

## Fish Tales: Salmon and Herring Fisheries of San Francisco Bay

Watch the segment online at <http://education.savingthebay.org/fish-tales-salmon-and-herring-fisheries-of-san-francisco-bay>

Watch the segment on DVD: Episode 2, 36:00–39:39

Video length: 3 minutes 52 seconds

### SUBJECT/S

Science

History

### GRADE LEVELS

9–12

### CA CONTENT STANDARDS

Grades 9–12

*Biology/Life Sciences – Ecology*

6.b. Students know how to analyze changes in an ecosystem resulting from changes in climate, human activity, introduction of nonnative species, or changes in population size.

### VIDEO OVERVIEW

Fisheries in the San Francisco Bay have ranged from successful bonanza to complete collapse.



In this segment you'll learn:

- that past fisheries in San Francisco Bay were hugely successful.
- why the salmon fishery in the San Francisco Bay–Delta region collapsed in 1884.
- that the herring fishery is the only surviving commercial fishery in San Francisco Bay waters.

### TOPIC BACKGROUND

The nature of San Francisco Bay–Delta fisheries has changed considerably over the past 150 years. The Bay-Delta region once teemed with fish and supported several commercial fisheries. Now, only the Pacific herring is fished commercially in the Bay, and that fishery has been closed for the 2009 season due to low numbers.

The first organized commercial fishery in the San Francisco Bay Area developed around 1850 when a colony of Italian immigrants began using nets to fish for salmon in the Sacramento and San Joaquin rivers. By the 1870s, the salmon fishery was one of the greatest in the world. Huge fleets of ships fished the Bay-Delta waters. In the early 1880s, fishermen netted 10 million pounds on salmon in the upper reaches of the estuary. These practices, however, stressed the resources, and in the mid-1880s, the fishery inside the Bay collapsed.

As early as 1870, the philosophy of fish and wildlife management began to shift. The need to protect the supply of salmon prompted the state legislature to pass a law entitled “An Act to provide for the restoration and preservation of fish in the waters of this State,” resulting in the establishment of the original California Fish Commission, which later became the Fish and Game Commission (1878). Restrictive legislation, enhancement and protection of the environment (including designating some wildlife refuges), and acquisition of biological knowledge gained importance.

San Francisco Bay fisheries expanded throughout the latter half of the 19th century. Sardines, herring, halibut, sturgeon, oysters, crabs, and shrimp all saw active commercial interest. By the turn of the century, however, fish populations had seriously declined, and San Francisco’s glory as a fishing port began to fade. Only the Pacific herring fishery survived; it is now one of the country’s only remaining urban fisheries. The industry operated continuously until 2009—then, for the first time, the fishery was closed in an effort to save the herring population.

Factors contributing to the severe decline that led to the closure likely include high salt levels in the Bay caused by dry winters and the export of fresh river water to Southern California; oil from the *Cosco Busan* container ship spill in 2007; and increasing food shortages in the Pacific Ocean, leading to fish returning to the Bay undernourished and small.

## VOCABULARY

**cannery**

a factory for the canning of foods

**estuary**

a semi-enclosed body of water where fresh water and salt water mix

**fishery**

the industry of catching fish in a specific region; can be for commercial gain or recreation

**gill net**

a fishing net that hangs vertically in the water and traps fish by their gills

**roe**

the egg mass contained in the ovaries of a female fish, especially when used as food

**salmon run**

the time during which salmon swim from the ocean back up the rivers in which they were born in order to spawn

## PRE-VIEWING ACTIVITY

- Research the life cycle of salmon or herring in the San Francisco Bay. Explain their migration patterns and habitat requirements.

## FOCUS QUESTIONS FOR VIEWING

- Identify at least one thing the salmon and herring fisheries in the San Francisco Bay–Delta region have in common and one way in which they differ. *Both fisheries were commercially very successful, with high catches and high value. However, the salmon fishery collapsed after a short time, whereas the herring fishery has lasted for more than 150 years.*
- What caused the collapse of the salmon fishery in 1884? *primarily overfishing*
- What market currently drives the herring fishery in the San Francisco Bay Area? *Japanese sales of herring roe as a delicacy*

## POST-VIEWING ACTIVITIES

- Have students research the 2009 ban on herring fishing in the San Francisco Bay and write essays comparing what happened with the salmon fishery near the turn of the 20th century with current events in the herring fishery.
- Role-play different perspectives and conduct a debate or public hearing about whether or not to close the San Francisco Bay herring fishery in 2009.
- Research the effects of the California State Water Project on fish populations.

## ABOUT THE AUTHOR

**Lori Mann** is an environmental education consultant with 30 years' experience at the local, state, and national levels. She has worked extensively with curriculum development and review, has taught numerous environmental education courses and workshops, and served for 15 years as education director at Coyote Point Museum for Environmental Education in San Mateo, California.

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## ADDITIONAL RESOURCES

**“All in a Roe: Hard Times for the Bay’s Herring Fishery,”** Glen Martin, *BayNature*  
<http://baynature.org/articles/jan-mar-2009/all-in-a-roe>

This article explores the current status of the Pacific herring fishery in San Francisco Bay as well as the herring’s importance to the Bay ecosystem.

**“California’s Lost Salmon,”** *QUEST*, KQED Public Media

<http://www.kqed.org/quest/television/californias-lost-salmon>

Watch an 11-minute video clip about efforts to protect the coho salmon in Northern California and the role of salmon in the native ecosystem.

**The Fish and Wildlife Resources of the San Francisco Bay Area**, Department of Fish and Game

<http://www.estuaryarchive.org/cgi/viewcontent.cgi?article=1001&context=archive>

Review a 10-page report on fishery and wildlife resources and management from the earliest settlement of the Bay Area in the 1770s through the 1950s.

**Fish Out of Water: How Water Management in the Bay-Delta Threatens the Future of California’s Salmon Fishery**, Doug Obegi, Natural Resources Defense Council

<http://www.nrdc.org/water/conservation/salmon/contents.asp>

Review a fact sheet summary or a full report (July 2008) examining the effects of water management projects on Chinook salmon populations in California.

**Fishing for the Future**, Facing the Future

<http://www.facingthefuture.org/Home/FTFMembershipLogin/tabid/62/default.aspx>

In this lesson plan, students model several consecutive seasons of a fishery and explore how technology, population growth, and sustainable practices impact fish catch and fisheries management. (Free download)

**“Some Herring Fishermen Unhappy Season Closed,”** Matthew Stannard, *San Francisco Chronicle*

[http://www.sfgate.com/cgi-](http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/09/09/MNQQ19K93M.DTL&type=green)

[bin/article.cgi?f=/c/a/2009/09/09/MNQQ19K93M.DTL&type=green](http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2009/09/09/MNQQ19K93M.DTL&type=green)

Read an article about the history and current status of the herring fishery in San Francisco.

**Wildlife Spotlight: Pacific Herring**, *Upwelling*, Farallones Marine Sanctuary Association

[http://www.farallones.org/e\\_newsletter/2009-02/Herring.htm](http://www.farallones.org/e_newsletter/2009-02/Herring.htm)

Read about the life cycle and annual spawning ritual of the Pacific herring, the herring fishery, and different methods of harvesting roe.

## CREDITS

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## VIDEO TRANSCRIPT

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**NARRATOR:** In 1870, the California legislature created a state agency—a board of fish commissioners—to curb abuse and introduce new species, like striped bass. But the commission could not forestall what had already emerged as yet another bonanza—the salmon runs of the San Francisco Bay watershed.

**RICHARD WALKER:** The Sacramento River—we don't appreciate it now, but it was like a little Columbia. It was a huge salmon fishery.

**JEFF MOUNT:** The most diverse salmon runs anywhere in the world were in this system in terms of the number of races of salmon that would come through. Winter run, spring run, fall run, late fall run, and steelhead would come through this ... sturgeon came through this system.

**NARRATOR:** In both 1880 and 1883, fisherman netted an astounding 10 million pounds of salmon in the upper reaches of the estuary.

**PETER MOYLE:** They could literally string gill nets across the river and get almost every fish that was coming in. The early accounts suggest there was enormous wastage of salmon coming into the canneries. People just didn't think that this was a resource that had any limits.

**NARRATOR:** By spring 1884, 1,500 boats serving 21 canneries lined the Sacramento River awaiting the next run. It never came. One of the greatest salmon fisheries in the world collapsed.

By 1900, commercial fishing inside the Bay was approaching an exhausted end. "Populations are 1/20 what they were," noted the preeminent fish biologist of the day, David Starr Jordan. In order to meet demand at the canneries lining the Bay, fishing fleets were forced to range ever further outside the Golden Gate, some as far as the distant waters of Alaska.

In the 21st century, only one commercial fishery survives in the waters of San Francisco Bay. The herring fishery is a specialty fishery. The roe, or eggs, are a delicacy ... not in the United States, but Japan.

**ERNIE KOEPF:** This is their first choice—the golden roe of San Francisco herring. What we want to do is lay the net in front of the school. They flush back and forth with the tide. After a period of a week or two, they're ready to spawn and then they hit the beach—and that's when we do our catching. When the herring spawn is going on, it's kind of like the game is afoot and, you know, if you're quick and you're crafty, well, you do good.

**ED UEHER:** For a number of years, herring were the most valuable single species fishery in California. And it was interesting—you could walk along the Embarcadero and see commercial fishermen again in the Bay making a decent living.

**NARRATOR:** The herring fishery along San Francisco's waterfront is the last commercial fishery still operating within the boundaries of a major city in the United States ... and the last remnant of the once abundant fishery of San Francisco Bay.