

## Title

Rehab or Release?

## Grade level

3-8

## Time:

60-90 mins.

## Student Target

SC.3.L.17.1 Describe how animals and plants respond to changing seasons.

SC.3.N.1.1 Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.3.N.1.3 Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.

SC.3.N.1.4 Recognize the importance of communication among scientists.

SC.3.N.1.6 Infer based on observation.

SC.3.N.1.7 Explain that empirical evidence is information, such as observations or measurements that is used to help validate explanations of natural phenomena.

SC.3.N.3.2 Recognize that scientists use models to help understand and explain how things work.

SC.4.L.17.4 Recognize ways plants and animals, including humans, can impact the environment.

SC.4.N.1.1 Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

SC.4.N.1.4 Attempt reasonable answers to scientific questions and cite evidence in support.

SC.4.N.1.5 Compare the methods and results of investigations done by other classmates.

SC.4.N.1.6 Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

SC.5.N.1.1 Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations, experiments requiring the identification of variables, collecting and organizing data, interpreting data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.

SC.6.N.1.1 Define a problem from the sixth grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.



- SC.6.N.1.4 Discuss, compare, and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation.
- SC.7.E.6.6 Identify the impact that humans have had on Earth, such as deforestation, urbanization, desertification, erosion, air and water quality, changing the flow of water.
- SC.7.N.1.1 Define a problem from the seventh grade curriculum, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigation of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
- SC.8.N.1.1 Define a problem from the eighth grade curriculum using appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types, such as systematic observations or experiments, identify variables, collect and organize data, interpret data in charts, tables, and graphics, analyze information, make predictions, and defend conclusions.
- SC.8.N.1.6 Understand that scientific investigations involve the collection of relevant empirical evidence, the use of logical reasoning, and the application of imagination in devising hypotheses, predictions, explanations and models to make sense of the collected evidence.
- SC.8.N.4.1 Explain that science is one of the processes that can be used to inform decision making at the community, state, national, and international levels.

## Materials

Teacher:

- Vocab Sheet
- Projector with computer hook-up
- Ability to play video files
- DVD with video files
- Artifacts
- Scale

Students:

- Activity Pages 1-2 (enough sets for the class)
- Pencils

For each pair of students:

- Model turtle
- Caliper
- Measuring tape

## Set-up Requirements

- Desks or tables, facing front of room, set up to accommodate students working in pairs.
- Front table or desk to display artifacts and specimens.
- Large screen with projector and computer hook-up to play videos for the class.



- Small area at the side of classroom to place weight station.



## **PART 4 LESSON: Research**

**Has anyone here ever seen a sea turtle before?**

Before we get started, let's talk about what makes up a sea turtle. **Are sea turtles invertebrates or vertebrates? What is a good definition of each? Who can name a vertebrate? Invertebrate?**

**Ask the students if they know what type of animal a sea turtle is? (Mammal, fish, reptile, amphibian, etc.). Get them to name a few of each.**

Try to get the students to think what makes a reptile a reptile. Reptiles have scales for a body covering, use lungs to breathe air, are ectothermic (cold-blooded), lay eggs, and are vertebrates. See if they can think of any other animals that are reptiles.

- Snakes
- Alligators and crocodiles
- Lizards
- Other types of turtles

**Reptiles can live in all types of environments or habitats. Explain the difference between the two.** Environment is the summation of all living and non-living things within a large area. A habitat would be a more specific subset of that, where the organism's basic needs are met. For example, the ocean is an environment but a coral reef is a habitat. On the coral reef, sea turtles may find food, shelter and space. **What are some other habitats that turtles can live in besides the ones in the ocean environment?** (Forests, deserts, rivers, lakes, ponds, swamps).

Sea turtles are adapted to living in the ocean and you can see this in the way their body is built. **What is a good definition for "adaptation"?** (Something that an animal does or has that allows it survive better in its environment). Some examples of sea turtle adaptations are:

**They have a hard shell for?** (Protecting themselves from predators)

- The top part of their shell is called the carapace. On their carapace, they have "scutes". These scutes are made of the same thing your fingernails are made out of (keratin). Different species of sea turtles have scutes that are different colors, shapes and patterns.
- Their bottom shell is called the plastron.

**They have long, flat flippers for?** (Swimming very fast through the ocean)

**They have a flatter body than land turtles and most fresh water turtles. Why?** (To make them faster when swimming)



**They even excrete (“cry”) salty tears. Why?** *(To get rid of extra salt from the ocean water)*

There are five different species of sea turtles that live around Florida but we really only see 3 of these come up and nest on our beaches:

#### Loggerhead

- Most common sea turtle in Florida. We get thousands of nests each year on our beach.
- Called the “loggerhead” because of how large their head is compared to their body.
- Large head isn’t because they’re smart and have a big brain. Their skull is full of something that makes them incredibly strong biters (Muscle). This is an adaptation that helps loggerheads eat food.
- A lot of muscle means they can chomp down on really hard animals in the ocean. **Can you think of any?** *(Crab, lobster, clams, mussel, shrimp, conch).*
- They typically have other organisms like algae and barnacles growing on their carapace.
- You can often find these turtles in the nearshore habitat.

#### Green

- The second largest sea turtle in the world
- They get their name from the food they eat (*Seagrass*). In fact, they eat so much sea grass that inside, their body fat is green. **Can you think of any other animals that turn colors based on what they eat?** *(Flamingoes turn pink from the carotenoids in the shrimp they eat).*
- Green sea turtles are larger than loggerheads but their heads are much smaller. **Why?** *(They don’t need strong jaws to bite through seagrass).*
- They have another feeding adaptation. On their skull, they have tiny serrations like you would see on a steak knife. These are not teeth as no species of sea turtle has teeth. These serrations allow green sea turtles to tear seagrass.
- Their carapaces are usually very clean because they visit cleaning stations where fish will pick organisms off their shell.
- You can often find these turtles in the seagrass beds looking for food.

#### Leatherback

- The largest sea turtle in the world, weighing up to 2,000 lbs. and measuring up to 9 feet!
- The only species of sea turtle that does not have a hard shell. **They get their name from the texture of their shell, which feels like?** *(Leather)*
- Their soft shell is an adaptation that allows them to dive deeper than a submarine. Because it is soft, their shell can expand (grow) and contract (shrink) ever so slightly to adjust to the water pressure changes deep in the ocean. This is kind of like when you’re



in an airplane or driving through the mountains and your ears pop. Your body is adjusting to the atmospheric pressure you experience at higher elevations.

- Leatherbacks dive this deep looking for food. **Do you know what a leatherback's favorite food is?** (*Jellyfish*) Leatherbacks dive deep in search of jellyfish as big as a car.
- Leatherbacks don't have to worry about being stung because they don't have sensitive skin like we do.
- They have specialized notches in their top jaw that allows them to catch jellies easier.

### Endangered Species

- All species of sea turtles are protected under the Endangered Species Act (ESA).
- The ESA protects threatened and endangered plants and animals from potentially harmful human interactions that might result in extinction.
- These turtles are on here not because of natural causes but because of human interactions. **Can you think of any?** (Boat strikes, pollution, poaching, destroying habitat).
- In order to help save these animals, we must first understand them a little better. This is what marine biologists do.
- The work they do and the data they collect help answer questions we have about sea turtles. This information helps us form decisions on how to protect sea turtles.
- Since as early as the 1950's, biologists were realizing the negative impacts people were having on sea turtle populations and started studying them. From this, they were able to determine the biggest threats and help set in motion conservation practices we still implement today.

### Inwater Research Group

- Our organization is made up of a team of biologists.
- We get to study sea turtles all over the SE region of the United States.
- We do work in the Keys and on the west coast of FL.
- Our job is to catch turtles and study them. We do this by collecting data. We weigh, measure, and tag them before releasing them again. **Why do we collect data?** (This helps us better understand the different species. We can find out things like where they spend time at different stages of their lives and what species are using what habitats. It also helps us to answer questions regarding any human-related injuries we might see. For instance, if we see a large number of juvenile green turtles in a particular sea grass area, when we deliver our data to the state, they might realize that we need stricter boat speed regulation in that area.)
- Each turtle gets two kinds of tags:
  - A flipper tag, which goes into the flipper of the turtle



- A PIT (passive integrated transponder) tag, which is inserted under the skin, just like you would do for your dog or cat.
- These tags all have a unique number on them. **Why?** (To make sure that no two turtles have the same ID. This way, we can always look up that number and know exactly which individual we're looking at).
- If we tag a turtle and someone recaptures it many years from now, all they have to do is look up the tag number and it will give them all the information (location, measurements, etc.) originally collected from that turtle. **Why is this important?** (If a turtle is recaptured, we can compare data from when it was first captured to current data. This will tell us how much the turtle has grown or if they have incurred any injuries. Also, we can determine some of their migration patterns). Example: We had a loggerhead sea turtle that we found in Jensen Beach, FL that had an old tag on it. When we looked in the database, we found that this particular turtle was originally tagged in Spain! Information like this helps us figure out more about the different species and where they go, so we can help protect them. This is one of the reasons it is so important for scientists to share data and information. Because sea turtles are highly migratory, oftentimes more than one scientist will encounter the same turtle. Discussing how the turtle is utilizing both areas is really important when deciding how and where to protect them.

**Explain to the students that now we will be doing an activity.**

Many of the turtles we encounter are healthy but sometimes they come in with injuries or illness and we need to take them to a sea turtle hospital. Today, we're going to be acting as marine biologists and "working up" our own turtle.

Each pair will have their own model turtle that they must collect data from and assess body condition to determine whether or not this turtle is ready for a rehab facility or release. These data will be empirical evidence that will help us make a decision on whether or not are turtles are healthy enough to return to the ocean or if they need to be sent to rehab. We will walk through our worksheets together so don't jump ahead. The worksheets the students receive is very similar to the forms we must fill out for every sea turtle we encounter. The turtles will act as models that will help you make realistic inferences from observations since we can't give you real turtles to work on.



## **PART 4 Activity: Rehab or Release**

- Activity Pages 1-7

Explain to the students that as biologists, we use the metric system, which means we take measurements in centimeters and weights in kilograms.

### **Capture:**

***Explain to the students that biologists at IRG collect turtles in several different ways.***

1. Some are captured at the St. Lucie Project in Hutchinson Island.
2. The Fish and Wildlife Commission (FWC) will call to tell us someone spotted a sea turtle washed up on a nearby beach and we collect it.
3. Someone brings a turtle to our office, usually because they found it sick on the beach or floating in the ocean.
4. IRG biologists take research trips to different locations all around Florida, looking for turtles to capture and collect data from.

### **Species ID:**

**Review the different species of sea turtles we've discussed.**

First thing we want to do is determine the species of sea turtle we have. There are three species we often see: Loggerhead, green, leatherback.

**Have the students ID their turtle and document it on their papers by circling the correct species.** Note: every student has a green turtle

### **Measurements:**

**Remind the students that just as we classify people into age categories (baby, teenager, adult), we classify turtles as well, but into size categories.**

There is no way to tell the age of a turtle just by looking at it. The best guess we can make is by taking its measurements. This will place the turtles into a size class, which tells us a lot about the turtle. We want to know the size class for a number of reasons. **Prompt the students to think of some** (It tells us what habitat they're using. For example, a hatchling green would typically use the sargassum, but a juvenile green would commonly utilize seagrass habitats). By





putting turtles in different size classes, we can make inferences about the habitats they're using and how stable their population is.

Taking the calipers, students will need to make two measurements. The first measurement gives us the length of the carapace from "notch to notch". This is shown on their activity sheets in red but if they need assistance, explain that there is a notch at the top and bottom of the carapace. We measure from one to the other. Don't forget to have them measure in centimeters, not inches. **Have them document their findings on the line marked, "SCL".**

Next, students will take the straight carapace width (SCW), which is measured at the widest part of the carapace. **Have them document their findings.**

The students will now take curved measurements using the measuring tape. Have them measure the same spots on the turtle and mark these as curved carapace length (CCL) and curved carapace width (CCW), respectively. Explain to the students that we take these two different types of measurements because sometimes there are so many barnacles growing on the turtle's carapace that the curved isn't always accurate.

From here, we can determine the size class of the turtle by looking at the chart to the right on the activity sheet. Since they know their turtles' species, they will look in that column and find which row their SCL measurement falls. **Have them check the size class their turtle represents.**

### **Weight:**

It's important for us to also weigh each turtle we capture. In addition to length and width, this measurement will tell us if the turtle is growing at a healthy rate. This is important information for recapture and to also assess any internal injuries. If the turtle is underweight, this may indicate that the turtle is sick. A turtle of this size should weigh 1.1 kilograms.

Have student pairs come up to the weighing station as they finish measuring their turtles. Have them document their weight and as subsequent groups come up, have each pair who has already weighed their turtle determine if their turtle is underweight or healthy. **While waiting, have them think of some reasons why.** Don't forget to measure in kilograms.

### **Healthy and Body Condition:**

We now want to take a look at an important factor: health and overall body condition. Sometimes this is very obvious when there is a severe injury like a boat strike or fishing hook in the mouth. We can determine easily that that sea turtle needs to go to a hospital or rehab.



One thing we have to consider is if the wound is already healed and not affecting the turtle in any way. For example, you may capture a sea turtle that has had a run-in with a shark. The bite is already healing and occurred on the outer part of the shell where it didn't affect any organs. If the wound looks new and shows signs of blood, the turtle needs medical help. If the turtle is healthy and energetic sometimes we make the decision not to send it to rehab, but instead to release it.

Another thing we have to consider is that not all injuries are visible because they are internal, or inside the turtle. There are signs, though, that we can see on the outside that will tell us something is wrong on the inside:

- The turtle may be extremely underweight. This tells us that they are not eating food, most likely because of a non-food item they ate and shouldn't have is making them sick inside.
- The turtle may have many organisms growing on their carapace. It's typical for organisms like barnacles and algae to grow on the carapace of sea turtles. We collectively call these "epibiota". We expect to see some epibiota occasionally but when a turtle comes in and a large portion of their shell is covered, something is wrong. This means the turtle is moving slowly enough that organisms like these can become established. It also usually means that turtle has been floating near the surface of the water, allowing the algae to grow more rapidly. Both of these are signs that the turtle is sick or injured.

**Ask the students to think of some injuries they might be able to see just by looking at the turtle:**

**Fishing line entanglement:** Pieces of fishing line wrapped around the flippers or head.

**Fishing hook in flipper or mouth:** Hook will be embedded in either the flipper or coming out of the mouth of a sea turtle. Sometimes, we don't even see the hook but notice fishing line coming out of the mouth and going down the turtle's throat. We make the assumption that a hook was swallowed and further down than we can see.

**Boat strike:** Long, straight wounds, sometimes more than one that show where a boat's propeller would have hit the turtle.

**Shark bite:** You can always distinguish between a shark bite and propeller wound because shark bites are more jagged, whereas boat strikes are straight. You often find bite marks on the edge of the carapace or to the tips of the flippers. Have the students draw any injuries on their turtle diagrams. The diagrams have both the carapace and plastron view of the turtle. Students will use the plastron view to draw injuries or fishing line constrictions that go all the way around/through the shell or flippers.



**Plastic/balloon ingestion:** Sometimes if a turtle has eaten a balloon or plastic, we may still see it protruding from the mouth.

**Now, prompt the students to think of some injuries we might not necessarily see just by looking at the turtle:**

**Fishing hook ingestion:** When sea turtles go after bait, sometimes they can swallow the hook, ending up inside their throat and even their stomachs.

**Plastic/balloon ingestion:** Plastic can look like food to a sea turtle and cannot be digested, which can often making them sick. Sometimes we can't see the plastic or balloon because it has been completely swallowed.

Since we are biologists and not veterinarians, we can only observe what is happening on the outside of the turtle so we look for things like external injuries and high amounts of epibiota that indicate internal injury or sickness. If we think either of these is life-threatening, we immediately take the turtle to a nearby hospital or rehab facility.

**Tell the students to look for both injuries and epibiota.** If there are any questions, give the students some hints of how these wounds present (some of the wounds may sound graphic but reassure the students that these turtles are very resilient and can even heal on their own sometimes. When they can't, we send them to the hospital to get better).

### **Tags:**

***Have the students check their turtles for tags on the front flippers.*** These tags will have a series of letters that indicate the organization who tagged it first and numbers that ID which turtle in that series it is. Some turtles may have one, two, or none. When turtles are initially tagged, they typically get one in each flipper but over time, they can fall off.

Once everyone has looked for tags, open the folder labeled "Tag Returns". This folder will contain all the videos associated with tagged turtles. Each previously tagged turtle will have a corresponding video\*, in which a researcher will explain why that turtle was originally captured and any pertinent data collected the first time. Have students compare these data to their own measurements taken, to note any increase in size or weight.

***As a class, discuss connections between injuries, size class, species, and where the different tagged turtles were found or what type of study.*** For example, if someone has a juvenile green turtle with boat strikes we might make the connection that sea turtles forage for food in the



same seagrass beds where we recreate. Have them think of some recommendations we might have to decrease these interactions. Examples:

Boat strikes- We might recommend more obvious or more abundant speed limit signs.

Monofilament entanglement- We might recommend better signage at the dock or that they start their own Monofilament Recovery and Recycling Program (MRRP) if they haven't already.

Fishing hooks- Educational signage at the dock explaining the difference between circle and J hooks and how they interact with sea turtles can be helpful.

\*The videos do not always show a juvenile green turtle like the ones the students are working up but instead show turtles that the biologists have encountered in their research.

Plastic/balloon ingestion- Signage about the detrimental effects that releasing balloons and littering plastic bags can have on sea turtles could be helpful. Recycle bins for plastic bags at the dock could also provide service.

**Looking at some of these injuries caused by humans, have the students think of some things that we can do in our daily lives to reduce these occurrences.** Examples:

Boat strikes- Make sure when we're boating that we follow all posted speed limits

Monofilament entanglement- Many marinas and docks now have monofilament recycling containers. Make sure that we recycle any discarded fishing line in these receptacles.

Fishing hooks- Try to use barbless circle hooks when fishing as they tend to reduce the chance of becoming caught in a turtle's appendage or mouth.

Plastic/balloon ingestion- We can make sure that we don't ever let balloons go but instead pop them and toss them in the trash. Plastics should be recycled whenever possible or placed in the trash if not. We can also pick up garbage when we see it, even if it's not ours.

### **Rehab or Release:**

Now the students must make a conclusion and explain why their turtle must go to rehab or if it's healthy enough to be returned back to the ocean. Get them to make observations about the epibiota load and injuries, if any. Also, have them consider the weight of the turtle. From here, they will decide the next step and write down their justifications.

Explain to the students that they have just successfully acted as marine biologists working to save sea turtles. They've successfully collected data, made observations about said data, and developed inferences based on them. The data they've collected are very important in helping



protect sea turtles because they shed light on how turtles are utilizing their habitats and any human-related issues they might be encountering.





# Rehab or Release?

Name: \_\_\_\_\_

## A Day in the Life of Marine Biologists

**Capture:** This sea turtle was captured at the St. Lucie Project in Hutchinson Island by Inwater Research Group marine biologists.

**Species Identification:** Circle which sea turtle you have based on the descriptions.



Loggerhead- The carapace of young loggerheads has a jagged edge. Have a brown body and shell.



Green- Have a dark carapace and light plastron with greenish skin.



Leatherback- Largest of the sea turtles. Have a soft, leathery, black shell with white stripes.

**Measurements:** Now, you must take the straight carapace length and width, using the SCL to determine which size class of turtle you have.

**SCL (straight carapace length)** \_\_\_\_\_ cm

**SCW (straight carapace width)** \_\_\_\_\_ cm

**CCL (curved carapace length)** \_\_\_\_\_ cm

**CCW (curved carapace width)** \_\_\_\_\_ cm

Loggerhead



Green



Leatherback



<input type="checkbox"/>	Hatchling	→	< 5 cm	< 5 cm	< 7 cm
<input type="checkbox"/>	Post-hatchling	→	5-10 cm	5-10 cm	unknown
<input type="checkbox"/>	Juvenile	→	10-60 cm	10-60 cm	unknown
<input type="checkbox"/>	Sub-adult	→	60-90 cm	60-90 cm	unknown
<input type="checkbox"/>	Adult	→	> 90 cm	> 90 cm	138.5 cm

**Weight:** A turtle's weight can tell us a lot about its health. If it's underweight, it can mean that they are very sick. Go weigh your turtle on the scale and document it below:

\_\_\_\_\_ kg

The normal weight for a turtle this size is

\_\_\_\_\_ kg

Is your turtle (circle one):

Underweight    Healthy





# Rehab or Release?

Name: KEY

## A Day in the Life of Marine Biologists

**Capture:** This turtle was found washed up on the beach in Palm Beach. IRG biologists drove to get it and bring it back in order to take measurements and assess its condition.

**Species Identification:** Circle which sea turtle you have based on the descriptions.



Loggerhead- The carapace of young loggerheads has a jagged edge. Have a brown body and shell.



Green- Have a dark carapace and light plastron with greenish skin.



Leatherback- Largest of the sea turtles. Have a soft, leathery, black shell with white stripes.

**Measurements:** Now, you must take the straight carapace length and width, using the SCL to determine which size class of turtle you have. **Widths may vary for shark bite turtle.**

SCL (straight carapace length) 24 cm

SCW (straight carapace width) 20 cm

CCL (curved carapace length) 23 cm

CCW (curved carapace width) 22 cm

Loggerhead



Green



Leatherback



- |                          |                |            |                 |          |
|--------------------------|----------------|------------|-----------------|----------|
| <input type="checkbox"/> | Hatchling      | → < 5 cm   | < 5 cm          | < 7 cm   |
| <input type="checkbox"/> | Post-hatchling | → 5-10 cm  | 5-10 cm         | unknown  |
| <input type="checkbox"/> | Juvenile       | → 10-60 cm | <b>10-60 cm</b> | unknown  |
| <input type="checkbox"/> | Sub-adult      | → 60-90 cm | 60-90 cm        | unknown  |
| <input type="checkbox"/> | Adult          | → > 90 cm  | > 90 cm         | 138.5 cm |

**Weight:** A turtle's weight can tell us a lot about its health. If it's underweight, it can mean that they are very sick. Go weigh your turtle on the scale and document it below:

1.1 kg

The normal weight for a turtle this size is

VARIES kg

Is your turtle (circle one): **VARIES**

Underweight    Healthy



