



## Analyzing Science Practices and Concepts in Wild Hope

### INTRODUCTION

You will watch an episode from the film series *Wild Hope*, which highlights people working to protect a species or ecosystem. You will also observe science practices and concepts in the film that are important for learning about and practicing biology.

### PROCEDURE

Answer the following questions based on the episode. You can complete the questions in any order and return to previous questions as you learn new information.

1. Define the problem that the people in the episode are trying to solve.
2. Describe the questions that they are attempting to answer to help figure out solutions.
3. Who are the key players (people or groups) in the episode?
4. Review the “Core Competencies and Disciplinary Practices” list at the end of this handout. In the following table, record the ones that you observed in the episode and provide supporting evidence for your choices. (Not all of them will necessarily be in the episode, so you don’t need to fill in all the rows.)

Core Competency/Disciplinary Practice	Evidence

5. Review the “Core Concepts” list at the end of this handout. In the following table, record the ones that you observed in the episode and provide supporting evidence for your choices. (Not all of them will necessarily be in the episode, so you don’t need to fill in all the rows.)

Core Concept	Evidence

6. What progress has been made in solving the problem you identified in Question 1?
7. What other questions do you have about the episode?

**CORE COMPETENCIES AND DISCIPLINARY PRACTICES**

Important skills for practicing biology and addressing biology-related issues.

**1. Apply the Process of Science**

Biology is evidence-based and grounded in the formal practices of observation, experimentation, and hypothesis testing. People construct new knowledge by formulating hypotheses and then testing them against experimental and observational data about the living world. Skills in biology include posing problems, generating hypotheses, designing experiments, observing nature, testing hypotheses, interpreting and evaluating data, and determining how to follow up on the findings.

**2. Use Quantitative Reasoning**

Biology relies on applications of quantitative analysis and mathematical reasoning. People often apply quantitative skills to biological problems and use quantitative data from a variety of sources. Some approaches include statistics, quantitative analysis of dynamic systems, and mathematical modeling.

**3. Use Modeling and Simulation**

Biology focuses on the study of complex systems. Mathematical and computational tools, such as modeling and simulations, can be used to study the dynamics of biological systems — whether at the molecular, cellular, organismal, or ecosystem level. These tools can simulate many interacting components and illustrate emergent properties that allow people to generate and test their own ideas about complexity in biology.

**4. Tap into the Interdisciplinary Nature of Science**

Biology is an interdisciplinary science. Integration among subfields in biology, as well as integration between biology and other disciplines, has advanced our fundamental understanding of living systems and raised new questions. Interpreting biological phenomena often requires applying concepts and knowledge from both within and outside of biology. People may develop expertise or fluency in multiple disciplines or work with multidisciplinary teams.

**5. Communicate and Collaborate with Other Disciplines**

Biology is a collaborative scientific discipline. It increasingly involves teams who contribute diverse skills to tackling large and complex biological problems. Team members need to effectively communicate their ideas, participate in inclusive and diverse working communities, and take full advantage of their collaborators' multiple perspectives and skills.

**6. Understand the Relationship between Science and Society**

Biology is conducted in a societal context. Science in general can address critical issues affecting human society, including pressing global problems. It is important to explore the impacts of scientific discoveries on society, the ethical implications of research, and the effect of science and technology on human beings.

**CORE CONCEPTS**

Overarching principles and major themes in modern biology.

**1. Evolution**

The diversity of life evolved over time by processes of mutation, selection, and genetic change. Darwin's theory of evolution by natural selection transformed scientists' understanding of the patterns, processes, and relationships that characterize the diversity of life. Inheritance, change, and adaptation are recurring themes supported by evidence from a variety of biological fields.

**2. Structure and Function**

Basic units of structure define the function of all living things. Structural complexity, together with the information it provides, is built upon combinations of subunits that drive increasingly diverse and dynamic physiological responses in living organisms. Fundamental structural units and molecular and cellular processes are conserved through evolution and yield the extraordinary diversity of biological systems seen today — from the molecular to the ecosystem level of organization.

**3. Information Flow, Exchange, and Storage**

The growth and behavior of organisms are activated through the expression of genetic information in context. Many systems — including those in genetics, physiology, cell biology, ecology, animal behavior, and biogeochemical cycling — may be understood in terms of the storage, transmission, and utilization of biological information. All levels of biological organization depend on specific interactions and information transfer/exchange.

**4. Pathways and Transformations of Energy and Matter**

Biological systems grow and change by processes based upon chemical transformation pathways and are governed by the laws of thermodynamics. Thermodynamics governs the dynamic functions of living systems from the molecular level to that of cells, organisms, and ecosystems. Kinetics and the energy requirements of maintaining a dynamic steady state affect how living systems operate, how they maintain orderly structure and function, and how the laws of physics and chemistry underlie many biological processes.

**5. Systems**

Living systems are interconnected and interacting. To understand complex biological processes, it may be helpful to elucidate the interactions among components of the system at multiple functional scales. The dynamic interactions of components at one level of biological organization are often related to functional properties that emerge at higher organizational levels.