



Cabrillo Marine Aquarium Lesson Plan

Grade Level: Kindergarten

Title: What Belongs on a Beach?

Objective: Students will determine what belongs in a natural beach environment and what doesn't.

California Science Standards: K: 3a, 3c, 4e

Time to Complete: 30 minutes

Materials Provided by CMA Ocean Discovery Kits: *Worksheet: What Belongs on a Beach?, Photo: Stormdrain, Photo: Trash on the Beach*

Materials Provided by Teacher: Copies of coloring sheet

Vocabulary: Non-natural (man-made), habitat, pollution, harmful

Lesson Outline:

1. Discuss the beach environment using *Worksheet: What Belongs on a Beach?*
What can they see? What makes a beach a beach? Is the beach a habitat or a place where animals live? What animals do they see?
2. Ask students if they can see some things that do not belong on the beach.
3. Ask students if they would want to swim in a dirty ocean or build a sandcastle on a dirty beach.
4. Ask students to circle the objects that do not belong on a beach and draw a line to cross them out.
5. Color in the rest of the picture. Students can draw themselves into the picture doing their favorite beach activity.

Lesson Wrap-Up:

1. Ask students if they've been to the beach (or a park) before and seen trash? What did they do with the trash (leave it where they found it? put it in the trash can / recycling bin?)
2. Ask students if they've noticed trash in the street outside in their neighborhood. What do they do when they see trash in the street?

Lesson Extensions:**Storm Drains**

1. Do students know that trash in the street can get pushed to storm drains and end up in the ocean? Trash moves from streets to storm drains, then to rivers and moves through the rivers to the ocean when it rains.
2. Storm drains are meant to carry water from our streets to the ocean, but many times non-natural (trash) items get mixed in with the rain water on our streets.
3. By removing trash from the streets, it's just like crossing out the trash on their picture! The trash doesn't go to the ocean and we help to keep our oceans clean.

Further Student Exploration:**Learning about Storm Drains**

1. Locate the nearest storm drains around your school. Notice there might be a picture painted on the sidewalk over the storm drain (of a dolphin or other ocean animal).
2. Ask students to notice what materials you find around the storm drains.
3. Divide materials into natural and non-natural (man made) categories.
4. Remind students about the most recent rainstorm. Do they remember seeing a lot of water in the street? Did it look like a small river? Ask them where all those items in the street and by the storm drain would go if water was running into the storm drain.
5. Option: take a trash/recycle bag with you and remove the small and large trash items from the storm drain area, using gloves if necessary.
6. Congratulate your students for helping to keep the ocean clean.



Cabrillo Marine Aquarium

Lesson Plan

Grade Level: Kindergarten and Second Grade

Title: Natural or Man-Made?

Objective: Students will practice sorting. Students will be able to distinguish between natural and man-made objects. Students will be able to discuss the negative impact trash can make on the environment.

California Science Standards: K: 1a, 3c, 4c-b, 4d-e 2nd: 4c

Time to Complete: 30 minutes

Materials Provided by CMA Ocean Discovery Kits: *Worksheet: What Belongs on a Beach?*, Assortment of Shells, Gorgonians, Rocks, Feathers, Driftwood, Pieces of Fake Seaweed (Eelgrass), Packing Peanuts, 6-Pack Rings, Balloons with Ribbon, Pieces of Fishing Line, Pull Tabs from Soda Cans, Metal Bottle Caps, Nurdles

Materials Provided by Teacher: Add objects you can find from around your classroom and school such as plastic bags, glass bottles, leaves, pens, cups, etc.

Vocabulary: Natural, man-made, plastic, metal, glass, nurdles, fishing line, shell, rock, feather, seaweed, wildlife

Teacher Preparation:

- Place an assortment of natural and man-made objects into paper bags or bins for each team.

Lesson Outline:

1. Using the *Worksheet: What Belongs on a Beach?*, discuss what objects in the picture come from nature and can be considered “natural.” Discuss which objects are man-made (made by people).
2. Divide students into five teams. Each team should be able to work together around a workspace.
3. Place a mix of natural and man-made objects on their table and ask them to sort them by separating things that are natural and things that are man-made.

Lesson Wrap-Up:

1. Discuss with your students which group of objects is okay to find outside in nature/in your school yard.
2. Ask your students what harm some of these man-made objects can present to wildlife or to humans if they were left outside.

3. Discuss who is responsible for keeping these man-made objects from harming nature.

Clean-up:

1. Please carefully separate the items provided by CMA and any items you may have provided.
2. Return items provided by CMA into the appropriate bags.

Lesson Extensions:

1. Students can further sort items (natural objects can be sorted by things that come from plants and things that come from animals; man-made objects can be sorted by things that are made from plastic, polystyrene, glass, metal).
2. You can follow up this lesson by doing a beach cleanup and/or the ***Worksheet: Schoolyard Survey*** located in the 3rd grade section of the Ocean Discovery Kit Binder.



Cabrillo Marine Aquarium Lesson Plan

Grade Level: Third Grade

Title: Animal Tales

Objective: Students learn about the characteristics of marine animals that can make them susceptible to the hazards of marine debris.

California Science Standards: 3rd: 3a-c

Time to Complete: 40 minutes

Materials Provided by CMA Ocean Discovery Kits: *Reading Handout: Animal Tales, Photo: Lobster/Crab Trap*, Piece of Fishing Net, Fishing Line or Rope, Six-Pack Ring, Balloon and Ribbon, Popped Balloon (in jar of water), Nurdles, Other Types of Debris (such as a Pull Tab from a Can, a Metal Bottle Cap and a Glass Bottle)

Materials Provided by Teacher: Plastic Cup/Plate/Bowl, Plastic Shopping Bag, any other objects you'd like to add from around your classroom

Vocabulary: Endangered species, threatened species, entanglement, ingestion, resin pellets/nurdles, debris, harmful

Lesson Outline:

1. Place the items of debris on the floor in the middle of the classroom and have students form a circle around the items. Read the description of the seal on the "Animal Tales" handout, or ask one of your students to read it to the class. (NOTE: You might want to make copies of the handout and distribute it to the students so they can follow along.)
2. Choose a volunteer to be a seal and ask him or her to go into the center of the circle and pick up an item of debris that might harm a seal. Ask the "seal" to tell how and why it might become injured by their piece of debris. Encourage students to think about how animals could become entangled in the debris items, plus how the animals might eat the items, mistaking the debris for food.
3. Repeat this procedure for the remainder of animals on the handout. After you have finished, ask the students if they can associate any other pieces of debris with one of the animals in a way that the class has not yet discussed.

Lesson Wrap-Up:

Explain that many species of mammals, sea turtles, birds and fish that encounter marine debris are endangered or threatened. Ask students how marine debris

could pose special problems for these species. End your discussion by helping students to understand that **any** animal that lives in the ocean or along the coast can be affected by marine debris.

Lesson Extensions:

1. Have students locate photographs, artwork or articles describing the impacts of marine debris on wildlife. Students can work individually or in pairs to research a particular type of marine wildlife and develop a “photo essay” or brief presentation about how marine debris harms a particular species. Students could also focus on a particular type of marine debris and its impacts on wildlife in general.
2. Take students on a field trip to an aquarium or nature center/reserve, where they can learn about endangered and threatened species that might be harmed by marine debris. Contact the aquarium or nature center/reserve in advance and ask for a guided tour that emphasizes the problems that marine debris poses for endangered and threatened species.

References:

- NOAA Turning the Tide on Trash
<http://marinedebris.noaa.gov/outreach/pdfs/101turntd.pdf>



Reading Handout: Animal Tales



RING-BILLED GULL

Larus delawarensis

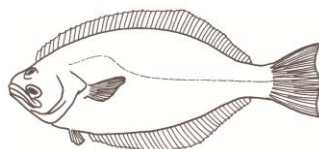
I am a scavenger. I look for food in the piles of seaweed and shells that wash up on the beach by the tides. If I can, I will eat food that has already been caught by someone or something else. I also like to eat fish eggs, which are round and clear.



CALIFORNIA SEA LION

Zalophus californianus

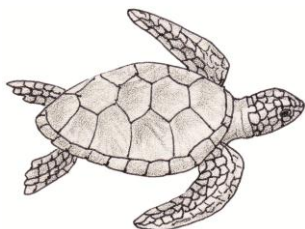
I like to splash in the water and I am curious about new things. I always investigate floating objects on the surface of the ocean. My nose is perfect for poking into things, but sometimes it can get stuck.



CALIFORNIA HALIBUT

Paralichthys californicus

I live on the bottom of the ocean and camouflage with the sandy bottom. If a lot of smaller, silvery fish gather above me, I may swim up closer to see if I can eat them for lunch.



GREEN SEA TURTLE

Chelonia mydas

I am a turtle that lives in the ocean. One of my favorite foods are sea jellies (jellyfish). Jellies float near the surface of the water and you can see right through them!



PACIFIC ROCK CRAB

Romaleon antennarius

I walk along the bottom of the ocean searching for food. Sometimes I find a meal inside a wooden crate resting on the ocean floor, but once I get into the crate, I cannot get out again.



Cabrillo Marine Aquarium Lesson Plan

Grade Level: Fifth and Seventh Grades

Title: An Albatross Mystery

Objective: Students will: (1) learn the life history of albatross including where they live, what they eat, and where they nest; (2) investigate the human impact on albatross populations.

California Science Standards: 5th: 2c, 4b, 6b 7th: 7b, 7d

Time to Complete: 50 minutes to introduce the topic, and then time to allow students to conduct research and present their findings

Materials Provided by CMA Ocean Discovery Kits: *Reading Handout: Ka'ena Point*, Examples of Albatross Boluses, Albatross Bolus Contents

Materials Provided by Teacher: Copies of *Reading Handout: Ka'ena Point* for each student or group of students, Internet access

Vocabulary: Albatross (Laysan), dry sack, remote, slogging, terrain, solitude, vague, silhouette, wildlife biologist, pelagic, courtship, thermoregulate, delirious

Teacher Preparation: Set aside examples of albatross boluses to show the class. Queue videos you'd like to show your class.

Lesson Outline:

Introduce students to albatross through the *Reading Handout: Ka'ena Point* and showing videos of Albatross courtship dances. Have students examine albatross boluses without revealing what boluses are. Through students' research and investigation in groups, they will solve the mystery of what the boluses are and why there are plastic fragments found inside them. Groups will communicate their findings to the class through poster presentations.

Lesson Procedures:

1. Have students read the *Reading Handout: Ka'ena Point*. Students can either read to themselves, out loud in small groups, or read together as a class.
2. Discuss the article as a class. Here are some example questions you can ask:
 - a. Would you walk through mud and rain like the author Evi Meyer did to see something in nature?

- b. Is there anything important enough to you that you would be willing to walk through mud and rain to see?
 - c. How do you think she felt when she met the wildlife biologists on the trail?
 - d. How do you think she felt when she arrived back at the car?
 - e. Do you have a special memory about something you might have experienced in nature?
3. Show students video clips of albatross showing off their courtship dances. Videos can be found on YouTube.
4. Introduce a mystery to the students by telling them that scientists who explore and conduct research in the albatross nesting areas find these strange clumps of material all over the place. Show the students the intact albatross bolus contained within the resin mount without explaining to them what a bolus is. Teachers may need to explain that the purpose of the resin is to preserve the material inside for viewing. Then show students the dissected bolus displayed in the riker mount so that they can observe the pieces of plastic and squid beaks found inside the boluses. The dissected display in the riker mount contains materials found in one bolus.
5. Allow time for the students to make their own observations and make guesses about what the strange clumps of materials are and what the contents of the clumps might be. You may have students pass the intact bolus and riker mount around. After they were able to observe the specimen(s) and passed it (them) along to the next student, have them write down what they observed, what types of materials they think they saw, and what they think those strange clumps of material are. Students will most likely be able to identify that there are pieces of plastic found inside the clumps.
6. After the students have had time to examine the bolus specimens and have individually hypothesized about what they might be, break the students into groups and ask each group to conduct research to explain the following:
 - a. What exactly are those strange clumps of material?
 - b. Why do the scientists studying albatross find these clumps of material around the birds' nesting grounds?
 - c. Why are there pieces of plastic found inside the clumps?
 - d. What else besides plastic is found inside the clumps?
 - e. Do you think the environment where the albatross are nesting is healthy or not healthy? Explain why or why not.
7. You can have students conduct research as homework, visit the library, or use a computer lab. Students can create posters to display their findings.
8. After students have finished their research and posters, have groups present their findings to the class.

Lesson Wrap-Up:

1. Show trailer to the movie "MIDWAY Message From the Gyre". Please preview

the trailer before showing it to your class. Some of the images and scenes may not be appropriate for younger students. <http://www.midwayfilm.com/>

2. Discuss what can be done as a school, as a class, and as individuals about plastic pollution.

Lesson Extensions:

- Have students write a story about a personal experience or an adventure they had in nature.
- Use Google Maps to locate the northwestern tip of Oahu and investigate how plastic fragments wind up there using maps of oceanic surface currents.

References:

- Midway Films
<http://www.midwayfilm.com/>



Cabrillo Marine Aquarium Lesson Plan

Grade Level: First and Third Grades

Title: All Tangled Up

Objective: Students will understand how entanglement can negatively impact animals from being able to survive by potentially restricting them from eating or moving.

California Science Standards: 1st: 2b 3rd: 3a, 3c

Time to Complete: 10 minutes

Materials Provided by CMA Ocean Discovery Kits: *Photos: Entangled Animals*

Materials Provided by Teacher: Rubber bands

Vocabulary: Entanglement, survive, debris,

Lesson Outline:

Students try an experiment in which they wrap a rubber band around their fingers and across the back of their hand and try to disentangle themselves. As a class, students discuss their thoughts and reactions and relate to real animals. Older students will write a story about an entangled animal

Lesson Procedures:

1. Ask students if it would be difficult for an animal to survive if they were tangled up? You can show pictures of entangled animals to help prompt their imagination. What if a bird's beak or wing was tangled up? What if a seal had something stuck around its mouth? What if a whale had some rope tangled around its fin?
2. Introduce the term "entanglement" for older students.
3. Pass out 1 rubber band to each student. Show students how you place a rubber band around your thumb, over the back of your hand across your knuckles, and around your pinky finger. You may want to have students help each other place the rubber bands on a friend's hand, or do it yourself.
4. Then ask your students to try and remove the rubber band without using the other hand, other parts of your body, or with anyone else's help.
5. Ask the students if it is easy or difficult to remove the rubber band.
6. Explain that this mimics the experience of sea animals that become entangled.

Lesson Wrap-Up:

1. Ask students (while using the rubber bands or after finishing the experiment) to imagine a sea gull that has gotten tangled in a piece of fishing line, abandoned net or other debris. The bird is unable to eat until they are free from the debris. Ask the following questions:
 - How would the bird feel after struggling like this all morning?
 - How would the bird feel after missing breakfast and lunch?
 - What would happen if the bird kept missing meals, and spent all its strength struggling to get free?
 - What would happen if a predator were chasing the bird?
2. Discuss what students can do to help prevent animals from getting entangled.
3. Discuss why animals need a healthy environment free of pollution.

Lesson Extensions:

Six-Pack Rings:

1. Have a student come up to the front of the room and experiment with entangling his or her arms in a six-pack ring. (This activity should be carefully guided by the teacher)
2. Have a student remove the 6-pack ring, or help him or her do so.
3. Then cut the loops of each ring with scissors.
4. Invite a different student up to experiment with becoming entangled in the cut ring. Have students compare the two experiences.
5. Finish by discussing why cutting six-pack rings is a good practice.

Balloons and Balloon Ribbon:

1. Have students discuss how balloons and balloon ribbons can present problems to fish, birds, turtles, and seals.
2. Using the Internet, older students can investigate whether your state has a law against the mass release of balloons.
3. Students can make posters, or write letters to the editors of newspapers to help increase knowledge about the need to keep balloons and balloon ribbons from becoming marine debris.

Further Student Exploration:

- Grade 3: Post the “Animal Entanglement” photos at the front of the class. Ask students to select one of the animals pictured and write a paragraph from that animal’s point of view telling how it feels to be entangled in marine debris. Students can include as many details as necessary to describe their experience. Encourage students to use a range of senses and feelings in their descriptions, and to be as imaginative as possible.

References:

- NOAA Turning the Tide on Trash
<http://marinedebris.noaa.gov/outreach/pdfs/101turntd.pdf>



Reading Handout: Ka'ena Point



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Ka-ena Point

By Evi Meyer

A couple of months ago my husband David and I went to Oahu Island in Hawaii. I had heard about the Laysan Albatross nesting site at Ka'ena Point at the northwestern tip of Oahu.

Our flight from Los Angeles arrived at noon in sunny Honolulu, and we immediately rented a car and headed out. We had about an hour drive to our destination. Before long we experienced the rain the north side of the island was famous for. As we drove up to where the paved road ended and parked our car, a drizzle had become full-blown rain.

There was still about an hour walk on a very muddy coastal trail to reach the nesting site, but I was determined to see those birds. David's desire to get out of the car was slim and I told him to just stay put and enjoy the view of the rain and waves pounding on each other from behind the windshield. He graciously agreed to wait and let me go.

I strapped on my camera and binoculars and waterproofed them with a dry sack. I put on my hiking boots and rain jacket and headed out. This was a very remote part of the island, and I seemed to be the only person crazy enough to brave this trail. As I was slogging through the terrain, my shoes were rapidly getting heavy with mud. The trail was slippery, and it was difficult to keep my balance with each step. But I was not going to give up easily. I continued for about half an hour walking in absolute solitude with a steep mountain cliff to my left and waves crashing to my right. I was beginning to have doubts. What was I doing here? I was not even sure I would have seen the nesting site, as I only had a vague idea of where it was.

But then I saw the silhouettes of two people walking on the same trail way ahead of me. I picked up speed and soon joined up with them. They were just as soaked as I was, and they also had binoculars and cameras with them. That was a really good sign. I struck up a



Laysan Albatrosses show their bills as part of their courtship. Photo by Evi Meyer

conversation and learned that they were two wildlife biologists, a professor and his student. They were both pelagic bird specialists and were on the island for a birding conference. Of course they were on their way to visit the Laysan Albatross nesting site. My doubts disappeared and I felt incredibly happy that I had stuck it out and met up with these interesting people who were very willing to share their knowledge.

We continued to walk and talk for about half an hour. Just when we were approaching Ka'ena Point, the rain diminished into a drizzle and then the clouds disappeared and the sky turned blue. We opened up our rain jackets and dry sacks to make our equipment accessible in anticipation of the big birds. We were rewarded almost immediately with soaring Albatross right above us. As we continued on the trail, we walked past some birds displaying their courtship behavior and others already sitting on eggs, or in one case even a newly hatched chick. Apparently very young birds cannot thermoregulate yet and the mother actually sits on them to keep them warm. This of course also protects the chicks against any predators that might be lurking around.

For 20 minutes we were almost delirious with enjoyment of these gorgeous winged creatures. There were Laysan Albatross everywhere doing their best to ensure the success of the next generation. I was struck by a threesome of birds showing their bill fencing typical for courtship. I'd seen this kind of behavior displayed by Waved Albatross on the Galapagos Islands, but only two birds at a time. What were these birds up to?

Yet nothing lasts forever, and certainly not the blue sky on the north shore of Oahu. Rain clouds were blowing in again and we knew that we had to waterproof our equipment to avoid damage. So we packed up our stuff, closed up the rain jackets and said goodbye to the beautiful birds. We started our walk back, again through mud and rain, but this time with a beautiful experience engraved in our memory. We felt grateful that the sky had opened up for us just at the right time, so we could photograph the Laysan Albatross colony. Back at the car, I felt tired and dirty, but enormously satisfied. David was listening to music and just shook his head in disbelief of how stubborn I can be. He did enjoy the pictures, though.