Several of my students, residents of Richmond and surrounding communities, have very little knowledge of their own physical and cultural environment. They are unable to identify major landmarks on a map or from a vista point. Orienting them to these features, in class and on the water, not only solves this problem but provides an excellent opportunity to teach key STEM topics such as data analysis, engineering, environmental science, geography, oceanography, and physics.

The history of the San Francisco Bay Area is written on water, from the indigenous coastal tribes, the Spanish explorers, the trading ships of the 18th and 19th centuries, and the riveting part Richmond played in World War 2 to the vital support the maritime trades give to our current local economy. My third-grade students will learn this history along with the geographic and oceanographic features of their home. They will also study the feats of engineering, historical and state-of-the-science, that cross the waters. The culmination of these studies will be a sail on the bay aboard the *Nehemiah*, a 57-foot wood ketch. Students will see these geographical and cultural landmarks from an entirely new perspective, grasp the physics of sailing, and get some hands-on experience with data sampling and analysis as they collect bay water to test for pH, salinity, temperature, and depth of available sunlight. They will view native marine mammals, fish, and birds in their habitat as well as other people using the bay waters for business or recreation and witness the direct effects of pollution on our environment. When they return home, students will have a deeper understanding of our coastal community and their place in it, both physical and personal.

I teach in a high-poverty school; many of my students have never and may never again have an opportunity to sail on their own local waters. They will study geography, history, economics, and science in the classroom all year and write and draw what they have learned, but a sailing experience out on the bay will anchor this information in their minds for a lifetime.

Based on individual ability, students will be able to complete the following:

- Draw a map of the San Francisco Bay Area with geographical and civil landmarks labeled, including but not limited to: bridges, islands, cities/communities, bays. Alternative: identify these landmarks on a printed map.
- Demonstrate an understanding of data analysis by gathering data points, representing them graphically, and explaining their findings in paragraph form. Alternative: answer fill-in questions about a chart or graph.
- Explain or demonstrate to other students a clear understanding of one of the following:
    - how local weather is affected by the geography and oceanography
    - how to tie a sailing knot
    - how a sailboat works
    - types of local bridges and how they stay up
- Write a report and give an oral presentation about one or more of the following local features: a bridge, an island, a city or community, a marine animal, a wildlife sanctuary, a historical period.
- Write and illustrate a journal entry detailing their trip on the *Nehemiah*. These will be combined into a book to share with classmates and parents.

September—November. We have already begun map reading skills by investigating our physical surroundings and comparing locations on a map. We will take a field trip to Wildcat Creek and perform

water testing similar to what will be done on the *Nehemiah*. Discussions will follow that tie the local ecology to San Francisco Bay ecology.

February—March. We will then build a small working model of the bay that mixes freshwater, dyed red, with ocean water, dyed blue. We will observe how the waters mix and use other dyes to simulate pollutants. We will also cover CCCS topics in science. An example of this is the energy exchanged in the local habitat, such as from which source the top predators get the energy they need to survive.

April: Sail on the *Nehemiah*. While on board, we will conduct the experiments and discuss the topics mentioned above. The captain of the boat, who is a captain of the ferry *Harbor Princess*, will speak to the students on local geographic features, his work as a ferry captain, and the historical use of ferries in San Francisco Bay.

May. The unit will conclude with written assessments in the form of review questions, essays, and visual art.