

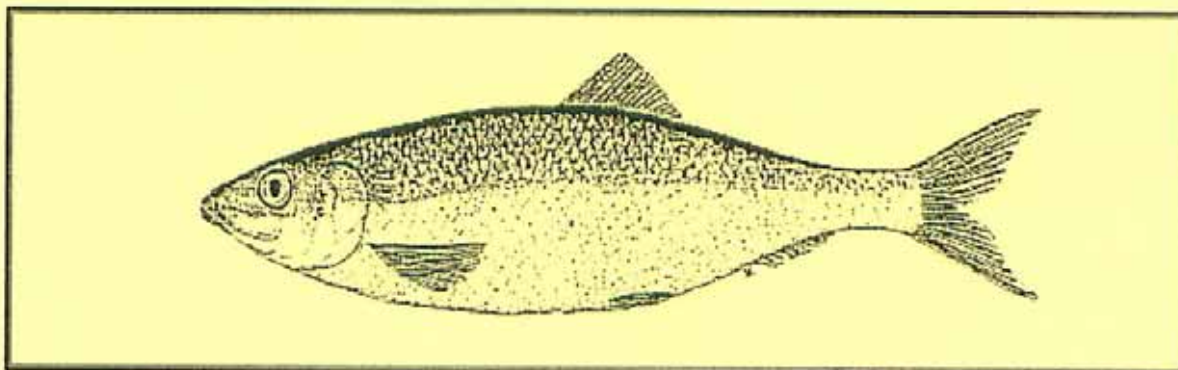
SCH No. 98052052

**FINAL**

**SUPPLEMENTAL ENVIRONMENTAL DOCUMENT**

**PACIFIC HERRING  
COMMERCIAL FISHING REGULATIONS**

(Sections 163, 163.5, and 164, Title 14, California Code of Regulations)



**2004  
STATE OF CALIFORNIA  
THE RESOURCES AGENCY  
DEPARTMENT OF FISH AND GAME**

**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 the review and analysis required by California Environmental Quality Act (CEQA) Guidelines to assist the California Fish and Game Commission (Commission) in regulating the commercial harvest of Pacific herring throughout the State's ocean and estuarine waters. Specifically, the FSED reviews and evaluates proposed regulatory changes for the 2004-05 fishing season, supplementing, and in some cases replacing, aspects of the proposed project described in the 1998 FED and the Final Supplemental Environmental documents of 1999, 2000, 2001, and 2002. A Notice of Preparation (NOP) and public scoping meetings were used to identify and incorporate concerns and recommendations of the public, resource and regulatory agencies, and the fishing industry into the review and analysis of the proposed changes contained in these documents.

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 for regulating the commercial harvest of herring. Chapter 3 describes the existing environment where the California 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 comments received on the Draft Supplemental Environmental Document. References used throughout this FSED are listed in the Literature Cited section.

The proposed project has been selected as the preferred alternative based on the analysis of this FSED. The proposed project is identified as the preferred alternative because it provides a set of regulations most likely to achieve the State's

CEQA policy with respect to the conservation, sustainability, maintenance, and utilization of the Pacific herring resource.

## **S.2 Proposed Project**

The proposed project is a body of recommended regulations governing the commercial harvest of herring-for-roe products, the harvest of herring eggs-on-kelp, and the harvest of herring as fresh fish, for bait, and pet food. The proposed project takes the form of recommendations for continuation, amendment, or change to an existing body of regulations in effect since November 1, 2003 (sections 163, 163.5, and 164, Title 14, California Code of Regulations [CCR]).

The proposed regulatory changes will establish fishing quotas for San Francisco and Tomales bays for the 2004-05 herring fishing season, based on the most recent assessments of the spawning populations in these locations. Previously established quotas for Humboldt Bay and Crescent City Harbor fisheries are not affected by these regulatory changes. The proposed changes recommended by this document also include provisions for the continued experimental use of a 2-inch mesh size for gill nets used in the roe herring fishery in Tomales Bay, for the 2004-05 season only. Other changes relating to the Department of Fish and Game's (Department) proposed commercial herring season dates for the 2004-05 season, permit suspensions, and minor editorial changes are recommended to improve the clarity of the regulations or provide for the efficient harvest and orderly conduct of the fishery and for the protection of the resource.

The specific regulatory changes recommended for the 2004-05 season will:

(1) provide for a 3,440-ton quota for San Francisco Bay (10 percent of the 34,400-ton estimated spawning biomass for the 2003-04 season); (2) provide an initial 400-ton fishing quota in Tomales Bay (2.3 percent of the 2003-04 estimated spawning biomass of 12,124 tons) for Tomales Bay with provisions to increase the quota in season if escapement goals are achieved by February 15, 2005; (3) set the dates of the roe herring fisheries in San Francisco Bay from 5:00 p.m. on December 5, 2004 until noon on December 23, 2004

("DH" gill net platoon only), and 5:00 p.m. on January 2, 2005 until noon on March 11, 2005; (4) set the dates of the roe herring fishery in Tomales Bay from 5:00 p.m. on Sunday, December 26, 2004 until noon on Friday, December 31, 2004, and from 5:00 p.m. on Sunday, January 2, 2005 to noon on Friday, February 25, 2005; (5) and provide for the Tomales Bay fishery a one-year continuation of a mesh size of no less than 2 inches or greater than 2 ½ inches, for the 2004-05 season only.

### **S.3 Project Alternatives**

Three alternatives are considered in this FSED. These alternatives include: (1) a no-fishery alternative; (2) using regulations established by Commission action; and (3) establishing individual vessel quotas for gill net vessels in the roe herring fishery. Refer to Section 2.4, Project Alternatives, and Chapter 6, Analysis of Alternatives, of the FED, 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 and Tomales 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. Herring fisheries also occur in the Crescent City Harbor area, Humboldt Bay, and the open ocean, primarily within Monterey Bay. Refer to Section 3.3, Specific Biological and Environmental Descriptions of the FED, 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 described by this FSED did not identify any new potential impacts that are not analyzed in the FED. Several areas of potential concern were identified in the FED. 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 roe 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 Department conducted 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.

#### **Alternative 1 (no fishery)**

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.

Potential biological impacts associated with a no fishery alternative include

an increased rate of natural mortality, the potential for deterioration in the condition of the herring population as it reaches carrying capacity, and potential impacts to other species that compete with herring for food resources. Although this would be a natural process, adverse temporary impacts would nonetheless be associated with this alternative.

#### **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 2003 and would not provide for the consistent management of the State's resources.

#### **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.

Wastage of 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, the 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 and no



regulatory changes proposed herein alter the potential for or the existing cumulative impacts. An analysis of cumulative impacts is provided in Chapter 5 of the FED.

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

### **S.6 Areas of Controversy**

The following areas of controversy have been identified regarding commercial herring fishing in prior years. Item numbers 1 through 6 of these areas of controversy are addressed in detail within Chapter 5 of the FED. Item numbers 7 through 9 were identified during three public scoping meetings held on January 22, 2004 in San Francisco, and April 13, 2004 in Sausalito and Bodega Bay, and during two Director's Herring Advisory Committee Meetings held on March 25, 2004 in San Francisco and April 30, 2004 in Sausalito; further details of items 7 through 9 are presented in this FSED:

1. Potential interactions between marine mammals and commercial fishing activities;
2. Importance of herring as a forage species for sea birds, marine mammals, and other fishes;
3. Inadequate knowledge of the resource;
4. Errors in stock assessment;
5. Insufficient management resources;
6. Potential impact of unforeseen events or catastrophes (e.g., oil spills, chemical spills);
7. Status of the herring population in San Francisco Bay;

8. Change in survey methodology for population assessment; and
9. Mesh size reduction in San Francisco Bay.

### **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 are needed to specify the areas, seasons, fishing quotas and other appropriate special conditions under which fishing operations may be conducted. 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, and the 2002 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) in taking action regarding the regulation of the commercial harvest of herring in California. It was prepared by the Department of Fish and Game (Department) following the California Environmental Quality Act (CEQA) Guidelines. The project being considered is the proposed changes to the regulations for the 2004-05 California Pacific 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; and the FSED, certified by the Commission in August 2002. The FED outlines the full proposed project consisting of the operation and management of California's Pacific herring commercial fisheries.

The FSED of 1999, 2000, 2001, and 2002 provided for the revisions of the proposed project contained in the FED and regulatory revisions necessary for the 1999-2000, 2000-2001, 2001-02, and 2002-03 Pacific herring commercial fishing seasons, respectively. Environmental documents, DSED and FSED, were not prepared for the 2003-04 season. The Department at the conclusion of the 2002-03 season did not anticipate proposing regulations requiring the preparation of CEQA documents. This FSED supplements the existing certified environmental documents and provides revisions to the regulations for the 2004-05 Pacific herring commercial fishing season.

The Department and Commission hold the public trust for managing the

State's 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. A Final Environmental Document (FED) for Pacific Herring Commercial Fishing Regulations was certified by the Commission on August 28, 1998. Section 1.2 of the FED provides an explanation of how the FED satisfies the required environmental assessment as mandated by CEQA. 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 (CEQA Guidelines Section 15162, Public Resources Code 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 the agency decides whether to approve the project, the decision-making body considers the previous FED as revised by the supplemental environmental document (CEQA Guidelines Section 15163). A Notice of Preparation (NOP) for the DSED was circulated to interested parties on April 9, 2004. Following its release, a 45-day public comment period for the DSED ended August 12, 2004, as explained in the enclosed Notice of Availability (NOA).

This FSED is the fifth Supplemental Environmental Document (SED) 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, and the fourth FSED certified by the Commission in August 2002. As provided for by CEQA, the Department will continue to use this method of revising sections 163, 163.5, and 164, Title 14, CCR for a period of approximately five to ten years. After this period, or sooner if deemed necessary, the Department will prepare a new environmental document.

### **1.3 Scoping Process**

The Department invited interested parties to an in-season public meeting held on January 22, 2004 in San Francisco, San Francisco County, a Director's Herring Advisory Committee (DHAC)<sup>1</sup> Meeting on March 25, 2004 in San Francisco, two public meetings on April 13, 2004, one in Bodega Bay, Sonoma County, and the other in Sausalito, Marin County, and a DHAC meeting on April 30, 2004 in Sausalito to receive input on the proposed project and the content of the DSED. The Department also distributed a NOP to interested parties on April 9, 2004. This provided an opportunity for the concerns of responsible agencies and citizens to be addressed in the DSED.

### **1.4 Report Availability**

This FSED Document is available at the California Fish and Game Commission office in Sacramento, and California Department of Fish and Game Marine Region offices.

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<sup>1</sup> 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.

### **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 (Section 7050, California Fish and Game Code). It is also the State's policy to promote the development of local fisheries 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 (Section 1700, California Fish and Game Code, Appendix 1 of the FED).

The Legislature provides further policy direction regarding herring management in Sections 8550 through 8559, California Fish and Game Code. The State Legislature delegated authority to the Commission, whose members are appointed by the Governor, to regulate the commercial harvest and possession of Pacific herring (Section 8553, California Fish and Game Code). The remaining code sections 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 meetings each year prior to the Pacific herring commercial fishing season. These meetings will be held for the 2004-05 season on June 24, 2004 in Crescent City and August 27, 2004 in Morro Bay.

The authority to prepare a supplemental environmental document is given in Section 21166 of the Public Resources Code.

## **Chapter 2. PROJECT DESCRIPTION**

### **2.1 Project Objectives**

The proposed project, as defined in the Final Environmental Document (FED) certified by the Commission on August 28, 1998, is the regulation of Pacific herring 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 Pacific herring (sections 163, 163.5, 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, commercial fishermen, and from the Director's Herring Advisory Committee (DHAC). The California Fish and Game Commission (Commission) has legislatively-delegated authority to act on these recommendations.

Project objectives include (not ordered by priority):

- Maintaining healthy Pacific herring stocks in California;
- Controlling commercial harvest of Pacific herring to maintain a sustainable fishery;
- Providing sufficient Pacific herring to conserve living resources of the ocean that utilize herring as a food source; and
- Providing sufficient Pacific herring to support recreational take.

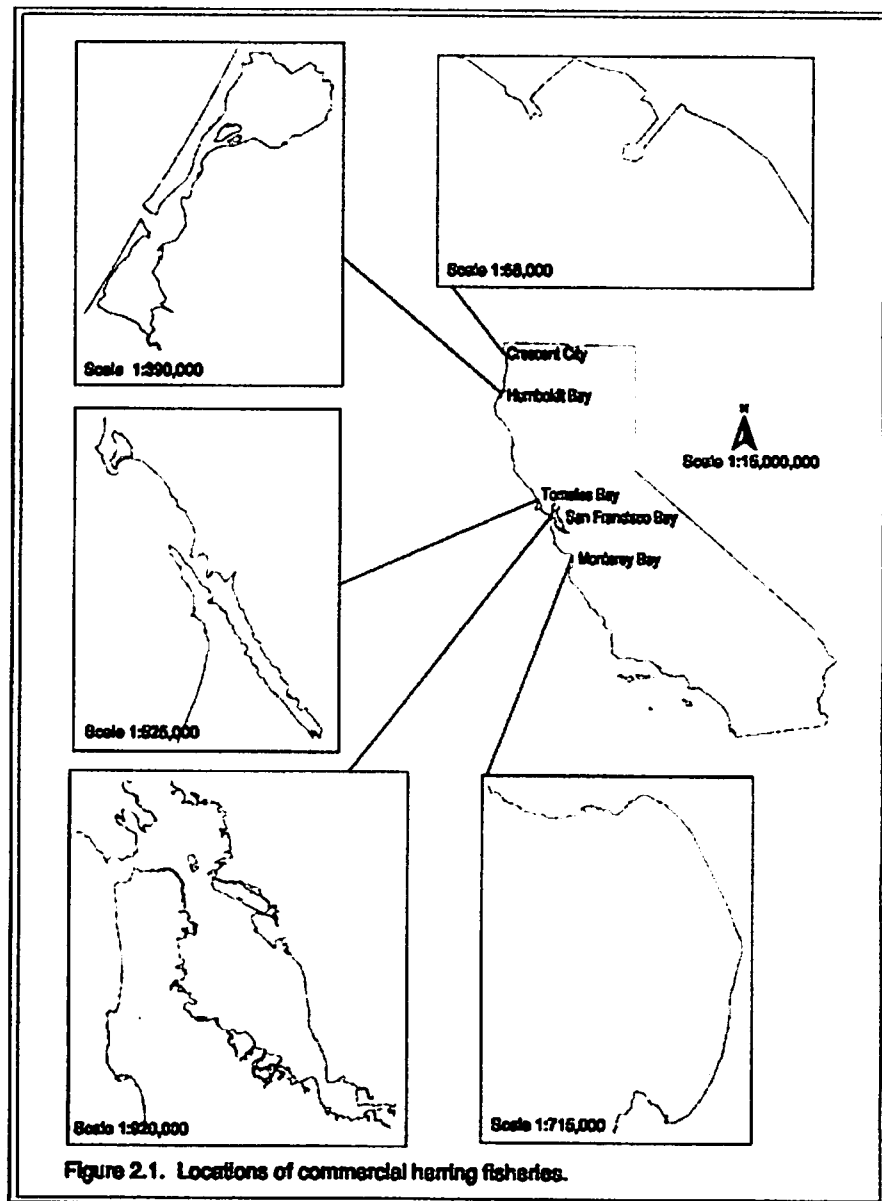
Under existing law, herring may be taken for commercial purposes only under a revocable permit, subject to such regulations as the Commission shall prescribe (Section 8550 California Fish and Game Code). Current regulations specify permit qualifications, permit validation requirements, permit limitations,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

The proposed project addressed by this FSED consists of amendments and changes to existing regulations for the 2004-05 commercial herring fishing season. The proposed project adjusts fishing quotas by area and gear type. Quota recommendations for San Francisco Bay and Tomales Bay are primarily based on the most recent assessments by the Department of Fish and Game (Department) of the size of the spawning populations of herring in those areas. Other proposed amendments and changes are intended to improve the efficient and orderly conduct of herring fisheries and the management of herring stocks.

## **2.2 Project Locations**

Permits have been issued for commercial herring fishing in five geographically distinct areas of the ocean and 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.





## **2.2.1 San Francisco Bay**

The proposed commercial herring fishing dates and quotas by location are as follows:

### **2.2.1.1 Roe Herring Fishery**

**Season:** 5:00 p.m. on December 5, 2004 until noon on December 23, 2004, and 5:00 p.m. on January 4, 2005 until noon on March 11, 2005.

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

Gill net permittees (DH) December 5-10, December 12-17, December 19-23, and, if necessary, after other platoons have reached their quotas, until the DH quota is reached or the last day of the season.

Gill net permittees (Even #) January 2-7, January 16-21, February 6-11, February 20-25, and March 6-11.

Gill net permittees (Odd #) January 9-14, January 23-28, February 13-18, February, 27 - March 4.

**Quota:** 3,440 tons

**Note:** The overall quota for the herring roe fishery will be reduced by transfers to the herring eggs-on-kelp fishery, and the fresh fish market quota (See Section 2.2.1.2 and 2.2.1.3)

**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 February 15 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, 2004 to March 31, 2005

**Quota:** An individual quota of 1.7 tons for transferred gill net permits, and an individual quota of 6.0 tons for transferred "CH" permits.

**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 herring eggs-on-kelp 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).

#### **2.2.1.3 Fresh Fish Market Fishery (not for roe purposes) San Francisco Bay**

**Season:** November 2 through November 15, 2004 and April 1 through October 31, 2005.

**Quota:** 20 tons, except that 10 tons total may be transferred to gill net permittees participating in research sponsored by the Department.

**Note:** No permittee may take or possess herring except in the amount specified on a current daily market order, not to exceed 500 pounds, from a licensed fish dealer.

**Area:** Same as the roe herring fishery.

### **2.2.2 Tomales Bay**

The proposed Department commercial herring fishing dates and quotas by location are as follows:

#### **2.2.2.1 Roe Herring Fishery**

**Season:** 5:00 p.m. on Sunday, December 26, 2004 until noon on Friday, December 31, 2004, and from 5:00 p.m. on Sunday, January 4, 2005, until noon on Friday, February 25, 2005.

**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 for roe purposes shall not exceed 400 tons for the season. However, if spawning escapement reaches or exceeds 4,000 tons prior to February 15, 2005, the quota shall be increased as follows: 1) if the spawning escapement is more than 4,000 tons, the total take of herring shall not exceed 500 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.

#### **2.2.2.2 Fresh Fish Market Fishery (not for roe purposes) Tomales Bay**

**Season:** November 2 through November 15, 2004 and April 1 through October 31, 2005.

**Quota:** 10 tons

**Note:** No permittee may take or possess herring except in the amount specified on a current daily market order, not to exceed 500 pounds, from a licensed fish dealer.

**Area:** Same as roe fishery.

### **2.3 Project Characteristics**

The proposed project recommends continuation of the existing regulations as modified by changes discussed below for San Francisco and Tomales bays. No modifications are proposed for Crescent City Harbor area, Humboldt Bay, and open ocean herring fisheries. These regulations, as amended, will assist in the control of the commercial harvest of herring at a level that meets the State's policy with respect to the use of aquatic resources. This section states the specific purpose of the regulations and summarizes the factual basis for the regulation.

The commercial roe herring and eggs-on-kelp 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 size of the spawning population of herring in San Francisco and Tomales bays (Sec 3.2.2.1, FED). These data serve as the basis for establishing fishing quotas for the following season.

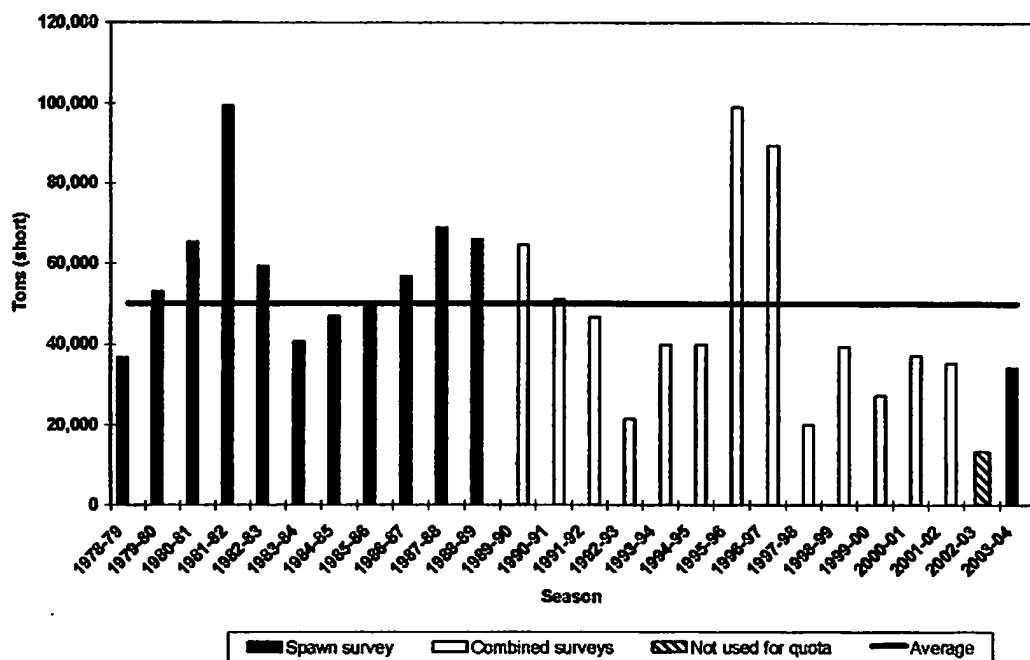
The principal regulatory changes proposed for the 2003-04 season included: a recommended closure for the San Francisco Bay herring fishery (Option 1 and the Department's preferred option) , resulting in a quota of zero tons, and a 300-ton quota for Tomales Bay. The Department also provided the Commission a second option of a fishery quota of 2,220 tons based on the lowest quota proposed in San Francisco during the past ten years, coupled with a shortened season (December 1, 2003 to February 13, 2004). The regulatory changes proposed for the 2003-04 season were approved, with Option 2 for a 2,200 ton quota and shortened season, by the Commission in August 2003.

Annual herring spawning population estimates from biomass surveys in San Francisco and Tomales bays have been conducted by the Department since 1973. Spawning ground surveys were conducted during the 1974-75, 1975-76, 1990-91, and discontinued following the 1991-92 in Humboldt Bay; surveys were

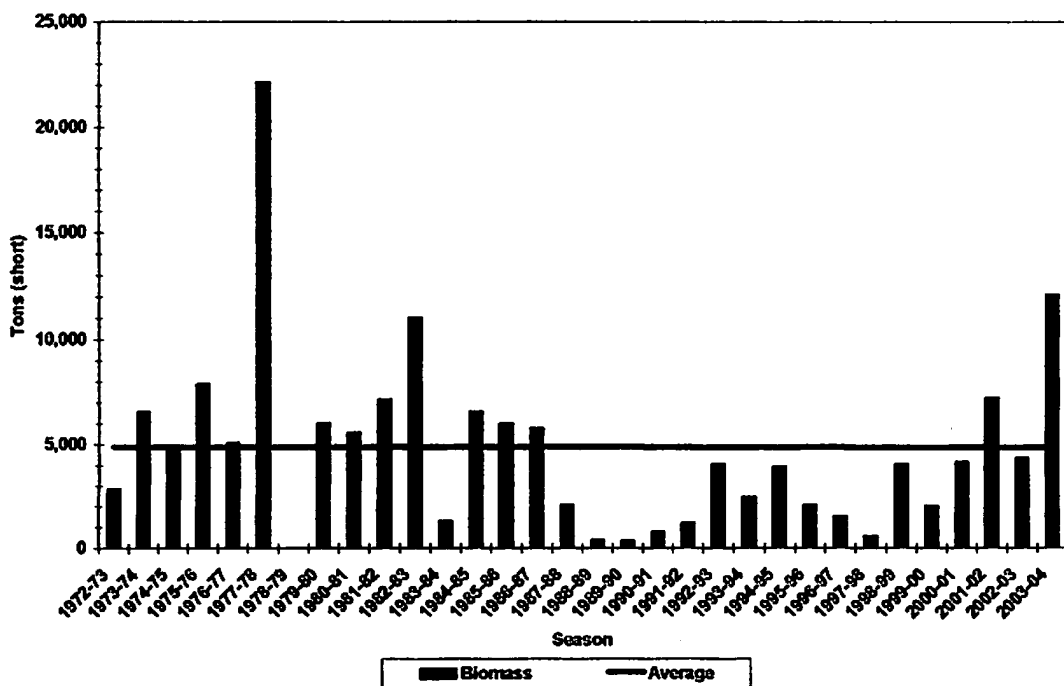
resumed beginning with the 2000-01 season. In San Francisco Bay, hydroacoustic and spawning ground surveys are used to estimate spawning biomass. In Tomales and Humboldt bays, spawning biomass estimates are based solely on spawning ground surveys. Hydroacoustic surveys use an echo sounder which transmits sound waves from a transducer on a boat and records reflected echoes to determine the size and density of fish schools (Section 3.2.2.1.2 of the FED). Spawning ground surveys assess the total number of eggs spawned and use this to calculate the parental population size (Section 3.2.2.1.1 of the FED).

From 1990 through 2003, the Department derived the spawning biomass estimate by meshing the results of the spawn deposition and hydroacoustic surveys. Beginning with the 2003-04 season, the Department is conducting hydroacoustic surveys, but primarily as a secondary assessment tool to the spawn deposition survey. Spawning biomass estimates for San Francisco and Tomales bays are shown in Figure 2.2 and 2.3, respectively. The Department does not conduct spawning biomass surveys in the Crescent City Harbor area.

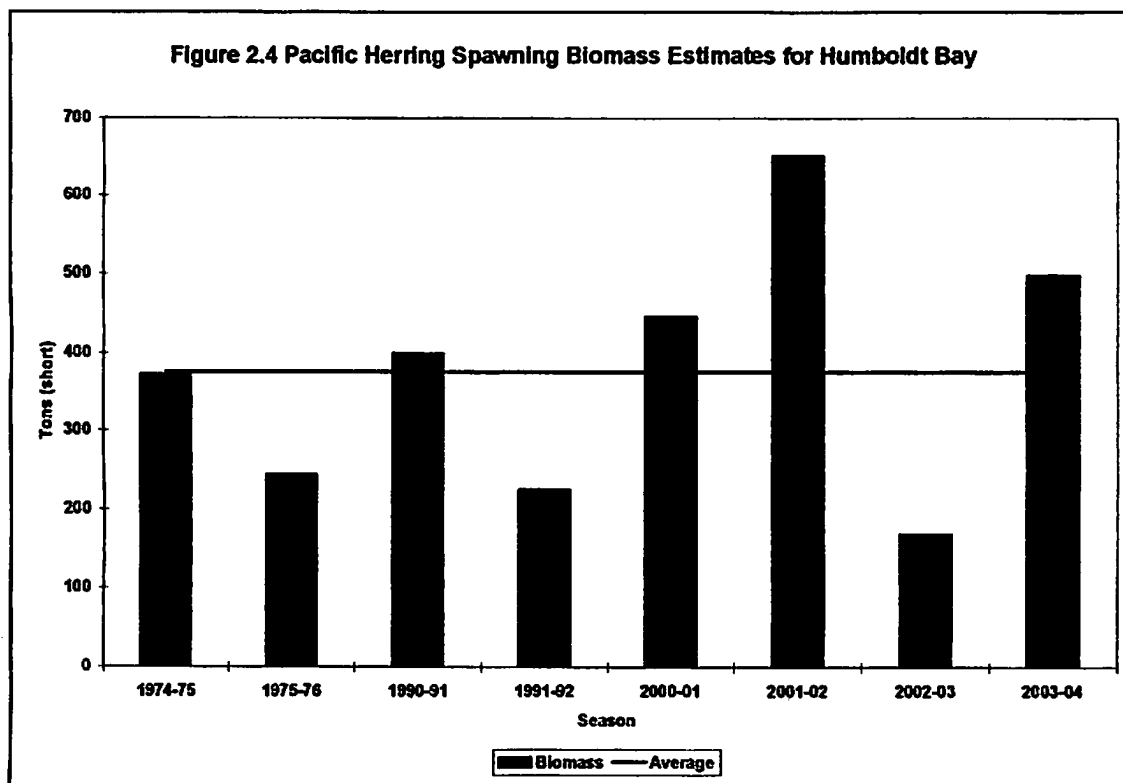
**Figure 2.2 Pacific Herring Spawning Biomass Estimates for San Francisco Bay 1978-2004.**



**Figure 2.3 Pacific herring spawning biomass estimates for Tomales Bay**



Note: No spawning biomass surveys were conducted in the 1978-79 season.



Annual roe herring fishery quotas are conservative and limit the total commercial catch to no more than 20 percent of the previous season's spawning biomass estimate. The previous season's biomass is considered the best available estimate of the quantity of fish returning the following season. This exploitation level was selected, based on computer model simulations developed by the Pacific Fisheries Management Council (Section 3.2.4 of the FED), to help ensure adequate protection of the herring resource and to provide for long-term yield of the fishery. Typically, exploitation rates of no more than 15 percent are recommended to prevent the 20 percent maximum harvest rate from being exceeded. Quotas are not determined by a fixed percentage; they are modified based on additional biological and fishery data collected each season, such as growth rates, strength and importance of individual year-classes, recruitment of incoming year-classes, and oceanographic conditions.



The 2003-04 spawning biomass estimate for San Francisco Bay is 34,400 tons, which is below the 27-year average of 50,071 tons. Landings from the San Francisco Bay roe herring fishery totaled 1,568 tons, 632 tons less than the 2,200-ton quota. This harvest level is 4.5 percent of the season's spawning biomass estimate. The 2003-04 estimate for Tomales Bay is 12,124 tons, which is a 177 percent increase from the 2002-2003 season, and it is the second largest in the history of the Tomales Bay fishery. Tomales Bay roe herring landings totaled 278 tons, 222 tons less than the 500-ton season quota, and 2.3 percent of the season's estimated spawning biomass.

The spawn escapement estimate for 2003-04 Humboldt Bay is 505 tons. This is close to a three-fold increase over last season's estimate of 167 tons and 158 tons higher than the eight year average from seasons when spawn deposition surveys were conducted in Humboldt Bay. The commercial Pacific herring landings were low for the 2003-04 season with 0.5 tons landed. This is the second lowest season recorded for the Humboldt Bay fishery. This harvest level is less than one percent of the season's spawning biomass estimate.

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, 163.5 and 164, Title 14 CCR, addressed by this FSED, reflect both Department and the public recommendations brought forward by the Department.

### **2.3.1 Roe Herring Fisheries**

#### **2.3.1.1 San Francisco Bay 2004-05 Quota**

The 2003-04 spawning biomass estimate for San Francisco is 34,400 tons (including catch), which is below the 27-year average of 50,071 tons. One of the Department's herring fishery management goals is to allow the harvest of age four and older herring and to avoid the harvest of two and three year old fish which are first time spawners. However, since the 1997-98 El Niño, the estimated numbers of age four and older herring which support the gill net fishery

have declined. There has also been an increase in the number of three year old herring in the catch.

The proposed quota for the 2004-05 San Francisco Bay herring fishery is 3,440 tons, representing 10 percent of the 34,400 ton estimated spawning biomass. A harvest rate of 10 percent will provide for a target for stock rebuilding and address the Department's concerns regarding the population size and age structure.

Within the overall quota in San Francisco Bay, separate quotas are established for each gill net platoon (i.e., December ("DH"), Odd, and Even platoons). The overall quota is divided among the three platoons in proportion to the number of permits assigned to them. Slight annual adjustments in the quota portions assigned for each platoon are needed to account for attrition of permittees and the use of sac roe herring permits in the herring eggs-on-kelp fishery.

#### **2.3.1.2 Tomales Bay 2004-05 Quota**

The Tomales Bay 2003-04 spawning biomass estimate is 12,124 tons, which is 177 percent more than the 2002-03 biomass estimate of 4,382 tons. This season's spawning biomass estimate is 199 percent greater than the previous eleven season average of 3,327 tons. During the 2003-04 season, the commercial gill net catch for the Tomales Bay herring fishery was below the maximum seasonal quota of 500 tons, and did not exceed the historic 300-ton initial quota. The 280 tons landed during the 2003-04 season was the fourth highest landing since the fishery was re-opened in the 1992-93 season, and greater than the 200 ton average catch in this period.

For the 2004-05 season, the Department proposes to set the initial Tomales Bay catch quota at 400 tons, which is 3.3 percent of the 2003-04 estimated spawning biomass of 12,124 tons. While the Department generally sets Tomales Bay initial quotas at 10 percent of the previous season's spawning biomass, the Department is in the midst of a mesh size study that allows permittees to use a gill net mesh size of 2 inches, which is smaller than the 2 ½

inch mesh allowed prior to the mesh size study. A proposed quota based upon 10 percent of the 2003-04 spawning biomass combined with unknown effects of the use of 2-inch mesh, dynamic oceanic conditions, and the historic fluctuation in the herring population, would not be consistent with the Department's conservative management strategy. The proposed one-year continuation of the mesh size study originally approved for the 2000-01, 2001-02 and 2002-03, 2003-04 seasons only, will allow the Department to continue to evaluate the effect of reduced mesh length on the size and age composition of herring caught in 2-inch mesh gill nets.

The Department's proposal also provides for an increased initial quota that reflects improvement in the Tomales Bay herring population, which has seen four consecutive seasons of above average (since the fishery was re-opened in 1992-93) spawning biomass. Since the fishery re-opened, the exploitation rate averaged 4.9 percent. The exploitation rate during this period has exceeded 10 percent twice, in the 1995-96 and 1996-97 seasons, at 17 percent and 14.7 percent. Since the implementation of the "one net per permittee" restriction, the Tomales Bay commercial catch has only exceeded 300 tons twice, during the 1995-96 and 2001-02 seasons. Despite an increase in the initial quota, the proposed initial quota of 400 tons provides a conservative starting point for next season. The quota has been set at an exploitation rate of less than 10 percent of the average spawning biomass since the fishery was re-opened in the 1992-93 season.

Due to the relative small scale of the Tomales Bay fishery, the Department has provisions in the regulations that allow for in-season quota increases should the spawning biomass support such increases. Refer to Section 2.2.2 of this FSED. The proposed regulations also contain provisions to increase the quota based on in-season estimates of spawning escapement. If the spawning escapement reaches or exceeds 4,000 tons prior to February 15, 2005, the quota shall be increased to a total take of herring which shall not exceed 500 tons for the season.

### **2.3.1.3 Humboldt Bay and Crescent City 2004-05 Quota**

The 2003-04 herring season marked the fourth consecutive year that spawning ground surveys and commercial fishery monitoring and assessment were carried out in Humboldt Bay since these surveys were discontinued following the 1991-1992 herring season. Spawn escapement for 2003-04 was estimated to be 505 tons, close to a three-fold increase above the 2002-03 season's estimate of 167 tons. The total spawning biomass estimate (spawn escapement plus commercial catch) was 506 tons, well above estimates from surveys conducted during the 1974-75, 1975-76, 1990-91, and 1991-92 seasons, which recorded a spawning biomass in Humboldt Bay of 372, 232, 400, and 225 tons, respectively. Spawn escapement data from current and historic surveys suggests that the Humboldt Bay spawning population can support the 60-ton seasonal quota established in 1983.

Despite the increase in spawning biomass the commercial Pacific herring landings were low for the 2003-04 season in Humboldt Bay with just over 0.5 tons landed. This is the second lowest season on record for Humboldt Bay, and just a fraction of the average total landings per year of 39 tons since 1983 when the current quota of 60 tons was set. For the last five seasons the average total landings per year was close to 20 tons with a range of 0.1 tons in 2000 to 61.2 tons in 2001. Although commercial landings in the Humboldt Bay herring fishery have been well below average the last two seasons, spawn assessments conducted by the Department during the same time period show that herring were entering the bay in schools to spawn. The 2003-04 spawn escapement estimate of 505 tons, if used as a basis for setting the Humboldt Bay fishery quota, would result in a conservative exploitation rate of 12 percent with a quota set at 60 tons. The average yearly spawn escapement from the last four spawn assessment surveys conducted since the 2000-2001 season is 417 tons. A 60 ton quota based on this average would result in a 14 percent exploitation rate, which would result in a conservative rate of harvest.

The Department does not conduct annual spawning biomass assessments in the Crescent City Harbor area. Although all permits are active,

no herring have been landed in the Crescent City Harbor area since the 2001-02 season. The Department proposes no changes to quotas for the Humboldt Bay or Crescent City Harbor area herring fisheries for the 2004-05 season. The proposed quota for Humboldt Bay and Crescent City are 60 tons and 30 tons, respectively.

#### **2.3.1.4 Season Dates**

Season opening and closing dates for San Francisco and Tomales bays, as well as the dates of various provisions of the regulations, are adjusted each year to account for annual changes in the calendar. The consensus of the DHAC, which met on March 25, 2004, was to recommend that the dates of the roe herring fisheries in San Francisco Bay be set from 5 p.m. on Sunday, December 5, 2004 to noon on Thursday, December 23, 2004 ("DH" gill net platoon only), and re-opened at 5:00 p.m. on Sunday, January 2, 2005. At the April 30, 2004 DHAC meeting the consensus was to set the season closing date at noon on Friday, March 11, 2005. The consensus among Tomales Bay permittees was to recommend opening at 5:00 p.m. on Sunday, December 26, 2004 until noon on Friday, December 31, 2004, and from 5:00 p.m. on Sunday, January 2, 2005 to noon on Friday, February 25, 2005. The season dates for the herring eggs on kelp fishery are December 1 through March 31 and do not change annually. The Department concurs with these recommendations.

#### **2.3.2 Herring Eggs-on-Kelp (HEOK) Fishery**

In addition to annual changes in the quota, 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 the DHAC. The proposed amendments to Section 164, Title 14 CCR reflect both Department and the public recommendations brought forward by the Department. These proposed amendments are discussed below.

#### **2.3.2.1 Definition of a Prior Permittee**

The HEOK permittees have requested that the requirement, as specified in subsection (f)(1)(b), that a person defined as a prior permittee participating in the herring eggs on kelp fishery suspend kelp for herring eggs on kelp fishing during the immediately preceding season be removed. This requirement was originally proposed by fishery participants to ensure that those participants who had a previously vested interest in the fishery be given priority in applying for a HEOK permit. The proposed amendment will still give priority to those with a vested interest in the fishery, while not imposing an economic burden to suspend kelp during seasons of poor fishing conditions. The proposed language has no negative effect to the resource. The Department supports the proposed amendment to subsection (f)(1)(b) to change the requirement to specify that a permittee must have renewed their herring eggs on kelp permit for the immediately preceding herring eggs on kelp season. The proposed change would also specify that the permittee must have submitted all fees from previous seasons.

#### **2.3.2.2 Definition of a Line Used in HEOK Fishing**

Subsection (j) defines a line used in HEOK fishing. The Department is proposing to further define a line with the requirement that floats or cork shall be attached over the entire length of line. The purpose of this requirement is to assist Department enforcement in identifying both the length of the line and the point at which it is attached to a permanent structure. The attached floats on the line will also prevent the line from becoming a hazard to navigation.

#### **2.3.2.3 Clarification of Requirements Regarding Brining HEOK Product**

Subsections (k)(5) and (k)(9) reference requirements in association with processing operations. The processing operations of specific concern are the brining of herring eggs on kelp product. Currently these subsections refer to "processing operations" and "processing". In order to clarify this requirement and remain consistent with subsection (e)(3) of these regulations, the Department is

proposing to amend these subsections to read "brining".

#### **2.3.2.4 Corrections and Clarifications**

The following changes are proposed to provide for the efficient operation and orderly conduct of the fishery, to improve the clarity of the regulations, and to provide for the protection of the resource:

- Revise the Herring Eggs on Kelp Permit Application number from FG 1406 (10/02) to FG 1406 (8/03).
- Specific language was added to subsection (i) for the 2003-04 season only. This language pertained to the proposed closure of the San Francisco Bay herring fishery for the 2003-04 season. This language pertained to the proposed closure of the gill net fishery for the 2003-04 season. The Department proposes removing this specific language as it is no longer relevant.

#### **2.4 Project Alternatives**

Three alternatives to the proposed project are considered. These alternatives were examined and detailed in the FED, 1998, and reexamined 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, alternative). Under this alternative, the commercial harvest of herring would be prohibited.
- Alternative 2 (existing regulations). 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 existing regulations for the commercial herring fishery are for the 2003-04 season. This alternative would apply those 2003-04 season regulations to the 2004-05 season, with changes in the quotas to reflect current biomass estimates and changes in season dates to reflect annual changes in the calendar. None of the other amendments to the regulations contained in the proposed project would be considered.

#### **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, *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 to Korea on the Asian coast (Outram and Humphreys 1974, Hart 1973). In California, herring are found offshore during the spring and summer months foraging in the open ocean. Beginning as early as October and continuing as late as April, schools of adult herring migrate inshore to bays and estuaries to spawn. Schools first appear in the deep water channels of bays to ripen (gonadal maturation) for up to two weeks, then gradually move into shallow areas to spawn. The largest spawning aggregations in California occur in San Francisco and Tomales bays which are near the southern end of the range for Pacific 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 ten days, determined mainly by water temperature. Larval herring metamorphose into juvenile herring in about ten to twelve weeks. In San Francisco Bay, juvenile herring typically stay in the Bay through summer, and then migrate out to sea. Where juvenile herring migrate to once they leave the bays and estuaries is not known.

Most of the herring fisheries occur during the spawning season. The roe herring or gill net fisheries catch adult herring as they move into the shallows to spawn, when the eggs are ripest. The product (called *kazunoko*) from this fishery is the sac roe (eggs) in the females which are 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.

The San Francisco Bay herring eggs-on-kelp fishery suspends giant kelp, *Macrocystis pyrifera*, from rafts for herring to spawn on. 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 also processed and exported to Japan. This product, *komochi* or *kazunoko kombu*, is served as an appetizer typically during New Year's celebrations.

The only existing ocean fishery for herring in California occurs during the non-spawning season in Monterey Bay. Landings from this fishery enter the aquarium food and bait markets. Small fisheries for fresh fish are also permitted during the non-spawning season in Tomales Bay and San Francisco Bay.

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 on herring eggs by birds and fish 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 of Fish and Game (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. Annual estimates of spawning biomass are made by the Department in Tomales Bay, and resumed recently in Humboldt Bay using spawn deposition surveys.

In San Francisco Bay, the Department estimated spawning biomass using spawn deposition surveys from 1974 through 1989; from 1990 through 2003 the Department estimated spawning biomass from a combination of spawn deposition and hydroacoustic surveys. For the 2003-04 spawning season, the spawning biomass estimate was derived from the spawn deposition surveys alone (See Section 3.3.1). In addition to the estimates of spawning biomass, the Department collects fishery independent age composition data from the population, as well as fishery dependent age composition from the commercial catch. All of the information collected by the Department, and information on ocean conditions, is used to assess the status of the population each year..

A thorough description of the environmental setting of California's Pacific

herring fisheries is provided in Chapter 3 of the 1998 Final Environmental Document (FED), which includes Pacific herring life history, ecology, status of stocks and fisheries at that time, and biological and environmental descriptions of herring fishery locations (Crescent City area, Humboldt Bay, Tomales Bay, San Francisco Bay, and Monterey Bay).

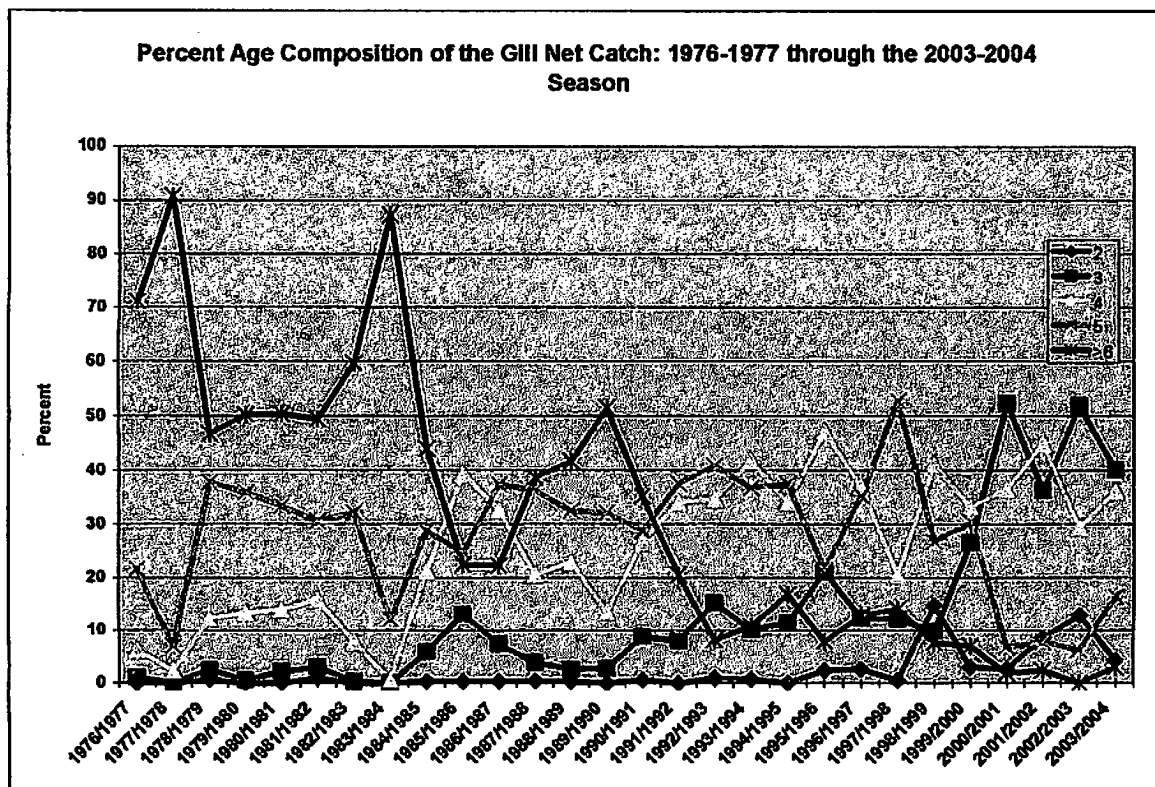
### **3.2 Status of the San Francisco Bay Spawning Population**

Following the 2002-03 herring season, Department biologists conducted a comprehensive review of the status of the San Francisco Bay herring population. The review included an analysis of several long-term data sets, some of which date back to the beginning of the roe fishery in 1973, including spawning biomass estimates, age composition of the population, age composition of the catch, length and weight at age, and environmental data. In addition, a stock assessment model, called Coleraine, was utilized to assess the status of the population. The Department's use of the Coleraine model and its results were subjected to an independent peer review, administered through California Sea Grant (Section 3.3.1). Three key indicators of a depressed stock, which have been developing over a number of years, were identified for the San Francisco Bay population:

1. Spawning biomass has remained well below the long-term average since the 1997 El Niño (Figure 2.2). Results of the Coleraine model indicate that the San Francisco Bay population has declined in size to roughly 20 percent of its unfished level.
2. Older ages (five years and older) are disappearing from the population (Table 3.1). San Francisco Bay herring have been aged as old as nine years in the past. Over time, the numbers of herring at age five and older have declined considerably; in the last several years virtually no herring aged seven or older have been found and the number of five and six year old herring are at very low levels. The decline in older ages has forced the gillnet fishery to increasingly depend on fewer and

younger age groups (primarily age four herring) to support it, resulting in higher fishing mortality on those younger age groups (Figure 3.1). Until the mid-1980s, more than 50 percent of the gillnet catch was comprised of age six and older herring; presently these ages are no longer supporting the fishery, falling well below 10 percent of the catch. In addition, age three herring, virtually nonexistent in the gillnet catch in the past, are being caught in increasing numbers in recent years. This is cause for concern as the Department's management strategy has been to avoid the harvest of age two and age three herring, many of which are coming into the bay to spawn for the very first time.

3. Recruitment of a strong year-class of herring to the population and fishery has not been observed since before the 1997 El Niño. With the decline of older age groups in the population, and the overall decline in the size of the population, the San Francisco Bay stock has needed strong recruitment to replenish the stock.



### **3.2.1 Peer Review of Age Structured Model and Survey Methods for San Francisco Bay**

Because the Coleraine stock assessment model (Section 3.2) had not been previously used by the Department to assess the status of Pacific herring, the Department requested an independent peer review of its use of the model through California Sea Grant. In addition, the Department requested that the peer review also evaluate the two survey methodologies (spawn deposition and hydroacoustic) used to estimate Pacific herring spawning biomass in San Francisco Bay. California Sea Grant assembled a panel of scientists with demonstrated expertise in modeling and assessing pelagic fish populations to provide the review.

In addition to reviewing the use of the Coleraine model, the peer review panel used two other models to assess the status of the San Francisco Bay herring population: an equilibrium surplus production model and a catch-age model used for Canadian herring management. Results of the three models were very similar. Reviewing model results and Department data, the peer review panel found that the San Francisco Bay herring population has been reduced to roughly 20 percent of its unfished level and is presently at or near its lowest abundance since the 1970s. The panel also found that the age composition of the catch has shifted over time towards younger herring. The panel recommended that a rebuilding policy be implemented. Other recommendations included: a re-evaluation of the harvest strategy, investigating the use of a threshold level for fishery closure, developing a specialized herring stock assessment model, and re-structuring the sampling program used in assessing age structure.

In reviewing the Department's biomass survey methodologies, the peer review panel found that the spawn deposition survey tends to underestimate biomass by about 10 percent and the hydroacoustic survey tends to overestimate biomass by about 20 percent. The panel found that the Department's method of combining the two surveys, which often involved using the higher of the two estimates on a school by school basis, has contributed to excessive quotas by

overestimating biomass. The panel recommended that the spawn survey be used as the primary index of abundance and as the biomass estimate for setting the fishery quota until an integrated catch-age model can be developed and verified for San Francisco Bay. They also recommended that hydroacoustic surveys be continued to support the location and timing of the spawn deposition survey in conjunction with sampling herring schools that are critical for collecting population age structure information.

### **3.2.2 San Francisco Bay Spawning Biomass Estimate and Age Structure**

The 2003-04 spawning biomass estimate is 34,400 tons including the catch. Based on the Department's continued concerns about the status of the San Francisco Bay herring population and the recommendations of the peer review panel, the biomass estimate for the 2003-04 season is based on the spawn deposition survey alone, rather than a combined estimate using both the spawn deposition and hydroacoustic survey estimates. Using the spawn deposition surveys alone represents a change in the Department's methodology, first implemented in the 1990. This change is being implemented by the Department as a conservative management measure.

The 2003-04 spawning biomass estimate for San Francisco Bay is 33.2 percent below the 27-year average of 50,071 tons. Thirteen spawning events, grouped into seven spawning waves, were documented in San Francisco Bay during the 2003-04 season. From these spawns, a total of 32,832 tons of spawn escapement (fish that spawned and were not caught by the fishery) was estimated. The gill net and herring-eggs-on-kelp fisheries landed 1,568 tons of herring, bringing the total spawning biomass estimate to 34,400 tons.

The first spawn was detected in late November in Richardson Bay and the last spawn occurred in mid-March in Richardson Bay as well. Spawns ranged in size from trace amounts to 11,161 tons. The majority of spawning biomass for the season occurred in February (11,546 tons, 33.6 percent) and January (10,805 tons, 31.4 percent), followed by March (10,565 tons, 30.7 percent), December (1,456 tons, 4.2 percent), and November (40 tons, 0.1 percent). Historically, the majority of

spawning on average has occurred in January, followed by December and February (Watters et al. 2004). Because older herring tend to be more abundant in the early part of the spawning season (Figure 3.6, 1998 FED), the shift in spawning biomass toward February and March during 2003-04 may reflect the younger age composition of the population.

One of the Department's fishery management goals is to allow the harvest of age four and older herring and to avoid the harvest of two and three year old herring which are entering the Bay to spawn for the first time. However, since the 1997-98 El Niño, there has been a decline in the estimated number of age four and older herring and a corresponding increase in the number of three year old herring in the catch.

The age composition of the 2003-04 San Francisco Bay population, based on current otolith readings, reflects a continued depressed age structure that has been observed since the 1997-98 El Niño season (Table 3.1). Age four, five, and six year-old herring remain far below long-term average numbers and percentages, while age seven and older herring, historically present in the population, were not found. Age three herring were below the long-term average in number but slightly higher than the long-term average in percentage, a result of the low numbers of older ages rather than high numbers of three-year-olds. Age two herring are not fully recruited to the spawning population (ie. not all age two herring spawn); therefore, their numbers are highly variable and are not a reliable indicator of year-class strength. The higher than average percentage of age two herring reflects the low numbers of older fish in the population, rather than high numbers of two-year-olds.

The age composition of the 2003-04 commercial gill net catch (Figure 3.1), based on current otolith readings, reflects the lack of older fish in the population and the fishery's increased dependence on young herring, particularly in recent years. Three-year-old herring, which historically have been a minor portion of the catch, were the most abundant age caught by the fishery in 2003-04, comprising 40 percent of the catch by number. This is cause for concern as the Department's management strategy has been to avoid the harvest of age two and three herring,



many of which are first time spawners. Four-year-old, comprised approximately 36 percent of the catch. Five-year-old herring, which historically have ranged between 20 and 40 percent of the catch, comprised 16 percent of the catch by number. Six-year-old herring, which were the most abundant age caught by the fishery in its early years, comprised approximately three percent of the catch in 2003-04, and 7-year-old and older herring, present historically, were not found in the catch.

**Table 3.1. Estimated Numbers (x 1,000) of Herring-at-Age in the San Francisco Bay Spawning Population, 1982-83 to present**

Age and Percent Composition																
Season	1	%	2	%	3	%	4	%	5	%	6	%	7	%	8	%
82-83	<sup>a</sup>	N/A	87,908	14.8	149,971	25.2	182,936	30.7	118,040	19.8	30,478	5.1	17,177	2.9	8,121	0.4
83-84	<sup>a</sup>	N/A	332,699	56.5	69,654	11.9	92,565	15.8	73,840	12.6	17,306	2.9	1,168	0.2	117	<0.1
84-85	<sup>a</sup>	N/A	184,695	38.7	190,998	40.0	46,613	9.8	22,153	4.6	25,914	5.4	6,652	1.4	688	0.1
85-86	<sup>a</sup>	N/A	162,422	32.4	160,613	32.1	126,535	25.3	26,780	5.3	16,038	3.2	7,752	1.5	717	0.1
86-87	<sup>a</sup>	N/A	168,962	29.2	194,365	33.6	134,528	23.2	64,598	11.2	9,182	1.6	6,175	1.1	1,065	0.2
87-88	<sup>a</sup>	N/A	233,193	30.6	292,508	38.3	136,604	17.9	66,494	8.7	25,337	3.3	5,027	0.7	3,939	0.5
88-89	<sup>a</sup>	N/A	146,525	25.8	222,058	39.0	139,906	24.6	44,435	7.8	12,310	2.2	3,030	0.5	534	0.1
89-90	<sup>a</sup>	N/A	294,631	37.6	237,377	30.3	136,248	17.4	84,361	10.8	23,970	3.1	6,572	0.8	0	0
91-92	1,356	0.3	13,666	3.0	126,016	28.0	206,930	45.2	82,870	18.1	23,764	5.2	3,490	0.8	0	0
92-93	0	0	48,925	20.5	50,398	21.1	79,045	33.1	51,713	21.7	8,642	3.6	0	0	0	0
93-94	11,485	2.6	22,403	5.1	134,870	31.0	160,335	36.9	63,331	14.6	25,926	6	4,808	1.1	355	0.1
94-95	2,276	0.5	39,363	9.0	236,783	54.1	94,833	21.7	42,850	9.8	18,223	4.2	3,196	0.7	0	0
95-96	3,142	0.3	483,164	38.9	359,357	29.0	282,069	22.7	81,768	6.6	28,904	2.3	1,687	0.1	0	0
96-97	1,184	0.1	290,497	29.1	359,459	36.0	183,370	18.4	120,029	12.0	33,098	3.3	8,935	0.9	270	<0.1
97-98	42	0.01	45,092	17.2	129,411	49.3	65,637	25.0	18,724	7.1	2,259	0.9	1,430	0.5	0	0
98-99	1,931	0.4	256,816	52.0	54,306	11.0	114,835	23.2	56,915	11.5	9,729	2	558	0.1	978	0.2
99-00	1,440	0.4	103,490	30.4	154,260	45.3	48,150	14.1	29,000	8.5	4,310	1.3	0	0	0	0
00-01	56,773	11.3	133,086	26.4	242,143	48.1	62,054	12.3	7,922	1.6	1,584	0.3	0	0	0	0
01-02	5,788	1.5	157,182	39.6	138,752	35.0	75,088	18.9	15,383	3.9	4,265	1.1	152	0.04	0	0
03-04 <sup>c</sup>	2,132	0.5	219,129	55.9	122,075	31.1	26,631	6.8	14,842	3.8	7,220	1.8	0	0	0	0
Mean <sup>d</sup>	7,296	1.5	171,192	29.0	181,269	35.1	119,746	22.0	54,303	9.3	16,423	2.8	3,890	0.6	838	0.1

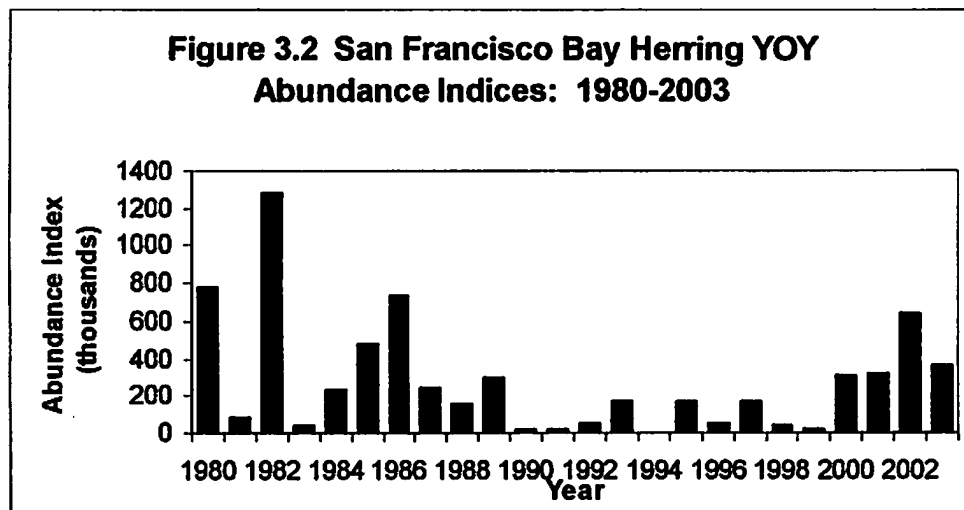
Note: 1990-91 season was not included due to incomplete data set for that season; 2002-03 season was not included because spawning biomass estimate unresolved.

<sup>a</sup> 1-year-olds were not estimated, <sup>b</sup> 9-year-olds were not estimated, <sup>c</sup> current otolith readings, <sup>d</sup> percentages are the average percentages for all years, not the percentage that the average number represents.

37,300

### 3.2.3 San Francisco Bay Herring Young of the Year (YOY)

Pacific herring young-of-the-year (YOY) are commonly caught by the Department's Central Valley Bay-Delta Branch San Francisco Bay Study (SFBS) during the spring and summer of each year. The SFBS conducts surveys at fixed stations to determine the abundance and distribution of invertebrates and fishes in the Western Delta and San Francisco Bay. Stations are sampled using a variety of research nets and other equipment, including a midwater trawl that is towed obliquely through the water column to capture species inhabiting varying depths. An index of abundance is calculated for YOY Pacific herring (Interagency Ecological Program Technical Report 63).



The herring young-of-the-year (YOY) abundance index for 2003 continues to show improvement over pre-2000 levels. The strength of the YOY indices for the 2000 to 2003 year classes may indicate favorable environmental conditions for YOY survival and growth within San Francisco Bay. They also indicate an increase in the availability of YOY herring as food to other species in the Bay. However, there is no predictive relationship between the YOY abundance index and the subsequent numbers of two and three year-old herring that return to spawn. Survival to first reproduction is affected by a number of factors during the first two to three years of life, including predation, food availability, and competition.

### **3.3 Status of the Tomales Bay Spawning Population**

The 2003-04 herring spawning biomass estimate for Tomales Bay is 12,124 tons, which is 177 percent more than the 2002-03 biomass estimate of 4,382 tons. This estimate is the largest since the re-opening of the Tomales Bay roe herring fishery in the 1992-93 season exceeding the average biomass since by 199 percent. It is the second largest spawning biomass estimate recorded since the Department began conducting annual population assessments in Tomales Bay following the opening of the fishery in the 1972-73 season (Table 3.2).

The Tomales Bay herring fishery was closed after a record low 167 tons of spawning escapement in the 1988-89 season, which followed several seasons of low spawning and herring abundance (Table 3.2). During the Tomales Bay herring fishery closure (1989-90, 1990-91, and 1991-92 seasons), fishing was allowed to continue in the outer Bodega Bay. The inner portion of Tomales Bay fishery re-opened for the 1992-93 season following improvements in spawning during the closed period; however, this recovery was not entirely attributed to recruitment of younger fish. Population data collected by the Department indicated that the increase in the numbers of older herring in Tomales Bay is most likely due to immigration to the Tomales Bay spawning population from other locations.

Since the 1992-93 season, spawning biomass estimates fluctuated after an initial increase and then declined to a post-closure low during the 1997-98 El Niño (586 tons) (Table 3.2). After the 1997-98 El Niño, the herring spawning biomass has shown a general trend towards improvement. Oceanic temperatures over the past few seasons indicate a cooling trend, which is often favorable to herring. The weak to moderate 2002-03 El Niño did not appear to negatively affect herring in Tomales Bay in 2003-04.

There were six spawning events during the 2003-04 season in Tomales Bay, which totaled an estimated 11,844 tons of spawning escapement. Twenty-five different spawning bed areas were utilized from December through March;

although, spawning was confined primarily to the southern half of Tomales Bay. Historically, eelgrass has been used as a primary spawning substrate for herring in Tomales Bay. During the 2003-04 season, spawn on *Gracilaria* spp. accounted for 72 percent of the total estimated spawning escapement. The density of *Gracilaria* spp. within most bed areas this season was greatly reduced; however, there was an increase in the total area of *Gracilaria* spp. distribution compared to the prior two seasons.

In January 2004, the Department recorded a significant spawning event south of Millerton Point. This is the first record of a significant spawn in this area in 30 years of spawn deposition surveying in Tomales Bay. The combination of increased abundance of spawning substrate, specifically eelgrass, in this area, and the lower local salinities produced by increased freshwater inflow from Lagunitas Creek, may have contributed to more favorable conditions for spawning.

Based on research catch data, the demographics of the spawning population in Tomales Bay changed in the 2003-04 season. Research samples are collected using gill nets with several mesh sizes, which are designed to sample a broader size range than commercial gill nets. The average size of herring in the research catch during the 2003-04 season was smaller than the 2002-03 season, 171.5 mm body length (BL) and 175.5 mm BL, respectively. There was a greater percentage of small fish (< 170 mm) in the population than prior seasons, indicating potentially good recruitment. However, there was also an increased percentage of larger fish (>200 mm) appearing in research catches than in recent seasons. The decline of larger, older herring in the Tomales Bay population had been a concern since the 1997-98 El Niño, and while lesser in extent, was comparable to the phenomenon observed in the San Francisco Bay stock (see Section 3.2).

Changes in the size composition were indicated in the samples taken from the commercial fishery in 2003-04. The mean length of herring sampled from the commercial catch in 2003-04 was also larger than last season, 191.1 mm BL and 188.1 mm BL, respectively. The mean length of commercially caught herring

surpassed the 190 mm BL mark for the first time in six seasons.

The Department is continuing a mesh size study for the Tomales Bay fishery. This study allows permittees to use a gill net mesh size of 2-inches, smaller than the 2 ½-inch mesh required by regulation. The Department is evaluating the effects of using 2-inch mesh on the age classes caught by the fleet to ensure that the younger fish ( $\leq$  3-year-olds) are not taken. Although there was an increase in the proportion of smaller fish in the population in 2003-04, the commercial catch was composed primarily of larger fish ( $\geq$  4-year-olds).

The population trends observed within the research and commercial catch data are desirable: the bulk of the population is composed of smaller fish ( $\leq$ 180 mm), but the majority of the commercial catch is supported by larger and older herring. Since the 1997-98 El Niño, the Tomales Bay herring spawning population has rebounded, due in part to favorable environmental conditions and low harvest levels. Recognizing that environmental conditions vary, the Department maintains a conservative fishery management strategy (closure of the outer bay fishery and conservative quotas) to help ensure the sustainability of the Pacific herring population in Tomales Bay.

**Table 3.2. Tomales Bay Herring Biomass Estimates 1972-73 through 2003-04 Season.**

<b>Season</b>	<b>Spawn Escapement (short tons)</b>	<b>Catch (short tons)</b>	<b>Percent Catch (Exploitation Rate)</b>	<b>Spawning Biomass (short tons)</b>
<b>Gillnet and Lampara Fisheries in Tomales Bay and Outer Bodega Bay</b>				
1972-73	2,265	598	26.4	2,863
1973-74	6,041	521	7.9	6,562
1974-75	4,210	518	11	4,728
1975-76	7,769	144	1.8	7,913
1976-77	4,739	344	6.8	5,083
<b>Gillnet Only Fishery - Tomales Bay and Outer Bodega Bay</b>				
1977-78	21,513	646	2.9	22,159
1978-79	—	448	—	— *
1979-80	5,420	603	10	6,023
1980-81	5,128	448	8	5,576
1981-82	6,298	851	11.9	7,149
1982-83	10,218	822	7.4	11,040
1983-84	1,170	110	8.6	1,280
1984-85	6,156	430	6.5	6,586
1985-86	435	771	12.8	6,000**
1986-87	4,931	867	15	5,798
1987-88	1,311	750	36.4	2,061
1988-89	167	213	56	380
<b>Tomales Bay Gillnet Fishery Closed - Fishing in Outer Bodega Bay Only</b>				
1989-90	345	0	0	345
1990-91	779	0	0	779
1991-92	1,214	0	0	1,214
<b>Tomales Bay Gillnet Fishery Opened - Fishing in Outer Bodega Bay Closed</b>				
1992-93	3,856	222	5.4	4,078
1993-94	2,244	219	8.9	2,463
1994-95	3,704	275	6.9	3,979
1995-96	1,704	355	17.2	2,059
1996-97	1,288	222	14.7	1,510
1997-98	586	0	0	586
1998-99	4,015	54	1.3	4,069
1999-00	1,969	42	2.1	2,011
2000-01	3,898	298	7.1	4,196
2001-02	6,889	354	4.9	7,243
2002-03	4,304	78	1.8	4,382
2003-04	11,844	280	2.3	12,124
<b>AVERAGE</b>	<b>4,400</b>	<b>359</b>	<b>9.5</b>	<b>4,911</b>

\* No herring fieldwork this season.

\*\*Biomass estimated by cohort analysis; for all other years, biomass was estimated from spawning-ground surveys.

### **3.4 Status of the Humboldt Bay and Crescent City Spawning Populations**

The spawn escapement estimate for the 2003-04 Humboldt Bay herring spawning season is 505 tons. This is close to a three-fold increase over last season's estimate of 167 tons and 158 tons higher than the 8-year average from seasons when spawn assessments were conducted in Humboldt Bay.

Four separate spawn events occurred in Humboldt Bay during the 2003-04 season. The first spawn detected was in the North Bay on January 4, 2004 and was estimated at 155 tons. The next spawn took place in the South Bay on or near January 22, 2004. Empty egg cases, along with soon-to-emerge larval herring, were found over a large area of eelgrass on the west side of the Bay. Because this spawn event was discovered too late for Department biologists to obtain an accurate estimate of egg density, spawn escapement estimates from this event are not included in the season total. Therefore, this season's spawn escapement estimate of 505 tons should be considered low by several tons. The next spawn event occurred on February 2, 2004 in the North Bay and was estimated at 187 tons. The last spawn detected this season occurred in the South Bay on February 4, 2004 and was estimated at 155 tons.

Due to the low numbers of herring landed during 2003-04 season the Humboldt Bay commercial catch was not sampled. Additionally, biological data is not available for the 2003-04 season since no herring were caught by Department research nets. However, during the 2002-03 season herring were available to Department biologists from both commercial and research nets. The mean size of herring sampled from the commercial catch was 200 mm BL (range 187-216 mm); 10 mm below the fourteen-year average of 213 mm between 1978-1992 when commercial landings were routinely sampled in Humboldt Bay. The mean size of herring from the Department's research net averaged 188 mm BL (range 139-223 mm) during the 2002-03 season, slightly above the mean lengths from the 2000-01 and 2001-02 seasons of 187 mm and 184 mm, respectively.

Commercial landings for both the 2002-03 and 2003-04 seasons were far below the 22-year average of 39 tons with 1.8 and 0.6 tons landed, respectively.



A long-time Humboldt Bay herring permittee attributed these low landings to a disproportionate amount of small herring entering the bay which were unavailable to commercial 2 ¼-inch mesh nets used in Humboldt Bay. Landing data from the Department's research nets appear to coincide with this observation, as approximately 81 percent (by number) of the herring caught during the 2002-03 season were captured in meshes two inches or less. Although commercial landings in the Humboldt Bay herring fishery have been well below average the last two seasons, spawn assessments conducted by the Department during the same time period show that a significant number of herring were entering the bay to spawn.

The 2003-04 spawn escapement estimate of 505 tons, if used as a basis for setting the Humboldt Bay fishery quota, would result in a conservative exploitation level of 12 percent with a quota set at 60 tons. The 60-ton quota was set in regulation for Humboldt Bay beginning in 1983. The average spawn escapement from the 2000-01 through 2003-04 seasons is 417 tons. A 60-ton quota based on this average would result in a 14 percent exploitation level, also considered to be a conservative harvest level.

The Department continued to work with University of California Sea Grant, Humboldt State University, and the Humboldt Bay Harbor District to monitor eelgrass (*Zostera marina*) biomass in Humboldt Bay. Agencies completed a full-year of sampling with 12 sample sites in both the north, central and the south regions of Humboldt Bay. Above-ground eelgrass biomass (fresh weight) for winter 2003-2004 had a mean of 0.48 kg/m<sup>2</sup> (range 0.29-0.97 g/m<sup>2</sup>), which is an increase of 24 percent from the winter 2002-2003 mean of 0.31 kg/m<sup>2</sup> (range 0.14-0.40 kg/m<sup>2</sup>). This data is essential for herring research and has greatly improved the accuracy of the season's spawning biomass estimate.

Spawning ground surveys and commercial fishery assessments were not conducted in the Crescent City Harbor area for the 2003-04 season. No commercial fishing effort occurred in the Crescent City Harbor area during the 2003-04 season. The 30-year average catch of 22 tons is below the 30-ton quota for this fishery. The Department does not plan to conduct spawning ground

surveys or commercial fishery assessments in the Crescent City Harbor area for the 2004-05 season.

### **3.5 Fishery Threshold**

The Department's continued concerns about the status of the San Francisco Bay herring population (Section 3.2) have led to renewed interest in establishing a threshold level below which fishery closure would be recommended. The concept of establishing a threshold for the San Francisco Bay fishery was introduced to the Director's Herring Advisory Committee (DHAC) in 1991. Development of a threshold was further discussed at the following year's DHAC meeting in 1992. This fishery management tool would provide objective criteria by which fishery closure would be recommended, in order to help rebuild the herring stock to a healthy level as swiftly as possible to reopen a fishery.

Threshold criteria currently being considered include: 1) a percentage of the long-term average total spawning biomass; 2) the lowest total spawning biomass from which the population recovered; 3) varying harvest levels with spawning biomass levels; and 4) a minimum level for the "catchable" based on the estimated proportion ("catchable biomass") level, rather than the total spawning biomass of the population exploitable by the gill net fleet. Other potential threshold criteria for fishery closure will be considered as Department research on the subject continues.

The long-term average spawning biomass estimate for the San Francisco Bay population since subtidal spawns were included is 50,071 tons (Table 3.3). A threshold based on 50 percent of this long-term average is 25,036 tons. In three seasons, 1992-93, 1997-98, and 2002-03, the spawning biomass dropped below this level. The Department proposed fishery closure for the 1993-94, 1998-99 and 2003-04 seasons to the Fish and Game Commission.

<b>Table 3.3 San Francisco Spawning Biomass Estimates: 1978 to present</b>	
<b>Season</b>	<b>Spawning Biomass Estimate</b>
1978-79	36,700
1979-80	53,000
1980-81	65,400
1981-82	99,600
1982-83	59,200
1983-84	40,800
1984-85	46,900
1985-86	49,100
1986-87	56,800
1987-88	68,900
1988-89	66,000
1989-90	64,500
1990-91	51,000
1991-92	46,600
1992-93	21,500
1993-94	39,900
1994-95	40,000
1995-96	99,050
1996-97	89,570
1997-98	20,000
1998-99	39,500
1999-00	27,400
2000-01	37,300
2001-02	35,400
2002-03	13,318
2003-04	34,400
<b>Average</b>	<b>50,071</b>

### **3.6 Areas of Controversy**

Several areas of controversy are outlined in summary section S.6 of this FSED. In particular, item numbers 7 through 9 are relevant for the 2004-05 season and have been of concern to the Department and the commercial herring industry for the past several seasons.

Item number 7, status of the herring population in San Francisco Bay, is discussed in detail in Section 3.2 above. The Department has been concerned about the status of the San Francisco Bay stock for several years. A below average biomass coupled with a lack of older age fish to support the commercial

fishery, as well as a lack of strong recruitment, underline the Department's concerns and point to the continuance of a conservative management strategy and the implementation of management measures to support rebuilding the stock.

Item number 8, change survey methodology for assessing the population, refers to the Department's decision to use the spawn deposition survey as the primary index of abundance and as the biomass estimate for setting the fishery quota until an integrated catch-age model can be developed and verified for San Francisco Bay (See section 3.2.1 above). Controversy surrounding this decision involves the opinion of some herring industry representatives that the Department is underestimating the spawning biomass. Given the Department's concerns regarding the status of the San Francisco Bay herring stock and the findings of the peer review panel regarding the tendency for overestimating when combining the two surveys, the Department believes that a more conservative approach is warranted in order to support rebuilding the San Francisco Bay stock.

Item number 9, mesh size reduction in San Francisco Bay, involves the long term opinion held by some members of the commercial herring industry that a smaller mesh size would enable the fishery to catch the quota more efficiently without catching a large proportion of younger age fish (age 3 and younger). As mentioned above in section 3.2.2, not all age classes are currently represented in the population (lack of older age class fish) and age 3 fish were the most abundant age caught by the fishery in 2003-04, comprising 40 percent of the gillnet catch. Three-year-old herring have comprised up to fifty percent of the catch in past seasons (Figure 3.1). The Department is concerned that a fleet-wide reduction in mesh size could further stress the already depressed San Francisco Bay stock. The Department does not support a fleet-wide reduction in mesh size at this time due to concerns regarding the condition of the stock discussed above.

## **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 the FED. The proposed project and two of the three alternatives will permit a continuation of the regulated commercial harvest of Pacific herring in California. An analysis of the impacts of the proposed project and its cumulative effects identified no new impacts that were not already addressed in the FED or in subsequent Supplemental Environmental Documents (SED).

Existing regulations permit the commercial harvest of herring in five geographical areas: San Francisco Bay, Tomales Bay, Humboldt Bay, the Crescent City Harbor area, and the open ocean. 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 five geographical areas and were not considered in the impact analysis. Potential impacts relative to the above categories were reexamined annually and addressed in the 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, and scenic, recreation, and noise 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.

Errors in stock assessments was identified as an area of controversy and addressed in detail within Chapter 5 of the FED. As presented in Section 3.2.1 in this FSED, the Department requested that the peer review include an assessment of the methodology used in formulating the annual season spawning biomass and resulting harvest level for the San Francisco Bay fishery. The reviewers concluded that a potential for overestimating the population existed when the higher of the two estimates was assigned on a spawning wave by spawning wave basis and recommended that the Department use the spawning escapement surveys to base harvest levels.

The Department followed the recommendation of the peer review panel consistent with its adaptive management strategy. The proposed quota for the 2004-05 San Francisco Bay fisheries is based solely on the results of the spawn escapement survey. 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 Pacific 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 identified and addressed impacts and cumulative effects of the proposed project on the existing environment described in Chapter 3 by the FED, subsequent SEDs, and this SED. No new impacts were identified that were not already addressed in the FED or prior SEDs. 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). The three commercial harvest alternatives were selected for consideration by the Fish and Game Commission (Commission) based on the Department of Fish and Game'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 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) reduce the health of stocks through density dependent competition between individual herring; (3) increase competition between species (e.g., sardines and anchovies) occupying the same ecological niche as Pacific herring and reduce standing crops of these species; (4) increase the availability of herring to predators by reducing search effort and increasing capture success; (5) 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; (6) 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 2003, were for the 2003-04 Pacific herring commercial fishing season. These regulations reflect the amendments as adopted by the Commission in August 2003. Under alternative 2, the only changes to the 2004-05 regulations would be to revise the herring fishing seasons, by location, and adjust quotas to reflect the 2003-04 biomass estimates determined by the Department. In most regards, the environmental impacts of alternative 2 will be similar to those of the proposed project. However, alternative 2 does not address problems or conditions that are addressed by the proposed project. Some of the changes and amendments in the proposed project address herring eggs-on-kelp fishery issues, or are simply clarification changes and are without apparent environmental implications.

### **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. 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.

#### **5.4 Proposed Project**

The proposed project, described in full in Chapter 2 of this Final Supplemental Environmental Document (FSED) is a body of recommended regulations governing the commercial harvest of herring for roe products, the harvest of herring eggs-on-kelp, and the harvest of herring for the fresh fish market, bait, and pet food. The proposed project is identified as the preferred alternative because it provides a set of regulations most likely to achieve the State's policy with respect to the conservation, maintenance and utilization of the Pacific herring resource.

## **Chapter 6. CONSULTATION**

Chapter 7 of the Final Environmental Document (FED) explains the role that consultation with other agencies, professionals, and the public plays in the Department's marine resource management programs.

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 2004-05 season with the Director's Herring Advisory Committee (DHAC) on March 25, 2004.

The Department's recommendations were modified, as necessary, based on the Committee's comments, and presented at public hearings on April 13, 2004. The public meetings also served as a scoping session for the content of the Draft Supplemental Environmental Document (DSED). A second DHAC meeting was held on April 30, 2004. The recommendations were again modified, as necessary, based on information and comments received during the public hearing, and the April 30th DHAC meeting. These recommendations will be presented to the Fish and Game Commission in August 2004.

Prior to preparation of the DSED, the Department initiated a broader consultation by distributing a Notice of Preparation (NOP) that announced the intent to prepare the document dated April 9, 2004. 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.

## **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 could submit statements in writing relevant to the environmental document until 5:00 p.m. on August 12, 2004, at the Fish and Game Commission office in Sacramento. Written and oral comments relative to the DSED were also solicited by the Commission at its August 6, 2004 meeting in Bishop.

### **7.1 Summary of Comments Received**

No oral or written comments regarding the DSED were received by the Department of Fish and Game (Department) during the public review period.

### **7.2 Department Responses to Comments**

Not applicable.

### **7.3 Copy of Letters Received**

No letters were received.

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