## Pre- and Post-Visit Activities
## "Extinction: Then and Now"

**Overview:**

These activities, which support the Staten Island Museum's lesson "Extinction: Then and Now," introduces students to the ideas of extinction and evolution, and their effects on plant and animal species both past and present.

**Three components:**

1. Background: Information on extinction and mass extinction events to prepare yourself and your students for your trip to the Staten Island Museum.
2. Pre-Visit Activity: Before your visit, students will explore various news sources for articles on current animal species facing extinction and analyze their content
3. Post-Visit Activity: Back in the classroom, students will use the template for their new animal design to create other new species, highlighting the changes the animal would undergo in order to survive new environments of the future

**Materials:**

1. Background information for teachers.
2. Read aloud books (suggestions below)
3. *Article Inquiry* handout
4. Habitat handout

**Background Information:**

Extinction, the process of dying out that begins with the death of the last individual of a species, can happen in a sudden massive event or can stretch across many millennia. Causes can vary from over hunting, competition and disease (where the events might affect only certain localized species) to events that occur on a global scale such as with climate change, volcanism, and asteroid collisions (where whole branches of the tree of life are erased). While determining causes for Earth's past extinction events can prove difficult for scientists, the fact remains that extinction is a process that is occurring all the time—it is not just relegated to the past. Today, there are several keystone species that are facing this dire reality, many of which happen to be critical pollinators like bees and butterflies. But humans were very reluctant to accept this dour idea of extinction and it wasn't until 1796 when a paper was written by Georges Cuvier that finally presented significant evidence to support the idea of extinction. Some of the initial fossils he used to support his theory of extinction in these seminal papers would later be named to a new, extinct species: the mastodon.

Perhaps the most famous and widely known occurrence of extinction is the one that ended the dinosaurs 65 million years ago. The last of the non-avian dinosaurs, like T. Rex and Triceratops, were part of the mass extinction event that concluded the Cretaceous period and paved the way for increased biodiversity amongst mammals. Scientists still debate today over the cause of this extinction event but it is thought to be either from a massive asteroid impact or massive volcanism. Either way, what becomes curious about this mass extinction is that birds, most mammals, crocodiles, frogs, salamanders, even bivalves, snails, and starfish managed to survive—mystery still surrounds the extinction event most prominently featured in pop-culture.

Yet despite being the most famous "dying out" in our cultural consciousness, it is not the worst by far. We eventually lose trilobites, a marine arthropod, in the mass extinction event of the Permian period. They were at one time the most successful of all early animals and roamed our oceans for 270 million years. In this event we lose at least 95% of marine species and 70% of terrestrial species—overall, 90% of the planets species were wiped out. What accounted for the largest mass extinction in Earth's history? There are many speculative theories including radiation from a nearby supernova, to the impact of a 3-mile wide asteroid, to a melting of the polar ice caps, to a massive string of volcanic eruptions. Some scientists even believe it to be a combination of all of these occurrences. But while the mystery of "the Great Dying" still remains prominent within the scientific community, connections are now being drawn to the extinction event we currently inhabit in the 21st century with many scientists asking if life on Earth can once again survive.

**Vocabulary:**

- Biodiversity: the existence of many different kinds of plants and animals in an environment.
- Ecosystem: all the living things from plants and animals to microscopic organisms that share an environment.
- Evidence: information that helps to form or prove a conclusion.
- Evolution: the process of adapting; making biological changes over multiple generations of an organism that aide in its survival.
- Extinct: died out; no more of its kind living anywhere. The moment of extinction occurs when the last individual of species dies.
- Fossil: any remains of a plant or animal that have been preserved over time. Frozen mammoth parts count as fossils, even though they have not been transformed into rock.
- Fossil Record: all fossils and the information that can be gathered by looking at where and how fossils appear.
- Gene: the basic unit of heredity. All plants and animals pass traits to their offspring through genes.
- Glacier: a large mass of ice that moves slowly across land. Glaciers form when layers of snow build up over years.
- Habitat: the natural environment where an animal or plant lives.
- Ice Age: a period of long-term reduction in the temperature of Earth's climate, resulting in an expansion of the continental ice sheets, polar ice sheets and mountain glaciers.
- Mammals: a group of animals whose bodies are generally covered with hair and that give birth to live young, which mothers feed with milk.
- Megafauna: a term used by archaeologists and paleontologist to refer to large-bodied mammals, that is, any mammal weighing more than 100 pounds.
- Paleontologist: a scientist who studies fossils of plants and animals from prehistoric times.
- Prehistoric: from the time before humans began recording history.

**Before Your Visit:**

*Grades 2-3*

Suggested books to read aloud:

"Once Upon a Mastodon: All About Prehistoric Mammals" by Bonnie Worth

"Prehistoric Mammals: National Geographic Kids " by Kathleen Weidner Zoehfeld

After the reading, have each student write two or more sentences about the book OR have a whole class discussion about the book.

*Grades 4-8*

Students will look for an article written in the past five years about an animal facing extinction and fill out the *Article Inquiry* handout on their chosen article (below). After reading and reporting on the article, encourage students to engage in a conversation about extinction events that are happening today and share what information they recorded on their handout.

**After Your Visit:**

*Grades 2-3*

1. After your students have completed their own imagined megafauna at the Staten Island Museum, have them create the ideal habitat their megafauna would need to survive using the habitat handout.
2. Engage the students in a conversation about why they chose that specific environment while thinking about all the things animals need to live i.e. water source, food source, shelter, preferred weather.

*Grades 4-8*

1. After your students have completed their own reimagined animal at the Staten Island Museum, have them revisit their news article inquiry. Have your students reimagine the animal featured in the article, brainstorming ways in which the animal would need to adapt to better survive the causes that threaten its extinction.
2. Following the guidelines of the evolved animal handout, have the students now draw and label their adaptations for the animal reported on in the news article. Make a collection of the student's redesigned animals.

# Article Inquiry

Title of Article: _____

News publication: _____

Date of Publication: _____

*What animal or animals are featured in the article? Where do they live?*

*What is the cause of extinction or endangerment?*

*Is there anything being done to protect the threatened animal?*

*What do you think needs to change in order for the animal to survive?*

# Your Megafauna Habitat

Where does your megafauna live?

_____

_____

What does your megafauna eat?

_____

_____

Where does your megafauna sleep?

_____

_____

Does your megafauna like it when it's hot outside or cold outside?

_____

_____

Draw your megafauna's perfect habitat!