changed the definition of Subarea A (northern subarea) and Subarea B (southern subarea) by moving the geographic boundary between the two areas from 35° 40' N. lat. (Point Piedras Blancas, California) to 39° N. lat. (Point Arena, California), (2) moved the date when Pacific sardine that remains unharvested is reallocated to Subarea A and Subarea B from October 1 to September 1, (3) changed the percentage of the unharvested sardine that is reallocated to Subarea A and Subarea B from 50 percent to both subareas to 20 percent to Subarea A and 80% to Subarea B, and (4) reallocates all unharvested sardine

that remains on December 1 coastwide.

The Council requested this allocation framework be in place for the 2003 and 2004 fishing seasons, and also in 2005 (if the 2005 harvest guideline is at least 90% of the 2003 harvest guideline). NMFS implemented the revised allocation framework by a regulation that was published on September 4, 2003 (68 FR 52523).

Using the best available information, the interim allocation framework was rapidly developed to address concerns in the short-term. At the time, it was understood that more information and time would be needed to develop a more comprehensive, longer-term allocation framework, which is why the proposed action is needed.

1.3. Determining the Scope of the Analysis

Regulations promulgated by the Council on Environmental Quality (CEQ) mandate scoping: “an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action” (40 CFR 1501.7). The Council process has been the mechanism for involving the public in this process. Amending the FMP to establish a permanent allocation framework was on the Council’s agenda at their June, September, and November meetings in 2004. At the June meeting the Council directed staff and advisory bodies to begin work on an FMP amendment to implement the allocation framework.

The CPS Advisory Subpanel (CPSAS) met August 3–4, 2004, to develop a preliminary range of alternatives, which were reported to the Council in September. The CPS Management Team (CPSMT) met August 5 and, among other things, reviewed the advice provided in a May 18, 2004, letter from Rodney McInnis, Acting Regional Administrator, NMFS SWR, to Council Chair Donald Hansen. Mr. McInnis recommended that an FMP amendment prepared in connection with the sardine allocation framework also address several other issues related to CPS management. He concluded by recommending “the Council initiate scoping to determine if a full EIS process is warranted for the next amendment to the CPS FMP,” based on an expanded scope for the FMP amendment and the fact that the last EIS prepared in connection with the CPS FMP is more than five years old. On July 19, 2004, the Council and NMFS published a notice of intent (NOI) to prepare an environmental impact statement (EIS) for this action (69 FR 42968).¹ However, in the report of their August 5 meeting, the CPSMT concluded that the additional issues raised by Mr. McInnis should not be addressed in this FMP amendment. Relative to preparing an EIS, the Management Team stated they were “not aware of any evidence that a comprehensive review of the FMP is warranted. If NMFS believes a full programmatic FMP EIS for CPS ... is needed, the CPSMT suggests it would take at least two years to develop...”

The Council took up these issues at their September meeting when providing further guidance on the development of the FMP amendment. They reemphasized that the allocation framework was the highest priority and should be the focus of the current proposed action. The other issues raised by Mr. McInnis would be taken up in subsequent FMP amendments.

The CPSAS met again on September 28–29 to further refine the range of alternatives. Their report containing

¹ The NOI established a time period for receiving comments on the intent to prepare an EIS. The Council received one comment letter during this time period, from the California Wetfish Producers Association. The letter presented recommendations for the range and type of alternatives to be considered.

the more developed alternatives was presented at the November Council meeting. The Council approved them as a preliminary range to be analyzed by CPSMT members and agency staff.

Team members and staff began their work by assessing the alternatives in order to identify environmental impacts and narrow the scope of the present analysis to the significant issues that will be analyzed in depth and eliminating from detailed study the issues which are not significant (40 CFR 1501.7). They used nine factors enumerated in NOAA NEPA guidance (NAO 216-6) §6.02, specific guidance on fishery management actions, in order to screen for potentially significant impacts and determine the scope of the analysis. These factors generally focus on components of the human environment² potentially affected by a fishery management action. (Regulations at 40 CFR 1508.27 list characteristics related to the intensity—or severity—of the impact, which were considered in the context of the environmental components listed below.)

As part of this process NMFS and Council staff reviewed the environmental assessment (EA) for the interim allocation framework for 2003–2005 and the pursuant finding of no significant impact (FONSI) (both hereby incorporated by reference). This review assessed whether the impacts of the current proposed action would differ substantially from those of the interim allocation, increasing the likelihood of significant impacts.

The nine factors from NAO 216-6 §6.02 are listed below followed by an assessment of the likelihood of whether consideration of these environmental components may be eliminated from detailed discussion because the likelihood of significant impacts is remote.

a. The proposed action may be reasonably expected to jeopardize the sustainability of any target species that may be affected by the action.

The CPS FMP establishes an environmentally-based harvest guideline for sardines. The harvest guideline establishes a minimum threshold value of 150,000 mt for the stock biomass. Harvest of any biomass surplus to this cutoff value varies between 15% and 5%. Sea surface temperature, an environmental cue influencing stock productivity, is used as a variable in a formula to compute the actual harvest rate between these upper and lower bounds. If the harvest guideline is not exceeded, there is little risk that overfishing would occur; therefore, the sustainability of the target resource would not be jeopardized. As with the interim allocation framework, the proposed action will not change the fishery in such a way as to increase the risk that the harvest guideline would be exceeded.

b. The proposed action may be reasonably expected to jeopardize the sustainability of any non-target species.

The sardine fisheries affected by the proposed action have very low incidental catches of non-target species. The main incidental catch is of northern anchovy, a CPS fishery management unit species. Catch is monitored and accounted for in determining total harvest mortality on this stock. This ensures that incidental catch will not jeopardize the sustainability of these species. Other species are caught in very small quantities, with no likelihood of jeopardizing sustainability. Protected species (ESA listed, marine mammals, seabirds) are incidentally caught but considered separately under factor e below. The proposed action is not predicted to change incidental catch rates in such a way to jeopardize the sustainability of fish stocks other than protected species.

² Regulations (40 CFR 1508.14) state “Human environment shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment.”

- c. *The proposed action may be reasonably expected to cause substantial damage to the ocean and coastal habitats and/or essential fish habitat as defined under the Magnuson-Stevens Act and identified in FMPs.*

Fisheries affected by the proposed action are prosecuted in pelagic habitats, which, because of their physical characteristics, are not significantly affected by the fishing gear. The proposed action will not affect the way in which fisheries are prosecuted such that effects on habitat would change from current conditions.

- d. *The proposed action may be reasonably expected to have a substantial adverse impact on public health or safety.*

The interim allocation EA discusses health and safety implications for that management regime as follows:

The proposed action is anticipated to enhance safety at sea (NS-10) by advancing the reallocation date from October 1 to September 1. Waiting until October 1 to reallocate has the potential of inducing Pacific Northwest fishers to fish in unsafe weather conditions. Ocean conditions off Oregon and Washington become increasingly rough in October. Also, crossing the Columbia River bar, always a hazardous exercise, becomes very dangerous during this time of year. (page 31)

The action alternatives considered under the current action either include reallocation on September 1 or have mechanisms to allow Pacific Northwest fishers continued access to harvest opportunity in September. As a result, the proposed action will not affect safety in a manner substantially different from the interim allocation regime, and will not have significant impacts on safety. There are no public health implications stemming from the action.

- e. *The proposed action may be reasonably expected to adversely affect endangered or threatened species, marine mammals, or critical habitat of these species.*

Adverse effects on threatened species may be considered in two contexts. First, the fishery target is an important forage species for a wide range of marine animals, including protected species. Second, fisheries subject to the proposed action could incidentally catch protected species, contributing to human-caused mortality. When developing the harvest guideline (see a above) the importance of CPS management unit species as forage fish was considered. The CPS FMP, as quoted in the interim allocation EA, notes:

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. (page 4)

As noted under a, above, the proposed action does not affect the calculation of the harvest guideline.

Section 2.2 of Appendix A to the CPS FMP reviews the incidental take of marine mammals, endangered salmon, and seabirds. CPS fisheries are categorized as Category II under the Marine Mammal Protection Act, meaning that incidental mortality of marine mammals is less than 50% of the potential biological removal (PBR) level. Although quantitative data are limited, anecdotal information indicates that the most significant interaction is between pilot whales and the squid fishery, a fishery not affected by the proposed action.

NMFS conducted an informal Section 7 consultation, pursuant to the ESA, in 1998 and found that CPS fisheries would not jeopardize the continued existence of endangered salmon stocks. However, this occurred before the development of a significant sardine fishery off the mouth of the Columbia River, which is the major factor driving the development of the new allocation scheme considered as the proposed action. Listed

salmon stocks (evolutionarily significant units) returning to the Columbia River system could be intercepted by sardine purse seine fisheries. Current data only identifies numbers of intercepted salmon at the species level, if that, which is insufficient to determine if listed stocks are being intercepted. For this reason NMFS decided to undertake a formal Section 7 consultation to determine if any stocks are being jeopardized. A jeopardy determination is also used as the threshold for identifying a significant impact to listed species in the NEPA context. The analysis in this draft document is based on the Biological Opinion prepared in the ESA consultation process.

- f. The proposed action may be reasonably expected to result in cumulative adverse effects that could have a substantial effect on the target species or non-target species.*

The interim allocation EA discusses cumulative effects; the same factors would come into play in relation to the effects of the proposed action. For target and non-target species these factors are other fisheries taking CPS, especially Canadian and Mexican fisheries, and fluctuations in the ocean environment. For the target species, calculation of the harvest guideline takes these factors into account, so cumulative adverse effects are very unlikely. The non-target species with more than negligible harvest in the sardine fisheries is northern anchovy, another CPS monitored although not actively managed under the FMP. According to information in the most recent SAFE document, combined fishing mortality from all sources is well below the threshold that would constitute overfishing.

- g. The proposed action may be expected to have a substantial impact on biodiversity and ecosystem function within the affected area (e.g., benthic productivity, predator-prey relationships, etc).*

As noted above, sardines are an important prey item (forage) for a wide range of marine animals; the primary significant ecosystem effect would be a reduction in sardine sufficient to threaten these other ecosystem components. As noted above, the harvest guideline was developed to account for their ecosystem role as forage. Because the proposed action would not affect the harvest guideline, significant impacts ecosystem impacts are not predicted.

- h. If significant social or economic impacts are interrelated with significant natural or physical environmental effects, then an EIS should discuss all of the effects on the human environment.*

The effects of allocation are almost exclusively economic. Therefore, the environmental impact assessment also evaluates these types of effects for potential significance. However, social or economic impacts by themselves, if there are no interrelated significant natural or physical environmental effects, would not meet the threshold requirement for preparing an EIS.

- i. A final factor to be considered in any determination of significance is the degree to which the effects on the quality of the human environment are likely to be highly controversial. Although no action should be deemed to be significant based solely on its controversial nature, this aspect should be used in weighing the decision on the proper type of environmental review needed to ensure full compliance with NEPA. Socio-economic factors related to users of the resource should also be considered in determining controversy and significance.*

Developing a new allocation scheme has been somewhat controversial because it has the potential of changing the distribution of socioeconomic benefits derived from sardine fisheries. This was an important factor in the initial determination to prepare an EIS. The EIS process includes a formal public comment opportunity in addition to any opportunities afforded as part of the Council process, which could help to make the decision-making process less controversial. The guidance states that no action should be deemed significant because of controversy alone; but an assessment of measurable non-significant impacts combined with the public expressing substantial concern could be a reason for preparing an EIS.

1.4. *Purpose of This Document*

As described in the chronology of events outlined above, a preliminary assessment by staff, in part based on the advice from Mr. McInnis, led to the decision to prepare an EIS. However, subsequent evaluation by the CPSMT and staff, considering the scope of the action, narrowed the scope of potential issues that need detailed evaluation. Three factors from NAO 216-6 §6.02 required further evaluation to adequately determine if potential impacts warrant preparation of an EIS:

1. Salmon stocks listed under the endangered species act (ESA) could be incidentally taken in numbers that would jeopardize their continued existence (factor e).
2. Allocation could affect the distribution of revenue and income across the regions designated in the allocation framework, engendering potentially significant economic impacts (factor h).
3. Because the action establishes a permanent allocation scheme, it could be highly controversial (factor i).

The preliminary analyses on listed salmon and economic impacts in this document, by disclosing whether significant impacts are predicted, can be used to determine if it is necessary to prepare an EIS. In this respect, this document functions as a preliminary EA; regulations (40 CFR 501.4) state that an agency shall prepare an EA to make its determination whether to prepare an EIS. If the preliminary analysis shows no significant impacts, a full EA and FONSI will be prepared after the Council takes final action, scheduled for the June 2005 meeting. (A Federal Register notice would be published when the EA is completed to notify the public of the decision not to prepare an EIS.) If significant impacts are predicted, NMFS and the Council will reaffirm their original intent to prepare an EIS; a draft EIS (DEIS) would then be published after the June Council meeting, commencing the public comment period.

Another factor considered in the decision of what type of NEPA document to prepare—aside from a finding of no significant impact—is the difference between an EIS and EA timeline. The shorter timeline for completing an EA would make it easier to implement the allocation framework before the beginning of the 2006 fishing year. The EIS process includes mandated public comment on a DEIS and publication of a final EIS responding to those comments before the action can be implemented. But many of the benefits of public participation have been accomplished through the Council process. For example, affected parties have been substantially involved in the development of the alternatives through the CPS Advisory Subpanel. Members of the public also have an opportunity to comment orally and in writing on the proposal, the analysis, and the Council action as part of the Council meeting process. Although a formal response is not required, these comments are considered by decision-makers and analysts evaluating the proposed action.

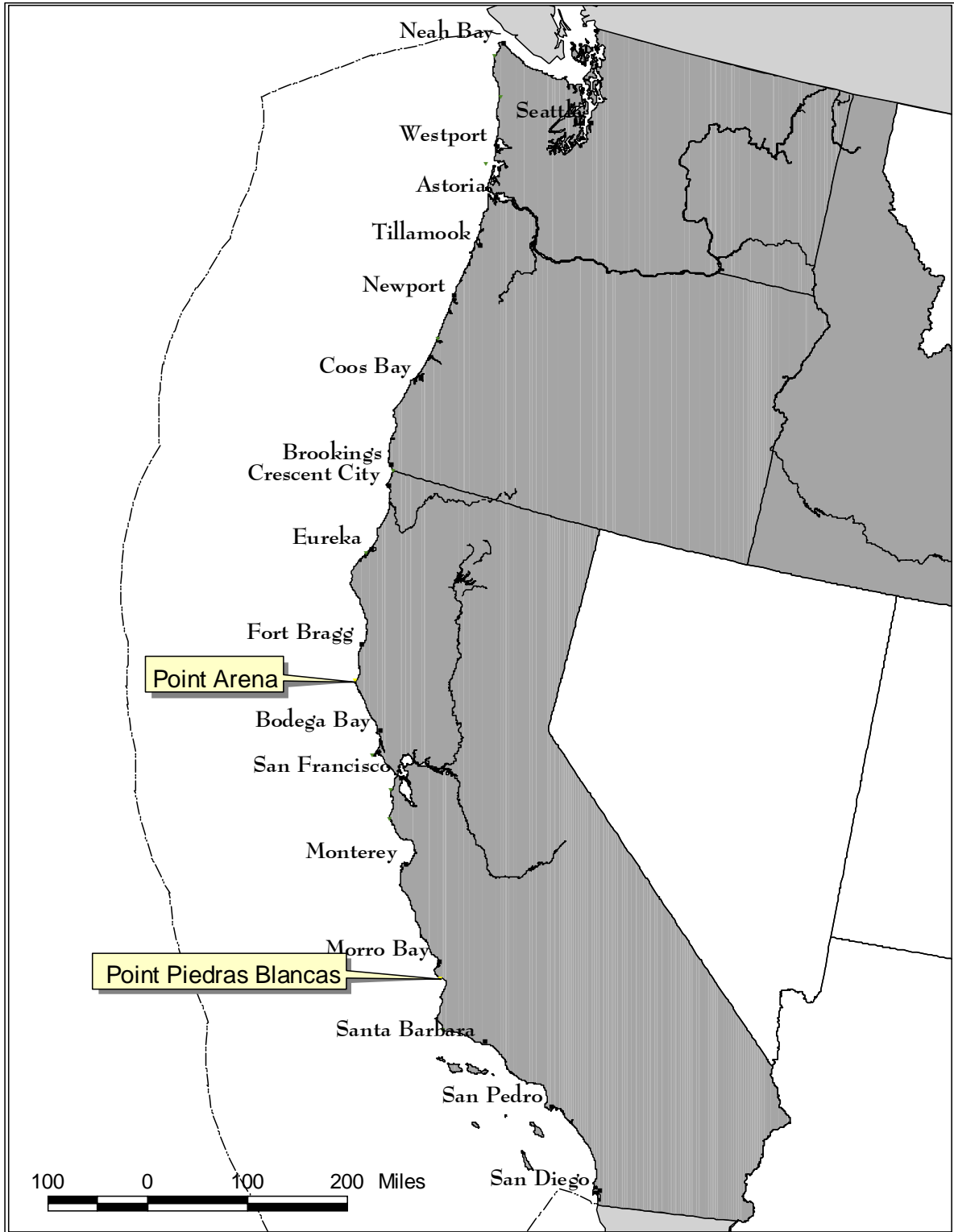


Figure 1-1. West Coast ports and sardine allocation subarea boundaries.

2.0 ALTERNATIVES

2.1. *Development of the Alternatives*

The CPSAS adopted the range of alternatives for sardine allocations at meetings in August and September 2004. At their November 2004 meeting the Council reviewed these alternatives and with some modifications and additions forwarded them to the CPSMT for preliminary analysis. They also identified the following program objectives, which can serve as a basis for evaluation.

- Strive for simplicity and flexibility in developing an allocation scheme.
- Transfer quota as needed.
- Utilize optimum yield.
- Implement a plan that balances maximizing value and historic dependence on sardine.
- Implement a plan that shares the pain equally at reduced harvest guideline levels.
- Implement a plan that produces a high probability of predictability and stability in the fishery.

The Council will review the analysis at their April 2005 meeting and adopt the final range of alternatives for public review.

2.2. *Description of the Alternatives*

Nine alternatives were forwarded for analysis including both a no action alternative is and a status quo alternative. If the Council takes no action, the allocation framework would revert to original FMP formula that was in place before the regulatory amendment was implemented in 2003. Under status quo the Council takes action to extend the interim allocation framework. The order of alternatives does not indicate rank or priority. All alternatives (except No Action) use Point Arena, California (39° N latitude) as the dividing line between the allocation subareas.

In order to present the alternatives in a clear and comparable fashion the descriptions bullet the fishing season and the allocations and reallocations made at different points during the fishing season.

No Action: FMP Allocation Framework

The allocation subareas are divided at Point Piedras Blancas, California (35° 40° N latitude).

Season: January 1–December 31

Initial allocation: On January 1, 33% of the harvest guideline is allocated to the Subarea A (north, which includes Monterey) and 66% to the Subarea B (Southern California)

Reallocation: On October 1 remaining unharvested portion of the harvest guideline is pooled and reallocated 50% to Subarea A (north) and 50% to Subarea B (south).

Status Quo: Interim Allocation Framework

Season: January 1–December 31

Initial allocation: On January 1, 33% of the harvest guideline is allocated to the Subarea A (north) and 66% to Subarea B (south).

Reallocation: On September 1 20% of the remaining unharvested portion of the harvest guideline is reallocated to the Subarea A (north) and 80% to Subarea B (south).

Second reallocation: On December 1 the remaining unharvested portion of the harvest guideline is reallocated coastwide.

Alternative 1: Coastwide Allocation In Two Periods

Season: January 1–December 31

Initial allocation: On January 1; 50% of the harvest guideline is allocated coastwide.

Reallocation: On July 1 the remaining harvest guideline (50% plus any unharvested portion from the initial allocation) is allocated coastwide.

Alternative 2: Coastwide Allocation on June 1

Season: June 1–May 31

Initial allocation: On June 1 100% of the harvest guideline is allocated coastwide with no subsequent reallocation.

Alternative 3: Coastwide Allocation In Three Periods

Season: January 1–December 31

Initial allocation: On January 1 40% of the harvest guideline is allocated coastwide

Reallocation: On July 1 40% of the harvest guideline (plus any unharvested portion from the initial allocation) is allocated coastwide

Second reallocation: On October 1 20% of the harvest guideline (plus any unharvested portion from the first reallocation) is reallocated coastwide.

Alternative 4: Allocation Formula Depends on the Size of the Harvest Guideline

Season: January 1–December 31

The coastwide harvest guideline is greater than 100,000 mt:

Initial allocation: On January 1 40% of the coastwide harvest guideline is allocated to the Subarea A (north) and 60% to the Subarea B (south).

Reallocation: On September 1 the remaining unharvested portion of the harvest guideline is pooled and allocated coastwide.

The coastwide harvest guideline is less than 100,000 mt:

Initial allocation: On January 1 33% of the coastwide harvest guideline is allocated to Subarea A (north) and 66% to the Subarea B (south).

Reallocation: On September 1 the remaining unharvested portion of the coastwide harvest guideline is pooled and 20% is allocated to Subarea A (north) and 80% to the Subarea B (south).

Second reallocation: On November 1 any remaining unharvested portion of the harvest guideline is again pooled and reallocated coastwide.

Alternative 5: Set-aside Released Incrementally During the Initial Allocation Period

Twenty percent of the harvest guideline is set aside at the start of the year, to be released in increments during the initial allocation period (January 1–September 30). The remaining 80% of the harvest guideline is initially allocated 40% to Subarea A and 60% to Subarea B. The set-aside is released in increments to a subarea once more than 90% of the initial allocation has been caught in that subarea (i.e., in Subarea A 28.8% of the coastwide harvest guideline and in Subarea B 43.2% of the coastwide harvest guideline). The analysis evaluates the effect of different size increments, ranging from 2% to 10% of the coastwide harvest guideline (i.e., 10%–50% of the set-aside).

Season: January 1–December 31

Initial allocation: On January 1 32% of the coastwide harvest guideline is allocated to Subarea A (north) (40% of the 80% remaining harvest guideline after the set-aside is deducted) and 48% to the Subarea B (south) (60% of 80%), with incremental release of the remaining 20% set-aside as described above.

Reallocation: on October 1 the remaining unharvested portion of the harvest guideline (which includes any of the remaining set-aside) is pooled and reallocated coastwide.

Alternative 6: Transfer of Unused Allocations Between Subareas

Season: January 1–December 31

Initial allocation (for 2006 only): On January 1 40% of the harvest guideline is allocated to the Subarea A (north) and 60% to the Subarea B (south).

Reallocation: on September 1 the remaining harvest guideline is pooled and allocated coastwide.

Transfer Rules For Computing Subsequent-Year Allocations

After the initial year (2006) these rules dictate the allocations to each subarea in each subsequent year:

Rule 1: The transfer of a portion of the harvest guideline from one subarea to the other, for the purpose of recomputing allocation percentages for the next year, occurs if the portion of a subarea's allocation remaining uncaught at the end of the year is greater than the transfer limits described in Rule 2.

Rule 2: If the harvest guideline is greater than 100,000 mt, the transfer amount will be equal to 10% of the coastwide harvest guideline for that year. When the coastwide harvest guideline is 100,000 mt or less, the transfer amount will be 5,000 mt.

Rule 3: The transfer amount is applied to the current-year allocation for each subarea. The resulting numerical values are then converted to percentages of the current-year coastwide harvest guideline and used to determine the initial allocation for the following year.

Rule 4: No subarea may initially be allocated more than 75% of the coastwide harvest guideline.

Rule 5: The September 1 coastwide reallocation always applies.

The box on the following page shows how the allocation formula would be computed over a series of years (using fictional values for the harvest guideline and subarea harvests).

Example Computations of the Allocation Formula in Alternative 6

Example Year 1

Current-year harvest guideline: 150,000 mt

Transfer amount: 15,000 mt.

Subarea A: 60,000 mt allocation (40%) - 45,000 mt catch = 15,000 mt uncaught

Subarea B: 90,000 mt allocation (60%) - 90,000 mt catch = 0 mt uncaught

The recomputed allocation formula for the next year would be:

Subarea A: $(60,000 \text{ mt} - 15,000 \text{ mt}) / 150,000 \text{ mt} = 30\%$

Subarea B: $(90,000 \text{ mt} + 15,000 \text{ mt}) / 150,000 \text{ mt} = 70\%$

Example Year 2

Current-year harvest guideline: 200,000 mt.

Transfer amount: 20,000 mt.

Subarea A: 60,000 mt allocation (30%) - 45,000 mt catch = 15,000 mt uncaught, which is less than the transfer amount

Subarea B: 140,000 mt allocation (70%) - 90,000 mt catch = 50,000 mt uncaught

The recomputed allocation formula for the next year would be:

Subarea A: $(60,000 \text{ mt} + 20,000) / 200,000 \text{ mt} = 40\%$

Subarea B: $(140,000 \text{ mt} - 20,000 \text{ mt}) / 200,000 \text{ mt} = 60\%$

Example Year 3

Current-year harvest guideline: 75,000 mt

Transfer amount: 5,000 mt

Subarea A: 30,000 mt allocation (40%) - 5,000 mt catch = 25,000 mt uncaught

Subarea B: 45,000 mt allocation (60%) - 35,000 mt catch = 10,000 mt uncaught

In this case since the uncaught portion in both subareas is greater than the transfer amount, the transfers would cancel each other out and no change in the allocation formula would occur.

Example Year 4

Current-year harvest guideline: 75,000 mt

Transfer amount: 5,000 mt

Subarea A: 30,000 mt allocation (40%) - 5,000 mt catch = 25,000 mt uncaught

Subarea B: 45,000 mt allocation (60%) - 43,000 mt catch = 2,000 mt uncaught

The recomputed allocation formula for the next year would be:

Subarea A: $(30,000 \text{ mt} - 5,000 \text{ mt}) / 75,000 \text{ mt} = 33\%$

Subarea B: $(45,000 \text{ mt} + 5,000 \text{ mt}) / 75,000 \text{ mt} = 66\%$

Example Year 5

Current-year harvest guideline: 105,000 mt

Transfer amount: 10,500 mt

Subarea A: 35,000 mt allocation (33%) - 5,000 mt catch = 30,000 mt uncaught

Subarea B: 70,000 mt allocation (66%) - 70,000 mt catch = 0 mt uncaught

Since the recomputed allocation percentage for Subarea A is less than 25% ($(30,000 \text{ mt} - 15,000 \text{ mt}) / 105,000 \text{ mt} = 14\%$), the Subarea A allocation is 25% and the Subarea B allocation is 75%.

Alternative 7: Equal Reallocation

Season: January 1–December 31

Initial allocation: on January 1 33% of the harvest guideline is allocated to the Subarea A (north) and 66% to the Subarea B (south).

Reallocation: on September 1 remaining harvest guideline is pooled and 50% of the harvest guideline is allocated to the Subarea A (north) and 50% to the Subarea B (south).

3.0 DRAFT ANALYSIS OF PROTECTED SPECIES EFFECTS

3.1. *An Approach to Analyzing the Environmental Effects of the Long-Term Allocation of the Pacific Sardine Resource Off the U.S. Pacific Coast*

The Pacific sardine (*Sardinops sagax*) fishery in the exclusive economic zone (EEZ, 3 to 200 nm off shore) offshore Washington, Oregon, and California is managed by the National Marine Fisheries Service (NMFS) under authority of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). The Pacific Fishery Management Council (Council) has identified a range of alternatives to develop a new allocation framework for the coast-wide Pacific sardine fishery. This revision will occur through Amendment 11 to the Coastal Pelagic Species (CPS) Fishery Management Plan (FMP). The FMP amendment is intended to achieve optimal utilization of the resource and the equitable allocation of the Pacific sardine harvest guideline (HG). In implementing this action, NMFS is also responsible for administering the Endangered Species Act (ESA) with respect to threatened or endangered species. Section 7 of the ESA requires that federal agencies, proposing an action which may affect listed species, consult with NMFS to ensure that the action does not jeopardize the continued existence of any threatened or endangered species. NMFS Southwest Region (SWR) Protected Resources Division (PRD) has recently completed a biological opinion (BO) to complete the section 7 consultation on the take of listed salmon in the Pacific sardine fishery. Although the BO and incidental take statement (ITS) apply only to the 2005 fishery, the information provided in the BO will be applied as a starting point for analyzing the environmental effects of the long-term allocation of the Pacific sardine resource beginning of the 2006 season.

This analysis will provide a description of the Pacific sardine fishery, the action, and an outline a basic approach for analyzing the environmental effects of implementing a long-term allocation. A section 7 consultation will not be completed for each alternative, rather NMFS will advise if any of the alternatives are likely to jeopardize the continued existence or recovery of species listed under the ESA. A formal section 7 consultation on the Council's preferred alternative will be initiated as part of NMFS's rule making process.

3.2. *The Pacific Sardine Fishery*

The Pacific sardine fishery has been economically important since the early part of the 20th century off the west coast of North America (Conser et al., 2004). The Pacific sardine fishery developed in response to demand for food during World War I. Landings increased from 1916 to 1936, and supported the largest fishery in the western hemisphere during the 1930s and 1940s. The fishery decline in the late 1940s and remained at extremely low levels of abundance until the 1970s. In 1986, the state of California lifted its 18-year moratorium on sardine harvest on the basis of sea-survey and other data indicating that the spawning biomass has returned to fishable levels. In January 2000, management authority for the U.S. Pacific sardine fishery was transferred to the Council when the CPS FMP was adopted. Around the same time that the CPS FMP was being developed (the mid-1990s), the Pacific sardine stock expanded its range northward up into the Pacific Northwest prompting the start of state managed fisheries in Oregon and Washington in the year 2000.

Species managed under the CPS FMP include: Pacific sardine, Pacific mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), jack mackerel (*Trachurus symmetricus*), and market squid (*Loligo opalescens*). The CPS FMP divides management unit species into the categories of actively managed and monitored. Harvest guidelines of actively managed species (Pacific sardine and Pacific mackerel) are based on formulas applied to current biomass estimates. No biomass estimates are calculated for species that are only monitored (jack mackerel, northern anchovy, and market squid). At public meetings each year, the biomass for actively managed species are reviewed by the Council's CPS Management Team (Team). The biomass, harvest guideline, and status of the fisheries are then reviewed at a public meeting of the Council's CPS Advisory Subpanel (Subpanel). This information is also reviewed by the Council's Scientific and

Statistical Committee (SSC). The Council reviews reports from the Team, Subpanel, and SSC, then, after providing time for public comment, makes its harvest guideline recommendation to NMFS which implements management measures in the EEZ if they are found to be consistent with the Magnuson-Steven Act and other applicable law, including the ESA. The annual harvest guideline and season structure is published by NMFS in the Federal Register as soon as practicable before the beginning of the appropriate fishing season. The Pacific sardine season begins on January 1 and ends on December 31 of each year.

The CPS FMP divides the fishery into a federally managed limited entry fishery, which occurs south of 39 degrees North latitude (Southern subarea), and an open access fishery, which occurs north of 39 degrees North latitude (Northern subarea). The latter is managed by the individual states of Oregon and Washington. Since 2004, the harvest guideline has been allocated one-third for Northern subarea, and two-thirds for Southern subarea beginning on January 1. On September 1 of each year, the remaining harvest guideline is pooled and reallocated to 80% for the Southern subarea and 20% for the Northern subarea. On December 1, all unharvested sardine that remain on are reallocated to a coast-wide harvest guideline until the fishing season ends on December 31. Revision of this allocation framework is the subject of this report and will occur through Amendment 11 to the CPS FMP.

The gear traditionally used in the CPS fishery is a purse seine. A typical purse seine net measures 185 fathoms long, 22 fathoms deep, and 1,600 meshes deep with 1¼ inch mesh (Lutz and Pendleton, 2000). There are 63 permits and 62 active vessels in the federally managed limited entry permitted portion (Southern subarea) of the CPS fishery. Vessels landing less than five metric tons of CPS per trip in the Southern subarea are exempt from limited entry requirements. In the open access area (Northern subarea), fishers must have individual state (Oregon and Washington) harvest permits to fish for Pacific sardine. In Oregon, the Pacific sardine fishery has been managed since the year 2000 under its Developmental Fishery Program which limits the number of harvest permits (McCrae, 2004). Prior to 2001, fifteen permits were allowed and in 2001, five additional permits were added for a total of 20 permits state-wide.

From 2000 to 2002, the Washington Department of Fish & Game (WDFG) managed Washington's Pacific sardine fishery as a trial fishery under which the number of participants cannot be limited (Culver and Henry, 2004). Following an extensive public process, the Director of WDFG decided to advance Washington's Pacific sardine fishery into an experimental fishery in 2003, which monitors the fishery under the Emerging Commercial Fishery provisions. The Emerging Commercial Fisheries legislation provides for the harvest of a newly classified species, or harvest of previously classified species in a new area or by new means, and also limits the number of permits to 25. For 2004, the number of permits issued in Washington state was 21 permits. Washington state Experimental Sardine Fishery Permits cost \$185 (for residents and \$295 for non-residents) and are non-transferable and the permit owner must designate a vessel on the permit a minimum of 48 hours prior to the first sardine fishing trip of that year.

3.3. Current Management Measures in Place to Reduce Bycatch and Protected Species Interactions

The Pacific sardine fishery has current management measures in place to reduce bycatch and interactions with protected species. The state of California does not allow fishing in state waters (i.e., shoreline to 3 nautical miles). Additionally, NWFS-SWR started a pilot observer program in the Southern subarea contingent of the CPS fishery in July of 2004. The pilot observer programs was put in place in order to document the type and amount of bycatch, and to validate bycatch rates provided by California Department of Fish and Game (CDFG) dockside sampling. Like California, Washington state does not allow fishing in state waters. Washington implemented a no fishing zone within state waters in order to minimize bycatch of salmon and to minimize the interaction between Pacific sardine fishers with recreational salmon fishers. The state of Washington has also had an observer program in place continuously since 2000. Observer coverage in the

Washington Pacific sardine fishery has ranged between 24% to 27% (Culver and Henry, 2004). Additionally, in 2000 and 2001, the state of Washington monitored dockside landings for bycatch—in particular, they were looking for incidental catch of juvenile salmon. After two years of dockside sampling, WDFG ceased dockside monitoring because of a low incidence of general bycatch and they specifically never observed bycatch of juvenile salmon (Culver, Pers. Comm., 2005). WDFG also has a mandatory logbook program. The state of Oregon allows fishing in state waters but requires fisher logbooks and grates to be placed over fish holds in order to minimize the take of incidentally caught species. Additionally, during the first two years (2000 & 2001) Oregon Department of Fish and Wildlife (ODFW) placed observers on the vessels, but after 2001 the observer program was halted due to a lack of funding. Observer coverage was between 4% and 7% for the state of Oregon (McCrae, 2001, and McCrae, 2002).

3.4. *The Action*

The Pacific sardine fishery is currently managed by NMFS as a limited entry fishery in the Southern subarea and an open access fishery in the Northern subarea. The Pacific Council is developing options for a new long-term allocation framework for the coast-wide Pacific sardine harvest guideline. The revision to the Pacific sardine allocation framework will occur through Amendment 11 to the CPS FMP. This FMP Amendment is intended to ensure optimal utilization of the Pacific sardine resource and equitably allocate harvest opportunity.

The Council tasked its CPS Advisory Subpanel (Subpanel) with initial development of a range of allocation alternatives. At the Subpanel's September 2004 meeting a suite of allocation scenarios were drafted that were then further refined into specific alternatives. The development of this suite of alternative was highly controversial between the Southern subarea fishery representatives and the Northern subarea fishery representatives. The pros and cons of each allocation alternative were developed to facilitate Council decision making. At the November 2004 meeting, the Subpanel presented seven alternative allocation formulae. The Council adopted for analysis the seven Subpanel alternatives and included two additional alternatives.

In developing long-term allocation framework recommendations for Pacific sardine, the Council analyzes alternative options occurring in the EEZ off the states of California, Oregon, and Washington. In order to implement long-term allocation framework for the Pacific sardine fishery in the EEZ, the NMFS must determine that implementing the allocation framework will not violate other applicable law, such as ESA. With specific regard to the ESA, NMFS must ensure that the action does not jeopardize the continued existences of any threatened or endangered species under the ESA. The BO produced by PRD analyzed the impacts of setting the 2005 Pacific sardine harvest guideline on Lower Columbia River chinook, Snake River fall chinook, and Willamette Spring chinook in the Northern subarea (specifically the Pacific Northwest portion) of the Pacific sardine fishery as there have been no documented bycatch of salmon species in the Southern subarea contingent of the Pacific sardine fishery since the inception of CDFG's dockside monitoring program back in the mid-1980s (Sweetnam and Laughlin, Pers. Comm., 2005). Additionally, in order to confirm salmon bycatch rates derived from the CDFG dock-side sampling, NMFS SWR started a pilot observer program in the limited entry fishery for CPS off California in July of 2004. From July 20 to January 17, 2005, observers have been observed approximately 45 vessel trips ranging from San Diego, California, in the south to Moss Landing, California, in the north. The preliminary data suggest no salmon bycatch in the Southern subarea of the Pacific sardine fishery. Other than salmon bycatch in the Northern subarea, preliminary data collected by at-sea observers in the California contingent of the Pacific sardine fishery and observer programs in the Northern subarea show no record of protected species interactions. Due to the absence of documented protected species interactions in the entire Pacific sardine fishery, and the absence of salmon bycatch in the California contingent of the Pacific sardine fishery, we have limited our area and species of concern in this analysis to the federally managed open access fishery in the Northern subarea (above 39 degrees North latitude) and to the ESA listed salmon species analyzed in the BO produced for the

2005 Pacific sardine harvest guideline. (Note: There is evidence of coho salmon bycatch. However, the evolutionary significant units (ESU) most likely to be taken are not currently listed. Two ESUs, Oregon coast natural and Lower Columbia coho will likely be listed as of June 2005 and will be analyzed at that time.)

3.5. *Protected Species Analysis*

This analysis will evaluate the impact of a range of annual landings for the years 2005-2009 in the Northern subarea on protected salmon in the affected environment. The analysis will be limited to the Chinook salmon identified in the BO as being the ESA listed species most likely captured as bycatch in the Northern subarea of the Pacific sardine fishery. This analysis uses Chinook salmon bycatch rates as documented in the BO and corresponding ITS provided by PRD for the 2005 Pacific sardine harvest guideline. We use these rates as a proxy for future bycatch by assuming that the Pacific sardine fishery characteristics remain similar to past years (i.e., the Northern subarea fishery remains similar in seasonality and geographically). We take this action because only the Washington component of the Northern subarea will be monitored in 2005. After 2005, no observer program in either Oregon or Washington will be conducted. Thus, after 2005 bycatch estimates will use a salmon bycatch rate based upon per metric ton of Pacific sardine landed. For the purposes of this action the annual average number of chinook salmon bycatch is estimated for the years 2005-2009 (step E below) and does not exceed the maximum threshold as established by using the ITS provided in the BO for the 2005 Pacific sardine harvest guideline (step A below).

Below is a brief analysis which uses the maximum allowable rate of chinook salmon bycatch for 2005 (step A below) to derive a maximum number of chinook salmon bycatch for 2005 (step B below) as a proxy for the maximum number of Chinook salmon allowed to be caught as bycatch for the years 2006-2009. By using this proxy maximum threshold, we then take the average rate of chinook salmon bycatch (step C below) and multiply that times the projected Pacific sardine landings for the years 2005-2009 (step D below) (Herrick, Pers. Comm., 2005) to derive the annual average number of Chinook salmon caught in the Northern subarea fishery for 2005-2009.

- A. The maximum allowable rate of Chinook salmon bycatch from BO ITS for the 2005 Pacific sardine harvest guideline action. This will be used as the maximum rate of Chinook salmon bycatch threshold (i.e., a threshold that would trigger reinitiation). The rate is given in Chinook salmon per mt of Pacific sardine landed. This rate was derived by using the maximum annual bycatch rate observed in the state of Washington Pacific sardine fishery. The maximum Chinook salmon bycatch rate was observed as 0.057 in 2001. The rate has been rounded to the nearest hundredth.

Maximum rate of chinook salmon from ITS: 0.06

- B. Estimate the maximum number of Chinook salmon bycatch for 2005 and use as a proxy for the maximum threshold number to Chinook salmon allowed to be caught as bycatch for years 2006-2009. This will be performed by using the maximum allowable rate of Chinook salmon from the BO for the 2005 Pacific sardine harvest guideline action (A) and the projected landing for Pacific sardine in 2005.

Maximum rate of Chinook salmon 0.06/mt P. sardine * 49,339 mt P. sardine=

2,960 individual Chinook salmon maximum threshold for 2005

- C. The mode (proxy for average) allowable rate of Chinook salmon bycatch from the BO ITS for the 2005 Pacific sardine harvest guideline action. This rate will be used as a proxy for the average rate of Chinook salmon bycatch. The rate is given in Chinook salmon per mt of Pacific sardine landed. The mode Chinook salmon bycatch rate was observed in the state of Washington as 0.033 in 2002.

Mode (used as average) rate of Chinook salmon from ITS: 0.033

- D. Projected Pacific sardine landings for 2005-2009 in mt. These landings are projected landings for the Northern subarea fishery off Oregon and Washington (Herrick, Pers. Comm., 2005). These landings were calculated by taking 2004 landings plus a 10% increase per year.

Year	Projected Pacific sardine landings (mt) from the Northern subarea fishery
2005	49,339
2006	54,273
2007	59,701
2008	65,671
2009	72,238

- E. Estimate the average annual number of Chinook salmon caught as bycatch for years 2005-2009. The estimated average annual number of chinook salmon caught as bycatch was estimated by using the projected annual landings for years 2005-2009 (C) (Herrick, Pers. Comm., 2005) and multiplying that estimate times the mode rate of Chinook salmon (B) from the BO for the 2005 Pacific sardine harvest guideline action.

Year	Projected Pacific sardine landings (mt) from the Northern subarea fishery	Mode (used as proxy for average) rate of chinook salmon caught per mt of Northern subarea fishery	Annual average number of chinook salmon caught in the Northern subarea fishery
2005	49,339	0.033	1,628
2006	54,273	0.033	1,791
2007	59,701	0.033	1,970
2008	65,671	0.033	2,167
2009	72,238	0.033	2,384

3.6. Conclusions

The annual average number of Chinook salmon caught in the Northern subarea fishery for the years 2005-2009 is estimated to be between 1,628 and 2,384 (E) which is below the 2,690 number of Chinook salmon (B) used as a proxy for the maximum threshold. Although this is a simple approach for analyzing the environmental effects of a long-term allocation Pacific sardine harvest guideline allocation, the analysis does not take the place of a ESA formal section 7 consultation which will be required once the Council identifies a preferred alternative. NMFS will be contributing to the environmental analysis provided as part of the documentation on possible environmental effects of implementing the new allocation framework for long-term allocation. An ESA section 7 consultation will not be completed for each alternative, rather NMFS will advise the Council if any of the alternatives are likely to jeopardize the continued existence or recovery of ESA listed species. A formal consultation on the council's preferred alternative will be initiated as part of the rule making process.

3.7. References

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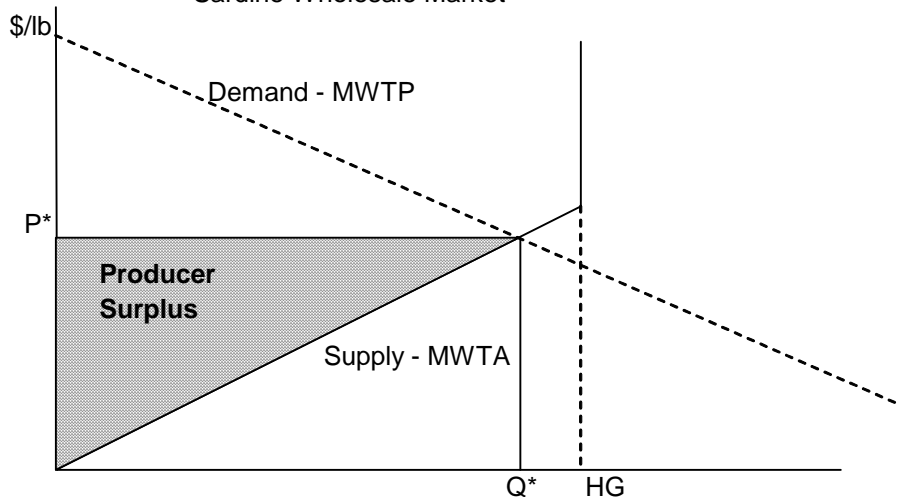
4.0 DRAFT ECONOMIC EVALUATION OF LONG-TERM PACIFIC SARDINE HARVEST GUIDELINE ALLOCATION ALTERNATIVES

4.1. Introduction

The economic analysis of alternative allocation schemes to partition the Pacific sardine harvest guideline (HG) 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.

It was assumed that there would 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 in facilities, 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). It was further assumed that each of the inputs were traded in perfectly competitive markets, and, therefore, their private cost will be equal to their social opportunity cost. Under this assumption, there would be no difference in measures of producer surplus and private profit. In other words the profits realized from sardine processing would be the same as the net benefits to the nation.

Analytical Framework for the Economic Analysis of Pacific Sardine Allocation Alternatives
Sardine Wholesale Market



I. Focus on changes in Producer Surplus from status quo under each allocation alternative. From the above figure:

Supply - minimum willingness to accept (MWTA); marginal cost of producing one more unit

Demand - maximum willingness to pay (MWTP); marginal benefit from consuming one more unit

Equilibrium price

Producer surplus (PS)

PS = short run profit; area under price line above supply curve

= total revenue - total variable costs

Establish time horizon

project changes in PS under each allocation alternative relative to status quo for each year over time horizon

II. Data needs/assumptions for PS projections

Supply exvessel

Biomass estimates

assumptions

Harvest guideline

fraction (water temperature)

U.S. share

assumptions

Availability

coastwide distribution (+/- 39o N)

environmental factors

water temperature

other factors

assumptions

Landings by fishery sector

exvessel demand

quantities

price exvessel prices

landings under baseline/status quo

landings under each allocation alternative

Supply exprocessor

exprocesor demand

product mix

quantities

prices

assumptions

production

product quantities

variable costs

assumptions

Producer surplus/short-run profits

Total revenue - total variable costs under baseline/status quo

Total revenue - total variable costs under each allocation alternative

Other?

III. Methodology

Calculate PV of changes in PS for each alternative

time horizon

discount rate

4.2. *Establish Baseline Sardine Landings by Fishery Sector*

Landings projections under each allocation alternative were based on 2004 monthly reported landings for the Southern California (SCA), Northern California (NCA, Monterey Area) and the Pacific Northwest (PNW, Oregon and Washington) fishery sectors. SCA and NCA combine to form the Southern Subarea and PNW the Northern Subarea under each allocation alternative, except for the No Action alternative where SCA is the Southern Subarea and NCA and the PNW combine to form the Northern Subarea. Because reported landings for California in December 2004 were incomplete, average California landings for December 1999-2003 were used for December 2004. Total California landings were prorated between northern and southern California based on the average proportion of total sardine landings in northern and southern California from 1999-2002. The 2004 monthly landings were inflated by 10% annually through 2009 to account for expected growth in the regional fishery sectors over the next five years, 2005-2009.

The baseline landings were then subjected to the allocation constraints under each allocation alternative (status quo, no action, alternative 1, alternative 2, alternative 3, alternatives 4.a and 4.b, alternative 5, alternative 6, and alternative 7). This gave a projection of actual monthly landings under each of the allocation alternatives, by fishery sector. These projected landings were compared to the baseline landings for each fishery sector from 2005-2009 to identify months in which there would be a shortfall in landings (expected baseline - actual landings) and months which would start out with no available allocation. These differences were then used to identify shortfalls in landings, months with shortfalls, and months with zero allocations, by fishery sector, in each year of the 5-year period. These landings projections were conducted under three harvest guideline (HG) scenarios: 1) low HG = 72,000 mt; 2) Base case HG = 136,000 mt; and, 3) high HG = 200,000 mt. Monthly projected landings were summarized annually by fishery sector, under each allocation alternative and HG scenario. Surplus HG was calculated as the difference between the annual HG and projected landings for the year.

4.3. *Preliminary Landings and Producer Surplus Comparisons*

Annual landings under each allocation alternative were compared to the status quo alternative to determine differences in landings, landings shortfalls, the number of months with shortfalls, the number of months with no allocation and differences in surplus HG. These comparisons were made by fishery sector for each of the HG cases.

The net economic benefit or PS was calculated as the difference between gross revenue from the sales of processed sardine products, and the total variable cost of producing those products. Aggregate PS under each alternative was calculated by multiplying projected annual landings in metric tons for each fishery sector, under each alternative, by the estimated PS per metric ton for each fishery sector. These measures were then used to estimate the incremental changes in PS associated with the proposed allocation alternatives relative to the Status Quo alternative.

The estimated PS per metric ton for each fishery sector was calculated as:

$$PS_r = \sum_i (APS_{ir} \times W_{ir})$$

where:

PS_r is the weighted average PS for fishery sector r ;

APS_{ir} is the average PS per metric ton for sardine product i in fishery sector r in 2004;

W_{ir} is the proportion of product i production of total production all products in fishery sector r for 2004.

and:

$PS_{SCA} = \$326/\text{mt}$

$PS_{NCA} = \$197/\text{mt}$

$PS_{PNW} = \$434/\text{mt}$.

Annual PS was calculated for each fishery sector, under each alternative, and under each HG case, for each of the years 2005-2009. Each measure of PS was compared to its corresponding measure under the Status Quo alternative. The net present value (NPV) for each estimate of annual PS was calculated for the 5-year time horizon using a social discount rate of 4.1%, assuming that each the per unit measure of PS for each fishery sector remained constant over the time horizon.

Preliminary results from the comparisons of each allocation alternative's projected landings and PS with the status quo alternative, by fishery sector and HG case, are summarized in Tables 1 through 5 and Figures 1 through 9.

4.4. Summary Comments on Preliminary Comparison Results

Status quo alternative - Projected total sardine landings for the entire 2005-2009 period ranged from 360,000 mt for the low HG case to 633,000 mt for the high HG case, with corresponding measures of PS ranging from \$110 million to \$198 (\$2004). Under the base HG case there were 12 months with shortfalls, all in the PNW, and six months in which there was no beginning allocation, all in the PNW. The number of months with shortfalls and zero allocations increases as the HG decreases and the converse. Surplus HG was over 80,000 mt for the period; surplus HG increases as the HG increases and the reverse.

Comparison of other alternatives to the Status Quo alternative:

No action alternative - Results in major shortfalls in landings for the northern subarea (NCA and PNW), particularly for the PNW. No shortfalls for SCA. Substantial loss in PS for the PNW and substantial increase in surplus HG. Results scaled accordingly for increase/decrease in the HG.

Alternative 1 - Increased harvest opportunities in the PNW result in increased total landings and the greatest net increase in the NPV of PS. Increases in the number of shortfalls and zero allocations in SCA and NCA toward the end of the 5-year period results in a loss of landings and PS for these fishery sectors. There is a decrease in surplus HG.

Alternative 2 - Similar to Alternative 1 in the distribution of impacts but difference in magnitude. Slightly lower overall PS. Benefits PNW primarily at the expense of SCA. Under low HG case PNW takes 70% of HG, a 94% increase from Status Quo. For high HG case there is no change from Status Quo.

Alternative 3 - Increase in PS since it favors PNW. However more constraining than alternatives 1 and 2. As in alternative 2, a bulge in the HG from July through September favors the PNW relative to SCA and NCA under a low HG.

Alternative 4.a (HG > 100,000 mt) - Same impacts as alternatives 1 and 6 (see below) under base and high HG cases.

Alternative 4.b (HG < 100,000 mt) - Not a substantial change from the Status Quo. Slight increase in total PS as gain for SCA offsets small losses for NCA and PNW.

Alternative 5 (Evaluated with a 10% release rate) - This alternative needs to be restructured to result in an improvement from the Status Quo. Under the base HG case leads to an overall loss in PS, which is reduced as the release rate increases. The 90% allocation threshold may be too high.

Alternative 6 - See above.

Alternative 7 - Overall improvement from Status Quo. Favors the PNW relative to the other fishery sectors but not to the extent of alternatives 1, 2, 3, 4.a under the base and low HG cases.

Table 4-1. Summary of actual landings projections and cost-benefit analysis results for status quo allocation option, 2005-2009.

Base Case: HG=136,000mt

Area	Projected Landings (MT)	Shortfall in Landings (MT)	Number of Months with Landings Shortfalls	Number of months with No Allocation	Status Quo NPV Producer Surplus	Year	Status Quo HG	Surplus HG
Southern CA	223,563	0	0	0	\$64,217,890	2005	136,000	32,227
Northern CA	108,759	0	0	0	\$18,872,232	2006	136,000	24,185
OR/WA	266,299	-34,923	12	6	\$102,418,316	2007	136,000	15,724
Southern SA	332,322	0	0	0	\$83,090,122	2008	136,000	7,855
Northern SA	266,299	-34,923	12	6	\$102,418,316	2009	136,000	1,387
Total	598,621	-34,923	12	6	\$185,508,438			81,379

Low HG Case: HG=72,000m t

Area	Projected Landings (MT)	Shortfall in Landings (MT)	Number of Months with Landings Shortfalls	Number of months with No Allocation	Status Quo NPV Producer Surplus	Year	Status Quo HG	Surplus HG
Southern CA	173,047	-50,516	14	10	\$49,904,990	2005	72,000	0
Northern CA	56,030	-52,730	14	10	\$9,858,709	2006	72,000	0
OR/WA	130,923	-170,299	25	15	\$50,576,315	2007	72,000	0
Southern SA	229,077	-103,245	14	10	\$59,763,699	2008	72,000	0
Northern SA	130,923	-170,299	25	15	\$50,576,315	2009	72,000	0
Total	360,000	-273,544	39	25	\$110,340,014			0

High HG Case: HG=200,000mt

Area	Projected Landings (MT)	Shortfall in Landings (MT)	Number of Months with Landings Shortfalls	Number of months with No Allocation	Status Quo NPV Producer Surplus	Year	Status Quo HG	Surplus HG
Southern CA	223,563	0	0	0	\$64,217,890	2005	200,000	96,227
Northern CA	108,759	0	0	0	\$18,872,232	2006	200,000	85,850
OR/WA	301,222	0	0	0	\$115,229,243	2007	200,000	74,435
Southern SA	332,322	0	0	0	\$83,090,122	2008	200,000	61,878
Northern SA	301,222	0	0	0	\$115,229,243	2009	200,000	48,066
Total	633,544	0	0	0	\$198,319,365			366,456

Table 4-2. Summary of actual projected landings and cost-benefit analysis results for long-term sardine harvest guideline allocation options, 2005-2009.

Base Case (HG = 136,000 mt)

Status Quo Summary, 2005-2009

Area	Status Quo Projected Landings (MT) 2005-2009	Status Quo Shortfall in Landings (MT) 2005-2009	Status Quo Mo/Yr of Shortfalls	Status Quo Mo/Yr with No Allocation	Status Quo NPV Producer Surplus	Year	Status Quo HG	Surplus HG
Southern CA	223,563	0			\$64,217,890	2005	136,000	32,227
Northern CA	108,759	0			\$18,872,232	2006	136,000	24,185
OR/WA	266,299	-34,923	10-11/06;10-11/07;8-11/08;8-11/09	11/06;11/07;10-11/08;10-11/09	\$102,418,316	2007	136,000	15,724
Southern SA	332,322	0			\$83,090,122	2008	136,000	7,855
Northern SA	266,299	-34,923	10-11/06;10-11/07;8-11/08;8-11/09	11/06;11/07;10-11/08;10-11/09	\$102,418,316	2009	136,000	1,387
Total	598,621	-34,923			\$185,508,438			81,379

No Action alternative (66% south, 33% north, 1/1; line at Pt. Piedras Blancas; Reallocate 50% south, 50% north 10/1), 2005-2009.

Area	No Action Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	No Action Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	No Action Mo/Yr of Shortfalls	No Action Mo/Yr with No Allocation	No Action NPV Producer Surplus
Southern CA	223,563	0	0	0			\$64,217,890
Northern CA	100,162	-8,598	-8,598	8,598	8/05;8-9/06;8-9/07;8-9/08;8-9/09	9/06;9/07;9/08;9/09	\$17,419,282
OR/WA	228,426	-43,459	-78,381	43,459	8/05;8-9/06;8-9/07;8-9/08;8-9/09	9/06;9/07;9/08;9/09	\$85,824,645
Southern SA ¹	223,563	0	0	0			\$64,217,890
Northern SA ²	328,588	-52,057	-86,979	52,057	8/05;8-9/06;8-9/07;8-9/08;8-9/09	9/06;9/07;9/08;9/09	\$103,243,927
Total	552,150	-52,057	-86,979	52,057			\$167,461,817

No Action alternative, continued

Area	Change in NPV of PS from SQ	Year	No Action HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$0	2005	136,000	38,268	6,041
Northern CA	-\$1,452,950	2006	136,000	33,028	8,843
OR/WA	-\$16,593,671	2007	136,000	27,264	11,541
Southern SA ¹	\$0	2008	136,000	20,924	13,069
Northern SA ²	-\$18,046,621	2009	136,000	13,950	12,563
Total	-\$18,046,621			133,435	52,057

¹Under the no action alternative the Southern Subarea consists of Southern California.

²Under the no action alternative the Northern Subarea consists of Northern California, Oregon and Washington.

Alternative 1 (50% Coastwide 1/1; 50% + Rollover 7/1), 2005-2009.

Area	Alternative 1 Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	Alternative 1 Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	Alternative 1 Mo/Yr of Shortfalls	Alternative 1 Mo/Yr with No Allocation	Alternative 1 NPV Producer Surplus
Southern CA	215,195	-8,367	-8,367	8,367	12/08;11/09;12/09	12/09	\$61,970,183
Northern CA	100,696	-8,064	-8,064	8,064	12/08;11/09;12/09	12/09	\$17,569,886
OR/WA	299,597	33,298	-1,625	-33,298	12/08;11/09;12/09	12/09	\$114,650,611
Southern SA	315,891	-16,431	-16,431	16,431	12/08;11/09;12/09	12/09	\$79,540,069
Northern SA	299,597	33,298	-1,625	-33,298	12/08;11/09;12/09	12/09	\$114,650,611
Total	615,488	16,867	-18,056	-16,867			\$194,190,680

Alternative 1, continued

Area	Change in NPV of PS from SQ	Year	Alternative 1 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	-\$2,247,707	2005	136,000	32,227	0
Northern CA	-\$1,302,346	2006	136,000	21,850	-2,335
OR/WA	\$12,232,295	2007	136,000	10,435	-5,289
Southern SA	-\$3,550,053	2008	136,000	0	-7,855
Northern SA	\$12,232,295	2009	136,000	0	-1,387
Total	\$8,682,242			64,512	-16,867

Alternative 2 (Season 6/1- 5/31 Coastwide HG), 2005-2009.

Area	Alternative 2 Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	Alternative 2 Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	Alternative 2 Mo/Yr of Shortfalls	Alternative 2 Mo/Yr with No Allocation	Alternative 2 NPV Producer Surplus
Southern CA	206,017	-17,546	-17,546	17,546	4-5/08;1-5/09	5/08;2-5/09	\$59,515,724
Northern CA	108,250	-510	-510	510	4-5/08;1-5/09	5/08;2-5/09	\$18,790,123
OR/WA	301,222	34,923	0	-34,923		5/08;2-5/09	\$115,229,243
Southern SA	314,266	-18,056	-18,056	18,056	4-5/08;1-5/09	5/08;2-5/09	\$78,305,847
Northern SA	301,222	34,923	0	-34,923		5/08;2-5/09	\$115,229,243
Total	615,488	16,867	-18,056	-16,867			\$193,535,090

Alternative 2, continued

Area	Change in NPV of PS from SQ	Year	Alternative 2 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	-\$4,702,166	2005	136,000	32,227	0
Northern CA	-\$82,109	2006	136,000	21,850	-2,335
OR/WA	\$12,810,927	2007	136,000	10,435	-5,289
Southern SA	-\$4,784,275	2008	136,000	0	-7,855
Northern SA	\$12,810,927	2009	136,000	0	-1,387
Total	\$8,026,652			64,512	-16,867

Alternative 3 (40% Coastwide 1/1; 40% + Rollover 7/1; 20% + Rollover 10/1), 2005-2009.

Area	Alternative 3 Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	Alternative 3 Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	Alternative 3 Mo/Yr of Shortfalls	Alternative 3 Mo/Yr with No Allocation	Alternative 3 NPV Producer Surplus
Southern CA	215,082	-8,481	-8,481	8,481	12/08;9/09;11-12/09	12/09	\$61,939,909
Northern CA	104,931	-3,828	-3,828	3,828	12/08;9/09;11-12/09	12/09	\$18,252,201
OR/WA	295,475	29,176	-5,747	-29,176	12/08;9/09;11-12/09	12/09	\$113,186,735
Southern SA	320,013	-12,309	-12,309	12,309	12/08;9/09;11-12/09	12/09	\$80,192,110
Northern SA	295,475	29,176	-5,747	-29,176	12/08;9/09;11-12/09	12/09	\$113,186,735
Total	615,488	16,867	-18,056	-16,867			\$193,378,845

Alternative 3, continued

Area	Change in NPV of PS from SQ	Year	Alternative 3 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	-\$2,277,981	2005	136,000	32,227	0
Northern CA	-\$620,031	2006	136,000	21,850	-2,335
OR/WA	\$10,768,419	2007	136,000	10,435	-5,289
Southern SA	-\$2,898,012	2008	136,000	0	-7,855
Northern SA	\$10,768,419	2009	136,000	0	-1,387
Total	\$7,870,407			64,512	-16,867

Alternative 4.a (HG > 100,000 mt; 40% North, 60% South 1/1; Coastwide Rollover 9/1), 2005-2009.

Area	Alternative 4.a Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	Alternative 4.a Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	Alternative 4.a Mo/Yr of Shortfalls	Alternative 4.a Mo/Yr with No Allocation	Alternative 4.a NPV Producer Surplus
Southern CA	215,195	-8,367	-8,367	8,367	12/08;11-12/09	12	\$61,970,183
Northern CA	100,696	-8,064	-8,064	8,064	12/08;11-12/10	12	\$17,569,886
OR/WA	299,597	33,298	-1,625	-33,298	12/08;11-12/11	12	\$114,650,611
Southern SA	315,891	-16,431	-16,431	16,431	12/08;11-12/12	12	\$79,540,069
Northern SA	299,597	33,298	-1,625	-33,298	12/08;11-12/13	12	\$114,650,611
Total	615,488	16,867	-18,056	-16,867			\$194,190,680

Alternative 4.a, continued

Area	Change in NPV of PS from SQ	Year	Alternative 4.a HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	-\$2,247,707	2005	136,000	32,227	0
Northern CA	-\$1,302,346	2006	136,000	21,850	-2,335
OR/WA	\$12,232,295	2007	136,000	10,435	-5,289
Southern SA	-\$3,550,053	2008	136,000	0	-7,855
Northern SA	\$12,232,295	2009	136,000	0	-1,387
Total	\$8,682,242			64,512	-16,867

Alternative 5 (20% Set Aside 1/1; 40% North, 60% South of Remaining 1/1, Coastwide Rollover 10/1), 2005-2009.

Area	Alternative 5 Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	Alternative 5 Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	Alternative 5 Mo/Yr of Shortfalls	Alternative 5 Mo/Yr with No Allocation	Alternative 5 NPV Producer Surplus
Southern CA	223,563	0	0	0			\$64,217,890
Northern CA	108,759	0	0	0			\$18,872,232
OR/WA	255,929	-11,420	-46,343	11,420	9/05;9/06;9/07;8-9/08;8-9/09		\$98,036,659
Southern SA	332,322	0	0	0			\$83,090,122
Northern SA	255,929	-11,420	-46,343	11,420	9/05;9/06;9/07;8-9/08;8-9/09		\$98,036,659
Total	588,251	-11,420	-46,343	11,420			\$181,126,781

Alternative 5, continued.

Area	Change in NPV of PS from SQ	Year	Alternative 5 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$0	2005	136,000	33,277	1,050
Northern CA	\$0	2006	136,000	27,357	3,171
OR/WA	-\$4,381,657	2007	136,000	18,124	2,401
Southern SA	\$0	2008	136,000	10,961	3,105
Northern SA	-\$4,381,657	2009	136,000	3,081	1,693
Total	-\$4,381,657			92,799	11,420

Alternative 6 (50% North, 50% South 1/1; Coastwide Rollover 9/1; Variable N/S Allocation Based on Prior Year's Use), 2005-2009.

Area	Alternative 6 Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	Alternative 6 Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	Alternative 6 Mo/Yr of Shortfalls	Alternative 6 Mo/Yr with No Allocation	Alternative 6 NPV Producer Surplus
Southern CA	215,195	-8,367	-8,367	8,367	12/08;11-12/09	12/09	\$61,970,183
Northern CA	100,696	-8,064	-8,064	8,064	12/08;11-12/09	12/09	\$17,569,886
OR/WA	299,597	33,298	-1,625	-33,298	12/08;11-12/09	12/09	\$114,650,611
Southern SA	315,891	-16,431	-16,431	16,431	12/08;11-12/09	12/09	\$79,540,069
Northern SA	299,597	33,298	-1,625	-33,298	12/08;11-12/09	12/09	\$114,650,611
Total	615,488	16,867	-18,056	-16,867			\$194,190,680

Alternative 6, continued.

Area	Change in NPV of PS from SQ	Year	Alternative 6 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	-\$2,247,707	2005	136,000	32,227	0
Northern CA	-\$1,302,346	2006	136,000	21,850	-2,335
OR/WA	\$12,232,295	2007	136,000	10,435	-5,289
Southern SA	-\$3,550,053	2008	136,000	0	-7,855
Northern SA	\$12,232,295	2009	136,000	0	-1,387
Total	\$8,682,242			64,512	-16,867

Alternative 7 (33% North, 66% South 1/1; 50% North, 50% South of Remaining 9/1, Coastwide Rollover 11/1), 2005-2009.

Area	Alternative 7 Projected Landings (MT) 2005-2009	Change in Landings (MT) from SQ	Alternative 7 Shortfall in Landings (MT) 2005-2009	Change in Shortfall from SQ	Alternative 7 Mo/Yr of Shortfalls	Alternative 7 Mo/Yr with No Allocation	Alternative 7 NPV Producer Surplus
Southern CA	218,490	-5,073	-5,073	5,073	11-12/09	12/09	\$62,865,198
Northern CA	105,540	-3,219	-3,219	3,219	11-12/09	12/09	\$18,353,673
OR/WA	291,327	25,028	-9,895	-25,028	8/08;8/09;11- 12/09	12/09	\$111,682,516
Southern SA	324,030	-8,292	-8,292	8,292	11-12/09	12/09	\$81,218,871
Northern SA	291,327	25,028	-9,895	-25,028	8/08;8/09;11- 12/09	12/09	\$111,682,516
Total	615,358	16,736	-18,186	-16,736			\$192,901,387

Alternative 7, continued.

Area	Change in NPV of PS from SQ	Year	Alternative 7 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	-\$1,352,691	2005	136,000	32,227	0
Northern CA	-\$518,559	2006	136,000	21,850	-2,335
OR/WA	\$9,264,200	2007	136,000	10,435	-5,289
Southern SA	-\$1,871,250	2008	136,000	131	-7,725
Northern SA	\$9,264,200	2009	136,000	0	-1,387
Total	\$7,392,950			64,642	-16,736

Table 4-3. Summary of actual landings projections and cost-benefit analysis results for long-term sardine harvest guideline allocation options, 2005-2009

High Harvest Guideline Case, HG = 200,000 mt

Status Quo Summary, 2005-2009

Area	Status Quo Projected Landings 2005-2009	Status Quo Shortfall in Landings 2005-2009	Status Quo Mo/Yr of Shortfalls	Status Quo Mo/Yr with No Allocation	Status Quo NPV Producer Surplus	Year	Status Quo HG	Surplus HG
Southern CA	223,563	0			\$64,217,890	2005	200,000	96,227
Northern CA	108,759	0			\$18,872,232	2006	200,000	85,850
OR/WA	301,222	0			\$115,229,243	2007	200,000	74,435
Southern SA	332,322	0			\$83,090,122	2008	200,000	61,878
Northern SA	301,222	0			\$115,229,243	2009	200,000	48,066
Total	633,544	0			\$198,319,365			366,456

No Action alternative (66% south, 33% north, 1/1; line at Pt. Piedras Blancas; Reallocate 50% south, 50% north 10/1), 2005-2009

Area	No Action Projected Landings 2005-2009	Change in Landings from SQ	No Action Shortfall in Landings 2005-2009	Change in Shortfall from SQ	No Action Mo/Yr of Shortfalls	No Action Mo/Yr with No Allocation	No Action NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	107,985	-774	-774	774	9/08;9/09		\$18,746,714	-\$125,518
OR/WA	291,733	-9,489	-9,489	9,489	9/08;9/09		\$111,836,180	-\$3,393,063
Southern SA ¹	223,563	0	0	0			\$64,217,890	\$0
Northern SA ²	399,718	-10,263	-10,263	10,263	9/08;9/09		\$130,582,894	-\$3,518,581
Total	623,281	-10,263	-10,263	10,263			\$194,800,784	-\$3,518,581

Area	Year	No Action HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA ¹	2008	200,000	63,591	1,713
Northern SA ²	2009	200,000	56,617	8,551
Total			376,719	10,263

¹Under the no action alternative the Southern Subarea consists of Southern California

²Under the no action alternative the Northern Subarea consists of Northern California, Oregon and Washington.

Alternative 1 (50% Coastwide 1/1; 50% + Rollover 7/1), 2005-2009.

Area	Alternative 1 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 1 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 1 Mo/Yr of Shortfalls	Alternative 1 Mo/Yr with No Allocation	Alternative 1 NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	108,759	0	0	0			\$18,872,232	\$0
OR/WA	301,222	0	0	0			\$115,229,243	\$0
Southern SA	332,322	0	0	0			\$83,090,122	\$0
Northern SA	301,222	0	0	0			\$115,229,243	\$0
Total	633,544	0	0	0			\$198,319,365	\$0

Alternative 1, continued

Area	Year	Alternative 1 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA	2008	200,000	61,878	0
Northern SA	2009	200,000	48,066	0
Total			366,456	0

Alternative 2 (Season 6/1- 5/31 Coastwide HG), 2005-2009.

Area	Alternative 2 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 2 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 2 Mo/Yr of Shortfalls	Alternative 2 Mo/Yr with No Allocation	Alternative 2 NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	108,759	0	0	0			\$18,872,232	\$0
OR/WA	301,222	0	0	0			\$115,229,243	\$0
Southern SA	332,322	0	0	0			\$83,090,122	\$0
Northern SA	301,222	0	0	0			\$115,229,243	\$0
Total	633,544	0	0	0			\$198,319,365	\$0

Alternative 2, continued

Area	Year	Alternative 2 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA	2008	200,000	61,878	0
Northern SA	2009	200,000	48,066	0
Total			366,456	0

Alternative 3 (40% Coastwide 1/1; 40% + Rollover 7/1; 20% + Rollover 10/1), 2005-2009.

Area	Alternative 3 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 3 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 3 Mo/Yr of Shortfalls	Alternative 3 Mo/Yr with No Allocation	Alternative 3 NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	108,759	0	0	0			\$18,872,232	\$0
OR/WA	301,222	0	0	0			\$115,229,243	\$0
Southern SA	332,322	0	0	0			\$83,090,122	\$0
Northern SA	301,222	0	0	0			\$115,229,243	\$0
Total	633,544	0	0	0			\$198,319,365	\$0

Alternative 3, continued

Area	Year	Alternative 3 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA	2008	200,000	61,878	0
Northern SA	2009	200,000	48,066	0
Total			366,456	0

Alternative 4.a (HG > 100,000 mt; 40% North, 60% South 1/1; Coastwide Rollover 9/1), 2005-2009.

Area	Alternative 4.a Projected Landings 2005-2009	Change in Landings from SQ	Alternative 4.a Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 4.a Mo/Yr of Shortfalls	Alternative 4.a Mo/Yr with No Allocation	Alternative 4.a NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	108,759	0	0	0			\$18,872,232	\$0
OR/WA	301,222	0	0	0			\$115,229,243	\$0
Southern SA	332,322	0	0	0			\$83,090,122	\$0
Northern SA	301,222	0	0	0			\$115,229,243	\$0
Total	633,544	0	0	0			\$198,319,365	\$0

Alternative 4a, continued

Area	Year	Alternative 4.a HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA	2008	200,000	61,878	0
Northern SA	2009	200,000	48,066	0
Total			366,456	0

Alternative 5 (20% Set Aside 1/1; 40% North, 60% South of Remaining 1/1, Coastwide Rollover 10/1), 2005-2009

Area	Alternative 5 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 5 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 5 Mo/Yr of Shortfalls	Alternative 5 Mo/Yr with No Allocation	Alternative 5 NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	108,759	0	0	0			\$18,872,232	\$0
OR/WA	299,967	-1,255	-1,255	1,255	9/09		\$114,783,676	-\$445,568
Southern SA	332,322	0	0	0			\$83,090,122	\$0
Northern SA	299,967	-1,255	-1,255	1,255	9/09		\$114,783,676	-\$445,568
Total	632,289	-1,255	-1,255	1,255			\$197,873,797	-\$445,568

Alternative 5, continued

Area	Year	Alternative 5 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA	2008	200,000	61,878	0
Northern SA	2009	200,000	49,321	1,255
Total			367,711	1,255

Alternative 6 (50% North, 50% South 1/1; Coastwide Rollover 9/1; Variable N/S Allocation Based on Prior Year's Use), 2005-2009.

Area	Alternative 6 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 6 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 6 Mo/Yr of Shortfalls	Alternative 6 Mo/Yr with No Allocation	Alternative 6 NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	108,759	0	0	0			\$18,872,232	\$0
OR/WA	301,222	0	0	0			\$115,229,243	\$0
Southern SA	332,322	0	0	0			\$83,090,122	\$0
Northern SA	301,222	0	0	0			\$115,229,243	\$0
Total	633,544	0	0	0			\$198,319,365	\$0

Alternative 6, continued.

Area	Year	Alternative 6 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA	2008	200,000	61,878	0
Northern SA	2009	200,000	48,066	0
Total			366,456	0

Alternative 7 (33% North, 66% South 1/1; 50% North, 50% South of Remaining 9/1, Coastwide Rollover 11/1), 2005-2009.

Area	Alternative 7 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 7 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 7 Mo/Yr of Shortfalls	Alternative 7 Mo/Yr with No Allocation	Alternative 7 NPV Producer Surplus	Change in NPV of PS from SQ
Southern CA	223,563	0	0	0			\$64,217,890	\$0
Northern CA	108,759	0	0	0			\$18,872,232	\$0
OR/WA	301,222	0	0	0			\$115,229,243	\$0
Southern SA	332,322	0	0	0			\$83,090,122	\$0
Northern SA	301,222	0	0	0			\$115,229,243	\$0
Total	633,544	0	0	0			\$198,319,365	\$0

Alternative 7, continued

Area	Year	Alternative 7 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	2005	200,000	96,227	0
Northern CA	2006	200,000	85,850	0
OR/WA	2007	200,000	74,435	0
Southern SA	2008	200,000	61,878	0
Northern SA	2009	200,000	48,066	0
Total			366,456	0

Table 4-4. Summary of actual landings projections and cost-benefit analysis results for long-term sardine harvest guideline allocation options, 2005-2009.

Low Harvest Guideline Case, HG = 72,000 mt

Status Quo Summary, 2005-2009.

Area	Status Quo Projected Landings 2005-2009	Status Quo Shortfall in Landings 2005-2009	Status Quo Mo/Yr of Shortfalls	Status Quo Mo/Yr with No Allocation	Status Quo NPV Producer Surplus	Year	Status Quo HG	Surplus HG
Southern CA	173,047	-50,516	11-12/05;10-12/06;10-12/07;10-12/08;10-12/09	12/05;11-12/06;11-12/07;11-12/08;10-12/09	\$49,904,990	2005	72,000	0
Northern CA	56,030	-52,730	11-12/05;10-12/06;10-12/07;10-12/08;10-12/09	12/05;11-12/06;11-12/07;11-12/08;10-12/09	\$9,858,709	2006	72,000	0
OR/WA	130,923	-170,299	8-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;10-12/06;10-12/07;10-12/08;8,10-12/09	\$50,576,315	2007	72,000	0
Southern SA	229,077	-103,245		12/05;11-12/06;11-12/07;11-12/08;10-12/09	\$59,763,699	2008	72,000	0
Northern SA	130,923	-170,299		10-12/05;10-12/06;10-12/07;10-12/08;8,10-12/09	\$50,576,315	2009	72,000	0
Total	360,000	-273,544			\$110,340,014			0

No Action alternative (66% south, 33% north, 1/1; line at Pt. Piedras Blancas; Reallocate 50% south, 50% north 10/1), 2005-2009.

Area	No Action Projected Landings 2005-2009	Change in Landings from SQ	No Action Shortfall in Landings 2005-2009	Change in Shortfall from SQ	No Action Mo/Yr of Shortfalls	No Action Mo/Yr with No Allocation
Southern CA	204,165	31,118	-19,398	-31,118	12/06;12/07;11,12/08;10-12/09	12/08;11,12/09
Northern CA	39,700	-16,330	-69,059	16,330	8,9,11,12/05;8-12/06;7-12/07;7-12/08;7-12/09	9,12/05;9,11,12/06;8,9,11,12/07;8,9,11,12/08;8,9,11,12/09
OR/WA	139,842	-16,183	-186,482	16,183	8,9,11,12/05;8-12/06;7-12/07;7-12/08;7-12/09	9,12/05;9,11,12/06;8,9,11,12/07;8,9,11,12/08;8,9,11,12/09
Southern SA ¹	204,165	31,118	-19,398	-31,118	12/06;12/07;11,12/08;10-12/09	12/08;11,12/09
Northern SA ²	179,542	-32,513	-255,542	32,513	8,9,11,12/05;8-12/06;7-12/07;7-12/08;7-12/09	9,12/05;9,11,12/06;8,9,11,12/07;8,9,11,12/08;8,9,11,12/09
Total	383,707	-1,396	-274,939	1,396		

No Action alternative, continued.

Area	No Action NPV Producer Surplus	Change in NPV of PS from SQ	Year	No Action HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$58,874,155	\$8,969,165	2005	72,000	1,396	1,396
Northern CA	\$7,002,685	-\$2,856,024	2006	72,000	0	0
OR/WA	\$44,345,935	-\$6,230,380	2007	72,000	0	0
Southern SA ¹	\$58,874,155	\$8,969,165	2008	72,000	0	0
Northern SA ²	\$51,348,620	-\$9,086,404	2009	72,000	0	0
Total	\$110,222,776	-\$117,238			1,396	1,396

¹Under the no action alternative the Southern Subarea consists of Southern California.

²Under the no action alternative the Northern Subarea consists of Northern California, Oregon and Washington.

Alternative 1 (50% Coastwide 1/1; 50% + Rollover 7/1), 2005-2009.

Area	Alternative 1 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 1 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 1 Mo/Yr of Shortfalls	Alternative 1 Mo/Yr with No Allocation
Southern CA	141,434	-31,613	-82,129	31,613	9-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;9-12/06;9-12/07;9-12/08;9-12/09
Northern CA	31,746	-24,284	-77,013	24,284	9-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;9-12/06;9-12/07;9-12/08;9-12/09
OR/WA	196,565	55,897	-114,402	-55,897	9-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;9-12/06;9-12/07;9-12/08;9-12/09
Southern SA	173,180	-55,897	-159,142	55,897	9-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;9-12/06;9-12/07;9-12/08;9-12/09
Northern SA	196,565	55,897	-114,402	-55,897	9-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;9-12/06;9-12/07;9-12/08;9-12/09
Total	369,746	0	-273,544	0		

Alternative 1, continued.

Area	Alternative 1 NPV Producer Surplus	Change in NPV of PS from SQ	Year	Alternative 1 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$40,785,313	-\$9,119,677	2005	72,000	0	0
Northern CA	\$5,558,556	-\$4,300,153	2006	72,000	0	0
OR/WA	\$72,201,236	\$21,624,921	2007	72,000	0	0
Southern SA	\$46,343,869	\$13,419,830	2008	72,000	0	0
Northern SA	\$72,201,236	\$21,624,921	2009	72,000	0	0
Total	\$118,545,105	\$8,205,091			0	0

Alternative 2 (Season 6/1- 5/31 Coastwide HG), 2005-2009.

Area	Alternative 2 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 2 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 2 Mo/Yr of Shortfalls	Alternative 2 Mo/Yr with No Allocation
Southern CA	75,397	-97,650	-148,166	97,650	10/05-5/06;10/06-5/07;9/07-5/08;9/08-5-09;9/09-5/10	11/05-5/06;11-06-5/07;10/07-5/08;10/08-5/09;10/09-5/10
Northern CA	31,039	-24,991	-77,721	24,991	10/05-3/06;10/06-3/07;9/07-3-08;9/08-3/09;9/09-3/10	11/05-5/06;11-06-5/07;10/07-5/08;10/08-5/09;10/09-5/10
OR/WA	255,578	122,641	-47,658	-122,641	10-12/05;10-12/06;9-12/07;9-12/08;9-12/09	11/05-5/06;11-06-5/07;10/07-5/08;10/08-5/09;10/09-5/10
Southern SA	106,436	-122,641	-225,886	122,641	10/05-5/06;10/06-5/07;9/07-5/08;9/08-5-09;9/09-5/10	11/05-5/06;11-06-5/07;10/07-5/08;10/08-5/09;10/09-5/10
Northern SA	255,578	122,641	-47,658	-122,641	10-12/05;10-12/06;9-12/07;9-12/08;9-12/09	11/05-5/06;11-06-5/07;10/07-5/08;10/08-5/09;10/09-5/10
Total	362,014	0	-273,544	0		

Alternative 2, continued.

Area	Alternative 2 NPV Producer Surplus	Change in NPV of PS from SQ	Year	Alternative 2 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$21,879,411	\$28,025,579	2005	72,000	0	0
Northern CA	\$5,480,381	-\$4,378,328	2006	72,000	0	0
OR/WA	\$97,551,312	\$46,974,997	2007	72,000	0	0
Southern SA	\$27,359,792	\$32,403,907	2008	72,000	0	0
Northern SA	\$97,551,312	\$46,974,997	2009	72,000	0	0
Total	\$124,911,104	\$14,571,090			0	0

Alternative 3 (40% Coastwide 1/1; 40% + Rollover 7/1; 20% + Rollover 10/1), 2005-2009.

Area	Alternative 3 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 3 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 3 Mo/Yr of Shortfalls	Alternative 3 Mo/Yr with No Allocation
Southern CA	147,854	-25,193	-75,709	25,193	8-9,11-12/05;8-12/06;8-12/07;6,8-12/08;6,8-12/09	9,12-05;9,11-12/06;9,11-12/07;9,11-12/08;9,11-12/09
Northern CA	55,212	-817	-53,547	817	8-9,11-12/05;8-12/06;8-12/07;8-12/08;8-12/09	9,12-05;9,11-12/06;9,11-12/07;9,11-12/08;9,11-12/10
OR/WA	172,752	26,010	-144,288	-26,010	8-9,11-12/05;8-12/06;8-12/07;6,8-12/08;6,8-12/09	9,12-05;9,11-12/06;9,11-12/07;9,11-12/08;9,11-12/11
Southern SA	203,067	-26,010	-129,255	26,010	8-9,11-12/05;8-12/06;8-12/07;6,8-12/08;6,8-12/09	9,12-05;9,11-12/06;9,11-12/07;9,11-12/08;9,11-12/12
Northern SA	172,752	26,010	-144,288	-26,010	8-9,11-12/05;8-12/06;8-12/07;6,8-12/08;6,8-12/09	9,12-05;9,11-12/06;9,11-12/07;9,11-12/08;9,11-12/13
Total	375,819	0	-273,544	0		

Alternative 3, continued.

Area	Alternative 3 NPV Producer Surplus	Change in NPV of PS from SQ	Year	Alternative 3 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$42,646,432	-\$7,258,558	2005	72,000	0	0
Northern CA	\$9,665,651	-\$193,058	2006	72,000	0	0
OR/WA	\$60,668,430	\$10,092,115	2007	72,000	0	0
Southern SA	\$52,312,083	-\$7,451,616	2008	72,000	0	0
Northern SA	\$60,668,430	\$10,092,115	2009	72,000	0	0
Total	\$112,980,513	\$2,640,499			0	0

Alternative 4.b (HG < 100,000 mt; 33% North, 66% South 1/1; 20% North, 80% South of Remaining 9/1, Coastwide Rollover 11/1), 2005-2009.

Area	Alternative 4.b Projected Landings 2005-2009	Change in Landings from SQ	Alternative 4.b Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 4.b Mo/Yr of Shortfalls	Alternative 4.b Mo/Yr with No Allocation
Southern CA	176,564	3,517	-46,998	-3,517	11-12/05;10-12/06;10-12/07;10-12/08;9-12/09	12/05;11-12/06;11-12/07;11-12/08;10-12/09
Northern CA	53,425	-2,605	-55,334	2,605	11-12/05;10-12/06;10-12/07;10-12/08;9-12/09	12/05;11-12/06;11-12/07;11-12/08;10-12/09
OR/WA	151,968	-913	-171,211	913	8-12/05;8-12/06;8-12/07;8-12/08;7-12/09	10,12/05;10-12/06;10-12/07;10-12/08;8,10-12/09
Southern SA	229,989	913	-102,332	-913	11-12/05;10-12/06;10-12/07;10-12/08;9-12/09	12/05;11-12/06;11-12/07;11-12/08;10-12/09
Northern SA	151,968	-913	-171,211	913	8-12/05;8-12/06;8-12/07;8-12/08;7-12/09	10,12/05;10-12/06;10-12/07;10-12/08;8,10-12/09
Total	381,957	0	-273,544	0		

Alternative 4.b, continued.

Area	Alternative 4.b NPV Producer Surplus	Change in NPV of PS from SQ	Year	Alternative 4.b HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$50,918,940	\$1,013,950	2005	72,000	0	0
Northern CA	\$9,405,087	-\$453,622	2006	72,000	0	0
OR/WA	\$50,226,029	-\$350,287	2007	72,000	0	0
Southern SA	\$60,324,027	\$560,328	2008	72,000	0	0
Northern SA	\$50,226,029	-\$350,287	2009	72,000	0	0
Total	\$110,550,055	\$210,041			0	0

Alternative 5 (20% Set Aside 1/1; 40% North, 60% South of Remaining 1/1, Coastwide Rollover 10/1), 2005-2009.

Area	Alternative 5 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 5 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 5 Mo/Yr of Shortfalls	Alternative 5 Mo/Yr with No Allocation
Southern CA	163,484	-9,564	-60,079	9,564	9-12/05;9-12/06;8-12/07;8-12/08;8-12/09	11-12/05;11-12/06;11-12/07;11-12/08;11-12/09
Northern CA	55,826	-204	-52,933	204	9-12/05;9-12/06;8-12/07;8-12/08;8-12/09	11-12/05;11-12/06;11-12/07;11-12/08;11-12/09
OR/WA	161,900	9,767	-160,532	-9,767	8-12/05;8-12/06;8-12/07;8-12/08;7-12/09	11-12/05;11-12/06;11-12/07;11-12/08;11-12/09
Southern SA	219,310	-9,767	-113,012	9,767	9-12/05;9-12/06;8-12/07;8-12/08;8-12/09	11-12/05;11-12/06;11-12/07;11-12/08;11-12/09
Northern SA	161,900	9,767	-160,532	-9,767	8-12/05;8-12/06;8-12/07;8-12/08;7-12/09	11-12/05;11-12/06;11-12/07;11-12/08;11-12/09
Total	381,210	0	-273,544	0		

Alternative 5, continued.

Area	Alternative 5 NPV Producer Surplus	Change in NPV of PS from SQ	Year	Alternative 5 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$47,252,856	-\$2,652,134	2005	72,000	0	0
Northern CA	\$9,812,602	-\$46,107	2006	72,000	0	0
OR/WA	\$54,209,912	\$3,633,597	2007	72,000	0	0
Southern SA	\$57,065,458	-\$2,698,241	2008	72,000	0	0
Northern SA	\$54,209,912	\$3,633,597	2009	72,000	0	0
Total	\$111,275,370	\$935,356			0	0

Alternative 6 (50% North, 50% South 1/1; Coastwide Rollover 9/1; Variable N/S Allocation Based on Prior Year's Use), 2005-2009.

Area	Alternative 6 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 6 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 6 Mo/Yr of Shortfalls	Alternative 6 Mo/Yr with No Allocation
Southern CA	149,824	-23,223	-73,739	23,223	9-12/05;9-12/06;9-12/07;8-12/08;8-12/09	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09
Northern CA	34,985	-21,045	-73,775	21,045	9-12/05;9-12/06;9-12/07;8-12/08;8-12/09	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09
OR/WA	187,104	44,268	-126,031	-44,268	8-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09
Southern SA	184,809	-44,268	-147,513	44,268	9-12/05;9-12/06;9-12/07;8-12/08;8-12/09	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09
Northern SA	187,104	44,268	-126,031	-44,268	8-12/05;8-12/06;8-12/07;8-12/08;8-12/09	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09
Total	371,913	0	-273,544	0		

Alternative 6, continued.

Area	Alternative 6 NPV Producer Surplus	Change in NPV of PS from SQ	Year	Alternative 6 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$43,255,904	-\$6,649,085	2005	72,000	0	0
Northern CA	\$6,121,691	-\$3,737,018	2006	72,000	0	0
OR/WA	\$67,669,595	\$17,093,279	2007	72,000	0	0
Southern SA	\$49,377,595	\$10,386,103	2008	72,000	0	0
Northern SA	\$67,669,595	\$17,093,279	2009	72,000	0	0
Total	\$117,047,190	\$6,707,176			0	0

Alternative 7 (33% North, 66% South 1/1; 50% North, 50% South of Remaining 9/1, Coastwide Rollover 11/1), 2005-2009.

Area	Alternative 7 Projected Landings 2005-2009	Change in Landings from SQ	Alternative 7 Shortfall in Landings 2005-2009	Change in Shortfall from SQ	Alternative 7 Mo/Yr of Shortfalls	Alternative 7 Mo/Yr with No Allocation
Southern CA	168,504	-4,543	-55,059	4,543	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09	11-12/05;11-12/06;11-12/07;10-12/08;10-12/09
Northern CA	44,788	-11,242	-63,971	11,242	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09	11-12/05;11-12/06;11-12/07;10-12/08;10-12/09
OR/WA	163,350	15,785	-154,514	-15,785	8-12/05;8-12/06;8-12/07;8-12/08;7-12/09	10-12/05;10-12/06;10-12/07;10-12/08;8,10-12/09
Southern SA	213,292	-15,785	-119,030	15,785	10-12/05;10-12/06;10-12/07;9-12/08;9-12/09	11-12/05;11-12/06;11-12/07;10-12/08;10-12/09
Northern SA	163,350	15,785	-154,514	-15,785	8-12/05;8-12/06;8-12/07;8-12/08;7-12/09	10-12/05;10-12/06;10-12/07;10-12/08;8,10-12/09
Total	376,642	0	-273,544	0		

Alternative 7, continued.

Area	Alternative 7 NPV Producer Surplus	Change in NPV of PS from SQ	Year	Alternative 7 HG	Surplus HG	Change in Surplus HG from SQ
Southern CA	\$48,559,190	-\$1,345,800	2005	72,000	0	0
Northern CA	\$7,837,630	-\$2,021,079	2006	72,000	0	0
OR/WA	\$56,824,132	\$6,247,817	2007	72,000	0	0
Southern SA	\$56,396,820	-\$3,366,879	2008	72,000	0	0
Northern SA	\$56,824,132	\$6,247,817	2009	72,000	0	0
Total	\$113,220,952	\$2,880,938			0	0

Table 4-5. Quota shortages by year and month under different HG scenarios, 2005-2009.

Low HG Case: HG = 72,000

mt

Alt: Status Quo

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	11-12	10-12	10-12	10-12	10-12	12	11-12	11-12	11-12	10-12
NC	11-12	10-12	10-12	10-12	10-12	12	11-12	11-12	11-12	10-12
OW	8-12	8-12	8-12	8-12	8-12	10-12	10-12	10-12	10-12	10-12

Alt: No Action

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC		12	12	11-12	10-12				12	10-12
NC	8,9,11,12	8-12	7-12	7-12	7-12	9,12	9,11,12	8,9,11,12	8,9,11,12	8,9,11,12
OW	8,9,11,13	8-13	7-12	7-12	7-12	9,13	9,11,13	8,9,11,12	8,9,11,12	8,9,11,12

Alt: 1

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	9-12	8-12	8-12	8-12	8-12	10-12	9-12	9-12	9-12	9-12
NC	9-12	8-12	8-12	8-12	8-12	10-12	9-12	9-12	9-12	9-12
OW	9-12	8-12	8-12	8-12	8-12	10-12	9-12	9-12	9-12	9-12

Alt: 2

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	10-12	1-5, 10-12	1-5, 9-12	1-5, 9-12	1-5, 9-12	11-12	1-5, 11-12	1-5, 10-12	1-5, 10-12	1-5, 10-12
NC	10-12	1-3, 10-12	1-3, 9-12	1-3, 9-12	1-3, 9-12	11-12	1-5, 11-12	1-5, 10-12	1-5, 10-12	1-5, 10-12
OW	10-12	10-12	9-12	9-12	9-12	11-12	1-5, 11-12	1-5, 10-12	1-5, 10-12	1-5, 10-12

Alt: 3

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	8,9,11,12	8-12	8-12	6,8-12	6, 8-12	9,12	9,11,12	9,11,12	9,11,12	9,11,12
NC	8,9,11,12	8-12	8-12	8-12	8-12	9,12	9,11,12	9,11,12	9,11,12	9,11,12
OW	8,9,11,12	8-12	8-12	6, 8-12	6, 8-12	9,12	9,11,12	9,11,12	9,11,12	9,11,12

Alt:

4.b

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	11-12	10-12	10-12	10-12	9-12	12	11-12	11-12	11-12	10-12
NC	11-12	10-12	10-12	10-12	9-12	12	11-12	11-12	11-12	10-12
OW	8-12	8-12	8-12	8-12	7-12	10,12	10-12	10-12	10-12	8, 10-12

Alt: 5

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	9-12	9-12	8-12	8-12	8-12	11-12	11-12	11-12	11-12	11-12
NC	9-12	9-12	8-12	8-12	8-12	11-12	11-12	11-12	11-12	11-12
OW	8-12	8-12	8-12	8-12	7-12	11-12	11-12	11-12	11-12	11-12

Alt: 6

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	9-12	9-12	9-12	8-12	8-12	10-12	10-12	10-12	9-12	9-12
NC	9-12	9-12	9-12	8-12	8-12	10-12	10-12	10-12	9-12	9-12
OW	8-12	8-12	8-12	8-12	8-12	10-12	10-12	10-12	9-12	9-12

Alt: 7

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC	10-12	10-12	10-12	9-12	9-12	11-12	11-12	11-12	10-12	10-12
NC	10-12	10-12	10-12	9-12	9-12	11-12	11-12	11-12	10-12	10-12
OW	8-12	8-12	8-12	8-12	7-12	10-12	10-12	10-12	10-12	8, 10-12

Base Case: HG = 136,000 mt

Alt: Status Quo

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW		10-11	10-11	8-11	8-11		11	11	10-11	10-11

Alt: No Action

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC	8	8-9	8-9	8-9	8-9		9	9	9	9
OW	8	8-9	8-9	8-9	8-9		9	9	9	9

Alt: 1

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC				12	11-12					12
NC				12	11-12					12
OW				12	11-12					12

Alt: 2

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC				4-5	1-5				5	2-5
NC				4-5	1-5				5	2-5
OW									5	2-5

Alt: 3

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC				12	9, 11-12					12
NC				12	9, 11-12					12
OW				12	9, 11-12					12

Alt:
4.a

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC				12	11-12					12
NC				12	11-12					12
OW				12	11-12					12

Alt: 5

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW	9	9	9	8-9	8-9					

Alt: 6

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC				12	11-12					12
NC				12	11-12					12
OW				12	11-12					12

Alt: 7

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC					11-12					12
NC					11-12					12
OW				8	8, 11-12					12

High HG Case: HG = 200,000 mt
Alt: Status Quo

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW										

Alt: No Action

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC				9	9					
OW				9	9					

Alt: 1

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW										

Alt: 2

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW										

Alt: 3

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW										

Alt:
4.a

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW										

Alt: 5

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW					9					

Alt: 6

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW										

Alt: 7

Area	Months with Shortfall					Months with 0 Allocation				
	2005	2006	2007	2008	2009	2005	2006	2007	2008	2009
SC										
NC										
OW										

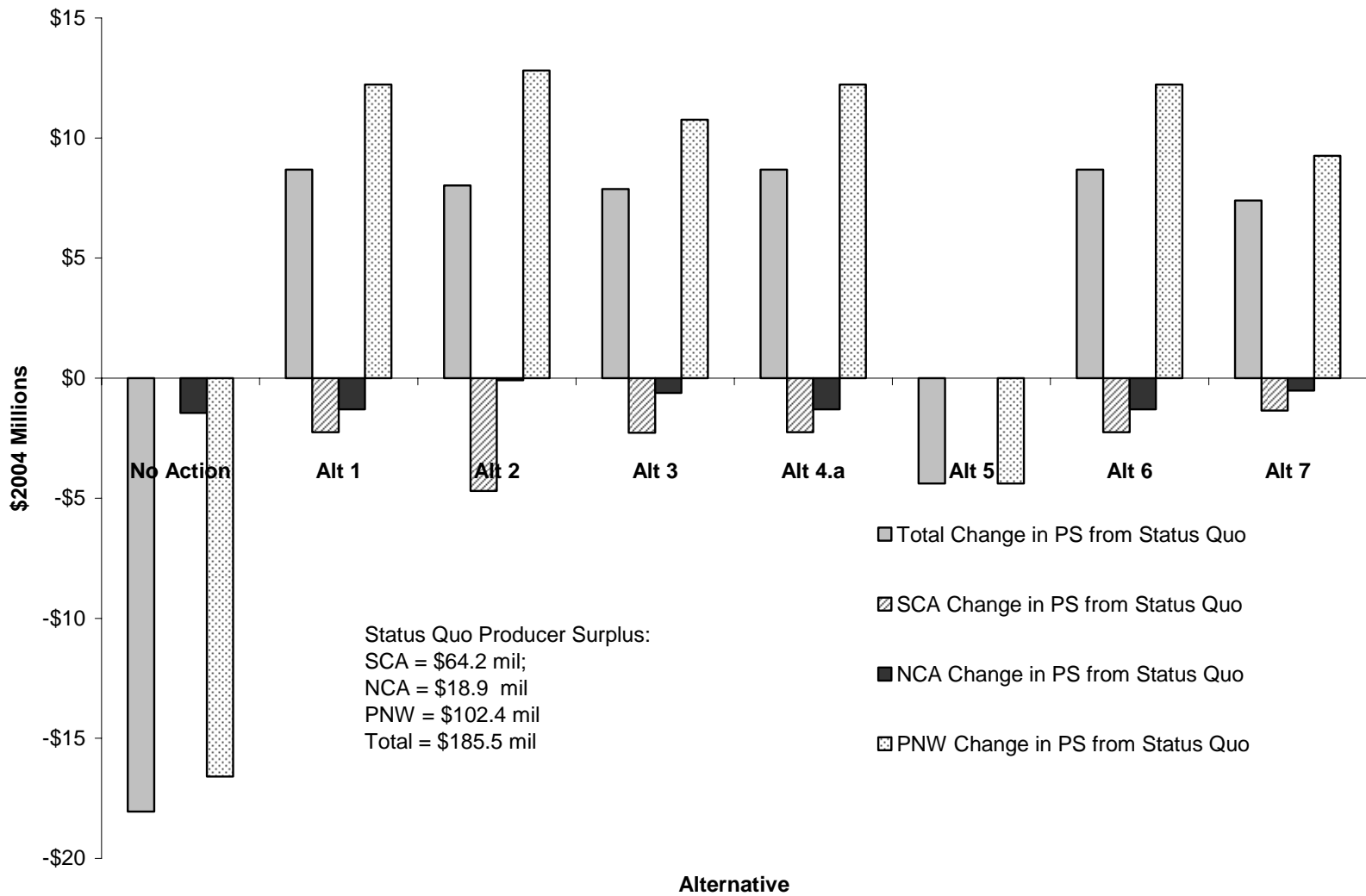


Figure 4-1. Change in producer surplus from the status quo under each alternative, by region, base case, 2005-2009.

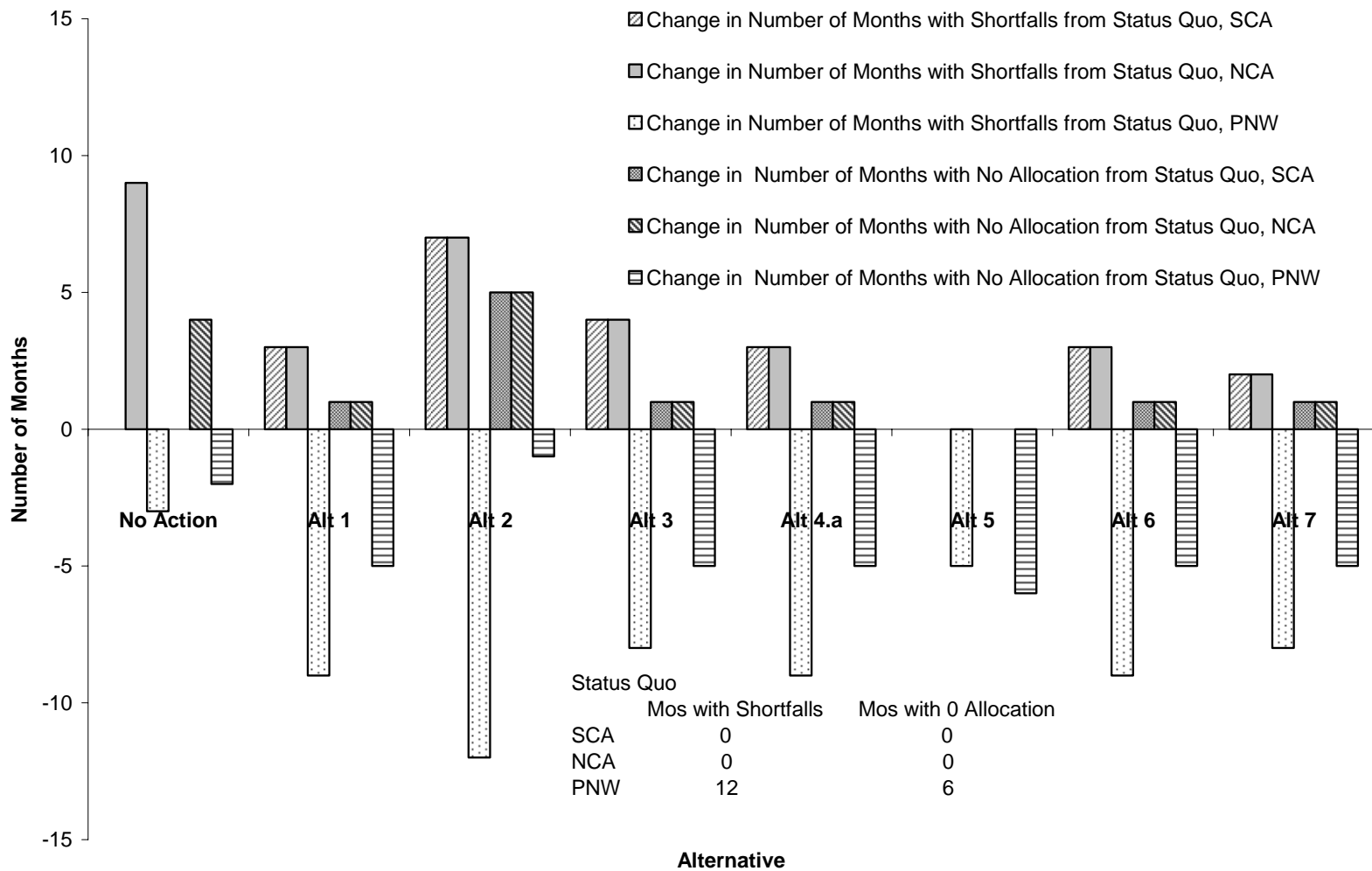


Figure 4-2. Change in the number of months with a landings shortfall and the number of months with a zero allocation for each allocation alternative relative to the status quo, by region, base case, 2005-2009.

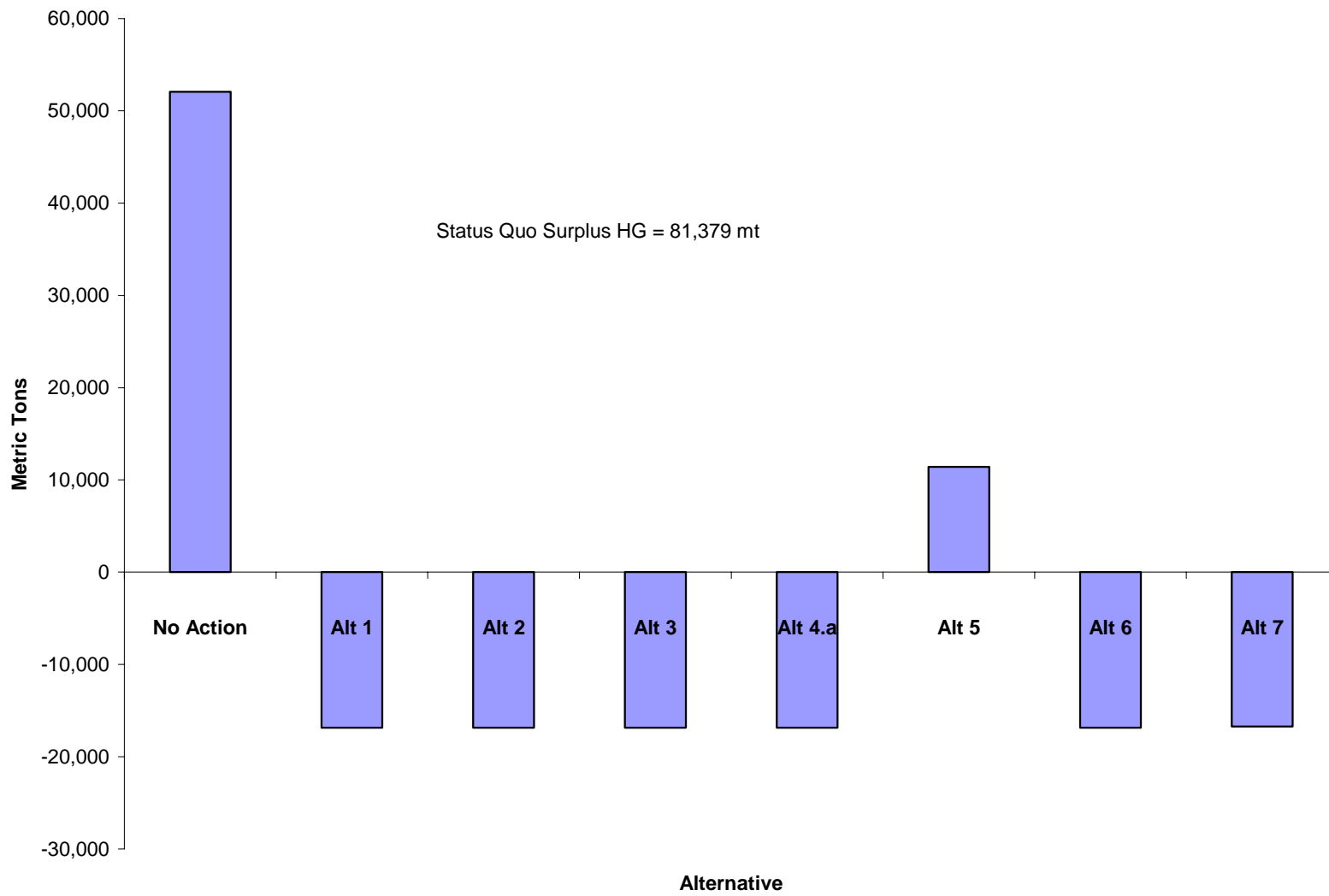


Figure 4-3. Change in surplus harvest guideline (mt) from the status quo for each allocation alternative, base case, 2005-2009.

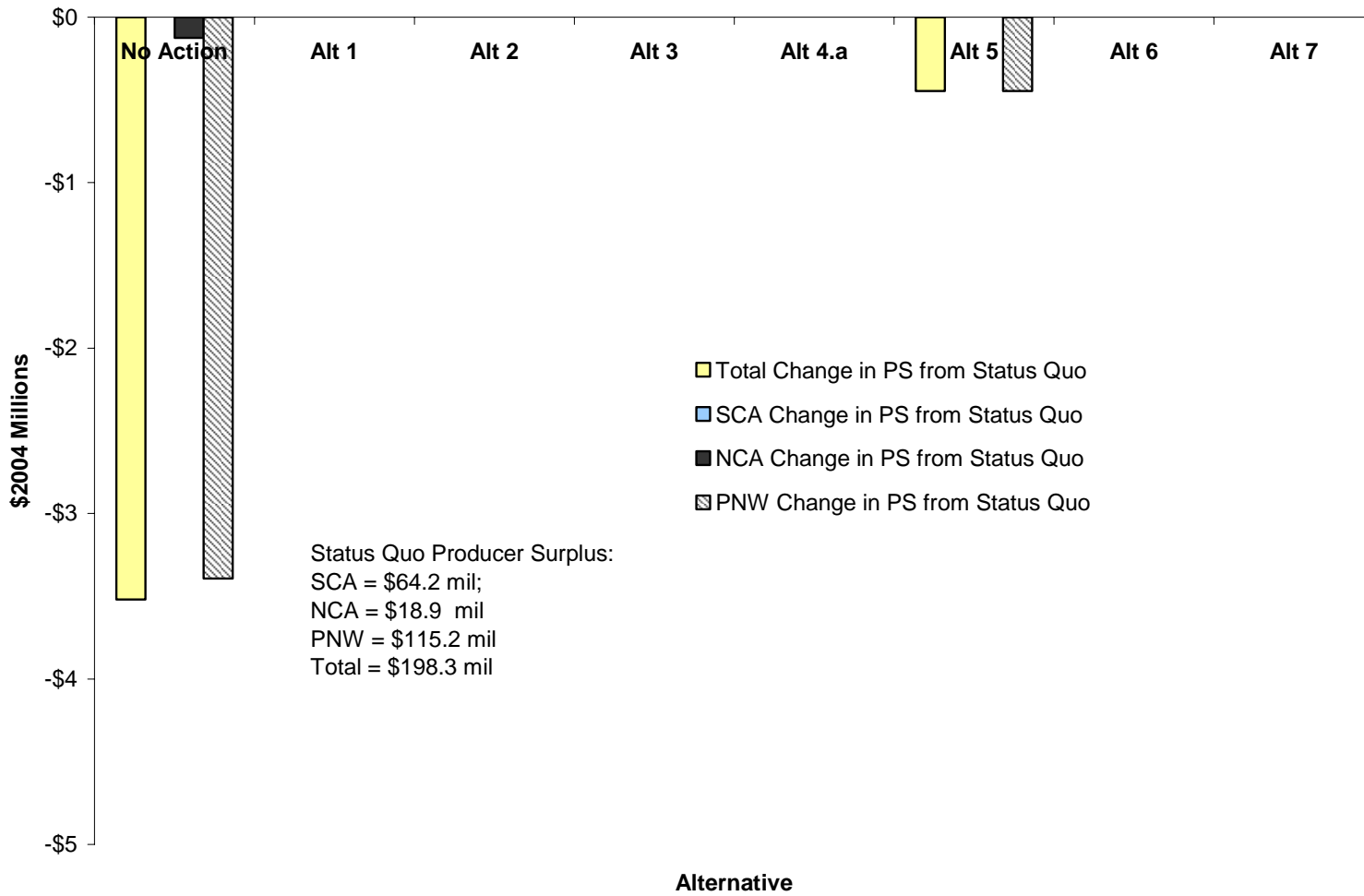


Figure 4-4 Change in producer surplus from the status quo under each alternative, by region, high harvest guideline case, 2005-2009

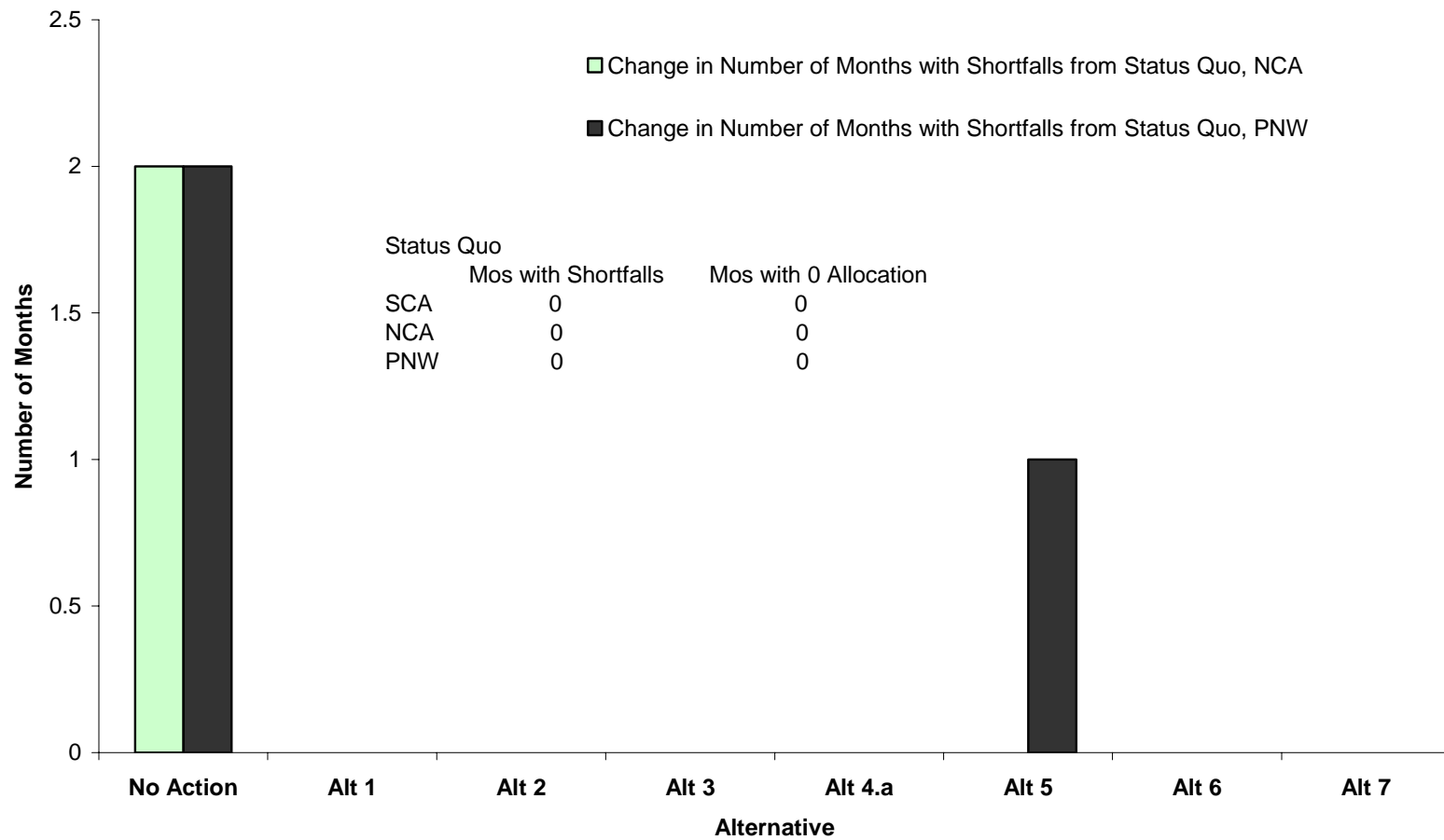


Figure 4-5. Change in the number of months with a landings shortfall and the number of months with a zero allocation, by region, for each allocation alternative relative to the status quo, high harvest guideline case, 2005-2009.

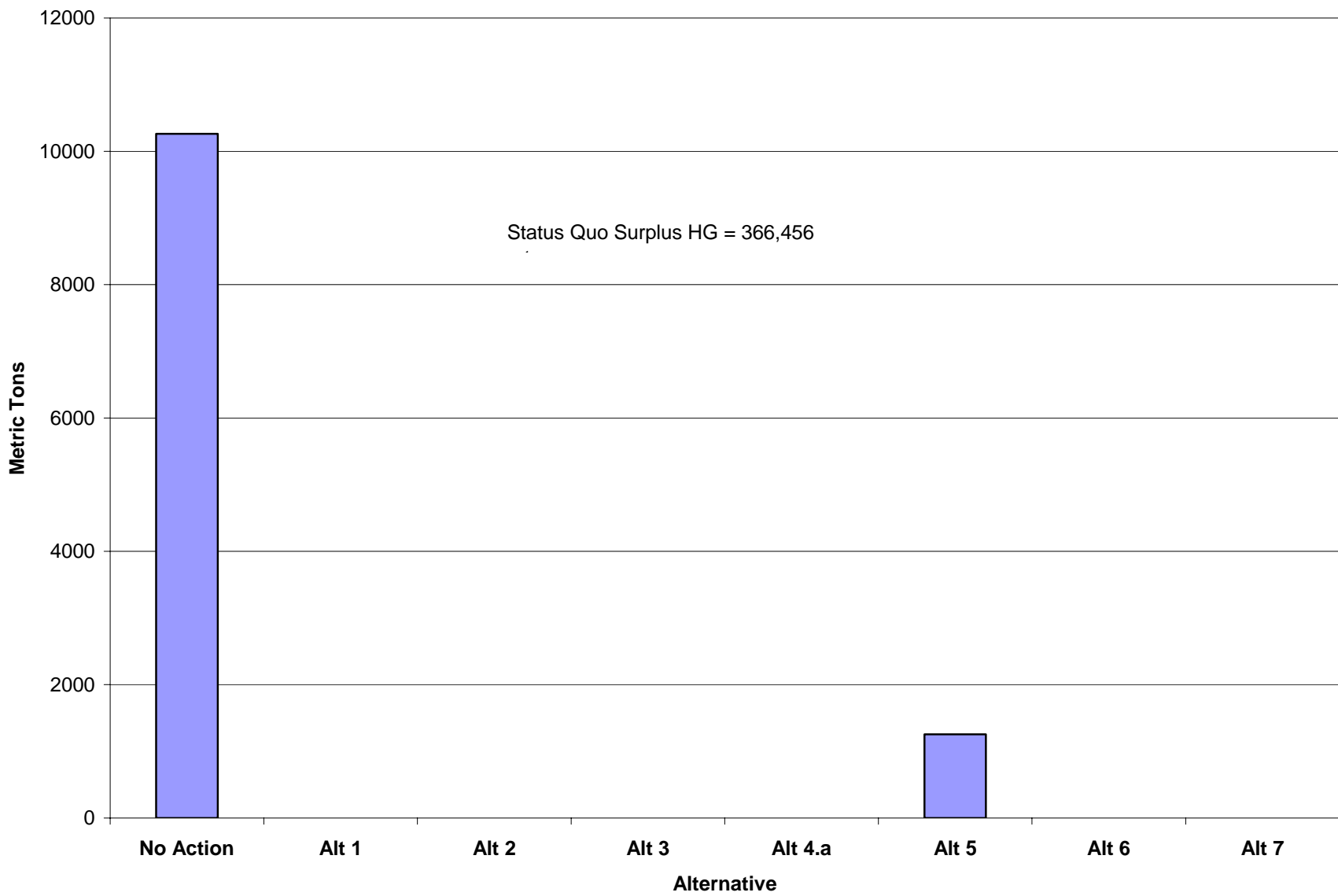


Figure 4-6. Change in surplus harvest guideline (mt) from the status quo for each allocation alternative, high harvest guideline case, 2005-2009.