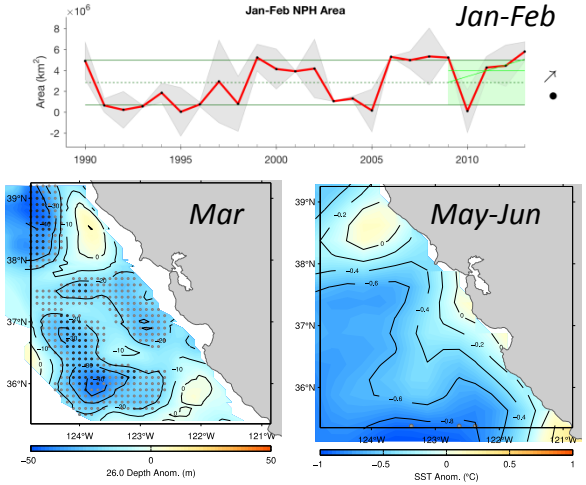
2013

"A Year in the Life of a Hungry Humpback Whale"

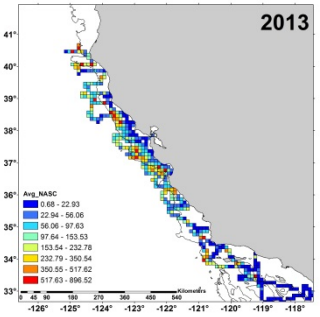
Winter-Spring Ocean Conditions



- An <u>exceptionally good</u> upwelling year
- Could see this by **February**, based on NPH (North Pacific High), which was higher than any other time 1990-2012
- **March:** Depth of the 26.0 isopycnal was shallower than average
- **May-Jun:** SST was cooler than average in most areas

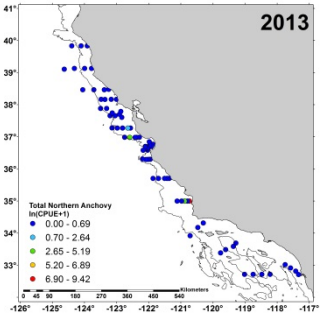
Spring Prey Availability (late Apr – early Jun)

Krill



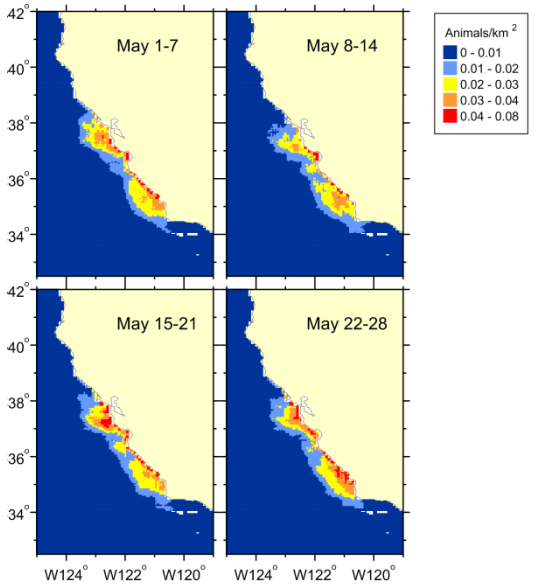
- Krill abundance high
- Widespread along outer shelf-break, from Pt Sur to Pt. Arena (36N - 39N)

Anchovy



- Virtually no anchovy found anywhere between Pt. Sur and Pt. Arena (36N - 39N)
- Some anchovies south of Pt. Sur

Modeled weekly whale densities for May



- Widespread whale distribution between Pt. Reyes and Pt. Conception
- No smaller 'hotspots' during spring
- By September, whales moved into Monterey Bay , creating a local 'hotspot' (anecdotal information)

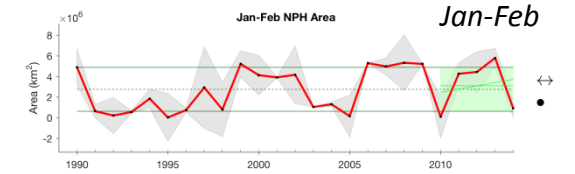
Forage/Ocean Conditions
RAF: low?

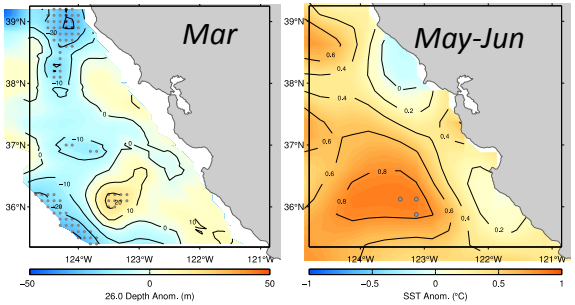
Humpback Whale Entanglements Confirmed: 0

2014

"A Year in the Life of a Hungry Humpback Whale"

Winter-Spring Ocean Conditions

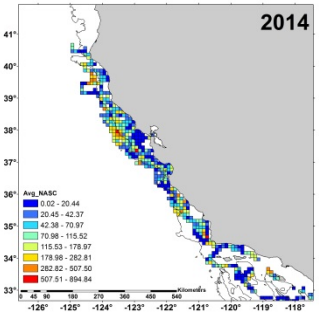




- An <u>average</u> upwelling year
- By **February**, the NPH (North Pacific High) was much lower than in 2013
- **March:** Depth of the 26.0 isopycnal was slightly deeper than average nearshore, and slightly shallower offshore
- **May-Jun**: SST was warmer than average in most of the region

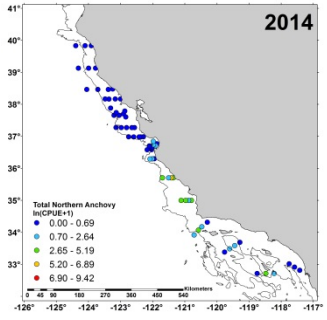
Spring Prey Availability (late Apr – early Jun)

Krill



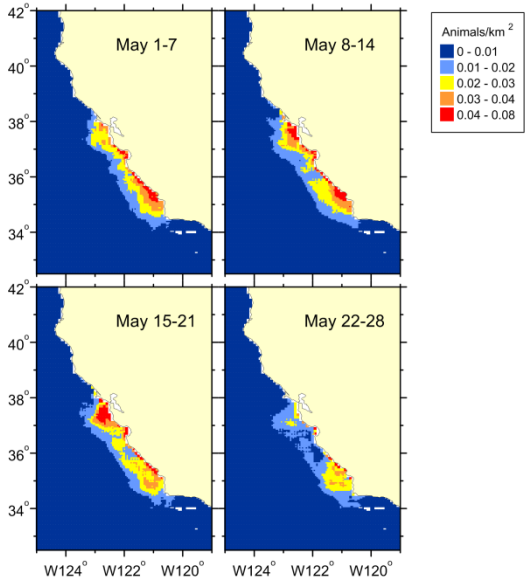
- Krill abundance was average
- Concentrated offshore along shelf-break, especially in outer Gulf of the Farallones

Anchovy



- Anchovy concentrated south of Monterey Bay
- Highest concentrations off Moro Bay

Modeled weekly whale densities for May



- Highest Density 'Hotspots' in the Gulf of the Farallones and nearshore Monterey Bay and Morro Bay

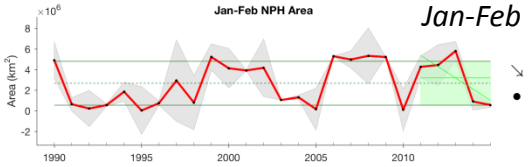
Forage/Ocean Conditions RAF: ?

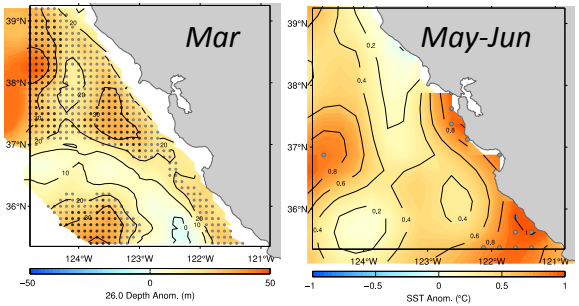
Humpback Whale Entanglements Confirmed: 17

2015

"A Year in the Life of a Hungry Humpback Whale"

Winter-Spring Ocean Conditions

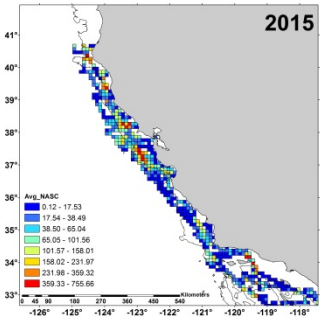




- A <u>weak</u> upwelling year
- By **February** the NPH (North Pacific High Index) had dropped to lowest level since 2010
- **March:** depth of the 26.0 isopycnal was deeper than average
- **May-Jun:** SST was warmer than average, and the

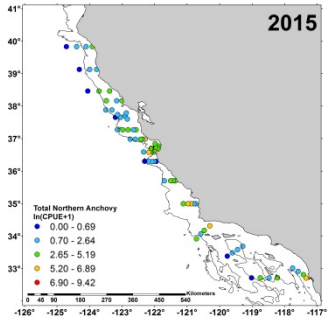
Spring Prey Availability (late Apr – early Jun)

Krill



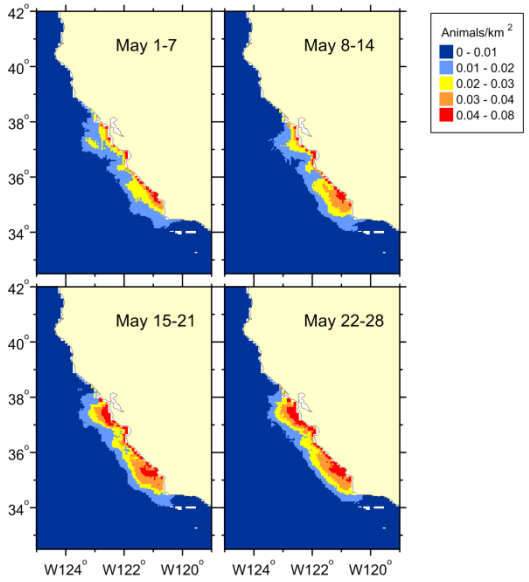
- Krill abundance was low/moderate
- Concentrated offshore along shelf break in a few patches off San Mateo, Sonoma, and Mendocino Counties

Anchovy



- Anchovy very abundant
- Distributed throughout the region, with high concentration patches off central and southern California

Modeled weekly whale densities for May



- Concentrated 'Hotspots' very close to shore in Monterey Bay in early May
- Distribution broadens along central coast during second half of May

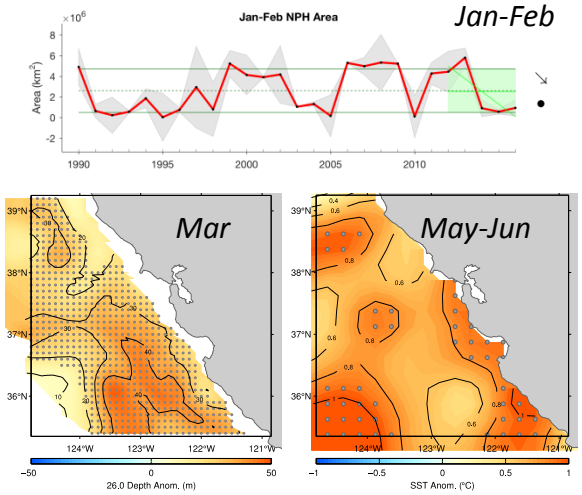
Forage/Ocean Conditions RAF: ?

Humpback Whale Entanglements Confirmed: 31

2016

"A Year in the Life of a Hungry Humpback Whale"

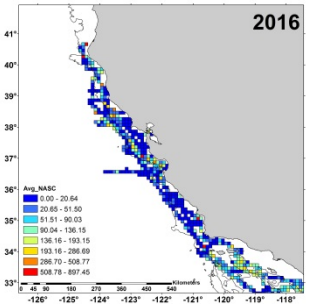
Winter-Spring Ocean Conditions



- A <u>weak</u> upwelling year
- By **February**, we could see that the NPH (North Pacific High) remained very low for the third year in a row.
- **March**: Depth of the 26.0 isopycnal was deeper than average throughout region
- **May-Jun**: SST was warmer than average throughout the entire region

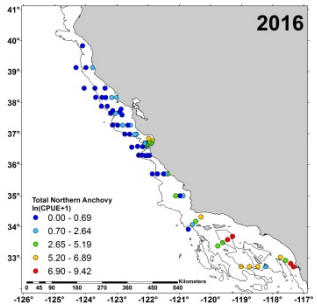
Spring Prey Availability (late Apr – early Jun)

Krill



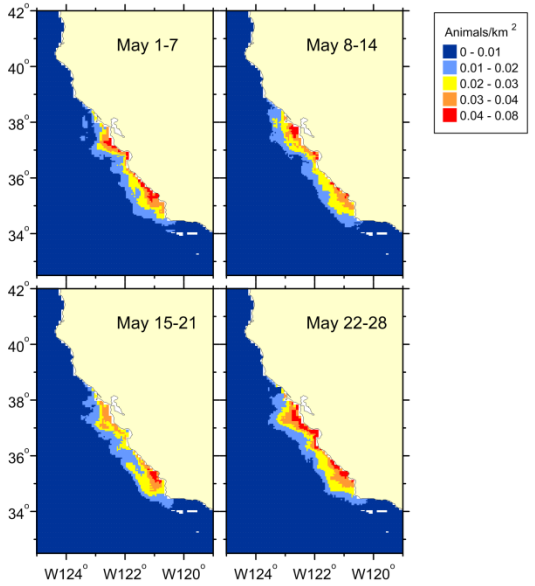
- Krill abundance low
- Few concentrations along the shelf-break

Anchovy



- Anchovy abundant in the south and concentrated inside Monterey Bay

Modeled weekly whale densities for May



- Concentrated 'hotspots' very close to shore in Monterey Bay, Gulf of Farallones and Morro Bay during early May
- Distribution broadens along central coast during late May

Forage/Ocean Conditions RAF: high?

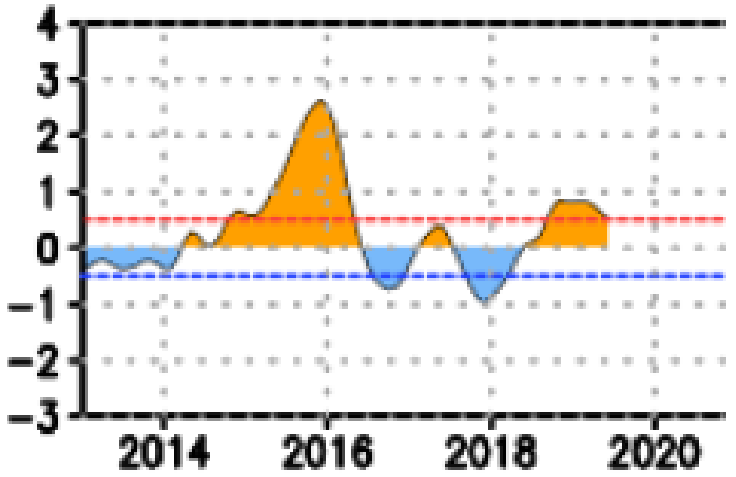
Humpback Whale Entanglements Confirmed: 42

El Nino Forecast

El Niño

Neutral

La Niña



The most recent ONI value (May - July 2019) is +0.5°C.

ENSO-neutral is most likely to continue through Northern Hemisphere winter 2019-20 (50-55% chance).*