Abundance and Distribution of Microplankton in the San Francisco Estuary

Carrie Ann Sharitt¹, Lindsay J. Sullivan², and Wim Kimmerer²

¹Columbus State University 4225 University Avenue Columbus, Georgia 31907
²Romberg Tiburon Center for Environmental Studies, San Francisco State University 3152 Paradise Drive Tiburon, California 94920

Introduction

Microplankton are a diverse group of planktonic organisms ranging from 0.02 to 0.2 millimeters (Figure 2). Defined solely by size, it spans numerous taxonomic groups, including both heterotrophs and autotrophs. Microplankton are abundant in all aquatic ecosystems and are important prey for many organisms, including bivalves, crustaceans, and fish. Specifically, in the San Francisco Estuary (SFE), microplankton are the main food source for copepods that in turn serve as an important food for several species of protected fish. Little is known about the microplankton community in the SFE, and information on their abundance and distribution will help scientists better understand their role in local foodwebs. Additionally, scientists will be able to understand how this community is affected by changes to the SFE.

Research Questions

How does the abundance and composition of microplankton differ:

1. between the Sacrament and San Joaquin Rivers?
2. among 2010, 2011, and 2012?
3. between fresh water and the low salinity zone?

Methods

1. Water samples were collected from the Sacramento and San Joaquin Rivers (Figure 2).
2. Samples were preserved using iodine (acid Lugol’s solution).
3. Fifty milliliters of the sample was poured into a settling tube (Figure 3a).
4. The settling tubes were stored to allow the cells to settle to the bottom.
5. Excess water was removed from the tube with a pipette (Figure 3b).
6. The remaining sample was transferred to a counting chamber (Figure 3c).
7. Microplankton were counted, measured, and identified with an inverted microscope (Figure 3d).

Results

Figure 1. Map of San Francisco Estuary with sampling stations (pink- low salinity zone, yellow- freshwater)

Figure 2. Examples of microplankton preserved in iodine.

Accurate ciliate, heterotroph
Cyanobacterium, autotroph
Centric diatom, autotroph

Figure 3. Methods.

How does the abundance and composition of microplankton differ:

- a. between the Sacramento and San Joaquin Rivers?
- b. between 2010, 2011, and 2012?
- c. between fresh water and the low salinity zone?

Figure 4. Percent composition in the Sacramento River.

Composition was similar in 2010 and 2012 was different

Figure 5. Percent composition in the San Joaquin River.

Figure 6. Percent composition in the low salinity zone.

Figure 7. Percent composition in freshwater.

Figure 8. Total microplankton abundance (# L⁻¹) in the Sacramento and San Joaquin Rivers.

Figure 9. Total microplankton abundance (# L⁻¹) in the low salinity zone and freshwater.

Discussion

- The abundance and composition of microplankton varied in space and time.
- More information is needed to discern annual patterns and their causes.
- Quantifying microplankton abundance will help scientists understand the food availability for copepods and further up the food web to protected fish.

References:
- Fishes Society; 32(6): 270–270