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Introduction

Global Freshwater Invasive Species: *Craspedacusta sowerbii* Lankester, 1880 (Cnidaria, Hydrozoa, Limnomedusae)¹

Predation Impact: *C. sowerbii* may impact freshwater communities through consumption of up to 39% of zooplankton standing stock during medusa blooms^{2,3}. By reducing zooplankton biomass, *C. sowerbii* is capable of triggering trophic cascades which may restructure plankton communities⁴.

Annual Abundance Patterns: A known phenomenon of *C. sowerbii* is that the medusae may be present in high abundance for several consecutive years and then be absent for several years⁵.



Fig 1. Peach Blossom Jellyfish (*Craspedacusta sowerbii*). Photo credit: Tarren McKay, 2022.

Study Site: Hotel Lake

Initial region-wide explorations in 2021 and 2022 showed Hotel Lake as hosting a sizable jellyfish population. The resident community was found to be highly interested, allowing for a **Citizen Science-centered** multi-year sampling campaign. The annual high and low abundance patterns have been observed at this location.

High Medusa Years (≤ 14 ind/m²): 2022 and 2024

Low Medusa Years (< 0.1 ind/m²): 2023 and 2025



Fig 2. Map of Hotel Lake, British Columbia, Canada, 49° 38 N, 124° 02 W. Main Station for sampling indicated in red.



Fig 3. Field sampling performed by (left to right) Dr. Bob Vroom, Dr. Evgeny Pakhomov, Dana Halay, Johanna Marshall, and Grace Young. Photo Credit: Brian Croft, 2025.

Research Questions

1. What is the impact of *C. sowerbii* predation on zooplankton abundance and community composition in Hotel Lake?
2. What are the implications of resulting trophic cascades on ecosystem services and larval fish resources?

Methods

1. **Sample zooplankton** using vertical tows of 150um, 30cm diameter conical net. Collected every 5 days from mid-May to early September.
2. **Sample co-variables** such as nutrients, temperature, oxygen, Secchi depth.
3. **Preserve zooplankton samples** with formalin.
4. **Scan samples** using ZooScan instrumentation.
5. **Classify** images by taxa using Ecotaxa web platform.
6. **Convert** image dimensions and taxa abundances to biomass measurements and taxa density.



Fig 4. Images produced by Zooscan instrumentation. *Daphnia* spp. (left) and *Diaptomus* spp. (right).

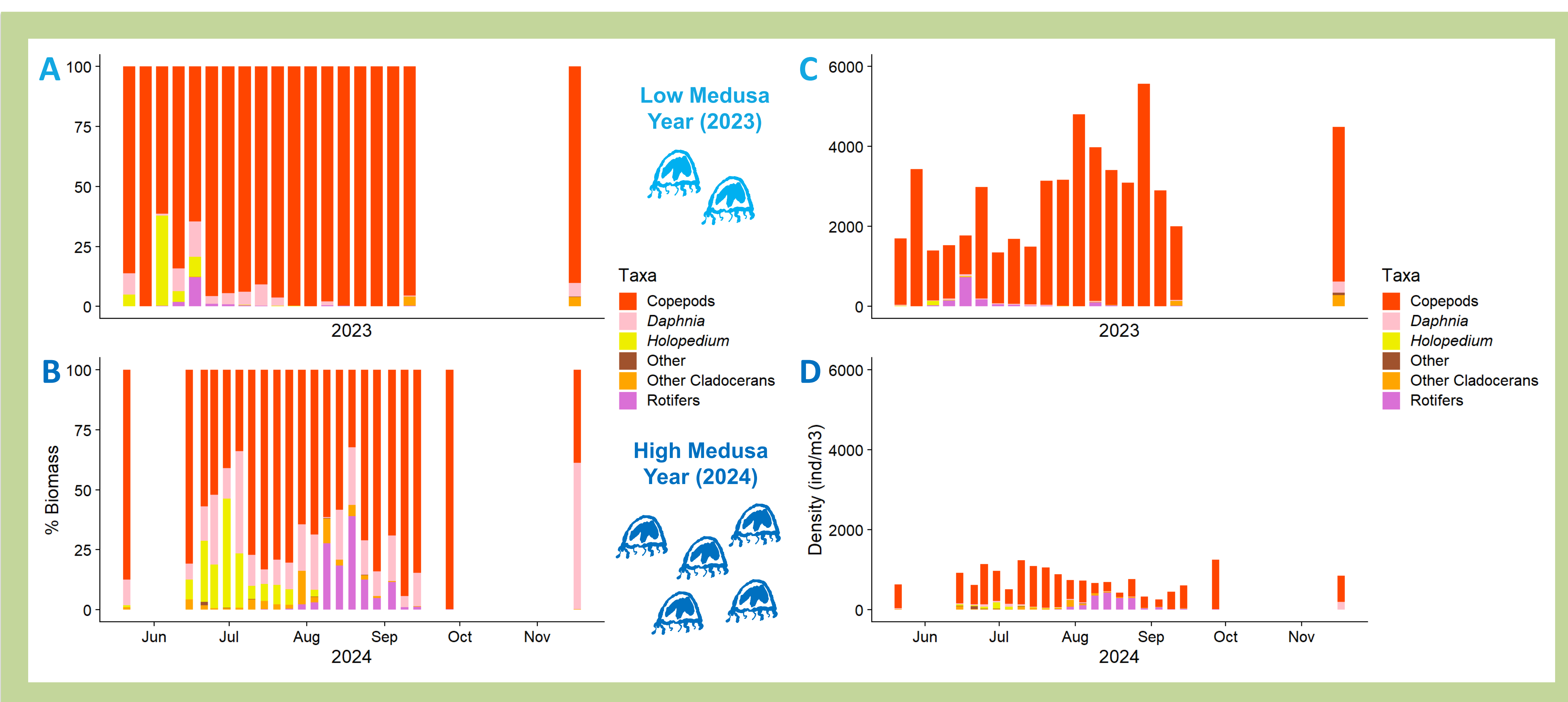


Fig 5. Zooplankton community (>300um) composition by % biomass (A,B) and density (C,D) in 2023 (a high medusa year) and 2024 (a low medusa year).

Results

Low Medusa Year (2023):

- Higher densities of zooplankton
- Higher biomass proportion of **Copepods** (ex. *Diaptomus* spp.)

High Medusa Year (2024):

- Lower densities of zooplankton
- Lower biomass proportion of **Copepods**
- Higher biomass proportion of cladocerans (ex. *Daphnia* and *Holopedium*)

Discussion

Lower zooplankton abundances
↓
Less prey for larval fish
↓
Annual variation in ecosystem services (fishing)

Differences in reproductive cycle length between copepods and cladocerans
↓
Differences in population recovery time from medusa predation
↓
Variable ecosystem stable states depending on level of predation

Conclusions

- Long-term presence of *C. sowerbii* and their predatory top-down control can result in **alternating stable states of zooplankton community**, causing annually variable trophic dynamics and community-available ecosystem services
- **Citizen Scientists** have played an invaluable role in this research. After proper training, and continued support and supervision, they are able to fill spatial and temporal gaps that researchers alone cannot complete.

Future Directions

- **Ecopath with Ecosim modelling:** cascading impacts on upper trophic levels such as salmonids
- **Role of zooplankton <300um:** species and size-specific diet preferences of *C. sowerbii*
- **Nighttime sampling:** species-specific diel vertical migration

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References:

