

Educator's Guide GRADES 2-6

Created in partnership with the Disneynature Educational Team



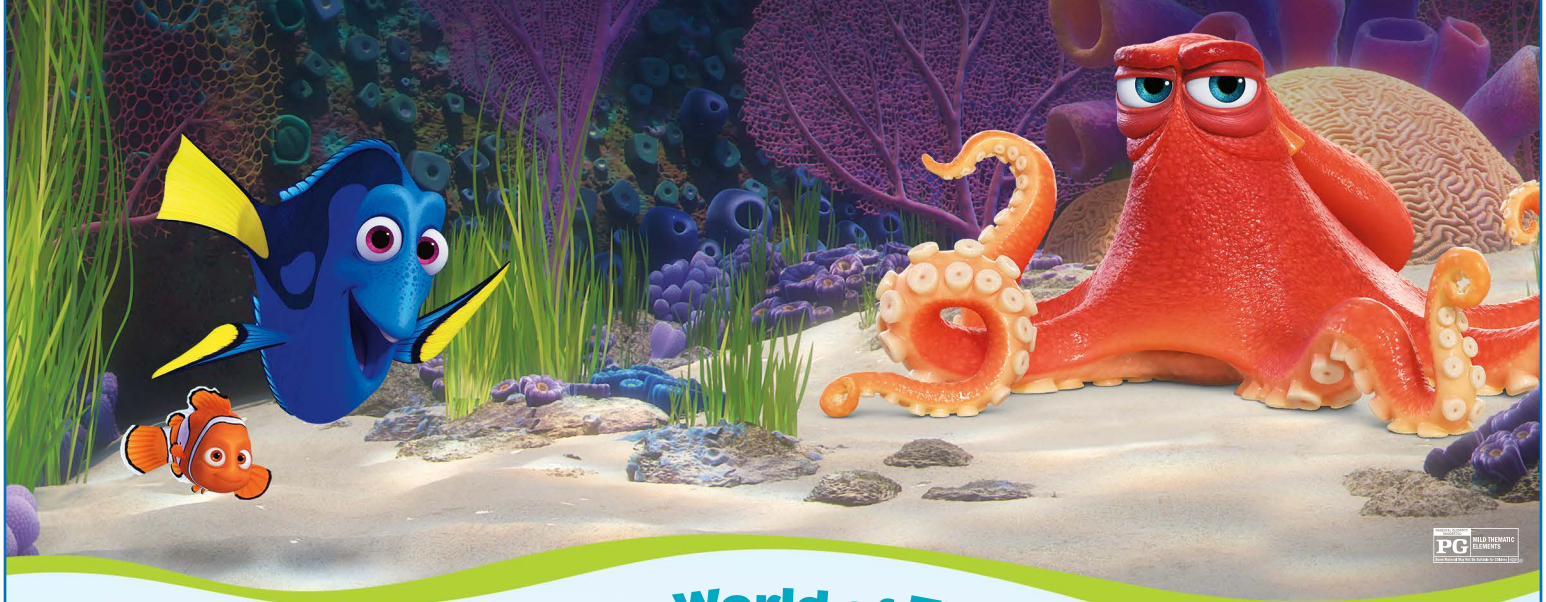
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FINDING DORY



Disney•Pixar's "Finding Dory" welcomes back to the big screen everyone's favorite forgetful blue tang Dory (voice of Ellen DeGeneres), who's living happily in the reef with Marlin (voice of Albert Brooks) and Nemo (voice of Hayden Rolence). When Dory suddenly remembers that she has a family out there who may be looking for her, the trio takes off on a life-changing adventure across the ocean to California's prestigious Marine Life Institute (MLI), a rehabilitation center and aquarium. In an effort to find her mom (voice of Diane Keaton) and dad (voice of Eugene Levy), Dory enlists the help of three of the MLI's most intriguing residents: Hank (voice of Ed O'Neill), a cantankerous octopus who frequently gives employees the slip; Bailey (voice of Ty Burrell), a beluga whale who is convinced his biological sonar skills are on the fritz; and Destiny (voice of Kaitlin Olson), a nearsighted whale shark. Deftly navigating the complex inner workings of the MLI, Dory and her friends discover the magic within their flaws, friendships and family.

Directed by Andrew Stanton ("Finding Nemo," "WALL•E"), co-directed by Angus MacLane ("Toy Story OF TERROR!"), and produced by Lindsey Collins (co-producer "WALL•E"), Disney•Pixar's "Finding Dory" swims into theaters June 17, 2016. For more information, like us on Facebook, https://www.facebook.com/PixarFindingDory, and follow us on Twitter, https://twitter.com/findingdory and Instagram, https://instagram.com/DisneyPixar.



Further Explore the World of FINDING DORY

The Finding Dory Educator's Guide includes over 40 pages of lessons and activities targeted to grades 2 through 6. The complete Educator's Guide and additional educational resources are now available at disney.com/findingdory.

The guide introduces students to a variety of topics, including:

- Animal Behavior and Natural History
- Predator/Prey Relationships
- Ocean Habitats and Ecosystems
- Migration
- Marine Careers
- Making a Positive Difference for Wildlife Worldwide

Educator's Guide Objectives

- ✔ Increase students' knowledge of marine animal species and their habitats through interactive and inquiry-based lessons.
- ✔ Enhance students' viewing of **Finding Dory** and inspire an appreciation for the wildlife and wild places featured in the film.
- ✔ Promote life-long conservation values and STEAM-based skills through exploration and discovery.
- ✔ Empower you and your students to create positive changes for wildlife in your school, community and world.
- ✔ Lessons are aligned to the Next Generation Science Standards, Common Core Language Arts and Common Core Mathematics Standards.

Content provided by education experts at Disney's Animals, Science and Environment

P21 PARTNERSHIP FOR 21ST CENTURY LEARNING

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Welcome!

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ACKNOWLEDGMENTS

The Walt Disney Studios would like to take this opportunity to thank the amazing teams that came together to develop the **Finding Dory** Educator's Guide. It was created with great care, collaboration and the talent and hard work of many incredible individuals.

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Dr. Lizabeth Fogel
Director of Education, The Walt Disney Studios

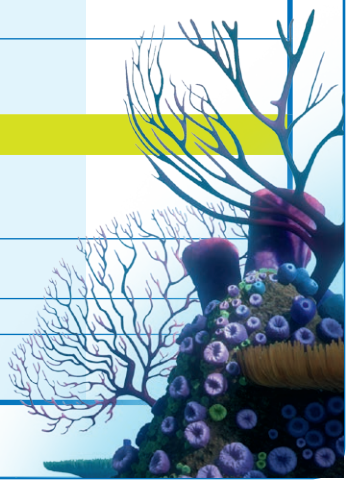


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Standards Alignment Chart

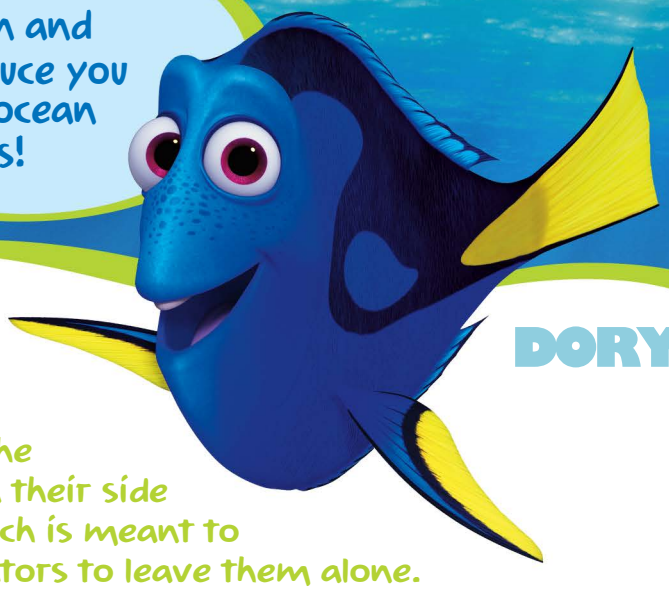
	1 Ecosystems Grades 2-6	2 Migration Grades 3-6	3 Predator vs Prey: Behaviors and Relationships Grades 2-3	4 Designing An Ocean Predator & Prey Grades 4-6	5 Caring for Ocean Animals Grades 2-3	6 Marine Careers Grades 4-6
NEXT GENERATION SCIENCE STANDARDS						
Ecosystems: Interactions, Energy and Dynamics	2-LS2-1, 3-LS2-1, 5-LS2-1, MS-LS2-1, MS-LS2-4, MS-LS2-5	3-LS2-1, 5-LS2-1 & Ms-Ls2-2	3-LS2-1	5-LS2.A, MS-LS2-1		
Heredity: Inheritance and Variation of Traits	3-LS3-2	3-LS3-2	3-LS3-1	MS-LS3.B		
From Molecules to Organisms: Structure and Process	5-LS1-1, 5-LS1-C	3-LS1-1, 4-LS1-2, MS-LS1-4	3-LS1-1	4-LS1-1, MS-LS1-4		
Earth and Human Activity		MS-ESS3-2				4-ESS3-2, 5-ESS3-1, MS-ESS3-3
Engineering Design		3-5-ETS1-1, MS-ETS1-1 & MS-ETS1-2	3-5-ETS1-1	3-5-ETS1-1, MS-ETS1-1 & MS-ETS1-2	2-ETS1-1, 2-ETS1-3, 3-5-ETS1-2	3-5-ETS1-2, MS-ETS1-2
Biological Evolution: Unity and Diversity	2-LS4-1, 3-LS4-3	3-LS4-4	2-LS4-1, 3-LS4-3			
COMMON CORE LANGUAGE ARTS STANDARDS						
Reading Standards for Literature		Key Ideas and Details: RI3.3, RI4.3 & RI5.3 Integration of Knowledge and Ideas: RI3.7, RI4.7, RI5.7 & RI6.7			Integration of Knowledge and Ideas: RI4.7, RI5.7 & RI6.7	Key Ideas and Details: RI2.3 Craft and Structure: RI3.4
Writing	Text Type and Purpose: W3.2, W.4.2, W5.2 & WHST6-8.2 Research to Build and Present Knowledge: W3.7, W4.7, W5.7 & WHST6-8.7	Text Type and Purpose: W3.2, W4.2, W5.2 & WHST6-8.2 Research to Build and Present Knowledge: W3.7, W4.7, W5.7 & WHST6-8.7		Text Types and Purpose: W4.2, W5.3, W6.3 &W6.3 Production and Distribution of Writing: W4.6, W5.6 &W6.6 Research to Build and Present Knowledge: W4.7, W5.7 & W6.7	Research to Build and Present Knowledge: W4.7.W5.7 & W6.7 Text Type and Purpose: W6.2	Research to Build and Present Knowledge: W2.7 Production and Distribution of Writing: W3.4
Speaking and Listening	Comprehension and Collaboration: SL3.1, SL4.1 SL5.2 & SL6.2 Presentation of Knowledge and Ideas: SL3.4, SL4.4, SL5.4 & SL6.4	Comprehension and Collaboration: SL3.1, SL4.1, SL5.2, & SL6.2 Presentation of Knowledge and Ideas: SL3.4, SL4.4, SL5.4 & SL6.4		Presentation of Knowledge and Ideas: SL4.4, SL5.4, SL6.4 & SL6.5	Presentation of Knowledge and Ideas: SL4.4, SL5.4, SL6.4 & SL6.5	Comprehension and Collaboration: SL2.1 & SL3.1
Language Standards		Vocabulary Acquisition and Use: L3.6 & L4.6, L5.6 & L6.6				
COMMON CORE MATHEMATICS STANDARDS						
Number and Operations in Base Ten			2.NBT.1 & 3.NBT.1			
Measurement and Data		3.MD.4, 4.MD.2, 4.MD.4, 5.MD.2	2.MD.1, 2.MD.2, 2.MD.4 & 3.MD.1			
Geometry		5.G.1 & 5.G.2				
Statistics and probability		6.SP.4 & 6.SP.5				



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Jump in and I'll introduce you to my ocean pals!



DORY

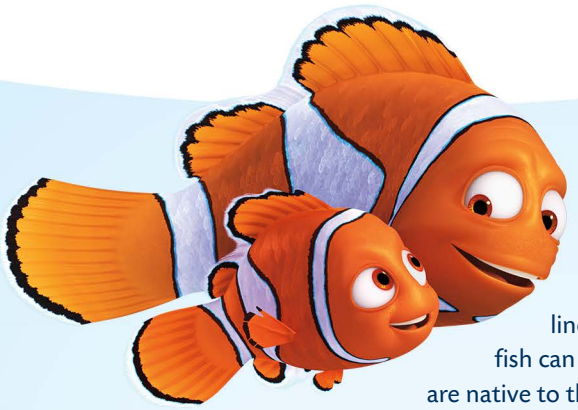
Regal Blue Tang

Blue tangs have the ability to lie on their side to "play dead" which is meant to convince predators to leave them alone.



Size: 10 – 12 in (25 – 30 cm)
Diet: Plankton & algae
Predators: Tuna, jack & lion fish

Blue tang fish, like Dory, have brilliant blue colored bodies, yellow fins and a bright yellow tail. These tropical fish can live up to 30 years or longer near coral reefs in the Pacific Ocean. Blue tangs serve an important role in coral reef habitats because they eat plankton and algae off of coral and sponges. This is beneficial for the entire ecosystem because too much algae prevents corals and sponges from growing. Blue tangs in turn benefit from coral by using the coral branches as a safe hiding place from predators. They stick together in large groups called schools, which help keep them safe from predator fish such as tunas, jacks and lionfish. Blue tangs have a few other impressive tactics to protect themselves from predators including a bright coloration to warn other animals of the sharp spines at the base of the tail that they use to defend themselves. Blue tangs can change color to a darker blue to warn others of danger!



NEMO & MARLIN

Clownfish



Clownfish have an orange body with three white stripes and black lines on each fin. These little fish can live to be 6 – 10 years old and are native to the Red Sea, and the Indian and Pacific Oceans. Clownfish feed on small things like zooplankton and detritus. Zooplankton are tiny animals, some of which are almost microscopic, and detritus are tiny particles of broken down plants and animals. Clownfish live in small groups in anemones which are a type of animal. The anemones have tentacles that can protect the clownfish by stinging other animals. Luckily, clownfish have a protective mucus coating on their skin and are able to slowly acclimate to the anemone and become desensitized to the sting. Clownfish keep the anemones clean by eating any accumulated detritus or parasites that fall within it. The relationship between clownfish and anemones is called mutualistic which means that both the anemone and the clownfish benefit from the interactions. Female clownfish can lay between 100 and 1,000 eggs at a time in their nest made on hard surfaces near the anemone, and it is the male's role to keep the nest clean and protect the eggs.

Clownfish have a mucus coating on their skin that helps protect them from an anemone's sting.

Size: 2 – 4 in (5 – 10 cm)
Diet: Zooplankton & detritus
Predators: Large fish, lionfish & sharks

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Octopus

An octopus's suckers have chemoreceptors that allow them to taste items before they reach their mouth!

Octopuses are invertebrates, meaning they don't have a backbone! Octopuses have big heads, two eyes and 8 tentacles. Their tentacles are very strong, can bend in any direction and are equipped with suction cups to help them catch food. There are many different species of octopus that come in lots of different sizes, colors and eat a variety of foods. Some species remain small and only grow to be about 1 – 2 inches (3 – 5 cm) in length whereas the giant Pacific octopus can grow to be on average 15 feet (4.6 m) long. Octopuses can be found in the deep ocean and in or near coral reef habitat. Octopuses are experts when it comes to hiding from predators. They are well known for their ability to expel ink to distract a threat while they make a quick getaway. Octopuses are also fantastic at camouflage and can change their color and texture to blend in with their surroundings in a fraction of a second! Since octopuses have no bones they can also squeeze into hard to reach places. The only rigid part of an octopus' body is its beak, or mouthpart; if its beak can fit through a small place, the whole octopus can fit!

Size: Varies by species

Diet: Crabs, shrimp, lobster, fish & zooplankton

Predators: Eels, dolphins & sharks

HANK





DESTINY

Whale Shark

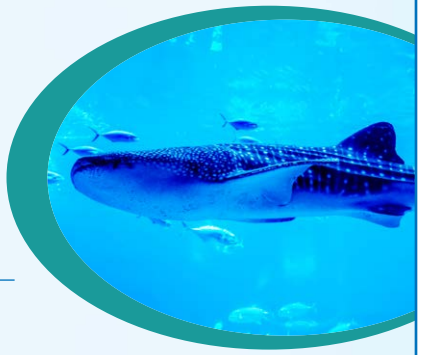
Whale sharks are the largest known living fish and like all sharks, have skeletons made of cartilage instead of bone. They have dark grey, brown or blue skin with light colored spots and stripes on their body that are unique to each individual, kind of like human fingerprints! These huge sharks have flattened broad heads with mouths that can measure up to 5 feet (1.5 m) wide depending on the whale shark's size and contain up to 300 rows of tiny replaceable teeth. Their wide mouth and filtration screens in their large gill slits make it easy for them to skim for food. To capture their food, they swim at a constant speed with their mouth wide open. Whale sharks are circumtropical, preferring to live in warm water marine climates, and are known to migrate every spring from tropical seas to the west coast of Australia. The presence of whale sharks usually means there is an abundance of plankton which can indicate an area of nutrient rich water. There is little information about the lifespan and reproduction of these giant fish, but it is estimated that they can live up to 100 years and possibly longer.

Whale sharks have small tooth-like scales called dermal denticles all over their bodies that help them swim faster and more efficiently.

Size: 18 – 32 ft (5.5 – 10 m)
41,000 lbs (18,600 kg)

Diet: Plankton, small fish, krill, jellyfish & squid

Predators: Sharks & orcas

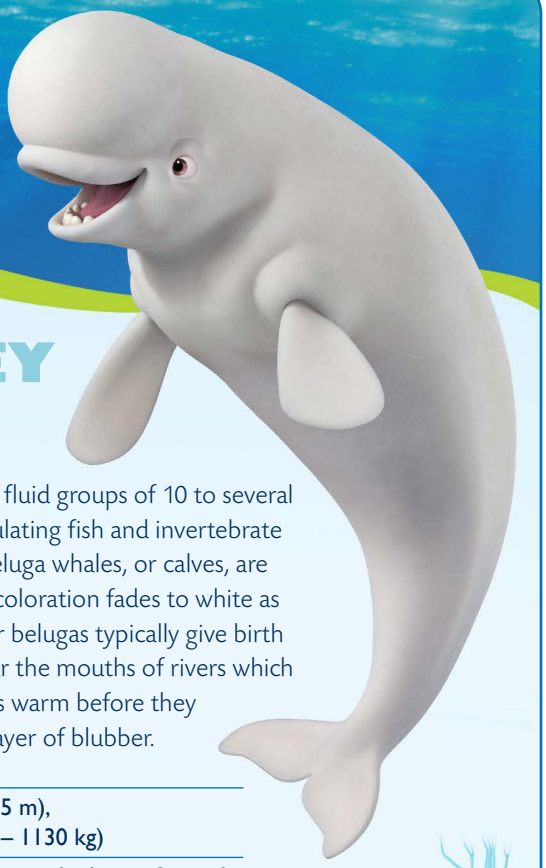


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Beluga Whale

BAILEY



Beluga whales are known for their entirely white bodies and their bird-like chirping, whistling and squawking vocalizations. They have melon shaped heads made of extra fat which help them focus the sounds they make in their heads for echolocation. Approximately 40% of their weight is thought to consist of fat, or blubber, which helps keep them warm in the arctic and sub-arctic waters they call home. Belugas lack a dorsal fin on their backs and have a small dorsal ridge instead. Having a relatively flat back helps them swim and maneuver under ice sheets. Belugas also have a flexible neck, which allows them to turn their heads independently of their bodies. These playful whales live in fluid groups of 10 to several dozen, naturally regulating fish and invertebrate populations. Baby beluga whales, or calves, are born grey and their coloration fades to white as they mature. Mother belugas typically give birth in warmer water near the mouths of rivers which helps keep the calves warm before they develop their thick layer of blubber.



Size: 10 – 16 ft (3 – 5 m), 1100 – 2500 lbs (500 – 1130 kg)

Diet: Salmon, flounder, crab, shrimp & squid

Predators: Polar bears & orcas

Belugas are nicknamed "sea canaries" because of the frequent bird-like vocalizations they make.

Sea Lion

FLUKE & RUDDER



Sea lions live along coastlines, island edges and sometimes near the mouths of rivers in the Pacific Ocean. These large, brown marine mammals typically live between 8 to 12 years and have a thick layer of blubber to help keep them warm in the cold ocean water. Males are very territorial and distinguishable from females because of their large size and more robust features. Groups will typically form with a few males among many females and they are known to seasonally migrate long distances. Sea lions are excellent swimmers and have the ability to close their ears and nostrils while they swim to prevent water from getting in their ears or noses! The sea lion's sleek body allows them to swim in short bursts at speeds of up to 20 miles (32 km) per hour and dive to depths of up to 900 feet (274 m). Since sea lions are mammals they do need to visit the surface of the water to breathe air; however, some individuals can hold their breath for up to 20 minutes!



Size: 6 – 7 ft (1.8 – 2.1 m), 200 – 800 lbs (90 – 362 kg) varies between male and female

Diet: Fish, squid, octopus & eels

Predators: Orcas & sharks

Sea lions cannot pant or sweat, so they often rely on the cold ocean water to help them cool down!

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MR. RAY

Sea Otter

Sea otters are the only members of the weasel family that spend most of their life in the water. These brown, furry mammals live in cold water climates along the coast of North America and Asia in the Pacific Ocean. Although they spend most of their time in cold ocean water they do not have blubber to keep them warm. Instead, sea otters have two layers of thick fur. Their innermost layer of fur helps them retain their body heat and traps in air to help them effortlessly float, whereas their outermost layer of fur is made up of longer hair which prevents water from seeping into their undercoat. Their flattened tail, webbed hind feet and sleek bodies make them impeccable swimmers and divers. Sea otters can hold their breath underwater up to 6 minutes and they are capable of closing their ears and nose while diving. To crack open hard shellfish, otters will float on their backs to use both front paws to hit a shell with a rock until it breaks. They even have loose skin under their forearms that acts kind of like pockets to carry their special shell breaking rocks!

Size: 4 ft (1.2 m), 65 lbs (29 kg)

Diet: Sea urchins, abalone, crabs, fish, octopus, mussels & clams

Predators: Orcas & sharks



Sea otters have the densest fur of any mammal which they keep clean by biting, scratching, and rubbing up against abrasive surfaces.



Spotted Eagle Ray

Spotted eagle rays are strong swimmers with the incredible ability to jump completely out of the water!

Spotted eagle rays can be found almost anywhere in the world near coral reef habitats in warm tropical waters. These graceful sea creatures have a flat, black body covered with white spots and a bright white underside. Their coloration is a type of camouflage called countershading, which helps keep them hidden from their predators. When a predator looks down on a spotted eagle ray, the dark coloration of their back helps them to blend in with the dark sea floor and when a predator looks up toward a ray's white underside it blends in with the sunlight shining down from the water's surface. Spotted eagle rays have venomous spines near the base of their tail that they can use to protect themselves. These rays typically live between 20 and 30 years and females usually only have a few baby rays, or pups, at a time. They have two flat tooth plates on the top and bottom of their mouths to help crack open hard shells, and their predatory behavior helps keep the populations of their prey balanced in their shared ocean ecosystem.

Size: 16.5 ft long (5 m), 507 lbs (230 kg)

Diet: Clams, shrimp, oysters, sea urchins & fish

Predators: Sharks



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Common Loon

BECKY



Common loons are migratory birds which breed in forest lakes and large ponds across North America, Greenland and Iceland. These unique birds spend their winters along North America's Pacific and Atlantic coasts, as well as in Europe and Iceland and they are known for their bright red eyes. A loon's body shape is well balanced for swimming; however, this does make it more difficult for them to walk on land. These graceful swimmers and awkward walkers are actually named for their clumsy appearance while walking on land. Some loon species have black heads and necks, while other have stripes or spots along their backs. Loons make very distinct cries that have been compared to that of a yodel. These eerie and silly calls are thought to be made in an effort to protect their territory, and they can be heard from very great distances.



Size: 32 in (81 cm), 9 lbs (4 kg)

Diet: Fish & invertebrates

Predators: Eagles, fish, raccoons, weasels & otters

Loons can dive more than 200 feet (61 m) below the surface of the ocean in search of food.

Hermit Crab

The body of a hermit crab is a spiral shape. This helps them fit into a new shell.

Hermit crabs are small creatures that can be found living on the sea floor in oceans all around the world. In fact, there are more than 1,000 different species of hermit crabs. Hermit crabs have ten legs, which include two large claws. They also have two antennae to help them feel and two long eyestalks with their eyes attached. They have a soft body with no backbone and they are not able to make their own shell, so they take shells left behind from other animals for their shelter. As they grow they need to transfer to a more fitting shell, so there is usually competition between hermit crabs when a new shell becomes available. A hermit crab's shell is also important for protection as well. When a hermit crab spots a predator, it will curl up in their shell for safety. Since hermit crabs are social creatures they can be found living in groups of 100 or more and observers would have more luck searching for them scuttling around at night since they are nocturnal.



Size: 3 – 4 in (7.6 – 10.1 cm), 7 – 8 oz (200 – 500 g)

Diet: Plankton, worms & detritus

Predators: Fish, octopus & sea turtles

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Giant Clam

Once a giant clam stations itself to a spot on a reef, it will stay in that location throughout its lifetime.

Giant clams live on coral reefs or in tide pools in the Indian and Pacific Oceans and attach themselves onto a hard surface, like rock or coral, at a young age. They will stay in one place their entire lives which can sometimes last over 100 years! Different types of clams are present in aquatic ecosystems all over the world and live primarily in shallow waters on the bottom of the habitat, but can also be found swimming! Clams are invertebrates, meaning they have no true backbone. Their fleshy bodies are protected by two shells and held together by a hinge, which is important for protection. Clams use the ocean floor as protection by using their muscular foot, which protrudes itself from the front of the clam's shell, to borough into the sand. Common clams can be found in both saltwater and freshwater ecosystems and are much smaller than their giant relatives with some only growing to be 0.0004 inches (0.1 mm) in length. Since clams are filter feeders, they filter tiny organism out of the water to eat, which provides food for the clam, but it is also helpful in keeping their aquatic habitat clean!

Size: 4 ft (1.2 m), 500 lbs (228 kg)
Diet: Nutrients from algae
Predators: Eels, snails, sea stars & fish





Squid

Squid are deep-sea dwellers and can be found in temperate oceans all over the world. They are part of the cephalopod family, which also includes cuttlefish and octopus. These incredible ocean creatures have eight arms and two longer feeding tentacles that are used to bring food right to their mouths. To aid in catching prey, squid have hooks embedded into their suckers along their tentacles and a hard, pointed beak that acts as their jaw. Squid can change their skin color when necessary to camouflage in order to catch prey or protect themselves from predators. Like their cousin the octopus, squid produce ink that they can use to evade predators and other animals when needed to escape danger. Colossal squids, the largest invertebrates on Earth, can grow between 39 and 46 feet long (12-14 m) and weigh up to 1650 pounds (750kg). Although quite large, giant squids are an elusive species and are rarely seen due to their deep water habitat.

Size: Varies by species
Diet: Fish, crab & smaller squid
Predators: Large fish, sharks & whales

A squid's mouth is actually shaped like a beak you would find on a bird.

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Corals

Corals typically live in warm, shallow ocean waters and come in many different shapes, sizes, colors and textures! The way a particular coral looks depends on where it lives. For example, corals that live in more turbulent regions are more stocky and sturdy, while corals that live in calm waters appear to be more thin and fragile. Although corals might resemble plants, they are actually animals that are related to jellyfish! Corals are made of polyps which are different from the bodies of most other animals. Some corals are just one single polyp and others are made of multiple identical polyps that form a colony. Polyps have soft tube like bodies that measure anywhere from smaller than 0.5 inches to 11 inches (1 – 30 cm) long with a mouth in the middle that is surrounded by stinging tentacles. To protect themselves, some corals build a hard skeleton around the polyps using minerals found in the water. A large grouping of these corals is called a coral reef.



Size: Varies by species
Diet: Zooplankton
Predators: Sea stars, fish & snails

Coral reefs have been growing in our oceans for millions of years!



Sea Urchins

Sea urchins are spiny invertebrates that are predominantly found around coral reefs and on ocean floors. They have no true backbone like their relatives, sea stars, sand dollars and sea cucumbers. There are many different species of sea urchins, but they all have distinct long spines coming from their body. Beneath the spines, sea urchins have a body that is rounded at the top and flat on the bottom. Sea urchins don't have eyes like we do; however, they use their entire body to see, including their spines, to feel their surroundings. Sea urchins can be many different colors including black, green, brown, purple, blue, pink or red, and they typically feed on algae, seaweed or kelp. Sea urchins move at a very slow pace; however, if they are threatened by a predator they can point their spines quickly in the direction of the threat if necessary. The lifespan of a sea urchin is variable depending on the species. For example, red sea urchins are believed to live for about 10 years, sea urchins in Southern California can live for about 50 years, whereas those found in British Columbia can live to be more than 100 years old!

Size: Varies by species
Diet: Broken or decomposing kelp & live algae
Predators: Sea otters, sea stars, eels & triggerfish

The name urchin is an old word for hedgehog.

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You Can Help Protect These Animals

By learning more about the species in this glossary you are on your way towards helping protect animals in your own backyard and beyond! Knowledge creates awareness, which can lead to action. A positive attitude towards all animals can help make a conservation impact when combined with actions that benefit the world around us. Think about ways you can help these animals.

Choose Pets Wisely.

Home aquariums are a great way to learn about animals and connect with nature. Saltwater aquariums are tricky for beginners, so consider a freshwater aquarium if you are a first-time owner. When selecting a fish, pick a farm-raised friend for your aquarium and never release fish into the wild.

Reduce, Reuse, Recycle.

Reduce your consumption to achieve a smaller "footprint." Reuse items that normally are tossed into the trash and recycle everything you can. Recycling and reusing reduces waste and saves precious resources. It also keeps items like plastic bags, water bottles and balloons out of the ocean, where animals may mistake them for food.

Become an Ocean Expert.

To expand your knowledge of wildlife in the world around you, visit the ocean or your local AZA-accredited aquarium or zoo. You can also learn more about ocean animals like sharks, rays, coral reefs and sea turtles by visiting DisneyAnimals.com. Don't forget to share your ocean knowledge with family and friends by celebrating World Oceans Day each year on June 8th!

Connect with Nature.

Explore the natural world around you. Take a nature walk or hike with your family and friends to learn more about wildlife in your community. Explore the beach and spend time watching wildlife near the shore. You can even participate in a beach cleanup during your next visit to the ocean!

Be Drain Smart.

Remember that all drains lead to the ocean. Keep paint, motor oil, grease, cooking oil, cleaning supplies and trash away from drains. Instead, recycle or dispose of these and other items properly.

Make Wise Conservation Choices.

When shopping, before you toss an item into your cart ask yourself, is this sustainably sourced? It is important to know where products like shells and other oceans items come from. Choosing wisely while dining out is another way you can make a difference. Make sustainable seafood choices by visiting seafoodwatch.org to find recommendations for which seafood to buy or avoid.

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Throughout the oceans of the world, animals both large and small face threats to their survival including habitat destruction, pollution and unsustainable fishing practices.

The Disney Conservation Fund has assisted many of the species seen in Disney•Pixar's **Finding Dory** including coral reefs, sea turtles, sharks and rays. As part of The Walt Disney Company's Corporate Citizenship focus, the fund supports nonprofit organizations that work to Reverse the Decline of threatened wildlife through scientific research, collaboration and community engagement. The fund also works with nonprofit organizations to increase the time kids and families spend in nature to engage young people in discovering the magic of nature and inspire them to care about the planet. The Disney Conservation Fund was established in 1995 on Earth Day (April 22) and to date has supported more than 300 nonprofit organizations and more than a thousand conservation projects worldwide. Take a tour of all of these projects, present and past, by visiting the Disney Conservation Fund website at www.disney.com/conservation.



Follow me to the lessons and activities!

SOURCES

- Animal Diversity Web http://animaldiversity.org/
- Association of Zoos and Aquariums http: //www.aza.org
- Aquarium of the Pacific http://www.aquariumofpacific.org/onlinelearningcenter
- BBC Earth http://www.bbc.com/earth/uk
- Disney Animals http://www.disneyanimals.com
- Disney Conservation Fund http://disney.com/conservation
- Encyclopaedia Britannica http://www.britannica.com
- Florida Museum of Natural History http://www.flmnh.ufl.edu/fish
- Monterey Bay Aquarium http://www.montereybayaquarium.org/animal-guide
- Disney•Pixar Finding Nemo 3D Mr. Ray's Ocean Explorer's Guide
- National Geographic http://animals.nationalgeographic.com/
- NOAA Coral Reef Conservation Program http://coralreef.noaa.gov
- San Diego Zoo http://animals.sandiegozoo.org
- Seaworld http://seaworld.org/animal-info
- Seattle Aquarium http://www.seattleaquarium.org/
- Smithsonian National Museum of Natural History http://invertebrates.si.edu
- World Wildlife Fund http://www.worldwildlife.org

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FINDING DORY

LESSON ONE

Ocean Ecosystems



THEME
Ocean Ecosystems

GRADE LEVEL
2-6

STUDENTS WILL BE ABLE TO...

- compare and contrast tide pools, coral reefs and kelp forests
- create an art installation of a kelp forest, coral reef or tide pool
- identify important components of an ecosystem within the three classroom art installations

VOCABULARY
abiotic, biotic, camouflage, consumer, decomposer, ecosystem, habitat, photosynthesis, producer, symbiosis, warning coloration

YOU'LL NEED:

- Suggested Art Supplies: paint, butcher paper, toothpicks, toilet paper rolls, styrofoam balls, plastic knives, paint brushes, glitter, glue, different types of pasta, doilies, pipe cleaners, wax paper, tissue paper, wooden dowels, ribbon, coffee filters, construction paper, markers, grocery plastic bags, paper plates, sponges, cupcake liners
- Activity Sheet 1: Venn Diagram
- Activity Sheet 2: Scavenger Hunt

Ecosystems are incredible webs of living and non-living things interacting together with populations that are in constant ebb and flow. Each ocean ecosystem is unique in its individual parts but similar in how interactions occur. For example, different species may thrive in different habitat locations, but there will always be predator/prey relationships. The place that provides an animal's food, water and shelter is called its habitat. Organisms depend on each other within a habitat that is nested within a larger ecosystem. The three marine ecosystems encountered by Dory in Disney•Pixar's Finding Dory are both alike and different in many ways.

Warm Up

In Disney•Pixar's **Finding Dory**, Dory learns to navigate different ecosystems across the ocean as she encounters some characters who are friendly and some who are not-so-friendly along the way. Begin by introducing students to the three ecosystems from the film: kelp forest, tide pool and coral reef. Use books or complete an online search to explore photos and videos of all three ecosystems. This can be done as a class, in small groups or individually depending on the accessibility of research tools.

Use the following questions to guide a class discussion about kelp forest, tide pool and coral reef.

- How deep in the ocean might each of the above ecosystems be found? Why? *They are all found in shallower waters because each depends upon a certain amount of light to flourish.*
- What are the food sources in each environment?
- Do you think the water in each ocean ecosystem is warm or cool?
- What type of marine animals and plants live in each environment?
- What might be the challenges of living in each environment?
- Do you see any patterns in the appearances of organisms that live in each environment?
- What additional elements stand out to students as they make observations about the different ecosystems?

Record answers on the board so students may refer to them during the next steps of the activities. Before moving to the next section, review with students the vocabulary words: **abiotic**, **biotic**, **camouflage**, **consumer**, **decomposer**, **photosynthesis**, **producer**, **symbiosis** and **warning coloration**.

Get Started

STEP 1: Students may continue to use their resources to learn more about these ecosystems while working in pairs. Students should record observations they make about each environment and seek detailed information about some of the key organisms that they find unique and interesting. Students should note in their observations how the vocabulary words influence each ecosystem.

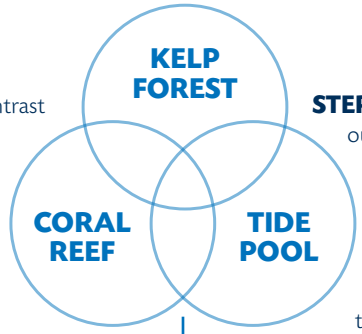
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FINDING DORY

LESSON ONE

Ocean Ecosystems

STEP 2: In pairs, students will compare and contrast the three different ocean ecosystems and record their data on *Activity Sheet 1* using a Venn diagram.



At the close of the activity, students should discuss characteristics that make each environment unique, and characteristics that all three share.

STEP 3: Now that students have investigated various elements of each ecosystem, divide the class into three groups. Each group will turn a section of the classroom into one of the three ecosystems.

STEP 4: Give students the opportunity to look over all materials that will be available to them for their art installation. Set aside time for each group to brainstorm how they will create their ecosystems. Provide the following questions to help groups create a plan and request each group provide a drawing of their plan before they access the art supplies.

- What do you want the bottom of your ocean ecosystem to look like (ocean floor), and how should it change as your eyes move from the bottom to the middle to the surface of the water?
- What colors and shapes will stand out most in your ecosystem and what colors and shapes will fill in the background?
- What kind of textures will you include in your art installation?
- What organisms will you choose to inhabit your ecosystem, and what does your ecosystem need to have in it in order for them to survive? What makes those organisms special?
- Where will you be installing your ecosystem art?

STEP 5: Once each group has a well thought out plan, encourage students to divide the responsibilities among each group member so that everyone is included in the process. Finally, allow students to access the art supplies to begin constructing their project.

If one group finishes before the others, allow them to assist other groups with their project if appropriate OR work as a group to create a scavenger hunt of their favorite organisms and elements within their ecosystem for their teacher, classmates or parents during an open house-type event.

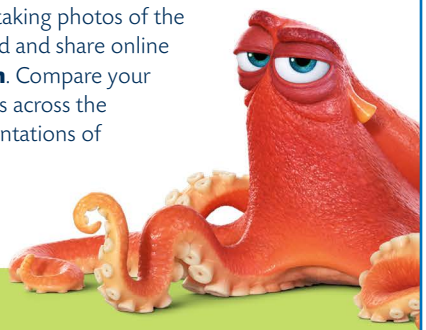
Wrap Up

As a class, explore all three ecosystems together. Provide students with *Activity Sheet 2* to structure exploration of each art installation while looking for the specific listed elements of any natural ecosystem. During a stop at each ecosystem discuss with students what kind of equipment you would need to explore these marine ecosystems (boots, snorkel gear, diving gear?).

Optional: Allow groups to act as tour guides for their own ecosystems to help classmates with their scavenger hunts.

As a class, compare and contrast the different ecosystems based on what you discovered during the scavenger hunt. Encourage students to edit their Venn diagrams based on their findings.

Finally, document the project by taking photos of the three ecosystems the class created and share online using **#FindingDoryClassroom**. Compare your students' artwork with classrooms across the country and see different representations of all three ecosystems.



Additional Resources

Websites

- http://www.nature.com/scitable/blog/saltwater-science/how_can_you_yes_you
- http://www.rampapish.com/portfolio.htm
- http://www.nps.gov/webrangers/activities/tidepool/
- http://www.underwatersculpture.com/projects/mexico/
- http://www.youtube.com/watch?v=Q0OXACplKXo
- http://www.youtube.com/watch?v=qI7LWfpMzPI
- http://www.youtube.com/watch?v=vKxrVmfU3-E

Books **Nonfiction:**

- Baker, J. (2000). *The Hidden Forest*. New York: Greenwillow Books. ISBN - 13: 978-0744578768
- Gray, S., & Thornton, S. (2001). *Ocean*. New York, NY: Dorling Kindersley Pub. ISBN – 13: 978-0789478528
- Hill, A. (1995). *Marine Biology: An Introduction to Ocean Ecosystems*. Portland, ME.: J. Weston Walch. ISBN - 13: 978-0825144011
- Hoare, B., & Jackson, T. (2010). *Endangered Animals*. DK Publishing. ISBN – 13: 978-0756668839
- Levy, J. (2008). *Discovering Coral Reefs*. New York, NY: Rosen. ISBN-13: 978-1-4042-3786-5
- Pike, K. & Turner, G. (2002). *Coral Reefs*. Broomall, PA: Chelsea Clubhouse. ISBN-13: 9780791072851
- Rigsby, M., & Deans, N. (1992). *Monterey Bay Aquarium*. Monterey, CA: Monterey Bay Aquarium Foundation. ISBN – 13: 978-1878244079
- Sabin, L., & Dodson, B. (1982). *Wonders of the Sea*. Mahwah, NJ: Troll Associates. ISBN – 13: 978-0893755782
- Walker, S.M. (2008). *Reefs*. Minneapolis, MN: Lerner. ISBN – 13: 978-0-8225-6738-7

Books **Fiction:**

- George, Jean Craighead, (1996). *The Case of the Missing Cutthroats: An Ecological Mystery*. New York: Harper Collins Publishers. ISBN – 13: 978-0064406475
- Paulsen, G. (2009). *The Voyage of the Frog*. New York: Scholastic Paperbacks; Reprint edition. ISBN – 13: 978-0545085359.
- O'Dell, S. (1960). *Island of the Blue Dolphins*. Boston: Houghton Mifflin. ISBN – 13: 978-0547328614
- O'Dell, S. (1976). *Zia*. Boston, MA: Houghton Mifflin. ISBN – 13: 978-0-395-24393-0.
- Verne, J. (1993). *Jules Verne's 20,000 Leagues Under the Sea: A Completely Restored and Annotated Edition*. Naval Institute Press. ISBN - 13: 978-0870216787

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Venn Diagram

ACTIVITY 1



KELP FOREST



CORAL REEF

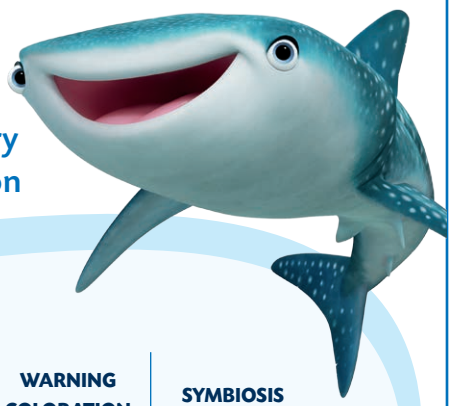
TIDE POOL

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Scavenger Hunt

ACTIVITY 2



Most ecosystems should include examples of abiotic components, consumers, producers, decomposers, organisms with camouflage, warning coloration and symbiosis. Search for examples of each category found on the top row of the chart within each ecosystem art installation and list them in the corresponding box below.

	ABIOTIC	CONSUMERS	PRODUCERS	DECOMPOSERS	CAMOUFLAGE	WARNING COLORATION	SYMBIOSIS
TIDE POOL							
CORAL REEF							
KELP FOREST							

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LESSON TWO

Migration



THEME
Migration

GRADE LEVEL
3-6

STUDENTS WILL BE ABLE TO...

- compare and contrast the distances of three marine species' migration journeys
- create a living bar graph display that illustrates the length of three marine species' migration journeys
- plot the migratory patterns of one of three marine species on maps
- design a prototype model of a new tracking device for a marine species
- explain the connection between data collected with tracking devices and the development of conservation management plans

VOCABULARY
bar graph, fragmentation, GPS, latitude, longitude, migration, patterns, routes, telemetry, tracking

YOU'LL NEED:

- Suggested Art Supplies: 4 balls of yarn, markers, rulers, scissors, 4 yard sticks, index cards, tape, elastic cords, matchboxes, ribbon, safety pins, small and large rubber bands, small plastic balls, small wooden blocks, string, Velcro ties
- Activity Sheet 1: Migrating Marine Species
- Activity Sheet 2: Shark Tracking
- Activity Sheet 3: Sea Turtle Tracking
- Activity Sheet 4: Loon Tracking
- Activity Sheet 5: Tracking Device Design

Although scientists have observed segments of animal migration routes over the years, the why, how and when of many marine species' migrations have remained a great mystery. Perhaps this is because some ocean animals are difficult to study, spending a great deal of their lives underwater and out of sight.

Warm Up

Pose the following hypothetical questions to the group. How do animals know how to migrate in the water, on the land or in the sky? How do flocks of shore birds fly thousands of miles with accuracy and little rest? What new technologies do scientists use to help track marine species' movements when they are underwater for long periods of time during migration?

In Disney•Pixar's **Finding Nemo**, Marlin hitched a ride with migrating sea turtles as they cruised along the East Australian Current (EAC). In Disney•Pixar's **Finding Dory**, Dory has the opportunity to observe and learn about the migration of stingrays. To help students understand the vast differences in the lengths of ocean migrations, tell them that they will create a living bar graph that showcases the distance traveled by sharks, sea turtles, and loons.

STEP 1: Divide students into three smaller groups. Assign each group one of the three marine species: sharks, sea turtles and loons.

STEP 2: Give each group a different colored ball of yarn, two pictures of their animal (found on *Activity Sheet 1*) and an index card that shows the average number of miles their animal travels during migration.

- Sharks = 12,400 miles (19,955 km)
- Sea turtles = 10,000 miles (16,093 km)
- Loons = 1,500 miles (2,414 km)

STEP 3: Ask students to use the following scale to figure out how much yarn they need to represent the distance their animals traveled: 1 foot = 1,000 miles (1 meter = 1,000 kilometers). For assistance, students can divide distance traveled by 1,000.

Give each small group an index card that displays the length of the journey for their assigned marine species. Students will next determine the following lengths of yarn:

- Sharks = 12.4 feet of yarn (3.77 m)
- Sea turtles = 10 feet of yarn (3 m)
- Loons = 1.5 feet of yarn (0.45 m)

STEP 4: In small groups students will measure and cut the length of yarn needed to represent their animal's journey. Once each group has determined the length of yarn, students should tape the ends of the yarn to the bottom edge of their two animal pictures.

STEP 5: Bring students to a safe, outside play area that will be large enough to display the living bar graph. Ask them to predict which of the animals typically travels the farthest distance? Which typically travels the shortest distance? Why do they think so? Students will see if their predictions are correct by forming a living bar graph. Remind the group that bar graphs display straight lines or columns that are arranged side-by-side so comparisons can be made.

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Migration

- Two students from each group will prepare to form vertical bars representing distances their assigned animal typically migrates, with one student standing on the front, straight edge of the bar graph, and the other student standing directly behind.
- On the count of 3, the student who is first in line holds up the picture of his or her group's animal (representing the start of the migration journey). The second student walks in a straight line away from the first student until he or she comes to the end of the length of yarn. Then the second student holds up the picture of the animal (representing the end of the migration journey) so that the string is held around waist-high level. Tell the rest of the class to form a circle around the bar graph.
- Next, the students in front of each line announce the distance traveled by their animals.

STEP 6: Guide students in a discussion to make comparisons about the different lengths of yarn. Were their predictions correct? What are the most striking differences between the distances traveled? Why would some species travel only 1,500 miles (2,414 km) and others 10,000 miles (16,093 km) or more?

Get Started

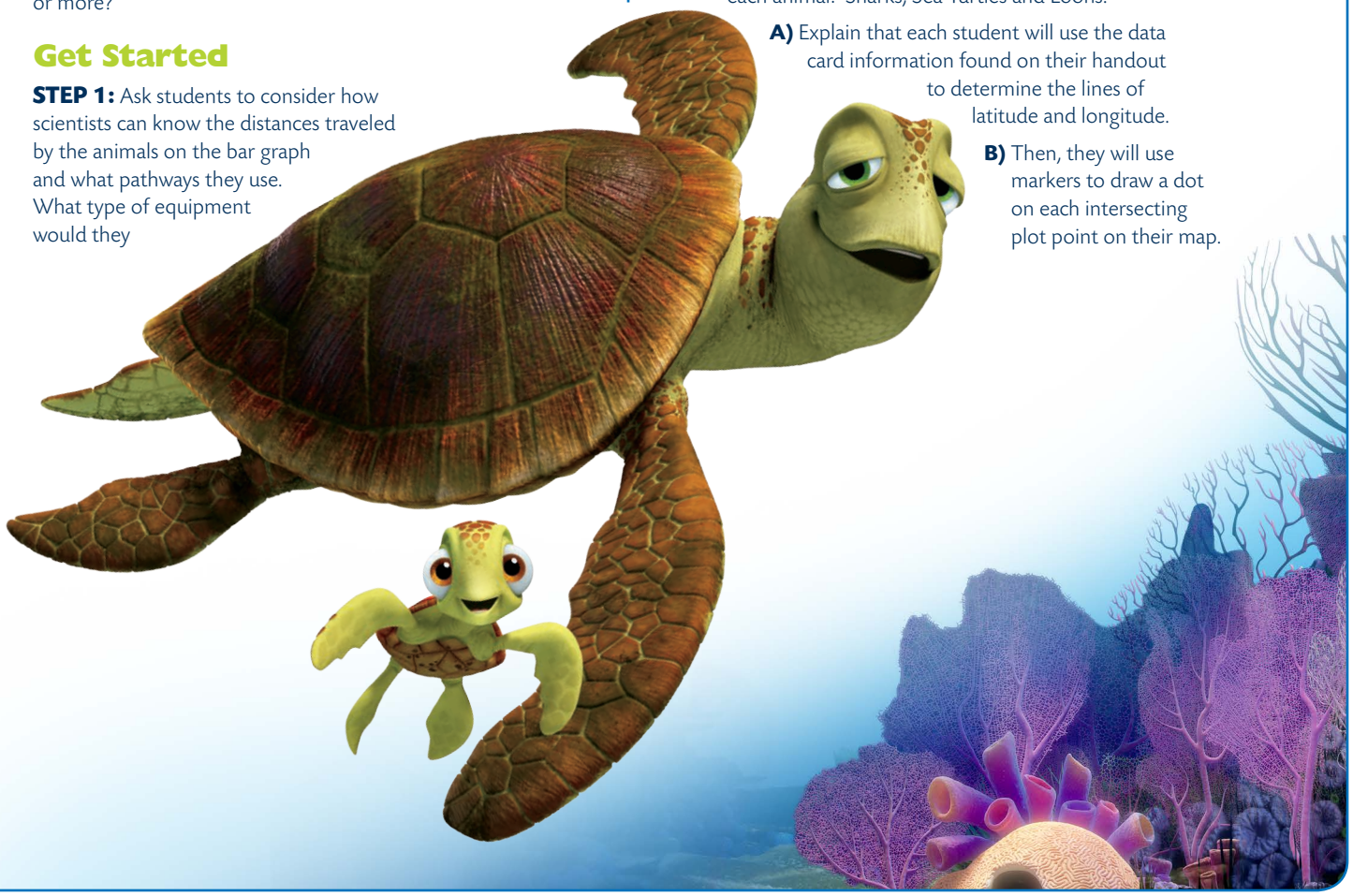
STEP 1: Ask students to consider how scientists can know the distances traveled by the animals on the bar graph and what pathways they use. What type of equipment would they need to measure distances? Inform students that tracking devices with GPS (Global Positioning Satellite) locators are often placed on animals to gather this information. Ask students what type of data or information they think a tracking device can send. What do scientists hope to learn by knowing where an animal is spending its time, where it is traveling and how far it is traveling? To help students gain insights about migration routes and why these ocean animals move great distances along them (nesting, finding food, seeking warmer or cooler climates, etc.), they will use intersecting points of latitude and longitude to plot the migratory patterns of one of the ocean animals on a map.

STEP 2: Break students into pairs and assign each group one of the three animals from the bar graph warm up. Go over the instructions with the whole group. If necessary, demonstrate how to plot one point using latitude and longitude. Display a large map that includes lines of latitude and longitude. Trace your finger along a designated line of latitude. Trace another finger along a designated line of longitude and make note of the intersection of the two lines.

STEP 3: Distribute *Activity Sheets 2-4* as indicated for each animal: Sharks, Sea Turtles and Loons.

A) Explain that each student will use the data card information found on their handout to determine the lines of latitude and longitude.

B) Then, they will use markers to draw a dot on each intersecting plot point on their map.



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Migration

C) Tell them to use the edge of a ruler to draw lines connecting each dot to the next, in the order of the date it was recorded.

D) Finally, students draw conclusions about their marine species' migration pattern. They will write a summary of the insights and be prepared to compare their findings with the group.

STEP 4: Discuss how scientists use maps that show the routes traveled by migrating animals to consider how to protect the areas they visit. Make note the Disney Conservation Fund's projects that directly link to conservation efforts. Notice that several of the projects relate to tracking and conserving wildlife and ocean animals. https://ditm-twdc-us.storage.googleapis.com/2015/10/2015-DCF-Funded-Projects.pdf

Wrap Up

Continue a discussion around tracking devices with students. What is their purpose beyond sending plot points for mapping? Why might wildlife researchers want to track animals? Explain that by tracking an individual, a family group or a collection of animals, and observing them when possible, scientists can learn about social behavior, infant development, feeding patterns, home territory size and the health of environmental conditions. All of this information can be incorporated into a long-range conservation management plan. But, what things must scientists consider when designing a tracking device for a specific animal?

STEP 1: Distribute *Activity Sheet 5*. Ask students if tracking devices for all animals look the same? Why or why not? When designing a tracking device for a specific animal, what type of things would the designer need to consider? Read over the design considerations from the table.

STEP 2: Divide students into smaller groups of four. Assign each group one of the marine species: sharks, sea turtles and loons. Tell them to discuss and fill in information on *Activity Sheet 5*.

- Distribute the tracking device supplies to each group (tape, elastic cords, matchboxes, ribbon, safety pins, scissors, small and large rubber bands, small plastic balls, small wooden blocks, string, Velcro ties). Students have 20-30 minutes to design their devices using the materials available to them. They should be prepared to present their design decisions and functions of the device to the larger group.

After students have presented their designs, show the class examples of tracking devices used by scientists in the field for each of the marine species. http://www.hindawi.com/journals/isrn/2013/631839/fig1/.

- Ask students what similarities their tracking device shares? What did they not include or think of for their species? How will you retrieve the data from the tracking device? How could the tracking device used by scientists be improved?



Additional Resources

Websites

- https://www.teacherspayteachers.com/Product/Tracking-Animals-with-Latitude-and-Longitude-1281840
- http://www.gtopp.org/
- http://education.nationalgeographic.org/activity/mapping-blue-whale-migration/
- http://soundwaves.usgs.gov/2003/05/outreach.html
- http://www.conserveturtles.org/seaturtletracking.php?page=satwelc
- https://www.youtube.com/watch?v=ssIY1HDkH0o
- http://nces.ed.gov/nceskids/createAgraph/
- http://rsbl.royalsocietypublishing.org/content/early/2011/02/04/rsbl.2010.1180.figures-only
- www.movebank.org

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Migrating Marine Species

ACTIVITY 1





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Migrating Marine Species

ACTIVITY 1





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Migrating Marine Species

ACTIVITY 1



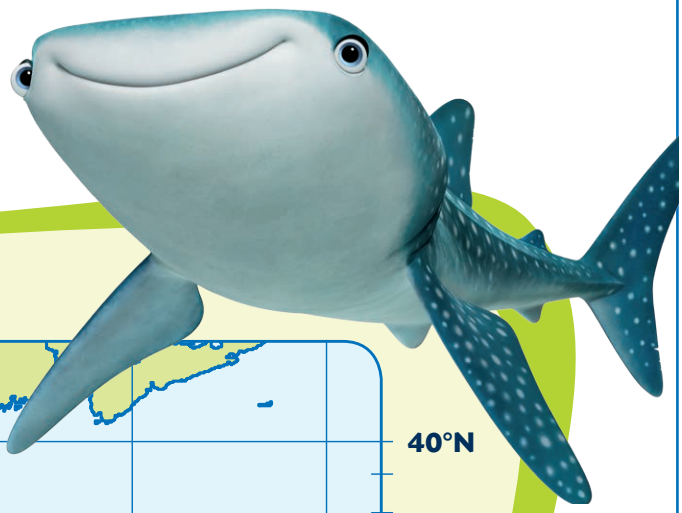


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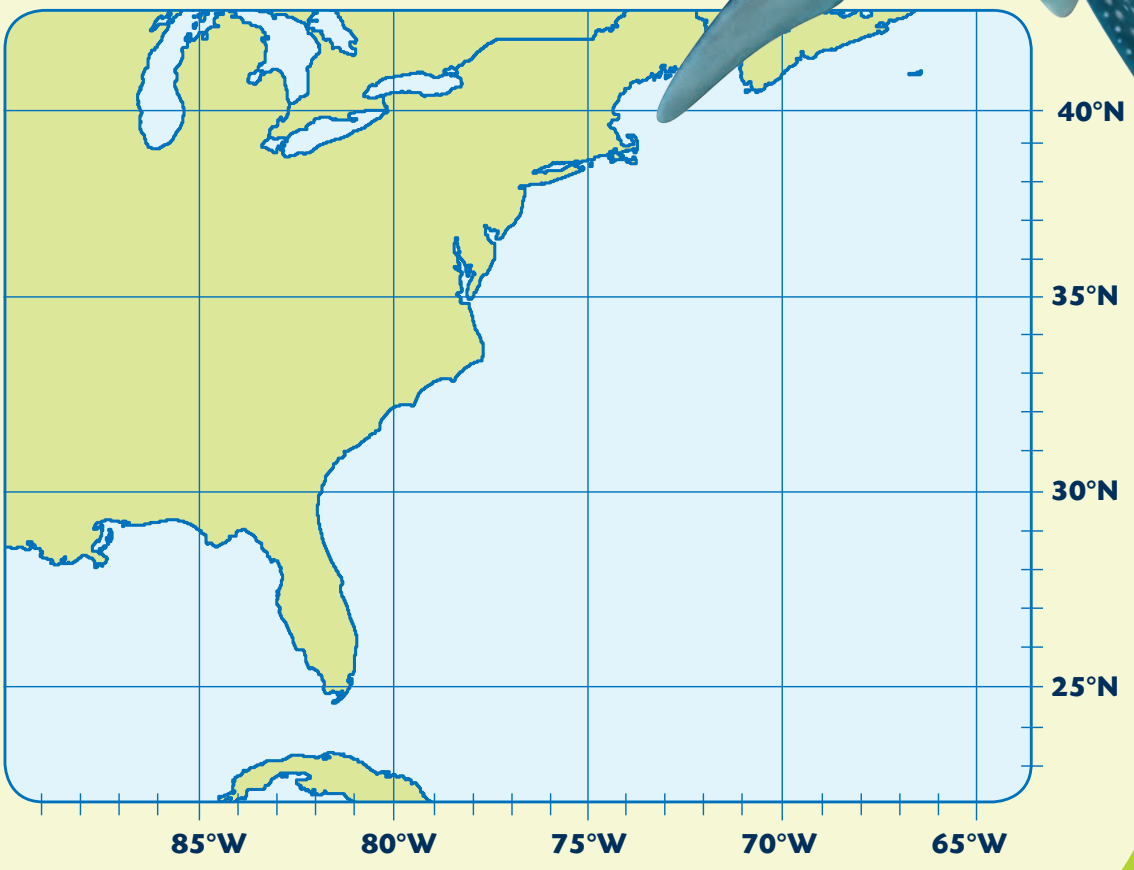
Shark Tracking

ACTIVITY 2

Use the coordinates below to track the shark migration on the map.



Shark Tracking Provided By: ocearch.org



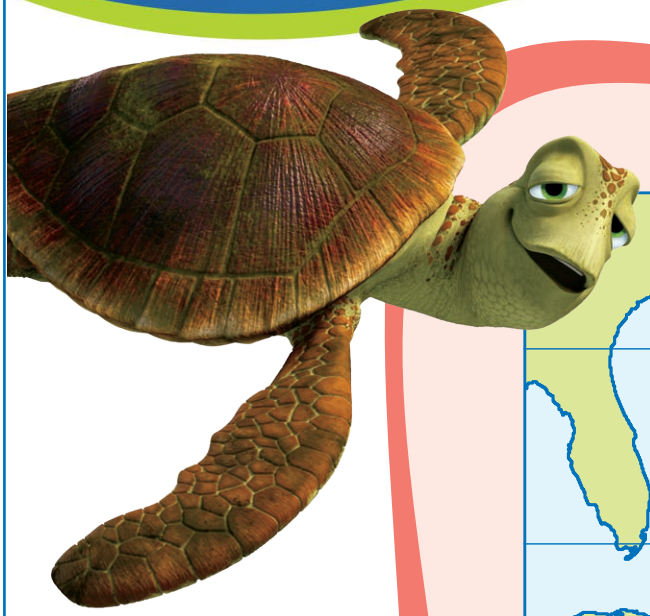
1. September 13
   37°N, 75°W
2. September 14
   30°N, 70°W
3. September 29
   34°N, 76°W
4. December 29
   31°N, 79°W
5. January 18
   30°N, 80°W
6. August 21
   33°N, 76°W
7. August 26
   34°N, 74°W
8. August 27
   33°N, 75°W
9. January 24
   31°N, 81°W

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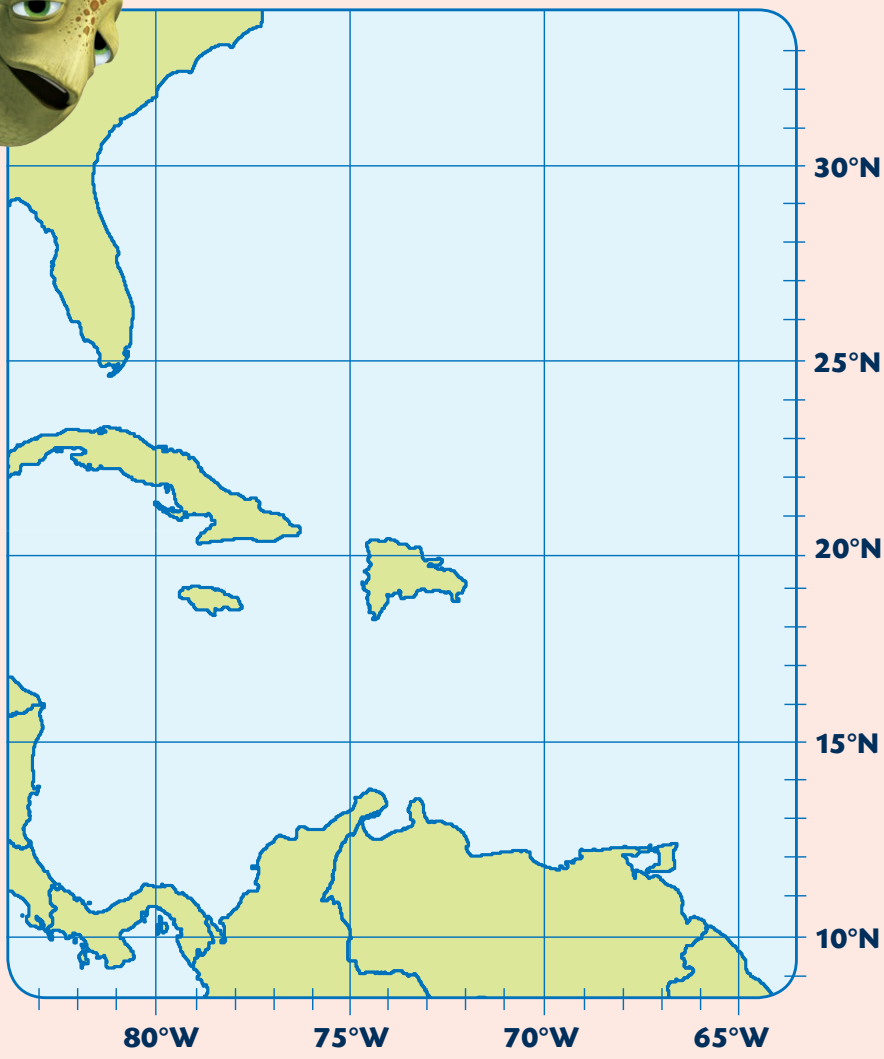
Sea Turtle Tracking

ACTIVITY 3



Use the coordinates below to track the sea turtle migration on the map.

Sea Turtle Tracking Provided By: tourdeturtles.org



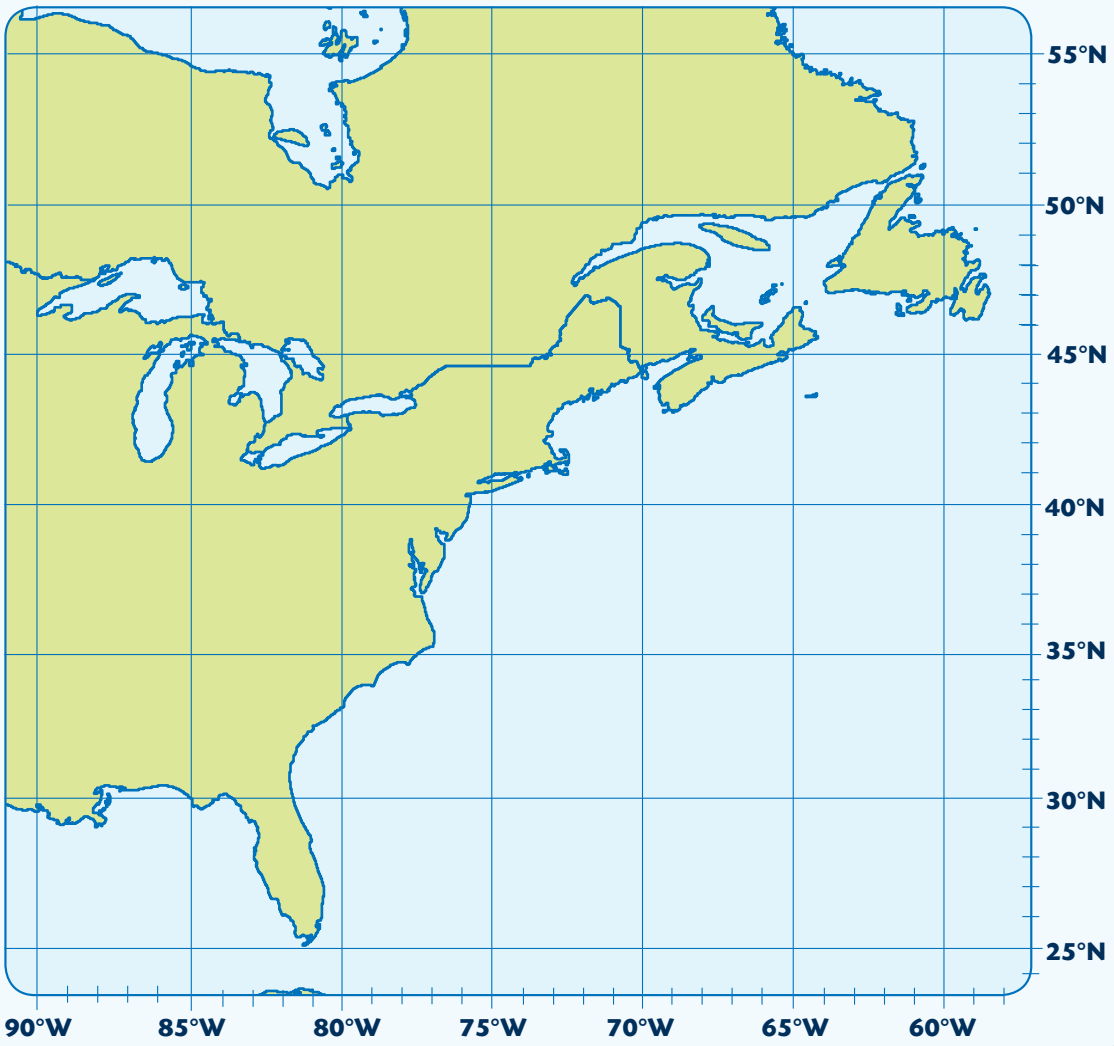
1. August 1
   27.5°N, 80.5°W
2. August 22
   22°N, 80°W
3. August 26
   30°N, 78.5°W
4. September 8
   25°N, 75°W
5. September 12
   22°N, 75.5°W
6. September 21
   20°N, 77°W
7. September 26
   19°N, 78°W
8. September 30
   17°N, 76°W
9. January 25
   14°N, 73°W

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Loon Tracking

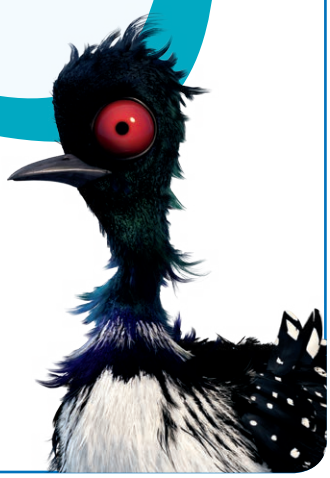
ACTIVITY 4

Loon Tracking Provided By: www.umesc.usgs.gov/terrestrial/migratory_birds/loons/migrations.html



Use these coordinates to track the loon migration on the map.

1. August 19
   45°N, 90°W
2. November 14
   29°N, 83°W
3. March 13
   27°N, 81°W
4. April 16
   29°N, 77°W
5. April 27
   34°N, 73°W
6. May 21
   41°N, 68°W
7. September 15
   53°N, 59°W
8. November 8
   47°N, 64°W
9. April 17
   30°N, 81°W

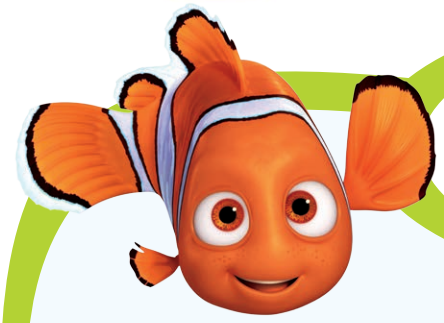


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Tracking Device Design

ACTIVITY 5



What's the best design for your animal?

Take these 5 elements into consideration before designing your animal's tracking device.

1 SIZE & WEIGHT	2 SHAPE	3 HABITAT(S)	4 BEHAVIORS	5 MATERIALS
Describe the size and weight of the animal and how that impacts the design of a tracking device.	**Describe the shape of the animal and how that impacts the design of a tracking device.**	**Describe the habitat(s) of the animal and how that impacts the design of a tracking device.**	**Describe the behaviors of the animal and how these impact the design of a tracking device.**	**Consider the materials for the prototype model and what source of energy might be required to power the device.**
Consider how much the device should weigh.	What part of the animal might be the best fit for a tracking device?	Terrain	Feeding	Materials
		Plant life	Defending	
		Temperature	Moving	Power source
What dimensions should the device be?	How should the device attach to the animal?	Weather	Resting	
		Depth in Water	Infant Care	Other
Other		Other	Other	

Hint:

Draw sketches of your device for each stage of your design process before you build your prototype model.

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LESSON THREE

Predator vs Prey:
Behaviors & Relationships
[Grades 2-3]



Both predators and prey have unique adaptations they use to help them skillfully obtain their next meal or craftily escape their demise! There are a number of diverse predators and prey that make appearances in the film Finding Dory. These are just a few examples of the incredible wildlife that survive in the big blue.

THEME
Predator/Prey Behaviors and Relationships

GRADE LEVEL
2-3

STUDENTS WILL BE ABLE TO...
- identify ocean predators and prey
- discuss adaptations that help ocean predators and prey survive
- explain the benefits of predator/prey relationships to an ocean ecosystem

VOCABULARY
camouflage, echolocation, filter feeding, predator, prey, schooling, shoals, marine

YOU'LL NEED:
- Activity Sheet 1: Ocean Chase ID Cards

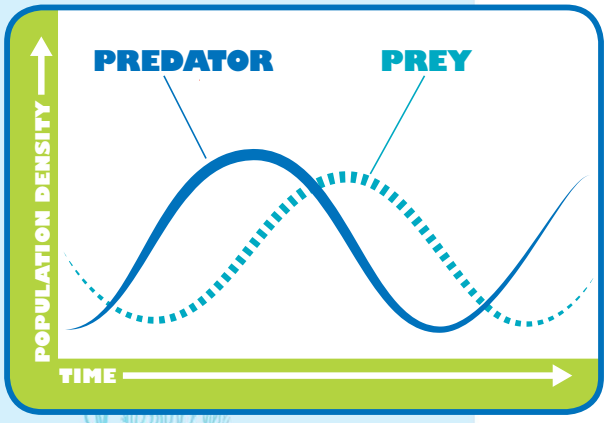


Figure 1

Warm Up

Explain that predators play a very important role within an ocean ecosystem as they ensure the prey population is maintained at a healthy balance. Discuss the following questions as a class and invite a student to help create a line graph showing approximate change in ocean predator and prey populations over time as seen in Figure 1.

- In a healthy ocean ecosystem, when prey is plentiful, how would we expect the predator population to change? *(increase)*
- If predator numbers increase, how would we expect the prey numbers to change? *(decrease)*
- Following a decline in their food source, how would we expect the predator population to change? *(decrease)*
- With a decrease in the number of predators, how would we expect the prey population to change? *(increase)*

Get Started

To gain insight into predator/prey relationships within an ocean ecosystem, it is helpful to explore the hunting and feeding techniques of marine predators.

STEP 1: Ask students to share animal hunting techniques they know of and write responses on the board. Invite students to organize responses into categories and highlight that not all predators have big, sharp teeth. Remind students that hunting and feeding can involve behaviors such as stealthy ambushes, crafty camouflage or even deadly venom.

STEP 2: Students are introduced to two role-playing games in which they'll have a chance to act out marine predator/prey relationships.

STEP 3: WHALE SHARK VS PLANKTON GAME
In the first game, students will role-play a research expedition to learn more about the whale shark in order to better understand the feeding habits of this giant but elusive predator of the ocean.

A) Getting Ready
The whale shark is a great example of a predator who doesn't have big, sharp teeth but is a very effective predator due to unique adaptations.

To get a better idea of how large a whale shark is, use a measuring tool to estimate a 10 meter (32.8 foot) line of tape, string, desks or even students

ADAPTATION EXAMPLES:

Shark Multiple rows of teeth
Seal Can hold breath up to 30 min in length
Sea Lion Can dive nearly 900 ft underwater
Barracuda Sleek bodies allow for speed up to 25 mph
Sea Anenome Uses venomous tentacles to paralyze passing prey
Moray Eel Second set of jaws in throat to help swallow large prey
Toadfish Camouflages into the sea floor to hide from prey

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Predator vs Prey: Behaviors & Relationships

[Grades 2-3]

ROLE-PLAYING GAMES provide unique opportunities for students to immerse themselves in an environment that relates to real-world situations. By stepping into marine animal predator/prey roles, students can bring to life complex relationships that are involved in survival. The adaptations involved in predator/prey hunting success or escape failures are likely to be more memorable.

to show the class how big a whale shark can be. Suggest students sit next to the measured length and imagine what it would be like to swim next to a fish that size! Ask students to consider how a whale shark – the largest shark in the world – hunts and what food it is hunting for.

Unlike other types of sharks, the feeding behaviors of whale sharks don't include swift attacks on prey or group feeding frenzy behaviors. When whale sharks feed, they open their mouths wide to pull in lots of water that contains thousands of tiny plankton. After closing their mouths they push out the water, but keep the plankton in, this is called filter feeding. Ask students to practice acting like whale sharks by opening their mouths as wide as they can. Show students a video of a whale shark feeding and ask them to make note of the wide-mouthed sweeping gulps. <https://www.youtube.com/watch?v=mNF5DKELUzg>

B) Set up and manage the game play

When playing the **Whale Shark vs Plankton Game**, students take on the roles of a marine biologist (RESEARCHER), a predator (WHALE SHARK), and prey (PLANKTON). The premise of the game is that a researcher is cruising the ocean in a research vessel, trying to observe and identify a whale shark that is actively feeding on prey. The whale shark is quite elusive and feeds as quietly as possible so as to not scare away the plankton, or draw the attention of the researcher that might also scare away all of the whale shark's food!

First, ask students to sit in a circle with legs crossed and their eyes closed.

Second, the teacher chooses one RESEARCHER by tapping a chosen student on the shoulder once. The teacher should also choose one WHALE SHARK by selecting a student and tapping them on the shoulder twice. The remaining students in the circle who were not tapped on the shoulder become PLANKTON, floating in the ocean. These roles should remain a secret until the teacher says otherwise. Once roles have been assigned, ask students to open their eyes and stand up.

Third, the RESEARCHER boards their vessel at the center of the circle to try and identify which student on the outside of the circle is the WHALE SHARK. He or she must be on alert for feeding behaviors. During game play, the WHALE SHARK wants to remain anonymous while feeding to avoid the RESEARCHER'S attention. The WHALE SHARK should try to conceal their identity as they walk around the circle, secretly consuming plankton by opening their mouths wide in the direction of one PLANKTON at a time.

Fourth, if any PLANKTON are eaten during the hunt (meaning the whale shark opens their mouth wide in their direction and makes eye contact) they should bow their head, lay down, and put their feet forward to show they can no longer be eaten.

Fifth, to win the game, the RESEARCHER gets 3 chances to guess which student is the WHALE SHARK. If he or she cannot identify the WHALE SHARK, or if the whale shark consumes all of the PLANKTON before he or she is identified, the WHALE SHARK wins and gets to choose the next WHALE SHARK and RESEARCHER. If the RESEARCHER is correct, he or she wins and gets to choose the next WHALE SHARK and the RESEARCHER then assumes the role of PLANKTON.

STEP 4: OCEAN CHASE GAME

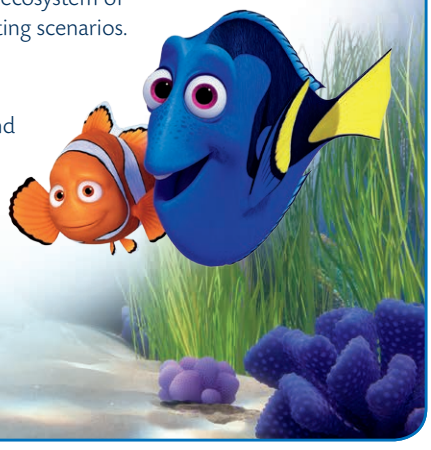
Explain to students that certain ocean prey have effective defenses against their predators, such as the octopus with camouflage, clownfish that live within the safe but deadly anemone, rays with barbs, and loons that flock together for safety. At the same time, ocean predators have techniques to enhance their hunting practices. For example, beluga whales find their prey by echolocation, which means that they bounce sounds off prey to locate them, like radar. Sea lions can slow down their heart rate allowing them to remain underwater longer to hunt before returning to the surface for air. Ocean predator/prey relationships are in constant push and pull because of the unique adaptations the animals possess. The **Ocean Chase Game** allows students to experience this relationship. The game can be played indoors or outdoors, but should occur in a large, open area.

A) Getting Ready

Explain to students that in the **Ocean Chase Game** they will have the opportunity to assume the roles of an ocean predator (sea lion) and two types of ocean prey (anchovy fish or octopus). They will also have opportunities to discover possible impacts on the ocean ecosystem of successful or unsuccessful hunting scenarios.

B) Set up and manage the game play

First, display *Activity Sheet 1* and invite students to look at the photographs and discuss what characteristics and adaptations they can observe that may help the marine predator or the prey hunt and/or survive. What do they already



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Predator vs Prey: Behaviors & Relationships

[Grades 2-3]

know about the hunting techniques of sea lions or the prey adaptations of the anchovy and octopus? To help guide the discussion use the reference sheet in Figure 2 for examples.

Second, show students an online video of sea lions hunting. https://www.youtube.com/watch?v=VX6XSqP6UVo Watch these together to discover if the animals used the adaptations that were hypothesized.

C) Playing the Game

First, provide each student with an identity card from *Activity Sheet 1*. Reference Figure 3 below for the recommended number of each animal determined by the number of students. This ratio may be changed in later rounds related to outcomes. Hand out an Ocean Chase ID card to each player so that the number of each animal matches Figure 3.

Figure 3

Number of players	Sea Lions	Octopus	Schools of Anchovy (groups of 3)
15-18	2	4	3-4
19-28	4	6	3-7
29-35	6	9	5-7
36-45	7	10	6-9

Second, give each animal group different colored armbands, or tape identity cards from *Activity Sheet 1* on their backs. Tell students to remain in character throughout the game. Go over the expected behaviors for each animal.

Sea Lions:

For this game, each sea lion will hunt independently.

1) Territories: Depending on the number of students, divide the game play area into territories and have each sea lion select a territory. In this case, sea lions may only hunt in their designated territory. Warn students that if a sea lion hunts in a different territory, he or she gives up any prey cards collected, and must start over.

2) Eating prey: A sea lion will tag a prey with a tap on the shoulder. The unsuccessful prey move to the sidelines and the sea lion will keep their Ocean Chase ID card

3) Prey that escape: Sea lions cannot tag an octopus that is frozen in place because that octopus is assumed to be using camouflage so that it cannot be seen by the sea lion.

Octopus:

The octopus enjoys staying close to hiding places or places where it can blend in through camouflage. To begin the game, octopuses should stick close to the back or side edges of any given territory.

1) Getting eaten: If a sea lion tags an octopus they give up their Ocean Chase ID card.

Figure 2

Sea Lion

EYESIGHT: Eyes have a membrane that acts like swimming goggles, helping them see even in murky waters.

WHISKERS: Can help sea lions feel vibrations of swimming fish or scratching crabs hiding in the sand.

MOUTH AND TEETH: Can help hold crab and large fish or squid so they can swallow prey whole.

LUNGS: They can hold their breath for 8 to 20 minutes, allowing them to sustain hunts for a long time.



Anchovy

CONFUSION EFFECT: It's hard for predators to pick out individual prey because many moving targets create a sensory overload.

MANY EYES EFFECT: As the size of the school increases, the task of scanning the environment for predators is made easier for each individual because the task is spread out among so many fish.

CHOREOGRAPHED EFFECT: A school of fish can swim collectively up or down quickly, twisting and making changes in the shape and outline of the group, without collisions. This can confuse predators or suggest there is a larger opponent to deal with.



Octopus

CAMOUFLAGE: Skin can quickly match the colors, patterns, and even textures of its surroundings.

INK: Clouds a predator's view, giving the octopus time to swim away. The ink even has a substance that dulls the sense of smell, making the octopus harder to track as it swims away.

FAST SWIMMING: They can jet forward by expelling water through their mantles.

SOFT BODIES: Can squeeze into very small cracks where predators can't reach them or fit.

ARM REGROWTH: As a last resort, an octopus can lose an arm and regrow it over time with no lasting damage.



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[Grades 2-3]

2) Eating prey: If an octopus tags an anchovy, he or she gives up their Ocean Chase ID card to the octopus and moves to the sidelines.

3) Escaping: Octopuses may move across hunting territories and cannot be tagged by sea lions when they are frozen in place because they are considered camouflaged to their surroundings and difficult to see.

Anchovy:
Many species of anchovy fish swim together in coordinated groups called schools. Anchovy will move in a school by moving in the same direction as their neighbors, staying close together and avoiding collisions. Schools of anchovy will begin the game collected in groups of three and scattered across the hunting territories.

1) Getting eaten: If a sea lion approaches a school of anchovy, he or she may tag one fish by tapping him or her on the shoulder. That anchovy will give up his or her Ocean Chase ID card and move to the sidelines.

2) Escaping: Anchovy may move across hunting territories.

Third, the teacher decides when to end each round of the game activities. At the end of the round, each sea lion and octopus counts his or her food points to see if they were able to successfully hunt enough food to survive.

- Each octopus is worth 5 points.
- Each anchovy is worth 1 point.

Number of players	Sea lion survival points needed	Octopus survival points needed
15-18	9	3
19-28	12	6
29-35	20	9
36-45	30	12

Fourth, explain that in a healthy ocean ecosystem prey that survive may reproduce, but predators that find enough food will also reproduce. To prepare for a second round, the animals that survived the first round remain the same. Switch out Ocean Chase ID cards for the following:

- The sea lions that did not survive become anchovy
- The octopus that were eaten become sea lions
- The anchovy that were eaten become their predator (sea lion or octopus)

Before playing another round, record the number of each species in addition to the numbers that the group had started with. Record numbers following each round.

Fifth, possible modifications:

- Decrease the number of prey animals and increase the number of predators; cite drought or disease as a reason for the shift in populations.
- Add safe zones (use hula hoops or cones to mark off areas), where anchovy can stand. These might represent protective shelter. Prey can stay there for a count of ten, then move on. A predator must stand back ten paces from a safe zone.

Wrap Up

Ask students questions to foster discussion and reflection. Consider graphing the population changes over time and compare and contrast these to the rough graph you made as a class at the beginning of the lesson.

- What aspects of the activity made it seem realistic?
- What would make the game more realistic?
- How do competing predators affect the ecosystem?
- What happened when too many of the same predators were in the ecosystem?
- How do predators and prey depend upon each other?
- What would happen if there were no predators in an ecosystem?
- What was the most difficult part of the game? Why?



Additional Resources

Websites

- http://www.arkive.org/whale-shark/rhincodon-typus/
- http://www.barcroft.tv/stargazer-fish-lembeh-strait-north-sulawesi-indonesia
- www.pbs.org/wgbh/evolution/survival/coral/partners.html
- http://www.gtopp.org/

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Ocean Chase ID Cards

ACTIVITY 1



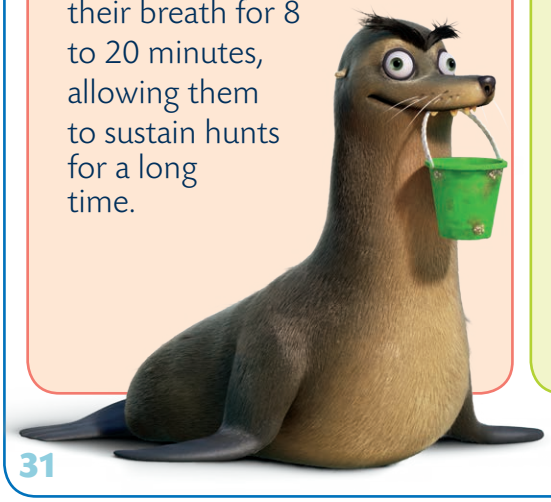
Sea Lion

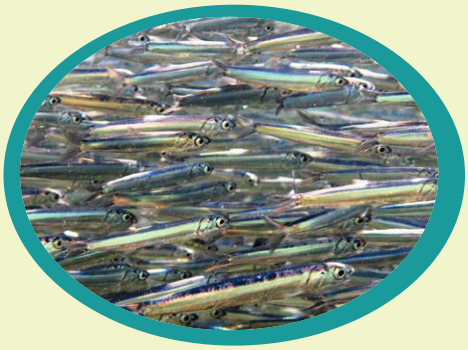
Eyesight: Eyes have a membrane that acts like swimming goggles, helping them see even in murky waters.

Whiskers: Can help sea lions feel vibrations of swimming fish or scratching crabs hiding in the sand.

Mouth and Teeth: Can help hold crab and large fish or squid so they can swallow prey whole.

Lungs: They can hold their breath for 8 to 20 minutes, allowing them to sustain hunts for a long time.





Anchovy

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Choreographed Effect: A school of fish can swim collectively up or down quickly, twisting and making changes in the shape and outline of the group, without collisions. This can confuse predators or suggest there is a larger opponent to deal with.



Octopus

Camouflage: Skin can quickly match the colors, patterns, and even textures of its surroundings.

Ink: Clouds a predator's view, giving the octopus time to swim away. The ink even has a substance that dulls the sense of smell, making the octopus harder to track as it swims away.

Fast Swimming: They can jet forward by expelling water through their mantles.

Soft Bodies: Can squeeze into very small cracks where predators can't reach them or fit.

Arm Regrowth: As a last resort, an octopus can lose an arm and regrow it over time with no lasting damage.

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LESSON FOUR

Designing an Ocean Predator & Prey [Grades 4-6]



THEME
Predator/Prey Adaptations

GRADE LEVEL
4-6

STUDENTS WILL BE ABLE TO...
- compare different types of adaptations
- develop and analyze "super" adaptations they created

YOU'LL NEED:
Suggested Art Supplies: tag board, construction paper, drawing paper, scrap paper, plastic, fabric, scissors, pencils, markers, crayons, brads, tape, glue, building blocks, clay, paper clips, paint, paintbrushes, toothpicks, modeling clay

Ocean animals have some of the most charismatic and impressive adaptations in the animal kingdom, and they use many of these adaptations to catch prey or escape predators. A number of species with impressive adaptations make appearances in Disney•Pixar's Finding Dory.

Warm Up

List on the board some of the animals found in Disney•Pixar's **Finding Dory**: giant squid, clam, grouper, sea lion, beluga whale, sea otters, whale shark, loons, rays... etc. Sort the animals in two different categories of predators and prey and ask students to identify specific adaptations they think can help the animal catch its prey or avoid becoming a meal.

Guide a discussion about how the hunting techniques of each predator relates to the specific type of prey that the animal eats. Compare answers to the adaptations of prey that help them escape danger from their top predators. For example, sea otters are known to use tools, like rocks, to open the hard shellfish they eat. On the other hand, manta rays sieve the water for tiny marine organisms such as microscopic plankton, small fish and crustaceans.

Get Started

STEP 1: Students can use the adaptations from the animals found in Disney•Pixar's **Finding Dory** that are listed on the board, or they may use the adaptations of other marine animals found in the animal glossary to design a "Super Prey" that is an amazing escape artist or a "Super Predator" that can overcome prey adaptations.

STEP 2: Students follow a design process that includes research, identifying adaptations, making design sketches and creating their "Super Prey" or "Super Predator" with a variety of art materials.

First, students choose to design either a marine predator or marine prey. They will discuss which specific combination of adaptations might work best for their super marine animal. They should keep in mind the type of situations they imagine their predator or prey would face.

Examples of adaptations to consider include sharp teeth (sea lions), wings (loons), a mucus coating to increase swimming speed (grouper) or the ability to plug one's ears and nose while diving (otter). Students can brainstorm their own list based on what they already know about marine species and what they learn after using credible sources to research their favorites.

Second, with a limit of 3 adaptations per animal, students can begin sketching their "Super Prey" or "Super Predator." They should list the featured adaptations, weight and length and draw design sketches. Students should also take

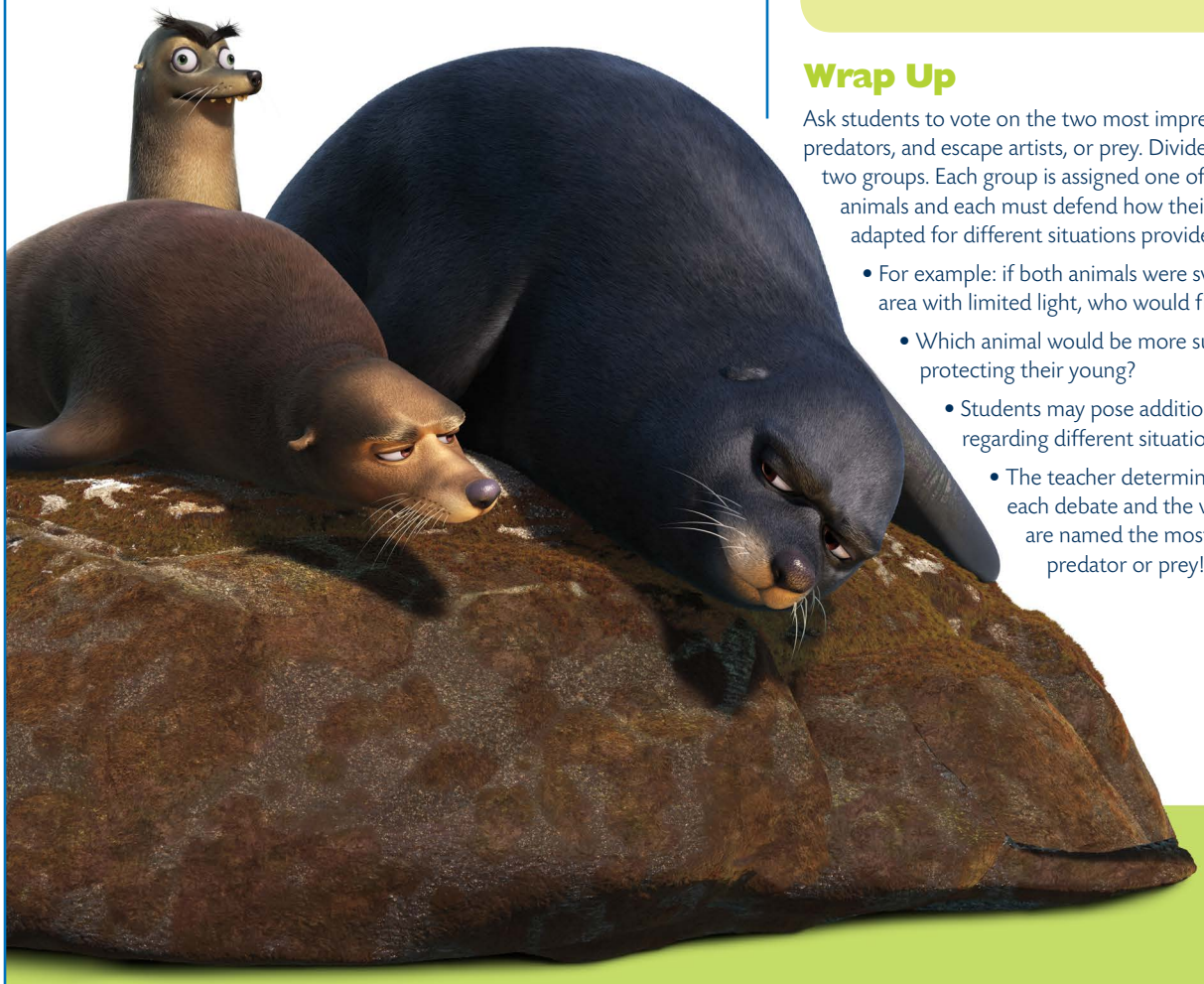
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Designing an Ocean Predator & Prey [Grades 4-6]

the opportunity to share their ideas with a partner, give and receive feedback and adjust designs if necessary.

Third, students begin making their super marine predator or prey by selecting from a variety of art materials. Students may draw, paint, create multimedia artwork or attempt a 3D project.

Fourth, students prepare an exhibit and presentation of their super creations. They should include the name of their animal, an explanation of animal adaptations and the predator or prey they are equipped to overcome.



ADAPTATION EXAMPLES:

Shark Multiple rows of teeth
Seal Can hold breath up to 30 min in length
Sea lion Can dive nearly 900 ft underwater
Barracuda Sleek bodies allow for speed up to 25 mph
Sea Anenome Uses venomous tentacles to paralyze passing prey
Moray Eel Two sets of jaws to grab prey and eat larger aquatic animals
Toadfish Camouflages into the sea floor to hide from prey

Wrap Up

Ask students to vote on the two most impressive hunters, or predators, and escape artists, or prey. Divide the class into two groups. Each group is assigned one of the winning animals and each must defend how their creation is better adapted for different situations provided by the teacher.

- For example: if both animals were swimming in an area with limited light, who would find food faster?
- Which animal would be more successful at protecting their young?
- Students may pose additional questions regarding different situations.
- The teacher determines the winner of each debate and the winning animals are named the most impressive predator or prey!

Additional Resources

Websites

- https://dtmag.com/thelibrary/defense-mechanisms-how-marine-creatures-avoid-predation/
- http://life-sea.blogspot.com/2011/07/life-of-four-eye-butterflyfish.html
- http://animals.nationalgeographic.com/animals/mammals/bottlenose-dolphin/
- http://www.arkive.org/daisy-parrotfish/chlorurus-sordidus/image-G123565.html
- http://www.gtopp.org/
- http://www.tunaresearch.org/

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LESSON FIVE

Caring for Ocean Animals [Grades 2-3]



While animals have amazing adaptations that help them survive in the wild, we as humans have the unique role on our planet of making sure we protect wildlife and wild places when they need help. Animals can also benefit when scientists conduct research to learn new things about them and when they educate others about the lives and needs of wildlife.

THEME
Marine Careers

GRADE LEVEL
2-3

STUDENTS WILL BE ABLE TO...
- discuss goals and responsibilities of careers that involve caring for marine animals
- create a "shield of commitment" for a marine career and protecting marine life

VOCABULARY
career, commitment, habitat, protect, responsibility, species

YOU'LL NEED:
- Activity Sheet 1: Marine Career Data Sheet
- Activity Sheet 2: Commitment Shield
- recycled cardboard or paper
- pencils
- crayons or markers

Warm Up

Pose the following questions to discuss as a class:

- Do you ever wonder what it would be like to have a career in caring for wildlife on the land or in the ocean?
- What are some jobs in the field of animal protection and care? (List on the board).
- What are the goals of these jobs?
- What would it be like to spend a day in their boots... or flippers?

First, add the jobs from the list below to the jobs already listed on the board. Ask students to continue to brainstorm about the main responsibilities each person has in caring for animals.

- **Veterinarian:** care for sick and injured animals, both domestic and wild
- **Aquarist:** care for aquarium animals, their display habitats and teach others how to protect them in their natural habitats
- **Nutritionist:** study the diet of animals, prepare food and create healthy recipes for animals in the care of humans
- **Field researcher:** learn more about animals and how we can protect them
- **Educator:** teach others about the importance of conservation and connecting with nature
- **Coast Guard:** protect marine animals and habitats

Second, discuss how the people in these and other careers are dedicated to caring for the ocean. Explain how this type of commitment is very important for creatures that live in and around the ocean. Ocean habitats face real threats such as pollution, overharvesting of fish, rising sea levels and coastline development. Without dedicated individuals who care about nature, oceans and the animals that live within them could be taken for granted and destroyed.

Get Started

STEP 1: Provide students with *Activity Sheet 1* and ask them to take notes of the following as they watch short videos about specific marine careers:

DISCOVER MARINE CAREERS

Marine Biologist: https://www.youtube.com/watch?v=EAZvxukW8kY
Oceanographer: https://www.youtube.com/watch?v=kxb-Kje0ZBc
Animal Curator & Herpetologist: https://www.youtube.com/watch?v=UZFpqztUYSs
Wildlife Biologist: https://www.youtube.com/watch?v=MmCCrV1RI9Y
Federal Wildlife Officer: https://www.youtube.com/watch?v=Uok3GhQ8N90

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Caring for Ocean Animals [Grades 2-3]

- Job titles
- Job responsibilities
- Job challenges
- Questions about each career

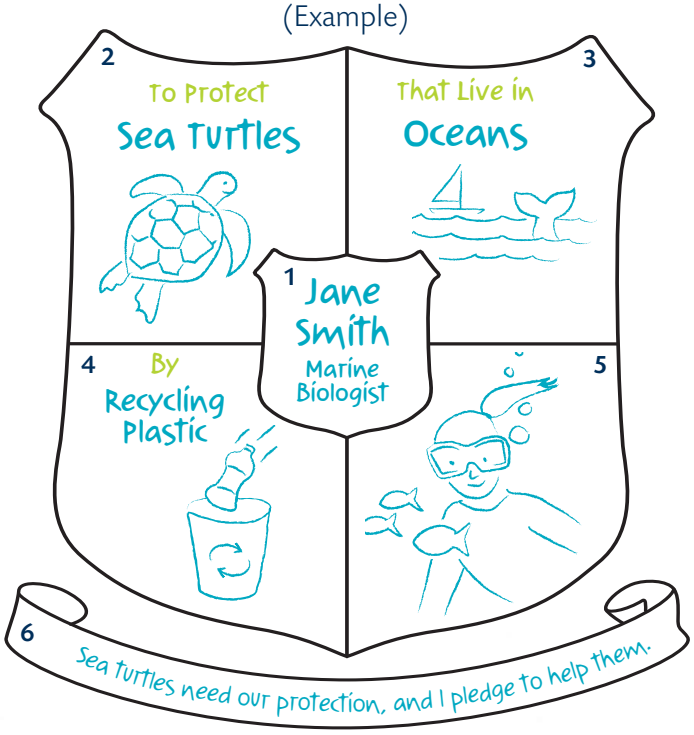
Suggest students write notes down for each career or take notes following each video as a class. Take some time to investigate students' questions about each career. Based on what they learned from the series of short video clips, students will choose a career that they think they would enjoy the most.

STEP 2: Students select a career and create a shield. Provide students a copy of *Activity Sheet 2* and have them fill out each section of the shield. Once completed, explain to students that throughout history, people have worn or displayed signs, such as badges, shields or crests of arms, to show their commitment to their family, important causes or jobs. These signs have often included names, titles, slogans, mottos or symbols related to a field of work.

Wrap Up

Give students the opportunity to present their shields to the class. Then display all of the shields on a bulletin board with the title, "Mr./Miss/Mrs./Dr. _____ class defends animals!"

(Example)





Additional Resources

Websites

- NOAA's OceanAGE Careers site with career profiles and other useful information: http://oceanexplorer.noaa.gov/edu/oceanage/welcome.html
- Monterey Bay Aquarium information on science careers: http://www.montereybayaquarium.org/education/science-careers
- 10 Things You Can Do to Save the Ocean http://ocean.nationalgeographic.com/ocean/take-action/10-things-you-can-do-to-save-the-ocean
- Animal Care: https://seaworldparks.com/en/seaworld-sandiego/Animals/Animal-Care/
- Caring Together For Animals: http://www.georgiaaquarium.org/conserve/caring-for-animals

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Marine Career Data Sheet

ACTIVITY 1



DIVE INTO DATA! Use this data sheet to collect interesting information about how people care for animals.

Name and Grade

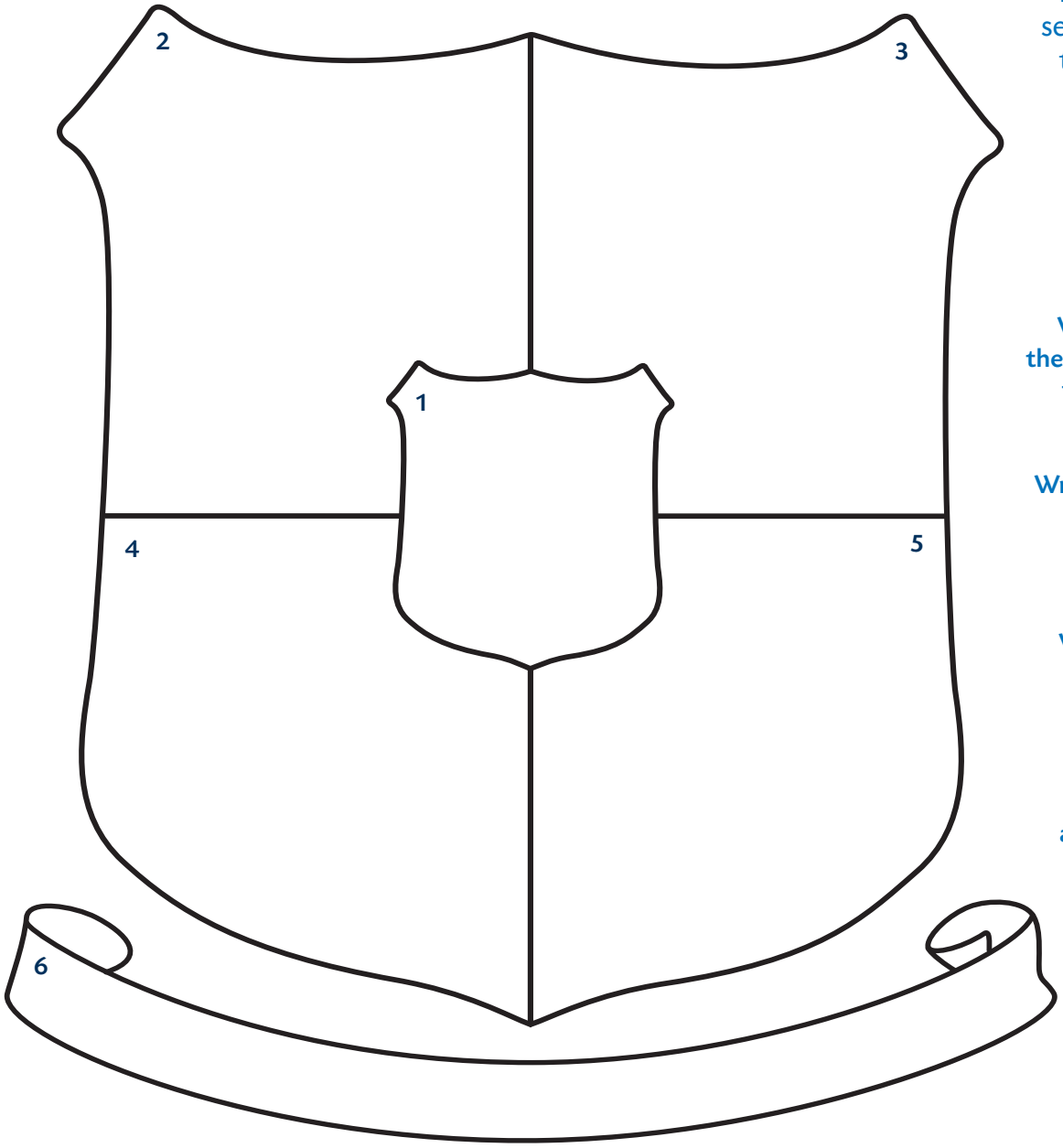
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Commitment Shield

ACTIVITY 2

Design Your Own Crest



Fill in each numbered section of the crest with the pictures or words as described below.

1. Write: Your Name & Job Title
2. Write: **TO PROTECT** then draw a picture and write the name of the species
3. Write: **THAT LIVES IN** then write or draw the type of habitat
4. Write: **BY** then write a conservation action
5. Draw yourself in your career, doing your job and protecting animals.
6. Write a slogan on the scroll below the shield.

Color Symbolism

Colors have certain meanings in different cultures. Using this chart, consider the meaning of the colors you use in your crest.

- Green=HOPE
- Purple=JUSTICE
- Blue=LOYALTY
- Silver=PEACE
- Yellow=GENEROSITY
- Red=SINCERITY

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LESSON SIX

Marine Careers

[Grades 4-6]



THEME
Marine Careers

GRADE LEVEL
4-6

STUDENTS WILL BE ABLE TO...
- research and write a profile for a career in the marine sciences
- demonstrate how a team of people from diverse fields can work together to address a wildlife threat/issue

VOCABULARY
geologist, commercial diver, commercial fisherman, archaeologist, biologist, engineer, microbiologist, oceanographer, outdoor & experiential educator

YOU'LL NEED:
- Activity Sheet 1: Marine Career Trading Cards
- Yarn

The marine sciences include a number of diverse career choices that involve people and jobs that help protect oceans and their inhabitants. We see a few of these careers represented in Disney•Pixar's Finding Dory, but there are many more!

Warm Up

Students view a series of videos that showcase different disciplines in the marine career field. As students watch each video focused on a different career, ask them to identify and write down the central figure's main responsibilities. They should be prepared to discuss what parts of the job they think contribute to caring for and protecting marine animals.

Video 1: Marine Biologist – Ask students to speculate about what it would be like to be a marine biologist for a day. View an 8-minute video of a student, Ayana Johnson, who takes viewers through a day that involves her field work, research and studies. http://science360.gov/obj/video/9fcb0d53-2352-437c-8702-f6d408467e39/profiles-scientists-engineers-marine-biologist

Video 2: Aquarist – Ask students what they think an aquarist does on a daily basis. What does the job title tell them? What type of responsibilities might be expected? Would students be prepared to do chores that range from mopping the floor to preparing aquatic food? As part of their research, students will view an 11-minute video of Jonathan Blue's visit to the New England Aquarium as a volunteer aquarist for a day. They will learn what it takes to care for thousands of fish in dozens of exhibits, including the massive 200,000 gallon Giant Ocean Tank. https://www.youtube.com/watch?v=ebcGjrBuloA

Video 3: Chemist – Ask students why it would be important for a chemist to work with marine animals. How does lab work, field work and mentoring graduate students contribute to Jon Wilker's career as a chemist? http://science360.gov/obj/video/18fd5c84-e871-4525-8e4e-be577fed5874/profiles-scientists-engineers-chemist

Get Started

STEP 1: Students will choose one marine science career to research.

First, divide the class into groups of 9. Distribute *Activity Sheet 1* and ask students to carefully cut out each of the marine career trading cards for all three sets. Blank cards can be used to assist with group size or to write in a different career that is not provided. Once the cards have been cut out, have each student select one of the marine careers to explore. Each card provides students with a broad overview of the career they chose with online links for further exploration.

STEP 2: Have students visit relevant websites to become experts on their career in the marine sciences, taking notes about the following topics...
- What are the job responsibilities of your selected career?
- What would you need to study in school and for how long? What type of schooling and training would you receive?
- What were key factors in your career decision?
- How does your job directly or indirectly take care of ocean life?

STEP 3: Students will write a career report to share with the class. Reports can take

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Marine Careers

[Grades 4-6]

many formats including speaking from the point of view of a scientist in the field; pretending to be at a news conference about "your" latest discovery and answering questions from "reporters"; creating a trifold poster about your career, etc.

STEP 4: Solving Ocean Problems

Now that students have become experts in various marine careers, ask them to recall different problems faced by the career they studied. In their research, did they come across other professionals who would collaborate with them? To illustrate how various marine careers work together, show students a short video clip showcasing a real life situation where members representing many marine careers came together to solve a problem facing sea turtles. https://www.youtube.com/watch?v=tmZGdDBizo8&feature=youtu.be. After viewing, ask students to list all of the careers represented in the video. How did everyone work together to solve the problem?

STEP 5: Ask students to sit in a circle and explain that they will now take on the perspectives of the professionals they researched. Using a ball of yarn, toss the ball to a student who can explain a responsibility of the career they researched. After they have stated their responsibility, ask other students in the circle which of their careers might connect to the student with the ball of yarn, and ask them to explain why. If the connection is correct, the student will toss the ball of yarn while holding the end of the thread to the connected career. Follow this process until all students are connected and have made a web. Discuss how the web of yarn illustrates how marine careers can connect in powerful ways that lead to solutions.

STEP 6: Divide students into five groups to collaborate on solving challenges that pose threats to specific species seen in Disney•Pixar's **Finding Dory**. Each student should represent the career they researched and each group should have multiple careers represented. The focus species can include any of the following.

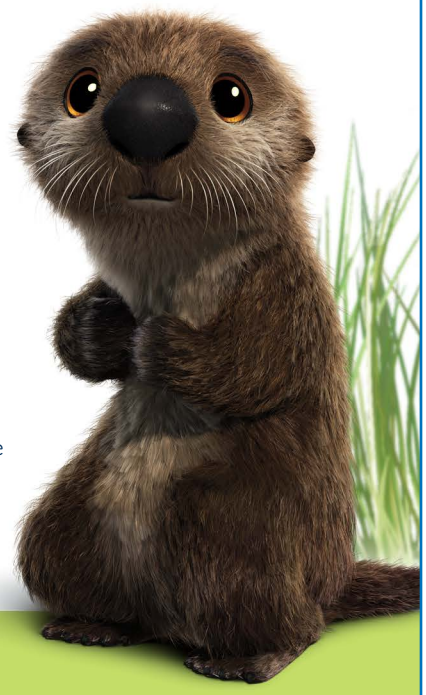
- Sharks & Rays
- Coral Reefs
- Sea Turtles
- Whales
- Migratory Birds

STEP 7: The group will research and hypothesize a threat to one of the listed species and collaborate on a possible solution. Students will conduct online research to find answers to the following questions.

1) What is the threat?
2) What is known about the causes and outcomes of the threat?
3) What does each person know from an area of expertise to identify a solution?
4) Determine an action plan and steps your group might take to initiate the action.

Wrap Up

Ask each group to present their species and action plan they created. After each group has presented, ask the class to describe the ways in which their careers worked together. Did any of the solutions they thought of have every career working together? Ask students to think of other issues facing the planet that could be solved with multiple careers working together.



Additional Resources

Websites

- Disney's Animals, Science and Environment Internships http://profinterns.disneycareers.com/en/students-recent-grads/operations/sciences-horticulture-zoology/
- Centers for Ocean Sciences Education Excellence's oceancareers.com: http://oceancareers.com/2.0/index.php
- Information on careers in marine science from OceanLink http://oceanlink.info/career/career2.html
- Resources for careers in marine or aquatic sciences compiled by Hopkins Marine Station (Stanford): http://hopkins.stanford.edu/careers.htm
- Profiles of women in oceanography: http://www.womenoceanographers.org/
- Undergraduate Programs: Woods Hole Oceanographic Institution http://www.whoi.edu/main/undergraduate-programs

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Marine Career Trading Cards

ACTIVITY 1

Set 1

Marine Biologist



Scientists in this field study the behavior and ecology of plants and animals that live in the ocean and their roles in the marine food chain.

They also study the effects of pollution on the marine environment.

Learn more and read a profile:
http://www.marinecareers.net/shannon-atkinson

Oceanographer



GEOLOGICAL oceanographers study evolution of the ocean floor and the minerals found there.

CHEMICAL oceanographers study ocean chemicals and chemical compounds.

PHYSICAL oceanographers study ocean motion, from gentle currents to powerful tidal waves.

Learn more and read a profile:
http://www.marinecareers.net/keil-schmid

Ocean Engineer



Ocean engineers design and build the instruments, equipment, vehicles and structures used in the marine environment.

Environmental engineers work to avoid or lessen any harmful impacts humans have on the marine and other environments.

Learn more and read a profile:
http://www.marinecareers.net/chad-w-scott

Marine Archaeologist



Underwater archaeologists record shipwrecks, harbors, maritime artifacts and any other type of maritime culture.

Their goal is preservation and maintenance of maritime cultural heritage.

Learn more and read a profile:
http://www.marinecareers.net/caitlin-zant

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Marine Career Trading Cards

ACTIVITY 1

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Set 2

Outdoor & Experiential Educator



Outdoor & experiential educators develop programs to engage the public with nature in fun and innovative ways. Educators develop new ways to involve people in conservation and science from developing new technology to sharing stories.

Learn more and read a profile:
http://www.marinecareers.net/anna-switzer

Research Microbiologist



Ocean microbiologists grow bacteria and fungi from the marine environment.

They take the DNA out of a sample of bacteria or fungi, and use sequencing to look for different microbes that might be living in those samples.

Learn more and read a profile:
http://oceanexplorer.noaa.gov/edu/oceanage/13kellogg/media/kellogg1.html

Aquatic Veterinarian



Aquatic veterinarians look over the basic health of aquatic animals by conducting physical exams, diagnosing illnesses, taking samples of blood, distributing prescription medications, evaluating behavior, performing surgical procedures and working with a team of veterinary technicians.

Learn more and read a profile:
http://animalcareers.about.com/od/Health/a/Aquatic-Veterinarian.htm

Public Affairs Specialist



Public affairs specialists are responsible for writing articles, press releases and online content to communicate information to the public for awareness. This individual is often in charge of social media platforms and creates a communications plan to build a relationship with the public through mass media.

Learn more and read a profile:
http://oceanservice.noaa.gov/profiles/oct10/ewald.html

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Marine Career Trading Cards

ACTIVITY 1

Set 3

Legislative Specialist



A legislative, or "policy" specialist works with local, state and federal government officials to enact bills and laws that help protect marine species and areas. This individual will often meet with members of a community to educate and build support to enact policy.

Learn more and read a profile:
http://oceanservice.noaa.gov/profiles/nov09/chae.html

Job Title: _____

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FINDING DORY

Keyword Glossary

Abiotic: related to physical not living.

Archaeologist: a specialist in the study of people and their culture through the investigation of artifacts, inscriptions and monuments.

Bar graph: a graph or chart that uses horizontal or vertical columns to visually represent amounts or quantities.

Biologist: a scientist who studies living things such as plants and animals.

Biotic: relating to living organisms.

Camouflage: a physical adaptation that helps an organism blend in with its environment.

Commercial diver: a professional who is paid to work below the surface of the water using scuba gear.

Commercial fisherman: a professional who fishes in large quantities for profit.

Consumer: an organism that does not make its own food and needs to eat other organisms for energy.

Decomposer: a living organism at the base of the food web that breaks down dead animals and plants.

Echolocation: the process by which animals such as beluga whales locate objects by emitting sounds and hearing the echos as the sound bounces back.

Ecosystem: the interaction of all living and nonliving components found within a given area.

Engineer: a professional trained to plan, design and construct complicated products, such as machines, systems or structures.

Filter feeding: when an animal obtains food by filtering organic matter or microscopic organisms from a current of water as it passes through a part of their body.

Fragmentation: the process by which a continuous section of one type habitat is broken up into smaller sections and separated by human-made barriers.

Global positioning satellite (GPS): a system of navigational satellites that can provide accurate data on an object's location.

Geologist: a scientist who studies the origin, history and composition of the earth.

Habitat: a place where plants and animals have everything they need to survive.

Latitude: imaginary lines used to measure the distance North or South from the equator.

Longitude: imaginary lines used to measure the distance East or West from the prime meridian.

Marine: pertaining to the sea and the plants and animals that live there.

Microbiologist: a scientist who studies microscopic organisms.

Migration: to move from one place to another in search of the climate or resources (food, water, shelter) needed to survive.

Oceanographer: a scientist who studies the ocean.

Outdoor & experiential educator: a specialist who uses the natural world as their classroom to teach through direct experiences, focusing on developing skills and increasing knowledge.

Patterns: a regular and repeated way in which something happens or appears.

Photosynthesis: the process by which a plant uses water, carbon dioxide and sunlight to create their own food.

Predator: an organism that captures and eats other organisms to gain energy.

Prey: an organism that is captured and eaten by another organism.

Producer: an organism that is able to make its own food (i.e. plants, algae).

Route: a specific course, way or road for passage or travel.

Schooling: when fish swim together in a coordinated group.

Shoals: an area of shallow water, such as a sandbar.

Symbiosis: a frequent interaction between two different kinds of organisms in which the organisms rely on the behavior of the other.

Telemetry: to take measurements of an animal's movement using special equipment and send them by radio transmitter to a receiver or by sonic means.

Tracking: to monitor the path of an animal's movement throughout its habitat by using different practices and tools such as recognizing footprints or using GPS.

Warning coloration: distinctive coloring, usually bright, that warns predators that an animal tastes bad or is poisonous or venomous.

Sources:

- **www.merriam-webster.com**
- **Ask.Dictionary.reference.com**
- **www.britannica.com**
- **www.biologicaldiversity.org**
- **www.bls.gov**
- **www.aee.org**

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