



Bringing Back the Extinct

Submitted by: Julie Pepperman, Science
Heritage Middle School, Maryville, TN

Target Grade: 8th Grade

Time Required: Seven 1 hour classes and 5 out of class days

Standards:

Next Generation Science Standards (NGSS):

- **MS-LS4-1** Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.

Lesson Objectives:

- The students will be able to identify the Tyrannosaurus rex's habitat, ecosystem, diet, reproduction habits, time period the animal lived based on the fossil record, and probable reason of extinction.
- The students will be able to use the fossil record to determine the existence and extinction of various non-animal organisms.
- Students will investigate an extinct organism and propose an adaptation the organism could have developed that might have helped it survive.

Central Focus:

In this lesson, students will learn about the causes of extinction and how adaptations allow species to survive. The students will research extinct animals and determine what could have helped the animal to survive. Then the students will make a model of their organism and present their research to their peers.

Keywords: identify, habitat, ecosystem, diet, fossil, fossils, record, extinction, adapt, survival, mutation, presentation, present

Background Information:

Extinction can occur when a species is no longer able to survive in a given environment (due to habitat changes, global changes, or human use). Two types of extinction occur as a part of evolution: background extinction and mass extinction. Background extinction is the natural extinction that occurs constantly. Mass extinction occurs when a large number of species become extinct in a relatively short



period of time, usually due to a catastrophic event or large environmental change to which the species cannot quickly adapt. There are five major extinction events that are believed to have occurred: Ordovician-Silurian Extinction, Devonian Extinction, Permian-Triassic Extinction, Triassic-Jurassic Extinction, and Cretaceous-Tertiary Extinction.

Adaptations are a change in a species that allows the species to be better suited to its environment. Some mutations allow individuals to be better suited to their environments than others (survival of the fittest); if the mutation is passed to the following generations and becomes a part of the species, the mutation is now an adaptation.

Materials

- Image of a T. rex from Jurassic World
- Video Clips
 - T. rex: <https://video.nationalgeographic.com/video/news/00000144-0a35-d3cb-a96c-7b3d15210000>
 - Rare Footage of Extinct Animals - <https://www.youtube.com/watch?v=jbmvwieuKrU>
- T. rex Research Note-Taking Sheet
- Fossil Record Image
- Fossil Record Era Research Note-Taking Sheet
- Image of a Woolly Mammoth from National Geographic
- List of Extinct Organism Resources
- Parent Signature Sheet
- Project Instructions
- Presentation and Model Grading Rubric
- Large sticky note paper
- Markers

Instruction

Day 1

Hook and Introduction (15min):

- When the students enter the room, instructions should be written on the board for the students to individually make a list of all of the extinct animals they know on a sheet of paper (2 minutes).
- Instruct the students to turn to their shoulder partner and compare lists of extinct animals. Students should put a check mark next to animals that appear on both students' lists (1.5 minutes).
- Students should then compare their list with their mirror partner (the student opposite their seat in the classroom). Once again, they should put a check mark next to animals that appear on both lists (1.5 minutes).



- Bring the class back together to discuss the animals that appear on their lists and create a class list of the animals that have received two check marks.
- Discuss these animals and, if possible, show images to the class to build excitement and motivate students (10 minutes).
 - Usually the Tyrannosaurus rex appears on the class list as one of the most commonly listed extinct animals. If that doesn't occur in a particular class, the teacher should ask the class about the T. rex. If possible, an image of a T. rex should be displayed on the smartboard to engage students.



Activity (32 min)

- Watch a short video clip of a T. rex:
<https://video.nationalgeographic.com/video/news/00000144-0a35-d3cb-a96c-7b3d15210000>.
- After the video, discuss everything the students know about the T. rex as a class.
- Instruct students to get into small groups to locate and record information about the T. rex using online resources provided by the teacher (attached). Students should be asked to specifically find information on the T. rex's habitat, ecosystem, diet, reproduction habits, time period the animal lived in, and probable reason for extinction (20 min).
 - See attached documents for suggested grouping based on numbers, symbols, and letters. Example groups are based on a class of 36 students.
- Regroup students into smaller groups. Have them take turns presenting the information they have learned through their online research. As each student presents, students should write down any information that they do not have recorded on their own papers. Encourage students to look up any information that they receive that seems to contradict their own research (10 min).



Wrap up (8 min)

- Individually, have students reflect on the lesson by stating one thing they learned that day, listing one thing they still want to know, and performing a self-assessment on their mastery of the class objective.

Day 2

Hook and Introduction (13 min)

- As students enter the room, have instructions on the board to direct the students to list every animal they know of that has gone extinct in the last 200 years.
- After a couple of minutes ask the students to get together with their other shoulder partner (opposite from the partner they talked to the previous day). Student pairs should compare lists and write down on their own papers any animals they did not have listed that their partner did (2 min).
- Create a class list of modern extinct animals. If there are any questions about whether an animal is actually extinct, allow the class to use their devices to quickly research the answer (5 min).
- After a list is compiled and agreed upon by the entire class, the students will watch a video, Rare Footage of Extinct Animals (<https://www.youtube.com/watch?v=jbmvwieuKrU>) (2 min).
 - Most students are amazed by the number and types of animals that have gone extinct so recently in history.

Activity 35 min

- Have students reflect on one animal they saw in the video. The students should reflect on the animal's predicted habitat, ecosystem, diet, reproduction habits, and reason for the extinction.
- Next, using the six animals featured in the video, divide the students into groups to research one assigned animal's habitat, ecosystem, diet, reproduction habits, time period of existence, and probable reason for the extinction. As a group, the students will create a poster (on giant poster sticky paper) that introduces their animal and presents the information to the rest of the class.

Wrap up (12 min)

- Individually, students should write down three things they think might have helped the extinct animal they researched to have possibly survived extinction. Have the students provide evidence for their ideas by explaining why they think these ideas may have helped the animal



survive based on the research they conducted in the activity. Keep each class's posters to display to the class the next day.

Day 3

Hook and Introduction (15 min)

- Have the student-created posters from the day prior hanging around the room. On the board, instruct students to take out a sheet of paper, turn it sideways or landscape, and divided it into six sections. Ask students to put the names of the six researched animals on the top, one in each column. Draw a sample of how you want the paper setup on the board. After students have set up their papers, explain that the students will rotate around the room (for a gallery walk), viewing the posters created by the rest of class. The students are instructed to take notes on each animal using their own paper (creating their own note sheet with facts about each animal).

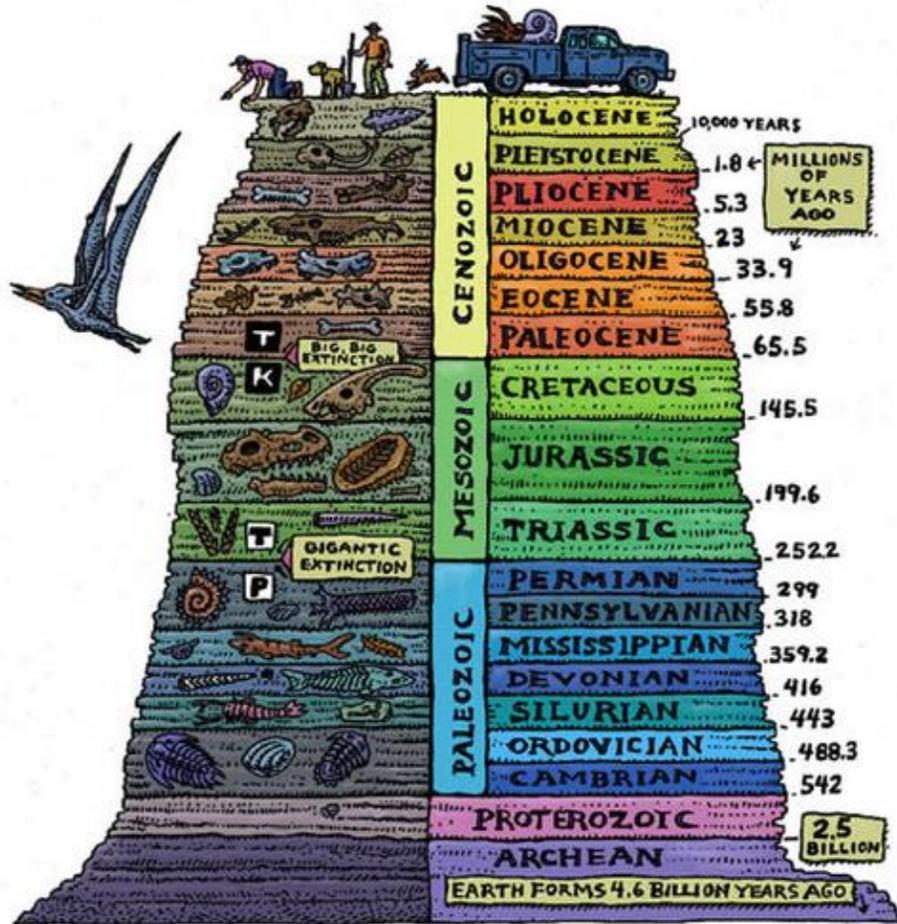
Heath Hen	Thylacine	Laysan Crane	Golden Toad	Baiji Dolphin	Western Black Rhinoceros

Activity (30 min)

- Give the students a copy of the fossil record and a note taking sheet. Instruct students to investigate a once living plant or fungus from each Era of the fossil record (Paleozoic, Mesozoic,



and Cenozoic). The focus on non-animal life helps students gain the understanding that extinction occurs in all forms of life. The students' note taking sheet will instruct them to draw and color pictures of the organisms, habitat, ecosystem, diet, reproduction habits, time period of existence, and probable reason for the extinction.



Wrap up (10 min)

- Instruct students to write a reflection about the last three days of lessons. The reflection should be a minimum of two paragraphs and focus on the way life has changed on earth based on what they have learned. Have the students include thoughts on the fossil record, extinction, and the animals they investigated.



Day 4

Hook and introduction (10 min)

- On the board, direct students to write down 5 things they remember about organism adaptations.
- Show students a picture of a Woolly Mammoth and ask them to think about this question: “If we could bring back the Woolly Mammoth, should we?” Give students a few minutes to reflect on this question and write down any thoughts they may have. Facilitate a student discussion of this question this for a few minutes. Guide students to consider all points of view.



Activity (35 min)

- Using the Woolly Mammoth as a lead in, ask the students to consider other organisms that would they would like to bring back to life. Facilitate a class discussion about the pros and cons of bringing back some of the organisms the students bring up during the discussion.
- Explain to the students that they will investigate an extinct organism of their choosing.
- After they complete their research, they will then determine what adaptations the animal could have developed that may have helped it survive. The students will develop a presentation about their organism and create a model of their adapted organism. Students will present their presentation and organism model to the class.



- Explain to the students that one species cannot be investigated by more than one student per class. For fairness, use an online random name picker (such as <https://www.classtools.net/random-name-picker/>).
- Give the students time to develop a list of the top five organisms they would like to investigate. Make sure students use devices to research different organisms and that they are specific when adding an organism to their list.
- Many students will focus on extinct animals, so remind them to consider plants and fungi by requiring at least one of their preferred organisms to be from one of these two categories of life.
 - It is important that they have five possible organisms because the most popular (Saber Tooth Tiger, Woolly Mammoth, T. rex, Dodo Bird, Megalodon, and the Giant Sloth) tend to be chosen quickly. Bring the class together and, using the random name picker, allow students to choose their organism (7 min).
- After students have chosen their organism, hand out the instructions and rubrics (attached) for the project. Give the due date (usually 5 -7 days in the future) and explain the three components of the project: research, presentation, and organism model (15 min).
 - Students will research their organism's habitat, ecosystem, diet, reproduction habits, time period of existence, and probable reason for the extinction and formulate their proposed adaptation based on their research.
 - They will create a presentation that includes their research, images of the organism, the proposed adaptation based on their research, and a citations slide.
 - Their adapted organism can be a physical model or a computer model.

Wrap up (10 min)

- Have the students use the due date to create a timeline for completing all three parts of the project. They should reflect on the parts of the project that they perceive as hard and brainstorm ways to find help (such as scheduling time to talk with the teacher, going to the library, etc.). The students should also list ideas for ways to create their organism model.

Day 5

- Use this day to allow students to conduct research, ask questions, find resources, and receive assistance from the teacher. After this day, the students should work on this project at home.
- Five to seven days outside of school is optimal for students to complete this project. Include a weekend in this time frame so parents and students can get supplies and have time to work on the project.

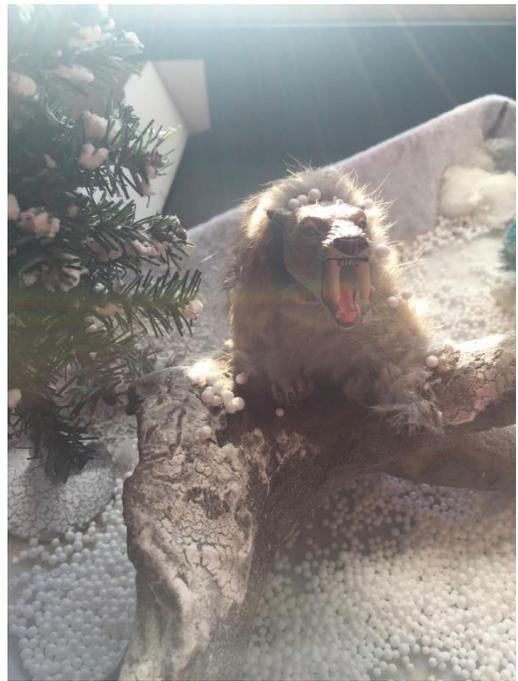


Days 6 – 10

- Have the students work on the project at home

Days 11 – 12

- Have the students present their presentation and organism model to the class.





Teacher Tips:

1. Make sure students understand that the grade they receive for the model of their organism is weighted towards choosing an adaptation for the organism that is viable and directly relates to the organism's probable reason for extinction. Students can get caught up in making the model and not the logical reason for their chosen adaptation.
2. The teacher should try to be available for help/questions before or after school and through email.
3. In addition to sending home the project paper requiring a parent signature, email parents information about the project, post the project and accompanying documents to a class site, send out reminders, and write a project due date reminder on the board.
4. Give a time limit for the presentations. Encourage students to practice their presentations at home or with friends.

Differentiation

This lesson provides instruction in a variety of methods to accommodate and engage different types of learners.

- Visual learner: T. Rex YouTube video
- Auditory learner: hearing presentations from students



- Social learner: group project on T. Rex
- Solitary learner: individual project assignment
- Physical learner: making organism model
- Remedial students: should be mirror partners with advanced students
- Advanced students: should be mirror partners with remedial students to assist in questions they may have

Assessment

Formative Assessment: The teacher may use the warm ups and exit tickets as part of the formative assessment.

Summative Assessment: The final project will be used as the summative assessment for the unit. The rubric (attached) will serve as a guide for teacher grading. Students should be sure to include a model of their animal with the adaptation, as well as research and explanations.

Name _____ Date _____ Class _____

Research resources for the Tyrannosaurus rex:

T. rex

1. <https://www.nationalgeographic.com/animals/prehistoric/tyrannosaurus-rex/>
2. <https://www.nature.com/news/palaeontology-the-truth-about-t-rex-1.13988>
3. <https://www.smithsonianmag.com/science-nature/five-things-we-dont-know-about-tyrannosaurus-rex-180951072/>
4. <https://gizmodo.com/how-smart-was-t-rex-and-other-dino-questions-youve-al-1826113633>
5. <https://www.amnh.org/dinosaurs/tyrannosaurus-rex>

Organism Name _____

Habitat	Ecosystem (the climate of the area, the climate of the earth, etc.)	Diet	Reproduction (Sexual or asexual, number of offspring, parenting style, etc.)	Living habits (do they live in a herd, mate for life, hunt in groups, etc.)	Organism's time period (include the fossil record and years)	Probable reason for extinction

Add any other interesting facts you may discovered.

Name _____ Date _____ Class _____

Paleozoic Era

Organism Name _____

Habitat	Ecosystem (the climate of the area, the climate of the earth, etc.)	Diet	Reproduction (Sexual or asexual, number of offspring, parenting style, etc.)	Living habits (do they live in a herd, mate for life, hunt in groups, etc.)	Organism's time period (include the fossil record and years)	Probable reason for extinction

List any other Interesting facts about this organism:

Name _____ Date _____ Class _____

Mesozoic Era

Organism Name _____

Habitat	Ecosystem (the climate of the area, the climate of the earth, etc.)	Diet	Reproduction (Sexual or asexual, number of offspring, parenting style, etc.)	Living habits (do they live in a herd, mate for life, hunt in groups, etc.)	Organism's time period (include the fossil record and years)	Probable reason for extinction

List any other Interesting facts about this organism:

Name _____ Date _____ Class _____

Cenozoic Era

Organism Name _____

Habitat	Ecosystem (the climate of the area, the climate of the earth, etc.)	Diet	Reproduction (Sexual or asexual, number of offspring, parenting style, etc.)	Living habits (do they live in a herd, mate for life, hunt in groups, etc.)	Organism's time period (include the fossil record and years)	Probable reason for extinction

List any other interesting facts about list organism.

Online Research Resources for Extinct Organisms

Good place to start in order to discover the names of extinct animals but do not use this site for research: https://en.wikipedia.org/wiki/Lists_of_extinct_animals?scrllybrkr

50 Birds website (this is not just birds)

<http://www.50birds.com/extan/gextanimals1.htm>

Animal Planet

<http://animal.discovery.com/tv/a-list/creature-countdowns/extinct/extinct.html>

Animal Port

<http://www.animalport.com/extinct-animals/Extinct-Animals.html>

25 extinct animals that scientists want to bring back

<http://list25.com/25-extinct-animals-that-scientists-want-to-de-extinct/>

16 Fascinating Extinct Animals

<https://mom.me/pets/19184-fascinating-extinct-animals/>

One Kind Planet

<https://onekindplanet.org/top-10/top-10-worlds-extinct-animals/>

Us Fish and Wildlife

<https://www.fws.gov/midwest/endangered/lists/extinct.html>

Smithsonian Magazine

<https://www.smithsonianmag.com>

National Geographic

<https://Nationalgeographic.com>

Museum of Natural History

<https://naturalhistory.si.edu/>

There are many more resources out there but, remember to make sure those sources are valid.

Surviving Extinction Parent Letter

Hi,

Your student, _____ has been assigned a project called "Surviving Extinction" on _____. This project is due on _____. Your student has been given an instruction sheet and rubric, guiding them towards successfully completing this assignment. Please review all the attached papers with your student and return this paper signed to class as soon as possible. This signed paper counts as 5 points in your student's final grade.

Please do not hesitate to contact me with any questions you may have at

(email and phone)

Sincerely,

Surviving Extinction!

This project helps determine the level of understanding you attained concerning the importance of biodiversity and the history of life on our planet. The **project is due on _____**. Presentations will begin this day. Each student will do the following 3-part project:

Part 1

Research an extinct organism. Some things you should research about your organism include

1. Scientific and Common name of the organism.
2. The organism's habitat.
3. The organism's ecosystem.
4. The organism's diet.
5. The time period the organism existence.
6. The organism's reproductive life.
7. The organism' habits/behaviors.
8. The atmosphere of earth at the time the organism existed.
9. The probable reason(s) the organism became extinct.
10. Your selected adaptation for your organism and the research based reason for choosing this adaptation.

Part 2

Google Slide presentation with a separate title slide that includes a picture of the original organism. The title slide should also have your name, date, period and the scientific and common name of your organism. A reference slide is also required. There should be at least three references and remember that pictures/images should be referenced too. Students should turn in **8 - 10 SLIDES TOTAL**. The Google Slides presentation should include the background research (see part 1) you have conducted and the research-based adaptation you think the animal needed to develop in order to avoid extinction.

Part 3

Create/Build (detailed) your organism *with the adaptation*. Be creative. In the past students have used clay, Papier-Mache, and computer coded/generated models. Be creative. The finished product is important but remember the research-based adaptation you choose is the most important. The organism you pick *can be anything that was once alive on this planet and has gone extinct*.

Tips: Proper spelling and English grammar rules apply to science. No texting language or “dead words (such as; ‘It,’ ‘they,’ and ‘you know’).” Slides should be clear, colorful, and include pictures or drawings. Remember, copying someone’s words, thoughts, or images is plagiarism and will result in an F.

The google slides presentation is worth 100 points and the built organism with a research-based adaptation is worth 200.

Student Name _____ Date _____ Class _____

Name of Organism _____

Surviving the Extinct Rubric			
(300 points)			
	Above Proficient (90 points)	Proficient (75 points)	Below Proficient (60 points)
Google Slides 90 points	Student demonstrates a thorough knowledge of the extinct organism, all parts of the research are represented in the Slides presentation, title and citation slides are present and include image credits, the adaptation chosen is clearly based on research about the organism, and the presentation is neat and organized clearly.	Student demonstrates adequate knowledge of the extinct organism but is missing 2 to 3 pieces of research information or does not adequately explain the relationship between their organism's adaptation and their research. Title or citation slide is missing, or the presentation is unorganized or incoherent. *Any combination of these factors.	Student does not demonstrate adequate knowledge of the extinct organism, or the adaptation selection appears random, or slides are missing, or citations are not present, or the presentation is incomplete, incoherent, messy, etc. *Any combination of these factors.
	Above Proficient (200 points)	Proficient (160 points)	Below Proficient (100 points)
Organism Model 200 Points	Student turns in a complete, original, and creative organism model that includes the selected research-based adaptation.	Student turns in an incomplete organism model, selected adaptation is not clear or not related to research, or the model is messy.	Student turns in an incomplete, uncreative organism model that clearly represents little effort on the student's part

Student Name _____ Date _____ Class _____

Name of Organism _____

	Above Proficient (5 points)		Below Proficient (0 points)
Parent Signature Sheet 5 Points	Student turned in parent signature sheet on time.		Student turned in parent signature late
	Above Proficient (5 points)	Proficient (3 points)	Below Proficient (1 points)
Creativity in Presentation 5 Points	Student demonstrates excitement, enthusiasm, and knowledge about their organism.	Student demonstrates some excitement, enthusiasm or knowledge about their organism	Student presents information with no enthusiasm or excitement. Student does not seem knowledgeable about organism

A 1☺♣	B 1❄♥	C 1🌸∞	D 1☀♦	E 1💧π	F 1★♠
A 2★♥	B 2☺∞	C 2❄♦	D 2🌸π	E 2☀♠	F 2💧♣
A 3💧∞	B 3★♦	C 3☺π	D 3❄♠	E 3🌸♣	F 3☀♥
A 4☀♦	B 4💧π	C 4★♠	D 4☺♣	E 4❄♥	F 4🌸∞
A 5🌸π	B 5☀♠	C 5💧♣	D 5★♥	E 5☺∞	F 5❄♦
A 6❄♠	B 6🌸♣	C 6☀♥	D 6💧∞	E 6★♦	F 6☺π