



TRACKING THE TIDE: INVESTIGATING CRAB BIODIVERSITY AND SPAWN TIMING SHIFTS

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Background

- Crabs play a crucial role in the marine ecosystem food web, contributing to nutrient cycling, and are part of a multibillion-dollar industry.
- Habitat destruction, ocean acidification, and increasing sea surface water temperatures cause rising concern for the crab population and its biodiversity.

Research Question

What are the changes in biodiversity and spawn timing of Poverty Bay's crabs?

Internship & Methods

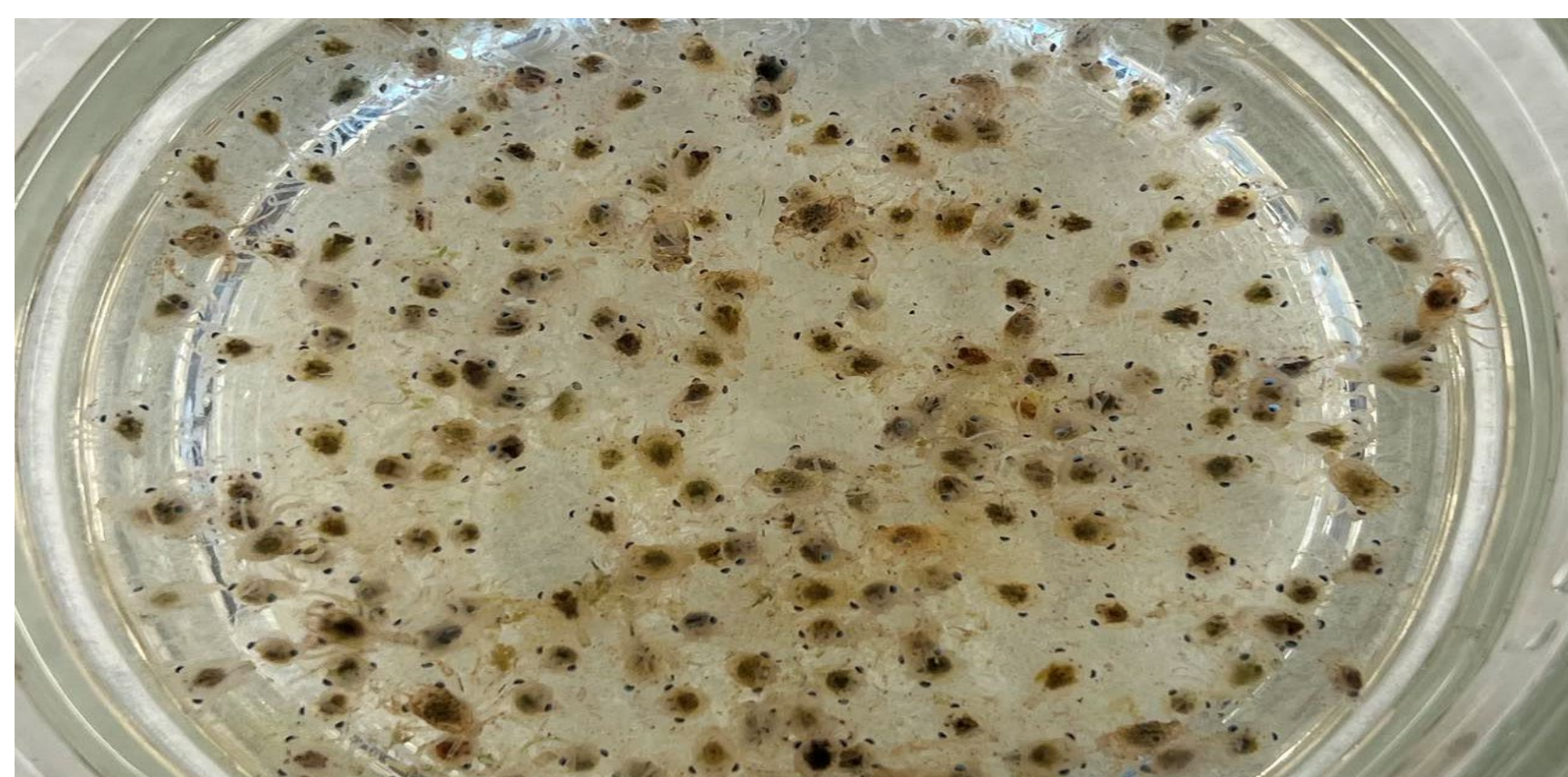
- Interned at Highline MaST Center Aquarium.
- On set days 4 days a week, collected from the light trap to identify, count, and record catch.
- Analyzed and compared results between years 2022 and 2023.
- Used the Simpson Index to quantify biodiversity:

$$1 - \left(\frac{\sum n_i(n_i - 1)}{N(N - 1)} \right) \left| \begin{array}{l} n_i : \text{total \# of individuals in the community} \\ N : \text{\# of individuals in the } i\text{-th species} \end{array} \right.$$



Figure 1: Light trap attached to a pulley on the MaST's dock.

Figure 2: Photograph of the first peak of 240 Dungeness crabs in a glass bowl.



Results

- Species caught: Dungeness (*Metacarcinus magister*), Shore (*Hemigrapsus sp.*), Red Rock (*Cancer productus*), Graceful decorator (*Oregonia gracilis*), Black-clawed (*Lophopanopeus bellus*).
- Biodiversity has been shown to increase in 2023 compared to 2022, but differences in identification expertise may have biased results.
- Dungeness crabs spawned later while shore crabs spawned earlier over the two monitored years.

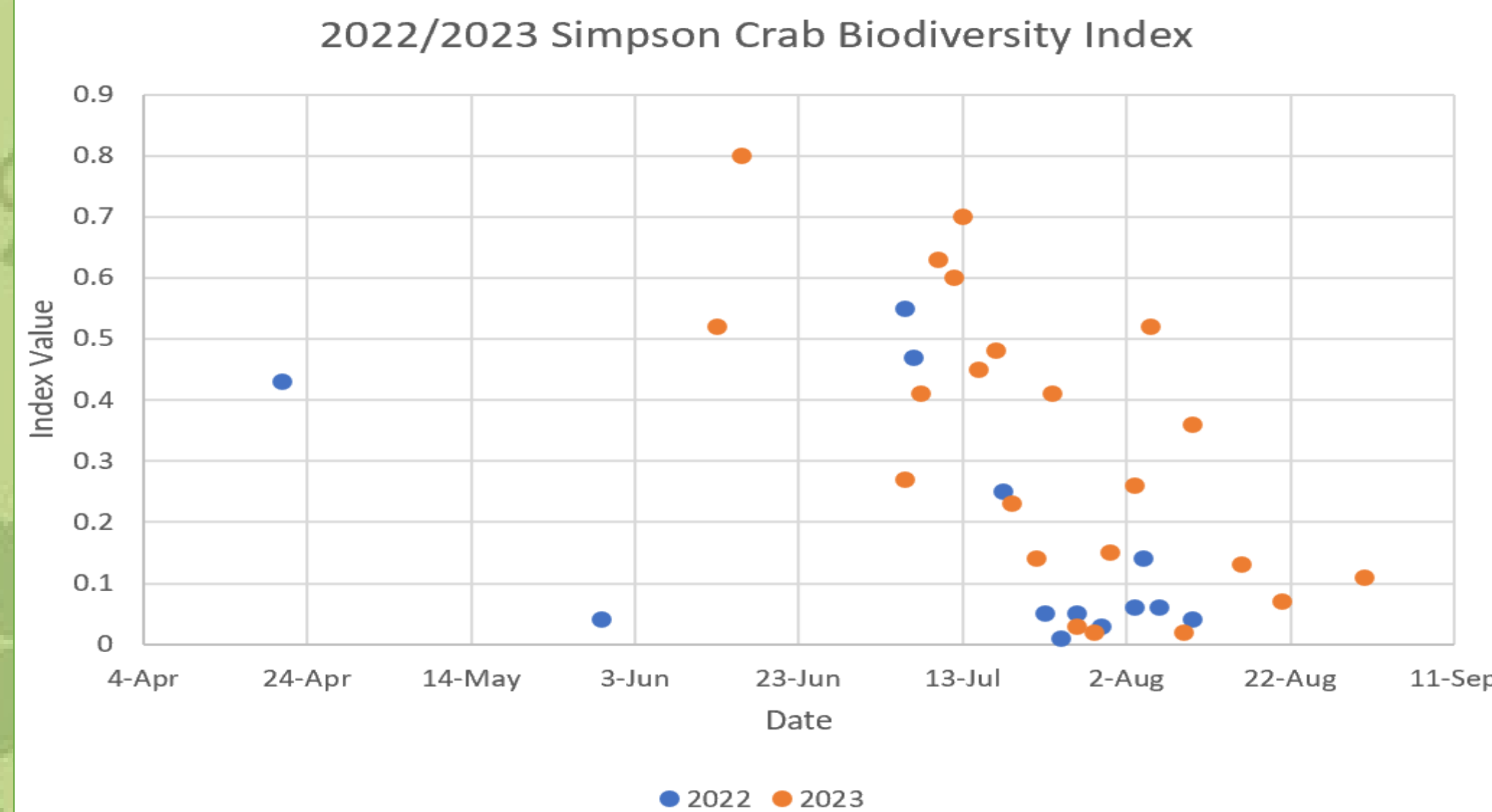


Figure 3: Simpson Biodiversity Index values of the five identified crab species over 2022 and 2023.

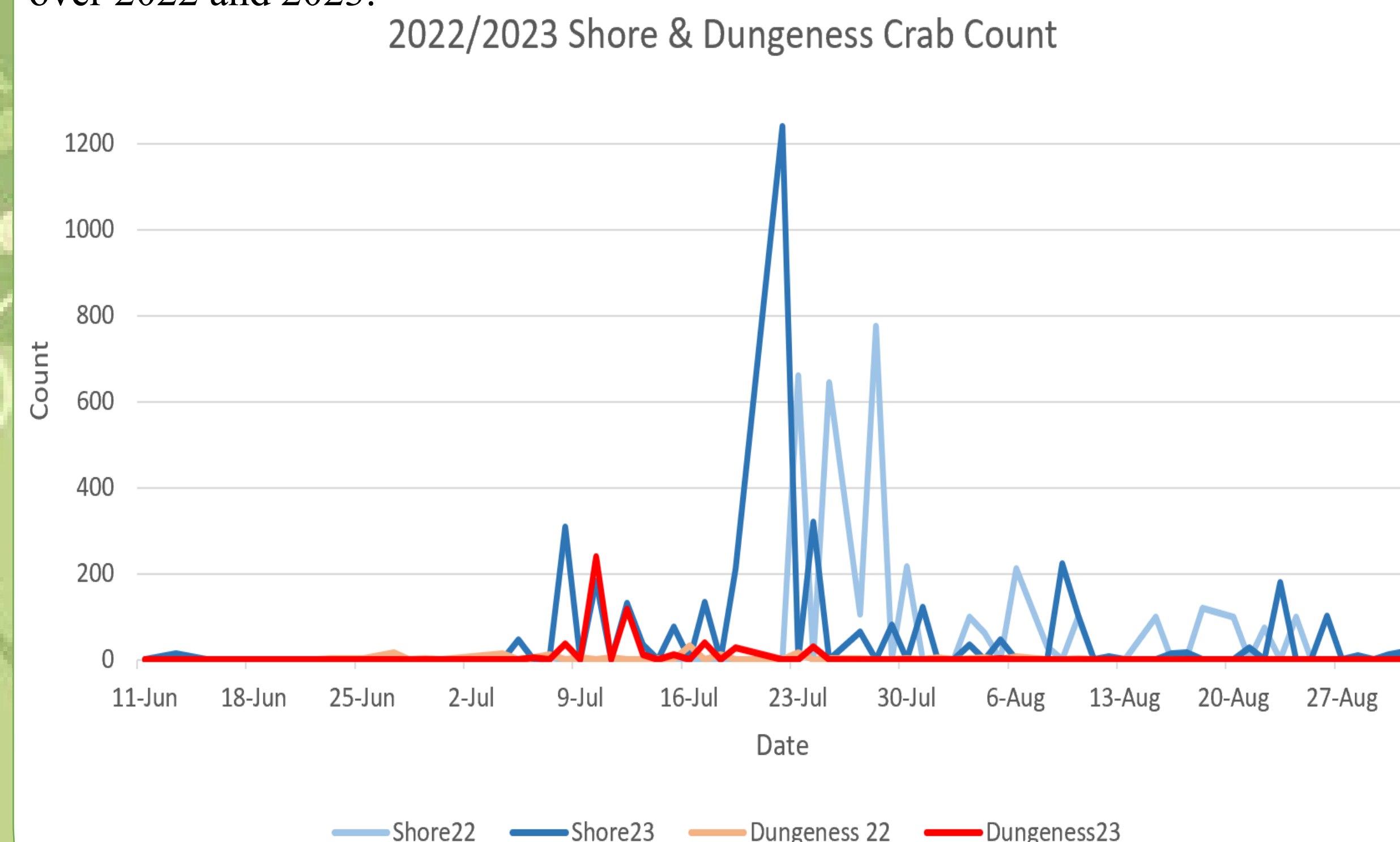


Figure 4: Shore and Dungeness crab counts over time for years 2022 (light colors) and 2023 (bold colors).

Implications

- The MaST data could be compiled with other sites to paint a more holistic picture of crab abundance and patterns of distribution.
- Maintaining a biodiversity index may be beneficial for the implementation of ecosystem-based management (EBM).
- Observed shifts in spawn timing can be used to reduce commercial harvest during intense spawning to sustain the fishery.

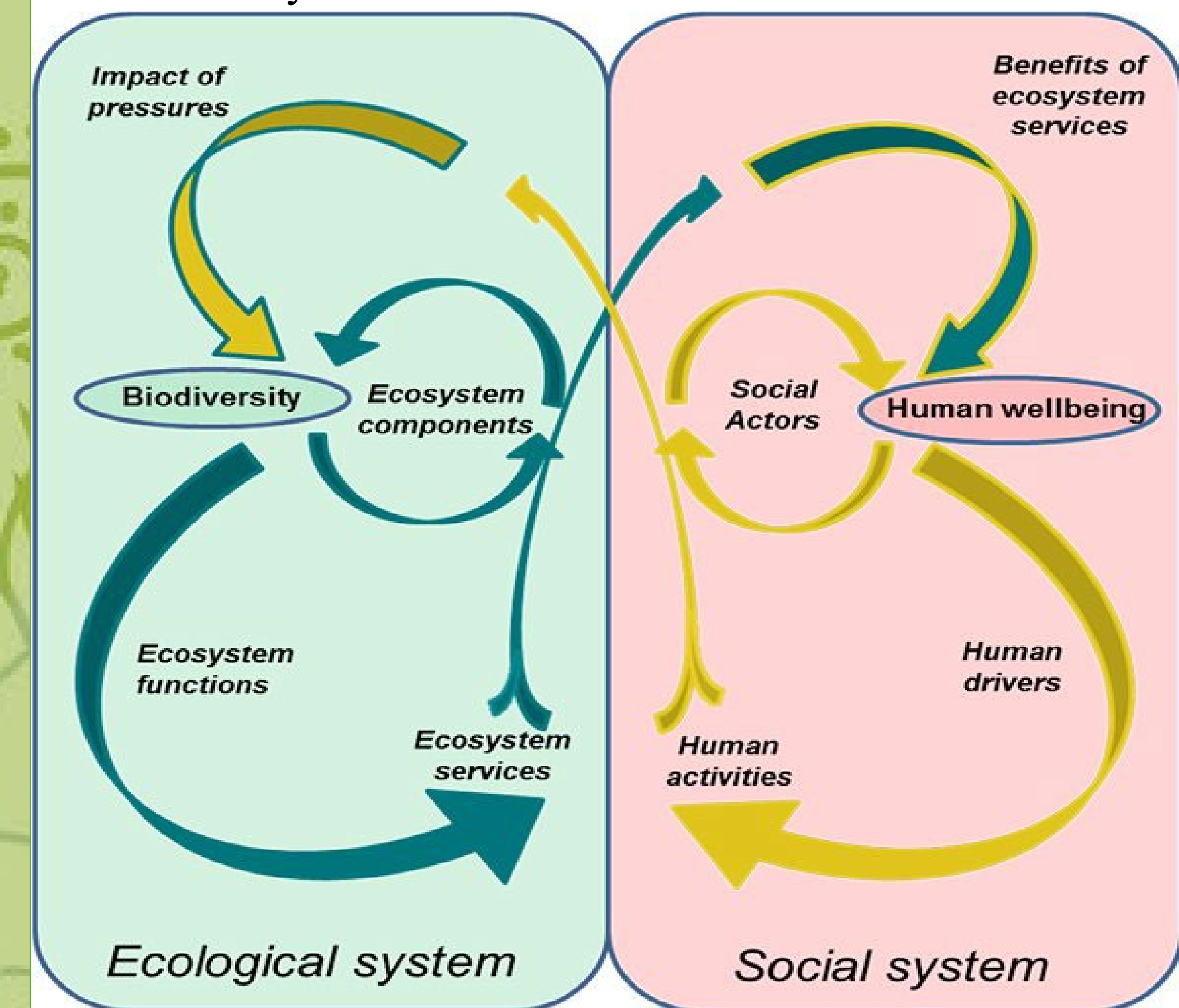


Figure 5: Schematic of ecosystem-based management (EBM) showing links between ecological (green box) and social (pink box) components (U.S. EPA).

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