Texas Turtle Watch

A citizen science program for tomorrow's turtles

fort worth zoo

Texas Turtle Watch Information Guide

Mission:
Texas Turtle Watch is dedicated to providing an outdoor experience for citizens of all ages and interest levels while learning and gathering scientific data that will contribute to knowledge about turtle populations in Texas.

Turtles of Texas:
Texas is home to 28 turtle species, including common turtles like sliders (genus *Trachemys),* cooters (genus *Pseudemys),* and softshells (genus *Apalone).* These species can be found in most of Texas' freshwater habitats and are easily spotted because of their basking behaviors.

Ecological Role of Turtles:
Turtles, like many reptiles, play an important role ecologically that is often not acknowledged by humans. Turtle eggs and young turtles serve as important food for many species. Turtles consume small aquatic life, such as snails, insects, crayfish, small amphibians and fish all of which are adapted to having turtles as predators. Many species of turtles are important consumers of carrion and serve as ecosystem "bottom feeders," or cleaners. Some turtle species consume algae that could deplete oxygen from the water if grown without control. Some turtles also eat plant matter and play an important role in seed dispersal. Therefore, it is important that turtle populations are not depleted, but rather maintained within their natural habitats.

Impacts on Turtles in Texas:
Currently, wild turtles are facing many pressures in Texas. One of the most intense pressures comes from the commercial trade. Turtles of the United States, including Texas, are caught in large numbers to be sold as food or as pets. They are sought for export to the Asian food and traditional medicine markets and run the risk of being over-harvested. According to the USFWS Law Enforcement Management Information System 2000 Declarations Standard Report, over 250,000 wild-caught turtles were exported from Texas to Asia from 2000-2005. There are few regulations in place on private lands in Texas regarding turtles. Private land makes up 97.4 percent of the land in Texas. There are regulations in place on public waters and land since 2007 with 2.6 percent of land in Texas as public domain. Therefore, it is difficult to know exactly how turtles are doing under the pressures from commercial trade. More information is needed to understand its impacts.

Another impact on turtle populations is roadways. Turtles, especially during the warmer months, are more active and will travel across roads and other man made paths to find suitable sites for their nests. This activity puts turtles at risk of being hit by vehicles, not only harming the traveling individual but also the eggs it may be carrying.

Current Regulations:
Under Texas state law, there are some regulations that have been established concerning freshwater, aquatic turtles. They are summarized below:

1. A person may possess, transport, sell, import or export common snapper, red-eared slider or softshell turtles with a nongame permit on private land and water. This prohibits such activities with all other species of turtles in Texas.
2. No nongame wildlife may be used for commercial activity from public land.
3. No nets or traps large enough to catch turtles may be used in public land and water.

For more information, go to Texas Parks and Wildlife at:
http://www.tpwd.state.tx.us/publications/pwdpubs/media/pwd_lf_w7000_1667.pdf

Captive Turtles:
Please keep in mind that turtles do not make good pets. Turtles are wild animals and require lots of maintenance and lots of space to grow. Without the proper attention and room a turtles shell can begin to grow improperly. This could cause long term, damaging affects to the turtle's health. They require proper lighting and temperatures and some even need a properly maintained water filtration system, which can be expensive. Additionally, turtles are a time commitment. These long lived reptiles may live decades or even longer.

Salmonella is also a concern, especially when children are in the home. For this reason, turtles smaller than 4 inches are illegal to sell as pets. This ban was put into place in 1975 by the United States Centers for Disease Control and Prevention (CDC).

If you do have a pet turtle and no longer wish to care for it, please do not release the turtle into the wild. Captive turtles released into the wild may also carry diseases that can potentially harm wild turtles and their populations. Alternatively, non-native turtle species released may become invaders, competing for the same food and space as a native species of turtle. A non-native turtle species may be able to out compete native turtles for food and space, thus harming native turtle populations.

Why Monitor Texas Turtles?:
By monitoring Texas turtles, information may be collected that will help to establish a baseline about turtle populations on both private and public lands. Repeat data sightings help scientists and the public learn about turtles' activities and impacts on turtle populations over time. This may provide information that will lead to better management of turtles in Texas.

Scientists are not the only people benefiting from the Texas Turtle Watch; so are you. Throughout Texas, citizens all ages and interest levels, are learning by observing turtles and developing an appreciation of them. All the while, turtle watch participants are enjoying the outdoors and contributing to conservation in their own community.

Natural History:
Turtles are reptiles, which means they have to use their environment to manage their body temperatures. Turtles are the only vertebrates (animals with a backbone) to have the entire skeleton inside a solid boney armor. The top shell of a turtle is called the carapace, and the bottom shell a plastron, and the two are connected by supports called bridges. A turtle's spine is fused to the inside of its carapace, so no turtle can leave its shell, nor can any turtle live once removed from its shell.

There are many types of turtles as well. There are terrestrial turtles, also referred to as tortoises. Tortoises have club-like, scaly feet and a dome shaped shell. There are sea turtles that spend their lives primarily in the ocean. They have large fin like arms and feet for swimming. The third category of turtle, and the turtles of this program (basking turtles) belong in this category, are freshwater, aquatic turtles. Freshwater, aquatic turtles have webbed feet for maneuvering through the water and generally have flattened shells for more agile swimming.

Like other turtles, basking turtles lay eggs. Many of the freshwater species will come out of the water and even travel a distance from their home body of water in order to lay eggs. The selected nest site is usually on a sunny, southern slope so that the eggs may be warmed by the sun. Turtles also look for a site that has minimal grass or vegetative cover to allow for more sun exposure to the nest. A hole is dug; the eggs are laid and then covered with soil or leaf litter. The nests are typically identified as a softly packed mound of soil. Temperature plays an important role in determining the sex of turtles. Warmer temperatures produce females and cooler temperatures produce male offspring.

All turtle species lay eggs, and many species have their sex determined by the temperature at which the eggs are incubated. Female turtles bury their eggs and do not sit on their eggs like birds. Leaving the eggs to develop on their own makes the eggs susceptible to predators, such as small mammals and birds. Once the offspring have hatched, they are still vulnerable to predators because of their small size. Turtles grow slowly and it may be years before they reproduce. For this reason, their reproductive cycle is slow. Turtles are long-lived and some even surpass 100 years of age.

Turtle Names and Classification:
Most turtle species live in freshwater and can simply be called "turtles." However, some common names have supplanted the "turtle"– sliders, cooters and softshells are good examples in which "turtle" doesn't usually follow the name. In the United States, one species of turtle lives in salty coastal marshes – it is known as the "terrapin." "Tortoises" are turtles in one family (large group of related genera and species) that live only on land. "Sea turtles" live in the ocean, in salt water. The trouble with common names is that not everyone uses the same series. In Texas, some people call turtles in the genus *Terrapene* (land turtle species that look like tortoises but are more closely related to sliders and cooters than to tortoises.) "terrapin" and/or "tortoise" instead of the more widely used common name "box turtle." In Australia, which has no land turtle species, all freshwater turtles are called tortoises, and only a few species that live in the ocean are called turtles.

Scientists have tried to simplify communication by giving all animals "scientific names," which on first glance seems to be much harder than common names. Latin is the language used for these names, and all species tend to come with what seems like a first name and a last name. The first name is the genus, which functions sort of like a person's last name – it affiliates the turtle with a larger group of relatives. The second name is the species, which is specific to the point of which organisms it is similar enough with to successfully breed. The common name cooter represents three species – the River Cooter, the Texas Cooter, and the Rio Grande Cotter. Each of these species has its own scientific name. All share the genus *Pseudemys* because they are closely related, but each group of these turtles, separated by geography and physical characteristics, is its own species – River Cooter (*Pseudemys concinna*), the Texas Cooter (*P. texana*), and the Rio Grande Cooter (*P. gorzugi*).

How to Monitor Texas Turtles:

1. Selecting a site: Choose a place that is in an aquatic zone, containing a pond, lake, river, etc. Basking turtles will be found in or near bodies of water. Be sure that you have permission to observe and survey the turtles on a site if the land or body of water is on private property.
2. Selecting a time: Basking turtles are most active in warm weather (not extreme temperatures, such as freezing.) They also may not be easily sighted on a cloudy, rainy day. Be sure to check the weather conditions before you go out. May through July is considered peak basking season; however turtles can be spotted basking throughout most of the year in many parts of Texas. Also consider the time of day when going to an observation site. Peak activity for most basking turtles is mid morning and mid afternoon.
3. Identify and record the location: Using the Texas Turtle Watch Data Report Form and a GPS if you have one, record to the best of your knowledge, the location of the site.
4. Upon arrival to the site: Find a place at the survey site in which you may quietly sit and observe the turtles for period of time. Record the start and end times. The longer time you spend at the site, the more likely you will spot turtles. Turtles are extremely shy and sensitive to motion. They may quietly slip away without being noticed. This is true of turtles laying eggs and turtles that are basking. It is best to select a place to observe in which you may comfortably sit and watch without being too close.
5. Bring a digital camera, binoculars and guide books: To help you more easily identify a turtle, binoculars and guide books are tools that you may want to bring to the site. Binoculars allow you to view the turtles and their distinct characteristics while maintaining some distance from the turtles (binoculars with at least 10x magnification will be optimal). This is especially important if you are unable to get within a distance of visually identifying the turtle with the naked eye. The turtle guide books allow you to properly identify a species using their distinct traits and geographic locations. A camera may allow you to identify a

species you are unsure of. Photos may also be submitted with your Texas Turtle Watch survey data.

6. Scan the location: Using the Texas Turtle Watch Data Report Form, begin scanning and recording information about turtles at the site. To begin a scan, looking at one side of the observation site (pond, creek, portion of a river, etc.) and scan or move your eyes visually across the site. As you visually observe from one side of the location to the next, record information about each turtle sited. Please record turtle data only related to the three turtle species of focus (sliders, cooters and softshells) on the Texas Turtle Watch Data Report Form. Do not record the same turtle more than one time. Any additional information pertaining to other species record only in the "Other notes" section of the form. We are focusing on these three genera of turtles because they are more visually identifiable when basking or nesting than other aquatic turtle species, such as mud turtles or snapping turtles. It is very important to carefully identify each species so as to not mistake a map turtle for example, for a cooter. Please only mark a turtle by species if you are certain you know what it is. This is to ensure the validity of the data.
7. Identifying a turtle properly: In order to properly identify a turtle, utilize the information in this or the Texas Turtle Watch Guide trifold. Guidebooks may also be helpful. As you complete the data form, only fill out information you are sure of. If you do not know the answer to a question, leave that question blank. For example, you can identify that you have three hard shell turtles and zero softshells, so go to the next question. You now must identify the number of the types of hard shell turtles as cooters or sliders. You have one slider and two cooters. The next question asks, "Are you able to identify the species of each type of turtle?" You know the slider is a red-eared slider so record this. However, you are unsure about which species of cooters you are seeing, leave the remainder of this question blank. If you are unsure about the species of any of the turtles, leave this portion of the data form blank. You would then move on to the next question that asks about the size of the turtles sighted. You may take digital photos to get a closer look at the turtles for later identification or to submit the photos to the Texas Turtle Watch.
8. If you are a group, for example a class of students, students may record data as individuals or in groups on the Texas Turtle Watch Data Report Form. However, only one data report form will need to be submitted for the entire class surveying the same location at the same time. Do not submit each individual student's data report form from the same location and time.
9. After observing a site: Once you have completed your paper data form, there are two ways to submit your information. We encourage you to submit data online at www.fortworthzoo.org/conserve/txturtlewatch.html.
   You may also submit your survey data by mailing your paper Texas Turtle Watch Data Form to: Texas Turtle Watch
   Fort Worth Zoo
   1989 Colonial Parkway
   Fort Worth, TX 76110

10. Repeat the Observation: If you are able to go out and repeat the data survey at the same site more than one time, this would provide valuable data about the turtles at this site. Surveying turtles through visual scanning is intended to be a short glimpse into the turtle's behavior. Repeated scans at different seasons, times of day or even weeks, provide insight into the turtle's patterns and changes in behavior within a habitat. This will provide a continued set of data that accounts for the turtle population over time.
11. The Texas Turtle Watch encourages participants to observe and learn about turtles through observation of their behaviors. Please do not pick up or handle turtles without a permit and proper training. Turtles have sharp beaks for biting and long claws that can also be harmful if handled. Turtles also carry *Salmonella*. You put yourself and the turtle at risk of injury if you handle a turtle.

Sliders (*Trachemys*)

Pictured above is the red eared slider (*Trachemys scripta)*, female at top, old male at bottom.

Description:
Sliders are most easily identified by a red, Red-eared slider (*Trachemys scripta)*, or orange, Big Bend slider (*Trachemys gaigeae*), stripe that extends on the side of the head beginning at the eye. Juveniles will have brighter markings and color. The yellow stripes on the head will extend from the eye and nose down the neck. In males these features in color and markings fade away as the turtle ages (shown in picture.) In females, the color will lose intensity, but the patterns remain.

The carapace (top shell) is olive to brown with yellow stripes or reticulating patterns. The plastron (bottom shell) is yellow, often with black patterns.

An adult's body size is 5-12 inches in shell length with females being larger in size. Males will have longer front claws than females.

Reproduction:
Males use their long claws during courting to create a current of water movement near the female's head. If she accepts the male, then they will mate. When a female is gravid, (carrying eggs), she will travel to land and find an appropriate site to lay her eggs. The

site is typically an open area of soil so that the sun may directly warm the nest. She will dig a hole, lay 4-23 eggs and then cover the eggs with soil and sometimes leaf litter. Females lay their eggs from April to August. The incubation period is 60 to 90 days.

Behavior:
Sliders are known for basking. They can often be seen stacked upon one another on a log in the water or a pond rock, often with other turtle species.

When sliders are young they are primarily carnivorous, feeding on invertebrates and small crustaceans. As they mature, sliders shift to a vegetarian diet of algae and aquatic plants. They also feed opportunistically on carrion. Fish are too fast for a slider to capture as a primary food source.

Habitat:
Sliders are found in slow-moving water with muddy bottoms and dense vegetation. They are not fond of rapid currents. Red-eared sliders (*Trachemys scripta)* are widely distributed throughout the state of Texas, where as Big Ben sliders (*Trachemys gaigae)* are highly restricted to rivers in western Texas and southwest New Mexico.

Species of Sliders in Texas:
Red-eared slider (*Trachemys scripta*)
Big Bend slider (*Trachemys gaigeae*)

Cooters (*Pseudemys*)

Pictured above is the river cooter (*Pseudemys concinna)* at top, the Texas cooter *(Pseudemys texana)* at bottom.

Description:
Cooters have yellow lines on the skin, reticulated markings on a dark carapace (top shell). The rear end of the carapace is typically serrated. The plastron (bottom shell) is creamy to yellow in color and usually has no pattern. The head is dark green and has yellow stripes from the nose to the top of the head. There are two large, yellow stripes on the top of the head and sometimes, a yellow spot behind the eye. The yellow stripes also extend down the legs

As they age, the bright yellow shell and skin markings may become orange or even black. Adult females grow 12-16 inches in shell length. Adult males grow 8-12 inches in shell length and have elongated front claws. They are the largest of the Texas Turtle Watch target species.

Reproduction:
Females lay eggs between May and June. Females will sometimes dig more than one nest cavity to lay one or a few eggs in. In total, their clutches range from 4-22 eggs. Incubation takes 80 to 150 days.

Behavior:
Cooters are often seen on rocks or logs that are in bodies of water. They can be seen basking with other aquatic turtles.

Young cooters will eat crustaceans, mollusks, worms and other invertebrates. As they age, their diet shifts to vegetation. Many cooter populations are among the most herbivorous turtles in North America.

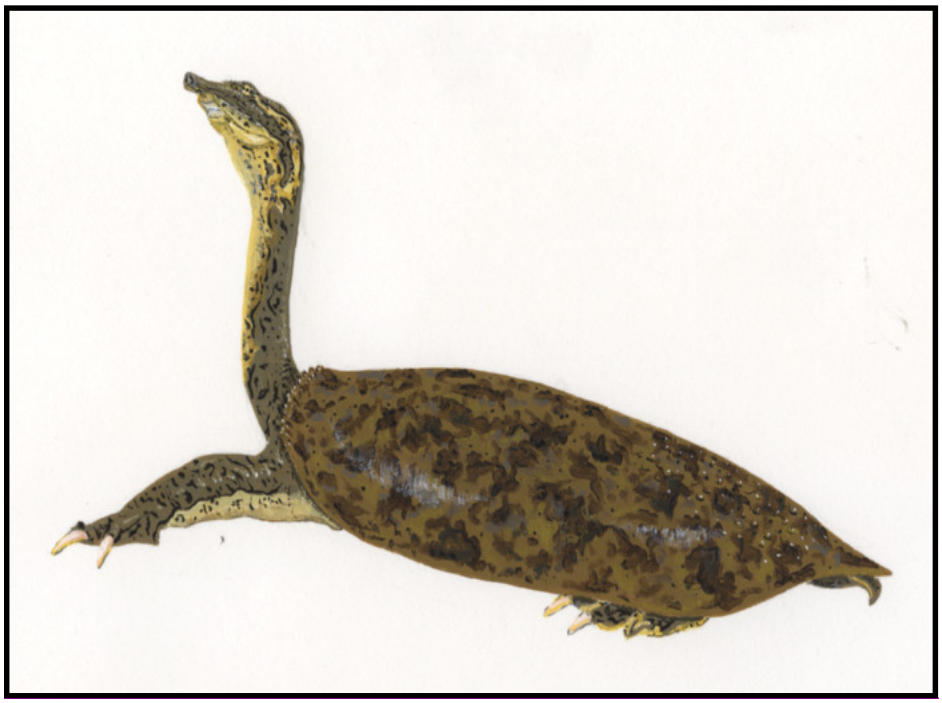
Habitat:

Cooters generally prefer habitats with slow-moving, fresh water and muddy bottoms. They can be found in ponds, lakes, canals and slow-moving rivers. Sometimes they can be found in brackish water.

Species of Cooters in Texas:

River cooter (*Pseudemys concinna*)
Rio Grande river cooter (*Pseudemys gorzugi*)
Texas cooter (*Pseudemys texana*)

Softshells (*Apalone)*



Pictured above is the spiny softshell (*Apalone spinifera*), female.

Description:
Softshell turtles have soft leathery shells that look shiny when dry. The carapace will blend in with the muddy water and pond bottoms, being olive, brown or grey. In some populations males will have light speckling on the carapace (top shell); most females show uniform dark mottling.

The nose of a softshell is snorkel-like with a lateral ridge that separates the nasal passage. The neck is very long when extended from the shell.
Adult soft shells range from 5-21 inches in shell length with the females being significantly larger in size.

Reproduction:
These turtles rarely leave a body of water except when a female ventures to shore for nesting. Females will lay eggs from May until August on banks that are exposed to full sun. This helps the eggs incubate. It will lay 4-32 eggs per clutch and up to three clutches per breeding season. Hatchlings will emerge late summer or the following spring.

Behavior:
Softshell turtles are baskers and may be spotted on a sandbar, log or rock among other basking turtle species. They are easily startled and will quickly retreat in response to sounds and changes around them. Otherwise, this turtle will be found at the bottom of a body of water under the mud or sandy soil so as to conceal itself.

Softshell turtles are fast swimmers. They use their agility in water to capture prey. They are primarily carnivorous and eat invertebrates, insects, tadpoles, frog, fish and other small vertebrates.

Habitat:
Softshells are found in various kinds of fresh water and some coastal waters. They like ponds, marshy creeks, lakes as well as fast-flowing rivers. They also prefer bodies of water with sandy, gravelly or muddy bottoms.

Species of Soft shells in Texas:
Smooth softshell turtle (*Apalone mutica*)
Spiny softshell turtle (*Apalone spinifera*)

Texas Turtle Watch in Your Classroom

Texas Turtle Watch is an opportunity for you to take your students outdoors while learning about native wildlife, using the scientific method, participating in conservation and meeting the state standards in your classroom. There are two core lessons, "Where are the Turtles?" for elementary through middle school students and "Why Do Turtles Bask?" for middle through high school students. The curriculum also includes onsite journaling activities for students to become familiar with turtles and observational skills. The Texas Turtle Information Guide provides information about turtles and the purpose for this project as you progress through the activities and lessons.
This project can easily be extended beyond the classroom as well. Families, scout troops, and community organizations will find these lessons to be very helpful for teaching, spending quality time together and contributing to the community through the Texas Turtle Watch.

How to use the curriculum:

1. Decide to "Adopt A Pond." Adopting a pond means that you or your group has decided to be responsible for collecting repeated data for a site. This means that data is collected two or more different times at the same wetland, pond, creek, etc. The times ideally occur two or more times per year, but may be once per year at the same site. This body of water may be in your school outdoor center or off of school grounds. By going to the same site repeatedly, children are able to enhance their observation skills. Adopting a pond means that you will have repeated site visits, resulting in more data collection over time. You will begin to see changes and consistencies within the site and turtle behavior. Patterns may be more easily recognized in turtle behavior as students continue to repeat visits to the same site.
2. Encourage students to become familiar with turtle characteristics and behavior. Begin with "On-site Activities," so students learn to recognize identifying features of turtles. Refer to the "On-site Activities" for ideas.
3. Once familiar with the background information of the Basking Turtle Watch and the identification of turtles, participate in Texas Turtle Watch through one of the lessons, "Where Are the Turtles? or Why Do Turtles Bask?" Collect data using a Data Report Form.
4. For each lesson, students will use the actual Data Report Form from Texas Turtle Watch. Students may have one data sheet per group or individuals, but only one Data Report form needs to be turned in to the Texas Basking Turtle Watch Project per class.
5. Submit your class data after every site visit, to the Texas Turtle Watch at www.fortworthzoo.org/conserve/txturtlewatch.html
6. Sign-up for the Texas Turtle Watch Newsletter. Share updates through the newsletter with your students and groups.

7. Let Texas Turtle Watch know what you are doing with this project. We want to share your story in our newsletter. Send pictures and stories to:

    Texas Turtle Watch Newsletter
    Fort Worth Zoo
    1989 Colonial Parkway
    Fort Worth, Texas 76110

Turtles Close-up

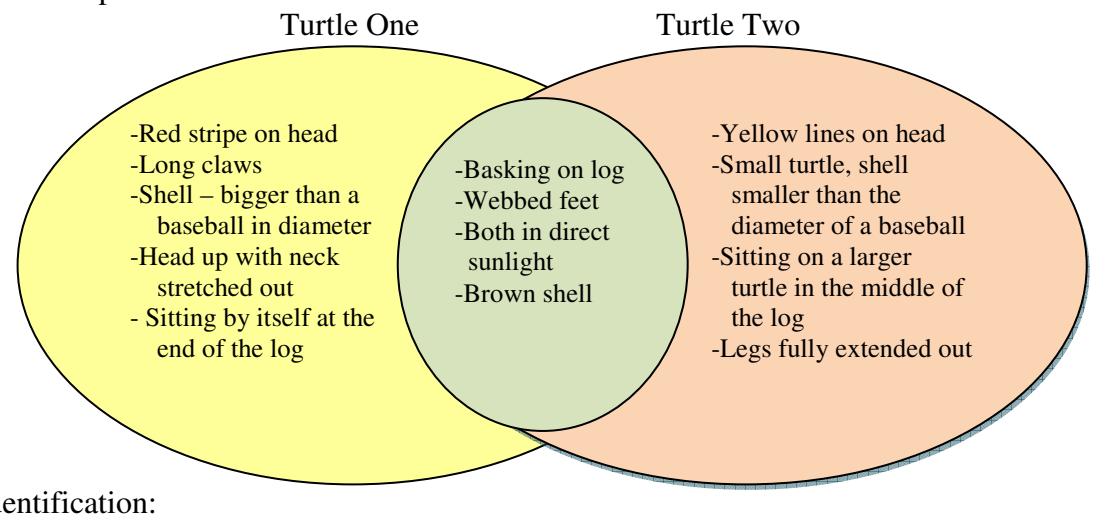
Provide a pair of binoculars to each pair of students. Quietly have one student write a description of the turtles they are observing without binoculars and another student write a description of the turtles with the binoculars. Give the students a set amount of time, 10-20 minutes for writing. Have the students share their descriptions with each other and then with the group if time allows. What details did the student with binoculars observe that the student without binoculars did not describe? What observations did the student without binoculars make that were different than the student with binoculars? Were any observations the same?

Alternative Option: Students may draw a picture of their observations instead of writing.

Name that Turtle

Visually choose two turtles to observe as they bask. Binoculars may be useful. Have students draw two circles in their journals that overlap in the middle (Venn diagram). One circle will be labeled turtle one and the other will be labeled turtle two. Students will list all of the characteristics and behaviors that are unique to that turtle in the appropriate circle. The common characteristics and behaviors of both turtles will be listed in the center of the circle. Discuss the observations as a class. Once the exercise in compare and contrast is complete, use a field guide and the characteristics observed to determine if the turtles are of the same genera. If possible, determine the species of each turtle.

Example:



Identification:

Turtle One: Red-eared slider Turtle Two: River cooter

Alternative Option: Use a picture of turtles basking on an overhead projector if you are unable to go to a site for that day.

Turtle Recall

Observe a turtle for 5-10 minutes. Then turn away and draw the turtle without looking at it again. Draw from memory. Try to recall as much detail as possible. The class may then share their drawings and the details about the turtle from their memory.

Basking in Poetry

Write an acrostic poem using the word turtle or a word related to turtles, such as basking, swimming, shelled, etc. Students can gather ideas for their poem by observing turtles.

Example:
S oft shell
H ard shell
E ncompassing every turtle
L ittle shell or large
L iving covered

If I Were a Turtle…

Prompt: Imagine you are a turtle. What kind of turtle are you? What do you look like? Where do you live? What do you do each day? What do you eat? Describe yourself and your behaviors as a turtle. Allow 10 - 20 minutes for students to write their prose.

Turtle Mapping

Upon arrival to the site, sit and observe the surroundings. Draw a map of the area, including the body of water and the land surrounding it. Label the map with identifying features such as a sandy shore, tree, rocks in the creek, etc. Students may color the map as well. Have students predict and label behaviors on the map at places they think turtles will be egg laying, basking, eating and swimming. For example, egg laying may be predicted on the shore or in a field and written as such on the map. If students actually observe turtles active in behaviors, label the behavior and maintain a tally of the number of turtles sighted. This activity is to help students understand the relationship between the habitat and turtle behavior.

Texas Turtle Watch Lesson Plans

Where are the Turtles?
Elementary/Middle School Level

Abstract: Students learn to use their observation skills by exploring the characteristics of turtles and then comparing those characteristics to a turtle habitat. Students will create a simple hypothesis based upon the features of a turtle to predict where it will live.

Background: Sight is one of the five senses that is important in discovery and use of the scientific method. Students learn terms related to the features of turtles such as "shell" and "webbed" feet. Students will also be provided the opportunity to observe habitats related to living organisms. Understanding the relationship between an animal and its habitat is valuable to gaining an appreciation of animals and their roles in ecosystems. Students will collect valuable information that may help define turtle populations in their area as well as familiarize the students with turtle species indigenous to their state. Reptile history, characteristics and anatomy should be included as background information before taking students to a suitable location to observe turtle behavior and their habitats.

Objectives: (Texas TEKS)
Use of scientific method during field investigations
Demonstrate the ability to make written observations of turtle behavior
Effective collecting and graphing of data
Organize, evaluate, and predict trends from data
Be able to group organisms based upon characteristics

Materials:
Turtle or Reptile Field Guides and paper
Binoculars (if possible)
Graphing paper
Clock or timer
Photo of Texas turtles (one set of four or more photos for each group)

Procedure:
1. Divide students into groups of two to four.
2. Begin in the classroom by providing students with four or more pictures of various Texas turtles. Include a box turtle, a softshell and two hard shell turtles (a slider and a cooter). Go through features of the turtles in a game of grouping.
3. Go through a series of features and have students group the turtles according to those features. Ask how do each of these features help the animal in their habitats? After each feature is discussed, have students combine their pictures again so they may separate them for the next feature discussed.

For example,

a. Describe what a hard shell is versus a soft shell turtle. Then have your students, in their groups, separate the turtles pictures into softshell and hard shell turtles. (Hard shells offer protection from predators that would eat a turtle. Soft shells allow a turtle to be lighter and faster when swimming through water.)
b. Discuss how some feet are rounded with flat bottoms and others are webbed. Separate the pictures into the two categories. Ask what webbed feet help turtles do? And rounded feet? (Webbed feet allow turtles to swim through the water but rounded feet allow a tortoise to walk on land more easily than webbed feet.)
c. Flat nostrils and sharp beak versus a tube-like snout and cusp, a sharp ridge of the mouth used to capture food. (Flat nostrils and a sharp beak allow a turtle to tear food, such as a plant without the nose interfering. A tube-like snout allows a turtle to stick the snout out of the water to breath and the cusp allows it to capture prey.)
d. Flattened shell versus a rounded, dome shell. (Flattened shell leads to mobility and agility in water as well as a larger surface area for basking. A rounded, dome shell offers protection from a predator's jaw. The shape makes it more difficult for a predator to fit the turtle in its mouth and crush it.)
e. Bright color (red in sliders) versus dull color. (Bright color is for attracting a mate and dull color is to camouflage or hide from predators or prey).

4. Each time a group successfully categorizes all of their turtle photos acknowledge or offer a small prize.
5. After the categorizing game, assign a turtle photo to each group and have them make a hypothesis about the type of habitat they live in.
6. Go to a your "Adopt a Pond" location. Consider the peak basking times for turtles, mid morning and mid afternoon. Remind students of turtle observation etiquette. Being quiet and still is important when observing turtles. Allow enough time for observation as well so that startled turtles return to the surface to bask. Have students describe the habitat. Tell your students to be patient and wait to see if they observe any turtles (students may see turtles at basking sites). Record the number of turtles sighted along with the habitat description. If possible, go to the locations more than one day for repeat observations and sightings.

Conclusion:

1. After returning to the classroom, have a discussion about their findings and create a classroom graph or chart that includes the turtles sighted. What did they discover? Describe the turtles through their findings. What would they do differently next time to improve their methods of observation? What did their observations say about their hypothesis?
2. Submit one data report form for the class to Texas Turtle Watch at www.fortworthzoo.org/conserve/txturtlewatch.html

Texas Turtle Watch Lesson Plans

Why Do Turtles Bask?
Middle/High School Level

Abstract: Students learn to solve a question by formulating a hypothesis, making written observations of reptile behavior, graphing the data, and analyzing the information.

Background: The scientific method is a concept that is usually introduced at the beginning of high school biology courses but needs to be reinforced with actual field investigations during the school year. The opportunity for students to observe living organisms and collect valuable information may help define turtle populations in their area as well as familiarize the students with turtle species indigenous to their state. Reptile history, characteristics, anatomy and current species status should be included as background information before taking students to a suitable location to observe turtle behavior. The Texas Turtle Watch Guide will provide additional information about the importance of this project and native turtles.

Objectives: (Texas TEKS)
Use of scientific method during field investigations
Practice accurate measure of temperature
Demonstrate the ability to make written observation of turtle behavior
Effective collecting and graphing of data
Organize, evaluate, and predict trends from data

Materials:
Turtle or Reptile Field guide & paper
Thermometers
Clock or timer
Binoculars (if possible)
Graphing paper

Procedure:
Day 1
Provide notes that include reptile history, characteristics, anatomy and species status or assign students to computer research on each of the previous topics listed above. Suggested website list follows:

- http://www.sandiegozoo.org/animalbytes/t-turtle.html
- http://www.ucmp.berkeley.edu/anapsids/testudines/testudines.html
- http://42explore.com/turtle.htm
- www.texasturtles.org

Pre-Lab: questions for students to answer before doing the lab

1. Define the problem. Students will perform a lab based upon the question, "Why do turtles bask?" Write down or list facts that are known (information you have learned) and unknown (information need in order to solve the problem). **Any sources that you use must be cited.**
2. Restate the problem in the form of a hypothesis (if…then statement).

3. What will the **dependent variable** (what you can measure or observe) be?
4. What will the **independent variable** be?
5. What do you expect or predict as an outcome of this experiment?

Day 2

This portion of the lab requires a pond or body of water to engage students in observations of reptile behavior. Ideally, students will be familiar with this site as their "Adopt a Pond" location. Proper safety information and class expectations should be reviewed. Peak basking times are mid morning and mid afternoon. One hour of observations is ideal. **Students must be very quiet at pond locations or no basking will be observed.**

Students are put into teams of two and given:

- Timer/clock
- Graphing paper
- Thermometer
- Paper & pen

All students will create a time/temperature/number of turtles chart. They will record the initial water temperature, air temperature and then take these temperatures every 10 minutes (very quietly). In addition, the students must also record the number of turtles observed in each 10-minute session.

The students will graph the air temperature vs. water temperature rate and write in the number of turtles observed over each point. Evaluation of the data will then be used to write a lab report.

The Lab Report should include:

1. Report Titles
2. Question: Why do turtles bask?
3. Background Information: Research and finding about turtles and their behaviors.
4. Hypothesis: This hypothesis is based upon your background information and question or original problem.
5. Methods: The procedures used to test the hypothesis. This should include not only procedures, but equipment and the dependent and independent variables.
6. Results: The collected data is then presented in a readable graph or chart.
7. Conclusion: The conclusion provides evidence to support or unsupport your hypothesis using the data results of the experiment. Further ideas and explanations are offered as well as questions and comments presented through the findings.
8. Sources cited page.

Day 3
After watching turtles on Day 2, students are familiar with the procedures of being quiet and recording their observations. Familiarize students with the three genera of turtles presented in the Texas Turtle Watch Project. Go to the site and demonstrate how to record and observe turtles using the Data Report Form. Provide a Data Report Form for each individual or divide students into small groups and give each group a form. Have students observe for an additional amount of time on their own and record their observations on the Data Report Form.

Return to the classroom and discuss the observations. Discuss the benefits of collecting such data. How does this contribute to conservation?

Report only one Data Report Form for the class to the Texas Turtle Watch Project. Submit your data online at www.fortworthzoo.org/conserve/txturtlewatch.html