



Liz Hadly Tracks the Impact of Climate Change in Yellowstone

OVERVIEW

This worksheet complements the short video “[Liz Hadly Tracks the Impact of Climate Change in Yellowstone](#)” from the *Scientists at Work* series.

PROCEDURE

1. Prior to watching the film, read the questions below and think about how you might answer them.
2. Watch the film.
3. Discuss the questions with a partner or in a small group, or think about them on your own, and then write down the answers.

QUESTIONS

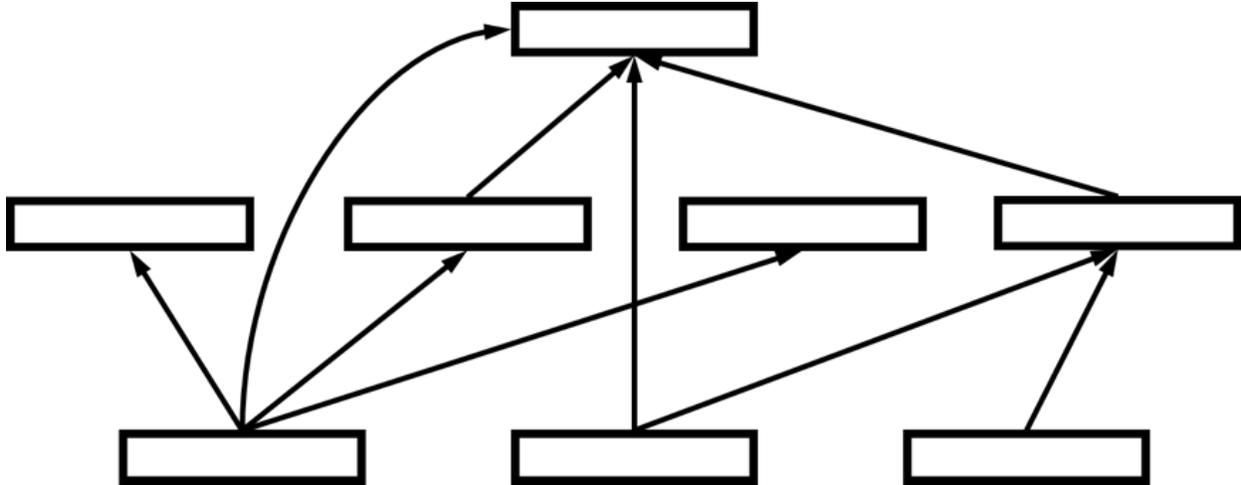
1. Explain what is happening to the whitebark pine in Yellowstone National Park as a result of climate change.

2. Researchers often study ecosystems for a long period of time. Dr. Hadly has studied Yellowstone’s ecology for 30 years and the amphibians for 20 years. What is the value of long-term studies to advancing scientific understanding?

3. Food webs are models that biologists use to illustrate the interconnected feeding relationships among organisms in a community.
 - a. Why are whitebark pine seeds important to bear hibernation?

 - b. The whitebark pine trees are key producers in the Yellowstone ecosystem. Predict what would happen to the bear population if half of the whitebark pine tree population were lost. Explain your prediction.

- c. Use the following list of organisms from Yellowstone National Park to fill in the simple food web below: whitebark pine, mountain pine beetles, bears, elk, grasses, sedges, Clark’s nutcrackers, and squirrels. Remember, food web arrows point in the direction of energy flow. You may need to research what animals eat to complete the food web.



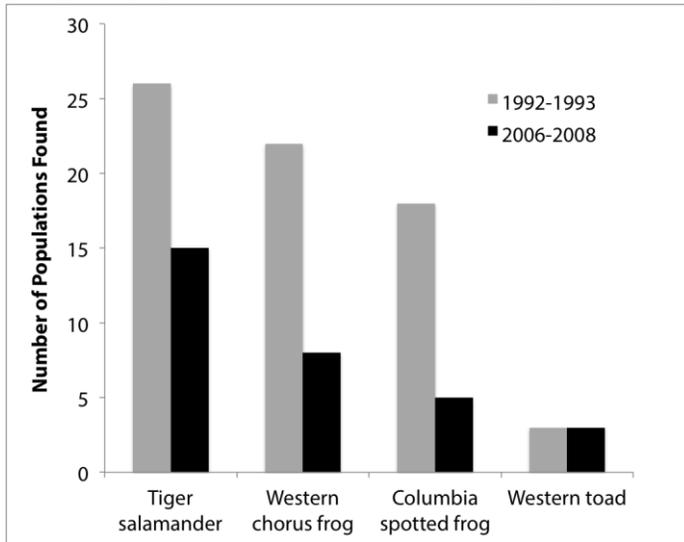
- d. Food webs illustrate the flow of energy in an ecosystem. Using the food web you have sketched, describe in detail the impact of climate change on the flow of energy in the Yellowstone ecosystem.

4. Working with the data:

- a. Based on Dr. Hadly’s research, of 46 active ponds surveyed in 1992-1993, 43 supported amphibian life. What percentage of the surveyed ponds had amphibians?

- b. From 2006 to 2008, only 38 of the 46 ponds contained water and only 21 of 31 ponds the researchers had access to contained amphibians. What percentage of the surveyed ponds had amphibians during that time range?

c. Using the graph below, answer the following questions:



Data from: McMenamain, S. K., Hadly, E. A., & Wright, C. K. (2008). Climatic change and wetland desiccation cause amphibian decline in Yellowstone National Park. *Proceedings of the National Academy of Sciences*, 105(44), 16988–16993.

- i. Explain, in your own words, what the graph represents.
- ii. What is the overall trend in the data from 1992-1993 to 2006-2008?
- iii. Which population does not align to the overall trend? Suggest a reason why this population might not have followed the trend.

5. Justify how climate change has impacted the frog and salamander habitats and thus the populations of these organisms.
6. Biological research involves collaboration across disciplines. How does this film illustrate the collaborative nature of science?
7. If you were doing the research in the film, what is another scientific question you would like to try to answer?