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Zooplankton composition and phenology off eastern Australia

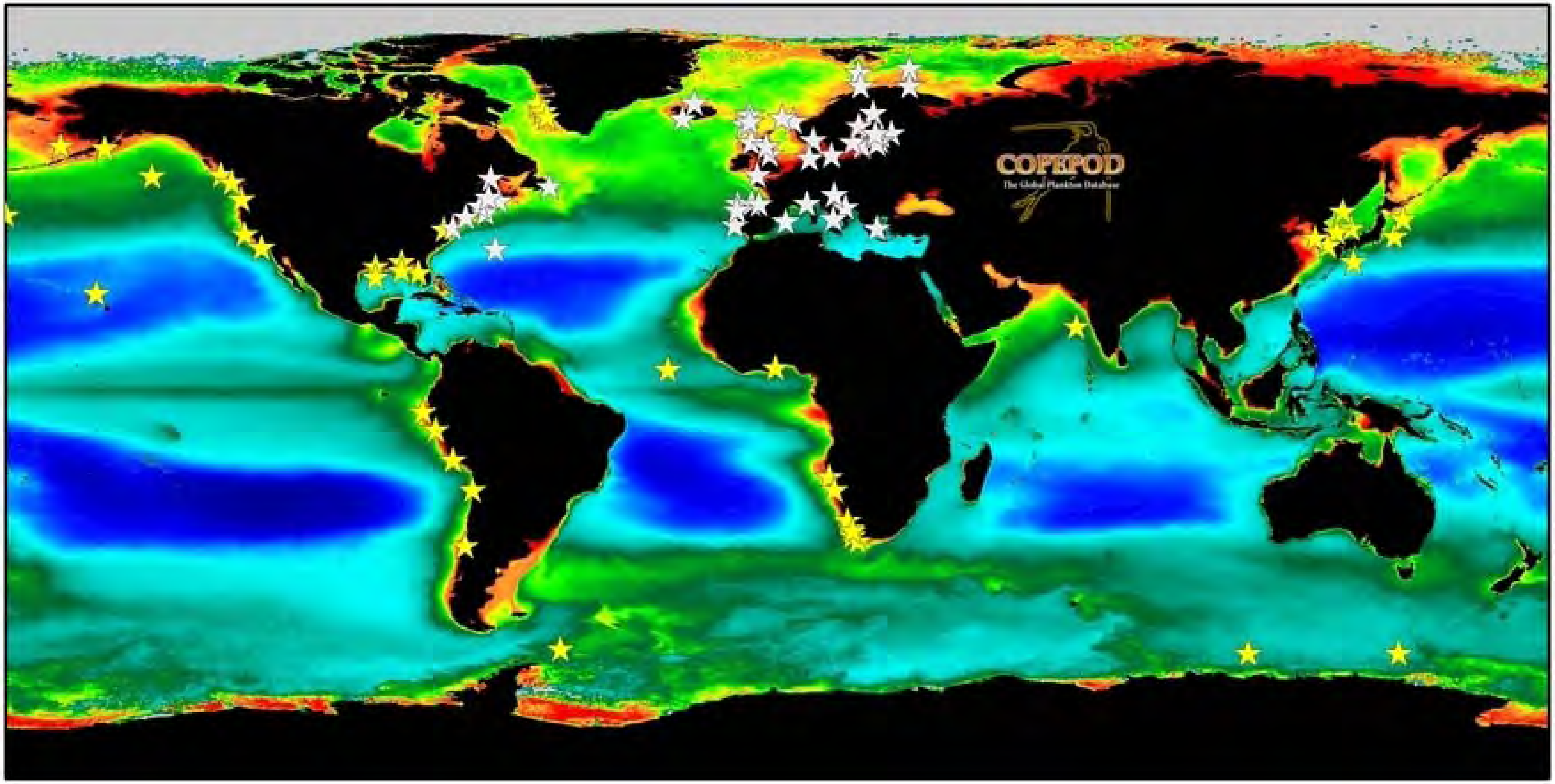
Climate Adaptation

Anthony J. Richardson, Felipe Gusmão, Mark Baird, Frank Coman, Claire Davies, Jocelyn Dela-Cruz, Tim Pritchard, Anita Slotwinski and Iain Suthers

The University of Queensland Australia

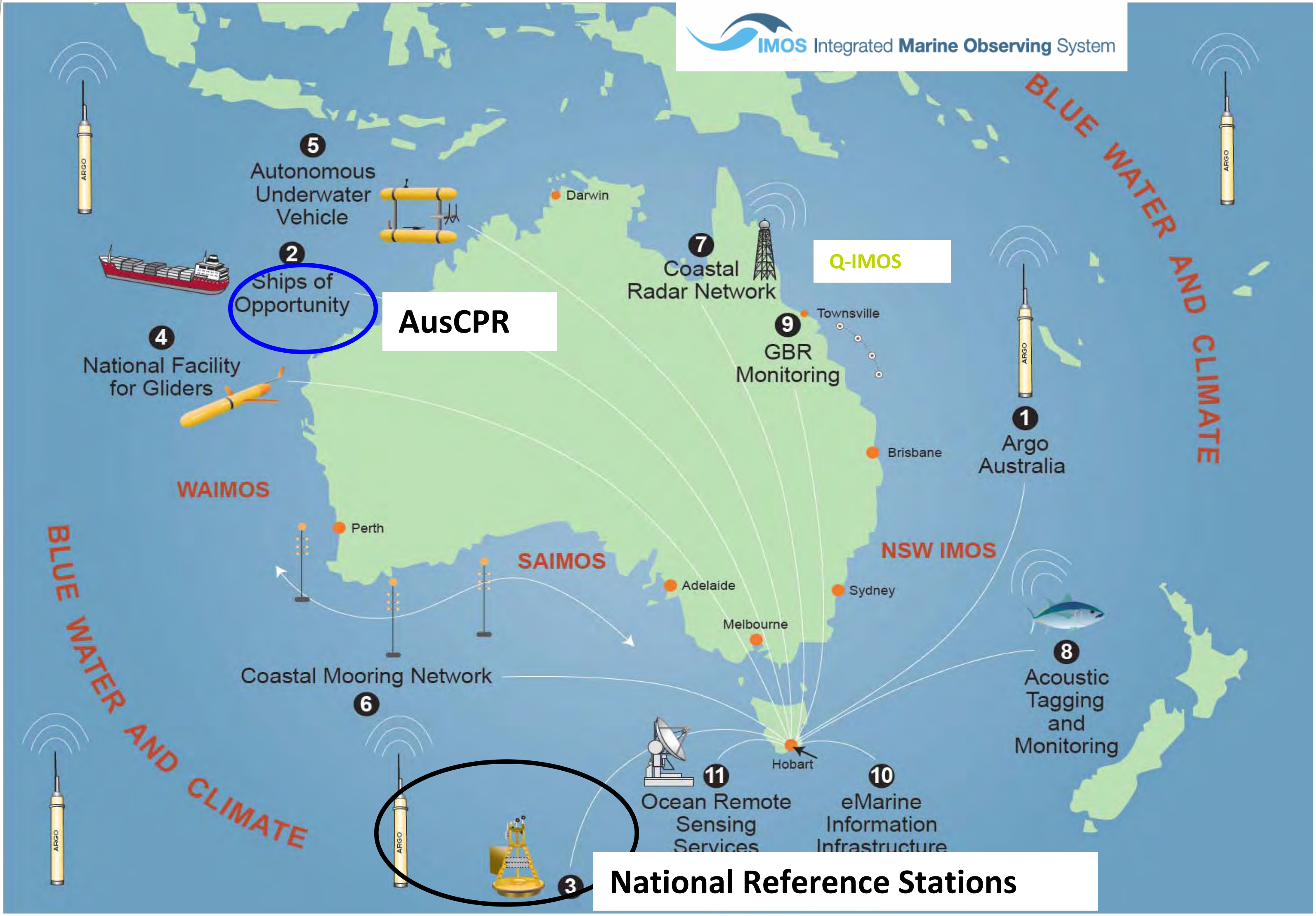
CSIRO

Context: Australian time series

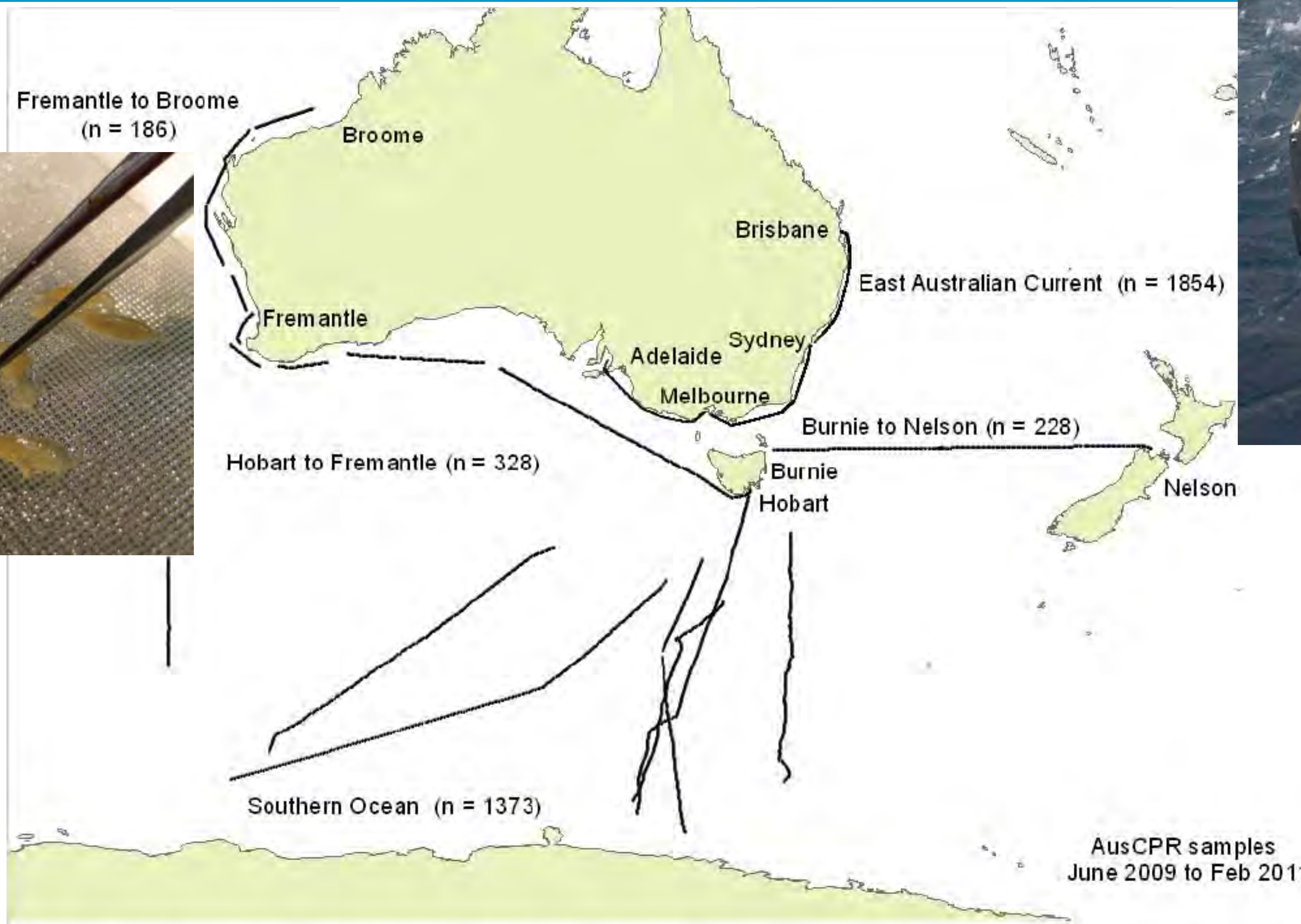


http://www.st.nmfs.noaa.gov/plankton/

An integrated observing approach



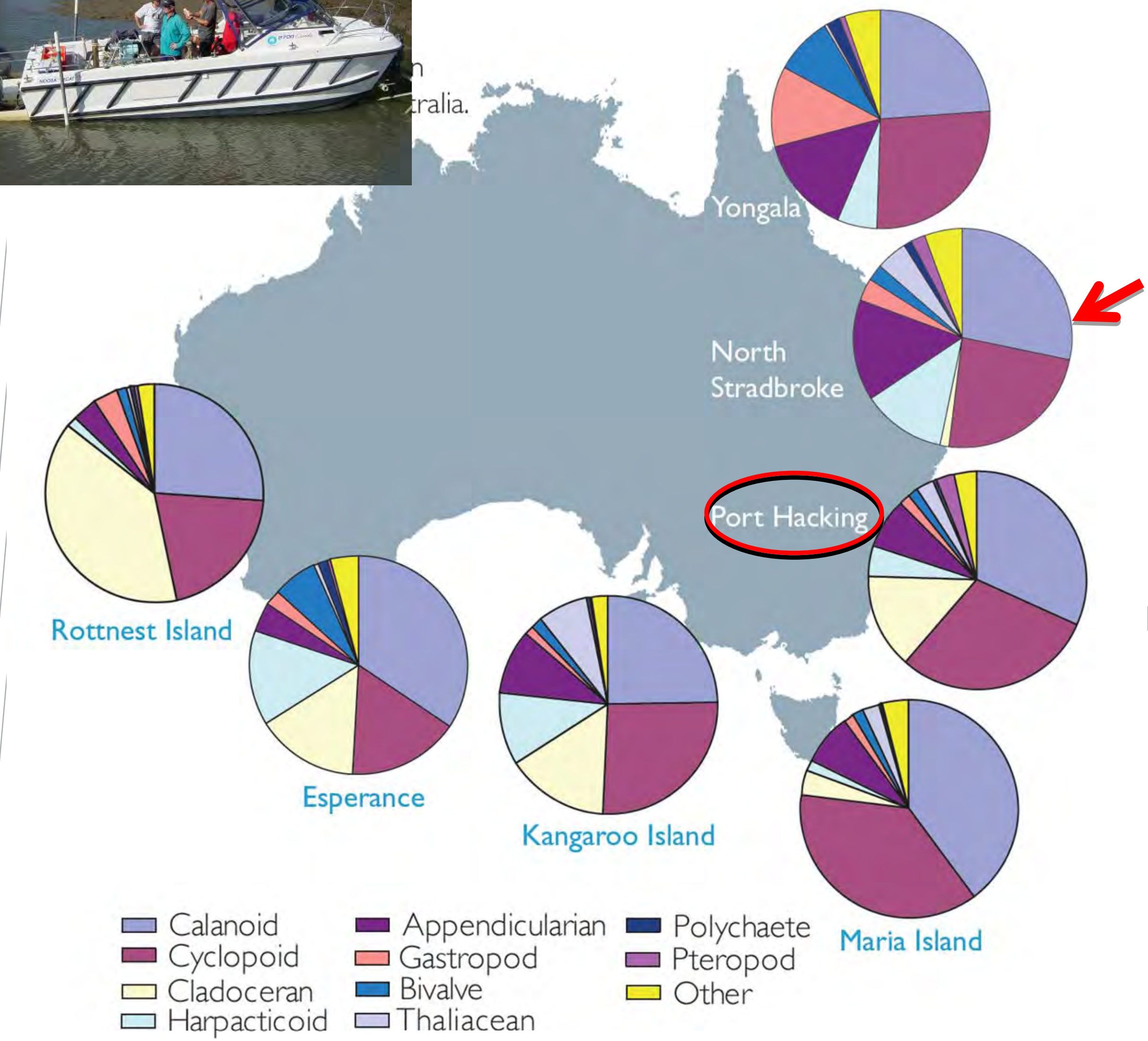
AusCPR: the Australian Continuous Plankton Recorder survey

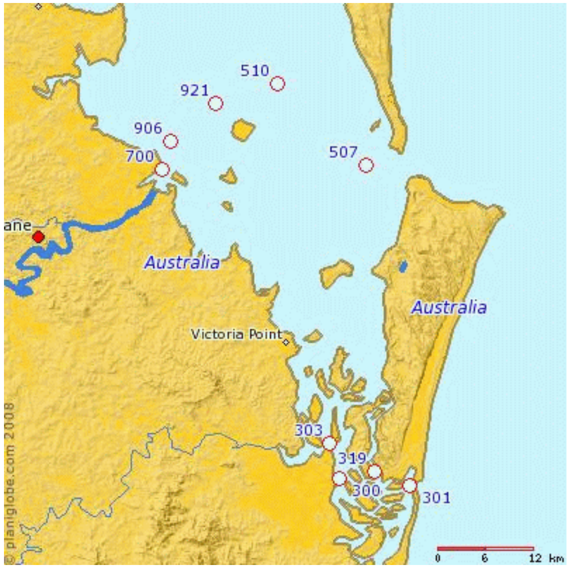


Plankton data collected by the AusCPR survey as of February 2011.

Slotwinski et al. (poster S1-7236)

National Reference Stations

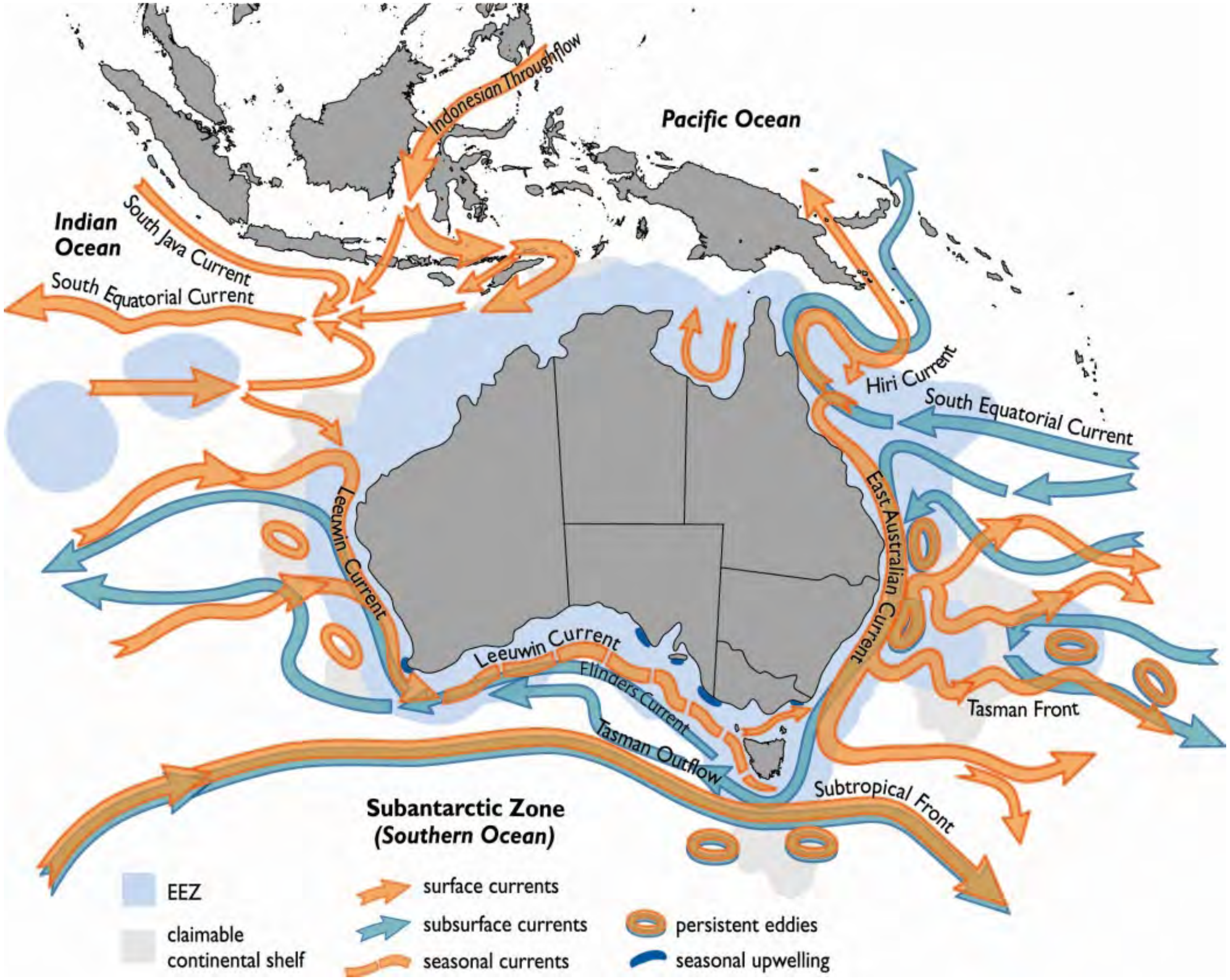




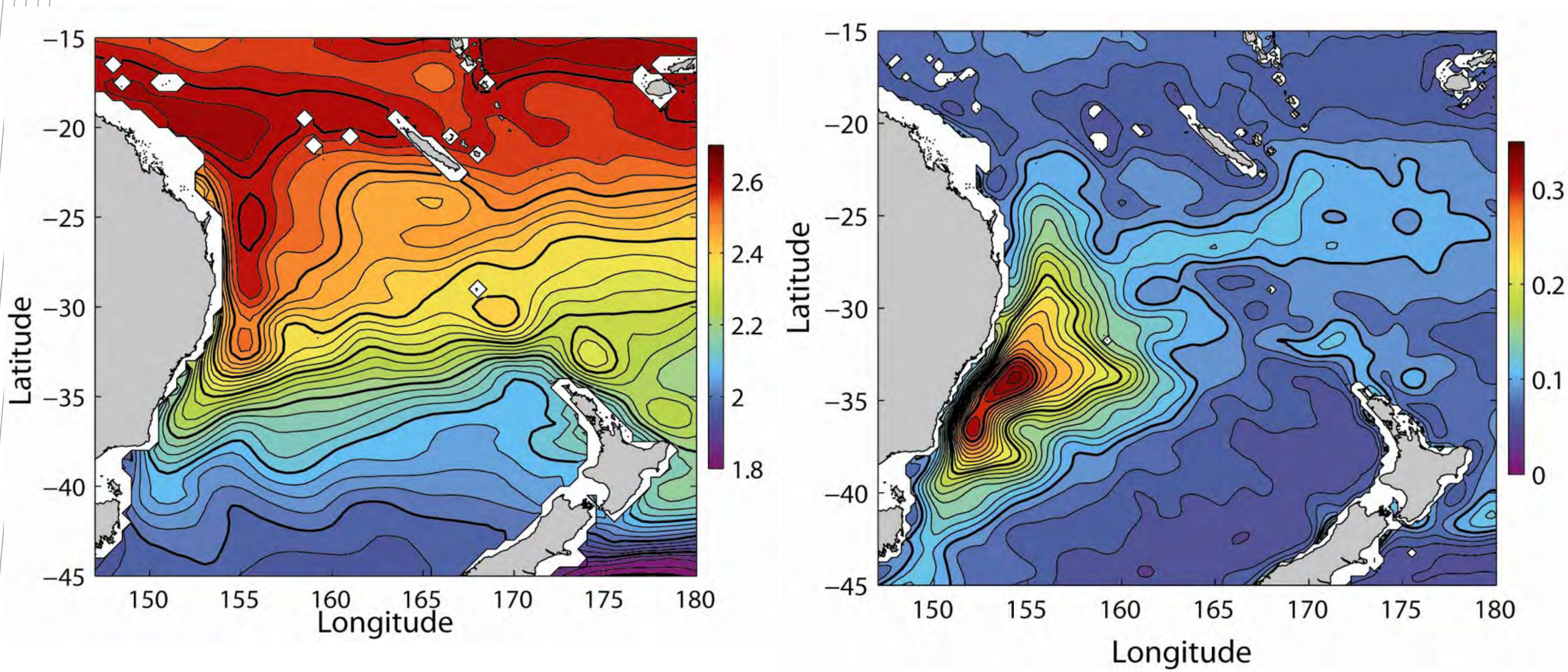
Pausina et al. (poster S5-7083)

Davies et al. (poster S1-7237)

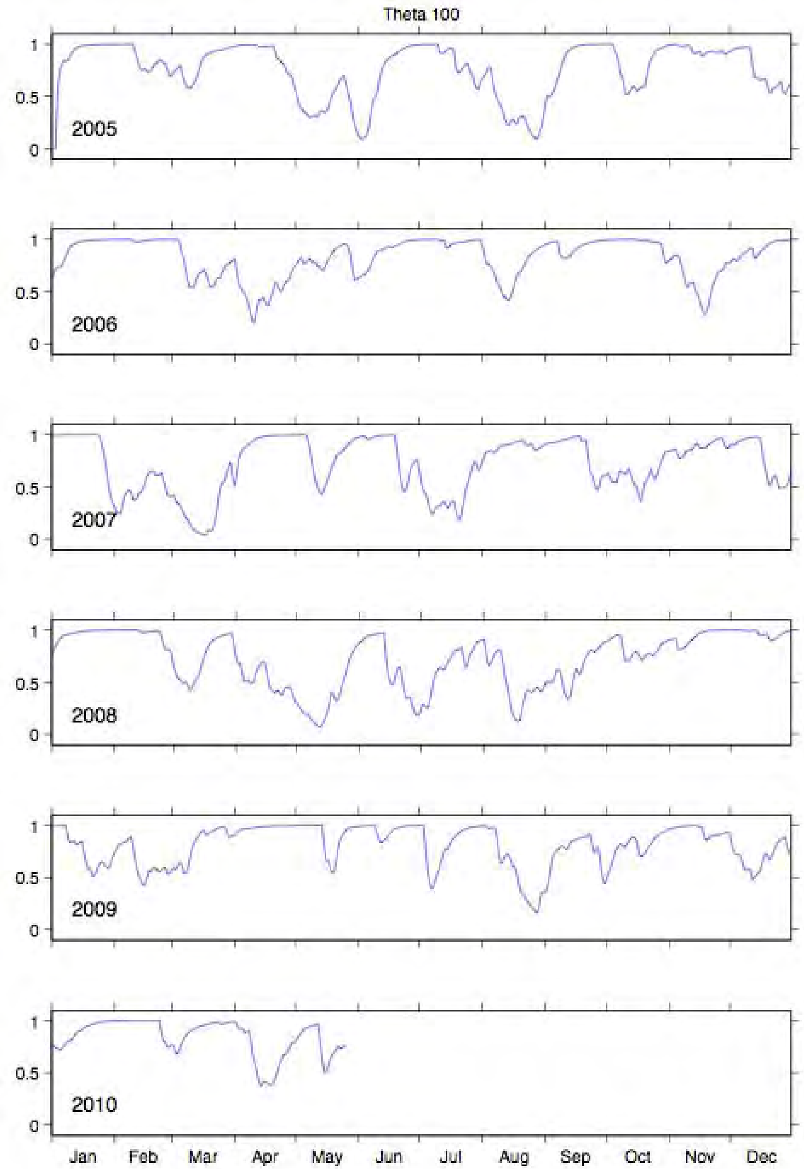
Regional Oceanography



Strength and Variability of EAC

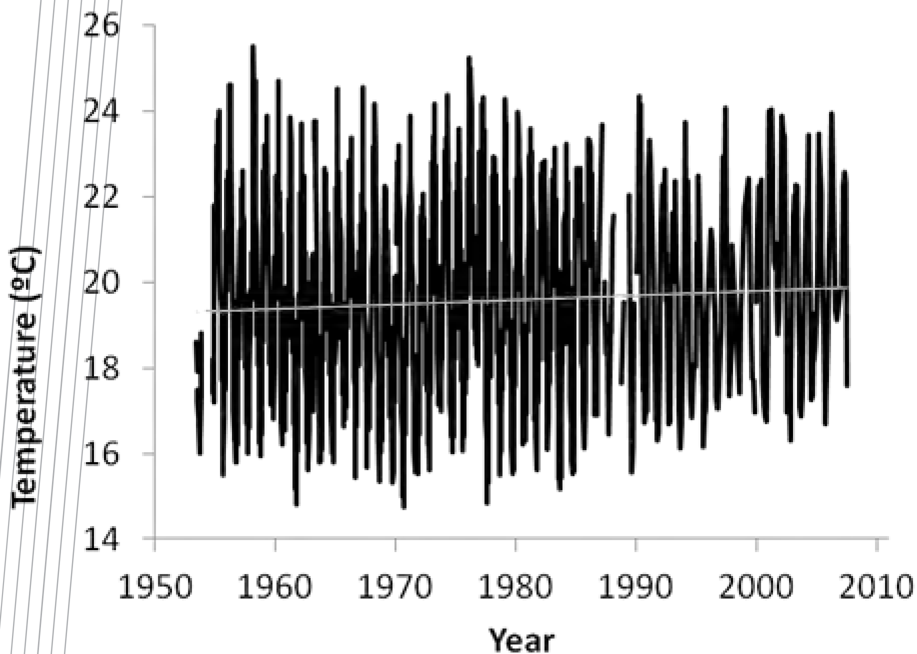


N-S Transport

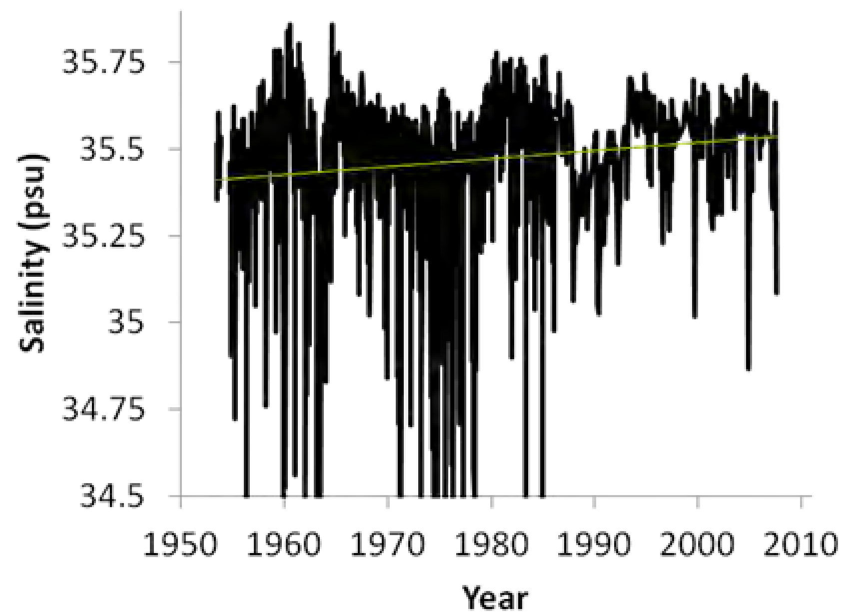


Long-term physical changes

0.6°C warming

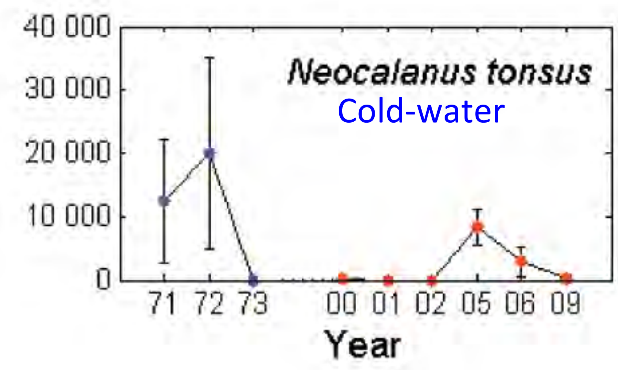


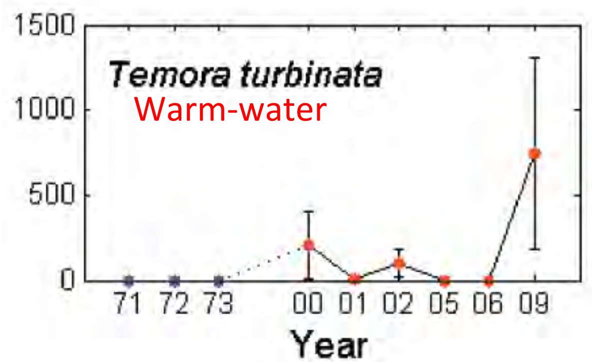
0.15 psu over past 60 yrs



Expectations

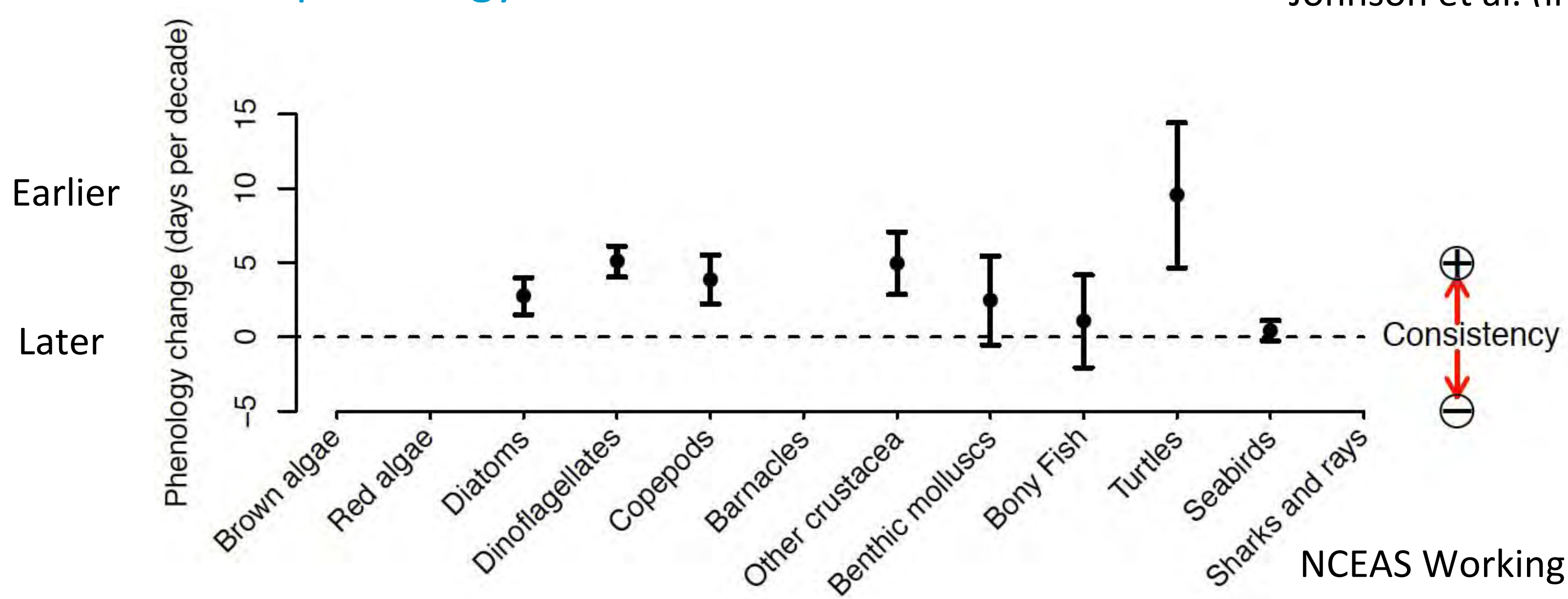
1. Increase in warm-water communities?





Kerrie Swadling
Johnson et al. (in press)

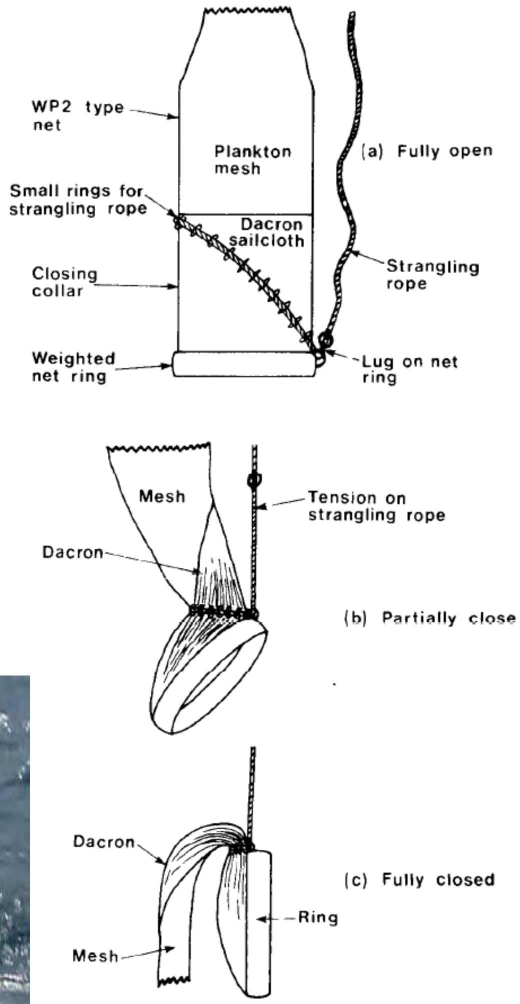
2. Earlier phenology?

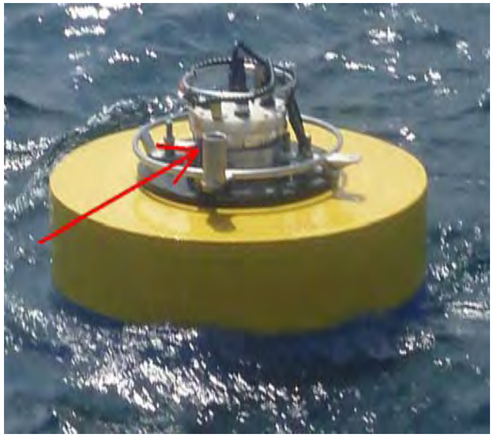


NCEAS Working Group

Methods

- **Mooring with temperature, salinity, fluorescence, ADCP at each location**
- **Drop net with heavy galvanised collar**
  - **100 μm mesh**
  - **Closing design**
  - **Depth measured by timing**
- **Samples counted to lowest possible taxon**

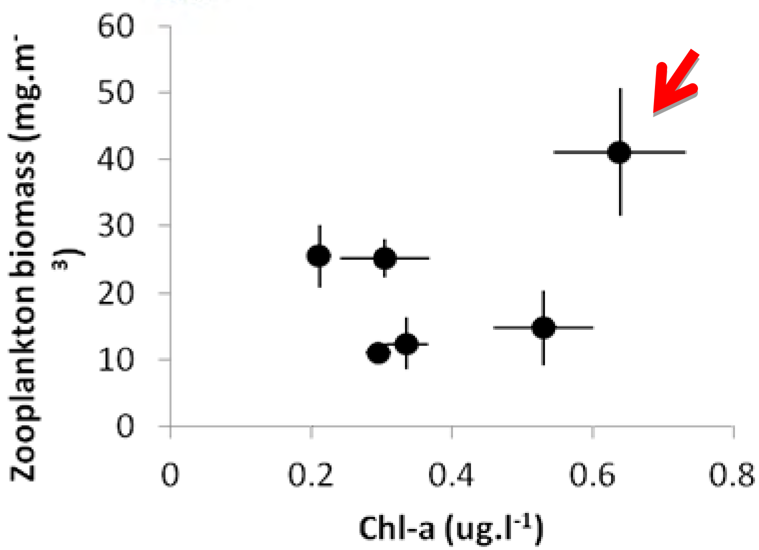




Results: Zooplankton Biomass

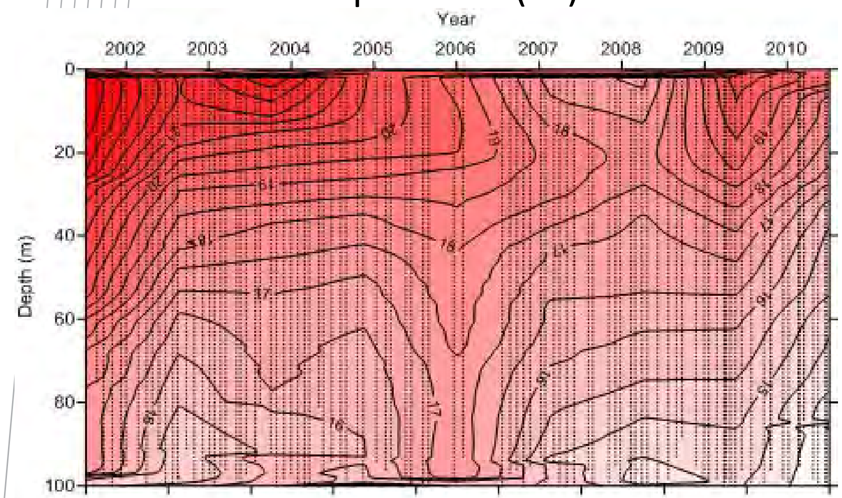
Biomass

Abundance

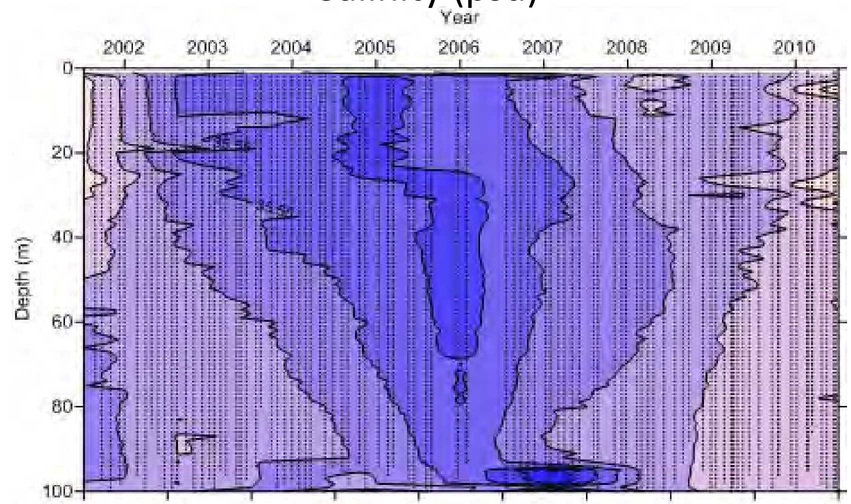


Environmental conditions at Port Hacking

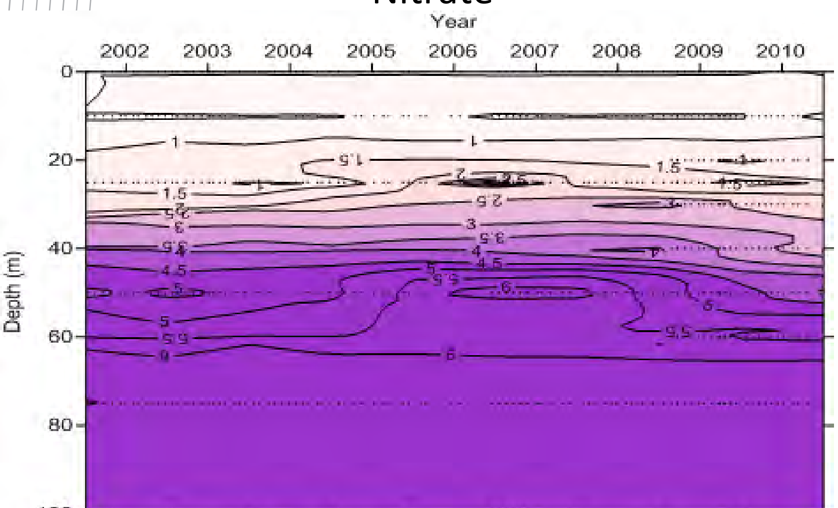
Temperature (°C)



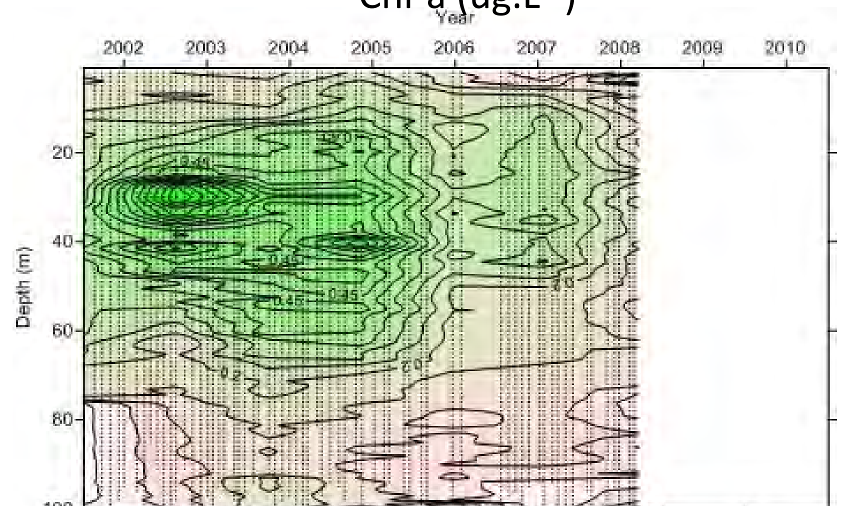
Salinity (psu)



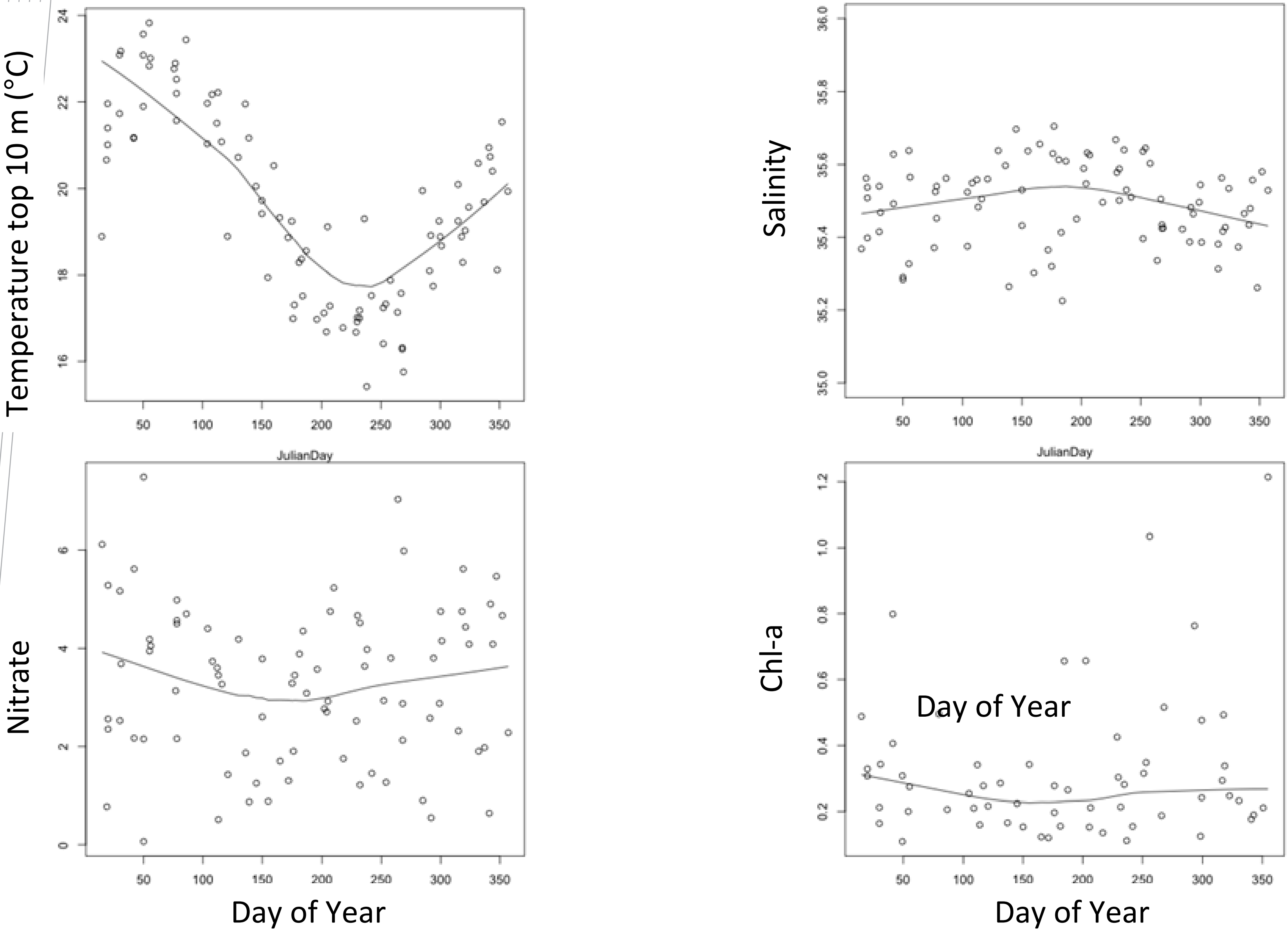
Nitrate



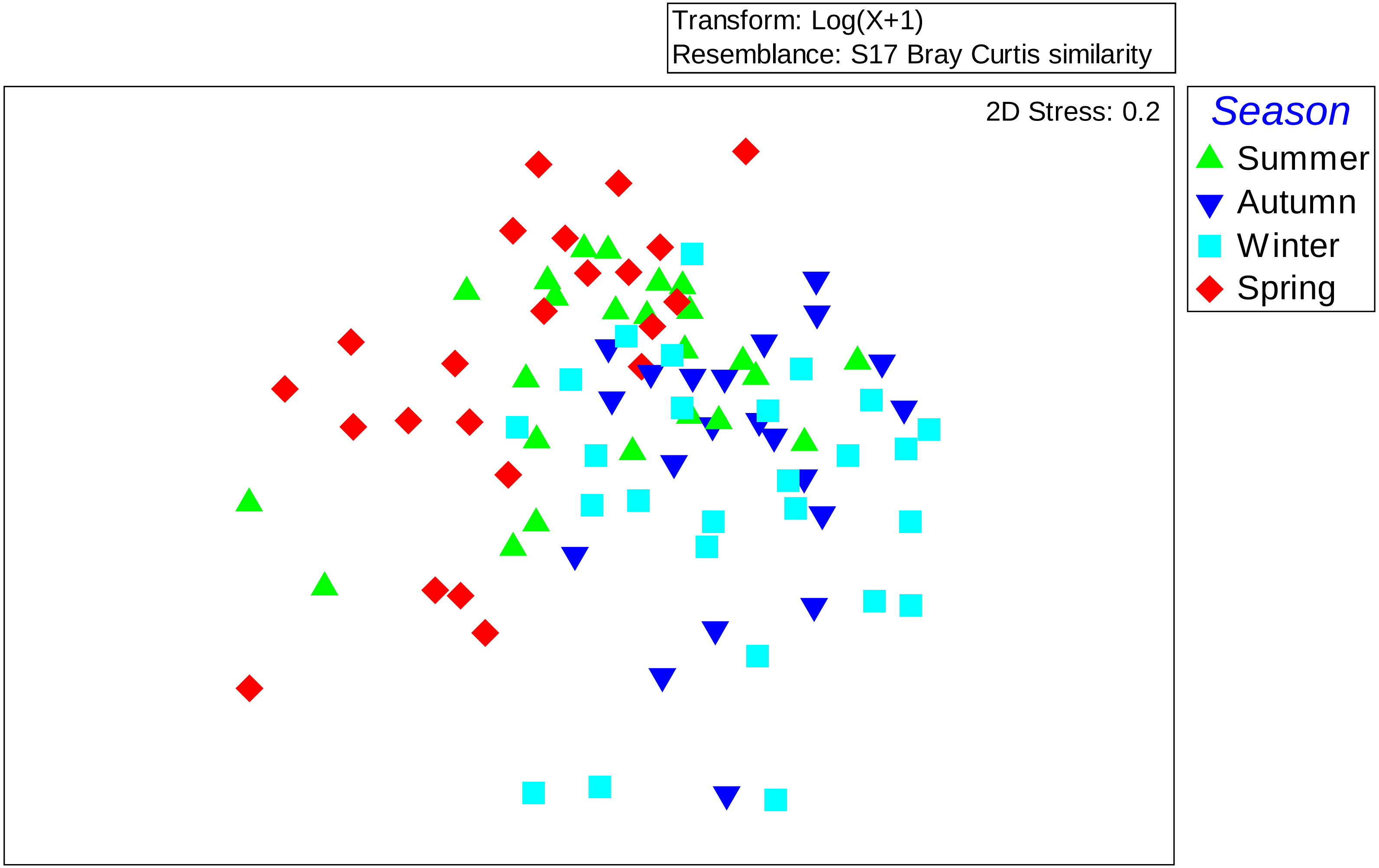
Chl-a (ug.L^{-1})



Environmental seasonality



Seasonality in the zooplankton community

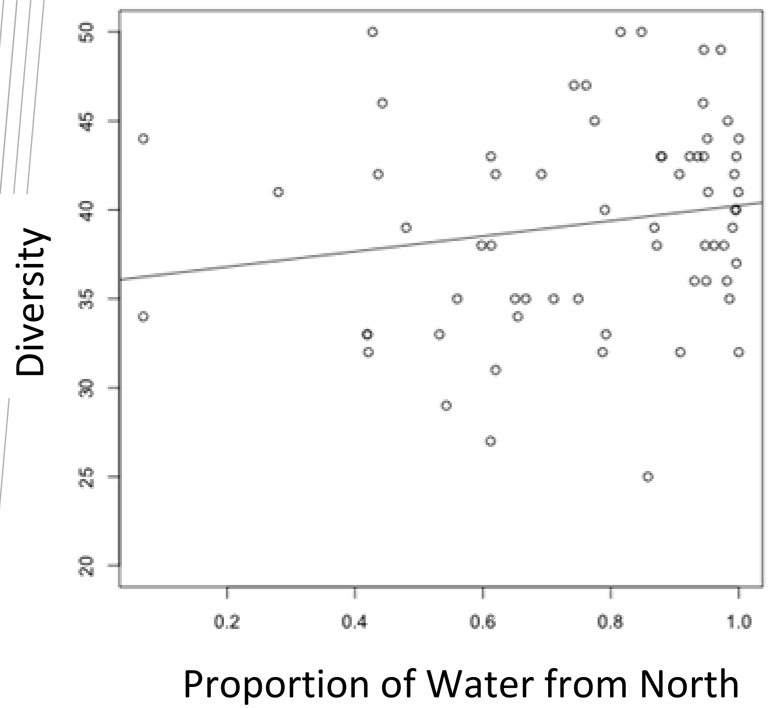


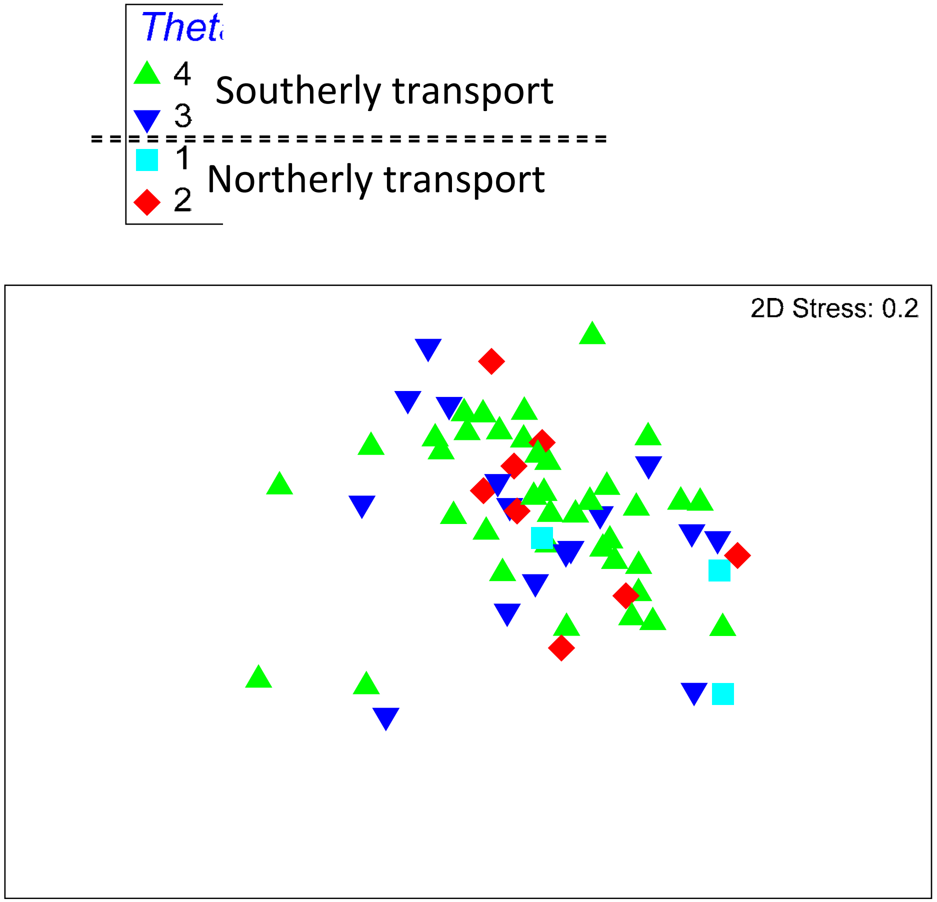
What is different about the communities?

Groups Winter & Spring (average dissimilarity = 49.65)

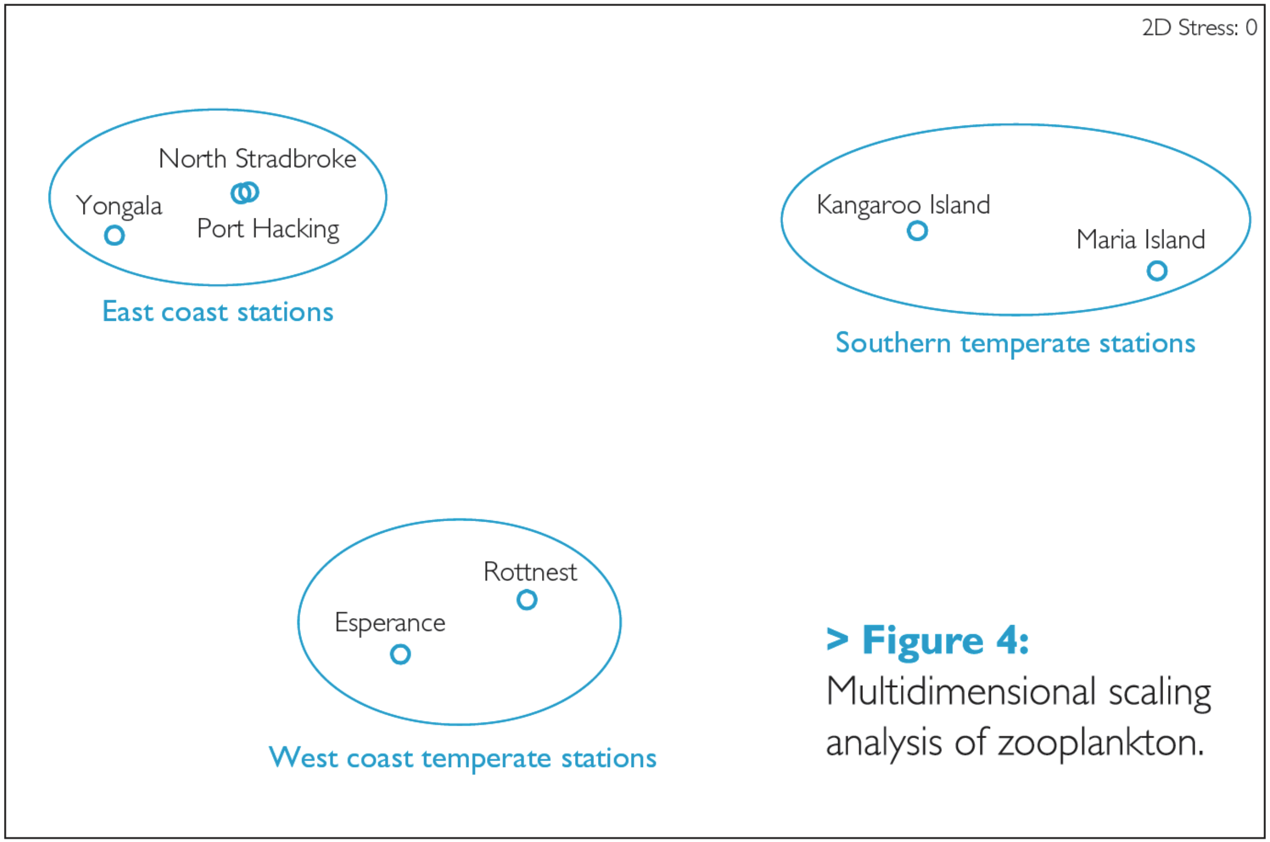
Abundance in:	Winter	Spring
Noctiluca scintillans	2.67	8.39
Penilia avirostris	2.46	3.37
Pseudevadne tergestina	2.33	2.94
Podon spp.	0.77	2.71
Doliolum denticulatum	1.90	2.23
Oncaea venusta	3.45	1.96
Clausocalanus arcuicornis	3.06	1.50
Acartia tranteri	0.97	2.29
Corycaeus spp.	3.39	2.17
Clausocalanus furcatus	1.92	1.03
Temora turbinata	2.40	2.02
Oncaea clevei	1.83	1.41
Delibus sp.	1.55	0.56

Effect of the East Australian Current?



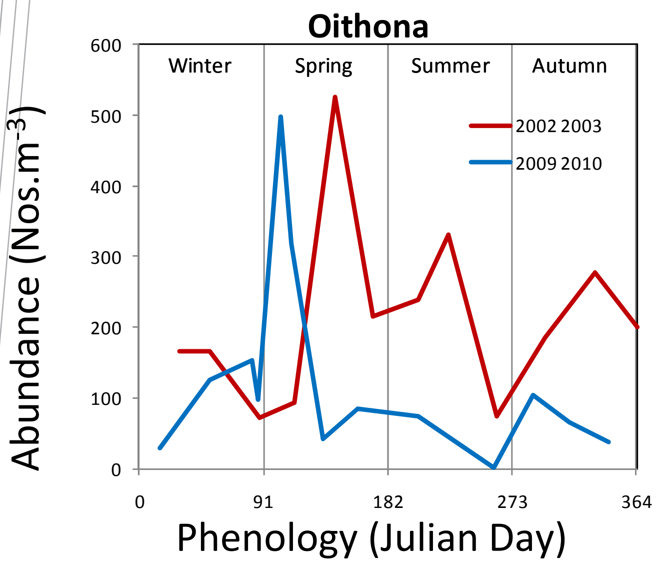


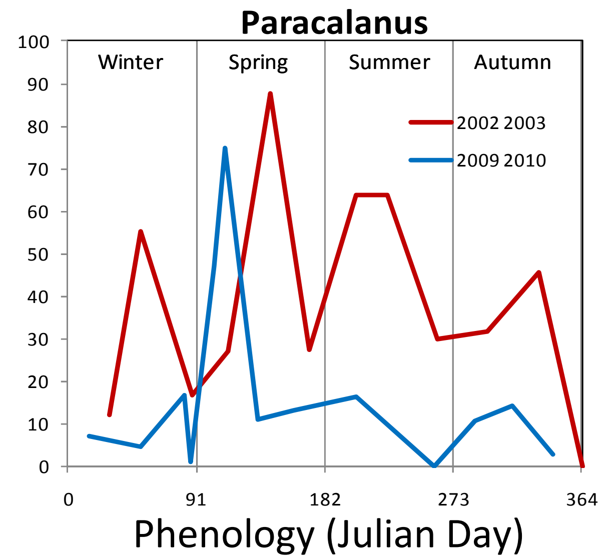
Communities similar to further north

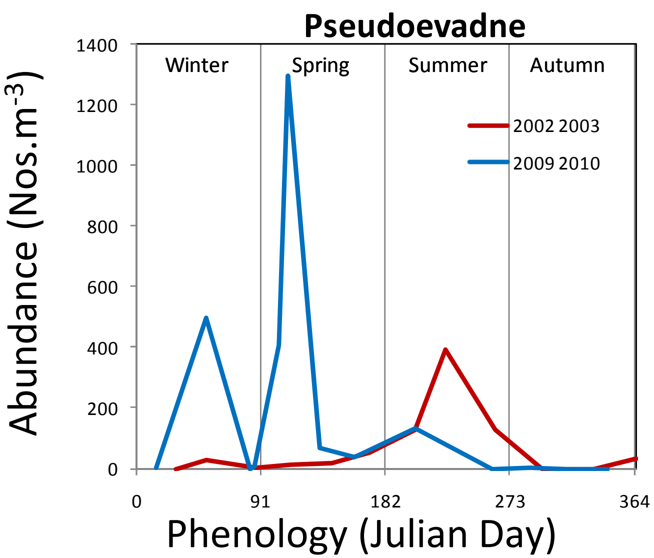


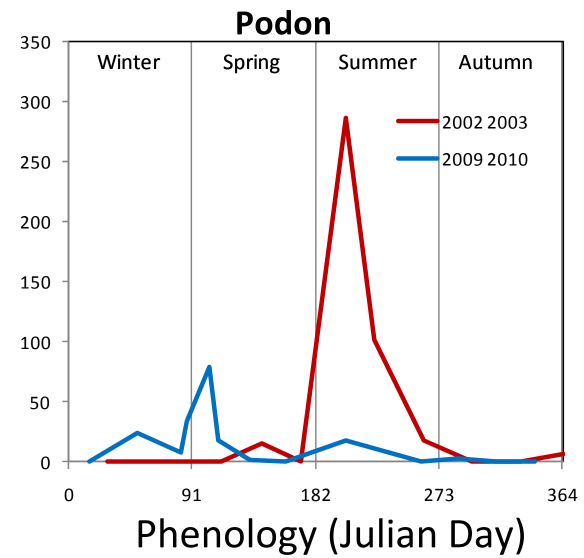
> Figure 4:
Multidimensional scaling analysis of zooplankton.

Phenology changes (warm vs cold year)



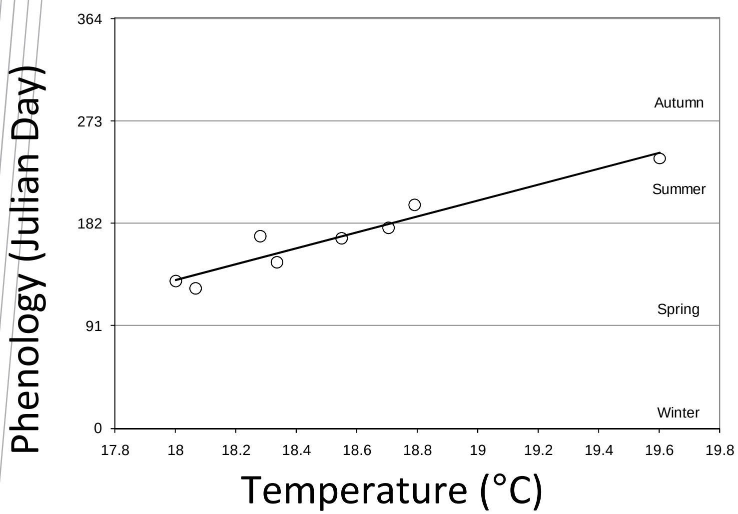




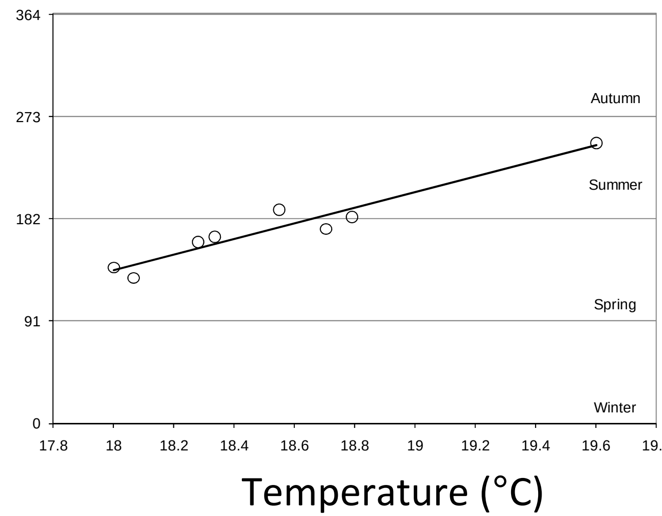


Phenology (0=mid-year)

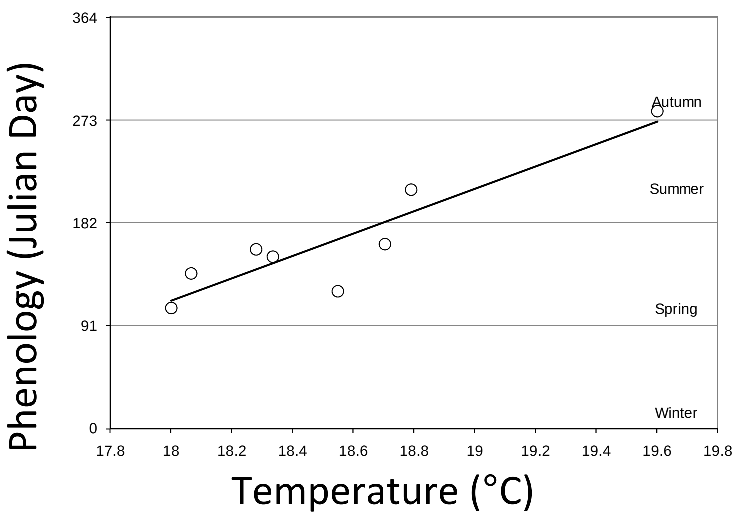
Oithona



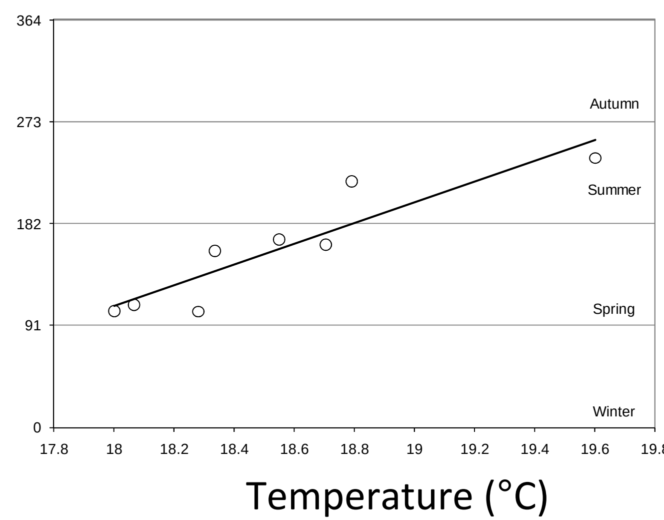
Paracalanus



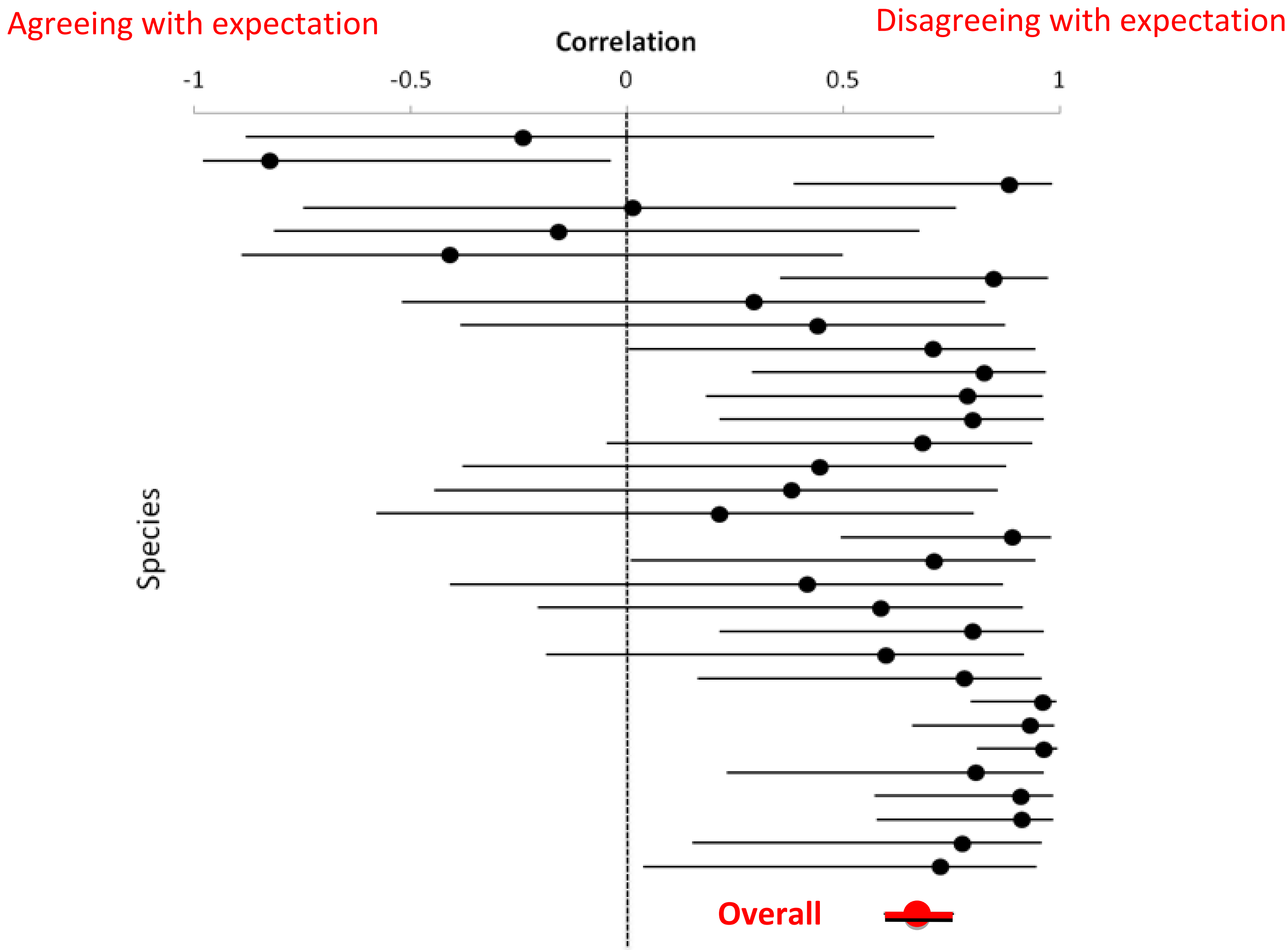
Podon



Pseudoevadne



Phenology vs Temperature



Conclusions

- Zooplankton communities are similar along the east coast of Australia
- Copepods become increasingly important in the zooplankton
- Some seasonality in the physico-chemistry off Port Hacking
- Reasonably strong seasonality in the zooplankton, particularly in the non-copepod component
- Surprisingly later and broader peaks of zooplankton with warming – requires further analysis
- Little effect of N-S transport (well-mixed because of eddy activity?)

Acknowledgments

- Thanks to Australian collaborators on zooplankton work including Dave McKinnon, Kerrie Swadling, Joanna Strzelecki
- IMOS, NSW DECC