Building an Integrated Dataset of Zooplankton Monitoring in the San Francisco Estuary

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Background

- Zooplankton play a key role in pelagic food webs, transferring energy to higher trophic levels.
- Many monitoring programs in the San Francisco Estuary (SFE) collect zooplankton data.
- We have integrated these datasets to improve spatial and temporal resolution for zooplankton analysis.

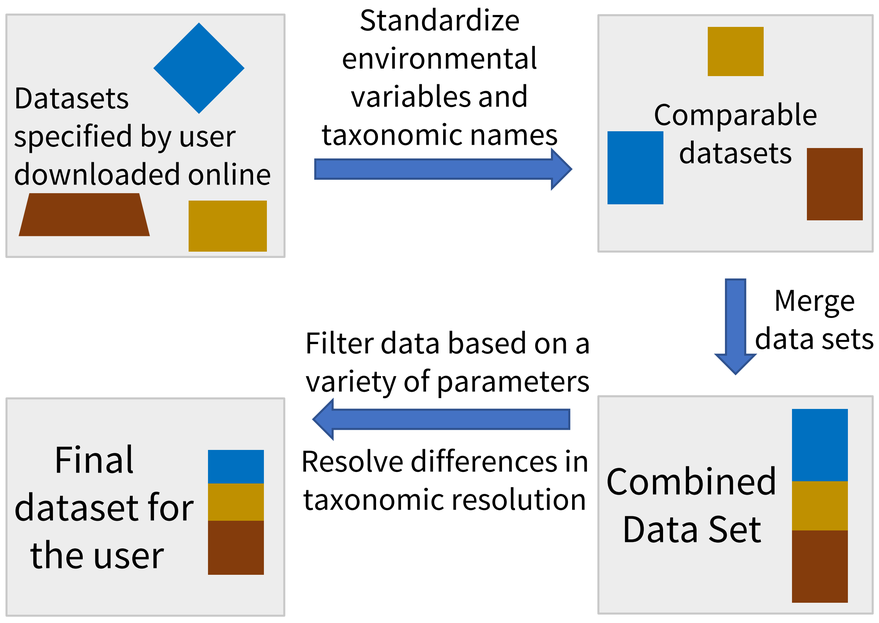
Datasets included

- Environmental monitoring program (EMP)
- Fall midwater trawl (FMWT)
- Summer townet (STN)
- Fish restoration program (FRP)
- 20-mm survey (20mm)

Integrated dataset features

- All environmental variables
- Latitude / longitude
- Consistent taxonomic names

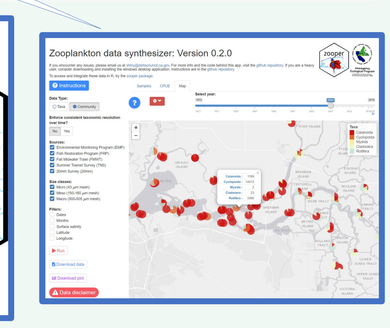
Data integration workflow



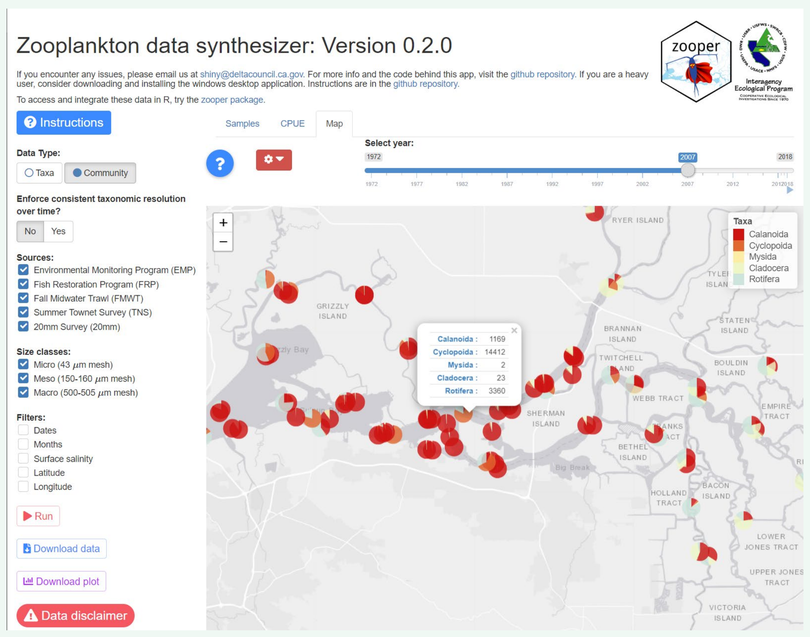
Data products

Data publication	R package zooper	Interactive online R Shiny app
For anyone	For R-users	For non-R users (or R-users for quick data exploration)
Archived full integrated dataset	Download, integrate, and filter zooplankton data in R	Integrate and filter zooplankton data
Download final dataset to utilize with any statistics software	Process and analyze data within R	Download final dataset to utilize with any statistics software
		Visualize data with pre-set plots

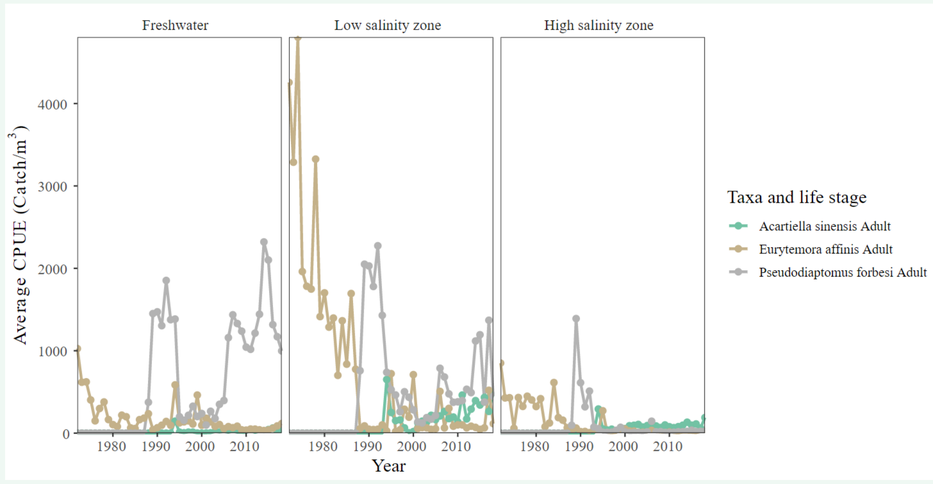
Click me!



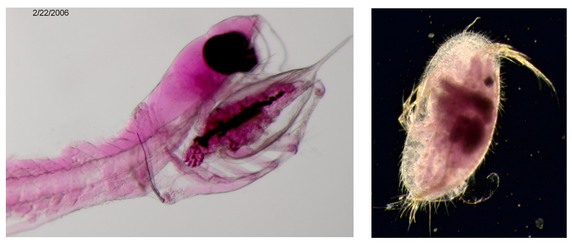
R shiny app



The composition of the zooplankton community at each station in 2007.



Average yearly catch of 3 zooplankton taxa across time and salinity zones from the app.



Differences in taxonomic resolution among studies is resolved with one of two approaches

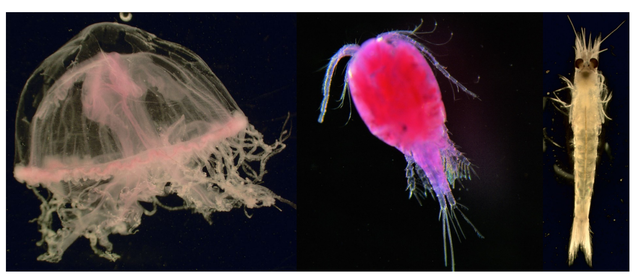
For community data analyzers:	For specific taxa analyzers:
I want to analyze the community composition at whatever taxonomic level lets me use all these datasets	I want all possible data on specific taxa
Consistent taxonomic categories	Calculates total CPUE for higher taxonomic levels
No plankters counted more than once	Some plankters appear in multiple nested taxa (e.g., Calanoida, Copepoda)
Sacrifices some taxonomic resolution	Preserves taxonomic resolution and creates taxonomic categories comparable across all datasets
Removes taxa with no relatives in other datasets (e.g., Annelida)	Labels taxa that are comparable across all datasets, warns about those that are not

Metadata report (coming soon)

- Metadata documentation on each included dataset
- Similarities and differences among lab and field methods
- Data integration methods
- Recommendations for improving zooplankton monitoring
  - Publish data online in table format
  - Document taxonomic classifications
  - Identify each species to life stage if possible
  - Distinguish between zero-catch (0) and non-counted (NA)
  - Use similar methods across surveys

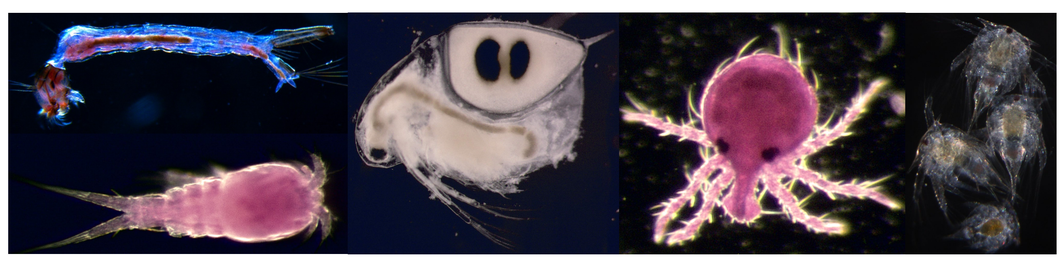
Workshops

- Zoopfest I (11/13/2019): Taxonomic identification training
- **Zoopfest II (October 2020)**: Zooplankton ecology, emerging sampling technologies, data applications



Next steps

- Start analyzing the integrated dataset
- Incorporate length data and biomass
- Integrate more datasets!



Analysis ideas?

- How should we use these data?
- Submit your high-priority research questions on the discussion forum!

Acknowledgements

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