



Live Elk Cam: Thinking Like an Elk Biologist

Summary: Students do scientific inquiry using the Game Commission's Live Elk Cam to develop a deep understanding of the work of scientists, specifically an elk biologist. Students learn about the scientific method and practice it by completing steps 1-3 in the scientific method: make and record observations, ask a question based on their observation, and develop a hypothesis. **Note: The Game Commission live elk cam streams from Labor Day to Columbus Day, and this lesson plan coordinates with those dates.**

Subjects: Environment and Ecology

Standards: 4.1.5.F, 4.1.6.F;4.1.7.F; 4.1.8.F; 4.1.10.F; 4.1.12.F

Suggested Grades: 5-12

Duration: 15-30 minutes over several days for five weeks

Objectives: Students will be able to:

- Describe the scientific method
- Make and record scientific observations
- Develop a hypothesis based off of their observations
- Recognize that data is facts, statistics, or items of information that can be used to understand or solve problems
- Understand that scientific investigations may result in new ideas for study, new methods or procedures for an investigation, or new technologies to improve data collection.
- Know that both direct and indirect observations are used by scientists to study the natural world and universe.
- Interpret results of experimental research to predict new information, propose additional investigable questions, or advance a solution.

Method: Direct and indirect observation and data collection

Materials:

- Access to the Pennsylvania Game Commission's [Live Elk Cam](#)
- [Elk Wildlife Note](#)
- Data Sheet (included)

Background:

About the PGC: The Pennsylvania Game Commission formed in 1895 during a time period when wildlife was dwindling as a result of unregulated hunting and habitat destruction. The Game Commission was established to

protect the remaining wildlife and replenish some of the species that were extirpated or had very low numbers. The mission of the Pennsylvania Game Commission is to manage Pennsylvania's wild birds, wild mammals, and their habitats for current and future generations. The Commission accomplishes their mission through wildlife protection, monitoring wildlife populations, establishing laws and regulations, setting seasons and bag limits, establishing and maintaining habitat, and informing and educating the public. The PGC is mostly funded by hunters and trappers and does not receive state General fund appropriations. The Pennsylvania Game Commission owns and manages over 1.6 million acres of land called State Game Lands (SGL). These lands are purchased primarily to ensure wildlife has access to suitable habitat and the public has access to hunting and trapping areas. These lands are also used by secondary users for hiking, wildlife watching, and other recreational activities.



About the Live Elk Cam: The Pennsylvania Game Commission, HDOnTap, and the North Central Regional Planning and Development Commission teamed up to live stream a portion of the Pennsylvania Elk Range during the elk breeding season (the rut). Thousands of visitors travel to Winslow Hill in Benezette, Pennsylvania to view elk behavior during their breeding season. Male elk (bulls) bugle to attract cows and warn off other bulls. The bulls may spar with each other in an effort to win breeding rights to a harem (a group of elk consisting of cows, calves, and one mature male, during the rut). In an effort to allow visitors the chance to view this spectacular behavior from home, the Game Commission placed the live elk cam in a grassy meadow that elk frequent. The State Game Land 311 Land Manager along with the Habitat Maintenance Crew maintains the meadow. The camera has audio and infrared light to allow viewers to hear any sounds elk make and to see in the twilight hours when elk are most active. This live elk cam allows humans to observe elk in their natural habitat undetected. The Live elk cam streams from Labor Day to Columbus Day and has been streaming since 2014.

Thinking like a scientist and the scientific method:

A scientific investigation is the way scientists use a

systematic approach to answer questions about the natural world around us. Scientific investigations usually begins with an observation. Observations can be direct (i.e. The researcher is the observer) or indirect (i.e. the researcher relies on an observation reported by another researcher). The systematic approach that scientists use to conduct their scientific investigation is called the *scientific method*. The scientific method is a logical approach to problem solving. The scientific method consists of a sequence of steps for systematically analyzing scientific problems in a way that leads to verifiable results. The Scientific method is used in all sciences. An elk biologist, seeing elk feeding in grassy meadows more frequently in the twilight hours than daylight hours, may set out to find out why elk prefer the twilight hours to graze and not daylight hours. The elk biologist would use the scientific method to find the answer to their question. The Scientific Method has six steps:

- 1) **Make an observation** (elk feed in twilight hours more than day light hours in this area)
- 2) **Ask a question** that can be answered in a measurable way. Using what, how, or why is a good way to start the question (why do elk feed more frequently in twilight hours than day light hours in this area?)
- 3) **Form a hypothesis**—a proposed explanation for the observed phenomenon made during or after the initial data collection; A hypothesis must be testable and falsifiable in order to be valid. (Elk prefer to feed during the coolest parts of the day)
- 4) **Make a prediction** based on the hypothesis (Elk will feed during the daylight hours if it is cool)
- 5) **Test the prediction** (record the temperature and feeding behavior of elk over a period of time)
- 6) **Accept, abandon, or alter your hypothesis**—often results from the test may lead to additional investigative questions.

A *Theory* is “a scientific idea supported by an abundance of evidence that has passed many tests and failed none. “Scientist have more confidence in the correctness of a theory than they do of a hypothesis...Some theories may eventually be disproven and replaced by better ones... A scientific law is a concise statement that completely describes a specific relationship or phenomenon. These statements apply without exception for a given range of conditions. An example is Newton’s law of gravitation. Note that scientific laws do not in themselves, explain a phenomenon, and in regard differ from theories.”- Marshak, S., Earth Portrait of a Planet, 4th Edition.

Procedure:

- 1) Ask students what they think a scientist is.
- 2) Ask students how they can think like a scientist.
- 3) Explain the scientific method, theory, and scientific law (see background)

- 4) Tell students that starting today they are going to start thinking like a scientist, specifically an elk biologist, by making observations of elk in their natural habitat via the Game Commission’s live elk cam. Explain that observations are collected using one or more of your senses to gather information. Scientists can also use instruments , cameras, or in the case of an elk biologist studying elk movements; they can use tracking collars. Stress to the students that observations need to be accurate and factual; therefore, it is important to keep detailed records of their observations.
- 5) Explain the difference between direct and indirect observations (see background)
- 6) Handout the Game Commission’s Elk Wildlife Note to each student and have students take turns reading it aloud to the class to familiarize themselves with elk and elk behavior.
- 7) Handout the observation and data collection sheet
- 8) Over the next five weeks, have students watch the live elk cam and record their observations on their data-collecting sheet. They can record information such as the number of bugles they hear, how many elk are present, how the elk are behaving: are they eating? resting? herding?, and any other information that they observe. Again, explain the importance of only recording actual information.
- 9) After watching the live elk cam for the final time, have students review their observations and then generate a question from their observations (something to investigate further).
- 10) Have students develop a hypothesis (a potential answer to their question, one that can somehow be tested) and write it down .
- 11) Have the class take turns sharing their observations and hypothesizes
- 12) Have a class discussion on “Thinking like an Elk Biologist”.

Extensions:

- Choose one student's hypothesis and as a class, discuss a prediction to the hypothesis and the best way to test that prediction. If possible, test the prediction.
- Repeat a similar exercise by watching the Game Commission Live Bald Eagle Cam that usually runs from the end of December until at least June.

Resources: Kahn Academy, Scientific Method: [https://www.khanacademy.org/science/biology/intro-to-biology/science-of-biology/a/the-science-of-biology/](https://www.khanacademy.org/science/biology/intro-to-biology/science-of-biology/a/the-science-of-biology); Marshak, S., Earth Portrait of a Planet, 4th Edition.; Pennsylvania Game Commission, Elk, www.pgc.pa.gov.

