Tule Springs Fossil Beds National Monument
Teacher Resources

Grades 9-12

Tule Springs Fossil Beds is one of our newest National Park Service units, located in the Las Vegas Valley. We are providing these educational resources for K-12 educators together with our partners: the Protectors of Tule Springs. Over the last ~570,000 years, water has transformed the Upper Las Vegas Valley. Tule Springs Fossil Beds National Monument is an urban park that preserves the unique story of this ever-changing ecosystem

Tule Springs Fossil Beds National Monument preserves thousands of Pleistocene (Ice Age) fossils that help tell the story of a dynamic environment. These fossils were preserved within expanding and contracting wetlands between 100,000-12,500 years ago. Many of the Pleistocene animals of Tule Springs are still alive today, including the coyote (Canis latrans), jackrabbit (Lepus sp.), and aquatic snails. Some animals went extinct, disappearing from North America entirely.

The Monument also protects Mojave Desert habitat from urban development. This wildlife and plant corridor is home to a diverse group of native plants and animals. Flash floods are also common seasonally in the upper Las Vegas Wash. Important cultural resources, such as historic objects, cultural sites, and artifacts are also protected within the Monument.

Tule Springs Fossil Beds National Monument is in the early phases of park planning, so we do not have facilities on site. Further information can be found at NPS.gov/TUSK

National Parks in the History of Science: Radiocarbon Dating

Video Notes

Instructions: Complete this note taker on the history of radiocarbon dating at Tule Springs Fossil Beds National Monument while you watch the video at https://www.nps.gov/articles/000/radiocarbondating.htm.

1. At several times in the past, Tule Springs had a lot of _____.
2. That water and associated _____ _____ supported a diverse community of _____.
3. The sediments that are found at Tule Springs are from the _____, which is commonly known as the last Ice Age.
4. List at least three animals that once lived in Tule Springs
    a.
    b.
    c.
5. The Tule Springs Expedition was an effort to determine if Ice Age mammals and _____ coexisted.

6. A multidisciplinary team was put together, consisting of _____, _____, and _____.

7. Trenches that were hundreds of meters long and 35 to 40 feet deep were used to expose _____ _____ layers of rock.

8. The Tule Springs Expedition was later nicknamed _____ _____ _____.

9. What did archaeologists find at Tule Springs in the 1930s?
    a.
    b.

10. In the 1950s, after the development of the atomic bomb, a powerful new tool was created: _____ _____.

11. The radioactive form of _____ is taken up by all living things on Earth.

12. When an animal or plant dies, that uptake of Carbon-14 ceases, and you can measure the _____ of that in this plant or animal.

13. Carbon dating can be used to date:
    a.
    b.
    c.

14. The Tule Springs expedition was unique in that it was the first place in North America where _____ _____ was performed in a field setting.

15. Was there evidence that Ice Age mammals and ancient people interacted at Tule Springs?

Climate Change and Bird Range

Virtual Investigation Activity

Introduction: Two times a year, Tule Springs Fossil Beds National Monument takes part in the Climate Watch bird survey, a community science project started by the National Audubon Society. At our park, we search for the Mountain Bluebird (*Sialia currucoides*) which has Winter and Summer ranges around the Las Vegas Valley. Watch the video at this link (https://vimeo.com/268020183) for additional information on the Climate Watch bird survey.

Instructions:

- Go to this link (https://www.audubon.org/climate/survivalbydegrees/visualizer-1; Audubon Birds and Climate Visualizer). Input 89124 for the Zip Code, where Tule Springs Fossil Beds National Monument is located (you do not need to include State or Email Address). Click search.
- You should see the heading ***Vulnerable Birds in Clark County*****.** Below this, set the *Warming Scenario* to "+1.5℃" and *Season* to "Summer".
    1. If the temperature was to rise +1.5℃, how many birds in Clark County would be:
        - High Vulnerability _____
        - Moderate Vulnerability? _____
        - Low Vulnerability? _____
        - Are Stable Species? _____
    2. Click +2℃ and +3℃. Record your observations about what is happening to the number of birds in each category as temperature increases.

- Scroll down to the heading **How Will the Mountain Bluebird's Range Be Affected in Clark County?** Below this, set the *Warming Scenario* to "Current" and *Season* to "Summer".

3. Click through the +1.5℃, +2℃, and +3℃ buttons. What do you observe happening to the Mountain Bluebird range as temperatures increase?

4. Zoom out on the map. Where do you see the Mountain Bluebird gaining range? Identify the State.

- Scroll down to the heading **Climate Threats Facing Birds and People in Clark County.** Below this, set the Warming Scenario to "+3℃".

5. Scroll over the map and list the climate threats to birds and people around Las Vegas.

- Go back to the Audubon Birds and Climate Visualizer. Input YOUR Zip Code.

6. Write a paragraph comparing and contrasting the vulnerable bird populations and climate threats to Tule Springs Fossil Beds National Monument and where you live.

7. List some possible solutions to address these climate threats. Discuss with your class.

Ice Age Mammals of Tule Springs

Research Project

Introduction: Go to this link (https://www.nps.gov/articles/park-paleo-spring-2019-tulesprings.htm) to read more about Tule Springs Fossil Beds National Monument.

Instructions:

1. Select one of the following Pleistocene mammals.
    - Columbian Mammoth (*Mammuthus columbi*)
    - Dire Wolf (*Canis dirus*)
    - American Lion (*Panthera atrox*)
    - Saber-tooth Cat (*Smilodon fatalis*)
    - Camelops (*Camelops hesternus*)
    - Long-Horned Bison (*Bison latifrons*)
    - Jefferson's Ground Sloth (*Megalonyx jeffersonii*)
    - Large Stout-Legged Horse (*Equus scotti*)

2. Using reliable sources (be sure to create a citation for your sources), research your selected animal to answer the following questions:
    - What was the species' habitat distribution?
    - What was the species' diet?
    - What was the species' behavior?
    - What is a modern relative (a related species that is still alive today) of your species?
        i. Briefly describe key facts about the modern relative
        ii. Compare similarities and differences in appearance, distribution, diet, and behavior
    - Other Interesting Facts

3. Create a poster OR slideshow presentation on your selected species. This should include:
    - The name of your species
    - An image of your species
    - A summary of the habitat, diet, behavior, and modern relative information from your research
    - References (Ask your teacher if they have a preferred citation format)

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Past vs. Present

Instructions:

- Read *The Geology and Paleontology of Tule Springs Fossil Beds National Monument, Nevada*. While you read, answer the following questions:

1. Describe the climate of Tule Springs during the Pleistocene (be sure to discuss water).

2. List at least 4 different species that lived in Tule Springs during the Pleistocene.

3. How long did megadroughts typically last for during the Ice Age?

4. What is one potential explanation for the extinction of the mammals of Tule Springs at the end of the Pleistocene?

- Research Tule Springs Fossil Beds National Monument and the Las Vegas Valley today.

7. What is the climate like in/around Tule Springs today?

8. List at least 4 different species that live in Tule Springs today.

- Read the article *Las Vegas Holds Key to Abrupt Climate Change* (https://www.usgs.gov/news/las-vegas-holds-key-abrupt-climate-change)

7. If Tule Springs Fossil Beds were to experience a megadrought today, hypothesize what might happen to the species that live there.

- As a class, discuss your predictions as to what might happen during a megadrought.

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Biodiversity Hunt-Field Experience

Introduction: Go to this link (https://www.nps.gov/articles/park-paleo-spring-2019-tulesprings.htm) to read more about Tule Springs Fossil Beds National Monument.

Required Materials: Cell Phone/Camera

Instructions:

1. On your Field Experience at Tule Springs Fossil Beds National Monument today, be sure to have your phone/camera ready. Try to take pictures of:
    - At least 3 DIFFERENT plant species
    - At least 3 DIFFERENT arthropods (insects, spiders, scorpions, etc.)
    - At least 3 DIFFERENT mammals, reptiles, or birds
        i. While taking your pictures, try to use something to show the scale/size of the species (such as a coin or pen).
2. Create a slideshow presentation of the species you saw today
    - Compare your presentation with your classmates; how many DIFFERENT species did your class see? _____
3. As a class, discuss:
    - The importance of *biodiversity* in an ecosystem
    - Anything that stood out to you about the species you observed

4. (Optional) Use the internet, reference books, or other sources to find the common and scientific names of the species you found at Tule Springs. Add these names to your slideshow.

References

National Audubon Society. *Birds and climate visualizer*. https://www.audubon.org/climate/survivalbydegrees/visualizer-1

National Park Service (2021). *National parks in the history of science: Radiocarbon dating*. https://www.nps.gov/articles/000/radiocarbondating.htm

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