Nearshore Dissolved Oxygen and Landscape-Scale Eelgrass Production

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Objectives

• Assess dissolved oxygen (DO) data as a measure of *Z. marina* (eelgrass) production at the landscape scale

• Identify periodicities and anomalies in a nearshore DO record to serve as test cases

• Compare DO patterns with tidal cycles, PAR (light), and expected patterns of eelgrass photosynthesis and respiration
Water Quality Stations

Continuous monitoring with YSI 6600 Data sondes

- water temperature
- salinity
- turbidity
- water depth
- dissolved oxygen
- pH

Available Data:
Bayview Channel:  1995 – 2005
Gong:  2003 – 2005
Padilla Bay
Bathymetry
Padilla Bay Vegetation (1989)

- Z. marina (eelgrass)
- Z. marina / Z. japonica mixed
- Z. japonica
- Ruppia maritima
- Spartina alterniflora
- Ulva - Enteromorpha
Light (PAR) and DO
Bayview, March 2004

Cottrell, Bulthuis and Margerum (2005)
Expected Mean Daily DO (Long-Term Average)
Observed Mean Daily DO (Long-Term Average)

Bayview: 1995 – 2005
Gong: 2003 – 2005
19-day running average
Mean Daily Max & Min DO
(Long-Term Average)

Bayview
- max
- min

Gong
- max
- min

Mean Daily Max & Min DO
(Long-Term Average)
Summary of Daily DO

Bayview Channel
1995-2005 data

Bayview Channel
2005 data

DO (mg/L)

record high
mean high
mean low
record low

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

2005 daily high
2005 daily low

1995-2005 data
Bayview Annual DO Time Series


DO (mg/L)

Bayview Channel

2005

out of phase

in phase
September

Graphs showing data for September 2005. The graphs illustrate changes in dissolved oxygen (DO), depth, and photosynthetically active radiation (PAR) over time. Specific dates highlighted are September 6 and September 12.
Summary

• Long-term DO record at Bayview reflects seasonal patterns of eelgrass photosynthesis/respiration

• Strength of eelgrass signal within the DO record is strongly mediated by tides

• Eelgrass effects strongest at very low tides:
  Daytime: sharp DO peaks
  Nighttime: sharp DO troughs

• Feasibility of assessing eelgrass production from DO limited to long-term data records and tidal filtering

• Next Steps:
  • tidal filtering
  • temperature effects
  • turbidity and depth effects on available PAR