# The role of plankton in a changing Arctic: some views from the South

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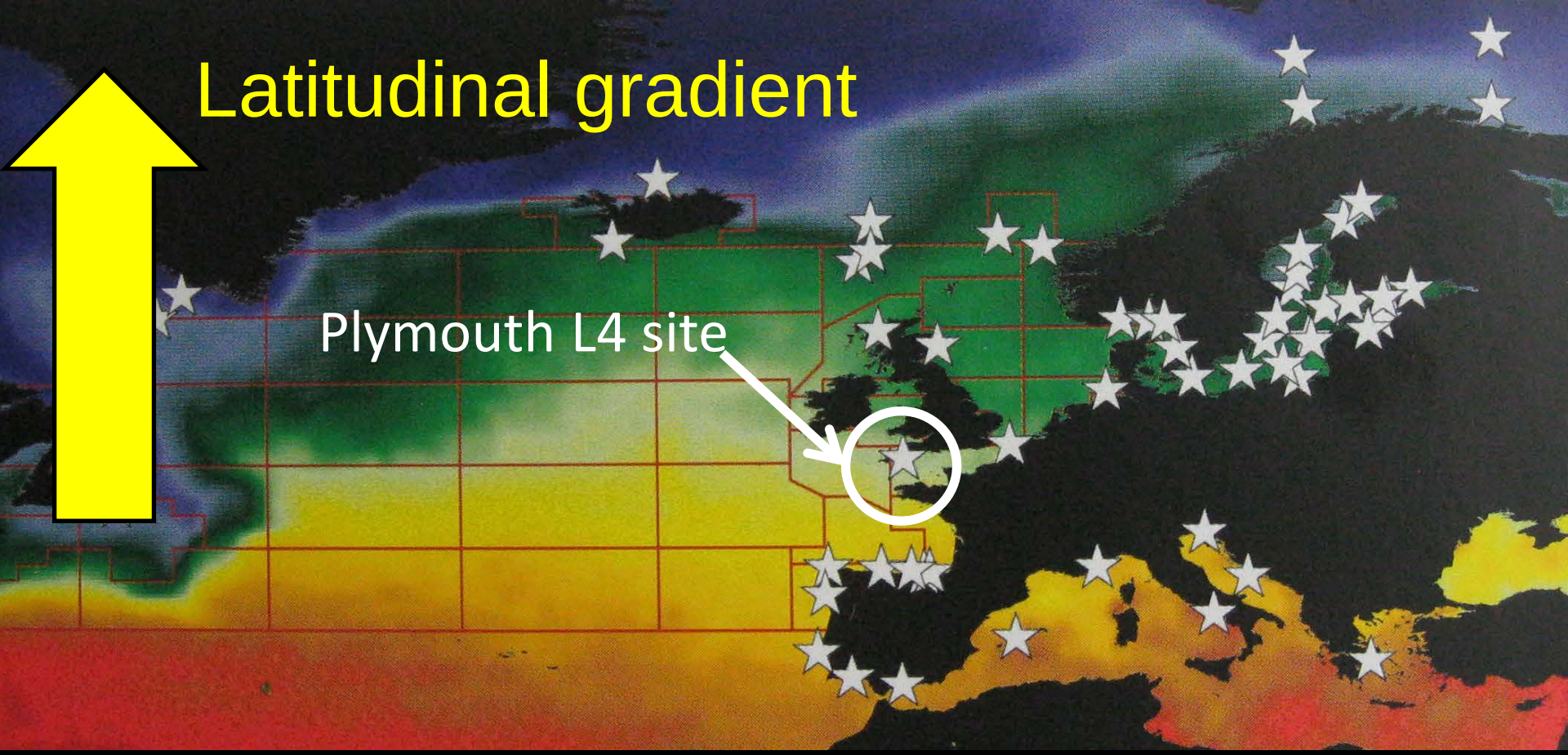
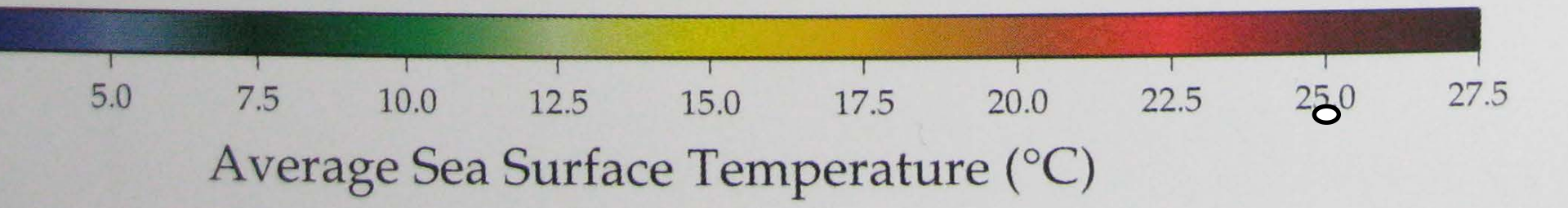



# Optimise existing networks of time series: ICES monitoring sites



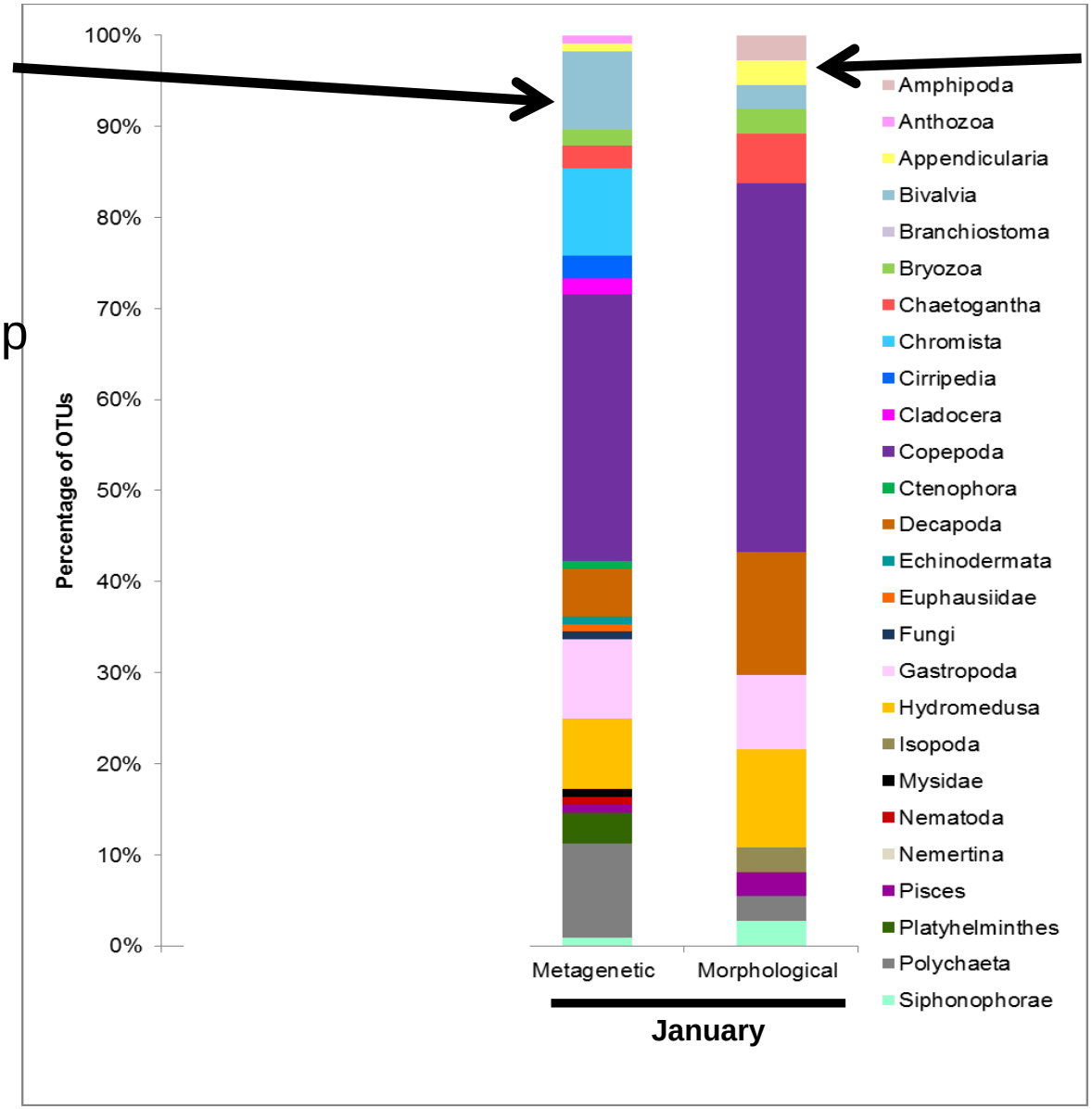
# 1. Measuring changes in diversity

Next Generation Sequencing reveals the hidden diversity of L4 zooplankton

Molecular Approach:

205 OTUs

2 *Calanus* spp



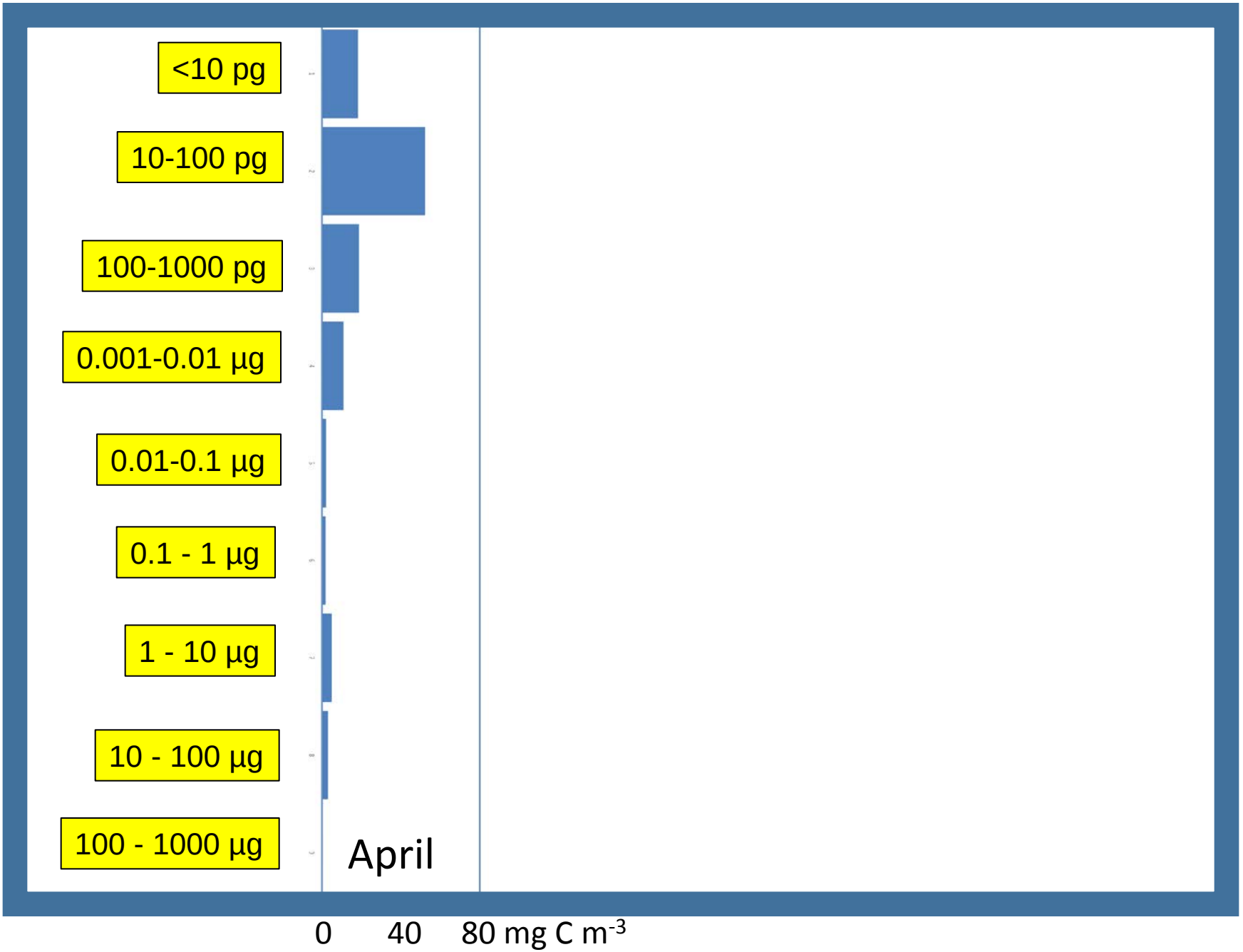

Skilled microscopist:

58 taxa

1 *Calanus* spp

Lindeque et al. PloS One (2013)

# 2. Size-based approaches to understand energy flow



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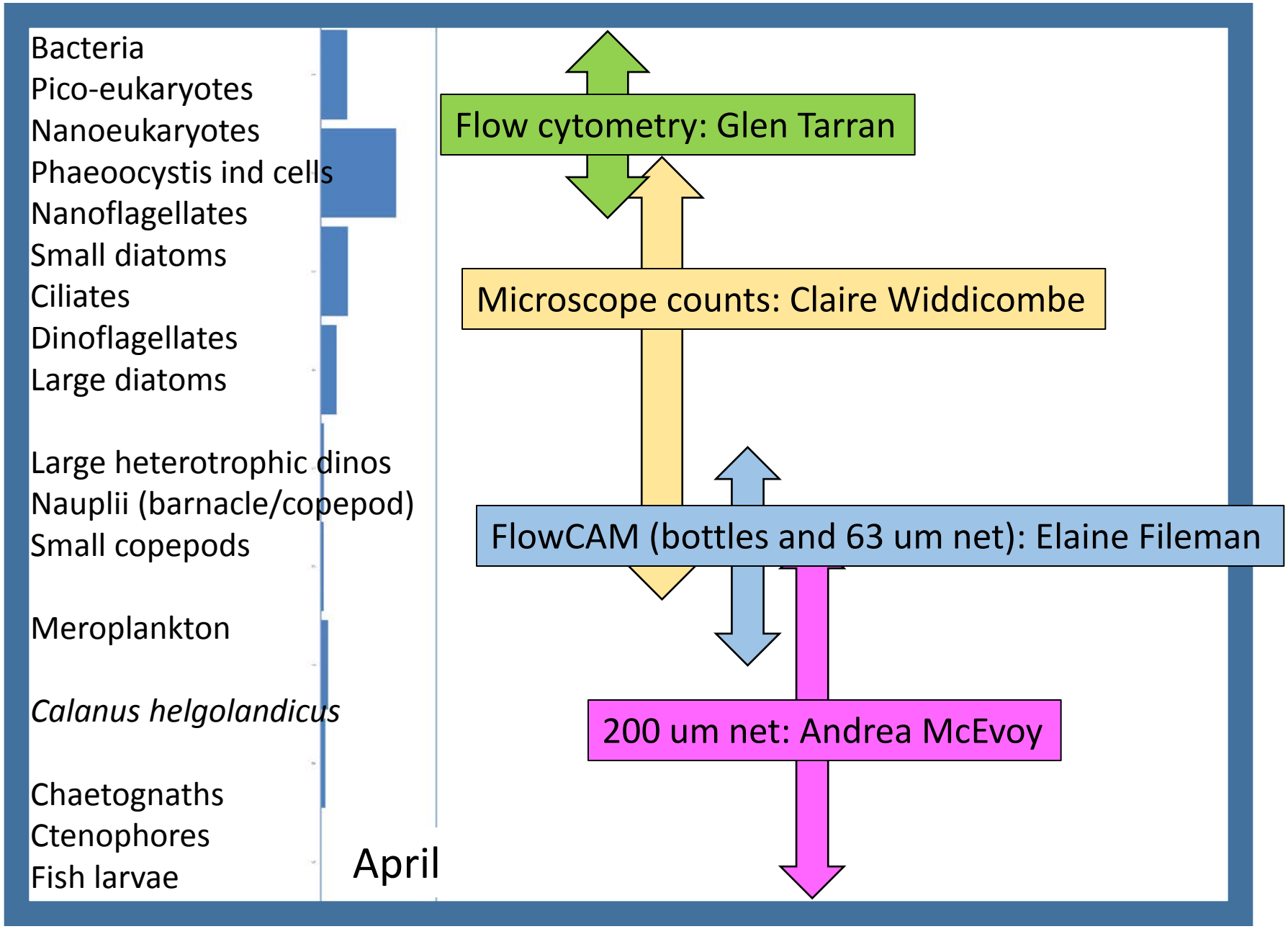

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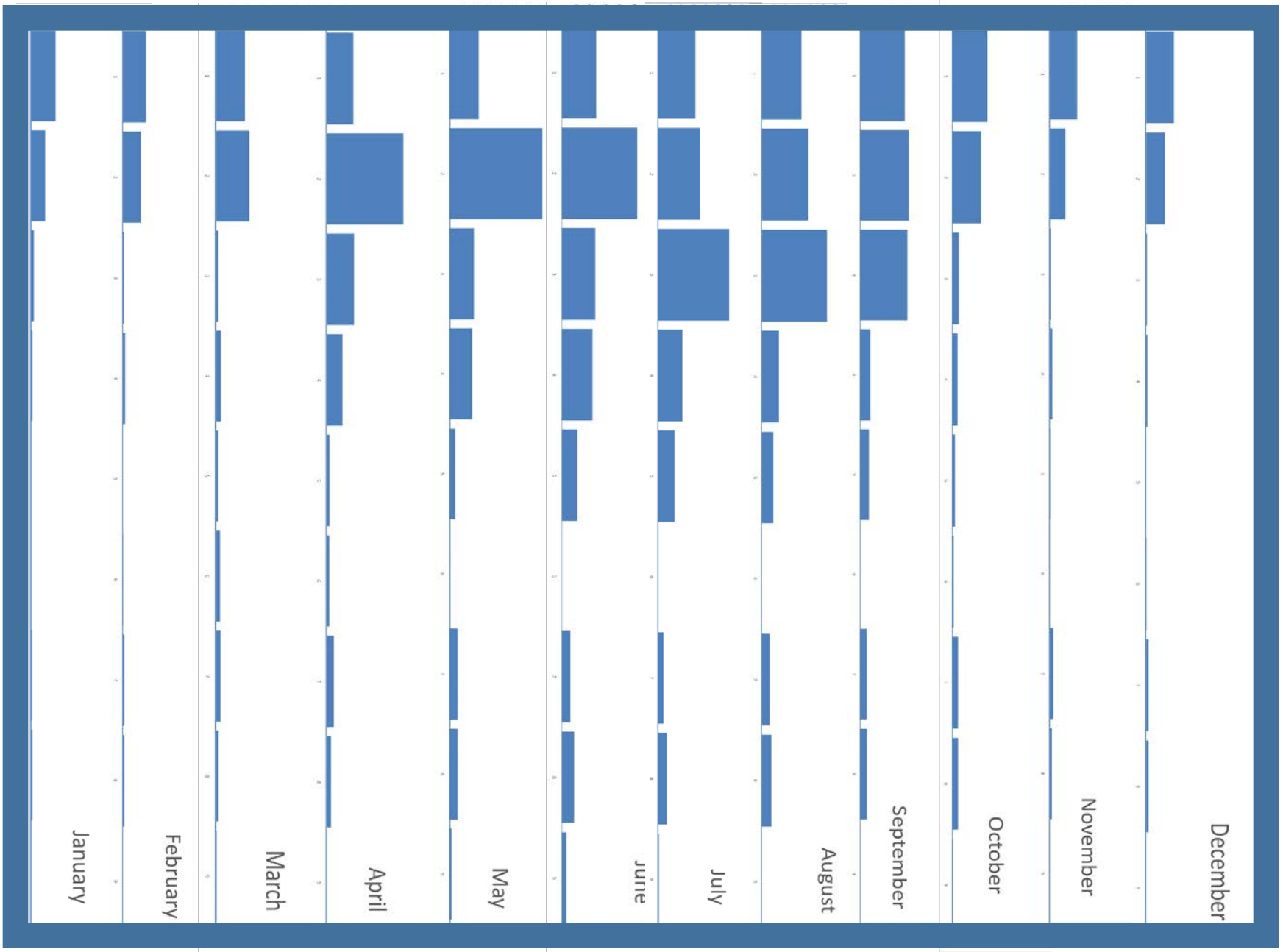
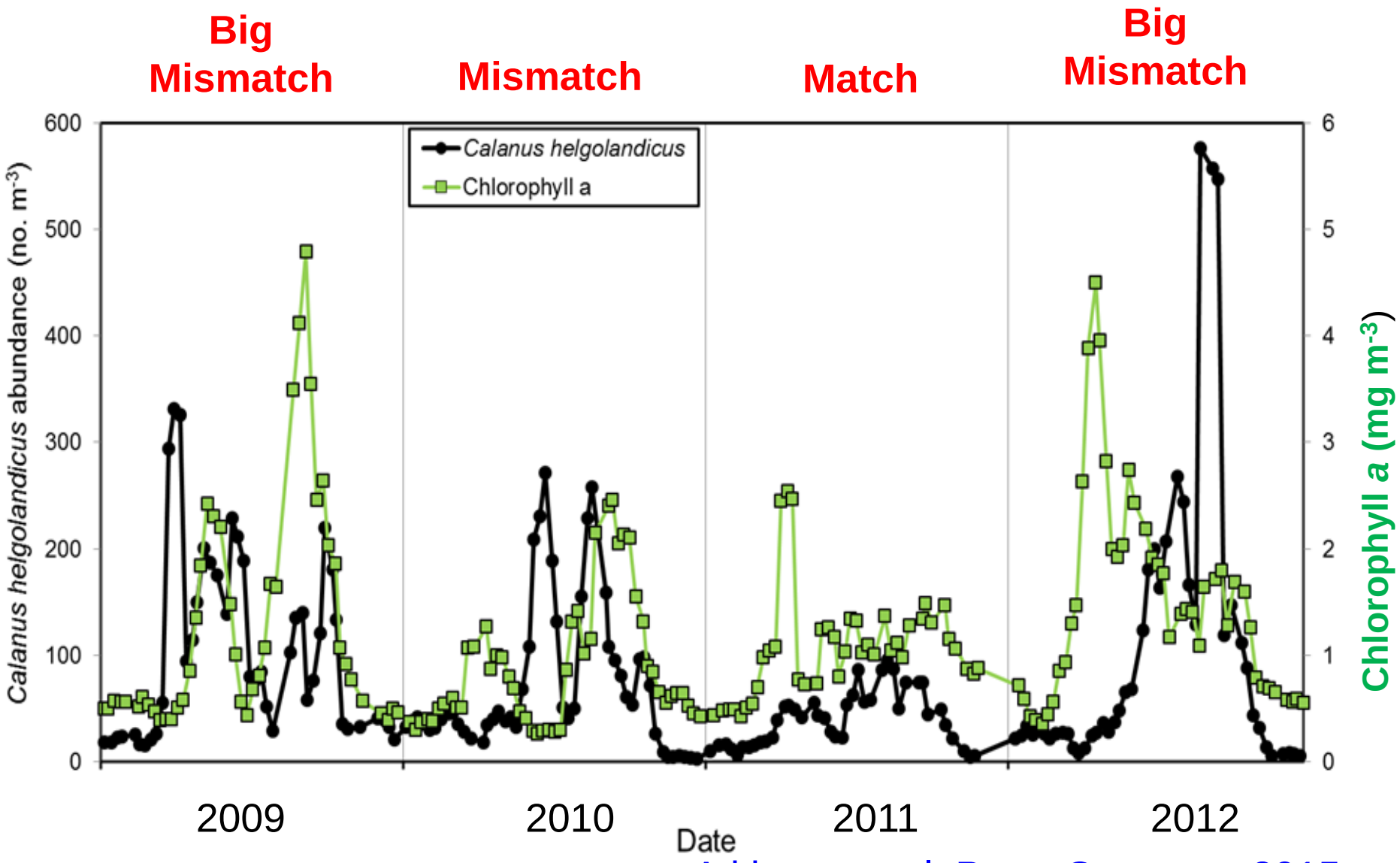


# 2. Size-based approaches to understand energy flow

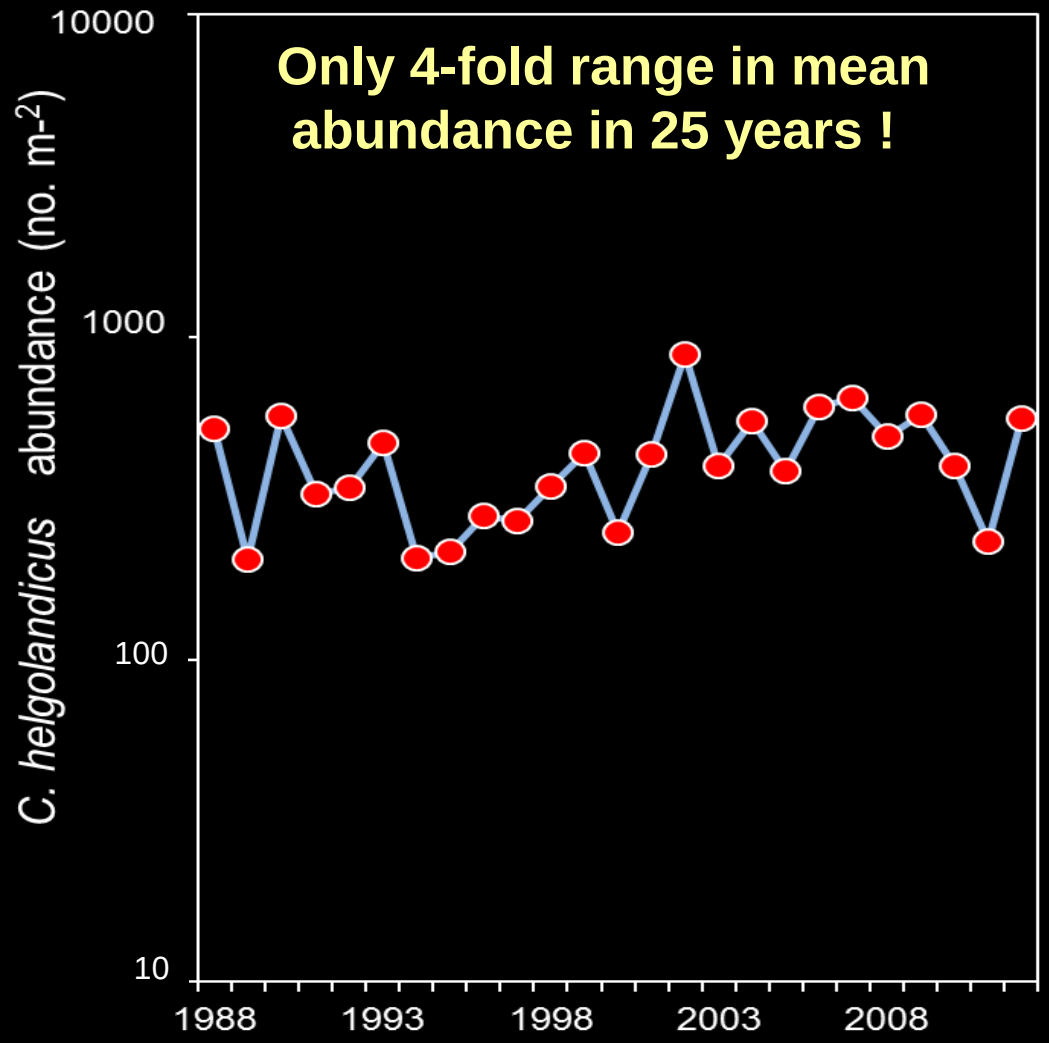
# 3. Phenology shifts and trophic mismatching

## Case study with *Calanus helgolandicus at Plymouth L4*

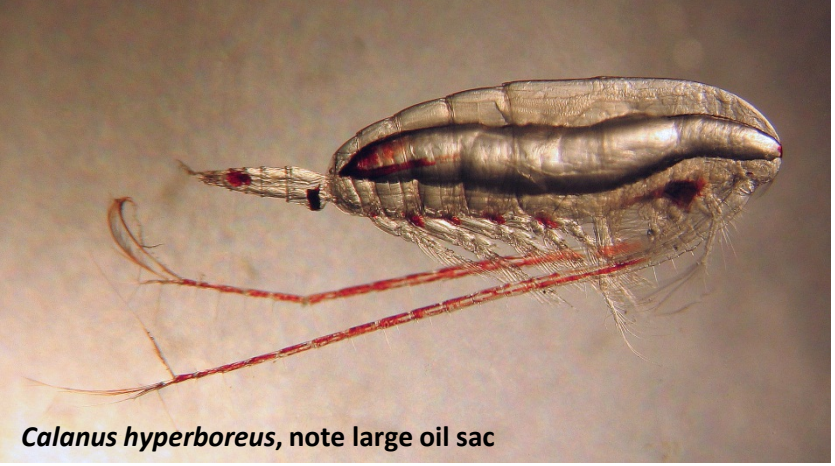



Atkinson et al. Progr Oceanogr 2015

# *Mortality constrains* Calanus *populations at L4*
# *Bottom up factors may increase with Latitude??*



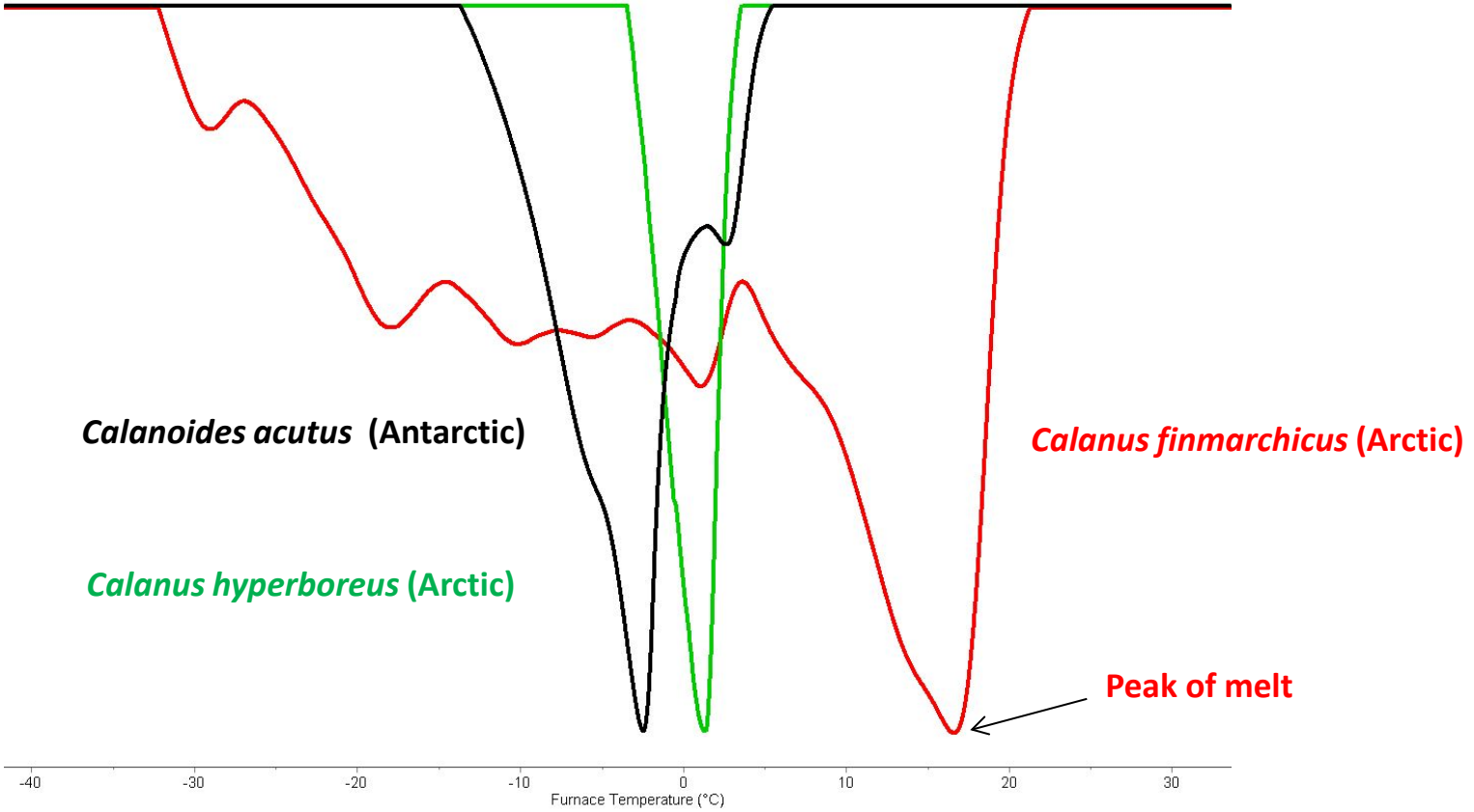

***Pond et al. (MEPS1996)***
***Hirst et al. (MEPS2007)***
***Maud et al (P iO 2015)***



***Calanus hyperboreus*, note large oil sac**

## Diapause behaviour of Arctic calanoid copepods and how this will be impacted by a changing Arctic

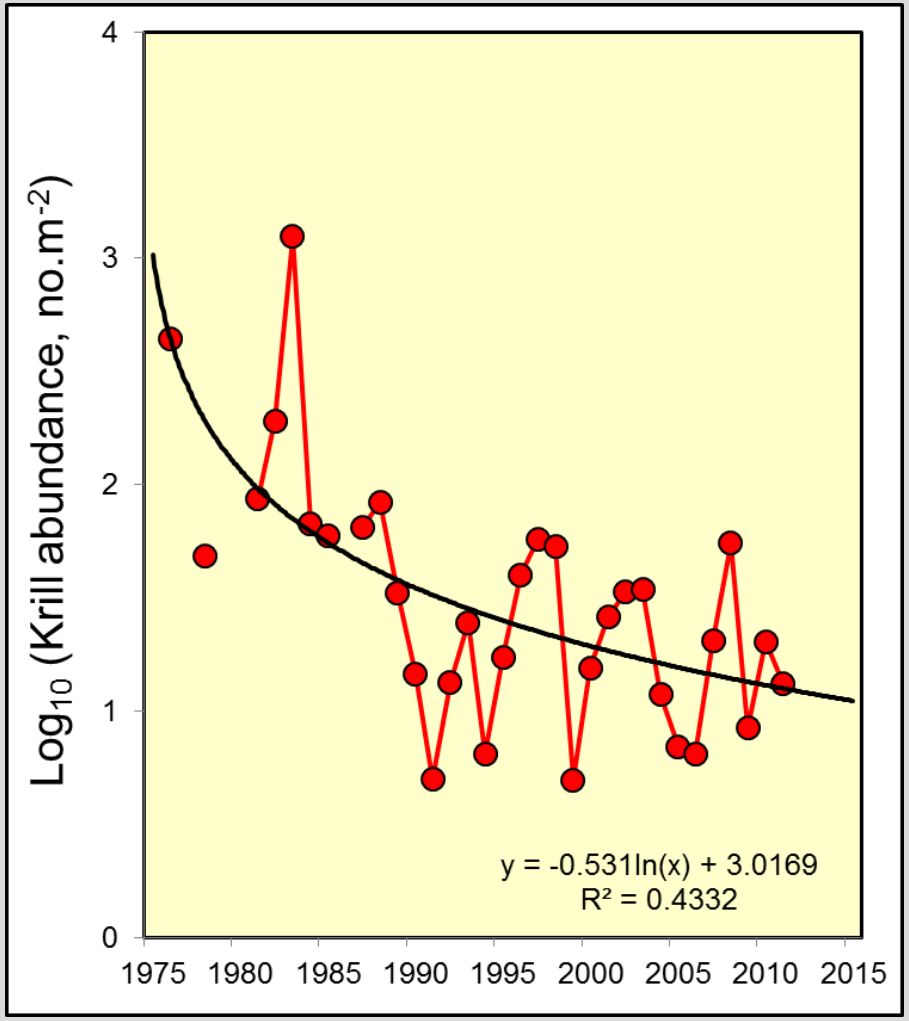
Role of solid liquid phase transitions of lipids in regulating buoyancy of diapausing copepods and the crucial relationships with diatom derived lipids.

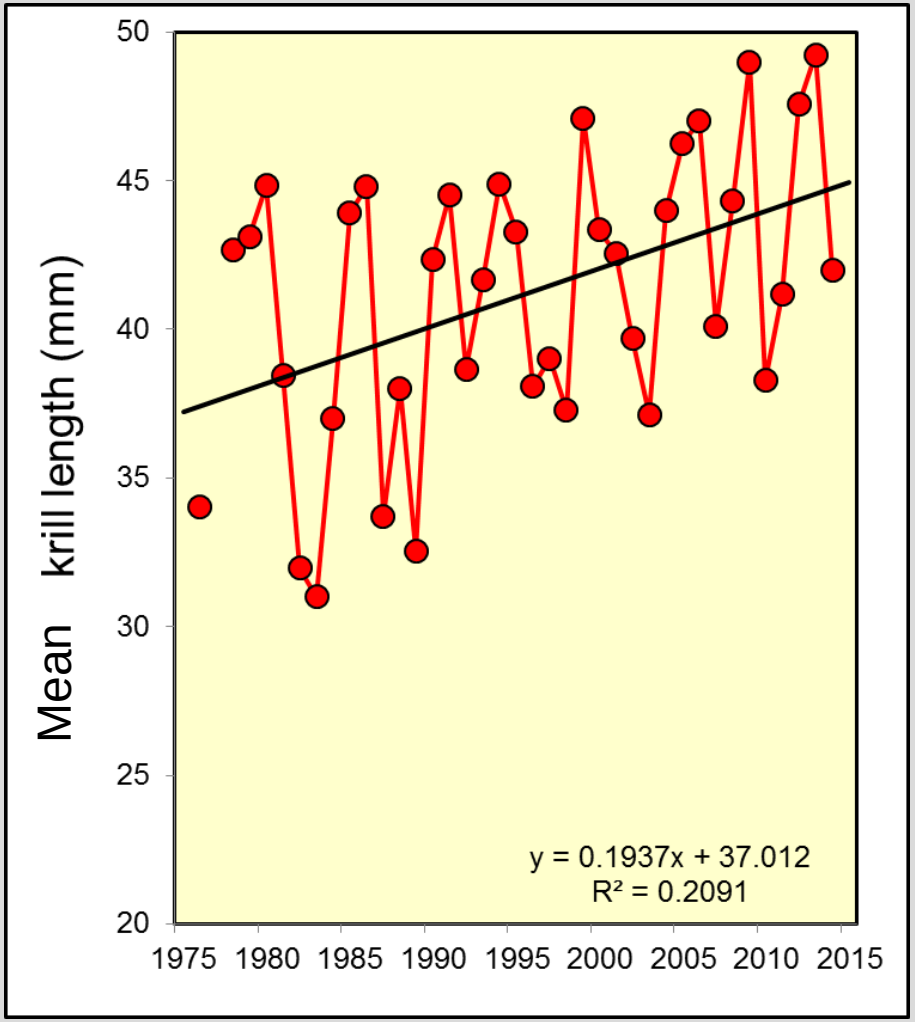



Pond DW, Tarling GA. (2011). Phase transitions of wax esters adjust buoyancy in diapausing *Calanoides acutus*. Limnology and Oceanography. 56: 1310-1318.

# KRILLBASE

## LONG time series of *Euphausia superba* data




Updated from Atkinson et al. Nature 2004

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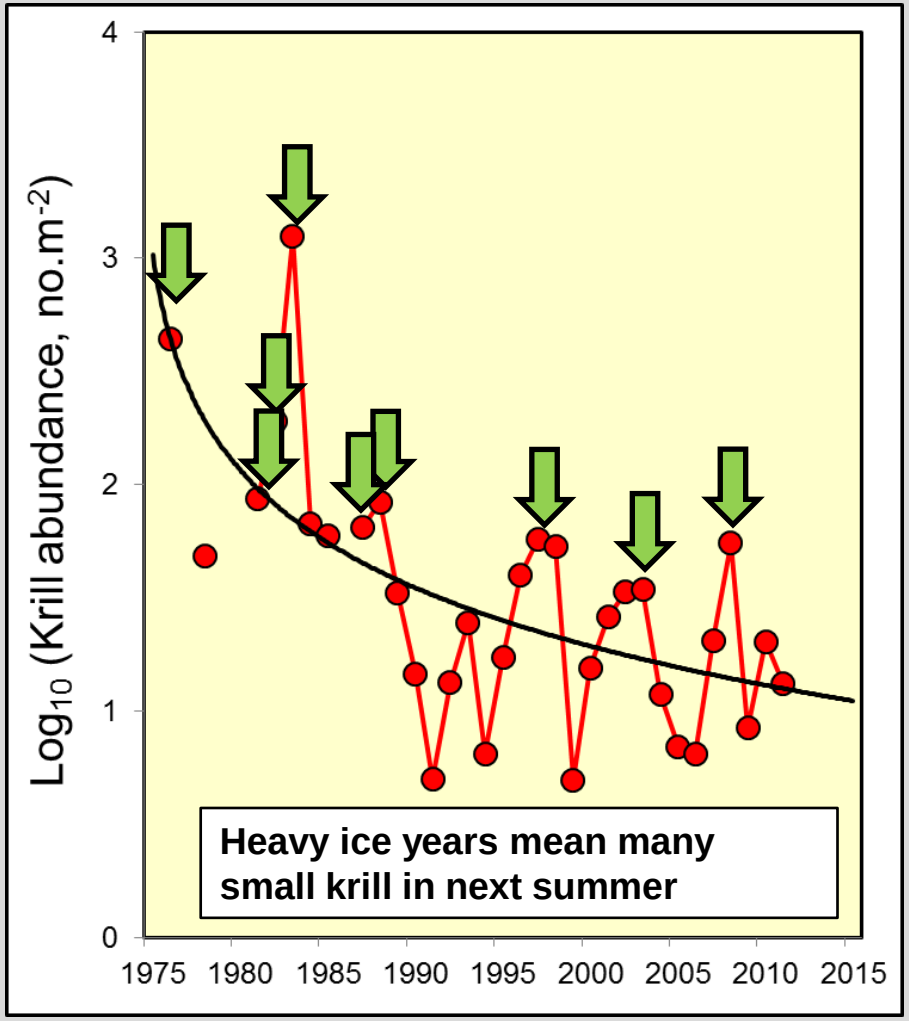
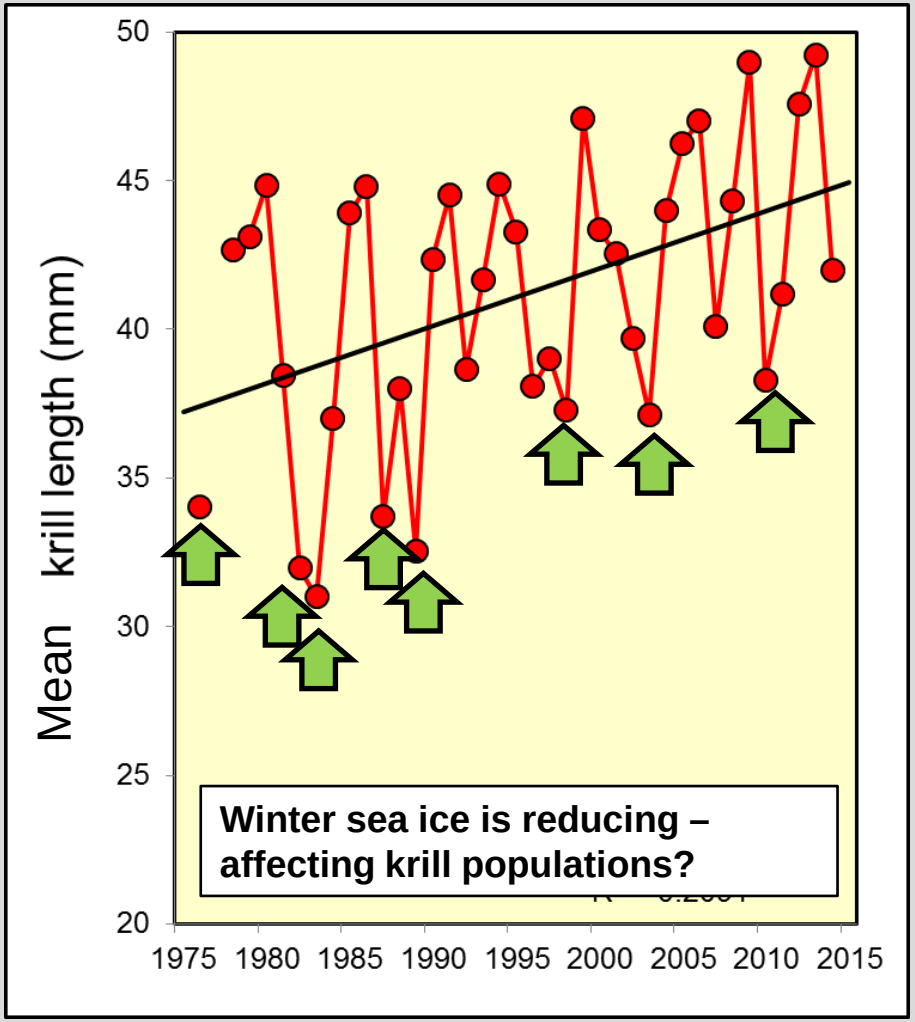
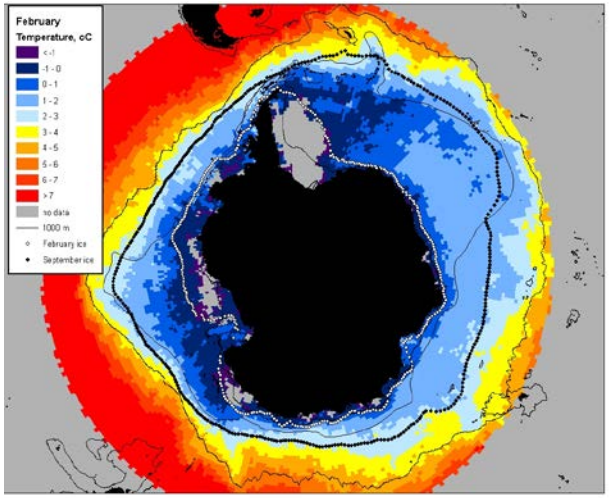
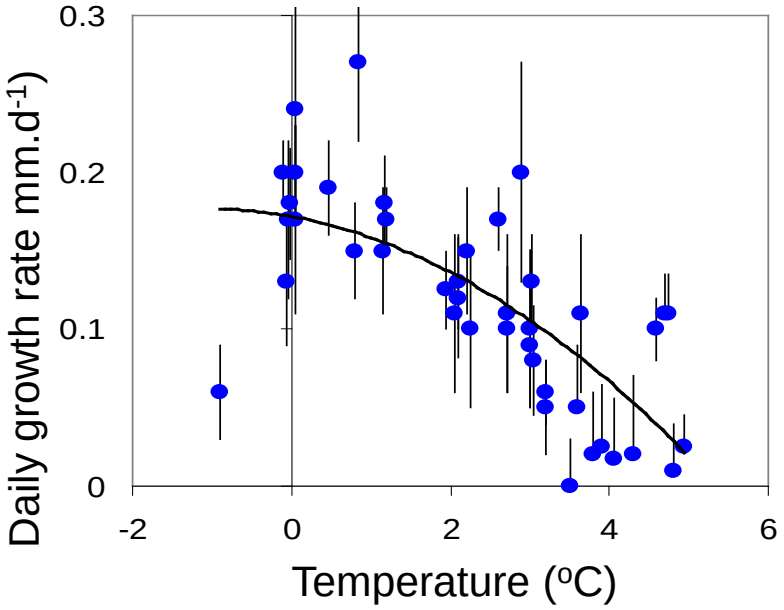


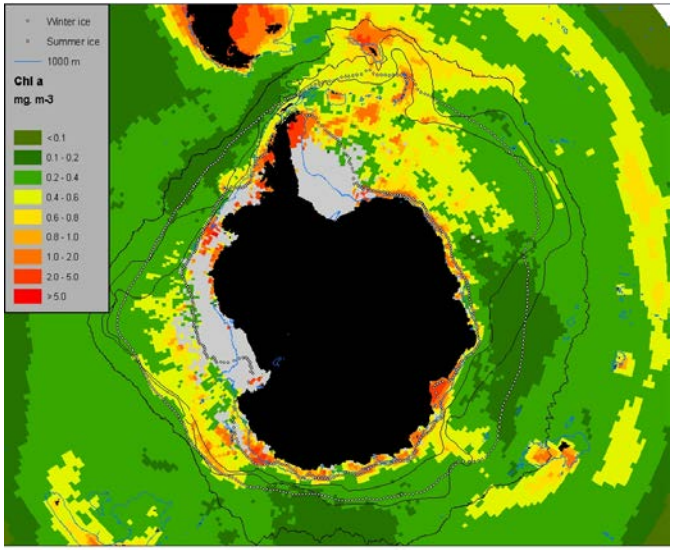

Updated from Atkinson et al. Nature 2004

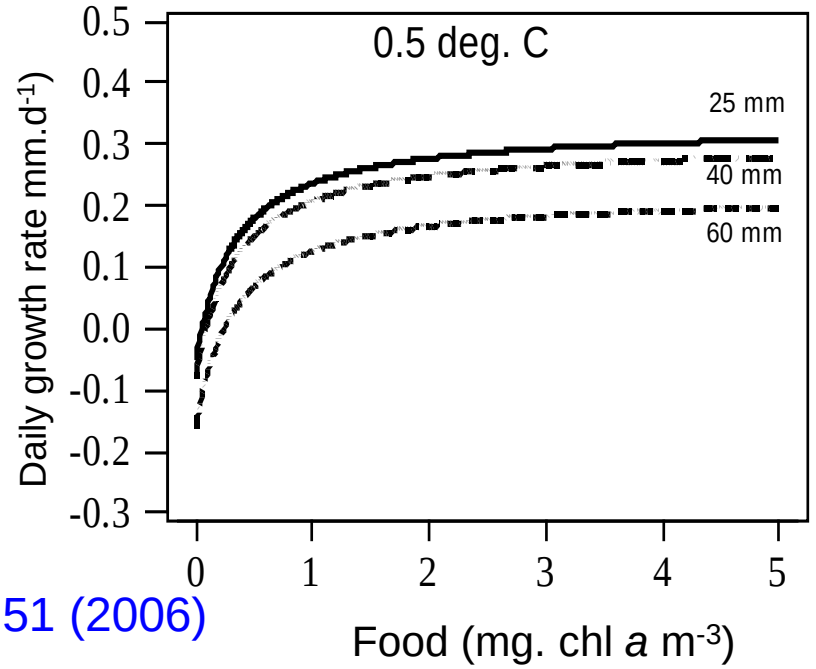
# 4: Projecting future habitat suitability




Temperature

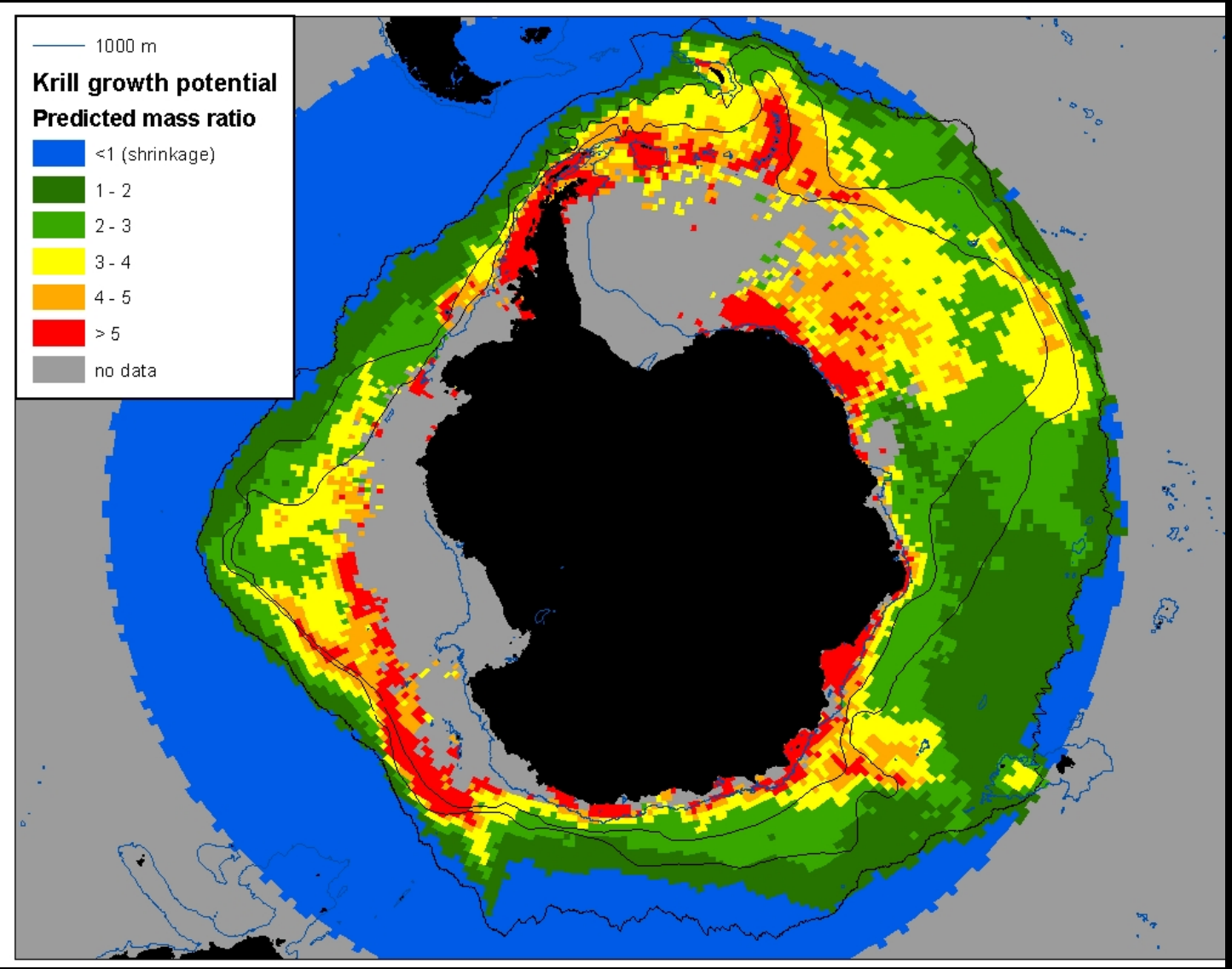



Food

Atkinson et al. Limnol Oceanogr 51 (2006)

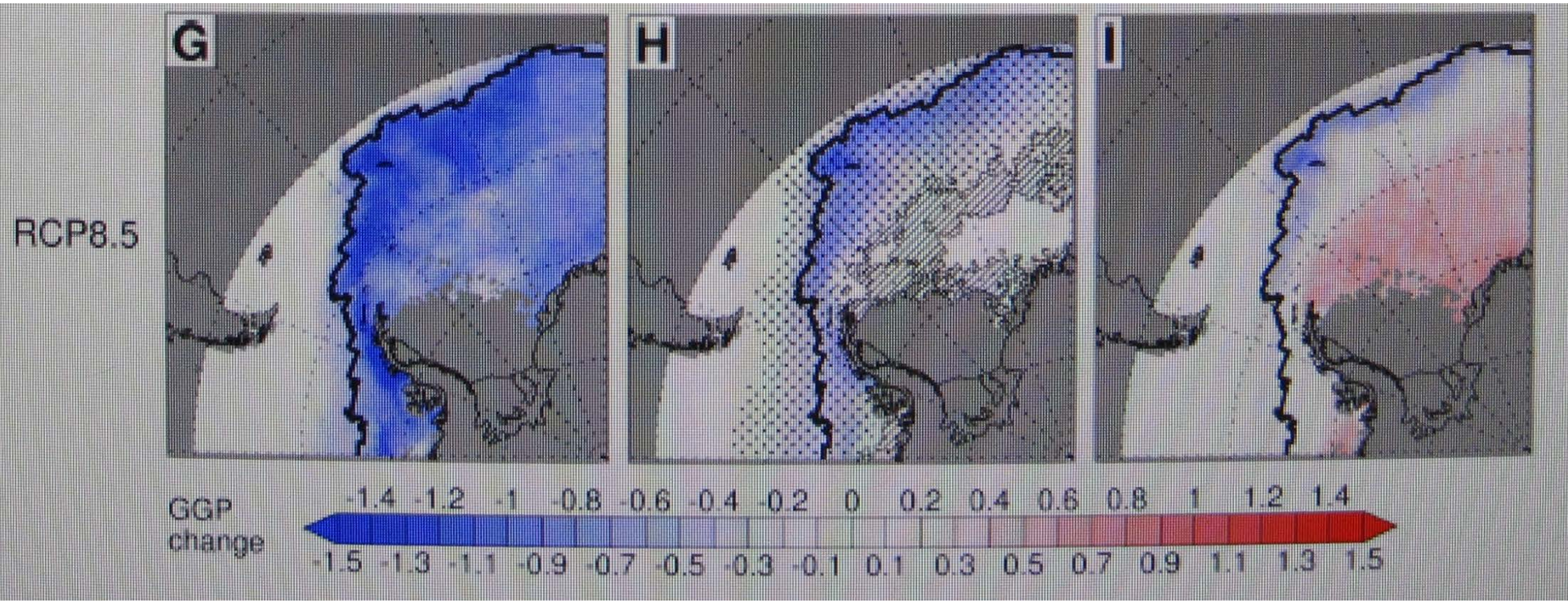
# Mapping “good growth habitat”: present day




Atkinson et al. MEPS (2008)

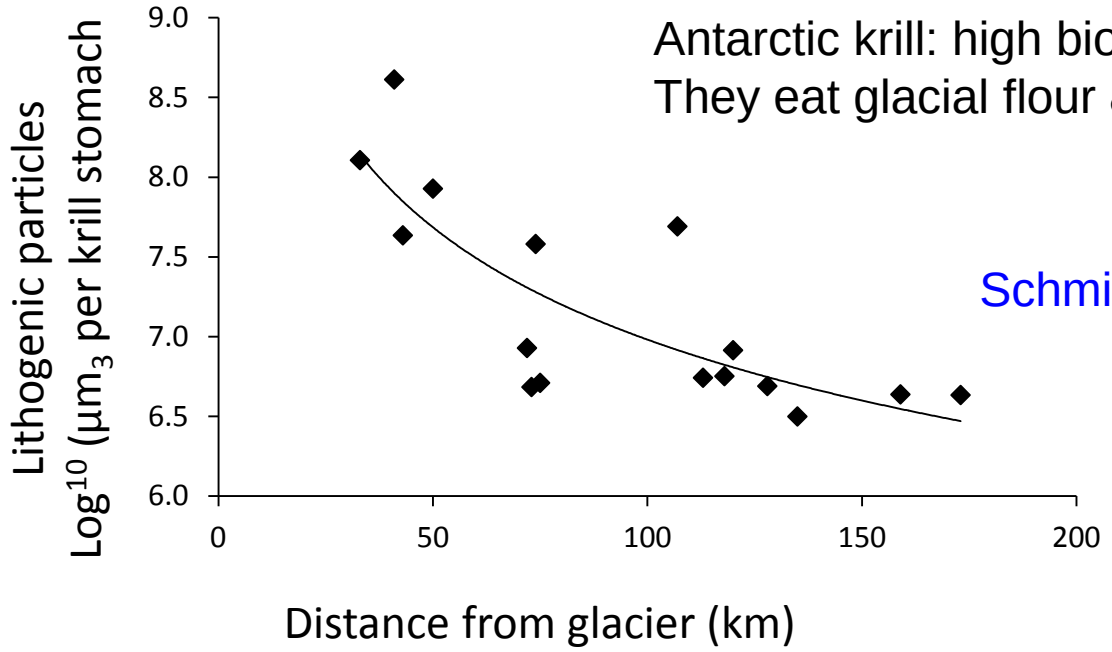
# Modelling potential habitat suitability in a warming world

Observed food - 50% | Observed food | Observed food + 50%




Hill et al. PLoS ONE (2013)

# 5. How do zooplankton modify biogeochemical cycling ?




Antarctic krill: high biomass, migratory
They eat glacial flour & seabed detritus

Schmidt et al. L&O 2011

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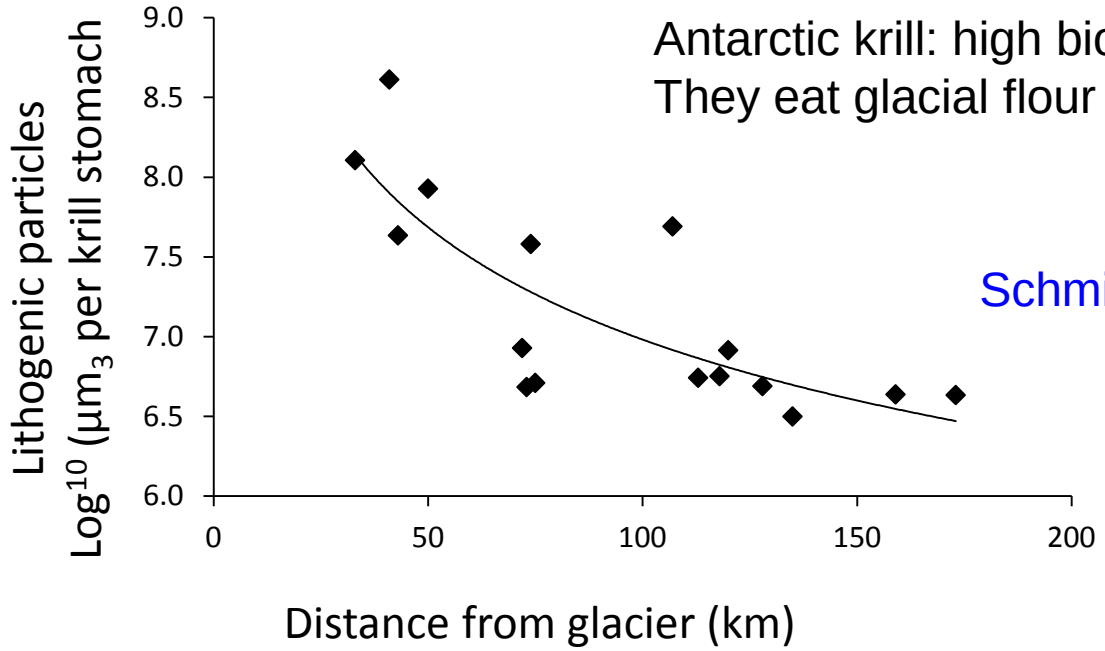


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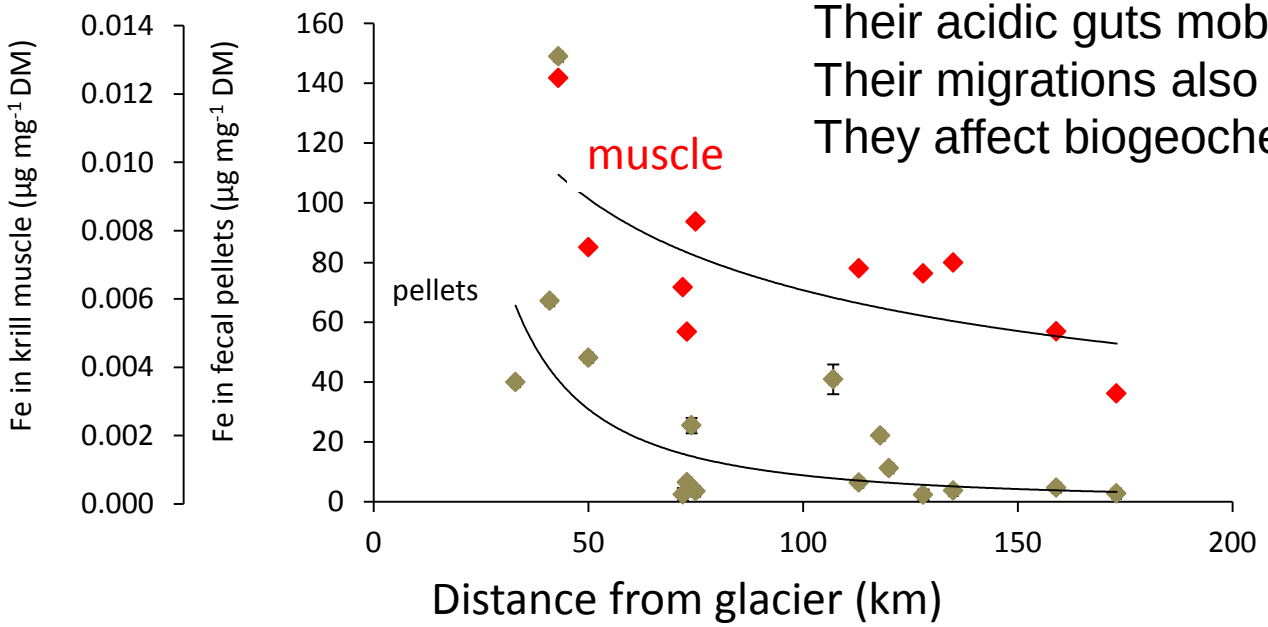


Their acidic guts mobilise iron
Their migrations also redistribute nutrients
They affect biogeochemical cycling

Schmidt, Atkinson
Schlosser, Fielding
et al. submitted