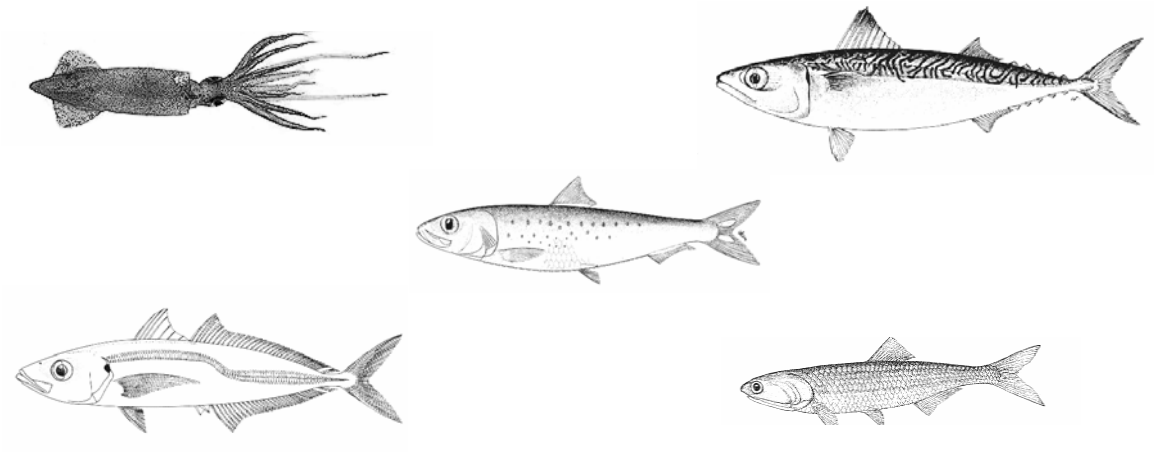
STATUS OF THE PACIFIC COAST COASTAL PELAGIC SPECIES FISHERY AND RECOMMENDED ACCEPTABLE BIOLOGICAL CATCHES

STOCK ASSESSMENT AND FISHERY EVALUATION 2007



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LIST OF ACRONYMS AND ABBREVIATIONS

ABC	acceptable biological catch
CalCOFI	California Cooperative Oceanic Fisheries Investigations
CANSAR-TAM	Catch-at-age Analysis for Sardine - Two Area Model
CDFG	California Department of Fish and Game
CESA	California Endangered Species Act
Commission	California Fish and Game Commission
Council	Pacific Fishery Management Council
CPFV	commercial passenger fishing vessel
CPS	coastal pelagic species
CPSAS	Coastal Pelagic Species Advisory Subpanel
CPSMT	Coastal Pelagic Species Management Team
CPSPDT	Coastal Pelagic Species Plan Development Team
CPUE	catch per unit effort
CUFES	Continuous Underway Fish Egg Sampler
CV	coefficient of variation
DEPM	daily egg production method
EEZ	exclusive economic zone
EFH	essential fish habitat
ENSO	El Niño southern oscillation
FMP	fishery management plan
GIS	Geographic Information System
GT	gross tonnage
HG	harvest guideline
LE	limited entry
LIDAR	light detection and ranging
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MAXCAT	maximum harvest level parameter
MSY	maximum sustainable yield
mt	metric ton
NMFS	National Marine Fisheries Service
ODFW	Oregon Department of Fish and Wildlife
OY	optimum yield
PacFIN	Pacific Coast Fisheries Information Network
PFAU	Pelagic Fisheries Assessment Unit
RecFIN	Recreational Fishery Information Network
RFA	Regulatory Flexibility Act
RIR	regulatory impact review
ROV	remotely operated vehicle
SAFE	stock assessment and fishery evaluation
Secretary	U.S. Secretary of Commerce
SSC	Scientific and Statistical Committee
SST	sea surface temperature
STAR	Stock Assessment Review (Panel)
STAT	Stock Assessment Team
SWFSC	Southwest Fisheries Science Center (NMFS)
VPA	virtual population analysis
WDFW	Washington Department of Fish and Wildlife

1.0 INTRODUCTION

The Guidelines for Fishery Management Plans (FMPs) published by the National Marine Fisheries Service (NMFS) require that a stock assessment and fishery evaluation (SAFE) report be prepared and reviewed annually for each FMP. SAFE reports are intended to summarize the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries being managed under federal regulation. Regional Fishery Management Councils use this information to determine annual harvest levels for each stock, document significant trends or changes in the resources, marine ecosystems, and fishery over time, and assess the relative success of existing state and federal fishery management programs.

This is the eighth *Status of the Pacific Coast Coastal Pelagic Species Fishery* SAFE document prepared for the Pacific Fishery Management Council (Council). Following NMFS guidelines, the purpose of this report is to briefly summarize aspects of the coastal pelagic species (CPS) FMP and to describe the history of the fishery and its management. Species managed under this FMP include: Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), jack mackerel (*Trachurus symmetricus*), and market squid (*Loligo opalescens*).

The SAFE report for Pacific Coast CPS fisheries was developed by the Council's Coastal Pelagic Species Management Team (CPSMT) from information contributed by scientists at NMFS, Southwest Fisheries Science Center (SWFSC), California Department of Fish and Game (CDFG), Oregon Department of Fish and Wildlife (ODFW), and Washington Department of Fish and Wildlife (WDFW). Included in this report are descriptions of landings, fishing patterns, estimates of the status of stocks (including stock assessments for Pacific sardine and Pacific mackerel, Appendix 1 and Appendix 2), and acceptable biological catches (ABCs).

The ABC recommendations, together with social and economic factors, are considered by the Council in determining annual harvest guidelines and other measures for actively managed fisheries (i.e., Pacific mackerel and Pacific sardine).

2.0 THE CPS FISHERY

2.1 Management History

The CPS FMP is an outgrowth of the *Northern Anchovy Fishery Management Plan*, which was implemented in September 1978. The Council began to consider expanding the scope of the northern anchovy FMP in 1990, with development of the seventh amendment to the FMP. The intent was to develop a greatly modified FMP, which included a wider range of coastal pelagic finfish and market squid. A complete draft was finished in November of 1993, but the Council suspended further work because NMFS withdrew support due to budget constraints. In July 1994, the Council decided to proceed with public review of the draft FMP. NMFS agreed with the decision on the condition that the Council also consider the options of dropping or amending the northern anchovy FMP. Four principal options were considered for managing CPS fisheries:

1. Drop the anchovy FMP (results in no Federal or Council involvement in CPS).
2. Continue with the existing FMP for anchovy (status quo).
3. Amend the FMP for northern anchovy.
4. Implement an FMP for the entire CPS fishery.

In March 1995, after considering the four options, the Council decided to proceed with option four, developing an FMP for the entire CPS fishery. Final action was postponed until June 1995 when the Council adopted a draft plan that had been revised to address comments provided by NMFS and the Council's Scientific and Statistical Committee (SSC). Amendment 7 was submitted to the U.S. Secretary of Commerce (Secretary), but rejected by NMFS Southwest Region as being inconsistent with National Standard 7. NMFS announced its intention to drop the FMP for northern anchovy in a proposed rule published in the *Federal Register* on March 26, 1996 (61*FR*13148). The proposed rule was withdrawn on November 26, 1996 (61*FR*60254). Upon implementation of Amendment 8 (see below), the northern anchovy FMP was renamed the Coastal Pelagic Species Fishery Management Plan.

2.2 Recent Management

For a complete listing of formal Council actions and NMFS regulatory actions since implementation of the CPS FMP see Tables 1 and 2, respectively.

2.2.1 Amendment 8

Development of Amendment 8 to the northern anchovy FMP began during June 1997 when the Council directed the Coastal Pelagic Species Plan Development Team to amend the FMP for northern anchovy to conform to the recently revised Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and to expand the scope of the FMP to include other species harvested by the CPS fishery.

In June 1999, NMFS partially approved the CPS FMP. Approved FMP elements included: (1) the management unit species, (2) CPS fishery management areas, consisting of a limited entry (LE) zone and two subareas, (3) a procedure for setting annual specifications including harvest guidelines (HG), quotas, and allocations, (4) provisions for closing directed fisheries when the directed portion of a harvest guideline or quota is taken, (5) fishing seasons for Pacific sardine and Pacific mackerel, (6) catch restrictions in the LE zone and, when the directed fishery for a CPS is closed, limited harvest of that species to an incidental limit, (7) a LE program, (8) authorization for NMFS to issue exempted fishing permits for the harvest of CPS that otherwise would be prohibited, and (9) a framework process to make management decisions without amending the FMP.

At that time, NMFS disapproved the optimum yield (OY) designation for market squid, because there was no estimate of maximum sustainable yield (MSY). Bycatch provisions were disapproved for lack of standardized reporting methodology to assess the amount and type of bycatch and because there was no explanation of whether additional management measures to minimize bycatch and the mortality of unavoidable bycatch were practicable.

On December 15, 1999, final regulations implementing the CPS FMP were published in the *Federal Register* (64*FR*69888). Provisions pertaining to issuance of LE permits were effective immediately. Other provisions, such as harvest guidelines, were effective January 1, 2000.

2.2.2 Amendment 9

During 1999 and 2000, the CPSMT developed Amendment 9 to the CPS FMP. Originally, Amendment 9 addressed both disapproved provisions of the FMP – bycatch and market squid MSY. The amendment also included provisions to ensure that treaty Indian fishing rights are implemented according to treaties between the U.S. and specific Pacific Northwest tribes.

The Council distributed Amendment 9 for public review on July 27, 2000. At its September 2000 meeting, the Council reviewed written public comments, received comments from its advisory bodies, and heard public comments. Based on advice about market squid MSY determination, the Council decided to include in Amendment 9 only the provisions for bycatch and treaty Indian fishing rights. The Council decided to conduct further analysis of the squid resource and prepare a separate amendment to address OY and MSY for squid. The Secretary approved Amendment 9 on March 22, 2001, and the final rule implementing Amendment 9 was published August 27, 2001 (66*FR*44986).

2.2.3 Amendment 10

In April 2001, the Council adopted a capacity goal for the CPS LE finfish fishery and asked the CPSMT to begin work on a 10th amendment to the FMP. Amendment 10 included the capacity goal, provisions for permit transferability, a process for monitoring fleet capacity relative to the goal, and a framework for modifying transferability provisions as warranted by increases or decreases in fleet capacity. The amendment also addressed determination of OY and MSY for market squid.

In June 2002, the Council adopted Amendment 10 to the CPS FMP. Relative to the LE fishery, the amendment established a capacity goal, provided for LE permit transferability to achieve and maintain the capacity goal, and established a process for considering new LE permits. The purpose of this action was to ensure fishing capacity in the CPS LE fishery is in balance with resource availability. Relative to market squid, Amendment 10 established an MSY (or proxy) for market squid to bring the FMP into compliance with the Magnuson-Stevens Act. The purpose of this action was to minimize the likelihood of overfishing the market squid resource. On December 30, 2002, the Secretary approved Amendment 10. On January 27, 2003, NMFS issued the final rule and regulations implementing Amendment 10 (68*FR*3819).

2.2.4 Sardine Allocation Regulatory Amendment

In September 2002, the Coastal Pelagic Species Advisory Subpanel (CPSAS) recommended the Council initiate a regulatory or FMP amendment and direct the CPSMT to prepare management alternatives for revising the sardine allocation framework. The Council directed the CPSMT to review CPSAS recommendations for revising the allocation framework. At the March 2003 Council meeting, the SSC and CPSAS reviewed analyses of the proposed management alternatives for sardine allocation. Based on the advisory body recommendations and public comment, the Council adopted five allocation

management alternatives for public review. In April 2003, the Council took final action on the regulatory amendment. This change was implemented by NMFS on September 4, 2003 (68*FR*52523); the new allocation system: (1) changed the definition of Subarea A and Subarea B by moving the geographic boundary between the two areas from 35°40' N latitude (Point Piedras Blancas, California) to 39° N latitude (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% to both subareas, to 20% to Subarea A and 80% to Subarea B, and (4) provided for coastwide reallocation of all unharvested sardine that remains on December 1. This revised allocation framework was in place for the 2003 and 2004 fishing seasons. It was also used in 2005 because the 2005 HG is at least 90% of the 2003 harvest guideline.

2.2.5 Amendment 11

The Council began developing options for a new allocation framework for the coastwide Pacific sardine fishery in 2003 while the fishery operated under the regulatory amendment described in the previous section. This revision to the sardine allocation framework will occur through Amendment 11 to the CPS FMP in 2006. The FMP amendment is intended to achieve optimal utilization of the resource and equitable allocation of harvest opportunity.

The Council tasked the CPSAS with initial development of a range of allocation alternatives. At the November 2004 meeting, the CPSAS presented several program objectives and a suite of alternative allocation formulae. The Council adopted for preliminary analysis a range of alternatives, including the CPSAS recommendations, as well as the following program objectives:

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

For the analysis of the alternatives, the Council gave specific direction to the CPSMT, including:

- Analyze each alternative in a consistent manner.
- Review differential impacts on northern and southern sectors for each alternative.
- Review effects of high and low catch years by sector for each alternative.
- Review resulting effects at various HG levels ranging from 25,000 mt to 200,000 mt (at appropriate intervals) for each alternative.
- At the discretion of the CPSMT, combine aspects of the various alternatives to create new alternatives that meet program objectives.

At the April 2004 Council meeting, the CPSMT presented preliminary economic analyses of these alternatives to the Council and its advisory bodies. The economic analysis of alternative allocation schemes included five-year projections of the incremental change in producer surplus and landings projections for each fishing sector and subarea. Monthly landings projections were based on 2004 landings and were inflated by 10% annually to account for expected growth in the regional fishery sectors over the next five years. These projections identified months in which there would be a shortfall in landings, and months which would start out with no available allocation. These landings projections were conducted under three HG scenarios: (1) low HG = 72,000 mt, (2) Base case HG = 136,000 mt, and (3) high HG = 200,000 mt.

The Council reviewed the preliminary results and public testimony before following the advice of both the CPSAS and CPSMT when adopting the remaining range of alternatives for further analysis and public review. The Council directed the CPSMT to take into account the advice of the SSC as they proceed with the analysis. Specifically, the Council requested a sensitivity analysis of the effects of future fishery growth where varying growth assumptions by subarea are applied, rather than the previously assumed 10% growth of the fishery coastwide. The Council also recommended that two different provisions for the review of a sardine allocation framework be included in the documentation for public review. The first based on time, where sardine allocation would be reviewed after three, five, or seven years of implementation; the second based on the size of the HG, where sardine allocation would be revisited if the HG falls below 75,000 mt or 100,000 mt.

In June 2005, the Council adopted a long-term allocation framework to apportion the annual Pacific sardine harvest guideline among the various non-tribal sectors of the sardine fishery. The Council followed the unanimous opinion of the CPSAS when adopting a seasonal allocation scheme which provides the following allocation formula for the non-tribal share of the HG:

(1) January 1, 35% of the harvest guideline to be allocated coastwide;
(2) July 1, 40% of the HG, plus any portion not harvested from the initial allocation, to be reallocated coastwide; and
(3) September 15, the remaining 25% of the harvest guideline, plus any portion not harvested from earlier allocations, to be reallocated coastwide.

The Council also heeded the advice of the CPSAS, CPSMT, and SSC regarding the dynamic nature of the Pacific sardine resource and uncertainties inherent in long-term projections, and scheduled a formal review of the allocation formula in 2008. This review will provide a comparison of the performance of the fishery in the first two years to the projections used to evaluate the adopted allocation scheme and will include any new information from Pacific sardine research. The Council recommended NMFS continue to pursue coastwide research on the Pacific sardine stock, and requested a report from the Southwest Fisheries Science Center at the September 2005 Council meeting regarding CPS research plans. The Council further recommended that NMFS work closely with the governments of Mexico and Canada to facilitate fishery data exchange and strong international resource stewardship of trans-boundary fish resources.

2.2.6 Amendment 12

At the November 2004 meeting the Council initiated development of a formal prohibition on directed fisheries for krill, and directed staff to begin development of management measures to regulate directed fisheries for krill within Council-managed waters. The proposal for a krill ban was first proposed for West Coast National Marine Sanctuary waters by the National Marine Sanctuary Program. These measures are recommended to be incorporated into an amendment to the CPS FMP. The Council also included a specific alternative for analysis that would prohibit directed krill fisheries within waters of West Coast National Marine Sanctuaries.

This proposed action is in recognition of the importance of krill as a fundamental food source for much of the marine life along the West Coast. Moreover, state laws prohibit krill landings by state-licensed fishing vessels into California, Oregon, and Washington, respectively. Thus, the action could provide for consistent Federal and state management. There are currently no directed krill fisheries in Council-managed waters.

NMFS took the lead on this proposed krill amendment and briefed the Council and advisory bodies on progress at the March and April 2005 Council meetings. The Council anticipated an update by NMFS at the September 2005 meeting, including a review of draft regulatory and environmental compliance

documents. Council final action and regulatory implementation were tentatively scheduled for spring and summer 2006 respectively.

At the November 2005 Council meeting the Council recommended that all species of krill be included in the CPS FMP as prohibited species, and approved a range of krill fishing alternatives for public review and additional analysis over the winter. The Council narrowed the range of alternatives to: 1) status quo, 2) a prohibition on krill fishing in all Council-managed waters, and 3) an initial prohibition combined with the establishment of a process for considering future krill fishing opportunities. Of these alternatives, the Council adopted the second, a complete ban on krill fishing as a preliminary preferred alternative. There are currently no directed krill fisheries on the U.S. West Coast, and state laws prohibit krill landings by state-licensed fishing vessels into California, Oregon, and Washington.

In March 2006, the Council adopted a complete ban on commercial fishing for all species of krill in West Coast Federal waters and made no provisions for future fisheries. They also specified essential fish habitat (EFH) for krill, making it easier to work with other Federal agencies to protect krill. This broad prohibition will apply to all vessels in Council-managed waters and will take form as Amendment 12 when fully implemented in 2007.

2.3 The CPS Fleet

During the 1940s and 1950s, approximately 200 vessels participated in the Pacific sardine fishery. Some present day CPS vessels are remnants of that fleet. CPS finfish landed by the roundhaul fleet (fishing primarily with purse seine or lampara nets) are sold as relatively high volume/low value products (e.g., Pacific mackerel canned for pet food, Pacific sardine frozen and shipped to Australia to feed penned tuna, and northern anchovy reduced to meal and oil). In addition to fishing for CPS finfish, many of these vessels fish for market squid, Pacific bonito, bluefin tuna, and Pacific herring.

A fishery for Pacific sardine has operated off Oregon and Washington since 1999. This fishery targets larger sardine, which are typically sold as bait for Asian longline tuna fisheries.

Along the West Coast, other vessels target CPS finfish in small quantities, typically selling their catch to specialty markets for relatively high prices. In recent years, these included:

- Approximately 18 live bait vessels in southern California and two vessels in Oregon and Washington that landed about 2,000 mt per year of CPS finfish (mostly northern anchovy and Pacific sardine) for sale to recreational anglers. Oregon's landings for live bait in 2005 totaled 2.6 mt of sardines by one vessel.

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

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

2.3.1 Limited Entry Fishery

The CPS LE fleet currently consists of 63 permits and 61 vessels (Table 3). The LE vessels range in age from 4 to 68 years, with an average age of 33 years (Table 4). Average vessel age has decreased by approximately four years since the initial fleet was established.

The capacity goal and transferability provisions established under Amendment 10 are based on calculated gross tonnage (GT) of individual vessels. Calculated GT serves as a proxy for each vessel's physical

capacity and is used to track total fleet capacity. Calculated GT incorporates a vessel's length, breadth, and depth, which are consistent measures across vessel registration and U.S. Coast Guard documentation lists. As described at 46 CFR § 69.209, GT is defined as:

$$GT=0.67(length*breadth*depth)/100.$$

Vessel dimension data were obtained from the U.S. Coast Guard database, and each vessel's calculated GT was attached to the permit under Amendment 10. Original GT endorsements (specified in Table 3) remain with the permit, regardless of whether the permit is transferred to a smaller or larger vessel.

GT values for the current fleet range from 23.8 GT to 340.2 GT, with an average of 88.7 GT (Tables 3 and 4). Total fleet GT decreased from 5,462.9 GT to 5,408.4 GT during 2004. This decrease was due to the loss of the "Connie Marie" (permit 64; sank in 2002), which has yet to be replaced by the owner. The fleet capacity goal established through Amendment 10 is 5,650.9 GT, and the trigger for restricting transferability is 5,933.5 GT (Goal + 5%). The current LE fleet is 5,408.4 GT, well within the bounds of the capacity goal.

2.3.2 Northern Fisheries

2.3.2.1 Oregon

Pacific sardine was managed as a developmental fishery from 1999 to 2005. In 2004, the sardine industry asked the Department of Fish and Wildlife to remove Pacific sardines form the developmental species list and create a limited entry system for the fishery. The Department began work with the Developmental Fisheries Board and the industry to develop alternatives for the fishery. In December 2005, the Oregon Fish and Wildlife Commission (Commission) moved the Pacific sardine fishery from a developing fishery into a state run limited entry fishery system. Twenty Oregon permits were established and made available to qualifying participants for the 2006 fishery. At that point, the Commission directed the Department to create minimum landing requirements for permit renewal. In April, the Commission established permit renewal requirements that included annual minimum landing requirements of at least ten landings of at least five metric tons (mt) each, or landings totaling at least $40,000, based on exvessel price, of sardines into Oregon. The industry expressed concern over the lack of markets and the possibility of not being able to meet the minimum landing requirements. Therefore, rules also allow a waiver of landing requirements due to illness, injury, or circumstances beyond the control of the permit holder and authorize the Commission to waive the landing requirements for the industry as a whole for any particular year due to unusual market conditions. In May and August of 2006, the Commission heard petitions to amend LE permit eligibility rules to include all 2005 developmental fishery permit holders who did not meet eligibility requirements chosen by the Commission in December. The Commission amended a rule which resulted in an immediate addition of six permits for a total of 26 LE permits in 2006.

Although 26 permits were issued, only 18 permits were actively utilized in the fishery. Two of those 18 permits were transferred to vessels with the intention of qualifying them under the new renewal requirements. A total of eight (of 26) permit holders did not meet the minimum landing requirements for renewal of their LE permit. In September, the Commission received letters from eight processors and one fisherman requesting an industry-wide waiver of the minimum landing requirements due to unusual market conditions. The Commission granted a waiver for all 2006 LE permit holders in January 2007. The Commission also directed ODFW staff to work with the Oregon sardine industry to establish a minimum number of permits for the fishery and create a regulatory system to reissue permits that are not renewed.

During the winter of 2007, ODFW hosted discussions with Washington and the Pacific Northwest (PNW) sardine industry to focus on current state rules that prevent a directed reduction fishery. Attendees

discussed difficulties of minimizing reduction of fish and finding alternative markets for small and unwanted sardines. The two states will continue to work together with the PNW sardine industry to consider the resource, economics and harvesting capabilities to conserve the resource, yet uphold the value of the fishery.

2.3.2.2 Washington

In Washington, sardines are managed under the Emerging Commercial Fishery provisions, which provide for the harvest of a newly classified species or harvest of a previously classified species in a new area or by new means. From 2000 through 2002, WDFW had trial purse seine fisheries for Pacific sardines, under which the number of participants, by law, cannot be limited. Since participation could not be limited, the Washington fishery was managed to a state HG of 15,000 mt. Following an extensive public process, which included establishing and meeting with a formal Sardine Advisory Board, the Director of WDFW decided to advance the sardine fishery from a trial to an experimental fishery in 2003. Experimental fisheries, under the Emerging Commercial Fisheries legislation, require participation to be limited. In collaboration with the Sardine Advisory Board, WDFW developed and implemented an effort limitation program in 2003. The experimental fishery and LE program has continued through 2006. WDFW also conducted a 5-year observer program from 2000 through 2004 to document bycatch levels in the fishery. Overall observer coverage in this program was in excess of 25% and was financially supported by fishery participants as part of their permit conditions. A mandatory logbook program has also been in place since the fishery began in 2000. All logbook records must be submitted, and any outstanding observer or permit fees owed to must be paid prior to receiving a permit for the current season.

In 2006, limited experimental fishery permits were issued to fourteen fishers meeting the necessary permit criteria of previously holding such a permit and also landing at least 40 mt of sardines into Washington over the previous two years. Additionally, the Director of WDFW may issue replacement permits if the total number of experimental permits falls below 20. To qualify for a replacement permit in 2006, a fisher must have had at least 50% ownership in a vessel that was designated on an experimental sardine fishery permit in 2004 or 2005, and that vessel must have landed a minimum of 40 mt of sardine into Washington over the period of 2004 and 2005. Four such replacement permits were issued in 2006, bringing the total number of Washington permits up to 18. Of these, only seven permits participated in the 2006 fishery. In addition to limiting participation in the fishery, WDFW also restricts the cumulative seasonal total of sardines that can go toward reduction, at both the individual vessel and processor level, to 15 percent.

2.3.3 California's Market Squid Fishery

In 2001, legislation transferred the authority for management of the market squid fishery to the California Fish and Game Commission (Commission). Legislation required that the Commission adopt a market squid fishery management plan and regulations to protect and manage the squid resource. In August and December of 2004, the Commission adopted the Market Squid Fishery Management Plan (MSFMP), the environmental documentation, and the implementing regulations, which went into effect on March 28, 2005, just prior to the start of the 2005/2006 fishing season which started April 1.

The goals of the MSFMP are to provide a framework that will be responsive to environmental and socioeconomic changes and to ensure long term resource conservation and sustainability. The tools implemented to accomplish these goals include: (1) setting a seasonal catch limit of 107,047 mt (118,000 short tons) to prevent the fishery from over-expanding, (2) maintaining monitoring programs designed to evaluate the impact of the fishery on the resource, (3) continuing weekend closures that provide for periods of uninterrupted spawning, (4) continuing gear regulations regarding light shields and wattage used to attract squid, (5) establishing a restricted access program that includes provisions for initial entry

into the fleet, permit types, permit fees, and permit transferability that produces a moderately productive and specialized fleet, and (6) creating a seabird closure restricting the use of attracting lights for commercial purposes in any waters of the Gulf of the Farallones National Marine Sanctuary. Under this framework, the MSFMP provides the Commission with specific guidelines for making management decisions. The Commission has the ability to react quickly to changes in the market squid population off California and implement management strategies without the need for a full plan amendment. The MSFMP framework structure was also designed achieve the goals and objectives of the Marine Life Management Act and to be consistent with the management outlined in CPS FMP Amendment 10.

Under the restricted access program in the MSFMP, a permit is needed to participate in the fishery. Qualification for different types of permits and transferability options was based on historical participation in the fishery. In 2006 a total of 163 permits were issued under seven permit categories. Market squid vessel permits allow a vessel to attract squid with lights and use large purse seines to capture squid; a total of 73 transferable and 12 non-transferable vessel permits were issued for the 2006-2007 fishing season. Brail permits allow a vessel to attract squid with lights and use brail gear to capture squid; a total of 16 transferable brail permits were issued for the 2006-2007 season. Light boat permits only allow a vessel to attract squid with lights (30,000 watts, maximum); a total of 59 transferable light boat permits were issued. Three experimental non-transferable market squid permits were issued in 2006 which allow these vessels to fish in areas not historically targeted by the market squid fishery (namely north of San Francisco). Landings of two short tons or less are considered incidental and no permit is required.

2.3.4 Treaty Tribe Fisheries

Tribal fisheries on sardine may evolve in waters north of Point Chehalis, Washington. The CPS FMP recognizes the rights of treaty Indian tribes to harvest Pacific sardine and provides a framework for the development of a tribal allocation. The Makah Tribe informed the Council of their intent to enter the sardine fishery in 2006. In response, the Council created the Ad Hoc Sardine Tribal Allocation Committee made up of state, Federal, and tribal representatives, to immediately begin to work on this issue. If a tribal allocation is established, the non-tribal allocation formula will likely be applied to the remainder of the harvest guideline after accommodation of the tribal fishery.

3.0 STOCK ASSESSMENT MODELS

3.1 Pacific Sardine

The Pacific sardine (*Sardinops sagax caerulea*) resource is assessed each fall in support of the Council process that, in part, sets an annual HG (quota) for the U.S. commercial fishery. This process is centered on an environmentally-based control rule that establishes a U.S. coastwide HG for an annual (Jan. 1 to Dec. 31) management cycle. The primary purpose of the assessment is to provide an estimate of current biomass, which is used to calculate annual HGs. A general overview of the harvest control rule is provided in Sections 4.3.2 and 9.1.1.1 of this SAFE report. For background analyses regarding the harvest control rule, see Amendment 8 of the CPS FMP (PFMC 1998).

The Pacific sardine stock assessment used for 2007 management (Hill *et al*. 2006; see Appendix 1) was conducted using a likelihood-based, age-structured model (Age-structured Assessment Program-ASAP, see Legault and Restrepo 1999). The general estimation approach used in the ASAP model is a flexible, 'forward-simulation' that allows for the efficient and reliable estimation of a large number of parameters. The population dynamics and estimator theory that serves as the basis of forward-estimation, age-structured models such as ASAP, is described in Fournier and Archibald (1982), Deriso et al. (1985), Megrey (1989), and Methot (1990, 1998).

The final ASAP model (1982-2006) was based on fishery-dependent data from three fisheries (Ensenada, Mexico; U.S. California; and U.S. Pacific northwest) and fishery-independent data from two research surveys: an index of spawning biomass based on the Daily Egg Production Method survey data, see Lo et al. (1996, 2005, 2006), and an index of pre-adult biomass from aerial spotter plane survey data (Lo *et al.* 1992). Finally, an environmental index (i.e., a time series of sea-surface temperatures recorded at Scripps Pier, La Jolla, California) is used to develop a fishing mortality-based proxy for MSY, which is an additional parameter used in the harvest control rule for determination of annual HGs (see Section 9.1.1.1). For details regarding the current assessment model, readers should consult Hill et al. (2006; see Appendix 1). See Deriso et al. (1996) and Hill et al. (1999) for descriptions of input data and modeling methods used in previous (CANSAR and CANSAR-TAM) assessments of Pacific sardine.

3.2 Pacific Mackerel

A Pacific mackerel (*Scomber japonicus*) stock assessment is conducted each spring in support of the Council process that ultimately establishes a HG for the U.S. management season opening July 1 and ending June 30 of the following year. The primary purpose of the assessment is to provide an estimate of current biomass, which is used in a harvest control rule to calculate the HG. A general overview of the harvest control rule is provided in Section 4.3.3 of this SAFE Report. For background and analyses regarding this species' harvest control rule, see Amendment 8 of the CPS FMP (PFMC 1998).

Full assessments for Pacific mackerel typically occur every third year, necessitating a three-year cycle for the CPS Stock Assessment Review (STAR) process. The National Marine Fisheries Services, Southwest Fisheries Science Center, took the lead in developing a new full assessment of Pacific mackerel for the 2007-2008 fishing season. The full assessment was reviewed during a May 1-4, 2007 STAR Panel meeting in La Jolla, California. The STAR Panel and the assessment team agreed on an assessment for use in managing the upcoming Pacific mackerel season and recommended additional analyses for review at the next CPS STAR Panel meeting schedule for September 18-21, 2007. The Council and the full SSC reviewed and approved the assessment at the June 11-15 Council meeting in Foster City, California.

The full Pacific Mackerel stock assessment used for 2007-08 management (Dorval *et al*. 2007; see Appendix 2) was conducted using a likelihood-based, age-structured model (Age-structured Assessment Program-ASAP, see Legault and Restrepo 1999). The general estimation approach used in the ASAP

model is a flexible, 'forward-simulation' that allows for the efficient and reliable estimation of a large number of parameters. The population dynamics and estimator theory that serves as the basis of forward-estimation, age-structured models such as ASAP, is described in Fournier and Archibald (1982), Deriso et al. (1985), Megrey (1989), and Methot (1990, 1998).

The final ASAP model (1926-27 - 2006-07 seasons) was based on: (1) fishery-dependent data from three fisheries (i.e., U.S. Commercial and Recreational fisheries, and Mexico Commercial fishery), (2) one fishery-independent survey (i.e., an index of spawning biomass based on the Daily Larval Production at Hatching Method, see Lo et al. (2007) and Appendix 2), (3) two fishery-dependent surveys (i.e., an index of population biomass from aerial spotter plane survey data (Lo *2007,* Appendix 2), and (4) a catch-per-unit effort index developed from the Commercial Passenger Fishery Vessel logbooks (see Appendix 2). For details regarding the current assessment model, readers should consult Dorval et al. (2007; see Appendix 2).

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Hill, K. T., N. C. H. Lo, B. J. Macewicz, and R. Felix-Uraga. 2006. Assessment of the Pacific sardine (*Sardinops sagax caerulea*) population for U.S. management in 2007. NOAA Tech. Mem. NOAA-TM-NMFS-SWFSC-396. 104 p.

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Hill, K. T., N. C. H. Lo, B. J. Macewicz, and R. Felix-Uraga. 2006. Assessment of the Pacific sardine (*Sardinops sagax caerulea*) population for U.S. management in 2006. NOAA Tech. Mem. NOAA-TM-NMFS-SWFSC-386. 85 p.

Legault, C. M., and V. R. Restrepo. 1999. A flexible forward age-structured assessment program. ICCAT Coll. Vol. Sci. Pap. 49(2): 246-253.

Lo, N. C. H.. 2007. Spotter data analysis for the Pacific mackerel in 1962-2002 using Delta-GLM. In Dorval et al. 2007: Assessment of Pacific mackerel (*Scomber japonicus*) stock for the U.S. management in the 2007-08 Season), Appendix I, pp:92-105.

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4.0 OPTIMUM YIELD, MAXIMUM SUSTAINABLE YIELD, AND MAXIMUM SUSTAINABLE YIELD CONTROL RULES

Information in this section is excerpted from: Amendment 8 (To the Northern Anchovy Fishery Management Plan) incorporating a name change to the Coastal Pelagic Species Fishery Management Plan. Pacific Fishery Management Council. Portland, Oregon. 1998.

4.1 Optimum Yield

The Magnuson-Stevens Act defines the term "optimum," with respect to the yield from a fishery, as the amount of fish which:

- Will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems.
- Is prescribed on the basis of the MSY from the fishery, as reduced by any relevant social, economic, or ecological factor.
- In the case of an overfished fishery, provides for rebuilding to a level consistent with producing the MSY in such fishery [50 C*FR* §600.310(f)(1)(i)].

Optimum yield for a CPS stock is defined to be the level of harvest which is less than or equal to ABC estimated using a MSY control rule, consistent with the goals and objectives of this FMP, and used by the Council to manage the stock. The ABC is a prudent harvest level calculated based on an MSY control rule. In practice, OY will be determined with reference to ABC. In particular, OY will be set less than ABC to the degree required to prevent overfishing.

4.2 Maximum Sustainable Yield, MSY Control Rules, and Acceptable Biological Catch

For CPS, an MSY control rule is defined to be a harvest strategy that provides biomass levels at least as high as the F_{MSY} (fishing mortality rate that maximizes catch biomass in the long term) approach while also providing relatively high and consistent levels of catch. According to Federal regulations (50 CFR §600.310(b)(1)(ii)), an MSY control rule is "a harvest strategy which, if implemented, would be expected to result in a long-term average catch approximating MSY." Similarly, MSY stock size "means the long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate units that would be achieved under an MSY control rule in which the fishing mortality rate is constant." The definition of an MSY control rule for CPS is more general, because it includes the definition in National Standard 1. It is also more conservative, because the focus for CPS is oriented primarily towards stock biomass levels at least as high as the MSY stock size. The primary focus is on biomass, rather than catch, because most CPS (Pacific sardine, northern anchovy, and market squid) are very important to the ecosystem as forage.

The MSY control rules in the CPS fishery may vary depending on the nature of the fishery, management goals, assessment and monitoring capabilities, and available information. Under the framework management approach used for CPS, it is not necessary to amend the CPS FMP in order to develop or modify MSY control rules or definitions of overfishing.

The use of an MSY control rule for actively managed stocks provides managers with a tool for setting and adjusting harvest levels on a periodic basis, while preventing overfishing and overfished stock conditions. All actively managed stocks must have stock-specific MSY control rules, a definition of overfishing, and a definition of an overfished stock. Definitions of overfishing and overfished are detailed below in Section 5.

The main use of an MSY control rule for a monitored stock is to help gauge the need for active management. MSY control rules and harvest policies for monitored CPS stocks may be more generic and simpler than those used for actively managed stocks. Under the FMP, any stock supporting catches approaching the ABC or MSY levels should be actively managed unless there is too little information or other practical problems.

4.3 MSY Control Rules for CPS

The Council may use the default MSY control rule for monitored species unless a better species-specific rule is available, e.g., the MSY-proxy approach adopted for market squid (see Section 4.3.4). The default MSY control rule can be modified under framework management procedures. The default MSY control rule sets ABC for the entire stock (U.S., Mexico, Canada, and international fisheries) equal to 25% of the best estimate of the MSY catch level. Overfishing occurs whenever total catch (U.S., Mexico, Canada, and international fisheries) exceeds ABC or whenever fishing occurs at a rate that is high enough to jeopardize the capacity of the stock to produce MSY. Overfishing of a monitored CPS stock is "approached" whenever projections or estimates indicate the overfishing will occur within two years.

In making decisions about active management, the Council may choose to consider ABC and catches in U.S. waters only. ABC in U.S. waters is the ABC for the entire stock prorated by an estimate of the fraction of the stock in U.S. waters. Active management may not be effective if U.S. catches are small, and overfishing is occurring in Mexico, Canada, or in international waters outside the jurisdiction of Federal authorities.

4.3.1 General MSY Control Rule for Actively Managed Species

The general form of the MSY control rule used for actively managed CPS fisheries was designed to continuously reduce the exploitation rate as biomass declines. The general formula used is:

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

H is the harvest target level, CUTOFF is the lowest level of estimated biomass at which directed harvest is allowed, and FRACTION is the fraction of the biomass above CUTOFF that can be taken by the fishery. BIOMASS is generally the estimated biomass of fish age 1+ at the beginning the season. The purpose of CUTOFF is to protect the stock when biomass is low. The purpose of FRACTION is to specify how much of the stock is available to the fishery when BIOMASS exceeds CUTOFF. It may be useful to define any of the parameters in this general MSY control rule, so they depend on environmental conditions or stock biomass. Thus, the MSY control rule could depend explicitly on the condition of the stock or environment.

The formula generally uses the estimated biomass for the whole stock in one year (BIOMASS) to set harvest for the whole stock in the following year (H) although projections or estimates of BIOMASS, abundance index values or other data might be used instead. BIOMASS is an estimate only, it is never assumed that BIOMASS is a perfect measure of abundance. Efforts to develop a harvest formula must consider probable levels of measurement error in BIOMASS which typically have coefficient of variations of about 50% for CPS.

The general MSY control rule for CPS (depending on parameter values) is compatible with the Magnuson-Stevens Act and useful for CPS that are important as forage. If the CUTOFF is greater than zero, then the harvest rate (H/BIOMASS) declines as biomass declines. By the time BIOMASS falls as low as CUTOFF, the harvest rate is reduced to zero. The CUTOFF provides a buffer of spawning stock that is protected from fishing and available for use in rebuilding if a stock becomes overfished. The

combination of a spawning biomass buffer equal to CUTOFF and reduced harvest rates at low biomass levels means that a rebuilding program for overfished stocks may be defined implicitly. Moreover, the harvest rate never increases above FRACTION. If FRACTION is approximately equal to F_{MSY}, then the MSY control rule harvest rate will not exceed F_{MSY}. In addition to the CUTOFF and FRACTION parameters, it may be advisable to define a maximum harvest level parameter (MAXCAT) so that total harvest specified by the harvest formula never exceeds MAXCAT. The MAXCAT is used to guard against extremely high catch levels due to errors in estimating biomass, to reduce year-to-year variation in catch levels, and to avoid overcapitalization during short periods of high biomass and high harvest. MAXCAT also prevents the catch from exceeding MSY at high stock levels and spreads the catch from strong year classes over a wider range of fishing seasons.

Other general types of control rules may be useful for CPS and this FMP does not preclude their use as long as they are compatible with National Standards and the Magnuson-Stevens Act.

4.3.2 MSY Control Rule for Pacific Sardine

The MSY Control Rule for Pacific sardine sets ABC for the entire sardine stock based on an estimate of biomass for the whole sardine stock, a CUTOFF equal to 150,000 mt, a FRACTION between 5% and 15% (depending on oceanographic conditions as described below), and MAXCAT of 200,000 mt. The U.S. ABC is calculated from the target harvest for the whole stock by prorating the total ABC based on 87% proportion of total biomass in U.S. waters.

FRACTION in the MSY control rule for Pacific sardine is a proxy for F_{MSY} (i.e., the fishing mortality rate for deterministic equilibrium MSY). FRACTION depends on recent ocean temperatures, because F_{MSY} and sardine stock productivity are higher under ocean conditions associated with warm water temperatures. An estimate of the relationship between F_{MSY} for sardine and ocean temperatures is:

$$FMSY = 0.248649805\ T^2 - 8.190043975\ T + 67.4558326,$$

where T is the average three-season sea surface temperature (SST) at Scripps Pier (La Jolla, California) during the three preceding seasons. Thus, the MSY control rule for Pacific sardine sets the control rule parameter FRACTION equal to F_{MSY}, except that FRACTION is never allowed to be higher than 15% or lower than 5%, which depends on recent average sea surface temperature.

Although F_{MSY} may be greater or lesser, FRACTION can never be greater than 15% or less than 5% unless the MSY control rule for sardine is revised, because 5% and 15% are policy decisions based on social, economic, and biological criteria. In contrast, relationships between FRACTION, F_{MSY} and environmental conditions are technical questions and estimates or approaches may be revised by technical teams (e.g. the CPSMT) to accommodate new ideas and data.

4.3.3 MSY Control Rule for Pacific Mackerel

The MSY control rule for Pacific mackerel sets the CUTOFF and the definition of an overfished stock at 18,200 mt and the FRACTION at 30%. Overfishing is defined as any fishing in excess of ABC calculated using the MSY control rule. No MAXCAT is defined because the U.S. fishery appears to be limited by markets and resource availability to about 40,000 mt per year. The target harvest level is defined for the entire stock in Mexico, Canada, and U.S. waters (not just the U.S. portion), and the U.S. target harvest level is prorated based on 70% relative abundance in U.S. waters.

4.3.4 MSY Control Rule for Market Squid

Although market squid is only a monitored species, a potential MSY Control Rule for market squid has been reviewed formally through a stock assessment review (STAR) conducted in 2001, as well as presented within the Council forum in 2002. The proposed MSY Control Rule is generally based on the Egg Escapement method, which currently serves as an informal assessment tool for this species (see Appendix 3 in PFMC (2002) for further discussion concerning specific details involved in this assessment approach, as well as review-related discussion). It is important to note that the main objective of a MSY Control Rule for a "monitored" stock (e.g., market squid) is to help assess the need for "active" management. That is, the MSY Control Rules and harvest policies for monitored CPS stocks may be based on broader concepts and constraints than those used for stocks with significant fisheries that fall under active management. Any fishery whereby catches approach an ABC or MSY level warrant consideration within active management processes, given catch statistics are scientifically based and management operations can be practically implemented. Overfishing of a monitored CPS stock is considered whenever current estimates or projections indicate that a minimum stock threshold will be realized within two years. In practical terms, the market squid fishery is monitored through a state-based management plan that includes an annual landings cap (CDFG 2005) and various spatial/temporal constraints. Whereas, within a research context only, population dynamics and biological reference point (say MSY-related) evaluations regarding this species are addressed through the Egg Escapement method and simulation analysis. Given the "monitored" status of this population, the above management/research approach appears reasonable; however, "active" management may need to be considered in the future if fishery operations change substantially (e.g., spatially expand, harvest high amounts of immature squid, etc.) and/or ongoing modeling efforts identify areas (spatial or temporal) of concern regarding egg escapement levels associated with commercial fishery sample data. A brief description of the Egg Escapement method follows, with further discussion presented in section 9.2.3.

The Egg Escapement method is founded on conventional spawning biomass "per-recruit" theory. In general, the proposed MSY Control Rule for market squid is based on evaluating (throughout a fishing season) levels of egg escapement associated with the exploited population(s). The estimates of egg escapement are evaluated in the context of a "threshold" that is hypothesized to represent (generally) a biological reference point that, if not exceeded (and over the long-term and given favorable oceanographic conditions), will support sustainable abundance levels and some degree of surplus for fishery-related purposes. It is important to note that the threshold proposed currently (i.e., 30%) represents a strictly preliminary statistic and intended as a precautionary reference point, which ultimately, is expected to be revised (to some degree) as more sample data (spatially and temporally) are examined through egg escapement and simulation research. In this context, in fall 2006, the CPSMT reviewed results from ongoing research addressing egg escapement modeling efforts over the last two years. A working paper summarizing the results of this research will be distributed (via CPSMT discussions) in fall 2007.

4.4 Section References:

California Department of Fish and Game (CDFG). 2005. Final market squid fishery management plan. Document can be obtained from State of California Resources Agency, Department of Fish and Game, Marine Region, 4665 Lampson Avenue (Suite C), Los Alamitos, CA 90720. 124 p.

Pacific Fishery Management Council (PFMC). 1998. Amendment 8 (To the northern anchovy fishery management plan) incorporating a name change to: the coastal pelagic species fishery management plan. Document can be obtained from Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 200, Portland, OR 97220.

Pacific Fishery Management Council (PFMC). 2002. Status of the Pacific coast coastal pelagic species fishery and recommended acceptable biological catches: stock assessment and fishery evaluation (2002). Appendix 3: market squid MSY. Document can be obtained from Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 200, Portland, OR 97220.

5.0 OVERFISHING CONSIDERATIONS

Information in this section is excerpted from: Amendment 8 (To the Northern anchovy fishery management plan) incorporating a name change to: the Coastal Pelagic Species Fishery Management Plan. Pacific Fishery Management Council. Portland, Oregon. 1998.

5.1 Definition of Overfishing

By definition, overfishing occurs in a fishery whenever fishing occurs over a period of one year or more at a rate that is high enough to jeopardize the capacity of the stock to produce MSY on a continuing basis if applied in the long term. Overfishing in the CPS fishery is "approached" whenever projections indicate overfishing will occur within two years. The definition of overfishing is in terms of a fishing mortality or exploitation rate. Depending on the exploitation rate, overfishing can occur when CPS stocks are at either high or low abundance levels. The Council must take action to eliminate overfishing when it occurs and to avoid overfishing when exploitation rates approach the overfishing level.

In operational terms, overfishing occurs in the CPS fishery whenever catch exceeds ABC, and overfishing is approached whenever projections indicate that fishing mortality or exploitation rates will exceed the ABC level within two years. The definition of an overfished stock is an explicit part of the MSY control rule for CPS stocks.

5.2 Definition of an Overfished Stock

By definition, an overfished stock in the CPS fishery is a stock at a biomass level low enough to jeopardize the capacity of the stock to produce MSY on a continuing basis. An overfished condition is approached when projections indicate that stock biomass will fall below the overfished level within two years. The Council must take action to rebuild overfished stocks and to avoid overfished conditions in stocks with biomass levels approaching an overfished condition.

5.3 Rebuilding Programs

Management of overfished CPS stocks must include a rebuilding program that can, on average, be expected to result in recovery of the stock to MSY levels in ten years. It is impossible to develop a rebuilding program that would be guaranteed to restore a stock to the MSY level in ten years, because CPS stocks may remain at low biomass levels for more than ten years even with no fishing. The focus for CPS is, therefore, on the average or expected time to recovery based on realistic projections. If the expected time to stock recovery is associated with unfavorable ecosystem conditions and is greater than ten years, then the Council and the Secretary may consider extending the time period as described at 50 CFR § 600.310(e).

Rebuilding programs for CPS may be an integral part of the MSY control rule or may be developed or refined further in the event that biomass of a CPS stock reaches the overfished level.

6.0 BYCATCH AND DISCARD MORTALITY

Fishery management plans prepared by a fishery management council or by the Secretary must, among other things, establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery, and include conservation and management measures that, to the extent are practicable and in the following priority:

1. Minimize Bycatch.
2. Minimize the mortality of bycatch that cannot be avoided.

The Magnuson-Stevens Act defines bycatch as "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program" (16USC1802).

CPS vessels fish with roundhaul gear (purse seine or lampara nets of approximately one-half mile in total length). These are encircling type nets, which are deployed around a school of fish or part of a school. When the school is surrounded, the bottom of the net may be closed, then the net drawn next to the boat. The area including the free-swimming fish is diminished by bringing one end of the net aboard the vessel. When the fish are crowded near the fishing vessel, pumps are lowered into the water to pump fish and water into the ship's hold. Another technique is to lift the fish out of the net with netted scoops (e.g., brails). Roundhaul fishing results in little unintentionally caught fish, primarily because the fishers target a specific school, which usually consists of pure schools of one species. The tendency is for fish to school by size, so if another species is present in the school, it is typically similar in size. The most common incidental catch in the CPS fishery is another CPS species (e.g., Pacific mackerel incidental to the Pacific sardine fishery). If larger fish are in the net, they can be released alive before pumping or brailing by lowering a section of the cork-line or by using a dip-net. The load is pumped out of the hold at the dock, where the catch is weighed and incidentally-caught fish can be observed and sorted. Because pumping at sea is so common, any incidental catch of small fish would not be sorted at sea. Grates can be used to sort larger non-CPS from the catch. Grates are mandatory in Oregon to sort larger non-CPS from the catch. At-sea observers have record discard at one time or another since the year 2000 off the states of Oregon, Washington, and California. Incidental harvest of non-prohibited larger fish are often taken home for personal use or processed.

Historically, market squid have been fished at night with the use of powerful lights, which cause squid to aggregate, which enables fishermen to pump squid directly from the sea or to encircle them with a net. California actively manages the market squid fishery in waters off California and has developed an FMP for the state-managed fishery. California's market squid FMP established a management program for California's market squid resource with goals that are aimed at ensuring sustainability of the resource and reducing the potential for overfishing. The tools to accomplish these goals include:

- Establishing fishery control rules, including a seasonal catch limitation to prevent the fishery from over-expanding; continuing weekend closures, which provide for periods of uninterrupted spawning; continuing gear regulations regarding light shields and wattage used to attract squid; and maintaining monitoring programs designed to evaluate the impact of the fishery on the resource.

- Instituting a restricted access program, including provisions for initial entry into the fleet, types of permits, permit fees, and permit transferability.

- Establishing a general habitat closure area in northern California rarely used by the squid fishery to eliminate the potential of future negative interactions with seabirds, marine mammals, and important

commercial and sport fishes, and adding limitations on using lights to attract squid around several of the Channel Islands, an effort intended to protect nesting seabirds.

In addition to the reasons discussed above, several circumstances in the fishery tend to reduce bycatch:

1. Most of what would be called bycatch under the Magnuson-Stevens Act is caught when roundhaul nets fish in shallow water over rocky bottom. Fishers try to avoid this to protect gear. Also, they may be specifically prohibited to fish these areas because of closures.

2. South of Pt. Buchon, California, many areas are closed to roundhaul nets under California law and the FMP, which reduces the chance for bycatch.

3. In California, a portion of the sardine caught incidentally by squid or anchovy fishers can be sold for reduction, which reduces discard.

4. The five tons or less allowable landing by vessels without LE permits under the FMP should reduce any regulatory discard, because those fish can be landed.

5. From 1996 to 2003, bycatch from the live bait logs was reported with an incidence of 10%. The primary species taken as incidental catch was barracuda. Virtually all fish caught incidentally in this fishery are either used for bait, for personal use, or released alive. See Tables 15, 16, and 17.

6. CDFG has implemented a logbook program for the squid fishery. The data to be collected includes bycatch.

Generally, fisheries for CPS can be divided into two areas: north and south of Pigeon Point, California (approximately 37°10' N latitude). In recent history, virtually the entire commercial fishery for CPS finfish and market squid has taken place south of Pigeon Point. The potential for taking salmon exists in this area, but diminishes south of Monterey, California (37° N latitude). Starting in 1999, CPS fisheries (notably, targeting Pacific sardine) increased in waters off Oregon and Washington. Oregon and Washington actively manage these northern fisheries, in part, because of the heightened potential for salmon bycatch. Section 6.1 through 6.2 describes the California fishery; section 6.3 provides information on Oregon and Washington fisheries.

See Amendment 9 to the CPS FMP (Environmental Assessment/Regulatory Impact Review, March 2001) for a complete description of bycatch-related issues and monitoring and reporting requirements. Amendment 9 is available from the Council office.

6.1 Federal Protection Measures

National Marine Fisheries Service (NMFS) regularly conducts Endangered Species Act (ESA) section 7 consultations to ensure that federally threatened or endangered species are not adversely affected by federally managed fisheries. Since 1999 NMFS, Sustainable Fisheries Division (SFD), Southwest Region (SWR) has conducted eight consultations with other Federal agencies, including NMFS Protected Resource Division (PRD) and U.S. Fish and Wildlife Service, regarding the CPS fishery.

Most recently, NMFS, SFD, SWR, initiated a formal section 7 consultation with NMFS, PRD, SWR, for the implementation of Amendment 11 to the CPS FMP. PRD completed a formal section 7 consultation on this action and in a Biological Opinion dated March 10, 2006, determined that fishing activities conducted under the CPS FMP and its implementing regulations are not likely to jeopardize the continued existence of any endangered or threatened species under the jurisdiction of NMFS or result in the

destruction or adverse modification of critical habitat of any such species. Specifically, the current status of the Lower Columbia River Chinook, Snake River Fall Chinook, Upper Willamette Chinook, Puget Sound Chinook, and Lower Columbia River coho were deemed not likely to be jeopardized by the Pacific sardine fishery.

6.1.1 California Coastal Pelagic Species Pilot Observer Program

NMFS SWR initiated a pilot observer program for California-based commercial purse seine fishing vessels targeting CPS in July 2004 with hopes of augmenting and confirming bycatch rates derived from CDFG dockside sampling. SWR personnel trained the first group of CPS observers in mid-July in Long Beach, California. Frank Orth and Associates (FOA), a private contractor, hired and provided observers for training and subsequent deployment. Six observers who had previous experience in other SWR-observed fisheries attended and completed the course. The training course emphasized a review of ongoing observer programs (drift gillnet, pelagic longline) and introduction to the soon-to-be observed fisheries (purse seine, albacore hook-and-line). The training curriculum included vessel safety, fishing operations, species identification, and data collection.

In late July 2004, observers began going to sea aboard CPS vessels. Observers used ODFW's Sardine Bycatch Observations' form to record data on fishing gear characteristics, fishing operations, and target/non-target species catch and disposition. Observers also recorded data on trip specifics and protected species sightings/interactions. Observers had access to data field definitions in their SWR observer program Field Manuals. Most data detailing length, volume, or weight are obtained verbally from the vessel operator. Position and time data are recorded by the observer directly from hand-held or on-board electronics.

Data from this ongoing program has been compiled though January 2006. A total of 107 trips by vessels targeting CPS (228 sets) were observed from July 2004 to January 2006. Tables 5-8 show incidental catch and bycatch data collected during this time and are categorized by target species of the trip (i.e., Pacific sardine, Pacific mackerel, market squid or anchovy).

Future needs of the CPS observer program include: standardization of data fields, development of a fishery-specific Observer Field Manual, construction of a relational database for the observer data, and creation of a statistically reliable sampling plan. A review of the protocol and catch data by NMFS Southwest Science Center staff, the CPS Management team and other CPS interested parties is planned in the future to help address some of these needs.

NMFS also initiated an ESA section 7 consultation with USFWS regarding the possible effects of implementing Amendment 11 to the CPS FMP. USFWS concurred with NMFS and determined that implementing Amendment 11 may affect, but was not likely to adversely affect (NLAA): the endangered tidewater goby, the threatened western snowy plover, the Santa Ana sucker, the endangered short tailed albatross, the endangered California brown pelican, the endangered California least-tern, the threatened marbled murrelet, the threatened bald eagle, the threatened bull trout, and the candidate Xantus's murrelet. Formal consultation, however, was deemed necessary on the possible effects to the southern sea otter. The resulting biological opinion signed June 16, 2006, concluded that fishing activities conducted under Amendment 11 and its implementing regulations were not likely to jeopardize the continued existence of the otter. As a result of this BO new reporting requirements and conservation measures were implemented within the CPS FMP to provide further protection for southern sea otters.

6.2 Fishery South of Pigeon Point

Information from at-sea observations of the CDFG and conversations with CPS fishers suggest that bycatch is not significant in these fisheries. However, some individuals have expressed concern that

game fish and salmon might constitute significant bycatch in this fishery. This is a reasonable concern, because anchovy and sardine are forage for virtually all predators, but there are no data to confirm significant bycatch of these species. CDFG port samples indicate minimal bycatch in the California fishery (Tables 9,10, and 11). The behavior of predators, which tend to dart through a school of prey rather than linger in it, and can more easily avoid encirclement with a purse seine, may help to minimize bycatch. Large predators such as blue sharks have been observed on occasion, but are by no means a common occurrence.

CDFG port samples collect information from CPS landings in Monterey and ports to the south. Biological samples are taken to monitor the fish stocks, and port samplers report incidentally caught fish. Reports of incidental catch by CDFG port samplers confirm small and insignificant landings of bycatch at California off-loading sites (Tables 9,10, and 11). These data are likely representatives of actual bycatch, because (as noted) fish are pumped from the sea directly into fish holds aboard the vessel. Fishers do not sort catch at sea or what passes through the pump, however, large fishes and other animals that cannot pass through the pump are not observed by the port sampler. Unloading of fish also occurs with pumps. The fish is either pumped into ice bins and trucked to processing facilities in another location or to a conveyor belt in a processing facility, where fish are sorted, boxed and frozen.

From 1985 through 1999, there were 5,306 CDFG port samples taken from the sardine and mackerel landings. From 1992 to 1999, incidental catch was reported on only 179 occasions, representing a 3.4% occurrence. Up to 1999 reports of incidental catch were sparse, and prior to 1992 none were reported. Earlier incidents of bycatch may not have been noted, because the harvest of anchovy and sardine was small, and only in recent years has the harvest of sardine increased. The incidental catch reported are primarily those species that are marketable and do not meet the definition of bycatch in the Magnuson-Stevens Act. During this period, unless an incidental species represented a significant portion of the load (at least a whole percentage point) the amount of the incidental catch was not recorded. Of the incidental catch reported from 1992 to 1999, the two most prevalent species were market squid at 79%, and northern anchovy at 12% incidence within samples (not by load composition). CDFG port sample information provides a useful database for determining the significance of bycatch in the CPS fishery off California (south of Pigeon Point).

In 2001, California wetfish port samplers began tallying undocumented incidental catch observed during landings in greater detail, and listed the occurrence of species in each sampled landing. The port sampling program records bycatch observed (i.e., presence or absence evaluations), but actual amounts of incidental catch have not been quantified to date. These observations are summarized for all areas in Table 9 for the last five years (2002 – 2006). The most commonly occurring animals in wetfish landings during 2006 were kelp, Pacific butterfish, white croaker, market squid, California scorpionfish, queenfish, bat ray, hornyhead turbot, northern anchovy, California halibut, Pacific bonito, cusk eel, California lizardfish, and specklefin midshipman. Forty-eight incidental species were observed in total.

In the Monterey area, incidental catch in wetfish landings was enumerated for the fourth year. In contrast to 2005, when only six incidental species were observed, there were thirty-two species observed incidental to finfish landings. The most commonly occurring species were northern anchovy, kelp, unspecified sanddabs, Pacific butterfish, white croaker, jacksmelt, marine algae (red, usually Turkish towel), eelgrass, American shad, sea stars, Pacific electric ray, starry flounder, sand sole, pink surfperch, big skate, plainfin midshipman, C-O sole, and bat ray. Because of staff shortages, the port complex of Santa Barbara/Ventura/Port Hueneme did not collect any CPS finfish samples in 2006.

Kelp (specifically holdfasts), crustaceans, flatfish, California scorpionfish, and elasmobranchs can serve as an indication of shallow set depth. Larger fish and animals are typically sorted for either market, personal consumption, or nutrient recycling in the harbor. To document bycatch more fully at sea, including marine mammal and bird interactions which port samplers are not privy to, NOAA Fisheries

has placed observers on a number of California purse seine vessels beginning in the summer of 2004 (see Sec. 11.6).

6.2.1 Incidental Catch Associated with the Market Squid Fishery

Because squid frequently school with CPS finfish, mixed landings of market squid and incidentally caught CPS finfish occur intermittently. In 2006, about eight percent of round haul squid landings included reported incidental catch of CPS species (Table 10). Squid also occurs as incidental catch in trawl fisheries for sea cucumber and ridgeback prawn, and in various other gears.

Although non-target catch in market squid landings is considered minimal, the presence of incidental catch (i.e., species that are landed along with squid that are not recorded through landing receipt processes [i.e., not sold] as is typically done for incidentally-caught species) has been documented through CDFG's port sampling program. The port sampling program records bycatch observed (i.e., presence or absence evaluations), but actual amounts of incidental catch have not been quantified to date. During 2006, incidental catch consisted of twenty-nine species (Table 11). Similar to previous years, most of this catch was other pelagic species, including Pacific sardine, Pacific mackerel, jack mackerel, squid egg cases, and northern anchovy. However, kelp and butterfish were also observed frequently.

Finally, the extent that squid egg beds and bottom substrate are damaged by recent purse seine operations and subsequently, contribute to significant mortality of early life stages is not definitively known at this time. However, information regarding the frequency of occurrence of squid eggs in squid landings port-side generally indicates that egg bed-related impacts have increased over the last several years. For example, from October 1998 through September 2001, bycatch of squid eggs had a 1.8% frequency of occurrence. In 2004, squid egg capsule bycatch was 5.1% statewide, a 0.2% increase over 2003 (4.9%). If bycatch of squid egg capsules continues to increase, some gear regulations may need to be implemented in the future (e.g., restrictions to the depth at which nets could be set, spatio-temporal closures of some shallow water habitats). In this context, further investigations regarding potential damage to squid spawning beds from fishery-related operations would likely benefit status-based analyses concerning the overall squid population off California, given eggs-per-recruit theory underlies the recently adopted squid assessment method. In 2006, CDFG will begin retaining egg capsules in order to determine first, if capsule age can be quickly determined in the laboratory, and second whether a measure of egg bed disturbance can be produced.

6.3 Fishery North of Point Arena

Since 2000, limited fisheries for Pacific sardines have occurred off the Pacific Northwest. Oregon and Washington closely monitor these fisheries and collect information about landings. Information on bycatch from Oregon and Washington is summarized in Tables 12 through 14.

6.3.1 Oregon

Oregon's directed fishery started approximately a month later than past years due to the late arrival of fish into northern Oregon waters. Spotter planes hired by the industry were used to locate fish and the first limited entry permitted landing into Oregon was made at the end of June. However, because of the small fish size and low oil content, major harvest activities did not start in earnest until early August. Approximately 3,000 mt per week were landed during the peak of the fishery from August to September, with an average of 43 mt per landing. The last landing occurred on October 18th and the 2006 Oregon sardine fishery saw the second-highest harvest on record since the current Oregon fishery began in 1999. Eighteen of the 26 permitted vessels landed a total of 35,648 mt of sardines. This a 21% decrease from the 45,110 mt landed in 2005. A total of 766 landings were made at seven different processors throughout Warrenton and Astoria. As in 2005, due to large amounts of small fish in the area, the majority of 2006

fishing activity took place off Washington rather than Oregon. Based on logbook data, 36% of sardine pounds landed were taken off Oregon and 64% off Washington. This is a similar ratio as in 2005. The exvessel value of sardine in the 2006 sardine fishery is roughly $3.54 million, with an average price per pound of $0.05. Sardine value varied from $0.02 to $0.09 per pound. Roughly 4,938 mt of sardines were valued at less than $0.02/lb.

Oregon's permit stipulations include allowing observers when requested and requiring a grate over the hold opening to sort out larger species of fish. Oregon did not have personnel dedicated to ride along on sardine vessels and observe bycatch of non-target species. Available staff was able to observe 14 of 766 trips (1.8%). Vessel skippers were also required to record all species caught in a logbook. We received 97% of the logbooks for trips in 2006 which accounted for 98% of the landings. A total of 1041 sets were made with 88% (913) of them successful for sardines. Positive sets averaged 56 mt.

Based on state fish tickets, observer and logbook data bycatch continues to be low. Various bycatch included mackerel, northern anchovy, sharks and salmon (Table 13). The estimated total catch of salmon for the fishery, based on log data, is 257 salmon and is the second lowest salmon incidental rate since 2000. An estimated 55% of all salmon were released alive. Based on log data, the incidental catch rates are 0.13 salmon caught per trip and 0.007 salmon per mt of sardine landed. The incidental catches of salmon during 14 observed trips with a total catch of 6 salmon in 2006 is 0.43 salmon per observed trip (two of the 14 trips did not catch fish). This does do not reflect the logbook estimates of 0.13 salmon per trip but the observed rate may be high due to a low number observational trips. The observed salmon per mt of sardine caught during the observed trips (0.010) is similar to the salmon per mt rate calculated from logbooks (0.007). Therefore, the logbooks may reflect the overall fishery incidental rate.

Incidental catch recorded on fishtickets consisted of 665 mt of Pacific mackerel, 1.4 mt of jack mackerel, 8.6 mt of northern anchovy, 1.2 mt of Pacific herring, 0.44 mt of American shad, 0.16 mt of thresher shark and 0.01 mt of sablefish for a total of 2% of the total catch (Table 14). The 2006 Pacific mackerel exvessel value in the sardine fishery was roughly $35,000.

6.3.2 Washington

The Washington fishery opened by rule on April 1, 2006, however, the first landing into Washington did not occur until July 7. The Department issued a total of 18 permits and 7 of the permit holders participated in the fishery. Three primary vessels accounted for 75% of the harvest. A total of 4,363.1 mt of sardines were landed into Washington. A total of 108 landings were made, 79 of which occurred within the months of August and September. A total of 127 sets were made, with 95% (121) of them successful. The average catch per successful set was 43.7 mt. Fishers and processors reported that sardines too small for available market demands constrained the 2006 fishery.

As part of the trial fishery and the experimental LE fishery regulations from 2000 through 2004, WDFW required fishers to carry at-sea observers, as well as provide financial support for this observer effort. Bycatch information was collected in terms of species, amount, and condition; observers noted whether the fish were released or landed, and whether alive, dead, or in poor condition. During the five-year period of the program, overall observer coverage averaged over 25% of both total landed catch and number of landings made. Based on observer data, the bycatch of non-targeted species in the Washington sardine fishery has been relatively low. Due to low bycatch levels, as well as a WDFW commitment to industry that an observer fee would only be assessed until bycatch in the sardine fishery could be characterized, the mandatory observer program was suspended at the conclusion of the 2004 season. Since a comparison of logbooks to observer data from 2000 to 2004 indicates that logbook data, in general, tends to be under-reported by 20% to 80% (Culver and Henry, 2006), salmon bycatch in the Washington sardine fishery for subsequent fishing years (2005 & 2006) has been calculated using the 5-year average bycatch rates from the observer program applied to total sardine catch. Bycatch and

mortality estimates of incidentally captured salmon for the past seven years, by species, based upon 2000-2004 observer information, is shown in Table 12.

6.4 Section References

Culver, M., and C. Henry, 2006. Summary Report of the 2005 Experimental Purse Seine Fishery for Pacific Sardine (Sardinops sagax). Washington Department of Fish and Wildlife, Montesano, Washington. 11 pp.

Hill, K. T., and P. R. Crone. 2004. Stock assessment of Pacific mackerel (Scomber japonicus) in 2004. Paper can be obtained from Pacific Fishery Management Council, 7700 NE Ambassador Place, Suite 200, Portland, OR 97220. 44 p. and Appendices.

McCrae, J., 2006. Oregon's Sardine Fishery, 2005 Summary. Oregon Department of Fish and Wildlife, Newport Oregon. 12. pp.

NMFS. 2005. Endangered Species Act Section 7 Consultation Biological Opinion. Implementation of the 2005 Harvest Guideline for Pacific sardine fishery under the Coastal Pelagic Species Fishery Management Plan. 501 Ocean Blvd. Long Beach, CA 90802. 40 pp.

7.0 CALIFORNIA LIVE BAIT FISHERY

7.1 Introduction

Through much of the 20th century, CDFG monitored the harvest of CPS finfish in the California live bait fisheries by requiring live bait logs. Northern anchovy and Pacific sardine are the main species in this fishery, with a variety of other nearshore or CPS taken incidentally. An estimated 20% of this harvest is sold to private fishing vessels, with the remainder to the CPFV fleet, where payment to the bait haulers is on a percentage basis of the CPFV revenues (Thomson *et al.* 1994). An example of the first Live Bait Log from 1939, termed a "Daily Bait Record" as printed for the State of California, Department of Natural Resources, and Division of Fish and Game can be found in Aplin (1942). The nature of the data collected were self-reported daily estimates of the number of "scoops" taken and sold by the fishermen, by species. Although this variety of data does not lend itself readily to rigorous scientific analysis, there are at least 63 years of data available, collected in a reasonably uniform manner that can serve as an index to this low volume, high value fishery.

Studies conducted by CDFG, NMFS, and others have examined this fishery, generally with a focus on the dominant species taken over a given period. As in the directed commercial CPS fisheries, the local availability of each CPS to the bait fleet changes periodically. Problems with the live bait data such as conversion factors for scoops of live fish to weight, the economics of the fishery, the character of the fleet, and compliance rates in submitting logs have been addressed in various agency reports (Maxwell 1974; and Thomson *et al.* 1991, 1992, 1994).

7.2 Legislative History

Alpin (1942) describes the earliest implementation of the live bait log program in 1939, which followed a pilot program of verbal interaction with the fishermen that established four categories describing the variation in abundance or availability of CPS to the recreational industry.

Live bait logs have been at different times mandated by state law, or submitted to the CDFG on a voluntary basis. In the early 1990s sardine became more prevalent in the bait fishery, and quotas were imposed on their annual take pursuant to management efforts to recover the sardine population off California. In 1995, CDFG lifted quotas restricting the quantity of sardines that the live bait industry could harvest. The sardine population along the California Coast was increasing toward a "recovered" level, as anchovy showed a decline, and sardines became the preferred live bait over anchovy. With the sardine quota lifted, the level of scrutiny on the harvest of the live bait industry lessened.

7.3 Logbook Information

The CDFG Live Bait Log (Title 14, Section 158, California Code of Regulations: DFG 158, October 1989) requires only the estimated scoops taken daily of either anchovy or sardine be reported, and a check mark be made if other particular species were taken, with space for comments related to fishing. Other species noted, but not consistently enumerated in the live bait harvest, include white croaker (*Genyonemus lineatus*), queenfish (*Seriphus politus*), Pacific and jack mackerels (*Scomber japonicus and Trachurus symmetricus*), and various small fishes collectively known as "brown bait" that can include juvenile barracuda (*Sphyraena argentea*), Osmerids, Atherinids, and market squid (Table 15). Estimates of ancillary catch data has been documented in earlier reports, and in CPS FMP Amendment 9.

The CDFG Pelagic Fisheries Assessment Unit at the SWFSC in La Jolla presently archives the CDFG live bait logs. Preliminary estimates of the reported total live bait harvest in California through 2006 have been appended to previously reported estimates from Thomson *et al.* (1991, 1992, 1994) (Table 16). The CDFG is in the process of an evaluation of the current logbook structure, reporting requirements, and the

information obtained in order to correct the data problems identified above, increase reporting compliance rates, and to better estimate the economics of the fishery.

7.4 Species Composition

The ratio of anchovy to sardine in the southern California live bait harvests shifts significantly as the populations of these two fish expand and contract over periods of years or decades. Much of the early reported harvest consisted of anchovy, following the collapse of the sardine fishery in the 1940s. Through the years 1994 to 2006 the proportion of anchovy in the total reported harvest ranged from a high of 58% in 1994 to a new low in 2004 of 5%. The proportion of sardine ranged from a low of 42% in 1994, to a new high of 95% in 2004 (Table 17).

7.5 References:

Alpin, J. A. 1942. Bait records in The commercial fish catch of California for the year 1940. Calif. Dept. Fish and Game Fish Bull. 58: 20-23.

Maxwell, W. D. 1974. A History of the California Live-Bait Fishing Industry. Calif. Dept. Fish and Game Marine Resources Technical Report 27. 24 p.

Thomson, C. J., T. Dickerson, G. Walls, and J. Morgan. 1991. Status of the California coastal pelagic fisheries in 1990. NMFS, SWFSC Admin. Rep. LJ-91-22: 27 p.

Thomson, C. J., T. Dickerson, G. Walls, and J. Morgan. 1992. Status of the California coastal pelagic fisheries in 1991. NMFS, SWFSC Admin. Rep. LJ-92-95:46 p.

Thomson, C. J., T. Bishop, and J. Morgan. 1994. Status of the California coastal pelagic fisheries in 1993. NMFS, SWFSC Admin. Rep. LJ-94-14.

Title 14, California Code of Regulations.

California Fish and Game Code. 2000. Lexis Law Publishing, Charlottesville, VA. 553 p.

California Fish and Game Code. 2001. Gould publications, Altamonte Springs, FL. 568 p.

8.0 VESSEL SAFETY CONSIDERATIONS

In implementing any form of management, it is imperative to evaluate whether the strategy will impact the safety of fishing activities. Roundhaul fisheries operating off the Pacific Coast are often limited by environmental conditions, most notably inclement weather. Given that the average age of permitted CPS vessels in the LE fishery is 32 years and many older vessels are constructed of wood, concern has been raised regarding their safety and seaworthiness. Implementing time/area closures or restricting transferability could impact safety by restricting the ability of an older vessel to be replaced with a newer, safer vessel or by promoting fishing activity during potentially hazardous weather conditions.

In January 2003, NMFS published final regulations to implement Amendment 10 to the CPS FMP, which allows LE permits to be transferred to another vessel and/or individual.

As discussed in Section 2.2, the Council recently implemented a long term allocation strategy for sardines under Amendment 11 to the CPS FMP. This action is not expected to have a substantial adverse impact on public health or safety. However, for Pacific Northwest fisheries, the action is anticipated to enhance safety at sea by advancing the reallocation date from October 1 to September 15. Waiting until October 1 to reallocate has the potential of inducing fishermen 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 in this time of year.

9.0 SUMMARY OF STOCK STATUS AND MANAGEMENT RECOMMENDATIONS

The CPS FMP distinguishes between "actively managed" and "monitored" species. Actively managed species (Pacific sardine and Pacific mackerel) are assessed annually. Harvest guidelines (HGs), fishing seasons, and other management controls are used. Other CPS species (northern anchovy, jack mackerel, and market squid) are monitored to ensure their stocks are stable, but annual stock assessments and Federal fishery controls are not used.

While this document focuses on U.S. fisheries, many CPS stocks are distributed coastwide, hence, catch information from Mexican fisheries is of interest. See Table 18 for information on commercial harvest of CPS finfish landed into Ensenada, Mexico (1978-2001) (Table 15, García and Sanchéz 2003).

9.1 Actively Managed Species

9.1.1 Pacific Sardine

Hill *et al.* (2006; see Appendix 1) summarized the status of the Pacific sardine resource off the U.S. Pacific Coast and northern Baja California, Mexico. Pacific sardine landings for the fisheries off the Pacific Northwest (Oregon-Washington-Canada), California, and Ensenada (Mexico) totaled 152,852 mt in 2005-06 (July-June 'biological year'). In calendar year 2006, landings in California (51,029 mt) increased considerably from the previous year (38,193 mt in 2005; Table 20). Pacific Northwest landings were lower in 2006 (35,665 mt) than in 2005 (51,831 mt; Table 20). The U.S. fisheries (California-Oregon-Washington) are regulated using a quota-based HG management scheme. Since the mid-1990s, actual landings from the U.S.-based fisheries have been less than the recommended HGs (Table 20). For example, the 2006 U.S. landings of sardine comprised ~73% of the HG established for that year (86,694 mt out of 118,937 mt). Total annual harvest of Pacific sardine by the Mexico fishery is not regulated, but there is a minimum legal size limit of 165 mm (García and Sánchez 2003). The Ensenada fishery landed 41,441 mt in 2006. See Table 21 for a retrospective of West Coast Pacific sardine landings, 1981-2006.

Estimated stock biomass (ages 1+) from the assessment conducted in 2006 (Hill et al. 2006; see Appendix 1) indicated the sardine population has remained at a relatively high abundance level, with an estimate of roughly 1.32 million mt as of July 2006. Estimated recruitment (age-0 fish) in 2006 (4.9 billion fish) declined markedly from the peak estimate in 2003 (>14 billion). Further, given the inherent uncertainty surrounding estimated recruitment in recent years, definitive determinations regarding the apparent 'plateau' reached by the sardine population should be interpreted accordingly. See Table 19 for biomass and recruitment time series (1982-2006) from the most recent assessment.

Finally, estimates of Pacific sardine biomass from the 1930s (Murphy 1966 and MacCall 1979) indicate that the sardine population may have been more than three times its current size before the stock decline and eventual collapse observed in the 1960s. Considering the historical perspective, it would appear that the sardine population, under favorable oceanographic conditions, may still have growth potential beyond its current size. However, per capita recruitment estimates show a downward trend in recruits per spawner in recent years, which may be indicative of a stock that has reached a threshold under current environmental conditions.

9.1.1.1 Harvest Guideline for 2007

The Pacific sardine HG established for the U.S. fishery in calendar year 2007 was 152,564 mt. The MSY control rule defined in Amendment 8 of the CPS FMP (Option J, Table 4.2.5-1, PFMC 1998) was used to

calculate the HG. The formula, intended to prevent overfishing and maintain relatively high and consistent catch levels over a long-term horizon, is as follows:

$$HG_{2007} = (BIOMASS_{2006} - CUTOFF) \bullet FRACTION \bullet DISTRIBUTION,$$

where: HG_{2007} is the total U.S. HG in calendar year 2007, $BIOMASS_{2006}$ is the estimated July 1, 2006 stock biomass (ages 1+) from the current assessment (1,319,072 mt), CUTOFF is the lowest level of estimated biomass at which harvest is allowed (150,000 mt), FRACTION is an environment-based percentage of biomass above the CUTOFF that can be harvested by the fisheries (see below), and DISTRIBUTION (87%) is the percentage of $BIOMASS_{2006}$ assumed in U.S. waters. The value for FRACTION in the MSY control rule for Pacific sardine is a proxy for F_{msy} (i.e., the fishing mortality rate that achieves equilibrium MSY). Given F_{msy} and the productivity of the sardine stock have been shown to increase when relatively warm-ocean conditions persist, the following formula has been used to determine an appropriate (sustainable) FRACTION value:

$$FRACTION \text{ or } F_{msy} = 0.248649805(T^2) - 8.190043975(T) + 67.4558326,$$

where T is the running average sea-surface temperature at Scripps Pier, La Jolla, California during the three preceding seasons (July-June). Ultimately, under Option J (PFMC 1998), F_{msy} is constrained and ranges between 5% and 15%. Based on the T values observed throughout the period covered by this stock assessment, the appropriate F_{msy} exploitation fraction has consistently been 15% since implementation of this control rule. This remains the case under current oceanic conditions (T_{2006} = 18.11 °C). The 2007 USA harvest guideline (152,564 mt) is 28% higher than the 2006 harvest guideline (118,937 mt), and 51,197 mt greater than the largest recent harvest by the U.S. fisheries (101,367 mt in 2002; Table 20).

9.1.2 Pacific Mackerel

The Pacific mackerel population that inhabits waters off California and northern Baja California (Ensenada, Mexico) has continually declined in abundance since the late 1970s. The coastwide harvest of this species was characterized by a generally similar decreasing pattern over this time frame, although the decline was not as consistent year-to-year or as precipitous as that observed for population biomass. In particular, during the 1990s, the directed fisheries off California had average annual landings of roughly 37,000 mt, whereas since 2002, average yearly landings have decreased nearly 90 percent (5,000 mt per year). This pattern of declining yields generally characterized all of the fisheries, including U.S. commercial and recreational fleets, as well as the commercial fishery of Mexico. Total annual harvest of Pacific mackerel by the Mexico fishery is not regulated, but there is a minimum legal size limit of 255 mm.

Determination of the status of the Pacific mackerel population for the 2007 fishing/management year (i.e., a fishing season that spans from July 2007 through June 2008) was based on the 'forward estimation' assessment model ASAP (see sections 3.1 and 3.2 and Dorval *et al*. 2007; see Appendix 2).

Pacific mackerel biomass peaked in the late 1970s at approximately 680,000 mt, declining steadily to 67,000 mt in 2002. Presently, the biomass (ages $\geq$ 1 year old fish) is forecasted to be 359,290 mt as of July 1, 2007 (Dorval et al. 2007; Appendix 2 of this document). The peak biomass observed during this time largely resulted from historically high levels of recruitment from the mid to late 1970s. These recruitment pulses occurred after a decade of extremely low biomass observed from the early-1960s to early-1970s. The decline in biomass since the early 1980s has resulted from a steady decline in year class strength and relatively low reproductive success (recruits-per-spawning stock biomass) since that time.

9.1.2.1 Harvest Guideline for 2007-2008

In Amendment 8 to the CPS FMP (PFMC 1998), the recommended MSY-based harvest control rule for Pacific mackerel is:

$$HG_{2007} = (\text{TOTAL STOCK BIOMASS}_{2007} - \text{CUTOFF}) \bullet \text{FRACTION} \bullet \text{STOCK DISTRIBUTION},$$

where HG_{2007} is the highest harvest guideline or ABC for all U.S. fisheries for the 2007 fishing year (July 2007 - June 2008), TOTAL STOCK $BIOMASS_{2007}$ is the estimated stock biomass in 2007 (i.e., 359,290 mt; ages $\geq$1), CUTOFF is the lowest level of estimated biomass at which harvest is allowed, FRACTION is an environment-based percentage of biomass above the CUTOFF that can be harvested by the fisheries, and STOCK DISTRIBUTION is the percentage of TOTAL STOCK $BIOMASS_{2007}$ in U.S. waters. CUTOFF (18,200 mt), FRACTION (30%), and STOCK DISTRIBUTION (70%) are currently 'fixed' terms in the harvest control rule. See section 4.0 (PFMC 1998) and MacCall *et al.* 1985 for analyses applicable to parameters included in the harvest control rule.

Therefore, for the 2007-2008 fishery:

$$HG_{2007} = (359{,}290 \text{ mt} - 18{,}200) \bullet 0.30 \bullet 0.70 = 71{,}629 \text{ mt},$$

Based on this new assessment and the Pacific mackerel harvest control rule in the Coastal Pelagic Species Fishery Management Plan (FMP), the Council recommended an ABC of 71,629 metric tons (mt) and an HG for the Pacific mackerel directed fishery of 40,000 mt for the fishery season from July 1, 2007 through June 30, 2008. Setting the HG for the directed fishery substantially below the ABC is recommended as a precautionary measure in response to uncertainty associated with changes to assessment modeling parameters and the reference in the FMP that the domestic fishery appears to be market limited to roughly 40,000 mt.

Should the directed fishery attain the HG of 40,000 mt, the Council recommended that NMFS close the directed fishery and establish a 45% incidental catch allowance when Pacific mackerel are landed with other CPS, except that up to one mt of Pacific mackerel could be landed without landing any other CPS. Any incidental harvest of Pacific mackerel should be applied against the remaining ABC of 31,629 mt.

The Council may schedule an inseason review of the Pacific mackerel fishery for the March or April 2008 Council meeting, towards a possible consideration of either releasing a portion of the incidental allotment to the directed fishery or further constraining incidental landings to ensure total harvest remains below the ABC.

9.2 Monitored Species

The monitored species category of the CPS FMP includes northern anchovy, jack mackerel, and market squid. Figure 1 illustrates distribution of northern anchovy and jack mackerel eggs for areas surveyed off southern California, April 2005.

9.2.1 Northern Anchovy

The most recent complete assessment for northern anchovy was described in Jacobson *et al.* (1995). California landings of northern anchovy began to increase in 1964, peaking in 1975 at 143,799 mt. After 1975, landings declined. From 1983 to 1999, landings did not exceed 6,000 mt per year until 2000. California landings of northern anchovy reported by Pacific Coast Fisheries Information Network (PacFIN) totaled 11,752 mt in 2000; 9,187 mt in 2001; 4,650 mt in 2002; 1,676 mt in 2003; 6,877 mt in 2004; 68 mt in 2005; and increased to 12,788 mt in 2006 (mostly caught in the Monterey area). There are

no reported landings of northern anchovy in Oregon from 1981 through 2001, with 3.1 mt reported in 2002; 39 mt in 2003; 13 mt in 2004; 170 mt in 2005, and only 9 mt in 2006. Washington reported about 42 mt in 1988, but didn't land more until 2003 when 214 mt was landed; no landings occurred from 2004 through 2006. Through the 1970s and early 1980s, Mexican landings increased, peaking at 258,700 mt in 1981 (Table 19). Mexican landings decreased to less than 2,324 mt per year during the early 1990s, with a spike of 17,772 mt in 1995, primarily during the months of September through November. Catches in Ensenada decreased to 4,168 mt in 1996; and remained at less than 3500 mt through 2003. Anchovy landings in Ensenada increased to 5,604 in 1995; however, no landings were reported (or were not available) for 2002, 2004 or 2006.

Jacobson *et al.* (1995, 1997) summarized the disposition of northern anchovy landed in California. Beginning in 1965, when a reduction quota was first established separately from non-reduction uses, statistics for each use became available. All non-reduction uses are combined and include fresh, frozen, processed for human consumption, and dead bait. Mexican landings data first appear for 1962.

Total age 1+ biomass of northern anchovy rose in the early 1970s to a maximum estimate of 1,598,000 mt in 1973, and decreased to 392,000 mt in 1994. Further estimates of spawning biomass (age 1+) peaked in 1975 at 1,069,000 mt, and declined to 388,000 mt in 1994. Fishing mortality estimates in 1990 to 1994 did not exceed 0.03%, and declined to zero in 1993 and 1994.

9.2.2 Jack Mackerel

Until 1999, jack mackerel were managed under the Council's Pacific Coast groundfish FMP. Jack mackerel are now a monitored species under the CPS FMP. There is no evidence of significant exploitation of this species on the Pacific Coast of North America, and accordingly, there have not been regular stock assessments or efforts to collect biological information. Management efforts to collect fishery-dependent age composition data, such as the CDFG Port Sampling Program, are in place for the two actively managed CPS (Pacific sardine and Pacific mackerel), but not for jack mackerel, aside from samples taken prior to 1995. Previous discussions of jack mackerel, such as in the groundfish FMP, were brief:

> Available data indicate that the current, nearly un-used spawning biomass is about one million mt, the natural mortality rate is in the range of 0.1 to 0.2, a fishery located north of 39° N latitude would harvest fish that are mostly older than age 16, and the long-term potential yield for this age range is 19,000 mt. The [Council's Groundfish Management Team] recommends continuation of the 52,600 mt ABC on the basis of a constant exploitation rate (equal to natural mortality) applied to estimates of current biomass of ages 16 and over. Biomass and short-term yield are expected to slowly decline under this level of exploitation. If this level of exploitation reduces long-term biomass to approximately 30% to 50% of the current biomass, the long-term average yields for this age range would be near 19,000 mt. The GMT recommended close tracking of this fishery and the age composition of the harvested fish, particularly if catches are begun outside the exclusive economic zone. (PFMC, 1998.)

Currently, most landings of jack mackerel are incidental to Pacific sardine and Pacific mackerel in California; however, pure landings do occur sporadically. In California, CDFG landing receipts for jack mackerel totaled 1,269 mt in 2000, 3,624 mt in 2001(these may be somewhat over-reported – the jump in jack mackerel landings in 2001 coincided with an early closure of the Pacific mackerel HG), 1,006 mt in 2002, dropped to only 189 mt in 2003, 1,199 mt in 2004, and dropped back to 253 mt in 2005. Landings of jack mackerel in the California Pelagic Wetfish fishery through the decade of the 1990s reached a maximum of 5,878 mt in 1992, and averaged under 1,900 mt over 1990-2000. During the previous decade, California landings ranged from a high of 25,984 mt in 1982 to a low of 9,210 mt in 1985.

Oregon reported 161 mt in 2000, 183 mt in 2001, 9 mt in 2002, 74 mt in 2003, and 126 mt in 2004, 70 mt in 2005, and 5 mt in 2006. Washington reported 11.5 mt in 2002, 1.8 mt in 2003, and none in 2004, 2005, or 2006.

Mason (2001) concluded that spawning biomass estimates of the past were inadequate. Anecdotal evidence suggests that the spawning biomass may be large in California waters, but test fishing found the adult fish too scattered for economical harvest. Most of the contemporary catch is in small aggregations of young fish along rocky shores, or schooling with Pacific sardines or Pacific mackerel.

9.2.3 Market Squid

The CDFG is currently monitoring the market squid fishery through a state-based management plan including an annual landings cap and various spatial/temporal constraints, such as weekend closures and the establishment of marine protected areas (CDFG 2005). In addition, the Egg Escapement method and simulation modeling currently serve as informal assessment tools (see Appendix 3 in PFMC (2002) and section 4.3.4), within a research context only, to evaluate population dynamics and biological reference points (say MSY-related) regarding this species. However, "active" management may need to be considered in the future if fishery operations change substantially (e.g., spatially expand, harvest high amounts of immature squid, etc.) and/or ongoing modeling efforts identifying areas of concern regarding egg escapement levels associated with commercial fishery sample data.

Currently, limited information is available on market squid population dynamics, and data on its historical and current levels of absolute biomass are unavailable. A STAR Panel was convened in May 2001 to evaluate assessment methods for use in the management of the squid fishery and to assess the appropriateness of defining MSY for this species. Preliminary attempts to estimate biological reference points (e.g., MSY, F_{MSY}, and B_{MSY}) from surplus production models were unsuccessful. In view of the difficulties in determining traditional estimates of MSY for market squid, and given new, albeit limited, information on reproductive biology was available, the STAR Panel focused attention on reference points based on "egg escapement" and its related proxies, such as F. Egg escapement is defined here as the proportion of a female squid's potential lifetime fecundity is spawned, on average, before being harvested in the fishery. An Egg Escapement method (see Appendix 3 in PFMC (2002)) based on conventional yield and spawning biomass "per recruit" theories was fully developed by the Stock Assessment Team and the STAR Panel and subsequently, supported by the SSC, the CPSMT, and the CPSAS.

In practical terms, the Egg Escapement approach can be used to evaluate the effects of fishing mortality (F) on the spawning potential of the stock, and in particular to examine the relation between the stock's reproductive output and potential levels of fishing mortality that results in MSY (F_{MSY}). However, it is important to note that this approach does not provide estimates of historical or current total biomass and thus, a definitive yield (i.e., quota or ABC) cannot be determined at this time. Ultimately, the Egg Escapement method can be used to assess whether the fleet is fishing above or below an a priori determination of sustainable exploitation, and in this context can be used as an effective management tool.

The STAR Panel provided general recommendations regarding analytical methods (i.e., the Egg Escapement method) and left determination of specific model configurations and other management-related parameters to the CPSMT. In this context, the CPSMT provided guidance concerning four critical areas of the Egg Escapement method, which were necessary to develop a pragmatic framework for monitoring/managing this species in the future, (1) selection of a "preferred" model scenario; (2) selection of a "threshold" level of egg escapement that can be considered a warning flag when tracking the status of the population; (3) fishery operations in (and after) El Niño/Southern Oscillation (ENSO) events; and finally, (4) important management-related constraints. Readers interested in details regarding assessment

methods, STAR-related discussion and conclusions, and CPSMT decisions should refer to papers presented in Appendix 3 of the PFMC (2002).

Data collection programs and subsequent laboratory analysis has continued to the present in attempts to complement baseline information that served as the foundation for developing the Egg Escapement method described above. That is, as generally discussed in previous CPS-related documents [e.g.,, Appendix 3 of the PFMC (2002)] further work surrounding the Egg Escapement assessment approach has addressed the following: (1) collecting much needed samples from the fisheries to bolster the original source of reproductive data that was relied upon initially when developing the overall Egg Escapement method: additional sample data now span from 1999 to 2005; (2) critically evaluating spatial/temporal patterns of the overall fishery through stratified sampling (spatially and temporally) and subsequent analysis including data from 1999 to 2005; (3) in concert with the CPSMT, preparing preliminary analysis-related schedules that could be accommodated within the Council forum and meet the stipulations required for 'monitored' species (also see Section 6.1.1); and (4) conducting simulation modeling to further examine the relationship between critical biological reference points (i.e., 'threshold' levels) and absolute levels of squid population abundance off southern California–results from this research were presented in a working paper distributed (via CPSMT discussions) in the fall of 2006.

To date, preliminary analyses, including estimates of fishing mortality, egg escapement, and abundance estimates have been conducted on a regional/quarterly basis for data from 1999-2006. Furthermore, sensitivity analyses based on varying levels of influential (assumed) parameters, namely natural mortality and egg-laying rates, have also been completed for the same time period. Finally, simulation modeling has been performed to examine levels of fishing mortality and proportional egg escapement (eggs-per-recruit, relative to a maximum value, profiled across levels of fishing mortality) that are most likely to be sustainable, i.e., produce levels of recruitment that sustain long-term population abundance. Preliminary results from these analyses were presented to the CPSMT in fall 2006, and a working paper will be submitted to the CPSMT for review in fall 2007 (see Section 4.3.4).

9.2.3.1 California's Market Squid Fishery

In 2001, legislation transferred the authority for management of the market squid fishery to the California Fish and Game Commission (Commission). Legislation required that the Commission adopt a market squid fishery management plan and regulations to protect and manage the squid resource. In August and December of 2004, the Commission adopted the Market Squid Fishery Management Plan (MSFMP), the environmental documentation, and the implementing regulations, which went into effect on March 28, 2005, just prior to the start of the 2005/2006 fishing season which started April 1.

The goals of the MSFMP are to provide a framework that will be responsive to environmental and socioeconomic changes and to ensure long term resource conservation and sustainability. The tools implemented to accomplish these goals include: (1) setting a seasonal catch limit of 107,047 mt (118,000 short tons) to prevent the fishery from over-expanding, (2) maintaining monitoring programs designed to evaluate the impact of the fishery on the resource, (3) continuing weekend closures that provide for periods of uninterrupted spawning, (4) continuing gear regulations regarding light shields and wattage used to attract squid, (5) establishing a restricted access program that includes provisions for initial entry into the fleet, permit types, permit fees, and permit transferability that produces a moderately productive and specialized fleet, and (6) creating a seabird closure restricting the use of attracting lights for commercial purposes in any waters of the Gulf of the Farallones National Marine Sanctuary. Under this framework, the MSFMP provides the Commission specific guidelines for making management decisions. The Commission has the ability to react quickly to changes in the market squid population off California and implement management strategies without the need for a full plan amendment. The MSFMP framework structure was also designed achieve the goals and objectives of the Marine Life Management Act and to be consistent with the management outlined in CPS FMP Amendment 10.

In 2006, the market squid fishery was the largest fishery in the state, with landings estimated at 49,145 mt. This is 12% less than in 2005 (55,606 mt) and 59% less than the record high set in 2000 (118,827 mt). The exvessel price ranged from $88-$1,102/mt, with an average of $569/mt. The 2006 exvessel value was approximately $27.2 million, a 14% decrease from 2005 ($31.6 million).

The fishing permit season for market squid runs from April 1 through March 31 the following year. During the 2006/2007 season (as opposed to the 2006 calendar year), 31,786 mt were landed, 55% less than the 2005/2006 season (70,972 mt). The northern fishery continued to experience a decline in catch levels during the 2006/2007 season. Only 628 mt was landed, a 70% decrease from the 2005/2006 season and a 96% decrease from the 2003/2004 season (17,399 mt). The southern fishery once again surpassed the northern fishery with 31,158 mt landed (98% of the catch) during the 2006/2007 season. However, this was a 55% decrease from the 2005/2006 season (68,925 mt). The southern fishery was centered mainly around the northern Channel Islands (Santa Cruz, Santa Rosa), in stark contrast to the 2005/2006 season which was predominantly centered farther south around Santa Catalina Island.

Market squid remains an important international commodity. Squid is used domestically for food and bait and is packed and processed for export. In 2006, approximately 22,562 mt of market squid were exported for a value of $28.8 million. Asian countries were the main export market with China and Japan taking about 49% of the trade.

9.3 References

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10.0 EMERGING ISSUES

This section describes current and future issues that may need to be addressed relative to FMP species and management in general.

10.1 Pacific Sardine

In April 2003, the Council adopted an interim (through 2005 fishing season) allocation framework that seeks optimal use of the annual Pacific sardine HG with minimal impacts on all sectors of the West Coast sardine fishing industry and communities. The CPSMT generally agreed that the impacts of the interim allocation scheme used to partition the Pacific sardine HG were primarily socioeconomic. However, the development of a long-term allocation framework would require that the biological-based implications of different allocation schemes be further evaluated to provide management guidance regarding how the operations of the sectoral fisheries might affect the dynamics of the sardine population at large. Thus, a comprehensive analysis was conducted regarding alternative allocation frameworks, particularly in terms of long-term socioeconomic impacts; results from this analysis were presented to the Council over a series of meetings from 2004-2005.

Further, although this allocation issue primarily influenced socioeconomic factors associated with the fishery, broad biological questions arise, given the relation between this species' biology and how quotas are implemented spatially and temporally across the state-based fishery sectors of southern California, northern California, and PNW:

- What are impacts to the coastwide sardine resource from a fishery that targets older, mature fish vs. a fishery that targets younger, immature fish?
- Are there indications of changes in sardine maturity rates (i.e., delayed maturity) in the southern fisheries resulting from density-dependent factors?
- Are there potential refinements to the sardine assessment and/or harvest control rule in response to new biological information?

To address these questions, biological information has been collected from NMFS research surveys off the PNW. That is, the PNW research surveys have occurred in July 2003, March and July 2004, and the first coastwide survey occurred in April 2006. These Southwest Fisheries Science Center-based surveys included sardine acoustic trawl and Continuous Underway Fish Egg Sampler surveys off the coast of Oregon and Washington. The surveys are designed to fill major gaps in knowledge of sardine populations, by measuring the age structure and reproductive rates, and assessing the extent the fishery is dependent on migration and local production of sardine. The primary objective of the surveys is to accumulate additional biological data regarding the northern expansion of the population into waters off the PNW and ultimately, to include data directly (or indirectly) in ongoing stock assessments of both Pacific sardine and Pacific mackerel.

Finally, many review bodies (CPSMT, CPSAS, SSC, and STAR-related) encourage the continuance of synoptic research surveys on an annual basis to ensure survey results are representative of the entire range of this species (as well as other CPS of concern). That is, developing and conducting such a survey will necessarily require considerable additions to current budgets, staff, and equipment (see Section 11).

10.2 Pacific Mackerel

At this time, emerging issues for Pacific mackerel are similar to those described for Pacific sardine.

As the Pacific mackerel abundance estimate has decreased over the past several years, the CPSMT discussed overfishing concerns related to this fishery. Based on the current modeling approach and the harvest control rules in the FMP, there is, currently, not a concern related to overfishing of Pacific mackerel. Historically, intermittent periods of high recruitment have supported relatively high amounts of fishing pressure. However, more recently, protracted periods of generally lower recruitment have contributed to lower levels of spawning stock and total biomass. Fishing pressure is largely influenced by availability of the resource to the fishery, as well as market factors. The U.S. West Coast Pacific mackerel fishery targets the mackerel in the northern parts of its overall range and inshore waters. It is possible that mackerel abundance could be strong south of the U.S. border and/or offshore waters beyond the range of the U.S. West Coast CPS fleet. Also, as in other CPS fisheries, market dynamics greatly influence total harvest. While mackerel is desirable, it is not as important to the CPS fishery as Pacific sardine and market squid. In addition, most commercial harvest of Pacific mackerel occurs within the area under LE as defined by the CPS FMP. Under the LE system, overall effort on Pacific mackerel is constrained by a cap on harvest capacity. Thus, given the reasons above, the level of fishing effort relative to mackerel abundance should not give rise to immediate concern. However, model estimates of the spawning stock and recruitment relationship indicate little to no reproductive-related compensation at low levels of spawning stock biomass. Thus, issues surrounding recruitment-based overfishing should be monitored closely.

Overfishing for Pacific mackerel is defined in the CPS FMP as harvest exceeding ABC for two concurrent years. Recent landings have been well below ABC. Also, the cutoff value in the harvest control rule serves as a proxy for determining if mackerel is overfished. The cutoff value equates to a biomass estimate of 18,200 mt. The current biomass estimate of 112,700 mt is well above the cutoff value.

10.3 Market Squid

It has been observed that the northern fishery (Monterey Bay) that exploits the squid resource off California may not operate in a similar manner as observed in the southern fishery, e.g., patterns of fishing in the day vs. the night (see Sections 6.1.1 and 9.2.3) and gear-related impacts to squid egg beds on or near the ocean floor. The differences between the two fisheries may have considerable influence on the state-wide monitoring programs currently in place, as well as results generated from the assessment method recently adopted for this marine resource. This issue should not be considered a trivial one, given that due to limited amounts of sample information, the population analysis recently developed for this species (i.e., the Egg Escapement method, see Section 9.2.3) was strictly based on rather broad stock distribution assumptions. That is, the recent observations regarding differences in fishery operations north and south of Point Conception necessarily dictate more detailed data collection programs and subsequent analysis to ensure that spatio-temporal patterns related to the squid population(s) are considered when assessing the overall status of the exploited resource. In this context, over the next year, the CPSMT will discuss, develop, and bring forth to the Council a workable monitoring/analysis schedule that is based on more detailed (stratified spatially and temporally) analysis of the accumulated data to date. Since fall 2003, the SWFSC and CDFG have coordinated research efforts that involve simulation modeling that generally focus on important biological reference points included in the Egg Escapement method, such as the relationship between reproductive-based thresholds and absolute population abundance levels for this species (see also Section 4.3.4). Results from this research were presented to the CPSMT in fall 2006, and will be summarized in working paper (to be reviewed by the CPSMT) in fall 2007.

10.4 Management Issues

Emerging management issues include market squid overfishing definition, international CPS fisheries, and standardized bycatch reporting, including at-sea observers in California-based CPS fisheries.

10.4.1 Bycatch Reporting and Observer Programs

The States of Oregon and Washington have had observers on vessels indicating there has not been a bycatch problem to the north (see Section 6.3). While CDFG port sampling suggests there is not a bycatch problem, port sampling alone is insufficient to demonstrate with assurance that there is not a bycatch problem. Therefore, NMFS has placed observers on some California-based CPS vessels in a pilot project intended to provide better information on the extent to which there is bycatch in this fishery (see Section 6.1.1 and Section 11.6). NMFS will work with the CPSMT to consider the need for additional field observations including possible expansion of observer coverage to Oregon and Washington since state observer programs there have been discontinued, and possibly consider alternative ways to address any bycatch issues identified, as required by the Magnuson-Stevens Act.

10.4.2 Market Squid Overfishing Definition

With respect to market squid, it appears that there is a need to address further the prospective use of the egg escapement value as a proxy for MSY and as a value for determining if the stock is overfished or is subject to overfishing (i.e., minimum stock size and maximum fishing mortality thresholds). Based on the most recent review for the annual NMFS Report to Congress on the status of fish stocks, NMFS notified the Council that the current FMP language is ambiguous (see Section 4.3.4). NMFS is currently working to revise National Standard 1 Guidelines to meet the new provisions of the reauthorized MSA. The Council may direct the CPSMT to consider this issue and advise the Council as to possible revisions once any changes to the Guidelines have been proposed.

10.4.3 International CPS Fisheries

There has been interest in coastwide management for the Pacific sardine fishery, which would entail a more consistent forum for discussion between the U.S. and Mexico. Recent U.S.-Mexico bilateral meetings indicated willingness from Mexico to continue scientific data exchange and cooperation on research, and engage in discussions of coordinated management. Mexico suggested that the Trinational Sardine Forum would be a good venue for starting that discussion. Canada will host the next Trinational Sardine Forum in October of 2006. Mexico also agreed to host a Mexico-U.S. scientific meeting to discuss CPS. The meeting is slated to take place in La Paz, Mexico in June of 2006.

11.0 RESEARCH AND DATA NEEDS

Several recent developments highlight the need to enhance current assessment procedures in order to meet the requirements of the FMP. These include (1) the development of a high-volume fishery for Pacific sardine in Oregon and Washington; (2) increasing recognition of the importance of CPS as principal forage for many salmon and groundfish stocks that are currently at low abundance levels; (3) the importance of CPS biomass estimates to the Council's annual determination of allowable coastal pelagic harvests; and (4) the need to monitor status of the market squid stock using data-intensive techniques. A pressing need exists for stock assessments that accurately reflect the reproductive characteristics of CPS stocks throughout their geographic range and for additional stock assessment personnel in NMFS and the three Pacific Coast states to carry out these assessments.

In addition to research and data needs presented in this chapter, in December 2006, the Council adopted its comprehensive research and data needs document for 2007-2008. The document includes a chapter dedicated to CPS matter and can be obtained by contacting the Council office or by visiting the Council web page.

The highest priority research and data needs for CPS are:

- Gain more information about the status of CPS resources in the north using egg pumps, trawl and sonar surveys, and spotter planes.

- Develop a coastwide (Mexico to British Columbia) synoptic survey of sardine and Pacific mackerel biomass; i.e., coordinate a coastwide sampling effort (during a specified time period) to reduce "double-counting" caused by migration.

- Develop a formal review process for the harvest control rules for Pacific sardine and Pacific mackerel. Currently this review is not part of the stock assessment process.

- Increase fishery sampling for age structure (Pacific sardine and Pacific mackerel) in the northern and southern end of the range. Establish a program of port sample data exchange with Mexican scientists.

- Evaluate the role of CPS resources in the ecosystem, the influence of climatic/oceanographic conditions on CPS, and define predatory-prey relationships.

- Routinely, collect detailed cost-earnings data to facilitate analyses for long-term changes to the sardine allocation structure.

11.1 Pacific Sardine

The Trinational Sardine Forum (Mexico, U.S., and Canada) met again in 2005 in Ensenada, Mexico to discuss issues related to the rapidly recovered sardine population and fishery along the West Coast of North America. The Forum has identified several issues for priority work. Issue 1 is developing cooperative relationships with the fishing industry to provide fishing vessel platforms for critical studies of the life history of sardine. Issue 2 is to standardize fishery-dependent data collection among agencies, particularly age and size data, and improve exchange of this data in summarized form to stock assessment scientists. Issue 3 is the need to assemble mutually compatible fishery assessments off of the West Coast of Mexico, the U.S., and Canada to form a baseline of stock status and variability of possibly more than one interbreeding stock of sardines, or a temperature-derived phenotype with radically heterogeneous population parameters influencing HGs. Coastwide sea surveys which include egg and adult samples are

viewed as a top priority. Otolith microchemistry and DNA analyses are promising tools to improve our knowledge of sardine stock structure.

11.2 Pacific Mackerel

California's Pacific mackerel fishery has been sampled by CDFG for age composition and size-at-age since the late-1920s. The current stock assessment model incorporates a complete time series of landings and age composition data from 1929 onward. Ensenada (Baja California) landings have rivaled California's over the past decade, however, no biological information is readily available from Mexico's fishery. Landings are accounted for in the assessment, but size and age composition are assumed to be similar to the San Pedro, California fishery. Like sardine, there is a need to establish a program of port sample data exchange with Mexican scientists (INP, Ensenada) to fill this major gap in the stock assessment.

Fishery-independent survey data for measuring changes in mackerel recruitment and spawning biomass are generally lacking. The current CalCOFI sampling pattern provides information on mackerel egg distributions in the Southern California Bight, the extreme northern end of the spawning area. Mexican scientists have conducted a number of egg and larval surveys off of Baja California in recent years (e.g., IMECOCAL program). Access to this data would enable us to continue the historical CalCOFI time series, which begins in 1951. This information could be directly incorporated into the assessment model. Night-light surveys for newly recruited Pacific mackerel should be re-instituted in the Southern California Bight. Surveys following protocols employed during CDFG Sea Survey cruises (1950-1988) could allow splining the new recruitment data set to the historical time series. The new time series would represent the only recruitment index in the mackerel stock assessment and would strengthen the ability to accurately forecast age zero and total stock abundance for each coming fishing season.

Pacific mackerel biomass has been declining since the early 1980s, but recent El Niño events have concurrently extended their northern range to British Columbia. Pacific mackerel are caught incidentally in the Pacific whiting and salmon troll fisheries. Pacific mackerel are regularly caught in triennial survey trawls off the Pacific Northwest. A simple reporting system is needed to document incidental take of mackerel in fisheries to the north. Presence-absence information may allow us to detect southward movement or further decreases in biomass.

11.3 Market Squid

Currently, there exists only limited understanding of market squid population dynamics, which has hampered assessing the status (health) of this valuable marine resource found off California. General information concerning important stock- and fishery-related parameters suggests maximum age is less than one year, and the average age of squid harvested is roughly six to seven months. However, at this time, there is considerable variability (uncertainty) surrounding many of these estimated parameters. In this context, the CPSMT strongly advises that extensive monitoring programs continue for this species, including tracking fishery landings, collecting reproductive-related data from the fishery, and obtaining fishermen-related logbook information.

Although some information exists on coastwide squid distribution and abundance from fishery-independent midwater and bottom trawl surveys largely aimed at assessing other finfish species, there is no reliable measure of annual recruitment success beyond information obtained from the fishery. Given fishing activity generally occurs only on shallow-water spawning aggregations, it is unclear how fluctuations in landings are related to actual population abundance and/or availability to the fishery itself. That is, the general consensus from the scientific and fishery management communities is that squid do inhabit, to some degree, greater depths than fished by the fleet, however, species' range suppositions

remain largely qualitative at this point in time. Better information on the extent and distribution of spawning grounds along the U.S. Pacific Coast is needed, particularly, in deep water and areas north of central California. Additionally, fecundity, egg survival, and paralarvae density estimates are needed from different spawning habitats in nearshore areas and oceanographic conditions associated with the population. Furthermore, information describing mechanisms and patterns of dispersal of adults, as well as paralarvae, along the coast is required to clarify how local impacts might be mitigated by recruitment from other areas inhabited by this short-lived species.

Although some fishery effort information is now being collected with a newly-implemented logbook program in the State of California, the continuation of this program is essential to provide estimates of relative abundance (e.g., CPUE time series) in the future. Continuation and/or establishment of annual surveys using midwater trawls, bottom trawls, remotely operated vehicles (ROVs), and satellite and aerial surveys would also provide useful information for developing alternative indices of abundance other than those derived from logbook data.

Potential impacts to EFH-related issues would most likely arise in concert with fishing activity by the purse-seine fleet on spawning aggregations in shallow water when gear potentially makes contact with the sea floor (see Section 6.1.1). In this regard, there are two areas of potential concern that have not been quantified to date: (1) damage to substrate where eggs may be deposited; and (2) damage or mortality to egg masses from contact with the gear itself. The CDFG is currently working on research methods to evaluate egg stage of squid egg capsules collected in fishery landings to determine the how long the egg capsule had been laid before being taken by the fishery.

Currently, market squid fecundity estimates, based on the Egg Escapement method (see Section 9.2.3), are used to assess the status of the stock and evaluate biological reference points, such as MSY. The Egg Escapement method is based on several assumptions, (1) immature squid are not harvested; (2) potential fecundity and standing stock of eggs are accurately measured; (3) life history parameters are accurately estimated (e.g., natural mortality, egg laying rate); and (4) instantaneous fishing mortality (F) translates into meaningful management units. Given the inherent uncertainty associated with these assumptions, it is imperative that each receive further scrutiny in the future, through continuation of rigorous sampling programs in the field that generate representative data for analysis purposes, as well as further histological evaluations in the laboratory and more detailed assessment-related work. For example, data collected through the CDFG port sampling program currently in place will provide information on the age and maturity stages of harvested squid. Also, the CDFG logbook program should be maintained (and bolstered) for purposes of developing alternative tools for assessing the status of the resource. Further, laboratory work concerning general mantle condition, especially the rate of mantle 'thinning,' will likely benefit the current understanding of squid life history and subsequently, help improve the overall assessment of this species. Finally, other biological-related parameters that are currently poorly understood generally surround spawning and senescence (e.g., life history strategies concerning spawning frequency, the duration of time spent on spawning grounds, and the period of time from maturation to death).

11.4 Live Bait Fishery

Although tonnage of CPS and squid taken in the live bait fishery is minimal compared with volume taken in the commercial fishery, better estimates of live-bait landings and sales of sardine, anchovy and squid is essential as it pertains to estimates of the overall economic value of these fisheries. Outdated estimates have previously shown that the value of the live-bait fishery for sardine has equaled that of the commercial catch. In the case of squid, there is no documentation of the dramatic expansion of live-bait sales in southern California made by commercial light vessels in recent years.

The live bait fishery supplies product for several recreational fisheries along the Pacific Coast, primarily in southern California, but as far north as Eureka. Live bait catch is generally comprised of both Pacific sardine and northern anchovy; the predominant species depends on biomass levels and local availability. Recent landings estimates range between 5,000 mt and 8,000 mt annually statewide, with effort increasing in summer months. However, these estimates are based only on logbooks provided by a limited number of bait haulers, and estimates provided by the CPFV industry. Since the sale of live bait in California is not permitted in a manner similar to that used for the commercial sale of CPS, estimates of tonnage and value are imprecise. Therefore, no estimates of volume or value for the sale of market squid for live bait are available at this time. However, the CDFG will reexamine reporting requirements and data needs to better estimate landings and value.

11.5 Socioeconomic Data

Economic analyses of management actions affecting coastal pelagic fisheries requires detailed, representative cost and earnings data for the sardine harvesters and processors making up each fishery sector. Experience with the long-term allocation of the Pacific HG emphasizes this need, and moreover underscores the necessity to collect this data on a routine basis. Collecting such data as needed to address an issue at hand makes them suspect in a number of regards, particularly in terms of strategic bias.

A step in this direction has been taken with the advent of a bycatch observer program for coastal purse seine vessels participating in CPS fisheries. Observers will be collecting economic data on the vessel's fishing operations during observed trips. The key will be designing the program to provide observer coverage that satisfies the requirements in terms of obtaining representative bycatch data as well as vessel economic data. This data collection effort would have to be supplemented with an onshore complement to obtain comprehensive economic data for harvesting vessels.

A parallel effort will need to be taken with regard to processors. To be able to fully evaluate the economic impacts of proposed management actions detailed, representative cost and earnings data for west coast sardine processors will also be needed on a routine basis. This will entail periodic surveys of CPS processors to collect representative economic data on their processing operations.

11.6 Observer Program

Bycatch in the California contingent of the CPS fishery has been qualitatively monitored by the CDFG's dockside monitoring program since the mid-1980s (Sweetnam and Laughlin, Pers. Comm., 2005). CDFG only gives qualitative descriptions of bycatch meaning they do not document the amount or quantity of bycatch but rather only document the species or type of bycatch encountered at the fish processing plant. In order to confirm bycatch rates derived from CDFG's dock-side sampling, NMFS started a pilot observer program in July 2004 on the California purse seine fishing vessels landing CPS in the LE fishery. The pilot observer program's main focus is to gather data on total catch and bycatch, and on interactions between their fishing gear and protected species such as marine mammals, sea turtles, and sea birds. See Section 6.1.1 for additional information and preliminary results from this program.

11.7 References

Sweetnam, D., and L. Laughlin. 2005. Personal Communication, January 11, 2005. California Department of Fish and Game, La Jolla, California. Email address: Dale.Sweetnam@noaa.gov.

12.0 ECONOMIC STATUS OF WASHINGTON, OREGON, AND CALIFORNIA CPS FISHERIES IN 2006

This section summarizes economic data presented in tables 25-35 and figures 2-8. Pacific Coast landings of CPS totaled 156,192 mt in 2006, a 1% decrease from 2005. Market squid landings, all in California, were 49,070 mt in 2006, down 12% from 2005. Pacific sardine landings at 86,452 mt in 2006 were virtually unchanged from 2005 (85,791 mt). The exvessel value of all CPS landings was $38.8 million in 2006, down 14% from 2005 (2005 converted to 2006 dollars). Market squid accounted for 31%, and Pacific sardine 55% of total Pacific coast CPS landings in 2006. Landings of Pacific mackerel increased 82%, and landings of northern anchovy rose 14% from 2005 to 2006. Real exvessel market squid revenues (2006 $) decreased 17% from 2005. The decrease in market squid landings was accompanied by a 6% decrease in exvessel price from $581 to $548 per mt (2006 $). There was a 5% increase in aggregate CPS finfish landings from 2005; exvessel revenue also fell 5%, with a corresponding overall finfish exvessel price decline of 10% in 2006. In 2006, market squid made up almost 7% of the exvessel value of total Pacific Coast landings, and CPS finfish accounted for almost 3%. California accounted for 74% of coastwide CPS landings in 2006, up from 67% in 2005, Oregon 23% down from 29%, and Washington 3% down from 4% in 2005.

California sardine landings were 46,438 mt in 2006 up 34% from 2005, 34,552 mt. Market squid ranked second in exvessel value among California commercial fisheries in 2006, with exvessel revenue of $26.8 million, $17.8 million less than that for Dungeness crab, the most valuable California fishery in 2006. Landings of Pacific sardine ranked sixth highest in California exvessel value in 2006 at $5.1 million. California Pacific mackerel landings were 5,381 mt in 2006, up 80% from 2005. California landings of Northern anchovy were 12,788 mt in 2006, up 14% from 2005.

Oregon's landings of Pacific sardine decreased 21% in 2006, from 45,110 mt to 36,651 mt. Sardine generated $3.9 million in exvessel revenue for Oregon in 2006, 4% of the state's total exvessel revenue, ranking it seventh behind Dungeness crab in total exvessel value. Washington landings of Pacific sardine decreased 35% from 6,721 mt in 2005 to 4,363 mt in 2006. With exvessel revenue less than 1% of the Washington total in 2006, sardine ranked 19th behind Dungeness crab in exvessel value.

Oregon landings of Pacific mackerel increased from 318 mt in 2005 to 665 mt in 2006. Washington landings of Pacific mackerel increased from 24 mt in 2005 to 41 mt in 2006, while anchovy landings fell from 164 mt to 161 mt.

In 2006, the number of vessels with Pacific Coast landings of CPS finfish was 191, up from 188 in 2005. With the increase in vessels and an increase in total CPS finfish landings, finfish landings per vessel, 561 mt in 2006, increased 4% from 2005. Of the CPS finfish vessels active in 2006, 14% depended on CPS finfish for the largest share of their 2006 exvessel revenues. From 2005 to 2006, the number of vessels with Pacific Coast landings of market squid increased from 173 to 196, with 36% of these vessels dependent on market squid for the largest share of their total 2006 exvessel revenue. Market squid landings were 250 mt per vessel in 2006, down 22% from 2005. Market squid total revenue shares for vessels that depend mainly on market squid have been higher on average than average finfish total revenue shares for vessels that depend primarily on CPS finfish, suggesting that market squid vessels tend to be more specialized than CPS finfish vessels. By far, roundhaul gear accounted for the largest share of total CPS landings and exvessel revenue by gear in 2006; dip net gear was a far distant second.

The major West Coast processors and buyers of CPS finfish are concentrated in the Los Angeles, Santa Barbara-Ventura, Monterey and Oregon-Washington Columbia River port areas. The exvessel markets for market squid are mainly in the Los Angeles, Santa Barbara-Ventura and Monterey port areas.

In 2006, 47,224 mt of market squid were exported through West Coast customs districts with an export value of $58.5 million; an 8% increase in quantity, and a 5% increase in the real value of West Coast market squid exports from 2005. The primary country of export was China, 56% of the total, which received 26,477 mt, 5% more than the quantity exported to China in 2005. Eighty-three percent of market squid exports went to China and four additional countries: Switzerland (4,201 mt), Japan (3,136 mt), Philippines (3,009 mt) and Spain (2,479 mt). Domestic sales were generally made to restaurants, Asian fresh fish markets, or for use as bait.

In 2006, 72,201 mt, of sardines were exported through West Coast customs districts up 7% from 2005. Sardine exports were valued at $48.4 million in 2006, down 14% from 2005. Almost 85% of sardine exports were in the frozen form, the balance were in the preserved form. Australia was the primary export market in 2006, receiving 23,630 mt, up 42% from 2005, representing 33% of total west coast sardine exports in 2006. Japan was second with 20,999 mt, 29% of the total, a 32% decrease from 2005. West Coast Pacific sardine exports to Australia are primarily for feed in Australia's bluefin tuna ranching operations. Japanese demand for Pacific sardine is for both human consumption and use as bait in its longline fisheries. Domestic use of Pacific sardine is primarily as canned product for human consumption.

TABLE 1. HISTORY OF COUNCIL ACTIONS

- The Pacific Fishery Management Council (Council) initiated development of the fishery management plan (FMP) for Northern anchovy in January of 1977. The FMP was submitted to the U.S. Secretary of Commerce (Secretary) in June of 1978. Regulations implementing the FMP were published in the *Federal Register* on September 13, 1978 (43*FR*40868). Subsequently, the Council has considered seven amendments.

- The first amendment changed the method of specifying the domestic annual harvest for Northern anchovy and added a requirement for an estimate of domestic processing capacity and expected annual level of domestic processing. Approval for this amendment was published in the *Federal Register* on July 18, 1979 (44*FR*41806).

- The second amendment, which became effective on February 5, 1982, was published in the *Federal Register* on January 6, 1982 (47*FR*629). The purpose of this amendment was to increase the domestic fishing fleet's opportunity to harvest the entire optimum yield (OY) of Northern anchovy from the U.S. Exclusive Economic Zone (EEZ) by releasing, inseason, unutilized portions of the Northern quota.

- During the spring of 1982, the Council considered a third amendment that divided the quota for Northern anchovy into two halves and made release of the second half conditional on the results of a mid-season review of the status of the stock. The methods proposed for the mid-season assessment were considered too complex to implement, and the amendment was not approved.

- The fourth amendment, which had two parts, was published in the *Federal Register* on August 2, 1983 (48*FR*34963) and became effective on August 13, 1983. The first part abolished the five inch size limit in the commercial fishery and established a minimum mesh size of 5/8 inch for Northern anchovy. The mesh size requirement did not become effective until April 1986 in order to give the fleet additional time to comply without undue economic hardship. The second part established a mid-season quota evaluation that was simpler in design than the method proposed in Amendment 3.

- The fifth amendment in 1983 incorporated advances in scientific information concerning the size and potential yield of the central subpopulation of Northern anchovy. Additionally, the fifth amendment included changes to a variety of other management measures. Two or more alternative actions were considered in each of seven general categories; (1) OY and harvest quotas; (2) season closures; (3) area closures; (4) quota allocation between areas; (5) the reduction quota reserve; (6) minimum fish size or mesh size; and (7) foreign fishing and joint venture regulations. The alternatives for the fifth amendment were reviewed by the Council during 1983. The final rule was published in the *Federal Register* on March 14, 1984 (49*FR*9572).

- In 1990, the sixth amendment implemented a definition of overfishing for Northern anchovy consistent with National Standard 7, and addresses vessel safety (56*FR*15299, April 16, 1991).

- The Council began developing the seventh amendment as a new FMP for coastal pelagic species (CPS) on a motion from National Marine Fisheries Service (NMFS) and California in 1990. A complete draft was available in November of 1993, but the Council suspended further work, because NMFS withdrew support due to budget constraints. In July of 1994, the Council decided to proceed with the plan through the public comment period. NMFS agreed with the decision on the condition that the Council also consider the options of dropping or amending the anchovy FMP. Thus, four principal options were considered for managing CPS (1) drop the anchovy FMP (no Federal or Council involvement in CPS); (2) continue with the existing FMP for anchovy (status quo); (3) amend the FMP for Northern anchovy; and (4) implement an FMP for the entire CPS fishery. In March of 1995, the Council decided to proceed with the FMP for CPS. Final action was postponed until June 1995 when the Council adopted a draft plan that had been revised to address comments provided by NMFS and the SSC. Amendment 7 was submitted to the Secretary, but rejected by NMFS, Southwest Region, as being inconsistent with National Standard 7. NMFS announced its intention to drop the FMP for Northern anchovy (in addition to FMP=s other species) in the *Federal Register* on March 26, 1996 (61*FR*13148), but the action was never completed.

- Development of Amendment 8 began in June, 1997 when the Council directed the Coastal Pelagic Species Plan Development Team (CPSPDT) to amend the FMP for Northern anchovy to conform to the recently revised Magnuson-Stevens Fishery Conservation and Management Act and to expand the scope of the FMP to include the entire CPS fishery. Amendment 8 was partially approved by the U.S. Secretary of Commerce on June 10, 1999, and final regulations were published on December 15, 1999 (64*FR*69888). The FMP was implemented on January 1, 2000.

- At its meeting in June 1999, the Council directed its Coastal Pelagic Species Management Team (CPSMT) to recommend appropriate revisions to the FMP and report to the Council the following September. A public meeting of the CPSMT was held in La Jolla, California, on August 3 and 4, 1999, and August 24, 1999, and a meeting was held between the CPSMT and the Coastal Pelagic Species Advisory Subpanel (CPSAS) on August 24, 1999. At its September 1999 meeting, the Council gave further direction to the CPSMT regarding maximum sustainable yield (MSY) for squid. At its March 2000 meeting, the Council asked the CPSMT for a more thorough analysis of the alternatives proposed for establishing MSY for squid and for bycatch. At a public meeting in La Jolla, California, on April 20 and 21, 2000, the CPSMT reviewed comments from the Council, the Council's Scientific and Statistical Committee (SSC) and prepared additional material for establishing MSY for squid based on spawning area.

- The Council distributed Amendment 9 for public review on July 27, 2000. At its September 2000 meeting, the Council reviewed written comments, received comments from its advisory bodies, and heard public comments, and decided to submit only two provisions for Secretarial review. Based on testimony concerning MSY for squid, the Council decided to include in Amendment 9 only the bycatch provision and a provision providing a framework to ensure that Indian fishing rights are implemented according to treaties between the U.S. and the specific tribes. Since implementation of the FMP, the CPS fishery has expanded to Oregon and Washington. As a result, the FMP must discuss Indian fishing rights in these areas. These rights were not included in the FMP; and the

Council decided to address this issue in Amendment 9. The Council decided to conduct further analysis of the squid resource and will prepare a separate amendment that addresses OY and MSY for squid.

- The U.S. Secretary of Commerce approved Amendment 9 on March 22, 2001.

- In April 2001, the Council adopted the capacity goal and transferability provisions recommended by the CPSMT for inclusion in Amendment 10. The Council directed the CPSMT to develop an amendment to the CPS FMP that will include the capacity goal, provisions for permit transferability, a process for monitoring fleet capacity relative to the goal, and a framework for modifying transferability provisions as warranted by increases or decreases in fleet capacity. The amendment will also address determination of OY and MSY for market squid.

- In November 2001, the Council reviewed the findings of the market squid stock assessment review (STAR) workshop and endorsed the egg escapement approach as a proxy for squid MSY, as recommended by the market squid STAR Panel and CPSMT.

- In March 2002, the Council adopted draft Amendment 10 to the CPS FMP for public review.

- In June 2002, the Council adopted Amendment 10 to the CPS FMP.

- December 30, 2002, the Secretary of Commerce approved Amendment 10. On January 27, 2003 NMFS issued the final rule and regulations for implementing Amendment 10.

- September 2002, the Council requested NMFS take emergency action to reallocate the unharvested portion of the harvest guideline (HG) prior to October 1. The Council believed this action would minimize negative economic impacts in the northern fishery without causing market disruptions in the southern fishery. On September 26, 2002, through an emergency rule, NMFS reallocated the remaining Pacific sardine HG and reopened the northern subarea fishery, which had been closed on September 14, 2002.

- September 2002, the CPSAS recommended the Council initiate a regulatory or FMP amendment and direct the CPSMT to prepare management alternatives for revising the sardine allocation framework. The Council directed the CPSMT to review CPSAS recommendations for revising the allocation framework. A public meeting of the CPSMT was held on October 8, 2002. The CPSMT discussed information needs and prospective analyses for developing allocation management alternatives.

- On October 30, 2002, the Council initiated a regulatory amendment to address allocation problems.

- The CPSMT met January 30-31, 2003 to analyze various alternatives for revising the allocation framework and developed recommendations for Council consideration.

- At the March 2003 Council meeting, the SSC and CPSAS reviewed analyses of the proposed management alternatives for sardine allocation. Based on the advisory body recommendations and public comment, the Council adopted five allocation management alternatives for public review.

- At the April 2003 Council meeting, the CPSAS reviewed the five management alternatives and developed recommendations for the Council. The Council took final action on the regulatory amendment. The proposed action adopted by the Council would (1) change the definition of subarea A and subarea B by moving the geographic boundary between the two areas from 35° 40' N latitude to 39° N latitude, (2) move the date when Pacific sardine that remains unharvested is reallocated to Subarea A and Subarea B from October 1 to September 1, (3) change the percentage of the unharvested sardine that is reallocated to Subarea A and Subarea B from 50 percent to both subareas to 20 percent to Subarea A and 80 percent to Subarea B, and (4) reallocate all unharvested sardine that remains on December 1 coastwide. The Council's intent is for this interim revision to the allocation framework be in effect for the 2003 and 2004 seasons. The allocation regime could be extended to 2005 if the 2005 HG were at least 90 percent of the 2003 HG.

- The regulatory amendment for allocation of the Pacific sardine HG was approved on August 29, 2003. The final rule implementing the regulatory amendment was published September 4, 2003 (68*FR*52523).

- At the November 2003 Council meeting, the Council adopted a HG of 122,747 metric tons (mt) for the 2004 Pacific sardine fishery, within an incidental catch allowance of up to 45 percent. This HG is based on a biomass estimate of 1,090,587 mt. Per the revised allocation framework, on January 1, the HG will be allocated 33 percent to the northern subarea and 66 percent to the southern subarea, with a subarea dividing line at Point Arena, CA. The final rule implementing the HG was published December 3, 2003 (68*FR*67638).

- At the June 2004 Council meeting, the Council adopted the following management measures for the July 2004-June 2005 Pacific mackerel fishery: 1) total fishery HG of 13,268 mt; 2) directed fishery guideline of 9,100 mt; and 3) set-aside for incidental catches of 4,168 mt and an incidental catch rate limit of 40 percent when mackerel are landed with other CPS species, except that up to one mt of Pacific mackerel can be landed without landing any other CPS. The Council also requested NMFS track utilization of the directed fishery guideline and advise the Council at the March 2005 meeting if additional action (e.g. a mop-up fishery) is warranted. Additionally, the Council initiated an amendment to the CPS FMP with the primary purpose of allocating the coastwide Pacific sardine HG. The Council discussed a schedule that included final Council action on the FMP amendment by June 2005, which would enable implementation by January 2006. To facilitate development of the amendment, the Council directed the CPSAS to draft a range of alternative sardine allocation scenarios. The Council also directed the CPSMT to formally review the CPS FMP issues raised by NMFS to identify issues that could be addressed through amendment to the CPS FMP and if they could be addressed in the short-term or would require more extensive time to complete.

- At the September 2004 Council meeting, the Council adopted STAR Panel reports for Pacific mackerel and Pacific sardine. New assessment methodologies will be used for management of the 2005 sardine fishery and the 2005-2006 Pacific mackerel fishery. Relative to the CPS FMP amendment process, the Council requested the CPSAS to narrow the current broad range of Pacific Sardine allocation alternatives for Council consideration at the November 2004 meeting. The Council received information from the CPSMT about their consideration of several FMP-related issues raised by NMFS, and directed Council staff to communicate to NMFS the Council plans for further review of CPS essential fish habitat (EFH).

- At the November 2004 Council meeting, the Council adopted a HG of 136,179 mt for the 2005 Pacific sardine fishery. This HG is based on a biomass estimate of 1.2 million mt. Per the FMP allocation framework, on January 1 the HG will be allocated 33 percent to the northern subarea and 66 percent to the southern subarea with a subarea dividing line at Point Arena, California. Additionally, the Council directed the CPSMT and staff to begin development of Amendment 11 to the CPS FMP to include alternatives for sardine allocation, as recommended by the CPSAS as well as two additional alternatives The Council anticipates reviewing the draft analyses and considering formal adoption of allocation alternatives at the April 2005 Council meeting.

- At the March 2005 Council meeting, the Council reviewed a progress update from NMFS Southwest Region on a proposed course of action for management of krill in the West Coast EEZ and National Marine Sanctuaries under the auspices of the CPS FMP. The Council approved a draft outline for an alternatives analysis.

- At the April 2005 Council meeting, the Council approved a range of alternatives for the allocation of Pacific sardine for further analysis and public review. After reviewing preliminary results on the range of alternatives approved for analysis in November 2004 and reports of the CPS advisory bodies, the Council eliminated two alternatives (Alternatives 2 and 5) from further consideration. The Council recommended that the CPSMT follow the advice of the SSC as they complete the analysis of allocation alternatives for public review.

- At the June 2005 Council meeting, the Council addressed three CPS matters, pacific mackerel HG and management measures, long term Pacific sardine allocation and CPS EFH.

  Regarding Pacific mackerel, the Council adopted the new assessment and the following management measures for the July 2005-June 2006 Pacific mackerel fishery: 1) total fishery HG of 17,419 mt; 2) directed fishery guideline of 13,419 mt; and 3) set-aside for incidental catches of 4,000 mt and an incidental catch rate limit of 40 percent, when mackerel are landed with other CPS, except that up to one mt of Pacific mackerel can be landed without landing any other CPS. The Council requested NMFS track utilization of the directed fishery guideline and advise the Council at the March 2006 meeting if release of the incidental set-aside is warranted.

Regarding Pacific sardine allocation, the Council took final action on a long-term allocation of the annual Pacific sardine HG. The Council approved a modified version of Alternative 3, which provides the following allocation formula for the non-tribal share of the HG:

1. A seasonal allocation structure with 35 percent of the HG to be allocated coastwide on January 1.
2. 40 percent of the HG, plus any portion not harvested from the initial allocation, to be reallocated coastwide on July 1.
3. On September 15 the remaining 25 percent of the HG, plus any portion not harvested from earlier allocations, to be reallocated coastwide.

The Council also recommended a review of the allocation formula in 2008.

The Council adopted the 2005 Stock Assessment Fishery Evaluation (SAFE) document as drafted by the CPSMT including the required review of CPS EFH. The Council recommended no changes to the existing definition of EFH because the CPSMT review identified no new information on which to base EFH modifications. The Council agreed with the research needs identified by the CPSMT in the 2005 SAFE and stressed the importance of coastwide sardine research and harvest policy review.

- At the November 2005 Council meeting, the Council adopted a Pacific sardine HG of 118,937 mt for the 2006 season to be managed under the terms of the allocation arrangements under Amendment 11.

  The Council also approved a range of krill fishing alternatives for public review and additional analysis, including a preliminary preferred alternative to identify krill as a prohibited species in the EEZ. The proposed krill management measures will be implemented as Amendment 12 to the CPS FMP. At the June 2005 Council meeting, the Council addressed three CPS matters, pacific mackerel HG and management measures, long term Pacific sardine allocation and CPS EFH.

- At the March 2006 Council meeting, the Council took final action adopting CPS FMP Amendment 12 to prohibit harvest of all species of krill in the U.S. EEZ. Additionally, the Council adopted an EFH designation for all species of krill that extends the length of the West Coast from the shoreline to the 1,000 fm isobath and to a depth of 400 meters. No habitat areas of particular concern were identified.

- At the June 2006 meeting, the Council adopted the new assessment model and the following management measures for the July 2006-June 2007 Pacific mackerel fishery: a total fishery HG of 19,845 mt, a directed fishery guideline of 13,845 mt; and a set-aside for incidental catches of 6,000 mt and an incidental catch rate limit of 40 percent when mackerel are landed with other CPS, except that up to one mt of Pacific mackerel can be landed without landing any other CPS.

- At the November 2006 meeting, the Council adopted a HG of 152,654 mt for the 2007 Pacific sardine fishery. This HG is based on a biomass estimate of 1.32 million mt. Per

the FMP allocation framework adopted under Amendment 11, the Pacific sardine HG is allocated seasonally with 35 percent of the HG to be allocated coastwide January 1, 40 percent of the HG, plus any portion not harvested from the initial allocation reallocated coastwide July 1; and the remaining 25 percent of the HG, plus any portion not harvested from earlier allocations, to be reallocated coastwide September 15. The Council also recommended a 45 percent incidental catch rate be allowed for other CPS fisheries in the event that a seasonal allocation be taken before the end of an allocation period or the HG is taken before the end of the year.

Additionally, the Council reviewed the draft Terms of Reference for the CPS stock assessment process scheduled for 2007 and directed Council staff to revise the document as recommended by the CPSAS, the CPSMT, and the SSC and distribute it for public review. The Council is scheduled to approve a final document in March 2007 for use during the review of full assessments for Pacific mackerel and Pacific sardine in May and September, respectively.

- At the March 2007 Council meeting, the Council approved the final Terms of Reference for the 2007 CPS stock assessment process. The final document was posted on the Council website and distributed for use during the review of full assessments for Pacific mackerel and Pacific sardine May 1-3 and September 18-21 respectively.

- At the June 2007 Council meeting, he Council adopted the new assessment model and the following management measures for the July 2007-June 2008 Pacific mackerel fishery: an acceptable biological catch (ABC) for U.S. fisheries of 71,629 mt, a directed fishery HG of 40,000 mt, and in the event the directed fishery reaches 40,000 mt, the directed fishery will revert to an incidental-catch-only fishery with a 45 percent incidental catch allowance when Pacific mackerel are landed with other CPS, except that up to 1 mt of Pacific mackerel could be landed without landing any other CPS. The Council and NMFS will track the 2007-08 Pacific mackerel fishery and will recommend an in-season review of the mackerel season for the March 2008 Council meeting, if needed, with the possibility of re-opening the directed fishery as a routine action. Additionally, the Council directed Council staff to send a letter to the U.S. State Department requesting increased coordination with Mexico on the exchange of data for the improvement of international management of CPS.

January 25, 2000. NMFS published HGs for Pacific sardine and Pacific mackerel for the fishing year beginning January 1, 2000. A HG of 186,791 mt was established for Pacific sardine, based on a biomass estimate of 1,581,346 mt. The HG was allocated for Subarea A, which is north of 35° 40' N latitude (Point Piedras Blancas) to the Canadian border, and for Subarea B, which is south of 35° 40' N latitude to the Mexican border. The northern allocation was 62,264 mt; the southern allocation was 124,527 mt. The sardine HG was in effect until December 31, 2000, or until it was reached and the fishery closed. A HG of 42,819 mt was established for Pacific mackerel based on a biomass estimate of 239,286 mt. The HG for Pacific mackerel was in effect until June 30, 2000, or until it was reached and the fishery closed. (65*FR*3890)

September 11, 2000. NMFS announced the annual HG for Pacific mackerel in the EEZ off the Pacific Coast. Based on the estimated biomass of 116,967 mt and the formula in the FMP, a HG of 20,740 mt was calculated for the fishery beginning on July 1, 2000. This HG is available for harvest for the fishing season July 1, 2000, through June 30, 2001. (65*FR*54817)

November 1, 2000. NMFS announced the closure of the directed fishery for Pacific mackerel in the EEZ off the Pacific Coast on October 27, 2000. The FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on a formula in the FMP and to close the fishery when the HG is reached. The HG of 20,740 mt is projected to be reached before the end of the fishing season on June 30, 2001, which requires closing the directed fishery and setting an incidental harvest limit for Pacific mackerel so that the harvest of other CPS will not be further restricted. The intended effect of this action is to ensure conservation of the Pacific mackerel resource. For the reasons stated here and in accordance with the FMP and its implementing regulations at 50 CFR 660.509, the directed fishery for Pacific mackerel will be closed October 27, 2000, after which time no more than 20 percent by weight of any landing of Pacific sardine may be Pacific mackerel. (65*FR*65272)

November 17, 2000. NMFS published a correction to the Pacific mackerel closure which was published on November 1, 2000. In 65*FR*65272, make the following correction: On page 65272, in the third column, under the heading SUPPLEMENTARY INFORMATION, the last sentence is corrected to read as follows: "For the reasons stated here and in accordance with the FMP and its implementing regulations at 50 CFR 660.509, the directed fishery for Pacific mackerel will be closed October 27, 2000, after which time no more than 20 percent by weight of a landing of Pacific sardine, northern anchovy, jack mackerel, or market squid may consist of Pacific mackerel." (65*FR*69483)

December 27, 2000. NMFS announced the annual HG for Pacific sardine in the EEZ off the Pacific Coast for the January 1, 2001, through December 31, 2001, fishing season. This HG has been calculated according to the regulations implementing the FMP. The intended effect of this action is to establish allowable harvest levels for Pacific sardine off the Pacific Coast. Based on the estimated biomass of 1,182,465 mt and the formula in the FMP, a HG of 134,737 mt was calculated for the fishery beginning January 1, 2001. The HG is allocated one third for Subarea A, which is north of 35° 40' N latitude (Point Piedras Blancas) to the Canadian border, and two thirds for Subarea B, which is south of 35° 40' N latitude to the Mexican border. Any unused resource in either area will be reallocated between areas to help ensure that the OY will be achieved. The northern allocation is 44,912 mt; the southern allocation is 89,825 mt. (65*FR*81766)

February 22, 2001. NMFS announced changes to the restriction on landings of Pacific mackerel for individuals participating in the CPS fishery and for individuals involved in other fisheries who harvest small amounts of Pacific mackerel. The incidental limit on landings of 20 percent by weight of Pacific mackerel in landings of Pacific sardine, northern anchovy, jack mackerel, and market squid remains in effect; however, CPS fishermen may land up to 1 mt of Pacific mackerel even if they land no other species from the trip. Non CPS fisherman may land no more than 1 mt of Pacific mackerel per trip. After the HG of 20,740 mt is reached, all landings of Pacific mackerel will be restricted to 1 mt per trip. This

action is authorized by the FMP and is intended to ensure that the fishery achieves, but does not exceed, the HG while minimizing the economic impact on small businesses. For the reasons stated here, no fishing vessel may land more than 1 mt of Pacific mackerel per fishing trip, except that fishing vessels with other CPS on board may land more than 1 mt of Pacific mackerel in a fishing trip if the total amount of Pacific mackerel on board the vessel does not exceed 20 percent by weight of the combined weight of all CPS on board the vessel. (66*FR*11119)

March 30, 2001. NMFS announced the closure of the fishery for Pacific mackerel in the EEZ off the Pacific Coast at 12:00 a.m. on March 27, 2001. The FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on a formula in the FMP and to close the fishery when the HG is reached. The HG of 20,740 mt has been reached. Following this date no more than 1 mt of Pacific mackerel may be landed from any fishing trip. The effect of this action is to ensure conservation of the Pacific mackerel resource. (66*FR*17373)

July 25, 2001. NMFS announced a HG of 13,837 mt for Pacific mackerel for the fishing season July 1, 2001 through June 30, 2002. A directed fishery of 6,000 mt was established, which, when attained, would be followed by an incidental allowance of 45 percent of Pacific mackerel in a landing of any CPS. If a significant amount of the HG remained unused before the end of the fishing season on June 30, 2002, the directed fishery would be reopened. This approach was taken because of concern about the low HG's potential negative effect on the harvest of Pacific sardine if the fishery for Pacific mackerel had to be closed. The two species occur together often and could present incidental catch problems. (66*FR*38571)

November 27, 2001. NMFS announced the closure of the directed fishery for Pacific mackerel in the EEZ off the Pacific Coast at 12:00 noon on November 21, 2001. For the fishing season beginning July 1, 2001, 6,000 mt of the 13,837 mt HG was established for a directed fishery. More than 6,000 mt has been landed. Therefore, the directed fishery for Pacific mackerel was closed on November 21, 2001, after which time no more than 45 percent by weight of a landing of Pacific sardine, northern anchovy, jack mackerel, or market squid could consist of Pacific mackerel. The intended effect of this action was to ensure that the HG was achieved, but not exceeded, and to minimize bycatch of Pacific mackerel while other CPS were being harvested. (66*FR*59173)

December 27, 2001. NMFS published the HG for Pacific sardine for the fishing season beginning January 1, 2002. A HG of 118,442 mt was established for Pacific sardine based on a biomass estimate of 1,057,599 mt. The HG is allocated for Subarea A, which is north of 35° 40' N latitude (Point Piedras Blancas) to the Canadian border, and for Subarea B, which is south of 35° 40' N latitude to the Mexican border. The northern allocation is 39,481 mt; the southern allocation is 78,961mt. The sardine HG is in effect until December 31, 2002, or until it is reached and the fishery closed. (66*FR*66811)

April 5, 2002. NMFS announced the reopening of the directed fishery for Pacific mackerel in the U.S. EEZ off the Pacific Coast on April 1, 2002. A significant portion of the Pacific mackerel HG remains unharvested (6,585 mt). Therefore, the incidental catch allowance that has been in effect since November 21, 2001 is removed, and any landing of Pacific mackerel may consist of 100 percent Pacific mackerel. This action was taken to help ensure that the HG is attained. If the HG is projected to be reached before June 30, 2002, the directed fishery will be closed and an appropriate incidental landing restriction imposed. (67*FR*16322)

July 11, 2002. NMFS proposed a regulation to implement the annual HG for Pacific mackerel in the EEZ off the Pacific Coast. The CPS FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on the formula in the FMP. This action proposes allowable harvest levels for Pacific mackerel off the Pacific Coast. Based on the estimated biomass of 77,516 mt and the formula in the FMP, a HG of 12,456 is proposed for the fishery beginning on July 1, 2002, and continue through June 30, 2003, unless the HG is attained and the fishery closed before June 30. (67*FR*45952)

September 18, 2002. NMFS announced the closure of the fishery for Pacific sardine in the U.S. EEZ off the Pacific Coast north of Point Piedras Blancas, California, (35° 40' N latitude) at 0001 hrs local time on September 14, 2002. The closure will remain in effect until the reallocation of the remaining portion

of the coastwide HG is required by the CPS FMP. That reallocation is expected to occur on or about October 1, 2002. The purpose of this action is to comply with the allocation procedures mandated by the FMP. (67*FR*58733)

September 26, 2002. Emergency rule. NMFS announced the reallocation of the remaining Pacific sardine HG in the U.S. EEZ off the Pacific Coast. The CPS FMP requires that NMFS conduct a review of the fishery 9 months after the beginning of the fishing season on January 1, and reallocate any unharvested portion of the HG, with 50 percent allocated north and south of Point Piedras Blancas, California. The allocation north of Point Piedras Blancas was reached on September 14, 2002, and the fishery was closed until the scheduled time for reallocation on October 1, 2002. This action reallocates the remainder of the HG earlier than the date specified in the FMP in order to minimize the negative economic effects on fishing and processing, primarily in the Pacific Northwest, that would result from delaying the reallocation. (67*FR*60601)

October 3, 2002. NMFS issued a regulation to implement the annual HG for Pacific mackerel in the EEZ off the Pacific Coast. The CPS FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on the formula in the FMP. This action is to conserve Pacific mackerel off the Pacific Coast. Based on the estimated biomass of 77,516 mt and the formula in the FMP, a HG of 12,456 is proposed for the fishery beginning on July 1, 2002, and continue through June 30, 2003, unless the HG is attained and the fishery closed before June 30. There will be a directed fishery of at least 9,500 mt, and 3,035 mt of the HG will be utilized for incidental landings following the closure of the directed fishery. After closure of the directed fishery, no more than 40 percent by weight of a landing of Pacific sardine, northern anchovy, jack mackerel, or market squid may consist of Pacific mackerel, except that up to 1 mt of Pacific mackerel may be landed without landing any other CPS. The fishery will be monitored, and if a sufficient amount of the HG remains before June 30, 2003, the directed fishery will be reopened. The goal is to achieve the HG and minimize the impact on other coastal pelagic fisheries. 67*FR*61994)

October 30, 2002. NMFS proposed a regulation to implement Amendment 10 to the CPS FMP, which was submitted by the Council for review and approval by the Secretary of Commerce. Amendment 10 addresses the two unrelated subjects of the transferability of limited entry permits and maximum sustainable yield for market squid. Only the provisions regarding limited entry permits require regulatory action. The purpose of this proposed rule is to establish the procedures by which limited entry permits can be transferred to other vessels and/or individuals so that the holders of the permits have maximum flexibility in their fishing operations while the goals of the FMP are achieved. (67*FR*66103)

November 25, 2002. NMFS proposed a regulation to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific Coast for the fishing season January 1, 2003, through December 31, 2003. This HG has been calculated according to the CPS FMP and establishes allowable harvest levels for Pacific sardine off the Pacific Coast. Based on the estimated biomass of 999,871 mt and the formula in the FMP, a HG of 110,908 mt was determined for the fishery beginning January 1, 2003. The HG is allocated one third for Subarea A, which is north of 35° 40' N latitude (Point Piedras Blancas) to the Canadian border, and two thirds for Subarea B, which is south of 35° 40' N latitude to the Mexican border. The northern allocation is 36,969 mt; the southern allocation is 73,939 mt. (67*FR*70573)

December 31, 2002. NMFS issued a regulation to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific Coast for the fishing season January 1, 2003, through December 31, 2003. This HG has been calculated according to the CPS FMP and establishes allowable harvest levels for Pacific sardine off the Pacific Coast. Based on the estimated biomass of 999,871 mt and the formula in the FMP, a HG of 110,908 mt was determined for the fishery beginning January 1, 2003. The HG is allocated one third for Subarea A, which is north of 35° 40' N latitude (Point Piedras Blancas, California) to the Canadian border, and two thirds for Subarea B, which is south of 35° 40' North latitude to Mexican border. The northern allocation is 36,969 mt; the southern allocation is 73,939 mt. If an allocation or the HG is reached, up to 45 percent by weight of Pacific sardine may be landed in any landing of Pacific mackerel, jack mackerel, northern anchovy, or market squid. (67*FR*79889).

January 27, 2003. NMFS issued a regulation to implement Amendment 10 to the CPS FMP, which was submitted by the Council for review and approval by the Secretary of Commerce. Amendment 10 addresses the two unrelated subjects of the transferability of limited entry permits and maximum sustainable yield for market squid. Only the provisions regarding limited entry permits require regulatory action. The primary purpose of this final rule is to establish the procedures by which limited entry permits can be transferred to other vessels and/or individuals so that the holders of the permits have maximum flexibility in their fishing operations while the goals of the FMP are achieved. (68*FR*3819)

June 26, 2003. NMFS proposed a regulatory amendment to the CPS FMP. This amendment was submitted by the Council for review and approval by the Secretary. The proposed amendment would change the management subareas and the allocation process for Pacific sardine. The purpose of this proposed amendment is to establish a more effective and efficient allocation process for Pacific sardine and increase the possibility of achieving OY. (68*FR*37995)

July 29, 2003. NMFS proposed a regulation to implement the annual HG for Pacific mackerel in the EEZ off the Pacific coast. The CPS FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on the formula in the FMP. (68*FR*44518)

September 4, 2003. NMFS issued a final rule to implement a regulatory amendment to the CPS FMP that changed the management subareas and the allocation process for Pacific sardine. The purpose of this final rule was to establish a more effective and efficient allocation process for Pacific sardine and increase the possibility of achieving OY. (68*FR*52523)

September 9, 2003. NMFS announced the reallocation of the remaining Pacific sardine HG in the EEZ off the Pacific Coast. On September 1, 2003, 59,508 mt of the 110,908 mt HG is expected to remain unharvested. The CPS FMP requires that a review of the fishery be conducted and any uncaught portion of the HG remaining unharvested in Subarea A (north of Pt. Arena, California) and Subarea B (south of Pt. Arena, California) be added together and reallocated, with 20 percent allocated to Subarea A and 80 percent to Subarea B; therefore, 11,902 mt is allocated to Subarea A and 47,600 mt is allocated to Subarea B. The intended effect of this action is to ensure that a sufficient amount of the resource is available to all harvesters on the Pacific Coast and to achieve OY. (68*FR*53053)

October 3, 2003. NMFS issued a final rule to implement the annual HG for the July 1, 2003 - June 30, 2004 Pacific mackerel fishery in the EEZ off the Pacific coast. The CPS FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on the formula in the FMP. Based on this approach, the biomass for July 1, 2003, is 68,924 mt. Applying the formula in the FMP results in a HG of 10,652 mt, which is lower than last year but similar to low HGs of recent years. (68*FR*57379)

October 28, 2003. NMFS announced the closure of the fishery for Pacific sardine in the EEZ off the Pacific Coast north of Pt. Arena, California (39° N latitude) at 12:01 a.m. local time on October 17, 2003. The purpose of this action is to comply with the allocation procedures mandated by the CPS FMP. (68*FR*61373)

December 3, 2003. NMFS proposed a regulation to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific coast for the fishing season January 1, 2004, through December 31, 2004. This HG was calculated according to the regulations implementing the CPS FMP and established allowable harvest levels for Pacific sardine off the Pacific coast. (68*FR*67638)

February 25, 2004. NMFS issued a regulation to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific coast for the fishing season January 1, 2004, through December 31, 2004. This action adopts a HG and initial subarea allocations for Pacific sardine off the Pacific coast that have been calculated according to the regulations implementing the CPS FMP. Based on a biomass estimate of 1,090,587 mt (in U.S. and Mexican waters), using the FMP formula, the HG for Pacific sardine in U.S. waters for January 1, 2004, through December 31, 2004 is 122,747 mt. The biomass estimate is slightly

higher than last year's estimate; however, the difference between this year's biomass is not statistically significant from the biomass estimates of recent years. Under the FMP, the HG is allocated one third for Subarea A, which is north of 39° N latitude (Pt. Arena, California) to the Canadian border, and two thirds for Subarea B, which is south of 39° N latitude to the Mexican border. Under this final rule, the northern allocation for 2004 would be 40,916 mt and the southern allocation would be 81,831 mt. (69*FR*8572). July 20, 2004. NMFS proposed a regulation to implement the annual HG for Pacific mackerel in the EEZ off the Pacific coast for the fishing season July 1, 2004, through June 30, 2005. The CPS FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on the formula in the FMP. This action proposes allowable harvest levels for Pacific mackerel off the Pacific coast. (69 *FR* 43383)

September 14, 2004. Information memorandum. NMFS announced the reallocation of the remaining Pacific sardine HG in the U.S. EEZ off the Pacific Coast. A regulatory amendment (69 *FR* 8572, February 25, 2003) requires that NMFS conduct a review of the fishery 10 months after the beginning of the fishing season on January 1, and reallocate any unharvested portion of the HG, with 20 percent allocated north of Point Area, California, and 80 percent allocated south of Point Arena, California. (69 *FR* 55360)

October 21, 2004. NMFS issued a final rule to implement the annual HG for the July 1, 2004 - June 30, 2005 Pacific mackerel fishery in the EEZ off the Pacific coast. The CPS FMP and its implementing regulations require NMFS to set an annual HG for Pacific mackerel based on the formula in the FMP. Based on this approach, the biomass for July 1, 2003, is 81,383 mt. Applying the formula in the FMP results in a HG of 13,268 mt. (69 *FR* 61768)

December 8, 2004. NMFS proposed a regulation to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific coast for the fishing season January 1, 2005, through December 31, 2005. This HG was calculated according to the regulations implementing the CPS FMP and established allowable harvest levels for Pacific sardine off the Pacific coast. (69 *FR* 70973)

June 22, 2005. NMFS issues a regulation to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific coast for the fishing season January 1, 2005, through December 31, 2005. This HG was calculated according to the regulations implementing the CPS FMP and established allowable harvest levels for Pacific sardine off the Pacific coast. Based on a biomass estimate of 1,193,515 mt (in U.S. and Mexican waters) and using the FMP formula, NMFS calculated a HG of 136,179 mt for Pacific sardine in U.S. waters. Under the FMP, the HG is allocated one-third for Subarea A, which is north of 39°00′ N. lat. (Pt. Arena, California) to the Canadian border, and two-thirds for Subarea B, which is south of 39° 00′ N. lat. to the Mexican border. Under this final rule, the northern allocation for 2005 would be 45,393 mt, and the southern allocation would be 90,786 mt. (70 *FR* 36053)

August 29, 2005. NMFS proposes a regulation to implement the annual HG for Pacific mackerel in the U.S. EEZ off the Pacific coast. For specific regulations, see final rule language from October 21, 2005 below. (70 *FR* 51005)

October 21, 2005. NMFS issues a final rule to implement the annual HG for Pacific mackerel in the U.S. EEZ off the Pacific coast. The biomass estimate for July 1, 2005, would be 101,147 mt. Applying the formula in the FMP results in a HG of 17,419 mt, which is 32 percent greater than last year but similar to low HGs of recent years. For the last three years, the fishing industry has recommended dividing the HG into a directed fishery and an incidental fishery, reserving a portion of the HG for incidental harvest in the Pacific sardine fishery so that the Pacific sardine fishery is not hindered by a prohibition on the harvest of Pacific mackerel. At its meeting on June 15, 2005, the Subpanel recommended for the 2005–2006 fishing season that a directed fishery of 13,419 mt and an incidental fishery of 4,000 mt be implemented. An incidental allowance of 40 percent of Pacific mackerel in landings of any CPS would become effective if the 13,419 mt of the directed fishery is harvested. The Subpanel also recommended allowing up to 1 mt of Pacific mackerel to be landed during the incidental fishery without the requirement to land any other CPS. (70 *FR 61235*)

October 28, 2005. NMFS announces that the Pacific Fishery Management Council (Council) has submitted Amendment 11 to the CPS FMP for Secretarial review. Amendment 11 would change the framework for the annual apportionment of the Pacific sardine HG along the U.S. Pacific coast. The purpose of Amendment 11 is to achieve optimal utilization of the Pacific sardine resource and equitable allocation of the harvest opportunity for Pacific sardine. The public comment period on Amendment 11 was open through December 27, 2005. (70 *FR* 62087)

January 17, 2006. NMFS proposes a regulation to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific coast for the fishing season of January 1, 2006, through December 31, 2006. This HG has been calculated according to the regulations implementing the CPS FMP and establishes allowable harvest levels for Pacific sardine off the Pacific coast. (71 *FR* 2510)

June 29, 2006. NMFS issues the final rule to implement Amendment 11 to the CPS FMP which changes the framework for the annual apportionment of the Pacific sardine HG along the U.S. Pacific coast. The purpose of this final rule is to achieve optimal utilization of the Pacific sardine resource and equitable allocation of the harvest opportunity for Pacific sardine. (71 *FR* 36999)

July 5, 2006. NMFS issues a final rule to implement the annual HG for Pacific sardine in the U.S. EEZ off the Pacific coast for the fishing season of January 1, 2006, through December 31, 2006. This HG has been calculated according to the regulations implementing the CPS FMP and establishes allowable harvest levels for Pacific sardine off the Pacific coast. Based on the estimated biomass of 1,061,391 mt and the formula in the FMP, a HG of 118,937 mt was determined for the fishery beginning January 1, 2006. (71 *FR* 38111)

August 21, 2006. This notice retracts the Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) to analyze a range of alternatives for the annual allocation of the Pacific sardine HG proposed action published on July 19, 2004. Further scoping subsequent to the publication of the NOI revealed additional information indicating that it was unlikely the proposed action would result in significant environmental impacts. An Environmental Assessment (EA) was completed and a subsequent Finding of No Significant Impact (FONSI) was signed. (71 *FR* 48537)

October 20, 2006. NMFS proposes a regulation to implement the annual HG for Pacific mackerel in the U.S. EEZ off the Pacific coast. (71 *FR* 61944).

December 7, 2006. NMFS proposes a regulation to implement new reporting and conservation measures under the CPS FMP. These reporting requirements and prohibitive measures would require CPS fishermen/vessel operators to employ avoidance measures when southern sea otters are present in the area they are fishing and to report any interactions that may occur between their vessel and/or fishing gear and sea otters. The purpose of this proposed rule is to comply with the terms and conditions of an incidental take statement from a biological opinion issued by the U.S. Fish and Wildlife Service regarding the implementation of Amendment 11 to the CPS FMP. (71 *FR* 70941).

January 31, 2007. NMFS issues a final rule to implement the annual HG and management measure for the 2006-2007 Pacific Mackerel fishery. Based on the estimated biomass of 112,700 mt and the formula in the FMP, a HG of 19,845 mt is in effect for the fishery which began on July 1, 2006. This HG applies to Pacific mackerel harvested in the U.S. EEZ off the Pacific coast from July 1, 2006, through June 30, 2007, unless the HG is attained and the fishery is closed before June 30, 2007. All landings made after July 1, 2006, will be counted toward the 2006–2007 HG of 19,845 mt. There shall be a directed fishery of 13,845 mt, followed by an incidental fishery of 6,000 mt. An incidental allowance of 40 percent of Pacific mackerel in landings of any CPS will become effective after the date when 13,845 mt of Pacific mackerel is estimated to have been harvested. A landing of 1 mt of Pacific mackerel per trip will be permitted during the incidental fishery for trips in which no other CPS is landed. (72 *FR* 4464).

May 30, 2007. This action implements new reporting and conservation measures under the CPS FMP. The purpose of this action is to prevent interactions between CPS fisherman and southern sea otters, as well as establish methods for fishermen to report these occurrences when they occur. These reporting requirements and conservation measures require CPS fishermen/vessel operators to employ avoidance measures when southern sea otters are present in the area they are fishing and to report any interactions that may occur between their vessel and/or fishing gear and sea otters. (72 *FR* 29891).

Table 3. Coastal pelagic species limited entry permit vessel listing, with U.S. Coast Guard registered measurements and calculated gross tonnage (GT) values for each vessel. (Page 1 of 2)

Vessel Name	Coast Guard Number	Year Built	Vessel Age	Registered Measurements (ft)[1]			Calculated Vessel GT[2]	Permit No.	Permit GT Endorsement	Permit Transfer Allowance
				Length	Breadth	Depth				
Misty Moon	D578511	1976	29	49.60	19.00	10.10	63.8	1	63.8	70.2
Paloma	D280452	1960	45	47.40	16.50	8.30	43.5	2	43.5	47.9
St. George II	D238969	1939	66	71.40	21.20	9.70	98.4	3	98.4	108.2
Barbara H	D643518	1981	24	64.90	24.00	11.60	121.1	4	121.1	133.2
San Antonio	D236947	1937	68	72.10	19.50	8.70	82.0	5	82.0	90.2
Permit No Longer Exists	---	---	---	---	---	---	---	6	---	---
San Pedro Pride	D549506	1973	32	79.60	24.50	12.30	160.7	7	160.7	176.8
Ferrigno Boy	D602455	1978	27	69.60	23.70	12.60	139.3	8	139.3	153.2
King Phillip	D1061827	1997	8	79.00	26.00	11.40	156.9	9	156.9	172.6
Sea Wave	D951443	1989	16	78.00	22.00	18.00	206.9	10	206.9	227.6
Mary Louise	D247128	1944	61	58.30	18.00	8.00	56.2	11	56.2	61.8
Bainbridge	D236505	1937	68	78.60	22.70	9.60	114.8	12	114.8	126.3
Pioneer	D246212	1944	61	77.80	24.30	11.20	141.9	13	141.9	156.1
Maria	D236760	1937	68	70.70	20.50	9.20	89.3	14	89.3	98.2
St. Joseph	D633570	1981	24	62.90	22.00	9.10	84.4	15	84.4	92.8
Permit No Longer Exists	---	---	---	---	---	---	---	16	---	---
Retriever	D582022	1977	28	54.20	19.60	8.70	61.9	17	61.9	68.1
Atlantis	D649333	1982	23	49.60	19.00	10.10	63.8	18	63.8	70.2
G. Nazzareno	D246518	1944	61	78.00	22.70	10.50	124.6	19	124.6	137.1
Sea Queen	D582167	1974	31	68.40	22.00	11.10	111.9	20	111.9	123.1
Pacific Leader	D643138	1981	24	59.50	21.00	9.20	77.0	21	77.0	84.7
Chovie Clipper	D524626	1970	35	51.10	18.00	10.30	63.5	22	63.5	69.9
Pacific Journey[4]	OR661ZK	2001	4	64.30	22.01	10.30	97.7	23	97.7	107.5
Ocean Angle I	D584336	1977	28	49.60	19.00	10.10	63.8	24	63.8	70.2
Maria T	D509632	1967	38	57.30	18.10	9.80	68.1	25	68.1	74.9
Manana	D253321	1947	58	40.10	13.20	6.70	23.8	26	23.8	26.2
Miss Juli[5]	---	---	---	---	---	---	---	27	55.5	61.1
Mineo Bros.	D939449	1989	16	58.00	21.00	9.00	73.4	28	73.4	80.7
Sea Queen	D583781	1977	28	49.00	16.00	8.00	42.0	29	42.0	46.2
Little Joe II	D531019	1971	34	50.10	16.00	7.60	40.8	30	40.8	44.9
Caitlin Ann	D960836	1990	15	98.00	33.00	15.70	340.2	31	340.2	374.2
Eldorado	D690849	1985	20	56.00	17.00	8.60	54.9	32	54.9	60.4
Kristen Gail	D618791	1980	25	87.00	26.00	12.80	194.0	33	194.0	213.4
Fiore D'Mare	D550564	1973	32	71.50	23.00	11.40	125.6	34	125.6	138.2
Endurance	D613302	1979	26	49.00	16.00	8.00	42.0	35	42.0	46.2
New Sunbeam	D284470	1961	44	50.30	20.00	4.00	27.0	36	27.0	29.7
Calogera A	D984694	1992	13	57.75	21.00	10.50	85.3	37	85.3	93.8
Eileen	D252749	1947	58	79.40	22.10	10.20	119.9	38	119.9	131.9
Pamela Rose	D693271	1985	20	54.00	19.00	9.00	61.9	39	61.9	68.1
New Stella	D598813	1978	27	58.00	22.00	8.40	71.8	40	71.8	79.0
Traveler	D661936	1983	22	56.00	17.00	6.90	44.0	41	44.0	48.4
Lucky Star	D295673	1964	41	49.90	17.00	7.30	41.5	42	41.5	45.7
Ocean Angel II	D622522	1980	25	74.50	28.00	10.70	149.5	43	149.5	164.5
Crystal Sea[7]	D1061917	1997	8	66.00	26.00	12.00	138.0	44	138.0	151.8
Trionfo	D625449	1980	25	63.80	19.30	9.60	79.2	45	79.2	87.1
Corva May[6]	D615795	1979	26	49.60	19.00	10.10	63.8	46	85.0	93.5
Heavy Duty	D655523	1983	22	58.00	21.30	10.20	84.4	47	84.4	92.8
Aliotti Bros	D685870	1985	20	67.60	26.00	9.10	107.2	48	107.2	117.9
Lady J	D647528	1982	23	50.30	17.00	7.10	40.7	49	40.7	44.8
Anna S	D253402	1947	58	50.80	16.20	9.10	50.2	50	50.2	55.2
Endeavor	D971540	1990	15	57.40	19.00	9.90	72.3	51	72.3	79.5

Table 3. Coastal pelagic species limited entry permit vessel listing, with U.S. Coast Guard registered measurements and calculated gross tonnage (GT) values for each vessel. (Page 2 of 2)

Vessel Name	Coast Guard Number	Year Built	Vessel Age	Registered Measurements (ft)[1/]			Calculated Vessel GT[2/]	Permit No.	Permit GT Endorsement	Permit Transfer Allowance
				Length	Breadth	Depth				
Antoinette W	D606156	1978	27	45.40	16.00	7.60	7.0	52	37.0	40.7
Donna B	D648720	1982	23	73.20	25.00	12.90	158.2	53	158.2	174.0
Papa George	D549243	1973	32	72.00	22.80	11.50	126.5	54	126.5	139.2
Mercurio Bros	D650376	1982	23	42.00	16.70	8.60	40.4	55	40.4	44.4
Kathy Jeanne	D507798	1967	38	65.90	22.20	8.80	86.3	56	86.3	94.4
Merva W	D532023	1971	34	56.70	17.90	8.00	54.4	57	54.4	59.8
Santa Maria	D236806	1937	68	79.20	19.50	8.80	91.1	58	91.1	100.2
Buccaneer	D592177	1978	27	62.10	19.90	9.00	74.5	59	74.5	82.0
Midnight Hour	D276920	1958	47	61.10	18.00	8.60	63.4	60	63.4	69.7
Nancy B II	D542513	1972	33	56.40	18.00	8.80	59.9	61	59.9	65.9
Miss Kristina	D580843	1977	28	50.00	16.00	7.40	39.7	62	39.7	43.7
Emerald Sea	D626289	1980	25	62.70	26.00	7.90	86.3	63	86.3	94.9
Connie Marie8/	---	---	---	---	---	---	---	64	54.5	60.0
Theresa Marie	D629721	1980	25	40.90	14.70	6.60	26.4	65	26.4	29.0

1/ Vessel dimension information was obtained from the Coast Guard Website at: http://psix.uscg.mil/.
2/ Vessel Gross Tonnage GT=0.67(Length*Breadth*Depth)/100. See 46 CFR 69.209.
3/ Maximum transfer allowance is based on permit GT + 10%.
4/ Pacific Journey was built in Canada and is not currently registered with the U.S. Coast Guard. Measurements by marine surveyor Det Norske Veritas.
5/ Miss Juli sank in 2001 and is pending replacement.
6/ Permit #46 was transferred to Corva May after the Jenny Lynn sank in 2003.
7/ Permit #44 formerly registered as Mellow Boy was sold and the name changed to Crystal Sea. The permit was transferred to new owner on 01/17/2005.
8/ Connie Marie sank in 2002 and is pending replacement.

Table 4. Vessel age and calculated gross tonnage (GT) for the initial and current limited entry fleet.

	Initial Fleet	Current Fleet
Number of Vessels	65	61
Average Vessel Age	35 years	33 years
Range of Ages	12 to 66 years	4 to 68 years
Average GT	71.3	88.7
Range of GT	12.8 to 206.9	23.8 to 340.2
Sum of Fleet GT	4,635.9	5,408.4
Capacity Goal (GT)[1/]	---	5,650.9
Transferability Trigger	---	5,933.5

1/ Established in Amendment 10 to the CPS FMP.

Table 5. Preliminary catch summary for vessels targeting Pacific sardine from NMFS-SWR coastal pelagic species pilot observer program. Page 1 of 2.

Target species - Pacific sardine					
Species	**Target Catch**	**Incidental Catch**	**Bycatch Returned**		
			Alive	**Dead**	**Unknown**
Sardine	1495 mt		80 mt	100 lbs	100 lbs
Anchovy		9 mt	82	1300 lbs	
Bat Ray		1	143	14	1
Bat Star			5		
CA Barracuda		2	1	3	
CA Halibut		9		4	
Giant Sea Bass			2		
Jacksmelt		1			
Jack Mackerel		2 mt			
Midshipman			1	13	1
Moon Jelly		1			
Pacific Bonito		10 lbs			
Pacific Butterfish		3			
Pacific Electric Ray			2		
Pacific Mackerel		1 mt	100 lbs		
Pacific Tomcod		1			
Pompano		167			
Queenfish		49			
Sanddab			25 lbs	10 lbs	
Scorpionfish		1			1
Sculpin				1	3
Shovelnose Guitarfish			1		
Spanish Mackerel		100 lbs			
Squid		1 mt	2 mt		
Starry Flounder			2		
Stingray		2			
Thornback Ray			2		
Unid. Crab			1		1
Unid. Croaker		40			
Unid. Flatfish		78	8	130	12
Unid. Jellyfish		3	3		
Unid. Mackerel		8 mt	12 mt		
Unid. Octopus					2
Unid. Ray					2
Unid. Rockfish		2	1		
Unid. Seastar			41	135	1
Unid. Scorpionfish/Sculpin					1
Unid. Shark				2	
Unid. Skate				3	

Table 5. Preliminary catch summary for vessels targeting Pacific sardine from NMFS-SWR coastal pelagic species pilot observer program. Page 2 of 2.

Target species - Pacific sardine					
Species	**Target Catch**	**Incidental Catch**	**Bycatch Returned**		
			Alive	**Dead**	**Unknown**
Unid. Smelt		2			
Unid. Surf Perch		1			
Unid. Turbot				60	
White Croaker		31 lbs	50 lbs		
Yellowfin Croaker		10 lbs			
CA Sea Lion			49		
Harbor Seal			1		
Unid. Gull			3	2	4

Table 6. Preliminary catch summary for vessels targeting market squid from NMFS-SWR coastal pelagic species pilot observer program.

Target species - Squid					
Species	**Target Catch**	**Incidental Catch**	**Bycatch Returned**		
			Alive	**Dead**	**Unknown**
Squid	1274 mt		28 mt	350 lbs	2 mt
Anchovy		100 lbs	120 lbs		
Jack Mackerel		2 mt	18 lbs	2 lbs	
Pacific Mackerel		20 mt	20 mt	180 lbs	1 lb
Sardine		12 mt	13 mt	1077 lbs	3 lbs
Spanish Mackerel		20 lbs			
Bat Ray			53		1
Bat Star			1		
Blue Shark			2		
Common Mola			1		
Pelagic Stingray			60		
Pacific Butterfish		19			1
Sunstar		30	4		
Squid Eggs					505 lbs
Lobster			3		
Brittle Star				3000	
Unid. Batfish				2 lbs	
Unid. Crab		1	1		93
Unid. Croaker		3	2	16 lbs	
Unid. Flatfish		1	1	6	2
Unid. Jellyfish		4			
Unid. Mackerel		2 lbs	102 lbs		
Unid. Octopus		1			
Unid. Rockfish		1	1	4	
Unid. Ray			4		1
Unid. Sanddab		4	3		4
Unid. Seastar		1			
Unid. Seaslug					21
Unid. Scorpionfish		1			
Unid. Surfperch				3	
Unid. Skate		3		1	
Unid. Smelt		49			
Unid. Stingray		9	17		
Unid. Shark					1
Thresher Shark		1			
CA Sea Lion			98		
Harbor Seal			3		
Common Dolphin				1	
Unid. Gull			16	1	

Table 7. Preliminary catch summary for vessels targeting Pacific mackerel from NMFS-SWR coastal pelagic species pilot observer program.

Target species - Pacific mackerel					
Species	**Target Catch**	**Incidental Catch**	**Bycatch Returned**		
			Alive	**Dead**	**Unknown**
Pacific Mackerel	40 mt				
Bat Ray			2		
CA Yellowtail			1		
Midshipman			1		
Sardine		16 mt			
Sea Cucumber		5			
Unid. Crab		1			
Unid. Flatfish			3		
Unid. Jellyfish			3		
Unid. Shark			1		

Table 8. Preliminary catch summary for vessels targeting northern anchovy and northern anchovy/Pacific sardine from NMFS-SWR coastal pelagic species pilot observer program.

Target species - Anchovy and Anchovy/Sardine					
Species	**Target Catch**	**Incidental Catch**	**Bycatch Returned**		
			Alive	**Dead**	**Unknown**
Anchovy	373 mt		2 mt	1 mt	
Sardine		21 mt	2 mt		
Bat Ray			4		
CA Lizardfish			4		
Kelp Bass		1			
Midshipman					5
Pacific Bonito			20 lbs		
Pacific Mackerel		2			
Queenfish		50 lbs	11 lbs		
Round Stingray			1		
Sculpin		2			
Spiny Dogfish			1		
Unid. Croaker		20	45		
Unid. Flatfish		10			
Unid. Hake		4			
Unid. Seastar			1		
Unid. Smelt		2			
Unid. Turbot			1	1	20
White Croaker		50 lbs	35 lbs		
Yellowfin Croaker		50 lbs	10 lbs		
CA Sea Lion			5		
Sea Otter			1		

Table 9. Percent frequency of bycatch in observed incidents of CPS finfish, by port, 2002-2006. (Page 1 of 3).

	All Ports					San Pedro					Monterey			
Common Name	**2002**	**2003**	**2004**	**2005**	**2006**	**2002**	**2003**	**2004**	**2005**	**2006**	**2003**	**2004**	**2005**	**2006**
Finfish														
Anchovy, northern	3.8	3.7	7.4	6.1	9.2	3.8	4.1	4.2	5.8	3.5	2.1	32.6	18.2	24.0
Barracuda, California	0.6		0.5	0.4	0.4	0.6		0.6	0.4	0.3				0.4
Bass, barred sand	1.5	1.1	1.1	1.1	0.6	1.5	1.4	1.2	1.2	0.9				
Bass, kelp	0.6	1.1		1.1	0.7	0.6	1.4		1.2	1.0				
Blacksmith					0.1					0.2				
Bonito, Pacific	0.3				2.1	0.3				2.9				
Butterfish, Pacific (Pompano)	3.2	2.8	4.7	5.5	6.0	3.2	2.7	5.1	5.2	6.4	3.1	2.3	18.2	4.9
Cabezon					0.1									0.4
Combfish, longspine		0.2			0.7					1.0				
Corbina, California	1.5				0.5	1.5				0.7				
Croaker, white (kingfish)		7.8	6.9	0.2	5.8		7.4	5.7	0.2	6.4	9.4	16.3		4.4
Croaker, yellowfin	0.3					0.3	0.0	0.0	0.0					
Cusk-eel, spotted					0.9					0.9				0.9
Cusk-eel, unspecified	2.6	1.1	1.3	4.7	2.1	2.6	1.4	1.5	4.8	2.9				
Eel, yellow snake	0.3	0.2				0.3	0.3							
Eel, wolf		0.2									1.0			
Fish, unspecified		0.9					1.1							
Flatfish, unspecified	8.5	2.2	1.8	0.2	0.6	8.5	2.7	2.1	0.2	0.7				0.4
Flounder, starry		0.4	0.3		0.5						2.1	2.3		1.8
Flyingfish	0.6	0.4	0.3	0.6		0.6	0.5	0.3	0.6					
Grunion, California			0.3		0.1					0.2		2.3		
Halfmoon					0.1									0.4
Halibut, California	1.8	6.9	4.2	7.6	2.5	1.8	7.1	4.8	7.7	3.3	6.3			0.4
Herring, Pacific		0.4			0.1						2.1			0.4
Jacksmelt	0.9	1.1	0.8	1.5	1.9	0.9	0.3	0.6	1.0	0.9	4.2	2.3	27.3	4.4
Kelpfish, giant					0.1					0.2				
Lizardfish, California	2.6	0.9	2.1	5.7	2.1	2.6	1.1	2.4	5.8	2.9				
Midshipman, plainfin	3.8				1.6	3.8				1.7				1.3
Midshipman, specklefin		0.4	1.3		1.6		0.5	1.5		2.2				
Midshipman, unspecified		3.5	2.1	0.6			4.4	2.4	0.6					
Pipefish, kelp		0.2	1.1	0.6	0.1		0.3	1.2	0.6	0.2				
Poacher, unspecified					0.1					0.2				
Queenfish					3.1					4.3				
Rockfish, chilipepper					0.1									0.4
Sablefish														
Salema					0.1					0.2				
Sanddab, longfin					0.2					0.3				
Sanddab, Pacific		0.2			1.4					1.9	1.0			
Sanddab, speckled					0.1					0.2				
Sanddab, unspecified	0.3	3.0	4.0	2.1	2.6	0.3	2.2	3.9	1.9	1.4	6.3	4.7	9.1	5.8
Scorpionfish, California	7.6	8.0	10.0	8.7	3.4	7.6	9.9	11.3	8.9	4.7	1.0			
Sculpin, pithead		0.2	1.3	0.2	0.1			0.3	0.2	0.2	1.0	9.3		
Sculpin, staghorn		0.4			0.1						2.1			0.4
Sculpin, unspecified					0.2					0.3				
Seabass, giant (black)	0.3				0.1	0.3				0.2				
Senorita	0.3					0.3								
Shad, American					0.9									3.1

Table 9. Percent frequency of bycatch in observed incidents of CPS finfish, by port, 2002-2006. (Page 2 of 3).

	All Ports					San Pedro					Monterey			
Common Name	**2002**	**2003**	**2004**	**2005**	**2006**	**2002**	**2003**	**2004**	**2005**	**2006**	**2003**	**2004**	**2005**	**2006**
Sheephead, California					0.1					0.2				
Silversides					0.5					0.7				
Smelt, whitebait		0.7									3.1			
Sole, C-O					0.6					0.3				1.3
Sole, curlfin		0.2					0.3							
Sole, English					0.2									0.9
Sole, fantail	0.3	0.0				0.3								
Sole, sand		2.2	0.3		0.5						10.4	2.3		1.8
Sole, slender					0.1					0.2				
Sole, unspecified		0.2			0.2						1.0			0.9
Sturgeon, unsp.		0.2									1.0			
Sunfish, ocean					0.1									0.4
Surfperch, barred					0.1									0.4
Surfperch, black					0.1					0.2				
Surfperch, pink	0.6				1.1	0.6				0.9				
Surfperch, rubberlip					0.1					0.2				1.8
Surfperch, shiner					0.9					1.0				0.4
Surfperch, unspecified	0.3	0.3			0.4	0.3				0.3	2.3			0.4
Surfperch, walleye			0.3									2.3		
Surfperch, white					0.1					0.2				
Tonguefish	0.9	0.9	2.1	1.9	1.4	0.9	1.1	2.4	1.9	1.7				0.4
Topsmelt	0.3					0.3								
Turbot, curlfin	0.3				0.1	0.3				0.2				
Turbot, diamond	0.3				0.2	0.3				0.3				
Turbot, hornyhead	0.9	3.5	4.0	6.1	2.9	0.9	4.4	4.5	6.2	3.6				
Turbot, spotted					0.6									
Turbot, unspecified		0.7		1.1	1.0		0.3		1.2	1.4	2.1			
Whitefish, ocean	0.3					0.3								
Whiting, Pacific					0.1									0.4
Total % Freq. Incidents	**45.3**	**56.0**	**58.0**	**55.9**	**65.2**	**45.3**	**55.1**	**55.7**	**55.5**	**64.6**	**59.4**	**76.7**	**72.7**	**63.6**
Elasmobranchs														
Guitarfish, shovelnose	0.3	2.0		1.5	0.2	0.3	2.5		1.5	0.3				
Ratfish, spotted					0.1					0.2				
Ray, Bat	5.8	7.8	7.4	6.3	3.0	5.8	9.3	7.1	6.4	3.6	2.1	9.3		1.3
Ray, California butterfly	0.3			0.2		0.3			0.2					
Ray, Pacific electric	0.9	0.4	0.3		1.2	0.9		0.3		0.9	2.1			2.2
Ray, Unspecified		0.2					0.3							
Shark, brown smoothhound	0.3	0.0			0.1	0.3				0.2				
Shark, gray smoothhound	0.3	0.2			0.2	0.3				0.3	1.0			
Shark, horn					0.6					0.9				
Shark, Pacific angel	0.3				0.2	0.3				0.3				
Shark, shortfin mako		0.4									2.1			
Shark, spiny dogfish			0.3		0.1							2.3		0.4
Shark, swell														
Shark, Unspecified	0.3					0.3								
Skate, Big		0.4			0.6					0.2	2.1			1.8
Skate, California		0.2			0.5					0.7	1.0			

Table 9. Percent frequency of bycatch in observed incidents of CPS finfish, by port, 2002-2006. (Page 3 of 3).

	All Ports					San Pedro					Monterey			
Common Name	**2002**	**2003**	**2004**	**2005**	**2006**	**2002**	**2003**	**2004**	**2005**	**2006**	**2003**	**2004**	**2005**	**2006**
Skate, longnose		0.4	0.8				0.5	0.9						
Skate, thornback	1.5	3.7	2.4	3.6	1.6	1.5	3.6	2.7	3.7	1.9	4.2			
Skate, Unspecified	0.6	0.4			0.1	0.6				0.2	2.1			
Stingray, round	0.3	1.1	0.3	1.5	0.2	0.3	1.4	0.3	1.5	0.3				
Total % Freq. Incidents	**10.8**	**17.4**	**11.3**	**13.1**	**9.1**	**10.8**	**17.5**	**11.3**	**13.3**	**10.0**	**16.7**	**11.6**	**0.0**	**5.8**
Invertebrates and Plants														
Algae, marine					1.2									1.2
Bryozoans					0.1									0.1
Crab shells	0.3	0.2	0.8		0.3	0.3	0.3	0.9		0.3				0.4
Crab, box					0.1					0.2				0.1
Crab, decorator		0.2			0.2						1.0			0.2
Crab, Dungeness		1.1			0.1						5.2			0.1
Crab, elbow		0.2					0.3							
Crab, pelagic red	1.8					1.8								
Crab, rock unspecified	0.9	0.9	1.3	0.2	0.2	0.9	0.8	1.5	0.2	0.3	1.0			0.2
Crab, sheep		0.2			0.1		0.3			0.2				0.1
Crab, slender		0.4									2.1			
Crab, swimming					0.3					0.5				0.4
Crab, unspecified					0.5					0.7				0.5
Eelgrass	0.9	0.9	1.1	1.5	2.0	0.9	1.1	1.2	1.5	1.4				2.1
Gorgonians	0.3				0.6	0.3				0.9				0.6
Jellies	0.3	1.1	1.3	2.3	0.2	0.3	0.5	0.3	2.3	0.3	3.1	9.3		0.2
Kelp	19.6	10.4	15.3	15.0	10.4	19.6	12.6	17.3	14.9	10.4	2.1		18.2	11.2
Kelp, feather boa					0.3									0.4
Lobster, California spiny	0.9					0.9								0.9
Octopus, unspecified	0.9				0.8	0.9				1.0				0.1
Pleurobranch	0.3					0.3								0.5
Prawn, spot	0.3				0.1	0.3				0.2				1.7
Salps	5.6	0.7	0.5	0.2		5.6	0.8	0.6	0.2	0.7				0.1
Sea cucumber	0.9	0.9	0.3	0.6	0.5	0.9	1.1	0.3	0.6					0.1
Sea pansies		0.2		0.2			0.3	0.0	0.2	1.2				4.2
Sea star	0.6	2.2	0.3	0.8	1.6	0.6	1.9	0.3	0.8		3.1			
Shrimp, black-spotted bay		0.4		0.2			0.5	0.0	0.2					
Shrimp, unspecified					7.6					0.2				
Snail, Unspecified														
Sponge, unspecified					0.1					0.2				
Squid Egg Cases	0.3	0.2	0.5			0.3		0.6			1.0			
Squid, market	10.2	6.1	9.2	10.2	3.9	10.2	6.8	10.1	10.3	5.9	3.1	2.3	9.1	
Total % Freq. Incidents	**43.9**	**27.1**	**31.9**	**31.3**	**31.3**	**44.7**	**28.2**	**34.5**	**31.1**	**24.5**	**22.9**	**11.6**	**27.3**	**25.7**
Total All Incidents	**342**	**461**	**379**	**528**	**804**	**342**	**365**	**336**	**517**	**579**	**96**	**43**	**11**	**225**
Total Observed Landings	**203**	**200**	**205**	**199**	**266**	**203**	**167**	**180**	**199**	**172**	**27**	**33**	**25**	**94**

Table 10. Market squid incidental catch for 2001 - 2006. Incidental catch includes species landed with market squid and recorded on landing receipts (round haul gear).

	2002		2003		2004		2005		2006	
Species name	**Number of Landings**	**Tons**	**Number of Landings**	**Tons**	**Number of Landings**	**Tons**	**Number of Landings**	**Tons**	**Number of Landings**	**Tons**
Pacific sardine	127	1,601.6	109	1,447.9	122	1,525.7	179	1,076.9	184	534.6
Northern anchovy	19	342.6	8	91.9	17	616.1	31	1,042.9	19	122.3
Pacific mackerel	37	71.2	16	163.2	23	143.1	187	571.5	169	360.3
Jack Mackerel	15	16.5	14	33.6	19	38.8	19	21.0	28	45.6
Jacksmelt			1	1.9			2	0.2		
Yellowtail										
Surfperch			1	0.1						
Kelpfish					1	2.2				
Bonito					1	0.01	1	1.3	3	3.3
Pacific herring							2	34.0		
White seabass							1	>0.1		

Table 11. Percent frequency of bycatch in observed loads of California market squid by port, 2002-2006 (Page 1 of 4).

Common Name	Total All Ports					San Pedro					Santa Barbara/Ventura					Monterey/Moss Landing				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Finfish																				
Anchovy, northern	4.8	4.4	5.8	5.7	5.1	5.9	4.2	4.1	5.9	5.0		5.8	7.4	3.8	7.8	3.8	3.2	5.8	6.5	3.2
Baracuda, California		0.2		0.3	1.3		0.2			0.8					3.9				0.7	
Bass, barred sand		0.2					0.2													
Bass, kelp					0.4					0.8										
Blacksmith		0.5			0.4		0.5			0.8										
Bonito, Pacific		0.2			0.4		0.2								2.0					
Butterfish, Pacific (Pompano)	4.1	3.3	1.6	0.5	2.6	3.9	1.7	2	0.7	4.2		4.2			2.0	5.1	4.1	1.2	0.7	
Cabezon	0.4	0.2				0.7	0.2									0.6				
Combfish, longspine			0.7					0.7												
Croaker, queenfish		0.5					0.5													
Croaker, white (kingfish)	0.7	0.5	0.6			2	0.5											0.6		
Croaker, unspecified			0.7					0.7												
Cusk-eel			0.7					0.7												
Eel, wolf			1.2															1.2		
Fish, unspecified	0.9					2.6														
Flatfish, unspecified			0.7		0.4			0.7												1.6
Flounder, starry			1.2															1.2		
Flyingfish		0.7					0.7													
Greenling, painted		0.2	0.7				0.2	0.7												
Halibut, California		0.9					1										0.9			
Herring, Pacific	0.4	0.9	1.8	0.5												1.3	0.9	1.8	1.3	
Herring, round		0.2	0				0.2	0												
Jack mackerel	5.2	8.1	7.5	6.5	12.4	5.9	10.5	8.2	10.5	15.0		4.2	7.4		2.0	6.4	9.6	7	5.9	15.9
Jacksmelt	2.6	4	7.7	3.1	0.4		0.7	0.7	0.7							7.7	7.3	14.6	7.2	1.6
Lizardfish, California		0.5	0.7				0.5	0.7												
Mackerel, Pacific	8.9	9.9	13.8	21.0	18.8	13.1	10.3	10.9	25.7	17.5	0.1	15.8	25.9	41.3	33.3	1.3	3.7	4.7	5.9	9.5
Midshipman, plainfin	0.2					0.7														
Midshipman, specklefin					0.4					0.8										
Midshipman, unspecified		0.7	1.2	0.5			0.5	0.7						1.3			0.9	1.8	0.7	
Medusa fish		0.5															0.5			
Poacher , unspecified		0.2					0.2													
Pomfret, Pacific																				
Rockfish, blue		0.5		0.3					0.7								0.5			
Rockfish, bocaccio	0.4	0.8	0.7				0.7	0.7								1.3	0.9			

Table 11. Percent frequency of bycatch in observed loads of California market squid by port, 2002-2006 (Page 2 of 4).

Common Name	Total All Ports					San Pedro					Santa Barbara/Ventura					Monterey/Moss Landing				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Rockfish, chilipepper			1.8	0.3														1.8	0.7	
Rockfish, olive		0.2					0.2													
Rockfish, shortbelly		0.5															0.5			
Rockfish, unspecified	0.2	0.4					0.2									0.6	0.5			
Roughback Sculpin			0.7					0.7												
Salema		1.4															1.4			
Salmon, chinook	1.3	0.5	0.6		0.4											3.8	0.5	0.6		1.6
Salmon, unspecified		0.5															0.5			
Sanddab, longfin		0.7	0.7				0.7	0.7												
Sanddab, Pacific	0.2	1.3	1.6	2.1	1.3		1.7	2	1.3	0.8				1.3		0.6	0.9	1.2	3.3	3.2
Sanddab, speckled		0.4	0.7				0.2	0.7									0.5			
Sanddab, unspecified	2.2	4.4	3	0.5		0.7	3.7	0.7			0.1	6.7				0.6	2.7	5.3	1.3	
Sardine, Pacific	26	24.2	24.8	21.6	22.2	32.7	18.1	21.1	23.7	26.7	0.3	42.5	44.4	25.0	33.3	12.2	11.9	8.8	17.6	4.8
Saury, Pacific	0.4	0.8					0.2									1.3	1.4			
Scorpionfish, California	0.9	3.2	1.4	0.8		2.6	3.2	1.4	2.0											
Sculpin, staghorn				0.3					0.7											
Sculpin, unspecified		1.4															1.4			
Silversides (jack- or topsmelt)				0.3					0.7											
Smelt, night		0.5															0.5			
Smelt, true		0.2					0.2													
Smelt, unspecified		0.2					0.2													
Sole, bigmouth	0.2	0.2				0.7	0.2													
Sole, curlfin		0.2					0.2													
Sole, English	0.2	0.6					0.2									0.6	0.9			
Sole, fantail		0.5					0.5													
Sole, sand		0.9	0.6														0.9			
Sole, Petrale																				
Sole, unspecified	0.4	0.8	3.7			0.7						0.8	3.7					0.6		
Sunfish, ocean		0.5			0.4										2.0		0.5			
Surfperch, kelp		0.2					0.2													
Surfperch, pink	0.2	0.2			0.4	0.7	0.2													
Surfperch, shiner			2		0.4			2		0.8										
Surfperch, unspecified	0.2	0.4					0.2			0.8						0.7	0.5			
Topsmelt		0.2	3.7	0.3			0.2						3.7	1.3						
Thornyhead, unspecified		0.2					0.2													

Table 11. Percent frequency of bycatch in observed loads of California market squid by port, 2002-2006 (Page 3 of 4).

Common Name	Total All Ports					San Pedro					Santa Barbara/Ventura					Monterey/Moss Landing				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Triggerfish	0.2					0.7														
Turbot, curlfin	0.2	0.6				0.7	0.2										0.9			
Turbot, diamond	0.2	0.2				0.7	0.2													
Turbot, hornyhead	0.2	1	0.7	0.3		0.7	1	0.7											0.7	
Turbot, unspecified	0.2	3.7	0.7	0.3				0.7								0.6	3.7		0.7	
Total Percent Frequency Fish Incidents	**62.0**	**89.3**	**94.0**	**64.9**	**67.9**	**75.7**	**65.8**	**62.2**	**72.4**	**74.2**	**0.5**	**80.0**	**92.5**	**73.8**	**86.3**	**48.5**	**62.6**	**58.2**	**52.9**	**41.3**
Elasmobranchs																				
Guitarfish, shovelnose	0.2					0.7														
Ray, bat	1.5	1.2	1.3	2.1	1.3	2	1.5	1.4	3.3	0.8		0.8		3.8	3.9	1.9	1.4			
Ray, Pacific electric	1.7		6.4	3.9	0.4											5.1		1.2	9.8	1.6
Ray , thornback		0.5					0.5											6.4		
Ray, unspecified	0.2	0.2					0.2									0.6				
Shark, horn	0.4	0.7		0.3		0.7	0.5		0.7			0.8								
Shark, Pacific angel		0.2					0.2													
Shark, spiny dogfish																				
Shark, unspecified					0.4															1.6
Skate, California																				
Skate, thornback																				
Skate, unspecified				0.3															0.7	
Stingray, round	0.4	0.7	3.4			0.7	0.5	3.4				0.8								
Total Percent Frequency Elasmobranch Incidents	**4.4**	**3.5**	**11.1**	**6.5**	**2.1**	**4.1**	**3.4**	**4.8**	**3.9**	**0.8**	**0.0**	**2.4**	**0.0**	**3.8**	**3.9**	**7.6**	**1.4**	**7.6**	**10.5**	**3.2**
Invertebrates and Plants																				3.2
Algae, marine					0.9															
Barnacle	0.2					0.7														
Cnideria (Sea Anenomes)	0.2	3			0.4		0.5									0.6	5.5			1.6
Crab shells		0.7					0.7													
Crab, box		0.2					0.2													
Crab, decorator		0.2					0.2													
Crab, Dungeness	2.2	5	1.2					0.7								6.4	5			
Crab, elbow																		1.8		
Crab, hermit		0.2					0.2													

Table 11. Percent frequency of bycatch in observed loads of California market squid by port, 2002-2006 (Page 4 of 4).

Common Name	Total All Ports					San Pedro					Santa Barbara/Ventura					Monterey/Moss Landing				
	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006	2002	2003	2004	2005	2006
Crab, pelagic red	0.2					0.7														
Crab, purple globe		0.5					0.5													
Crab, sheep		0.7		0.3			0.7		0.7											
Crab, rock unspecified	0.4	0.5		0.3		1.3	0.5		0.7											
Eelgrass		1.5	5.4	0.8	0.9		1.5	5.4	2.0	1.7										
Gorgonians			0.7		0.4			0.7		0.8										
Invertebrates, colonial	15.2					0.7										44.2				
Jellies		7.1	15.8	2.6	0.4		0.5							1.3			13.7		5.9	1.6
Kelp	15.4	10.7	8.9	17.4	16.7	21	13.9	13.6	18.4	15.0	0.1	14.2	3.7	13.8	7.8	14.1	4.1	15.8	18.3	27.0
Lobster, California spiny				0.3					0.7											
Mussels	0.2					0.7														
Octopus, unspecified		0.7					0.7											9.4		
Salps		0.2	2.7				0.2	2.7												
Sea cucumber		1.5					1.5													
Sea star	0.9	1.1	1.9	0.5	1.3	2	1	0.7	1.3	0.8		0.8	3.7				1.4			3.2
Squid Egg Cases	8	4.9	5.1	1.6	8.5	3.3	5.4	8.8		5.8		2.5	0		2.0	18.6	6.8	1.2	3.9	19.0
Squid, jumbo		0.2	0.7	4.9	0.4		0.2	0.7		0.8				7.5				6.4	8.5	
Tunicates		0.5					0.5													
Urchin, purple		0.7					0.7													
Total Percent Frequency Invert/Plant Incidents	**42.9**	**40.1**	**42.4**	**28.6**	**29.9**	**30.4**	**29.6**	**33.3**	**23.7**	**25.0**	**0.1**	**17.5**	**7.4**	**22.5**	**9.8**	**83.9**	**36.5**	**34.6**	**36.6**	**52.4**
Total All Incidents	**506**	**802**	**345**	**384**	**234**	**167**	**449**	**147**	**152**	**120**	**120**	**120**	**27**	**79**	**51**	**219**	**233**	**171**	**153**	**63**
Total Observed Landings	**461**	**395**	**160**	**178**	**136**	**153**	**192**	**86**	**100**	**73**	**156**	**117**	**32**	**42**	**37**	**152**	**86**	**42**	**36**	**26**

Table 12. Expanded salmonid bycatch in Pacific sardine fisheries in Oregon and Washington, 2000-2006.

	Chinook (live)	Chinook (dead)	Coho (live)	Coho (dead)	Pink (live)	Unid (live)	Unid (dead)	Total (live)	Total (dead)	Grand Total
2006										
Oregon[1/]								164	93	257
Washington[2/]	31	101	19	116				50	217	267
2005										
Oregon[1/]								411	176	587
Washington[3/]	47	156	29	178				76	334	410
2004										
Oregon[1/]								518	305	823
Washington	35	225	19	105	0	39	0	93	330	423
2003										
Oregon[1/]								315	185	500
Washington	92	262	81	231	0	173	0	346	493	839
2002										
Oregon[1/]								199	81	280
Washington	150	356	61	765	0	200	0	411	1211	1532
2001[2/]										
Oregon	45	45	201	134	22	45	0	313	179	492
Washington	449	170	571	504	0	80	0	1100	674	1774
2000[2/]										
Oregon	43	72	159	43	0	303	43	505	158	663
Washington	38	3	276	116	0	7	0	321	119	440

1/ Oregon salmon bycatch data 2000-2001 are expanded from a bycatch rate of salmon/trip based on vessel observation program.

2/ Oregon salmon bycatch data 2002-2006 are from logbooks.

3/ 2005 Washington totals calculated from observed 2000-2004 observed bycatch rates.

Table 13. Reported logbook and observed catches of non-target species caught in Oregon sardine fishery, 2006.

Species	Logbook data (97% coverage)	Observer data (1.8% coverage)
	# Caught	# Caught
Blue shark	3	0
Thresher shark	2	0
unknown shark	1	0
Salmonids	257 (55% alive; 45% dead)	6 (55% alive; 45% dead)
Mackerel	292,150 lb	Approx. 30,000 lbs
Anchovy	1000 lb	½ lb
Squid	150	0
Jelly fish	<100 lb	250 lbs

Table 14. Recorded incidental catch (mt) in Oregon sardine fishery, 2001-2006 (from fish ticket data).

Species	2001		2002		2003		2004		2005		2006	
	mt landed	% of catch	mt landed	% of catch	mt landed	% of catch	mt landed	% of catch	mt landed	% of catch	mt landed	% of catch
Pacific mackerel	52.8	0.4	126.3	0.6	158.3	0.6	161.5	0.5	316.1	0.7	665	1.8
Jack mackerel	1.2	<0.1	0.3	<0.1	3.2	<0.1	24.1	0.1	3.6	<0.1	1.4	<0.1
Pacific herring	-	-	3.3	<0.1	-	-	10.3	<0.1	0.1	<0.1	1.2	<0.1
Northern anchovy	-	-	0.2	<0.1	-	-	1.0	<0.1	68.4	0.2	8.6	<0.1
American shad	-	-	0.3	<0.1	-	-	1.2	<0.1	-	-	0.44	<0.1
Pacific hake	-	-	-	-	0.1	<0.1	-	-	-	-	-	-
thresher shark	-	-	-	-	0.3	<0.1	0.3	<0.1	0.4	<0.1	0.16	<0.1
Squid	-	-	-	-	-	-	13.9	<0.1	-	-	-	-
Jellyfish	-	-	-	-	-	-	5.5	<0.1	-	-	-	-

Table 15. Species noted as encountered on CDFG Live Bait Logs, 1996-2006.

Year	Days Fished	Jack Mackerel	Pacific Mackerel	Barracuda	Herring	Grunion	Smelts	Shiner Surfperch	Jellyfish	Queenfish	Market Squid	Pacific Bonito
2006	940	7	169	3								2
2005	1,045	49	188	27					1		1	6
2004	1,059	87	214	13						1	1	8
2003	1,123	18	140	23							2	
2002	1,105	9	147	1						1		
2001	1,052	11	176	56		1						
2000	488	25	87	34		1						
1999	449	16	77	7	1		1					
1998	809	8	189	69	1			1				
1997	773	46	190	104				3				
1996	522	10	45	27	3		5					

Table 16. Estimates of Pacific sardine and Northern anchovy live bait harvest in California (mt). Data for 1939-1992 from Thomson et al. (1994), and 1993-2006 from CDFG logs.

Year	Anchovy	Sardine	Year	Anchovy	Sardine
1939	1,364	0	1973	5,639	0
1940	1,820	0	1974	5,126	0
1941	1,435	0	1975	5,577	0
1942	234	0	1976	6,202	0
1943	World War II	World War II	1977	6,410	0
1944	World War II	World War II	1978	6,013	107
1945	World War II	World War II	1979	5,364	0
1946	2,493	0	1980	4,921	12
1947	2,589	0	1981	4,698	6
1948	3,379	0	1982	6,978	38
1949	2,542	0	1983	4,187	193
1950	3,469	0	1984	4,397	53
1951	4,665	0	1985	3,775	11
1952	6,178	0	1986	3,956	17
1953	5,798	0	1987	3,572	216
1954	6,066	0	1988	4,189	50
1955	5,557	0	1989	4,594	100
1956	5,744	0	1990	4,842	543
1957	3,729	0	1991	5,039	272
1958	3,843	0	1992	2,572	1,807
1959	4,297	0	1993	669	176
1960	4,225	0	1994	2,076	1,506
1961	5,364	0	1995	1,278	2,055
1962	5,595	0	1996	703	1,801
1963	4,030	0	1997	1,077	2,344
1964	4,709	0	1998	304	2,037
1965	5,645	0	1999	453	2,411
1966	6,144	0	2000	834	1,270
1967	4,898	0	2001	1,238	1,245
1968	6,644	0	2002	965	1,701
1969	4,891	0	2003	1,085	3,028
1970	5,543	0	2004	192	3,900
1971	5,794	0	2005	1,464	2,949
1972	5,307	0	2006	476	3,629

Table 17. Ratio of anchovy to sardine in reported live bait catch in California, 1994-2006. Values are in metric tons with the assumption that 1 scoop =12.5 lbs.

Year	Anchovy	Sardine	Total	Proportion Anchovy	Proportion Sardine
2006	476	3,629	4,105	0.12	0.88
2005	1,464	2,949	4,413	0.33	0.67
2004	192	3,900	4,092	0.05	0.95
2003	1,085	3,028	4,113	0.26	0.74
2002	965	1,701	2,666	0.36	0.64
2001	1,238	1,245	2,483	0.50	0.50
2000	834	1,270	2,104	0.40	0.60
1999	453	2,411	2,864	0.16	0.84
1998	304	2,037	2,341	0.13	0.87
1997	1,077	2,344	3,420	0.31	0.69
1996	703	1,801	2,504	0.28	0.72
1995	1,278	2,055	3,333	0.38	0.62
1994	2,076	1,506	3,582	0.58	0.42

Table 18. Commercial harvest (metric tons) of CPS finfish in Ensenada, Baja California, Mexico, for calendar years 1978-2006[1,2,3,4/]. Market squid are not commercially fished off Ensenada.

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Year	Pacific sardine	Northern anchovy	Pacific mackerel	Jack mackerel
1978	0	135,036	0	n/a
1979	0	192,476	0	n/a
1980	0	242,907	0	n/a
1981	0	258,745	0	n/a
1982	0	174,634	0	n/a
1983	274	87,429	135	n/a
1984	0	102,931	128	n/a
1985	3,722	117,192	2,582	n/a
1986	243	93,547	4,883	n/a
1987	2,432	124,482	2,082	n/a
1988	2,035	79,495	4,484	902
1989	6,224	81,811	13,687	0
1990	11,375	99	35,767	25
1991	31,391	831	17,500	30
1992	34,568	2,324	24,345	n/a
1993	32,045	284	7,741	n/a
1994	20,877	875	13,319	85
1995	35,396	17,772	4,821	0
1996	39,065	4,168	5,604	47
1997	68,439	1,823	12,477	78
1998	47,812	972	50,726	480
1999	58,569	3,482	10,168	781
2000	51,173	1,562	7,182	0
2001	22,246	76	4,078	0
2002	43,437	0	7,962	0
2003	30,540	1,287	2,678	0
2004	44,382	n/a	n/a	n/a
2005	56,715	5,604	2,126	0
2006	41,441	n/a	n/a	n/a

1/ Data for 1978 to 2002 from García and Sánchez (2003).
2/ Data for Jan-Nov 2003 were provided by Dr. Celia Eva-Cotero, CRIP Instituto Nacional de la Pesca, Ensenada (pers. comm.).
3/ 2005 data from Cota et al. (2006).
4/ Sardine landings for 1989 through 2006 provided by Manuel Nevarrez, CRIP-INP Guaymas (pers. comm.).

Table 19. Pacific sardine population numbers at age (millions), spawning stock biomass (SSB, mt), and age 1+ biomass (mt) at the beginning of each biological year, 1982-83 to 2006-07 (July-June) (Hill et al. 2006). 'Model SSB' is based on maturity-at-age and fishery weights-at-age and is used in ASAP to estimate stock-recruitment. 'Population SSB' and 'Age 1+ biomass' were calculated using population weights-at-age. Total landings (Canada+USA+Ensenada) by biological year are also provided. Recruitment is shown as population numbers at age-0. Age 1+ biomass as of July 2006 (bold) served as the basis for setting a HG for the U.S. fishery in calendar year 2007.

Biological	--- Population Numbers-at-age (millions) ---						Model	Population	Age 1+	Total
Year	0	1	2	3	4	5+	SSB	SSB	Biomass	Landings
1982-83	176	15	9	5	3	2	7,393	5,543	4,680	487
1983-84	328	117	9	5	3	3	15,236	12,826	15,395	372
1984-85	467	219	77	6	3	4	35,590	29,056	36,085	3,571
1985-86	519	303	136	46	4	5	57,736	48,793	60,367	1,838
1986-87	1,261	346	199	86	30	6	88,068	78,108	85,518	2,667
1987-88	1,392	841	227	127	56	23	148,640	124,428	155,124	5,887
1988-89	2,495	927	548	141	81	52	223,080	194,543	222,866	4,795
1989-90	2,481	1,666	612	354	92	88	366,450	286,496	352,707	15,322
1990-91	3,004	1,641	1,080	388	228	119	431,690	387,036	453,436	20,602
1991-92	4,954	1,984	1,058	678	249	228	489,870	492,340	557,239	35,022
1992-93	3,941	3,217	1,230	650	428	312	467,370	613,992	751,102	74,214
1993-94	7,148	2,452	1,791	673	380	470	491,760	702,226	777,950	31,540
1994-95	9,785	4,651	1,523	1,105	426	559	629,310	907,218	1,062,119	66,295
1995-96	6,803	6,276	2,774	901	681	643	778,570	1,158,675	1,437,764	62,677
1996-97	5,641	4,413	3,861	1,695	567	868	1,024,000	1,341,011	1,559,516	65,968
1997-98	6,737	3,673	2,744	2,386	1,075	946	976,910	1,375,343	1,536,719	131,380
1998-99	7,054	4,212	2,056	1,514	1,401	1,292	803,950	1,291,477	1,462,943	113,901
1999-00	5,100	4,366	2,293	1,101	871	1,709	628,580	1,229,013	1,427,391	119,258
2000-01	3,853	3,092	2,242	1,153	607	1,636	752,430	1,090,755	1,238,913	121,295
2001-02	7,487	2,389	1,680	1,177	639	1,383	751,430	977,236	1,048,074	125,612
2002-03	3,371	4,631	1,285	866	637	1,217	729,770	925,604	1,139,043	141,774
2003-04	14,370	2,100	2,528	662	459	1,072	823,690	972,553	969,557	106,550
2004-05	5,100	9,245	1,255	1,424	370	889	836,480	1,177,696	1,599,603	140,985
2005-06	5,468	3,258	5,412	684	766	710	833,470	1,323,892	1,503,871	152,852
2006-07	4,877	3,459	1,862	2,870	361	808	731,210	1,160,075	1,319,072	133,827

Table 20. Annual U.S. Pacific sardine landings and HGs (metric tons) by state and management subarea, 1981-2007.

	California						Management Subarea[1,2\] Landings			HGs by Subarea[1,2\]		
Year	So. Calif.	Cen. Calif.	No. of 39°N	California	Oregon	Washington	Southern	Northern	Total	Southern	Northern	Total
1981	34.4	0.0	0.0	34.4	0.0	0.0	34.4	0.0	34.4	n/a	n/a	n/a
1982	1.8	0.0	0.0	1.8	0.0	0.0	1.8	0.0	1.8	n/a	n/a	n/a
1983	0.6	0.0	0.0	0.6	0.0	0.0	0.6	0.0	0.6	n/a	n/a	n/a
1984	0.9	0.3	0.0	1.2	0.0	0.0	0.9	0.3	1.2	n/a	n/a	n/a
1985	3.7	2.2	0.0	5.9	0.0	0.0	3.7	2.2	5.9	n/a	n/a	n/a
1986	304.0	84.4	0.0	388.4	0.0	0.0	304.0	84.4	388.4	n/a	n/a	n/a
1987	391.6	47.8	0.0	439.4	0.0	0.0	391.6	47.8	439.4	n/a	n/a	n/a
1988	1,185.4	3.0	0.0	1,188.4	0.0	0.0	1,185.4	3.0	1,188.4	n/a	n/a	n/a
1989	598.7	238.0	0.0	836.7	0.0	0.0	598.7	238.0	836.7	n/a	n/a	n/a
1990	1,537.1	127.1	0.0	1,664.2	0.0	0.0	1,537.1	127.1	1,664.2	n/a	n/a	n/a
1991	6,601.4	985.9	0.0	7,587.3	0.0	0.0	6,601.4	985.9	7,587.3	n/a	n/a	n/a
1992	14,821.9	3,127.6	0.0	17,949.5	4.0	0.0	14,821.9	3,131.6	17,953.5	n/a	n/a	n/a
1993	14,669.6	675.6	0.0	15,345.2	0.2	0.0	14,669.6	675.8	15,345.4	n/a	n/a	n/a
1994	9,348.5	2,295.0	5.0	11,643.5	0.0	0.0	9,348.5	2,295.0	11,643.5	n/a	n/a	n/a
1995	34,645.7	5,681.2	2.0	40,326.9	0.0	0.0	34,645.7	5,681.2	40,326.9	n/a	n/a	n/a
1996	24,565.0	7,988.1	0.5	32,553.1	0.0	0.0	24,565.0	7,988.1	32,553.1	n/a	n/a	n/a
1997	29,885.4	13,359.7	0.0	43,245.1	0.0	0.0	29,885.4	13,359.7	43,245.1	n/a	n/a	n/a
1998	32,462.1	10,493.3	21.0	42,955.4	1.0	0.0	32,462.1	10,494.3	42,956.4	n/a	n/a	n/a
1999	42,017.2	17,246.3	0.0	59,263.5	775.5	1.0	42,017.2	18,022.8	60,040.0	n/a	n/a	n/a
2000	42,248.0	11,367.5	0.0	53,615.5	9,527.9	4,842.0	42,248.0	25,737.4	67,985.4	124,527.3	62,263.7	186,791.0
2001	44,721.5	7,103.5	0.5	51,825.0	12,780.3	11,127.1	44,721.5	31,010.9	75,732.4	89,824.7	44,912.3	134,737.0
2002	44,464.0	13,881.0	0.0	58,345.0	22,710.8	15,832.4	44,464.0	52,424.2	96,888.2	78,961.3	39,480.7	118,442.0
2003	24,832.0	7,907.5	14.0	32,739.5	25,257.6	11,920.1	32,739.5	37,177.7	69,917.2	73,938.7	36,969.3	110,908.0
2004	32,393.4	15,284.8	23.6	47,701.8	36,110.7	8,934.3	47,678.2	45,068.6	92,746.8	81,831.3	40,915.7	122,747.0
2005	30,252.6	7,940.1	0.0	38,192.7	45,109.7	6,721.1	38,192.7	51,830.8	90,023.5	90,786.0	45,393.0	136,179.0
2006	33,285.8	17,743.1	0.0	51,028.9	35,651.8	4,363.1	51,028.9	35,664.6	86,693.5	n/a	n/a	118,937.0
2007	---	---	---	---	---	---	---	---	---	n/a	n/a	152,564.0

1/ As of 2003, the 'Southern Subarea' comprises fisheries and landings from Pt. Arena, California (39°N latitude) to the Mexican border.
2/ As of 2006, the U.S. sardine HG is no longer managed by subarea. HG's are now allocated coastwide and released on a seasonal basis.

Table 21. West Coast Pacific sardine landings by country, 1981-2006. Landings made by commercial fisheries based in southern Baja California and the Gulf of California are not included.

Year	Ensenada Mexico	United States	Canada	Total
1981	0.0	34.4	0.0	34.4
1982	0.0	1.8	0.0	1.8
1983	274.0	0.6	0.0	274.6
1984	0.0	1.2	0.0	1.2
1985	3,722.0	5.9	0.0	3,727.9
1986	243.0	388.4	0.0	631.4
1987	2,432.0	439.4	0.0	2,871.4
1988	2,035.0	1,188.4	0.0	3,223.4
1989	6,224.0	836.7	0.0	7,060.7
1990	11,375.0	1,664.2	0.0	13,039.2
1991	31,391.0	7,587.3	0.0	38,978.3
1992	34,568.0	17,953.5	0.0	52,521.5
1993	32,045.0	15,345.4	0.0	47,390.4
1994	20,877.0	11,643.5	0.0	32,520.5
1995	35,396.0	40,326.9	25.0	75,747.9
1996	39,065.0	32,553.1	88.0	71,706.1
1997	68,439.0	43,245.1	34.0	111,718.1
1998	47,812.0	42,956.4	745.0	91,513.4
1999	58,569.0	60,040.0	1,250.0	119,859.0
2000	51,173.0	67,985.4	1,718.0	120,876.4
2001	22,246.0	75,732.4	1,600.0	99,578.4
2002	43,437.0	96,888.2	1,044.0	141,369.2
2003	30,540.0	69,917.2	954.0	101,411.2
2004	44,382.0	92,746.8	4,258.8	141,387.6
2005	56,715.0	90,023.5	3,200.0	149,938.5
2006	41,441.0	86,693.5	1,558.0	129,692.5

Table 22. RecFIN estimated recreational harvest of Pacific (chub) mackerel by state (type A+B1estimate in metric tons), 1980-2006.

Year	California	Oregon	Washington	Total
1980	2,754.44	0.00	0.00	2,754.44
1981	1,394.47	0.00	0.00	1,394.47
1982	1,667.49	0.00	0.00	1,667.49
1983	1,467.35	1.50	0.00	1,468.85
1984	1,445.11	0.24	0.00	1,445.36
1985	1,076.62	0.02	0.00	1,076.64
1986	1,002.60	0.00	0.00	1,002.60
1987	1,271.19	0.00	0.00	1,271.19
1988	800.08	0.00	0.00	800.08
1989	610.57	0.00	0.00	610.57
1990	n/a	n/a	n/a	n/a
1991	n/a	n/a	n/a	n/a
1992	n/a	n/a	n/a	n/a
1993	621.92	2.08	0.00	624.00
1994	947.13	0.21	0.00	947.34
1995	1,026.32	0.12	0.00	1,026.44
1996	693.85	0.10	0.00	693.95
1997	966.96	0.31	0.00	967.27
1998	448.23	0.04	1.00	449.26
1999	196.04	0.21	0.33	196.58
2000	250.00	0.07	0.00	250.07
2001	561.39	0.05	0.00	561.44
2002	279.11	0.11	0.00	279.22
2003	341.35	0.27	0.00	341.61
2004	546.44	0.10	0.00	546.53
2005	411.48	0.07	0.00	411.55
2006	633.81	0.11	0.00	633.92

Table 23. RecFIN estimated recreational harvest of Pacific (chub) mackerel by fishing mode (type A+B1 estimate in metric tons), 1980-2006. Estimates for 'Man Made Structures' and 'Beach/Bank' were included in 'Shore Modes'.

Year	Shore Modes	Party/Charter	Private/Rental	Total
1980	424.8	1,320.5	1,009.2	2,754.4
1981	288.1	590.7	515.7	1,394.5
1982	274.7	865.1	527.6	1,667.5
1983	361.9	702.6	404.3	1,468.9
1984	281.9	577.9	585.5	1,445.4
1985	142.0	544.7	389.9	1,076.6
1986	91.6	520.1	390.9	1,002.6
1987	450.8	244.6	575.8	1,271.2
1988	105.5	239.1	455.4	800.1
1989	256.7	134.8	219.1	610.6
1990	n/a	n/a	n/a	n/a
1991	n/a	n/a	n/a	n/a
1992	n/a	n/a	n/a	n/a
1993	88.8	172.5	362.7	624.0
1994	205.9	245.1	496.3	947.3
1995	121.2	373.5	531.8	1,026.4
1996	93.4	319.4	281.1	694.0
1997	148.3	168.6	650.4	967.3
1998	96.7	131.2	221.4	449.3
1999	62.4	60.8	73.4	196.6
2000	51.3	76.8	121.9	250.1
2001	347.0	52.2	162.2	561.4
2002	92.9	25.7	160.6	279.2
2003	208.4	25.4	107.8	341.6
2004	406.3	20.3	119.9	546.5
2005	314.7	19.4	77.4	411.6
2006	586.9	7.5	39.5	633.9

Table 24. Pacific mackerel HGs and landings (mt) by July-June management season.

Season	Quota or HG[a/]	Landings
1992-93	34,010	18,307
1993-94	23,147	10,793
1994-95	14,706	9,372
1995-96	9,798	7,615
1996-97	8,709	9,788
1997-98	22,045	23,413
1998-99	30,572	19,578
1999-00	42,819	7,170
2000-01	20,740	20,936
2001-02	13,837	8,039
2002-03	12,535	3,541
2003-04	10,652	5,961
2004-05	13,268	5,012
2005-06	17,419	4,572
2006-07[b/]	19,845	6,956

[a/] California Quotas 1992-03 through 1998-99. PFMC HGs from 1999-00 onward.
[b/] 2006-07 landings as of Feb, 2007 (CDFG wetfish tables).

Table 25. West coast landings (mt) and real[1] exvessel revenues (2006 $) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid, 1981-2006.

	Pacific	Pacific	Pacific	Pacific	Jack	Jack				
Year	Sardine mt	Sardine Rev	Mackerel mt	Mackerel Rev	Mackerel mt	Mackerel Rev	Anchovy mt	Anchovy Rev	Squid mt	Squid Rev
1981	15	$5,924	35,388	$14,293,545	17,778	$7,170,864	52,309	$6,424,811	23,510	$9,966,329
1982	2	$996	36,065	$13,438,936	19,617	$7,370,841	42,155	$4,005,322	16,308	$6,615,098
1983	1	$311	41,479	$14,299,851	9,829	$3,189,626	4,430	$742,648	1,824	$1,349,023
1984	1	$1,488	44,086	$14,202,181	9,154	$2,348,353	2,899	$711,995	564	$519,267
1985	6	$2,353	37,772	$10,924,361	6,876	$2,150,566	1,638	$397,118	10,276	$6,598,265
1986	388	$134,659	48,089	$12,676,472	4,777	$1,349,219	1,557	$381,945	21,278	$7,354,905
1987	439	$100,058	46,725	$10,583,117	8,020	$1,893,034	1,467	$490,602	19,984	$6,269,729
1988	1,188	$262,950	50,864	$12,591,601	5,068	$1,220,007	1,518	$639,400	37,316	$11,588,397
1989	837	$288,274	47,713	$10,419,902	10,745	$2,448,022	2,511	$1,030,442	40,974	$11,098,864
1990	1,664	$271,061	40,092	$7,620,158	3,254	$629,632	3,259	$889,245	28,447	$6,727,187
1991	7,587	$1,227,092	32,067	$7,339,630	1,712	$341,699	4,068	$895,026	37,389	$8,344,504
1992	18,056	$2,519,290	19,045	$5,382,574	1,526	$320,857	1,166	$300,560	13,112	$3,283,895
1993	15,347	$2,029,126	12,129	$1,978,885	1,950	$361,585	2,003	$627,543	42,830	$13,484,054
1994	11,644	$1,948,164	10,293	$1,847,339	2,906	$490,260	1,859	$707,787	55,383	$18,438,541
1995	40,256	$4,481,417	8,823	$1,449,266	1,877	$367,661	2,016	$464,481	70,252	$28,121,532
1996	32,553	$3,896,773	9,730	$1,628,614	2,437	$377,409	4,505	$866,011	80,561	$27,031,460
1997	43,290	$5,401,011	20,168	$3,382,844	1,533	$300,612	5,779	$987,084	70,329	$25,116,992
1998	43,312	$4,356,248	21,561	$3,054,436	1,777	$460,339	1,584	$294,878	2,895	$1,953,252
1999	60,476	$6,151,637	9,094	$1,296,391	1,557	$236,984	5,311	$1,137,530	92,101	$39,599,911
2000	67,982	$8,448,580	22,058	$3,404,346	1,451	$318,184	11,832	$1,677,828	118,903	$31,614,791
2001	75,801	$10,365,167	7,618	$1,366,236	3,839	$688,421	19,345	$1,624,610	86,203	$19,191,041
2002	96,897	$11,813,852	3,744	$584,887	1,026	$232,122	4,882	$694,326	72,895	$20,341,502
2003	71,923	$7,947,226	4,213	$718,570	231	$79,706	1,929	$372,901	45,056	$27,686,354
2004	89,339	$10,683,681	3,708	$609,704	1,160	$283,299	7,019	$868,720	40,068	$20,975,664
2005	86,383	$10,492,750	3,586	$596,294	294	$223,878	11,414	$1,160,108	55,708	$32,368,321
2006	86,452	$9,425,554	6,538	$897,381	1,174	$201,621	12,958	$1,333,730	49,070	$26,902,811

Source: PacFIN - 1981-2006 data extracted April 2007.

[1]Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 2007.

[2]Pacific mackerel landings and revenues also include landings and revenues of unspecified mackerel.

Table 26. Pacific coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by landing area, 1981-2006. (Page 1 of 5)

	Landings (mt)					Exvessel Revenues (2006 $)				
Year	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid
San Diego										
1981		13.2	11.8	1.7	4.3		$18,125	$7,974	$1,284	$3,538
1982		29.9	0.1		0.1		$24,636	$241		*
1983		18.4	0.4	1.7	1.2		$17,002	$948	$1,221	$1,276
1984	0.3	27.2	0.2			$451	$22,348	$705		
1985		18.8	0.1		0.3		$30,449	$145		*
1986		9.4	0.1				$9,808	$341		
1987		9.7	0.8		2.7		$12,189	$1,532		$2,276
1988	0.1	17.4		5.5	18.6	$84	$18,352		$4,952	$10,737
1989	0.1	7.6		93.5	2.1	$231	$9,409		$350,139	$3,272
1990	0.2	7.7	0.1	18.4	1.2	$275	$8,212	$90	$59,144	$1,538
1991		11.3	0.1	399.9			$10,716	$108	$143,217	
1992	0.1	17.4	1.1	120.9	16.4	$238	$18,843	$1,284	$28,429	*
1993	0.4	16.3	3.2	3.7	0.2	$696	$17,384	$3,438	$1,363	*
1994	2.0	20.8	4.9	27.9	0.8	$1,123	$17,503	$3,293	$12,446	$278
1995	5.3	31.2	0.5	38.2	0.8	$5,166	$21,916	$552	$25,645	*
1996	1.2	26.0		144.6	1.8	$1,377	$19,187		$83,420	$567
1997	2.7	15.7		13.0	2.6	$3,602	$12,177		$7,218	$875
1998	215.3	52.3		2.3	2.2	$24,205	$10,445		$1,226	$1,839
1999	592.3	15.3	0.1	1.9	4.1	$70,971	$5,412	$148	$788	*
2000	19.2	1.7	0.2	4.3	34.8	$8,510	$2,484	$264	$2,012	*
2001	0.2	2.8	0.1	1.5	11.0	$112	$2,878	$125	$841	$5,239
2002	90.5	0.5	0.1	5.2		$66,266	$999	$126	$3,451	
2003	28.1	0.9	2.5	13.6		$23,596	$1,062	$3,485	$8,838	
2004	44.4	0.2			14.2	$28,026	$281			$6,798
2005	21.5	1.0		18.2		$13,219	$887		$10,737	
2006	17.6	0.5		26.1	1.4	$10,327	$623		$15,073	$803
Orange/LA										
1981	14.7	29,084.7	14,699.9	38,216.3	8,290.6	$5,908	$11,838,360	$5,922,295	$4,578,331	$1,888,578
1982	1.8	29,827.6	18,131.1	32,514.7	4,292.8	$916	$11,083,965	$6,829,081	$2,819,515	$1,068,074
1983	0.6	33,902.3	6,785.8	900.2	853.6	$287	$12,049,007	$2,453,120	$181,724	$579,844
1984	0.5	35,572.8	3,566.3	204.8	66.3	$582	$12,397,118	$1,207,599	$140,090	$62,065
1985	3.4	32,012.6	5,860.1	43.1	3,095.9	$1,356	$9,556,372	$1,821,210	$29,203	$1,696,260
1986	286.6	41,071.7	4,289.0	140.8	8,121.8	$98,439	$10,965,474	$1,167,704	$35,836	$2,999,043
1987	317.3	39,863.3	7,801.2	108.8	5,421.5	$74,173	$9,110,793	$1,836,196	$31,841	$1,762,888
1988	1,172.1	47,656.6	4,939.1	92.9	15,173.7	$257,157	$11,713,646	$1,171,977	$26,471	$4,778,291
1989	505.0	41,717.5	10,703.7	479.0	16,434.2	$86,118	$9,554,369	$2,399,823	$75,410	$4,220,341
1990	1,179.4	37,123.6	2,968.0	193.2	9,797.9	$182,302	$7,088,981	$560,440	$41,363	$1,951,221
1991	6,415.1	31,602.9	1,640.2	414.3	12,305.3	$1,048,725	$7,225,705	$314,421	$66,921	$2,216,722
1992	13,950.8	18,071.7	1,095.7	136.6	1,700.5	$1,851,283	$5,227,413	$292,276	$35,923	$349,441
1993	13,977.6	11,714.9	1,268.9	118.7	12,889.7	$1,845,459	$1,922,410	$232,025	$22,426	$3,544,738
1994	9,031.7	9,842.3	2,459.8	136.6	11,231.1	$1,210,603	$1,753,364	$349,442	$21,207	$3,070,760
1995	34,137.0	7,864.0	1,596.2	297.8	18,413.1	$3,776,652	$1,297,387	$244,562	$35,774	$6,496,473
1996	23,922.6	8,764.9	2,054.0	239.1	14,993.9	$2,693,341	$1,402,872	$340,105	$30,561	$5,425,803
1997	26,533.7	14,002.6	822.6	1,120.8	17,779.1	$3,088,711	$2,687,186	$219,264	$116,110	$7,097,955
1998	31,702.3	18,149.6	1,012.4	338.1	227.5	$3,443,702	$2,766,819	$384,351	$44,591	$157,374
1999	39,084.2	8,551.1	927.4	1,418.2	27,684.1	$4,162,530	$1,229,235	$219,634	$258,579	$10,838,647
2000	39,104.1	21,646.1	1,209.5	1,280.1	44,839.9	$4,857,497	$3,359,517	$262,155	$170,659	$13,182,224
2001	40,763.6	6,676.6	3,623.8	3,657.7	39,170.6	$5,074,283	$1,208,197	$636,424	$365,108	$9,623,275
2002	39,308.0	3,367.8	1,003.5	1,205.7	28,136.9	$4,265,710	$543,191	$225,247	$113,189	$7,158,013
2003	22,882.7	3,941.3	133.4	205.5	7,758.8	$2,001,541	$677,836	$55,962	$33,422	$4,855,894
2004	23,677.4	3,018.3	1,027.1	147.2	10,504.3	$2,393,430	$529,470	$263,643	$38,706	$5,138,400
2005	24,119.0	3,145.8	166.6	1,992.4	31,813.9	$2,415,314	$537,479	$50,497	$197,530	$19,211,758
2006	26,780.1	5,641.4	1,025.8	878.4	37,107.1	$3,255,870	$801,695	$168,442	$82,550	$20,396,661

Table 26. Pacific coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by landing area, 1981-2006. (Page 2 of 5)

	Landings (mt)					Exvessel Revenues (2006 $)				
Year	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid
Ventura/Santa Barbara										
1981		4,872.1	2,846.6	9,034.5	2,389.7		$1,970,767	$1,145,862	$1,096,493	$421,493
1982		4,095.4	1,195.0	6,440.7	1,403.2		$1,615,452	$432,332	$644,780	$275,067
1983		3,905.0	559.1	2,727.1	3.2		$1,262,639	$163,150	$278,656	$3,693
1984		1,263.2	52.1	141.0	7.1		$392,447	$17,304	$77,294	$14,467
1985		2,950.7	787.1	109.8	2,959.4		$760,284	$230,879	$51,138	$1,264,446
1986	17.5	5,004.5	296.9	160.9	6,411.8	$4,894	$1,299,091	$84,974	$69,019	$1,736,229
1987	74.3	5,877.7	8.0	140.2	8,406.6	$17,421	$1,269,797	$2,605	$59,052	$2,400,430
1988	13.2	3,119.6	6.5	154.3	16,334.4	$4,503	$820,619	$1,718	$71,793	$4,730,972
1989	93.3	5,907.6		160.9	16,861.9	$15,793	$821,194		$77,074	$4,416,656
1990	236.1	420.9	75.7	140.9	10,600.5	$30,259	$58,995	$9,706	$63,981	$2,733,715
1991	186.4	138.1	8.6	189.9	16,904.8	$29,417	$20,877	$1,309	$81,117	$3,401,139
1992	973.4	92.2		89.8	2,809.2	$93,432	$10,264		$38,439	$600,055
1993	691.7	34.5		298.1	17,367.2	$67,724	$4,752		$110,210	$4,803,115
1994	315.0	39.5	47.5	340.8	21,333.6	$29,653	$10,289	$4,139	$179,660	$6,597,693
1995	354.5	249.1	0.4	346.3	41,184.3	$50,307	$29,945	$237	$179,713	$17,605,580
1996	461.1	66.8	11.1	374.5	46,435.3	$47,806	$37,095	$1,949	$184,705	$15,056,816
1997	3,357.3	1,160.3	7.4	510.4	34,610.6	$285,650	$125,672	$3,110	$109,987	$11,315,933
1998	899.3	1,305.7		239.1	2,175.6	$109,491	$82,530		$95,097	$1,494,117
1999	2,545.1	215.0		2,233.2	52,718.7	$288,479	$42,696		$382,727	$23,834,618
2000	3,072.2	230.0	9.1	3,548.3	48,747.0	$346,036	$24,957	$1,012	$454,549	$11,599,505
2001	3,956.7	72.4		3,909.3	31,876.3	$418,485	$7,525		$510,730	$6,000,160
2002	5,064.5			732.2	11,814.1	$694,516			$202,368	$3,480,825
2003	2,365.9	39.3		625.4	13,199.8	$237,155	$4,705		$153,163	$8,142,467
2004	4,711.0	67.4		2,722.2	15,397.0	$457,310	$8,464		$433,880	$8,239,134
2005	1,885.7	96.0	44.3	2,948.5	13,639.5	$180,437	$16,655	$2,743	$505,639	$7,592,284
2006	1,924.4	126.3		4,164.7	5,901.4	$179,658	$8,689		$621,764	$3,245,922
San Luis Obispo										
1981		1.0		17.2	0.1		$972		$12,611	$150
1982		2.5			0.3		$2,199			$444
1983		0.7			0.2		$571			$231
1984		5.0			0.1		$3,339			$132
1985	0.3	19.5	0.1	47.5	0.3	$104	$5,024	$59	$25,973	$443
1986		0.6		11.3	0.1		$377		$5,057	$137
1987		0.8		2.4	0.4		$727		$994	$411
1988		0.2			0.1		$319			$108
1989		1.2		0.2	19.2		$885		$47	$6,394
1990	121.1	1.9	16.5		0.1	$15,494	$1,203	$2,090		$76
1991		1.0					$649			
1992		0.4			0.2		$329			$134
1993		0.1		1.1	2,035.9		$57		$657	$1,057,165
1994	0.1	0.2		0.8	1,343.6	$28	$118		$463	$751,426
1995					182.5					$50,385
1996					216.8					$76,322
1997				22.6					$11,376	$15
1998		0.3					$179			
1999				2.0	16.7				*	$5,507
2000										
2001				3.5	79.4				$1,731	*
2002	101.9				356.2	*				$84,669
2003				3.2	650.2				*	$389,630
2004					905.7					$471,636
2005					40.0					*
2006	0.1					*				

Table 26. Pacific coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by landing area, 1981-2006. (Page 3 of 5)

	Landings (mt)					Exvessel Revenues (2006 $)				
Year	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid
Monterey/Santa Cruz										
1981		1,359.2	211.5	4,617.0	12,822.7		$438,570	$88,688	$531,183	$7,650,502
1982		2,053.4	280.3	2,609.1	10,607.3	$80	$686,031	$103,532	$260,154	$5,267,852
1983		3,449.2	2,457.2	320.8	500.0	$22	$895,338	$546,725	$76,145	$394,005
1984	0.3	7,151.1	5,486.0	1,894.7	390.9	$455	$1,352,850	$1,107,631	$194,775	$347,091
1985	2.2	2,704.4	228.1	1,138.2	3,813.1	$893	$538,801	$98,034	$150,843	$3,279,899
1986	84.5	1,987.9	191.1	808.2	5,487.9	$31,325	$390,431	$96,075	$82,185	$2,160,050
1987	47.6	956.7	209.7	676.3	5,611.0	$8,288	$179,504	$52,102	$122,883	$1,926,762
1988	3.0	59.0	121.5	696.3	4,896.7	$1,172	$28,586	$45,804	$283,832	$1,767,818
1989	238.0	60.0	37.2	928.7	7,145.5	$185,840	$18,009	$43,602	$193,330	$2,325,209
1990	127.1	2,495.7	192.4	2,131.5	7,917.5	$42,549	$433,674	$56,259	$442,512	$1,996,334
1991	985.9	298.0	43.6	2,526.8	6,703.2	$148,951	$71,526	$22,300	$395,336	$2,248,501
1992	3,093.2	374.9	109.8	608.2	6,111.3	$566,151	$102,454	$24,817	$105,238	$1,691,840
1993	676.1	38.1	345.1	1,285.0	6,039.6	$114,404	$17,082	$112,168	$310,932	$2,618,419
1994	2,289.4	38.4	191.2	985.8	13,648.1	$704,149	$22,693	$122,732	$318,090	$5,779,539
1995	5,678.1	460.7	109.1	1,110.5	2,449.1	$636,230	$79,342	$97,643	$115,127	$1,032,227
1996	7,987.9	703.0	91.0	3,553.9	4,672.0	$1,097,618	$113,519	$16,295	$457,305	$1,701,208
1997	13,356.7	3,208.2	327.2	3,895.1	8,282.9	$1,936,546	$523,995	$75,310	$677,853	$3,554,868
1998	10,009.0	1,456.7	32.5	901.2		$736,838	$170,738	$13,285	$81,142	
1999	16,417.2	2.7	24.2	1,511.3	301.3	$1,417,652	$11,854	$2,072	$398,390	$94,469
2000	11,367.0	39.4	50.0	6,804.3	7,125.4	$1,124,616	$7,391	$31,275	$921,148	$2,225,496
2001	7,102.5	172.2		11,660.3	7,746.6	$1,625,259	$21,441		$644,991	$2,010,055
2002	13,607.4	0.1	1.8	2,689.5	25,084.8	$1,445,458	$80	$432	$284,157	$7,570,346
2003	7,907.3	1.0	19.8	705.7	13,921.4	$727,587	$4,600	$2,691	$89,393	$8,638,628
2004	15,443.8	489.9		3,890.8	5,542.5	$1,268,931	$55,876		$308,281	$3,024,873
2005	8,119.3	0.4	0.5	6,192.2	1,916.3	$585,064	$743	$309	$394,303	$1,014,591
2006	17,578.9	31.1	140.7	7,634.5	509.3	$1,633,143	$9,114	$30,127	$564,264	$254,141
San Francisco										
1981			1.9	203.9				$1,671	$92,361	
1982		4.2	0.2	394.6	2.3		$2,451	$296	$196,621	*
1983		13.3	1.2	332.3	461.5		$5,383	$371	$134,214	$365,434
1984		13.8	0.3	537.7	97.0		$9,241	$161	$235,733	$92,769
1985		14.6		258.8	77.0		$9,350	$42	$109,080	$56,564
1986		12.0		392.7	831.9		$9,040		$149,566	$353,181
1987	0.3	6.3	0.5	424.4	342.8	$102	$5,966	$596	$167,150	$127,913
1988		6.2	0.4	492.3	299.2	$2	$5,699	$441	$187,753	$104,385
1989		9.0	4.3	755.3	3.4	$18	$7,979	$4,510	$240,063	$2,147
1990		13.8	1.6	714.0	128.8	$41	$10,037	$1,038	$217,926	$43,801
1991		2.7	0.2	459.2	1,471.4		$2,057	$96	$148,530	$476,035
1992	34.5	11.5	1.4	164.4	2,447.9	$8,168	$12,762	$470	$46,218	$629,799
1993		1.2	0.3	243.9	1,017.8		$1,303	$271	$143,072	$493,817
1994	0.8	1.7	0.4	279.6	2,235.6	$737	$1,972	$600	$106,838	$823,148
1995	1.6	0.6	0.2	93.2	746.8	$607	$677	$298	$11,025	$273,748
1996		4.4	0.8	105.1	332.9		$2,967	$701	$30,717	*
1997	3.1	3.7	0.2	155.7	204.5	$1,573	$2,871	$434	$12,941	$84,197
1998	463.5	3.8	1.2	0.5	14.1	$37,430	$4,226	$980	$24	$18,644
1999	1,057.9	0.9		46.8	5.4	$107,867	$682		$17,372	*
2000	0.5		0.4	116.5		$242		$787	$73,616	
2001		0.6		42.3	279.9		$1,880		$15,221	$83,920
2002	171.8			17.2	864.6	$35,590			$10,543	$239,179
2003	0.1				2,807.7	$550				$1,687,511
2004	370.1	0.1			164.5	$36,464	$126			$96,196
2005	309.0				0.6	$28,057				*
2006	130.9	0.9		70.5		$9,244	$1,150		$4,662	

Table 26. Pacific coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by landing area, 1981-2006. (Page 4 of 5)

	Landings (mt)					Exvessel Revenues (2006 $)				
Year	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid
Northern California										
1981		1.9			2.1		$988			$1,958
1982		3.0	1.1		1.7		$1,023	$535		$1,682
1983		2.9	0.1				$1,421	$30		
1984		0.1		0.5	0.1		$75		$1,029	*
1985										
1986										
1987					0.1					*
1988					1.0					*
1989		0.1			0.6		$48			*
1990		0.4			0.8		$248			*
1991		0.1			1.3		$61			*
1992		0.4	1.0	0.7	0.5		$453	$609	$138	$1,487
1993		0.2	55.4	0.1			$148	$10,118	$67	
1994	4.9	0.3	0.1	8.4	37.6	$1,869	$204	$85	$3,685	$13,466
1995	1.5	0.1	0.1		1.8	*	*	*		*
1996	0.3	3.1				$144	$2,117			
1997		5.7	2.2		3.4		$3,819	$1,483		$2,400
1998	20.9	9.2	6.2			$3,528	$3,969	$4,823		
1999		2.9					$916			
2000		1.7	0.1		0.5		$389	$104		*
2001	0.1			2.3	0.1	$45			$7,189	$94
2002		0.2	0.1		3.9		$532	$39		*
2003	13.5					*				
2004	23.6					$11,018				
2005										
2006					1.9					*
Other California										
1981										
1982										
1983										
1984		0.1					*			
1985										
1986		0.2					*			
1987										
1988										
1989										
1990										
1991										
1992										
1993										
1994		3.9		3.7	32.7		$11,907		$313	*
1995										
1996										
1997										
1998										
1999										
2000										
2001										
2002										
2003										
2004										
2005										
2006										

Table 26. Pacific coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by landing area, 1981-2006. (Page 5 of 5)

	Landings (mt)					Exvessel Revenues (2006 $)				
Year	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid	Sardine	P. Mackerel	J. Mackerel	Anchovy	Squid
					Oregon					
1981										
1982				0.1					$185	
1983		8.3					$13,889			
1984		3.0					$1,385			
1985										
1986										
1987		1.5					$825			
1988		0.6					$526			
1989		4.7					$1,654			
1990		10.3					$5,118			
1991		0.5	19.3				$234	$3,332		
1992	3.9	462.3	316.5				$208	$1,071		
1993	0.2	279.9	276.6				$1,126	$3,493		
1994		252.2	202.3	0.9			$12,354	$9,956	$257	
1995		189.5	148.6	0.2			$4,488	$9,058	$611	
1996		61.4	257.7				$4,728	$9,480		
1997		1,611.0	373.0				$2,783	$913		
1998	1.0	537.7	686.0			$932	$10,389	$52,628		
1999	775.5	259.1	496.1			$101,836	$1,195	$5,507		
2000	9,527.9	119.1	160.8	0.1		$1,333,241	$7,095	$20,001	$348	
2001	12,780.4	322.0	183.1			$1,834,450	$36,316	$45,553		
2002	22,711.0	126.6	8.9	3.1		$3,140,216	$7,202	$4,264	$1,980	
2003	25,257.9	160.0	73.6	39.1		$3,207,601	$20,325	$17,354	$3,393	
2004	36,111.0	106.9	125.8	13.1		$5,164,281	$11,924	$17,924	$4,913	
2005	45,110.1	317.8	69.6	68.4		$6,380,678	$36,613	$167,010	$1,622	
2006	35,651.3	665.0	5.3	8.6	26.9	$3,887,627	$61,869	$2,598	$19	$15,777
					Washington					
1981				1.3					$580	
1982				5.1					*	
1983				2.9					*	
1984		0.1		10.1			*		*	
1985				11.7					*	
1986				22.1					*	
1987				77.6					*	
1988				40.4					$50,003	
1989		0.2		61.8			$74		$79,902	
1990		0.1		50.3			$221		$59,447	
1991		0.2		54.5			$55		$51,233	
1992		5.9		41.7			$3,720		$44,288	
1993		30.2		19.9			$5,462		$14,255	
1994		33.3		38.5			$3,779		$34,950	
1995		7.5		118.3			$1,030		$82,372	
1996		65.3	2.8	85.6			$24,598	$847	$78,376	
1997		152.5	0.7	59.1			$20,448	$97	$50,613	
1998		45.9	38.5	102.5			$4,943	$4,224	$72,798	
1999	1.4	46.8	108.4	97.8		$1,956	$4,343	$9,010	$78,608	
2000	4,841.9	19.1	20.3	78.7		$770,007	$2,265	$2,583	$55,411	
2001	11,127.2	370.6	32.1	68.0		$1,404,534	$87,554	$6,177	$78,798	
2002	15,832.5	248.2	11.5	228.7		$2,157,384	$32,780	$2,004	$78,639	
2003	11,920.2	53.8	1.8	213.8		$1,603,103	$7,852	$129	$71,917	
2004	8,934.3	22.2	7.1	213.4		$1,320,229	$2,469	$1,692	$67,773	
2005	6,721.1	23.6	10.8	163.7		$875,075	$3,692	$2,552	$36,788	
2006	4,363.1	41.2	1.8	161.1		*	*	*	*	

Source: PacFIN - 1981-2006 data extracted April 2007.

[1]Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 2006.

[2]Pacific mackerel landings and revenues also include landings and revenues of unspecified mackerel.

*Exvessel revenue not reported because less than three vessels or less than three processors accounted for total landings.

Table 27. Average annual real[1] exvessel prices ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid, 1981-2006.

Year	Pacific Sardine $/lb	Pacific Mackerel $/lb	Jack Mackerel $/lb	Anchovy $/lb	Squid $/lb
1981	$0.18	$0.18	$0.18	$0.06	$0.19
1982	$0.23	$0.17	$0.17	$0.04	$0.18
1983	$0.14	$0.16	$0.15	$0.08	$0.34
1984	$0.67	$0.15	$0.12	$0.11	$0.42
1985	$0.18	$0.13	$0.14	$0.11	$0.29
1986	$0.16	$0.12	$0.13	$0.11	$0.16
1987	$0.10	$0.10	$0.11	$0.15	$0.14
1988	$0.10	$0.11	$0.11	$0.19	$0.14
1989	$0.16	$0.10	$0.10	$0.19	$0.12
1990	$0.07	$0.09	$0.09	$0.12	$0.11
1991	$0.07	$0.10	$0.09	$0.10	$0.10
1992	$0.06	$0.13	$0.10	$0.12	$0.11
1993	$0.06	$0.07	$0.08	$0.14	$0.14
1994	$0.08	$0.08	$0.08	$0.17	$0.15
1995	$0.05	$0.07	$0.09	$0.10	$0.18
1996	$0.05	$0.08	$0.07	$0.09	$0.15
1997	$0.06	$0.08	$0.09	$0.08	$0.16
1998	$0.05	$0.06	$0.12	$0.08	$0.31
1999	$0.05	$0.06	$0.07	$0.10	$0.19
2000	$0.06	$0.07	$0.10	$0.06	$0.12
2001	$0.06	$0.08	$0.08	$0.04	$0.10
2002	$0.06	$0.07	$0.10	$0.06	$0.13
2003	$0.05	$0.08	$0.16	$0.09	$0.28
2004	$0.05	$0.07	$0.11	$0.06	$0.24
2005	$0.06	$0.08	$0.35	$0.05	$0.26
2006	$0.05	$0.06	$0.08	$0.05	$0.25

Source: PacFIN - 1981-2006 data extracted April 2006.

[1]Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 2006.

[2]Pacific mackerel landings and revenues also include landings and revenues of unspecified mackerel.

Table 28. West coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by state, 1981-06. (Page 1 of 3)

Year	Pacific Sardine mt	Pacific Sardine Rev	Pacific Mackerel mt	Pacific Mackerel Rev	Jack Mackerel mt	Jack Mackerel Rev	Anchovy mt	Anchovy Rev	Squid mt	Squid Rev
	California									
1981	15	$5,924	35,388	$14,293,542	17,778	$7,170,864	52,308	$6,424,231	23,510	$9,966,329
1982	2	$996	36,065	$13,438,859	19,617	$7,370,841	42,150	$3,987,600	16,308	$6,615,098
1983	1	$311	41,471	$14,285,962	9,829	$3,189,626	4,427	$733,083	1,824	$1,349,023
1984	1	$1,488	44,083	$14,200,648	9,154	$2,348,353	2,889	$694,831	564	$519,267
1985	6	$2,353	37,772	$10,924,358	6,876	$2,150,564	1,626	$377,363	10,276	$6,598,265
1986	388	$134,659	48,089	$12,676,471	4,777	$1,349,219	1,535	$349,659	21,278	$7,354,905
1987	439	$100,058	46,724	$10,582,292	8,020	$1,893,034	1,390	$397,490	19,984	$6,269,729
1988	1,188	$262,950	50,863	$12,591,075	5,068	$1,220,007	1,478	$589,395	37,316	$11,588,397
1989	837	$288,274	47,708	$10,418,174	10,745	$2,448,022	2,449	$950,518	40,974	$11,098,864
1990	1,664	$271,061	40,081	$7,614,806	3,254	$629,632	3,208	$829,798	28,447	$6,727,187
1991	7,587	$1,227,092	32,066	$7,339,341	1,693	$338,366	4,014	$843,793	37,389	$8,344,504
1992	18,052	$2,519,290	18,577	$5,378,646	1,209	$319,784	1,124	$256,272	13,112	$3,283,895
1993	15,346	$2,029,126	11,819	$1,972,296	1,673	$358,092	1,959	$591,998	42,830	$13,484,054
1994	11,644	$1,948,164	10,008	$1,831,206	2,704	$480,304	1,789	$645,665	55,383	$18,438,541
1995	40,256	$4,481,417	8,626	$1,443,748	1,728	$358,603	1,886	$367,362	70,252	$28,121,532
1996	32,553	$3,896,773	9,603	$1,599,288	2,177	$367,082	4,419	$787,635	80,561	$27,031,460
1997	43,290	$5,401,011	18,401	$3,358,969	1,160	$299,603	5,720	$936,470	70,329	$25,116,992
1998	43,311	$4,355,316	20,978	$3,039,098	1,052	$403,488	1,481	$222,080	2,895	$1,953,252
1999	59,700	$6,047,844	8,788	$1,290,853	952	$222,467	5,214	$1,058,922	92,101	$39,599,911
2000	53,612	$6,345,332	21,920	$3,394,986	1,269	$295,600	11,753	$1,622,069	118,903	$31,614,791
2001	51,893	$7,126,183	6,925	$1,242,351	3,624	$636,691	19,277	$1,545,812	86,203	$19,191,041
2002	58,353	$6,516,252	3,369	$544,906	1,005	$225,854	4,650	$613,708	72,895	$20,341,502
2003	34,745	$3,136,522	3,999	$690,393	156	$62,223	1,676	$297,591	45,056	$27,686,354
2004	44,293	$4,199,171	3,579	$595,311	1,027	$263,683	6,793	$796,034	40,068	$20,975,664
2005	34,552	$3,236,997	3,244	$555,989	213	$54,316	11,182	$1,121,698	55,708	$32,368,321
2006	46,438	$5,089,873	5,831	$822,012	1,167	$198,579	12,788	$1,296,119	49,044	$26,887,034

Table 28. West coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by state, 1981-06. (Page 2 of 3)

Year	Pacific Sardine mt	Pacific Sardine Rev	Pacific Mackerel mt	Pacific Mackerel Rev	Jack Mackerel mt	Jack Mackerel Rev	Anchovy mt	Anchovy Rev	Squid mt	Squid Rev
	Oregon									
1981			<1	$3						
1982			<1	$77			<1	$185		
1983			8	$13,889						
1984			3	$1,385						
1985			<1	$3	<1	$2	<1	$64		
1986										
1987			1	$825						
1988			1	$526			<1	$2		
1989			5	$1,654			<1	$22		
1990			10	$5,130						
1991			<1	$234	19	$3,332				
1992	4		462	$208	317	$1,073				
1993			280	$1,126	277	$3,493				
1994			252	$12,354	202	$9,956	1	$257		
1995			189	$4,488	149	$9,058	<1	$611		
1996			61	$4,728	258	$9,480				
1997			1,611	$2,783	373	$913				
1998	1	$932	538	$10,389	686	$52,628				
1999	776	$101,836	259	$1,195	496	$5,507				
2000	9,528	$1,333,241	119	$7,095	161	$20,001	<1	$348		
2001	12,780	$1,834,450	322	$36,316	183	$45,553				
2002	22,711	$3,140,216	127	$7,202	9	$4,264	3	$1,980		
2003	25,258	$3,207,601	160	$20,325	74	$17,354	39	$3,393		
2004	36,111	$5,164,281	107	$11,924	126	$17,924	13	$4,913		
2005	45,110	$6,380,678	318	$36,613	70	$167,010	68	$1,622		
2006	35,651	$3,887,627	665	$61,869	5	$2,598	9	$19	27	$15,777

Table 28. West coast landings (mt) and real[1] exvessel revenues ($ 2006) for Pacific sardine, Pacific mackerel[2], jack mackerel, anchovy and market squid by state, 1981-06. (Page 3 of 3)

Year	Pacific Sardine mt	Pacific Sardine Rev	Pacific Mackerel mt	Pacific Mackerel Rev	Jack Mackerel mt	Jack Mackerel Rev	Anchovy mt	Anchovy Rev	Squid mt	Squid Rev
	Washington									
1981							1	$580		
1982							5	*		
1983							3	*		
1984			<1	*			10	*		
1985							12	*		
1986							22	*		
1987							78	*		
1988							40	$50,003		
1989			<1	$74			62	$79,902		
1990			<1	$221			50	$59,447		
1991			<1	$55			54	$51,233		
1992			6	$3,720			42	$44,288		
1993			30	$5,462			44	$35,545		
1994			33	$3,779			70	$61,865		
1995			7	$1,030			130	$96,508		
1996			65	$24,598	3	$847	86	$78,376		
1997			156	$21,092	1	$97	59	$50,613		
1998			46	$4,949	39	$4,224	103	$72,798		
1999	1	$1,956	47	$4,343	108	$9,010	98	$78,608		
2000	4,842	$770,007	19	$2,265	20	$2,583	79	$55,411		
2001	11,127	$1,404,534	371	$87,569	32	$6,177	68	$78,798		
2002	15,833	$2,157,384	248	$32,780	12	$2,004	229	$78,639		
2003	11,920	$1,603,103	54	$7,852	2	$129	214	$71,917		
2004	8,934	$1,320,229	22	$2,469	7	$1,692	213	$67,773		
2005	6,721	$875,075	24	$3,692	11	$2,552	164	$36,788		
2006	4,363	$448,054	41	$13,500	2	$444	161	$37,593		

Source: PacFIN - 1981-2006 data extracted April 2007.

[1]Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 2006.

[2]Pacific mackerel landings and revenues also include landings and revenues of unspecified mackerel.

*Exvessel revenue not reported because less than three vessels or less than three processors accounted for total landings.

Table 29. Pacific coast CPS landings (mt) and real[1] exvessel revenues ($ 2006) by gear group, 1981-2006.

Year	Roundhaul or Lampara	Dip Net	Pot or Trap	Trawl	Hook and Line	Gillnet	Other or Unknown
Landings (metric tons)							
1981	120,578	8,231	<1	11	9	80	
1982	110,254	3,693	1	13	27	82	
1983	56,944	490	<1	8	2	44	40
1984	56,285	64	<1	4	1	189	
1985	55,494	495	1	20	9	430	<1
1986	75,784	88	4	3	<1	135	
1987	75,048	213	1	6	7	1,314	<1
1988	94,190	140	1	39	1	1,395	<1
1989	102,026	248	<1	132	3	100	
1990	76,010	489	1	15	34	72	
1991	81,817	724	37	128	4	63	
1992	47,666	4,322	3	802	15	31	
1993	68,346	5,171	2	592	3	44	
1994	78,350	2,997	59	510	49	11	13
1995	120,940	1,410	1	386	121	9	42
1996	128,354	855	1	401	64	23	
1997	138,534	247	<1	2,157	90	14	
1998	69,660	37	<1	1,334	44	5	
1999	166,933	528	72	961	12	10	
2000	219,844	1,568	45	275	420	4	<1
2001	190,196	1,791	1	621	153	3	
2002	178,656	761	<1	10	10	2	
2003	123,128	133	<1	76	10	<1	<1
2004	140,277	790	<1	110	7	<1	63
2005	154,761	2,504	11	92	9	<1	
2006	154,473	1,582	15	33	84	<1	
Revenues (2006 $)							
1981	$36,086,136	$1,643,504	$293	$7,611	$9,393	$56,468	
1982	$30,476,988	$838,461	$3,963	$7,690	$16,268	$45,264	
1983	$19,167,229	$341,593	$1,649	$4,847	$2,344	$23,628	$12,528
1984	$17,546,604	$59,553	$3,027	$3,337	$1,604	$83,522	
1985	$19,254,371	$518,219	$1,163	$15,244	$6,478	$219,362	$1,381
1986	$21,733,781	$43,279	$1,670	$2,952	$213	$67,332	
1987	$18,822,958	$64,393	$3,085	$3,772	$2,803	$387,757	$14
1988	$25,741,043	$49,875	$1,081	$44,595	$758	$387,403	$2
1989	$24,850,737	$63,303	$64	$44,127	$1,285	$37,028	
1990	$15,921,164	$65,378	$1,040	$9,509	$41,047	$42,093	
1991	$17,945,449	$73,885	$9,437	$32,630	$6,398	$25,543	
1992	$11,061,629	$641,389	$2,563	$9,538	$26,294	$15,071	
1993	$17,311,750	$1,030,106	$2,289	$11,985	$4,694	$24,891	
1994	$22,642,926	$603,474	$22,614	$35,873	$52,987	$7,137	$3,090
1995	$34,210,657	$455,029	$662	$21,882	$67,374	$5,778	$11,308
1996	$33,366,171	$235,108	$612	$49,849	$77,251	$13,670	
1997	$34,886,204	$103,775	$122	$36,861	$110,900	$8,182	
1998	$9,905,781	$29,665	$163	$92,952	$69,646	$3,541	
1999	$48,093,123	$223,053	$18,834	$39,917	$30,135	$7,024	
2000	$44,821,205	$458,234	$11,707	$30,853	$102,663	$2,311	$111
2001	$32,565,923	$434,461	$451	$151,519	$45,044	$1,844	
2002	$33,420,529	$207,468	$133	$6,126	$26,856	$1,460	
2003	$36,670,846	$81,219	$71	$18,515	$29,285	$132	$21
2004	$32,946,342	$394,592	$2	$16,191	$20,610	$109	$36,587
2005	$43,109,538	$1,530,243	$6,452	$171,350	$16,990	$160	
2006	$37,849,285	$860,839	$8,977	$18,029	$20,261	$172	

Source: PacFIN - 1981-2006 data extracted April 2007.

[1]Real values are current values adjusted to eliminate the effects of inflation. This adjustment has been made by dividing current values by the current year GDP implicit price deflator, with a base year of 2006.

Table 30. **Number of vessels** with Pacific coast landings of **CPS finfish** by landing area, 1981-2006.

Year	San Diego	Orange & LA	Ventura & Santa Barbara	San Luis Obispo	Monterey & Santa Cruz	San Francisco	Northern CA	Other CA	Oregon	Washington	Other
1981	64	136	71	46	82	9	6	1	5	4	24
1982	60	135	38	53	109	18	7		4	1	30
1983	53	113	28	49	117	47	15		64	1	15
1984	54	103	35	44	121	65	3	1	3	2	26
1985	51	124	49	34	115	74			4	2	24
1986	39	116	37	33	85	48	1	1	1	2	13
1987	38	110	41	30	77	63	5		92	2	21
1988	39	104	40	22	97	77	2		79	3	21
1989	46	99	31	28	62	111	5	1	152	3	20
1990	48	95	34	50	122	106	6		162	4	30
1991	53	96	34	33	48	21	4		39	4	18
1992	53	86	12	27	152	138	7		38	11	26
1993	46	103	14	16	73	41	5		28	10	23
1994	49	94	17	7	52	53	8	4	38	12	14
1995	40	96	32	3	35	38	2		44	6	18
1996	35	99	29	1	41	37	4		41	14	31
1997	27	102	20	3	49	53	7		50	18	14
1998	21	77	15	10	35	56	11		46	9	10
1999	17	80	17	2	24	21	5		44	10	7
2000	17	83	18	2	40	35	7		43	19	10
2001	18	76	17	3	27	14	4		43	28	6
2002	8	80	9	2	22	7	4		42	24	7
2003	8	58	14	2	22	6	2		43	20	9
2004	6	60	11	1	19	9	4		46	21	17
2005	4	66	12		14	7	2		42	25	16
2006	4	56	20	1	20	13	5		39	27	6

Source: PacFIN - 1981-2006 data extracted April 2007.

Table 31. **Number of vessels** with Pacific coast landings of **market squid** by landing area, 1981-2006.

Year	San Diego	Orange & LA	Ventura & Santa Barbara	San Luis Obispo	Monterey & Santa Cruz	San Francisco	Northern CA	Other CA	Oregon	Washington	Other
1981	6	61	26	9	53	1	10				3
1982	1	51	25	7	53	2	7				3
1983	4	44	12	4	32	22	3				7
1984	1	9	17	6	31	8	2				4
1985	1	44	32	5	59	10	1				23
1986	2	43	27	7	41	4	1				8
1987	7	41	30	3	33	17	1				7
1988	10	51	32	4	30	7	1				11
1989	3	48	31	7	28	3	2				5
1990	7	42	26	3	36	9	2				3
1991		36	24	2	30	7	1				3
1992	1	18	14	4	36	16	4				1
1993	1	43	25	13	33	13	1				9
1994	3	42	31	11	34	6	3	1			9
1995	2	59	44	8	28	4	2				27
1996	4	62	66	8	28	2					39
1997	3	55	50	3	28	4	11				22
1998	3	19	45	1		3	2				18
1999	1	76	80	3	13	1	2				43
2000	2	86	63	1	23	1	2				42
2001	4	62	50	2	18	3	3				27
2002		72	61	5	33	3	1				32
2003		43	54	9	36	17					29
2004	3	72	50	8	23	3	1				42
2005		90	40	1	12	2					28
2006	3	90	30		11	1	1		37		23

Source: PacFIN - 1981-2006 data extracted April 2007.

Table 32. **Number of vessels** with **CPS finfish as principle species**[1] by principle landing area[2], 1981-2006.

Year	San Diego	Orange & LA	Ventura & Santa Barbara	San Luis Obispo	Monterey & Santa Cruz	San Francisco	Northern CA	Other CA	Oregon	Washington	Other
1981	4	53	6	1	3	2				1	5
1982	10	49	8	2	2	1				1	7
1983	8	50	7		7					1	3
1984	3	35	4		18	1				1	4
1985	2	40	6	2	3	1				2	2
1986	1	33	8	1	3	1				2	
1987	2	39	6		1	2				2	
1988	3	28	3		1	2			1	2	
1989	6	32	6		4	1				2	1
1990	5	28	3		2					2	2
1991	6	37	4		5					2	1
1992	5	37	4		3	2	1			1	1
1993	2	23	3	1	1	1					1
1994	2	27	6	1	2			1			
1995	2	18	5		2				1		
1996	2	19	7		9						
1997	1	26	3	1	5						
1998	3	37	4		8		1				
1999	1	19	2		7	1			2	1	
2000		26	3		3				6	1	
2001		24	3		3				11	6	
2002	2	23	4		1				10	8	
2003	2	10	2		2		1		10	5	
2004	2	13	3		5				13	6	
2005	1	8	2		2				14	4	1
2006	1	6	3		4				8	3	1

Source: PacFIN - 1981-2006 data extracted April 2007.

[1]Principle species is the species that accounts for the greatest share of a vessel's total exvessel revenues across all species landed.

[2]Principle landing area is the area that accounts for the greatest share of a vessel's total exvessel revenues accross all areas in which it had landings.

Table 33. **Number of vessels** with **market squid as principle species**[1] by principle landing area[2], 1981-2006.

Year	San Diego	Orange & LA	Ventura & Santa Barbara	San Luis Obispo	Monterey & Santa Cruz	San Francisco	Northern CA	Other CA	Oregon	Washington	Other
1981	2	14	3		33					1	
1982		16	2		35					2	
1983		6			4	1			1	7	1
1984					2				4	7	
1985		6	6		28				3		2
1986		9	4		16	1					1
1987	2	6	8		14						
1988	3	18	18		15						1
1989	2	16	12		15						1
1990	1	7	13		12						
1991		5	15		12	1					
1992			4		16	2					
1993		15	13	3	16						2
1994		8	18		19	2					4
1995		24	31		3	2				2	6
1996		30	41		7					1	15
1997		28	33		8						9
1998		3	22								6
1999		31	47		1						19
2000	1	43	30		8						9
2001	1	32	22		8	1					5
2002		33	11		17	1					6
2003		20	21		15	1					15
2004	1	41	15		8						9
2005		59	12		1						8
2006		61	4								6

Source: PacFIN - 1981-2006 data extracted April 2007.

[1]Principle species is the species that accounts for the greatest share of a vessel's total exvessel revenues across all species landed.

[2]Principle landing area is the area that accounts for the greatest share of a vessel's total exvessel revenues accross all areas in which it had landings.

Table 34. **Number of processors and buyers**, by landing area, whose annual purchases of **CPS finfish** represents the largest share of their total annual exvessel expenditures, 1981-2006.

Year	San Diego	Orange & LA	Ventura & Santa Barbara	San Luis Obispo	Monterey & Santa Cruz	San Francisco	Northern CA	Other CA	Oregon	Washington	Other
					CPS Finfish						
1981	1	5	4	2	1	1					2
1982		3	7							1	5
1983	1	4	5		2	1				1	3
1984	1	2	3		3	2				1	3
1985		5	2	1	2	1				1	1
1986		5	4		2	1				1	2
1987	1	6	5		1	2				2	1
1988		7	4		1	1				2	1
1989	3	8	3		1	1				2	1
1990	6	5	2		1	2				2	1
1991	2		3		2	1				2	1
1992	1	7	4		1	1				1	
1993		4	5		2	1				1	
1994	2	6	4		2	1		1		1	
1995	1	7	4			1			1		2
1996	2	4	6		1	1				1	1
1997	1	9	6		1	1				1	
1998	1		6		3	1	1			1	2
1999	2	5	4		2	3	1			1	
2000			4		3				2	1	1
2001		6	6	1		1	1		4	1	
2002	2	7	6		1	1			3	1	
2003	2	8	5		1		1		3	2	
2004	2	7	8	1	1		1		5		1
2005	1	3	3		1				6		
2006	1	2	3						5		1

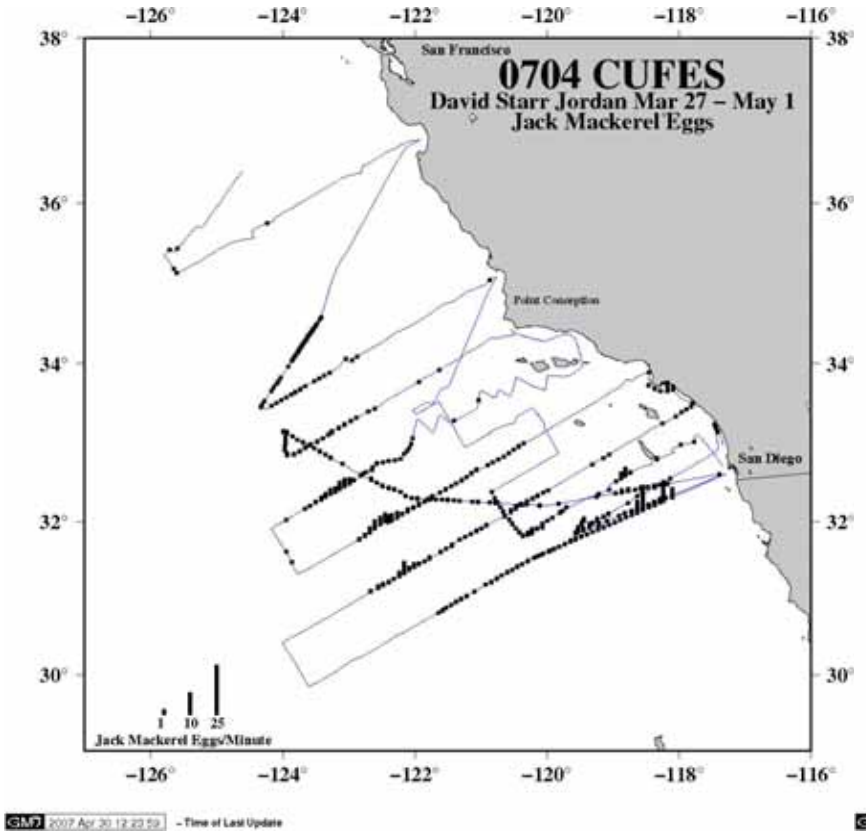
Source: PacFIN - 1981-2006 data extracted April 2007.

Table 35. **Number of processors and buyers**, by landing area, whose annual purchases of **market squid** represents the largest share of their total annual exvessel expenditures, 1981-2006.

Year	San Diego	Orange & LA	Ventura & Santa Barbara	San Luis Obispo	Monterey & Santa Cruz	San Francisco	Northern CA	Other CA	Oregon	Washington	Other
1981		1	2		5	4					
1982		1			7	1				2	
1983						3				3	
1984					1					2	
1985			3		5						1
1986		1	3		6	1					1
1987		1	3		4	1					
1988		2	3	2	2	2					
1989		1	11	1	3	2					
1990		2	6		4						
1991			6			1					
1992			4			3					
1993	1		8	1	1	1					
1994		2	16	1	2			1			1
1995		1	16								1
1996		4	10		2					1	3
1997		6	10		1						1
1998	1		3								
1999		6	19								5
2000	1		20	1	1						5
2001	1	3	14	1	1		1				2
2002		4	11	1							4
2003		4	11	1	2						1
2004		3	16	2	1						2
2005		2	11								1
2006		4	6	2							2

Source: PacFIN - 1981-2006 data extracted April 2007.

Figure 1. Distribution of jack mackerel and northern anchovy eggs collected with the Continuous Underway Fish Egg Sampler (CUFES) during CalCOFI cruise 0704 (April 2007).
http://swfsc.noaa.gov/textblock.aspx?Division=FRD&ParentMenuId=218&id=1340.



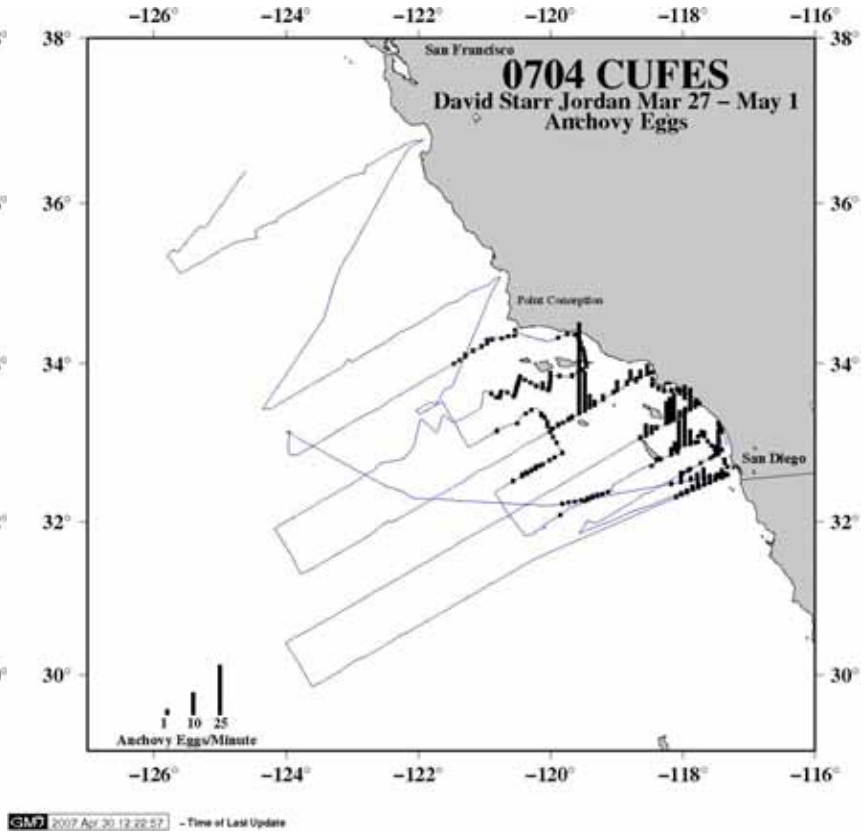


Figure 2. Annual Pacific coast landings and real exvessel revenues for all CPS species, 1981-2006.

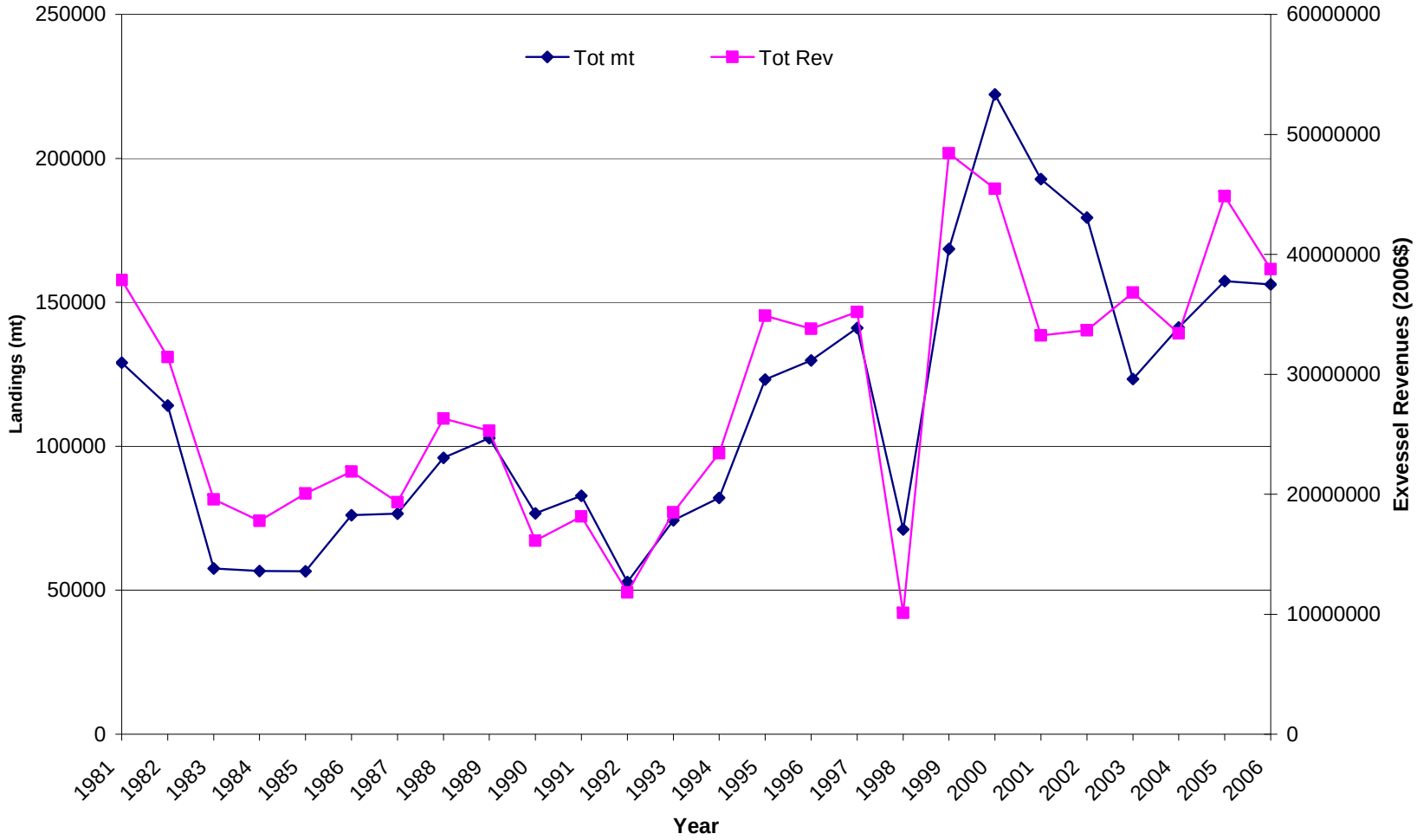


Figure 3. Percentage contribution of Pacific coast CPS finfish and market squid landings to the total exvessel value of all Pacific coast landings, 1981-2006.

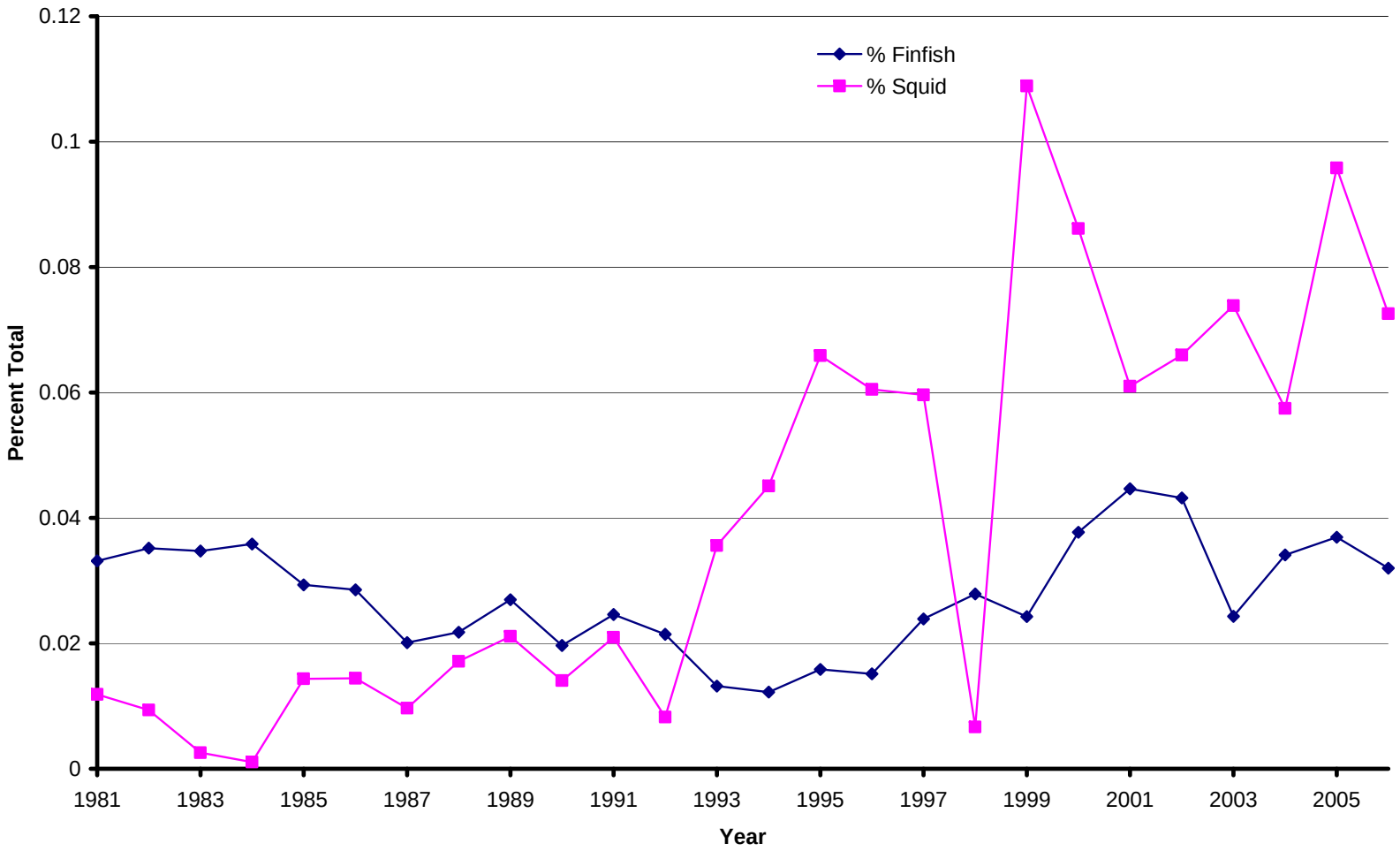


Figure 4. Pacific coast CPS finfish landings and real exvessel price ($/lb, 2006 $), 1981-2006.

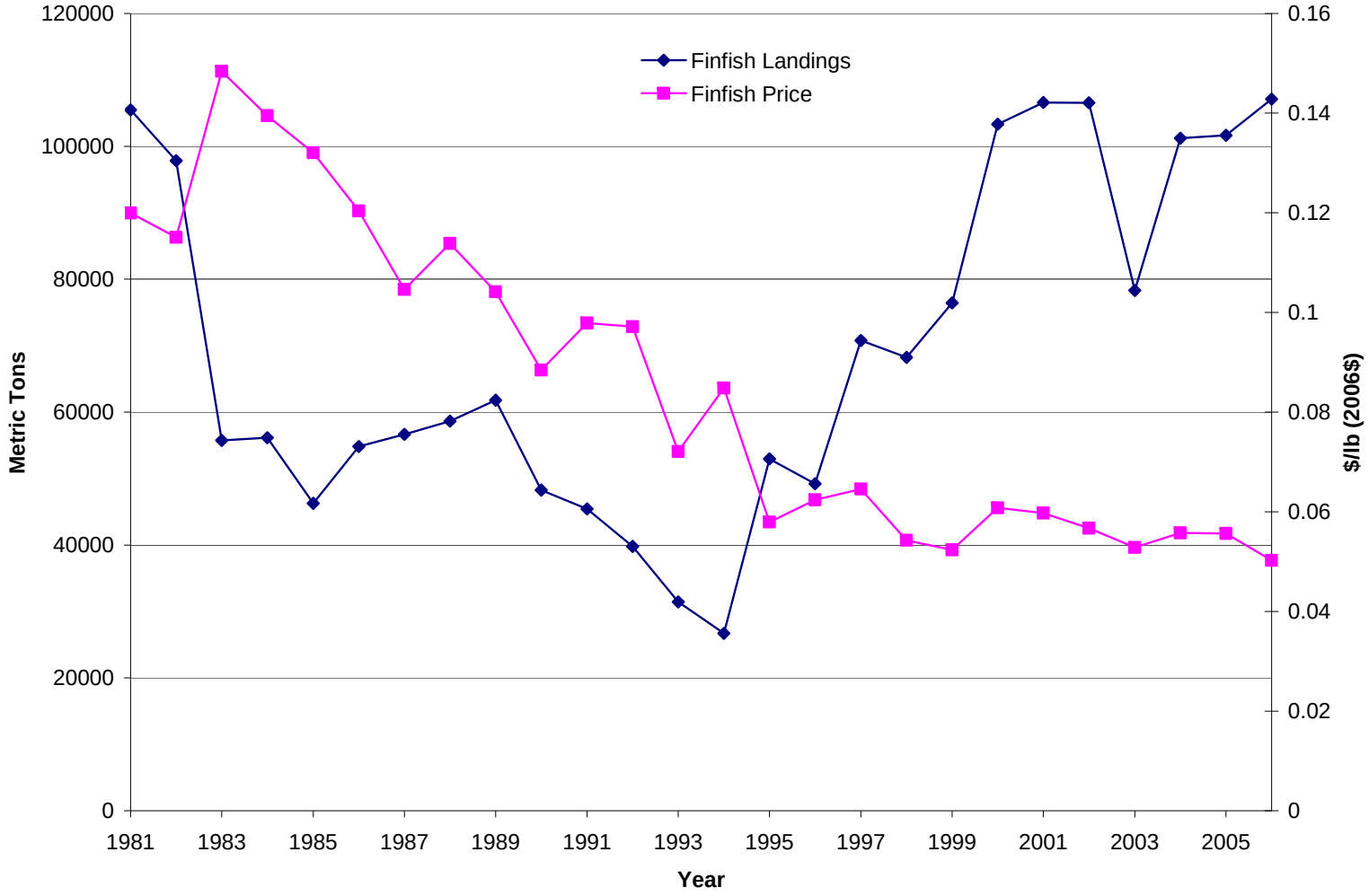


Figure 5. Pacific coast market squid landings and real exvessel price ($/lb, 2006 $), 1981-2006.

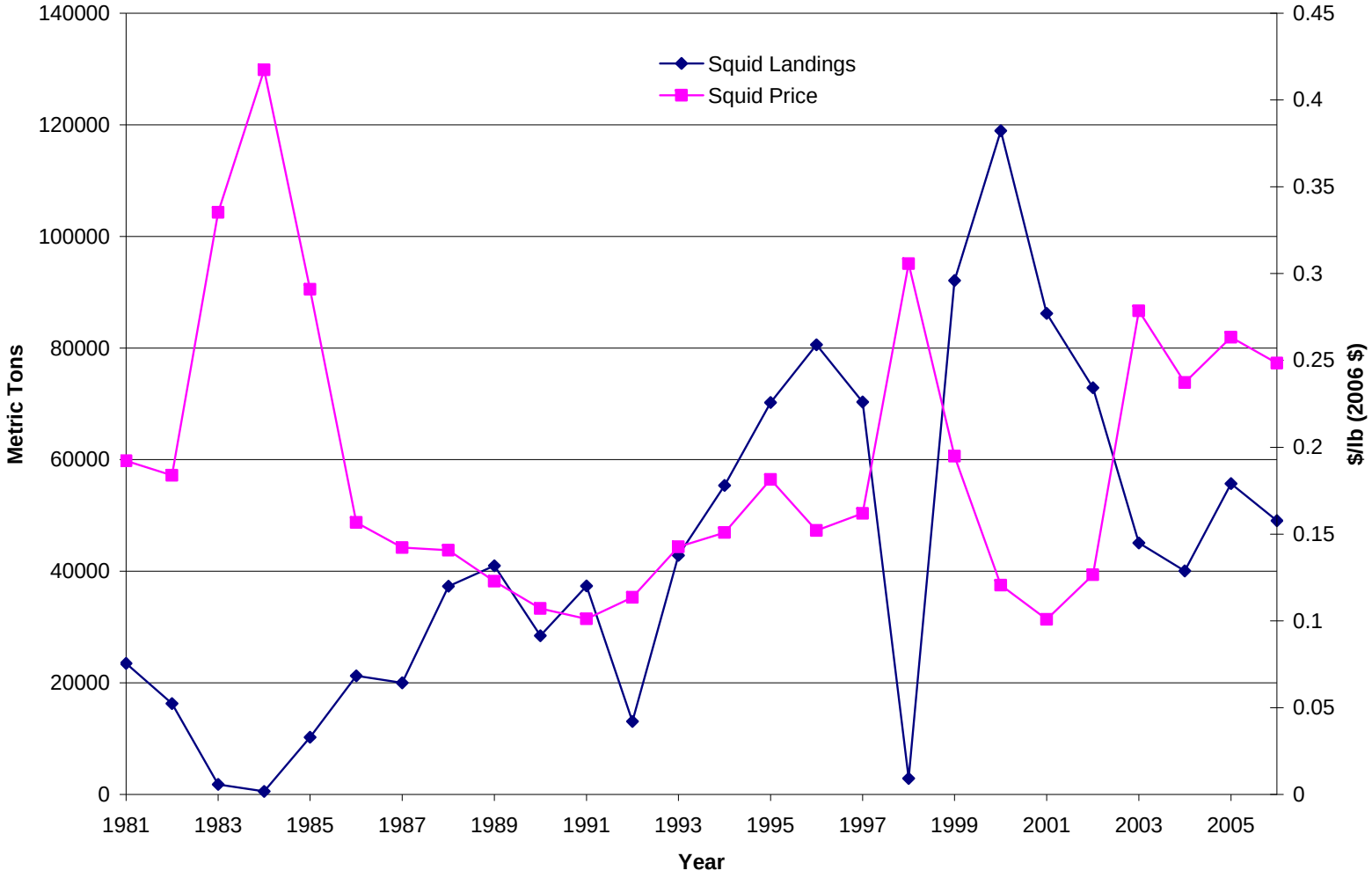


Figure 6. Number of vessels with Pacific coast landings of CPS finfish, and number for which CPS finfish was the principle species, 1981-2006.

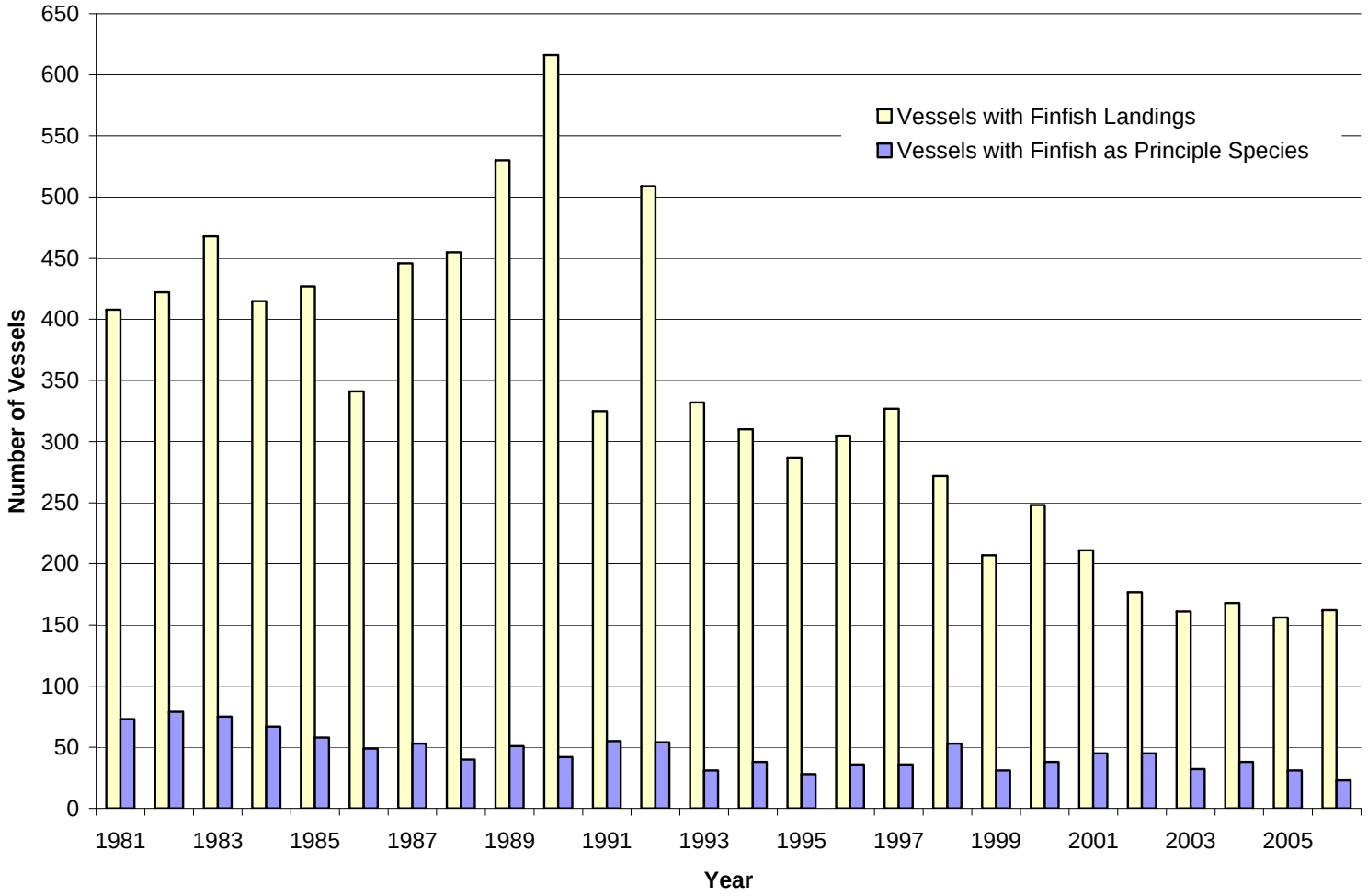


Figure 7. Number of vessels with Pacific coast landings of market squid, and number for which market squid was the principle species, 1981-2006.

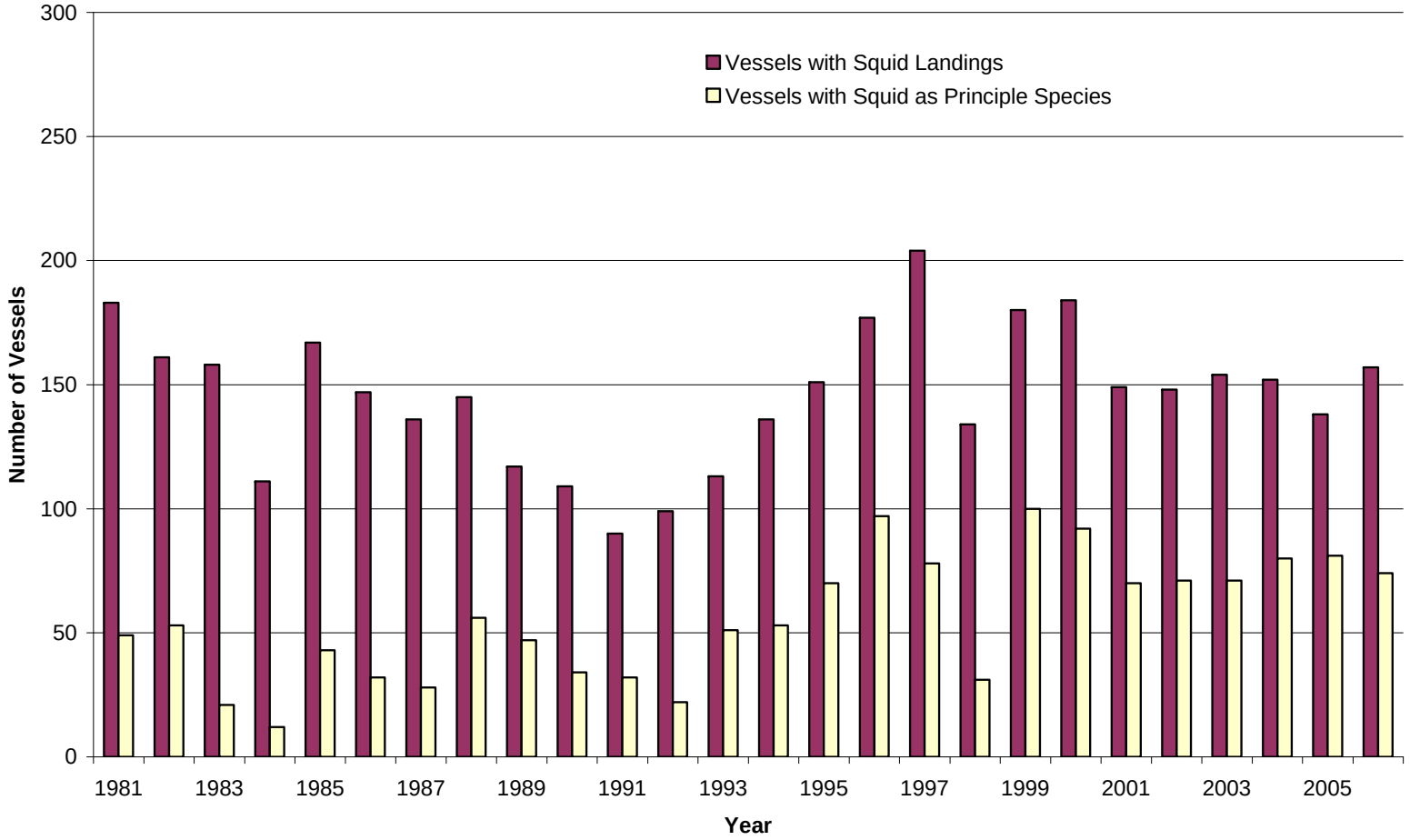


Figure 8. Average share principle species revenues of total revenues for vessels whose principle species was CPS finfish, market squid or non-CPS, 1981-2006.