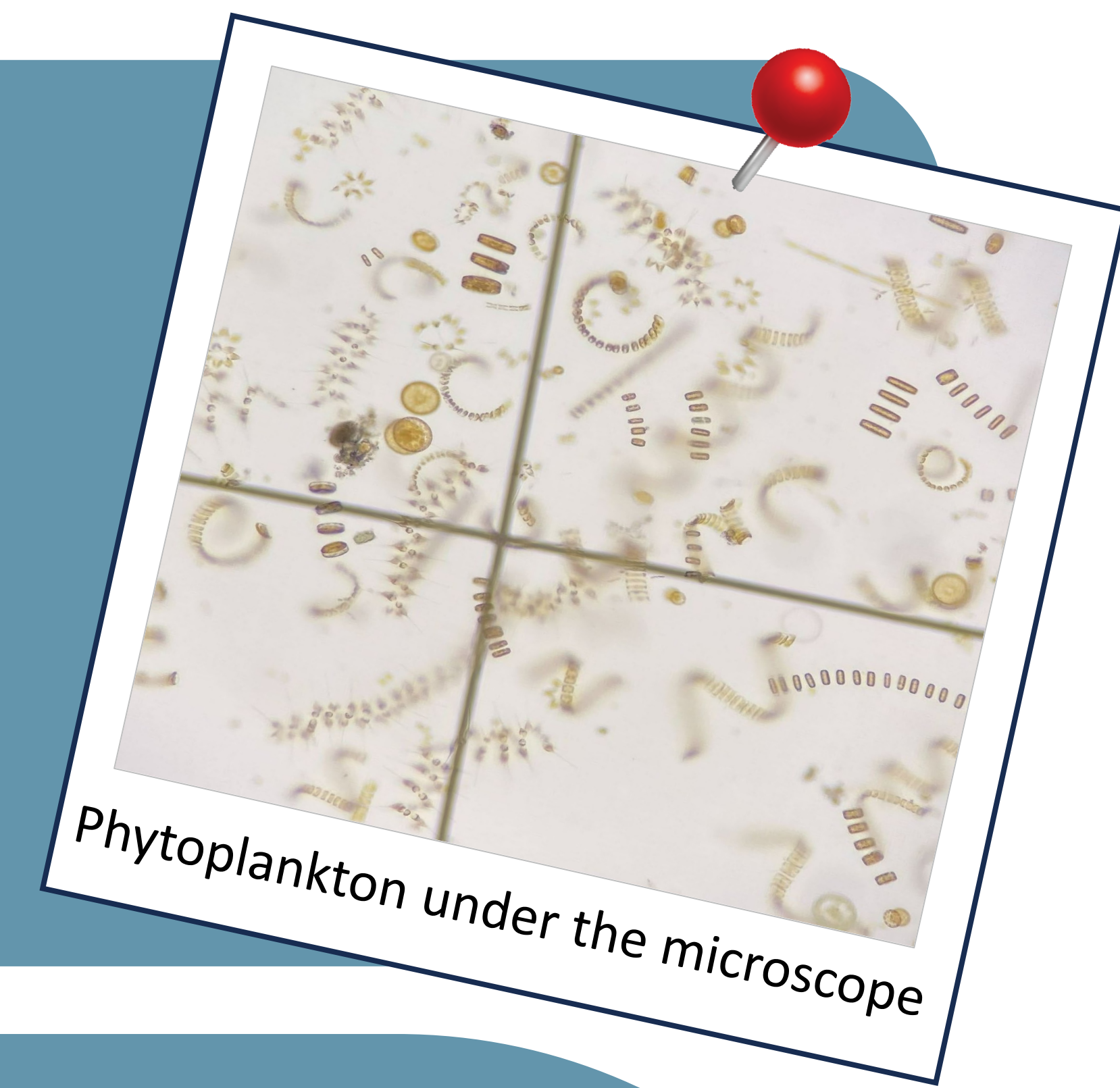


Phytoplankton in Morro Bay Estuary

Why study phytoplankton in Morro Bay?

- Phytoplankton are microscopic plant-like organisms that form the base of the marine food web.
- Environmental conditions such as temperature, salinity, nutrients, and light influence the phytoplankton community.
- Some phytoplankton known as HABs can be harmful to wildlife and people.
- **Studying phytoplankton abundance and diversity in Morro Bay helps assess the overall health and resilience of the bay's ecosystem.**



HABs

Harmful Algal Blooms (HABs) occur when phytoplankton grow in high densities while producing toxins or causing other harmful effects on people and marine organisms. California has monitoring programs to ensure that commercially harvested fish and shellfish are safe to eat.

Phytoplankton Patterns within Morro Bay

Common Phytoplankton in the Bay



Figure 1. Microscopy images of some common diatoms (top row) and dinoflagellates (bottom row) within Morro Bay courtesy of Kudela Lab.

- **Diatoms** are non-motile and have cell walls made of silica (Fig. 1). They provide a critical source of food for zooplankton and larval fish.
- **Dinoflagellates** can be motile and have a cell wall made of cellulose (Fig. 1). They have mixed nutritional strategies – some get energy from the sun, some get energy from eating other phytoplankton or bacteria, and others do both. Many groups contribute to HABs.

Spatial Patterns

- As ocean waters flow into Morro Bay, they bring cold, salty, and nutrient rich waters into the front of the bay (Fig. 2).
- The waters in the shallow back bay heat up faster, and the tides resuspend the sediments, making the back of the bay warmer and more cloudy than the front (Fig. 2).
- More nutrients (and more light) in the front of the bay support a higher abundance of phytoplankton relative to the back of the bay (Fig. 2).

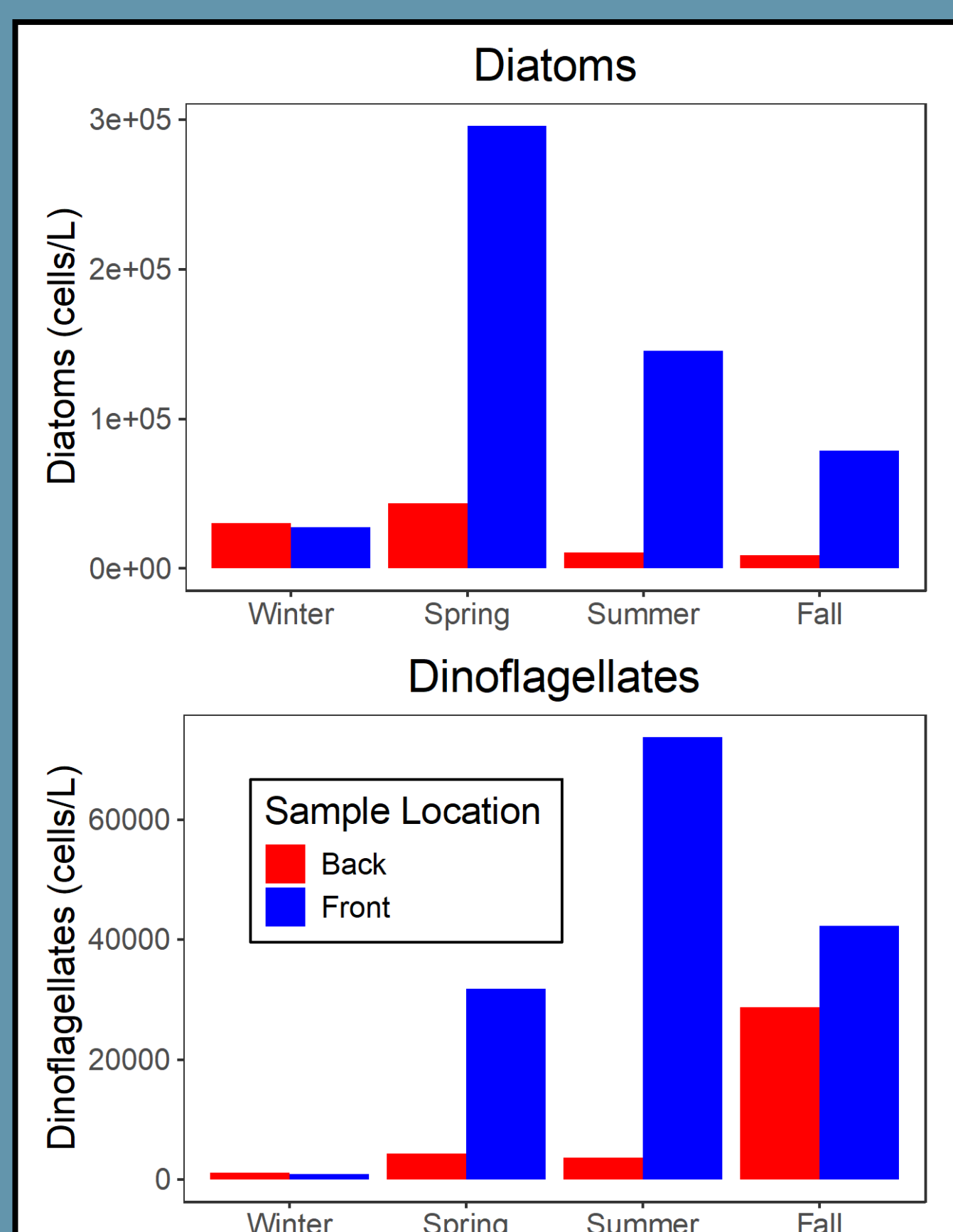
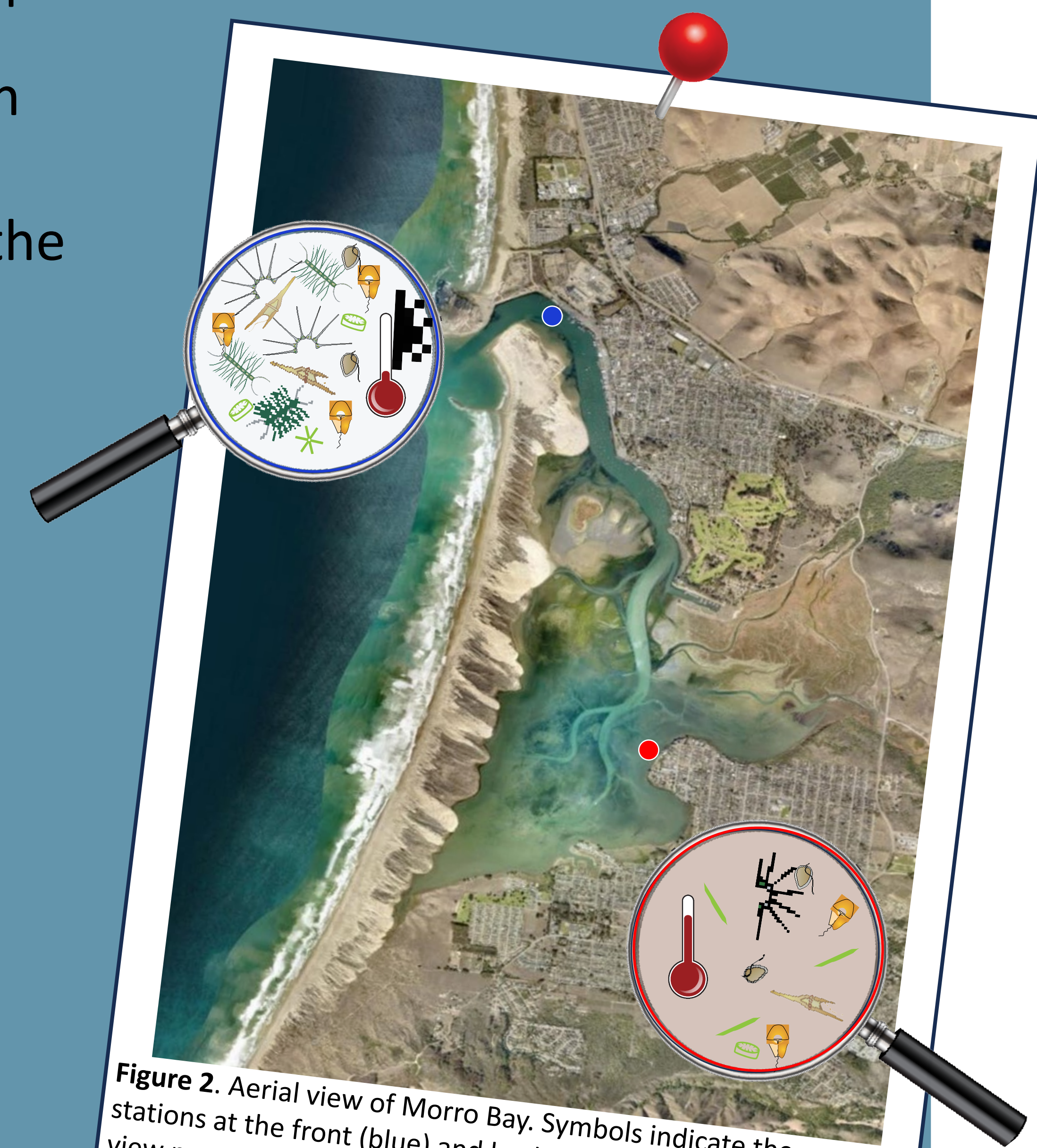


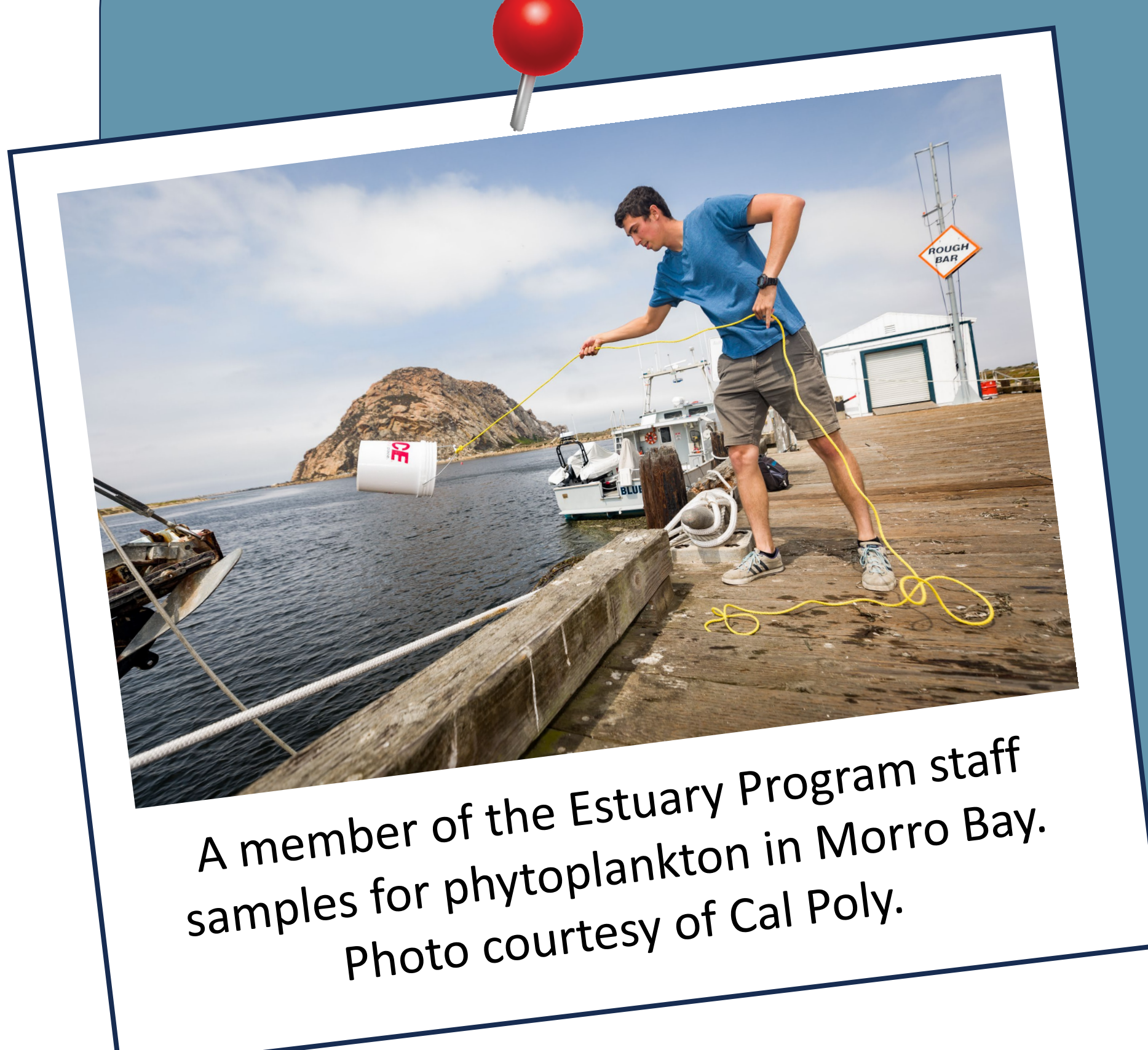
Figure 3. Data showing the abundance of diatoms (top) and dinoflagellates (bottom) across different seasons in the front (blue) and back of the bay (red).

Seasonal Patterns

- Phytoplankton abundance varies seasonally.
- The highest concentrations are associated with blooms of diatoms in the spring and dinoflagellates in the late summer (Fig. 3).
- Diatoms grow well when cold nutrient rich waters flow into the bay during the spring coastal upwelling season.
- Dinoflagellates grow well when warmer waters flow into the bay in the late summer and early fall.

Phytoplankton and a Changing Climate

- Warming waters along the coast of California will influence the composition and seasonality of phytoplankton in Morro Bay.
- Given that dinoflagellates grow better in warmer waters (and in more variable conditions), the timing of dinoflagellate blooms may change.
- Warming waters may influence the timing and frequency of HAB events, affecting ecosystem health, local aquaculture efforts, and tourism.
- These impending changes highlight the importance of continuing to monitor phytoplankton over time.



Learn more about the state-wide HAB monitoring network



Learn more about research in the PECO Lab at Cal Poly



Learn more about the Morro Bay National Estuary Program

