May 1st, 3:30 PM - 5:00 PM


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Zooplankton Monitoring in the Eelgrass Dominated Padilla Bay: A Baseline for Examining Future Changes

Nicole Burnett
Padilla Bay National Estuarine Research Reserve
Padilla Bay

- Approx. 8000 acre eelgrass bed
  - 1 of the largest contiguous eelgrass beds in North America
  - *Zostera marina* and *japonica*

- Shallow bay
  - 12 ft tidal range
  - Most of the bay is exposed at low tide
Limited previous zooplankton work in Padilla Bay
Compliments long term water quality and nutrient monitoring
Serve as baseline

Started mid 2007
Once a month at 3 sites
153 µm mesh
Identified to broad categories
• COPEPODite
  – Interactive Time-series Explorer module of the COPEPOD global plankton database project

• Online plankton time-series visualization toolkit
• Plankton, water quality and nutrient data
Data Analysis

- COPEPODite
Total Zooplankton

Ploeg

Bayview

Gong

Seasonal Anomaly
Plankton ID Categories

- Copepods
- Crabs
- Barnacles
- Other Arthropods
- Annelids
- Gelatinous
- Mollusks
- Larvaceans
- Echinoderms
- Chaetognaths
- Unknown
Dominant Plankton Categories

- Annelids
- Copepods
- Larvaceans

Graph showing the dominant plankton categories from 2008 to 2013 at different locations: Ploeg, Bayview, and Gong.
Annelid
Barnacles

2008 2009 2010 2011 2012 2013

0 1000 2000 3000 4000 5000 6000 7000

Ploeg
Bayview
Gong

Seasonal Anomaly

Jan + Feb + Mar
Apr + May + Jun
Jul + Aug + Sep
Oct + Nov + Dec
Crab Larvae

- Ploeg
- Bayview
- Gong
Data Analysis

- COPEPODite
### Zooplankton Relationships

| SST | Total Zoo | Annelid | Crab Larvae | Barnacle Larvae | Copepod + Nauplii | Other Arthro | Chaetognatha | Larvaceans | Hydrozoans | Ctenophores | Echinoderms | Mollusca | Other unk | Chla | PO4 | NO3 | NO23 | temp at depth | sal | DO | pH | Turbidity | Hadley Sal | SAT Chl | SUR Winds |
|-----|-----------|---------|-------------|----------------|-----------------|--------------|--------------|-------------|------------|------------|-------------|-----------|---------|---------|-----|-----|------|-------|--------------|-----|-----|-----|----------|---------|--------|----------|
| GS  | GS        | BP      | BY          | GS             | GS              | BY           | BP           | BP          | GS         | GS         | BP         | BY        | GS      | BP      | BY  | BP  | GS   | BY    | GS          | BP  | BP  | BP  | GS       | BP      | BP     | BP       |

Notes:
- SST: Surface Sea Temperature
- Total Zoo: Total Zooplankton
- Annelid: Annelid
- Crab Larvae: Crab Larvae
- Barnacle Larvae: Barnacle Larvae
- Copepod + Nauplii: Copepod + Nauplii
- Other Arthro: Other Arthropods
- Chaetognatha: Chaetognatha
- Larvaceans: Larvaceans
- Hydrozoans: Hydrozoans
- Ctenophores: Ctenophores
- Echinoderms: Echinoderms
- Mollusca: Mollusca
- Other unk: Other Unknown
- Chla: Chlorophyll a
- PO4: Orthophosphate
- NO3: Nitrate
- NO23: Nitrite and Nitrate
- temp at depth: Temperature at depth
- sal: Salinity
- DO: Dissolved Oxygen
- pH: pH
- Turbidity: Turbidity
- Hadley Sal: Hadley Salinity
- SAT Chl: Sea Surface Temperature
- SUR Winds: Surface Winds
Zooplankton Relationships
Shallow Eelgrass Sites

- Total zooplankton has significantly increased since 2007
- Copepods and annelids are the dominant groups
  - vary year to year in which groups blooms and intensity of the bloom

Deep Water Site

- Increasing trend of zooplankton but not significant
- Copepods and Larvaceans are the dominant groups
  - Little variation in annual pattern

Summary

Comparisons Analysis

- Few consistencies between or among sites
- Inconclusive results with water quality and nutrient data
Take Home Messages

- COPEPOdite is a great tool for analysis
- Longer time-scale to pick up trends with abiotic factors
- Even with broad categories and limited resources community trends can be detected
Thank You!

http://www.st.nmfs.noaa.gov/copepodite/

http://copepodite.org/