

The Role of Ocean Conditions on Longfin Smelt in the San Francisco Estuary

Frederick Feyrer
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Metropolitan Water District



Delta and Longfin Smelt: Is Extinction Inevitable?
Symposium, March 29, 2016



Key Players

Metropolitan Water District

Dave Fullerton, Corey Phillis, Alison Collins,
Shawn Acuna

NOAA Fisheries

Jeff Harding, Sean Hayes

California Department of Fish and Wildlife

Randy Baxter, CDFW

UC Davis

Jim Hobbs, Mandi Finger

California Department of Water Resources

Ted Sommer

US Geological Survey

Fred Feyrer

ICF International

Lenny Grimaldo





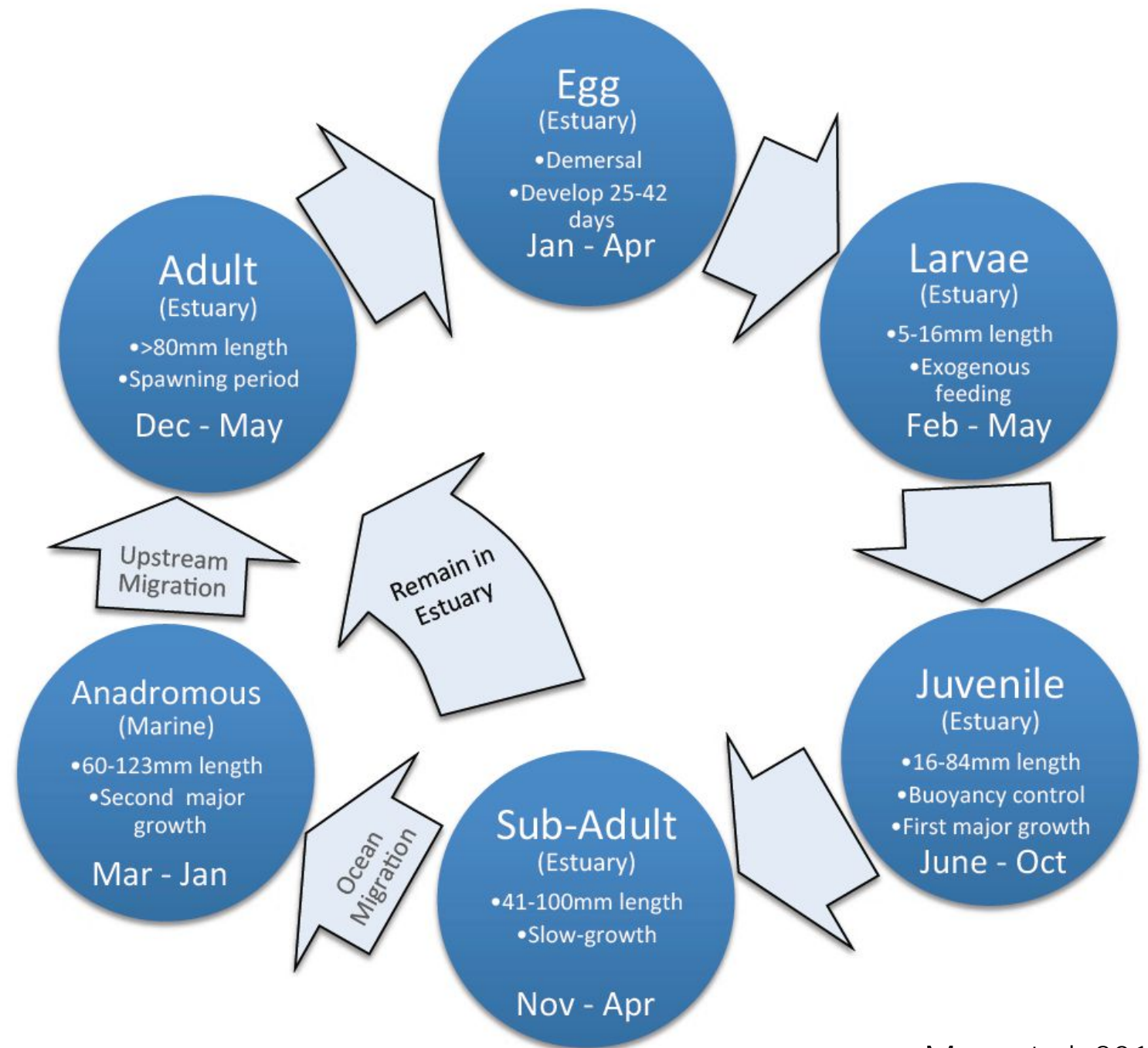


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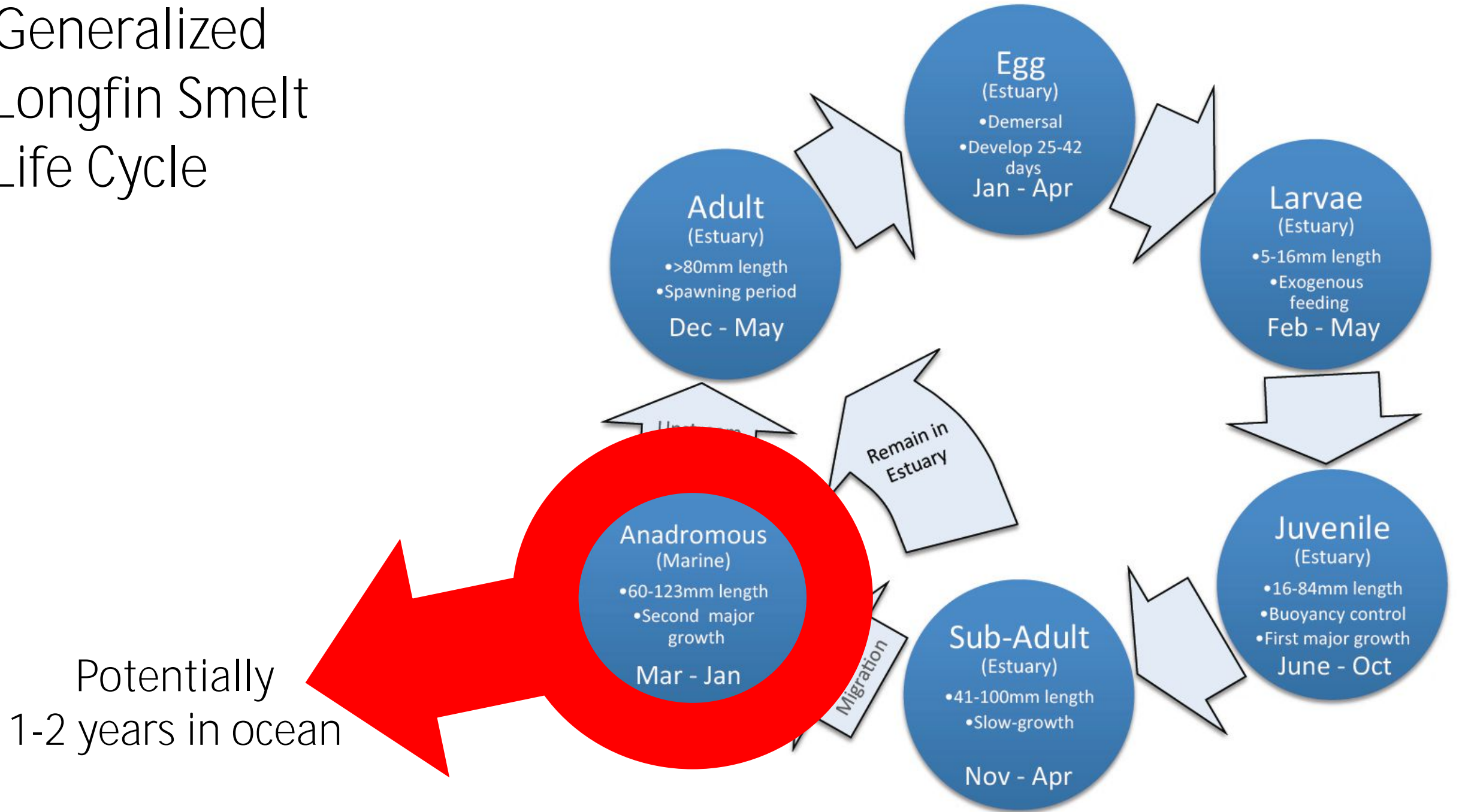
1. Ocean occupancy
2. Ecological processes
3. Research needs



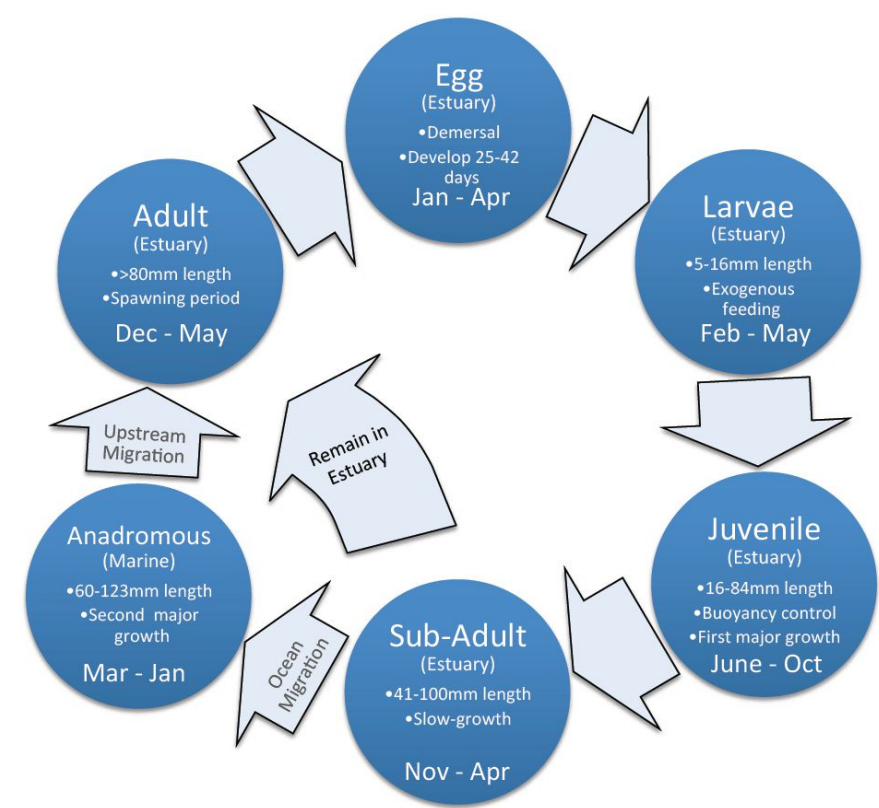
Generalized Longfin Smelt Life Cycle



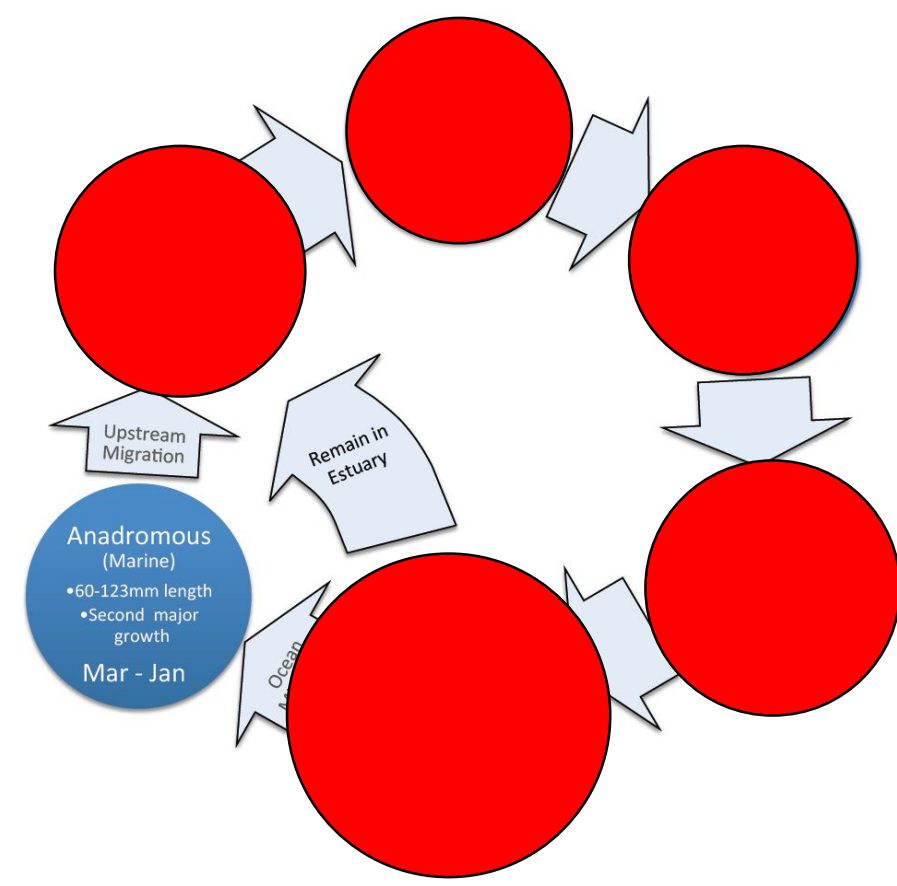
Generalized Longfin Smelt Life Cycle



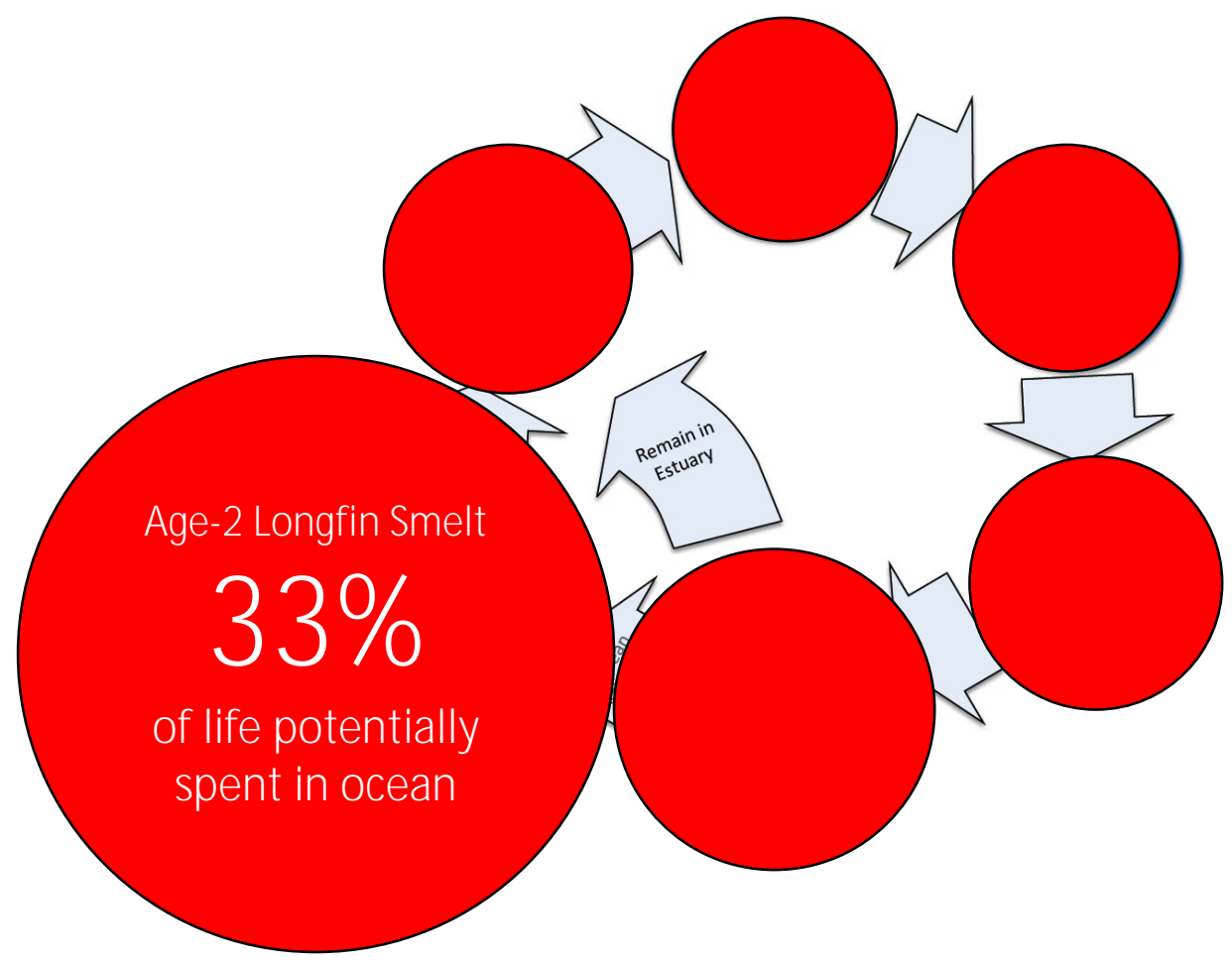
Generalized Longfin Smelt Life Cycle



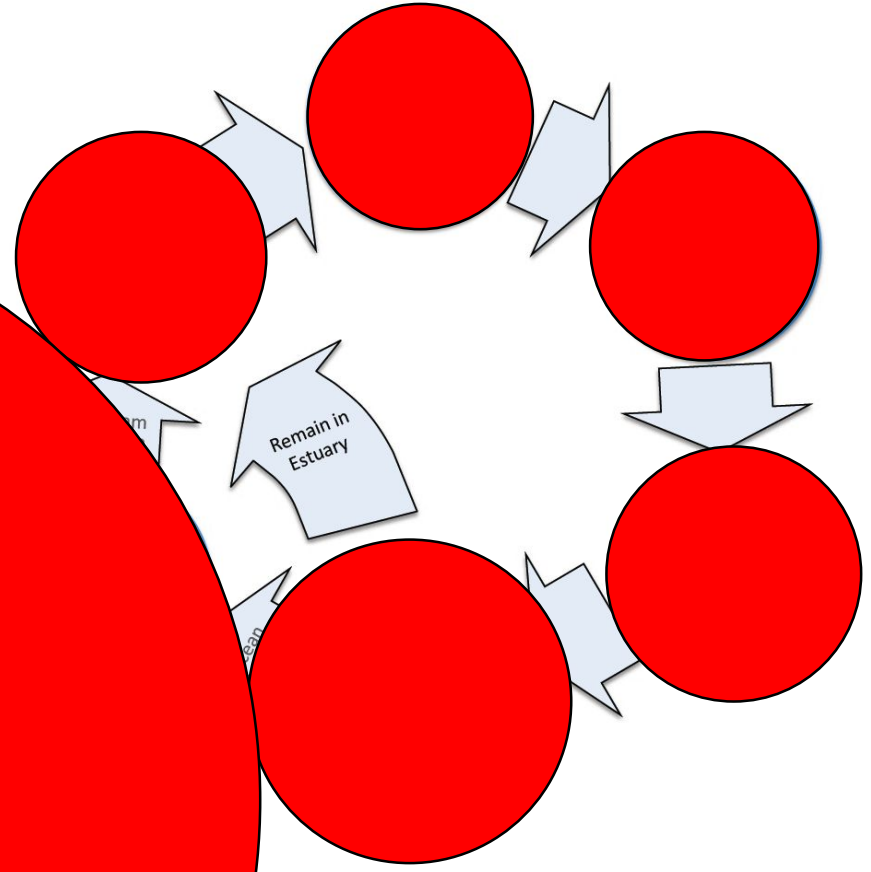
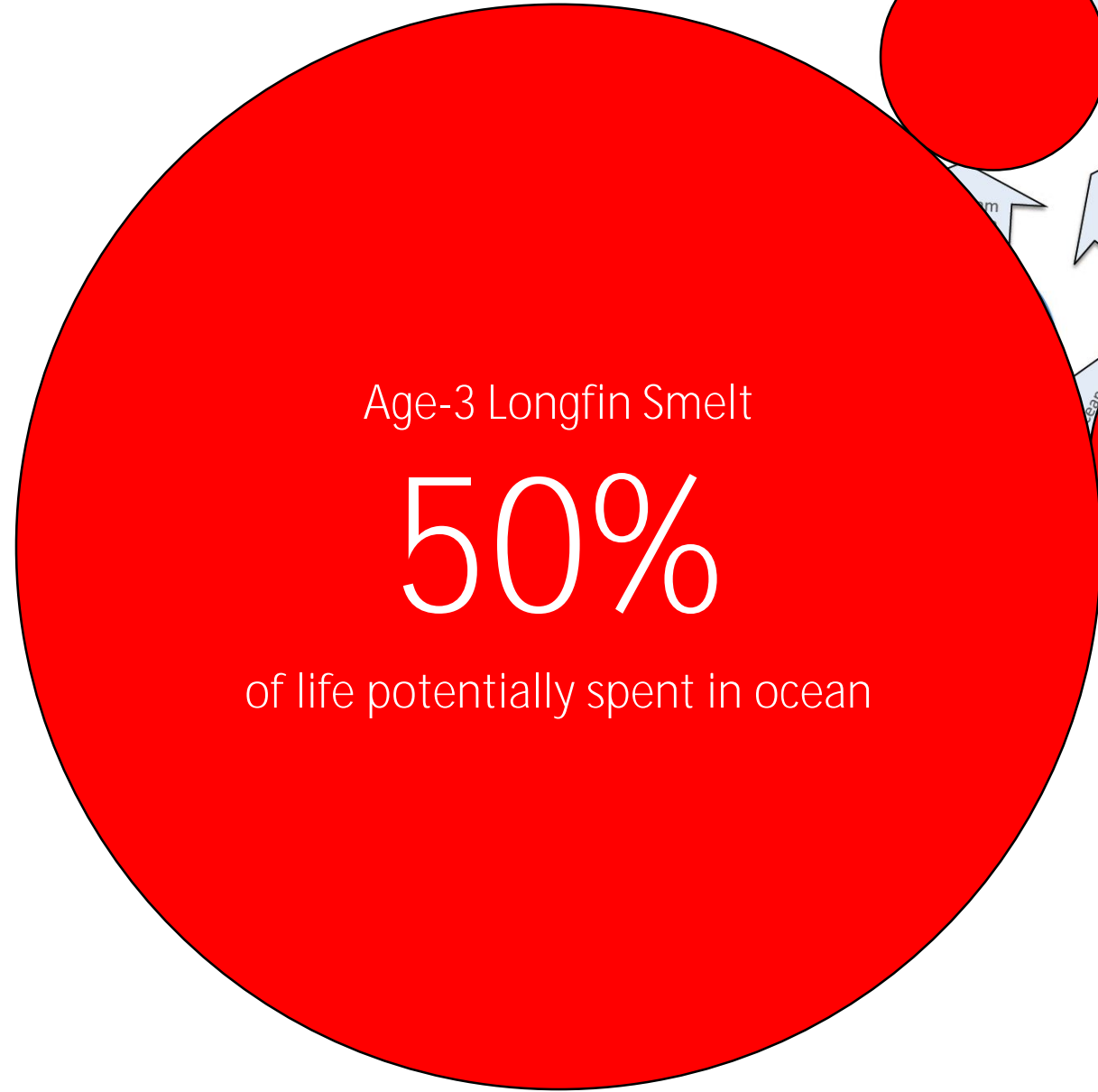
Generalized Longfin Smelt Life Cycle



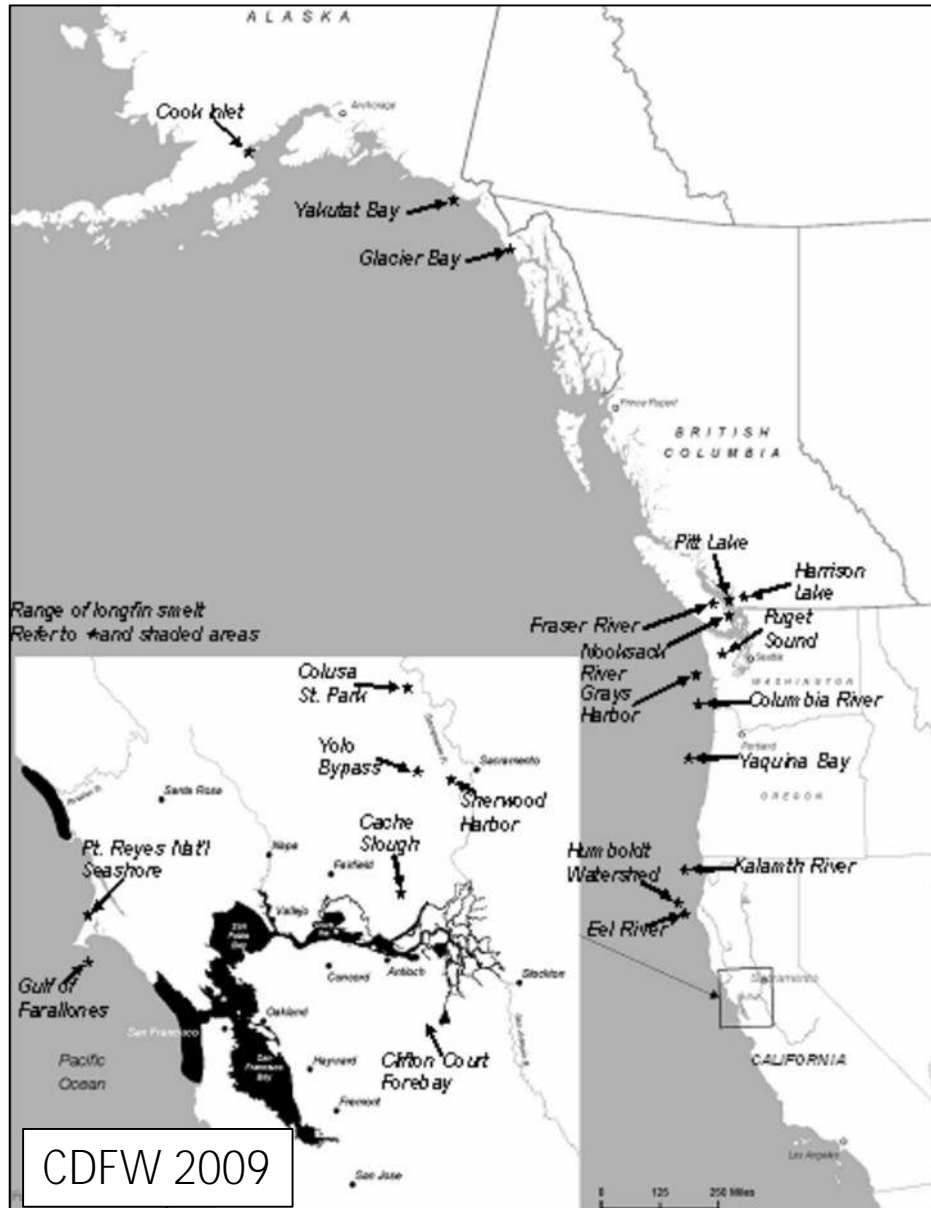
Generalized Longfin Smelt Life Cycle



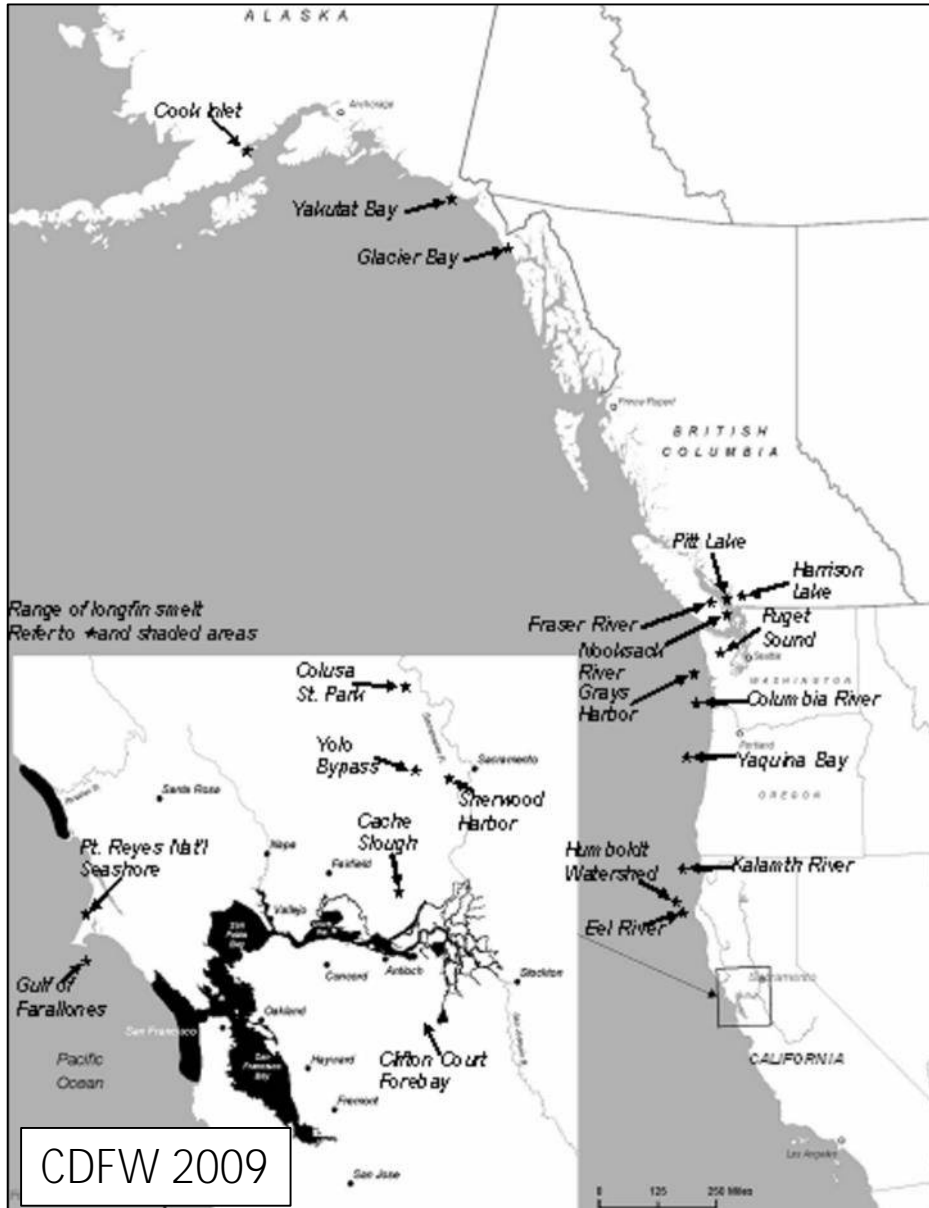
Generalized Longfin Smelt Life Cycle



Longfin Smelt

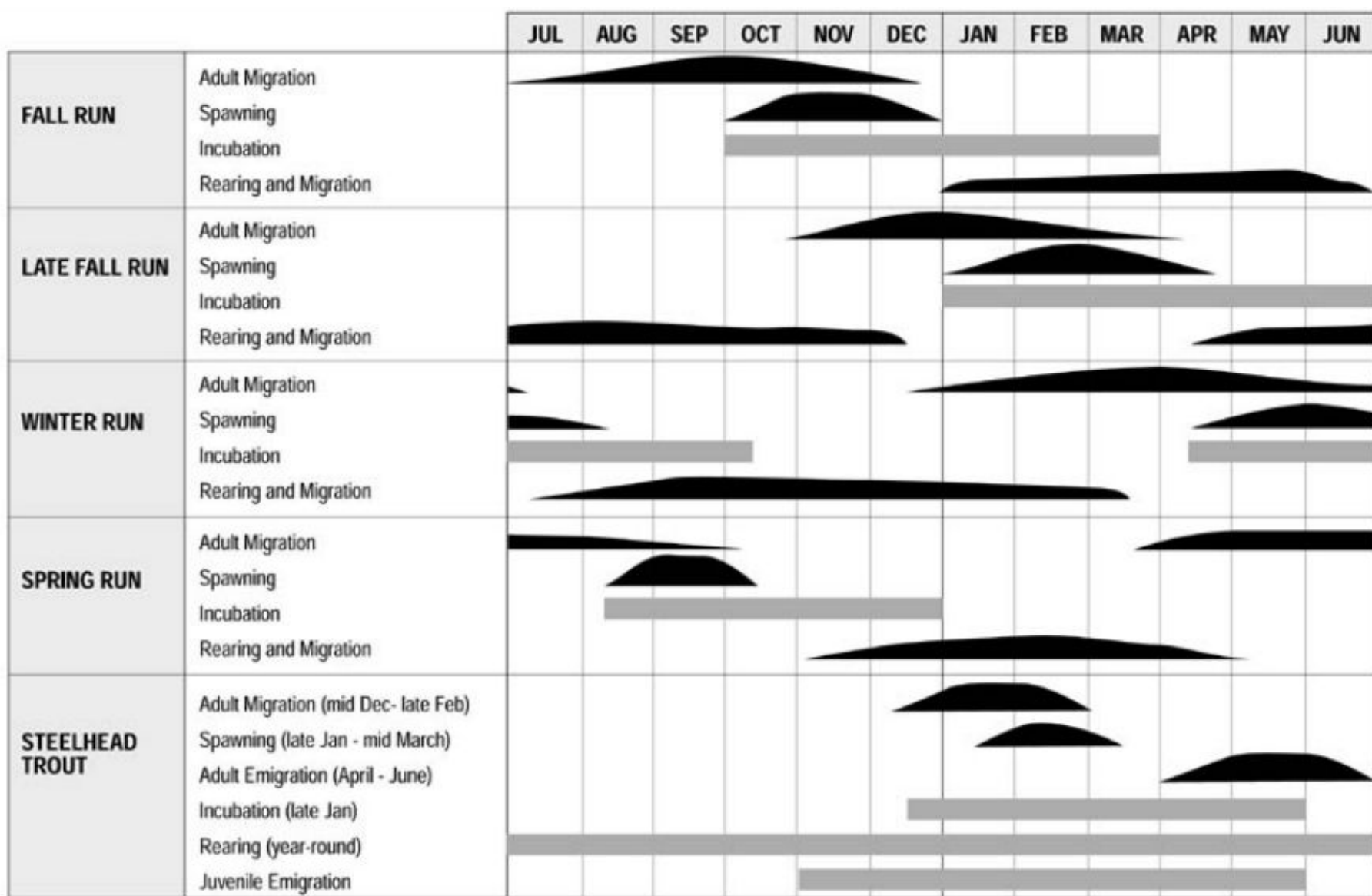


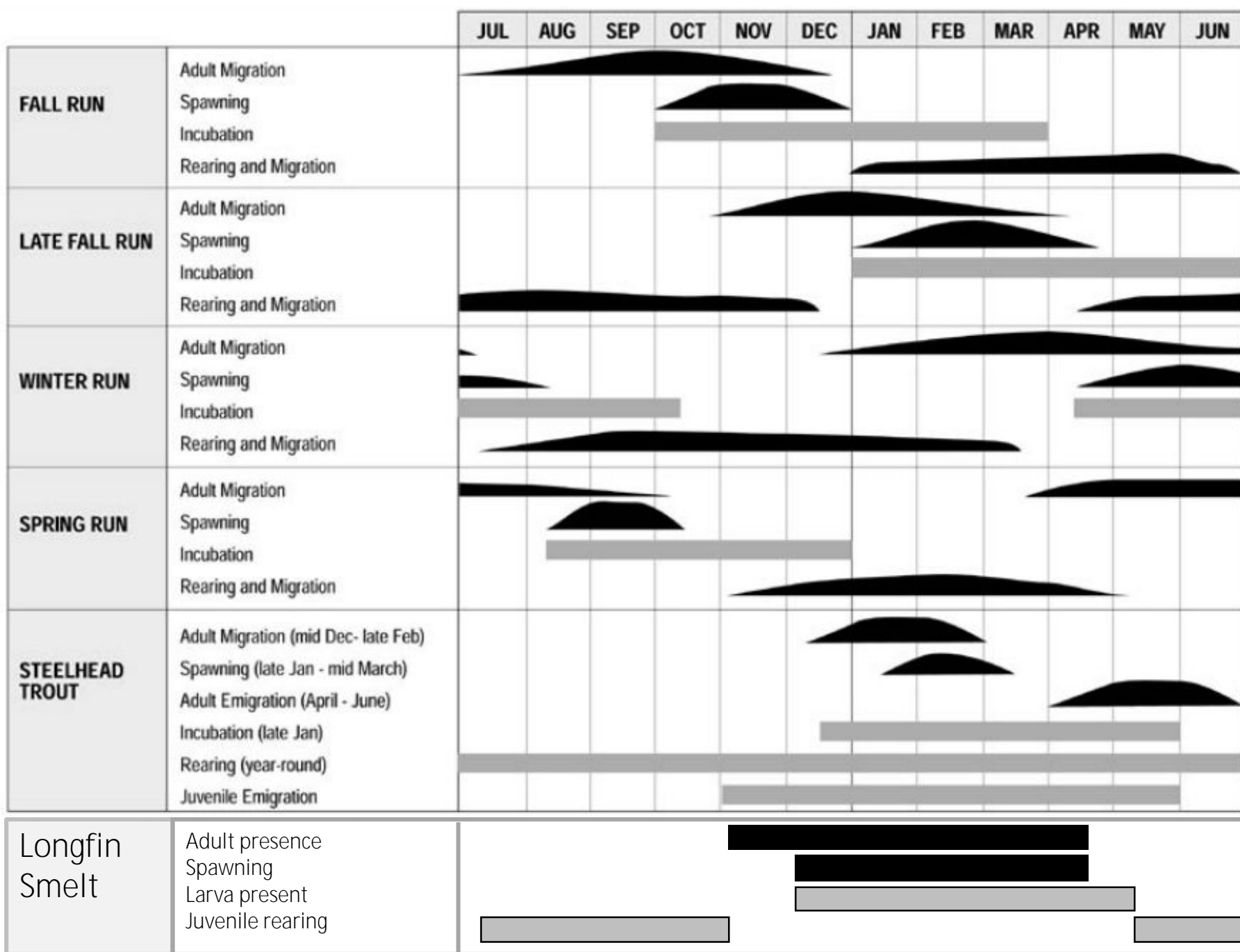
Longfin Smelt

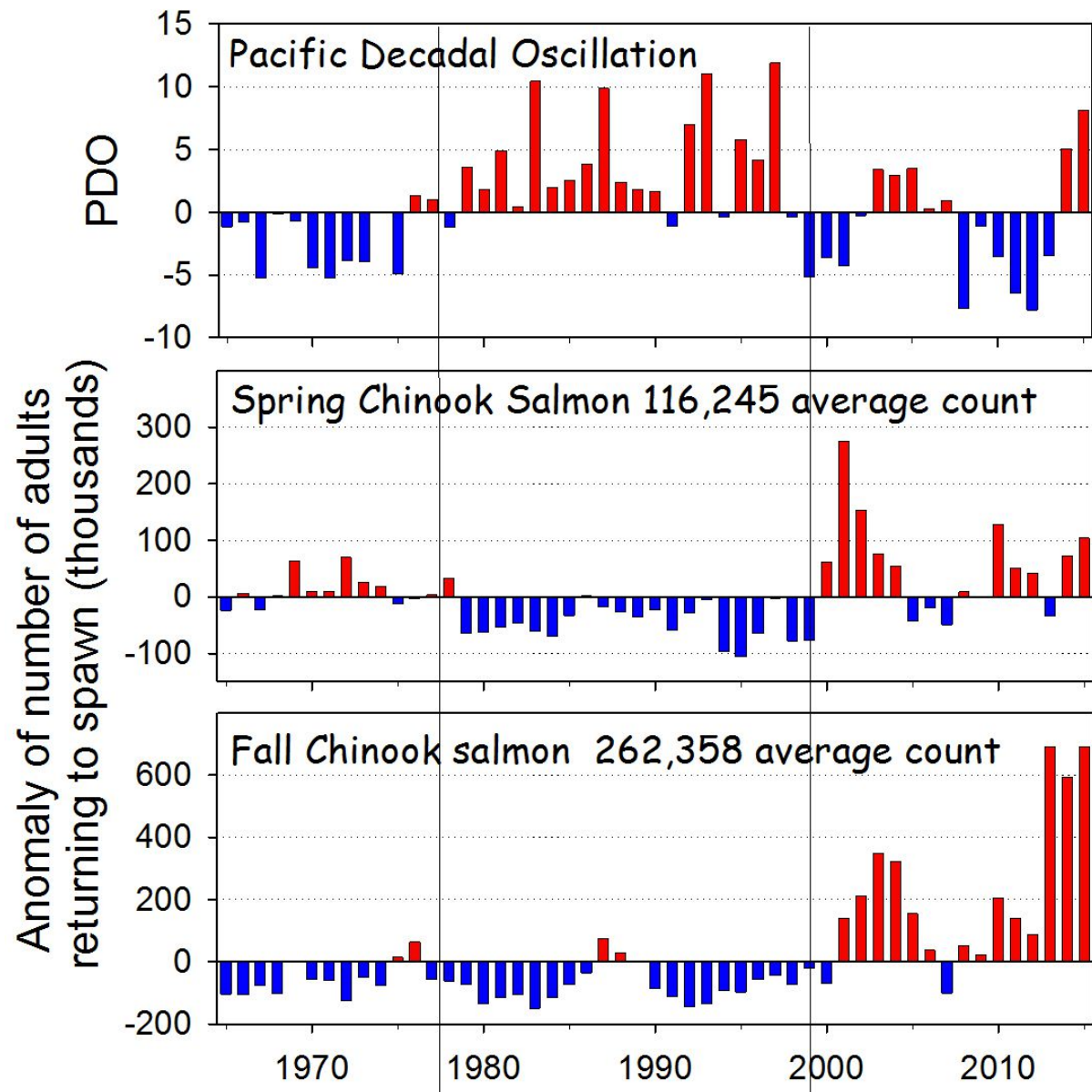


Chinook Salmon

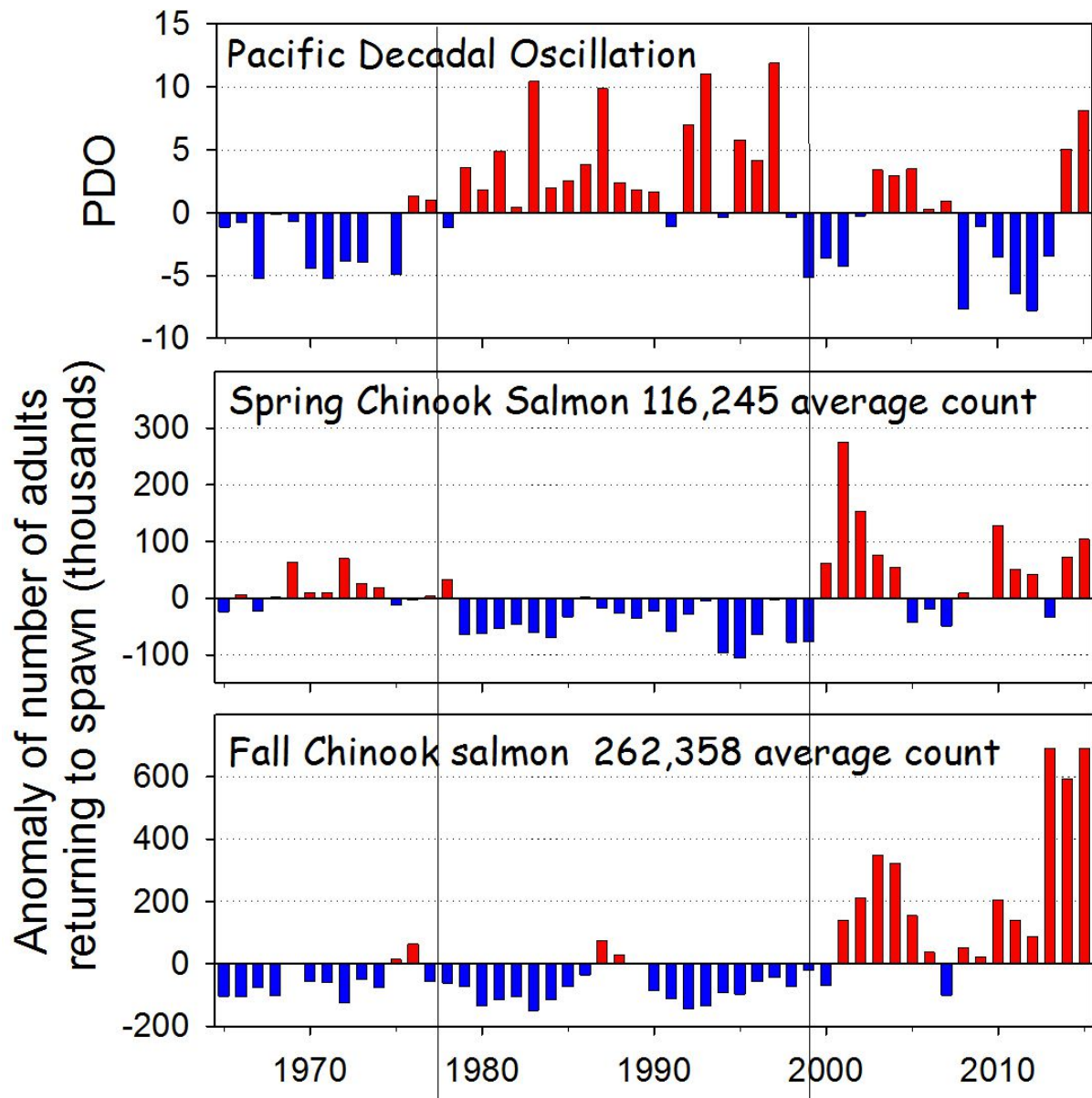




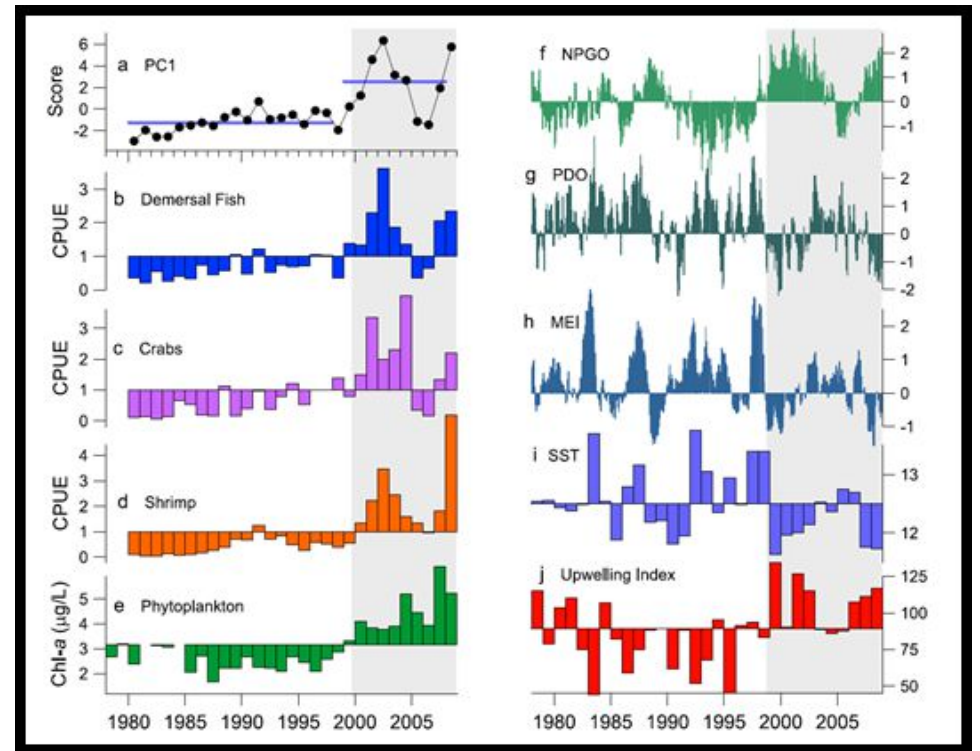




Credit: Nate Mantua, NOAA Fisheries



Credit: Nate Mantua, NOAA Fisheries



Cloern et al. 2010. *Geophys. Res. Lett.*, 37, L21602

Global Change Biology

Global Change Biology (2015), doi: 10.1111/gcb.12969

Estuarine fish communities respond to climate variability over both river and ocean basins

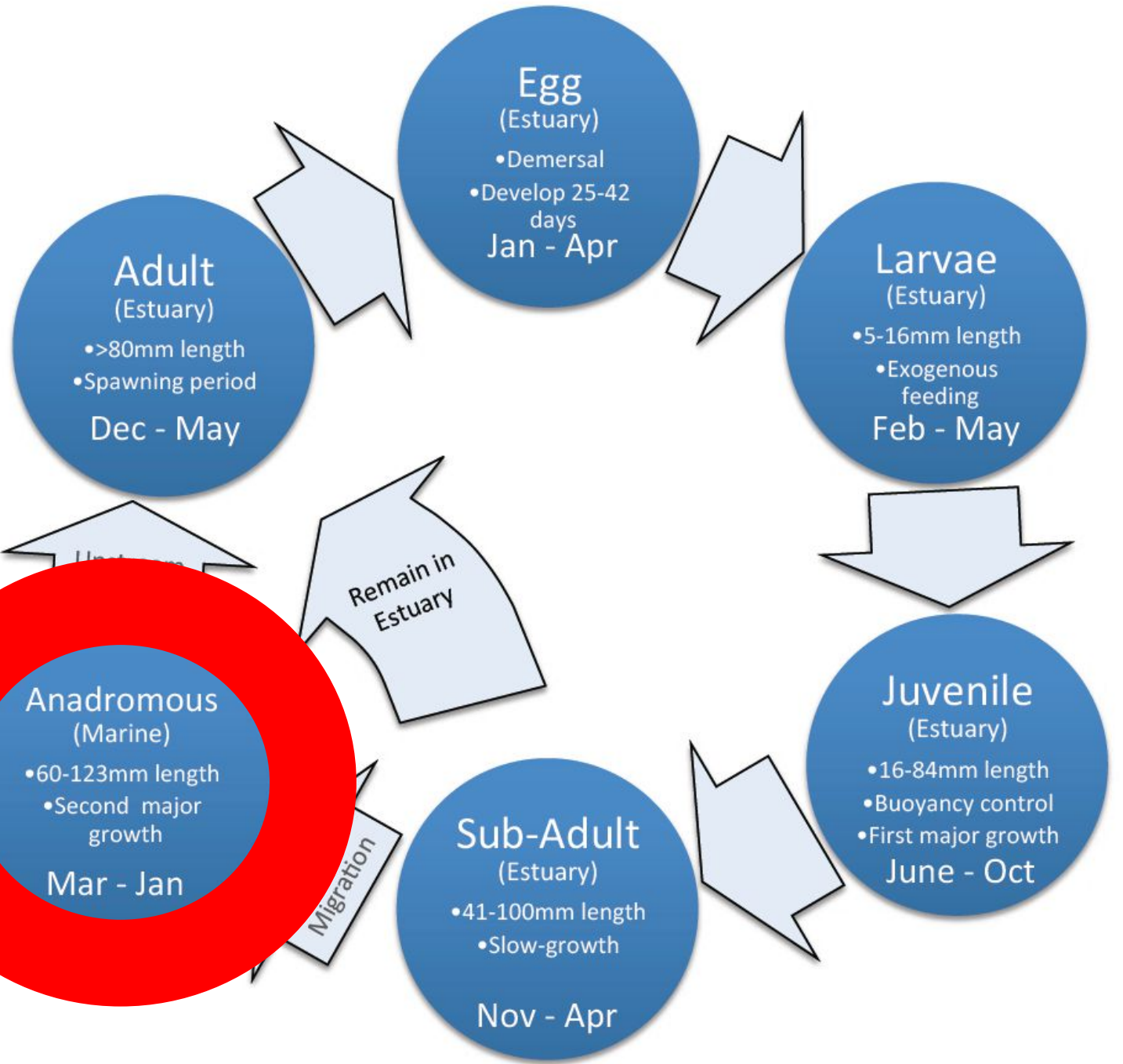
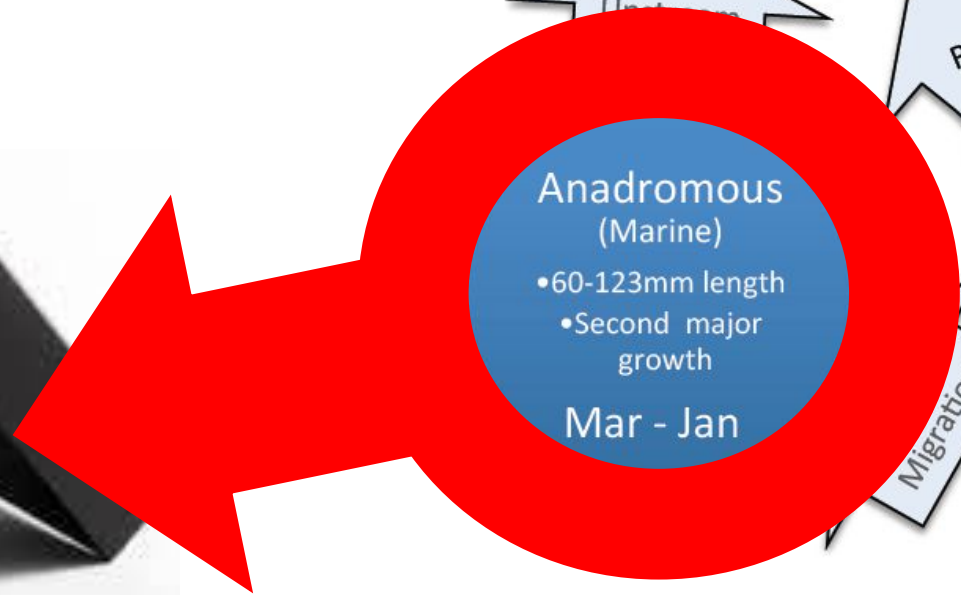
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Abstract

Estuaries are dynamic environments at the land-sea interface that are strongly affected by interannual climate variability. Ocean-atmosphere processes propagate into estuaries from the sea, and atmospheric processes over land propagate into estuaries from watersheds. We examined the effects of these two separate climate-driven processes on pelagic and demersal fish community structure along the salinity gradient in the San Francisco Estuary, California, USA. A 33-year data set (1980–2012) on pelagic and demersal fishes spanning the freshwater to marine regions of the estuary suggested the existence of five estuarine salinity fish guilds: limnetic (salinity = 0–1), oligohaline (salin-

Generalized Longfin Smelt Life Cycle



Biotic and abiotic factors influencing forage fish and pelagic nekton community in the Columbia River plume (USA) throughout the upwelling season 1999–2009

Marisa N. C. Litz¹*, Robert L. Emmett², Paul J. Bentley², Andrew M. Claiborne³, and Caren Barceló⁴

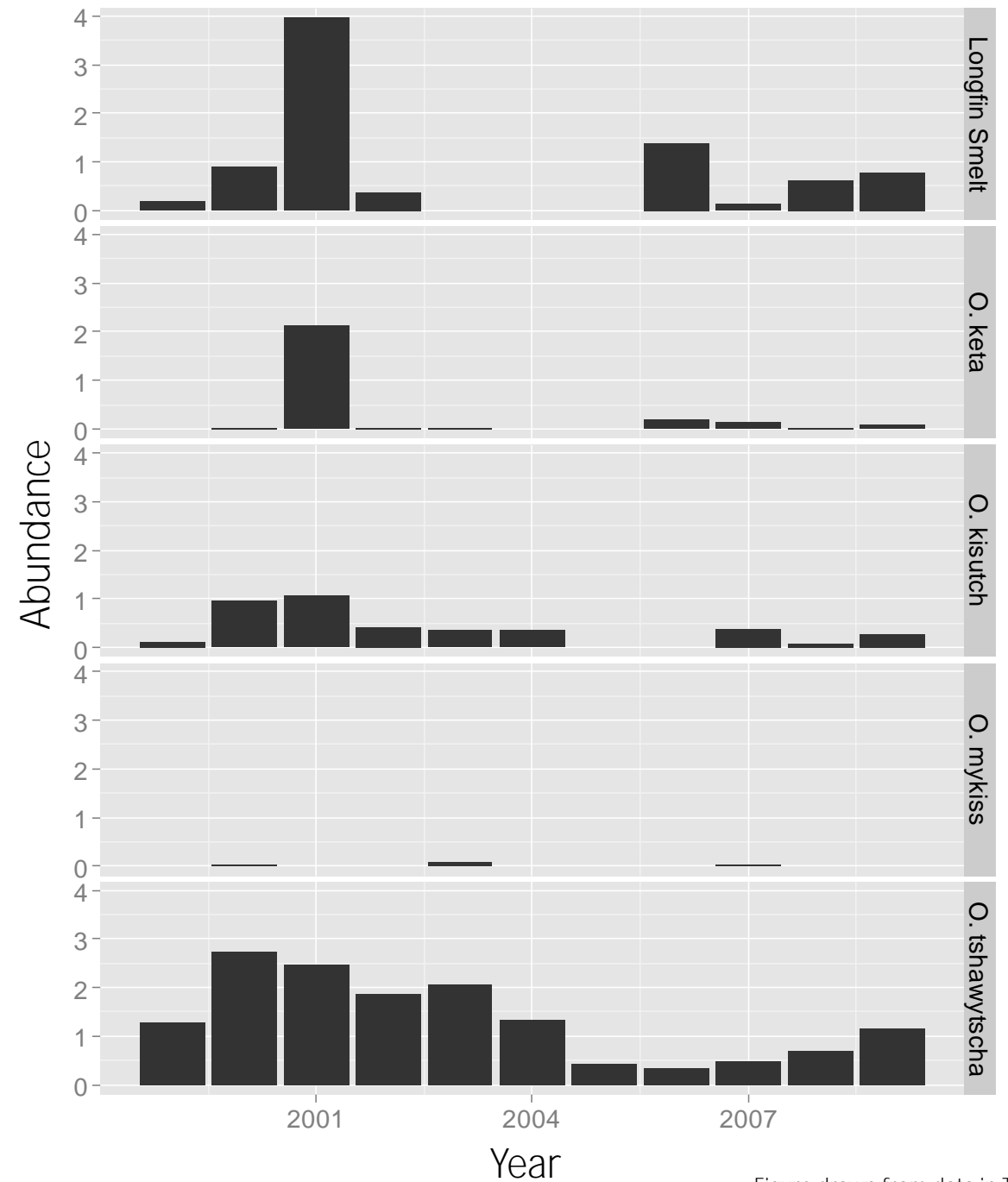
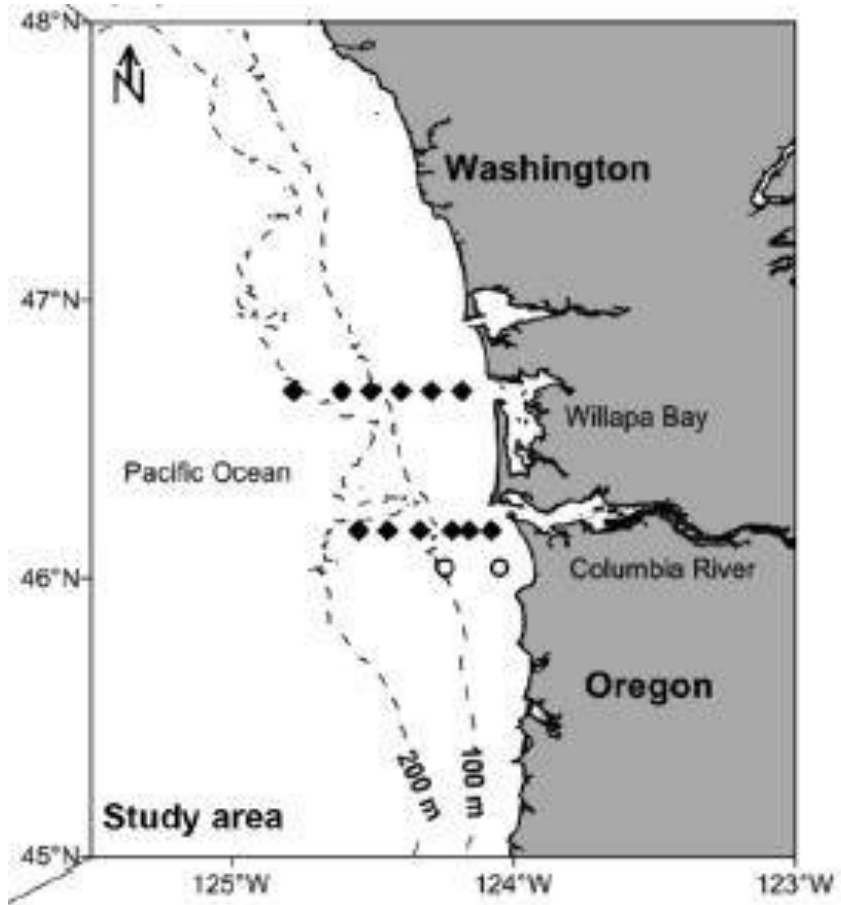
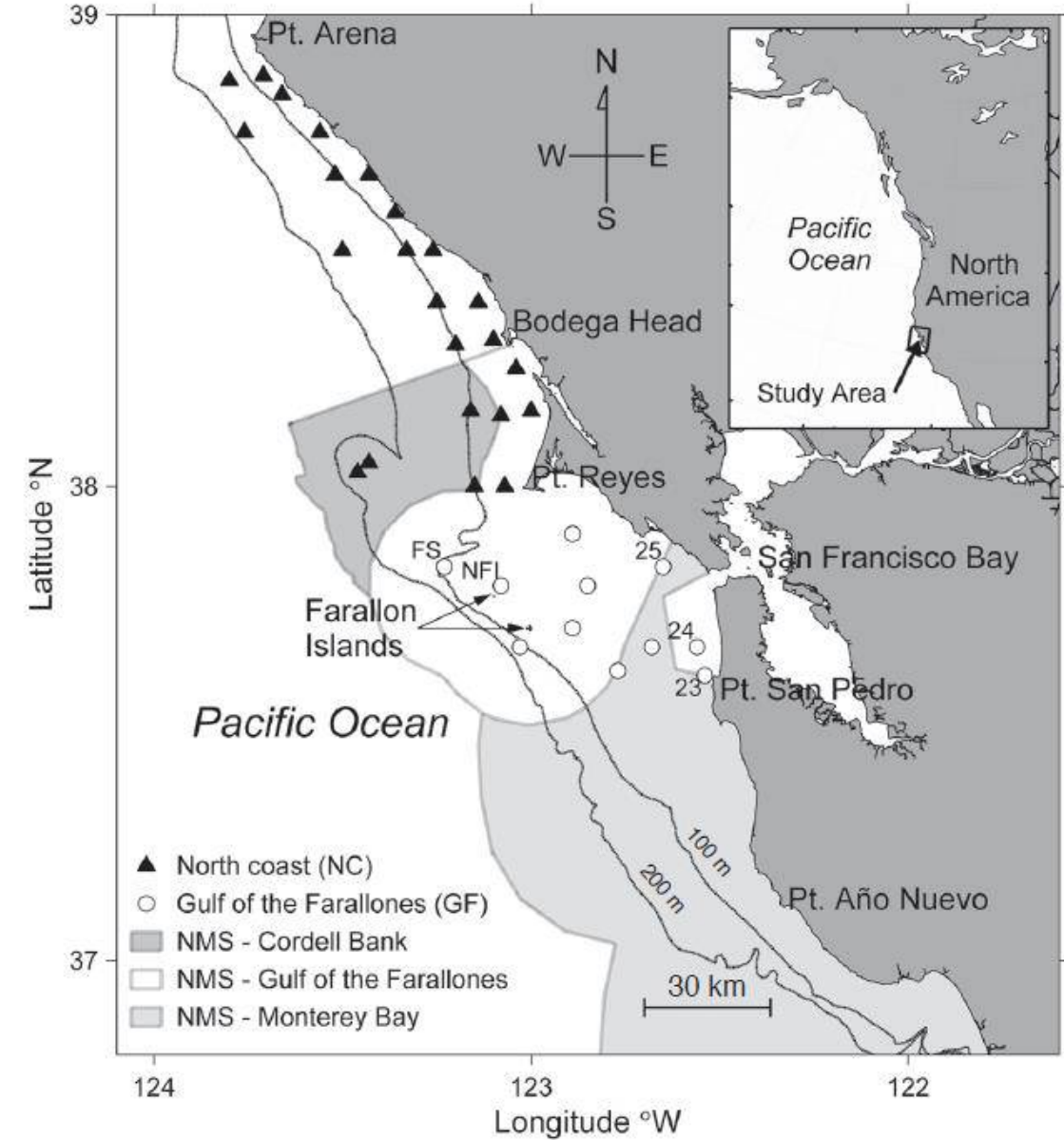


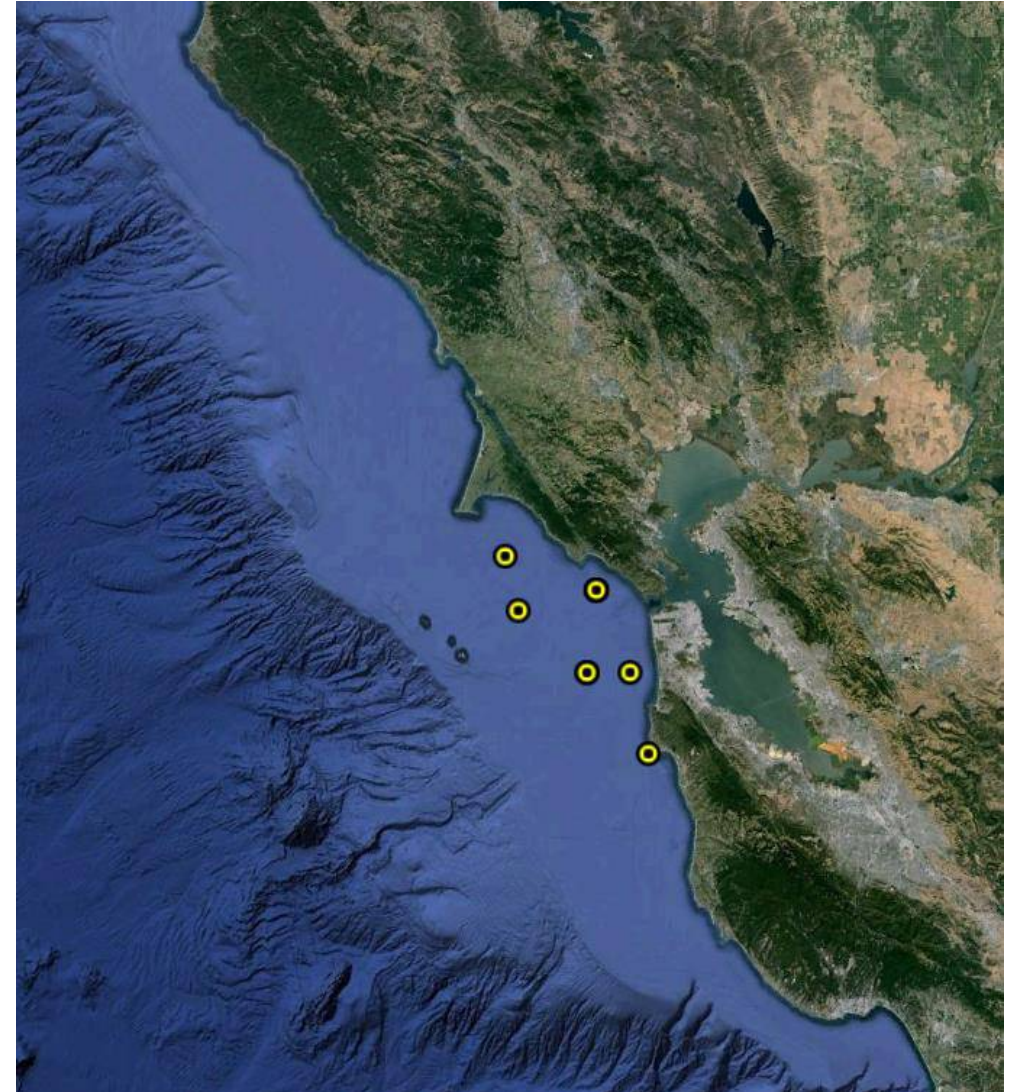
Figure drawn from data in Table 1

NOAA Fisheries Ocean Salmon Survey "Local" Sites

Longfin Smelt Observations, 1998-2015

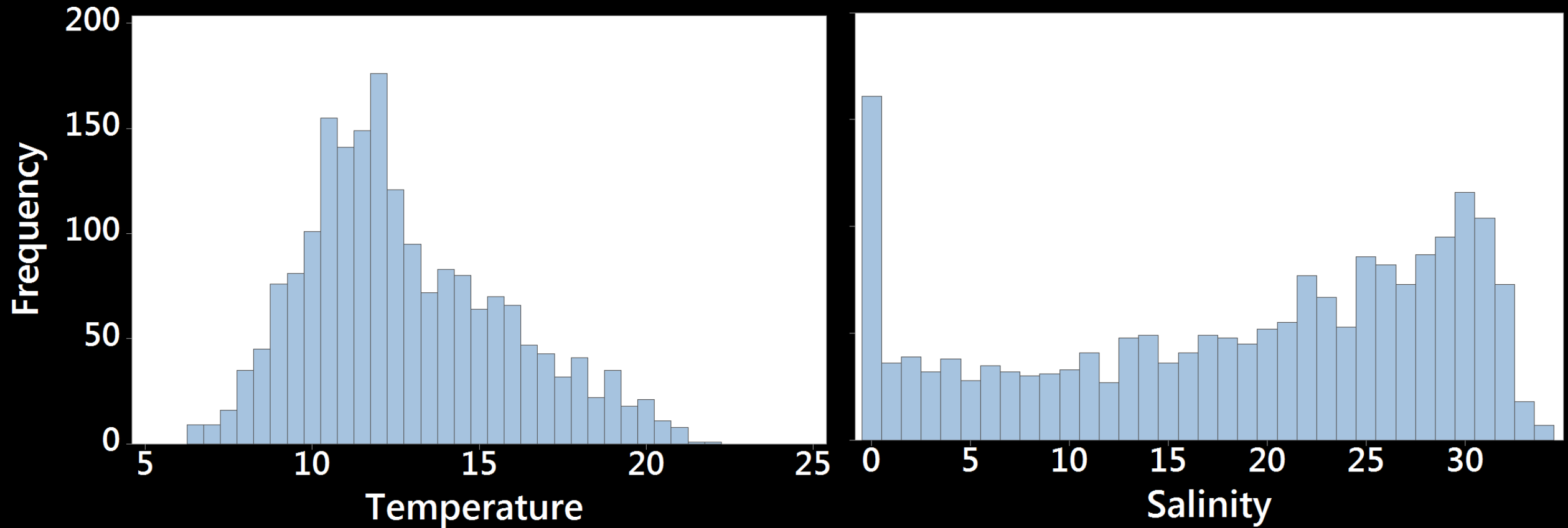


Map: Harding et al. (1999)

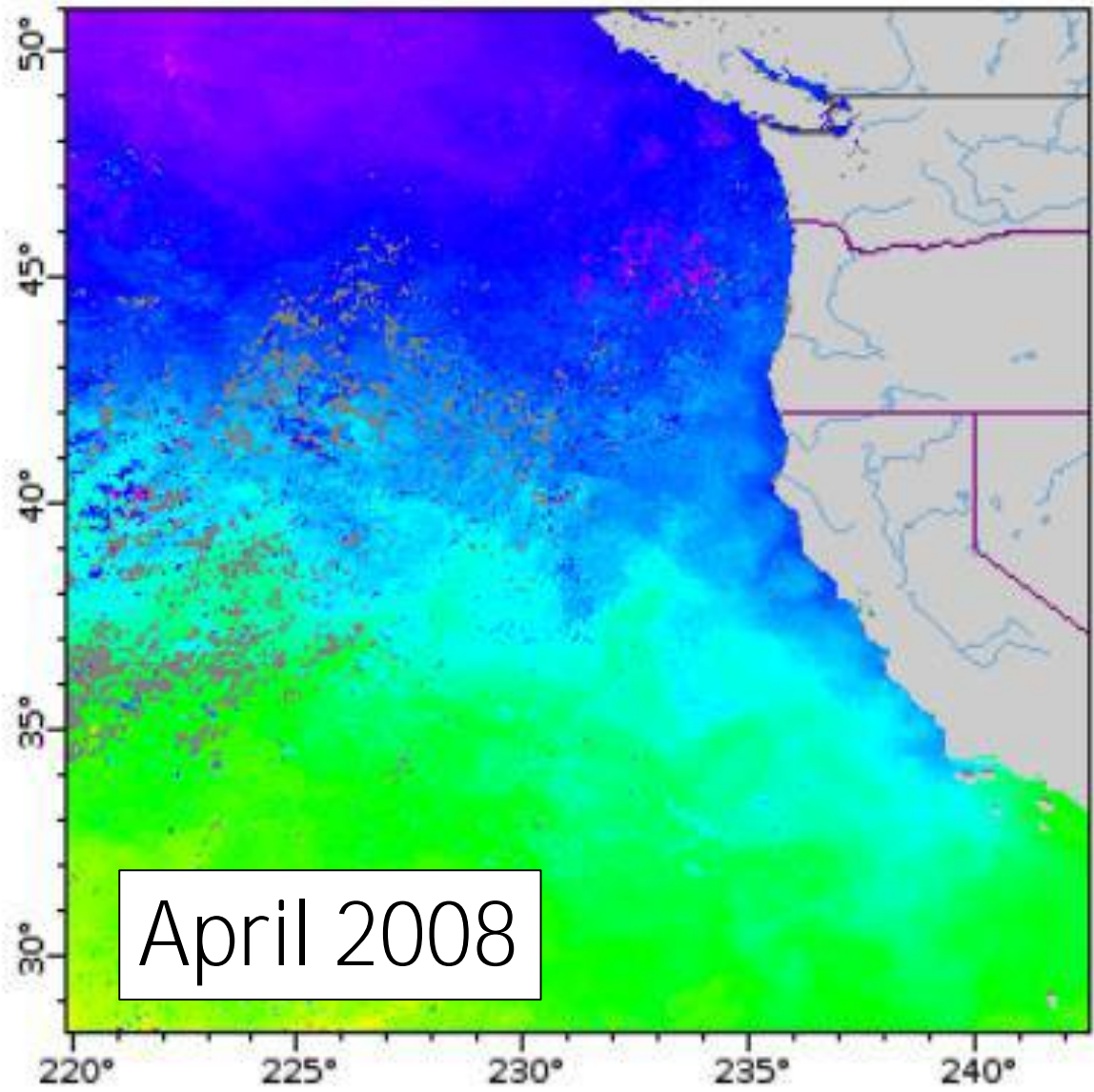


Data: J. Harding, NOAA Fisheries

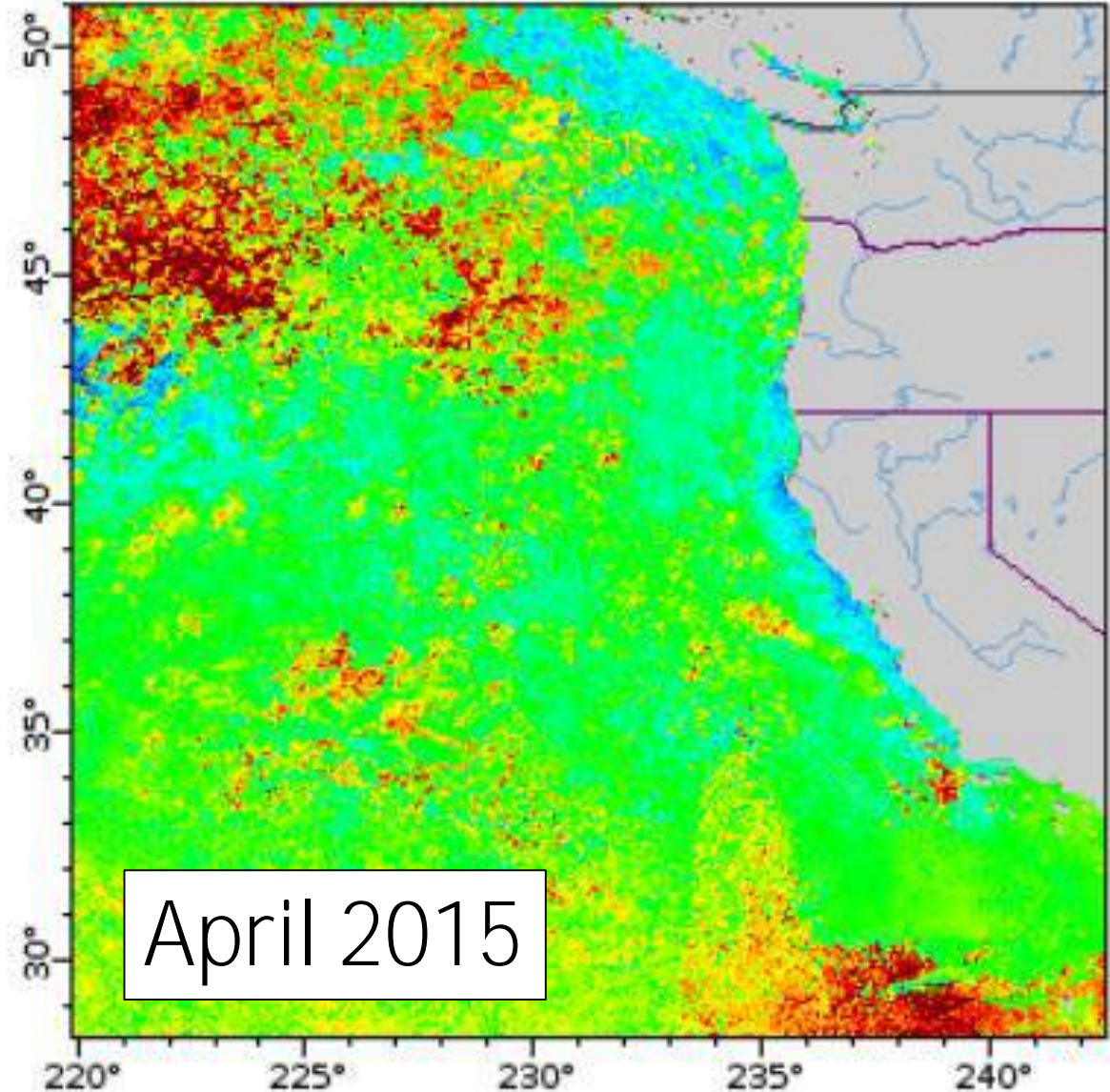
Temperature and Salinity Range in San Francisco Estuary



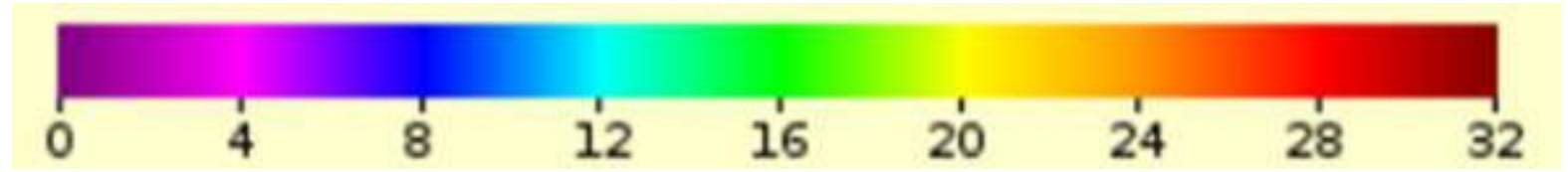
Source: CDFW Bay Study, Otter Trawl, Age-1+ Longfin Smelt, 1981-2012



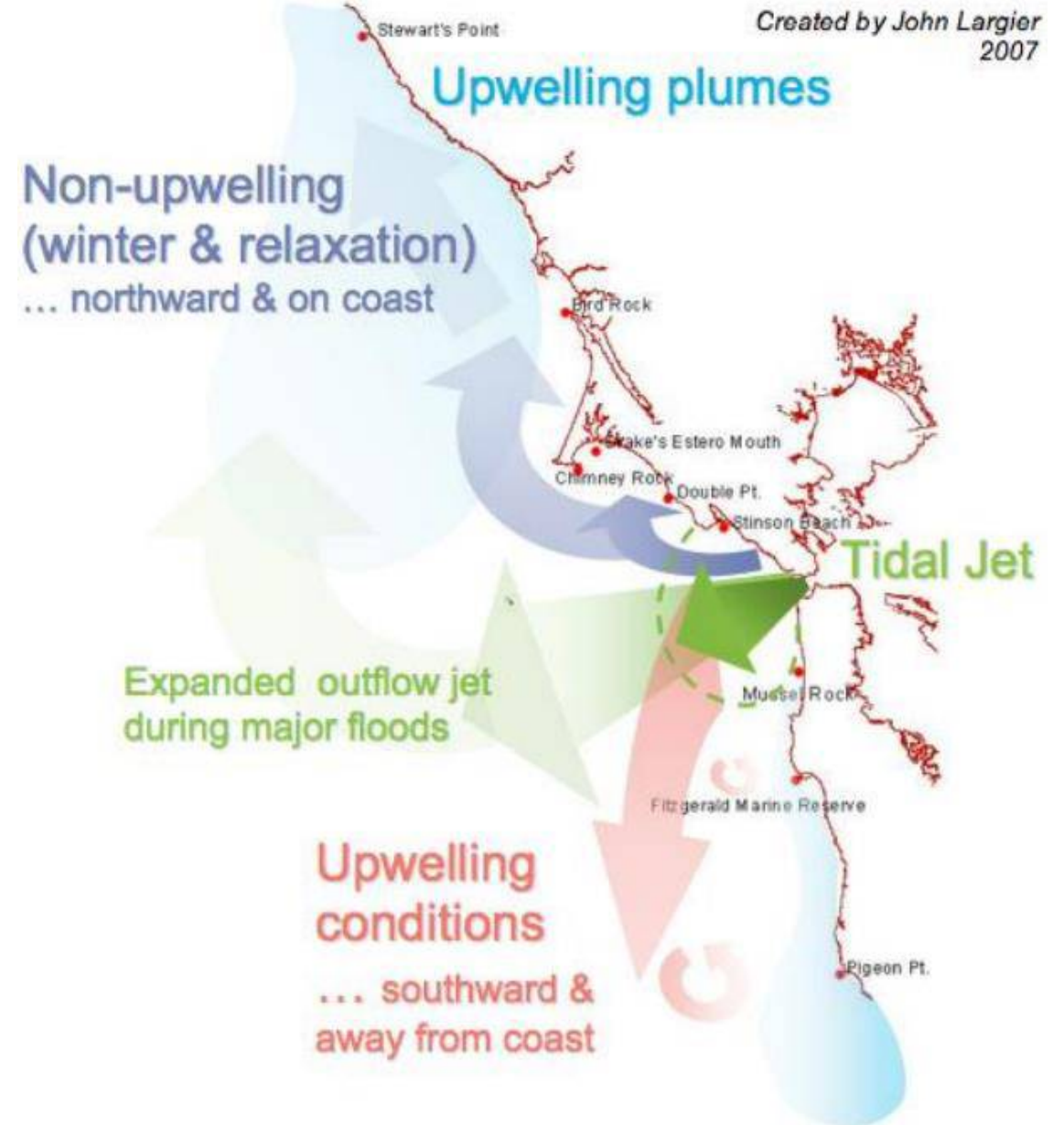
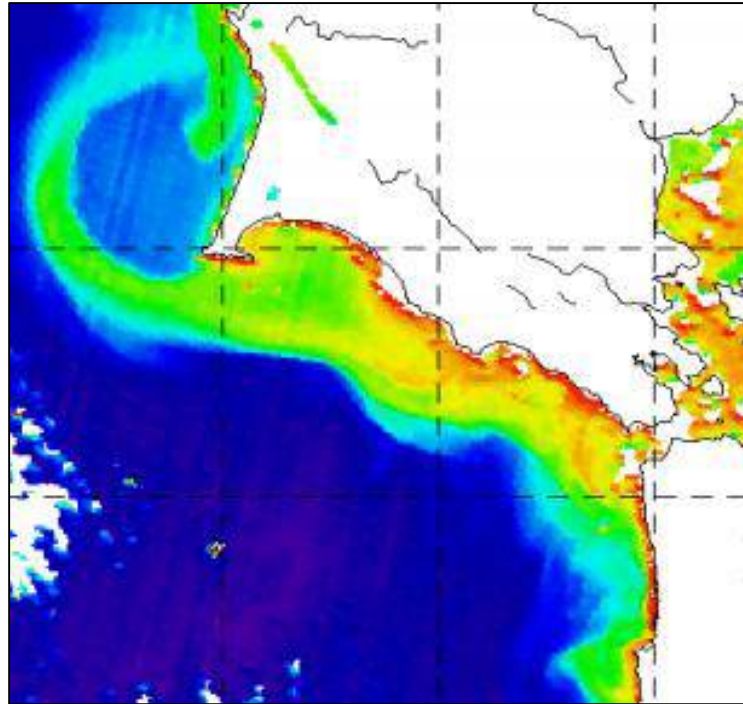
April 2008

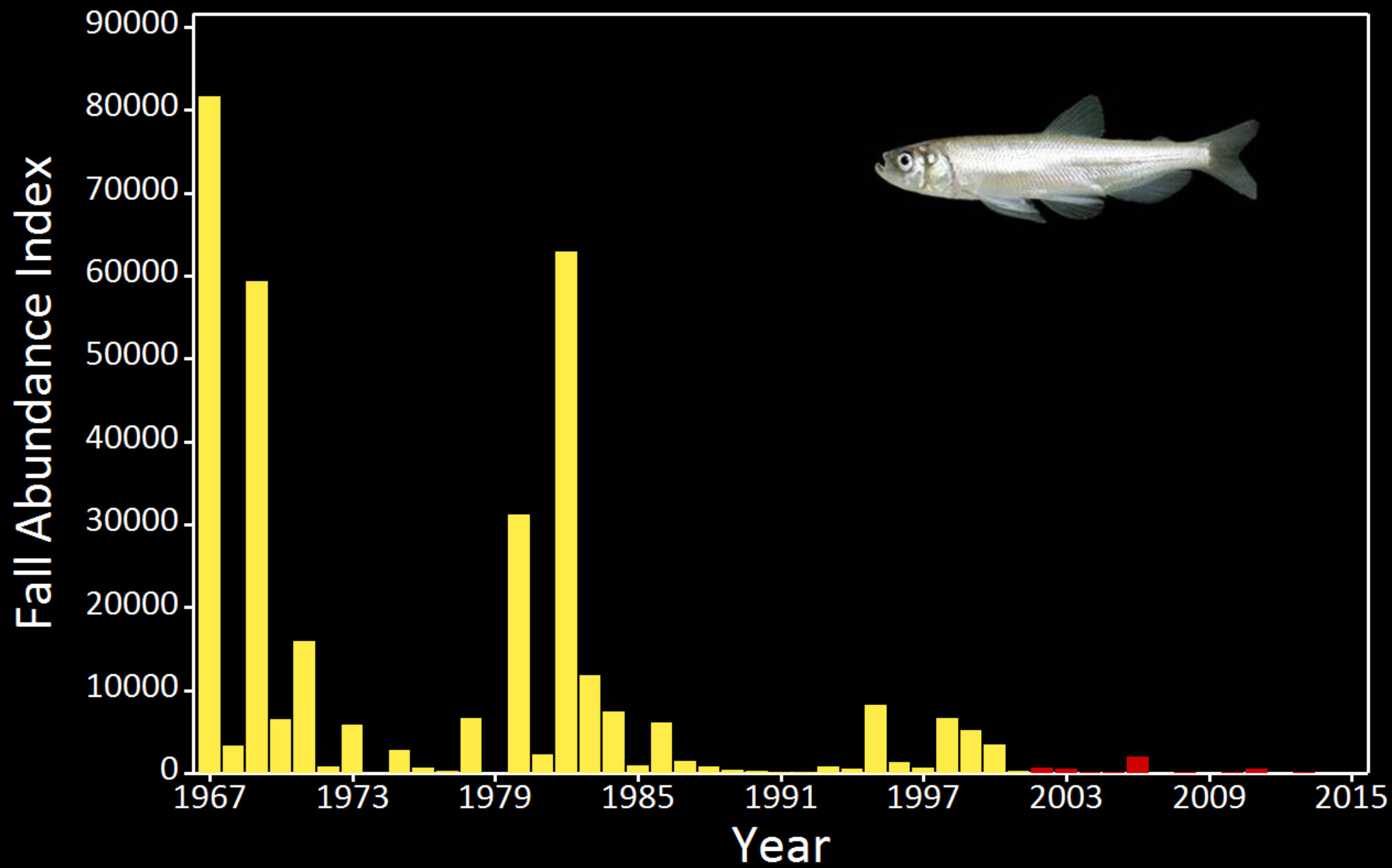


April 2015



Interactions between upwelling and San Francisco Bay Plume may drive local habitat conditions







Longfin Smelt Coastal Research Program

Fundamental Science Needs:

- Abundance and distribution
- Stock composition
- Feeding, growth, condition
- Mortality

The Role of Ocean Conditions on Longfin Smelt in the San Francisco Estuary

1. Ocean occupancy

- Widely distributed and often locally abundant

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2. Ecological processes

- Climate drives local habitat conditions and food webs

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3. Research needs

- Fundamental research critically needed