MS Life in a Biodiversity Hotspot Literature Dive Lesson Plan

At a Glance

Students practice reading scientific articles to better understand the current scientific research related to seed processing and the Stephen's kangaroo rat.

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 of articles 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 infographic provided or any other documents that you find helpful.

• Provide your students with the two articles related to seed processing and the Stephen's kangaroo rat.

•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: Wang (2018). The Stephen's Kangaroo Rat: The Animal Star.[2]

KEY POINTS:

- Institute staff Thea Wang and Emily Gray attended an outreach event in Riverside County
- Most people have never seen a kangaroo rat
- Stephens' kangaroo rats (SKR) are nocturnal, small mammals, with huge black eyes
- SKR's can jump up to 6 ft (1.8 meters)
- The event drew attention to highlight a local species where the current total population trend is decreasing

Vocabulary:

- Docile - ready to accept control or instruction; submissive[3]
- Endangered - (of a species) seriously at risk of extinction[3]
- Species - a group of living organisms consisting of similar individuals capable of exchanging genes or interbreeding[3]
- Fragmented - an isolated or incomplete part of something (think of islands)[3]
- Degraded - reduced in quality[3]

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

1. Stephens' kangaroo rats:
    A. are endangered
    B. can jump up to 6 ft
    C. are nocturnal
    D. all of the above
    E. I don't know
2. Educating the public is important because:
    A. SKR's are cute
    B. they are not endangered

C. people can make a difference

D. all of the above

E. I don't know

3. Stephens' kangaroo rats are found in:

A. San Fransisco

B. San Diego

C. Riverside

D. Both b and c

E. I don't know

4. Why are outreach events important?

Answer: The events are a great way to draw attention to and highlight a local San Diego and Riverside County endangered species.

5. What is the current status of the Stephen's kangaroo rat?

Answer: Currently, SKR are doing well (flourishing) in the multi-species reserve but much of their wider habitat has been lost or is fragmented and degraded. The current population trend is decreasing. They are endangered.

Optional Class Activity: As a class, generate one question or comment for Dr. Wang (please use your school name in the comment form).

Post-Lesson Article: Davitt (2016). Freezing San Diego's Rarest Seeds.[1]

KEY POINTS:

- An ideal seed collection contains at least 2,500 seeds collected on a single date from at least 50 mother plants in a population. However, for rare species sometimes only 100 seeds is possible.
- "Processing" refers to a number of techniques used to separate the seeds from the other plant material, dirt, and other contaminates.
- Before freezing and banking seeds a portion of the collected seeds undergo a germination test. Sometimes these tests include a variety of conditions including germination with hot water or smoke water to simulate how they would survive in fire conditions.
- Some seeds cannot be frozen at all (oak seeds) and some seeds can last hundreds, maybe even thousands, of years frozen and banked.
- Collections must be tested on a regular basis to check viability of seeds that have been banked.

Vocabulary:

- Contaminants - a polluting or poisonous substance that makes something impure[3]
- Winnowing - blow a current of air through seeds in order to remove the chaff (lighter debris)[3]
- Germination - the development of a plant from a seed or spore after a period of dormancy[3]
- Baseline data - a minimum or starting point data used for comparisons with data from after intervention has occurred[3]
- Dormancy - (of a plant or bud) alive but not actively growing[3]

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

1. Performing a germination test with hot or smoke-water simulates what?

   A. San Diego summer weather

   B. fire

   C. mudslides

   D. cooking

2. An ideal seed collection contains at least how many seeds?

    A. 250

    B. 1000

    C. 2500

    D. 50

3. "Processing" refers to any number of techniques that we use to:

    A. file information about the seeds.

    B. separate seeds from other plant material, dirt, and contaminates.

    C. organize seeds in the freezer.

    D. collect seeds from the field.

4. Why is it important to remove debris and contaminants from seeds before they are banked?

    Answer: Removing debris and contaminants reduces the storage space needs and also reduces the risk of growing mold and fungus.

5. Why is it important to perform a germination test with some of the seeds before you bank the rest?

    Answer: Performing a germination test allows for you to check to see if your seeds are viable. Germination tests might also help you determine how well and for how long your seeds might survive after being frozen and banked.

Optional Class Activity: As a class, generate one question or comment for Dr. Wang (please use your school name in the comment form).

References

1. Davitt (2016) Freezing San Diego's Rarest Seeds. http://institute.sandiegozoo.org/science-blog/freezing-san-diego%E2%80%99s-rarest-seeds
2. Wang (2018) The Stephen's Kangaroo Rat: The Animal Star. https://institute.sandiegozoo.org/science-blog/stephens%E2%80%99-kangaroo-rat-animal-star
3. https://en.oxforddictionaries.com/