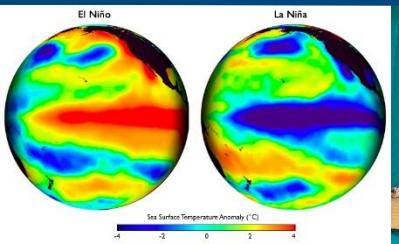
Agenda Item G.4.a
Supplemental SWFSC PowerPoint
November 2016

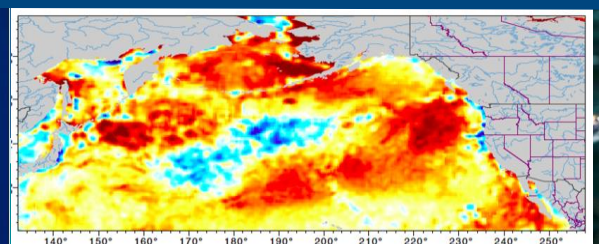
NOAA FISHERIES
Southwest Fisheries Science Centers

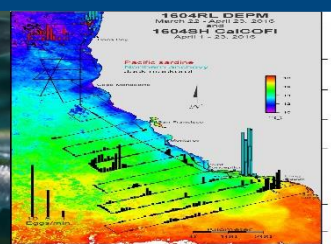
Southwest Fisheries Science Center Summary of Current Information Available on Coastal Pelagic Species with Emphasis on the Central Subpopulation of Northern Anchovy

Gerard DiNardo and Dale Sweetnam





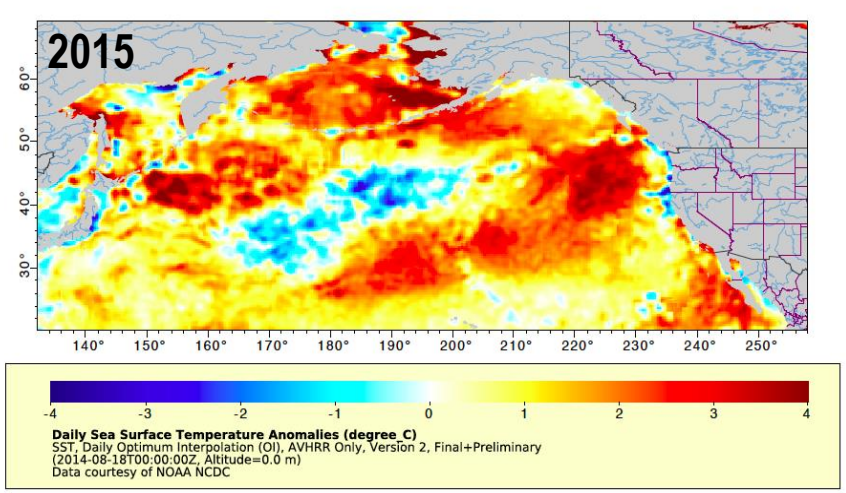


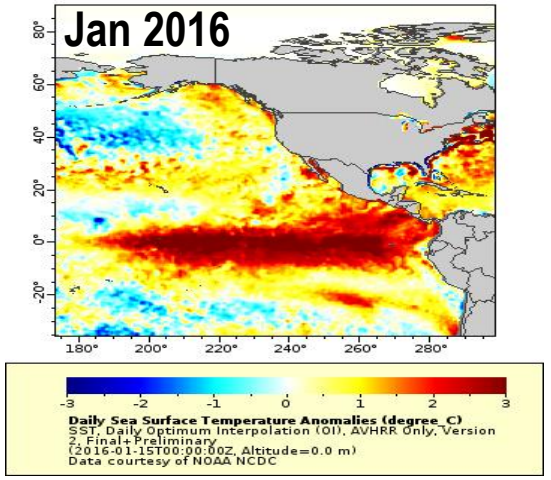


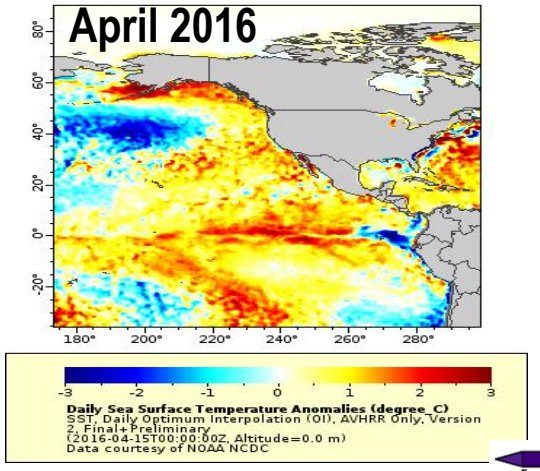
Outline

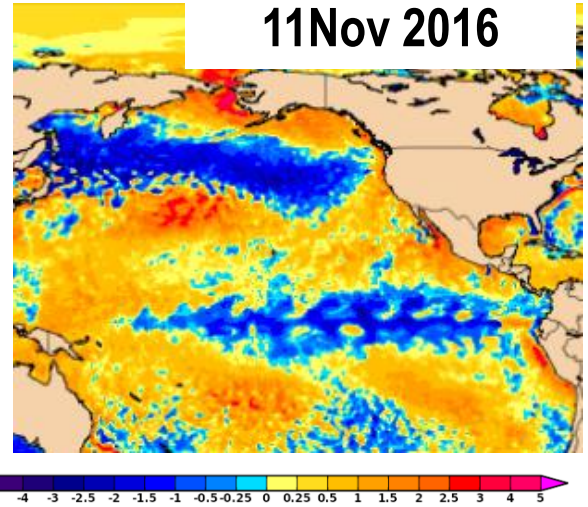
1. Changing environmental conditions
2. Historical Egg and Larval Production of the Central Subpopoulation of Northern Anchovy in the Southern California Bight (Agenda Item G.4.a. SWFSC Report)
3. 2015 “SaKe” Survey ATM estimate (Agenda Item G.4.a. Sup.SWFSC Report, Appendix 1)
4. 2016 Survey Updates (Agenda Item G.4.a. Sup.SWFSC Report)
   - Winter CalCOFI Survey Spring CalCOFI/CPS DEPM survey
   - Summer California Current Ecosystem Survey
   - Rockfish Recruitment and Ecosystem Assessment Survey
5. Ancillary Ecosystem Information
6. Next Steps

2013-2015 Warm Blob, 2015-2016 El Niño, 2017 La Niña?









- While El Niño-related impacts on spring/summer 2016 productivity are anticipated to be similarly weak, their combination with preexisting anomalous conditions likely means continued low phytoplankton biomass.
- **Take home message**: the conditions we witnessed *ecosystem-wide* were unprecedented, and they gave us the opportunity to take a peek into what may be either a "new baseline" or possible recurrent conditions. It implies we need to consider new ways of executing our mandates.
- **The bottom line is that the NE Pacific marine heat wave appears to be receding.**
- **La Niña appears to be coming (55% chance NCEP)**

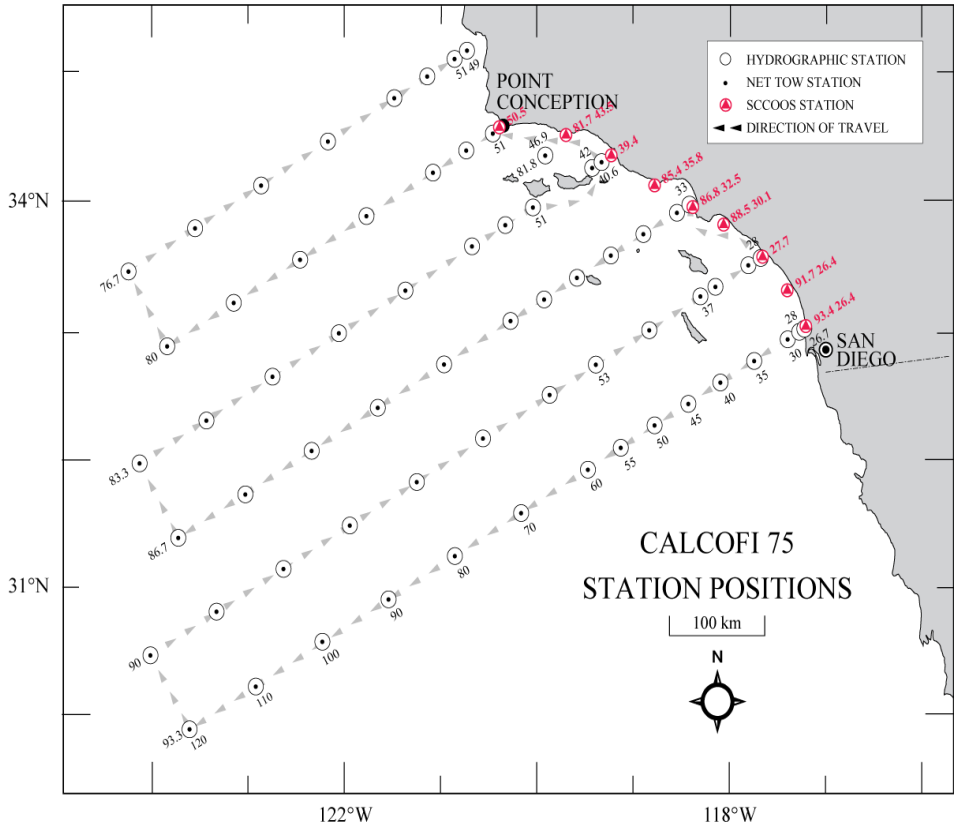
'The Blob' overshadows El Nino

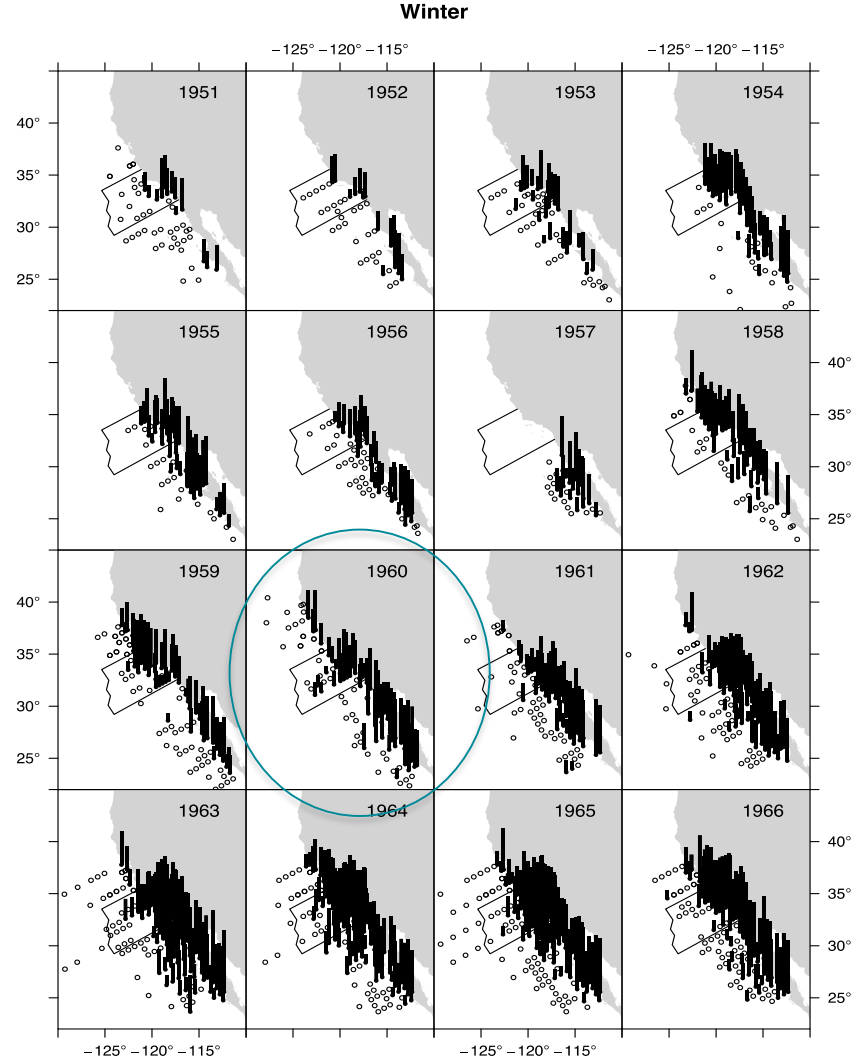
July 6, 2016

'The Blob' and El Niño are on their way out, leaving a disrupted marine ecosystem behind. Credit: Michael Jacox

2. Historical Egg and Larval Production of the Central Subpopoulation of Northern Anchovy in the Southern California Bight (Agenda Item G.4.a. SWFSC Report)

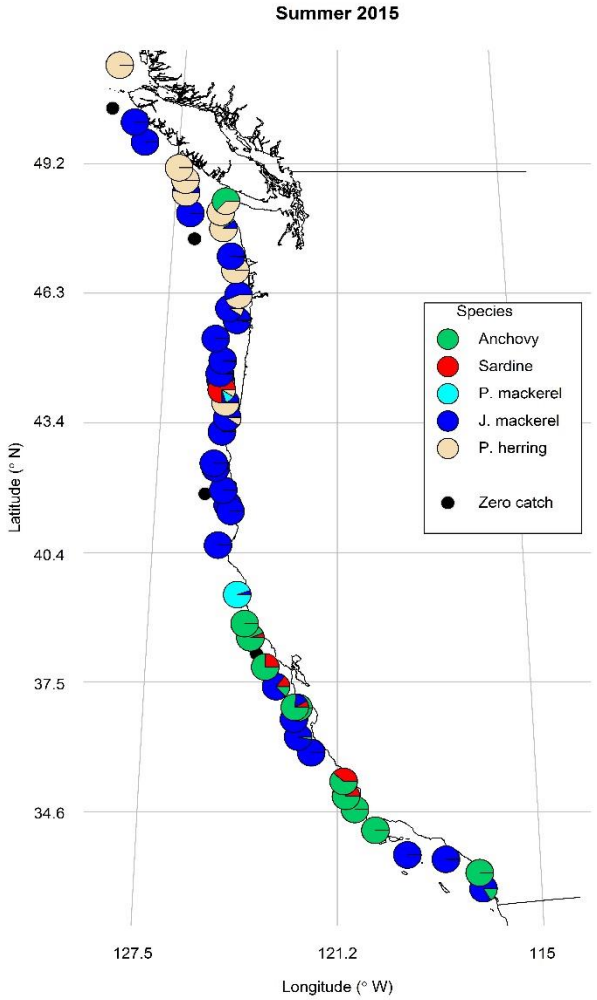
- Scaling egg and larval indices to biomass estimates using DEPM estimates from the 1980s appears unjustified and does not produce credible estimates.
- Current CalCOFI grid does not sample the entire range of NSNA, with a large portion in Mexican waters.

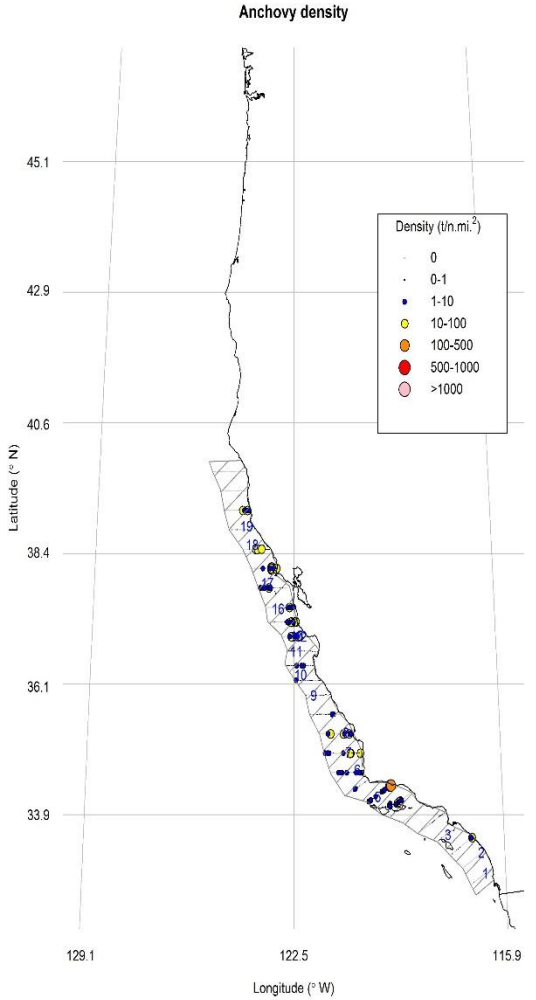




3. 2015 Summer SaKe ATM results

- Northern anchovy were widely spread along the coast of central California, and to a lesser extent in the Southern California Bight.
- The majority of anchovy were YOY (2015 year class) averaging around 60 mm (range 40-130mm).
- The Acoustic Trawl Method (ATM) survey was able to produce a negatively biased estimate of CSNA biomass at 31,427 mt.
- *"Use of these data for management purposes should be restricted to providing an estimate of abundance only for the area and the portion of the water column surveyed, until a methodology review (and possibly additional research) can be undertaken to address concerns about the proportion of the population inshore of the survey area and that in the surface waters."* SSC (http://www.pcouncil.org/wp-content/uploads/2016/08/E2a_Workshop_Rpt_SEPT2016BB.pdf).

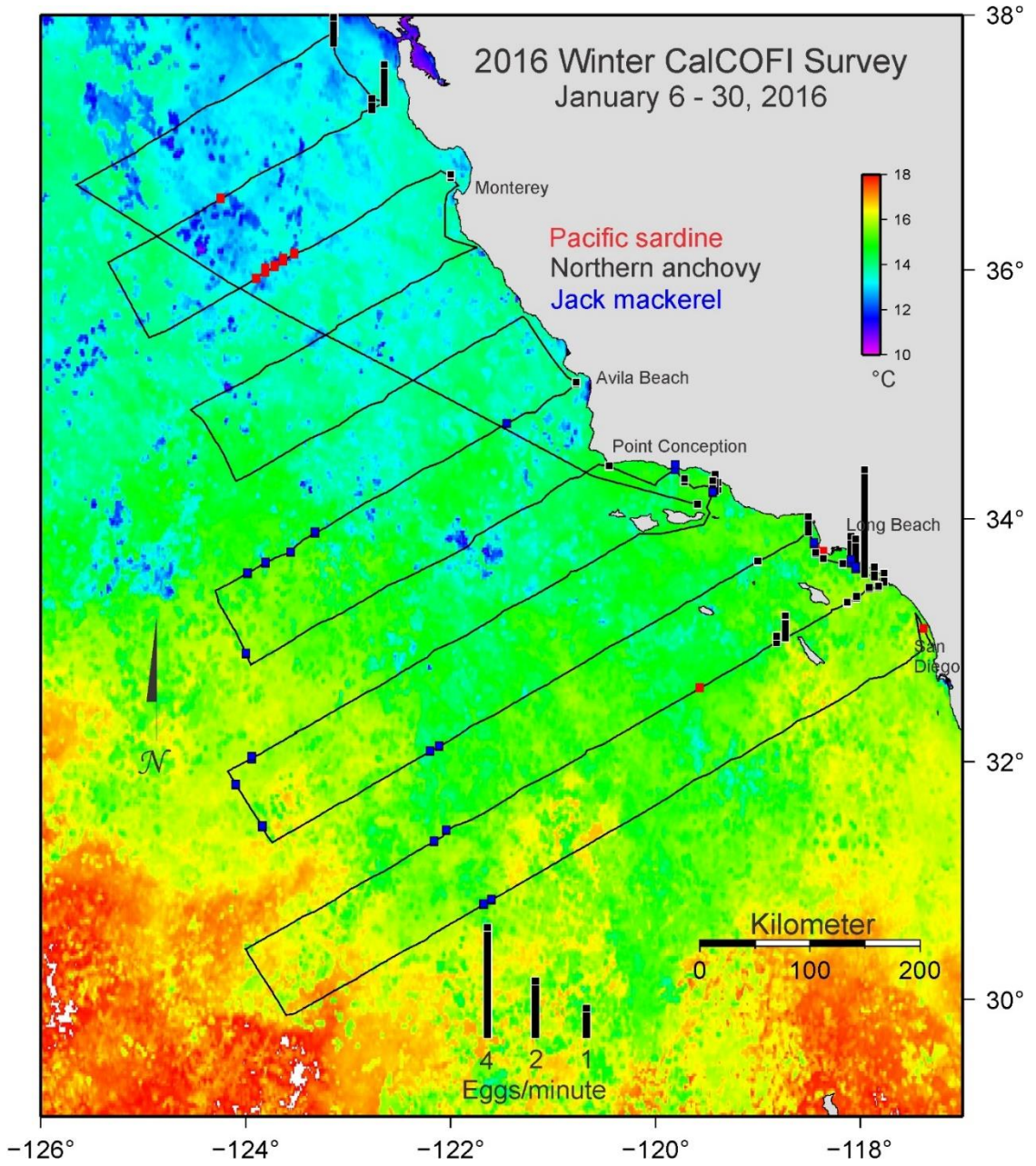




4. 2016 Survey Updates

Winter CalCOFI Survey (January 6-30, 2016):

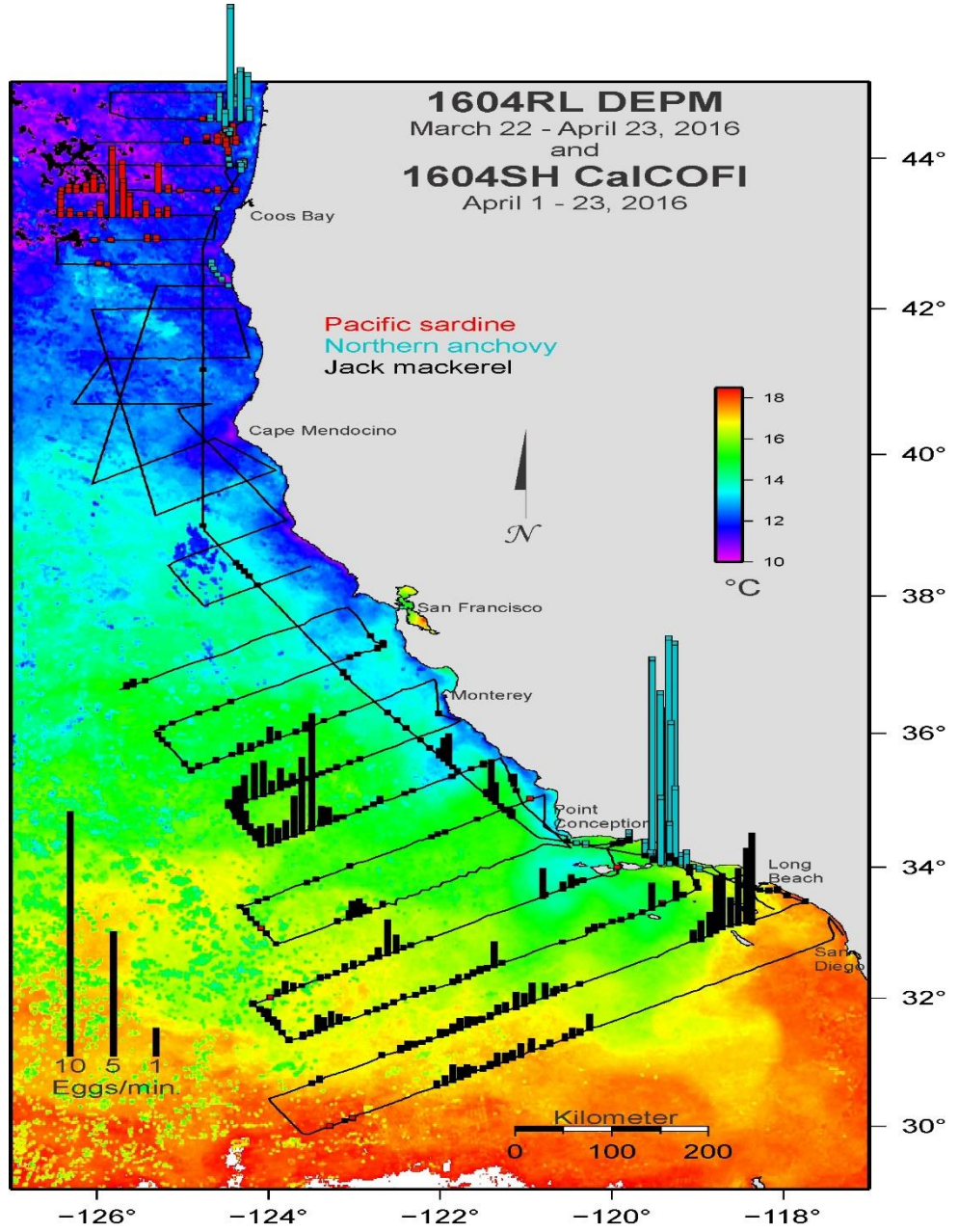
- Found low anchovy egg abundance in Continuous Underway Fish Egg Sampler (CUFES) samples.
- High temperatures (> 14^{o}C) remained in CalCOFI Survey area and north to San Francisco.



4. 2016 Survey Updates

Spring CalCOFI/CPS DEPM Survey (March 22-April 23, 2016)

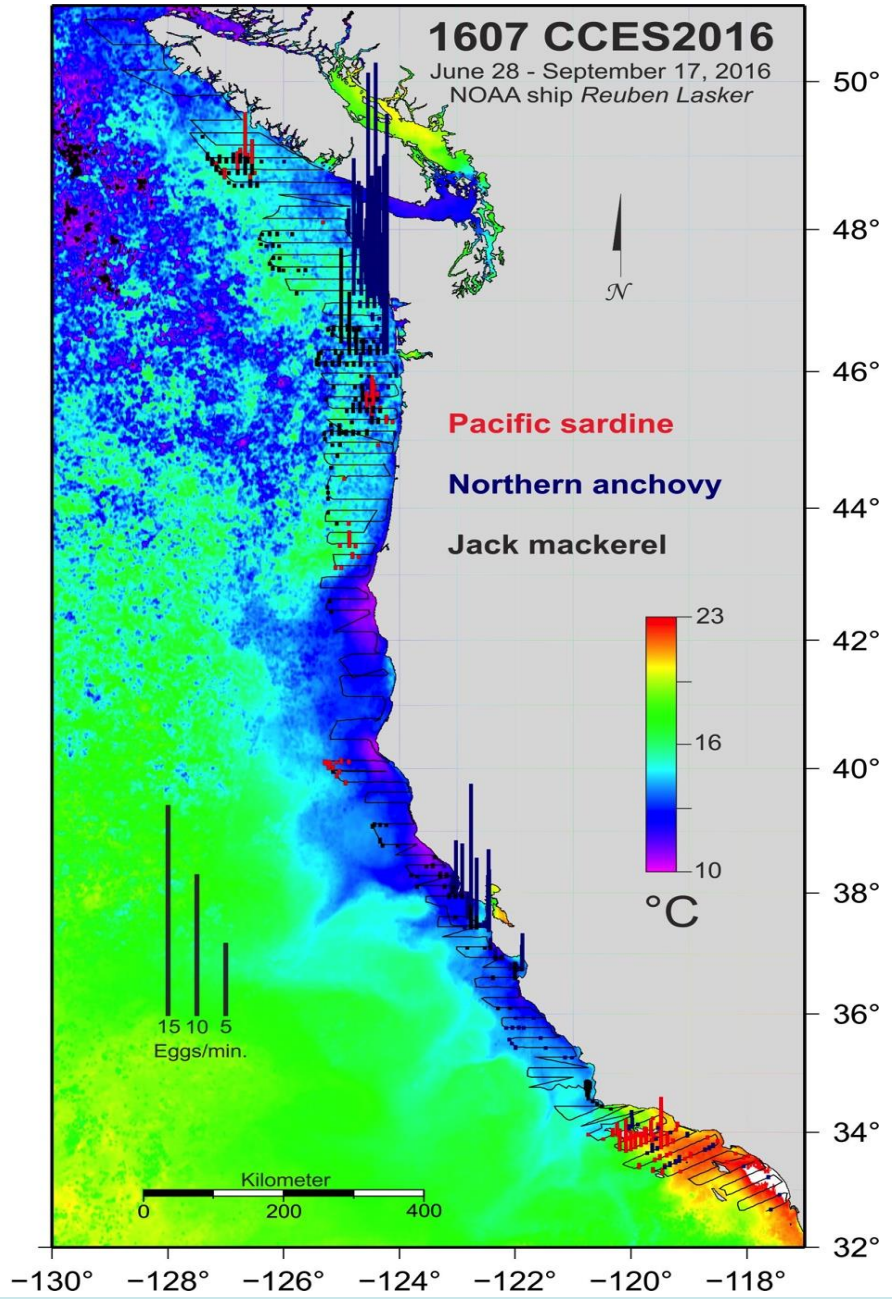
- High temperatures (>14°C) remain in CalCOFI Survey area as well as north to San Francisco.
- Anchovy eggs (blue bars) found in:
  - Southern California Bight, and
  - northern portion of the survey area.
- Sardine (red bars) spawned at least 445–556 km further north than historical, from the California Oregon border to Central Oregon (43-45°N), similar to 2015.
- Jack Mackerel eggs (black bars) were found off the Southern California Bight.



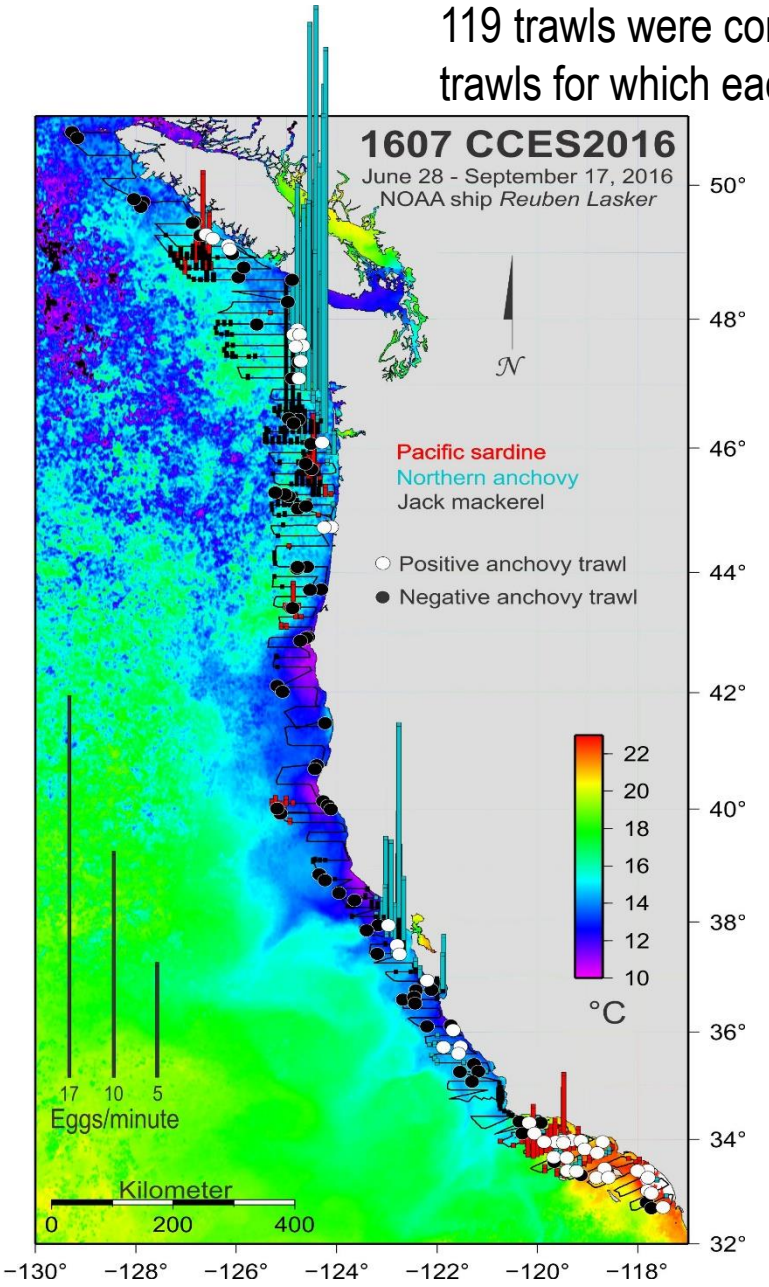
4. 2016 Survey Updates

Summer 2016 California Current Ecosystem Survey (CCES)

- *FSV Lasker* started in June at the northern end of Vancouver Island and ended at the U.S. Mexico border 78 days later in September.
- CUFES collected:
  - anchovy eggs (blue bars) in WA (NSNA) and CA (CSNA, near SF and Monterey).
  - sardine eggs (red bars) in Canada, WA, OR and CA.
- 2500 CPS otoliths & 700 ovaries collected for age and maturity.



119 trawls were completed; the number of trawls for which each of the listed species:

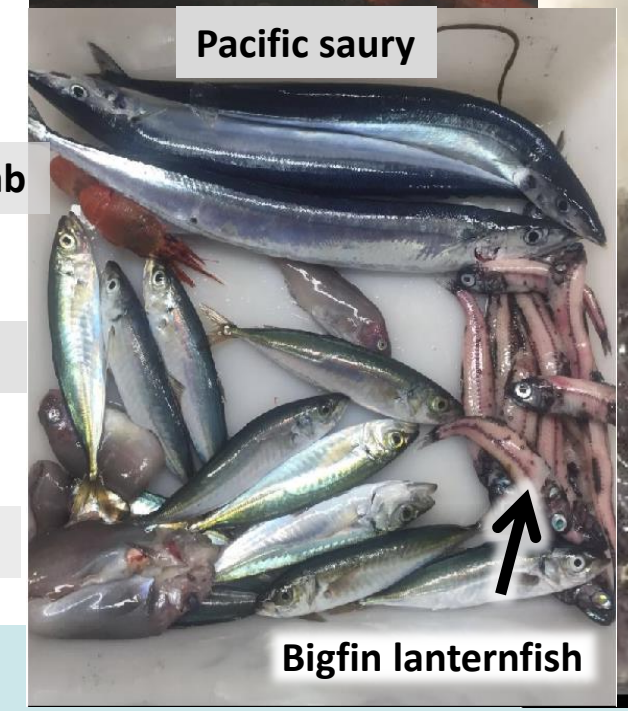


Species	# Positive Hauls
Anchovy	46
Sardine	22
Pac. Mack	34
Jack mack	42
Mar. Squid	57

Pelagic red crab

Jack mackerel

Medusafish



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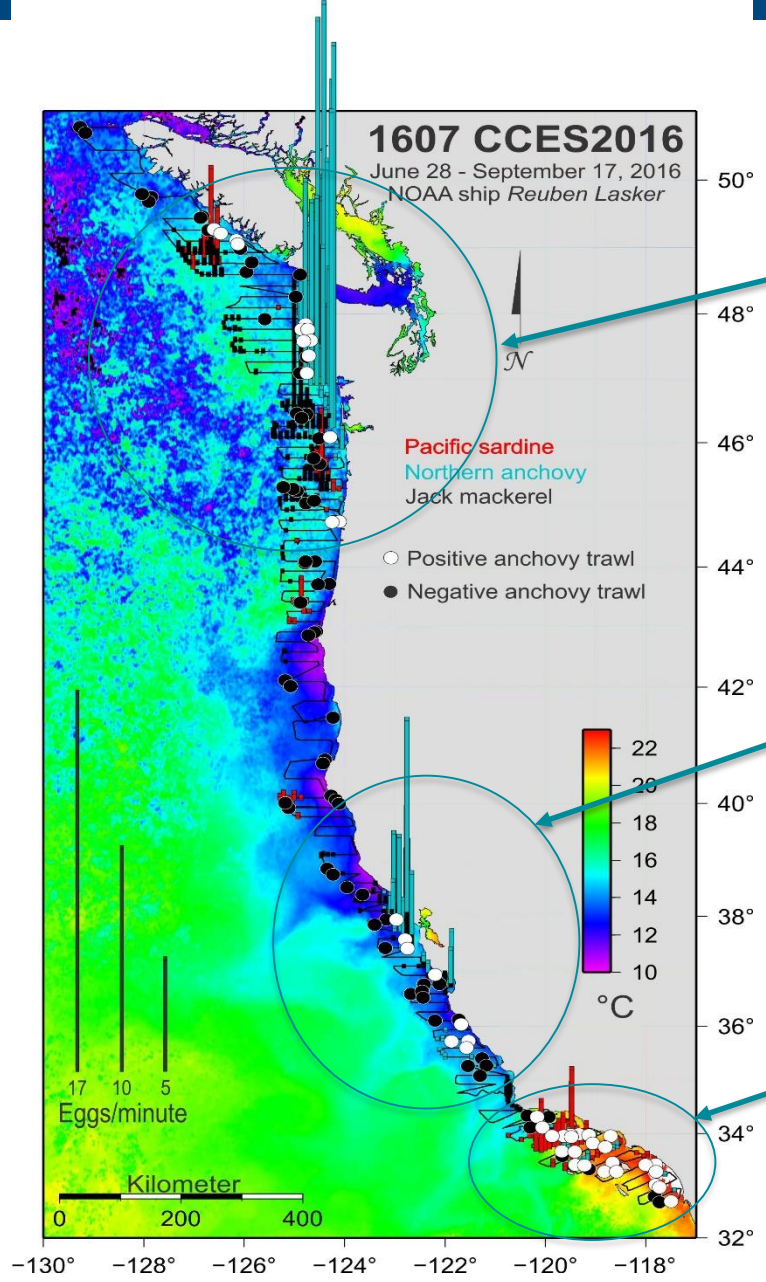
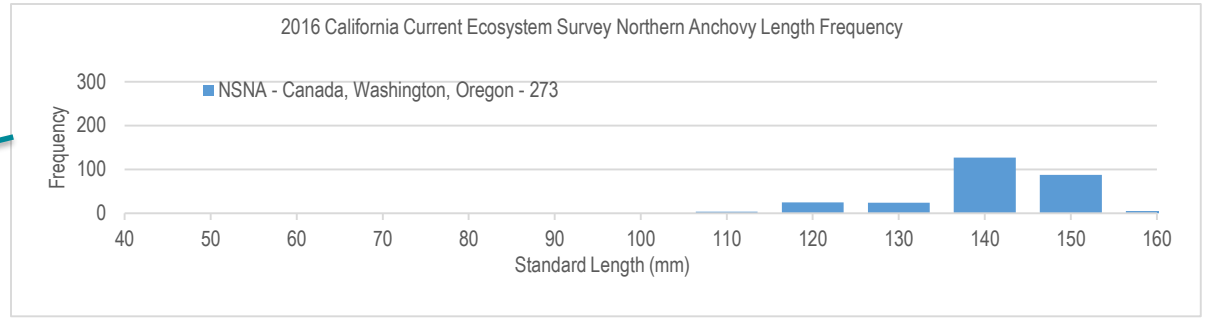
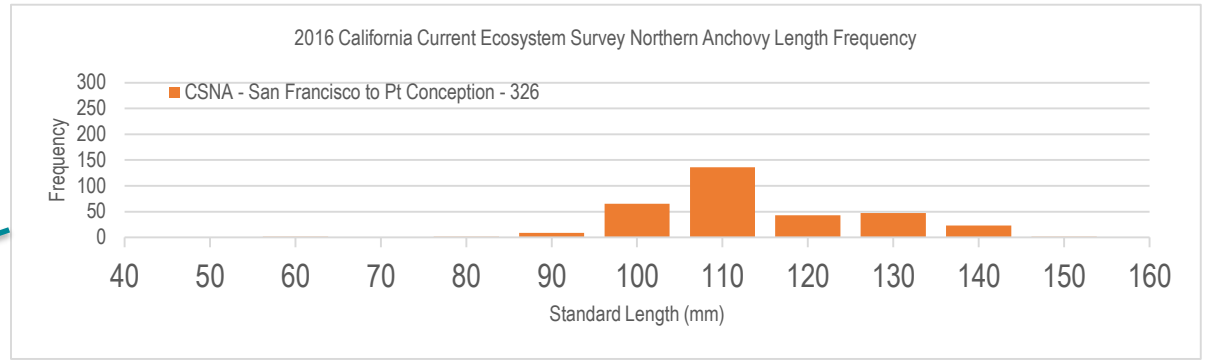
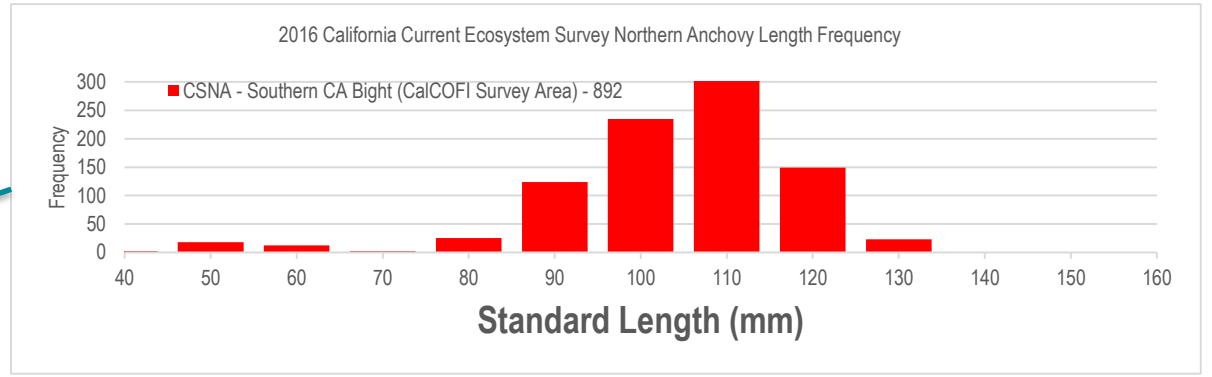


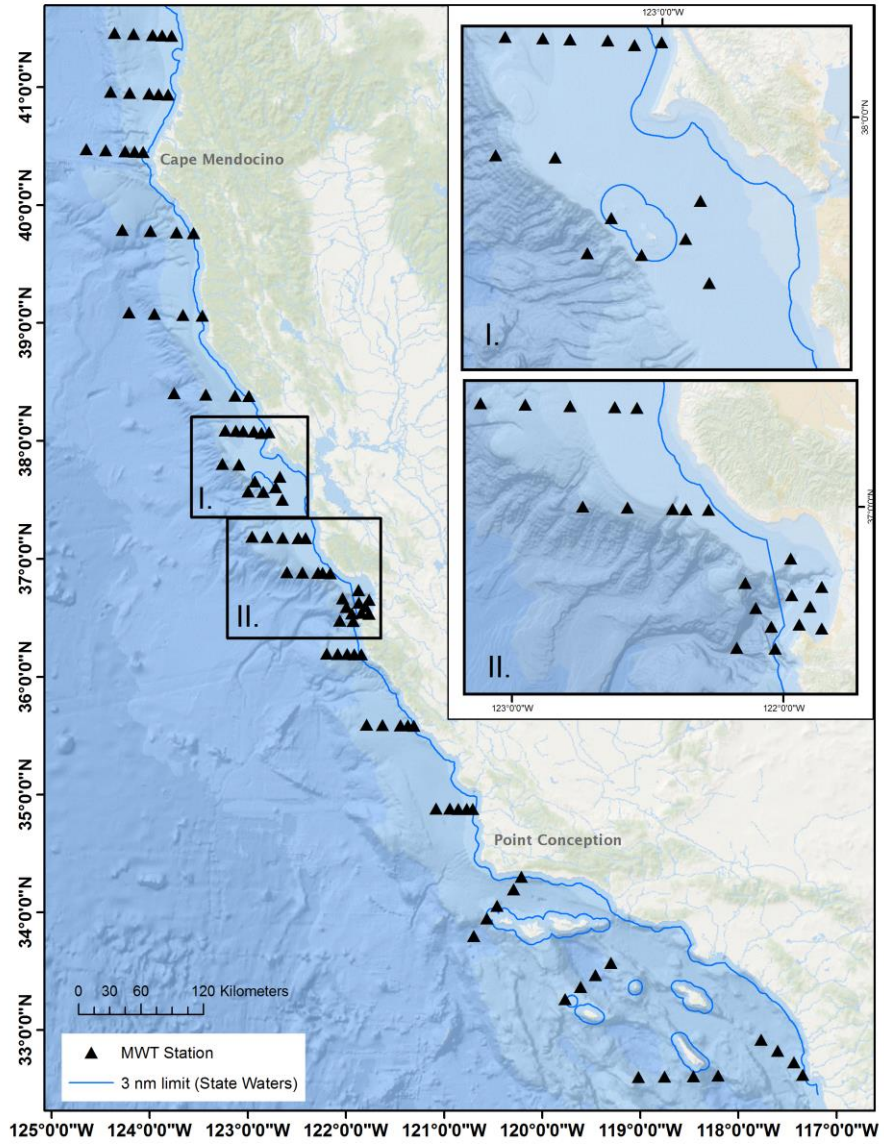


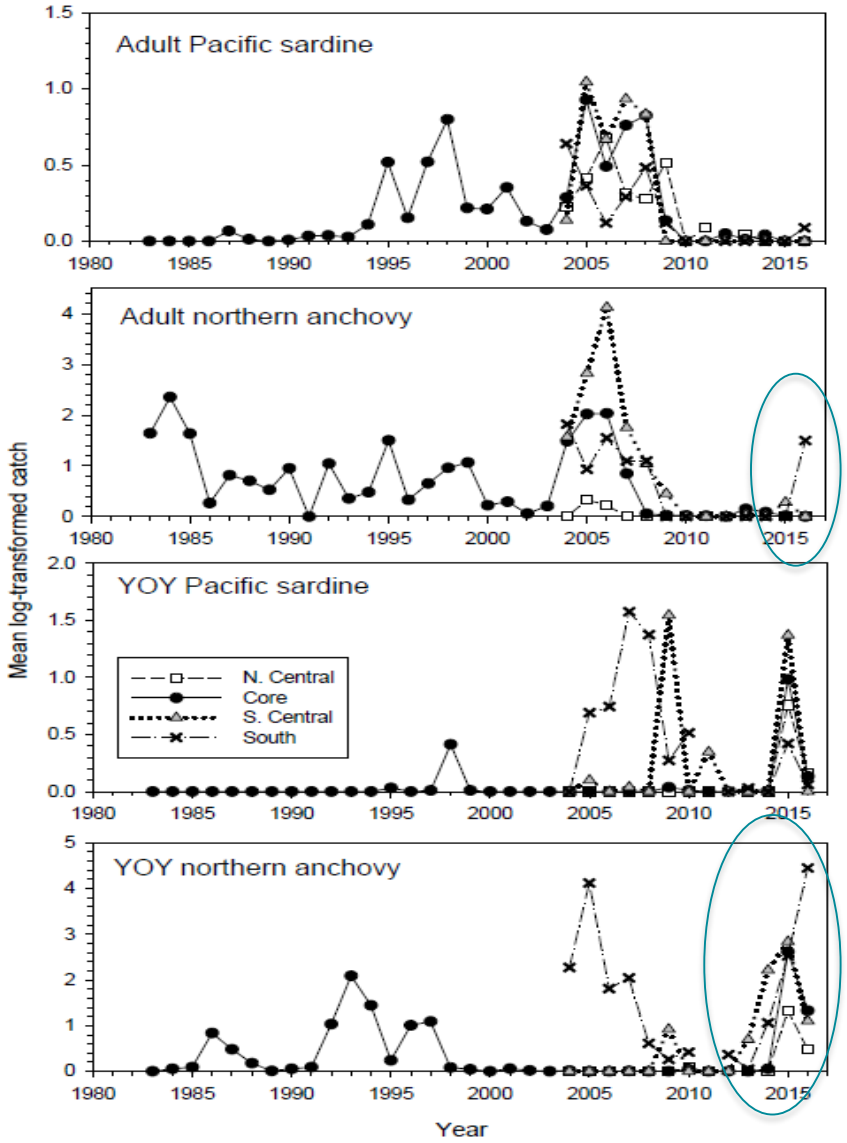




- There appears to be at least 3 year classes present.
- Timing and distribution of spawning shifted compared to historical patterns (see slide 4).

2016 Rockfish Recruitment and Ecosystem Assessment Survey





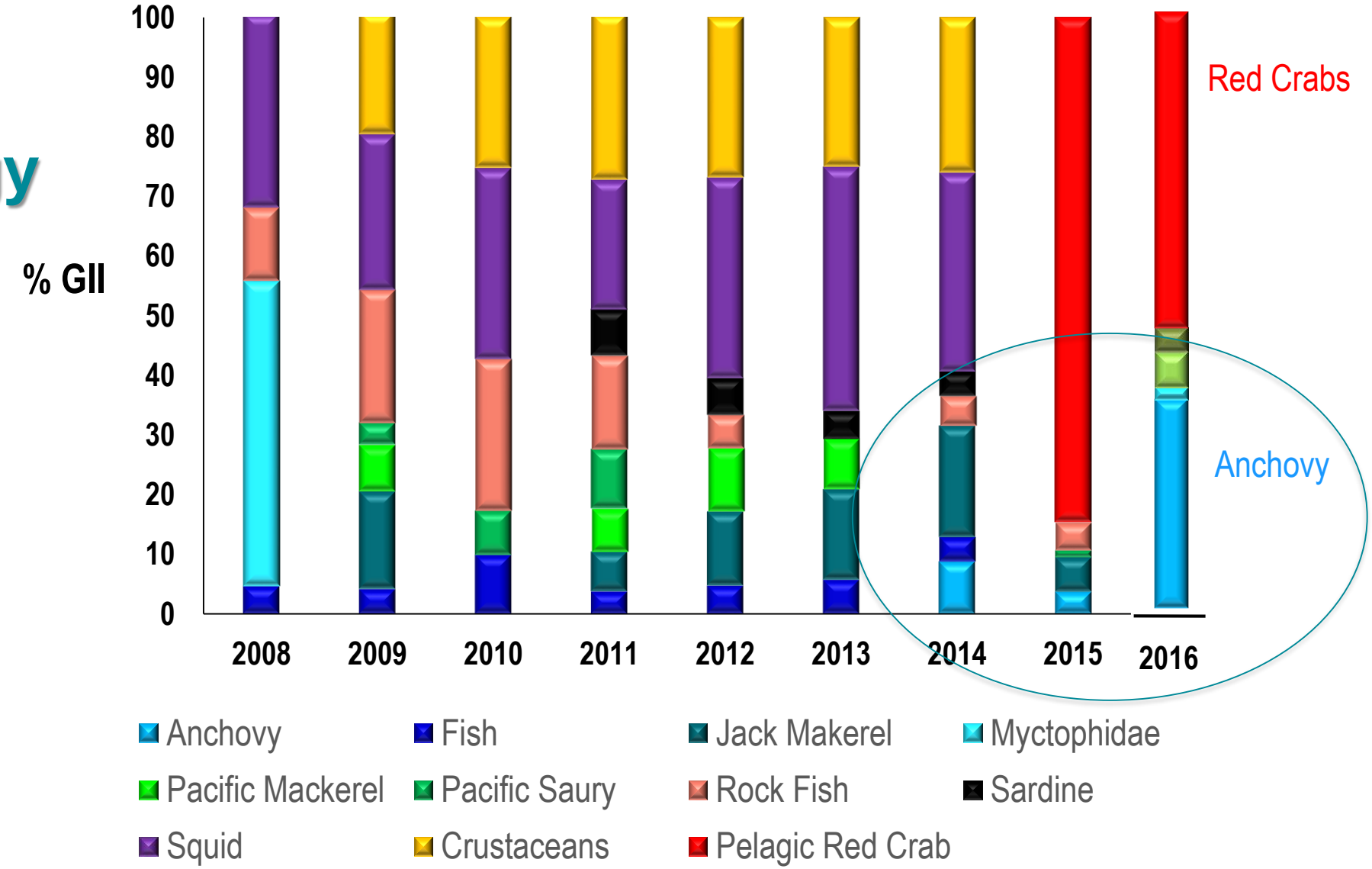
Survey conducted May-June 2016

- Adult anchovy not observed in north or core areas (square box insets).
- Adult anchovy survey catch in south at near historical survey levels for first time since 2009.

- 2015 YOY anchovy survey catch observed at high levels for this survey in all areas.
- 2016 YOY anchovy survey catch was lower in all areas than 2015, except,
- 2016 YOY anchovy catches in the south were highest level ever (values are log transformed).

5. Ancillary Ecosystem Information – Pacific Bluefin Tuna

foraging ecology



Past Studies

Year	Species	Dominant Prey	Prey Length (mm)	Author
1949-1950	ALB	**Saury**	n/a	McHugh
1954-1957	ALB	**Saury**	n/a	Iverson
1968-1969	ALB/ PBF	**Anchovy**	30-44	Pinkas
1983	ALB	**Anchovy**	20-45	Bernard
2005-2006	ALB	**Anchovy**	35	Glaser

Current Study

Year	Species	Dominant Prey
2007	ALB/ YFT	**Anchovy**
2008	ALB/ BFT/ YFT	**Zooplankton/ Squid/ Fish**
2009	ALB/ BFT/ YFT	**Zooplankton/ Squid/ Fish**
2010	ALB/ BFT/ YFT	**Zooplankton Squid/ Fish**
2011	YFT/ PBF	**Zooplankton/ Squid/ Fish**
2012	PBF	**Zooplankton/ Squid/ Fish**
2013	PBF	**Zooplankton/ Squid/ Fish**
2014	PBF	**Zooplankton/ Squid/ Fish**
2015	PBF	**Pelagic Red Crab**
2016	PBF	**Pelagic Red Crab/ Anchovy**

5. Ancillary Ecosystem Information – California Sea Lion

Field teams from the Alaska Fisheries Science Center's Marine Mammal Laboratory (MML) were at San Miguel Island and San Nicolas Island throughout the summer and early fall to assess the health of the California sea lion population in 2016.*

- After 4 years of consistently poor condition, the condition of 3-month-old California sea lion pups at the end of September improved in 2016. Average female pup weights assessed by MML at San Miguel and San Nicolas Islands were 17 kg (about 37 lbs) which is normal for this age of pups.

- With the subsiding of El Niño conditions over the summer, environmental conditions have improved in the adult female sea lion foraging area off the central and southern California coast.

* Sharon Melin, NOAA/NMFS/Alaska Fisheries Science Center, Marine Mammal Laboratory, Seattle, WA.

Los Angeles Daily News

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Life is looking up for California sea lion pups, marine researchers say

Researchers from NOAA and Sea Word found that it appears that female sea lions are better able to find food for the pups. (Photo courtesy of NOAA)

By Erika Ritchie, eritchie@scng.com

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http://www.dailynews.com/environment-and-nature/20161014/life-is-looking-up-for-california-sea-lion-pups-marine-researchers-say

6. Next Steps

- The SWFSC is committed to completing an integrated stock assessment of the CSNA as soon as the appropriate biological information can be collected, verified, and processed (States are collecting port samples, aging and fecundity work is ongoing).
- Results from the 2016 Spring CalCOFI and CPS surveys (ichthyoplankton) as well as the ATM biomass estimate from the 2016 summer "CCES" should be available for the **April 2017 Council meeting.**
- A methodology review of the ATM survey methods for both Pacific sardine and northern anchovy is scheduled for **early 2018** allowing for additional information to be collected on behavior of CPS in the upper water column as well as distribution and abundance in nearshore areas.
- Cooperative research to sample nearshore areas (i.e., CDFG/CWPA aerial survey, SK grants, etc.) will help answer outstanding questions of CSNA abundance where large survey vessels are unable to collect information.
- Questions remain as to the transboundary nature of the CSNA.

Questions

Anchovy school off Scripps on July 8, 2014. Credit: Douglas Alden.