Nearshore Dissolved Oxygen and Landscape-Scale Eelgrass Production

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Padilla Bay, Washington

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

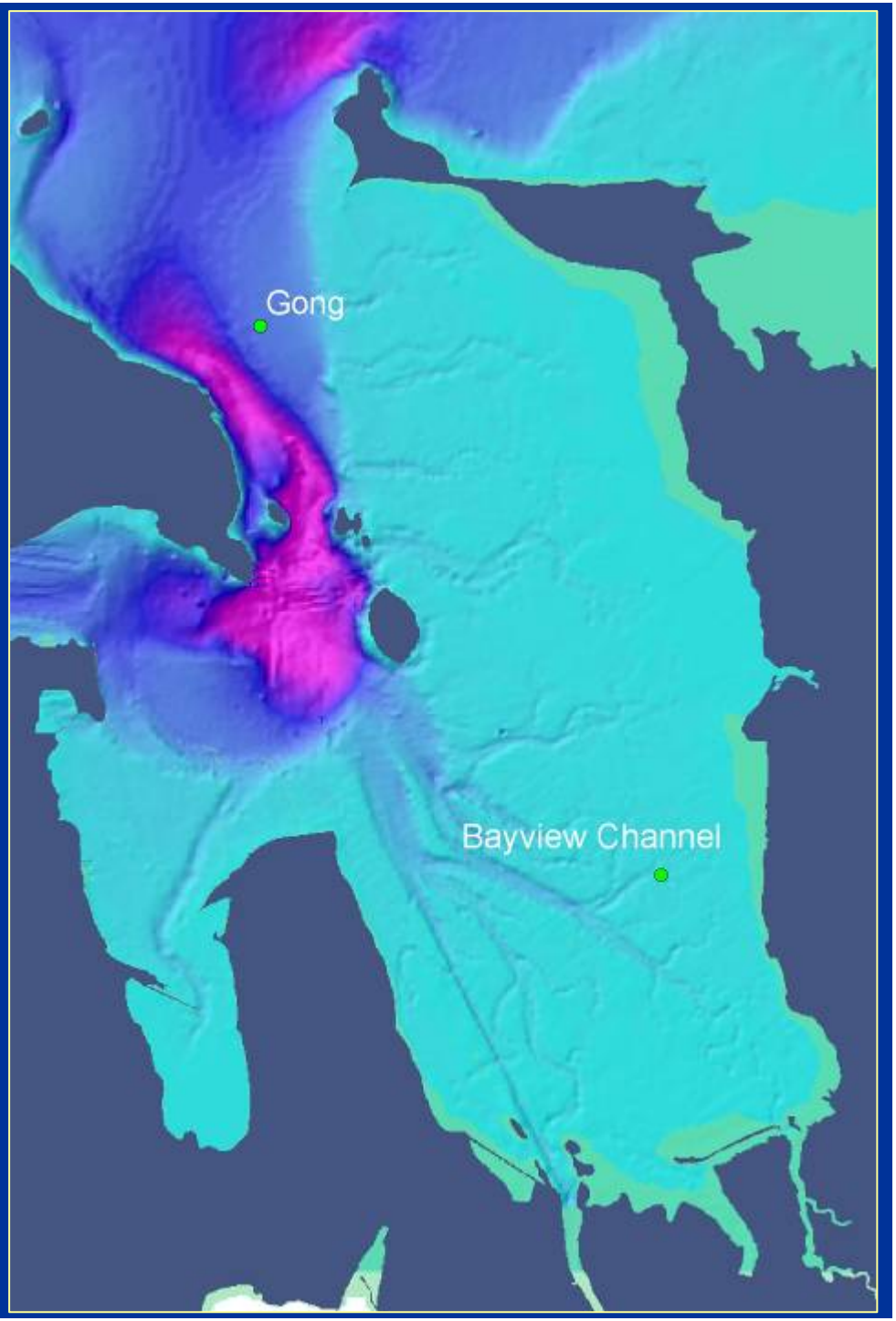
Continuous monitoring with YSI 6600 Data sondes

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

Available Data:

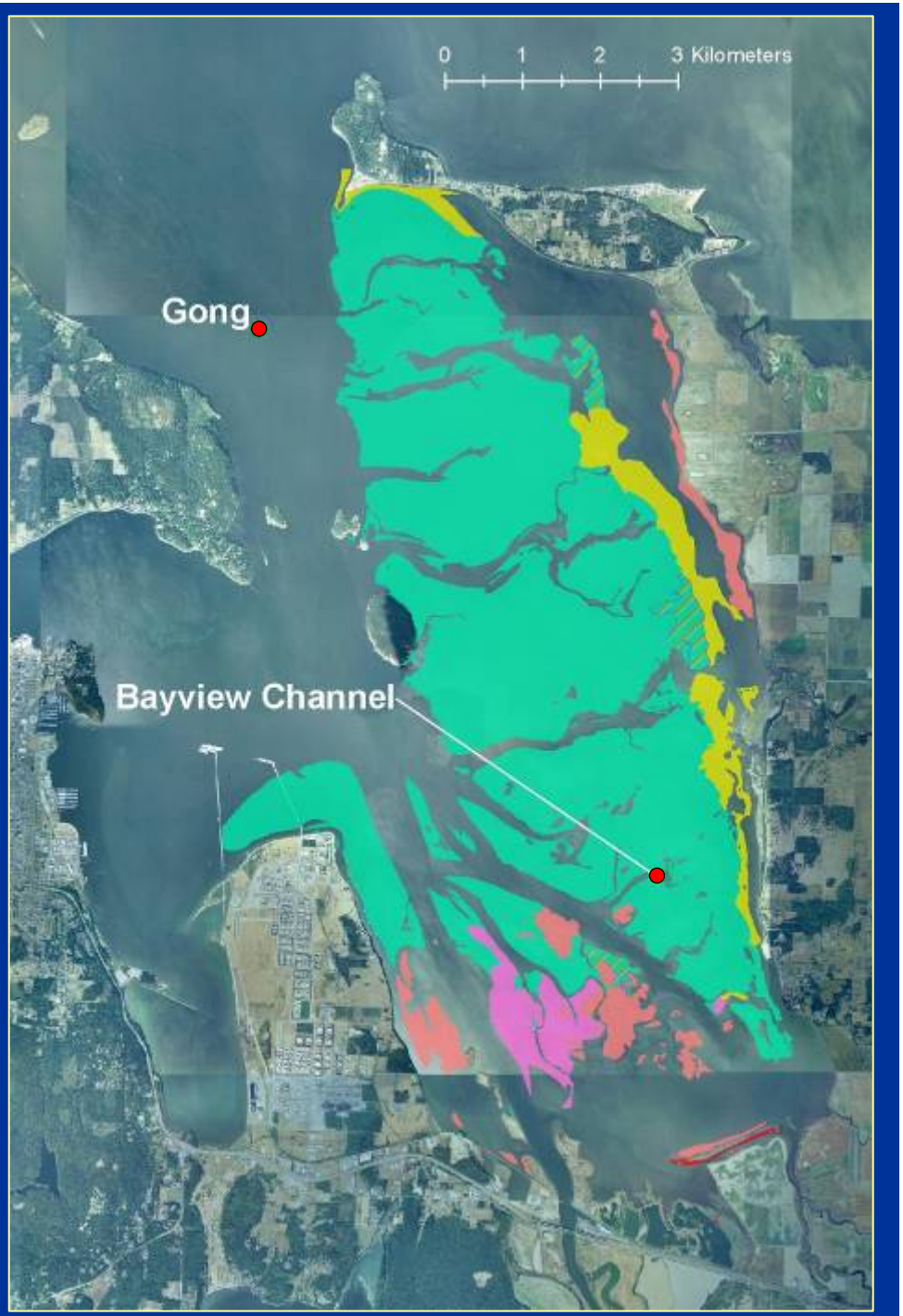
Bayview Channel: 1995 – 2005
Gong: 2003 – 2005

Padilla Bay Bathymetry



Padilla Bay Vegetation (1989)

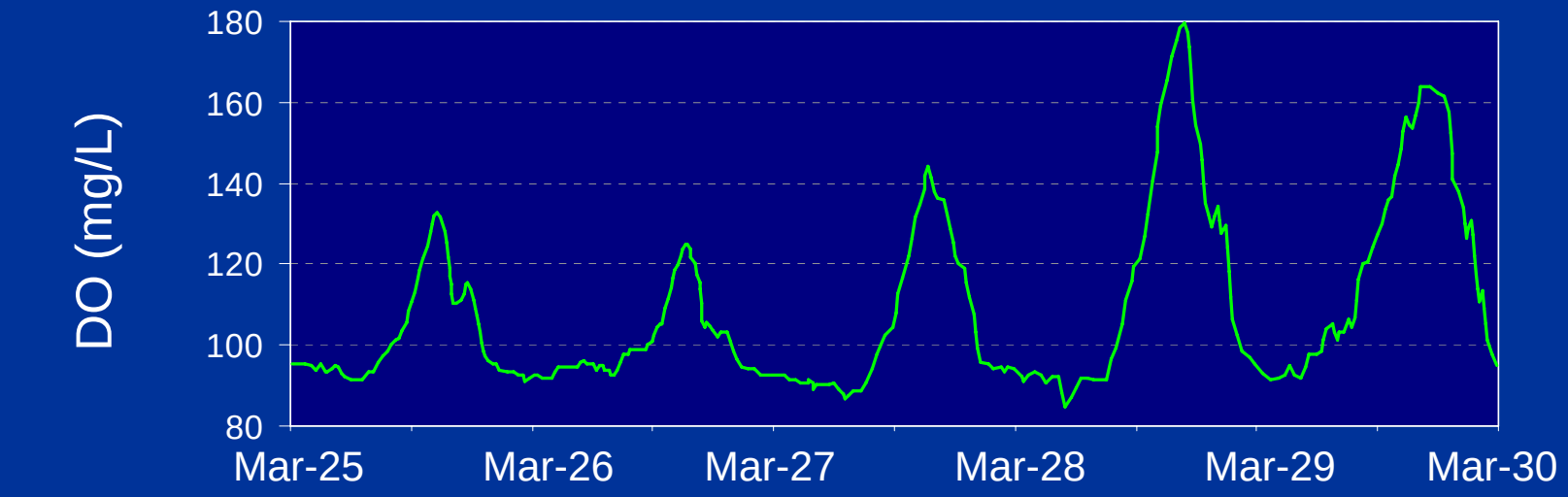
- *Z. marina* (eelgrass)
- *Z. marina / Z. japonica mixed*
- *Z. japonica*
- *Ruppia maritima*
- *Spartina alterniflora*
- *Ulva - Enteromorpha*

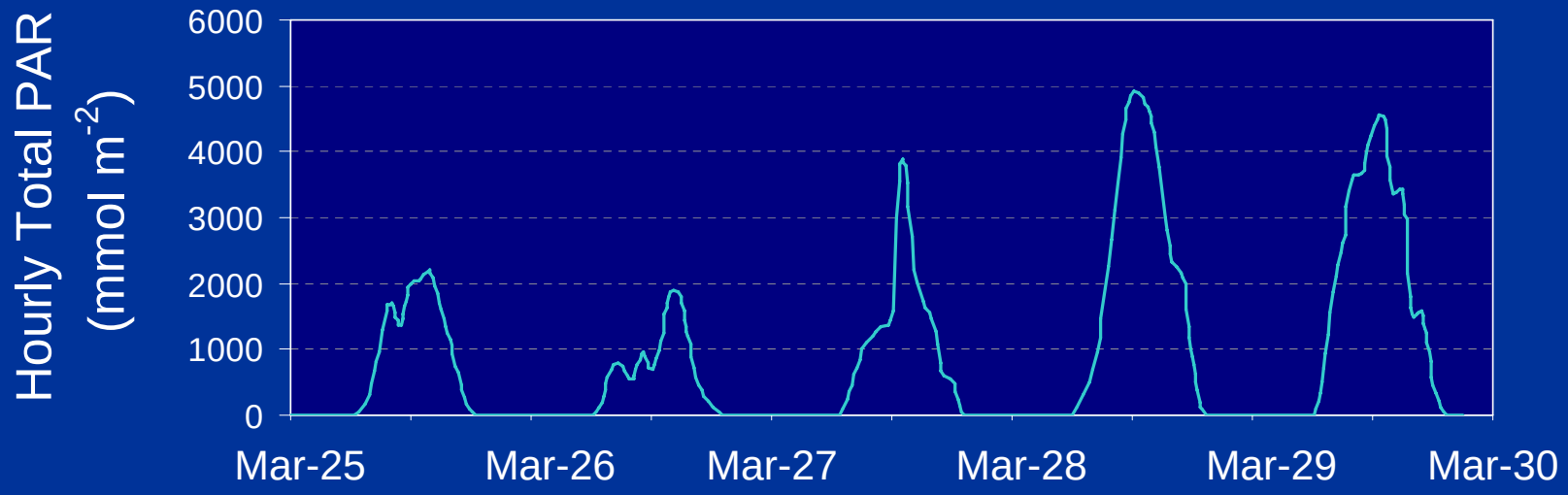


Light (PAR) and DO

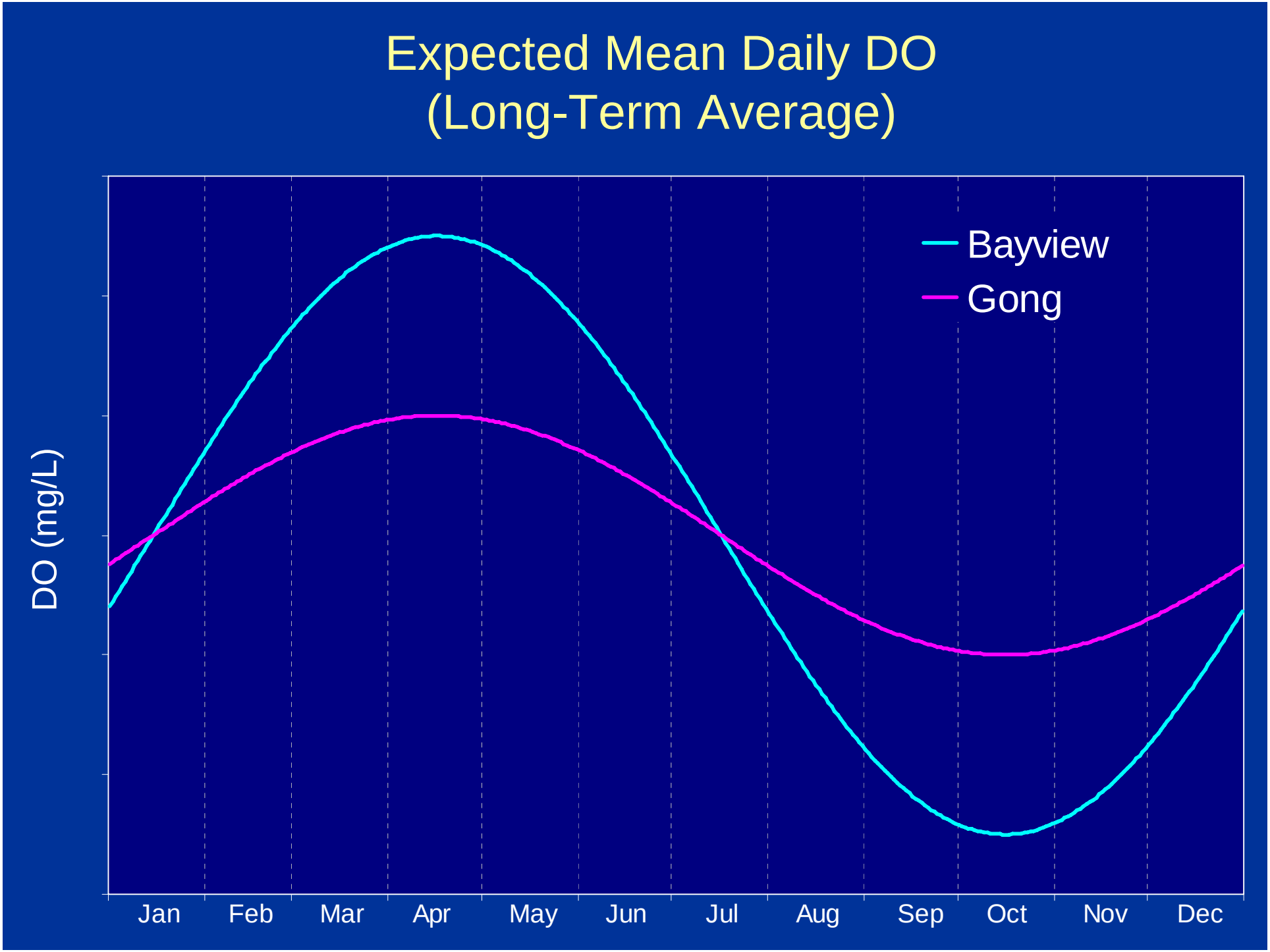
Bayview, March 2004

Cottrell, Bulthuis and Margerum (2005)



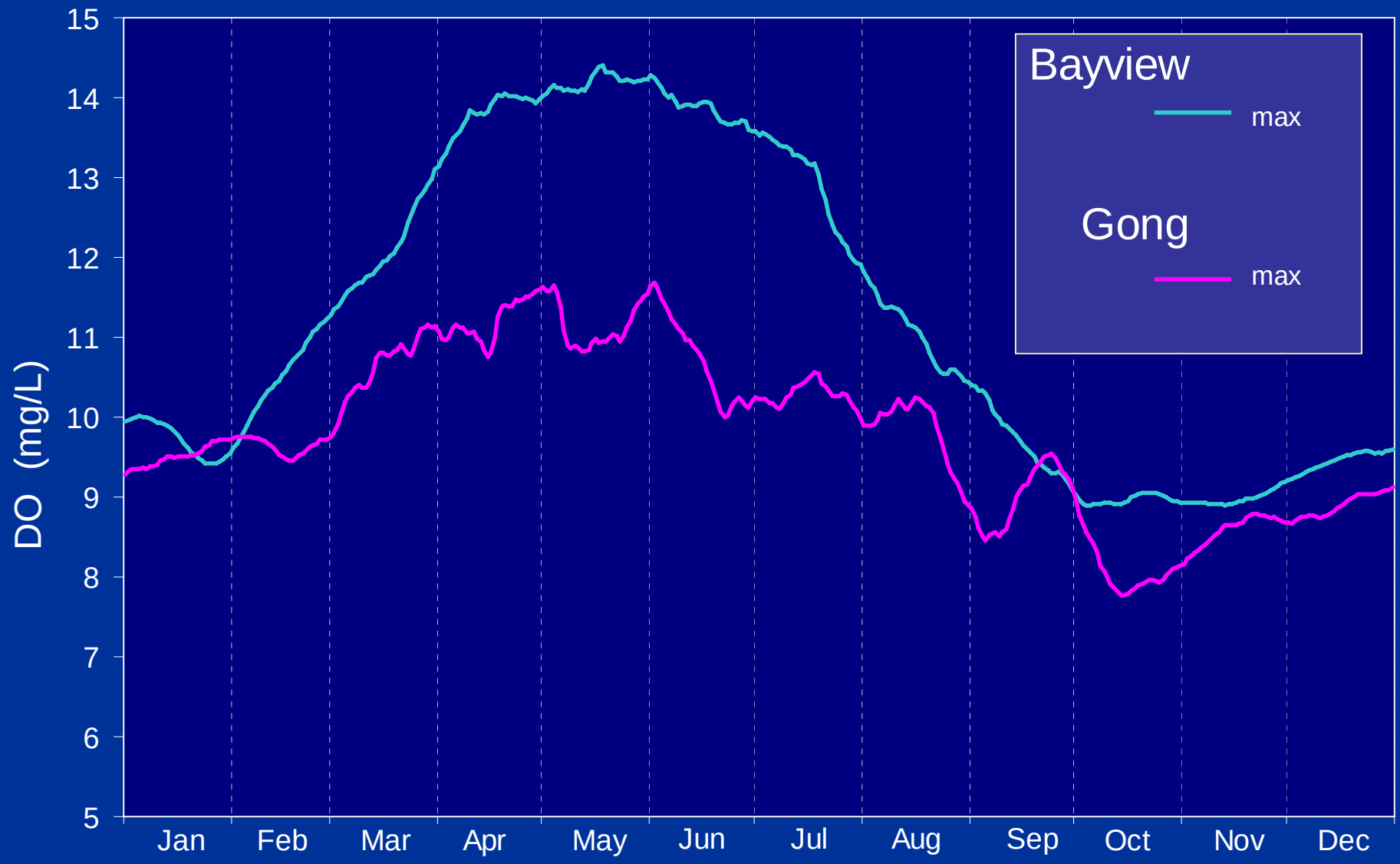


Expected Mean Daily DO (Long-Term Average)

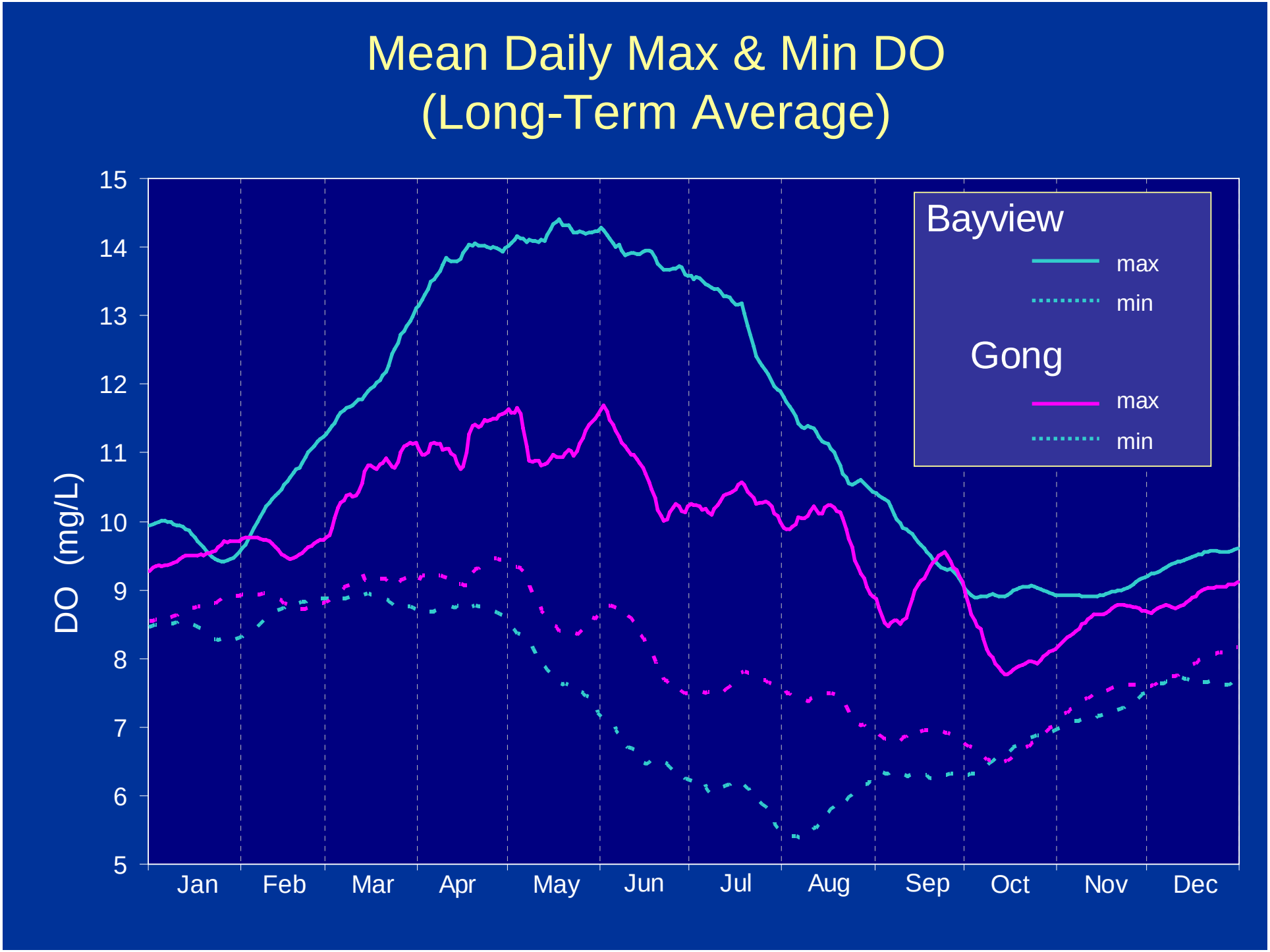


Observed Mean Daily DO (Long-Term Average)

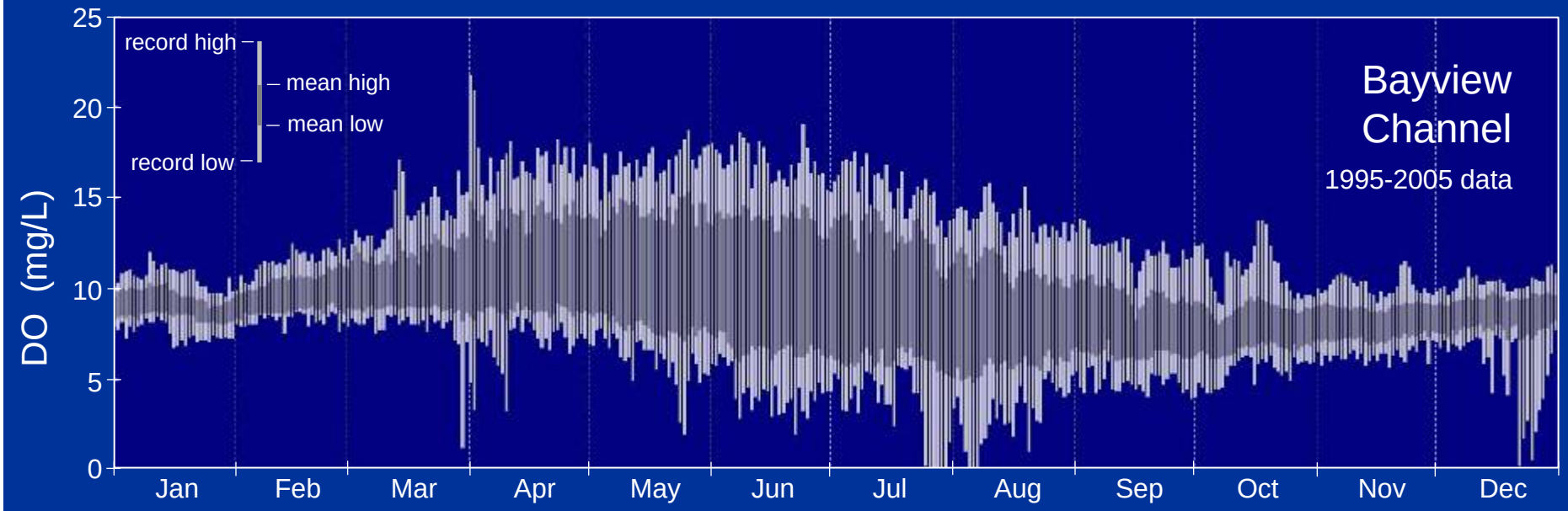
Mean Daily Max DO (Long-Term Average)

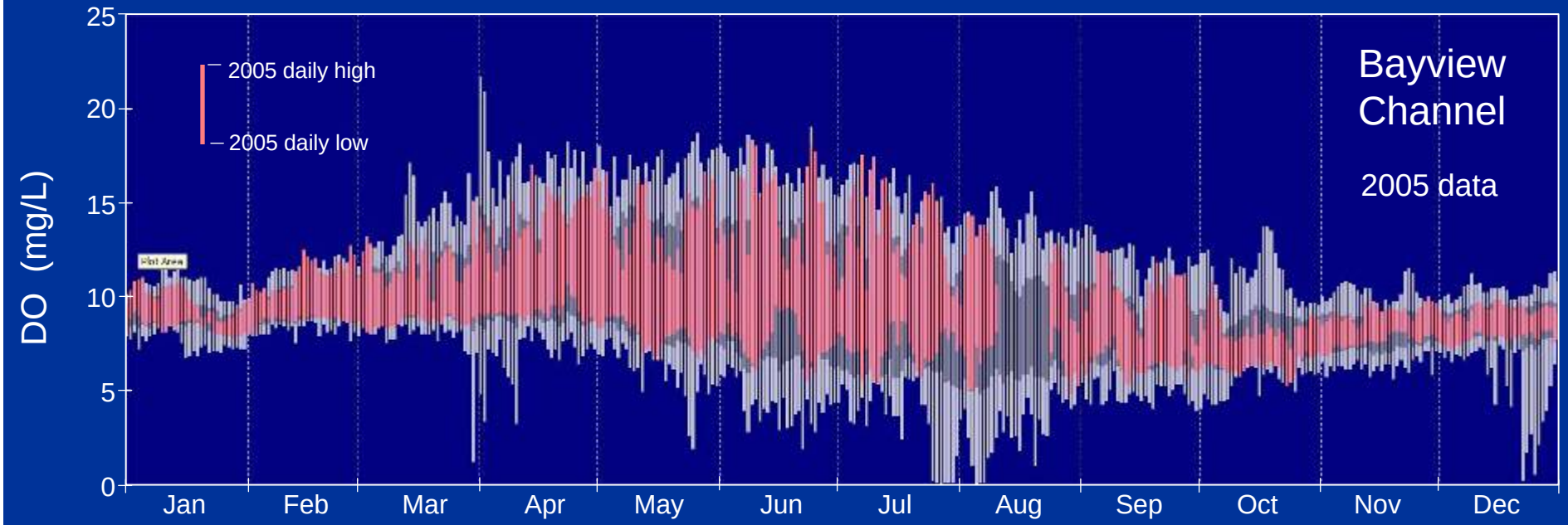


Mean Daily Max & Min DO (Long-Term Average)



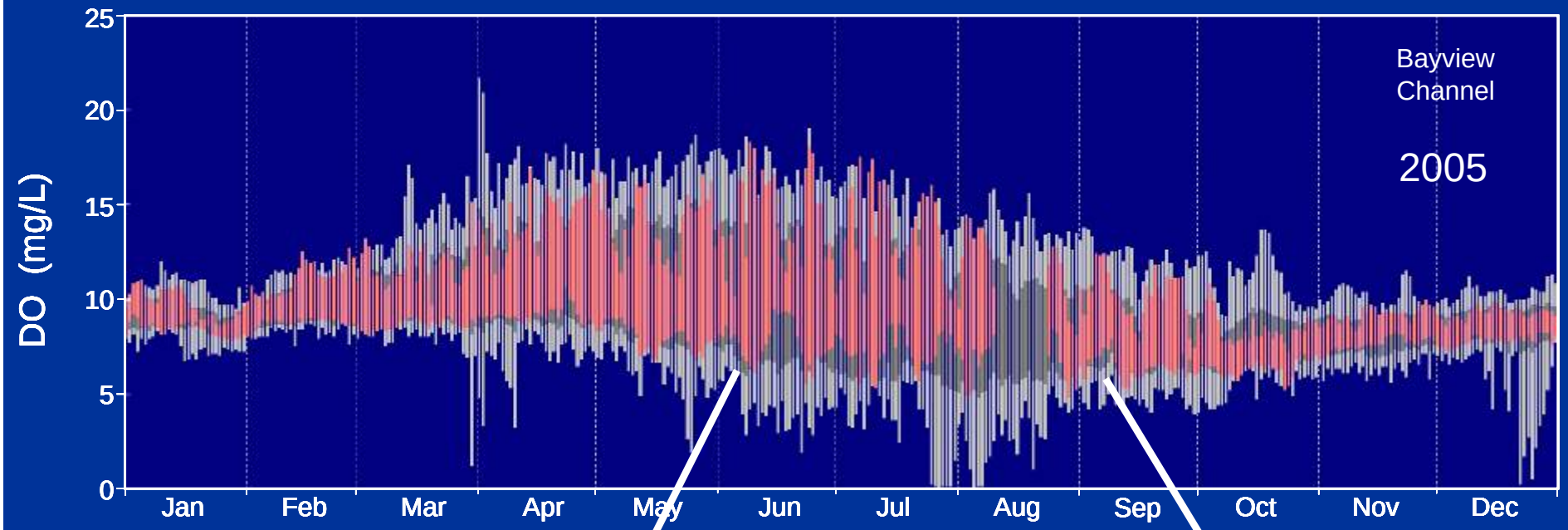
Summary of Daily DO

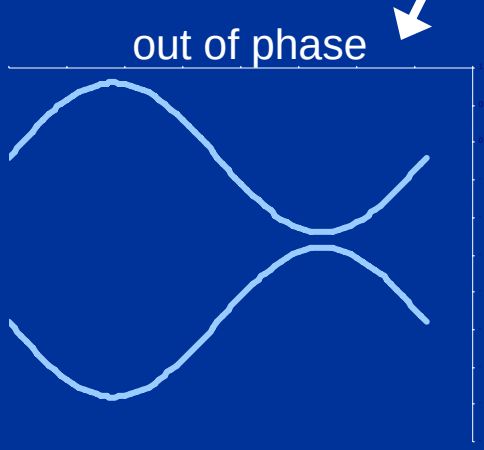




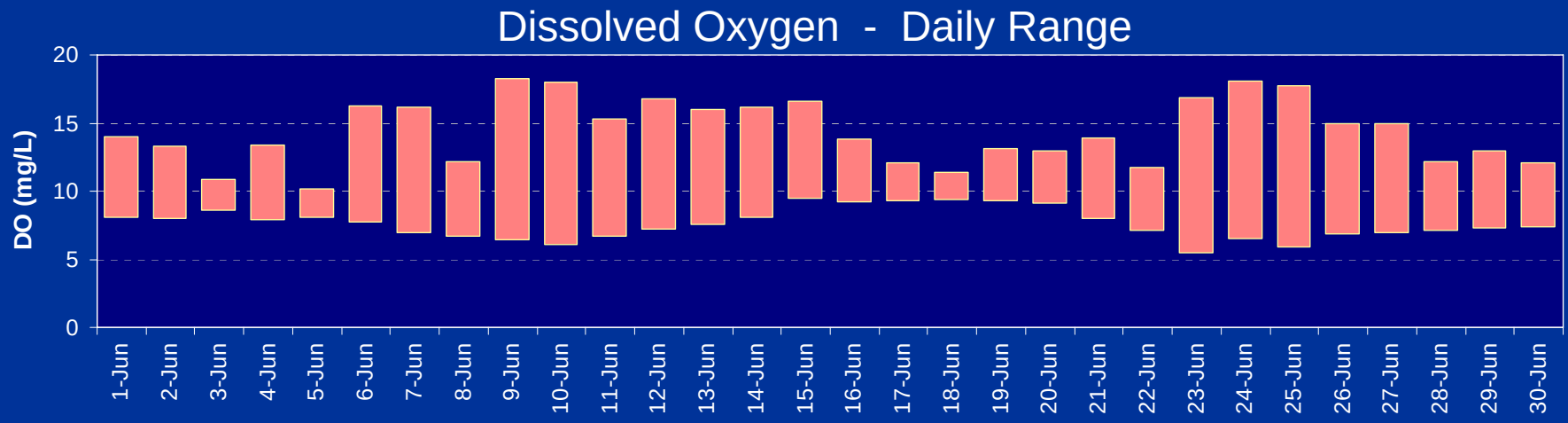
Bayview Annual DO Time Series

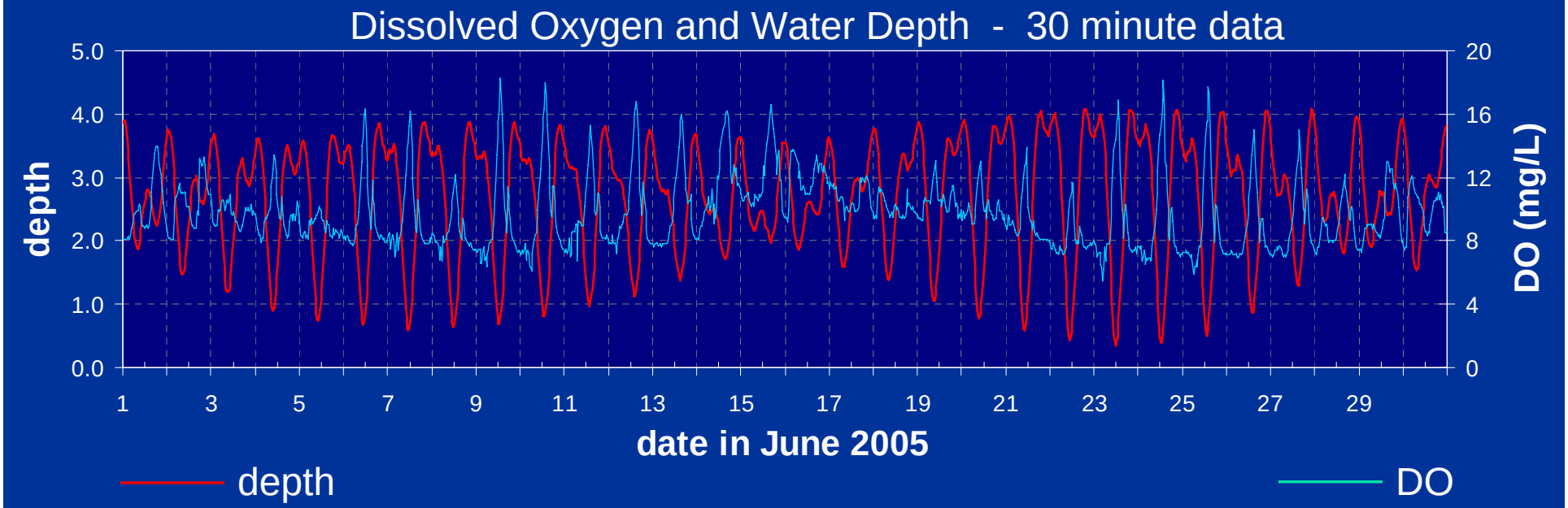
1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005

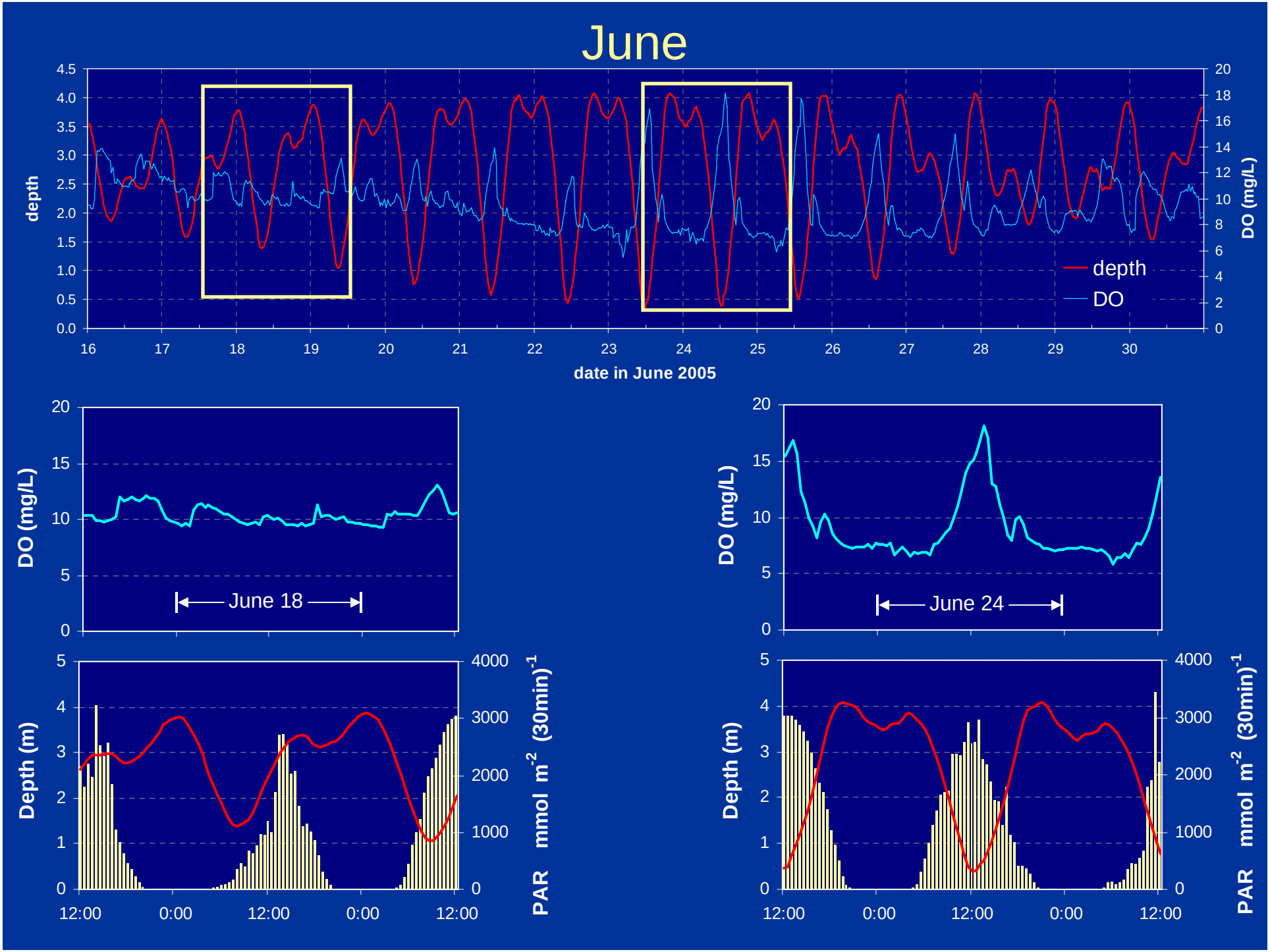




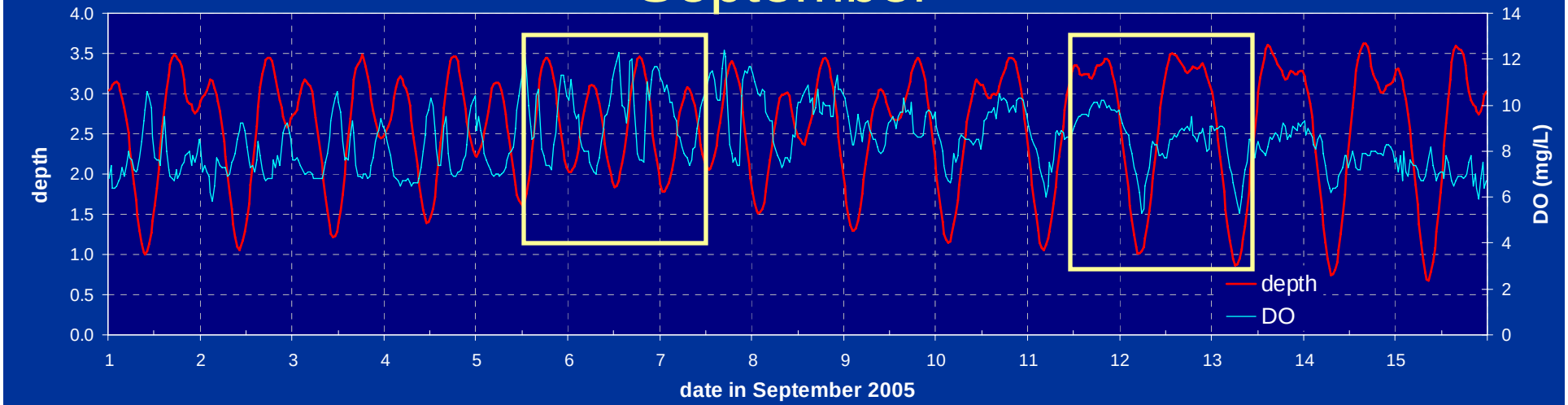
Bayview - June 2005

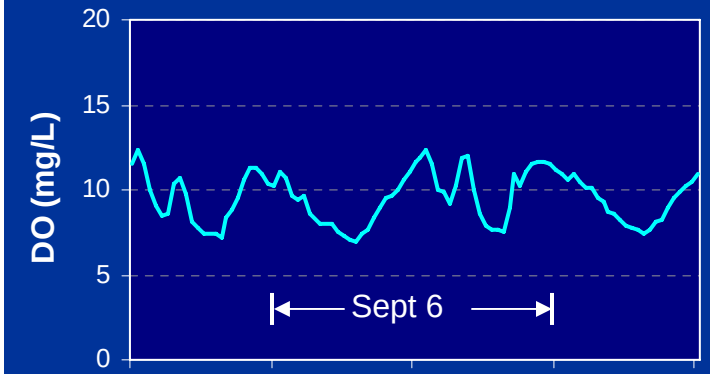


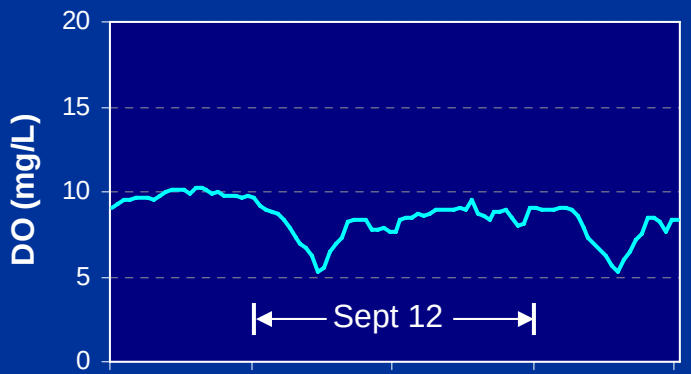


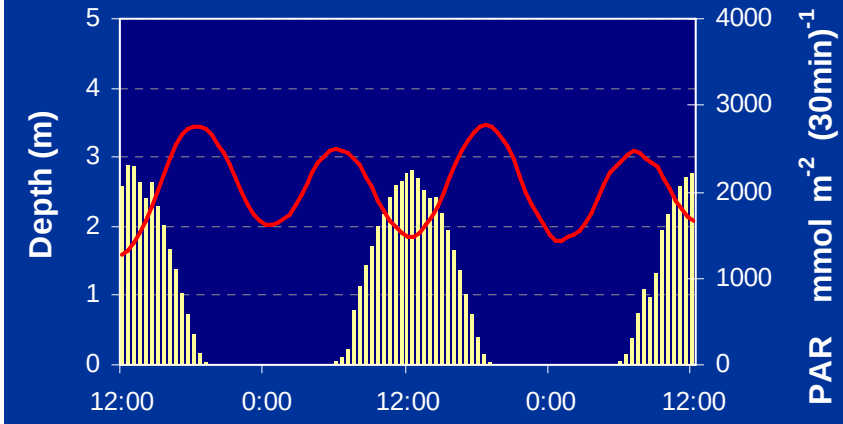

June
depth
DO (mg/L)
depth
DO
date in June 2005
DO (mg/L)
June 18
DO (mg/L)
June 24
Depth (m)
PAR mmol m-2 (30min)-1
12:00
0:00
12:00
0:00
12:00
Depth (m)
PAR mmol m-2 (30min)-1
12:00
0:00
12:00
0:00
12:00

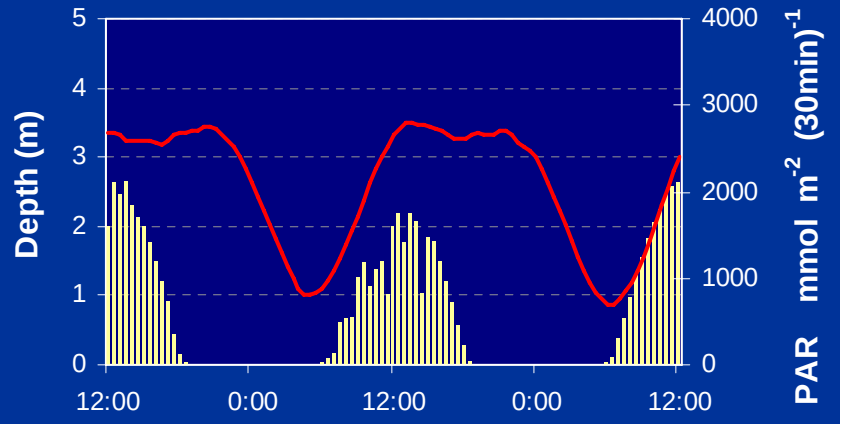
September


depth
DO (mg/L)
depth
DO
date in September 2005


DO (mg/L)
Sept 6


DO (mg/L)
Sept 12


Depth (m)
PAR mmol m-2 (30min)-1
12:00
0:00
12:00
0:00
12:00


Depth (m)
PAR mmol m-2 (30min)-1
12:00
0:00
12:00
0:00
12:00

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