Title

PART 4 Lesson: Research

PART 4 Activity: Rehab or Release?

Grade level

3-5

Time:

60 minutes

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
- Activity Pages 2-11 (Lesson 1)

Students:

- Activity Pages 1-2 (enough sets for the class)
- Activity Pages 3-8 (one per group of 3-4)
- Rulers (one per group of 3-4)
- Pencils

Set-up Requirements

- Desks or tables, facing front of room, set up to accommodate students working in groups of 3-4.
- Large screen with projector and computer hook-up to play videos for the class.

PART 4 Lesson: Research

Review with the students some ways you've previously studied sea turtles. *(Nesting, population)*

Ask the students some reasons why we study turtles and what they can tell us. Prompt them by asking them to think about their habitats, environment and the resources/food they use. For example, if we see a decline in green turtle populations, what might that tell us about sea grass beds? If we see a lot of sick hatchlings, what might that tell us about the sargassum habitat?

There is one characteristic of sea turtles that we learned in lesson 1 that is crucial to why we study them.

Sea turtles are migratory! What happens to them in their travels (sick, injured) tells us a lot about the quality of the ocean and specific habitats. We call sea turtles indicator species because the status of how well they're doing, indicates the health of the ocean and coastal habitats.

Also express to the students that we tag sea turtles with a specific number. Why?

Sea turtles don't have names so it's up to us to give them a unique ID number to tell them apart. This is similar to a social security number (or for younger students who may not know what an SSN is, a phone number).

For example, we all have a phone number. Why are they all different? *So we know which person is calling.*

Sea turtle ID numbers are similar. No two are alike so if a turtle is tagged in Florida with the ID "IRG398" and another turtle is captured five years from now in Puerto Rico with the same number, what can we assume? That they're the same turtle! Researchers must tag turtles to better understand where they're migrating to and during what time of year. Here's why:

If an adult green sea turtle washes on shore in Florida because it is too sick to swim, we will want to send it to rehab and have the veterinarian run some tests. Turns out, this turtle is suffering from eating seagrass that's been polluted with chemicals that wash into the ocean from land. We know it's been sick for a while so we look up its tag. This turtle was originally tagged in Boca Raton a few months ago. This means that somewhere along the coast from here to Boca is being polluted. As scientists, we try to find these areas and make changes to the way humans behave to help sea turtle survival so endangered turtles don't become extinct.

Sea turtles are involved in a number of studies all around the world. Biologists study sea turtles in a number of ways:

- Nesting - Counting and monitoring the nests that are laid on the beach

    - This will give us a snapshot on how healthy the populations are because it's telling us how many active adult females there are from year to year.
- Population samples- Catching, counting and tagging sea turtles out in the wild
    - This also gives us a snapshot of the population as a whole, not just adult females.
- Migration- Tracking sea turtle migrations by putting a GPS on the backs of sea turtles and letting them go.
    - This tells us which habitats they're using at what times of year and where they're traveling on their journey.
- Health- Sometimes sea turtles are tagged after they've received medical care. The information about that turtle's health while at the hospital is important to understanding how they heal and what treatment works best for what ailment.

Studies like these help determine which habitats to protect, how well the turtles are doing year to year, and what other countries they're visiting.

Biologists at Inwater Research Group (IRG) capture turtles every day and take down sample data like size/age, weight, species, and overall health. Some turtles are injured due to man-made causes.

Ask the students if they can think of anything that might injure a sea turtle (man-made)?

1. Boat strikes ***(Why?)***
    - *Sea turtles, especially juvenile greens tend to forage for food in the same areas we like to boat*
2. Fishing line wrapped around flippers or head ***(Why?)***
    - *Sea turtles, especially juvenile greens tend to forage for food in the same areas we like to fish.*
3. Fishing hook in flipper or mouth ***(Why?)***
    - *Sea turtles will go after bait, thinking it's okay to eat. Oftentimes the hooks will get stuck in their mouth or flipper when they do this.*
4. Ingested a fishing hook ***(Why?)***
    - *If a sea turtle goes after bait and is able to swallow it, the hook can be in its esophagus, stomach or intestines.*
5. Ingested a plastic bag or other plastics **(Why?)**
    - *Sea turtles don't know the difference between food and non-food items. The abundance of plastic and likeness that it has to things like jellies can confuse turtles into eating it.*

Which injuries can we identify just by looking at the turtle? *(1-3)*

As biologists, we have to look at the turtle and determine whether it's healthy enough to be released or if its injury requires a trip to rehab. Most of the time, wounds heal on their own. For

example, if we get a turtle that survived a shark bite, its wound didn't hit any vital organs and it's healing, we usually release it. If the wound looks fresh then we send it directly to rehab for treatment. Additionally, if the turtle has a hook or constriction by fishing line, those turtles go directly to rehab to vets can determine how severe their injuries are. We NEVER remove anything from the turtle or administer medical treatment.

Many turtles when they are injured or sick, develop something called epibiota on their carapace. Epibiota are organisms that grow on another organism. Things like barnacles, algae, and other small things move very slow and for a sea turtle to develop them on their body, it means the turtle was moving very slow, too. This is usually caused by an injury. Some epibiota is common, especially in loggerheads but an abundance tells us that something is wrong.

Healthy turtles get tagged before being released. Turtles are tagged in two ways: on their flippers (which we'll see in the activity) and an internal tag, about the size of a piece of rice that gets injected. This does not hurt the sea turtle and is the same a dog or cat would get. We also make sure to look for tags once we capture the turtle to make sure someone didn't previously tag it.

Explain to the students that they will be acting as marine biologists for the next half hour.

Students should be broken into groups that evenly distribute them amongst the six example turtles. Each group will receive a "turtle" that has its own unique set of characteristics. Run through the worksheet with the students, explaining as they go from one activity to the next. Students will be examining the turtle, making observations and taking down data with prompting and information from you. Have each student take the measurements to check one another's work.

PART 4 Activity: Rehab or Release

- Activity Pages 2-11 (Lesson 1)
- Activity Pages 1-8

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 will ride our ATV out to get 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 a boat to different locations all around Florida to look for turtles to capture and tag.

Species ID:

Review the different species of sea turtles we've discussed. Prompt the students to remember the Kemp's ridley and hawksbill turtles we briefly mentioned. See if they can remember anything about either species. Use species ID photos (Lesson 1, Activity Pages: 2-11) to remind the students if necessary.

First thing we want to do is determine the species of sea turtle we have. There are three main species we often see: Loggerhead, green, Kemp's ridley. We rarely see leatherbacks. ***Why?*** *Leatherbacks swim in deep ocean waters so we rarely see them. Hawksbills are seen seldom so we only used the above three for the purpose of this activity.*

Have the students ID their turtle species and document it on their papers by circling.

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. *Before we only used three classifications but for this activity we use all 5.*

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 use the sargassum, but a juvenile green would utilize seagrass habitats). Remind the students that sea turtles are indicator species that tell us what's going on in the ocean. 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 rulers, 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. Have them document their findings on the line marked, "SCL". Don't forget to have them measure in centimeters, not inches.

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

From here, we can determine the size class of the turtle by looking at the chart on the bottom of the worksheet. A size class is how we generalize a sea turtle's age since we don't know exactly. This would be similar to us using the terms: infant, toddler, child, teenager, adult, and senior citizen. When using these terms, we don't know an individual's exact age, but it lets us place them into a category based on their appearance, to have a better idea of how old they are. 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.

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 there aren't any organs. The turtle is healthy and energetic so sometimes we make the decision not to send it to rehab, but instead to release it.

Since we are biologists and not veterinarians, we can only observe what is happening outside the turtle so we look for things like external injuries and epibiota. Obvious injuries are easy to assess but what if you have a turtle that has no obvious injuries but is underweight for its size class and covered in epibiota? ***Ask the students if they've ever seen a barnacle***. Barnacles are a type of crustacean (like crabs and lobsters) and move very slowly, floating in the water until they find something to latch onto and grow. If turtles are moving slow because they are sick on the inside, they tend to have a lot of barnacles growing on them.

Ask students whether or not they've ever heard of something called algae*.** Algae is a plant-like organism that we see as green hairy masses on coastal rocks or washing up on our shore as sargassum seaweed. Algae requires sunlight to photosynthesize. ***Ask the students if they can explain photosynthesis. *(A process utilized by plants and plant-like organisms that takes sunlight, water and carbon dioxide to make food. The result is sugar, which the organism uses for food and oxygen, which we breathe).*

When we see a lot of algae on a turtle's carapace, what can we infer? Prompt the students to think about the sunlight aspect of the equation. Since sea turtles live in the ocean, do they encounter a LOT of sunlight? When sea turtles are sick, they tend to float near the surface of the ocean, moving slowly. Both are reasons why algae thrives: lots of sunlight and a slow moving surface to become established.

An abundance (more than 50% of the sea turtle's carapace) of either algae or barnacles is a sign that something is probably happening internally that we can't see. These turtles are also sent to rehab so the veterinarian can look inside their bodies. ***Ask the students if they know what that machine is called and what is shows us*** (*X-ray machines show us our skeletons and things that are hard like plastics and fishing hooks/line that the turtle may have ingested*).

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 often heal on their own. When they can't, we send them to the hospital to get better):

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. In addition, because of the way sharks feed by throwing their heads back and forth, you may find crescent-shaped "rake marks" on the turtle as well. These are shallow and don't hurt the turtle.

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.

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.

There is also a list of tag numbers associated with different capture sites and types of studies. ***Have the students look to see if their turtle is listed and if it is, get them to make connections between injuries, size class, species and where it was 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 we recreate in. If we find a Kemp's ridley juvenile involved in a migration study, we might make the connection that at this size class, these turtles migrate to find better shelter or food. **Open the folder, Tag Returns. It will bring up video files* that correspond to all of the tagged turtles. The videos show the researcher who originally tagged the turtle as they discuss why.**
*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.

Rehab or Release:

Now the students must make a <u>conclusion</u> 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. From here, they will decide the next step and write down their justifications. There really are no right answers as biologists have to make judgement calls all the time. Allow the students to choose their turtle's fate by justifying why in the writing section. See the Rehab or Release section below to get an idea of what we would do with the turtles, in case students just aren't sure.

Page 3.

Species: Green
SCL/SCW: 13.5cm
Size Class: Juvenile
Injuries: The turtle has also sustained a shark bite injury to the edge of its shell, which appears to have healed over as there is no presence of blood. You can also see faint "rake marks" from where the shark grabbed the carapace with its mouth and shook it back and forth
Epibiota: Some algae growth but nothing of great concern since it's less than 50%
Tag Number (if any): IRG073
Last Known Capture Site: Archie Carr National Wildlife Refuge, FL
Type of Study: Nesting

Rehab or Release: Release (because wounds have healed over and aren't of great danger to the turtle)

Page 4.

Species: Green
SCL/SCW: 13.5cm
Size Class: Juvenile
Injuries: You can see three distinct propeller wounds from a boat. The wounds appear to be bleeding and open.
Epibiota: None
Tag Number (if any): None
Last Known Capture Site: N/A
Type of Study: N/A
Rehab or Release: Rehab (because of bleeding and open boat strike wounds)

Page 5.

Species: Green
SCL/SCW: 13.5cm
Size Class: Juvenile
Injuries: The turtle appears to have ingested a fishing hook but it is not visible. It looks as though this injury happened a while ago due to all the epibiota growing.
Epibiota: Very abundant! Covers more than 50% of carapace.
Tag Number (if any): IRG063
Last Known Capture Site: Crystal River, FL
Type of Study: Population
Rehab or Release: Rehab (due to the fishing hook and apparent prolonged injury)

Page 6.

Species: Kemp's ridley
SCL/SCW: 11.2cm
Size Class: Juvenile
Injuries: Two distinct boat strike wounds on the left side of the carapace. Wounds are open and bleeding.
Epibiota: None.
Tag Number (if any): None
Last Known Capture Site: N/A
Type of Study: N/A

Rehab or Release: Rehab (due to open boat wounds)

Page 7.

Species: Kemp's ridley
SCL/SCW: 11.2cm
Size Class: Juvenile
Injuries: Fishing hook in mouth
Epibiota: Few. Nothing of great concern
Tag Number (if any): IRG052
Last Known Capture Site: Jupiter, FL
Type of Study: Population
Rehab or Release: Rehab (due to fishing hook in mouth)

Page 8.

Species: Loggerhead
SCL/SCW: 11.7cm
Size Class: Juvenile
Injuries: none apparent
Epibiota: High epibiota, indicates something internal
Tag Number (if any): IRG051
Last Known Capture Site: St. Lucie, FL
Type of Study: Population
Rehab or Release: Rehab (due to high epibiota. Indicates something wrong internally).

Name: _____

Rehab or Release?

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.

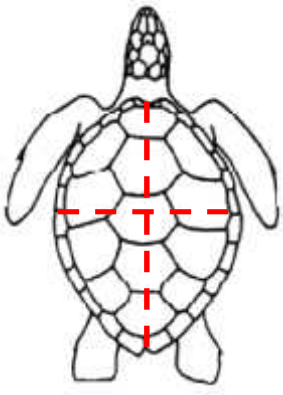
Kemp's Ridley– Smallest of the sea turtles. Have a round gray shell and gray body

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

Where to measure:

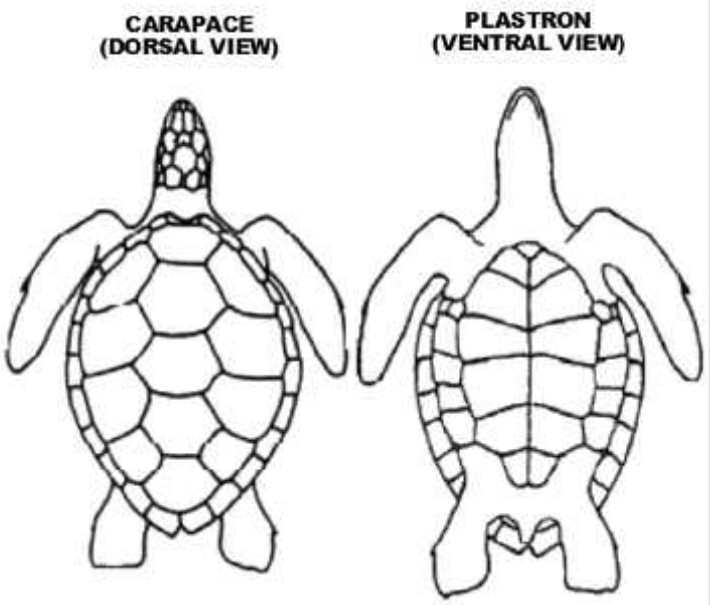


		Loggerhead	Green	Kemp's Ridley
				
☐	Hatchling →	Less than 5 cm	Less than 5 cm	Less than 5 cm
☐	Post-hatchling →	5-10 cm	5-10 cm	5-10 cm
☐	Juvenile →	10-60 cm	10-60 cm	10-45 cm
☐	Sub-adult →	60-90 cm	60-90 cm	45-60 cm
☐	Adult →	More than 90 cm	More than 90 cm	More than 60 cm

Health and body condition: Note any injuries, which may include the following:

- Constriction with monofilament fishing line
- Hook in flipper or mouth
- Boat strike or open wound
- Shark bite or teeth marks

Oftentimes, the turtle will have other marine life (epibiota) growing on it's shell and body, such as algae and barnacles. If the turtle is really sick, these become very numerous. Draw any epibiota that may be growing on the turtle:



Draw any injuries/epibiota here

Tags: Check both front flippers for a silver tag with a series of letters and numbers. If you locate one, document the tag ID number below and check the list to see where your turtle was last captured and why.

Flipper Tag Number _____

Last Known Capture Site: _____

Type of Study (circle one):

Health Migration Population Nesting

Tag ID	Last Capture Site	Study Type
IRG073	Archie Carr National	Nesting
CRM6386	Spain	Migration
IRG051	St. Lucie, FL	Population
RCW6594	Rancho Nuevo, Mexico	Nesting
IRG052	Jupiter, FL	Population
STW7731	Brazil	Nesting
IRG063	Crystal River, FL	Population

Rehab or Release?: Now you must assess whether or not your turtle needs to go to a rehab facility or is healthy enough for release. Write a brief paragraph on what you decide, using observations from the activity.

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