

The Truth About Sharks

Sharks are magnificent, but misunderstood creatures that are unfortunately being pushed to the brink of extinction due to overfishing and poor international management. This program highlights the beauty and importance of these animals by showing the incredible rich diversity of shark species and their unique adaptations.

Students will rotate through hands-on stations in small groups that involve shark tooth and jaw morphology, shark identification, and shark sensory systems. The session culminates in a discussion about the critical need for conservation of many shark species and what students, no matter where they live, can do to help.



The Story of the Sea Turtle

Sea turtles are one of the most ancient creatures on Earth, yet we are still learning more and more about them every day. This program covers the life history, ecology, behavior, and unique adaptations of these extraordinary marine animals.

Hands-on activities will highlight nesting behavior, sea turtle predators, how hatchlings make it to the ocean, and how they are able to return to the same nesting beaches as adults. Students will have sea turtle models to study and even get a chance to experience what it is like for a sea turtle biologist studying these animals in the wild. The session ends in a discussion on current sea turtle conservation measures and how students can help protect marine life.



The World of Whales

Whales are found in every ocean region and are the largest mammals on the planet, yet we still have much to learn about these magnificent creatures. This program highlights the rich diversity of whale species and their unique adaptations that allow them to grow to mind-boggling dimensions, dive deep underwater, survive in cold-water habitats, and even sing elaborate songs to each other!

Through hands-on activities, students will learn about whale feeding and communication strategies, and how scientists study these incredible animals in the wild. The session closes with a discussion on whale conservation efforts and how students can help be a part of making a healthier ocean.





Arctic Adaptations: The Life of the Polar Bear

The only bear species to be considered marine mammals, polar bears make their true home on the sea ice. This program covers the remarkable adaptations that allow polar bears to survive in the extreme and unforgiving Arctic environment.

Through some *icy* activities, students will get to experience how these adaptations, from special fur to unique feet to layers of fat, have enabled these sea bears to become the largest land dwelling carnivore in the world! The presentation ends with a discussion on what a warming ocean means for these animals and how our actions can make a difference in the lives of our polar bears!



Corals Up Close

Corals are the building blocks of reef environments, and provide homes and food for many different fish, invertebrates, and humans. In fact, while coral reefs make up less than 1% of the marine environment, about 25% of all marine species live within them. These valuable ecosystems, unfortunately, are threatened by global warming, ocean acidification, marine debris, and more. This program covers coral diversity, and the importance of corals and the reef habitats they build.



Students will learn about coral anatomy by building their own edible models, sort through *3 million year old* coral fossils, and even test their skills in a feeding game! This program ends with a discussion on the issues facing coral today and the ways that we can help to protect these incredible animals.



Ocean Exploration

The ocean covers more than 70% of the Earth's surface, yet less than 5% of it has been explored. Over hundreds of years, in a quest for discovering the underwater world, humankind has developed self-contained underwater breathing apparatuses (SCUBA), manned submersibles, and even underwater remotely operated vehicles (ROV). This program covers the various methods of ocean exploration and the importance of investigating our marine ecosystems.

Students will learn about the science behind SCUBA diving, discover how underwater ROVs have furthered



our knowledge of some unique, deep-sea creatures, and even experience their own virtual 360° SCUBA dive! The session culminates in a discussion on how exploration continues to increase our knowledge of the marine environment every day, helps to protect our ocean, and how students can be a part of the next discovery!

Marine Debris: Let's Talk Trash!

Currently, there is no place on Earth that is immune from or untouched by marine debris. Every year, over 8 million metric tons of plastic enter our ocean and even as it breaks down, it will persist in the environment indefinitely as smaller pieces of microplastic. This presents a huge problem for marine life as they mistake the small plastic particles for food that then travels up the food chain. This program covers why marine debris has become a major issue for our planet and how it impacts every part of our ocean.



Students will discover how water travels from our homes to the sea and how trash influences aquatic life from microscopic plankton to giant whales. Students will also discover how long certain items, like plastic, take to break down in the ocean and how different animals, like albatross, are negatively impacted by marine debris. The session closes with a discussion about the need for protecting the ocean and its inhabitants from debris, as well as how students can be a part of the solution.



Ocean Acidification: The Power of pH

The ocean is a natural carbon dioxide (CO₂) sink, absorbing up to one-quarter of the manmade CO₂ from the atmosphere. The ocean converts carbon dioxide into carbonic acid, which ultimately lowers the pH of the ocean, making it more acidic. As the pH of the ocean decreases, it negatively impacts the biodiversity of the ocean by causing organisms that rely on a calcium carbonate exoskeleton to become weakened, which in turn disrupts food webs across many habitats. Organisms such as corals, oysters, clams, and lobsters are all directly impacted by ocean acidification as an ever decreasing pH works to erode and weaken their calcium carbonate based shells.

Students will observe and measure pH changes to water with the addition of carbon dioxide. Students will create a model of the ocean and introduce CO₂ via dry ice. Using pH indicators students will observe how CO₂ impacts the pH of the ocean and, ultimately, marine life and the people that rely on it.

Sea Level: On the Rise

Greenhouse gases such as carbon dioxide, methane, nitrous oxide, and ozone are naturally occurring gases that serve to keep Earth warm and insulated, making it possible for life to exist. However, since the Industrial Revolution the amount of greenhouse gases, along with manmade aerosols, have significantly increased, resulting in greater heat absorption and retention. As the atmosphere warms, the global temperature also increases. One outcome of this is increasing sea levels due to melting of polar ice. As sea level rises, not only are coastal communities impacted, but marine ecosystems such as coral reefs, kelp forests, and mangroves are also at risk.

Students will create a model of the ocean to observe and measure how water level changes as ice melts. Students will measure the change in water volume based on melting land ice (glaciers) and sea ice (icebergs). Students will use this information to observe how sea level rise will impact not only coastal regions, but marine ecosystems as well. Additionally, students will recognize the various forms of ice that have the potential to impact sea level rise.



Renewable Energy

Humans have historically obtained much of their energy and electricity from fossil fuels and wood burning sources, but we have begun to understand the negative effects that this is having on the earth. Over the past few decades there has been a shift to renewable energy resources such as water, wind, and solar power. The aim being to reduce greenhouse gases, avoid the environmental impacts of mining, and reduce overall air pollutants.

In this program, students will learn about the differences between renewable and nonrenewable energy, the negatives associated with non-renewable energy, and various sustainable energy sources. In a hands-on lab they will be able to design, build, and test their own blades for mini-wind turbines to power an LED light. This will allow them to see the principles of wind energy in action, as well as test their engineering skills.



Land to Sea Connections: Exploring Watersheds

Every one of us lives within a watershed. We also depend on clean water every day, and understanding where this water comes from and how we impact it is incredibly important. This program explores the connections we all have with our water, nearby waterways, and our ocean, as well as discovers the functions of watersheds, types of pollutants found in waterways, and the importance of healthy watersheds for the well-being of all plants and animals.



Students will get to act out the water cycle, visualize the impacts of pollution through a watershed model, and even study the quality of local water samples. The session ends with a discussion on the importance of clean water for a healthy planet and how we can all help to protect our watersheds!

Unsustainable Fishing



Humans have always relied on fish and other organisms from the sea for food. In fact, around 17% of the proteins in human diets worldwide comes from fish (and this is even higher in some countries). Many communities also rely on money obtained through fishing to feed their families, with about 56 million people directly employed in fisheries and aquaculture. However, unsustainable fishing can damage marine habitat to the extent that it will take years, if not decades, to recover and can cause the crash of fish populations if they are overharvested.

This program investigates several of the different types of unsustainable fishing methods, what these types of fishing mean for marine life, and what is being done to help harvest from our ocean more sustainably moving forward. And through a fishing game, the students will discover the challenges (and fun!) of working together as a community to protect our open ocean. The session ends with some tools we can all use to make the best choices in our eating habits and how to educate others on being a part of the solution.