Choosing the Climate Indicators

Largier et al. 2010

Duncan et al. 2013

Hutto et al. 2016
Monitoring the Climate Indicators

Elliott et al. 2020

ONMS 2020
ACCESS

Research that supports marine wildlife conservation and healthy marine ecosystems to inform management, policy and conservation in central CA

Founders:

Members:
Research takes ecosystem approach

- Birds/mammals (standardized strip and line transects)
- Zooplankton/fish (hydroacoustics and nets)
- Oceanography (CTD, OA, nutrients, and continuous TSG)
ACCESS data includes:

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<th>Dataset</th>
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<th>Description</th>
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California Current Ecosystem

https://lternet.edu/site/california-current-ecosystem-lter/

https://oceanexplorer.noaa.gov/facts/upwelling.html
Climate indices: PDO and NPGO

Pacific Decadal Oscillation (PDO)

North Pacific Gyre Oscillation (NPGO)
Regional indices: SST and SLH

Sea surface temperature (SST) – Southeast Farallon Island

Sea level height (SLH)
Nutrients: building blocks of phytoplankton

- N03+N02
- Si
- P04

Data from 2005 to 2019.
Adult krill: bigger in cold waters

Proportion of adults

- 2005-06, 2014-16 (warm years)
- 2007-13 (cold years)

Length ranges (mm): 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, >27

Year labels: 2005-06, 2014-16 (warm years), 2007-13 (cold years), 2017, 2018, 2019

Proportion of adults vs. length ranges (mm)

- 2005-06, 2014-16 (red bars)
- 2007-13 (blue bars)
- 2017 (green bars)
- 2018 (purple bars)
- 2019 (brown bars)
Ocean acidification and hypoxia

- Less aragonite available for animals with calcified shells – **undersaturated waters**
  - Shell thinning
  - Increased mortality

- Hypoxia = little to no oxygen (< 2 mg/L)
  - Death for organisms that need oxygen (e.g., fish, crabs)

Tracking ocean acidification

Calculating aragonite saturation from commonly measured variables (T, S, DO)
Ocean acidification (west of Cordell Bank)

Aragonite saturation values

- 0-10 m (May)
- 0-10 m (July)
- 80-90 m (May)
- 80-90 m (July)
- horizon

undersaturated
Hypoxia (west of Cordell Bank)

Dissolved oxygen concentration (mg/L)

- 0-10 m (May)
- 0-10 m (July)
- 80-90 m (May)
- 80-90 m (July)

hypoxic (<2 mg/L)

near hypoxic (<5 mg/L)
And now on to Kate!