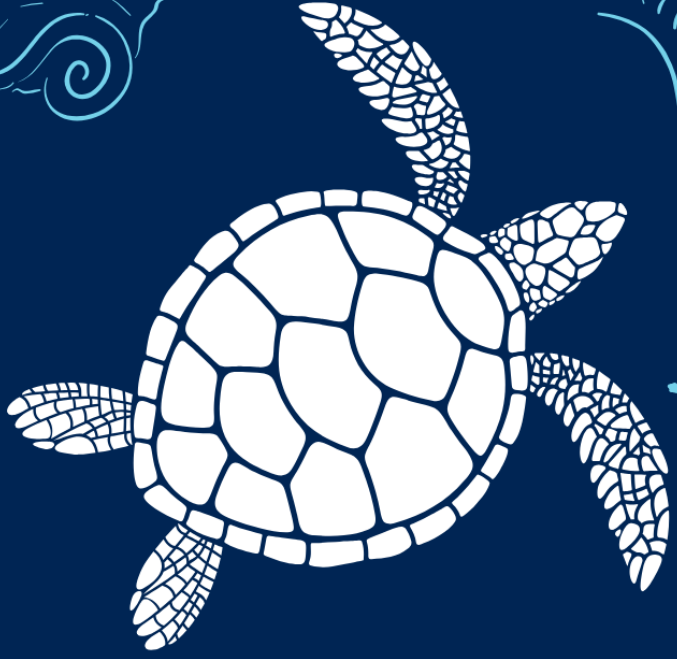


SMITHSONIAN MARINE ECOSYSTEMS EXHIBIT

OCEAN ADVENTURE AT-HOME

AGES (9-11)

Smithsonian
Marine Station Fort Pierce

CONTENTS

MODULE I: INDIAN RIVER LAGOON TRIVIA

Florida's coasts have a great diversity of dynamic ***habitats*** (the natural homes of living organisms) and ***ecosystems*** (the combination of interactions that happen between living and non-living things in a habitat). At the Smithsonian Marine Ecosystems Exhibit (SMEE) we love highlighting some of these ecosystems and one of the most important missions at our facility is sharing information about the Indian River Lagoon, an estuary that covers about 40% of the state's eastern coast. Learn some facts about the Lagoon before jumping into a trivia session:

The IRL is an estuary, not a river.

- ***Estuaries*** are bodies of water where saltwater from the ocean and freshwater from rivers and tributaries mix, creating ***brackish*** water.
- ***Lagoons*** are a type of estuary separated from the ocean by barrier islands or reefs.

Did you know?

The Indian River Lagoon (IRL) is part of the longest barrier island complex in the United States. Starting at the Ponce de Leon Inlet, it extends for a total of **156 miles** and ends at the Jupiter Inlet. The IRL is the most biodiverse estuary in North America. It is home to 2,200 animals, 2,100 plants, and so much more!

The following IRL ecosystems are essential for the healthy development of many species of aquatic animals:

Pictured: Seagrass Bed

Pictured: Mangrove Forest

Pictured: Hardbottom Ecosystem

- Seagrass beds provide shelter and food for small and young animals, making them great nursery habitats for fish and invertebrates.
- Mangrove forests are not only nursery habitats. They also help to stabilize the coastline by reducing erosion from storms, currents, waves, and tides.
- Hardbottom habitats provide hiding nooks for organisms transitioning out of their nurseries and on their way to the ocean, many of which are commercially relevant. That means you might find them on your dinner plate!

Indian River Lagoon Trivia Time!

- You will need access to at least two different screens to play this game of trivia.
- A computer screen can be used to display the quiz questions. A phone, tablet or another computer can be used as a controller to submit answers.
- Others will be able to join you for the game if they also have their own phone!

HERE ARE THE STEPS TO ACCESS THE TRIVIA QUIZ:

1. If using a tablet or phone, download the free Kahoot app from your app store.
2. Copy this link and paste it into your computer´s browser to access the trivia quiz.
3. A screen including a preview to the quiz will open. Press ¨Play as guest¨ if you do not wish to sign up for an account.
4. Select the green ¨Classic¨ game button for single player games or the blue ¨Team mode¨ button so various individuals can share one phone as a controller to battle another team using another phone.
5. Submit the pin that will appear on the screen on the Kahoot app. The same pin can be used for all the players that wish to join the game.
6. Start playing!

Some other resources in case you need to sharpen your Indian River Lagoon facts before trivia time:

Indian River Lagoon Inventory

One Lagoon Program (biodiversity facts)

Look us up on Youtube for quick and informative aquarium videos!

MODULE II: TAKING A LOOK AT OUR WATER

OVERVIEW

This activity will introduce you to the importance of water as a necessary component for life on planet Earth. You will reflect on the physical properties of water and how it reacts to changes in temperature.

BACKGROUND KNOWLEDGE NEEDED

None.

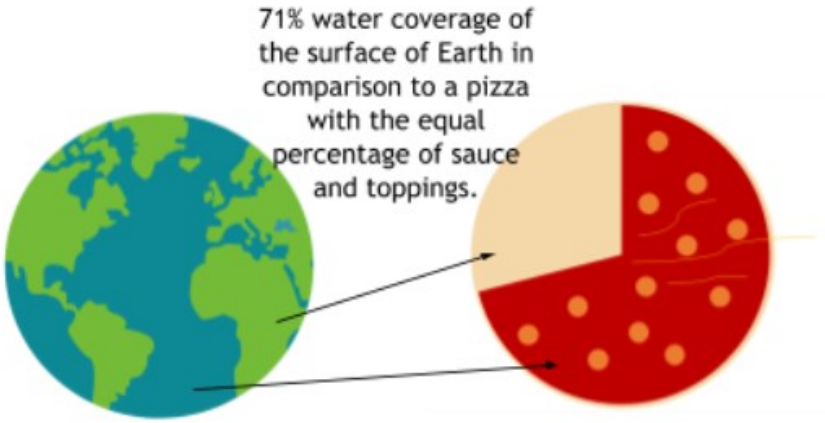
LEARNING OBJECTIVES

After completing this module, you will understand that water is all around us; learn the three states of water naturally found on Earth; and understand one of the physical properties of water that influences life and ocean currents.

INTRODUCTION

We are part of a watery world

Our planet is called Earth because it is mainly made of rock, but when we look at it from space, it looks mostly blue. Do you know why? That's because most of the rocky coating of Earth is covered by water! In fact, 71% of the surface (what we see) of planet Earth is covered with water. Imagine if planet Earth was a deep-dish pizza, and water was the pizza sauce covering a major part of the pizza, but not all of it. It would look like this:



Water is up, down, and all around

Water can be naturally found on Planet Earth in three states or forms: liquid, gas, and solid. The liquid form of water falls from the sky as rain and can be found in the ocean, rivers, lakes, estuaries and under the ground. Some of those watery environments are home to many animals and plants. They are also places where humans find food, explore, and have fun. The solid state of water can be found as ice, snow, hail and glaciers. Glaciers are important because they contribute to the system that keeps Earth cool enough for life as we know it to exist. The gas state of water, known as water vapor, is found around us and up in the clouds.

If you heat ice, it will become liquid water and if you heat liquid water, it will become gas or water vapor! On Earth it's almost like the three states of water play dress up as each other in a never-ending game known as the water cycle, which is powered by the Sun. The water cycle controls the movement of water all over the planet. *Watch this video about the water cycle by SciShow kids to learn more.*

ACTIVITY: WATER DENSITY EXPLORATION

This activity will demonstrate that water's density can influence water movement, mixing, and consequently, the formation of ocean currents on planet Earth.

Integrated directly from Foras na Mara Marine Institute

INTRODUCTION

Now that you know oceans cover about 71% of the Earth surface, have you ever wondered where all of it goes? Of course, there is the water cycle: water heats up thanks to the power of sunlight, evaporates into water vapor, and then goes up into the clouds where it condenses into droplets and falls down again as liquid raindrops. But, how about the vertical movement (up and down) of water in the ***ocean column*** (the water found from the surface of the ocean to the bottom)?

There is a special property of ***matter*** (everything that has mass and takes up space) called ***density***. Water is a type of matter, therefore, it has density. Density can be obtained when we compare mass or the amount of "stuff" something has versus the volume or the amount of space it occupies. In other words, density describes how compact or tightly packed something is.

Have you ever held a golf ball and a ping pong ball side-by-side? From a distance, they seem to be very similar, but the golf ball feels significantly heavier than the ping-pong ball because it is denser! Can you think of any other pair of things that might seem like they would have the same type of density, but end up having the same size, but weighing extremely different amounts?

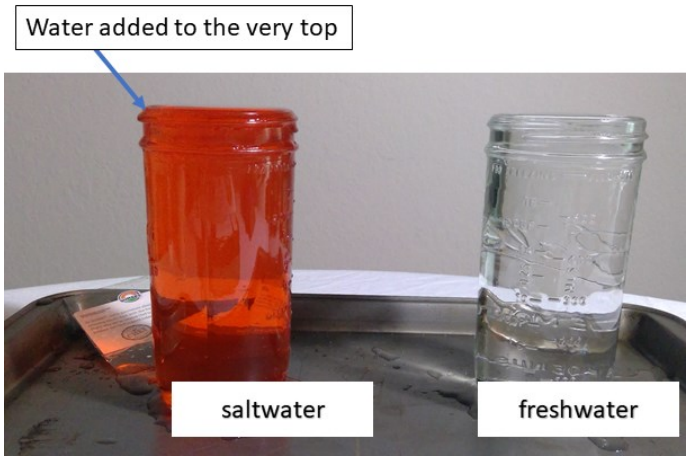
If you understand the idea behind this concept, you are ready for the fun part of this activity! Otherwise, check out this video Why does ice float in water?

MATERIALS

- 2 mason jars (same size)
- 1 Piece of plastic wide enough to cover the mouth of the mason jars (look through your recycling bin to find a piece of plastic that fits this description).
- Table salt
- Food coloring
- Paper towels
- Plastic / baking tray

INSTRUCTIONS

1. Fill one jar with freshwater (from the tap is fine). Fill the other jar with saltwater (mix table salt with tap water to a point where you can notice it is no longer dissolving). Add food coloring to the saltwater. Place both the jars in the tray.



2. Place a piece of plastic on top of the jar with the saltwater and turn the jar upside down, holding the card in place. When you remove your hand, the upward pressure of air will hold the card in place (most of the time).
3. Place the saltwater jar on top of the freshwater jar. Then carefully remove the plastic. Do this over the tray in case of spillages. Observe the results. (What happened with the saltwater? Why?)
4. Repeat steps 1 to 3 – this time put the freshwater on top of the salt water, remove the card and observe the results. (What happened? Why?)
5. Repeat steps 1 to 3 – this time with warm freshwater and cold freshwater to see which is denser.
6. Based on the observations above, make inferences about what would happen if you were to mix warm and cold saltwater.

INTERPRETATION

Answers:

- First experiment: Saltwater is denser than freshwater. This means that saltwater will sink and mix with the freshwater on the bottom.
- Second experiment: Because the freshwater (least dense) is on top, it will remain there. No significant amount of mixing will be observed.
- Third experiment: Cold water is denser than warm water, so the cold water will sink.
- To understand how the observations of your experiment play out in real life, check out this video about the ocean conveyor belt!

Experiment 1

Experiment 2

MODULE III: INTRO TO VERTEBRATES AND INVERTEBRATES

OVERVIEW

This module introduces you to two of the major taxonomic groups in the animal kingdom: vertebrates and invertebrates. Venture out on a nature walk (around the neighborhood, on a trail or at the beach) to observe how many vertebrates and invertebrates you can identify close to home. The nature walk experience will serve as inspiration as you reinforce your observational skills, matching vertebrates to their skeletons and inventing an invertebrate. By the end of this module you will be able to identify all the main groups of vertebrates and some of the most commonly known groups of invertebrates on the planet by recognizing characteristics shared within each classification.

LEARNING OBJECTIVES

After completing this module, you will understand that living organisms are grouped according to their physical characteristics and behaviors. You will also learn what it means to be a vertebrate or invertebrate animal as well as the names and defining characteristics of major groups of vertebrates and invertebrates.

INTRODUCTION

How long would it take you to count to 8 million? Can you imagine what it would look like to have 8 million pieces of your favorite snack available to you? Would they fit in a house or would you need a huge field to fit them? The world may never know...but we can agree that 8 million is an extremely LARGE number. According to the Census of Marine Life, there is an estimated 8.7 million species or kinds of living organisms on Planet Earth, many of which are yet to be discovered and studied!

All the organisms on Earth are very diverse and can be hard to study and understand. More than 200 years ago there existed a man named Carl Linnaeus who dedicated his life to studying living organisms. Linnaeus came up with a system that helps scientists organize all types of life into groups, making it a little easier to keep track of species, where they come from and how they relate to one another. He is now known as the father of ***taxonomy***, the science that names, describes and classifies organisms into groups. Although this science keeps on growing and changing with the evolution of genetics, the focus remains in grouping ***biodiversity*** (the diversity of life) based on common characteristics.

In this module you will learn about the two major groups into which ***animals*** (organisms that eat other living things to stay alive) are divided: vertebrates and invertebrates. Check out the following resources to get a short introduction to vertebrates and invertebrates:

- Ocean Invertebrates vs Vertebrates by San Diego Zoo Kids

- [Learn about Smithsonian marine biologist Dr. Karen Osborn's research on marine invertebrates.]
  The following infographics show characteristics about each of the groups:

INVERTEBRATES

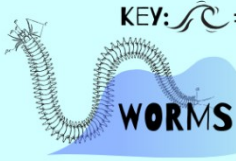
LACK A BACKBONE

30 MAJOR GROUPS OR PHYLLUMS

SOME GROW PROTECTIVE EXOSKELETONS (EXTERNAL)

EXAMPLES:

KEY: = AQUATIC HABITAT = LAND HABITAT



WORMS

Habitat:

Characteristics
- Long, thin bodies without legs.
- Definite head and tail ends.

SPONGES

Habitat:

Characteristics
- No tissues or organs.
- Filter water.

CORALS & JELLIES

Habitat:

Characteristics
- Gelatinous bodies.
- Have stinging cells.

MOLLUSKS

Habitat:

Characteristics
- Mostly soft bodied.
- Some have shells.
- Some have a muscular foot for movement.

ECHINODERMS

Habitat:

Characteristics
- "Spiny skin"
- Water-based vascular system.
- Test made of calcium carbonate.

ARTHROPODS

Habitat:

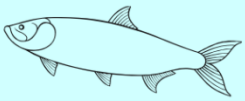
Characteristics
- Jointed appendages
- Exoskeleton

VERTEBRATES

Have backbones

KEY: = AQUATIC HABITAT = LAND HABITAT

FISH



Habitat:

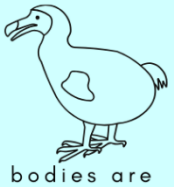
Characteristics:
- Most are cold blooded.
- Have gills, fins, and scales.

AMPHIBIANS

Habitat:

Characteristics
- Most have four legs or appendages.
- Slimy, moist skin.

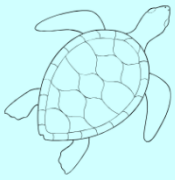
BIRDS



Habitat:

Characteristics
- Have beaks and their bodies are covered in feathers.
- Lay eggs to reproduce.

REPTILES



Habitat:

Characteristics
- Skin covered in scales.
- Cold blooded. Use behavior to get warm.

MAMMALS

Habitat:

Characteristics
- Have hair. Some have modified hairs.
- Give live birth and nurse their babies.

ACTIVITY I: TAKE A NATURE WALK!

Practice your observation skills by looking for the vertebrate and invertebrate animals around your neighborhood.

MATERIALS

- Nature journal (could be any notebook) or a copy of the observation sheet.
- Pencil or pen
- Optional: Camera to take pictures of the animals and coloring pencils/crayons
- Note: Bring the infographics along to help you tell if an animal is a vertebrate or invertebrate and the major groups it belongs to.

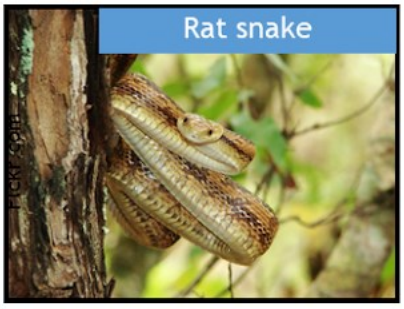
ACTIVITY INSTRUCTIONS

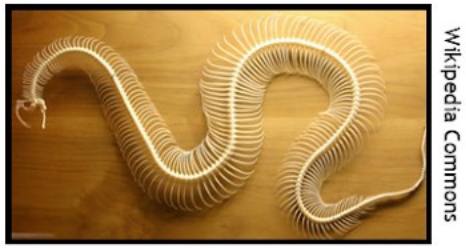
1. Talk to your parents or guardian about going out for a walk around the neighborhood, the beach, a trail, or even just around the yard! Anywhere you can put your vertebrate and invertebrate knowledge into practice. This nature walk is just an opportunity for learning and enjoyment!
2. Print out a copy of the nature walk observation sheet or write down the categories of the sheet into a notebook and bring it with you.
3. Go explore your surroundings. Do your best to spot all the animals around you! You might be surprised to find out there are many animals, like insects and worms, even in your backyard.
4. Look up at the sky, around trees, shrubs, grassy areas and even in and around puddles.
5. Write down observations about the animals you are seeing:
    - *Do you know what type of animal it is?*
    - *If not, describe how it looks. Use the characteristics learned from the videos and infographics to help identify important characteristics.*
    - *How many are there?*
    - *How is it acting?*
    - *Sketch the animals you are observing.*
    - *Can you tell what major animal group it belongs to?*
    - *Can you call it by its common name?*

ENJOY YOUR NATURE WALK AND BE RESPECTFUL OF THE ANIMALS AND THE PLACE YOU ARE VISITING. HAPPY EXPLORING!

HAVE FUN WITH YOUR PHONE!

Download the **FREE iNaturalist app** on your phone, register and share your observations with the rest of the community! Once you spot your vertebrate or invertebrate, take a clear picture and upload it as an observation. iNaturalist has a cool feature where it suggests species identification for your observations. Bring any species identification books available at home in case iNaturalist isn't able to accurately identify your animal. Here is a list of video tutorials for the app.





Draw a line to match each vertebrate animal to their skeleton.

Optional activity:

Print out an enlarged version of a fish skeleton. Use modeling clay to build a 3D version of the skeleton by laying each piece of clay bone structure on top of the flat sheet of paper. Once you are done, identify: the vertebral column, caudal fin, dorsal fin, anal fin, pectoral fin, operculum (hint: protects the gills), and lower jaw. Answer sheet here.

ANSWER FOR MATCHING GAME: HTTPS://BIT.LY/2LSRZLW

ACTIVITY III: INVENT AN INVERTEBRATE

In this activity you will create an invertebrate of your own. As you create your invertebrate, read through the worksheet, and think about how your creature would survive and where it would live. There is no wrong way to make your invertebrate! As you are working on your invertebrate or after you have finished making it, answer the questions on the worksheet.

MATERIALS

- Invent an invertebrate worksheet.
- A variety of random craft supplies (paper cups, paper plates, pipe cleaners, toothpicks, pom-poms, googly eyes, markers, crayons, string, etc.)
- Glue and/or tape

ACTIVITY INSTRUCTIONS

Watch this video for instructions and an example.

MODULE IV: WHAT'S A FISH?

OVERVIEW

This module will introduce you to the basic characteristics used by scientists to identify fish. You will learn introductory terms about the fish anatomy through an interactive activity that will set the stage for creating your very own species of fish!

BACKGROUND KNOWLEDGE NEEDED

Basic knowledge of marine environments and habitats.

LEARNING OBJECTIVES

After finishing this module, you will understand that not all animals living in water-based environments are fish. You will learn the list of characteristics scientists use to designate an aquatic animal as fish and recognize the basic body parts shared between most fish as well as how they are used.

INTRODUCTION

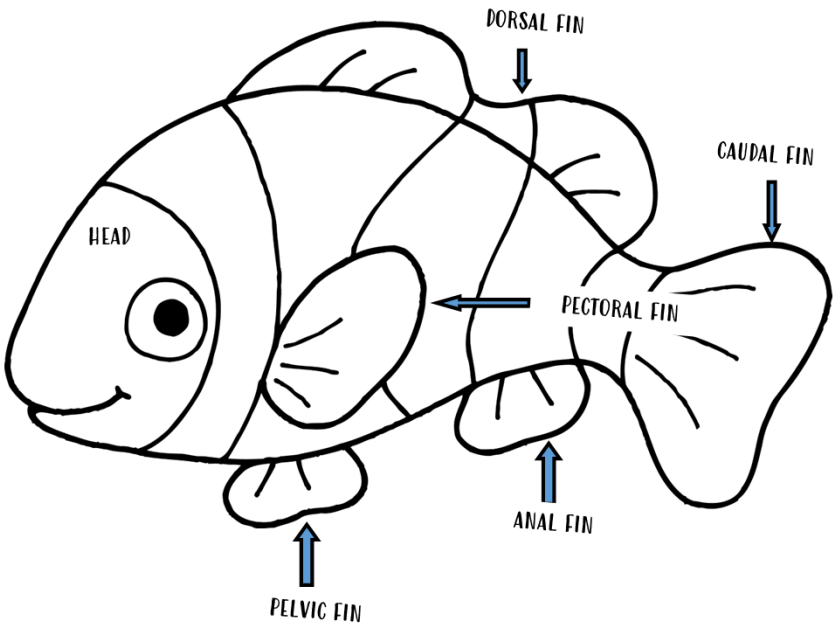
What are fish?

These are the five characteristics scientists use to tell fish apart from other aquatic (water-based) animals:

- Fish live in aquatic (water-based) environments such as rivers, streams, lakes, ponds, estuaries, and oceans. Marine fish (live in the sea) can be found all over the world from the shallowest parts of the sea, to the deepest, darkest, and coldest corners of the deep ocean.
- Fish are ***vertebrates***, animals with backbones that provide the basic structure for swimming.
- Fish are ***cold-blooded*** (also known as ectotherms). Contrary to humans, their body temperature is affected by the temperature of the environment.
- Fish have ***gills***, structures located close to their faces used for breathing. Water enters the mouth and passes through the gills, oxygen is extracted, and water exits through the gill opening.
- All fish have appendages known as ***fins***.
- The skin of many fish is covered in protective scales which can vary in shapes and sizes.

Check out the introductory video for ¨WHAT'S A FISH?¨

Fish Anatomy



Check out our video for an introduction to fish anatomy!

- Eyes: The eyes of fish are sensitive to light and help them navigate the environment to find food. Very often, eyes are specialized for specific conditions, like seeing low-light levels in the deep sea.
- Mouth: Mouths help fish eat and pump water towards their gills for breathing. They are shaped according to what the species of fish eats. Some fish open their mouths wide to show power over a territory. There are other species, like the bangaii cardinalfish, who practice mouthbrooding. Mouthbrooding is a behavior through which males protect their eggs and larvae (babies) by holding them inside their mouths until the young are ready to face the ocean on their own.
- Dorsal fins: Located along the top of the body, dorsal fins keep fish from rolling on their sides. Elongated fish, like eels, use them as their main form of propulsion.
- Pectoral fins: Pectoral fins come in pairs and are located on either side of most fish, helping them maneuver from side to side and gain forward propulsion. Flying fish use their pectorals for gliding!
- Pelvic Fins: These paired fins are located along the ventral (bottom) part of fish, close to the pectoral fins. They provide stability for fish and serve as the brakes for some, helping them stop whenever necessary.
- Anal fins: Located on the ventral and posterior area of the body, these keep fish from rolling on their sides.
- Caudal fin (the tail of the fish): Helps push fish forward and turn or steer from side to side.

ACTIVITY I: FISH ANATOMY COLORING

MATERIALS

- One copy of the fish anatomy coloring sheet per camper. Answer key found as second page of this pdf document.
- Crayons or coloring pencils (yellow, red, orange, pink, green, blue)

INSTRUCTIONS

1. Color each of the body parts on the seahorse and clownfish drawings as indicated on the fish anatomy coloring sheet.
2. Check the answer sheet to see if you were right after finishing.

ACTIVITY II: OCEAN EXPLORATION TRUSTS´S ANY FIN IS POSSIBLE

This activity belongs to Ocean Exploration Trust´s STEM modules.

MATERIALS

- Introductory Level: Any Fin is Possible Printable Body Parts and Overview of adaptations. https://bit.ly/2YttbkV
- 4 containers (box/large envelope/bags) containing:
    - Body Shapes Descriptions + Cutouts
    - Fin Design Descriptions + Cutouts
    - Mouths Descriptions + Cutouts
    - Sensory structures/additional features + cutouts
    - 1 pair of kid-safe scissors per child
    - 1 set of crayons and coloring pencils
    - Glue sticks, glue dots or clear tape
    - New Species worksheet

SET-UP INSTRUCTIONS

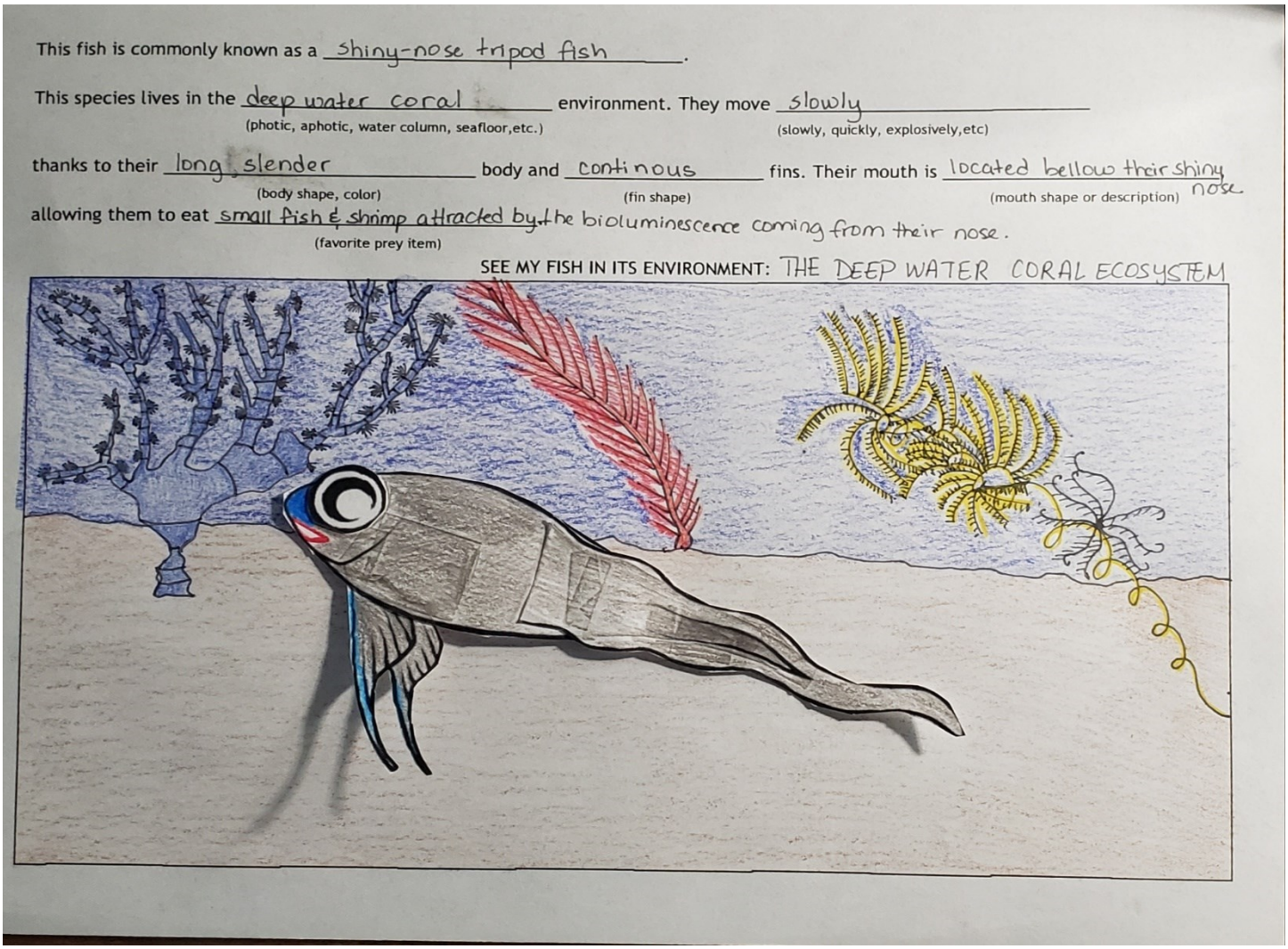
1. Set-up one container for each of the cards included in the Any Fin is Possible activity pack.
2. Cut out each body part, including their number, and place them inside the respective container: body shape, fin design, mouths, and sensory structures. Each type of body part must be grouped in a container with the others from the same group. For example: all fins go into one container.

INSTRUCTIONS

1. Time to make your own fish! Now that you know the basics of fish anatomy, visit the following links with the supervision of an adult to observe four species of fish that live in different habitats. Think about how their bodies have adapted to survive within those specific conditions:
    - Flounders
    - Humphead Parrotfish
    - Gulper Eel
    - Sargassum fish

2. Explore the four different containers of body parts and the adaptations cut-outs inside. Try to match each shape with their description to learn why each adaptation is helpful to fish.
3. Grab your New Species Worksheet and read the sentences on the top. Use those sentences as inspiration while you use the body parts inside each container to create a new species of fish. Cut, color and assemble!
4. Fill in the blanks of the New Species Worksheet and draw a habitat for your fish.
5. Place your new species of fish on top of the habitat drawing.
6. Share on social media by tagging us on Facebook, Instagram and Twitter at @SMSEducation.

Here is an example of a new species of fish created by one of our educators:



MODULE V: SEA TURTLES

OVERVIEW

This module will introduce you to the species of sea turtles that swim in the Atlantic Ocean. You will get acquainted with the characteristics used to identify each species and life cycle. You will also learn about a special sense that helps sea turtles feel the magnetic field of the Earth's core.

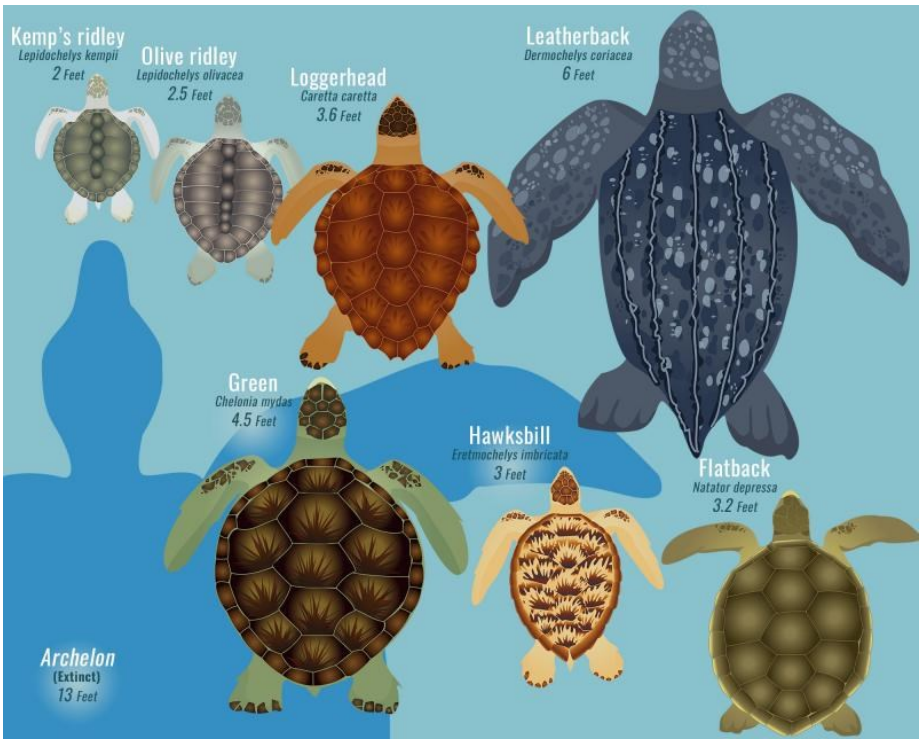
LEARNING OBJECTIVES

After completing this module, you will be able to identify the sea turtles found in the Atlantic Ocean, recognize their nests and explain how females return to the same area where they hatched to lay their own nests.

INTRODUCTION

Sea turtles are marine reptiles that outlived the dinosaurs, having survived on Earth for approximately 110 million years. They swim all over the Earth's oceans, with the exception of the polar seas, and migrate for hundreds of miles between feeding and breeding areas (where they have babies). Sea turtles can hold their breath for several hours depending on the rate of activity! For example, they will catch a quick snooze under rocky ledges before coming up for air (they are air breathers after all). According to the Sea Turtle Conservancy, resting sea turtles can stay submerged for 4-7 hours.

Wondering what makes them different to the terrestrial gopher tortoises or aquatic terrapin turtles found in Florida? Instead of legs, sea turtles have powerful fins for swimming and live exclusively in ocean water. Females will come up to the beach to nest and green sea turtles will visit estuaries to feed on seagrasses, but they spend most of their lives out at sea.



Illustrated: The seven species of sea turtles currently alive. The blue outline is one of their ancient relatives: Archelon. Diagram belongs to Smithsonian Ocean.

There are seven species of sea turtles in the world. Look at the following diagram to learn how to identify the five species found in Florida waters. Look at the prefrontal scales, carapace (top of the shell), plastron (ventral area of the shell) and the amount of scutes (or plates) on the carapace:

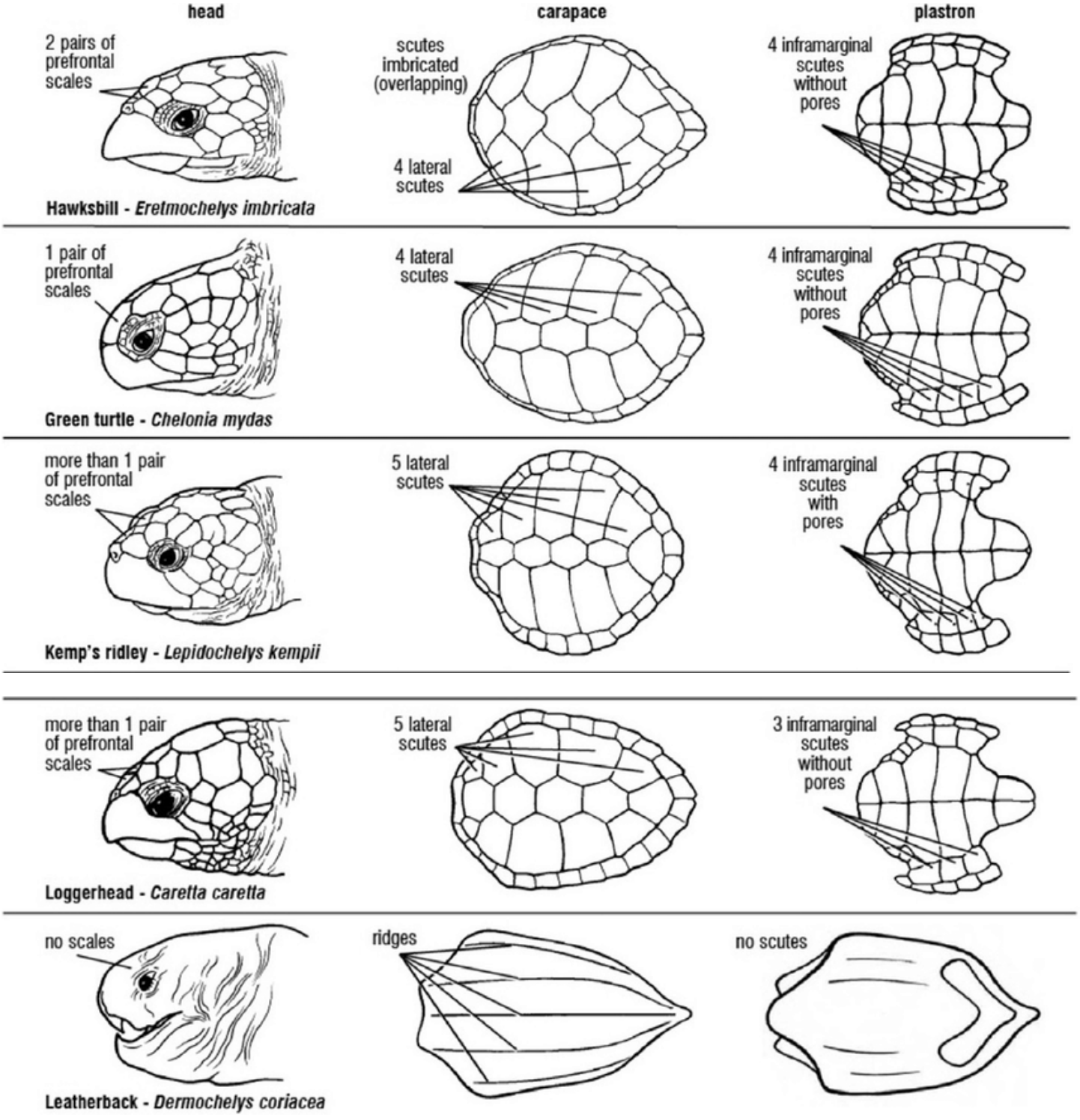


Diagram: [Shigenaka, Gary & Milton, Sarah & Lutz, Peter & Hoff, Rebecca & Yender, Ruth & Mearns, Alan. (2003). Oil and Sea Turtles: Biology, Planning, and Response.]

DIVE INTO THESE RESOURCES FOR IN-DEPTH INFORMATION ON SEA TURTLES

- Website: Smithsonian's Ocean Portal Sea Turtle Profile
- Video: National Geographic shows sea turtle hatching frenzy (**warning for graphic bird/turtle predation**)
- Podcast: Scientist Roger Brothers discusses his research on sea turtles and how females recall the Earth's magnetic field of the geographic area where they were born, a behavior known as magnetic homing.
- Nat Geo Kids video: What Sam Sees visits The Sea Turtle Hospital in Florida
- Florida Fish and Wildlife Website. More information on sea turtles of Florida.

ACTIVITY I: SEA TURTLE ID CRAFT & MAGNETIC RACE

Use the defining traits of your favorite species of sea turtle to make a craft that showcases the key physical identification features of the species. Use your new sea turtle craft to race your family and friends as you mimic the magnetic navigational sense of these marine reptiles!

Activity adapted from animaplates https://youtu.be/dUiz5K8Ud7M

MATERIALS

- Sea turtle diagram included in the introduction
- One copy of the sea turtle stencil (print and cut)
- Craft foam sheets or another water-resistant material that floats on water and could be repurposed for crafts and painting. (ex: big cartons of milk, any carton-based food container with plastic film over top)
- Markers
- Paper pins
- Scissors
- One dowel rod or unsharpened pencil per person
- Magnets
- Hot glue or glue dots
- Elongated storage container, kiddy pool or tub
- Access to water

INSTRUCTIONS FOR CREATING THE SEA TURTLE

1. Print out the sea turtle stencil
2. Cut the stencil
3. Trace the shape of the stencil on top the craft foam or repurposed material two different times. This means you will end up with two turtle shapes.
4. Cut the shapes out.
5. Now, look for the sea turtle identification diagram included on this module. Which of the species of sea turtles would you like to model with your craft? Read over the identification information for your preferred species on the diagram (for example, amount of prefrontal

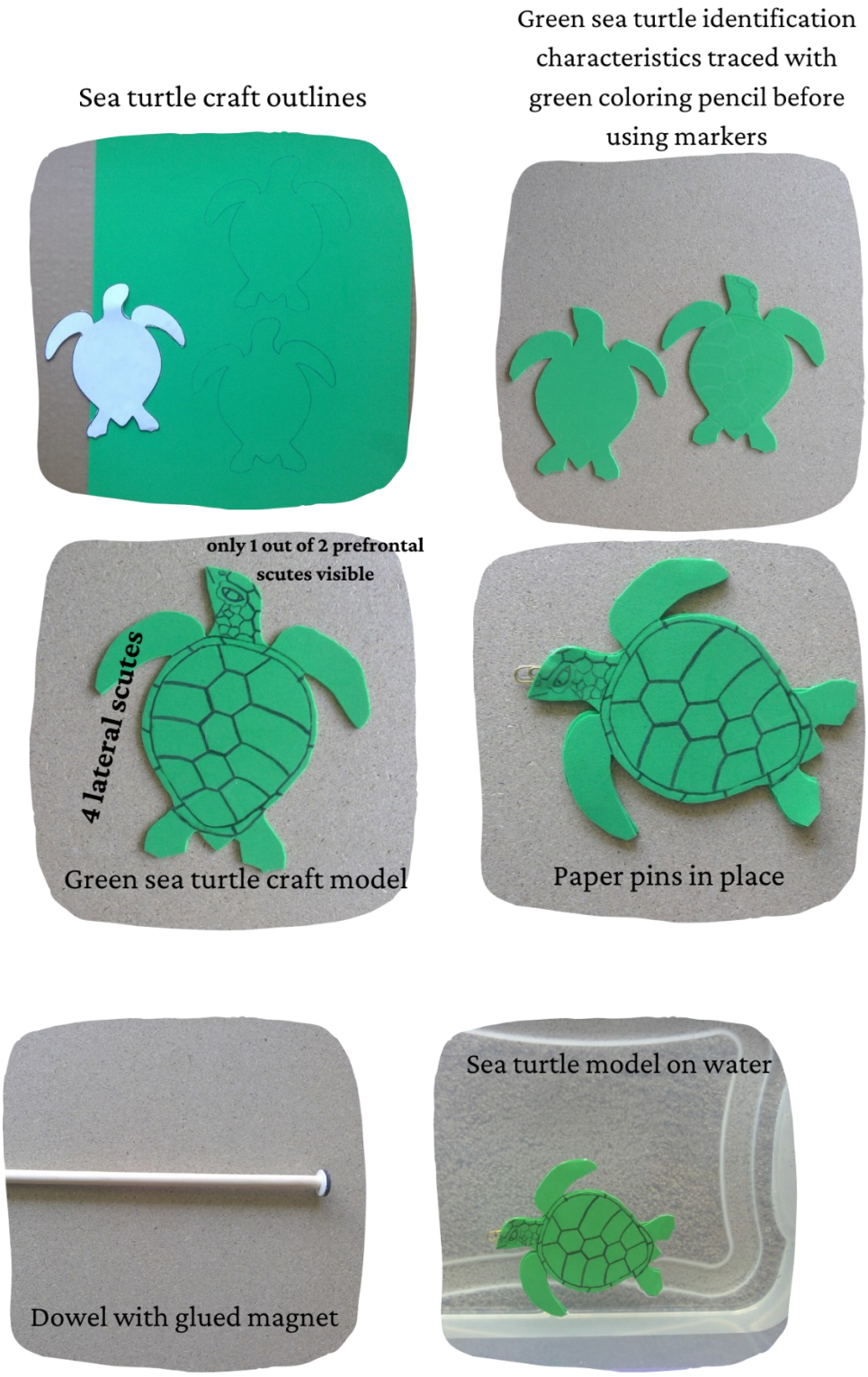
scales on the head, shape of shell, amount of scutes or lack of them on the leatherback sea turtle).

6. Do your best to draw the identification traits of your species of turtle on one of the turtle shapes. Tracing with a pencil before using a marker or pen for your drawing might be beneficial in case you need to make adjustments. Count the scales and scutes one more time to make sure you are representing the right species.
7. If you used markers for drawing, make sure that it dries up completely before moving on to the next step.
8. Warm up your hot glue gun. Once hot, use the glue to merge the two turtle shapes making sure that the part you draw is on top and that the mouth area does not get glued.
9. Once the glue is dry, insert two metal paper clips through the mouth space of your sea turtle model, allowing them to slightly show beyond the mouth.
10. Use the hot glue or pre attached adhesives to glue a magnet to a dowel rod. Depending on the strength of your magnet, you may want to add another one on top of the one that is glued to the dowel rod.

TIME TO RACE!

1. Get your elongated plastic container, kiddy pool or use your bathroom´s tub.
2. Put enough water in it so the turtle model can float without touching the bottom.
3. Put your turtle model inside the water-filled container.
4. Use your dowel rod to mimic the magnetic navigation sense of sea turtles, waving it about 2 inches away from the sea turtle's mouth.
5. Watch as your sea turtle begins moving towards the magnet.
6. Get a family member or friend and race sea turtle models.
7. Another modification would be to draw a map or trails on a piece of paper, placing the map under a clear container partially filled with water and doing your best to complete the route by having your sea turtle "swim" over it.

Pictured below: Steps for completing the activity



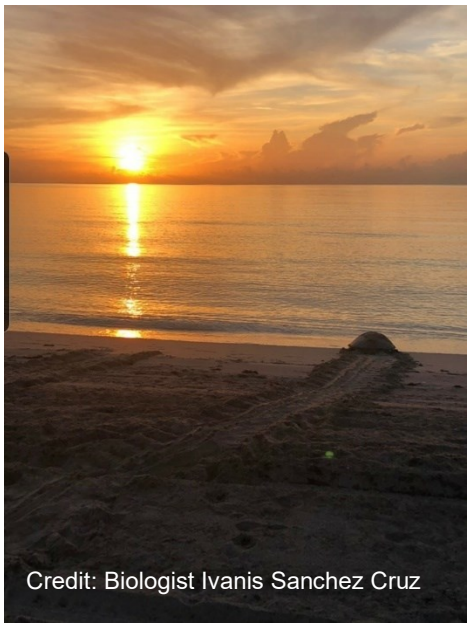
Check out this short video of the sea turtle model being pulled by the magnetic force of the magnet! You will notice that our model took two magnets piled together on the dowel for this to work.

ACTIVITY II: SEA TURTLE TRACK WALK

*****ONLY FOR EARLY RISERS!*****

Female green, loggerhead, and leatherback sea turtles visit the sandy beaches located along Florida's coasts to lay their eggs at night between the months of March and October. They build nests, lay their eggs, and go back into the ocean, leaving the eggs to develop and hatch on their own. This makes it hard to keep track of the nesting females, which can swim up and down a stretch of beach multiple times in one night waiting for the perfect moment and place to crawl out of the water and lay their eggs.

How do sea turtle specialists keep track of the species of turtles nesting on and hatching from our beaches? One of the methods commonly used is simply observing!



Credit: Biologist Ivanis Sanchez Cruz

Each of the nesting species found in Florida leaves a different type of track behind, just like we leave footprints in the sand. The tracks left by a female can be correlated (matched) to the average size of the species, the shape of their bodies and the order in which they move their fins as they climb up and down the sand. Just like turtle scientists and citizen scientists that help care for these endangered species every single day, you too can learn to identify the tracks left on the sand by nesting sea turtles! Ready to go out on a sea turtle track walk? Be mindful! Sea turtles are protected by the law, so remember to walk respectfully and at a safe distance from the nests.

MATERIALS

1. One good alarm clock! In order to have a successful mission, you and an adult will have to arrive at the beach before other beachgoers start walking over the tracks, consequently erasing them. Try to be at the beach between 6am-7am.
2. Print out this guide by the Florida Fish and Wildlife Conservation Commission (FWC) for your walk.
3. If you wish to have an extended version of the guide above, FWC website and learn the differences between the tracks made by a sea turtle that left the beach before nesting (a false crawl) and one that completed the process. (Optional)
4. To go even deeper, check out this older but great 30-minute video titled "A Beachcomber's Guide to Turtle Tracks", also by FWC. (Optional)

RECOMMENDATIONS

- To make sure you are not trampling any unmarked nests, please keep your walk as close to the water line as possible. The waterline can be easily identified by a long line of clumps of algae, seagrass, and shells that waves bring up to the shore.

- If there happens to be a female nesting, please DO NOT approach. Keep a good distance from her, as your presence could be a stressor.

ACTIVITY III: SEA TURTLE HATCHLING GAMES

Pretend to be a sea turtle hatchling (newborn) as you make your way from your “nest” to the sea. Baby sea turtles do not have any protection from their parents. They rely on instinct, luck, speed, and determination to make it out of their nest and into the ocean without being eaten by crabs, birds or even racoons! Getting into the water is just one successful step in the process of swimming far out into a major ocean current and taking shelter under a patch of floating vegetation to escape predators. All of this, before they enter what are known as ¨the lost years. During these years, young sea turtles remain in the open ocean, which is the reason why scientists do not know a lot about what happens during this phase.

Ready to pretend to be hatchling? Let’s play!

Game 1: Sea Turtles vs Crabs!

You will understand sea turtle hatching dynamics and the predatory threats that come along as they try to make their way out to sea. Hatchlings have no defense mechanisms apart from moving quickly towards water. As you will see, chances of survival diminish as the number of predators (crabs) increases.

Number of players: 4+

Materials:

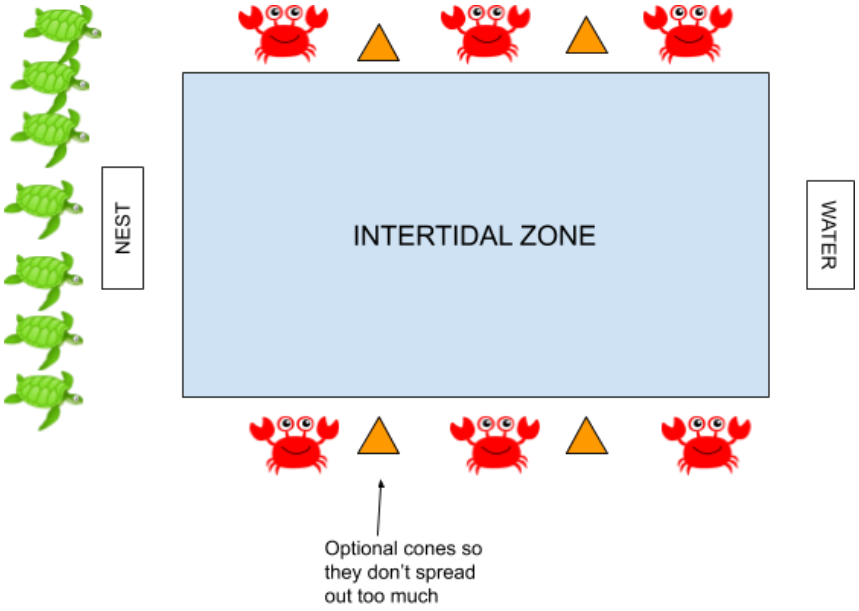
1. Water + Nest markers (could be a flag, landmark, a white board, or pieces of paper with labels)
2. Turtle hatchling headbands or necklaces. Print out this turtle tag. Cut, hole punch and use a piece of string to make into a necklace or headband.
3. Optional: Cones to mark intertidal zone boundaries

Task: Make sure there is a leader available to supervise the game and give out instructions for “hatching” and “attacks”. Divide the group between crabs(predators) and sea turtle hatchlings(prey). Half of the players will be crabs and half of the players will be sea turtles. This can be changed for the following rounds.

Sea turtles will line up parallel to each other right behind the nest boundary. Half of the crabs will line up on one side of the intertidal zone and half on the other. When the leader shouts “hatching time”, the crabs must do their best to tag the hatchlings (equivalent to eating them), at which point the hatchling would be out of the game. The hatchlings will run as fast as they can to get to safety (water).

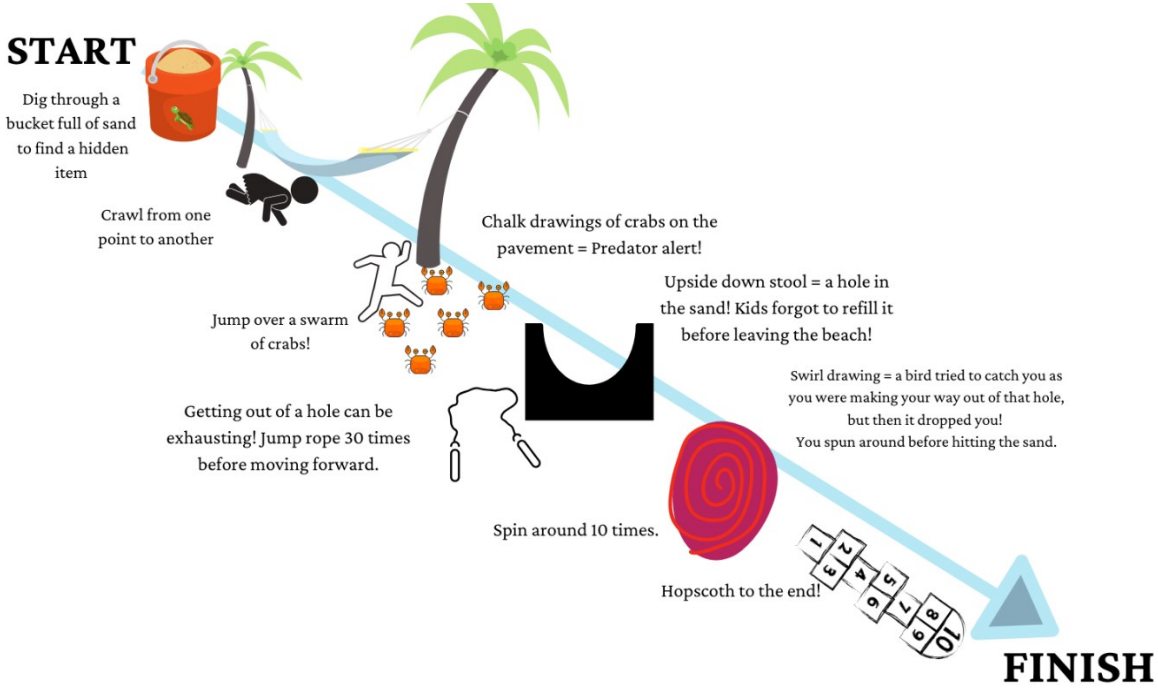
The leader should play around, changing how many turtle hatchlings go out of the nest and how many crabs attack. They can call one crab and one sea turtle, two crabs versus one sea turtle, all sea

turtles versus two crabs, all crabs versus 4 sea turtles, etc. to show how the amount of surviving sea turtles decreases as the amount of crabs increases and the other way around.



Optional game: Sea turtle hatchling obstacle course!

Task: Look for any items around your house that can work as obstacles. Get a piece of chalk and draw a series of obstacles hatchlings may encounter on their way to the sea, based on what you have learned so far. Race your family and friends to see who can go through the obstacle course more quickly!! If playing alone, ask an adult to set up the course without letting you see! Time yourself using a stopwatch to check if you can become faster over time. Here is an example of the types of challenges that can be included:



ADITTIONAL MARINE-FOCUSED GAMES

Park Ranger:

Task: The person who is "it" stands in the middle of a large area while all other players line up facing them. Each player must think of a type of sea animal and the instructor will call out different things that each of the organisms may or may not have (for example if you animal has fins, if your animal has teeth, if your animal is large, etc.). If the animal selected by the player has any of the physical or behavioral characteristics called out by the person who is "it", they must run to the other side without getting tagged! If they do get tagged they are out of the game until the next round.

Shipwreck (Ship to Shore):

Task: This is a game to get children's blood pumping! Kids are given the instructions to do the following gestures when the following words are shouted out by the person who is "it":

- Bow- run in the direction that the leader indicates as bow (front of the ship)
- Stern- run in the direction that the leader indicates as stern (back of the boat)
- Port- run left (in regard to bow)
- Starboard- run right (in regard to bow)
- Barnacle- run and "stick" to the nearest item i.e. tree or wall
- Shark- drop to the ground on their belly, lift legs up and put arms together to form a shark fin.
- Seagrass- stop moving where you are and put your arms in the air and wave around like seagrass in the water
- Land Ho- (2 people) One person gets down on their hands and knees while the other places their foot on the partners back and gets in the stance as if they spotted land!
- Man Overboard: (3 people) two partners hold the third partner by their hands and feet.
- Mates in a Row: (4 people) four people sit in a circle on the ground.
- Island: Everyone runs to a circular area indicated as the island

Once everyone has the hang of the game you can start eliminating individuals- the last person to reach an area, people who aren't in a group (of 2, 3, or 4 depending on what is called).

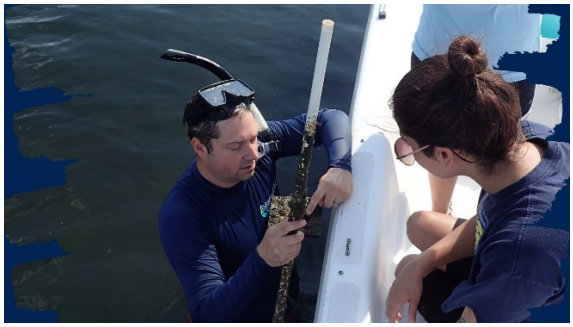
CAREER DIVES: CONVERSATIONS IN MARINE SCIENCE SCHEDULE

Learn how Smithsonian marine science professionals earned their fins through this weekly summer series. Discussions will include how they found their paths into the marine sciences, interests, and research. Bring your questions for live Q&A sessions! Thursdays at 10 AM.

June 11
World Oceans Day Edition:
Marine Microplastics
Laura La Beur, Marine educator
Smithsonian Marine Ecosystems Exhibit
Registration: https://bit.ly/3c7b7QR

June 18
Katie Skura, Aquarist
Smithsonian Marine Ecosystems Exhibit
Registration: https://bit.ly/3ccs0cF

June 25
Bill Hoffman,
Aquarium manager and Head aquarist
Smithsonian Marine Ecosystems Exhibit
Registration: https://bit.ly/3c5oXmF



July 2
Dean Janiak, Biologist
Smithsonian Marine Station & Marine Geo Project
Registration: https://bit.ly/3cuMM7O

July 9
Kelly Pitts, Research technician
Coral Health and Marine Probiotics Lab,
Smithsonian Marine Ecosystems Exhibit
Registration: https://bit.ly/2U9418q

July 16
Michelle Donahue
Science writer and Communications
specialist, Smithsonian Marine Station
Registration: https://bit.ly/2ACira8

July 23
Holly Sweat (Ph.D.),
Marine community ecologist
Smithsonian Marine Station
Registration: https://bit.ly/2U8eUas