



Mesozooplankton grazing and egg production in the coastal Gulf of Alaska

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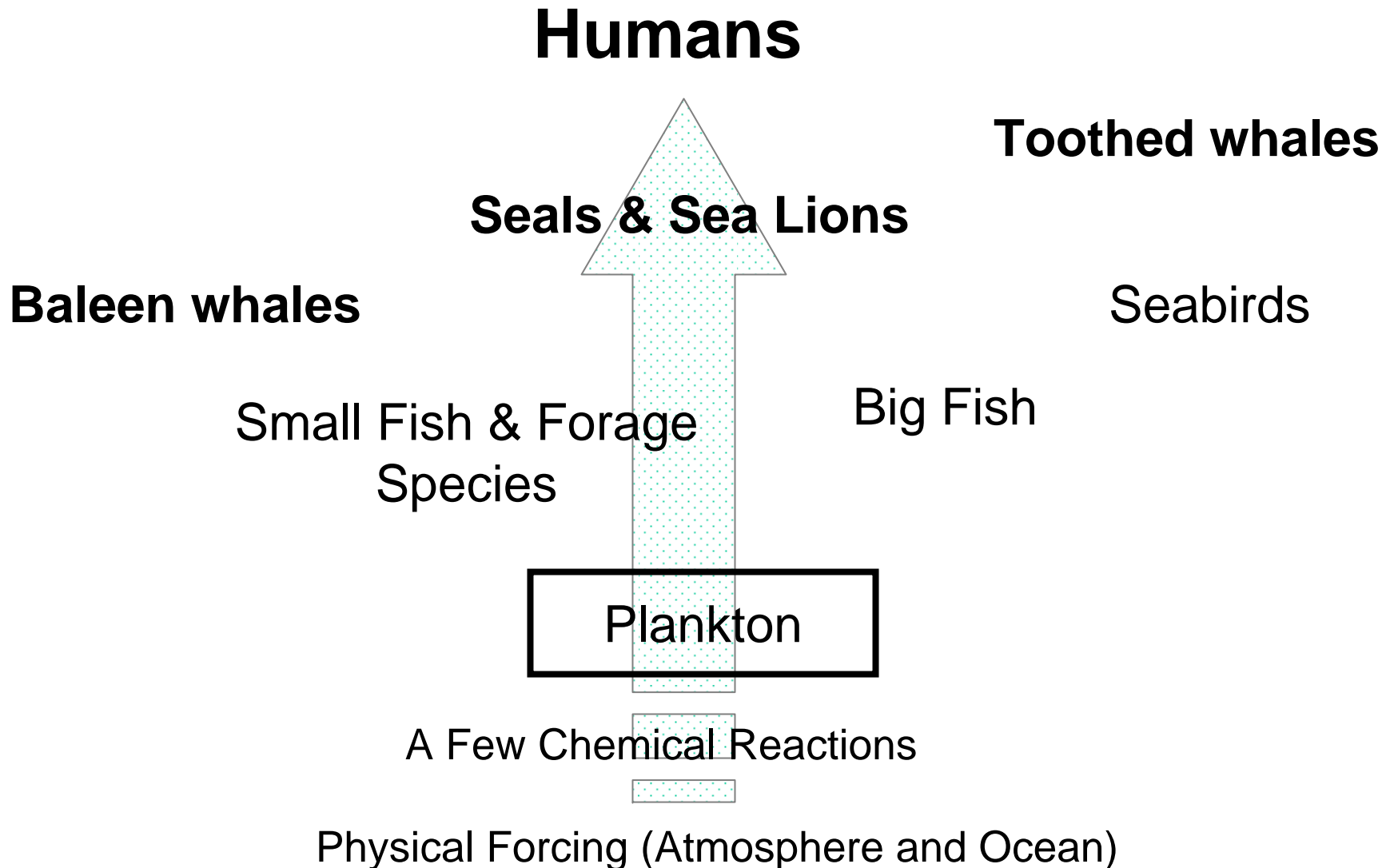
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Northeast Pacific GLOBEC

- To understand the effects of climate variability and climate change on the distribution, abundance and production of marine animals (including commercially important living marine resources) in the eastern North Pacific. To embody this understanding in diagnostic and prognostic ecosystem models, capable of capturing the ecosystem response to major climatic fluctuations. (U.S. GLOBEC, 1996a)



Gulf Of Alaska -- End To End



Objective

Measure natural variability in egg production rate (EPR) and viability for *Calanus*, *Metridia*, and *Pseudocalanus*.

- H_0 : Egg production and viability are high and invariant among cruises and hydrographic regimes.
- H_A : Maximum EPR and viability occurs during the spring phytoplankton bloom in waters that have high phytoplankton biomass.

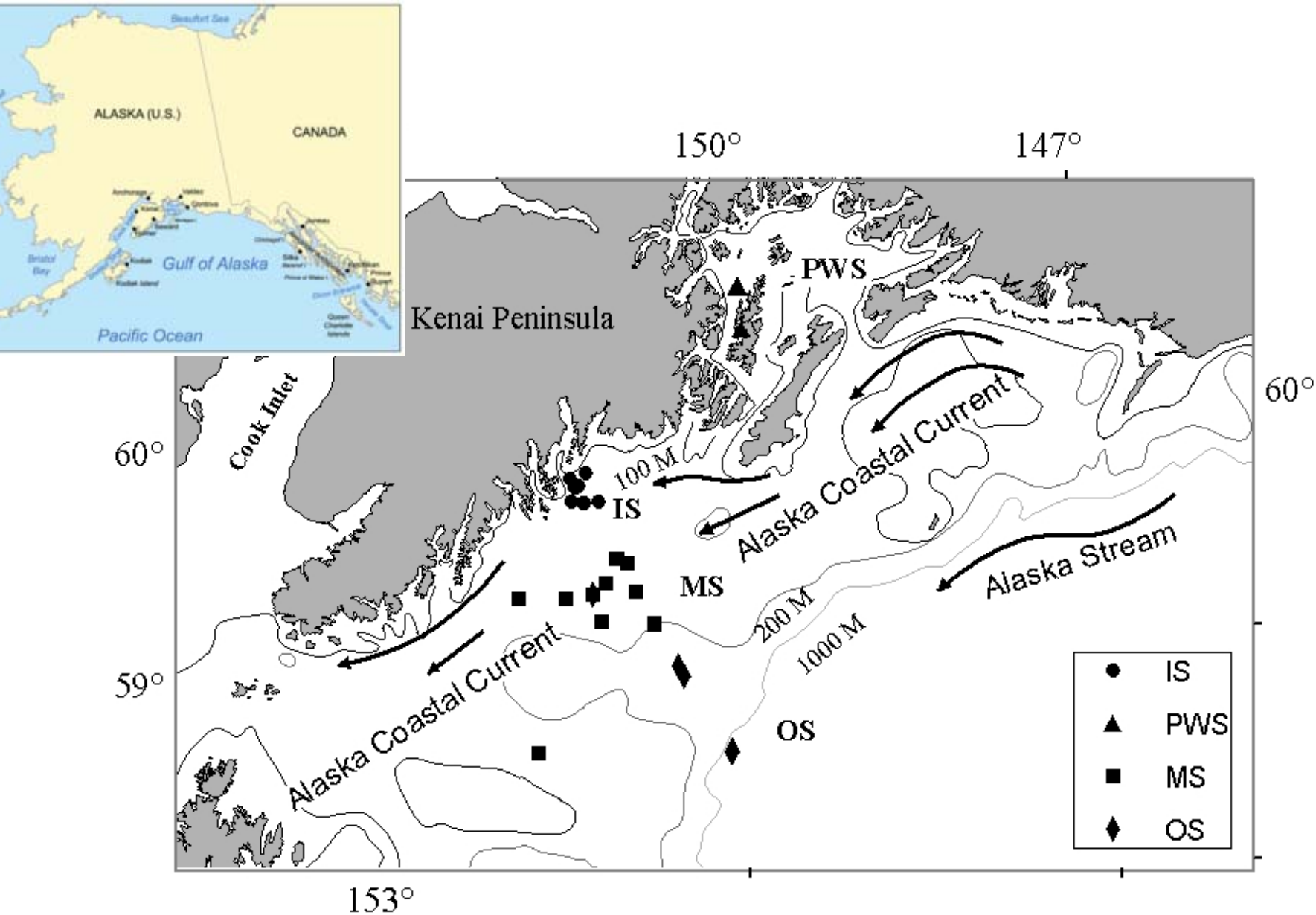


Figure 1: Grazing and egg production experiment stations.

Outline of Methods

- Gentle capture & handling.
- Grazing -- shipboard incubations on rotisserie w. natural particulate matter at simulated in situ light levels. Values corrected for microzooplankton grazing.
- Egg production and viability -- shipboard incubations in the dark at mixed layer temperatures.
- “Food” estimated as size-fractionated chlorophyll & microzooplankton carbon.
- Concurrent dilution technique estimates of microplankton growth and grazing.



Concordance of egg production with availability and ingestion of different prey categories. Number of samples shown in parentheses.

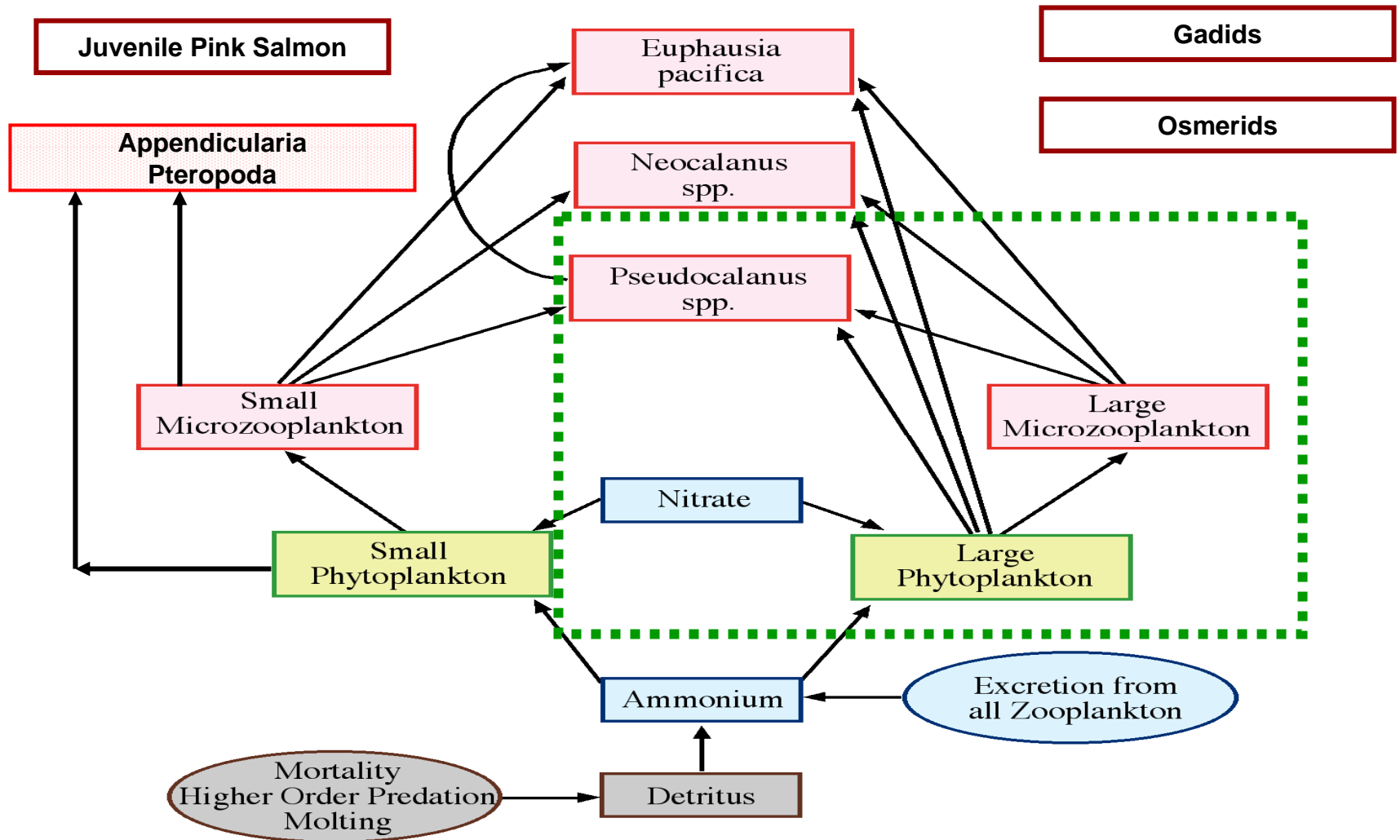
	>20 µm Chl	Tot Chl	>20 µm Chl + Tot MZ
<i>Pseudocalanus</i> 2001	0.552 (12)	0.486 (12)	**0.742 (10)
<i>Pseudocalanus</i> 2003	*** 0.791 (8)	*0.719 (7)	*0.835 (6)
<i>Pseudocalanus</i> 2001 & 2003	*****0.699 (20)	**0.580 (19)	***0.710 (16)
<i>Calanus</i> 2001 & 2003	***0.908 (7)	0.626 (7)	***0.900 (8)

* P < 0.05, ** P < 0.025, *** P < 0.01, ****P < 0.005, *****P < 0.001.

Egg viability of *Calanus marshallae* in the coastal Gulf of Alaska as expressed by percent of eggs (\pm Std Dev; Number of vials) that hatched without deformities.

	Spring		Summer	
	April/May 2001	May 2003	July 2001	August 2003
Prince William Sound	97.1 ± 6.3 (26)	91.3 ± 8.6 (7)		
Inner Shelf	94.9 ± 6.1 (11)	81.6 ± 16.3 (8)		31.4 ± 30.2 (9)
Middle Shelf				71.8 ± 18.6 (10)
Outer Shelf			45.8 ± 25.7 (4)	

GLOBEC Coastal Gulf of Alaska NPZ Model



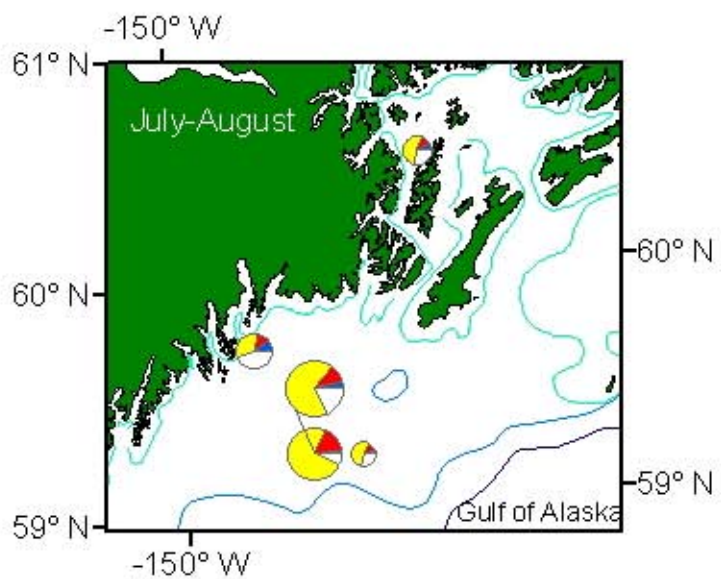
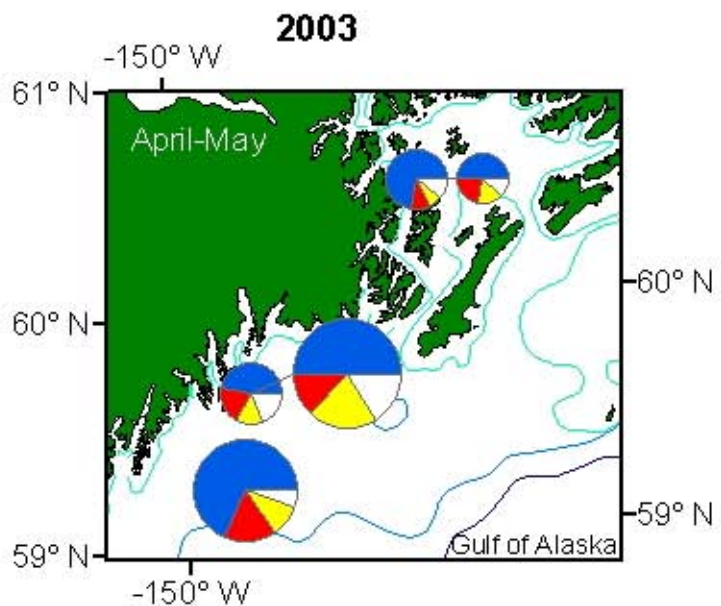
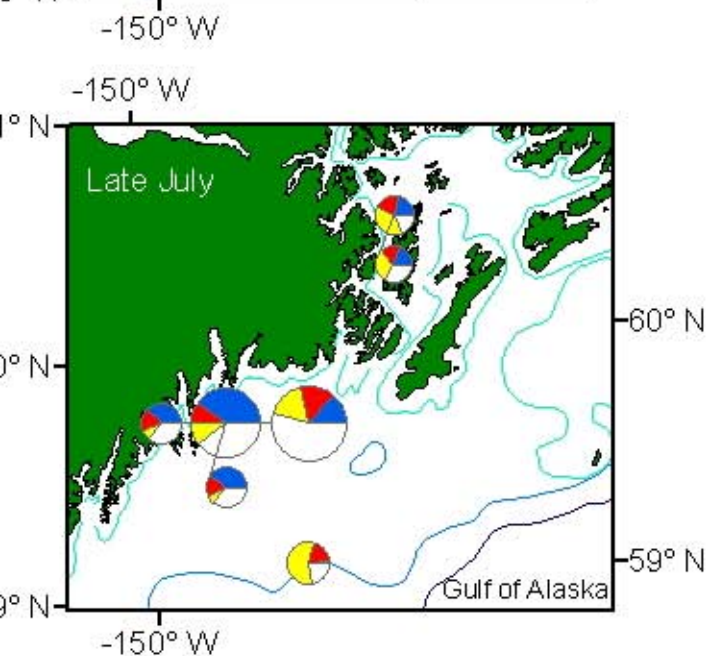
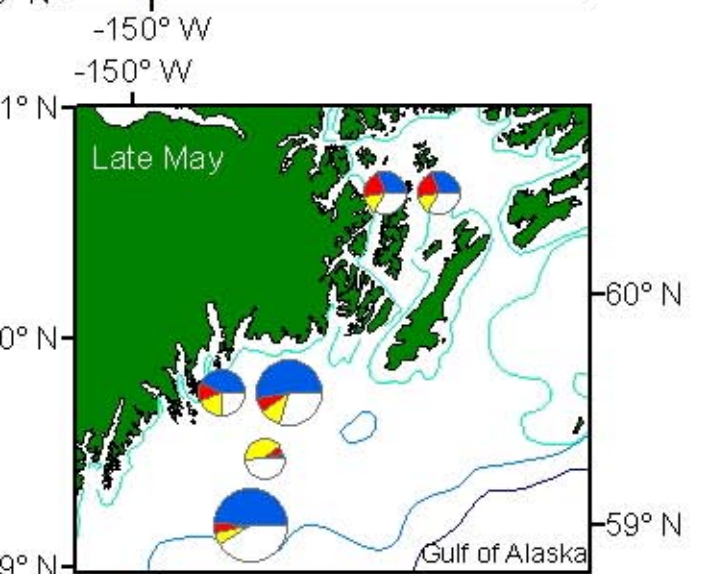
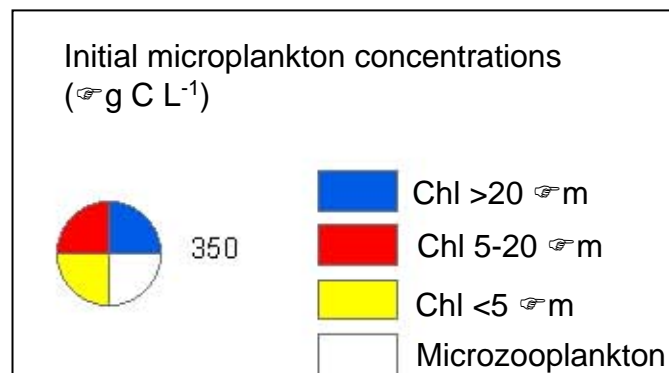
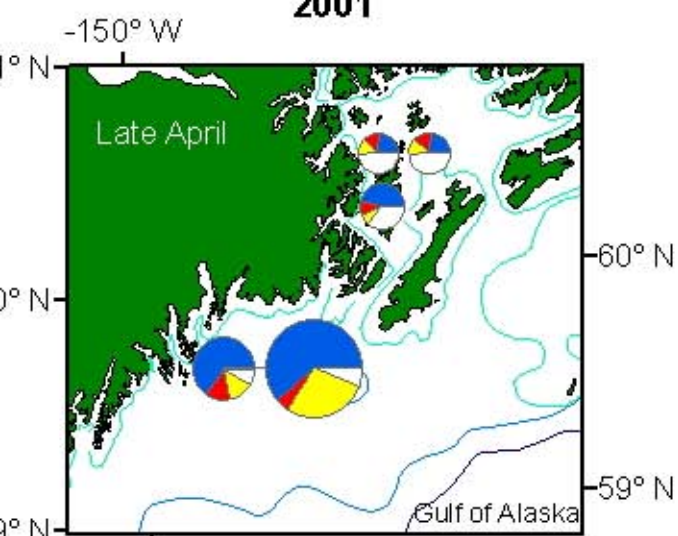
S. Hinckley, pers. comm.



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2001

Late April

Kenai Peninsula

Gulf of Alaska

Ingestion by *Pseudocalanus* spp.
($\mu\text{g C copepod}^{-1} \text{ day}^{-1}$)



13



Chlorophyll

Microzooplankton

2003

April-May

Kenai Peninsula

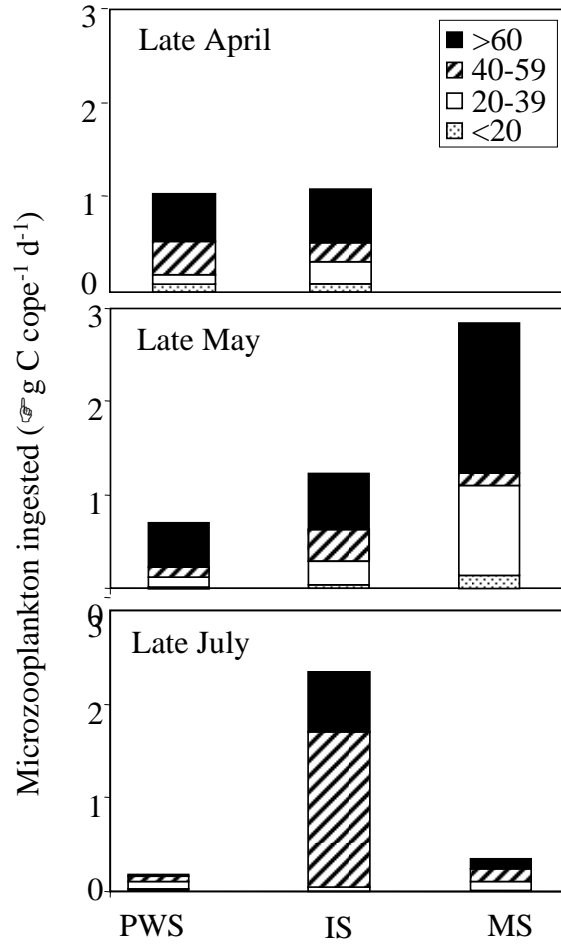
Gulf of Alaska

July-August

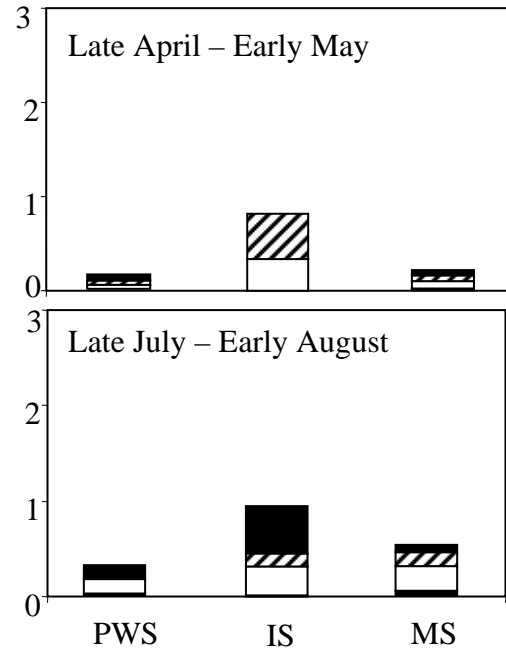
Kenai Peninsula

Gulf of Alaska

2001



2003



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