# LA State Student Standards for Science K-12

The Louisiana Student Standards for Science listed below can be met utilizing interpretive/educational programs at our state parks and preservation area. The standards listed below are a starting point for planning a field trip to one of our sites, but is not limited to the following educational standards:

## Kindergarten

**K-PS3-1**: Make observations to determine the effect of sunlight on Earth's surface.
**Clarification Statement**: Sunlight heats Earth's natural surfaces including sand, soil, rocks, or water and the unnatural surfaces including man-made objects like plastics, asphalt, or concrete. Example of observations could be relative changes in temperature of surfaces exposed to sunlight.

**K-ESS2-2**: Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
**Clarification Statement**: Examples of plants and animals changing their environment could include a squirrel digging in the ground to hide its food, tree roots breaking concrete, or a dandelion spreading seeds to generate more dandelions.

**K-ESS3-3**: Use a model to represent the relationship between the needs of different plants or animals (including humans) and the places they live.
**Clarification Statement**: Examples of relationships could include that deer eat buds and leaves and therefore usually live in forested areas; grasses need sunlight so they often grow in meadows. Plants, animals, and their surroundings make up a system.

## First Grade

**1-LS1-1**: Use tools and materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
**Clarification Statement**: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclist by mimicking turtle shells, acorn shells or animal scales; stabilizing structures by mimicking animal tails or roots on plants; keeping out intruders by mimicking thorns on braces or animal quills; and detecting intruders by mimicking eyes or ears.

**1-LS1-2**: Read grade-appropriate texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
**Clarification Statement**: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).

**1-ESS1-1**: Use observations of the sun, moon, and stars to describe patterns that can be predicted.
**Clarification Statement**: Examples of patterns could include that the sun and moon appear to rise in one part of the sky, move across the sky, and set; and stars other than our sun are visible at night but not during the day.

## Second Grade

**2-LS2-1**: Plan and conduct an investigation to determine if plants need sunlight and water to grow.
**Clarification Statement**: Emphasis on testing one variable at a time during investigations.
**2-LS2-2**: Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.
**Clarification Statement**: Students could use the model to describe: (1) How the structure of the model gives rise to its function. (2) Structure-function relationships in the natural world that allow some animals to disperse seeds or pollinate plants.

**2-LS4-1**: Make observations of plants and animals to compare the diversity of life in different habitats.
**Clarification Statement**: Emphasis is on the diversity of living things in each of a variety of different habitats. Students could explore different habitats in the community (e.g. state parks).

**2-ESS2-1**: Compare multiple solutions designed to slow or prevent wind or water from changing the shape of land.
**Clarification Statement**: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.

## Third Grade

**3-LS1-1**: Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
**Clarification Statement**: Changes that organisms go through during their lives form a pattern. For plant life cycles there is an emphasis on flowering plants.

**3-LS3-2**: Use evidence to support the explanation that traits can be influenced by the environment.
**Clarification Statement**: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted or an animal that is given too much food and little exercise may become overweight.

**3-LS4-4**: Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.
**Clarification Statement**: Examples of environmental change(s) could include changes in land characteristics, water distribution, temperature, food, and other biological communities. Louisiana specific examples could include impacts related to levees, dams, crop rotations, irrigation systems, hunting limits, diversion canals, or sea level rise.

## Fourth Grade

**4-LS1-1:** Construct an argument that plants and animals have internal and external structures that function to support survival growth, behavior, and reproduction.
**Clarification Statement**: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, shells, fur or skin.

**4-ESS2-1**: Plan and conduct investigations on the effects of water, ice, wind, and vegetation on the relative rate of weathering and erosion.

**Clarification Statement**: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.

**4-ESS2-3**: Ask questions that can be investigated and predict reasonable outcomes about how living things affect the physical characteristics of their environment.
**Clarification Statement**: Investigations include making observations in various habitats in real life or virtual circumstances. Living things could include animals such as beavers, crawfish, armadillos, nutria, gophers, and plants such as kudzu, water hyacinth, and Chinese tallow.

**4-ESS3-2**: Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
**Clarification Statement**: Examples of solutions could include designing flood, wind, or earthquake resistant structures and models to prevent soil erosion.

## Fifth Grade

**5-LS1-1**: Ask questions about how air and water affect the growth of plants.
**Clarification Statement**: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil. The chemical processes of photosynthesis and cellular respiration are not addressed at this grade level.

**5-LS2-1**: Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment. **Clarification Statement**: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems of the Earth not including molecular explanations.

**5-ESS3-1**: Generate and compare multiple solutions about ways individual communities can use science to protect the Earth's resources and environment.
**Clarification Statement**: Examples of solutions can include cleanup of oil spills, protecting against coastal erosion, or prevention of polluted runoff into waterways.

## Sixth Grade

**6-MS-LS2-1:** Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
**Clarification Statement:** Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant or scarce resources.

**6-MS-LS2-2**: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
**Clarification Statement**: Emphasis is on (1) predicting consistent patterns of interactions in different ecosystems and (2) relationships among and between biotic and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, mutually beneficial, or other symbiotic relationships.

**6-MS-LS2-3**: Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
**Clarification Statement**: Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems, and on defining the boundaries of the system.

## Seventh Grade

**7-MS-LS2-5**: Undertake a design project that assists in maintain diversity and ecosystem services.
**Clarification Statement**: Examples of ecosystem services could include water purification, nutrient recycling, habitat conservation or soil erosion mitigation. Examples of design solution constraints could include scientific, economic, or social considerations.

**7-MS-LS2-4**: Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
**Clarification Statement**: Emphasis is on recognizing patterns in data, making inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems.

**7-MS-LS4-4**: Construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individual's probability of surviving and reproducing in a specific environment.
**Clarification Statement**: Emphasis is on using simple probability statements and proportional reasoning to construct explanations about why some traits are suppressed and other traits become more prevalent for those individuals better at finding food, shelter, or avoiding predators.

## Eight Grade

**8-MS-PS3-3**: Apply scientific principles to design, construct, and test a device that either minimizes or maximized thermal energy transfer.
**Clarification Statement**: Emphasis on the ability to maximize or minimize thermal energy transfer as it relates to devices used when an area loses electricity after a natural disaster. Examples of devices could include an insulated box or a solar cooker. Testing of the device relies on performance and not direct calculation of the total amount of thermal energy transferred.

**8-MS-ESS2-1**: Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
**Clarification Statement**: Emphasis is on the processes of melting, crystallization, weathering, deformation, and sedimentation, which act together to form minerals and rocks through the cycling of Earth's materials.

**8-MS-ESS2-2**: Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
**Clarification Statement**: Emphasis is on how processes change Earth's surface at time and spatial scales that can be large (such as slow plate motions or the uplift of a large mountain ranges) or small (such as rapid landslides on microscopic geochemical reactions), and how many geosciences processes usually behave gradually but are punctuated by catastrophic events and depositions by the movements of water, ice, and wind. Emphasis is on geoscience processes that shape local geographic features, where appropriate.

**8-MS-ESS3-3**: Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.

**Clarification Statement**: Examples of the design process may include examining human environmental impacts, assessing the kinds of solutions that are feasible, and designing and evaluating solutions that could reduce that impact. Examples of human impacts may include water usage (such as the withdrawal of water from streams and aquifers or the construction of dams and levees), land usage (such as urban development, agriculture, or removal of wetlands), and pollution (such as of the air, water, or land).

**8-MS-LS1-5**: Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
**Clarification Statement**: Examples of local environmental conditions include availability of food, light, space, and water. Examples of genetic factors could include large breed cattle and species of grass affecting growth of organisms. Examples of evidence could include drought decreasing plant growth, fertilizer increasing plant growth, different varieties of plant seeds growing at different rates in different conditions, or fish growing larger in ponds than they do in small ponds.

**High School**

## Earth Science

**HS-ESS2-2**: Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth's systems.

**HS-ESS2-4**: Analyze and interpret data to explore how variations in the flow of energy into and out of Earth's systems result in changes in atmosphere and climate.

**HS-ESS2-5**: Plan and conduct an investigation on the properties of water and its effects on Earth materials and surface processes.

**HS-ESS3-1**: Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

**HS-ESS3-4**: Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

## Life Science

**HS-LS1-5**: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

**HS-LS2-6**: Evaluate the claims, evidence and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

**HS-LS2-7**: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

**HS-LS4-5**: Evaluate evidence supporting claims that changes in environmental conditions can affect the distribution of traits in a population causing: (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.

## Environmental Science

**HS-EVS1-1**: Analyze and interpret data to identify the factors that affect sustainable development and natural resource management in Louisiana.

**HS-EVS1-3**: Analyze and interpret data about the consequences of environmental decisions to determine the risk-benefit values of actions and practices implemented for selected issues.

**HS-EVS2-3**: Use multiple lines of evidence to construct and argument addressing the negative impacts that introduced organisms have on Louisiana's native species.

**HS-EVS3-1**: Construct and evaluate arguments about the positive and negative consequences of using disposable resources versus reusable resources.

**HS-ESS2-2**: Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth's systems.

**HS-ESS2-5**: Plan and conduct an investigation on the properties of water and its effect on Earth materials and surface processes.

**HS-LS2-6**: Evaluate the claims, evidence and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

**HS-LS2-7**: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.