September 24, 2012

To: James Kellogg, President
California Fish and Game Commission
1416 Ninth Street, Room 1320
Sacramento, CA 95814

Dear President Kellogg and Commissioners:

On behalf of our members, Audubon California, Oceana, Earthjustice, Golden Gate Audubon, and Santa Clara Valley Audubon submit the following comments on the supplemental environmental document for the commercial herring fishery 2012-2013, and the Commission's proposed intent to amend sections 163 and 164, Title 14, California Code of Regulations, relating to the commercial herring fishery.

In the past year, we have interacted with the California Department of Fish and Game (CDFG) herring management team, as well as representatives of the commercial herring fleet, and found a high level of interest in protecting this fishery. Commercial fleet leaders are clearly concerned for the long-term health of the stock, and have implemented harvest quota reductions aimed at recovering the stock from historic lows in the late 1990's, among other actions. Recent modest recovery in estimated spawning biomass of herring may be at least partially attributed to these actions, as well as to favorable ocean and estuarine conditions. Regardless, there are several causes for alarm in the status and management of Pacific herring in California including:

- Persistent and worsening truncation of age structure in the stock, with almost no older fish remaining;
- Depressed stock biomass relative to past decades;

- Absence of a Fisheries Management Plan (FMP) under the California Marine Life Management Act (MLMA), which would provide clear objectives for herring management or reference points from which to evaluate stock recovery or sustainable management;
- Lack of monitoring herring stocks in areas open to commercial harvest outside of San Francisco Bay;
- No clear or explicit accounting for the needs of herring-dependent predators when setting sac roe harvest quotas;
- Violations of the California Environmental Quality Act (CEQA) including a confusing and non-transparent management structure that discourages or prevents informed public input; and
- Inadequate support by the state for the Department's herring team.

While these concerns raise serious questions about whether any commercial herring fishing is warranted at this time, we acknowledge the precautionary actions taken by the Commission, the Department, and the industry and support a harvest of no more than 5% of estimated biomass, contingent on demonstrated continued recovery of the stock. However, we urge the immediate re-initiation of an FMP for this fishery and will strongly oppose any quota increases above 5% until the stock shows signs of recovery and management inadequacies are resolved.

Fortunately, there are clear and unique opportunities to reshape the future of the herring fishery, particularly in light of the "blueprint" for forage species management now before the Commission. This comment provides a review of the importance of herring to California's marine wildlife, explanation of areas of concern, and constructive recommendations and opportunities for improvement.

Forage Species - the Foundation for Marine Predators

Forage species are the primary driver of marine predator distribution and abundance and the growing threats to their viability underlie the many scientific review papers, management recommendations, and policy changes recently initiated or completed at state and federal levels. In 2012, the Lenfest Forage Fish Task Force, comprised of 13 of the world's leading fisheries biologists and marine scientists, released a comprehensive examination of the science and management of forage fish populations, calling for the need to dramatically reduce harvest levels to protect predators, including large fish, seabirds and whales.[1] Another 2012 review published in *Science* documented the consistent and significant negative response of marine birds to depletion of primary forage species in seven discrete marine ecosystems.[2]

These findings, among others, have supported significant new policy changes in forage species management on the west coast. In June 2012, the Pacific Fishery Management Council voted to "prohibit the development of new directed fisheries on forage species that are not currently managed."[3] In California, the Fish and Game Commission's Marine Resource Committee recently agreed to language for a state forage policy and also to bring the draft policy to the full Commission for adoption. This policy would prevent the expansion of existing state-managed fisheries on forage species, and prevent new directed fisheries on forage species.[4]

Pacific herring stocks, found in the northern Pacific from Japan to Baja California, are foundationally important for marine wildlife. Many large fish, birds and marine mammals feed preferentially on energy-rich and highly exploitable herring and their roe, including special status species and salmonids. Fortunately, estimates of the energetic demands for a number of marine species are now available and could be used to assess the amount of herring needed to sustain marine predator populations.

The Importance of Pacific Herring to Birds and Other Wildlife in California and the Northwest Pacific

Marine areas off central and northern California are some of the Pacific's most important areas for marine wildlife. This region attracts and retains a high density of whales, pinnipeds, turtles, large fish, and birds.[5] The region is hemispherically important for marine birds, with the largest seabird colony south of Alaska (the Farallon Islands), rich at-sea foraging grounds (Monterey Canyon, Farallon Escarpment and Cordell Bank), and the most important wintering areas for sea ducks and other Pacific waterbirds (San Francisco and Tomales Bays).

Pacific herring are known to spawn in at least 13 sites in California (Figure 1). Many predators feed preferentially on herring. Spawning events generate a feeding frenzy on herring eggs by ctenophores, juvenile salmonids, sturgeon, smelt, surfperches, crabs and at least 20 species of birds. Adult herring are prey for salmon, seals, sea lions, seabirds, porpoises, dolphins, orcas, humpback whales, salmonids, lingcod, several species of rockfish, and sand sole. Within San Francisco Bay, herring provide forage year-round, in the form of eggs and juveniles.[6]

The following is a summary of some of the information available regarding the dependence of key predator species on herring.

<u>Salmonids</u>

Salmon rely on a diverse array of prey resources that fluctuate in abundance and distribution depending on ocean climate, fisheries pressure and interspecific competition. Chinook salmon, an important commercial species in central California, has suffered dramatic population declines in recent years prompting multi-year closures of the commercial fisheries and displacement of fishing communities. Currently, over 200 salmon runs in the California and the Pacific Northwest are at "varying degrees of the risk of extinction in the near future" due to a combination of factors including reduced food availability.[7]

Herring is one of the most important prey items of Chinook salmon in central California, along with anchovies, sardines and jack mackerel.[8] Chinook salmon feed preferentially on herring in offshore areas.[9] There was a dramatic decline of herring in Chinook salmon diet in central California over the last half century. In 1955, herring comprised the majority of California Chinook salmon diet in the late winter and spring (February, March and April) with significant pulses also in summer. In 1980-1986, herring was a minority of Chinook salmon diet in late winter/spring, although summer pulses were still evident at similar levels. Winter/spring was not sampled in 2005-2007 but herring was undetectable during the summer period when herring had previously comprised 10% of salmon diet.[10] Concurrently, stocks of anchovies in southern California, and stocks of sardines coast-wide, have declined.[11] This overall reduction in prey availability and diversity has "likely contributed to reduced and more variable Chinook salmon abundance and return rates."[12]

Marine mammals

The 1998 Final Environmental Document (FED) and subsequent Final Supplemental Environmental Documents (FSEDs) lack any information on the status and energetic needs and prey preferences of marine mammals in California. The FED simply states that "California sea lions specialize on schooling, open-water fishes … and may be one of the most significant of the mammalian predators of herring in California…. all of the smaller cetaceans are likely to be herring predators. Among the larger cetaceans, minke whales, humpback whales and fin whales are known to be fish eaters."

In reality, herring are a critical component of the diet of whales and pinnipeds, including the federally endangered humpback whale and the federally threatened Steller sea lion. Examples of recent studies on a few of these species, referenced below, show that many of these predators feed preferentially on herring, and this predation can have a strong impact on herring stocks.

Humpback whale (Megaptera novaeangliae) The humpback whale population in the northeast Pacific has increased by approximately 5% per year for the last 20 years, requiring a larger share of forage species than in previous years. The California and Oregon population quadrupled from 1990 to 2008 and is now estimated at 2,043 individuals.[13,14] The population of 2,043 humpback whales in California and Oregon requires approximately 817 tons of food per day (0.4 tons/day/whale/2043 whales).[15,16]

While studies of humpback whale diets off the US west coast are lacking, studies in southeast Alaska (Prince William Sound, Sitka Sound and Lynn Canal) have demonstrated the profound effects humpback whales have on herring spawning biomass. Herring is the most important prey item for humpback whales at all three sites but not in all months (Figure 2). In the most affected area, Prince William Sound, a population of 81 (2007-2008) and 147 (2008-2009) humpback whales removed an estimated 10-70% of herring biomass. According to these studies, "Whales foraged in large numbers (81-147 individuals) over much of the fall and winter in Prince William Sound resulting in significant predation intensity. In absolute terms, whales potentially consumed between 2,639 and 7,443 tons of herring in 2007-2008. This represented a predation intensity of 27% to 77%. In 2008-2009 whales potentially consumed between 2,362 and 12,989 tons and predation intensities ranged between 11% and 63% of the total biomass present in spring 2008. For comparison, the last harvest of herring from Prince William Sound was 3,904 tons in 1998- approximately 20% of the spawning biomass."[17]

These studies hypothesize that disruption of herring schools by foraging whales makes herring available to other predators with limited diving abilities, and that the disruption of herring's formation of overwinter schools by foraging humpback whales facilitates foraging of Steller sea lions, seabirds, and other pelagic predators for which the deep overwintering herring schools would otherwise be relatively inaccessible. Seabirds and pinnipeds associate with whales and capitalize on whale foraging efforts during the winter months.[18] Overall, the Alaska studies have shown the profound importance of herring to humpback whales.

Steller sea lion (Eumetopias jubatus): Steller sea lions are recovering in Washington and Alaska, but failing to recover in central and southern California, where the population declined between 1982 and 2002 and is now estimated at 4,000 individuals.[19] Two important rookeries occur at Ano Nuevo and the Farallon islands. There is no published information on Steller sea lion diet in California, but in southeast Alaska herring is the most common prey item.[20] In southeast Alaska, Steller sea lions make high energetic investments to locate herring schools. One study notes that "abundant quantity and presence of some high quality prey (salmon, herring and eulachon) likely sustains the increasing population in southeast Alaska."[21] The population of 4,000 Steller sea lion in central and northern California requires 78 tons of food each day (calculated using calorie content of herring and hake).[22,23,24,25]

California sea lion (Zalophus californianus) and harbor seal (phoca vitulina): The U.S. population of California sea lions increased 6.5% per year from 1983-2003, and may now be stabilized at about 238,000 individuals.[26] California sea lions in central California (Hurricane Point to Ano Nuevo Island) in 1999, numbering about 18,000 individuals, consumed about 8-10% of the sardine stock.[27] There are an estimated 34,233 harbor seals in California, which are known to target herring spawning aggregations or juvenile herring.

The 1998 Final Environmental Document (FED) and subsequent Final Supplemental Environmental Documents (FSEDs) lack any information on the energetic needs and prey preferences of marine mammals in California. The FED simply states that "California sea lions specialize on schooling, open-water fishes … and may be one of the most significant of the mammalian predators of herring in California…. all of the smaller cetaceans are likely to be herring predators."

<u>Birds</u>

Herring and their roe provide a persistent, energy-rich, and aggregated food source for a wide suite of bird species. Adult herring are consumed by many birds along the coastline, including Brandt's and double-crested cormorants, brown pelicans, western grebes, terns, gulls and loons. In San Francisco Bay, young-of-the-year herring are also an important component of the diet of the endangered California least tern. Off the coast, marine birds including shearwaters, cormorants, common murre, auklets, puffins, marbled murrelet, and brown pelican feed on adult herring.[28,29] In Prince William Sound, herring comprise approximately 50% of the prey volume of black-legged kittawakes and this species actively seeks out herring while foraging.[30]

Many other species specialize on herring roe, which is thought to substantially increase winter survival rates for birds that have access to this food resource. In British Columbia, aggregations of 50,000-300,000 waterbirds, including gulls, sea ducks, and other diving species, have been observed at herring spawning events. Pacific sea ducks are more dependent on herring than any other taxa of birds. For example, harlequin ducks aggregate in British Columbia only when feeding on herring spawn [31] and long-tailed ducks [32] and Steller's eiders [33] seek out and preferentially feed on herring roe.

Scoters in particular are highly dependent on herring roe for overwinter survival and breeding success. Scoters dramatically alter their movement and habitat use patterns in spring to take advantage of ephemeral and energy-rich herring roe, suggesting that this food resource is of particular importance to these species.[34,35] Surf scoters have declined by 50-60% in the last 50 years[36] while greater and lesser scaup, two other diving ducks that depend on herring roe, have declined by 15%.[37] From southeast Alaska to California, the spatial extent of herring spawning has declined and in British Columbia waterbirds aggregate at increasingly fewer spawning sites.[38]

San Francisco Bay is a global Important Bird Area, supporting 50% of the wintering sea ducks along the Pacific Flyway (Alaska to Baja). This is in part because San Francisco Bay supports an estimated 90% of California's remaining herring stock,[39] which provides critical overwinter nutritional support for at least 20 species of waterbirds, including all members of the scoter group. San Francisco Bay supports about 50% of the total Pacific population of surf scoters and 40% of the total population of greater and lesser scaup.[40]

Among other reasons, San Francisco Bay is critically important for waterbirds because of the spatially consistent and predictable foraging hotspots where herring spawn. Most herring spawning in San Francisco Bay takes place in greater Richardson Bay and to a lesser extent at Point Richmond. (see Figures 3a and 3b, showing CDFG herring team sampling locations in recent years that also represent the locations of major spawning events.) The vast majority of commercial herring catch originates in greater Richardson Bay (Figure 4), an area known to strongly attract and retain waterbirds. There is a winter seasonal closure on 900 acres of subtidal area leased by Audubon California and administered by the Richardson Bay Audubon Center. In most years 38 species of wintering waterbirds occur here, and in recent years, up to 9,300 waterbirds, including a high of 126 surf scoters, have been observed here.[41] This overlap of a critical wintering waterbird site and commercial fishing activity should be explicitly considered in management, as there is a potential for interference competition at these consistent foraging hotspots. Similar considerations exist for Tomales Bay, an Important Bird Area for waterbirds.

Other taxa that tend to forage on prey other than, or in addition to, herring shed light on the high volume of prey consumed by apex predators:

- In British Columbia, total annual consumption of herring by 13 predators averaged 61,000 tons from 1973-2008. This is over 25% of the estimated maximum carrying capacity for herring in British Columbia.[42]

- The common murre population between Cape Blanco and Pt Conception, numbering ~1.5 million birds, requires over 170,000 tons of prey pre year, primarily Market squid, shiner surfperch, midshipman, rockfish, anchovies, sardines and herring.[43]

Pacific Herring Are in Decline and California's Stocks Are Stressed or Unassessed

The San Francisco Bay stock, where commercial fishing activity still takes place, is manifesting signs of stress in the form of severe age class truncation, low biomass, and reduced size at age.

<u>Age Class Truncation</u>
The severe age class truncation of Pacific herring shows no sign of improvement, despite several years of improved biomass after historic lows in 2006-2009. Eight-year-old fish disappeared after 1982-1983, seven-year-olds disappeared after 1998-1999, six-year-olds disappeared in 2010-2011, five-year-olds were almost undetectable in 2010-2011, and four-year-olds were at or near historic lows in the three seasons starting in 2008-2009 (Figures 6a and b). Age-class truncation is a well-documented sign of stress in fish stocks.[44]

The 2011-2012 FSED (which also serves as FSED for 2012-2013 commercial season) notes that:

"The numbers and proportion of older herring remain well below historical averages and is of concern because these older fish historically supported the commercial fishery. The successive cohorts that would normally support a commercial fishery (herring age four, five, and six), have shown poor survival. Low survival of these older age classes places additional burden on abundant cohorts like the 2007-08 year class to support the San Francisco Bay fishery and to fulfill the ecosystem role of herring. This is the primary reason the Department recommends a five percent quota for the commercial herring fishery."

This trend has also been observed in Tomales and Humboldt Bays. While discussing a downward trend in landings relative to harvest quota for Humboldt Bay, the 2005 FSED notes that "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-in. mesh nets. Landing data from the Department's research nets appear to support this observation as approximately 91 percent (by number) of the herring caught during the 2004-05 season were captured in meshes 2-in. or less." Humboldt Bay stocks have not been assessed since 2005-2006.

The Department does not offer an explanation for state-wide age class truncation, nor a plan for addressing the cause and improving age structure in this population. One possibility is that predators may be consuming the majority of the older herring[45] that tend to occur on the continental shelf and outer coast.[46]

In addition to the age-class truncation reported in the FSEDs, CDFG notes that "more two-year-olds are sexually mature, and more fish are smaller-at-age than in past years." [47] This important detail, an indicator of stressed stocks in schooling pelagic species,[48] is not reported in the FSEDs.

Reduced Biomass

The Department has characterized the stock as "recovering" despite the lack of significant improvement in biomass between 2010-2011 and 2011-2012 (~57,000 tons and ~61,000 tons, respectively).(Figure 6c) It is notable and worrisome that highly favorable ocean conditions in 2009-2010 failed to support strong recruitment of two-year-olds in 2010-2011. Also, the Department measures recovery against estimated spawning biomass from the early 1970s. This is not an acceptable historical baseline against which to measure recovery, considering that the 1970s were years of heavy over-exploitation when quotas approached or reached 20%. It is, rather, a shifting baseline nested in a long-term declining trend; for example, in 2007 the average historic biomass was 52,302 tons, in 2011 it was 49,327 tons. Again, this highlights the need for estimates of unfished biomass and reference points based on best estimates of abundance prior to fishing pressure.

The 2007 FSED is the last in which Tomales Bay, Humboldt Bay, Monterey Bay and Crescent City are included in the Environmental Setting. The Department ceased survey work in these areas following the 2005-2006 season. Regardless, the Commission continues to authorize substantial commercial fishing in these areas.

Tomales Bay: This site was historically the focal point for herring harvest in the greater Bay Area, with periods of heavy fishing to supply a canned fish market in California and the overseas herring roe market. Herring stocks declined nearly 20% in Tomales Bay from 1972-2005 and show a clear declining trend between the first and second half of this 33-year time period (Figure 7). The last year that estimated biomass exceeded 5000 tons was in 1986 and prior to that biomass estimates were as high as 22,000 tons. The 1993 to 2006 average estimated spawning biomass in Tomales Bay was 3712 tons.[49] Yet, the Commission has been authorizing a 350 ton quota, almost 10% of the estimated current standing biomass.

Humboldt Bay: From 1974 to 2007 average herring biomass estimates for Humboldt Bay averaged just under 400 tons (Figure 8) and returns have weakened noticeably since 2000. The last biomass estimate for Humboldt Bay was seven tons in 2007, the year of near-historic low returns in San Francisco Bay. Trends in biomass for Humboldt Bay were nearly the reverse of those observed in San Francisco Bay, with strong returns in the mid-1990s when San Francisco Bay stocks were depressed and poor returns in the mid-2000s when San Francisco Bay stocks were stronger. The Commission is authorizing a quota of 60 tons for Humboldt Bay; this is eight times the total biomass from the Department's assessment in 2007. Sixty tons is also 15% of the average biomass estimate of 400 tons since 1974.

Crescent City: The FED and FSEDs do not appear to contain information on stock assessments conducted in Crescent City. The 1998 FED contains a map of the coastal area open to commercial fisheries and the Commission has authorized a 30 ton quota for this area, despite a lack of information on spawning biomass.

Monterey Bay: From 1947 through 1972, landings of herring caught on the coast in Monterey Bay normally exceeded that of San Francisco Bay, with a high of 2951 tons caught in 1952 (Figure 9). This stock is no longer assessed, open ocean fishing is no longer allowed, and there is no information available on current spawning areas of herring in the region of Monterey Bay. The FED notes that spawning historically occurred in Elkhorn Slough, also an Important Bird Area.

<u>Stochastic events</u>
Management of the herring fishery must take into account the stochastic nature of herring productivity, as well as the cumulative effects of the fishery with other natural and anthropogenic stressors. In particular, a major goal of herring management should be to maintain the resilience of the stock in the face of unexpected events. In 2007, the container ship Cosco Busan released 54,000 gallons of bunker fuel oil into San Francisco Bay, causing unexpectedly high mortality in Pacific herring embryos and contributing to recent population declines. Ultimately, the effects of fishing pressure and this type of event are cumulative, rather than separate effects, as a healthier herring stock is more robust to unexpected impacts than an already depleted one.

Management Deficiencies

<u>Insufficient grounds for finding of No Significant Impact</u>

FSEDs (generated from 1999-2000 to 2011-2012) fail to adequately describe herring predators (Affected Resources) in central California, and their energetic needs relative to herring, and therefore provide insufficient grounds for findings of No Significant Impact.

The FED contains general information on herring predators in central and northern California, but is outdated and lacks detail on current status and dietary requirements in the context of herring abundance (described in part above) that should inform a consideration of significant impact. Subsequent FSEDs contain approximately one page on the role of herring as forage, and fail to include current, updated or additional information. For example, the FED, in its finding of No Significant Impact on birds and marine mammals, states that "direct feeding by birds on herring roe has only been reported in the ornithological literature as a limited or incidental, late-winter activity... mitigation in recognition of the importance of herring as a forage item for birds is provided by setting conservative exploitation rates … no additional mitigation is proposed for impacts to bird (and marine mammal) populations because they are expected to be localized, short-term and less than significant."

This 1998 finding, approved each year in FSEDs through the certification process, fails to take into account new information on the importance of herring and roe to ducks, seabirds, marine mammals and salmonids. The FED and FSEDs conclude No Significant Impact without attempting to acknowledge or account for the energetic requirements of herring-dependent scoters, or the status of many other predators of herring in central California, such as whether these predators are able to feed on alternative prey sources, the availability of those alternative prey sources, or the consequences of feeding on prey with lower energy density than herring.

These documents also define a conservative exploitation rate as up to 20% of estimated biomass, for which there is no clear justification or evidence. Recent scientific studies of forage fish fishing strategies demonstrate that traditional concepts of "conservative exploitation rates" for single species can cause widespread impacts on predators and include recommendations that fishing rates do not exceed ½ of FMSY levels and that management plans utilize "hockey stick" harvest rules where at least 40% of unfished biomass is set-aside. These studies represent the best available science and call for significantly revised definitions of conservative exploitation rates.[50, 51, 52]

The proposed 4.7% estimated biomass harvest level (2,854 tons) for 2012-2013 equals 30-35% of the highest reported harvest rates (about 8500 tons) since 1916 (Figures 5a and 5b).

<u>Procedural violations of CEQA</u>

An EIR has never been conducted for the commercial fishery. Instead the State has taken a "functional equivalent" approach to the commercial herring fishery. The 2011-2012 FSED states that:

"An alternative to the EIR/ND requirement exists for State agencies for activities that include protection of the environment as part of their regulatory program. Under this alternative, an agency may request certification of its regulatory program from the Secretary for Natural Resources. With certification, an agency may prepare functional equivalent environmental documents in lieu of EIRs or NDs. A functional equivalent, Final Environmental Document for Pacific Herring Commercial Fishing Regulations, was certified by the Commission on August 28, 1998. A new FED is required: (1) when subsequent changes are proposed in the project requiring important revisions of the previous FED due to new significant environmental impacts not considered in a previous FED; or (2) when new information of substantial importance to the project becomes available (Section 15162, Title 14, CCR and Public Resources Code (PRC) Section 21166). The CEQA lead agency may choose to prepare a supplement to a FED instead of a new FED, if only minor additions or changes are necessary, to make the previous FED adequately apply to the project in the changed situation. The draft supplemental document is given the same notice and public review given to a draft environmental document, and may be circulated by itself without the previous FED. The lead agency when deciding whether to approve the proposed project, considers the

previous FED as revised by the supplemental environmental document (Section 15163, Title 14, CCR).”

According to the state’s requirements for a “functional equivalent” approach, a new FED is clearly needed to satisfy (1) and (2). In the 14 years since the publication of the FED, substantial new information of importance to the project is available, and new potentially significant environmental impacts have not been considered. As previously discussed, some of those deficiencies that need to be addressed include the importance of herring as forage, the severe age class truncation of the stock, and a lack of assessment effort in Tomales Bay and Crescent City.

Other new information includes the known and projected impact of climate change. More frequent and intense storms are likely to affect the availability of vegetative substrate, in particular the red algae *Gracilaria,* which may be the most important spawning substrate for herring in central California. The FED notes that Richardson Bay was the primary subtidal spawning area in the Bay in the 1970s and early 1980s, until “storm action during the 1982-1983 El Nino is thought to have removed much of the *Gracilaria* from this area. Despite the loss of subtidal vegetation, Pacific herring have continued to spawn in Richardson Bay, often on pilings and boat bottoms in marinas as well as on eelgrass.” Audubon California’s own observations of spawning substrate in Richardson Bay, both with DFG herring staff and independently (Figure 10), support the idea that *Gracilaria* is the preferred spawning substrate, but this has yet to be definitively confirmed. The 2002 FSED also supports this conclusion, stating that for Tomales Bay “70% of total spawning escapement was estimated to have occurred on *Gracilaria*. Herring displayed a preference for *Gracliaria* as a spawning substrate. This was especially noticeable in areas where both types of vegetation occurred simultaneously.”

Additionally, more erratic and flashy patterns of precipitation are likely to affect spawning conditions due to the influence of salinity on spawning intensity and duration. For example, spawning biomass in Tomales Bay began to decline drastically in the late 1980s as a result of what would become a six-year drought. Drought conditions in Tomales Bay were thought to be the primary cause of the decline in spawning biomass. Without normal rainfall, bay salinities remain high and are not conducive for spawning. Poor spawning conditions may have led a large portion of herring to temporarily abandon Tomales Bay until conditions improved.[53]

In addition to the deficiencies of the “functional equivalent” documents, the process for public input is poorly organized and communicated. There is no supplemental information provided on the rationale for the proposed 2012-2013 quota of 5% estimated 2011-2012 biomass. Critical information that should be aggregated and made easily accessible to the public should include, at a minimum: 2011-2012 estimated biomass, size-frequency distribution from the research catch and samples of commercial catches, the relationship of gill net mesh size and other aspects of authorized fishing gear to management goals, and the status and timeline for development of a fishery management plan in accordance with the California Marine Life Management Act. Other critical information that has not been publicly available includes notice of public forums, such as the annual meeting of the Commission’s herring committee, at which many important discussions and decisions take place.

Overall, the FED and FSEDs fail to fully and accurately inform decision-makers and the public of the environmental consequences of proposed actions, and therefore do not satisfy the basic requirements of CEQA. Courts have invalidated EIRs as a matter of law due to the omission of information about a project's setting that undermined accurate analysis of environmental effects. An accurate description of the environmental setting also is critical because existing conditions normally constitute the baseline for determining the significance of environmental impacts.[54]

Recommendations

At the October 2012 meeting, we urge the Commission to:

- Set a sac roe quota of no more than 4.7% of the 2011-2012 estimated biomass, as is recommended by the Department, but do not certify the FSED, in light of CEQA violations.

- Close commercial fisheries in Tomales Bay and Crescent City pending an assessment of stocks in these areas.

- Freeze the commercial fishing harvest at no more than 5% or less of the estimated biomass until the identified deficiencies in this letter are resolved, particularly the completion of a new FMP.

- Require the Department to develop an EIR (or, at a minimum, a new FED) that fulfills CEQA requirements.

- Consider retiring latent permits, and other mechanisms, to prevent fishery expansion.

- Acknowledge and support the fresh fish quota and markets.

- Make good faith efforts to identify funds for the Department's herring program staff to undertake essential activities in support of a robust EIR, including, but not limited to: assess stock status in Tomales Bay and Crescent City; convene experts to evaluate the severe age class truncation of the San Francisco Bay stock; map essential spawning and buffer habitat in these areas.

- Inform the public as to the timeline and status of the development of a Fishery Management Plan under the Marine Life Management Act, and reasons for the delay in developing an FMP.

In order for the Department to justify the 4.7% harvest rate as conservative, it must consider and describe for public review its justification in the context of the whole ecosystem and the newly available scientific benchmarks established by recent studies. Specifically, the Department should:

- Account for how much herring are needed by predators and integrate forage reserves into the harvest quota. As we describe above, there exists sufficient data to develop these estimates.

- Clearly describe the management goals for Pacific herring, including target and limit reference points for herring biomass.

- Determine how quotas, mesh sizes, areas closures, and other recommendations, will help reverse the severe age class truncation of the SF Bay stock and recover the population to specified target levels.

- Assess the cumulative impacts of the functional disappearance of other historically important herring spawning stocks in Tomales and Monterey Bays and possibly other areas of California.

- Consider the coastwide depletion of herring stocks from California through British Columbia, which has reduced the cumulative availability of herring to predators.

- Develop an estimate of historic unfished biomass in order to establish a baseline against which current stock status can be measured.

- Integrate, minimally, coarse descriptions of the known and potential impact of climate change on herring stocks in California.

- Immediately resume development of a Fishery Management Plan for the commercial herring fishery.

- Clearly post opportunities for public involvement as per CEQA.

- Make essential ecological, socioeconomic, and other relevant information available for public review.

- Assess herring management of other U.S. states and British Columbia to identify best practices.

- Apply the recommendations in the literature discussed above, to the management of Pacific herring, including the establishment of a harvest threshold cutoff and other reference points.

Please include this letter in the administrative record of proceedings for the management of the California commercial herring fishery. Thank you for the opportunity to comment, and please feel free to contact us with any questions or concerns.

Sincerely,

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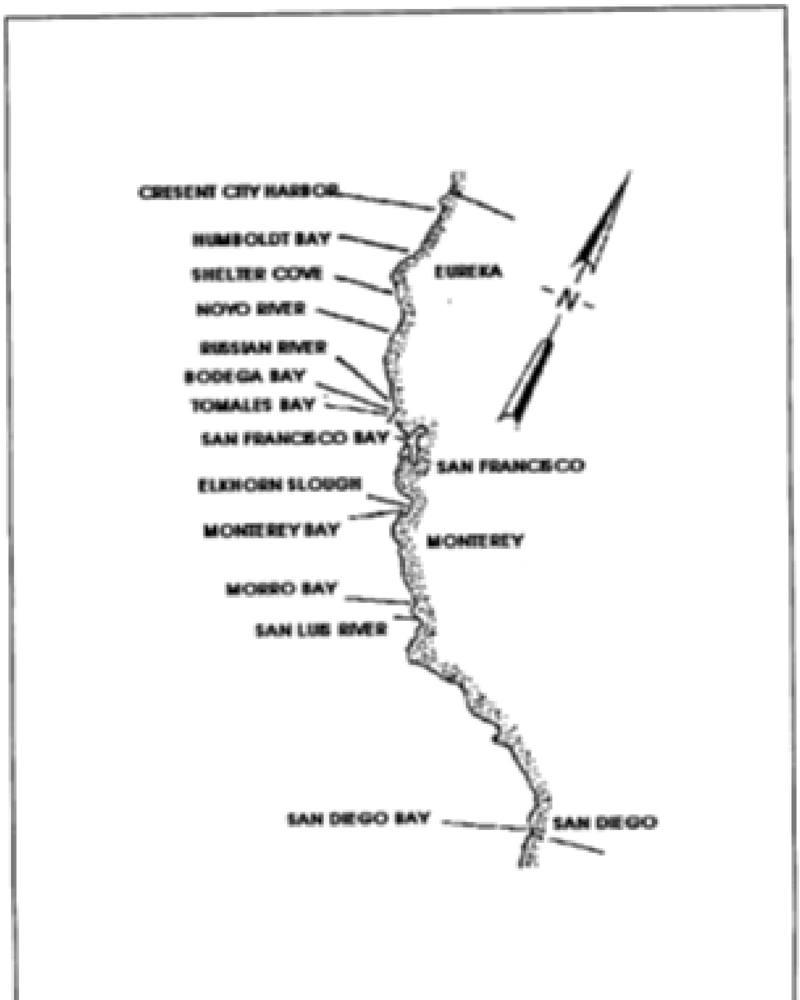


Figure 3.4. Known Pacific herring spawning areas in California.

3-6

Figure 1. Known herring spawning locations in California. (Source: FED)

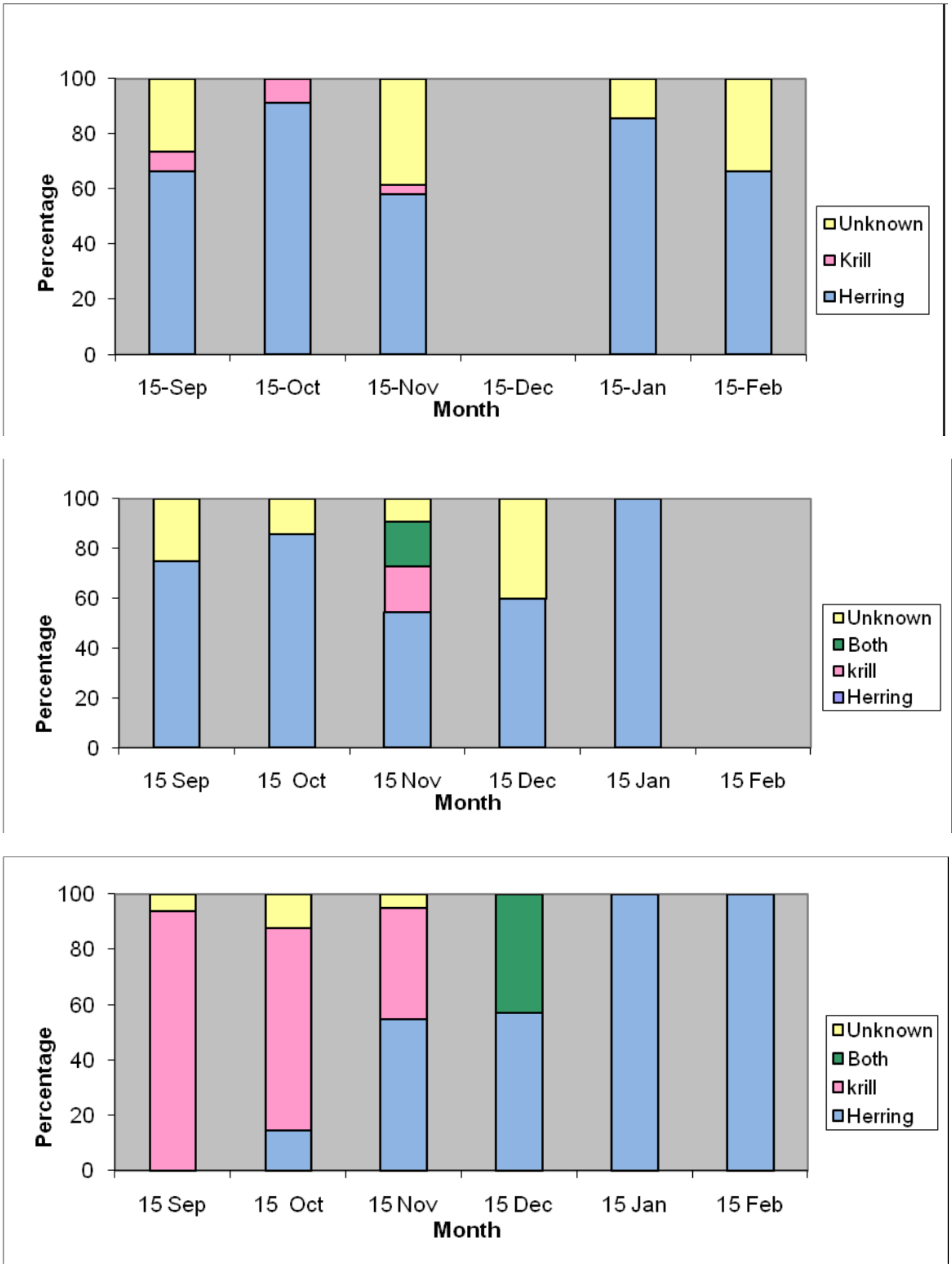
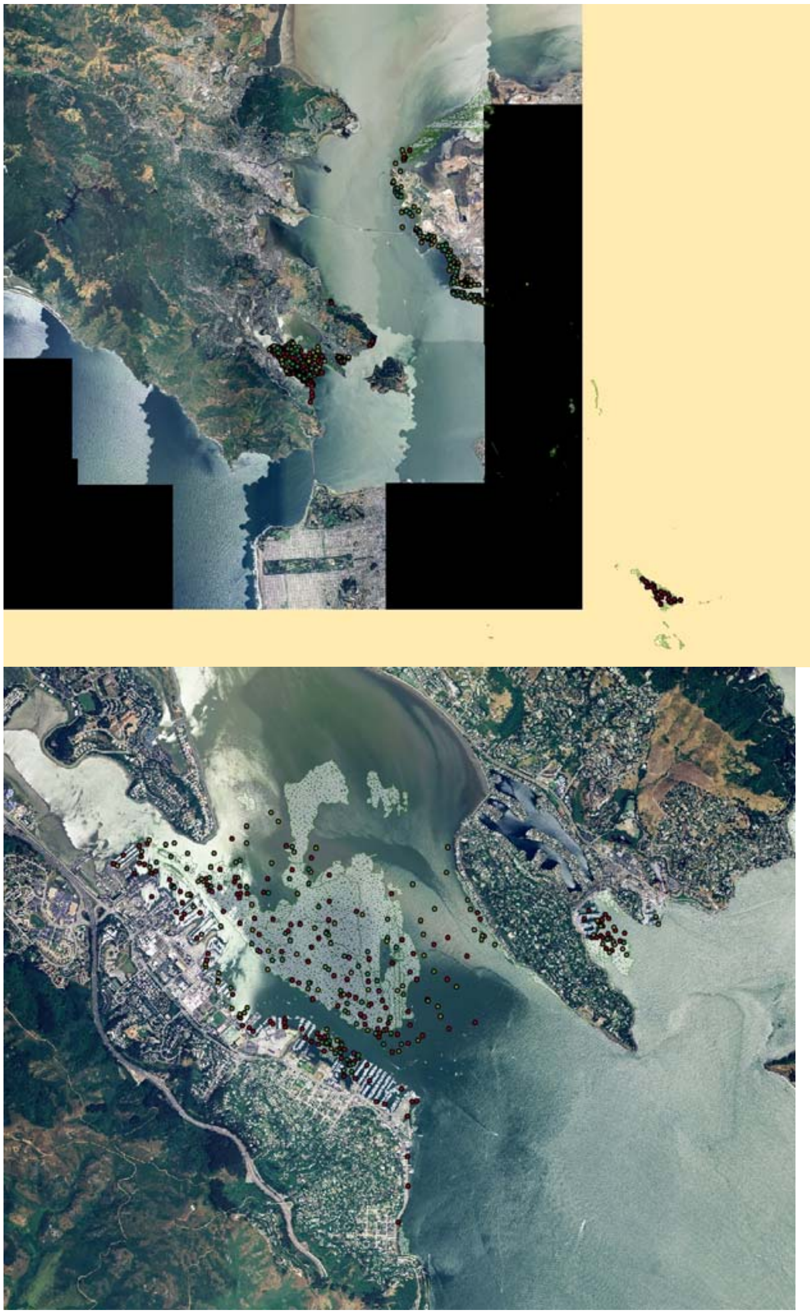


Figure 2. Humpack whale diet at three locations in southeast Alaska. (Source: Rice et al 2010).

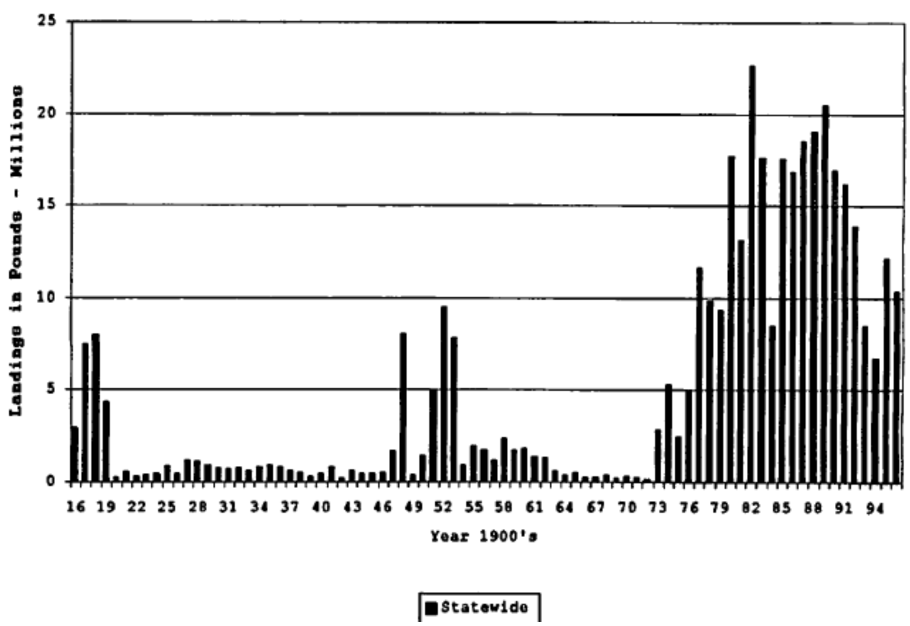


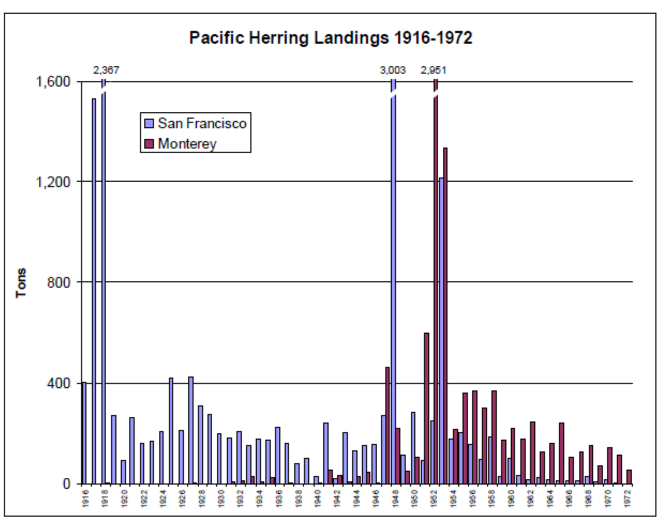
Figures 3a and 3b. Recent locations of CDFG herring spawn sampling locations in San Francisco Bay. Source: Ryan Bartling, Department of Fish and Game.

#	Approximate Spawn/Catch Date	Location	Submerged Veg	Shoreline	Spawn Total	Gill net	HEOK	Biomass Total
	Table 3.1 2010-2011 San Francisco Bay Pacific Herring Biomass Estimate (weights in short tons)							
1	December 1-4, 2010	Richardson Bay	39		39			39
2	December 7-8, 2010	Burlingame WFront		77	77			77
3	December 22-23, 2010	Richardson Bay	2,241		2,241			2,241
4	December 29, 2010	Coyote Point		189	189			189
5	January 10-11, 2011	Richardson Bay	27,485		27,485	246		27,731
6	January 18-20, 2011	San Francisco WFront		9,484	9,484	746		10,230
7	January 24-27, 2011	Paradise to GG Bridge (includes Richardson Bay)	7,806	2,429	10,235	734		10,969
8	February 4-7, 2011	Point Richmond	3,855	198	4,052			4,052
9	February 27-28, 2011	Point Richmond	153	3	156			156
10	March 5, 2011	Richardson Bay	1,397		1,397			1,397
n	spawn events = 10	Total in Tons	42,976	12,379	55,356	1,727	0	57,082

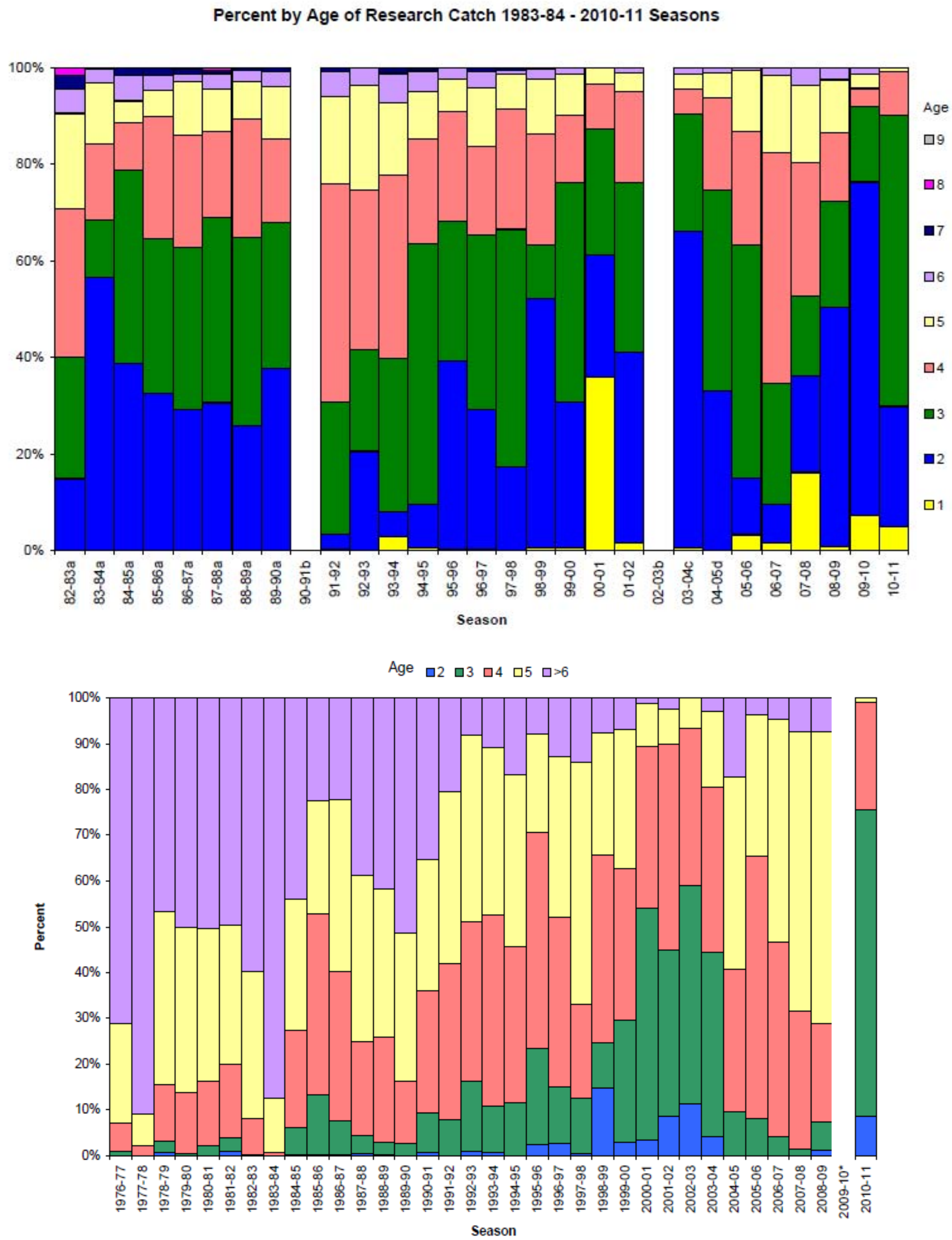
Figure 4. 2010-2011 San Francisco Bay herring biomass estimate .

Figure 3.13. Annual landings of Pacific herring in California.





Figures 5a and b. Pacific herring historic landings data, Sources: FED (a) and Tom Grenier (b)



Figures 6a and b. Age class truncation in the San Francisco Bay stock.

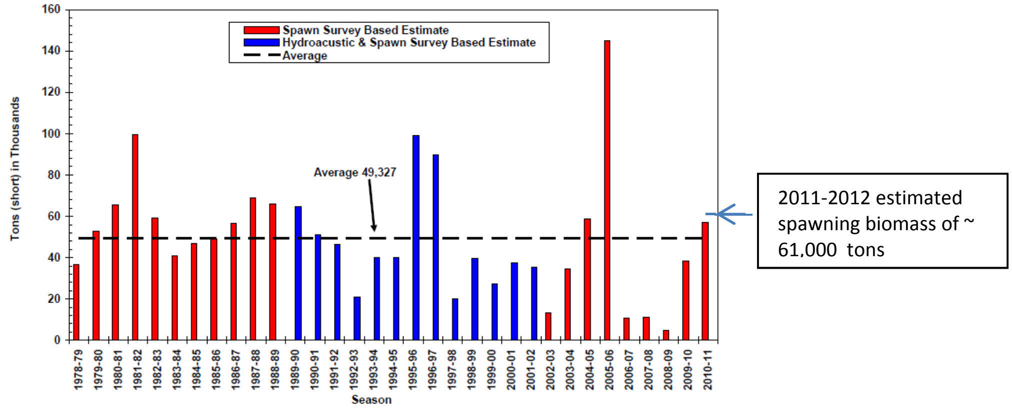


Figure 2.2 San Francisco Bay Pacific Herring Spawning Biomass Estimates for Seasons 1978 to 2011

Figure 6c. Pacific herring biomass estimates for San Francisco Bay. 2011-2012 estimate added.

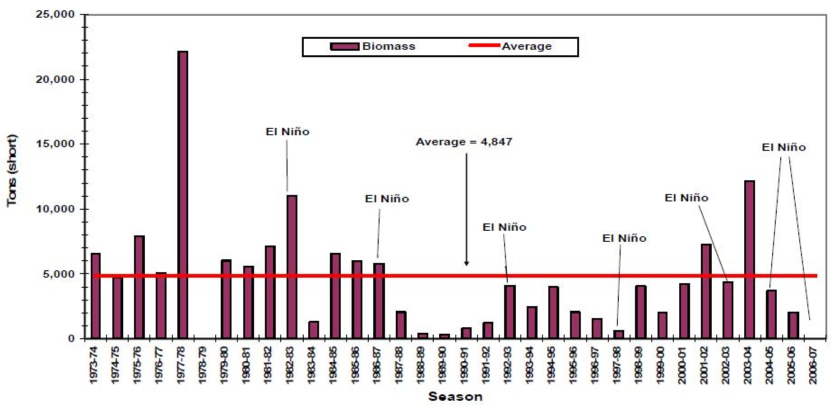


Figure 2.3. Pacific herring spawning biomass estimates for Tomales Bay

Figure 7. Pacific herring biomass estimates for Tomales Bay, for seasons surveyed.

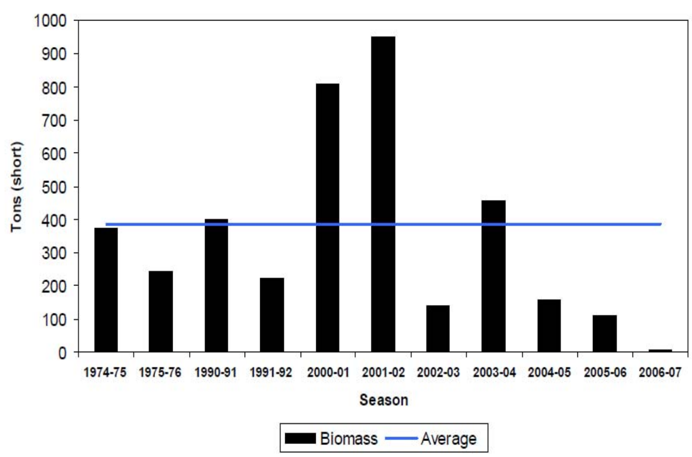


Figure 2.4 Pacific herring biomass estimates for Humboldt Bay for seasons surveyed

Figure 8. Pacific herring biomass estimates for Humboldt Bay, for seasons surveyed.

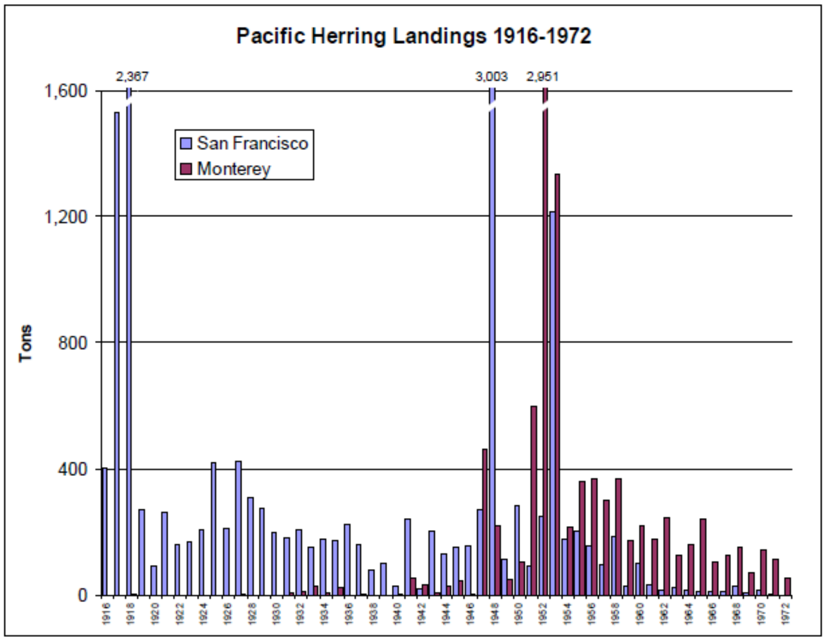


Figure 9. Pacific herring landings in Monterey Bay and San Francisco Bay, 1916-1972

Figure 10. Herring eggs on *Grasilaria* in Audubon Richardson Bay Sanctuary, 2011. Egg density was much higher than on eelgrass. Photo by Anna Weinstein and Lara Martin.

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