

# MS Desert Tortoise Literature Dive Lesson Plan

## At a Glance

Students practice reading scientific articles to better understand the current scientific research related to desert tortoises.

## Advance Preparation

- Decide how you want students to view articles (on a computer/tablet or printed out).
- The following resources are meant to support your teaching of scientific readings, and are laid out in order of student reading level from youngest to oldest:
  1. *The Vocabulary of Science*: <https://www.readingrockets.org/article/vocabulary-science>
  2. *Supporting Literacy in the Science Classroom*: <https://www.edutopia.org/article/supporting-literacy-science-classroom>
  3. The *How to Read a Scientific Paper* infographic can be read individually or gone through as a class. <https://www.elsevier.com/connect/infographic-how-to-read-a-scientific-paper>

## Objectives

- Learn the process of reading a scientific article
- Learn how to pull out relevant information from scientific articles to share with others

## Materials

- PDF's or web link of article and blog for each student to read
- “Check for Understanding” questions for each student (online or print-out)

## Lesson

- Introduce your students to the process of reading a scientific paper, article, or blog utilizing the links provided or any other documents that you find helpful.
- Provide your students with the two articles related to the polar bear, starting with the Pre-Lesson Article.
- There are vocabulary words provided in the Teacher Summary section. You can introduce them before or after students read the articles, whenever you feel it fits best in the lesson for your students.
- Provide each student with the “Check for Understanding” questions. These questions could be done while reading the article (worksheet style) or after students are done reading the articles (quiz style). We suggest going through the “Check for Understanding” questions as a class after students have completed individually to see if there are any concepts in the questions that need more clarification.

## **Teacher Summary**

**Pre-Lesson Article:** Schipani (2017). To Save Desert Tortoises, Make Conservation a Real-Life Video Game.<sup>2</sup>

### **KEY POINTS:**

This article discusses the threat of introduced predators, especially ravens, facing desert tortoises in the Mojave Desert, and some innovative strategies being used to deter them.

- Desert tortoise shells do not harden until they are about 5-6 years old.
- Raven population in the Mojave has increased about 700% since 1960.
- Ravens can puncture through juvenile desert tortoise shells, which are only about as thick as a fingernail, and eat them.
- To deter ravens from eating baby tortoises, Hardshell Labs is 3D printing baby tortoise decoys and treating them with a chemical deterrent that is sourced from grape juice.
- Laser guns can also be used to deter ravens because ravens have extremely sensitive eyesight. Laser beams appear like solid barriers and raven will avoid them while flying.
- Lasers and treated tortoise decoys are nonlethal which is important because ravens are federally protected under the Migratory Bird Treaty Act, and can have positive ecological impacts on their environment.
- The ultimate goal of Hardshell Labs is to turn armchair activists into real-time conservationists, by allowing users to remotely control techno-tortoises, lasers, and rovers online.

### **Vocabulary:**

- Pandemic - (of a disease) prevalent over a whole country or the world<sup>3</sup>
- Proverbial - well known, especially so as to be stereotypical<sup>3</sup>
- Biome - a large naturally occurring community of flora and fauna occupying a major habitat, e.g. forest or tundra<sup>3</sup>
- Invasive species (or alien invasive species) - a nonnative species whose introduction and/or spread threaten biological diversity<sup>4</sup>
- Umbrella species - species that have either large habitat needs or other requirements whose conservation results in many other species being conserved at the ecosystem or landscape level<sup>4</sup>

**Check for Understanding Questions:** (Answers are bolded for teacher reference)

1. What new resources have become available for ravens in the desert due to humans?
  - A. Landfills and dumpsters
  - B. Sewage ponds
  - C. Golf courses
  - D. All of the above**
  - E. I don't know
  
2. Why is the Mojave Desert considered a unique eco-region?
  - A. It's a desert that is nearly devoid of life
  - B. It contains 80-90% endemic species**
  - C. It's the only place in the world where tortoises can live
  - D. Both a and c
  - E. I don't know
  
3. In conjunction with laser guns what other method does Hardshell Labs use to deter ravens from desert tortoises?
  - A. Set up scarecrows
  - B. 3D print tortoise decoys and treat them with chemical deterrent**
  - C. Set up loudspeakers near tortoise nests that play unpleasant noises
  - D. Capture and move ravens away from tortoise habitat
  - E. I don't know
  
4. Why is the use of non-lethal methods important for deterring ravens from preying on the tortoises?

**Answer:** Ravens are federally protected under the Migratory Bird Treaty Act and are important to the ecosystem in their own way. Many people care deeply about ravens and finding non-lethal solutions for managing their population can be part of a collaborative and meaningful conservation strategy.
  
5. Why are laser guns an effective strategy for deterring ravens from preying upon tortoises?

**Answer:** Ravens have very sharp vision, and the green beam from the laser gun looks like a solid pole to their eyes. Shining the beam in front of them will cause them to change their flight course abruptly and avoid certain areas. Laser beams shot within a meter's range of a raven is usually enough to deter it.

**Post-Lesson Article:** Braun (2016). Passport to the Wild.<sup>1</sup>**KEY POINTS:**

- Fences were put up along the I-15 freeway in CA and NV in order to prevent tortoises from wandering into the road and getting hit by vehicles
- Translocated tortoises are not as familiar with their surroundings so the fences help keep them off the roads
- There are several things that must be considered when translocating animals including health of those to be released, resident population health, habitat suitability, and social dynamics.
- Disease can be a serious threat to survivability in wild populations and even in zoos. For tortoises Upper Respiratory Tract Disease (URTD) caused the viruses *Mycoplasma agassizii* and *Mycoplasma testudineum* is a major threat.
- Like in the wild, diseases caused by herpesviruses can be a major concern for the health of animals in zoos.

**Vocabulary:**

- Contiguous - sharing a common border; touching<sup>3</sup>
- Corridor - a belt of land linking two other areas or following a road or river<sup>3</sup>
- Latent infection - an infection that does not produce visible signs of a disease, but may be transmitted to another host<sup>5</sup>
- Gastrointestinal - relating to the stomach and the intestines<sup>3</sup>
- Reservoir species/host - the host of an infection in which the infectious agent multiplies and/or develops, and on which the agent depends for survival in nature; the host essential for the maintenance of the infection during times when active transmission is not occurring<sup>5</sup>

**Check for Understanding Questions:** (Answers are bolded for teacher reference)

- I. What herpesvirus causes the chickenpox and shingles in humans?
  - A. *Mycoplasma agassizii*
  - B. *Mycoplasma testudineum*
  - C. Malignant Catarrhal Fever
  - D. Varicella-zoster**

2. The critical step to managing the spread of disease in wildlife is to prevent:

**A. reservoir species from passing the virus to susceptible hosts.**

B. susceptible hosts from passing the virus to reservoir species.

C. people from sneezing on airplanes.

D. wildlife from crossing the freeways.

3. What is probably the best way to stop the spread of cold viruses in humans?

A. Wash your hands frequently

B. Maintain a healthy immune system

**C. Both a and b**

D. None of the above

4. Why is it important to monitor the health every tortoise that is going to be released into the wild? (Hint: What could happen if you didn't monitor tortoise health and then released them?)

**Answer:** If scientists didn't monitor the health of tortoises and then released them, individuals might be sick or carrying disease without our knowledge. Then after release they could get sicker and die or make other individuals sick, creating a threat to the population and their species through the spread of disease.

5. What are some ways that people use the Mojave Desert? How does this impact the species that live there?

**Answer:** People use the desert for recreation, housing expansion, and renewable energy. These activities can contribute to habitat fragmentation and drought. Human presence can also contribute to wildlife death on roadways.

## References

1. Braun (2016). Passport to the Wild. <http://institute.sandiegozoo.org/science-blog/passport-wild>
2. Schipani (2017). To Save Desert Tortoises, Make Conservation a Real-Life Video Game. <https://www.smithsonianmag.com/science-nature/save-tortoises-researchers-are-making-conservation-real-life-video-game-180963289/>
3. <https://en.oxforddictionaries.com/>
4. <http://www.biodiversitya-z.org/content/umbrella-species>
5. <https://medical-dictionary.thefreedictionary.com>