

# E.3 Northern Anchovy Status and Management (Central Subpopulation)

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Presentation to PFMC  
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# Summary

- Best available science shows N. Anchovy Central Sub-Population has collapsed
- Immediately close the directed fishery and update reference points
- Initiate longer-term effort to establish active management with an ecosystem-based harvest control rule

# *Adverse changes in availability of CPS for dependent predators have been discovered*

## Food limitation of sea lion pups and the decline of forage off central and southern California

Sam McClatchie, John Field, Andrew R. Thompson, Tim Gerrodette, Mark Lowry, Paul C. Fiedler, William Watson, Karen M. Nieto, Russell D. Vetter

Published 2 March 2016. DOI: 10.1098/rsos.150628

ROYAL SOCIETY  
OPEN SCIENCE **2016**

### Other Examples:

- Brown pelican reproductive failures since 2010
- Biggest known common murre die-off ever in California in 2015
- Brandt's cormorant population has declined by two thirds since 2007 attributed to anchovy decline
- California least terns crashing at coastal sites in 2015 due to lack of anchovies
- Observed impacts to humpback whales in Monterey Bay

U.S.  
**Survey says California brown pelican breeding population has plunged drastically**

Published June 02, 2014 · Associated Press



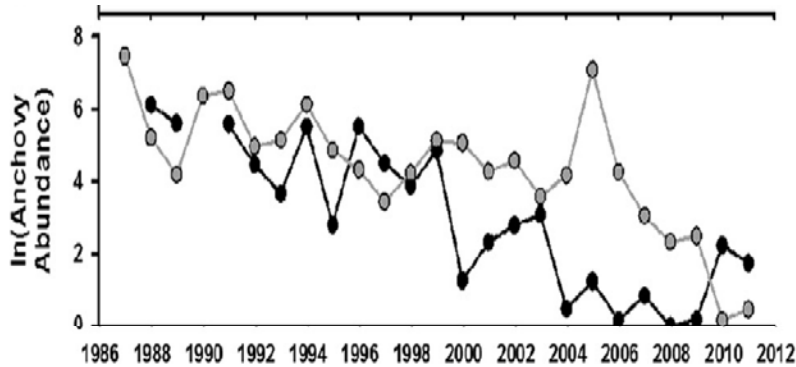
**Starving Sea Lions Washing Ashore by the Hundreds**

By JACK HEALY MARCH 12, 2015

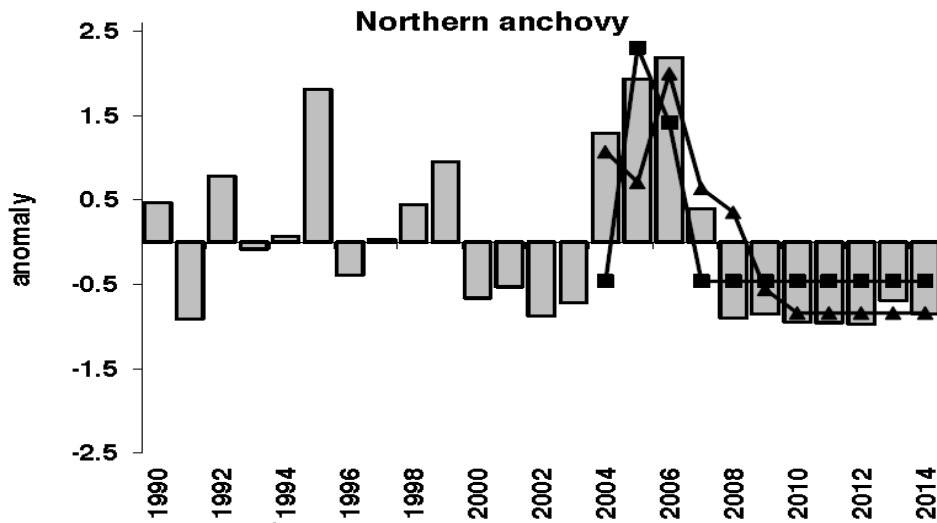


Rescued sea lions recuperated at the Pacific Marine Mammal Center in Laguna Beach, Calif., last month. In a normal January, animal rescuers will find about 20 to 40 stranded sea lions. This year, they recovered 250.

# Northern Anchovy Available Science



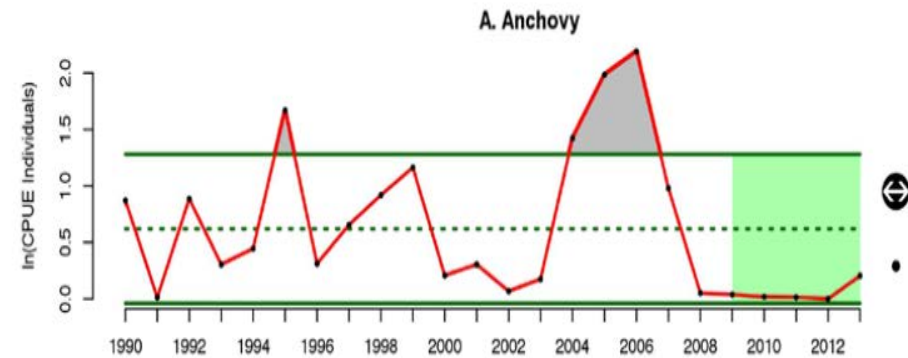
Sydeman et al. 2015



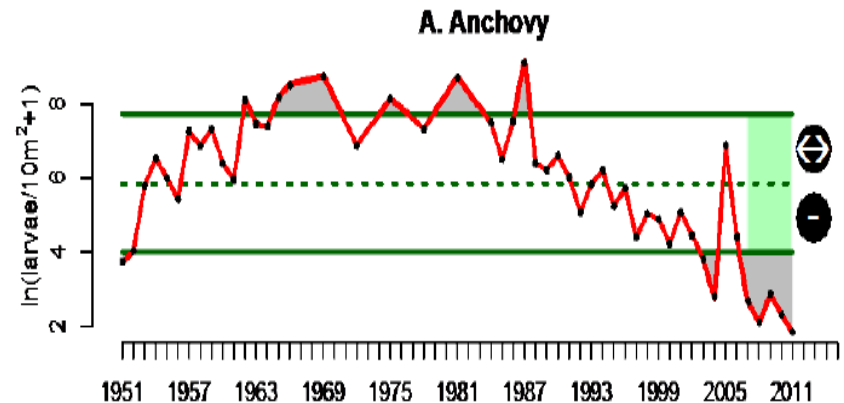
Leising et al. 2014.

## NMFS State of CA Current (IEA)

### Central CA



### Southern CA

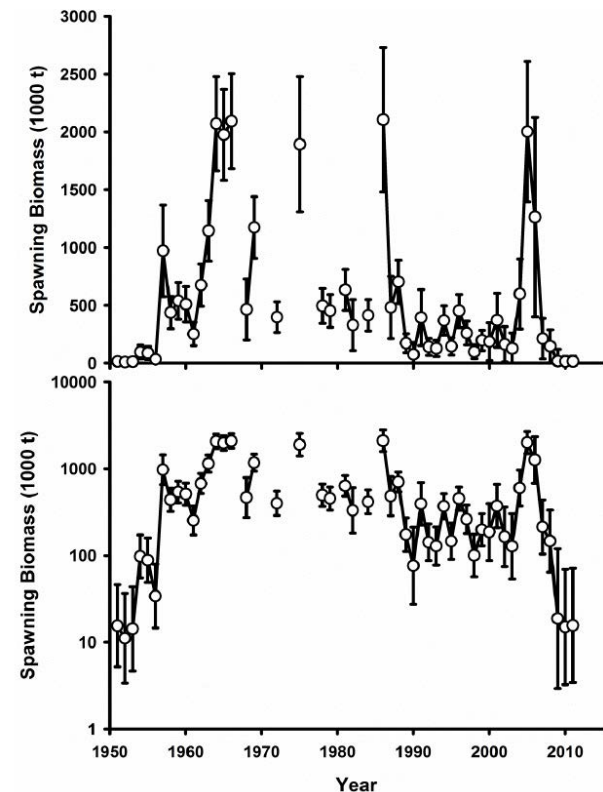
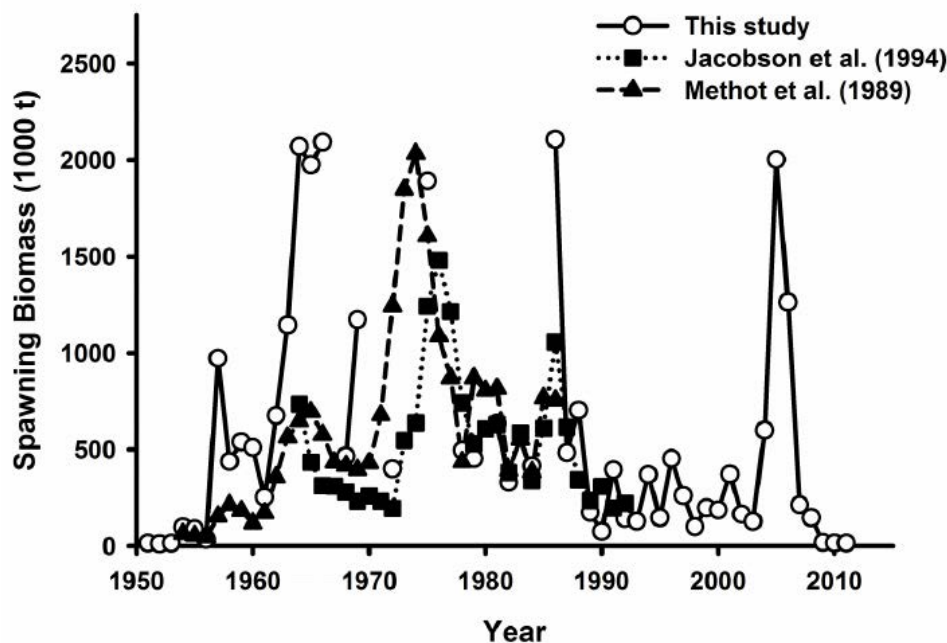


“Larval anchovy abundance continued a declining trend over the last thirty years to the lowest abundance since 1951”

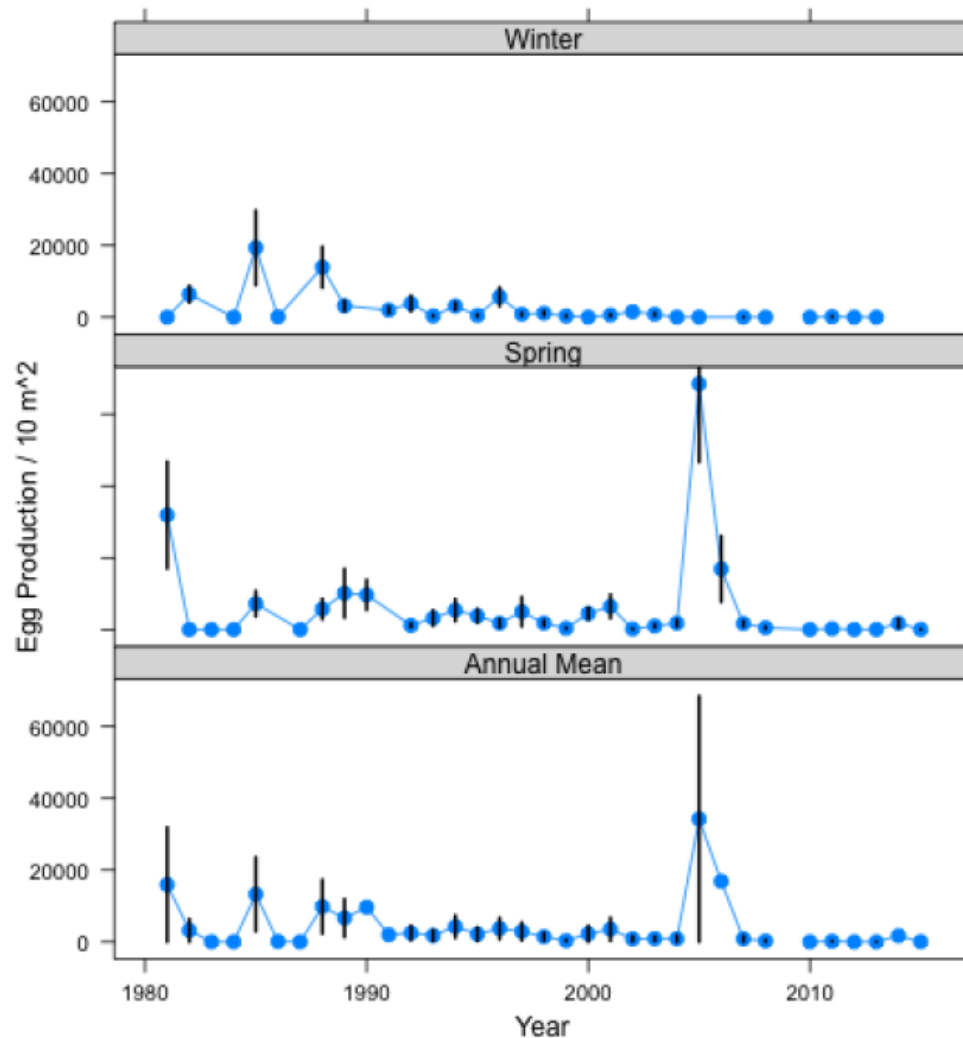
# MacCall et al. 2016

## *“Recent collapse of northern anchovy biomass off California”*

- Peer reviewed and published in *Fisheries Research*
- “Anchovy biomasses estimated for 2009-2011 are the lowest seen in 60 years... **below 20,000 mt**”; 3% of average biomass from 1951-2011
- Based on egg surveys conducted since 2011, “there has been no substantial recovery of the anchovy population as of 2015.”



# Northern Anchovy



- Production is still low
- Jackknife variance (SE shown) is large



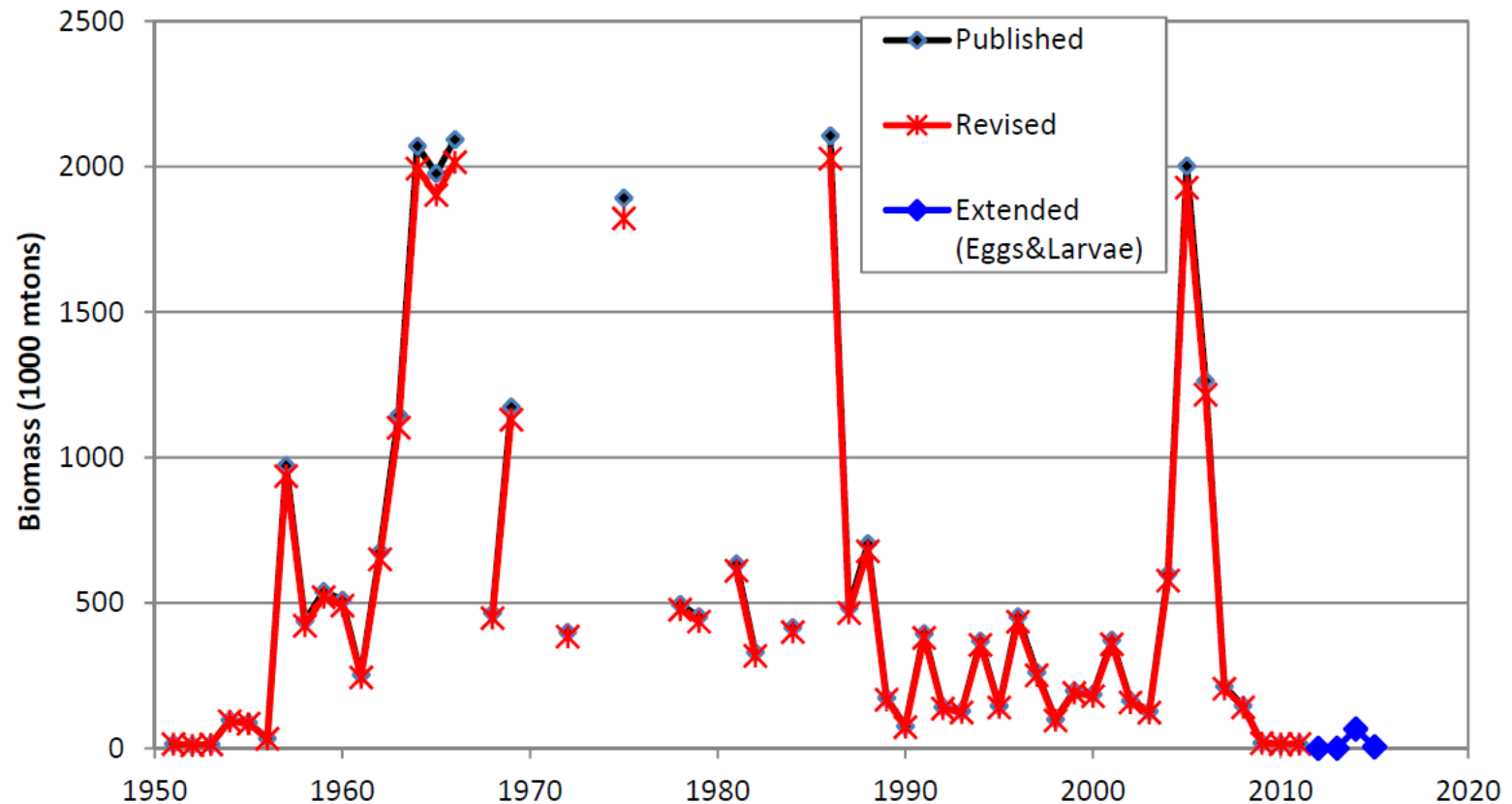
Egg and Larval Production of CPS  
in the California Current

Edward D. Weber  
Southwest Fisheries  
Science Center



NOAA FISHERIES

# Updated Estimate Using MacCall et al. 2016 Method



“...the biomass is almost certainly less than 100,000 mt.”  
Average biomass of ~18,200 mt from 2012-2015

From MacCall Sept 2016  
Suppl. Pub Comment

# No Evidence of Recruitment in 2016

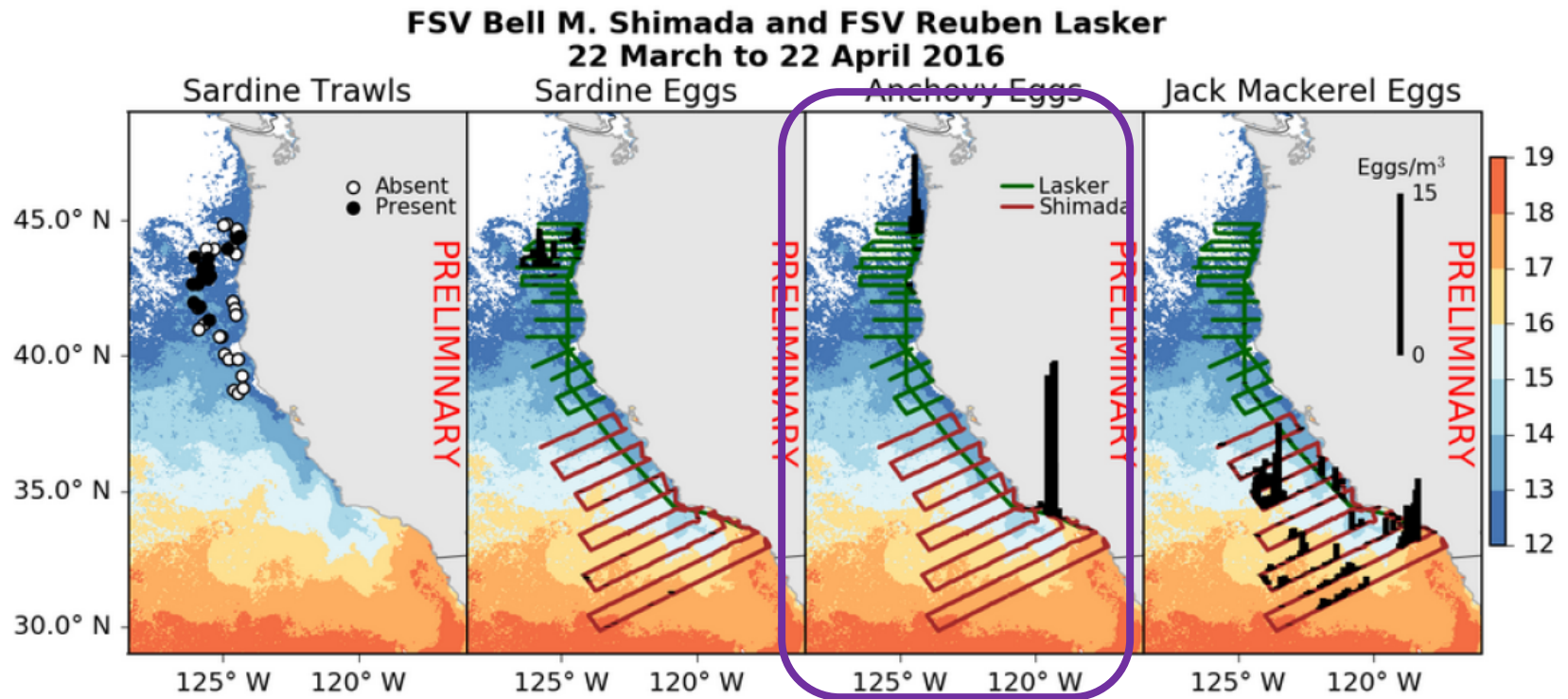
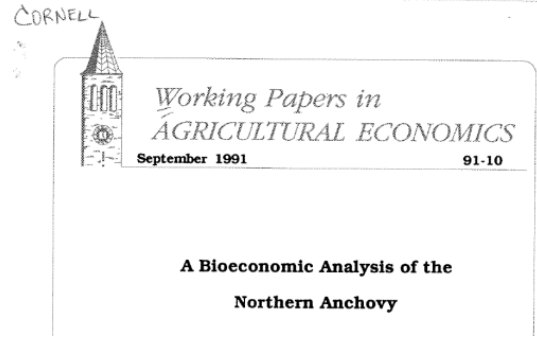


Figure. 3. Preliminary CUFES survey results from spring 2016  
(<https://swfsc.noaa.gov/textblock.aspx?Division=FRD&ParentMenuId=218&id=1340>).  
Note the continued very nearshore distribution and low values of anchovy eggs.

# Anchovy Reference Points in CPS FMP are Inappropriate

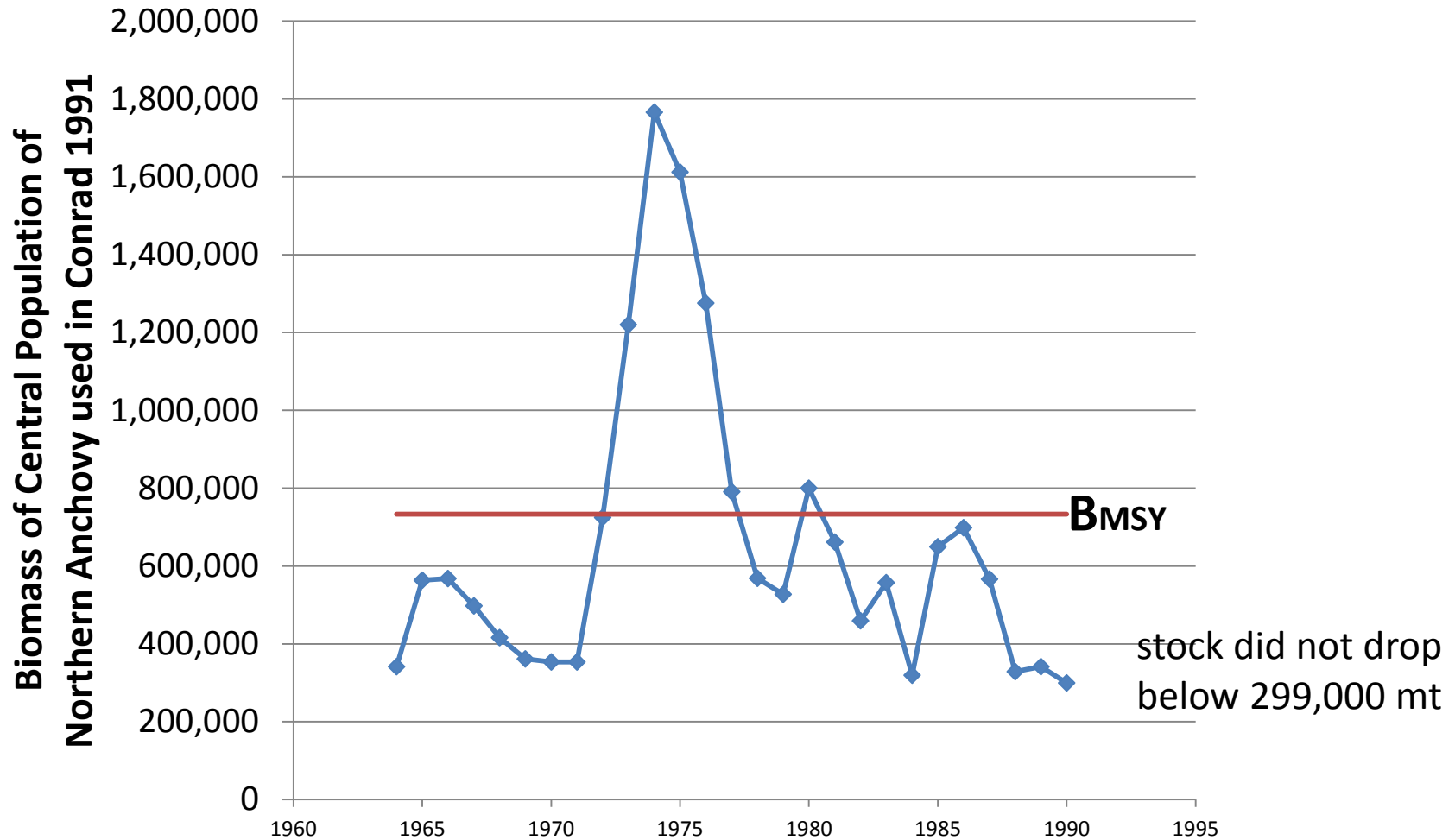


- OFL based on Conrad 1991
- Bioeconomic model of major industrial fishery using 1964-1990 time series
  - MSY of 123,336 mt
  - Bmsy of 733,410 mt

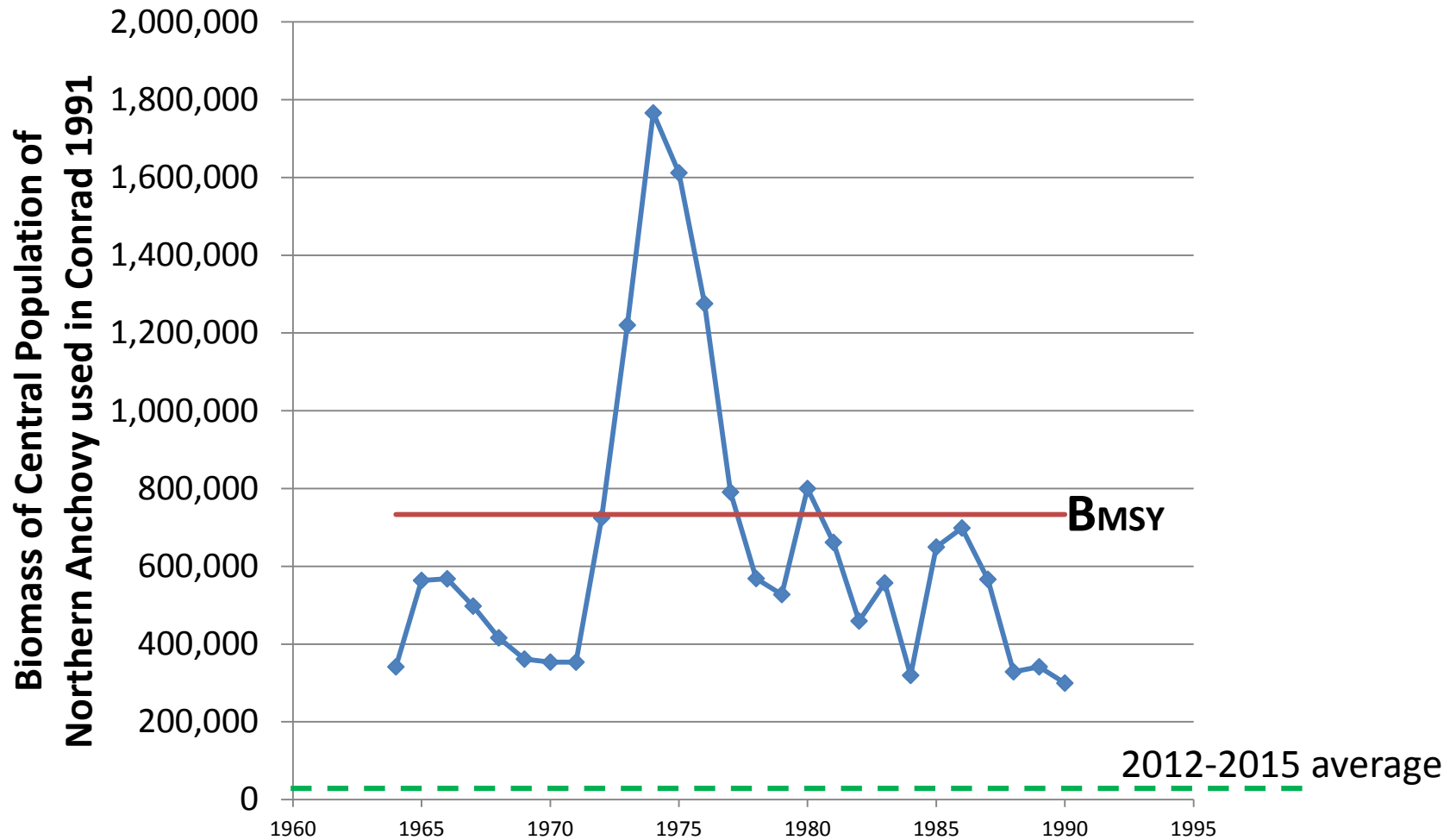
The concept of maximum sustainable yield (MSY) is no longer regarded as an appropriate management objective in a stochastic environment. If it is maintained for any length of time it can result in depletion of a fish stock.

-Conrad 1991

# Basis of Current OFL

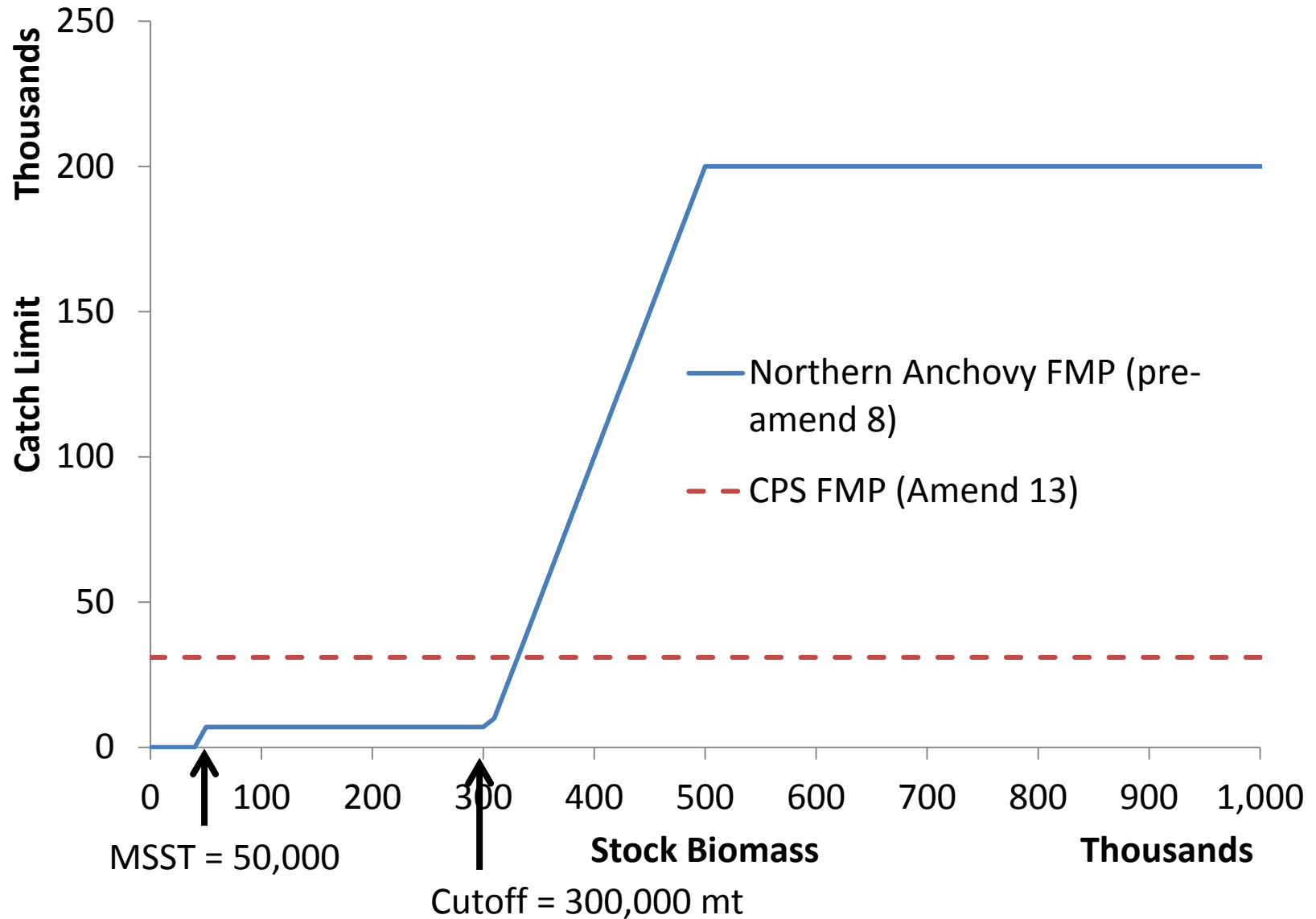


# Basis of Current OFL



Current biomass 98% below  $B_{msy}$

## Existing and Historical Harvest Rules for N. Anchovy Central Sub-population



# January-June Anchovy Closure to Protect Brown Pelicans

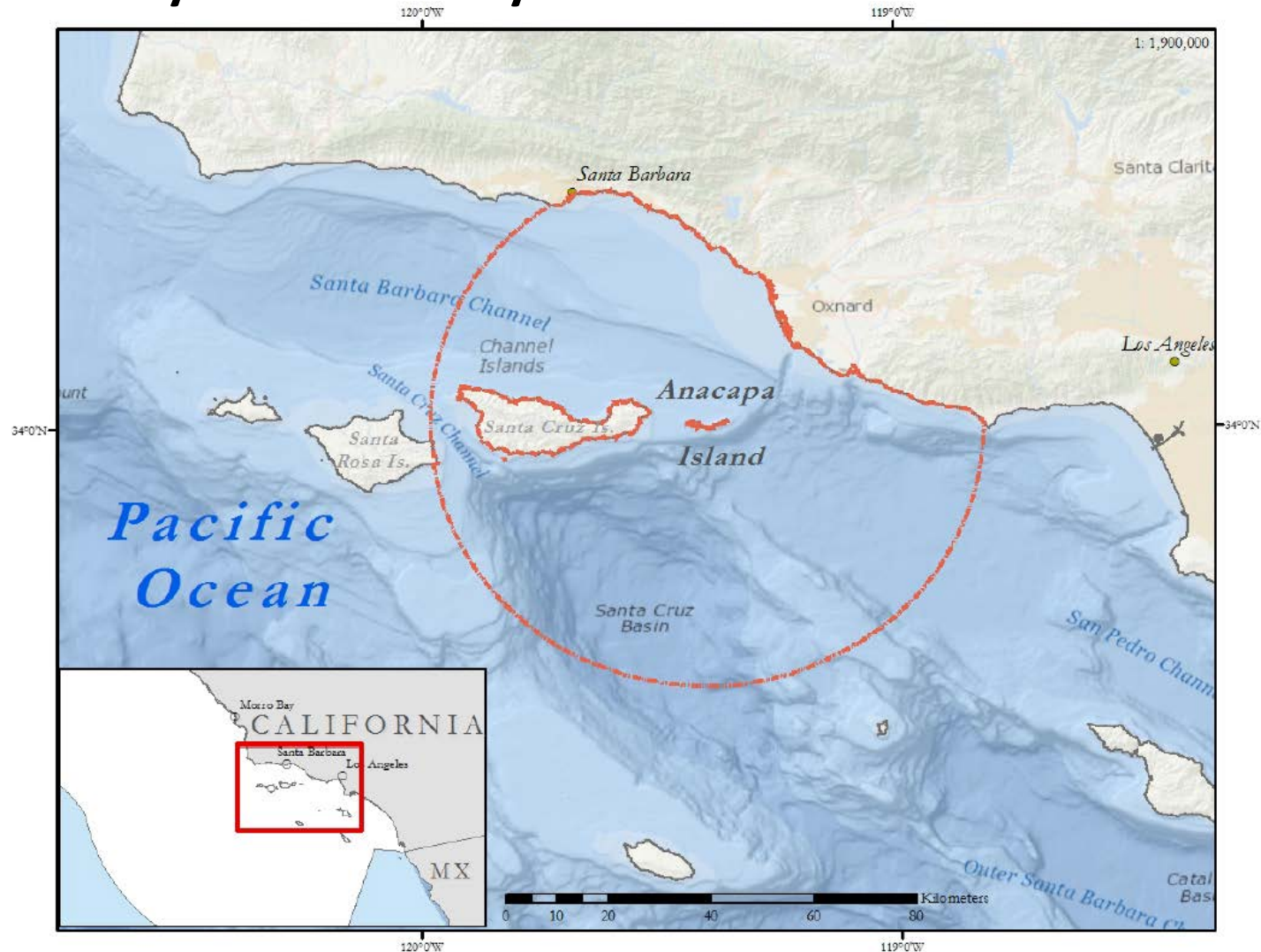


Figure 2. Proposed seasonal anchovy fishing closure during brown pelican nesting and fledging season (January-June) representing a 50 km buffer around Anacapa Island.

# Management Mechanisms

- Option 1: Adjust specifications (OFL, ABC, ACL & ACT) in November 2016
- Option 2: Invoke Point of Concern Framework in CPS FMP at this meeting
- Option 3: Adjust ACL and/or ACT

# CPS FMP Point of Concern

“The point-of-concern process is the Council's primary tool (along with setting HGs, ACLs, ACTs, or harvest quotas) for exercising resource stewardship responsibilities.”

“A ‘point-of-concern’ occurs when one or more of the following is found or expected”

- “Any adverse or significant change in the biological characteristics of a species (age composition, size composition, age at maturity, or recruitment) is discovered.”
- “An overfishing condition appears to be imminent or likely within two years.”
- “Any adverse or significant change in ecological factors such as the availability of CPS forage for dependent species or in the status of a dependent species is discovered.”

Source: CPS FMP at 15

# Summary of Requests for N. Anchovy (Central Subpop)

- Immediately:
  - Close the directed fishery for N. anchovy (CSP)
  - Update OFL & ABC based on best available science
  - Reduce ACL & ACT to allow minimal incidental catch
  - Consider time/area closures to protect predators
- Initiate long-term effort to re-establish ecosystem-based harvest control rule and active management based on full stock assessment