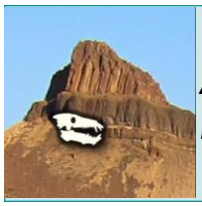

Anthony Barnosky and Kaitlin Maguire Measure Mammal Extinctions at the John Day Fossil Beds

hhmi | BioInteractive

Scientists at Work
Student Worksheet

OVERVIEW

This worksheet complements the short video "Anthony Barnosky and Kaitlin Maguire Measure Mammal Extinctions at the John Day Fossil Beds" from the *Scientists at Work* series.

PROCEDURE

1. Prior to watching the film, read the questions below that accompany the video.
2. Watch the film.
3. If working with a partner or in a small group, discuss and answer the questions below. If working alone, think about and answer the questions below.

QUESTIONS

1. Describe what Drs. Barnosky and Maguire are attempting to measure in the John Day Fossil Beds.

2. Explain why it is important to understand the normal rate of extinction over millions of years of Earth history.

3. The film mentioned that the researchers had a special permit to work in the John Day Fossil Beds National Monument. Provide two reasons why this is an important science practice.

4. Dr. Maguire collected rocks near where the specimen was found. Why was this an important step in the research process?

5. Provide two reasons why teeth are an important part of a mammal specimen to analyze.

6. Technology has changed the way researchers communicate and collaborate. Describe how Dr. Barnosky's team communicated and shared data with other scientists.

7. Biological research involves collaboration across disciplines. How does this film illustrate the collaborative nature of science?

8. The narrator states in the film, "Species are going extinct way too quickly." Then Dr. Barnosky states, "In as little as three centuries, you would lose three out of four species you are familiar with." Describe three conservation biology strategies that might be used to slow down this rate of extinction.

9. If you were doing the research in the film, what is another scientific question you would like to try to answer?

10. Working with data:
    Extinction rates are expressed in units of extinctions per million species-years (E/MSY). For a given analysis, species-years can be calculated by multiplying the number of species in the study by the number of years being considered. For example:

    20 bird species × 100,000 years = 2,000,000 species-years

    similarly,

    2,000 bird species × 1,000 years = 2,000,000 species-years

    a. Considering that about 5,500 mammalian species live on Earth today, how many species-years are represented by the last 100 years?

    b. The normal rate of extinction for mammals is 1.8 E/MSY. How many extinction events would you expect to have occurred over the last 100 years (i.e., for the MSY calculated in 10a)?

    c. According to the International Union for Conservation of Nature (IUCN), 43 mammals have become extinct in the past 100 years. How does that number compare to the expected number calculated in 10b?

    d. In November of 2014, the IUCN listed 1,199 mammals as threatened. If all those mammals went extinct in the next 100 years, what would be the extinction rate in E/MSY and how does that number compare to the expected rate? (Hint: Assume 5,500 species for the total number of mammals.)