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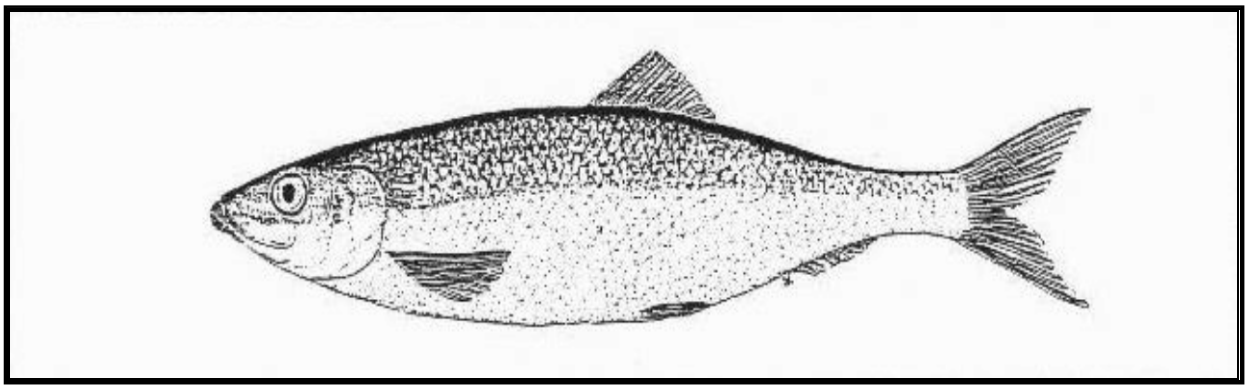
Final

SUPPLEMENTAL ENVIRONMENTAL DOCUMENT

PACIFIC HERRING
COMMERCIAL FISHING REGULATIONS

(Sections 163 and 164, Title 14, California Code of Regulations)



2014
STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF FISH AND WILDLIFE

Final SUPPLEMENTAL ENVIROMENTAL DOCUMENT
PACIFIC HERRING COMMERCIAL FISHING REGULATIONS

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SUMMARY

S.1 Introduction

This Final Supplemental Environmental Document (FSED) to the Final Environmental Document (FED), Pacific Herring Commercial Fishing Regulations, 1998, provides review and analysis as required by California Environmental Quality Act (CEQA) Guidelines (Section 15000 et seq., Title 14, California Code of Regulations [CCR]). This review and analysis will assist the California Fish and Game Commission (Commission) in regulating the commercial harvest of herring throughout the State's ocean and estuarine waters. Specifically, the FSED reviews and evaluates proposed regulatory changes for the 2014-15 fishing season, supplementing, and in some cases replacing, aspects of the proposed project described in the 1998 FED and the FSEDs of 1999, 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, and 2013. A Notice of Preparation (NOP) notified and provided opportunity for the public, resource and regulatory agencies, and the fishing industry to offer input on the scope of the environmental document.

The FSED includes seven chapters. Chapter 1 discusses the authorities and responsibilities under which the FSED was developed and describes its intended use. Chapter 2 describes the proposed project and alternatives, as well as options for regulating the commercial harvest of herring. Chapter 3 describes the existing environment where the California Pacific herring (herring), *Clupea pallasii,* fisheries occur. Chapter 4 addresses the impacts of the proposed project and cumulative effects. Chapter 5 describes the impacts of the alternatives to the proposed project and Chapter 6 identifies consultations with other agencies, professionals, and the public. Chapter 7 responds to public comments regarding the proposed project.

The proposed project has been selected as the preferred alternative based on the analysis in this FSED. The proposed project is identified as the preferred alternative because it provides a set of regulations most likely to achieve the CEQA requirements with respect to the conservation, sustainability, maintenance, and utilization of the herring resource.

S.2 Proposed Project

The proposed project is a body of regulations governing the commercial harvest of herring for roe products, bait, as fresh fish, and the harvest of herring eggs on kelp. It also includes regulations from Section 163.1 (herring permit transfers) and 163.5 (penalties in lieu of suspension or revocation-herring permittees), Title 14, CCR that were adopted by the Commission on March 2006 and October 2002, respectively. The proposed project takes the form of recommendations for continuation, amendment, or change to an existing body of regulations in effect since October 30, 2013 (Sections 163, and 164, Title 14, CCR).

The proposed regulatory changes will establish season quotas for fishing operations in San Francisco Bay for the 2014-15 herring fishing season, as well as providing quota options for the Tomales Bay, Humboldt Bay and Crescent City area herring fisheries. The specific regulatory changes proposed for the 2014-15 season will: (1) provide the Commission a quota option range between zero (0) and 10 percent of the most recent San Francisco Bay, 2013-14, spawning biomass estimate; and (2) provide the Commission a zero (0) ton quota option for Tomales Bay, Humboldt Bay, and Crescent City, in addition to the status-quo for those areas.

S.3 Project Alternatives

Three alternatives to the proposed project are considered in this FSED. These alternatives include: (1) a no-fishery alternative; (2) a no change alternative, which uses existing regulations; and (3) establishing individual vessel quotas for gill net vessels in the herring fishery. Refer to Section 2.4, Project Alternatives, and Chapter 5 of this DSED, and Chapter 6 of the 1998 FED, Analysis of Alternatives, for a thorough description of alternatives and analysis of their impacts.

S.4 Existing Environment

The environments most likely to be affected by the regulatory revisions outlined in this FSED are San Francisco Bay, Tomales Bay, Humboldt Bay, and Crescent City area. Although the proposed project consists primarily of regulatory changes for San Francisco Bay fisheries, the existing environment potentially affected by the proposed project and alternatives also includes the open ocean and other bays in which herring occur. Historically, herring fisheries have occurred in Tomales Bay, Humboldt Bay, and

Crescent City area; however these fisheries are no longer active. Refer to Section 3.3 of the FED, Specific Biological and Environmental Descriptions, for a thorough description of these environments and Chapter 3 of this document for a description of the environmental setting for these areas.

S.5 Environmental Impacts

S.5.1 Proposed Project

An analysis of the potential impacts of the proposed project is described by this FSED. The FED identified the area with the highest potential for adverse impacts associated with the proposed regulatory changes as the San Francisco Bay area, which supports the largest herring fishery in the State. The following localized, short-term and less than significant impacts were identified in the FED for several areas of potential concern including: (1) boat and vehicle traffic circulation; (2) water and air quality; (3) housing and utilities; (4) geology, scenic quality, recreation; and (5) noise. The FED found biological impacts to have the greatest potential for significant environmental impact, but found these impacts to be localized, short-term, and less than significant, with mitigation provided by the current management strategy and herring population monitoring. Refer to Chapter 4 of the FED for a thorough environmental impact analysis of the proposed project. Any adverse impacts associated with the regulatory changes proposed by this FSED are addressed within this document.

S.5.2 Alternatives

Three alternatives to the proposed project are considered. These alternatives have been examined as they apply to this FSED. A summary of impacts associated with these alternatives is provided below.

S.5.2.1 Alternative 1 (no project)

Localized, short-term, and less-than-significant impacts to vessel and vehicle traffic circulation, water quality, air quality, housing and utilities, scenic quality, recreational opportunities, and noise levels identified for the proposed project would be eliminated or redistributed in an unpredictable manner.

S.5.2.2 Alternative 2 (existing regulations)

In most regards, the environmental impacts associated with this alternative would be comparable to those of the proposed project. This alternative allows for adjustment of dates, but does not address certain fishery-related problems considered in amendments or changes to existing regulations. The existing regulation alternative would maintain the herring fishery regulations as amended through 2013 and would not provide for consistent adaptive management of the State's resources.

S.5.2.3 Alternative 3 (individual vessel quota)

As addressed in detail within the FED, individual vessel quotas, rather than the platoon-based quota system currently used in the herring gill net fishery, could potentially increase impacts due to an increase in the number of days fished. However, these impacts are still expected to be short-term, localized, and less than significant for most environmental categories.

Misuse of the resource could result from sorting catches to remove males from the catch or discarding unripe fish to achieve higher roe content, and therefore, higher ex-vessel prices. However, competition between permittees for a share of the quota is greatly lessened under an individual quota system, and may result in fewer nets likely to be lost, thus reducing impacts from "ghost" net fishing as explained in Section 4.2.6.1 of the FED.

S.5.3 Cumulative

An analysis of the cumulative impacts of the proposed project revealed no additional impacts to those addressed in the FED. The proposed regulatory changes addressed by this FSED are for an existing ongoing project. An analysis of cumulative impacts is provided in Chapter 5 of the FED.

A variety of factors have the capacity to influence the herring population status in California, in addition to the proposed project including: (1) biological events; (2) competitive interactions with other pelagic fish and fisheries; (3) oceanographic events; (4) habitat loss; and (5) water quality. However, as with potential impacts from the on-going commercial harvest of herring, continued monitoring of the herring resource and oceanographic conditions should help identify any trends that would signal that the stock's reproductive potential is in jeopardy.

S.6 Areas of Controversy

Status of the herring population in San Francisco Bay has been identified as the only area of controversy regarding commercial herring fishing and is addressed in Chapter 3 of this FSED.

S.7 Issues to be Resolved

At issue is whether or not to provide for commercial fishing as an element of herring management in California. If commercial herring fishing is authorized, decisions to specify the areas, seasons, fishing quotas and other appropriate special conditions under which fishing operations may be conducted are required. As discussed, one aspect of managing this and other fishery resources is the understanding that a no project alternative is considered a management tool. This document, the 1998 FED, the 1999 FSED, the 2000 FSED, the 2001 FSED, the 2002 FSED, the 2004 FSED, the 2005 FSED, the 2006 FSED, the 2007 FSED, the 2008 FSED, the 2009 FSED, the 2010 FSED, the 2011 FSED, and the 2013 FSED include a review and discussion of the proposed project as well as alternatives.

Chapter 1. INTRODUCTION

1.1. Background

This Final Supplemental Environmental Document (FSED) presents the review and analysis necessary to assist the California Fish and Game Commission (Commission), the lead agency pursuant to the California Environmental Quality Act (CEQA), in taking action regarding the regulation of the commercial harvest of Pacific herring (herring), *Clupea pallasii,* in California. It was prepared by the Department of Fish and Wildlife (Department) for the Commission following CEQA Guidelines (Section 15000 et seq., Title 14, California Code of Regulations [CCR]). The project being considered consists of proposed changes to the regulations for the 2014-15 herring commercial fishing season.

This FSED was prepared as a supplement to: (1) the Final Environmental Document (FED), Pacific Herring Commercial Fishing Regulations, certified by the Commission in August 1998; (2) the Final Supplemental Environmental Document (FSED), certified by the Commission in August 1999; (3) the FSED, certified by the Commission in August 2000; (4) the FSED, certified by the Commission in August 2001; (5) the FSED, certified by the Commission in August 2002; (6) the FSED, certified by the Commission in August 2004; (7) the FSED, certified by the Commission in September 2005; (8) the FSED certified by the Commission in October 2006; (9) the FSED certified by the Commission in October 2007; (10) the FSED certified by the Commission in September 2008; (11) the FSED certified by the Commission in September 2009, (12) the FSED certified by the Commission in September 2010; (13) the FSED certified by the Commission in September 2011, and (14) the FSED certified by the Commission in August 2013. The FED outlines the full proposed project consisting of the operation and management of California's herring commercial fisheries and can be found on the Department's website at: http://www.dfg.ca.gov/marine/herring/ceqa.asp.

The FSEDs of 1999, 2000, 2001, 2002, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, and 2013 provide for revisions of the proposed project contained in the FED and regulatory revisions necessary for the 1999-2000, 2000-01, 2001-02, 2002-03, 2004-05, 2005-06, 2006-07, 2007-08, 2008-09, 2009-10, 2010-11, 2011-12, and 2013-

14 herring commercial fishing seasons, respectively. Environmental documents (DSED and FSED) were not prepared in 2003 or 2012. This FSED supplements the existing certified environmental documents and provides revisions to the regulations for the 2014-15 herring commercial fishing season.

The Department and Commission hold the public trust for managing the State's fish and wildlife populations, including herring. That responsibility is fulfilled by a staff of experts in marine resource management and enforcement issues related to California's herring resource. The knowledge and training represented by that expertise qualifies them to perform the review and analysis of the proposed revisions of the commercial herring harvest regulations that are contained in this document.

1.2. The Functional Equivalent

CEQA requires all public agencies in the State to evaluate the environmental impacts of projects that they approve or carry out. Most agencies satisfy this requirement by preparing an Environmental Impact Report (EIR) if there are potentially significant environmental impacts. If no potentially significant impacts exist, a Negative Declaration (ND) is prepared. However, an alternative to the EIR/ND requirement exists for State agencies for activities that include protection of the environment as part of their regulatory program. Under this alternative, an agency may request certification of its regulatory program from the Secretary for Natural Resources. With certification, an agency may prepare functional equivalent environmental documents in lieu of EIRs or NDs.

The regulatory program of the Commission has been certified by the Secretary for Natural Resources. A functional equivalent, Final Environmental Document for Pacific Herring Commercial Fishing Regulations, was certified by the Commission on August 28, 1998. A new FED is required: (1) when subsequent changes are proposed in the project requiring important revisions of the previous FED due to new significant environmental impacts not considered in a previous FED; or (2) when new information of substantial importance to the project becomes available (Section 15162, Title 14, CCR and Public Resources Code (PRC) Section 21166).

The CEQA lead agency may choose to prepare a supplement to a FED instead of a new FED, if only minor additions or changes are necessary, to make the previous

FED adequately apply to the project in the changed situation. The draft supplemental document is given the same notice and public review given to a draft environmental document, and may be circulated by itself without the previous FED. When deciding whether to approve the proposed project, the lead agency considers the previous FED as revised by the supplemental environmental document (Section 15163, Title 14, CCR). A Notice of Preparation (NOP) for the DSED was circulated to interested parties on February 3, 2014. Following the release of the NOP, the 30-day public comment period pursuant to CEQA for the DSED ended March 5, 2014. Pursuant to CEQA regulations, a 45-day public comment period for reviewing the DSED occurred from April 4, 2014, to May 19, 2014.

This is the fourteenth FSED to the FED prepared by the Department. The first FSED was certified by the Commission in August 1999; the second FSED was certified by the Commission in August 2000; the third FSED was certified by the Commission in August 2001; the fourth FSED was certified by the Commission in August 2002; the fifth was certified by the Commission in August 2004; the sixth was certified by the Commission in September 2005; the seventh was certified by the Commission in October 2006; the eighth was certified by the Commission in October 2007; the ninth was certified by the Commission in September 2008; the tenth was certified by the Commission in September 2009; the eleventh was certified by the Commission in September 2010; the twelfth was certified by the Commission in September 2011; and the thirteenth was certified by the Commission in August 2013. As provided for by CEQA, the Department will continue to use this method of revising Sections 163 and 164, Title 14, CCR, until the Department prepares a new environmental document or a Fishery Management Plan (FMP).

1.3. Scoping Process

Pursuant to CEQA, the Department distributed, for the Commission, an NOP to interested parties on February 3, 2014. The Department hosted a meeting on February 6, 2014, in Sausalito, County of Marin, to encourage an informal exchange of ideas and information on the fishery and its management with interested organizations, members of the herring fishing industry, and members of the public. In addition, the Department received input on the proposed project at a Director's Herring Advisory Committee

(DHAC) meeting held on April 1, 2014, in Sausalito, County of Marin. The DHAC consists of 26 representatives from the herring fishery, including buyers and fishermen. They are appointed by the Director and serve at his or her pleasure. The Department as part of the scoping process also contacted herring permit holders in Tomales Bay, Humboldt Bay and Crescent City Harbor to notify them that the Commission would be considering a zero ton quota for the 2014-15 season for those fishing areas.

Historically, during the scoping process, several issues have been raised including: the need for determining unfished biomass, developing a harvest control rule, developing a simulation model for herring management, accounting for herrings importance as a forage species, genetic comparisons of the Tomales Bay and San Francisco Bay populations, the cost of managing the fishery, simplifying existing gill-net regulations, amending herring eggs on kelp regulations, permit stacking and establishing a limited voluntary individual quota herring fishery. A Fishery Management Plan (FMP) would address all of these issues. FMPs are prescribed for all marine fisheries pursuant to the Marine Life Management Act. FMPs typically contain a comprehensive environmental and economic analysis of the fishery along with clear objectives and measures to ensure sustainability of that fishery. In addition to the primary requirements below, the Department seeks advice and assistance in developing FMPs from participants in the affected fishery, marine scientists, marine conservationists, and other interested parties. The primary requirements of an FMP pursuant to Fish and Game Code (FGC) Section 7072 are as follows:

- To the extent practical, each sport and commercial marine fishery under the jurisdiction of other states shall be managed under an FMP. Fishery management plans will be developed in priority order.
- Each FMP shall be based on the best scientific information and other relevant information that is available, or that can be obtained, without substantially delaying the preparation of the plan.
- To the extent that conservation and management measures in an FMP provide guidelines for overall harvest, FMPs shall allocate those increases or restrictions of harvest fairly among sport and commercial fishing interests participating in the fishery.

Specifically, each FMP shall include:

- A summary of the fishery which includes historical data, economic and social information related to the fishery, habitat and ecosystem role of the species, natural history and population dynamics, number of participants, and a history of conservation and management measures affecting the fishery.
- A fishery research protocol that includes past and ongoing monitoring, essential fishery information, identification of additional information, resources and time needed, and procedures for monitoring the fishery and for obtaining essential fishery information.
- Measures necessary for the conservation and management of the fishery which includes limitations of the fishery, creation or modification of a restricted access program that contributes to a more orderly and sustainable fishery, procedures to establish, review and revise a catch quota, and requirements for permits.
- Measures to minimize adverse effects on habitat caused by fishing.
- Information and analysis of amount and type of bycatch if associated with the fishery and measures taken to minimize bycatch and mortality of discards.
- Criteria for identifying when the stock is overfished and measures to address overfishing if occurring.
- A procedure for review and amendment of the plan.

When an FMP is completed, it is subject to CEQA and is considered functionally equivalent to an EIR. Until an FMP can be developed the 1998 FED and subsequent FSEDs will serve as the primary management tools for herring.

In the interim and to address some of the issues raised during the scoping period, the Department offers the following information. The Department is currently working with the Centre for Environment, Fisheries and Aquaculture Science (Cefas) to develop a stock assessment model for herring. This model is a critical step in the development of an FMP and will help address many of the concerns regarding biological reference points and harvest control rules, as well as providing a valuable tool for managing the herring fishery. Cefas is experienced in using stock assessments in the development of fisheries management plans and recently completed a stock assessment model on the Atlantic herring (*Clupea harengus*). Preliminary modeling

results were provided to the Department in November 2013. After completing an internal review, the Department plans to subject the model to an independent peer review prior to using it for management decisions. The Department is also currently working to develop a partnership with several conservation organizations and the commercial fishing industry to identify funds for planning and implementation of an FMP.

Regarding herring as forage, due to the complexity of the ocean system and biological interactions, it is difficult to quantify all predator/prey relationships or to quantify all oceanic conditions and factors that affect herring recruitment and persistence in the spawning population. As a result the Department manages for herring's importance as a forage species by recommending conservative harvest percentages. Since 2010, as a conservation safeguard, the Department has recommended harvest percentages for herring at or below five percent of the most current spawning biomass estimate. This precautionary management approach has allowed, on average, more than 95 percent of the spawning stock (which represents only the portion of the total stock that leaves oceanic waters to spawn during a given season) to go unfished and remain available as forage or to meet other ecosystem functions, including stock rebuilding.

1.4. Report Availability

This FSED is available at the California Fish and Game Commission office and California Department of Fish and Wildlife Marine Region offices. It will also be posted on the Department of Fish and Wildlife website at: http://www.dfg.ca.gov/marine/herring/.

1.5. Authorities and Responsibilities

The California State Legislature formulates the laws and policies regulating the management of fish and wildlife in California. It is the policy of the State to ensure the conservation, sustainable use, and where feasible, the restoration of California's living marine resources for the benefit of all the citizens of the State (FGC Section 7050). It is also the State's policy to promote the development of local and distant-water fisheries based in California in harmony with international law respecting fishing and the

conservation of the living resources of the oceans and other waters under the jurisdiction and influence of the State (FGC Section 1700, Appendix 1 of the FED).

The Legislature provides further policy direction regarding herring management in FGC Sections 8550 et seq. FGC Section 8553 delegates authority from the Legislature to the Commission, whose members are appointed by the Governor, to regulate the commercial harvest and possession of herring. The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species. The Department, as trustee for fish and wildlife resources, provides requisite biological expertise to the Commission on impacts arising from regulating the commercial harvest of herring (FGC Section 1802). The remaining FGC sections related to herring provide for a limited entry fishery and require periodic review of regulations and policies.

The Commission holds public meetings at its discretion to consider and adopt revisions to these regulations. Recommendations and comments from the Department, other agencies, and the public are typically received at two public Commission meetings each year prior to the herring commercial fishing season. These meetings will be held for the 2014-15 season on June 4, 2014, in Eureka, California, and on August 6, 2014, in San Diego, California. The authority to prepare a supplemental environmental document is given in PRC Section 21166.

Chapter 2. PROJECT DESCRIPTION

2.1. Project Objectives

The proposed project, as defined in the Final Environmental Document (FED) certified by the California Fish and Game Commission (Commission) on August 28, 1998, is the regulation of Pacific herring (herring), *Clupea pallasii,* fisheries under the State's jurisdiction. The regulations are considered for inclusion in the California Code of Regulations (CCR) to implement the State's policies for managing the commercial use of herring (Sections 163 and 164, Title 14, CCR). The proposed project and alternatives addressed in this Final Supplemental Environmental Document (FSED) take the form of recommendations for amendment or change to the existing body of regulations. The recommendations and alternatives are based on biological assessments of existing stock conditions and comments received from interested individuals, non-government organizations, commercial fishermen, and from the Director's Herring Advisory Committee (DHAC). The Commission has legislatively-delegated authority to act on these recommendations.

The project goal is to maintain healthy herring stocks in California. Objectives for achieving this goal include:

- Safeguard herring as an important forage species for all living resources of marine and estuarine ecosystems that utilize herring as a food source;
- Use precautionary principles when setting harvest targets;
- Manage the commercial harvest of herring to achieve a sustainable fishery;
- To the extent possible, maintain and/or restore healthy age structures to stocks;
- Avoid and/or minimize the harvest of two and three-year-old herring, many of which are first-time spawners;
- Set commercial harvest targets that conserve sufficient herring to support recreational take.

Under existing law, herring may be taken for commercial purposes only under a revocable permit, subject to such regulations, as the Commission shall prescribe (Fish and Game Code Section 8550). Current regulations specify: permit qualifications, permit validation procedures and requirements, permit limitations, permit areas, vessel identification requirements, seasons, fishing quotas, gear restrictions, landing and

monitoring requirements, permit categories and conditions, royalty fees, permit performance deposit requirements, fishing and harvesting restrictions, processing requirements, and permit suspension conditions and procedures.

The proposed project addressed by this FSED consists of amendments and changes to existing regulations for the 2014-15 commercial herring fishing season. The proposed project would establish the season quotas for fishing operations in San Francisco Bay, as well as provide quota options for the Tomales Bay, Humboldt Bay, and Crescent City area herring fisheries. Quota recommendations for San Francisco Bay are primarily based on the most recent assessments by the Department of Fish and Wildlife (Department) of the estimated spawning population of herring in San Francisco Bay. The recommendation also takes into account additional data examined each season, including age structure, growth and general condition, predicted size of incoming year-classes (*i.e.*, recruitment), biological aspects of the catch, and ocean and bay conditions.

2.2. Project Locations

Permits are issued for commercial herring fishing in four geographically distinct areas of estuarine waters under the jurisdiction of the State of California (Figure 2.1). Many of the regulations considered by this document are specific to an area and type of fishing operation. This section describes each area in which regulatory changes are proposed, including current commercial fisheries for herring, seasons, proposed quotas, and geographical restrictions for those fisheries. A complete description of commercial herring fishing areas is provided in Section 2.2 of the FED. The environmental setting for each geographical fishing area is detailed in Section 3.3 of the FED.

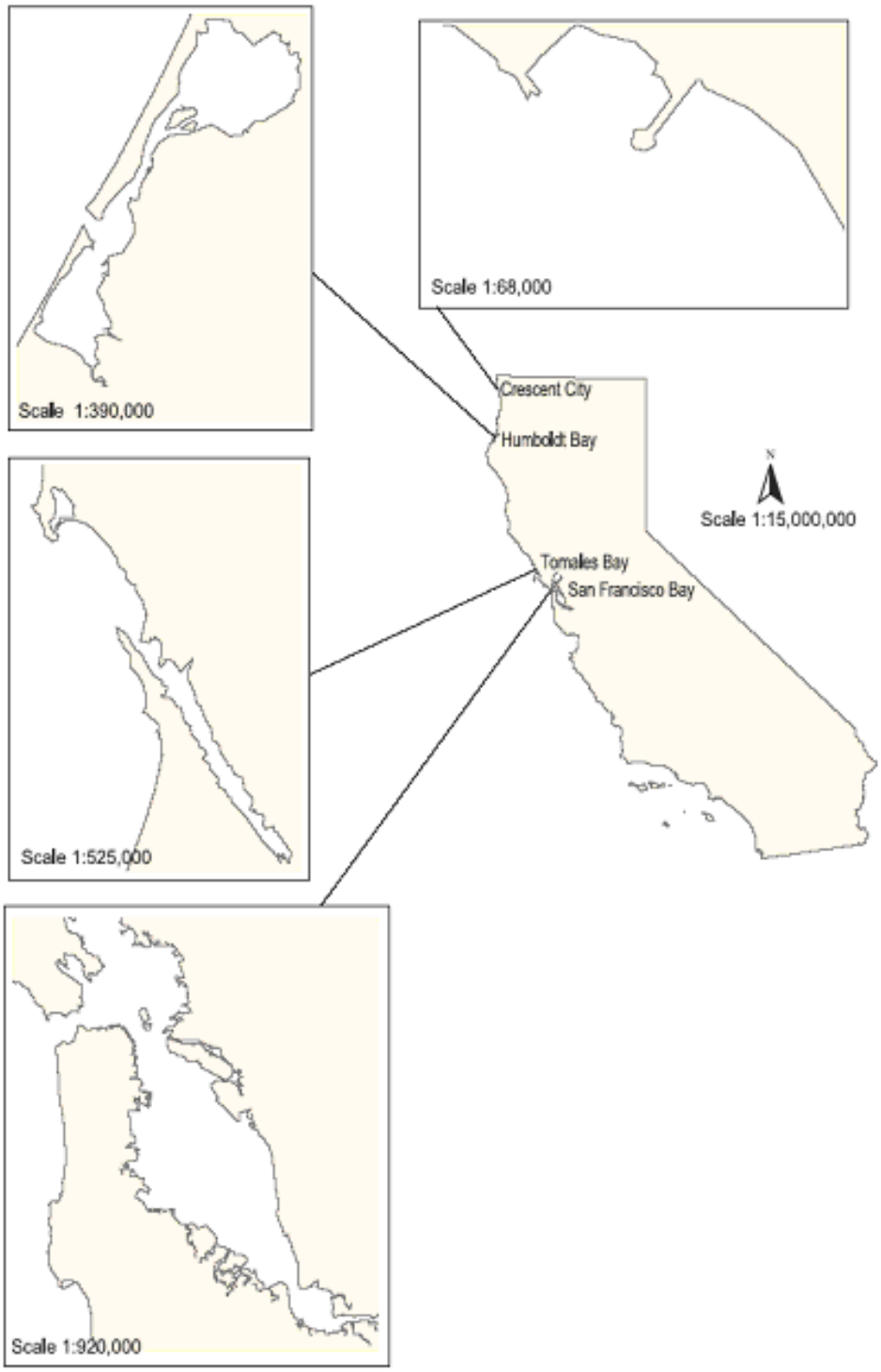

Figure 2.1 Locations of commercial Pacific herring fisheries.

2.2.1. San Francisco Bay

The proposed commercial herring fishing quotas for San Francisco Bay are as follows:

2.2.1.1. Herring Fishery

Season: 5:00pm on January 1, until noon on March 15. If January 1 falls on a Friday or Saturday, fishing shall commence on the first Sunday following that date at 5:00pm. If the closing date of the fishery falls on a Saturday or Sunday, fishing shall close on the Friday immediately preceding March 15 at noon.

Gill net permittees with odd numbered permits shall be permitted to fish first in odd numbered years and then alternating weeks with even numbered permits until the close of the season.

Gill net permittees with even numbered permits shall be permitted to fish first in even numbered years and then alternating weeks with odd numbered permits until the close of the season.

Note: Herring fishing is not permitted from noon on Friday through 5:00 p.m. on Sunday (Section 163 (h)(5), Title 14, CCR).

Quota: The total take of herring in San Francisco Bay for commercial purposes shall not exceed 3,737 tons for the 2013-2014 season. The proposed total take of herring in San Francisco Bay for commercial purposes shall be set between zero and 10 percent of the most current biomass estimate for San Francisco Bay. <u>For the 2014-15 season the Department recommends a conservative harvest option of 2,500 tons or 4.1 percent of the 60,600 ton 2013-14 spawning biomass estimate.</u> This quota range is based on the determination of the Department's assessment of the stock status and utilizing the best science available. The best available science includes, but is not limited to, recent fishery-independent field surveys, commercial catch and age composition analysis, and environmental data.

Note: The quota for the herring gill net fishery will be reduced by an allocation to the herring eggs on kelp fishery quota (See Section 2.2.1.2).

Area: Waters of Districts 12 and 13 and that portion of District 11 lying south of a line extending from Peninsula Point (the most southerly extremity of Belvedere Island) to the easternmost point of the Sausalito ferry dock.

1) Regulations prohibit the setting or operating of nets within 300 feet of the following piers and recreation areas: Berkeley Pier, Paradise Pier, and San Francisco Municipal Pier (between the foot of Hyde Street and Van Ness Avenue), Pier 7 (San Francisco), Candlestick Point State Recreation Area, the jetties in Horseshoe Bay, and the fishing pier at Fort Baker. Regulations also prohibit the setting or operating of nets within 70 feet of Mission Rock Pier.

2) Regulations prohibit the setting or operating of nets in Belvedere Cove (north of a line drawn from the tip of Peninsula Point to the tip of Elephant Rock). Regulations also prohibit the setting or operating of gill nets from November 15 through March 17, in the area bounded by a line drawn from the middle anchorage of the western section of the Oakland Bay Bridge (Tower C) to the Lash Terminal buoy #5 to the easternmost point at Hunter's Point (Point Avisadero), from Point Avisadero to the Y "A" buoy to Alameda NAS entrance buoy #1 (entrance to Alameda Carrier Channel) to the Oakland Harbor Bar Channel buoy #1, and then from the first Bar Channel buoy to Tower C of the Bay Bridge.

3) Other closures affecting the fishery include United States Coast Guard enforced Homeland Security Zones: 25 yards around all Golden Gate and Bay Bridge abutments and piers; 100 yards around and under any High Interest Vessels; and Naval Vessel Protection Zones which extend 100 yards around all Naval Vessels at all times and a 500 yard slow zone surrounding all Naval Vessels. The United States Coast Guard will also enforce Rule 9 of the Code of Federal Regulations (CFR) regarding channel and harbor blockages.

2.2.1.2. Herring Eggs on Kelp (HEOK) Fishery

Season: December 1 to March 31

Quota: The total amount of herring eggs on kelp (HEOK) that may be harvested by each permittee shall be based on the previous season's spawning population assessment of herring in San Francisco Bay, as determined by the department. This assessment is used to establish the overall herring fishing quota. Each HEOK permittee is allocated a quota equal to approximately 0.79 percent of the quota.

Note: The combined quota for harvest of herring eggs on kelp depends on the number of "CH" and gill net permits transferred to the herring eggs on kelp fishery.

Area: Waters of Districts 11, 12, and 13, and that portion of District 2 known as Richardson Bay.

Note: The area open to the HEOK fishery is further restricted. Rafts and lines may not be placed in any waters or areas otherwise closed or restricted to the use of herring gill net operations, except the areas known as Belvedere Cove and Richardson Bay or except where written permission is granted by the owners or controlling agency (e.g., Navy, Coast Guard). When rafts or lines are placed in Belvedere Cove or Richardson Bay, they must be tied to a permanent structure (e.g., pier or dock).

2.2.2. Tomales Bay

The proposed Department commercial herring fishing quotas for Tomales Bay are as follows:

2.2.2.1. Herring Fishery

Season: Noon December 26 until noon February 22. Weekend fishing is allowed contingent on funds made available to the Department to cover biological staff time (Section 163 (h)(5), Title 14, CCR).

Quota: The total take of herring shall not exceed 350 tons for the season. The Department is providing the Commission a zero (0) ton quota option for the 2014-2015 herring season. <u>The Department is recommending either 350 tons (status-quo) or zero (0) tons for the Tomales Bay fishery quota.</u>

Area: Tomales Bay includes the waters of District 10 lying south of a line drawn west 252° magnetic, from the western tip of Tom's Point to the opposite shore.

2.2.3. Humboldt Bay

The proposed Department commercial herring fishing quotas for Humboldt Bay are as follows:

2.2.3.1. Herring Fishery

Season: Noon January 2 until noon March 10.

Quota: The total take of herring shall not exceed 60 tons. The Department is providing the Commission a zero (0) ton quota option for the 2014-2015 herring season. <u>The Department is recommending either 60 tons (status-quo) or zero (0) tons for the Humboldt Bay fishery quota.</u>

Area: Humboldt Bay includes the waters of Districts 8 and 9.

2.2.4. Crescent City Area

The proposed Department commercial herring fishing quotas for Crescent City Area are as follows:

2.2.4.1. Herring Fishery

Season: Noon January 15 until noon March 24.

Quota: The total take of herring shall not exceed 30 tons. The Department is providing the Commission a zero (0) ton quota option for the 2014-2015 herring season. <u>The Department is recommending either 30 tons (status-quo) or zero (0) tons for the Crescent City area fishery quota.</u>

Area: Crescent City area waters include Crescent City Harbor and waters of District 6 less than 20 fathoms in depth between two nautical measure lines drawn due east and west true from Point Saint George and Sister Rocks.

2.2.5. Open Ocean

As of January 1, 2010, all commercial fishing for herring in ocean waters is prohibited, except as specified in Section 163 (f)(1), Title 14, CCR. An incidental take of no more than 10 percent herring by weight of any landing composed primarily of other coastal pelagic fish species or market squid may be landed.

2.2.5.1. Open Waters Fishery (closed)

Area: Ocean waters are limited to the waters of Districts 6 (excluding the Crescent City area), 7, 10 (excluding Tomales Bay), 16, and 17.

2.3. Project Characteristics

The proposed project recommends continuation of the existing regulations as modified by changes discussed below for the San Francisco Bay, Tomales Bay, Humboldt Bay, and Crescent City area fisheries. These regulations, as amended, will assist in the control of the commercial harvest of herring at a level that meets the State's policy with respect to the use of aquatic resources. This section states the specific purpose of the regulations and summarizes the factual basis for the regulation.

The commercial herring fisheries are closely regulated through a catch-quota system to provide for adequate protection and utilization of the herring resource. The Department conducts annual assessments of the spawning herring population in San Francisco Bay as part of its ongoing monitoring and management of the fishery. The Department also examines age structure, growth and general condition, biological aspects of the catch, and environmental conditions (Section 3.2.2.1, FED). These data serve as the basis for establishing fishing quotas for the following season. The principal regulatory changes proposed for the 2014-15 season included: (1) provide the Commission a quota option range between zero (0) and 10 percent of the most recent San Francisco Bay, 2013-14, spawning biomass estimate; and (2) provide the Commission a zero (0) ton quota option for Tomales Bay, Humboldt Bay, and Crescent City area fisheries.

Annual herring spawning population estimates from biomass surveys in San Francisco and Tomales bays have been conducted by the Department since 1973, but were discontinued in Tomales Bay after the 2005-06 season. Spawning ground surveys

in Humboldt Bay were conducted during the 1974-75, 1975-76, 1990-91, and 2000-01 through 2006-07 seasons. Spawning ground surveys assess the total number of eggs spawned, and these data are used to calculate the parental population size (Section 3.2.2.1.1 of the FED).

Since the 1973-74 herring season the Department has conducted annual spawning biomass estimates for San Francisco Bay using spawn deposition surveys. From 1990 through 2003, the Department derived the spawning biomass estimate in San Francisco Bay from a combination of the spawn deposition and hydroacoustic surveys. Beginning with the 2003-04 season, the Department reverted to spawn deposition surveys as the primary assessment tool to estimate the spawning biomass. This decision was based on a California Sea Grant peer review of the management of the commercial fishery that indicated the spawn deposition survey method tended to provide a better estimate of herring biomass. Currently, the spawn deposition survey is used in conjunction with trawl surveys to determine age and population structure of herring schools entering San Francisco Bay. Spawning biomass estimates for San Francisco Bay from the 1979-80 through the 2013-14 seasons are shown in Figure 2.2. As a result of state-wide reduced fishing effort as well as reduced staffing and budget constraints; the Department is not able to conduct spawning biomass surveys in Tomales Bay, Humboldt Bay, or the Crescent City area. It should also be noted that no commercial fishery has taken place in Tomales Bay since 2007, since 2005 in Humboldt Bay, and since 2002 in Crescent City.

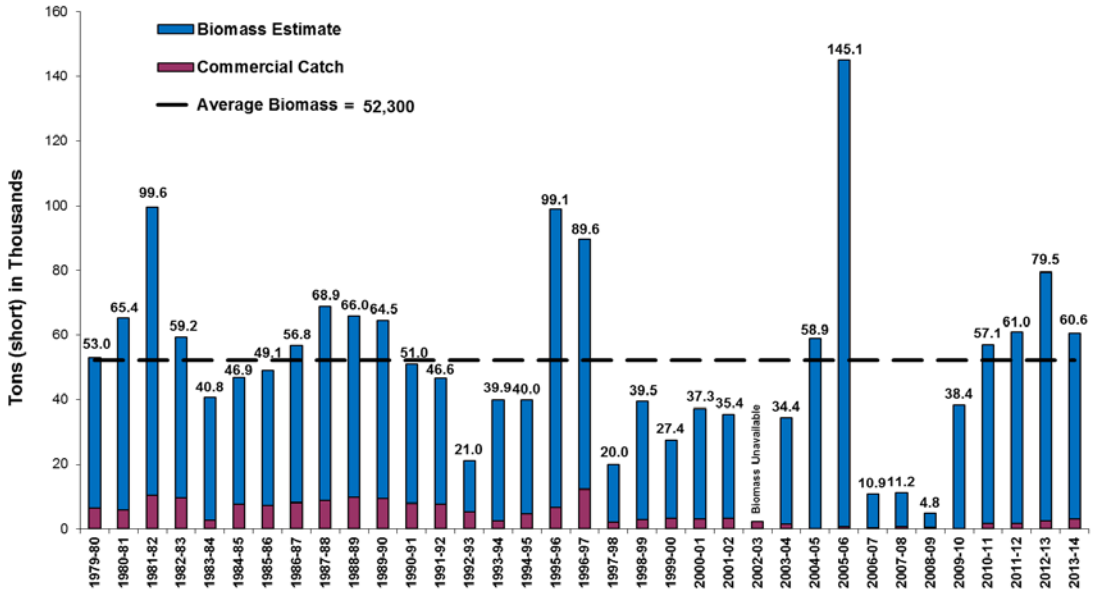

Figure 2.2 San Francisco Bay Pacific herring biomass estimates and commercial catch.

Annual fishing quotas are intended to provide for a sustainable fishery and have historically been limited to a total catch not to exceed 20 percent (harvest percentage) of the previous season's estimated spawning biomass. This harvest percentage was selected, based upon model simulations, to help ensure adequate protection of the herring resource while taking into account accidental overages and other management uncertainties. This model, however, assumes stable environmental and biological conditions. In an attempt to account for potential season-to-season variability in these conditions, the Department has set even more conservative harvest percentages. In 2003, due to exploitation rate concerns, the Department requested a peer review of its fishery management activities. The Department worked with California Sea Grant to assemble a team of scientists with demonstrated expertise in modeling and fish population assessment. A key recommendation resulting from this peer review was that a harvest rate in the range of 10-15 percent would be sustainable and that a lower level would provide a desirable target for stock rebuilding (California Sea Grant Extension Program 2003). Based on this assessment, the Department has continued to recommend low harvest percentages to the Commission, and since the 2010-11 season, the Department has recommended quotas less than or equal to five percent of

the previous season's estimated spawning biomass. Actual exploitation rates (catch percentages) by the commercial fishery have equaled an average of approximately four percent of the total spawning biomass since the 2003-04 season and have equaled an average of less than 10 percent of the spawning biomass since the 1979-80 season (Figure 2.2).

Quotas are the principal regulatory tool used to establish adequate protection of herring as an important forage species and to provide for the long-term yield of the commercial fishery. Each year, the Department recommends a harvest percentage that is not determined by a fixed mathematical formula; rather, the recommendation is based upon modeling results and takes into account additional data collected each season, such as ocean productivity and bay conditions, growth rates of herring, strength of individual year-classes, and predicted size of incoming year-classes (*i.e.*, recruitment). In response to poor recruitment, indication of population stress, and/or unfavorable oceanographic conditions, harvest percentages beginning in 2003 have been set at or below 10 percent. Since the 2003-04 season, harvest percentages on average have allowed over 90 percent of the spawning biomass to return to the ocean after spawning in the bay. The Department and DHAC recommended a no fishery option (zero ton quota) for the 2009-10 season, when the herring spawning biomass in 2008-09 fell to a new low of 4,833 tons. The Commission adopted this recommendation and the commercial fishery was closed in San Francisco Bay for the 2009-10 season. Since the re-opening of the fishery for the 2010-11 season, the Department has recommended harvest percentages at five percent or less of the spawning biomass. Based on accepted fishery management principles these harvest percentages are conservative and represent a precautionary approach to safeguard the population as forage and to provide a robust reproductive base to allow for stock rebuilding.

In addition to annual changes in quotas, management recommendations to improve or provide for the efficient harvest and orderly conduct of the herring fisheries are solicited from interested fishermen, individuals at public meetings, and DHAC. The proposed amendments to Sections 163 and 164, Title 14, CCR, addressed by this FSED, reflect both Department and the public recommendations.

2.3.1. Herring Fisheries

2.3.1.1. San Francisco Bay 2013-14 Quota

The current spawning biomass estimate for the 2013-14 season is 60,600 tons, which exceeds the historical average (1979-80 season to present) of 52,300 tons. This has been the fourth consecutive year of above average biomass following the record low in the 2008-09 season of 4,833 tons (Figure 2.2). The Department is providing the Commission the option to consider a quota range between zero (0) and 10 percent of the 2013-14 spawning biomass estimate of 60,600 tons. Due to the ongoing recovery of the herring population, the Department recommends a conservative quota option of 2,500 tons, or 4.1 percent of the current spawning biomass estimate, for the 2014-15 season. The Department's recommendation would maintain fishing mortality at a comparatively low level, which is beneficial for continued stock recovery. This approach would also help maintain a sustainable fishery while continuing to support herring's integral role in both ocean and bay ecosystems.

Preliminary age composition analysis, based on length frequencies for the 2013-14 season indicates that age 4- and 5-year old herring continued to persist in the population (Figure 3.1). This is important to a healthy age-class structure; for this reason, one of the Department's longstanding management objectives has been to reduce the harvest of 2- and 3-year old herring, many of which are first-time spawners. The Department considers appropriate harvest controls and precautionary harvest percentages as the primary means of assuring a sustainable fishery. As the stock recovers, the Department considers that a quota maintains sustainability while safeguarding sufficient numbers of herring for stock rebuilding. Additionally, fishing effort in the San Francisco Bay herring fishery has decreased significantly during the past several years. During the 1990s, the number of herring permits peaked at over 450 with over 120 vessels participating. In contrast, during the 2013-14 season there were only 187 herring permit renewals and 35 vessels elected to participate in the gill net fishery.

From the total quota for San Francisco Bay, separate permit quotas are established for each gill net platoon (i.e., Odd and Even fishing groups). The overall quota is allocated among the platoons in proportion to the number of permits assigned to each platoon. Adjustments to quotas for each fishing platoon are calculated annually to offset permittee attrition and the use of herring permits in the HEOK fishery. HEOK fishing occurs only in San Francisco Bay, and the fishery is regulated under Section

164, Title 14, CCR. Individual HEOK quotas depend on the total herring fishery quota for San Francisco Bay established by the Commission under Section 163, Title 14, CCR. In 1994, the Commission provided HEOK permittees possessing “CH” permits with a HEOK quota equal to approximately 0.79 percent of the overall quota. All HEOK permittees must hold a herring permit. To fish HEOK, permittees must waive herring fishing privileges under Section 163 and “exchange” their “share” of the herring quota for an equivalent HEOK quota. The current factor used to convert an equivalent amount of whole fish to the herring eggs on kelp fishery is 0.2237. This factor was derived from the round haul to gillnet conversion ratio allotted during the 1988-89 season.

2.3.1.2. Tomales Bay, Humboldt Bay, and Crescent City Area 2013-14 Quotas

The quotas for Tomales Bay, Humboldt Bay and Crescent City area are not to exceed 350 tons, 60 tons, and 30 tons, respectively. For the 2013-14 season, Tomales Bay had nine permit renewals and Humboldt Bay and Crescent City had four renewals. It should be noted that no commercial fishing activity has taken place in Tomales Bay since 2007, in Humboldt Bay since 2005 and in the Crescent City area since 2002.

Though the Department does not have current biomass data for these fishing areas, herring populations are ecologically linked through the California Current Large Marine Ecosystem. These populations have the same foraging opportunities and similar predator-prey relationships. Herring in these areas are likely able to take advantage of the same improved ocean conditions that allowed the San Francisco Bay spawning population recovery over the past five years. In addition these populations have not been subjected to fishing pressure which is likely to further enhance spawning stock recovery.

During the August 7, 2013, Commission meeting, the Department was asked by the Commission and the conservation community to provide a zero (0) ton quota option for Tomales Bay, Humboldt Bay, and the Crescent City area for the commercial harvest of herring during the 2014 rulemaking cycle. Based on decreased permit renewals, poor market conditions, and unique sites issues at each location, it is unlikely that fishing activity will return in the near future. Due to the lack of recent biomass data for each of these areas, as explained above, in addition to the status-quo, the Department

is providing a zero (0) harvest or no fishery option for the Commission to consider for the 2014-15 season for Tomales Bay, Humboldt Bay, and Crescent City area fisheries.

2.4. Project Alternatives

Three alternatives to the proposed project are considered and are examined as they apply to this FSED. Two of these alternatives take the form of additional changes to the existing regulations that could feasibly be joined. The third alternative is a no project (no fishery) alternative. In evaluating alternatives, the comparative merits and impacts of individual alternatives that could be logically and feasibly joined should be considered as so joined unless otherwise stated. The alternatives to be considered under this FSED are:

- Alternative 1 (no project, i.e. no fishery). Under this alternative, the commercial harvest of herring would be prohibited.
- Alternative 2. Under this alternative, existing regulations would only be modified to adjust current season dates.
- Alternative 3 (individual vessel quota for gill net vessels in herring fishery). Under this alternative, the proposed regulations would be modified by establishing an individual vessel quota for all gill net vessels. The proposed individual gill net vessel quota would equal the overall gill net quota divided by the number of permittees using gill net gear.

The following section states the specific purpose of the alternatives and summarizes the factual basis for determining that the alternatives are reasonably necessary.

2.4.1. Alternative 1 (no project)

This is a CEQA required alternative. It provides a reference for comparison to the proposed project and alternatives 2 and 3.

2.4.2. Alternative 2 (existing regulations)

The existing regulation alternative would maintain the herring fishery regulations as amended through 2013 and would not provide for adaptive management of the State's resources. The only amendment or change suggested allows for the adjustment of season dates.

2.4.3. Alternative 3 (individual vessel quota)

This alternative would establish an individual herring quota for each San Francisco Bay gill net permittee. Under existing regulations [Section 163(g)(4)(C), Title 14, CCR] an overall herring quota is established for each of the three gill net groups (platoons) in San Francisco Bay, allowing individual permittees to take and land as much fish (tonnage) as they are capable of until the overall quota for their respective group is reached. However, there has never been a clear consensus of support among industry members about this issue. The Department is concerned about the level of enforcement effort that would be necessary to effectively monitor and enforce this alternative. See Section 2.4.3 of the FED for a full description of this alternative.

Chapter 3. ENVIRONMENTAL SETTING

3.1. General

Pacific herring (herring), *Clupea pallasii*, are found throughout the coastal zone from northern Baja California on the North American coast, around the rim of the North Pacific Basin and Korea on the Asian coast (Hart 1973). In California, herring are found offshore during the spring and summer months foraging in the open ocean. Beginning as early as October and continuing as late as April, schools of adult herring migrate inshore to bays and estuaries to spawn. Schools first appear in the deep water channels of bays to ripen (gonadal maturation) for up to two weeks, then gradually move into shallow areas to spawn. The largest spawning aggregations in California occur in San Francisco and Tomales bays. San Francisco Bay is also near the southern end of the range for herring (Miller and Schmidtke 1956).

Herring are a food source for many species of birds, fish, invertebrates, and mammals. Predation is particularly high during spawning when adult fish and eggs are concentrated and available in shallow areas. Predation by birds and fish during the egg stage, when eggs are deposited in the intertidal and shallow subtidal zones, is a significant cause of natural mortality for herring.

Spawning occurs in the intertidal and shallow subtidal zones. Males release milt into the water column while females extrude adhesive eggs on a variety of surfaces including vegetation, rocks, and man-made structures such as pier pilings, boat bottoms, rock rip-rap, and breakwater structures. Embryos (fertilized eggs) typically hatch in about 10 days, determined mainly by water temperature. Larval herring metamorphose into juvenile herring in about 10 to 12 weeks. In San Francisco Bay, juvenile herring typically stay in the bay through summer, and then migrate out to sea. Research conducted on herring in Straits of Georgia, British Columbia (BC) suggests that 1- and 2-year old herring occupy inshore waters and older herring occupy shelf waters (Haegele 1997). In BC waters, juvenile herring were found in shallow nearshore waters of less than 50 meters during the summer, in shoals of similar-sized individuals. Based on the life history data of herring in BC waters, there may be very little direct competition for food between age classes, and the first opportunity for direct interaction may be when herring sexually mature and join the spawning stock (Hay 2002).

Most herring fisheries occur during the spawning season. The herring gill net fisheries catch herring as they move into the shallows to spawn. The primary product from this fishery, *kazunoko*, is the sac roe (eggs) removed from the females, which is processed and exported for sale in Japan. California's roe herring fisheries have historically occurred in the Crescent City area, Humboldt Bay, Tomales Bay, and San Francisco Bay.

The San Francisco Bay herring eggs on kelp (HEOK) fishery suspends giant kelp, *Macrocystis pyrifera*, from rafts for herring to spawn on in shallow water areas. The kelp is harvested near the Channel Islands and/or in Monterey Bay and then transported to San Francisco Bay. The product of this fishery is the egg-coated kelp blades that are processed and exported to Japan. This product, *komochi* or *kazunoko kombu*, is typically served as an appetizer during New Year's celebrations.

The herring fishery in California has been intensively regulated since its inception in 1973, at first by the California State Legislature, then by the Fish and Game Commission (Commission). Department of Fish and Wildlife (Department) estimates of the spawning population biomass have provided a critical source of information used for establishing fishery quotas to control the harvest of herring and provide for the long-term health of the herring resource. A thorough description of the environmental setting is provided in Chapter 3 of the 1998 Final Environmental Document (FED), which includes herring life history, ecology, status of stocks and fisheries at that time, and biological and environmental descriptions of herring fishery locations (Crescent City Harbor area, Humboldt Bay, Tomales Bay, San Francisco Bay, and Monterey Bay).

3.2. Spawning Population Estimation Methods

During the 1973-74 through 1988-89 seasons, Department estimates of San Francisco Bay herring spawning biomass were made using spawn deposition surveys (refer to Sections 3.4 and 3.5 below). From the 1990-91 through 2001-02 seasons, the Department estimated San Francisco Bay spawning biomass using a combination of spawn deposition and hydroacoustic surveys. In 2002-03, the Department was unable to generate a spawning biomass due to a wide discrepancy between the two survey methods.

The Department assessed the two methods using the Coleraine Model and an independent peer review conducted by California Sea Grant (California Sea Grant Extension Program 2003). The results indicated that the spawn deposition survey provided a better estimate of spawning biomass. Beginning with the 2003-04 season, the Department reverted to using the spawn deposition surveys alone for biomass estimation. In addition to the spawning biomass estimates, the Department collects fishery independent age composition data from the population and fishery dependent age composition data from the commercial catch. All of the information collected by the Department, including ocean conditions, is used in annual population assessments.

3.3. Status of the San Francisco Spawning Population

The spawning biomass estimate for the 2013-14 season is 60,600 tons, which exceeds the historical average (1979-80 season to present) of 52,300 tons. This is the fifth year of increasing or above average estimates since the 2008-09 season record low estimate of 4,833 tons (Figure 2.2). Age 1 fish made up a substantial portion of the spawning biomass (Figure 3.1) while age 4- and 5-year old herring continue to persist in the population. The high numbers of returning 4- and 5-year old herring, as well as improved physical condition, is likely due to more favorable biological and environmental conditions in oceanic ecosystems.

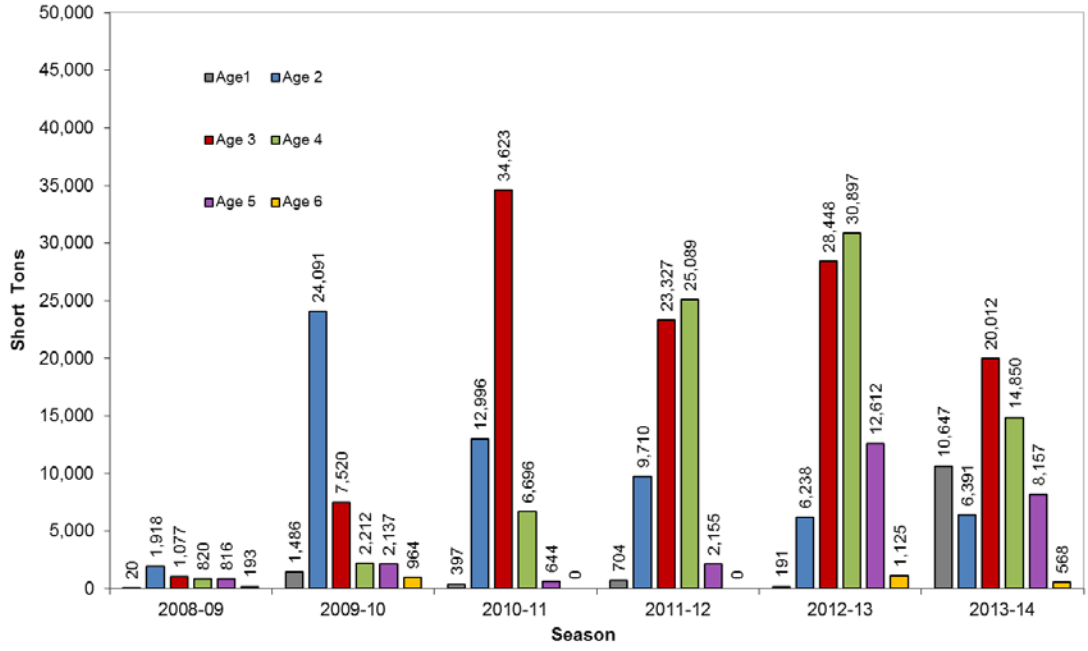

Figure 3.1 San Francisco Bay spawning biomass by age class for the 2008-09 to 2013-14 seasons.

Oceanic conditions in the North East Pacific ocean can influence the herring spawning population in the San Francisco Bay. Coastal upwelling has been shown to affect recruitment in estuarine populations of forage fish including herring (Reum et al. 2011). During coastal upwelling deep, cold, nutrient-rich water is brought to the surface nearshore by Ekman transport resulting from predominantly north winds during spring and summer along the coast of California. The presence of this nutrient-laden water results in increased plankton which fuels production in coastal pelagic ecosystems (Rykaczewski and Checkley 2008). However, large-scale oceanographic processes in the Pacific Ocean such as the El Nino Southern Oscillation (ENSO) cycle and the Pacific Decadal Oscillation (PDO) can affect the nutrient content of upwelled water, in turn affecting nearshore marine ecosystems (Chavez et al. 2002, Checkley and Barth 2009). Strong El Nino conditions result in upwelled water that tends to be warmer and more nutrient-poor than water that is upwelled during ENSO-neutral and La Nina conditions. Additionally, cool or warm PDO phases can either temper or augment ecosystem-level effects of El Nino and La Nina events (Chavez et al. 2002). ENSO-neutral conditions have persisted from mid-2012 through early 2014, and the PDO is

currently in a cool phase in the north Pacific (NOAA 2014a, b). This likely contributed to normal upwelling conditions and food availability for the 2013-14 San Francisco Bay herring spawning population.

Typically, winter storms result in increased freshwater outflow to San Francisco Bay, creating lowered bay salinity and ideal spawning conditions for herring. Optimal salinities range from 12-24 parts-per-thousand (ppt), though fertilization of herring eggs will occur at salinities of 8-28 ppt (Griffin et al. 1998). The California Department of Water Resources 2014 Water Year Precipitation Summary reports below-average precipitation for all river basins and hydrologic regions throughout the state for the October 2013-February 2014 period, with a statewide rated average of 42.52 percent of the historic average for that period (Department of Water Resources 2014). This reduction in freshwater outflow to the bay during the time of year when herring spawning occurs likely resulted in sub-optimal spawning conditions and may have influenced the somewhat atypical spawning behavior observed during the 2013-14 season. Herring spawned in areas of San Pablo Bay, which lies outside the traditional spawning area for this population (Figure 3.2).

Thirteen spawning events were recorded during the 2013-14 season, primarily in the northern areas of San Francisco Bay and into San Pablo Bay. Spawning events occurred from as far north as Point San Pedro and south to Coyote Point. The first recorded spawn of the season occurred November 22, 2013, and the last recorded spawn occurred on March 4-5, 2014 (Table 3.1). There were several large spawning events in the Richardson Bay and smaller events to the east along the Marin county shore and at Point Richmond (Figure 3.2). The spawning biomass for the season was temporally and spatially well distributed. This type of distribution helps prevent over exploitation of a single spawning wave. It should be noted that the spawn at Point San Pedro could be considered outside the normal herring spawning range. Generally, herring do not spawn northeast of the Richmond-San Rafael Bridge. However, given the drought conditions experienced during the winter of 2013-14, herring were likely searching for lowered salinities in other areas of the San Francisco Bay estuary for spawning.

Table 3.1 2013-14 San Francisco Bay Pacific herring spawning biomass estimate by event with commercial catch totals.

#	Approximate Spawn/Catch Date	Location	Submerged Areas	Shore Areas	Spawn Total	Gill-net	HEOK	Biomass Total
1	November 22, 2013	Richardson Bay	Trace		Trace			Trace
2	November 29, 2013	Richardson Bay	428		428			428
3	December 15-16, 2013	Richardson Bay	4,580		4,580			4,580
4	January 2, 2014	Coyote Point – Burlingame		132	132			132
5	January 2-7, 2014	Paradise Cove – Richardson Bay	5,335	1,027	6,362	847.7		7,209
6	January 9-10, 2014	Point San Quentin	1,055		1,055	540.8		1,596
7	January 12-13, 2014	Bay Farm Island		Trace	Trace	0.5		0.5
8	January 22-23, 2014	China Camp – San Pablo Bay	2,916		2,916	57.2		2,973
9	January 30-31, 2014	Paradise Cove		15	15	652.0		667
10	January 30-31, 2014	Richardson Bay	24,044		24,044	191.7		24,236
11	February 3-6, 2014	Point Richmond	5,153	25	5,178	906.0		6,084
12	February 20-23, 2014	Richardson Bay	11,443		11,433	2.2		11,445
13	March 4-5, 2014	Richardson Bay	1,276		1,276			1,276
Spawn Events (n) = 13		**Totals in short tons**	**56,229**	**1,199**	**57,428**	**3,198**		**60,626**

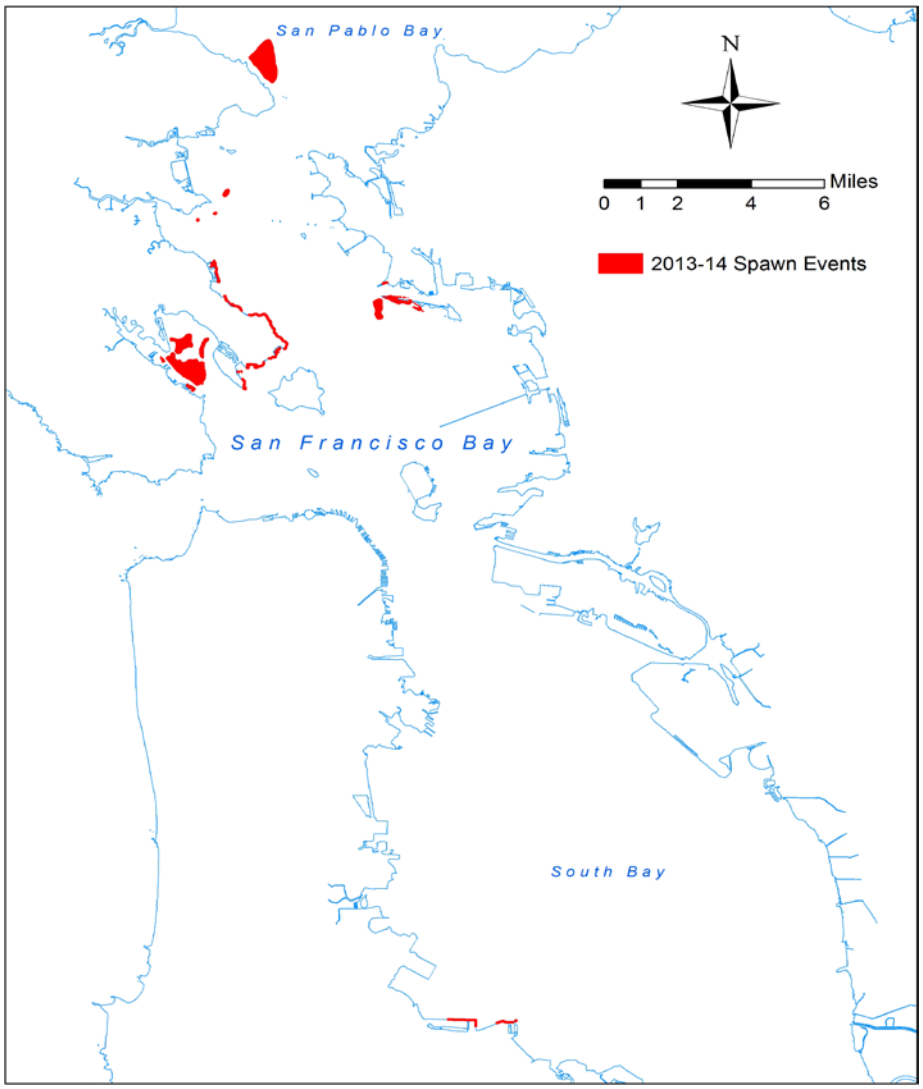

Figure 3.2 San Francisco Bay herring 2013-14 season spawn event map.

The Department uses the spawning stock biomass and age class structure to assess the spawning population and determine an appropriate harvest level from the available stock. Herring were captured with research nets to estimate the age class structure of the San Francisco Bay spawning population this season. Preliminary ages are assigned using a length-age key. Final ages are determined from a surface reading of the otoliths (ear bones) of herring. Data are compiled for analysis into age classes or groups of fish the same age. The age class composition is used to assess the cohorts (year classes) of herring born in a given season which compose the spawning population.

Age composition for the 2013-14 season shows a balanced age class distribution (Figures 3.1 and 3.3). However, the proportion of age six and older herring was below average. This remains a concern for fishery management because these older fish formerly supported the commercial fishery (Figure 3.4). Reduced numbers of these older age classes places additional burden on younger cohorts to support the San Francisco Bay fishery and to fulfill herring's role as forage. This is the primary reason the Department recommends a precautionary harvest percentage for the commercial herring fishery.

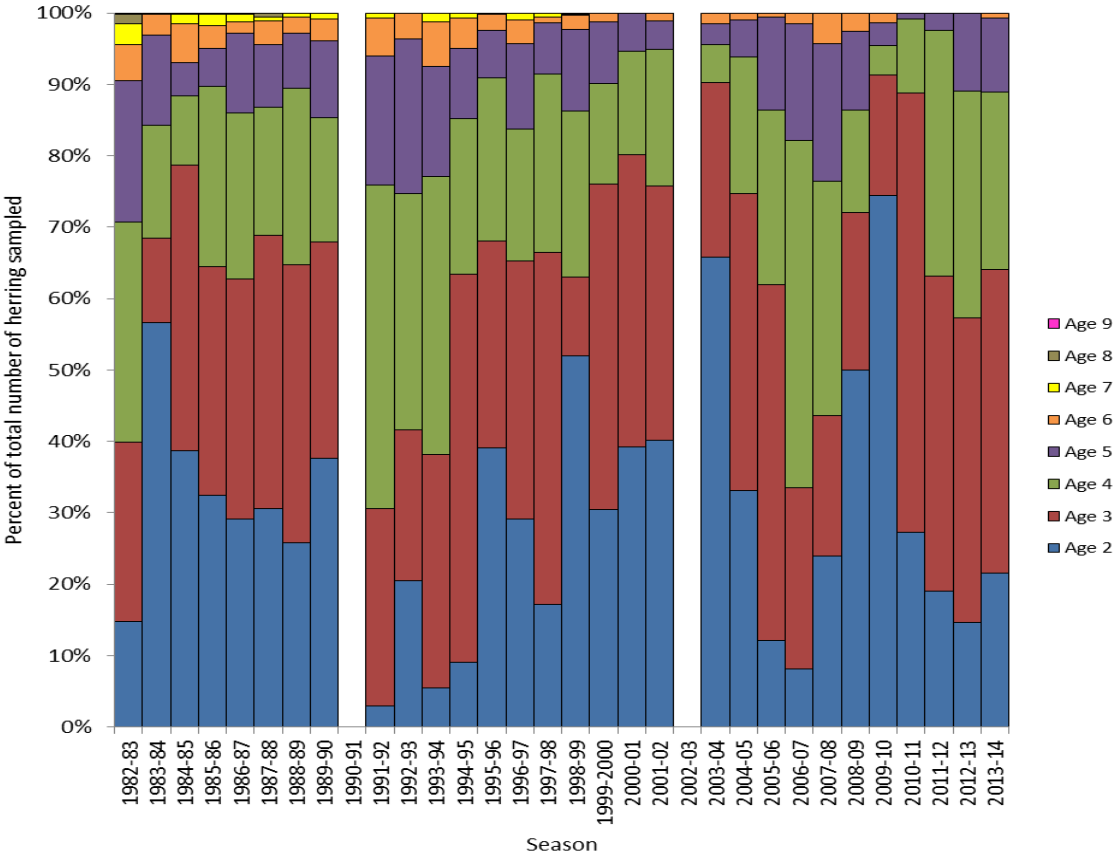

Figure 3.3 Age composition of the research catch (excluding age-1 fish) by number of ripe fish for the San Francisco Bay herring spawning biomass.

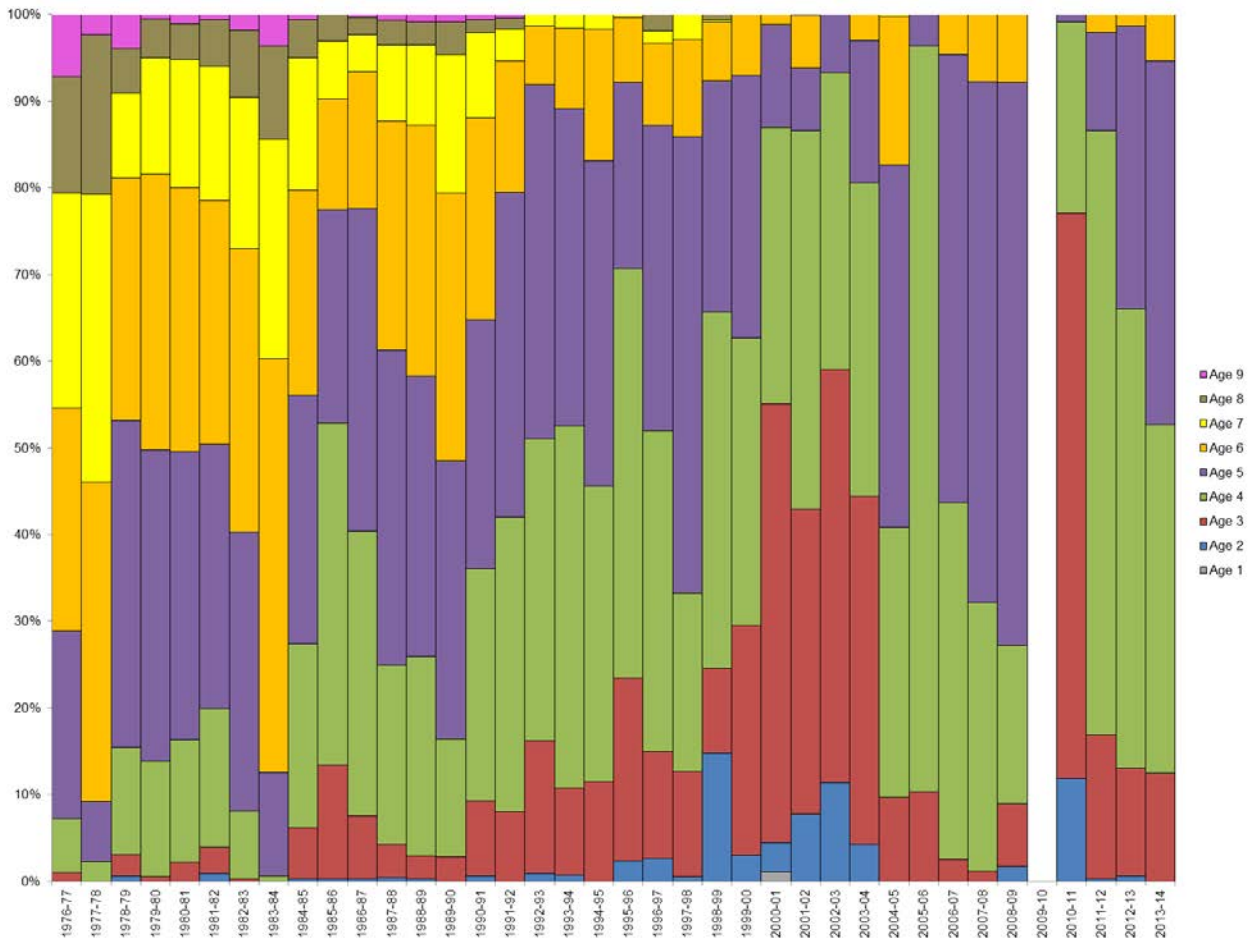

Figure 3.4 Age composition of the commercial gill net catch by number of fish for the San Francisco Bay herring fishery. There was a zero ton quota and therefore, no commercial catch during the 2009-10 season.

The length-weight relationships for herring in spawning condition are used to develop a condition factor index (CI), which is derived from a fish's weight divided by the cube of its length, and used to describe the health of a population. The San Francisco Bay herring CI for mature 2013-14 fish was near average and showed an increase relative to the 2012-13 season (Figure 3.5).

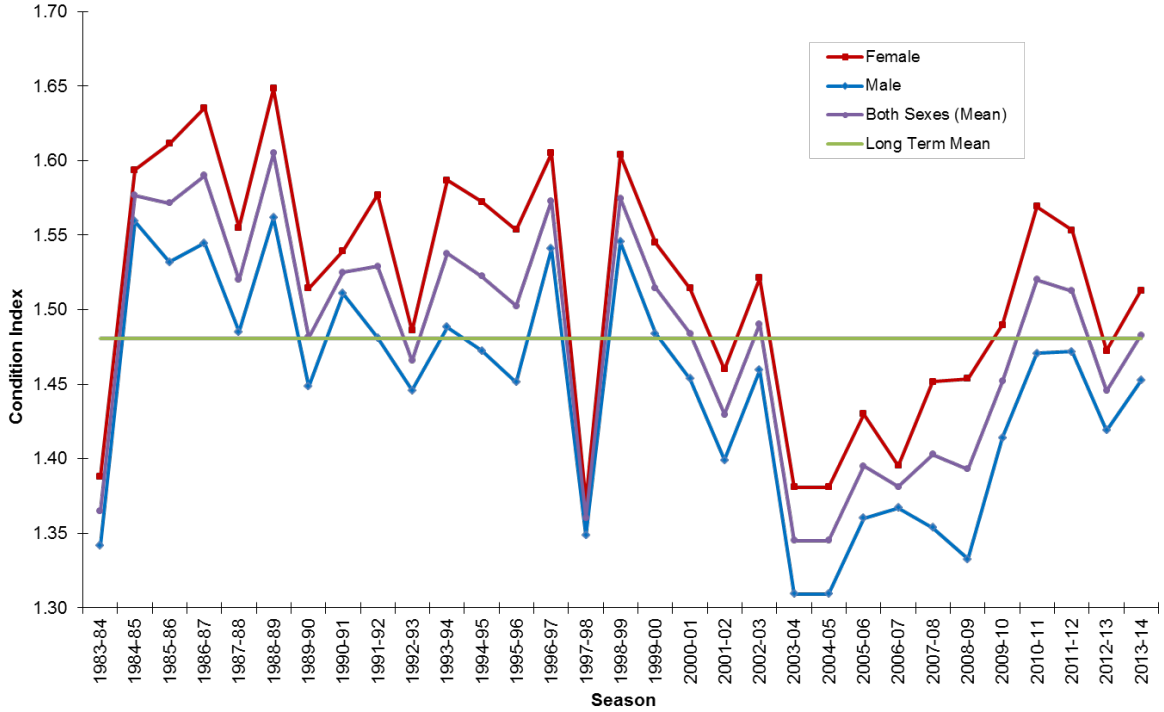

Figure 3.5 Condition Index (CI) and historical mean CI for ripe male and female fish from the Department's San Francisco Bay herring research catch.

In summary, the spawning biomass estimate for the 2013-14 season was 60,600 tons, 8,300 tons above the historical average (1979-80 season to present) of 52,300 tons. Following the record low spawning estimate of the 2008-09 season, the San Francisco Bay spawning population has shown strong signs of recovery over the last five years. The recovery began during the 2009-10 season with an estimate of 38,400 tons, followed by increases to 57,000 tons, 61,000 tons, and 79,500 tons. Age composition analysis indicated the continued above average spawning biomass was due to unusually high recruitment of 1-year old herring to the spawning population and the continued presence of high numbers of 4- and 5-years olds. Early 2014 reports of ENSO and PDO indices indicate neutral to favorable oceanic conditions that will aid in continued herring stock recovery. Hydrographic conditions within San Francisco Bay have declined from previous seasons with below average precipitation reported for the current water year. This may hinder spawning success and survival of young herring in the bay. However, the Department considers precautionary harvest percentages as the

primary means of assuring a sustainable fishery even in years of unfavorable hydrographic conditions. Additionally, continued monitoring of both the herring population and commercial catch will ensure that the Department's management goals are achieved and younger fish are not harvested at unsustainable levels. It is the Department's longstanding management objective to reduce the harvest of 2- and 3-year old herring, many of which are first-time spawners. Based on age composition analysis, this objective was achieved during the 2013-14 commercial season (Figure 3.4). Additionally, the population is safeguarded by the low exploitation rates in recent seasons that have resulted from the Department's recommended harvest percentages of less than 5 percent. These low harvest levels allow the herring population to maintain recent recovery gains and help provide for herring's importance as a forage species.

3.3.1. San Francisco Bay Herring Young of the Year (YOY)

Herring young-of-the-year (YOY) are collected by the Interagency Ecological Program for the San Francisco Estuary by the Department's San Francisco Bay Study (SFBS) during the spring and summer of each year. The SFBS conducts surveys to determine the abundance and distribution of invertebrates and fishes in the San Francisco Estuary from the western Sacramento-San Joaquin Delta to San Francisco Bay. Stations are sampled each month using a midwater trawl that is towed obliquely through the water column to capture species inhabiting varying depths. The catch from this net is used to calculate an index of abundance for YOY herring (Fleming 1999).

The herring YOY abundance index for 2012 was below average for the period of record (Figure 3.6)(*note: 1-2 year data lag for analysis). The abundance of YOY indicated less favorable environmental conditions for survival than the three years prior within San Francisco Bay (Hieb et al. in preparation). Herring are not fully recruited into the spawning population until age 3 and recruitment to the spawning stock is affected by a number of factors during the early life stages, including predation, food availability, competition, and environmental conditions. As a result YOY indices have not proven to be a reliable indicator of recruitment. It is however a good indicator of relative spawning success in a given year.

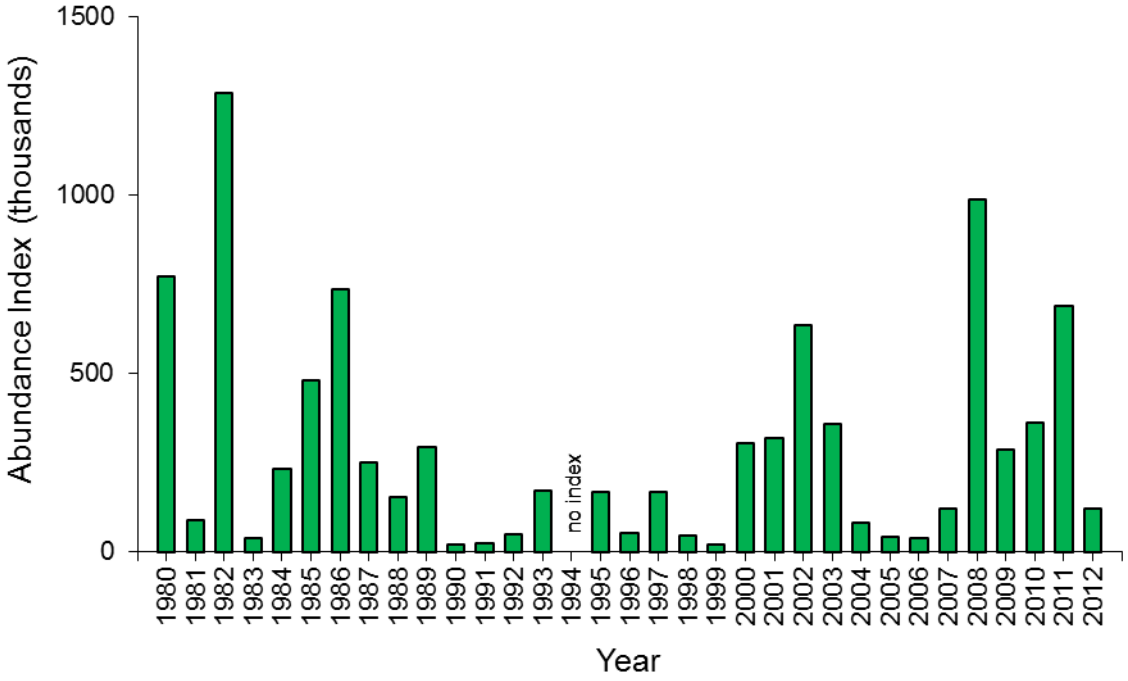

Figure 3.6 San Francisco Bay herring young-of-the-year abundance indices 1980-2012. *No index was calculated for 1994. *Data for 2013 are not yet available.

3.3.2. *Cosco Busan* Oil Spill and Potential Impacts to San Francisco Bay Herring

On November 7, 2007, the container ship, *Cosco Busan* spilled an estimated 58,000 gallons of bunker fuel (IFO 380) into San Francisco Bay. Due to the timing of the oil spill, herring resources were potentially impacted. Since the spill occurred prior to the majority of spawning schools entering the bay, the most likely impact would be to spawning habitat and egg and larval development in contaminated areas. Previous studies, conducted after the *Exxon Valdez* oil spill, on herring egg and larval development exposed to weathered oil and polycyclic aromatic hydrocarbons (PAH) indicate impacts range from increased egg mortality to larval developmental abnormalities resulting in poor survival. Significantly higher herring egg and larval mortality was found in oiled versus non-oiled areas, which supports the hypothesis that oil exposure decreases survival and hatching success in late stage embryos (McGurk and Brown 1996). Norcross et al (1996) found herring larvae from oiled areas had low growth rate and high proportions of deformities such as craniofacial defects. Larvae

from un-oiled areas in Prince William Sound had less severe abnormalities due to oil exposure through the water column or contaminated prey. PAH compounds found in oil selectively disrupt embryonic cardiac function and indirectly affect other tissues that are secondary to cardiovascular dysfunction (Incardona et al. 2004). Sublethal effects resulting from oil exposure, such as developmental abnormalities can become lethal at later stages and environmental variables can alter the baseline of sublethal indicators (Hose et al. 1996). Carls et al (2002) reviewed the toxicological impacts on herring from the *Exxon Valdez* oil spill found four to six percent of the spawn occurred within visibly oiled areas. However, elevated concentrations of biologically available oil were found in the water, providing evidence that the primary source of herring egg oil contamination was through the water. While crude oil and bunker fuel oil may have differing chemical properties, potential oil related impacts on herring are probably similar.

A Natural Resources Damage Assessment (NRDA) team conducted a study of egg and larval development in oiled and non-oiled areas in San Francisco Bay. The findings of the NRDA report assist in determining the immediate and long-term impacts to herring resources and direct management activities for San Francisco Bay herring (Cosco Busan Oil Spill Trustees 2012). Field observations by Department staff indicated that key spawning areas were oiled during the spill and impacts of oil exposure on herring may negatively affect year class strength. Herring have evolved reproductive strategies to withstand predation, environmental uncertainties, and stochastic events. The population appears to be recovering and the Department will continue to monitor the population and adapt its management strategies as appropriate.

3.3.3. Importance of Herring as a Forage Species

As described in Chapter 3, Section 3.2.1.8.1 of the FED, herring are an integral component to a healthy functioning marine ecosystem, making up a large portion of the diet of marine organisms from California to Alaska. Herring are a mid-trophic level species that play an important role linking the lower and higher trophic levels in the food web. Changes in abundance and age structure of a forage species such as herring, as well as variability in the size and timing of herring spawn events, can lead to changes in the abundances and behaviors of the variety of organisms that depend on herring and their eggs for food, including important recreational and commercial species as well as

threatened and endangered fish, marine mammals, and sea birds. The Commission has adopted policy that recognizes the importance of forage species to the marine ecosystem off California's coast and intends to provide adequate protection for forage species through precautionary and informed management. It is the goal of the Department to provide the Commission with management recommendations for herring that take into account their role as an important forage species and are based on the best available science.

Chapter 4. ENVIRONMENTAL IMPACT ANALYSIS AND CUMULATIVE EFFECTS

This chapter addresses the impacts and cumulative effects of the proposed project (changes to the commercial herring fishing regulations) on the existing environment described in Chapter 3 of this document and Chapter 3 of the Final Environmental Document (FED). The proposed project and two of the three alternatives will permit a continuation of the regulated commercial harvest of Pacific herring (herring), *Clupea pallasii*, in California. An analysis of the impacts of the proposed project is discussed in this Final Supplemental Environmental Document (FSED).

Existing regulations permit the commercial harvest of herring in four geographical areas: San Francisco Bay, Tomales Bay, Humboldt Bay, and the Crescent City area. Chapter 4 of the FED examined the environmental sensitivity of each of these areas at existing harvest levels. Thirteen environmental categories were considered, including; land use, traffic circulation, water quality, air quality, housing, public utilities, geological, biological, archaeological, scenic, recreation, noise, and growth inducement. Three categories (land use, archaeology, and growth inducement) were considered to have no environmental sensitivity to commercial herring fishery activity in any of the four geographical areas and were not considered in the impact analysis. Potential impacts relative to the above categories were re-examined annually and addressed in the Supplemental Environmental Document (SED). The basis for this assessment is provided in detail in Section 4.1 of the FED.

Section 4.2 of the FED provided a detailed impact analysis for the ten categories found to have environmental sensitivity to commercial herring fishery activity. Potential impacts to traffic circulation, water quality, air quality, housing and utilities, geology, scenic quality, recreational opportunities, and noise levels that were identified as an aspect of herring fisheries varied in degree with geographic area, but all were considered to be localized, short-term, and less than significant. Some of these potential impacts are mitigated by various existing regulations.

Section 4.2.6 of the FED provided a detailed analysis of the potential environmental impacts to biological resources that exist from commercial herring fisheries. The proposed project adds no new impacts to be analyzed.

The FED divided potential impacts into two categories: (1) direct harvest impacts, and (2) trophic level impacts. Short and long-term potential adverse impacts exist within each of these categories. Many of these potential impacts are mitigated by current management practices including annual spawning population estimates and regulations that control harvest and fishery impacts. Others are considered localized, short-term, and less than significant.

Chapter 5 of the FED provided a detailed analysis of the factors that have the capacity to influence future herring population status in California in addition to the existing herring fisheries or alternatives (cumulative effects). The proposed project introduces no new cumulative effects to those addressed by the FED. The FED discussed in detail the factors with greatest potential for cumulative effects, including continued commercial harvest of herring, unusual biological events, competitive interactions with other pelagic fish, unusual weather events, habitat loss, and water quality. Mitigation for these potential cumulative effects will be provided by annual stock assessments, annual changes in the level of harvest, or the selection of a no fishery alternative.

The Department of Fish and Wildlife identified and addressed impacts and cumulative effects of the proposed project on the existing environment described in Chapter 3 of the FED, subsequent FSEDs, and this FSED. No impacts were identified that were not already addressed in the FED or prior FSEDs. Other impacts identified were determined to be localized, short-term, and less than significant.

Chapter 5. ANALYSIS OF ALTERNATIVES

An analysis of the potential environmental impacts of the three alternatives described in Section 2.4 is provided in Chapter 6 of the Final Environmental Document (FED). Three commercial harvest alternatives were selected for consideration by the California Fish and Game Commission (Commission) based on the Department of Fish and Wildlife's (Department) recommendation, public comment received during the normal review process, or in response to the Notice of Preparation (NOP). These alternatives were selected to provide the Commission with a range of commercial harvest alternatives. The two commercial harvest alternatives contain common elements with only selected elements of the management framework considered as alternatives. A "no project" (no commercial harvest of herring within California state waters) alternative is also provided.

5.4. Alternative 1 (no project)

The "no project" alternative would eliminate the commercial harvest of Pacific herring (herring), *Clupea pallasii*, resources within California waters. Selection of this alternative would be expected to: (1) reduce total mortality and allow herring stocks to increase to carrying capacity; (2) increase competition between species (e.g., sardines and anchovies) occupying the same ecological niche as herring and potentially reduce standing stocks of these species; (3) increase the availability of herring to predators by reducing search effort and increasing capture success; (4) eliminate the ethical concern of those opposed to the commercial harvest of herring and the scientific information on herring derived from sampling the commercial harvest; and (5) eliminate revenues to local and regional economies, and state and federal agencies derived from the commercial harvest of herring.

Localized, short-term, and less than significant impacts to traffic circulation, water quality, air quality, housing, utilities, scenic quality, recreational opportunities, and noise levels would also be eliminated under the no project alternative. Section 6.1 of the FED provides a full analysis of the potential impacts associated with this alternative.

5.5. Alternative 2 (existing regulations)

Existing regulations, adopted in 2013, were for the 2013-14 herring commercial fishing season. These regulations reflect the amendments as adopted by the Commission in August 2013. Under Alternative 2, the herring fishery regulations as amended through 2013 would remain in place for the 2014-15 season. Under this alternative, existing regulations would be modified only by adjusting to current season dates. In most regards, the environmental impacts of Alternative 2 will be similar to those of the proposed project. Alternative 2, however, does not address certain fishery-related problems and would not provide for consistent adaptive management of the State's resources.

5.6. Alternative 3 (individual vessel quota)

This alternative modifies proposed regulations by establishing individual boat quotas for the herring gill net fishery in San Francisco Bay. Localized, short-term, and less than significant impacts of this alternative to circulation of traffic, water quality, air quality, housing, utilities, scenic quality, recreational opportunities, and noise levels are expected to be comparable to the proposed project. However, fishing effort could extend further into the season since the economic incentive would direct effort toward higher roe counts rather than quantity resulting in high-grading or throwing back males. Without individual boat quotas, typically, overall quotas have been met or fishing effort ceases long before season closure. Having the latitude to strive for higher roe counts could add incrementally to the potential impacts associated with the fishery. Section 6.3 of the FED provides further analysis of the potential environmental impacts of this alternative.

Chapter 6. CONSULTATION

Chapter 6 of the Final Environmental Document (FED) explains the role that consultation with other agencies, professionals, and the public plays in the Department of Fish and Wildlife (Department) marine resource management programs. Department staff involved in Pacific herring (herring), *Clupea pallasii*, resource management are in contact with other agencies, biologists, and researchers involved in herring management on an ongoing basis. The U.S. Fish and Wildlife Service, NOAA-Fisheries Service, U.S. Environmental Protection Agency, and other state and federal agencies have received all environmental documents that have been prepared regarding herring. To date, the Department has not received comments from these agencies.

Prior to preparation of the 2014 Final Supplemental Environmental Document (FSED), the Department initiated a broader consultation by distributing a Notice of Preparation (NOP) that announced the intent to prepare the Draft Supplemental Environmental Document dated February 3, 2014. In the NOP, the Department requested submission of views on the scope and content of the environmental information to be contained therein. The notice was distributed to members of the public, herring permittees, and interested organizations that had expressed prior interest in herring management. The NOP was also provided to the State Clearinghouse for distribution to appropriate responsible and trustee agencies.

In addition, the Department hosted a Town Hall Meeting on February 6, 2014, in Sausalito, County of Marin, to encourage an informal exchange of ideas and information on the fishery and its management with interested organizations, members of the herring fishing industry, and members of the public.

Consultations also occur during the annual review of regulations guiding the commercial harvest of herring. The process began this year when the Department presented the results of its annual population assessment and discussed possible regulatory changes for the 2014-15 season to the Director's Herring Advisory Committee (DHAC), as well as interested organizations and individuals on April 1, 2014, in Sausalito, County of Marin. The Department also contacted herring permit holders in Tomales Bay, Humboldt Bay and Crescent City Harbor to notify them that the

Commission would be considering a zero ton quota for 2014-15 season in those areas and collect permit holder input.

Proposed changes to the regulations for the 2014-15 season will be modified, as necessary, based on comments from the public, other interested parties and DHAC. These recommendations will be presented to the California Fish and Game Commission at their June 4, 2014, meeting.

Chapter 7. RESPONSES TO COMMENTS REGARDING THE PROPOSED PROJECT

Pursuant to Sections 2180.5 (d)(2)(vi) and 2180.5 (d)(3)(ii) of the Public Resources Code, a copy of the Draft Supplemental Environmental Document (DSED) was placed on file and made available for public review for a 45-day period. Notice was also given at the time of filing that any person interested in commenting on the DSED should do so, in writing, by May 19, 2014, to the Fish and Game Commission (Commission) office in Sacramento.

7.1. Summary of Comments Received

Written comments were received by the Commission office from Anna Weinstein, Audubon California, Seabird Program Manager on behalf of Audubon California, Oceana, Earthjustice, Ocean Conservance, Natural Resources Defense Council and The Pew Charitable Trusts in a letter dated May 19, 2014.

7.2. Department Responses to Comments

Comment 1
In summary, we support the unified recommendation of the California Department of Fish and Wildlife (Department) and the Director's Herring Advisory Committee (DHAC) regarding the San Francisco Bay commercial herring quota for 2014-2015, request the Commission adopt the zero quota option for all unassessed areas outside San Francisco Bay, and support the collaborative momentum toward an ecosystem-based fishery management plan process for Pacific herring.

Response
Comment noted that Audubon, et al. support the options analyzed in the Draft Supplemental Environmental Document (DSED) for Pacific Herring, which includes the San Francisco Bay 2014-15 quota and zero ton quota options for areas outside San Francisco Bay.

Comment 2
We commend the Department as well as representatives of the commercial fleet on the DHAC for proposing a program for the 2014-2015 San Francisco Bay Pacific herring season that is precautionary and serves the overall goal of "optimal management of the Pacific herring resource for its ecological value and human use." The program takes into account new information gathered in 2013-2014 by the Department and members of the fleet engaged in collaborative research with the Department; namely, a reduction in estimated spawning biomass relative to last season, the continued lack of recovery in

age structure, anomalous patterns of spawning behavior and distribution that may be attributable to drought conditions, and a reported increase in enforcement issues.

Response
The Department accepts this comment.

Comment 3
In light of these concerns, and in the absence of an explicit harvest control rule and other key management endpoints to be addressed through a Fishery Management Plan, we support the joint recommendation made by DHAC and the Department of a harvest option for herring in San Francisco Bay for commercial purposes of 2,500 tons or 4.1% of the 60,600 ton 2013-2014 spawning biomass estimate.

Response
Comment noted that Audubon, et al. supports the 2,500 ton quota analyzed in the DSED.

Comment 4
This conservative quota is also in keeping with the state's Forage Policy. This policy states that the Commission intends to provide adequate protection for forage species through management goals that:

- Are precautionary and utilize the best available science in management decisions using clear and transparent methods;
- Identify and progressively incorporate Essential Fishery Information (EFI) needed for ecosystem-based management of forage species, including physical factors, oceanographic conditions, the effects of fishing on forage species' dependent predators, the availability of alternative prey, spatio-temporal foraging hotspots for predators, and existing management, including marine protected areas;
- Prevent the development of new or expanded forage fisheries until EFI is available and applied to ensure the sustainability of target forage species and protection of its benefits as prey; and
- Facilitate consistency in the management of forage species, integrate with existing FMPs, and encourage cooperation and collaboration across jurisdictions and international boundaries in managing forage species.

Response
The Department agrees that conservative quotas help maintain sustainable fisheries. However, the Commission Forage Policy was not analyzed in this document and the comment falls outside the scope of the DSED.

Comment 5
Just as important, we commend the DHAC and the Department for moving forward in a collaborative approach through a series of informal meetings with conservation organizations, toward conceptualizing an FMP for Pacific herring in California. An FMP will provide the Department substantive opportunity to undertake a deliberate treatment of management objectives and concerns commensurate with the importance of this

essential resource. The FMP process as envisioned will also provide a model for a streamlined, stakeholder driven FMP process that reduces the burden on Department resources, as well as a test case for implementing the concepts in the Commission's Forage Species policy. As articulated in the DSED and further expanded through informal discussions with the undersigned and DHAC, the FMP should address:

- A Harvest Control Rule that provides opportunities to adjust harvest rate depending on stock status and other indicators and incorporates Essential Fishery Information such as the condition of predators and alternative forage species;
- An approach for managing fishing in unassessed areas that is consistent with the Forage Species Policy and the Marine Life Management Act;
- A description of spawning habitat and a set of recommendations pertaining to agency responsibilities, opportunities and coordination in protecting spawning habitat, as per Section 97 of the Fish and Game Code;
- An overhaul of permitting structure and regulations that would increase efficiency in the set gillnet and the herring eggs on kelp (HEOK) fisheries; and
- A review of existing regulations on recreational herring fishing.

Response
The Department agrees that an FMP is an important fishery management tool and looks forward to working with stakeholders. However, this comment and identifying elements of an FMP falls outside the scope of the analysis contained in the DSED.

Comment 6
At the DHAC meeting on April 1, 2014, a subset of the undersigned made presentations about the status and anticipated benefits of a Pacific herring FMP. A summary of these presentations is attached to this letter as Appendix A. We appreciated the general support of the Marine Resource Committee of the California Fish and Game Commission (MRC), which put "Herring FMP" on its meeting agendas over the next three years, demonstrating enthusiasm and commitment to ensuring proactive and robust Commission engagement in completing an FMP. At the DHAC meeting, the Department and members of the DHAC informally identified a number of management issues that will be addressed in the anticipated FMP process. We look forward to sharing the ideas for the Pacific herring FMP process with the full Commission.

Response
This comment falls outside the scope of the analysis contained in the DSED.

Comment 7
Per the Commission's request at its August 2013, meeting, the Department is providing the Commission with a zero (0) ton option for the upcoming season for all areas outside San Francisco Bay whose populations have been neither fished nor assessed in recent years. In 2013, the undersigned organizations urged the Commission to adopt a zero (0) quota for unassessed areas based on a lack of information about the status of these stocks and lack of recent fishing activity.

Response
The Department accepts this comment.

Comment 8
Any fishing on these stocks would constitute expansion of a forage species fishery without stock information. (Stock assessments were last conducted in Tomales Bay, Humboldt Bay and Crescent City Harbor in 2007, 2005 and 2002, respectively.)

Response
The Department does not consider this an expansion of the California herring fishery since existing quotas have been in place for Tomales Bay, Humboldt Bay and Crescent City Harbor since 2006, 1982 and 1978, respectively. These fishery areas have been dormant for many years due poor market conditions resulting in no fishing effort. It should also be noted that permit systems and quotas for these areas pre-date the adoption of the 2012 Fish and Game Commission Forage Policy.

Comment 9
In 2013, the Commission unanimously agreed that a zero (0) ton option should have been made available to them for the 2013-2014 season in light of agreement among Commission members that allowing fishing in unassessed areas may not be precautionary. This option was unexpectedly unavailable to the Commission in August 2013, due to an administrative error. Therefore, we request the Commission set a quota of zero tons for each of these three unassessed areas.

Response
The Department acknowledges there was an administrative error during the 2013 rulemaking and has provided the zero ton quota option for Tomales Bay, Humboldt Bay and the Crescent City Area for the 2014 rulemaking.

Comment 10
For the 2014-2015 season, should a permittee express interest in fishing in these areas, we would like to adjust our position to accept *de minimus* [*sic*] commercial fishing activity, provided that such fishing takes place in a manner that gathers additional information for the Department to inform the assessment of stock in such regions. We are adjusting our position so that it is consistent with the Forage Policy's goal to "Prevent the development of new or expanded forage fisheries until Essential Fishery Information (EFI) is available and applied to ensure the sustainability of target forage species and protect its benefits as prey." In keeping with the Forage Policy, we would not oppose *de minimus* [*sic*] fishing by commercial herring fishery permittees in unassessed areas provided the following conditions are met:

1. Fishery-independent EFI (including EFI defined in the Forage Species policy) needed for ecosystem-based management is collected and analyzed by the Department.
2. The permittee desiring to fish in unassessed area(s) develops a collaborative research plan with the Department, designed to fill essential gaps in EFI.

3. The Department evaluates the fishery-independent EFI and the research plan and makes a determination as to whether to allow *de minimus* [*sic*] fishing.
4. Should the Department allow *de minimus* [*sic*] fishing, it provides the Commission with a recommendation for a quota in the relevant unassessed area(s) that is in keeping with sustainability.
5. In light of the increase in violations of fishery regulations in the San Francisco Bay fishery in the 2013-2014 season, the Department consults with DFW Enforcement to ensure compliance with existing regulations in the expanded area.

Response
This comment falls outside the scope of the analysis contained in the DSED. The Department did however contact existing permittees for Tomales Bay, Humboldt Bay and the Crescent City Area fisheries to gauge interest in fishing during the 2014-15 season. No permittee indicated they would be fishing for the coming season. If any permittee had planned to fish during the 2014-15 season the Department would have asked for a voluntary collaboration to collect basic fishery information during the herring spawning season in the respective fishing area.

Comment 11
Separate yet related, we ask the Department to remove a misleading statement from the DSED. Regarding unassessed stocks in Tomales Bay, Humboldt Bay, and Crescent City, the DSED notes "these populations are likely returning to unfished abundance, following one or two generations of not being subjected to any fishing pressure." (pg. 2-12) This statement lacks justification, particularly in light of notable examples from Washington and British Columbia where stocks have not recovered following cessation of fishing pressure.

Response
The Department acknowledges it does not have current biomass data for these fishing areas. However, these herring populations are ecologically linked through the California Current Large Marine Ecosystem. These populations have the same foraging opportunities and similar predator-prey relationships; herring in these areas are likely able to take advantage of the same improved ocean conditions that allowed the San Francisco Bay spawning population recovery over the past five years. In addition these populations have not been subjected to fishing pressure which is likely to further enhance spawning stock recovery as stated in the DSED. The Department did clarify the statement referenced in comment 11 in FSED.

Comment 12
We provide the following examples:

Cherry Point, Washington
This stock, located in northern Puget Sound was historically larger than all other state stocks combined. This stock has dramatically declined from 15,000 tons in the 1970s to less than 1,000 tons in 2010 and is classified by the State Department of Fish and Wildlife as in "Critical Condition." No harvest has been allowed on this stock since 1996.

British Columbia
There are four major and two minor stocks of herring in British Columbia. In the past decade, five of the six populations have experienced a marked decline, and at least three have dropped below the biomass limit reference point where no fishing is allowed. There have been no signs of recovery in these stocks despite annual fishing closures. State fisheries managers note that "it appears that ecosystem forcing, such as food supply, predation, or competition, rather than fishing, could be limiting the recovery of these populations." Additionally, herring populations throughout British Columbia have displayed a long-term decline in size-at-age, suggesting that food supply may also have been reduced over the past two decades.

Response
The Department accepts this comment and appreciates the herring literature references.

Comment 13
The DSED highlights as a project goal: "Safeguard herring as an important forage species for all living resources of marine and estuarine ecosystems that utilize herring as a food source," (pg 2-1) and notes that "due to the complexity of the ocean system and biological interactions, it is difficult to quantify all predator/prey relationships or to quantify all oceanic conditions and factors that affect herring recruitment and persistence in the spawning population." (pg 1-6) We agree these interactions are complex, yet substantial information exists that will help support the development of robust management prescriptions based on principles of Optimum Yield as defined by the Marine Life Management Act.

Response
The Department accepts this comment and agrees that new information regarding predator-prey relationships often becomes available. Since the 2010-11 season, in an effort to safeguard herring's important role a forage species, the Department has recommended conservative harvest quotas that allow 95% of the spawning stock to be available as forage.

Comment 14
In past comments on rulemaking documents, we have referred to some of these energetics analyses, and we include new additional citations below. We include these citations to highlight the foundational importance of Pacific herring as prey and as a placeholder for the FMP rather than an expectation they will be included in the FSED for the 2014-2015 commercial herring season.

- In an analysis of prevalence in the diet of 121 predators in the California Current Large Marine Ecosystem (CCLME), Pacific herring is the fifth most important prey item across all taxa and the second most important for seabirds.
- In a separate analysis of occurrence in the diet of 32 predators in the CCLME, Pacific herring is the fourth most important prey item.

Response
The Department accepts this comment and appreciates the herring literature references.

7.3. Copy of Written Comments Received

May 19, 2014

Mr. Tom Barnes
Program Manager, State Managed Marine Species
California Department of Fish and Wildlife
3883 Ruffin Road
San Diego, CA 92123

Mr. Sonke Mastrup
Executive Director, Fish and Game Commission
1416 9th St., Suite 1320
Sacramento, CA 95814

Mr. Mike Sutton
President, California Fish and Game Commission
1416 9th St., Suite 1320
Sacramento, CA 95814

Dear Mr. Barnes, Mr. Mastrup and President Sutton,

We the undersigned organizations thank you for the opportunity to comment on the 2014 Draft Supplemental Environmental Document (DSED) for commercial herring fishing in California. We understand this document supplements the Revised Final Environmental Document (FED) certified by the California Fish and Game Commission (Commission) in

August 1998, as well as the Supplemental Environmental Documents certified by the Commission between August 1999 and August 2013.

In summary, we support the unified recommendation of the California Department of Fish and Wildlife (Department) and the Director's Herring Advisory Committee (DHAC) regarding the San Francisco Bay commercial herring quota for 2014-2015, request the Commission adopt the zero quota option for all unassessed areas outside San Francisco Bay, and support the collaborative momentum toward an ecosystem-based fishery management plan process for Pacific herring.

Proposed Program and Path to a Fishery Management Plan for Pacific Herring

We commend the Department as well as representatives of the commercial fleet on the DHAC for proposing a program for the 2014-2015 San Francisco Bay Pacific herring season that is precautionary and serves the overall goal of "optimal management of the Pacific herring resource for its ecological value and human use."[i] The program takes into account new information gathered in 2013-2014 by the Department and members of the fleet engaged in collaborative research with the Department; namely, a reduction in estimated spawning biomass relative to last season, the continued lack of recovery in age structure, anomalous patterns of spawning behavior and distribution that may be attributable to drought conditions, and a reported increase in enforcement issues.[ii]

In light of these concerns, and in the absence of an explicit harvest control rule and other key management endpoints to be addressed through a Fishery Management Plan, we support the joint recommendation made by DHAC[iii] and the Department of a harvest option for herring in San Francisco Bay for commercial purposes of 2,500 tons or 4.1% of the 60,600 ton 2013-2014 spawning biomass estimate.

This conservative quota is also in keeping with the state's Forage Policy.[iv] This policy states that the Commission intends to provide adequate protection for forage species through management goals that:

- Are precautionary and utilize the best available science in management decisions using clear and transparent methods;
- Identify and progressively incorporate Essential Fishery Information (EFI) needed for ecosystem-based management of forage species, including physical factors, oceanographic conditions, the effects of fishing on forage species' dependent predators, the availability of alternative prey, spatio-temporal foraging hotspots for predators, and existing management, including marine protected areas;
- Prevent the development of new or expanded forage fisheries until EFI is available and applied to ensure the sustainability of target forage species and protection of its benefits as prey; and
- Facilitate consistency in the management of forage species, integrate with existing FMPs, and encourage cooperation and collaboration across jurisdictions and international boundaries in managing forage species.

Just as important, we commend the DHAC and the Department for moving forward in a collaborative approach through a series of informal meetings with conservation organizations, toward conceptualizing an FMP for Pacific herring in California. An FMP will provide the Department substantive opportunity to undertake a deliberate treatment of management objectives and concerns commensurate with the importance of this essential resource. The FMP process as envisioned will also provide a model for a streamlined, stakeholder driven FMP process that reduces the burden on Department resources, as well as a test case for implementing the concepts in the Commission's Forage Species policy. As articulated in the DSED and further expanded through informal discussions with the undersigned and DHAC, the FMP should address:

- A Harvest Control Rule that provides opportunities to adjust harvest rate depending on stock status and other indicators and incorporates Essential Fishery Information such as the condition of predators and alternative forage species;

- An approach for managing fishing in unassessed areas that is consistent with the Forage Species Policy and the Marine Life Management Act;

- A description of spawning habitat and a set of recommendations pertaining to agency responsibilities, opportunities and coordination in protecting spawning habitat, as per Section 97 of the Fish and Game Code;

- An overhaul of permitting structure and regulations that would increase efficiency in the set gillnet and the herring eggs on kelp (HEOK) fisheries; and

- A review of existing regulations on recreational herring fishing.

At the DHAC meeting on April 1, 2014, a subset of the undersigned made presentations about the status and anticipated benefits of a Pacific herring FMP. A summary of these presentations is attached to this letter as Appendix A. We appreciated the general support of the Marine Resource Committee of the California Fish and Game Commission (MRC), which put "Herring FMP" on its meeting agendas over the next three years, demonstrating enthusiasm and commitment to ensuring proactive and robust Commission engagement in completing an FMP. At the DHAC meeting, the Department and members of the DHAC informally identified a number of management issues that will be addressed in the anticipated FMP process. We look forward to sharing the ideas for the Pacific herring FMP process with the full Commission.

Treatment of Unassessed Areas (Tomales Bay, Humboldt Bay and Crescent City Harbor)
Per the Commission's request at its August 2013 meeting, the Department is providing the Commission with a zero (0) ton option for the upcoming season for all areas outside San Francisco Bay whose populations have been neither fished nor assessed in recent years. In 2013, the undersigned organizations urged the Commission to adopt a zero (0) quota for unassessed areas based on a lack of information about the status of these stocks and lack of recent fishing activity. Any fishing on these stocks would constitute expansion of a forage species fishery without stock information. (Stock assessments were last conducted in Tomales Bay, Humboldt Bay and Crescent City Harbor in 2007, 2005 and 2002, respectively.) In 2013, the Commission unanimously agreed that a zero (0) ton option should have been made

available to them for the 2013-2014 season in light of agreement among Commission members that allowing fishing in unassessed areas may not be precautionary. This option was unexpectedly unavailable to the Commission in August 2013 due to an administrative error. Therefore, we request the Commission set a quota of zero tons for each of these three unassessed areas.

For the 2014-2015 season, should a permittee express interest in fishing in these areas, we would like to adjust our position to accept *de minimus* commercial fishing activity, provided that such fishing takes place in a manner that gathers additional information for the Department to inform the assessment of stock in such regions. We are adjusting our position so that it is consistent with the Forage Policy's goal to "Prevent the development of new or expanded forage fisheries until Essential Fishery Information (EFI) is available and applied to ensure the sustainability of target forage species and protect its benefits as prey." In keeping with the Forage Policy, we would not oppose *de minimus* fishing by commercial herring fishery permittees in unassessed areas provided the following conditions are met:

1. Fishery-independent EFI (including EFI defined in the Forage Species policy) needed for ecosystem-based management is collected and analyzed by the Department.

2. The permittee desiring to fish in unassessed area(s) develops a collaborative research plan with the Department, designed to fill essential gaps in EFI.

3. The Department evaluates the fishery-independent EFI and the research plan and makes a determination as to whether to allow *de minimus* fishing.

4. Should the Department allow *de minimus* fishing, it provides the Commission with a recommendation for a quota in the relevant unassessed area(s) that is in keeping with sustainability.

5. In light of the increase in violations of fishery regulations in the San Francisco Bay fishery in the 2013-2014 season, the Department consults with DFW Enforcement to ensure compliance with existing regulations in the expanded area.

Separate yet related, we ask the Department to remove a misleading statement from the DSED. Regarding unassessed stocks in Tomales Bay, Humboldt Bay, and Crescent City, the DSED notes "these populations are likely returning to unfished abundance, following one or two generations of not being subjected to any fishing pressure." (pg. 2-12) This statement lacks justification, particularly in light of notable examples from Washington and British Columbia where stocks have not recovered following cessation of fishing pressure. We provide the following examples:

> *Cherry Point, Washington*[v]
> This stock, located in northern Puget Sound was historically larger than all other state stocks combined. This stock has dramatically declined from 15,000 tons in the 1970s to less than 1,000 tons in 2010 and is classified by the State Department of Fish and

Wildlife as in "Critical Condition." No harvest has been allowed on this stock since 1996.

British Columbia[vi]
There are four major and two minor stocks of herring in British Columbia. In the past decade, five of the six populations have experienced a marked decline, and at least three have dropped below the biomass limit reference point where no fishing is allowed. There have been no signs of recovery in these stocks despite annual fishing closures. State fisheries managers note that "it appears that ecosystem forcing, such as food supply, predation, or competition, rather than fishing, could be limiting the recovery of these populations." Additionally, herring populations throughout British Columbia have displayed a long-term decline in size-at-age, suggesting that food supply may also have been reduced over the past two decades.

The importance of herring as forage
The DSED highlights as a project goal: "Safeguard herring as an important forage species for all living resources of marine and estuarine ecosystems that utilize herring as a food source," (pg 2-1) and notes that "due to the complexity of the ocean system and biological interactions, it is difficult to quantify all predator/prey relationships or to quantify all oceanic conditions and factors that affect herring recruitment and persistence in the spawning population." (pg 1-6) We agree these interactions are complex, yet substantial information exists that will help support the development of robust management prescriptions based on principles of OptimumYield as defined by the Marine Life Management Act.

In past comments on rulemaking documents, we have referred to some of these energetics analyses, and we include new additional citations below. We include these citations to highlight the foundational importance of Pacific herring as prey and as a placeholder for the FMP rather than an expectation they will be included in the FSED for the 2014-2015 commercial herring season.

- In an analysis of prevalence in the diet of 121 predators in the California Current Large Marine Ecosystem (CCLME), Pacific herring is the fifth most important prey item across all taxa and the second most important for seabirds. [vii]

- In a separate analysis of occurrence in the diet of 32 predators in the CCLME, Pacific herring is the fourth most important prey item.[viii]

We look forward to continued productive partnership with the Department, Industry, and Commission to ensure a vibrant Pacific herring resource to support California's wildlife and sustainable fisheries. Please include this letter in the administrative record of proceedings for the management of the California commercial herring fishery. Thank you for the opportunity to comment.

Sincerely,

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[ii] Director's Herring Advisory Committee Annual Meeting. Sausalito, CA. April 1, 2014.

[iii] Ibid.

[iv] California Fish and Game Commission. 2013. Fisheries Policies. http://www.fgc.ca.gov/policy/p2fish.aspx#FORAGE

[v] Washington State Pacific Herring Information Summary Washington Department of Fish and Wildlife. http://wdfw.wa.gov/conservation/fisheries/PacificHerringInformation_121911.pdf

[vi] Schweigert J. et al. 2010. A review of factors limiting recovery of Pacific herring stocks in Canada. . International Council for the Exploration of the Sea. Oxford Journals.

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APPENDIX A

S.1 Summary of Changes

This appendix provides a summary of the changes made to the Draft Supplemental Environmental Document (DSED) based on updated information on age data for San Franscisco Bay, and minor grammatical changes for clarity.

General changes throughout the document

- References to the DSED were changed to Final Supplemental Environmental Document (FSED), where applicable.
- Misspellings, grammatical errors, and errors in graphs labeling were corrected.

Table of Contents

- The Table of Contents was updated to match any page numbers that changed during the process of finalizing the FSED document.
- Chapter 7 Responses to Comments Regarding the Proposed Project was added.
- Appendix A and A.1 Summary of Changes was added.

Summary

- The following text was changed in S.1 Introduction, paragraph 2 to show the number of chapters in the FSED: The FSED includes seven chapters.
- The following text was added to S.1 Introduction, paragraph 2: Chapter 7 responds to public comments regarding the proposed project.

Chapter 1. Introduction

- The following text was added to the end of paragraph 1: The Department as part of the scoping process also contacted herring permit holders in Tomales Bay, Humboldt Bay and Crescent City Harbor to notify them that the Commission would be considering a zero ton quota for the 2014-15 season for those fishing areas.

Chapter 2. Project Description

- Minor editorial changes were made to improve clarity.
- The following paragraph was inserted into Section 2.3.1.2 Tomales Bay, Humboldt Bay, and Crescent City Area 2013-14 Quotas: Though the Department does not have current biomass data for these fishing areas, herring populations are ecologically linked through the California Current Large Marine Ecosystem. These populations have the same foraging opportunities and similar predator-prey relationships. Herring in these areas are likely able to take advantage of the same improved ocean conditions that allowed the San Francisco Bay spawning population recovery over the past five years. In addition these populations have not been subjected to fishing pressure which is likely to further enhance spawning stock recovery.
- The following sentence was removed from Section 2.3.1.2 Tomales Bay, Humboldt Bay, and Crescent City Area 2013-14 Quotas, paragraph 2: As a

result, these spawning populations are likely returning to unfished abundance, following one to two generations not being subjected to any fishing pressure.

Chapter 3. Environmental Setting

- Minor editorial changes were made to improve clarity.
- The following sentences were revised to reflect completed age analysis in Section 3.3 Status of the San Francisco Spawning Population, paragraph 1: Age 1 fish made up a substantial portion of the spawning biomass (Figure 3.1) and age 4- and 5-year old herring continued to persist in the population. The high numbers of returning 4- and 5-year old herring, as well as improved physical condition, is likely due to more favorable biological and environmental conditions in oceanic ecosystems.
- The preliminary age data found in Figure 3.1 of the DSED was updated using final age data.
- Table 3.1 was re-designed to enlarge text size and make organization clearer.
- The following sentence in Section 3.3 Status of the San Francisco Spawning Population, paragraph 6 was revised to reflect completed age analysis: Age composition for the 2013-14 season shows a balanced age class distribution (Figures 3.1 and 3.3). However, the proportion of age six and older herring was below average.
- The preliminary age data found in Figure 3.3 of the DSED was updated using final age data.
- The preliminary age data found in Figure 3.4 of the DSED was updated using final age data.
- The following sentence in Section 3.3 Status of the San Francisco Spawning Population, paragraph 8 was revised to reflect completed age composition analysis: Age composition analysis indicated the continued above average spawning biomass was due to unusually high recruitment of 1-year old herring to the spawning population and the continued presence of high numbers of 4- and 5-years olds.
- The following note was added to the end of the first sentence of paragraph 2, Section 3.3.1 San Francisco Bay Herring Young of the Year (YOY): 1-2 year data lag for analysis.
- The following sentences were added to the end of paragraph 2, Section 3.3.1 San Francisco Bay Herring Young of the Year (YOY): As a result YOY indices have not proven to be a reliable indicator of recruitment. It is however a good indicator of relative spawning success in a given year.

Chapter 6. Consultation

- The following sentence was added to paragraph 4: The Department also contacted herring permit holders in Tomales Bay, Humboldt Bay and Crescent City Harbor to notify them that the Commission would be considering a zero ton quota for 2014-15 season in those areas and collect permit holder input.

Chapter 7. Response to Comments

- This chapter was added to the FSED.

- Comments and responses have been included.

Appendix A

- This section was added to the FSED