What is the copepod *Pseudodiaptomus forbesi* eating when foraging within different habitats?

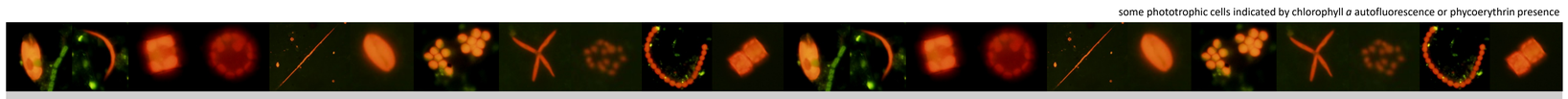
Anne Slaughter, Toni Ignoffo, Wim Kimmerer

Estuary & Ocean Science Center, San Francisco State University

CONTEXT & STUDY OBJECTIVES

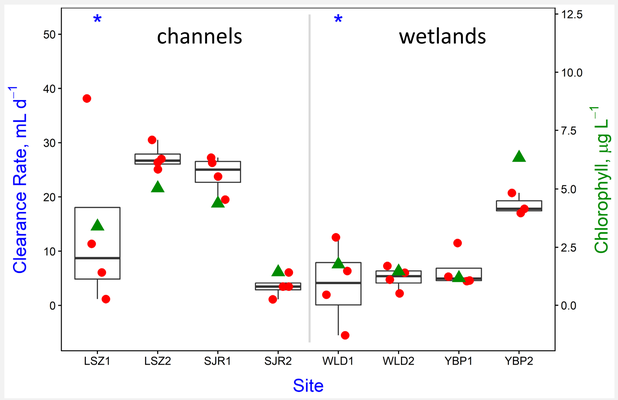
Copepods are a critical foodweb link in the upper San Francisco Estuary, where food limitation negatively impacts foodweb support for native pelagic fish. This study aims to clarify copepod diets in varying habitats to better understand how *Pseudodiaptomus forbesi* is utilizing this food, and how different diets contribute to the copepod population growth rate.

some phototrophic cells indicated by chlorophyll *a* autofluorescence or phycoerythrin presence



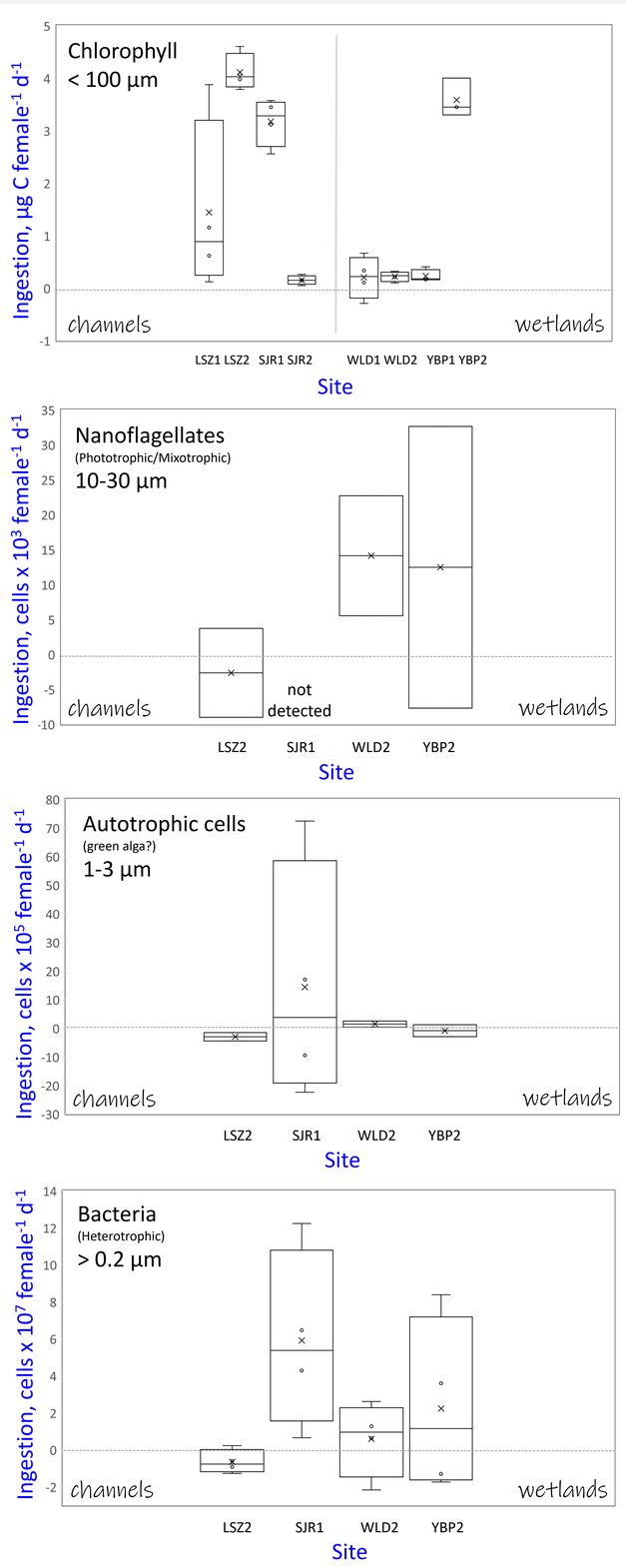
Feeding within different habitats leads to varied copepod diets

ADULT COPEPOD FEEDING RATES

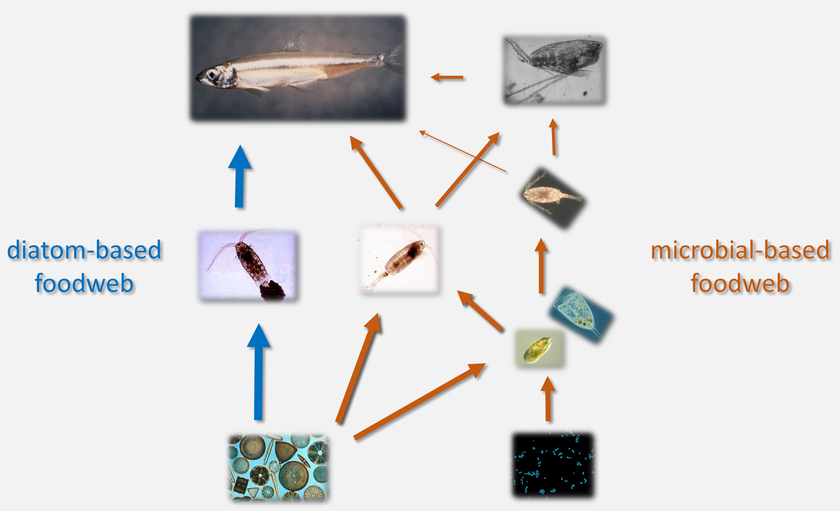


Blue asterisks: 6 h expts (all others 24 h)

clearance rate to feeding rate

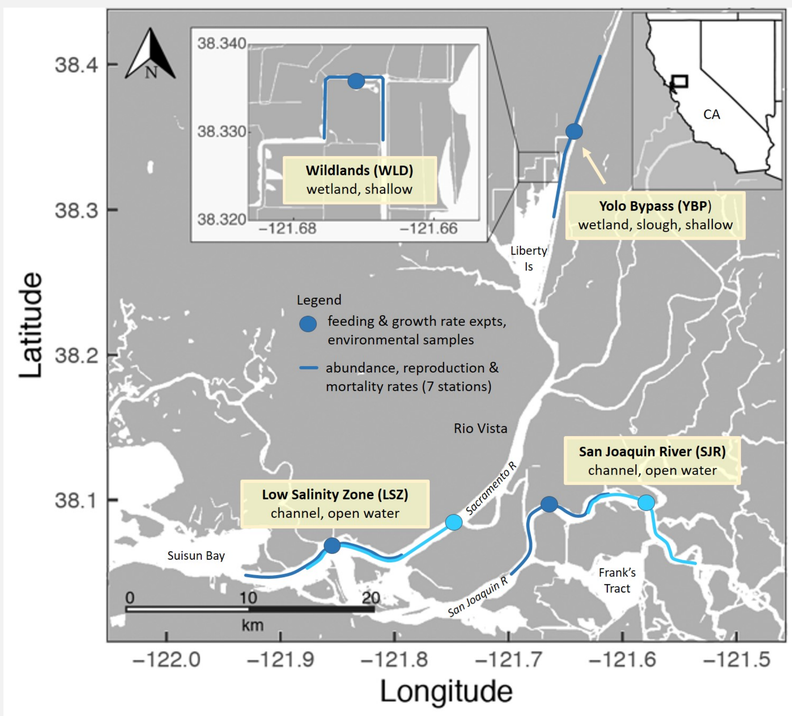


- Consumption on chlorophyll was widely different among and between study sites.
- Clearance and ingestion rates on chlorophyll varied by chlorophyll concentration:
  Highest consumption at the highest chl concentrations, and lowest consumption at the lowest chl concentrations.
- *P. forbesi* consumption on chlorophyll results suggest trophic cascade(s) occurred during some experiments.
  P. forbesi likely fed both on autotrophic cells (chl) as well as on their heterotrophic and mixotrophic predators (e.g., *Cryptomonas*);
  negative ingestion rates indicate cell growth was greater than mortality due to predation.



STUDY DETAILS

COLLECTION SITES



FEEDING EXPERIMENTS (2019)

collection, expt dates	site	habitat characteristics	# females per bottle	expt dur (h)
Jul 9-10	WLD1	wetland, shallow	24	6
Jul 16-17	LSZ1 (sal 0.6)	channel, open water	36	6
Jul 23-25	SJR1	channel, open water	24	24
Jul 30-Aug 1	YBP1	wetland, slough, shallow	24	24
Aug 13-15	WLD2	shallow, wetland	24	24
Aug 18-20	LSZ2 (sal 0.1)	channel, open water	24	24
Sep 3-5	SJR2	channel, open water	24	24
Sep 17-19	YBP2	wetland, slough, shallow	24	24

All water pre-filtered with 100 µm mesh (except for chl > 100 µm) to remove other mesozooplankton grazers from analyses and experiments.

SUMMARY OF SAMPLES COLLECTED

Sample type	Envir samples	Feeding Expts	Growth Rate Expts
P. forbesi gut contents (DNA of prey in gut)	•	•	
Prey assemblage (eDNA)	•	•	
Chlorophyll <100 µm	•	•	
Chlorophyll 5-100 µm	•		
Chlorophyll >100 µm	•		
HPLC	•		
Lipids	•		
Stable isotopes (of copepods)	•		
Stable isotopes (of prey, POM)	•		
Microzooplankton (standard microscopy)	•	•	
Microzooplankton (FlowCam)	•	•	
Microplankton (flow cytometer)	•	•	
Nanoflagellates (epifluorescence microscopy)	•	•	
Heterotrophic bacteria (epifluorescence microscopy)	•	•	
P. forbesi egg production rates	•		
P. forbesi growth rates			•
P. forbesi mortality rates	•		
Zooplankton composition and abundance	•		

results presented on this poster

WORK IN PROGRESS

NEXT STEPS

- Integrate microzooplankton and nanoflagellate data (in progress) to elucidate chlorophyll clearance results.
- Interpret feeding results within larger context of vital rates (i.e., growth and mortality rates).
- Fall 2020 and summer/fall 2021 – more field sampling and feeding experiments: **feeding in food replete (supplemented) vs in-situ conditions, juvenile vs adult feeding, day vs night gut contents.**

ESTUARY & OCEAN SCIENCE CENTER
AT THE ROMBERG TIBURON CAMPUS
SF STATE

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