Abundance and Community Composition of Invasive Intertidal *Watersipora* on the San Francisco Bay Outer Coast

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BACKGROUND

- Invasive species have largely invaded harbors, and rarely, the rocky intertidal coast in San Francisco Bay area[1]
- These invasive species can lead to declines in native species or modification of the community structure[2]
- *Watersipora spp.* is an invasive bryozoan species that has uniquely spread along the rocky intertidal coast and presents itself as a possible invasive species to impact the open-coast ecosystem[3]

Objective:

1. Assess occurence of *Watersipora* spp. at four sites and how it changes from lower intertidal to the higher intertidal
2. Investigate the community composition where *Watersipora* is located and the interactions with surrounding organisms

Figure 1: *Watersipora* in foliose form

Hypotheses:

- *Watersipora* occurrence will be less along lower intertidal transect than higher intertidal
- *Watersipora* will compete more with organisms that occupy the same ecological niche within the rocky intertidal community

METHODS

ASSESSING ABUNDANCE

1. Transect one (30 meters) placed parallel to the coast line where max abundance is assumed
2. Transect two (30 meters) placed at the mean distance of the *Watersipora* colony found farthest up the shore by walking perpendicular of transect one at 0 meters, and 30 meters.
3. One meter to each side of the transect all *Watersipora* colonies are documented for size and structure

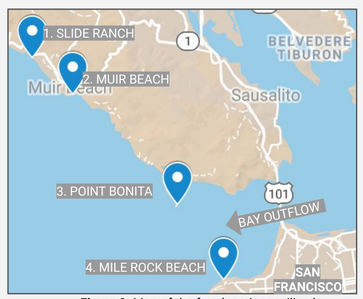


Figure 2: Map of the four locations utilized throughout the San Francisco Bay Area

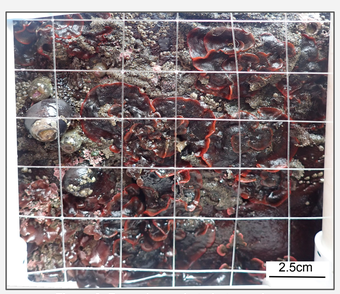


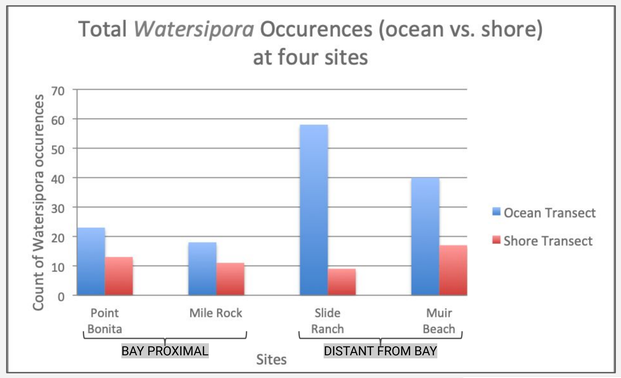
Figure 3: Example quadrat photograph displaying encrusting *Watersipora*

COMMUNITY COMPOSITION

1. Every other *Watersipora* occurence located was photographed using a 15cm by 15cm square quadrat with each square within it measuring 2.5cm by 2.5cm
2. Common organisms are scored either for presence within each square or a count
3. Organisms that were in contact with the *Watersipora* colonies were noted

RESULTS

ASSESSING ABUNDANCE:

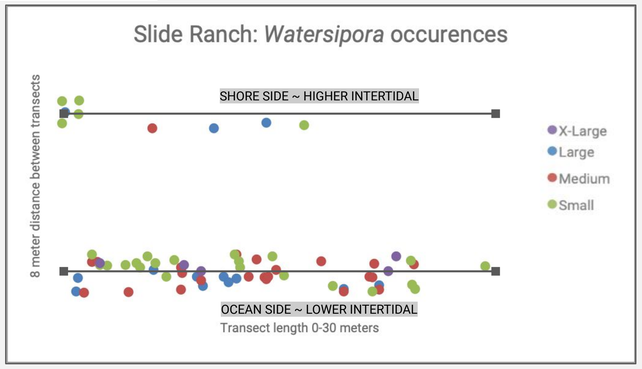


The total number of Watersipora colonies was greater at sites further from the bay outflow. Watersipora occurrence was greater at each of the four sites lower in the intertidal.

Figure 4: Total *Watersipora* occurences by site comparing counts between the transect closer to the ocean and the transect further up the shore

Abundance is higher along the lower intertidal transect throughout all four sites and presents a more diverse and larger spread of Watersipora occurrences.

Figure 5: Visual representation of *Watersipora* occurrences recorded for size at the Slide Ranch site to represent the spread of colonies along both transects.



COMMUNITY COMPOSITION:

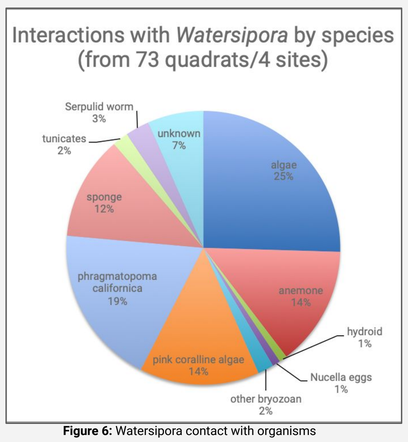


Figure 6: Watersipora contact with organisms

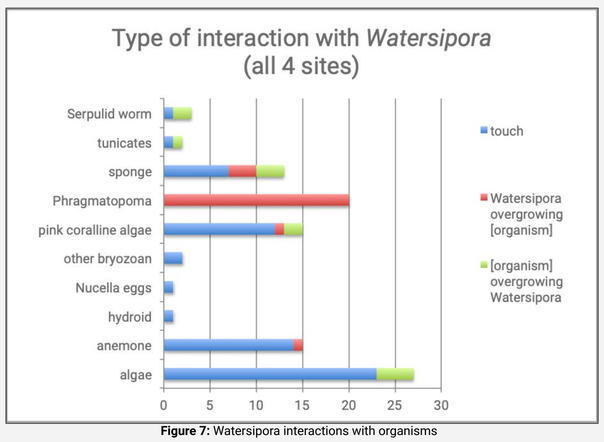


Figure 7: Watersipora interactions with organisms

Watersipora contacted with a variety of organisms but prevalently overgrew on Phragmatopoma californica and interacted with sponge species.

- **Pink coralline algae:** both encrusting & foliose
- **Algae:** all other algae except pink coralline algae
- **Sponge:** both pink and yellow sponge
- **Other bryozoan:** both pink and grey encrusting
- **Unknown:** visibility too poor or unclear
- **Tunicates:** colonial tunicates

- Watersipora overgrowing organisms (and vice-versa) was conservatively called
  - If unclear, contact was categorized as touch
- This categorization was completed to the best of the ability dependent on visibility within the quadrat photos

DISCUSSION

ASSESSING ABUNDANCE:

- Slide Ranch and Muir Beach, located furthest from the Bay Area outflow, has greater total number of colonies than sites distant from the bay
  - *Watersipora might not be sourced to the outer coast particularly from the San Francisco Bay since Watersipora is abundant and successful inside the Bay itself*
- Across all four sites, sizes of *Watersipora* colonies were variable and able to populate across both transect habitats
- ***Future consideration:*** investigation on how the Bay outflow's variable conditions influence *Watersipora* and nearby rocky intertidal communities

COMMUNITY COMPOSITION:

- *Watersipora* prevalently was found to overgrow *Phragmatopoma californica* tubes and come into contact with sponge species
- *Watersipora* colonies are commonly found in contact with other species in the ecosystem that are located along the lower intertidal
- ***Future consideration:*** how is *Phragmatopoma californica* impacted by *Watersipora* growth; do sponge species and *Watersipora* compete for the same ecological niche

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