

Evidence of Species over Time

Companion Lesson to X-STEM All Access Episode “[Wild About Animals](#)”

Grade/ Grade Band: Middle - High School		Topic: Evidence of Species over Time
<p>Brief Lesson Description: In this lesson, students will consider the definition of the word species and look at evidence to determine if a species is new. They will analyze citizen science data from i-naturalists and then complete a jigsaw literacy activity that describes what evidence helps determine if a species is new. They will then use this knowledge to evaluate the evidence supporting the identification of new species from the Natural History Museum of London and show their knowledge through a claim-evidence-reasoning prompt.</p>		
<p>Performance Expectation: HS-LS4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.</p>		
<p>Specific Learning Outcomes: Students will be able to:</p> <ul style="list-style-type: none"> -Explain what a species is and how it is different from another species -Explore species data from citizen scientists in their own area -Describe a variety of evidence that can be used to track and determine new species -Support a claim about what type of evidence they think best to use to determine if an organism is a new species. 		
<p>Narrative / Background Information</p>		
<p>Prior Student Knowledge: Students should be familiar with species and how they are classified. They should also have previous experience with what constitutes scientific evidence.</p>		
<p>Science & Engineering Practices: <u>Engaging in Argument from Evidence</u></p> <p>Engaging in argument from evidence in 9–12 builds on K–8 experiences and progresses to using appropriate and sufficient evidence and scientific reasoning to defend and critique claims and explanations about the natural and designed world(s). Arguments may also come from current scientific or historical episodes in science.</p> <ul style="list-style-type: none"> ● Evaluate the evidence behind currently accepted explanations or solutions to determine the merits of arguments. (HS-LS4-5) 	<p>Disciplinary Core Ideas: <u>LS4.C: Adaptation</u></p> <ul style="list-style-type: none"> ● Changes in the physical environment, whether naturally occurring or human induced, have thus contributed to the expansion of some species, the emergence of new distinct species as populations diverge under different conditions, and the decline—and sometimes the extinction—of some species. (HS-LS4-5) ● Species become extinct because they can no longer survive and reproduce in their altered environment. If members cannot adjust to change that is too fast or drastic, the opportunity for the species’ evolution is lost. (HS-LS4-5) 	<p>Crosscutting Concepts: <u>Cause and Effect</u></p> <ul style="list-style-type: none"> ● Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. (HS-LS4-5)
<p>Possible Preconceptions/Misconceptions: Students may have the following misconceptions about scientific evidence:</p> <ul style="list-style-type: none"> -All scientific evidence is equally as useful to supporting claims -Numeric or quantitative data is more useful than other types of data -New evidence or breakthroughs instantly are the “best” evidence available 		

LESSON PLAN – 5-E Model

ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions:

Scientists are marking claims that “climate change is resulting in some new species emerging while others are going extinct.” Today we will explore this claim.

Before starting, ask student to think about and then discuss the following 3 questions:

- 1) *What is a species?*
- 2) *What makes one species different from another species?*
- 3) *How do you think new species are discovered?*

Review the first two questions answers

Species:

Next, explain that we are going to see a tropical biologist named Phil Torres and he is going to explain how he is looking for new species in the wild. Then show the video “[Wild About Animals with Discovery Channel Host Phil Torres](#)”.

After watching the video, ask students to *Explain how Phil Torres is working to discover new species.*

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

Species can be found in numerous ways, but as Phil explained in the video, the funding for these studies is decreasing. This means that species may never be discovered because of limited funding. The i-naturalist citizen science program allows regular citizens the opportunities to document the species found in their community.

Today, your task will be to go to the website inaturalist.org and complete the following tasks:

1. *Explore the organisms you find when searching for “spiders” on the site. Based on your observations, are there any potential new species on the site? What evidence did you use to make this claim?*
2. *Compare the results of two organisms. One should be flagged “research quality” and one should not have this flag. Based on your observations, what do you think this flag means? What evidence did you use to make this claim?*
3. *Explore the organisms in your local area by searching with a zip code, city or state name. Based on your observations, are there any potential new species near your location? What evidence did you use to make this claim?*

As a class, discuss students' findings at the end of their exploration time. Highlight different evidence that students used to make their claims.

EXPLAIN: Concepts Explained and Vocabulary Defined:

Scientists are using a variety of methods to track species types over time. Students will complete a jigsaw activity to determine various methods used to collect evidence about species.

Break students into 4 expert groups. Assign each group one of the following four articles:

[Article 1: Digital Records of preserved plants and animals change how scientists explore the world](#)

[Article 2: Scientists pull animal DNA out of thin air](#)

[Article 3: How to discover a new species of fish](#)

[Article 4: Itching to discover a new species? Follow this map](#)

As students read their article, they should collect the following information to share with others:

- a. *What type of evidence is used in this article?*
- b. *How is the evidence used to track the type of species?*
- c. *What pros/cons are there in using this type of evidence to track species over time?*

Have students meet with other students in their expert group who read the same article to compare their answers. If there are disagreements, they should discuss and come to a consensus about what they will share with people who read other articles.

Group students into sharing groups—there should be one (or more) members in each group that read each of the articles above.

Have students share their findings with the other students.

After all students have shared, have them discuss which methods are most beneficial to tracking species data. Then discuss it as a whole class. There is not one right answer, but students should be asked to support their ideas with evidence from the text.

ELABORATE: Applications and Extensions:

Now students will each explore a recently discovered new species from the [Natural History Museum](#) in London. (There are enough that each student can have a unique species)

Once again, as they read the text, they will collect the following information to share with others:

- a. *What type of evidence is used in this article?*
- b. *How is the evidence used to track the type of species?*
- c. *What pros/cons are there in using this type of evidence to track species over time?*

When it is time to share data, students should use the [Whip Around Strategy](#) to share their learning with their peers. As they are sharing, students should keep information about types of evidence used to find new species.

After all students have shared, have them discuss which methods are most beneficial to tracking species data. Then discuss it as a whole class. There is not one right answer, but students should be asked to support their ideas with evidence from the text.

EVALUATE:

Formative Monitoring (Questioning / Discussion):

Formative questions throughout this lesson are found in *italics*.

Summative Assessment (Exit Ticket): Have students respond individually to the following prompt:

What form of evidence best helps track species over time? Support your claim with examples and facts from text and use clear reasoning to justify why this evidence supports your claim.

Use the [NSTA CER Rubric](#) to assess student work.

Elaborate Further / Reflect: Enrichment:

Become a citizen scientist and help collect data on wildlife species. Visit <https://www.citizen science.gov> and search for programs that are asking citizens to collect data in their communities. You can search the program catalog by field of science, government organization collecting the data, or current project status.

SOCIAL EMOTIONAL LEARNING ACTIVITY

CASEL Competency: Self-Management

Phil Torres discussed in the video how his passions as a child exploring nature turned into his career. What kind of careers would match your passions? We will take an interest- inventory to see what types of jobs match the things you enjoy doing.

Visit the [ONet Interest Profiler](#) and take the online assessment. For each activity, you will select how much you like the activity from Strongly dislike to Strongly like. After completing the inventory, you will find out your scores in six areas. The areas with the highest scores are the ones that might be a good job fit for you.

Explore these jobs and share three (3) that you find interesting with your partner. Explain how these jobs relate to interests or skills you have.

INTERDISCIPLINARY CONNECTIONS/IDEAS

Associated Classes:

- Art: The decoy spider discovered by Phil Torres is the only other animal known to create sculptures of themselves. Create a sculpture that represents you and your passions!
- Geography: One new technology that is showing promise for collecting biodiversity data is satellite mapping. Research this technology and use maps of land cover to predict what areas of the world scientists should focus their searches for new species.
- Mathematics: Investigate species data using the [Data Nuggets Activite "Are you my species?"](#)

Materials Required for This Lesson/Activity

Quantity	Description	Potential Supplier (item #)	Estimated Price
	No Materials Needed for this Lesson		



Lesson Created by Jess Noffsinger.

For questions please contact info@usasciencefestival.org