Coastal zooplankton communities of high and low production regions in the NE Pacific

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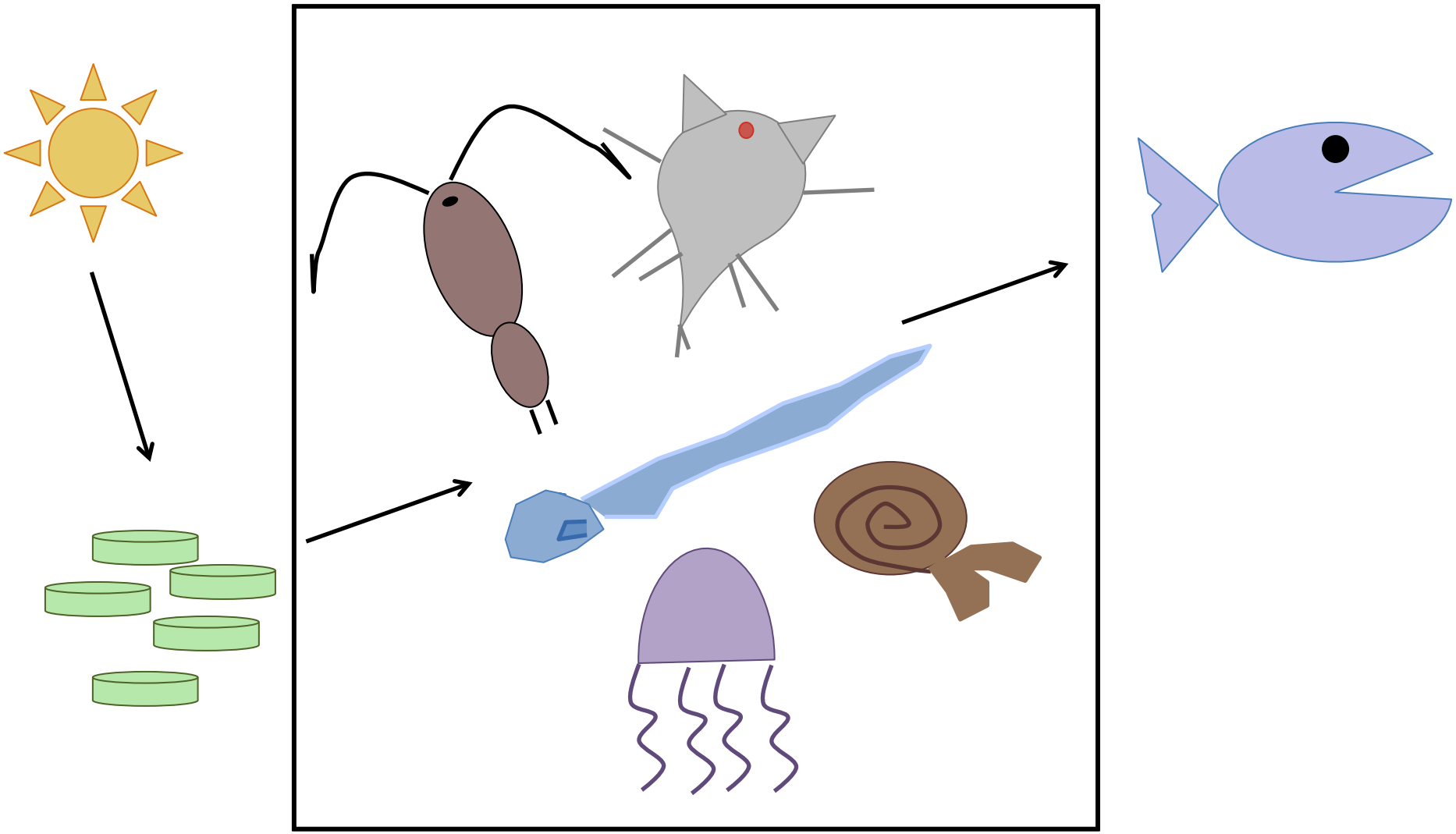
Zooplankton as a critical link

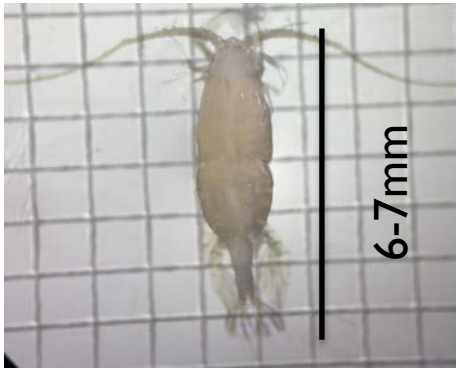


Microscopy gives us important information

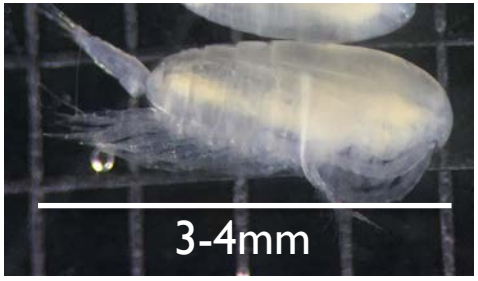
- Abundance, biomass & size
- Functional types
  - Function of food web
  - Energetic content
- Indicators
  - Warm & cold water
  - Energetic content

Herbivore, no DVM, broadcast spawning

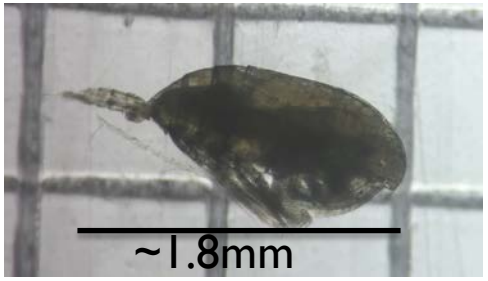
Carnivore, DVM, egg-brooding sac



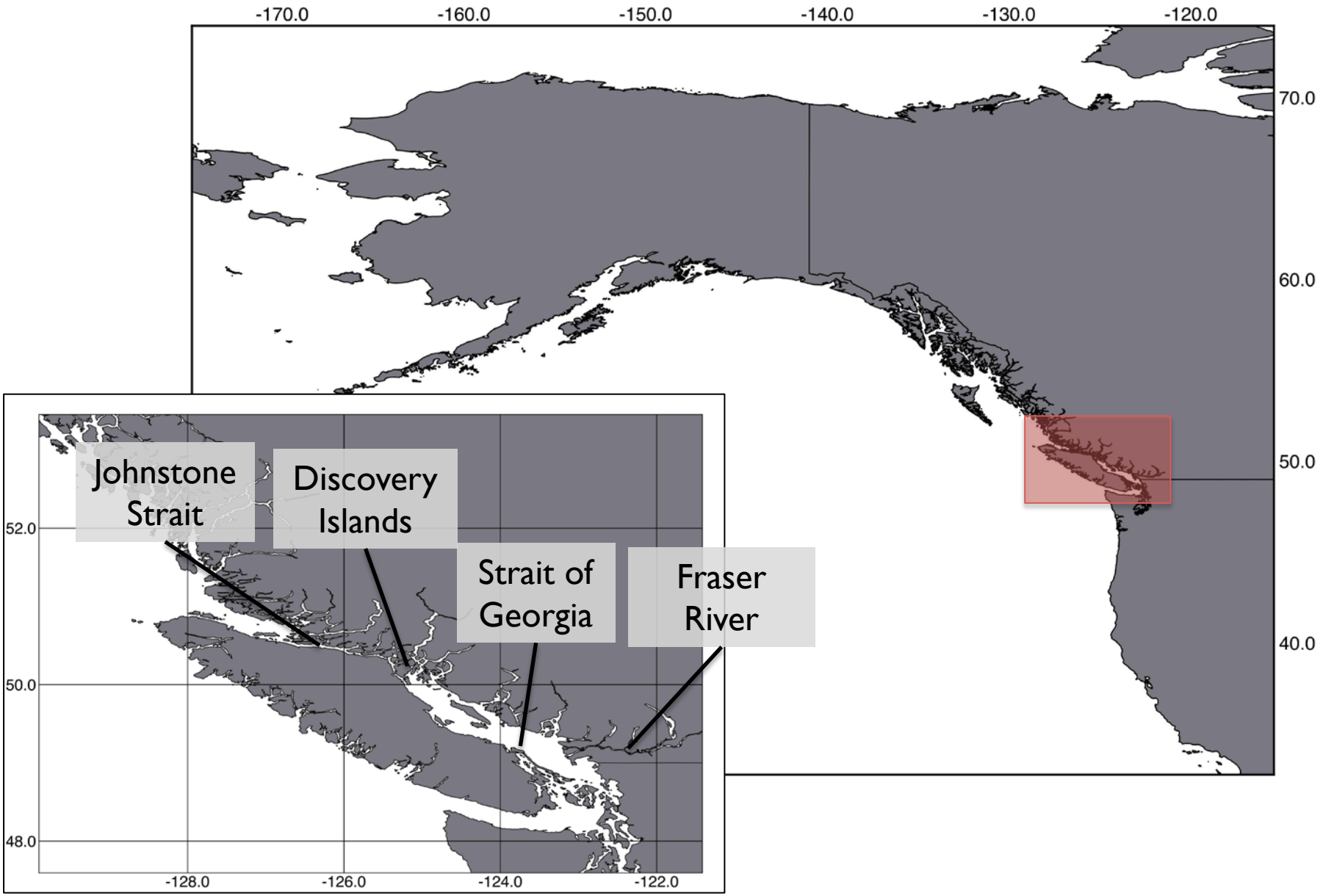
Cold water assemblage



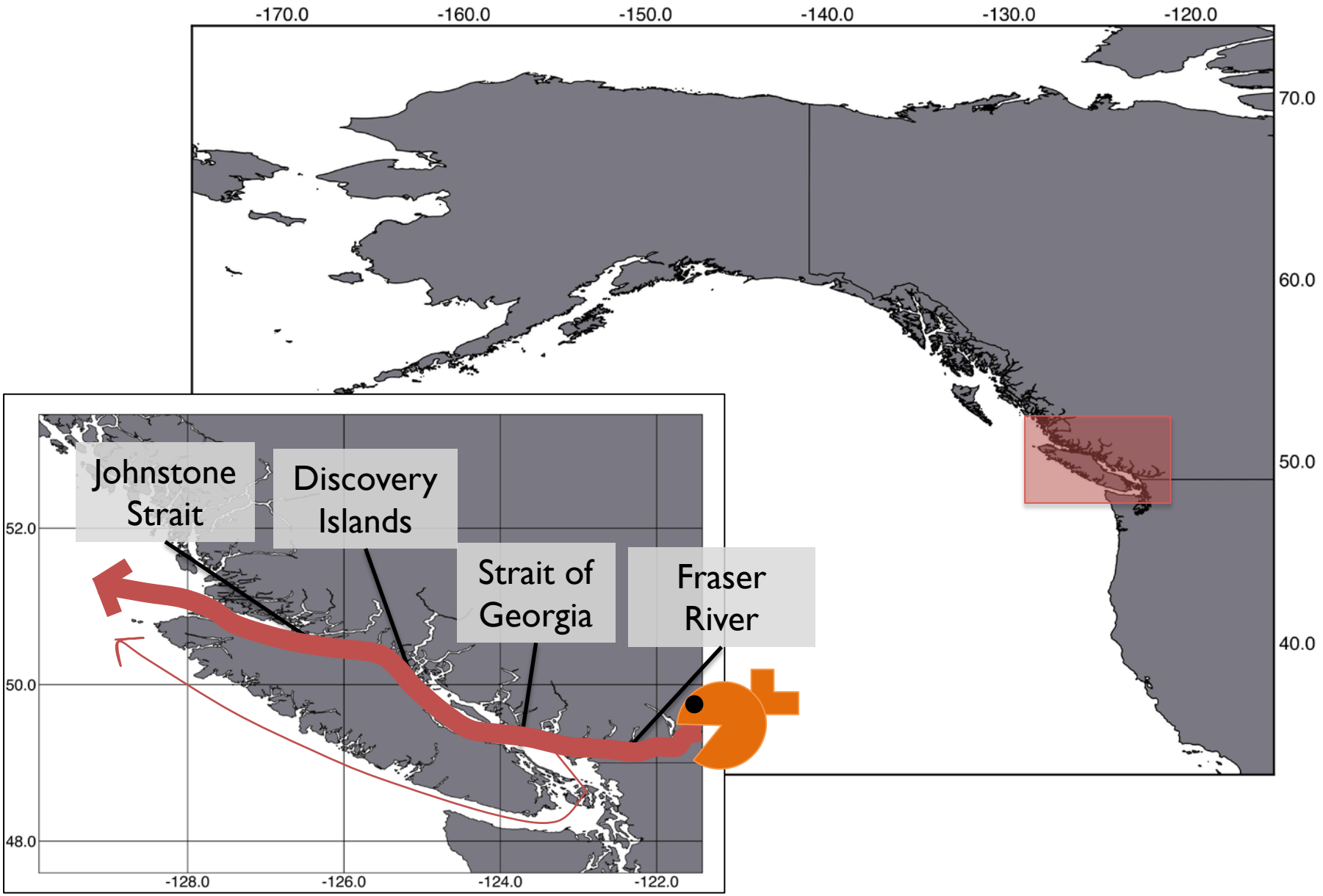
Warm water assemblage



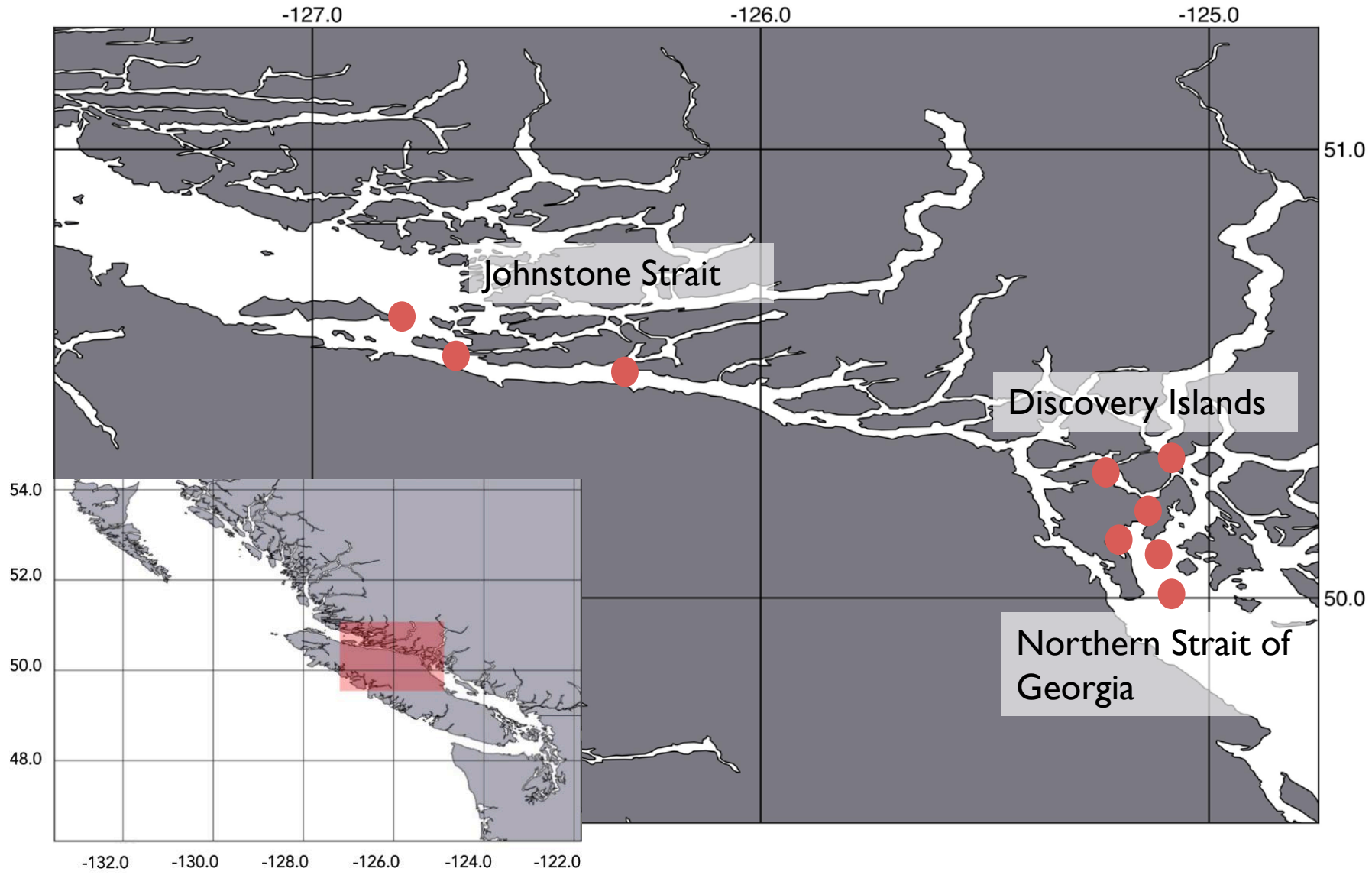
Coastal NE Pacific



Coastal NE Pacific



Discovery Islands / Johnstone Strait



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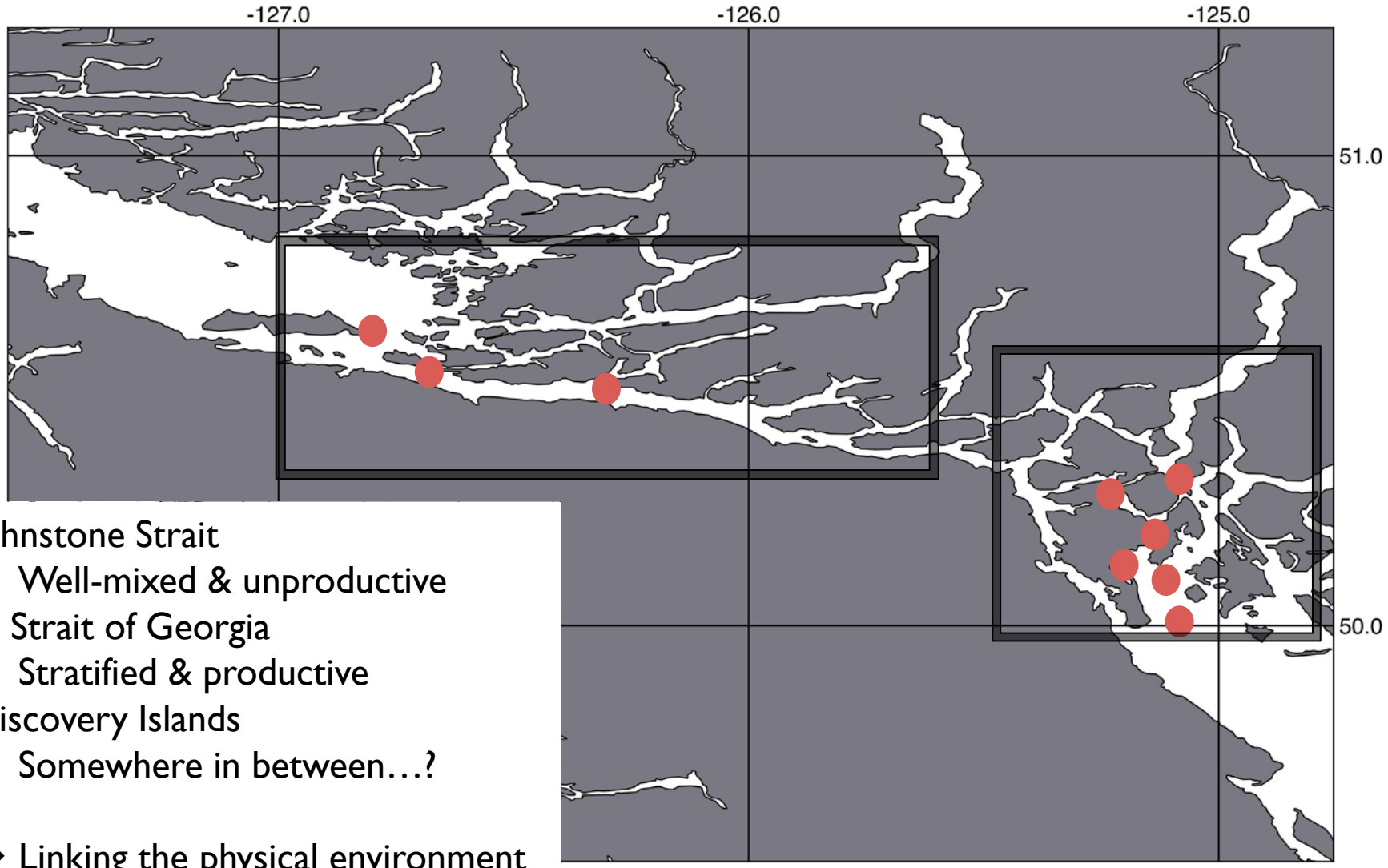


Johnstone Strait
- Well-mixed & unproductive

N Strait of Georgia
- Stratified & productive

Discovery Islands
- Somewhere in between…?

→ Linking the physical environment to higher trophic levels

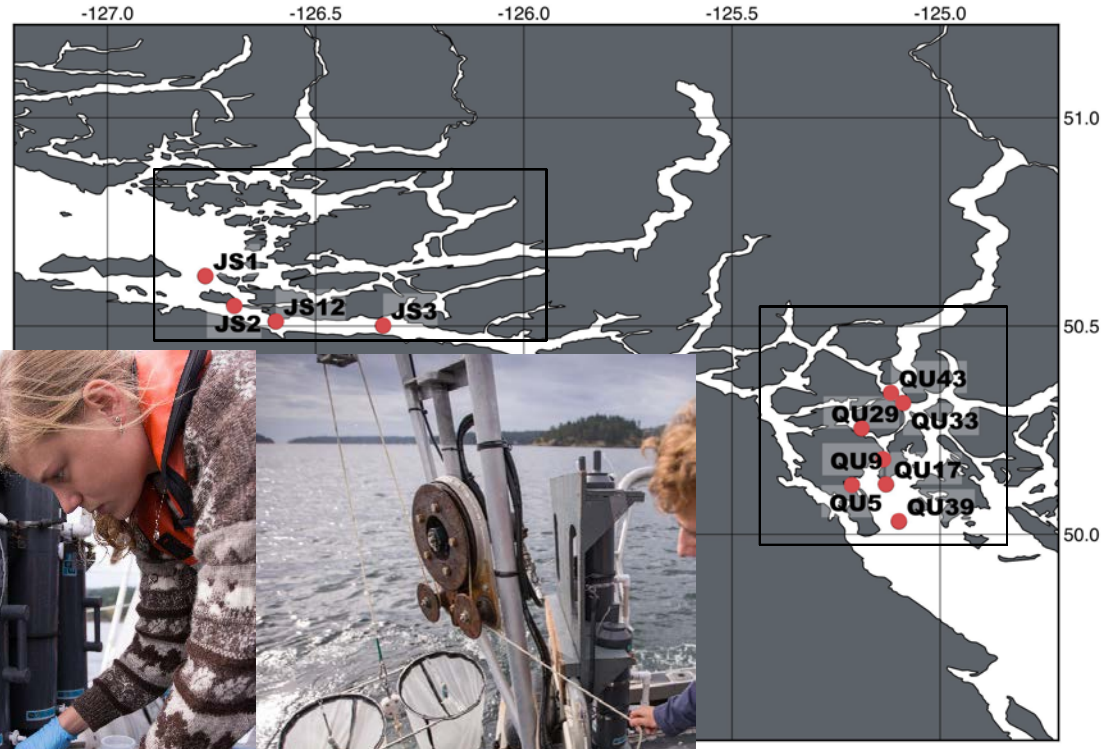
Research Aims

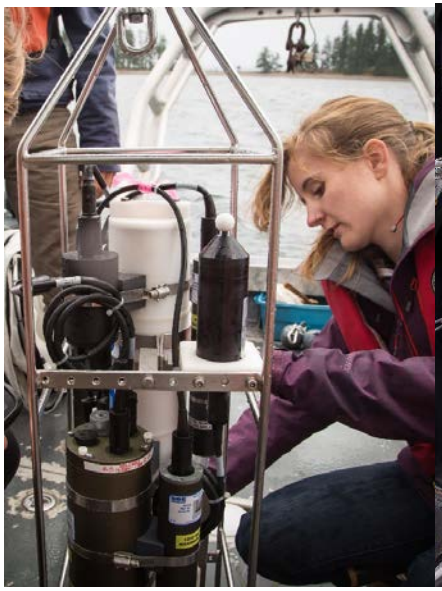
1. Does the level of mixing affect productivity across these regions?

1. What implications does this have for the zooplankton communities?

Methods

Oceanographic sampling
- 2015 (– 2016)
- April – July
- Sampling every 5-14 days



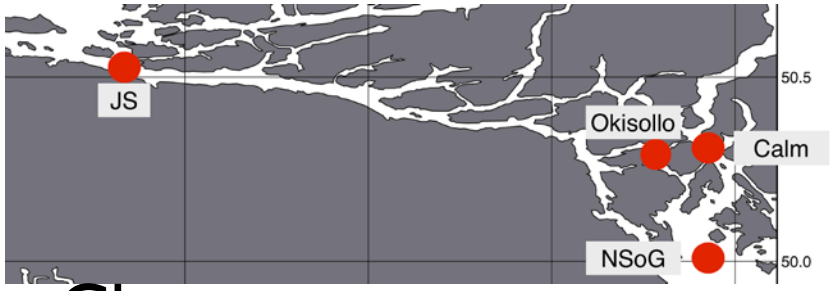


Temp, Salinity, Turbidity, PAR

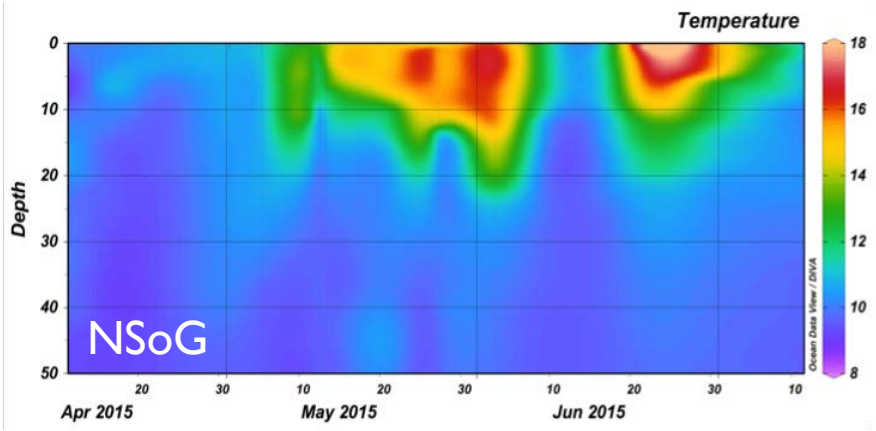
Nutrients, Phytopl, Microbes

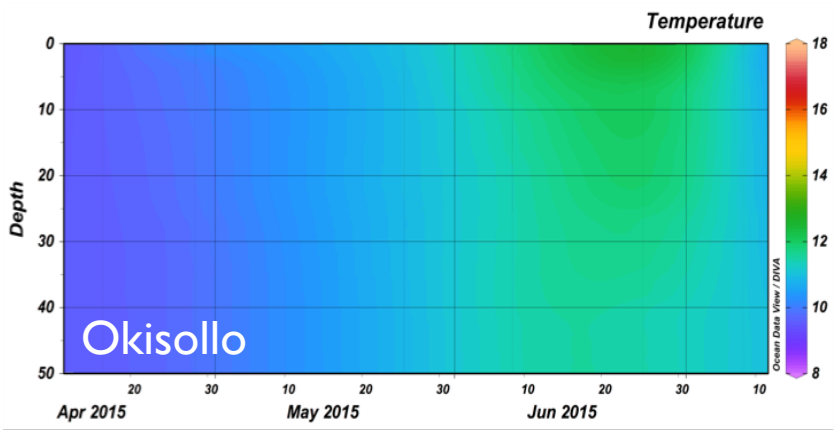
Zoopl. (250µm bongo net, full water column tows)

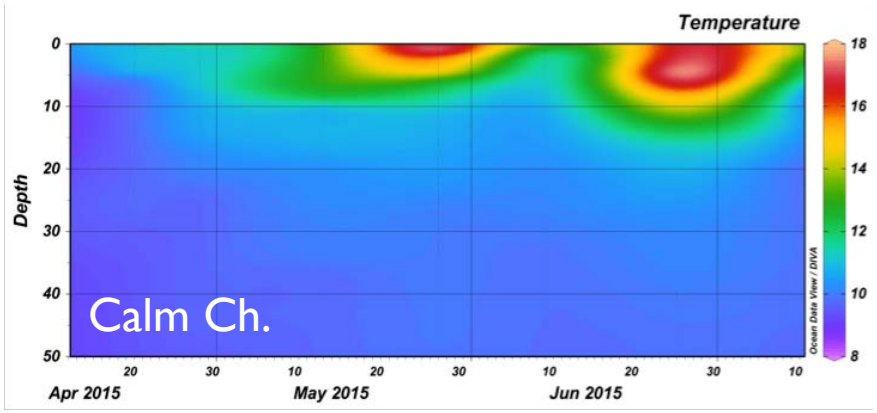
Temperature (°C)

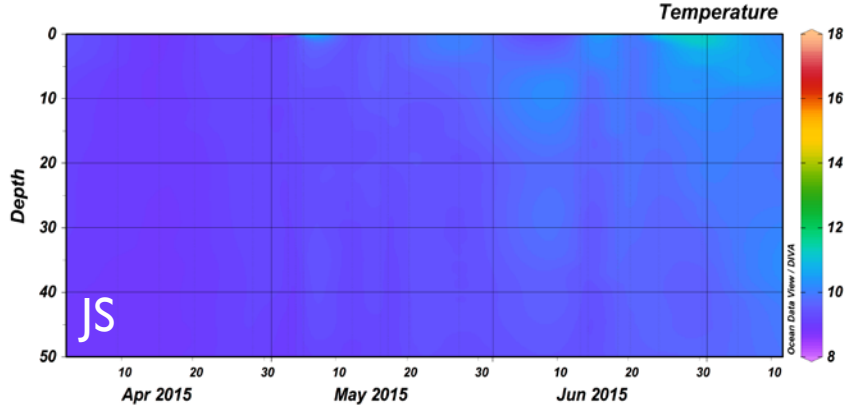


- Stratification at NSoG & Calm Ch.
- Intense mixing in JS & Okisollo

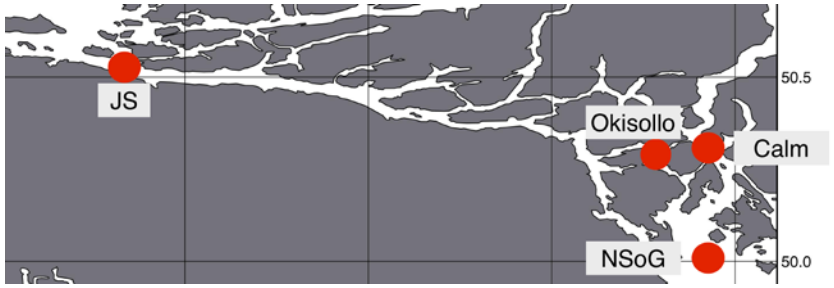




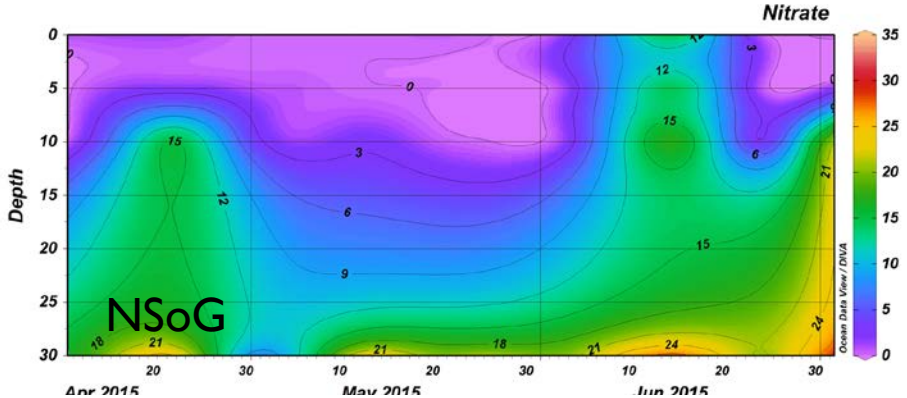


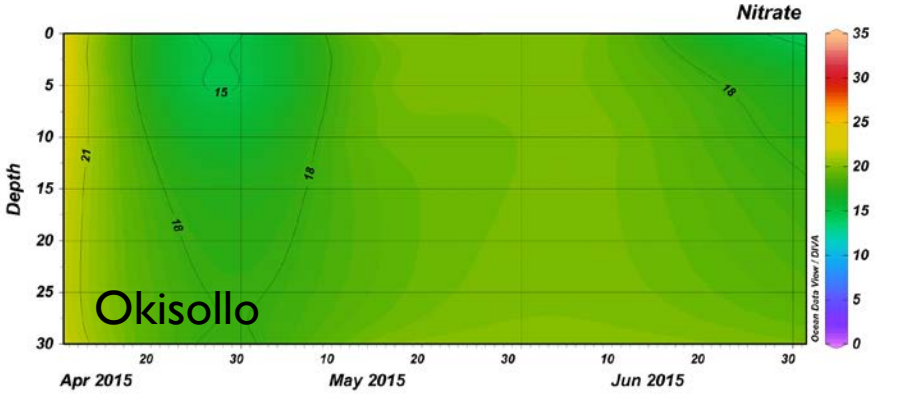


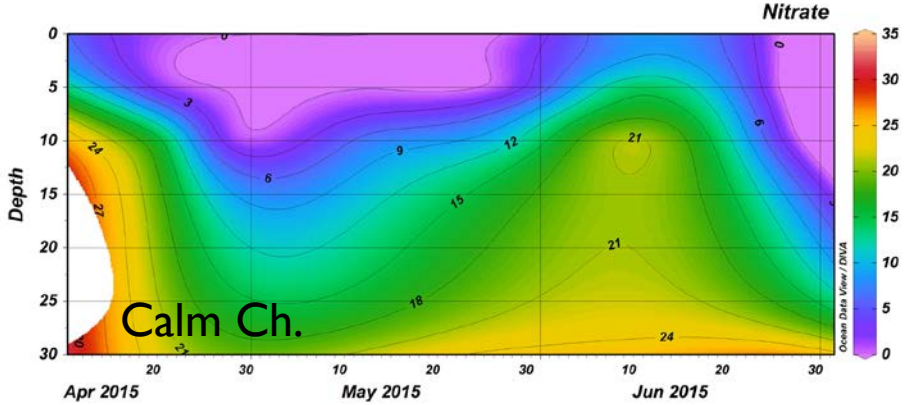
Nutrients ($NO_3^-+NO_2$, μM)

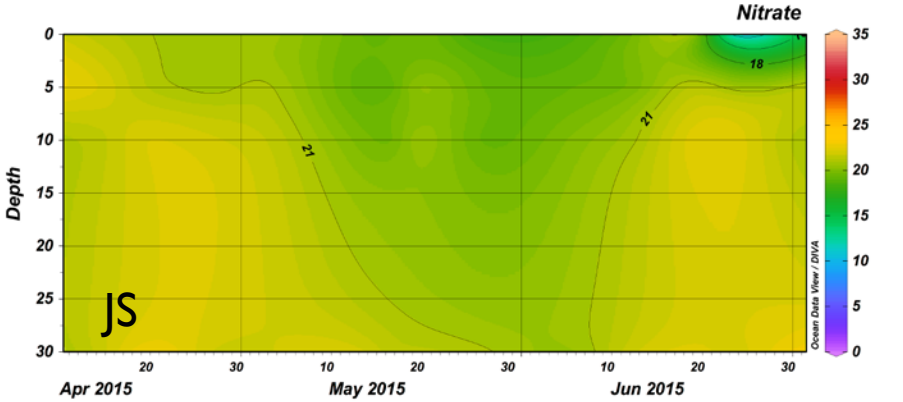


- Intense nitrate drawdown in stratified stations
- Non-limiting nutrient levels in well-mixed stations

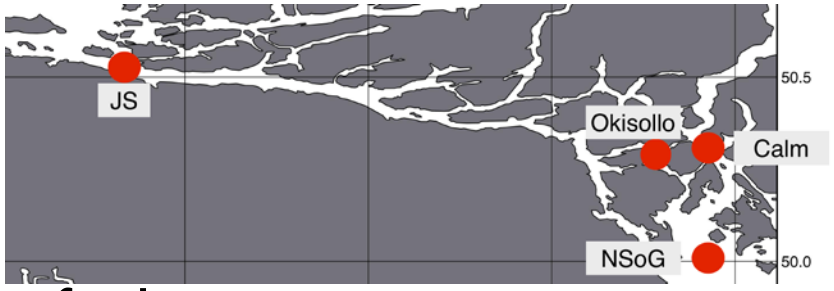




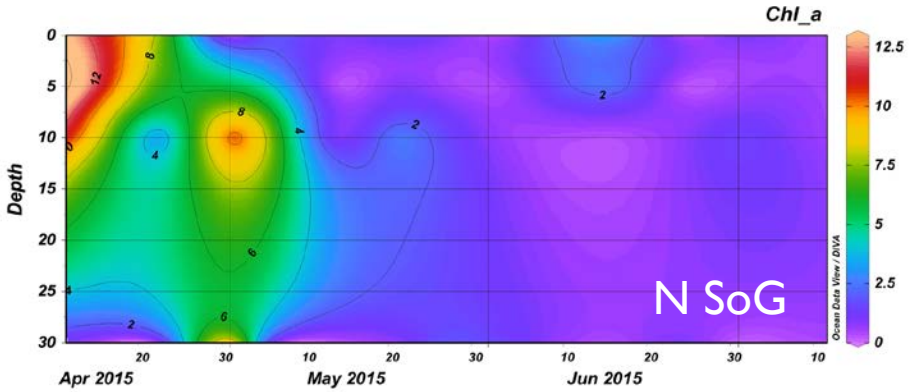


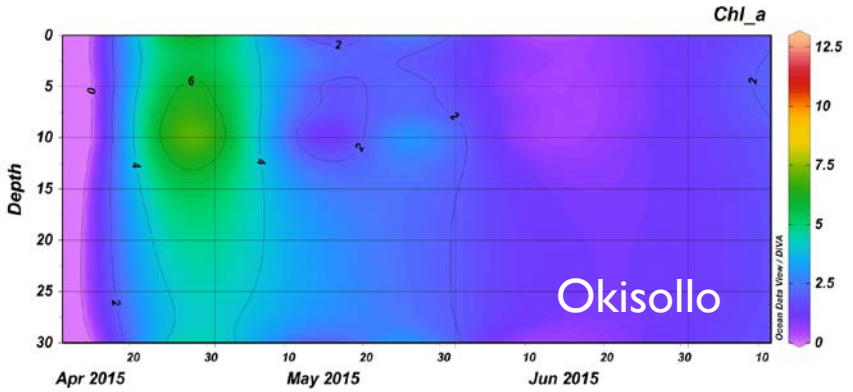


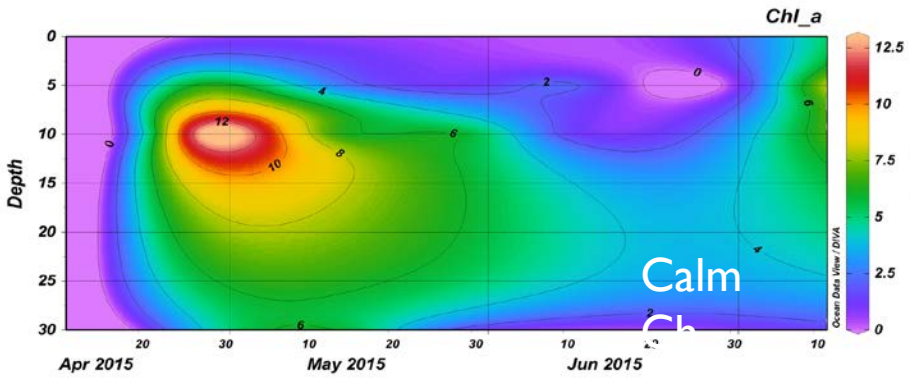
Chlorophyll *a* (µg/L)

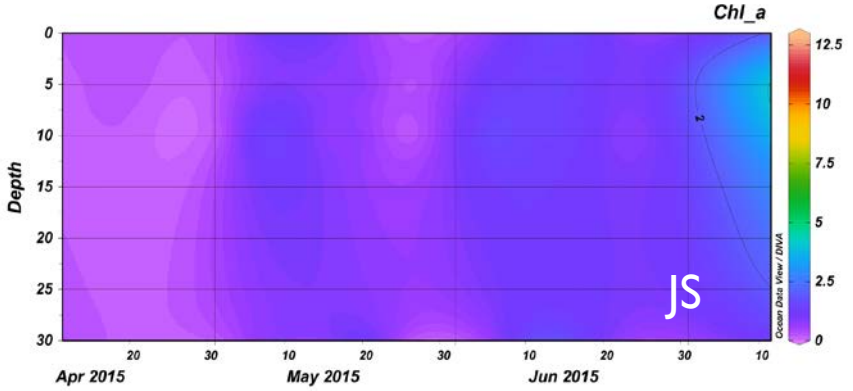


- Blooms during early spring in stratified stations
- Low chl*a* concentrations throughout season in mixed stations; small bloom in Okisollo

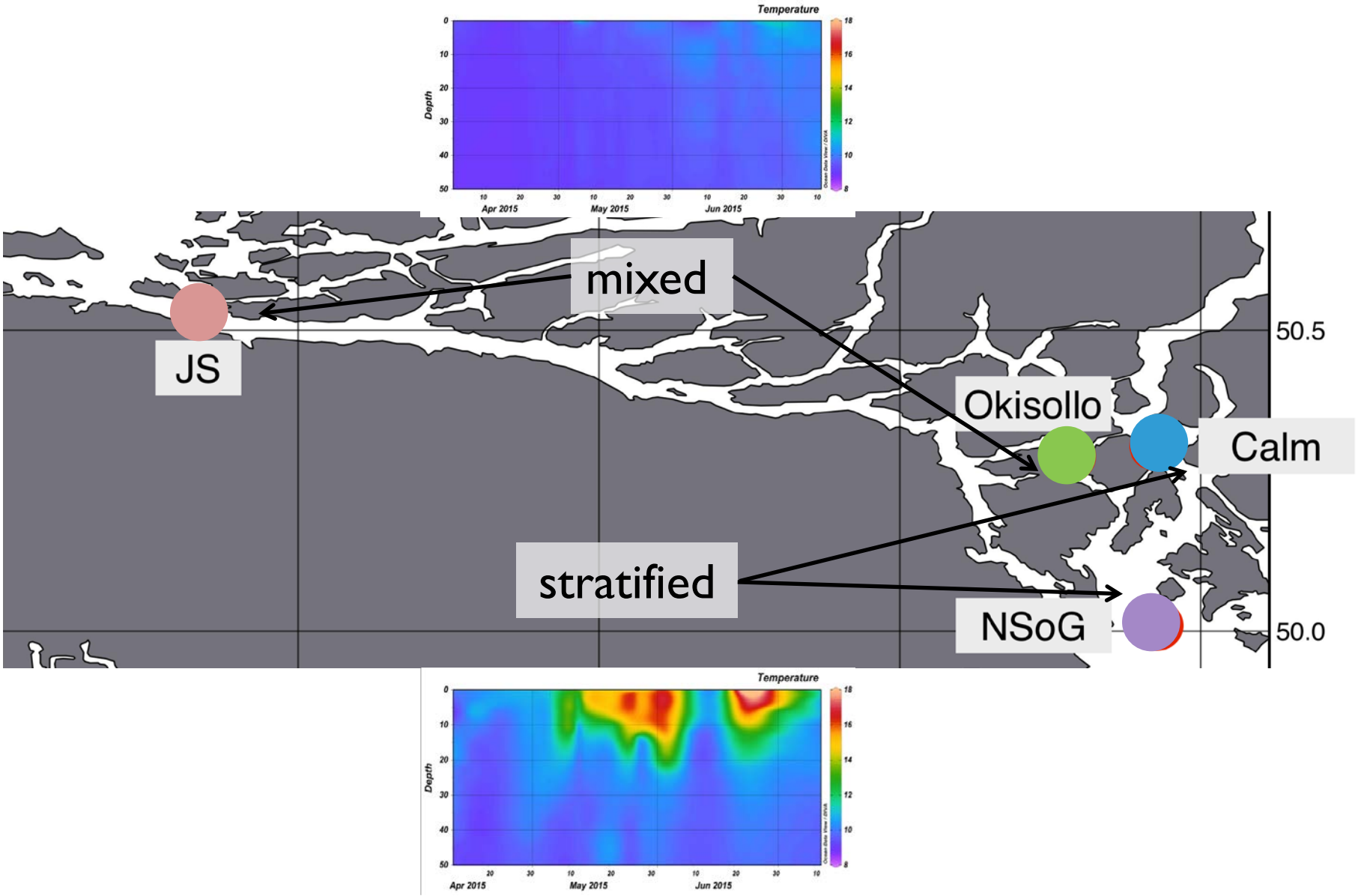




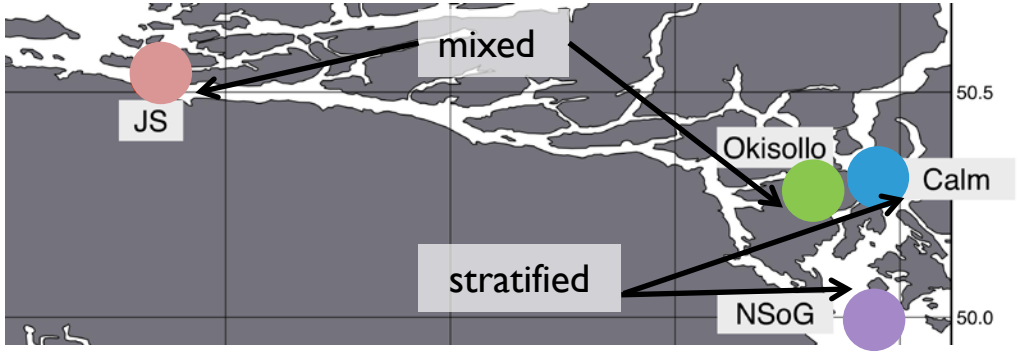


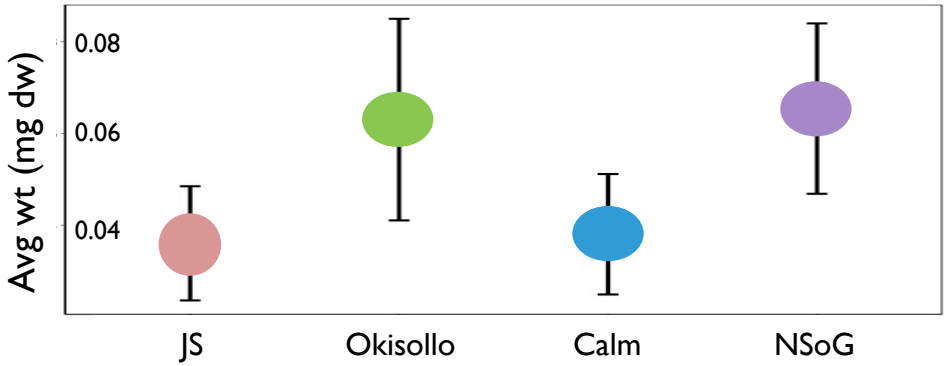


Characterizing the DIJS: stratified & well-mixed environments

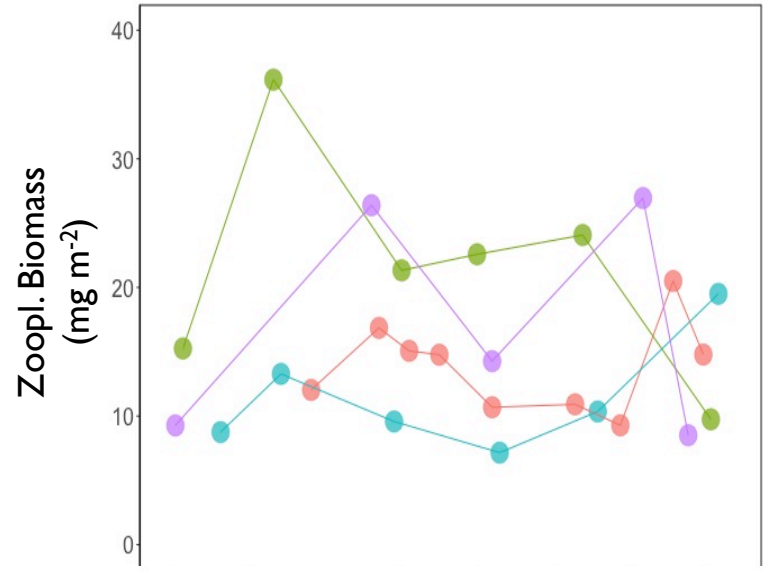


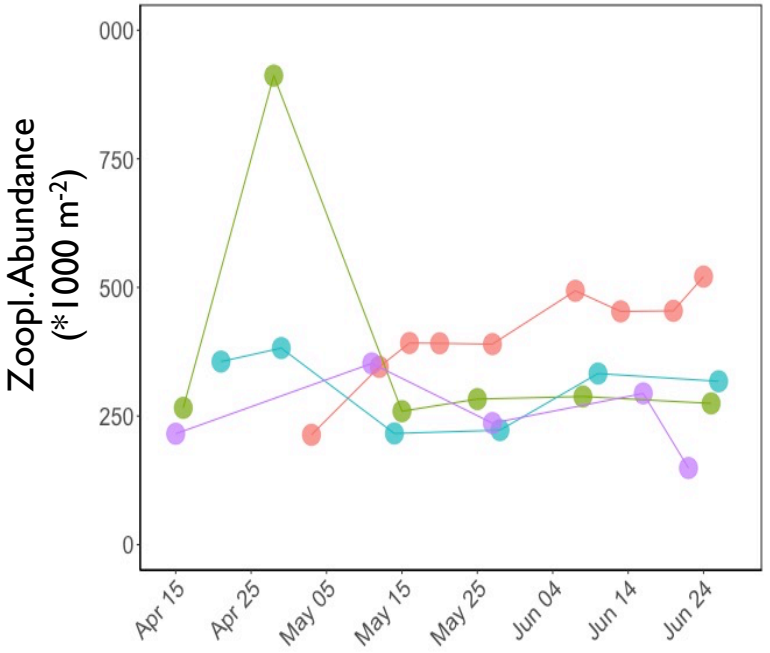
Level of mixing does not appear to determine avg zoopl. size, biomass, & abundance





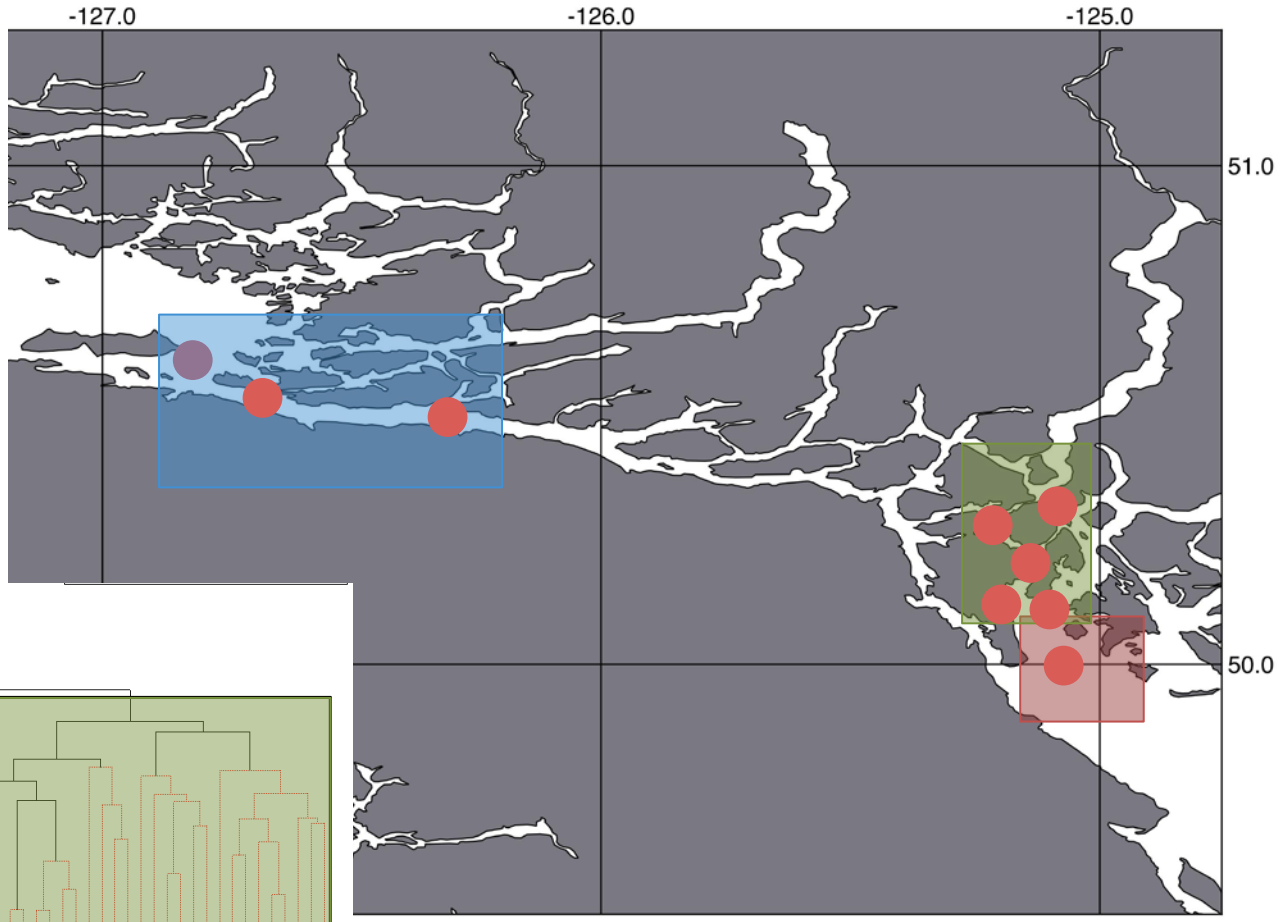
- moderate biomass & abundance, larger size
- lower biomass, building abundance, smaller size
- lower biomass & abundance, smaller size
- higher biomass, high peak abundance, larger size

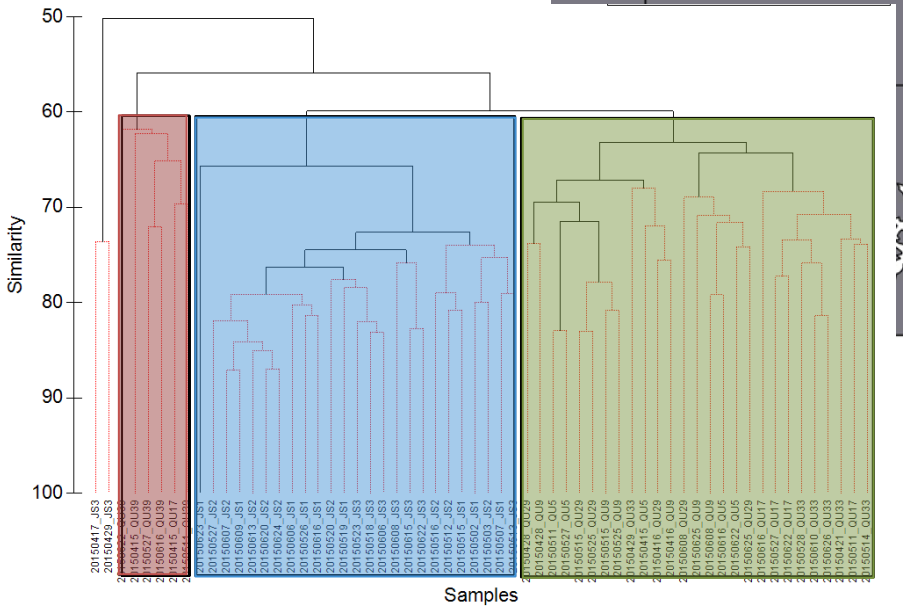




Cluster analysis – 3 main groupings

- N Strait of Georgia
- Johnstone Strait
- Discovery Islands





- Log-transformation
- Bray-Curtis similarity matrix
- Group-average linkage

SIMPER analysis: species contributing to >50% similarity within clusters

NSoG cluster	Abund (ind m^{-3})	DI cluster	Abund (ind m^{-3})	JS cluster	Abund (ind m^{-3})
Pseudocalanus	315	Pseudocalanus	297	Pseudocalanus	642
Euphauiid juv	128	Barnacles	578	Barnacles	147
Oithona	156	Euphausiid juv	295	Euphausiid juv	75
Metridia	75	Acartia	112	Acartia	49
Calanus	43	Oikopleura	174	Corycaeus	42
Ostracods	22	Corycaeus	174	Calanus	34
Oikopleura	61	Oithona	146		

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→ Differences in abundance drive stations to cluster together

Spp. richness & community composition

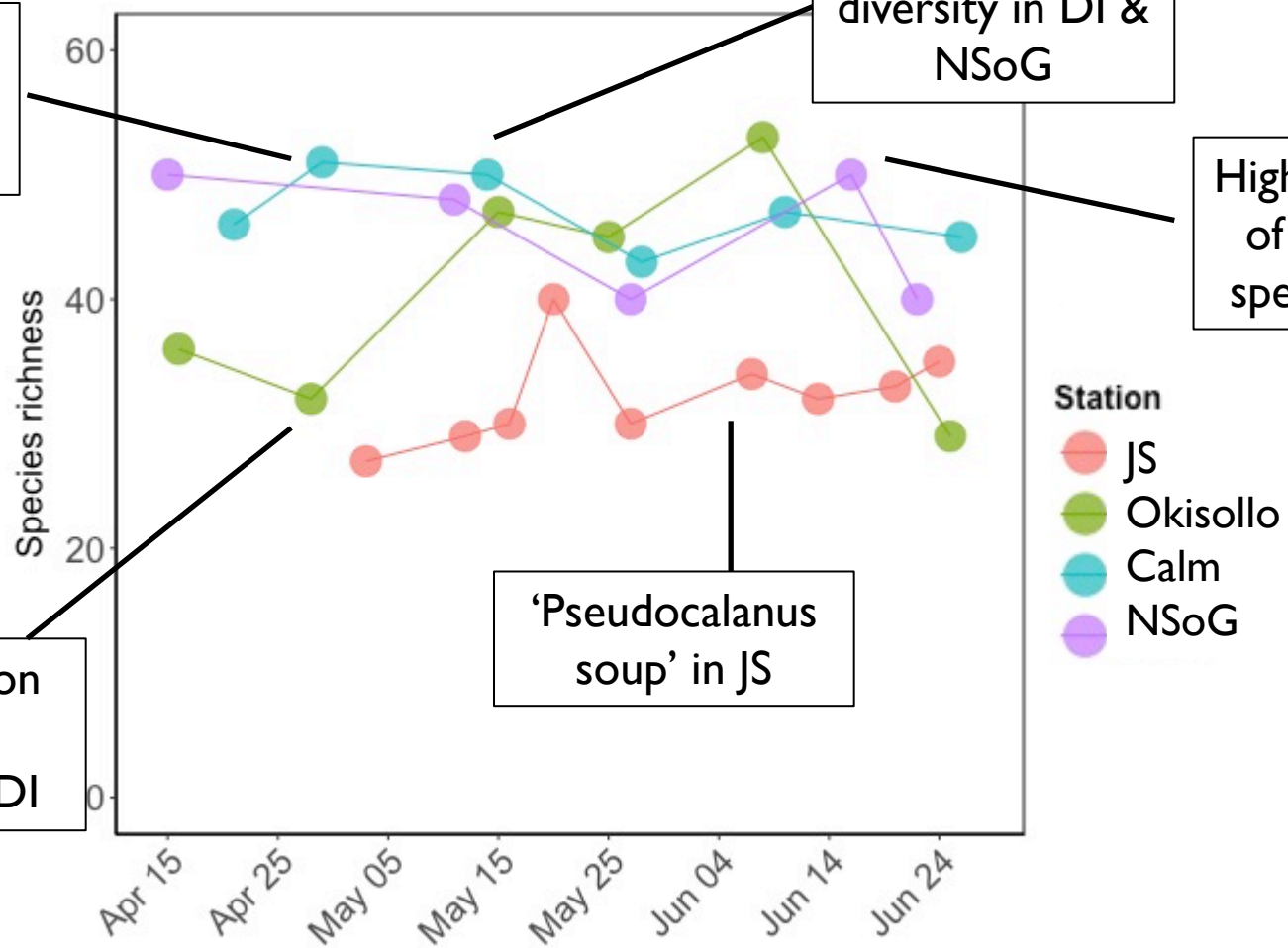
Relatively more jellies in DI

More spp. diversity in DI & NSoG

Higher prevalence of warm water species in NSoG

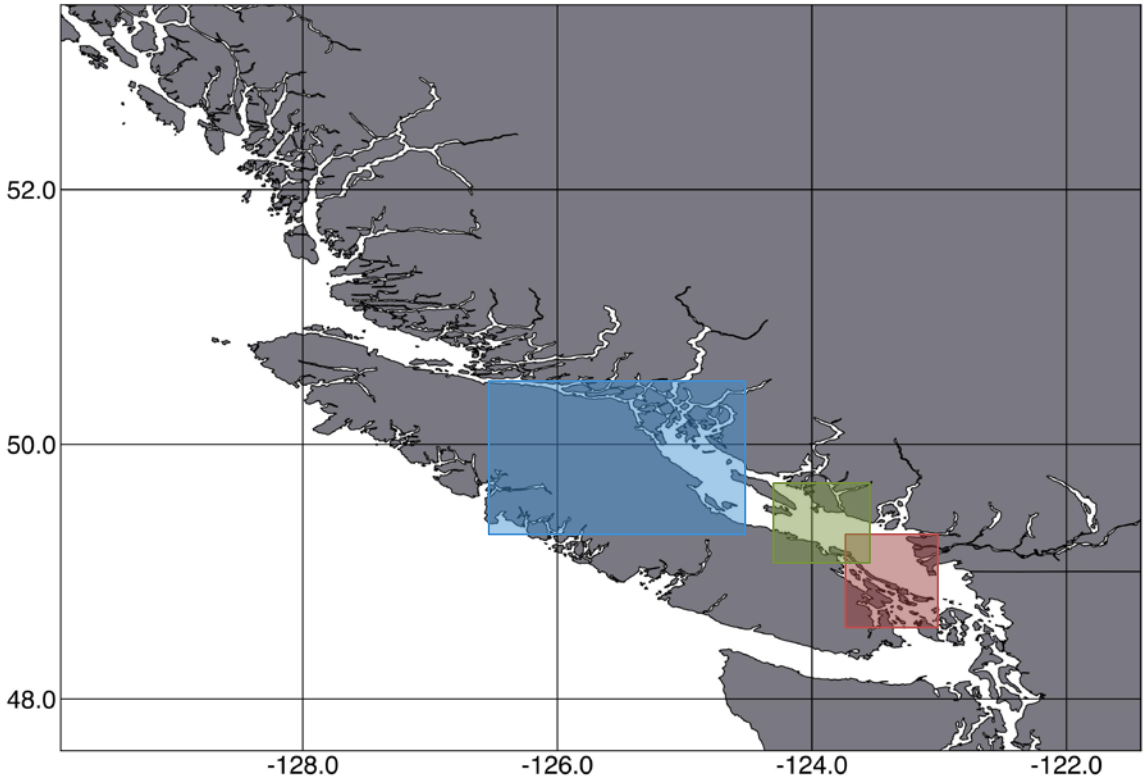
Meroplankton blooms in Okisollo & DI

'Pseudocalanus soup' in JS



DIJS: Further research

- High & low production regions
- Physical properties ≠ biology
- Working to link environment to biology
- Collaborative work connecting physics, chemistry, microbes, plankton, & juvenile salmon



Questions?

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