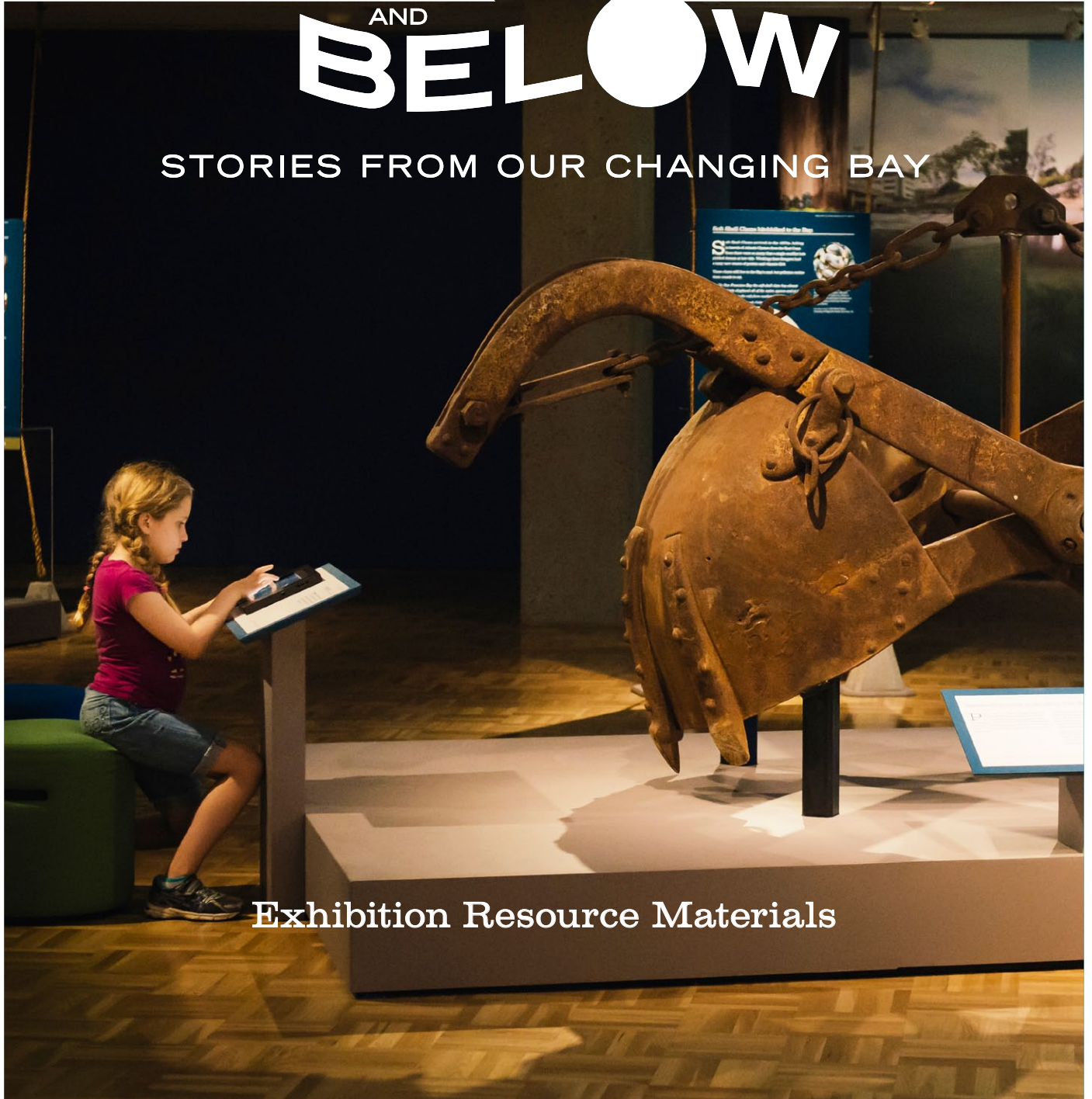


ABOVE AND BELOW

STORIES FROM OUR CHANGING BAY



Exhibition Resource Materials

Exhibition theme.

Above and Below: Stories From Our Changing Bay explores San Francisco Bay as a place where human engineering and natural processes have come together over time to shape and re-shape the land and water. Exploring this exhibition will enable your class to see the Bay and its history in the current landscape.

Your students will better understand how their lives are continually shaped by the Bay and will be able to consider how it might change in the future. Some of the questions this exhibit will encourage your students to think about include: What is the Bay? How did it come to be this way? What history does it hide? What might it become?

This guide will provide information on the various sections of the exhibition and offer ideas for questions to use with your students while exploring the space. In the second section, lesson plans and activity worksheets are provided for pre-visit activities, for use while at the museum and for post-visit follow up.

Organization.

The exhibition is organized into two main sections: ***Above*** and ***Below***.

In the *Below* section, your students will find evidence of how man has impacted the natural processes of the Bay and altered its environment. In the *Above* section, students will find evidence of how the Bay and its resources have been used over time and will discover how the Bay has always presented challenges to those living around its shores.

Your class can begin their exploration in either section.

Below sections:

- Water
- Species
- Bay Floor
- Pulse of the Bay

Above sections:

- Central Map and Geo-Stations
- Bridges
- Islands
- Shellmounds
- Military Landscapes
- Drawbridge
- Salt Ponds
- Bay Futures

Content standards.

Above and Below: Stories From Our Changing Bay addresses the following California Content Standards:

Science

- 3.3** Adaptations in physical structure or behavior may improve an organism's chance for survival. As a basis for understanding this concept.
- 4.2** All organisms need energy and matter to live and grow.
- 4.3** Living organisms depend on one another and on their environment for survival.
- 4.5** Waves, wind, water, and ice shape and reshape Earth's land surface.
- 5.3** Water on Earth moves between the oceans and land through the processes of evaporation and condensation.
- 6.2** Topography is reshaped by the weathering of rock and soil and by the transportation and deposition of sediment.
- 6.5** Organisms in ecosystems exchange energy and nutrients among themselves and with the environment.

History–Social Science

- 3.1** Students describe the physical and human geography and use maps, tables, graphs, photographs, and charts to organize information about people, places, and environments in a spatial context.
- 3.2** Students describe the American Indian nations in their local region long ago and in the recent past.
- 3.3** Students draw from historical and community resources to organize the sequence of local historical events and describe how each period of settlement left its mark on the land.
- 4.1** Students demonstrate an understanding of the physical and human geographic features that define places and regions in California.
- 4.2** Students describe the social, political, cultural, and economic life and interactions among people of California from the pre-Columbian societies to the Spanish mission and Mexican rancho periods.

Below.

This section of the exhibition focuses on how humans and nature have created what’s under the surface of the Bay.

Underwater, as above, the Bay is a hybrid landscape in which human beings have manipulated natural habitats in an effort to enhance their productivity. People have influenced the water, sediments, plants, and animals of the Bay in a variety of ways. Some human activities take advantage of natural processes; others completely alter the natural world. The result is a place that is not purely a human or natural creation.



Upon entering this area, have your students start by examining the US Geological Survey map of the Bay floor. This provides a visual representation of the floor of the bay.

What do your students notice? The nearby label provides a key to the depth of the bay. Can they find the deepest spots? As the map moves through a virtual fly-over of the Bay, can they recognize and familiar landmarks? Have them listen to the sounds around them. What you are hearing is the “sonification” of wave data coming in from the Pacific. What does the sound make them think of?

Water

This section explores the importance of the Bay as an estuary and examines how contaminants have found their way to its waters over the years.

The Bay is at the bottom of a vast watershed that drains nearly 40% of California. We've modified many of the components of the watershed by damming and diverting rivers to provide water sources or prevent flooding. The result—coupled with contaminants that end up in the Bay from myriad sources—has changed the mix of tidal and freshwater (salinity) and water quality. While water quality has improved since we stopped putting sewage directly into the Bay, new contaminants are still of concern.

Find the wall of contaminants. Until the Clean Water Act of 1972, all kinds of sewage and toxins, like the ones on display here, ended up in the Bay.

Have your students examine the wall of containments. Do they recognize any? Do they think it is important to keep these things out?



Species

Here your class will be introduced to the diversity of life in the Bay. San Francisco Bay is one of the most biologically productive places on earth. From microscopic plankton to 10 ft. fish (and even the occasional whale!), the Bay is host to wide array of creatures that live in its many different habitats. Some creatures only stay for a short while—feasting when food is abundant or passing through to reproduce in upland rivers—others stay all year round.



Humans have always tapped into this diversity for sustenance, as well as introduced new species. Bay species that once seemed unlimited have been driven to the brink. Some species are showing signs of recovery, but we're also finding the non-native species that now call the Bay home sometimes threaten native plants and animals.

There are four native species (Bay Shrimp, Salmon, Sturgeon, Porpoise) and four non-native species (Atlantic Oysters, Soft Shell Clam, Overbite Clam, Shipworm) highlighted in the exhibition. See if you students can find each of them. What conditions have caused each of them to either become successful or have led to their decline?

Bay Floor

In this section, students will discover what lies at the bottom of the Bay. If we drained the waters of the Bay, the bottom would be as varied as the land surrounding it, with bedrock knobs, sandy shoals, ridges, boulders, and valleys. Human activity has altered this depth significantly over the last 160 years, from dredging, mining, and increased sediment.

As your student explore this area, have them notice the debris found at the bottom of the bay (particularly the cannon balls!) Nearby they'll find material related to the effects of gold mining. Have your students look through the stereoscope of pictures of hydraulic mining. How would they describe the landscape they see in the images? Nearby you'll find information about the accumulation of mercury in the food chain. Have them look for evidence of what happens to mercury once it enters the Bay.

Pulse of the Bay

In this section your students will be able to take on the role of scientists monitoring the health of the Bay by tracking its changes.

Here you'll find exhibits depicting some of the tools scientists use to keep tabs on what is going on in the Bay. Have students try the counting species activity or examine the tiny animals that live on the bottom of the Bay at the microscope display.



Above.

This section of the exhibition focuses on how humans have utilized the physical space of the Bay and its resources. The exhibition space presents layers of experiences, full of memories and stories. Beyond the entrance you'll see a large video display that will give your students a bird's eye view around the Bay.

As your students enter this space, have them stop and watch the video for a few minutes. *San Francisco Bay Area Shoreline Landscan* is an aerial portrait of the San Francisco Bay region. It is a counter-clockwise loop, starting by entering the Bay through the Golden Gate, heading south along the shore of San Francisco, then up the shore of the East Bay, along the shores of San Pablo Bay and Suisun Bay, then westward again, and back out the Golden Gate.



This work was produced by the The Center for Land Use Interpretation (CLUI). CLUI is dedicated to the increase and diffusion of information about how the nation's lands are apportioned, utilized, and perceived.

After watching a portion of the video, discuss with your students what they noticed about the bay and its shoreline. Does the Bay's shore appear to have been heavily altered by human activity, or does it appear to retain its natural appearance?

Central Map and Geo-Stations

Upon entering the main gallery space, your class will discover a large floor map of the Bay. Around this map are eight geo-stations; stories about the Bay's cultural and natural landscape. They include:

- Arch Rock: exploding islands and navigation trees
- Emeryville mudflats artwork
- Port of Oakland
- San Francisco: A City Built on Water Lots and Buried Ships
- Freeway exits at marsh landings
- Mercury Pollution from New Almaden
- Foster City/Redwood Shores
- Hydraulic Mining and Marsh Expansion

Explore the map with your students. Look for familiar landmarks (bridges, mountains, islands, etc.). Have students try to find their school, home or the location of the Museum. Pick out a couple of the geo-stations and go deeper into their stories.





Bridges

In this section, your students will find the first great era of infrastructure construction on the Bay. The story occurs in the 1930s, with the construction of the Bay Bridge, connecting the East Bay with San Francisco. Bridges altered how humans moved across, lived and worked on, and even experienced the Bay.

At the bridge building station, have your students build a replica of the new Self Anchor Suspension Bridge. Have them find the troll that was placed on the old eastern span of the Bay Bridge for luck after the 1989 Loma Prieta Earthquake. How would they describe it? What does it look like the troll is doing? Do they think it would bring luck?



Islands

This section explores the role islands have played in the story of the Bay. Here, people have used the natural barrier of open water to separate outsiders, and the undesirable from ordinary life on the mainland. In this section two islands are highlighted: Angel Island with the story of the detention center for Chinese immigrants and Alcatraz Island through the story of the occupation by Native Americans in the 1960s and 70s.

Have your students explore the space and examine the objects, sounds and images. What feelings come across while in this enclosure?

Shellmounds

This portion of the exhibit deals with the history of the Emeryville Shellmound. Before contact, Ohlone people built hundreds of shellmounds around the region as burial sites for high-ranking people, and as sites within sacred geographies. Their contents speak to the Ohlone relationship to the rich local environment. Perhaps one of the most historically immense, the Emeryville Shellmound is now almost completely obliterated. Long mis-interpreted as a “garbage dump,” the site tells a story of landscapes lost and found, and poses questions about who speaks for the past, and whose histories are inscribed on the landscape.

Have students examine the mural inside the exhibit. What activities can they find illustrated? What does it seem the Ohlone are using the shellmound for? What importance do your students think the shellmound had for the local Ohlone?



Military Landscapes

This area of the exhibition explores the important role the military has played in the Bay. At the entry to this section, a three-dimensional chart illustrates how much of the Bay's shoreline was taken up by the federal government for shipbuilding, weapons installations, and military bases. Inside ship models, Dorothea Lange photographs, Nike missile launch panels, and other artifacts illustrate the heyday of the military during WWII and the Cold War.

Have your students look for the Port Chicago story. On July 17, 1944, a massive explosion killed 320 men who were loading munitions on to a ship. In the museum's Gallery of California History your students will find information on what happened to the sailors who refused to return to duty after this terrible event.



Drawbridge

Traveling along the southern edge of the Bay today you'll find remnants of a collapsed wooden shack, docks and boardwalk rise up at the edge of the salt ponds. Weather-beaten wood, salty grist, rusted hardware and decaying detritus form a frame of a darkened ghost town room. This section depicts one of those outposts; Drawbridge.

Have your students open the doors and windows of the cabin to explore the lives of people who lived and foraged along the margins of the Bay. What animal helped keep Drawbridge going for so long?



Salt Ponds

Most visitors who arrive in the Bay Area by plane notice the patterns and colors along the southern edges of the Bay: outlined by dikes, pink and green. In this section, your students can re-create that view from above and solve the mystery of the Bay's salt flats, gradually becoming one of the world's leading experiments in habitat restoration.

Have your students look at the different ways salt is acquired and examine the working salt table to get a sense of where salt comes from. Have them look for evidence as to what causes the vivid colors of salt ponds.



Bay Futures

This lounge will provide points of entry for discussions about several current and controversial issues pertaining to the Bay; including sea level rise, wetlands restoration, invasive species, and climate change. Here your students can leave their thoughts about the future of the Bay. What do they think the Bay will look like in a hundred years? What should we do about rising water levels?



Above and Below: Stories from Our Changing Bay was produced by the Oakland Museum of California in partnership with the San Francisco Estuary Institute. The exhibition is supported by the California Department of Transportation, in partnership with the Bay Area Toll Authority and the California Transportation Commission to complete the seismic safety project on the historic San Francisco-Oakland Bay Bridge. The exhibition and related oral histories, school curriculum, and on-line resources help satisfy mitigation obligations required to comply with state and federal environmental laws.