EXTREME MAMMALS
New York State Core Curriculum

The chart below aligns the *Key Ideas*, *Performance Indicators*, and *Major Understandings* from the New York State Core Curriculum in Science with the sections of the Extreme Mammals exhibition. There are two levels of alignment in the key to the table below based upon the depth to which the section content addresses a Major Understanding. Following the table are detailed descriptions for each Key Idea, Performance Indicator, and Major Understanding aligned to the exhibition sections.

KEY

- ● Content alignment addressed **in-depth** in exhibition section
- ○ Content alignment addressed **in some depth** in exhibition section

	SCIENCE CONCEPTS	What is a Mammal?	What is Extreme?	Head to Tail: Heads	Head to Tail: Reproduction	Head to Tail: Bodies	Mammals in Motion	Extreme Climates	Extreme Isolation	Extreme Extinction
NYS Elementary School	LE 3.1a			●	●	●	●			
	LE 3.1c						●	●		
NYS Middle School	LE 1.1h	●		○	○	○	○			
	LE 3.1b	●						○	○	
	LE 3.2b	●	○	○	○	○	○	●	●	●
	LE 4.1c					●				
	LE 4.1d					●				
	PS 2.1f							●		●
NYS High School	LE 3.1a	●		○	○	○	○	●	●	●
	LE 3.1f			○	○	○	○	○	○	
	LE 3.1g	●		○	○	○	○		●	
	LE 3.1l	○						●	●	●
	PS 1.2i	●		○	○	○	○	●	●	●
	PS 1.2j							●	●	●

New York State Core Curriculum

Elementary Science Core Curriculum:

Standard 4: The Living Environment

Key Idea 3: Individual organisms and species change over time.

Performance Indicator 3.1: Describe how the structures of plants and animals complement the environment of the plant or animal.

Major Understandings:

LE 3.1a Each animal has different structures that serve different functions in growth, survival, and reproduction.

- wings, legs, or fins enable some animals to seek shelter and escape predators
- the mouth, including teeth, jaws, and tongue, enables some animals to eat and drink
- eyes, nose, ears, tongue, and skin of some animals enable the animals to sense their surroundings
- claws, shells, spines, feathers, fur, scales, and color of body covering enable some animals to protect themselves from predators and other environmental conditions, or enable them to obtain food
- some animals have parts that are used to produce sounds and smells to help the animal meet its needs
- the characteristics of some animals change as seasonal conditions change (e.g., fur grows and is shed to help regulate body heat; body fat is a form of stored energy and it changes as the seasons change)

LE 3.1c In order to survive in their environment, plants and animals must be adapted to that environment.

- animal adaptations include coloration for warning or attraction, camouflage, defense mechanisms, movement, hibernation, and migration

Intermediate Level Science Core Curriculum:

Standard 4: The Living Environment

Key Idea 1: Living things are both similar to and different from each other and from nonliving things.

Performance Indicator 1.1: Compare and contrast the parts of plants, animals, and one-celled organisms.

Major Understandings:

LE 1.1h Living things are classified by shared characteristics on the cellular and organism level. In classifying organisms, biologists consider details of internal and external structures. Biological classification systems are arranged from general (kingdom) to specific (species).

Key Idea 3: Individual organisms and species change over time.

Performance Indicator 3.1: Describe sources of variation in organisms and their structures and relate the variations to survival.

Major Understandings:

LE 3.1b Changes in environmental conditions can affect the survival of individual organisms with a particular trait. Small differences between parents and offspring can accumulate in successive generations so that descendants are very different from their ancestors. Individual organisms with certain traits are more likely to survive and have offspring than individuals without those traits.

Performance Indicator 3.2: Describe factors responsible for competition within species and the significance of that competition.

Major Understandings:

LE 3.2b Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to permit its survival. Extinction of species is common. Fossils are evidence that a great variety of species existed in the past.

Key Idea 4: The continuity of life is sustained through reproduction and development.

Performance Indicator4.1: Observe and describe the variations in reproductive patterns of organisms, including asexual and sexual reproduction.

Major Understandings:

LE 4.1c Methods of sexual reproduction depend upon the species. All methods involve the merging of sex cells to begin the development of a new individual. In many species, including plants and humans, eggs and sperm are produced.

LE 4.1d Fertilization and/or development in organisms may be internal or external.

Standard 4: The Physical Setting

Key Idea 2: Many of the phenomena that we observe on Earth involve interactions among components of air, water, and land.

Performance Indicator2.1: Explain how the atmosphere (air), hydrosphere (water), and lithosphere (land) interact, evolve, and change.

Major Understandings:

2.1f Fossils are usually found in sedimentary rocks. Fossils can be used to study past climates and environments.

High School Science

Living Environment Core Curriculum:

Standard 4

Key Idea 3: Individual organisms and species change over time.

Performance Indicator: Observe and describe the variations in reproductive patterns of organisms, including asexual and sexual reproduction.

Major Understandings:

LE 3.1a The basic theory of biological evolution states that the Earth's present-day species developed from earlier, distinctly different species.

LE 3.1f Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.

LE 3.1g Some characteristics give individuals an advantage over others in surviving and reproducing, and the advantaged offspring, in turn, are more likely than others to survive and reproduce. The proportion of individuals that have advantageous characteristics will increase.

LE 3.1l Extinction of a species occurs when the environment changes and the adaptive characteristics of a species are insufficient to allow its survival. Fossils indicate that many organisms that lived long ago are extinct. Extinction of species is common; most of the species that have lived on Earth no longer exist.

Physical Setting / Earth Science Core Curriculum:

Standard 4

Key Idea 1: The Earth and celestial phenomena can be described by principles of relative motion and perspective.

Major Understandings:

PS 1.2i The pattern of evolution of life-forms on Earth is at least partially preserved in the rock record.

- Fossil evidence indicates that a wide variety of life-forms has existed in the past and that most of these forms have become extinct.

PS 1.2j Geologic history can be reconstructed by observing sequences of rock types and fossils to correlate bedrock at various locations.

- Fossils preserved in rocks provide information about past environmental conditions.

EXTREME MAMMALS
National Science Education Standards

The chart below aligns the Life Science Concepts from the National Science Education Standards with the sections of the Extreme Mammals exhibition. Following the table are detailed descriptions for each Life Science Standard or History and Nature of Science Standard aligned to the exhibition sections.

	LIFE SCIENCE	What is a Mammal?	What is Extreme?	Head to Tail: Heads	Head to Tail: Reproduction	Head to Tail: Bodies	Mammals in Motion	Extreme Climates	Extreme Isolation	Extreme Extinction
K – 4th	C1	●	●	●	●	●	●			
	C2					●				
	C3					●		●	●	●
5th - 8th	C1	●	●	●	●	●	●			
	C2					●				
	C5		●	●	●	●	●		●	
9th – 12th	C3	●							●	●

K-4
Life Science:

C1: The characteristics of organisms
Each plant or animal has different structures that serve different functions in growth, survival, and reproduction.

C2 Life Cycles of Organisms
Plants and animals closely resemble their parents. Many characteristics of an organism are inherited from the parents of the organism, but other characteristics result from an individual's interactions with the environment.

C3: Organisms and environments
An organism's patterns of behavior are related to the nature of that organism's environment, including the kinds and numbers of other organisms present, the availability of food and resources, and the physical characteristics of the environment. When the environment changes, some plants and animals survive and reproduce, and others die or move to new locations.

5-8
Life Science:

C1: Structure and Function in living systems
Living systems at all levels of organization demonstrate the complementary nature of structure and function.

C2: Reproduction and heredity
The characteristics of an organism can be described in terms of a combination of traits. Some traits are inherited and others result from interactions with the environment.

C5: Diversity and adaptations of organisms
Millions of species of animals, plants, and microorganisms are alive today. Although different species might look dissimilar, the unity among organisms becomes apparent from an analysis of internal structures, the similarity of their chemical processes, and the evidence of common ancestry.

Species acquire many of their unique characteristics through biological adaptation , which involves the selection of naturally occurring variations in populations. Biological adaptations include changes in structures, behaviors, or physiology that enhance survival and reproductive success in a particular environment.

9-12
Life Science:

C3: Biological evolution
Species evolve over time. Evolution is the consequence of the interactions of (1) the potential for a species to increase its numbers, (2) the genetic variability of offspring due to mutation and recombination of genes, (3) a finite supply of the resources required for life, and (4) the ensuing selection by the environment of those offspring better able to survive and leave offspring.

Natural selection and its evolutionary consequences provide a scientific explanation for the fossil record of ancient life forms, as well as for the striking molecular similarities observed among the diverse species of living organisms.

The millions of different species of plants, animals, and microorganisms that live on earth today are related by descent from common ancestors.

Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships. Species is the most fundamental unit of classification.