

Analyzing Challenges of Endangered Species

Companion Lesson to X-STEM All Access Episode “[Deep Sea Science](#)”

Grade/ Grade Band 9-12	Topic: Environmental Studies Endangered Species	
Brief Lesson Description: Chris Fischer is the Expedition Leader and Founding Chairperson of OCEARCH, an organization dedicated to researching giants of the ocean. In this lesson students will raise awareness about protecting animals in our oceans.		
Performance Expectation(s): HS-ETS1-1. Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.		
Specific Learning Outcomes: Students will be able to collect and select relevant information. Students will be able to plan an informative campaign. Students will be able to develop data reports and infographics.		
Narrative / Background Information		
Prior Student Knowledge: Students should know how to identify relevant information and to distinguish between relevant and irrelevant information.		
Science & Engineering Practices: Asking Questions and Defining Problems Asking questions and defining problems in 9–12 builds on K–8 experiences and progresses to formulating, refining, and evaluating empirically testable questions and design problems using models and simulations. <ul style="list-style-type: none"> Analyze complex real-world problems by specifying criteria and constraints for successful solutions. (ETS1) 	Disciplinary Core Ideas: ETS1.A: Defining and Delimiting Engineering Problems <ul style="list-style-type: none"> Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them. Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities. (EST1) 	Crosscutting Concepts: Connections to Engineering, Technology, and Applications of Science Influence of Science, Engineering, and Technology on Society and the Natural World New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology. (EST1)
Possible Preconceptions/Misconceptions: Students may believe their voice will not be listened to/heard. This lesson is designed to show students how to use facts to persuade others.		
LESSON PLAN – 5-E Model		
ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions: Begin today’s lesson by viewing Deep Sea Science with Chris Fischer . Let students know they are going to record notes in real-time using back channeling tools like: Google Classroom’s <i>stream</i> feature (allows students to chat) or Padlet where students create digital post-it notes (for device-free classroom use Post-It Notes). Provide the following guiding question: What are the different STEM job opportunities at OCEARCH? Encourage students to post notes on careers that are surprising or aligned with their favorite subject or very interesting to them. Students can respond to a classmate’s posted comment with constructive dialogue.		

EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions:

Before the lesson, be sure student laptops can access the [OCEARCH](#) tracker, the [WWF](#) list of endangered species, and [NOAA Fisheries](#) site about the Endangered Species Act.

Begin the lesson by asking students what they know about endangered species in a brainstorm (ans.: a species in danger of extinction throughout all or a significant portion of its range because of threats e.g., loss and degradation of habitat, over exploitation (hunting, overfishing), invasive species, introduction of a new pathogen or pest, climate change, and pollution (nitrogen, plastics)).

Provide students with the list of endangered species from the [WWF](#) website and ask them to identify some of the reasons these animals are in danger of extinction (ans.: overfishing, pollution of habitat).

Then have students visit the [OCEARCH](#) tracker and filter for any of the endangered animals that live in our oceans (Hammerhead, White Shark, Whale Shark, Loggerhead Sea Turtle, Swordfish and Green Sea Turtle) and record location.

EXPLAIN: Concepts Explained and Vocabulary Defined:

Students read about Endangered Species Conservation on NOAA Fisheries creating notes about:

- how to protect endangered or threatened species
- what does it mean to recover an endangered or threatened species
- what is NOAA doing to recover endangered and threatened species
- the Endangered Species Act
- how you can help prevent species from going extinct

Have students share their notes aloud and discuss examples of activities they engaged in to help prevent species from going extinct or aided in the recovery.

Vocabulary:

Endangered Species- a species in danger of extinction throughout all or a significant portion of its range

ELABORATE: Applications and Extensions:

Prior to starting the elaboration section of this lesson, you will need to gather the following materials (per student): laptops

After discussing endangered species conservation, students return to the [OCEARCH](#) tracker and select one of the animals from earlier in the lesson and create a campaign to save the species from extinction. The report/infographic should persuade people to take action and include information students gathered about the animal on the [WWF](#) site, the habits from the OCEARCH tracker and the strategies from [NOAA Fisheries](#). The campaign will be assessed on strategy employed, persuasiveness, and creativity.

EVALUATE:

Formative Monitoring (Questioning / Discussion): Questions found in the lesson: how to protect endangered and threatened species, the Endangered Species Acts, and how you can help prevent species from going extinct or aid in the recovery.

Summative Assessment (Quiz / Project / Report): Students create a persuasive advertisement to help select sea animal from extinction.

Elaborate Further / Reflect: Enrichment: Students create an Instagram post or story using Canva (graphic design program) regarding their sea animal tagging 3 relevant organizations and 3 pertinent hashtags.

SOCIAL EMOTIONAL LEARNING ACTIVITY**CASEL Competency: Relationship Skills**

Establishing and maintaining healthy, supportive relationships requires effective communication. In the video Deep Sea Science, Chri Fischer discusses how communication can be an important part of any STEM career. While in today's lesson students practice effectively communicating using words and visuals, this activity provides an opportunity to practice nonverbal communication.

In this activity: We Have to Move Now! Students are asked to act out an emotion/mood as they read aloud the statement "We all need to gather our possessions and move to another building as soon as possible"

Instructions:

1. Cut several strips of paper.
2. On each strip of paper, write down a mood or a disposition like guilty, happy, suspicious, paranoid, excited, acceptance, peaceful, pride, joy, love, sadness, horror, optimism, passion, insulted, or insecure.
3. Fold the strips of paper and put them into a bowl. They will be used as prompts.
4. Write the following sentence on the board: "We all need to gather our possessions and move to another building as soon as possible"
5. Have each student take a prompt from the bowl and read aloud the sentence: "We all need to gather our possessions and move to

- another building as soon as possible" expressing the mood/emotion they've selected.
- After each student has read their sentence, the other students should guess the emotion of the reader. Each student should write down assumptions they made about each "speaking" student as they read their prompts.

INTERDISCIPLINARY CONNECTIONS/IDEAS

ELA: Students are creating a persuasive report/advertisement using a wide variety of technical resources. **RST.11-12.7** Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.

Materials Required for This Lesson/Activity

Quantity	Description
Per student	Laptops



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