

Desert Tortoise 6th Grade Unit

Amy Fallon

Desert Tortoise Lesson

I currently teach 6th grade to approximately 120 students. This lesson has been adapted for this specific grade level. This unit should take up to a week with 90 minute lessons each day.

Goal: The goal for my project is for the students to gain an understanding about desert tortoises, human impacts on their environment, and show how researchers use spatial ecology for species conservation.

Standards: Next Generation Science Standards (NGSS):

- Human Impacts on Earth Systems – Ess3.C and MS-ESS3-4
- Interaction Among Organisms Across Multiple Ecosystems – MSSLS2-2
- Biodiversity and Humans – LS4.D
- Developing Possible Solutions – ETS.1B
- Ecosystem Dynamics, functioning, and resilience – LS2.C

Common Core Standards

- Draws evidence from informational texts to support analysis, reflection, and research – CCSS.ELA W6.9

Materials:

- Telemetry Kit from the education department of San Diego Zoo Institute for Conservation Research. This kit is only available for check-out for those that have participated in the weeklong teacher workshop training.
- Telemetry kit includes: telemetry units, stuffed tortoises which have been tagged, desert tortoise PowerPoint, Spatial ecology data sheets, data analysis sheets, desert tortoise overview article, conservation declaration, laminated spatial maps, x-rays of pregnant tortoises, ping pong balls, 2 bowls, small mini tortoises, construction paper, watercolors, oil pastels, dry erase markers, calculator, stopwatch
- You tube links: <http://youtube.com/watch?v=YtW52Dv6Bgc> and <https://www.youtube.com/watch?v=2m2H6GHW7Qo>

Day 1:

The students will discuss as a whole group the difference between a turtle and a tortoise. List these onto the board. Next, bring out the class pet, a tortoise, and observe how the tortoise moves, features that it has. With partners discuss why these features are important for a tortoise and then share with the class. Look at pictures of desert tortoises and compare with turtles and our class pet. List the observations of each species onto the board.

Using the spatial ecology worksheet, have the students brainstorm on what they know about the desert tortoise, share with partner and the class.

Watch the YouTube video: The Heat is On. While watching the video, pause to discuss throughout the video. Observe the tortoise and complete a sketch in their journal. Write a quick write in their science journal their wonderings about the desert tortoise. Share their wonderings with their partners.

Day 2:

Share their wonderings from the previous day and write on the board. Using the PowerPoint, share and discuss information on the desert tortoise, its conservation status, human impacts, disease, and climate change, and discuss what the zoos are doing to help the desert tortoise. As we discuss the information on the PowerPoint, students will take notes on their Spatial Ecology Data Sheet. Watch the next YouTube video and discuss. Next complete the Hatchling Survival Rate Activity.

Hatchling Survival Rate Activity: Have students look at X-rays of pregnant tortoise. Have partners find and count the number of eggs on the x-ray. Then the partners go to the station with bowls and ping pong balls. They will get the same number of ping pong balls as the number of eggs they saw on the x-rays. Next they will throw the balls into the bowl. The ones that land in the bowls represent the number of eggs that survive. Once everyone has had a chance to do this, look at other x-rays, repeat with the ping pong balls again. Come together and discuss how many of their total eggs survived. Why is this? What does this mean for the tortoise population? What would be an advantage or disadvantage of having few survivors? How does genetics play a role in these fragmented areas? How do you think researchers can help with this problem?

With partners, students will work on their annotating skills, and with a partner, read and annotate the Desert Tortoise Overview and write a summary on the desert tortoise.

Day 3:

Continuing on with the PowerPoint, define spatial ecology, GPS systems, radio telemetry, and how GPS is relevant to wildlife conservation. What information could they get that would be beneficial to the tortoise? What information is needed to help them to survive? As a researcher, what would you want to know from GPS or radio telemetry?

(Prior to the lesson, I will hide the stuffed tortoises in the canyon area near our school)

Groups of 3 students will use radio telemetry to find the hidden tortoise. Each tortoise has a informational card about them. Record this information in their journal. Discuss: What are the challenges they discovered? What would be difficult for researchers in the desert? Once we have this information, if you were a researcher, what would you do with it? What are some wonderings you have about this technology related to conservation?

Reflect in journal about activity.

Day 4:

Share reflections and wonderings from the previous day.

Data Analysis- Spatial Data: Students will use the spatial maps which show the movements of 9 desert tortoise. The students will work with partners to calculate the distance each tortoise traveled over 35 days. They will be comparing resident tortoises, tortoises that live in the wash, and tortoise that live in the flats. The groups will find the average distance traveled for each group of tortoises. Compare the 3 areas where the data was collected on these tortoises. Next they will refer back to the information on the tortoise that they found yesterday using the radio telemetry. Discuss with partners/whole group what areas had healthier tortoises? Why do they think the resident tortoises are moving less within their area? Using this data, where would be the best place for translocation? What would a researcher need to look for when translocating a tortoise? What would be a suitable habitat?

Complete the Population Size Monitoring Center Activity:

Using the mini tortoises split them up and place 13 in one bowl and 143 in the other bowl. Start the activity with the question of without counting all of the tortoises, how would you come up with a method to estimate how many tortoises are in the Mojave Desert 50 years ago and how many there are today? This really is impossible, but great conversation piece for the students. But how do researchers do this? Let them discuss and come up with solutions on their own. Place the solution for catch and

release on the board: $N=(M)(n)/R$ (N represents the total population size to be estimated, M represents the number of individuals in the initial capture, n represents the number of individuals in the repeat capture, and R represents the number of marked recaptures) Explain to the class what the letters represent. Give the students a hint that the dry erase markers may be helpful for the activity. Once they groups have discussed solutions, have the students grab one large handful of tortoises from the bowl, count, and mark with a dry eraser. These marked tortoises will go back into the bowl and they repeat. Record how many are already marked. Use the formula to estimate population size. They can repeat the procedure many times to check for accuracy. Come back as a whole group and discuss how the two populations differ and why it is important. What method did they use to count tortoise? Why did it or didn't it work? How would this be different in the wild?

Day 5:

Refer back to the wonderings what can be done to help the desert tortoise? Were any of their wonderings answered? How can we help from here where we are in Chula Vista? What are suggestions to help their population? From this, I want my students to brainstorm on questions that arise from what we learned this week about translocation, genetics, and the upper respiratory disease. What are next steps that should/could be taken from biologist and surrounding communities? What are the next steps we can take? Take the desert tortoise conservation pledge and look to see about adopting a desert tortoise. Get feedback and thoughts on the activity and what they think would be a fun next step.

Art Project:

Post pictures of the desert tortoise and desert plants on the board. Draw an outline of the desert tortoise and do an abstract watercolor painting for the inside of the tortoise. Once dry, the students will cut out the tortoise, glue onto paper, and use oil color pastels to create a desert scene for the tortoise.

I feel that my students will love this idea of using technology in a hands-on activity. I am hoping I see rich conversations, questioning, and critical thinking skills being applied throughout this activity.

Resources:

NGSS Lead States. 2013. *Next Generation Science Standards: For States, By States*. Washington, DC: The National Academies Press.

Telemetry Kits available through San Diego Zoo Institute for Conservation Research, teacher workshop in conservation science.