

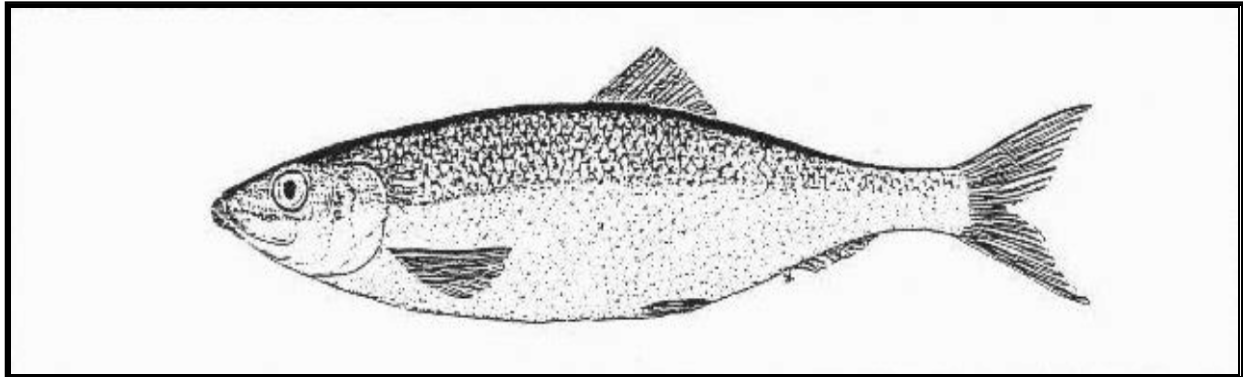
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Final

SUPPLEMENTAL ENVIRONMENTAL DOCUMENT

**PACIFIC HERRING
COMMERCIAL FISHING REGULATIONS**

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



**2013
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 2013-14 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 and 2011. 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 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. 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. The proposed project takes the form of recommendations for continuation, amendment, or change to an existing body of regulations in effect since November 2, 2012 (Sections 163, and 164, Title 14, CCR). 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 regulatory changes will establish season quotas and dates for fishing operations in San Francisco Bay and Tomales Bay for the 2013-14 herring fishing season. The Department of Fish and Wildlife (Department) also recommends clarifying and streamlining regulations pertaining to the take of herring for both the sac-rope and fresh fish market in San Francisco and Tomales Bay.

The specific regulatory changes proposed for the 2013-14 season will: (1) provide the Commission a quota option range between zero (0) to 10 percent of the most recent San Francisco Bay, 2012-2013, spawning biomass estimate; (2) set the dates of the herring fisheries in San Francisco Bay to open on January 1 at 5:00pm and close on March 15 at noon. 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 fisheries falls on a Saturday or Sunday, fishing shall close on the Friday immediately preceding March 15 at noon; (3) amend and streamline regulations to allow the take of herring for commercial purposes for both sac-rope and fresh fish market fisheries under one quota and one season. All fish landed during the herring season could be sold for sac-rope or fresh fish purposes; (4) amend regulations for the Tomales Bay fisheries quota to not exceed 350 tons per season; (5) simplify regulations so that the total amount of herring eggs on kelp that may be harvested by each permittee shall be based on the previous season's spawning biomass estimate for Pacific herring in San Francisco Bay; and (6) set the dates of the herring fisheries in Tomales Bay from noon on December 26, until noon on February 22.

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 roe herring fishery. Refer to Section 2.4, Project Alternatives, and Chapter 5 of this FSED, 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 and Tomales Bay. 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, Crescent City Harbor, and Humboldt Bay; 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

The alternatives proposed in this FSED are the same as those described in the FED. A thorough analysis of the impacts of these alternatives is provided in Chapter 6 of the FED. 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. Although this alternative does provide for an adjustment of quotas and season dates, it 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 2012 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 roe 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 ongoing 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, and the 2011 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 2013-14 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; and (13) the FSED certified by the Commission in September 2011. 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, and 2011 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, and 2011-12 herring commercial fishing seasons, respectively. Environmental documents (DSED and

FSED) were not prepared for the 2003-04 or 2012-13 seasons. This FSED supplements the existing certified environmental documents and provides revisions to the regulations for the 2013-14 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 January 25, 2013. Following the release of the NOP, the 30-day public comment period pursuant to CEQA for the DSED ended February 24, 2013. Pursuant to CEQA regulations, a 45-day public comment period for reviewing the DSED occurred from May 6, 2013, to June 20, 2013.

This is the thirteenth 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; and the twelfth was certified by the Commission in September 2011. 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 January 25, 2013. The Department hosted a Town Hall Meeting on February 13, 2013, 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 4, 2013, in Santa Rosa, County of Sonoma. 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.

During the scoping process, several issues were 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 and San Francisco populations, the cost of managing the fishery, simplifying existing 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 Pacific 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. Preliminary modeling results are expected to be available during the summer of 2013 and the Department plans to subject the model to an independent peer review prior to using it for management decisions.

Regarding herring as forage, due to the complexity of the ocean system and biological interactions, insufficient information is currently available to quantify all predator/prey relationships or to quantify all oceanic conditions and factors that affect

herring survival. As a result the Department manages for herring's importance as a forage species by recommending conservative harvest. Since 2010, the Department has recommended harvest targets for Pacific herring at five percent of the most current spawning biomass estimate or below as a conservation safeguard. This precautionary management approach allows more than 95 percent of the spawning stock (which represents only a portion of the total stock that leaves oceanic waters to spawn during a given season) to remain 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:

www.dfg.ca.gov/marine/herring/ceqa.asp.

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 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 have been scheduled for the 2013-14 season on May 22-23, 2013, in Los Angeles, California, and on August 7-8, 2013, in San Luis Obispo, 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 2013-14 commercial herring fishing season. The proposed project would establish the season quotas and dates for fishing operations in San Francisco Bay and Tomales Bay. The Department of Fish and Wildlife (Department) also recommends clarifying and streamlining regulations pertaining to the take of herring for both the sac-roe and fresh fish market in San Francisco and Tomales Bay. Quota recommendations for San Francisco Bay are primarily based on the most recent assessments by the Department of the size of the spawning population of herring in San Francisco Bay. The recommendation also takes into account additional data collected each season, including ocean and bay conditions, growth rates of herring, strength of individual year-classes, and predicted size of incoming year-classes (*i.e.*, recruitment).

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, and proposed seasons, 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.

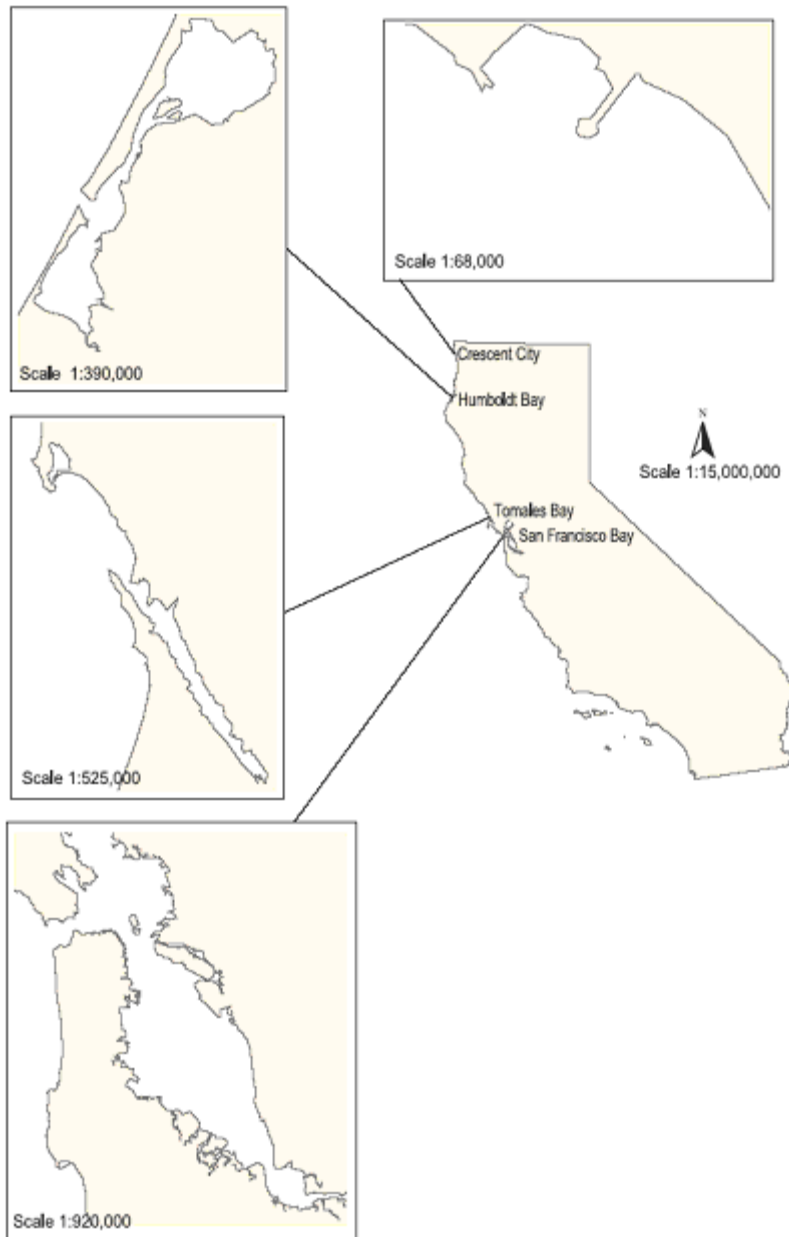


Figure 2.1. Locations of commercial herring fisheries.

2.2.1. San Francisco Bay

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

2.2.1.1. Herring Fishery (Sac-roe and Fresh fish)

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 be set from zero to 10 percent of the most current biomass estimate for San Francisco Bay. For the 2013-14 season the Department recommends a conservative harvest option of 3,737 tons or 4.7 percent of the 79,500 ton 2012-13 spawning biomass estimate. 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 overall quota for the herring 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 regulations for Tomales Bay are as follows:

2.2.2.1. Herring Fishery (Fresh Fish and Sac-roë)

Season: Noon on Sunday, December 26 until noon Friday, February 22. Weekend fishing is allowed contingent on funds made available to the Department to cover biological staff time.

Quota: The total take of herring for roe purposes shall not exceed 350 tons for the season.

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. 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.

2.2.3.1. 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 and Tomales Bay fisheries. No modifications are proposed for Crescent City Harbor area or Humboldt Bay. 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 2013-14 season included: (1) provide the Commission a quota option range between zero (0) to 10 percent of the most recent San Francisco Bay spawning biomass estimate; (2) set the dates of the herring fisheries in San Francisco Bay to open on January 1 at 5:00pm and close on March 15 at noon. 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 fisheries falls on a Saturday or Sunday, fishing shall close on the Friday immediately preceding March 15 at noon; (3) amend and streamline regulations to allow the take of herring for commercial purposes for both sac-roe and fresh fish market fisheries under one quota and one season. All fish landed during the herring season could be sold for sac-roe or fresh fish purposes; (4) amend regulations for the Tomales Bay fisheries quota to not exceed 350 tons per season; (5) simplify regulations so that the total amount of herring eggs on kelp that may be harvested by each permittee shall be based on the previous season's spawning biomass estimate for Pacific herring in San Francisco Bay; and (6) set the dates of the herring fisheries in Tomales Bay from noon on December 26, until noon on February 22.

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 in 2006-07. 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 have been used to estimate spawning biomass in San Francisco, Tomales, and Humboldt bays. 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).

Beginning with the 1973-74 herring season the Department began estimating spawning biomass 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 2003 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 2012-13 seasons are shown in Figure 2.2. Currently, the Department does not conduct spawning biomass surveys in Tomales Bay, Humboldt Bay, or the Crescent City Harbor area. This a result of state-wide reduced fishing effort as well as reduced staffing and budget constraints. It should 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. Should fishing effort or staffing levels increase, the Department will reevaluate the management needs of those fisheries.

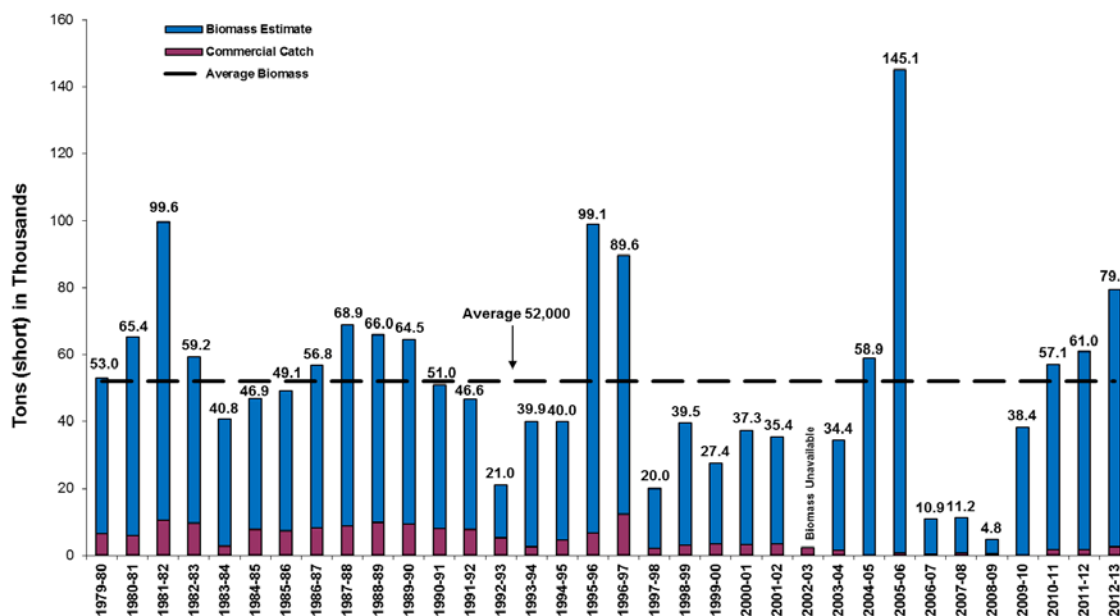


Figure 2.2 San Francisco Bay Pacific herring biomass estimates and commercial catch.

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 targets. 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. Based on this assessment, the Department has recommended even lower exploitation rates to the Commission to further safeguard the spawning stock. Since the 2010-2011 season, the Department has recommended quotas less than or equal to five percent of the previous season's estimated spawning biomass. Actual harvest rates by the commercial fishery have equaled less than four percent of the total spawning biomass since the 2003-04 season and have equaled 10 percent or less 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 oceanic 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 in recent years have been set at or below 10 percent. Since the 2003-04 season, harvest targets 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 4,800 tons. The Commission adopted this recommendation and no commercial fishery was held in San Francisco Bay for the 2009-10 season. Since

the fishery reopened during the 2010-11 season, the Department has recommended harvest rates at 5 percent or less of the spawning biomass. Based on accepted fishery management principles these harvest rates 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 spawning biomass estimate for the 2012-13 season was 79,500 tons, which exceeded the historical average (1979-80 season to present) of 52,000 tons. This was the fourth consecutive year of increasing biomass following the record low in the 2008-09 season of 4,800 tons (Figure 2.2). The Department is providing the Commission the option to consider a quota range of zero to 10 percent of the 2012-13 spawning biomass estimate of 79,500 tons. Due to the recovering status of the herring population, the Department recommends a conservative 4.7 percent harvest option for the 2013-14 season. The Department's recommendation will help reduce fishing mortality, which will be critical for continued stock recovery. This approach will also help maintain a sustainable fishery while continuing to ensure herring's integral role in both ocean and bay ecosystems.

Age composition data indicate that the increase in spawning biomass was due to a strong recruitment of 3-year old herring to the spawning population. Age 4- and 5-year old herring continued to persist in the population. The increasing proportion of older age classes over the last two seasons, i.e. 4- and 5-year old herring (Figure 3.1) indicate a recovering herring stock. The persistence of age four and older herring to the spawning population are 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 targets as the primary means of assuring a sustainable fishery. As the stock recovers, the Department considers that a limited 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 2012-2013 season there were 184 roe herring permit renewals and only 33 vessels elected to participate.

Within the overall quota for San Francisco Bay, separate allocations are established for each gill net platoon (i.e., Odd and Even fishing groups). The overall quota is divided among the platoons in proportion to the number of permits assigned to each platoon. Adjustments to allocations 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 Harbor 2013-14 Quotas

The quotas for Tomales Bay, Humboldt Bay and Crescent City Harbor area are currently set at 350 tons, 60 tons, and 30 tons, respectively. It should also be noted that no commercial fishing activity has taken place in Tomales Bay since 2007, in Humboldt Bay since 2005 and in Crescent City Harbor since 2002. For the 2012-2013 season,

Tomales Bay had 10 permit renewals and Humboldt Bay and Crescent City Harbor had four renewals.

2.3.1.3. Season Dates

Historically, season opening and closing dates for San Francisco and Tomales Bays were adjusted each year to account for annual changes in the calendar. The proposed regulations avoid year-to-year changes by setting the start date for the gill-net herring fishery in San Francisco Bay at 5:00pm on January 1 until noon on March 15, with the stipulations that if January 1 falls on a Friday or Saturday, fishing shall commence on the first Sunday following that date at 5:00pm, and that 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. This applies to all gill net platoons: "DH", Odd and Even (Note: Herring fishing is not permitted from noon on Friday through 5:00 p.m. on Sunday (Section 163 (h)(5), Title 14, CCR). The Tomales Bay gill-net fishery season would be set from Noon on December 26 until noon February 22.

2.3.2. Herring Market (Fresh Fish and Sac-roë) for San Francisco and Tomales Bays

The Department is recommending a change to clarify and streamline existing regulations pertaining to the take of herring for both the sac-roë and fresh fish market in San Francisco and Tomales Bays. The Department recommends removing regulations in Section 163, Title 14 pertaining to the take of herring for the fresh fish fishery. References to "sac-roë" would also be removed and simply state "herring". Amended regulations would allow the take of herring for commercial purposes for both market fisheries under one quota during the herring season (January 1 through March 15). All other regulations related to the permitting and buying of herring would still be in effect and enforceable.

2.4. Project Alternatives

Three alternatives to the proposed project are considered. These alternatives were examined and detailed in the FED, 1998, and re-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 be modified only by adjusting quotas to reflect current biomass estimates and by adjusting dates to reflect changes in the calendar.
- Alternative 3 (individual vessel quota for gill net vessels in herring roe 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 only amendment or change suggested relates to adjusting quotas to reflect current biomass estimates and adjusting dates to reflect annual changes in the calendar.

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. An individual permit quota has been suggested each season for the past several years. However, there has never been a clear consensus of support or opposition 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, Outram and Humphreys 1974). 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).

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 (Haeghele 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 roe herring gill net fisheries catch herring as they move into the shallows to spawn when the eggs are ripest. 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 occur in the Crescent City Harbor area, Humboldt Bay, Tomales Bay, and San Francisco Bay. Small fisheries for fresh fish markets are also permitted during spawning season in Tomales and San Francisco Bays.

The San Francisco Bay herring eggs-on-kelp 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.

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.

The roe 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 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. 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 2012-13 season is 79,500 tons, which exceeds the historical average (1979-80 season to present) of 52,000 tons. This is the fourth year of significant increase since the 2008-09 season record low estimate of 4,800 tons (Figure 2.2). Age composition data indicates that the increase in spawning biomass was due to a strong recruitment of 3-year old herring to the spawning population and continued persistence of 4- and 5-year old herring in the population (Figure 3.1). The increase in recruitment, returning 4- and 5-year old herring, as well as improved physical condition, is likely due to more favorable biological and environmental conditions, both in estuarine and oceanic ecosystems.

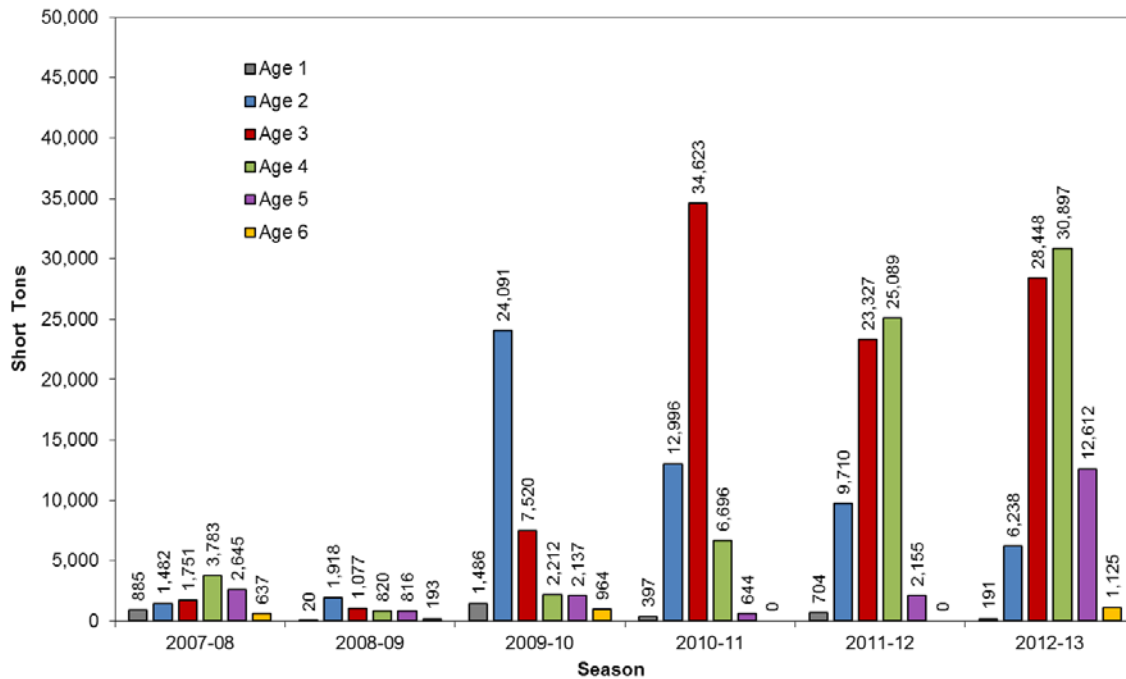


Figure 3.1 San Francisco Bay spawning biomass by age class for the 2007-08 to 2012-13 seasons.

Oceanic conditions are known to affect production of various fisheries including herring. El Niño Southern Oscillation (ENSO), Upwelling Index (UI), and Pacific Decadal Oscillation (PDO) indices can be used as predictors of favorable environmental conditions for herring. When indices show weak El Niño or La Niña conditions, cool sea surface temperatures and offshore winds often prevail, resulting in strong coastal upwelling events affecting plankton production. The cool, nutrient laden waters result in increased availability of plankton, fueling the marine food web of which herring are an integral part. Strong La Niña conditions in 2011-2012 began transitioning into ENSO-neutral/weak El Niño conditions during December of 2012. Additionally, the low PDO index values that persisted from the end of 2007 through 2012 began increasing by the end of 2012. UI was above average during upwelling season (May-Oct.) in northern California during 2012: however warm sea-surface temperatures (SST) were measured on the continental shelf in July. Together, these indices suggest ENSO-neutral conditions in the Northern hemisphere during winter of 2012-13 that will likely persist through spring of 2013 which should continue to provide favorable environmental conditions for herring.

As reported in the April 2013 California Department of Water Resources Hydrographic Executive Summary, California and the two main river systems that feed San Francisco Bay received below average precipitation for the 2013 water year. Seasonal averages for the Sacramento and San Joaquin rivers totaled 52 percent and 69 percent respectively. Typically, winter storms supply freshwater to San Francisco Bay, creating lowered bay salinity and ideal spawning conditions for herring. Optimal salinities range from 13-19 parts-per-thousand (ppt) though herring eggs can tolerate salinities of 3-33 ppt. The reduced rainfall, however, did not appear to affect historical spawning locations or frequency, with above average biomass reported.

Twelve spawning events were recorded during the 2012-13 season, primarily within the central and northern areas of San Francisco Bay. Spawning events occurred from as far north as Point San Pablo and south to Coyote Point. The first recorded spawn of the season occurred December 3-5, 2012, and the last recorded spawn occurred on March 10-11, 2013 (Table 3.1). There were several protracted spawning events in the North Bay and intermittent smaller spawning events occurring in the southern areas of the bay (Figure 3.2). The spawning biomass for the season was temporally and spatially well distributed this season. This type of distribution helps prevent over exploitation of a single spawning wave and is an important consideration when making management decisions for the herring fishery.

San Francisco Bay Pacific Herring Biomass Estimate for the 2012-13 Season (weights in short tons)								
#	Spawn/Catch Date	Location	Submerged Veg	Shoreline	Spawn Total	Gill-Net	HEOK	Fresh Fish Biomass Total
1	December 3-5, 2012	Coyote Point		7	7			7
2	December 16-17, 2012	Richardson Bay	271		271			271
3	December 26-30, 2012	Richardson Bay	6,228		6,228		2.7	6,230
4	December 27-31, 2012	Coyote Point		262	262	0.5		263
5	January 7-11, 2013	San Francisco WF		11,282	11,282	958.5	57.6	12,298
6	January 11-14, 2013	Richardson Bay - Sausalito WF	34,533	4	34,536	9.9		34,546
7	January 24-30, 2013	Richardson Bay	1,831		1,831	372.7	78.6	2,282
8	February 1-6, 2013	Richardson Bay	14,372		14,372	318.9		14,691
9	February 7-8, 2013	Paradise - Keil Cove	141	923	1,064	668.5	37.5	1,770
10	February 8-13, 2013	Point Richmond	1,889	757	2,646			2,646
11	February 16-19, 2013	Point San Pablo	515	28	544			544
12	March 10-11, 2013	Richardson Bay	3,958		3,958	2.8		3,961
n	spawn events = 12	Totals in Tons	63,738	13,263	77,002	2332	176	79,510

Table 3.1 2012-13 San Francisco Bay Pacific herring spawning biomass estimate by event with commercial catch totals.

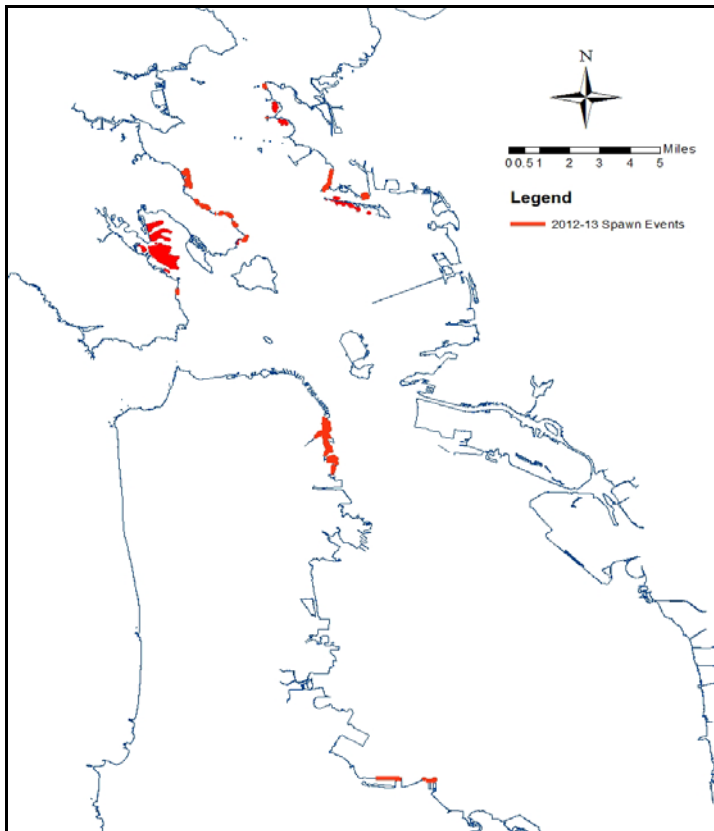


Figure 3.2 San Francisco Bay herring spawn event map 2012-13 season.

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. Age is determined from a surface reading of the otoliths (ear bones) of herring. Data are sorted into age classes or groups of fish the same age for analysis. The age class structure helps assess the cohorts (year classes) of herring born in a given season which compose the spawning population.

Age composition for the 2012-13 season, based on herring otolith analysis, shows continued rebuilding of the spawning stock through a strong recruitment of 3-year old herring (2009-10 year class) (Figures 3.1 and 3.3) and the return of large numbers of 4- and 5-year old herring in the spawning population. However, during the last several seasons, the herring population structure has experienced a truncation of

age classes which continued during the 2012-13 season. The numbers and proportion of age six and older herring remain below historical averages and is of concern because these older fish formerly supported the commercial fishery (Figure 3.4). Reduced numbers of these older age classes places additional burden on abundant 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 target for the commercial herring fishery.

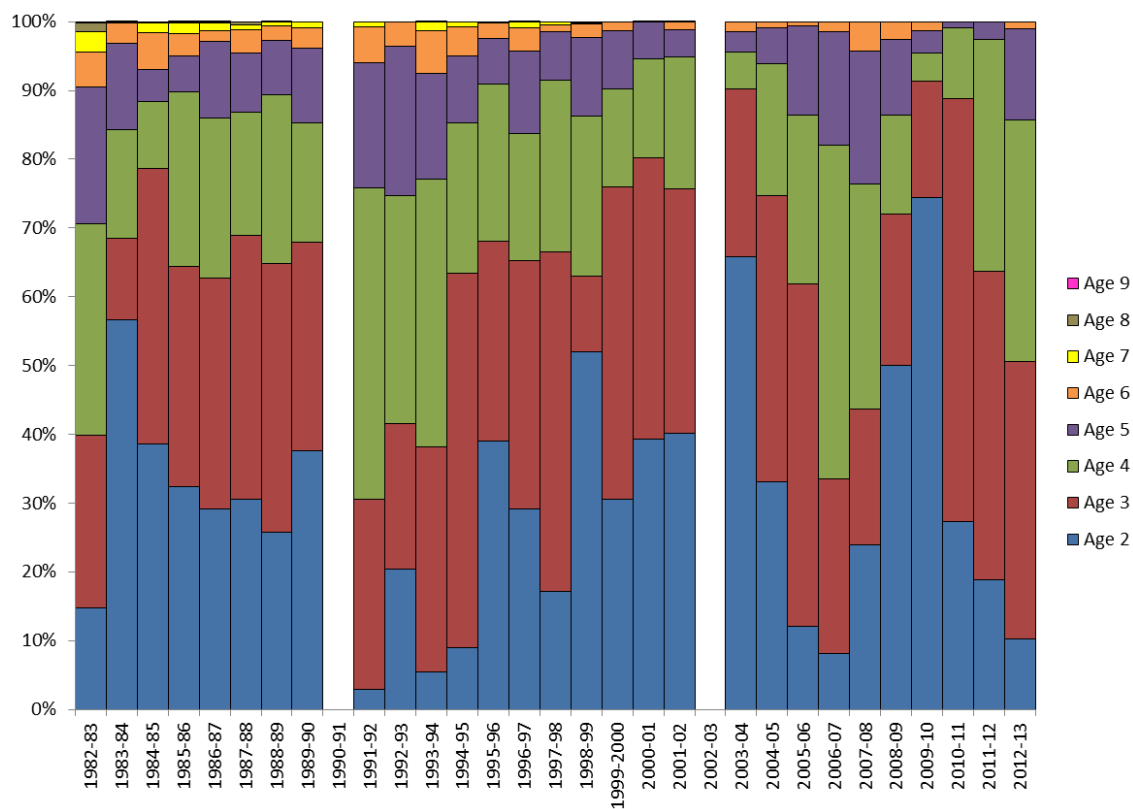


Figure 3.3 Age composition of the research catch (excluding age-1 fish) by number of ripe fish for the San Francisco Bay herring spawning biomass.

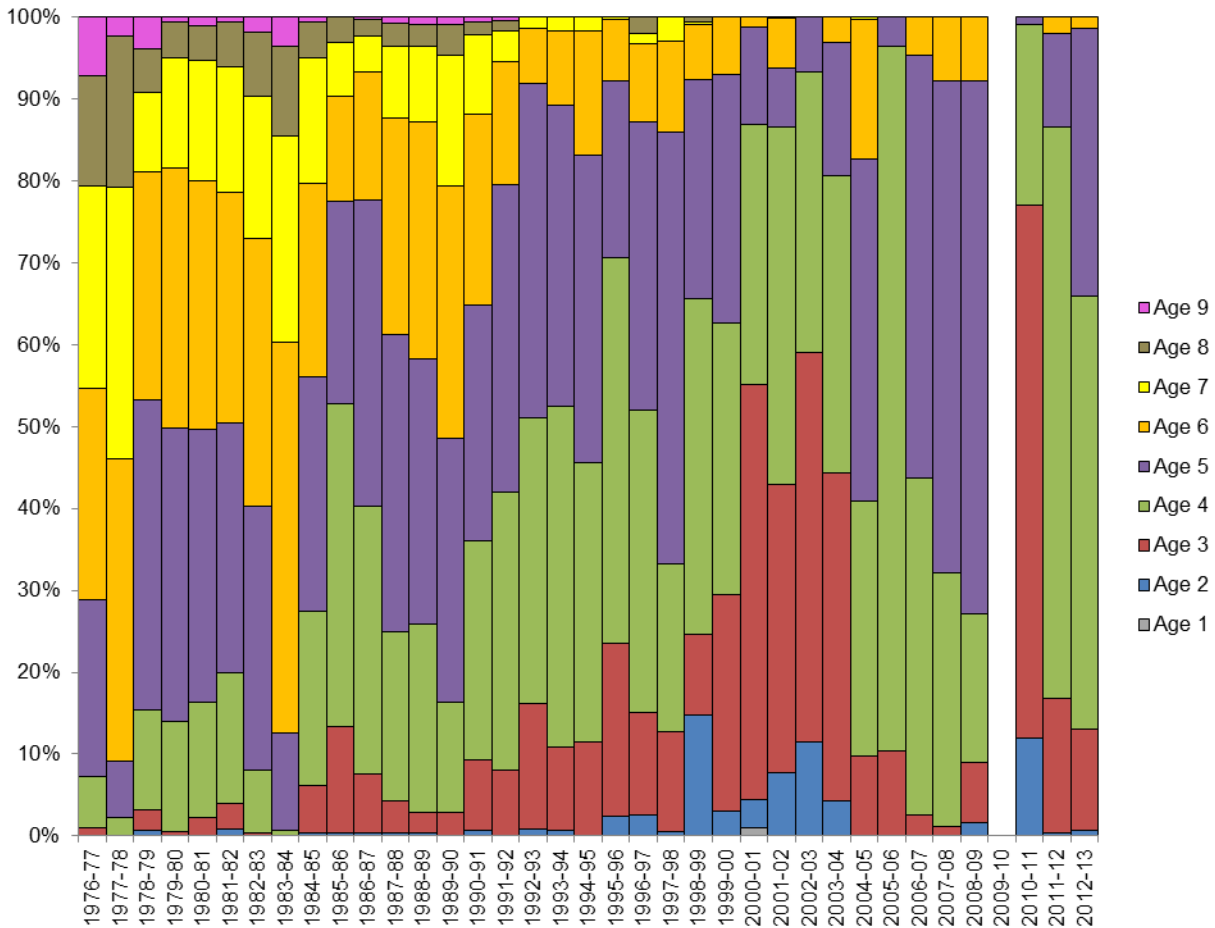


Figure 3.4 Age composition of the commercial gillnet catch by number of fish for the San Francisco Bay herring fishery. There was a zero ton quota and therefore, no commercial catch during the 2009-10 season.

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 declined for mature herring when compared to last season but remained above the historic average (Figure 3.5). Both female and male herring returned in a less robust condition than in the 2011-12 spawning season, which indicates that slower growth occurred during the oceanic post-spawn period.

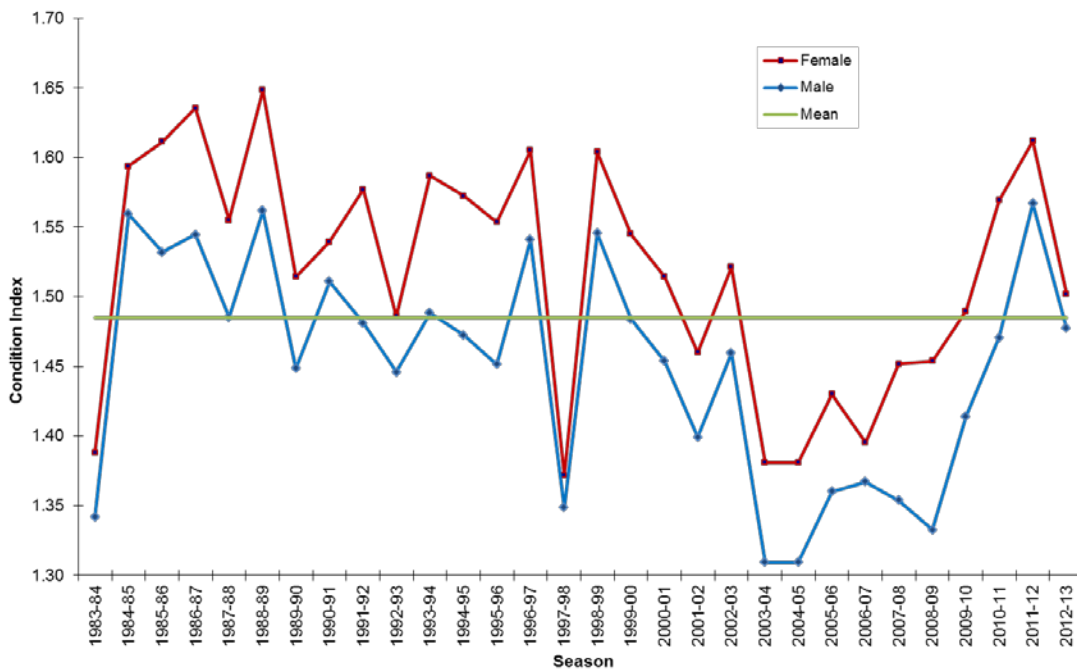


Figure 3.5 Average Condition Index (CI) and historical mean CI for ripe male and female fish in the commercial gillnet catch of the San Francisco Bay herring fishery.

In summary, the spawning biomass estimate for the 2012-13 season was 79,500 tons, 27,500 tons above the historical average (1979-80 season to present) of 52,000 tons. This was the fourth consecutive year of increased biomass following the record low during the 2008-09 season of 4,800 tons. 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 respectively. Age composition analysis indicated the increase in spawning biomass was due to strong recruitment of 3-year old herring to the spawning population and the continued presence of high numbers of 4- and 5-years olds. Early 2013 reports of the ENSO, UI, 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 over previous seasons with below average rainfall 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 targets 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 2012-13 commercial season (Figure 3.4).

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). The abundance of YOY indicated less favorable environmental conditions for survival within San Francisco Bay (Hieb et al, in press). YOY indices have not however, shown to be a good predictor of recruitment success. Recruitment to the spawning stock is affected by a number of factors during the first two to three years of life, including predation, food availability, competition, and environmental conditions.

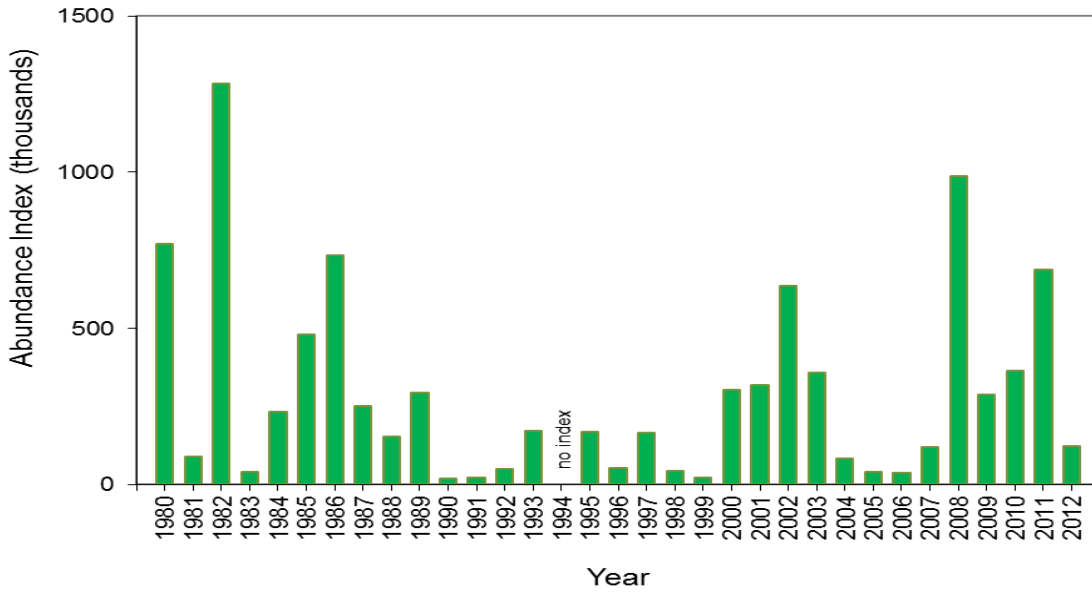


Figure 3.6 San Francisco Bay herring young-of-the-year abundance indices 1980-2011. No index was calculated for 1994.

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. 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 referenced in 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. As a key forage species, low biomass levels of herring could impact important recreational and commercial species as well as threatened and endangered fish, marine mammals, and sea birds that rely upon them as a food source. Changes in abundance and age structure of a forage species such as herring and 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. Additionally, variability in large-scale oceanic conditions such as coastal upwelling and the El Nino

Southern Oscillation cycle can affect both the timing of spawn events and recruitment success.

Herring are a crucial part of the San Francisco Bay food web. At each life history stage from egg to adult, herring are utilized as forage within San Francisco Bay. Spawning herring are an important food source for marine mammals and birds residing within the bay during the winter, when many other fish leave the bay. Herring eggs are consumed by at least 20 species of birds (including several species of ducks and gulls) in addition to non-avian predators such as sturgeon, surfperch, smelt and crab. Invertebrates, surfperch and young salmonids have all been documented as predators of herring larvae. As a food source, juvenile herring support a wide range of San Francisco Bay species, from spring through fall. In offshore waters, adult herring are consumed by Pacific whiting, salmon (Chinook and coho), sharks, sablefish, striped bass, steelhead, Pacific cod, rockfish, and walleye pollock. Herring are also consumed by a variety of birds, including cormorants, brown pelicans, gulls and western grebes, and marine mammals including harbor seals, northern fur seals, California and Stellar sea lions, porpoises, dolphins, and other whales.

Because herring play an important role as a forage species in ocean and bay ecosystems, it is vital that management concepts take into account these complex interactions. Herring occupy a crucial intermediate trophic level, between plankton and larger predators, which is usually comprised of only a few species (typically small pelagic fish). Changes in abundance of a forage species such as herring can lead to changes in the abundances of other species. Given the rebuilding status of the San Francisco Bay stock, the importance of conserving herring is vital to ensuring the long-term sustainability of the fishery while safeguarding its importance as a forage species in a functioning ecosystem.

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 Harbor 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 stock assessments 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.

5.1. 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 crops 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.

5.2. Alternative 2 (existing regulations)

Existing regulations, adopted in 2011, were for the 2011-12 herring commercial fishing season. These regulations reflect the amendments as adopted by the Commission in September 2011. Under Alternative 2, changes would be made to revise the herring fishing seasons by location or adjust quotas to reflect the 2012-13 biomass estimate determined by the Department. In most regards, the environmental impacts of Alternative 2 will be similar to those of the proposed project. Alternative 2, however, does not address problems or conditions that are addressed by the proposed project.

5.3. Alternative 3 (individual vessel quota)

This alternative modifies Alternative 2 by establishing individual boat quotas for the roe 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, overall quotas have typically been met 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, is 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 2013 Draft Supplemental Environmental Document (DSED), the Department initiated a broader consultation by distributing a Notice of Preparation (NOP) that announced the intent to prepare the DSED dated January 25, 2013. 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 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 13, 2013, 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 2013-14 season to the Director's Herring Advisory Committee (DHAC), as well as interested organizations and individuals on April 4, 2013, in Santa Rosa, County of Sonoma.

Proposed changes to the regulations for the 2013-14 season were modified, as necessary, based on comments from the public, other interested parties and DHAC.

These recommendations were presented to the California Fish and Game Commission at their May 22, 2013, 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 5:00 p.m. on June 20, 2013 to the Fish and Game 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 six conservation organizations in a letter dated June 20, 2013.

7.2. Department Responses to Comments

Anna Weinstein, Audubon California Seabird Program Manager, on behalf of Audubon California, Oceana, Earthjustice, Ocean Conservancy, Natural Resources Defense Council and Pew Charitable Trusts, letter received by Commission June 20, 2013.

Comment 1

Weinstein et al, commend the Department of Fish and Wildlife for making substantial progress toward improved stewardship of Pacific herring by proposing a program for the 2013-2014 season which reflects the Commission and Department's intent of prioritizing herring management reform in 2013 and 2014. They continue by summarizing the recently adopted goals of the Commission's Forage Policy.

Response

Comment noted.

Comment 2

Weinstein et al, recommend developing a harvest control rule for Pacific herring that explicitly incorporates Essential Fishery Information including the physical factors, oceanographic conditions, the effects of fishing on dependent predators, the availability

of alternative prey, spatiotemporal foraging hotspots, estimated unfished biomass, and other management.

Response

The Department is currently working with the Centre for Environment, Fisheries and Aquaculture Science (Cefas) to develop a population model for Pacific herring. This model will help address many of the questions posed by the conservation community regarding biological reference points and harvest control rules, as well as providing a valuable tool for managing this important fishery. Preliminary modeling results are expected to be available during the late summer or early fall of 2013.

Comment 3

Weinstein et al, request that the Department establish clear, quantitative recovery and sustainability benchmarks for age structure, biomass and geographic extent of spawning.

Response

See response to comment 2.

Comment 4

Weinstein et al, state the Department needs to summarize known effects of alternative mesh sizes and gear configurations, for consideration of regulations to better accommodate participants in the fresh fish fishery, and to assess the possibility that such management changes may help address class truncation in the San Francisco Bay stock and recover the population to specified target levels.

Response

Alternate gear types and mesh size have been analyzed or summarized in several documents since the start of the sac-roe fishery. Below are a few important examples and available on the CDFW Herring Web Page:

- *The Evolution of California's Herring Roe Fishery by J. Spratt describes the "evolution" of the herring fishery and the gear types used:
<https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=31398&inline=true>*
- *Information related to gear and mesh size are summarized in both the 2005 and 2006 Final Supplemental Document for Pacific Herring.*
 - *The 2005 Final Environmental Document for Pacific Herring, chapter 2.3.1.5 as well as appendices C, D and E:
<http://www.dfg.ca.gov/marine/herring/ceqa.asp>*
 - *The 2006 Final Environmental Document for Pacific Herring, chapter 3.4.1 as well as appendices A and B:
<http://www.dfg.ca.gov/marine/herring/ceqa.asp>*

Additionally, the Department, Commission and fishing industry have previously worked together to convert (eliminate) round-haul gear (purse-seine) due to concerns over wrap-and-release mortality associated with this fishing technique. A synopsis is provided in the 2005 Final Environmental Document for Pacific Herring, Appendix E. The Department continues to be committed to monitoring commercial catch and analyzing its impacts to the herring population during the course of its annual research activities.

Comment 5

Weinstein et al, request a regulatory option to establish permanent closure of commercial fisheries in unassessed areas, until a stock assessment is completed.

Response

No commercial fishery has taken place in Tomales Bay since 2007, since 2005 in Humboldt Bay, and since 2002 in Crescent City Harbor. Under existing regulations the Commission shall not set a quota that exceeds 30 or 60 tons respectively for Crescent City Harbor and Humboldt Bay. Under existing authority the Commission can set a quota for each of these areas that are less than the current set quotas, including a quota of zero tons. Permanent closure of these fisheries would require re-notice of the 2013-14 rulemaking for Pacific herring, and issues around existing fishing permits would need to be resolved. At this time the Department has not completed quantitative analysis to support a change and as a result is not recommending a change in quotas for fishing areas in Tomales Bay, Humboldt Bay and Crescent City Harbor.

It should be noted that there is no indication that these areas will receive fishing pressure in the near future and as a result these spawning populations are likely returning to unfished abundance. In addition, as a result of state wide reduced fishing effort as well as reduced staffing and budget constraints, the Department has discontinued survey efforts in these spawning locations.

Comment 6

Weinstein et al, request a regulatory option for modifying fish sale and gear type regulations to better accommodate participants in the fresh fish market.

Response

The Department is recommending a change to clarify and streamline existing regulations pertaining to the take of herring for both the sac-roe and fresh fish market in San Francisco and Tomales Bays. The Department recommends removing regulations in Section 163 Title 14, pertaining to the take of herring for the fresh fish fishery. References to “sac-roe” would also be removed and simply state “herring”. Amended regulations would allow the take of herring for commercial purposes for both fisheries under one quota during the herring season (January 1 through March 15). All other regulations related to the permitting and buying of herring would still be in effect and enforceable. Allowing cast-netting as a commercial gear type would create enforcement issues due to the difficulty in identifying commercial versus recreational activities during fishing operations. The Department considers that cast-netting would require a more

comprehensive review than is provided by amendments to Sections 163 and 164. Consequently, further consideration of cast nets would need to be thoroughly explored under a separate rule making and require additional CEQA analysis to address concerns. One of the most important concerns being the commercialization of recreationally caught herring.

Comment 7

Weinstein et al, would like to link Department and Commission herring management to other agencies' goals and activities for protecting and enhancing herring spawning habitat.

Response

*The Department already works collaboratively to enhance and protect herring spawning habitat in San Francisco, Tomales and Humboldt Bays. The Department was a contributor to a UC Davis, Bodega Marine Laboratory study involving the impacts of suspended sediments on Pacific herring embryos and larvae. The Department works closely with the National Marine Fisheries Service to provide input on restoration activities for eelgrass (*Zostera marina*). It also recently worked with the National Park Service to map and identify rockweed (*Fucus sp.*) beds in San Francisco Bay, another important spawning habitat for Pacific herring. The Department is currently working with San Francisco State University (SFSU) to identify potential impacts from an invasive tunicate (*Didemnum sp.*) on herring embryos and larval herring. The Department is also a co-principle investigator with SFSU and the Exploratorium on a UC Sea Grant proposal for a herring genetics study.*

Comment 8

Weinstein et al, state that for the 2013-2014 season, it is their firm position that until an explicit harvest control rule is established and other key management objectives are achieved, the commercial fishery quota should be set at no greater than 4.7% of 2012-2013 estimated spawning biomass, which is the harvest rate that has been in place since 2009. This position is based on the importance of Pacific herring as forage, uncertainties about stock status, lack of a harvest control rule, and the objectives of the Commission's forage policy. They commend the Department and the DHAC for recommending this harvest rate for the 2013-2014 season, in light of these considerations.

Response

Comment noted.

Comment 9

Weinstein et al, state that they are pleased to see the DSED contains important new language acknowledging the importance of herring as a forage species, and, explicit acknowledgement of the management objective of conserving herring for forage.

Response

Comment noted.

Comment 10

Weinstein et al, suggest that the FSED include an estimated timeline for release and peer review of the herring stock assessment model, and state explicitly how this model will be used to develop a harvest control rule and reference points.

Response

Preliminary modeling results are expected to be available during the summer or fall of 2013. Once the Department receives the model it will begin an internal evaluation. After the internal evaluation the Department plans to subject the model results to an independent technical review by a scientific advisory committee. The projected timeline for the technical review is early 2014 followed by a workshop in the summer of 2014. The Department anticipates working with Ocean Science Trust or a similar organization during this process and will continue to provide status updates when appropriate and available.

Comment 11

Weinstein et al, suggest the FSED recognize and include substantial Essential Fishery Information on Pacific herring that is currently available to support a harvest control rule, such as information on energetics of marine wildlife that is highly relevant to the stock assessment model and a harvest control rule.

Response

Beginning with the 2010 season, harvest targets for Pacific herring have been set at five percent or below as a conservation safeguard. This allows 95 percent of the spawning stock to be available as forage and to meet other ecosystem functions, including stock rebuilding. Due to the complexity of the ocean system and biological interactions, insufficient information is currently available to quantify all predator/prey relationships or to quantify all ocean condition factors that affect herring survival. However, this is indirectly taken into account by setting conservative harvest targets and allowing over 90 percent of the spawning biomass to remain unfished. The Department does agree that a harvest control rule is a desirable improvement to current management and will work to implement such a rule once the herring stock assessment model is completed.

Comment 12

Weinstein et al, suggest that the FSED explicitly state that the Department will continue to utilize the annual rulemaking process to achieve the Department's management objectives for the fishery as it works towards completing a Pacific herring FMP.

Response

The 2013-14 Draft Supplemental Document for Pacific Herring does state this in Chapter 1, page 1-5. "Until an FMP can be developed the 1998 FED and subsequent FSEDs will serve as the primary management tools for herring."

Comment 13

Weinstein et al, support a freeze in harvest rate at 4.7% in light of the absence of a justification for modifying the harvest rate higher or lower. Any such adjustment should be based on the results of a harvest control rule and achieving the management objectives outlined regarding incorporation of EFI.

Response

Comment noted.

Comment 14

Weinstein et al, would like a regulatory option and to implement closure of commercial fisheries in unassessed areas including Tomales Bay, Humboldt Bay and Crescent City Harbor, until a stock assessment is completed in these areas.

Response

See response to comment 5.

Comment 15

Weinstein et al, state that because fisheries have not taken place in these areas for at least the last five years there would no substantive effects on local stakeholders. Therefore, any new fishing in these areas should be considered “new or expanded.”

Response

See response to comment 5.

Additionally, a permanent closure would require re-notice of the proposed regulations and further economic analysis to identify the socioeconomic impacts to affected stakeholders.

Comment 16

Weinstein et al, request the FSED recommend a 0 ton quota for all of the unfished areas in California, in the absence of a stock assessment.

Response

See response to comments 5 and 15.

Comment 17

Weinstein et al, commend the Department for the proposal amending and streamlining the regulations for San Francisco Bay to allow take of herring for commercial purposes for both sac-roe and fresh fish market fisheries under one quota and one season.

Response

Comment noted.

Comment 18

Weinstein et al, state that the FSED should explicitly support the initiation of improved interagency cooperation and collaboration by at least including references to other agencies' existing actions and goals for herring.

Response

See response to comment 7.

Comment 19

Weinstein et al, state that the FSED should also include reference to the state marine reserves established through the Marine Life Protection Act process, and to Department cross-jurisdictional responsibilities and opportunities, for example South Humboldt Bay State Marine Resource Management Area.

Response

The inclusion of impacts of marine reserves is outside the scope of this document.

Comment 20

Weinstein et al, request that the Department remove or alter the section describing the independent peer review of its fishery management approaches, which took place in 2003.

Response

The Department agrees that the 2003 Peer Review is dated; however it remains the best available science for managing the commercial herring fishery. Due to ongoing exploitation rate concerns the Department requested a peer review of its fishery management activities. In 2003 the Department worked with California Sea Grant to assemble a team of scientists with demonstrated expertise in modeling and assessing fish populations: Alec MacCall; Mark Maunder, and Jake Schweigert. A key recommendation that resulted from the peer review was the following: "A harvest rate in the range of 10-15% appears to be sustainable with the lower level providing a desirable target for stock rebuilding." Based on this assessment the Department has recommended even lower exploitation rates to the Commission to further safeguard the spawning stock and ensure fishery sustainability. At present the harvest target is 4.7 percent of the spawning biomass for San Francisco Bay. Since the 2010-11 season quotas have been set at less than five percent of the previous seasons spawning biomass. Actual exploitation rates have averaged three percent. To put this into historical context, since the sac-roe fishery began in 1972-73, the average rate has equaled 11.7 percent.

As previously stated, the Department is working with the Centre for Environment, Fisheries and Aquaculture Science (Cefas) to develop a population model for Pacific herring. It is anticipated that this model will replace the peer review completed in 2003.

Comment 21

Weinstein et al, recommend improved geospatial description of herring ecology and management in San Francisco Bay and other areas; at a minimum, a map of historic use of spawning areas and a map of areas open and closed to commercial fishing.

Response

*Detailed descriptions of herring ecology and management are contained in **Chapter 3, Environmental Setting**, of the **1998 Final Environmental Document for Pacific Herring**. In addition, annual updates to this document include descriptions of yearly spawning events and locations. Title 14 of the California Code of Regulations also provides a detailed description of open and closed fishing areas. Finally, the Commercial Fishery Digest contains location maps of “fishing districts” referenced in Title 14.*

Comment 22

Weinstein et al, closes the comment letter by providing a summary of the comments provided in the document. Providing a list of supported management actions for the 2013-2014 season.

Response

See responses to comments 8, 5, 6, 10, 11, 7 and 21 respectively.

Comment 23

Weinstein et al, state that they are encouraged by the progress made thus far by the Department, and the responsiveness to their comments over the past year, and look forward to continued partnership with the Department, Commission, and industry to ensure a vibrant Pacific herring resource to support California’s wildlife and commercial fishery.

Response

Comment noted.

7.3. Copy of Written Comments Received



June 20, 2013

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

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

Dear Mr. Barnes and Mr. Mastrup,

We the undersigned organizations thank you for the opportunity to comment on the 2013-2014 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 2011.

We commend the Department of Fish and Wildlife (Department) for making substantial progress toward improved stewardship of Pacific herring by proposing a program for the 2013-2014 season which reflects the Commission and Department's intent of prioritizing herring management reform in 2013 and 2014,¹ and that is responsive to many recommendations previously submitted by our organizations.^{2,3} The proposed program moves the Department toward its overall goal of "optimal management of the Pacific herring resource for its ecological value and human use,"⁴ and reflects some of the goals of the Commission's new policy on the management of forage species.⁵ The policy states that the Commission intends to provide adequate protection for forage species through management goals that:

- ① • 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 Fishery Management Plans, and encourage cooperation and collaboration across jurisdictions and international boundaries in managing forage species.

Recommended key management objectives for management of Pacific herring in California

We have previously recommended and continue to support the following key management objectives for the Department to consider, among others, in order to fulfill the goals of the forage policy:

- ② • Develop a harvest control rule for Pacific herring that explicitly incorporates Essential Fishery Information including the physical factors, oceanographic conditions, the effects of fishing on dependent predators, the availability of alternative prey, spatiotemporal foraging hotspots, estimated unfished biomass, and other management.
- ③ • Establish clear, quantitative recovery and sustainability benchmarks for age structure, biomass and geographic extent of spawning.
- ④ • Summarize known effects of alternative mesh sizes and gear configurations, for consideration of regulations to better accommodate participants in the fresh fish fishery, and to assess the possibility that such management changes may help address class truncation in the San Francisco Bay stock and recover the population to specified target levels.
- ⑤ • Describe and implement a regulatory option to establish permanent closure of commercial fisheries in unassessed areas, until a stock assessment is completed in these areas.
- ⑥ • Describe and implement a regulatory option for modifying fish sale and gear type regulations to better accommodate participants in the fresh fish market.

- ③ Link Department and Commission herring management to other agencies' goals and activities for protecting and enhancing herring spawning habitat.

- ⑧ For the 2013-2014 season, it is our firm position that until an explicit harvest control rule is established and other key management objectives are achieved, the commercial fishery quota should be set at no greater than 4.7% of 2012-2013 estimated spawning biomass, which is the harvest rate that has been in place since 2009. This position is based on the importance of Pacific herring as forage, uncertainties about stock status, lack of a harvest control rule, and the objectives of the Commission's forage policy. We commend the Department and the DHAC for recommending this harvest rate for the 2013-2014 season, in light of these considerations.

Progress on meeting recommended management objectives through the DSED

A. Harvest control rule

- ⑨ We are pleased to see the DSED contains important new language acknowledging the importance of herring as a forage species, and, explicit acknowledgement of the management objective of conserving herring for forage:
- ...the Department manages for herring's importance as a forage species by recommending a conservative harvest. (pg 1-6)... Objectives for (maintaining healthy herring stocks in California include: a) safeguard herring as an important forage species for all living resources of marine and estuarine ecosystems; b) use precautionary principles when setting harvest targets (pg. 2-1)...The (Department's quota recommendation) will also help maintain a sustainable fishery while continuing to ensure herring's integral role in both ocean and bay ecosystems." (pg 3-12)*
- These statements support the objective of developing a robust harvest control rule. The DSED also includes information on the status of the stock assessment model currently under development to evaluate alternative harvest control rules, which the Department is developing through its collaboration with the Centre for Environment, Fisheries and Aquaculture Science (CEFAS).
- ⑩ We suggest the FSED include an estimated timeline for release and peer review of the model, and state explicitly how this model will be used to develop a harvest control rule and reference points. We also suggest the FSED recognize and include substantial Essential Fishery Information on Pacific herring that is currently available to support a harvest control rule, such as information on energetics of marine wildlife that is highly relevant to the stock assessment model and a harvest control rule. The DSED states that:
- ⑪ *"Regarding herring as forage, due to the complexity of the ocean system and biological interactions, insufficient information is currently available to quantify all predator/prey relationships or to quantify all oceanic conditions and factors that affect herring survival."*
- However, there is a substantial and growing body of information on the energetic needs of predators for prey, both in general and specifically for herring or herring roe, some of which we

have included in earlier comment letters.³ This information should be included in the FSED. For example:

- ⑪ Continued
- The population of ~2043 humpback whales in California and Oregon requires approximately 817 tons per day of food. In southeast Alaska, humpback whales have been shown to feed preferentially on herring. A population of less than 150 whales consumed between 2600-7400 tons of herring in one spawning season.⁶
 - The population of ~4000 Steller's sea lion in California requires approximately 7 tons of food per day. In Alaska, this endangered species feeds preferentially on herring.⁷
 - In British Columbia, total annual consumption of herring by 13 predators averaged 61,000 tons/year from 1973-2008.⁸
 - The common murre population between Cape Blanco and Pt. Conception, numbering about 1.5 million individuals, requires 170,000 tons of prey/year.⁹
 - The Pacific population of surf scoter, numbering about 61,000 individuals, if feeding exclusively on herring roe would require just over 31,000 kg roe/day.¹⁰

⑫ While a fisheries management plan should ultimately be the optimal vehicle for long-term management of herring, Department and Commission staff have committed that significant progress can be achieved toward a harvest control rule through the annual rulemaking process. The important changes to 2013-2014 management relative to previous years, as described in this DSED, are illustrative of the suitability of the annual rulemaking process to improve herring management. We therefore suggest that the FSED explicitly state that the Department will continue to utilize the annual rulemaking process to achieve the Department's management objectives for the fishery as it works towards completing a Pacific herring FMP.

B. Harvest quota freeze pending a harvest control rule and progress on other management objectives

⑬ For the 2013-14 season the Department recommends a conservative harvest option of 3,737 tons or 4.7 percent of the 79,500 ton 2012-13 spawning biomass estimate. We strongly support this freeze in harvest rate in light of the absence of a justification for modifying the harvest rate higher or lower. Any such adjustment should be based on the results of a harvest control rule and achieving the management objectives outlined regarding incorporation of EFL.

C. Describe and implement a regulatory option to close commercial fisheries in unassessed areas including Tomales Bay, Humboldt Bay and Crescent City Harbor, until a stock assessment is completed in these areas.

⑭ The DSED recommends that quotas for Tomales Bay, Humboldt Bay, and Crescent City Harbor: "...are not to exceed 350 tons, 60 tons and 30 tons, respectively." In previous correspondences^{2,3} a subset of our groups asked the Fish and Game Commission to close commercial fisheries in Tomales Bay, Humboldt Bay and Crescent City Harbor pending stock assessments. These areas were last assessed in the 2005-2006 spawning season. For Tomales Bay, the 1993-2006 average spawning biomass was 3,712 tons. The 350 ton harvest quota would be 10% of this average biomass; however, given the known fluctuations in herring abundance, this could represent a

14) much higher harvest rate in years of low abundance. Without a stock assessment, fishery managers have no means to assess whether these stocks are at low abundance. For Humboldt Bay, from 1994 to 2006, average biomass averaged just under 400 tons, and the last estimate was seven tons in 2006. Due to this alarming drop, the 60 ton harvest quota ceiling proposed in the DSED would be just over eight times the total biomass from 2006. This would also represent 15% of average biomass since 1974. For Crescent City, there is no information in the Department's environmental documents on any stock assessments having taken place, thus no justification for the 30 ton harvest quota. Furthermore, fisheries have not taken place in these areas for at least the last five years, so closures would have no substantive effects on local stakeholders. Therefore, any new fishing in these areas should be considered "new or expanded."

15) The DSED provides the Commission with a range of quota options for these areas, rather than a recommended quota for these areas. We commend the Department for including an option in the DSED to establish a quota of zero in these areas, and request that the Commission close these areas by setting quotas of zero until new stock assessments occur in these areas. Specifically, we also request the FSED recommend a 0 ton quota for all of these areas, reflecting the lack of stock assessment.

Streamline the sale of fresh fish to local markets

Our previous correspondence recommended that the Department describe a regulatory option to streamline the sale of fresh fish to local markets as well as modifying gear type regulations to better accommodate participants in the fresh fish fishery.

17) We commend the Department for amending and streamlining the regulations for San Francisco Bay to allow take of herring for commercial purposes for both sac-roe and fresh fish market fisheries under one quota and one season. In contrast with previous seasons, this modification will allow all fish to be landed during the herring season to be sold for sac-roe or fresh fish purposes (pg 2-3). This will support a growing local and regional demand for fresh herring¹¹ which will serve to create a higher value product for the commercial fishery as well as create a larger market for locally sourced seafood. We remain interested in exploring the possibility of a commercial cast net fishery for Pacific herring in San Francisco Bay as has been requested by some local fishermen and hope to work with the Department on this possibility in the future.

Interagency coordination and multiagency stewardship of herring

19) As cited earlier, the Commission's forage policy includes the provision to "Facilitate consistency in the management of forage species, integrate with existing Fishery Management Plans, and encourage cooperation and collaboration across jurisdictions and international boundaries in managing forage species."

The DSED notes that "the U.S. Fish and Wildlife Service, NOAA Fisheries, U.S. Environmental Protection Agency (EPA), and other state and federal agencies have all received environmental documents that have been prepared regarding herring. To date, the Department has not received comments from these agencies."

18) Continued
 19) In order to sustain a vibrant resource as both forage for wildlife and harvest for commercial fishing, management of Pacific herring in California should include an assessment of habitat needs, threats, and best practices, and, an analysis of the roles and responsibilities of a number of agencies. Toward that end, the FSED should explicitly support the initiation of improved interagency cooperation and collaboration by at least including references to other agencies' existing actions and goals for herring, including the Bay Conservation and Development Commission, the Habitat Goals Project (Subtidal Goals), the Coastal Conservancy, NOAA/NMFS, US Geological Survey, Golden Gate National Recreation Area (National Park Service), the Pacific Fishery Management Council, and Pt. Reyes National Seashore. The FSED should also include reference to the state marine reserves established through the Marine Life Protection Act process, and to Department cross-jurisdictional responsibilities and opportunities, for example South Humboldt Bay State Marine Resource Management Area (Figure 2, below).

Other recommended changes to the DSED

20) We request the Department remove or alter the section describing the independent peer review of its fishery management approaches, which took place in 2003 (pg 2-9). The peer review concluded 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." This peer review is outdated in that it did not include consideration of the energetic needs of predators or other Essential Fishery Information needed to generate a harvest control rule and required as per the Commission's policy on forage species. As written this section misrepresents and contradicts other statements in the DSED describing a 5% or lower harvest rate as precautionary and appropriate given the foundational importance of herring as forage as well as continued concerns about the age structure of the herring population (Figure 3.4), and about the substantial decline between 2011-2012 and 2012-2013 in Average Condition Index of spawning fish (Figure 3.5).
 21) Finally, we recommend improved geospatial description of herring ecology and management in San Francisco Bay and other areas. At a minimum, a map of historic use of spawning areas (for example Figure 1, below) and a map of areas open and closed to commercial fishing.

In sum, we support the following management actions for the 2013-2014 season:

- 22)
- maintain a maximum harvest rate of 4.7% of the estimated spawning biomass for the San Francisco Bay fishery;
 - close fisheries in Tomales Bay, Humboldt Bay, and Crescent City by setting a quota of zero;
 - streamline regulations to allow sale of fresh fish to local markets;
 - provide additional detail on the progress and plan for establishing clear reference points and an ecosystem-based harvest control rule;
 - provide an updated analysis of currently available information on the dietary importance of Pacific herring to California predators; include more detailed list of management objectives specifically including the establishment of reference points and a harvest control rule; and
 - include references to other agencies' and other Department jurisdictional responsibilities (especially marine reserves) for herring stewardship.

- 22
GMS
- Improved geospatial description of herring spawning areas and areas open and closed to fishing.

23

Again, we are encouraged by the progress made thus far by the Department, and the responsiveness to our comments over the past year, and we look forward to continued partnership with the Department, Commission, and industry to ensure a vibrant Pacific herring resource to support California's wildlife and commercial fishery.

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, and we look forward to future collaboration.

Sincerely,



Anna Weinstein
Seabird Program Manager
Audubon California
220 Montgomery St., Suite 2000
San Francisco, CA 94104
aweinstein@audubon.org



Geoffrey G. Shester, Ph.D.
California Program Director
Oceana
99 Pacific Street, Suite 155C
Monterey, CA 93940
gshester@oceana.org



Andrea Treece, Staff Attorney
Earthjustice
50 California Street, Suite 500
San Francisco, CA 94111



Greg Helms
Manager, Pacific Program
Ocean Conservancy
Greg Helms
ghelms@oceanconservancy.org



Seth Atkinson
Oceans Program Attorney
Natural Resources Defense Council
satkinson@nrdc.org



Paul Shively
Manager, U.S. Oceans, Pacific
The Pew Charitable Trusts
pshively@pewtrusts.org

Cc: Ryan Bartling, Tom Grenier

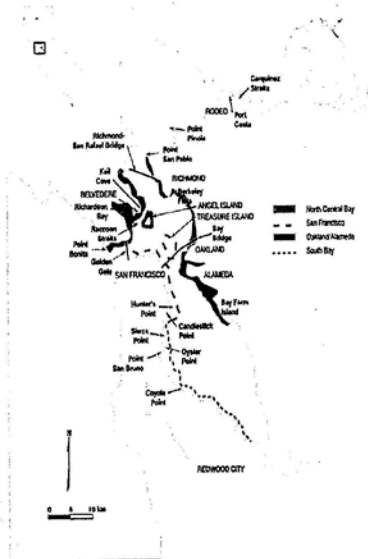


Figure 1. Historic herring spawning areas within San Francisco Bay (source: Incardona, J. 2011. http://www.fws.gov/contaminants/Restorationplans/CoscoBusan/Cosco_Settlement/App_D_Herring_Injury_Study.pdf)

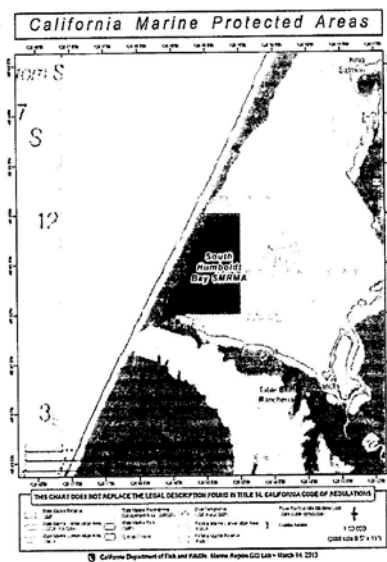


Figure 2. South Humboldt Bay State Marine Resource Management Area. <https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=47721&inline=true>

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- ¹ Marine Resources Committee of the California Fish and Game Commission. 2013. Sacramento, CA. March.
- ² Letter to the California Fish and Game Commission. 2012. Audubon California et al.
- ³ Letter to the California Department of Fish and Wildlife and the California Fish and Game Commission: scope and content of the 2013-2014 Supplemental Environmental Document for commercial herring fishing in California's ocean waters. 2013. Audubon California et al.
- ⁴ Department of Fish and Wildlife. 2013. Notice of preparation for the 2013-2014 Supplemental Environmental Document. January.
- ⁵ California Fish and Game Commission. 2013. Fisheries Policies.
<http://www.fgc.ca.gov/policy/p2fish.aspx#FORAGE>
- ⁶ Rice, S., J. Moran, J. Straley, K. Boswell, and R. Heintz. 2010. Significance of whale predation on natural mortality of Pacific herring in Prince William Sound. Restoration Project:100804. Final Report.
- ⁷ Sigler, M. 2009. Steller sea lion foraging response to seasonal change in prey availability. Marine Ecology Progress Series Vol. 388:243-261.
- ⁸ Schweigert, J., Boldt, J., Flostrand, L., and J. Cleary. 2010. A review of factors limiting recovery of Pacific herring stocks in Canada. International Council for the exploration of the sea. Published by Oxford Journals.
- ⁹ Roth, J., Nur, N., Warzybok, P., and W. Sydeman. 2008. Annual prey consumption of a dominant seabird, the Common Murre, in the California Current ecosystem. ICES Journal of Marine Science, 65: 1046-1056.
- ¹⁰ Weathers, W. and J. Kelly. 2007. The importance of ephemeral food abundance to wintering waterbirds: energy footprints on Tomales Bay. The Ardied. Audubon Canyon Ranch. Tomales, CA.
- ¹¹ Finn. M. Herring back on menu of Bay Area Restaurants. San Francisco Chronicle.
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Summary of Changes to the 2013 Draft Supplemental Environmental Document for Pacific Herring Commercial Fishing Regulations

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

General changes throughout the Document

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

Table of Contents

- The table of contents was revised 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, 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.
- The following sentence was revise in S.2 paragraph 2: The proposed regulatory changes will establish season quotas and dates for fishing operations in San Francisco Bay and Tomales Bay for the 2013-14 herring fishing season, as well as providing quota options for the Humboldt Bay and Crescent City Harbor herring fisheries

Chapter 1. Introduction

- Minor editorial changes were made to improve clarity.

Chapter 2. Project Description

- Minor editorial changes were made to improve clarity.
- The following sentence was revised in Section 2.1 paragraph 4: The proposed regulatory changes will establish season quotas and dates for fishing operations in San Francisco Bay and Tomales Bay for the 2013-14 herring fishing season, as well as providing quota options for the Humboldt Bay and Crescent City Harbor herring fisheries
- The following sentence was revised in Section 2.3 paragraph 5: Based on this assessment, the Department has recommended even lower exploitation rates to the Commission to further safeguard the spawning stock. Since the 2010-2011

season, the Department has recommended quotas less than or equal to five percent of the previous season's estimated spawning biomass.

- The following sentence was revised in Section 2.3.1.1. paragraph 1 to correct the Department quota recommendation for SF Bay: Due to the recovering status of the herring population, the Department recommends a conservative 4.7 percent harvest option for the 2013-14 season.
- The following sentence was revised in Section 2.3.1.1. paragraph 2 to reflect final age data: Age composition data indicate that the increase in spawning biomass was due to a strong recruitment of 3-year old herring to the spawning population.
- The following sentence was revised in Section 2.3.1.2. paragraph 1: The quotas for Tomales Bay, Humboldt Bay and Crescent City Harbor area are currently set at 350 tons, 60 tons, and 30 tons, respectively.

Chapter 3. Environmental Setting

- Minor editorial changes were made to improve clarity.
- The following sentence was revised in Section 3.1 paragraph 3: Small fisheries for fresh fish markets are also permitted during spawning season in Tomales and San Francisco bays.
- The following sentences were revised to reflect completed age analysis in Section 3.3, paragraph 1: The spawning biomass estimate for the 2012-13 season is 79,500 tons, which exceeds the historical average (1979-80 season to present) of 52,000 tons. This is the fourth year of significant increase since the 2008-09 season record low estimate of 4,800 tons (Figure 2.2). Age composition data indicates that the increase in spawning biomass was due to a strong recruitment of 3-year old herring to the spawning population and continued persistence of 4- and 5-year old herring in the population (Figure 3.1).
- The preliminary age data found in Figure 3.1 of the DSED was updated using final age data.
- The following sentence was revised to reflect completed age analysis in Section 3.3, paragraph 6: Age composition for the 2012-13 season, based on herring otolith analysis, shows continued rebuilding of the spawning stock through a strong recruitment of 3-year old herring (2009-10 year class) (Figures 3.1 and 3.3) and the return of large numbers of 4- and 5-year old herring in the spawning population.
- The preliminary age data found in Figure 3.3 of the DSED was updated using final age data based on a comprehensive analysis of herring otoliths.
- Figure 3.4 was updated using completed age composition analysis.
- The following sentence was revised to reflect updated analysis of the condition factor for herring in Section 3.3, paragraph 7: The San Francisco Bay herring CI declined for mature herring when compared to last season but remained above the historic average (Figure 3.5).
- The following sentence was revised to reflect completed age analysis in Section 3.3, paragraph 8: Based on age composition analysis, this objective was achieved during the 2012-13 commercial season (Figure 3.4).
- The following sentences were revised in Section 3.3.1. paragraph 2: The herring YOY abundance index for 2012 was below average for the period of record

(Figure 3.6). The abundance of YOY indicated less favorable environmental conditions for survival within San Francisco Bay (Hieb et al, in press). YOY indices have not however, shown to be a good predictor of recruitment success. Recruitment to the spawning stock is affected by a number of factors during the first two to three years of life, including predation, food availability, competition, and environmental conditions.

- Figure 3.6 was updated using final young-of-the-year abundance data. The DSED does not contain 2012 young-of-the-year abundance data.

Chapter 4. Environmental Impact Analysis and Cumulative Effects

- No changes

Chapter 5. Analysis of Alternatives

- The following sentences were revised to correct the season years in Section 5.2, paragraph 1: Existing regulations, adopted in 2011, were for the 2011-12 herring commercial fishing season. These regulations reflect the amendments as adopted by the Commission in September 2011. Under Alternative 2, changes would be made to revise the herring fishing seasons by location or adjust quotas to reflect the 2012-13 biomass estimate determined by the Department.

Chapter 6. Consultation

- The following sentence was revised to reflect the final date of the May Commission meeting in Chapter 6 paragraph 5: These recommendations were presented to the California Fish and Game Commission at their May 22, 2013, meeting.

Chapter 7. Response to Comments

- This chapter is added to all FSEDs.
- Comments and responses have been included.

Appendix A Summary of Changes

- Added