



# Environmental Education

## SANTA BARBARA SAILING CENTER

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### CONTENTS

- Introduction
- Effectively Facilitate Learning
- Age Appropriateness Levels
  - Experience
  - Ecosystem Services
  - Human Impact
- Ecosystem Definition
  - Trophic Levels
  - Energy Levels
  - Balance and Imbalance in the ecosystem
    - Sea Otter, Sea Urchin, Kelp and Climate Lesson
- Local Flora and Fauna
- Local and Global Environmental Issues

## Background Information for Camp Counselors

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As a counselor, you are also a mentor. As a mentor, you must have two things:

- Knowledge of how to facilitate learning in an effective way
  - Effective here means that the campers become engaged citizens that have a connection with the natural world. This connection is fostered in order that campers will be motivated to work towards resolution of environmental issues.
- Background knowledge
  - of ecosystem services, ecosystems, local flora, local fauna, and local & global environmental issues.

### How to facilitate learning in an effective way

- We begin with connection to nature. We then focus on ecosystem services, and then consider both positive and negative human impacts. It is essential for the campers to connect with the natural world so that they can feel motivated to care for it in their daily lives, and work towards solutions.
- It is important to start with connection because Environmental Issues are complex, and can seem daunting. Since solving these issues is necessary, it helps to have an intrinsic interest in the natural world.

### Age Appropriateness

The purpose of age appropriateness in teaching Environmental Education is to avoid subjecting younger children to overwhelming environmental issues such as the Great Pacific Garbage Patch and Mass Extinctions. The levels below are guidelines to follow to ensure that our campers are inspired and motivated rather than overwhelmed.

#### Level 1 *Experience connection* (all ages)

Outdoor unstructured free play. This is the most important level. Without this foundation, nothing can be built upon it.

#### Level 2 *Ecosystem Services* (10 and above)

How ecosystems benefit humans

#### Level 3 *Human Impact* (12\* and above)

How humans interact with ecosystem services. Bring light to the issues associated with humans mishandling ecosystem services, and promote actions that preserve and protect ecosystems.

\*It is ok to allow younger kids to participate in resolving issues, such as beach clean-ups and habitat restoration.

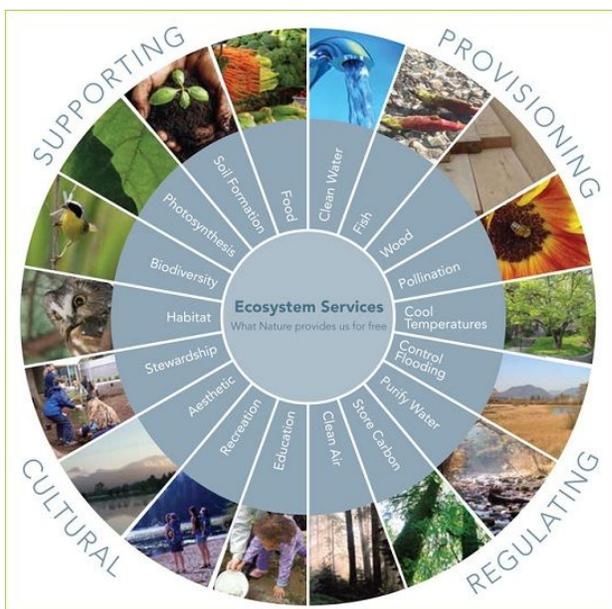
### Level 1 Experience Connection

- **Timelessness** Allow kids to play without having to worry about time. You will secretly keep track, but it will feel timeless for them. If you see an opportunity for the campers to benefit from keeping track of time themselves, it is ok to stray from this exercise.
- **Set an example** by having pure fun. Get wet, and don't be afraid to talk like a pirate.
- **Awe and wonder** Be in awe of the beauty around you and anything that crosses your path. Inspire the campers by asking open ended questions that encourage curiosity. Ask questions such as, "I wonder...what do you think?" Verbally express your interest in the beauty around you

so that the campers will begin to notice things they may not have noticed before. Also, encourage and validate campers by being awed by the things they point out or show you.

- **Animal Identification** During lunch/snack break, ask campers, “Did you see anything cool out there?” Encourage them that what they saw is cool, and ask, “what did it look like?” If they’re having a hard time remembering, suggest that next time, they look for the identification marks.
  - ID marks for birds: color patterns on various parts of the body such as the beak, top of head, wing. Also body size, body shape, beak size, song or call.
  - Counselors should become comfortable with identifying animals and have field guides of local flora and fauna to show kids who are interested.

## Level 2 Ecosystem Services



- Ecosystem Services are ways that humans benefit from nature. There are countless ways we benefit from nature. Here, they have been classified into 4 main sections: Supporting, Provisioning, Regulating, and Cultural.
- How does the ocean serve us in these ways?
  - The ocean, specifically marine organisms, provide 70% of the oxygen we breathe<sup>1</sup>
  - The ocean moderates temperatures
  - The ocean absorbs about half the carbon that humans emit into the atmosphere<sup>2</sup>
  - The ocean provides food, recreation, and peace of mind (LIKE SAILING!)
- “Where does that come from?” and “How does the ocean nourish you?” are the main questions of this level, and through these questions we learn that we are entirely dependent on the Earth for life.
  - Food and water are a great examples because they are our most basic need, they must come from a healthy environment, or else our health is negatively affected. With food and water, we can see the direct effects of the health of the environment on human health.

<sup>1</sup> National Geographic Society. Diana Nelson, B.S. Education, M.S. Aeronautics, Master Teacher K-12. 2011. <http://nationalgeographic.org/activity/save-the-plankton-breathe-freely/>

<sup>2</sup> National Geographic News. Pickrell, John. 2004.

[http://news.nationalgeographic.com/news/2004/07/0715\\_040715\\_oceancarbon.html](http://news.nationalgeographic.com/news/2004/07/0715_040715_oceancarbon.html)

- Keep these questions going throughout camp, so that campers begin to have an appreciation for where everything comes from. Make it specific to the Santa Barbara Harbor when you can.

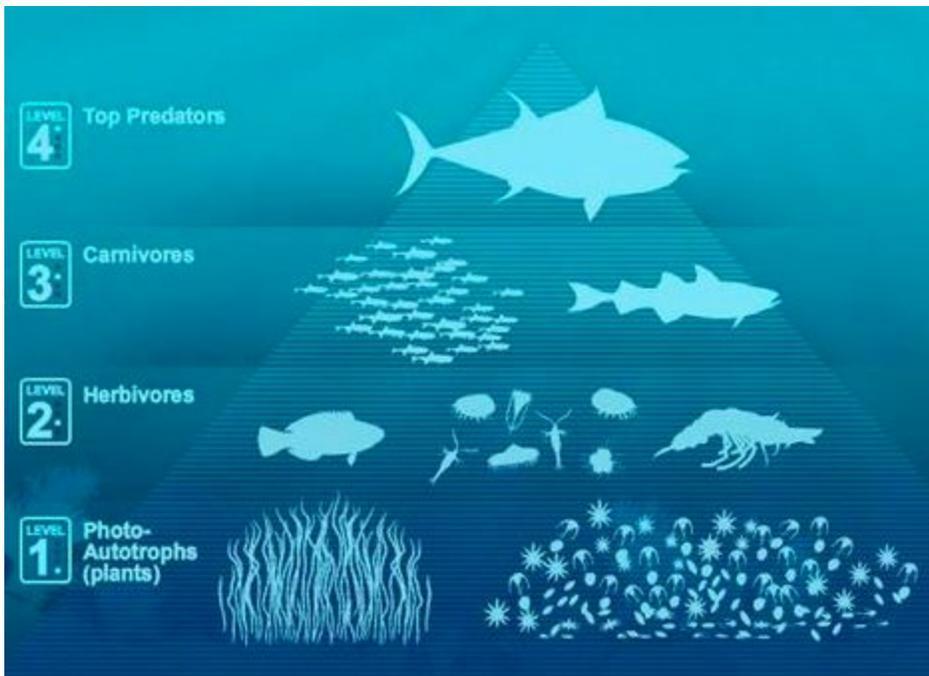
### Level 3 Human Impact

- Human Impact: How the environment is affected by humans
- This concept relates directly to ecosystem services. Ask campers, “Wow, since the Earth gives us so many resources, should we give something back in return/be thankful?”
  - Story Example: If your friend gave you a nice, juicy, yummy peach, you would want to give something back to her in return, right? We often forget about this when we receive things from where we live on this planet.
- “Can you think of any examples of how can we give back?”
  - By being thankful and taking care of where we live, picking up trash, calling Mammal Rescue if we see a hurt animal, respecting marine life by keeping our distance, growing a plant...there are countless answers to this question.
- Be cautious with how you introduce level 3, make sure it is an issue that is within their *sphere of influence* (an issue they can work towards solving). The Great Pacific Garbage Patch and Global Warming are not good issues to bring up, unless you are only bringing it up to ages 12 and above.

### ECOSYSTEM DEFINITION

A biological community of interacting organisms and their physical environment. A complex network, an interconnected system.

### Trophic Levels



The Lower levels are bigger because they have a larger population size. The higher levels have smaller boxes because they have a smaller population size to allow for a *balanced ecosystem*.

## Energy Levels

Energy levels would be illustrated by an inverted pyramid, opposite of the trophic levels. The top predators get the largest box, and the producers get the smallest box. This is because the predators require the most energy, and the producers require the least energy. The energy for the top level comes from the energy of every level below it combined. The energy of the lowest level comes from the sun and atmosphere.

## Balance and Imbalance in the ecosystem

### Sea Otters + Sea urchins + Kelp + Climate

Sea otters eat Sea Urchins, which eat Kelp scraps.

In an ecosystem with no Sea Otters, Sea Urchins become overpopulated and they consume an excessive amount of kelp. This affects the climate because there is significantly less kelp to intake the CO<sub>2</sub> in the atmosphere. In an ecosystem with the right amount of Sea Otters, the Sea Urchin population decreases, and the Kelp begins growing back almost immediately.

Fun Fact: "The amount of CO<sub>2</sub> sequestered each year by North Pacific Kelp is equivalent to taking as many as 6 million passenger cars off the road" KQED

Here is a link to more information on this relationship. This website also gives suggestions of what questions to ask campers so they understand this concept. The goal of this lesson is to know that **everything influences each other.**

<http://ww2.kqed.org/quest/2014/02/25/balancing-act-otters-urchins-and-kelp/>

## Get Familiar with local Fauna!

Become comfortable with identifying animals and plants throughout the Santa Barbara Harbor so that you can pass down the skill of identification with campers.

- We will have field guides of birds, marine animals, and marine plants available for your use.
- I am also working on making baleen and krill available for educational purposes

## 1. Bottlenose Dolphins

We have a local family of Bottlenose dolphins that we see on a daily basis here in Santa Barbara. There are about 30 in the family, though they tend to travel in smaller groups of 3 to 10 we do sometimes see all of them or most of them in one trip.

Size: about 13 feet long

Food: Small Fish and sometimes squid

Fun Facts: Each dolphin has their own distinct whistle. When other dolphins use their whistle, it is like us calling someone by name. Dolphins and whales need to be conscious to breathe. So, they rest half their brain at a time, resting at the surface and turning slightly to one side. They keep the eye closest to the surface closed, and let the other eye patrol for predators. Unlike whales, they don't need to travel down

to tropical waters to have their babies; because of this, they give birth year round. Bottlenose Dolphins are the same species of dolphin you see in Flipper and doing amazing tricks in aquariums.

## **2. Common Dolphins**

Common Dolphins are the most abundant dolphins in the world, numbering some think into the millions. And we have no lack of them here in the Santa Barbara Channel. We can see them traveling in groups from 100 to 4,000 strong. They often travel in the mid-channel, but sometimes they come in close enough for the Double Dolphin to get to. These dolphins are extremely playful, changing their direction to play off of the bow of a boat or even a passing whale. They love to jump and surf in the swells of the channel. There is only one way to count common dolphins. For every one dolphin you see above the water, count 10 more below. So if you see 10 jumping out of the water at one time, most likely there are about 100 or more dolphins swimming around you. Sometimes we see a small pod of dolphins, maybe about 20. This pod is called the scouting pod, they are looking for food. When we see this group we know that the larger pod is not far behind.

## **3. Pacific White-sided Dolphins**

Pacific White-sided dolphins can be seen in the channel throughout the year, but they are more often seen in the summer months. They can travel in groups of 5 to 100 strong. They have even been seen in groups of 500 before.

## **4. Dall's Porpoise**

Dall's Porpoise is the only type of porpoise found here in the Santa Barbara Channel. The differences between dolphins and porpoises are a couple of physical differences: porpoises are very small. Usually no more than 7 feet long and look almost chubby, whereas dolphins can be about 10 feet or more and look very sleek. Another difference is their dorsal, or top, fin. A porpoise's fin looks almost like a shark's, and a dolphin's fin looks more like a wave. Porpoises lack a rostrum or beak, which is very prominent on dolphins. Their teeth are also spade-shaped, where dolphin's teeth are cone-shaped.

Dall's Porpoise are the fastest in the world out of all small cetaceans, whales and dolphins. They can reach speeds of up to 35 miles per hour, and being so small they can hold that speed for quite a while.

## **5. California Sea Lions**

California sea lions live in this channel year round. They often rest on the red & white buoy, the moorings of Mr. Clean, and even some boats.

Sea lions give birth out at the Channel Islands between the months of June and July. When they are born they don't know how to swim, they have to learn. So they learn in the tidal pools out at the islands. Sea lions are often called seals, but that is a common mistake. Sea lions and true seals are very different. Sea lion's front flippers are larger and have rotator cuffs which allow them to walk around on land, and do the tricks that you see in aquarium shows. Seals don't have long front flippers or rotator cuffs, so when they are on land they have to move like a worm to get some around. Another difference

is their ears: sea lions have ear flaps a little like us and seals don't, they just have little holes in their head.

## 6. Spotted Harbor Seals

Harbor Seals tend to stay in the kelp forests, or hang out in the harbor. In Carpentaria there is the Seal Preserve. Harbor seals tend to hang out on this beach and give birth there between the months of December through May, at which time the beach is closed off. But there are trails that lead to an observation area right above the grounds. If you want directions on how to get there ask the crew. During the pupping season over 100 adults give birth. Within an hour of being born the pups instinctively know how to swim and they take to the water, swimming through the protective kelp forests and tidal pools.

## 7. Birds

The Santa Barbara Channel is home to many different pelagic, or ocean going, birds. These birds include the ever popular sea gulls, the endangered brown pelicans, surf scooters, great blue herrons, loons, grebes, snowy egrets, and more.

The brown pelicans nest off of the Channels Islands. During hatching months the island is Santa Barbara is actually closed down to people so they can nest in peace, and the largest part of Anacapa Islands is always closed to people as a permanent bird refuge. The reason for this is: brown pelicans are very sensitive, if a nest is disturbed or a person gets too close, the pelican will abandon the nest and the egg for life, never coming to that same spot ever again. This is one of the reasons for them being put onto the endangered species list. But because of intense protection, the brown pelicans are coming back and are now off of the critical list and are on the vulnerable list.

## 8. Gray Whales

**Identification** Streamlined body, with a narrow, tapered head. Grow to be 36-49 feet long.

**When to see here:** February-Mid May

**Food :** Krill and Small Crustaceans called Amphipods. Gray Whales are the only bottom feeding whales out of all baleen whales. When eating they will go down to the sea floor and scoop up a big mouth full of dirt and sand, then they will filter the muck through their baleen, which act like a coffee filter keeping the food in and the rest gets pushed out. **Baleen and Krill is kept on the Double Dolphin for educational purposes, we may be able to get access to that for kids camp.**

**Migration:** Every year they fill up on food in Alaska and then make the longest migration out of all whales to Mexico to give birth. When they are migrating they eat little to nothing. A fun way to remember this: Alaska is their grocery store and Mexico is their nursery. **In Santa Barbara, we can see them migrating back to Alaska (often with their babies) from February to Mid May.**

**Population History:** There were once 3 Gray Whale populations: The North Atlantic (now extinct), The Korean or Western North Pacific (now very depleted due to overhunting), and the Eastern North Pacific population, the only population to be taken off of the Endangered Species list. The Eastern North Pacific is the population we are seeing today.

## 9. Humpback Whales

The celebrities of all the whales, famous for their singing and fantastic jumps.

**Length:** grow to be 35 to 40 feet long.

**Food:** krill, small shrimp like creatures, and small fish. Can eat 1 ½ tons a day!

**Feeding method:** *Lunge feeding:* Humpback whales can work together to hunt. First, they Deep Dive, then use *bubble netting*. This means they blow a wall of bubbles as they swim to the surface in a spiral path. The cylindrical wall of bubbles traps the krill, plankton, and/or small fish and forces them to the surface in a giant, concentrated mass. The Humpbacks come up from underneath the ball, lunging out of the water with their mouths open to gulp up a large, hearty meal. Don't take my word for it, see it for yourself in this youtube video <https://www.youtube.com/watch?v=vJvfjiCTvq4>

**Mating:** Males sing only during mating season to attract females. The songs can last 10 to 20 minutes and are repeated for hours at a time. Every year the song changes ever so slightly and each male knows the changes.

**Flukes:** When whales prepare for a deep dive, or *sound*, you will get a good view of their tail, or *flukes*. This is the picture that everyone wants, even researchers. A humpback whale's tail is their ID, no two whales have the same pattern on their fluke, just like no two humans have the same fingerprints.

## 10. Blue Whales

The Santa Barbara Channel is one of the best places in the world to see the largest animals in the world, the Blue Whale. About 2,200 pass through this channel and stop to feed every year. Blue Whales can grow up to 90 feet long, the largest was a female found in Antarctica who was 110 ft long. To give you a better idea of how big they are: their tongue weighs as much as an elephant and a small child could fit inside their blowhole and their largest artery. These massive animals eat the smallest animals on earth, krill. One blue whale eats about 4 tons or 40 million krill a day. This is one of the reasons that they come here to this channel, because we have one of the highest krill productions on the west coast.

## 11. Minke Whales

Minke (Mink-e) Whales live here in the channel year round. They are the smallest whales out of all the baleen whales, like humpback and blue whales, reaching only 26 to 33 feet long.

They travel throughout the channel usually by themselves and they tend to move rather fast, sometimes making it hard to track them. Sometimes we get lucky and find one that stays by the surface for a while and isn't traveling very fast.

Local Flora and fauna field

guide:<http://msi.ucsb.edu/sites/msi.ucsb.edu/files/docs/education/FieldGuide.pdf>

### Local Environmental Issues (human impact)

The current issues of the Santa Barbara Coastal Waters are

- Polluted runoff
- Agriculture
- Sewage
- Toxic Waste
- Past Oil Spills

## **Global Ocean Environmental Issues**

- Ocean Acidification
- Pollution
- Overfishing
- Excessive carbon intake affects marine life