Cabrillo Adventure Traveling Trunk

Cabrillo National Monument

OBJECTIVE

The Cabrillo Adventure Traveling Trunk is designed to introduce teachers and students to the historical, cultural, and natural resources of their National Park, Cabrillo National Monument. Several educational activities, videos, and books connect students to cultural and historical stories and to science conducted within the park.

Books

- *An Account of the Voyage of Juan Rodriguez Cabrillo*
- *The Lighthouses of San Diego*
- *Cabrillo: The Story Behind the Scenery*
- *The Lorax*
- *Plant, DK Eyewitness Books*
- *The Magic School Bus and The Climate Challenge*
- *The Big Green Book*
- *How Does A Seed Sprout*
- *In One Tidepool: Crabs, Snails and Salty Tails*
- *Seashore (One Small Square series)*
- *Coral Reefs (One Small Square series)*
- *The Secrets of Kelp Forests*
- *The Secrets of the Tide Pools*

- *Shells of San Diego*

DVDs

- *Eyewitness: Plant*
- *Eyewitness: Life*
- *Eyewitness: Seashore*
- *Eyewitness: Ocean*
- *Bill Nye the Science Guy: Ocean Life*
- *Bill Nye the Science Guy: Plants, Climate*
- *On the Edge of Land and Sea*

Activities

- *Activity 1: Bio-Bingo*
- *Activity 2: Biodiversity Web Game*
- *Activity 3: Intertidal Guess Who*
- *Activity 4: Native Plant Memory Game*
- *Activity 5: Create Your Own Flag*

How to Use this Trunk

The Cabrillo Adventure Traveling Trunk is designed to be used in a variety of ways. Most of the activities in the trunk can be adapted for any number of people for any amount of time. Some activities are better suited for entire-class participation (i.e. watching DVDs, Design Your Own Flag) while others are better suited for small groups (i.e. Guess Who, reading books, Matching Game). If desired, teachers can decide to set up stations of different activities and have groups of students rotate through them at prescribed times or allow students to explore at their own pace. Associated worksheets can be found at the back of the binder and copies can be made for each person in the class. Please return original copies to the binder for future users. The "Beyond the Classroom" activities are designed for teachers once the trunk returns to Cabrillo. It is our hope that the learning will continue beyond the Traveling Trunk, whether on a field trip to Cabrillo, in your own backyard, or elsewhere.

INTRODUCTION TO THE NATIONAL PARK SERVICE & CABRILLO NATIONAL MONUMENT

America's Best Idea

Writer and historian Wallace Stegner called national parks "the best idea we ever had. Absolutely American, absolutely democratic, they reflect us at our best rather than our worst."

Starting in the 1800s, the scenic natural wonders of the West – places like mineral springs in Arkansas, towering mountains and majestic trees of Yosemite, spouting geysers of Yellowstone, and the arid ruins of Casa Grande – inspired individual Americans to call for their preservation, asking their government to create something called "national parks." In 1916, the work of caring for these places was moved to a new agency created by Congress for that specific purpose. The National Park Service was given the responsibility to not only conserve and protect parks, but also to leave them "unimpaired for the enjoyment of future generations."

The job got bigger as the number and types of parks expanded. In the 1930s, military parks and national monuments were added. Then came national parkways and seashores, followed by urban parks in the 1960s. During the next decade, the size of the National Park system nearly doubled with the addition of 47 million acres in Alaska.

Now numbering 417, National Parks include places that commemorate more recent – and in many cases more sobering – history. The stories of the fight for civil rights, the World War II Japanese American internment camps, and Sand Creek, the site of the tragic Indian massacre in 1864, are all told in National Parks.

Over the years, the work of the National Park Service has moved beyond park borders. We are honored to be invited into America's communities to help build trails and playgrounds, return historic buildings to productive use, revitalize neighborhoods, expand affordable housing, protect watersheds, recognize and promote local history, and introduce the next generation to stewardship opportunities and responsibilities.

America's Best Idea just keeps getting better.

Courtesy of the National Park Service

Cabrillo National Monument

In 1913, recognizing the significance of the San Diego Bay and the importance of Juan Rodriguez Cabrillo, the first European to discover it, President Woodrow Wilson designated the one-half acre of land surrounding the Old Point Loma Lighthouse as Cabrillo National Monument. Cabrillo National Monument was designated a California Historical Landmark in 1932. As a historical unit of the National Park Service, Cabrillo was listed on the National Register of Historic Places in 1966.

Juan Rodriguez Cabrillo

Juan Rodriguez Cabrillo was born on the Iberian Peninsula and was of Spanish descent. On June 27, 1542, Cabrillo and his crew sailed north from Navidad, Mexico to "discover the coast of New Spain." He was in command of three vessels the San Salvador, La Victoria, and the San Miguel. On September 28, 1542, Cabrillo's fleet entered the harbor that is now San Diego Harbor. He described the harbor as "a closed and very good port." He named this new land San Miguel and stayed for six days to wait out a storm before continuing his voyage north up the coast.

On January 3, 1543, his goals of exploration unfulfilled, Cabrillo died. The circumstances are still a bit of a mystery. It may have been complications from a broken leg, or a broken arm near the shoulder. Whichever it may have been, the cause of his death was probably due to infection following an injury. In 1901, a stone was found on Santa Rosa Island, one of the Channel Islands. This stone depicted a stick figure of a man with the letters "JR" etched into it. This is the only clue left of his possible whereabouts upon his death. The exact location is still a mystery.

Old Point Loma Lighthouse

The Old Point Loma Lighthouse sits on the Point Loma Peninsula near the very top of this finger of land. Construction was completed in 1854, and in 1855 a Fresnel lens was installed, the best technology of that day. At dusk on November 15, 1855, lighthouse keeper James P. Keating lit the oil lamp for the first time. This lighthouse was one of the original eight lighthouses built along the West Coast of the United States. A dedicated lighthouse keeper was on duty 24 hours a day, seven days a week, with no vacations. It was a demanding job.

For the next 36 years the light welcomed sailors to San Diego Harbor. The lamps were rated to be seen at 26 to 28 miles, but mariners reported seeing the lighthouse light from 39 miles away. However, what at first seemed like an excellent location hid a serious flaw. Fog and

low clouds often obscured, or hid, the light from sailors at sea. On March 23, 1891, keeper Robert Israel extinguished the lighthouse lamp for the last time. Boarding up the lighthouse, Israel, with his wife Maria and their family, moved into the new lighthouse at the bottom of the hill, ending the Old Point Loma Lighthouse's career as a functioning lighthouse. The current lighthouse sits 88 feet above the water at the tip of Point Loma and is managed by the United States Coast Guard.

Despite its inability to serve as an effective light over San Diego Bay, the Old Point Loma Lighthouse became a favorite tourist destination that continues to illuminate past events that have shaped America's history. The lighthouse has endured years of neglect, vandalism, and even being painted green during World War II, but it has since been restored to its original 1880s appearance, giving visitors a glimpse into Point Loma's past.

Military History

The Point Loma Peninsula forms a natural protective barrier at the entrance to San Diego Bay, providing views of the harbor and ocean. In 1852, the Federal Government recognized its importance and designated the area a military reserve. In 1899, the War Department dedicated Fort Rosecrans and built a series of gun batteries, which continued to grow throughout the years and greatly expanded during World Wars I and II. Between 1918 and 1943 the Army constructed searchlight bunkers, fire control stations, and gun batteries, many of which can still be viewed at the park today. The radio station at Fort Rosecrans was the first to receive the call from Pearl Harbor on December 7, 1941, putting the military and nearby citizens on high alert. Cabrillo National Monument was closed to the public soon after and remained a full-time military base until the end of World War II.

Terrestrial Ecosystems

Lots of sun and only a few rainy days a year describes the Mediterranean climate San Diego is known for. This climate is defined by a short rainy season (November-March), followed by a long dry season (April-October). This climate is only found in about 2 percent of the world in five locations. Besides Southern California, other regions which have a Mediterranean climate include the Mediterranean Basin, the Western Cape in South Africa, Central Chile, and Southwestern Australia.

This climate forces plant species to adapt to long periods without water. The two dominant plant communities at Cabrillo are Coastal Sage Scrub and Maritime Chaparral. These two plant communities hold a wide variety of species that have adapted to this climate.

Development has swallowed over 70 percent of these ecosystems in Southern California. Cabrillo National Monument holds an excellent example of these rare and sensitive plant communities and the animals that call them home.

The Rocky Intertidal

The Rocky Intertidal Zone is another unique ecosystem within Cabrillo National Monument. This zone is the area between the ocean and land. Marine plants and animals living here have adapted to harsh conditions including pounding surf, exposure to sun and wind during low-tide events, and varied temperatures and salinity.

The tides that influence this region are created by the gravitational pull from the moon and sun upon the Earth. Spring tides are present when the Earth is in a straight line with the sun and moon. This creates the highest high and lowest low tides of the season because of the gravitational pull of the Sun and Moon against the Earth working optimally against each other. Every day there are four tides in San Diego. These are called Mixed Semidiurnal tides because there are two high tides and two low tides of differing heights. San Diego's tides include High-High, Low-High, High-Low, and Low-Low tide each day. With this daily influx of available water, plants and animals have adapted to survive and thrive in this extreme environment.

The tidal cycle has created three zones within the intertidal, each characterized by different abiotic (non-living) and biotic (living) factors. The high zone is the upper-most area that is only covered in water during high tide and exposed to the Sun at all other times. The middle zone is exposed during low tide and submerged during high tide; it is home to more organisms than the high zone. The low zone is submerged except during the lowest of low tides several times a year. The low zone contains the greatest number of organisms, or highest biodiversity, of the three zones, but the species face greater predation pressure and other biotic stressors.

Biodiversity

San Diego is home to a large variety of plant and animal species. Biodiversity is defined by breaking the word into its two parts: the root "bio" means life, and "diversity" means variety. Therefore, the "variety of life" found in a given area is its biodiversity. San Diego is designated as a Biodiversity Hotspot, which means there is a particularly high variety of life and endemic species, or those native to this area. However, the term "hotspot" also

means that this biodiversity is threatened by human impacts, including urbanization and pollution.

To Learn More

Cabrillo National Monument:

https://www.nps.gov/cabr

Juan Rodriguez Cabrillo:

https://www.biography.com/people/juan-rodriquez-cabrillo-090115

Biodiversity:

http://www.nationalgeographic.org/encyclopedia/biodiversity/

http://thekidshouldseethis.com/post/why-is-biodiversity-so-important-ted-ed

San Diego as a Biodiversity Hotspot:

"Five Habitats of San Diego" on YouTube – https://youtu.be/CLyXOFn7488

Coastal Sage Scrub:

"Coastal Sage Scrub" on YouTube - https://youtu.be/BuxticCTj7k

ACTIVITY 1: BIO-BINGO

l of this activity is to guide student learning and engagement while watching the provided DVDs. The Bingo board is intentionally designed to be open-ended so that students will think a little deeper about the information presented.

NGSS Standards

K-5 PRIMARY: K-LS1-1. 1-LS1-2. 2-LS4-1. 2-ESS2-3. 3-LS2-1. 3-LS4-2. 3-LS4-3. 3ESS2-2. 4-LS1-1. 5-LS2-1.
MIDDLE SCHOOL: MS-LS1-5. MS-LS1-6. MS-LS2-2. MS-LS4-4. MS-LS4-5.
HIGH SCHOOL: HS-LS4-4.

Materials/Set-up

Each student will need one Bingo sheet per DVD watched. This activity works for any DVD provided in the trunk, and teachers can choose to play as many as desired. Each DVD runs for 20-30 minutes.

Background/Rules

This activity works as any other Bingo activity does, and it is suggested that students write or draw the organism in the box. This is not only so that students can remember these organisms at the end of the game, but to show a defining characteristic of biodiversity – that the same descriptors can be used to describe vastly different organisms, and similar organisms can be described in a variety of ways. It is possible that at the end of the game, no two students in the class will have the same organism written down in a given box. This should prompt a discussion that compares and contrasts the different organisms the students learned about in the DVD to reinforce the concepts of biodiversity and adaptation. Throughout the course of the game, students may see an organism that could fit into a number of boxes on the Bingo board. However, they must choose only one box per organism. Students may not use the same organism to mark off multiple boxes. For example, "sea snail" may fit into the "something that crawls" box and the "something smaller than you" box, but students must choose only one box and fill in the other with a different organism later on.

Procedure

1. Hand out Bingo sheets to each student.
2. Define the rules of the game described above. Teachers can decide whether they want to play "5 in a row," "X marks the spot," "blackout" (preferred), another variation of the game, and/or incentivize a prize.
3. Play the DVD of choice and let students fill out the board as the movie progresses.
4. At the end of the DVD, allow students to compare their board with those around them. Then, prompt a discussion based on the questions below.

Discussion Questions

5. Did those around you have the same things written/drawn in the boxes on your board? Why or why not?
6. Was it easy or difficult to fill the boxes on your board? If it was easy, explain how this relates to high biodiversity. If it was difficult, explain why.
7. Look at what you wrote in the "something that doesn't belong" box. What can you do to ensure that item doesn't end up in rivers, oceans, forests, or other natural places? (If you didn't have anything written, think of what you could have written to answer the question).
8. What is one thing that you learned that you didn't know before?

ACTIVITY 2: BIODIVERSITY WEB GAME

This activity builds understanding of how the biodiversity of an ecosystem is interconnected. In this activity, students will be able to see and feel the impacts and connectivity of species within the ecosystem. This game has two versions, one terrestrial (land) and one intertidal (ocean).

NGSS Standards

K-5 PRIMARY: K-LS1-1. K-ESS3-1. 1-LS1-1. 1-LS3-1. 2-LS2-1. 2-LS4-1. 3-LS3-2. 3-LS4-3. 3-LS4-4. 4-LS1- 1. 4-ESS2-1. 5-LS2-1.
MIDDLE SCHOOL: MS-LS1-4. MS-LS1-5. MS-LS2-1. MS-LS2-2. MS-LS2-4.
HIGH SCHOOL: HS-LS2-1. HS-LS2-2. HS-LS2-6.

Materials

- Green lanyard pouches (30 per set – one Intertidal and one Terrestrial)

Key Vocabulary

- Biodiversity: the variety of life; "bio" meaning life, "diversity" meaning all the differing kinds in an area.
- Community Scientist: an individual who voluntarily contributes his or her time, effort, and resources toward scientific research in collaboration with professional scientists or alone. These individuals don't necessarily have a formal science background.
- Naturalist: a person who studies plants and animals as they live in nature.
- Organism: an individual animal, plant, or single-celled life form.
- Habitat: where an organism lives and grows.
- Ecosystem: a system, or a group of interconnected elements, formed by the interaction of a community of organisms with their environment.
- Native species: plants and wildlife that exist naturally in a given area and have not been introduced by humans.

- Invasive species: a species that is not native to a specific location (an introduced species) that has established and spread. Such invasive species may be plants, animals, bacteria, or fungi, and may disrupt the ecosystem by out-competing native species and dominating these habitats or regions.
- Endemic species: species that exist in only one geographical region.
- Predator: an animal that hunts, kills, and eats other animals.
- Prey: an animal that is hunted and killed by another for food.
- Pollinator: something, such as an insect, that carries pollen from one plant to another, which helps plants reproduce.
- Urbanization: the process of an increasing population building in more rural areas as urban areas spread outward from city centers.
- Phenological mismatch: The phenomenon of food and habitat being available at different times than those to which the species was formerly cued. For example, the flowering of a certain plant prior to its insect pollinators hatching.

Procedure

1. Pass out lanyards to students. Have students form a circle and silently read the card on the back of their lanyard and note which species they are (pictured on the front).
2. Instruct students to unzip the pouch and remove the two cords inside. In turn, have each student read their card and build the cord connections to the **bolded** species in their card's description.
    a. *Note that every species will end up with a different number of connections.*
3. When the web has been built, point out to students how this ecosystem and its species are connected in multiple ways. Mention how this goes beyond a simple food-web and how the species are connected to each other. Have individual students tug their cords to demonstrate the interconnectedness of these species.
4. Have students holding an invasive species or stressor (red cords) give their cord a tug. Discuss how each of these have a big impact on the ecosystem in a negative way.
5. Reflect on how all these species are interconnected. Now ask students what they think will happen if even one of the species is removed.
6. Replace all cords to their pouches and collect lanyards.

**Note: if you don't have 30 participants for the game, you can take out as many lanyards as necessary. You can also have some students hold multiple pouches. Not everyone has to read.*

Discussion Questions

1. What stood out to you after doing this activity?
2. What did you notice when you pulled on the cords connected to your species?
3. How was your species affected by the invasive species/stressors – directly or indirectly?
4. If one species is removed, how would that affect the other species within the web?
5. Has your view of biodiversity changed? How so?
6. Why is biodiversity important in an ecosystem?

ACTIVITY 3: INTERTIDAL GUESS WHO

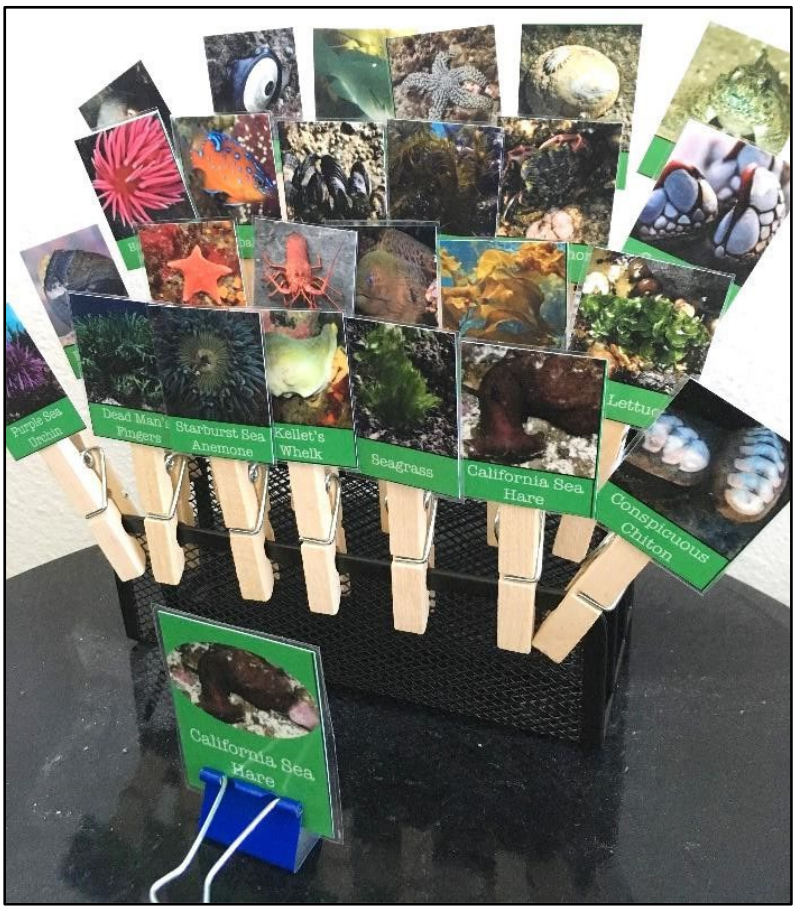
Southern California's temperate oceans support some of the greatest biodiversity in the world. The purpose of this game is to highlight this biodiversity while looking closer at life that students may have never seen before.

NGSS Standards

K-5 PRIMARY: K-LS1-1. 1-LS1-2. 2-LS4-1. 3-LS4-2. 3-LS4-3. 3-LS4-4. 4-LS1-1. 5-LS2-1.
MIDDLE SCHOOL: MS-LS1-5. MS-LS2-2. MS-LS-2-4.
HIGH SCHOOL: HS-LS4-4.

Materials/Set up

To set up the game, clip the 24 clothespin pieces to the black letter holder in any order with all of the blue pieces together, and all of the green pieces together. The binder clips can be used to hold each person's larger card. After setup, one person's side of the game should look like this:



Background

About the plants and animals in the game (24 total):

- Owl Limpet (*Lottia gigantea)*: Commonly found on rocky faces throughout the high and middle intertidal zones, Owl Limpets are approximately 10 cm (4 inches) or greater in length. They have a lumpy, low profile shell that is mottled white, brown, and black.
- Hopkin's Rose Nudibranch (*Okenia rosacea)*: Commonly found in the middle to low intertidal zone from Oregon to Baja California, the Hopkin's Rose Nudibranch can grow as long as 2.5 cm (1 inch). The Hopkin's Rose Nudibranch is bright pink and has long tentacle-like structures to deter predators.
- Gooseneck Barnacle (*Pollicipies polymerus*): Gooseneck Barnacles are common in the middle intertidal of the rocky shore. Goosenecks average about the size of an adult male's finger but can be as long as 13.8 cm (6 inches). True to their name, these barnacles have a fleshy, chalk-white stalk that resembles the neck of a goose.
- Moray Eel (*Gymnothorax mordax*): Commonly found in shallow waters and near rocky reefs all over the world, the Moray Eel is actually a toothed fish. This carnivore can grow up to 4.6 m (15 feet) and is known to live as long as 30 years. These eels secrete a protective mucus from their skin, giving them their distinct yellow-green color.
- Seagrass (*Phyllospadix scouleri)*: Commonly found in the low tidal zone from Southern Alaska to the tip of Baja California, Seagrass is a true flowering and pollinating marine plant. It is dark green and can be found at depths up to 12-15 m (40-50 feet). Seagrass grows in dense meadows connected by a root-like system of rhizomes, creating important habitat for a variety of organisms.
- Striped Shore Crab (*Pachygrapsus crassipes)*: Usually found throughout the mid to high intertidal zone from southern Oregon to Baja California, the Striped Shore Crab can grow up to 4.8 cm (2 inches). Striped Shore Crabs normally live in rock crevices, tide pools, and mussel beds. These crabs get their name from the colorful stripes on their backs.
- Starburst Sea Anemone (*Anthopleura sola)*: The Starburst Sea Anemone is mostly found in low tidal zones along the coasts of Southern California and Central America.

These sea anemones can grow up to 23 cm (10 inches) long. They are mostly green and blue and resemble an upside-down jellyfish.

- Giant Kelp (*Macrocystis pyrifera)*: Giant Kelp is commonly found along the coast from Santa Cruz to Mexico, and along the temperate coasts of South America, New Zealand, and Australia. Kelp can grow up to 53 m (175 feet) and up to 0.6 m (2 feet) each day! Found in various shades of brown, Giant Kelp has hollow gas-filled bladders called pneumatocysts that help the plant float and reach more sunlight.
- Sea Lettuce (*Ulva californica)*: Sea Lettuce is found globally and lives in the low and middle intertidal. Additionally, it is found deeper than 23 meters (75 feet) underwater. Sea lettuce can grow to be 8-15 cm (3-6 inches) long and can be varying shades of green.
- Black Turban Snail (*Tegula funebralis)*: This snail is commonly found between rocks in the middle tidal zone throughout the west coast of North America. The Black Turban Snail can typically grow about 2.5 cm (1 inch) long. These snails have a thick, dark, cone-shaped shell with a light-colored rounded tip.
- California Spiny Lobster (*Panulirus interruptus)*: California Spiny Lobsters are sometimes found in the middle intertidal zone but mainly live in deeper waters from Southern California to Baja California. Spiny Lobsters can grow up to 30 cm (12 inches) in length. Spiny Lobsters are often a dark red and orange color with multiple spines on their bodies.
- Garibaldi (*Hypsypops rubicundus)*: Commonly found in the low intertidal zone from Monterey Bay to the tip of Baja California. The Garibaldi is the state marine fish of California. These fish can grow to be 36 cm (14.5 inches). As adults, they are bright orange in color and live in the kelp forest. Juveniles are found in the low intertidal zone and are bright orange with blue dots on the top of their bodies.
- Knobby Sea Star (*Pisaster giganteus)*: Also known as the Giant Sea Star, Knobby Sea
- Stars are found in the low intertidal and subtidal along the coast from British Columbia to Mexico. Knobby Sea Stars grow to be about 46cm (18 inches) in diameter. As their name suggests, their bodies are covered with small white knobs.
- Bat Star (*Patiria miniata):* Bat Stars can be found on hard surfaces in the low tide zone and subtidal along the Pacific Coast from Alaska to Baja California. They grow

to be 15-20 cm (6-8 inches) in diameter, and can be brown, orange, or shades of purple. As their name suggests, they have webbing in between their arms that makes them look like bat wings.

- Purple Sea Urchin (*Strongylocentrotus purpuratus*): Sea urchins are commonly found in the subtidal kelp forest from Alaska to Baja California but, can also crawl to the low intertidal zone. They hide beneath shells and under rocks to protect themselves from the sun. Sea urchins can be up to 7 cm (3 inches) in diameter and resemble a purple pin cushion.
- Blue-Legged Hermit Crab (*Pagurus samuelis*): The Blue-Legged Hermit Crab can be found along the Pacific Coast from British Columbia to Baja California in the rocky intertidal. This 2.5 cm (1 inch) long crustacean has 10 legs, though often only six are showing outside their shell. True to their name, they can be recognized by bright blue bands on their appendages.
- California Mussels (*Mytilus californianus*): Mussels are commonly found throughout the intertidal zone attached to hard surfaces. California mussels live along the Pacific coast from Alaska to Baja California. These Mussels are commonly 7-12 cm (3-5 inches) long and have a black teardrop-shaped shell.
- Kellet's Whelk *(Kelletia kelletii*): Commonly found from Monterey Bay to Baja California, the Kellet's Whelk commonly lives in the low intertidal zone or subtidal. It is one of the largest gastropods and can grow up to 18 cm (7 inches) in length. They have a tan spiraled shell that is often covered in algae, which camouflages the snail.
  • Two-Spot Octopus (*Octopus bimaculoides*): The Two-Spot Octopus can be found from Central California to Baja California in the middle intertidal to depths of about 50 feet. They are usually a mottled brown color and grow to be around 1 m (3 feet) long. They are distinguished by their blue faux eye spots below their actual eyes, which confuse both predators and prey.
- Wooly Sculpin (*Clinocottus analis*): The Woolly Sculpin is common in the low and mid intertidal zones from Northern California to Baja California. These intertidal fish are typically 7-12 cm (3-5 inches) long. They live along the sea floor and are mottled brown, white, and black in color to blend in with their sandy, rocky environment.

- Conspicuous Chiton (*Stenoplax conspicua*): The Conspicuous Chiton is commonly found on the rocks in the middle to low intertidal zone from Santa Barbara to Baja California. Chitons have eight shell-like plates to protect them from predators. On average, these chitons grow to be about 10.5 cm (4 inches) long. Like snails, they have a tooth-like structure known as a radula to eat algae off the rocks.
- Feather Boa Kelp (*Egregia menziesii):* Feather Boa Kelp is commonly found in the mid to low intertidal zones along the Pacific coast from Alaska to Mexico. This alga is usually dark brown and olive green and can grow to be 10 m (32 feet) long. As their name suggests, Feather Boa Kelp has long, feather-shaped blades.
- Dead Man's Fingers (*Codium fragile)*: Dead Man's Fingers is a marine plant that can be found in the low and middle intertidal zones throughout the Pacific Coast. This alga grows in dense clumps, and individual "fingers" can grow up to 40 cm (16 inches) long. It is a dark green color with a spongy texture, hence its other common name, Sponge Weed.
- Opaleye (*Girella nigricans)*: Opaleye fish are commonly found in shallow waters off the southern coast of California and northern Mexico. Juveniles are found in the intertidal and grow to 5-10 cm (2-4 inches) before moving to the subtidal as larger adults. Opaleye have small white spots on their backs and bright blue-green eyes.

- **Procedure**

1. This is a two-player game (though there can be teams) – blue versus green.
2. Each participant will randomly choose a card from the pile, hiding it from the other player. This is the organism that their opponent is trying to guess.
3. Participants will take turns asking specific yes/no questions to determine the organism on the other persons' card. This game works via process of elimination, where players eliminate potential organisms from their board based on the answers to their questions.

   For example:

   a. Player 1 asks Player 2, "Is your organism a plant?"

   b. Player 2 answers, "Yes."

   c. Based on this information, Player 1 can eliminate all of the animals from their board.

   d. Now, it's Player 2's turn to ask a question.

4. Continue in this fashion until one of the players guesses the other's organism. They can make a guess during any of their turns.
5. The first person to guess their opponent's organism wins. Teachers can choose to offer a prize or incentive for winning.

ACTIVITY 4: NATIVE PLANT MEMORY GAME

This is a fun way for students to learn some of the 10 most common native plants at Cabrillo National Monument. The game consists of 10 photos and 10 name cards that coincide with each plant. The objective of the game is to match each plant with the correct corresponding name. The player with the most matches wins. This game can be played with one to four people.

NGSS Standards

K-5 PRIMARY: K-LS1-1. K-ESS3-1. 1-LS1-1. 1-LS3-1. 2-LS2-1. 2-LS4-1. 3-LS3-1. 3LS3-2. 3-LS4-2. 3-LS4-3. 4-LS1- 1. 4-ESS2-1. 5-LS1-1. 5-LS2-1.
MIDDLE SCHOOL: MS-LS1-4. MS-LS1-5. MS-LS2-1. MS-LS2-2. MS-LS2-4. MS-LS4-4.
HIGH SCHOOL: HS-LS1-5. HS-LS2-1. HS-LS2-2. HS-LS2-6.

Materials

- 2 sets of Master Cards: 10 cards with names and pictures together
- 3 sets of 20 cards: 10 plant names and 10 corresponding plant pictures

Key Vocabulary

- Ecosystem: a community of living organisms (plants, animals, bacteria, and fungi) living in a given area, interacting with each other and with their nonliving environments (weather, sun, atmosphere, soil, climate).
- Habitat: the natural home or environment of a plant, animal, or other organism.
- Adaptation: a change or the process of change by which an organism or species becomes better suited to its environment.
- Biodiversity: the variety of life; "bio" meaning life, "diversity" meaning all the differing kinds in an area.
- Biodiversity Hotspot: a region that has particularly high biodiversity and is under threat of destruction. San Diego County is an example of a Biodiversity Hotspot.
- Native Plant: a plant that evolved naturally in an ecosystem.

ACTIVITY 5: MAKE YOUR OWN FLAG

Procedure

1. Optional: The Master Cards can be used to familiarize students with the names and characteristics of each plant prior to playing the game. They can also be used as a reference to make sure the matches are correct.
2. Place all 20 cards face down on a desk or table.
3. Mix up the cards on the desk/table.
4. Put the cards in four rows of five cards each.
5. Each player takes a turn turning over two cards each turn.
    a. The game moves in a clockwise direction, each person getting a turn.
6. When the player turns over a plant and its corresponding name, they pick up both cards.
7. When all the cards have been picked up, the player with the most cards wins that round.

Juan Rodriguez Cabrillo's flagship, the *San Salvador,* sported the Spanish Royal flag, which depicted lions and castles in hues of red and gold. The flag let other people know where the ship came from and who might be on the ship. In this activity, students will create their own flags to tell their own stories.

Materials

- Copies of the flag template for each student
- Crayons/colored pencils/markers for each student

Background

Throughout history, flags have been used to identify individuals, groups of people, and entire countries. Flags were especially important when explorers went to new lands. Not only did their flag tell other people where they came from, it told the people who viewed it things about their homeland; what made it unique and special. This is all portrayed through colors, symbols, and picture drawings (words and writing were not used on flags).

Procedure

1. As explorers to Cabrillo National Monument, your students' job is to put symbols, designs, and colors on their flag that represent them, your classroom, or your school. For example, they may want to put your school mascot on the flag. If their neighborhood is by a valley, mountain, or water, they can add a picture representing that to their flag as well. Encourage creativity.
2. Flags were typically broken down into different sections, so each symbol could be easily identified. Students may choose to break up their flag in different ways, or leave it whole, depending on their style.
3. Mount your flags around your classroom and have each student discuss why they designed their flag the way they did.

BEYOND THE CLASSROOM ACTIVITIES

These activities are designed to take what students learned from the trunk out of the classroom and into the real world. Whether at Cabrillo or elsewhere, we hope that students and teachers continue to explore their world and work to make it a better place.

3D Cabrillo

The 3D Cabrillo program is designed to blend technology and nature and to make the Rocky Intertidal more accessible by creating 3D-printed biomodels of common intertidal organisms. A full library of free, downloadable, ready-to-print intertidal organisms can be accessed by visiting Cabrillo National Monument online at: https://www.nps.gov/cabr/learn/nature/3d_cabrillo_library.htm.

To create your own models, take any of the .STL files to your local library or personal 3D printer. In addition, the full curriculum can be accessed from our website (www.nps.gov/cabr), and be sure to check out Cabrillo NPS on YouTube for the *How It's Made – 3D Cabrillo* video.

BioBlitz

"Bio" means "life" and "Blitz" means a sudden, energetic, and concerted effort, typically on a specific task. When combined they make "BioBlitz", a concentrated effort to discover and document as many species of plants, animals, and other organisms in a 24hour period. This helps map the biodiversity of a given area and can be used as a tool to measure impacts and changes over time. This 'snapshot' of biodiversity is a great way to connect the community with citizen science and the outdoors in a fun, interactive, and engaging way.

Conducting your own BioBlitz can take place anywhere, whether in your schoolyard, a local park, or elsewhere. This activity is designed to highlight the importance of citizen science through the app iNaturalist, which can be downloaded for free on any mobile device. This app allows its users to document observations of life in their local area, including plants, animals, and insects. This information can be accessed by other iNaturalist users around the world, and when pooled together, this data can give us a better picture of our local ecosystems.

To find out more information about conducting your own BioBlitz, visit Cabrillo NPS on YouTube for the *How to iNaturalist* video in both English and Spanish, or find the curriculum online at:

https://www.nps.gov/cabr/learn/nature/cabrillobioblitz.htm

Beach Cleanup

(Adapted from I Love A Clean San Diego)

As a result of littering, overflowing trash cans, and natural forces, a lot of trash finds its way into our natural environment. Once this trash is picked up by rainwater or wind, it can travel into rivers, down storm drains, and eventually make its way to the ocean. Marine debris can affect ecosystems both locally and globally as the trash moves in ocean currents. It can be extremely harmful to marine organisms that may consume or become entangled in the trash.

Furthermore, landfills are quickly filling due to the estimated 5 pounds of trash Southern Californians produce per person per day, equating to thousands of pounds per year. As a result, San Diego has recently adopted a "zero-waste" philosophy, which attempts to eliminate the use of landfills altogether by reducing consumption, reusing goods, and recycling paper, plastics, and metals. Eliminating waste will not only help to ensure that this debris doesn't end up in the natural environment, but existing natural resources aren't over exploited, either.

We encourage students and teachers to get involved in the effort to minimize marine debris by hosting their own beach cleanup or getting involved in existing efforts. Many organizations in San Diego host regular beach cleanups. To find out more, and learn how you and your students can get involved, visit:

- I Love A Clean San Diego: http://www.ilacsd.org/
- San Diego Coast Keeper: http://www.sdcoastkeeper.org/
- Surfrider Foundation: https://sandiego.surfrider.org/beach-cleanups/

However, we understand that getting students to the beach isn't always feasible. Instead, classrooms can host their own "campus cleanup," which can be just as important in ensuring that waste doesn't end up in our waters. All you need to host a campus cleanup are trash bags, gloves, and students! Begin the activity by having a short discussion about landfills and recycling. Then, designate an area and instruct students to pick up all the trash that

they see within the allotted time. Be sure to sort recyclables (paper, cardboard, metal, hard plastics) from landfill items, and instruct students to avoid handling hazardous waste (batteries, electronics, rusted metals, etc). If students do encounter hazardous waste, instruct them to inform an adult or professional rather than picking it up themselves. After the cleanup, ensure all the trash makes its way to a nearby dumpster/recycling bin. Optional: weigh the trash, sort and graph the data, and/or create an art project from your collection.

It's our sincere hope that by participating in the activities within this trunk, students will be inspired to help us preserve and protect these amazing stories for the next generation of park stewards.