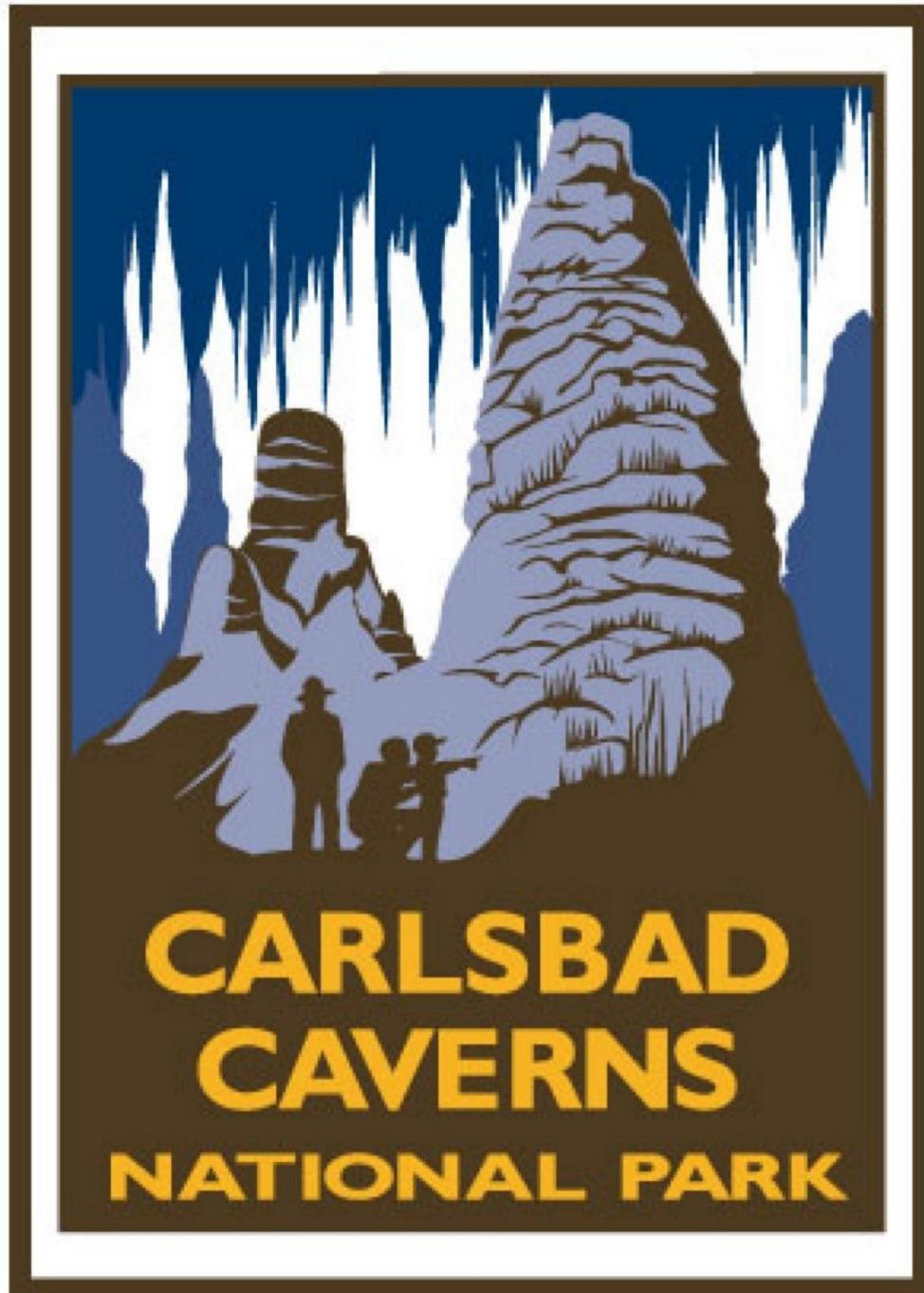


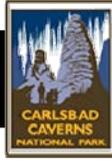
About Bats, Caves, & Deserts

A curriculum and activity guide for Carlsbad Caverns National Park



Elementary School





Section 13 – Student Glossary

adapt: change to fit the environment

adaptation: a behavior, physical feature or other characteristic that helps an animal survive and make the most of its habitat; the way any living thing is fitted to the life it leads

algae: group of plants found in water or damp places that have chlorophyll, but lack tree stems, roots and leaves; a one-celled or many-celled, colonial plant

amphibian: a smooth-skinned, cold-blooded vertebrate that starts its life in water then lives on land in moist areas as an adult

anatomy: the science of the structure of animals; the structure of an animal or plant

aquatic: growing or living in water; done in water

bark: the outer covering of branches, roots and trunks of trees

biography: an account of a person's life written by another

bird: an animal that lays eggs and has wings and a body covered with feathers

brachiopod: a marine shellfish that began extinct

Brunton Compass: a special compass used by geologists to help them make maps of rock formations

bureau: a division of a government department

calcite: a mineral composed of calcium carbonate; the mineral found in limestone that serves as a cement in sandstone. Most cave formations are made of calcite.

calcium carbonate: a chemical compound that is found in seashells and in limestone and in other sedimentary rocks; a mineral important in the development of coral reefs, mollusk shells and other aspects of the marine environment

camouflage: an organism's ability to blend in with its surroundings by changing its color and/or shape to conceal itself from predators

carbon dioxide: a gas formed during organic decomposition and respiration; a gas that is naturally found in the air and combines with water to form carbonic acid; a gas in the air

carbonic acid: a weak acid that forms when carbon dioxide mixes with water; the solution of water and carbon dioxide that dissolves limestone to make caves. This acid can dissolve calcite and redeposit it in the form of a speleothem.

cave: a naturally formed underground passageway or room, often formed by the dissolving action of acidic groundwater

cave pearl: a small, round ball of calcite formed under water

caver: a person who explores caves in a safe manner while showing respect for the cave, its contents and the land above it

cavern: another word for cave; commonly defined as a large cave

chamber: a large room in a cave

chemical reaction: the action of substances undergoing chemical changes

chemical weathering: the breaking down of rocks by chemicals found in water, air and plants

climate: average of weather conditions over a long period of time in a large geographical area, as determined by air pressure, heat, wind and moisture

cold-blooded: ectothermic; not able to maintain a constant body temperature independent of the outside temperature. Insects, reptiles, fish and amphibians are cold-blooded.

colony: a group of living things of one kind living together

column: a speleothem that is formed by the joining of a stalactite and a stalagmite, or when a stalactite grows down connecting with the cave floor or a stalagmite grows up to the cave ceiling

cones: Specialized cells in the retina of the eye that makes it possible to see color.

conservation: the wise and careful use of our natural resources

controlled fire: a fire that is confined to a particular area

coral reef: a ridge or mass of limestone built up of materials deposited around a framework of skeletal remains of mollusks, colonial coral and massive calcareous algae

core: the center portion of the Earth; the metallic center of the Earth. It consists of the inner core and the outer core. The outer core lies 3,100 miles below the Earth's surface.

crust: the outer layer of the earth

crystal: a rock that is formed when minerals cool from the liquid state and become solid

culture: the ideas, skills, arts and customs of a people from a particular period of civilization

deposit: material laid down over time

desert: an area that receives less than 10 inches (25 cm) of rainfall a year and has a very high rate of evaporation

dichotomous key: a tool that uses a series of yes/no questions to classify animals, plants or minerals.

dissolve: to become a part of a liquid

dissolution: the act of breaking down a soluble component of a material, such as the dissolving of calcium carbonate from limestone

diurnal: active during the day

diversity: a term referring to variety or differences in the natural world. Biological diversity refers to variety in living things; species diversity refers to variety among different species;

genetic diversity refers to the variety within a single species; ecosystem diversity refers to differences in living communities

drapery: a speleothem formed when water deposits calcite in thin sheets that hang in delicate folds; a hanging curtain formed by seeping water

echolocation: the use of reflected sound from an emitter such as a bat, to locate objects; a special hearing system in which an animal navigates or locates food by producing short, high-pitched sounds and then listens for the echoes the sounds make when they bounce off objects

eclipse: the partial or total apparent darkening of the sun when the moon comes between it and the earth (solar eclipse); or, of the moon when the earth's shadow is cast upon it (lunar eclipse)

ecology: the study of how plants and animals interact with each other and with their environments

ecosystem: a major interacting system that involves both living organisms and their physical environment

endangered species: a category of animal or plant that is in danger of becoming extinct

energy: the power or ability to make things move or happen

environment: the sum of all the surroundings affecting something's development and survival

estivation: a deep "sleep" some animals enter during droughts

evaporation: the process of converting a solid or liquid state into a vapor or gas

exploration: an investigation for either recreation, research or some other reason

extinct: a type of living organism that no longer exists

fauna: animal life

feldspar: the most common rock forming mineral (contains aluminum and silica)

fibers: any threadlike substance. Fibers often accumulate in show caves from people's clothing.

flora: plant life

flowstone: formed when water flows down walls, over floors and older speleothems over a period of time, building up sheets of calcite and looking like a rock waterfall; a cave formation made by flowing water

formation (cave): common term for a cave feature formed by minerals being deposited into a cave; sometimes called a cave decoration; a body of rock with defined characteristics that is different from other bodies of rock; speleothem

fossil: the hardened remains of a plant or animal from some previous time period, preserved in rock formations in the earth's crust

fuel: a substance that can be burned

geology: the study of the structure of the earth's crust, its formation and development of its layers; the scientific study of the earth and the rocks that make it up. It includes the study of

individual rock types (petrography) and early forms of life found as fossils in rocks (paleontology).

global positioning system: (GPS) the 24 satellites which orbit around the Earth launched and maintained by the US Dept. of Defense

groundwater: water that infiltrates the soil and is stored in slowly flowing reservoirs (aquifers); used loosely to refer to water which flows beneath the surface of the earth

guano: the waste and excrement from bats or birds; bat or bird droppings

gypsum: a soft form of calcite byproduct

habitat: an animal's home; the type of environment in which an animal or plant lives; the locality in which a plant or animal lives; the native environment of an animal that contains food, water, shelter and living space

heat: thermal energy in transit

helictites: twisted speleothems projecting at all angles from ceiling walls and the floor of caves that seem to defy the laws of gravity

herp: a collective name given to reptiles and amphibians

hibernation: a state of greatly reduced activity and metabolism produced by lowering of body temperature

humidity: the amount of moisture in the air

hydrochloric acid: a strong, highly corrosive acid; a solution of the gas hydrogen chloride in water

hygrometer: an instrument used to measure humidity

hypothesis: a tentative, unproven explanation that seeks to describe or explain a process in nature

indicator species: an animal or plant that is only found in a certain area. Lechuguilla, sotol and tarbush are indicator species of the Chihuahuan Desert.

inorganic: anything that is nonliving, was never alive and is not the product of a living organism

insect: any of many small invertebrate animals having a segmented body and three pairs of legs

insectivorous: the habit of eating insects; feeds on insects

instinct: an inborn ability to do something

interpretation: the act of explaining or giving meaning to an event

intersect: to cross each other

invertebrate: an animal without a backbone

Jacobson's organ: a sensory organ, usually in a herp's mouth, that helps a herp smells its environment

karst: a terrain underlain by solutional rocks such as limestone; a terrain where the topography is formed by the dissolving rock, usually limestone and is generally characterized by sinkholes, underground streams and caves; a limestone formation pitted with caves, craves, cracks, potholes and sinkholes

larva: the immature stage of an insect

lava tunnel: horizontal cave-like tube formed when the surface of a large lava flow hardens, but the lava beneath remains molten and continues to flow

leaf: any of the flat, thin parts, usually green, growing from the stem of a plant

limestone: a sedimentary rock consisting primarily of calcite carbonate, commonly from shells and dead sea animals; a rock composed mostly of the remains of living things, such as shells or coral. Most solutional caves form in limestone.

lint: clinging bits of thread or fluff from clothing

litter: trash, rubbish or garbage

management ignited fires: prescribed fire; a fire started by fire officials to meet specific objectives. When planning a fire, officials consider safety, economics, public health, and environmental, social and legal issues.

mantle: the layer between the crust and the outer core of the earth; the layer beneath the earth's crust. Scientists think it is about 1,800 feet deep.

maternity colony: a group of pregnant or nursing bats that gather into a single large colony, sometimes hundreds or even millions, for the purpose of rearing young. The shared body heat is essential to survival and growth of the young.

mammal: a vertebrate which is warm blooded, has hair or fur, produces milk, and usually gives live birth to its young

marine organisms: animal or plant life found in the sea/ocean

medicinal: having the properties of medicine

megabats: nickname for fruit bats and flying foxes

metamorphosis: a process that changes the young of certain animals (such as amphibians) into their adult forms

microbats: nickname for all bats that can echolocate with ultrasonic sound

migration: the periodic movement of organisms into or out of an area

mineral: an inorganic substance occurring naturally in the earth and having definite physical and chemical properties; basic components that rocks are made of

mole: a small burrowing animal with very soft fur and very tiny eyes

molt: to shed the exoskeleton or outer skin

moon: a natural satellite of a planet. The Earth has one moon.

moon phases: the stages of the moon (quarter, full, new, etc.) as it moves around the Earth during a month's time

myth: a traditional story serving to explain some phenomenon, custom, etc.

national park system: all lands (376 units) under the management of the National Park Service, US Department of the Interior

native species: a species that occurs naturally in an area

national park unit: an area set aside by Congress and owned by the people of the United States for the purpose of preserving some of the best of America's scenery, history, nature and wilderness for future generation

natural resource: resources found in our natural environment

nocturnal: active at night

nomex: a type of flame-retardant clothing

non-native species: an organism that has been brought accidentally or intentionally into an area where it does not naturally occur. These species often compete with and cause problems for native species. Non-native species are also called exotic, invasive and alien species.

organic: of, like or derived from living organisms

organism: any living thing

oxygen: a gas in the air that almost all-living things need to survive

Park Service Organic Act: With the signing of this legislation on August 25, 1916, President Woodrow Wilson created a new federal bureau—the National Park Service.

pesticide: a chemical used to destroy insects or other pests

petrograph: proper term for any type of rock art

petroglyph: a relief carving cut into the face of cliff or rock representing an image or an idea

photosynthesis: the process by which plants use the sun's energy to convert carbon dioxide and water into sugar

pictograph: a painting made on a rock surface representing an image or an idea

pollination: the transfer of pollen from the anther of a flowering plant to the stigma prior to fertilization

pollution: a human-caused change in the physical, chemical or biological conditions of the environment that creates an undesirable effect on living things

popcorn: small, round formations on cave walls and ceilings

population: the organisms, collectively, inhabiting an area or region

precipitation: any or all forms of liquid or solid water particles that fall from the atmosphere and reach the Earth's surface

predator: an animal that lives by hunting and killing other animals for food

preen: to smooth with the bill, to make one's appearance neat and tidy

pre-historic: being in existence in the period before written history began

prescribed burn: a fire that is planned; management-ignited fire. These fires are often set to reduce the potential of a hot, uncontrolled fire in the area, or to restore a more natural balance in an area that burned more frequently naturally, but has experienced extensive fire suspension.

preservation: action taken by humans to help protect wilderness lands, historic buildings or other places for the enjoyment of future generations

prey: an animal that is hunted or caught by another animal for food

pulaski: Named for a famous firefighter, the Pulaski is a tool used as an ax or a hoe to cut and remove fuels.

pup: a baby bat

rabies: an infectious viral disease of mammals, usually transmitted through a bite

regurgitate: to bring back up to the mouth, partly digested food

raptor: a bird, which hunts at night for rodents and small birds

reef: a ridge of rock, coral or sand at, or near, the surface of the water

renewable resource: a resource that can be replaced through natural processes if it is not overused or contaminated

reptile: a cold-blood vertebrate, dry-skinned vertebrate that usually has scaly skin and typically lays shelled eggs on land. Most reptiles do not go through metamorphosis. Lizards, snakes and turtles are examples of reptiles.

respiration: exchange of gases (oxygen in; carbon dioxide out) between living cells (plants and animal) and the environment, including oxidation and the release of energy

rimstone dam: calcium carbonate deposits located on cave floors that usually impound small pools of water

riparian: of, pertaining to, or living on the bank of a river, lake or tidewater

rocks: composed of single mineral or mixture of mineral and are called igneous, sedimentary or metamorphic, according to how they were formed

rods: The eye's rods allow people and animals to see light.

rodent: a mammal that has one pair of continuously growing incisors in each jaw

roost: resting place, usually for bats and birds; also, to rest in such a place

roots: the part of a plant that is usually underground

sedimentary rock: rock made of particles of rock, minerals, plants and animals matter that have been squeezed and cemented together by heat, pressure and chemical actions

sediments: deposits of sand, mineral fragments or sometimes-organic matter usually laid down by water but sometimes deposited by wind or glaciers

seed dispersal: the act of transporting seeds from the parent plant to new locations where seeds are more likely to survive. When forests are cleared, they cannot regenerate without seed dispersal.

shelf stone: a flat shelf or stone formed in a cave pool

show cave: a cave which has been made available for safe public exploration and tours

shrew: a small mouse-like animal with a long pointed snout and tiny eyes that lives on insects and worms

skeleton: the hard framework of an animal body that supports the tissues and protects the organs

soda straw: thin-walled hollow tube speleothems about ¼-inch diameter. They grow from ceiling of caves as water runs down inside them and deposit rings of calcite at their tips.

solar: having to do with the sun

solutional cave: a cave that is formed in rock that can be dissolved by acidic groundwater. Most solutional caves form in limestone, dolomite, gypsum and marble.

sonar: SONAR is an acronym for “sound navigation ranging”—a system developed by scientists to locate objects under water by sending out signals and listening to the echo; echolocation

sound waves: waves of energy in the atmosphere that are generated by sound

species: a genetically and adaptively unique plant or animal, which is able to reproduce itself

specimen: a part or individual used as a sample of a whole or group

speleology: the science of the cave environment, including both the physical and the biological aspects

speleothem: cave formation; cave decoration; a secondary mineral deposit formed in caves, such as stalactites and stalagmites. It is derived from two Greek words “spelaion” meaning cave and “thema” meaning deposit.

spelunker: an outdated term for a person who explores caves; caver

spot fires: new fires started from embers blowing from the main fire

stalactite: a speleothem that hangs down from cave ceilings and can form as layers of calcite are deposited by water flowing over the outside of soda straws. They form after the centers of the hollow soda straws become plugged or partially plugged. They can also form by water leaving deposits on the cave ceiling.

stalagmite: a speleothem that rises upward from the floor of a cave passage. They are often, but not always, formed by dripping water from stalactites above. They are usually larger in diameter than stalactites and more rounded at the top.

stewardship: responsible service

sulfuric acid: a highly corrosive acid created by the combination of hydrogen sulfide gas and water. It readily dissolves limestone and leaves gypsum as one of the residues of the chemical reaction.

symmetrical: something that has corresponding form, size and/or arrangement of parts in its two opposite halves

synthetic: something artificial or man-made, not of natural origin

temperature: the degree of hotness or coldness of anything

thermometer: a device for measuring temperature

threatened species: a species that is not yet endangered, but whose populations are heading in that direction

topography: the physical features of a district or region, such as the relief and contour of the land

topographical map: a map of the surface features of an area that uses contour lines

transpiration: loss of water from plants into the surrounding atmosphere; the giving off of moisture through the pores on the surface of leaves and other parts of plants

tree: a large, woody perennial plant with one main trunk and many branches

trigonometry: a form of mathematics used in surveying

trilobite: a crab-like invertebrate that became extinct

tropical rain forest: an evergreen forest located at low elevations in regions between the Tropics of Cancer and Capricorn

troglobite: an animal which spends its entire life in a cave's total darkness and uniform environment; nickname – cave dweller

troglophile: an animal that lives above ground, but can live above-ground; nickname – cave lover

trogloxene: an animal that lives above ground, but visits caves occasionally; nickname – cave guest

twilight zone: the area of a cave that has very little natural light

ultrasonic: having a frequency above the human ear's audibility limit of about 20,000 cycles per second; sound often too high a pitch for humans to hear

uplift: the process by which tectonic forces (forces that cause sea floors to spread and continents to move apart as new crust is created at mid-ocean ridge) push rocks upward

vandalism: the willful or malicious destruction or damage of any public or private property

velocity: quickness of motion; speed

Venn diagram: a diagram that uses overlapping circles to show relationships between sets

vertebrate: an animal with a backbone, skull and skeleton of cartilage or bone

vibration: a rapid rhythmic, back and forth motion

warm-blooded: endothermic; being able to maintain a constant body temperature independent of the outside temperature. Mammals and birds are warm-blooded.

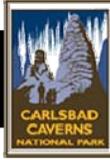
water table: the boundary between underground areas that are saturated by water and unsaturated; the level of standing groundwater beneath the earth's surface

weather: condition of atmosphere, determined by air pressure, heat, wind and water

wild cave: a cave that does not have improvements, such as lights, stairs and railings for visitor safety

wildfire: an unwanted wildland fire

wildland fire: any non-structure fire, other than a prescribed fire (management ignited fire), that occurs in the wildland



Section 14 – Content Standards with Benchmarks

Science

Unifying Concepts

CONTENT STANDARD #1 – Students will understand science concepts of order and organization.

SC1-E1 – Students will demonstrate knowledge and understanding that science is based on the assumption that the environment is understandable and predictable.

CONTENT STANDARD #2 – Students will use evidence, models and explanations to explore the physical world.

SC2-E1 – Students will use evidence to understand interactions that allow prediction of changes in natural and artificial systems.

SC2-E2 – Students will describe different terms such as hypothesis, model, law, theory, principle and paradigm.

SC2-E3 – Students will recognize models as representations of real objects and events, and explain how the models work.

SC2-M3 – Students will design and develop models.

SC2-H3 – Students will analyze models for limitations, strengths and basic assumptions.

CONTENT STANDARD #3 – Students will use form and function to organize and understand the physical world.

SC3-E1 – Students will describe form and function as complementary aspects of units of matter, objects, organisms and systems.

CONTENT STANDARD #4 – Students will understand the physical world through the concepts of change, equilibrium and measurement.

SC4-M3 – Students will use elementary scientific devices to measure objects and simple phenomena.

Science as Inquiry

CONTENT STANDARD #5 – Students will acquire the abilities to do scientific inquiry.

SC5-E1 – Students will describe the scientific method.

- identification of a problem
- research literature review

- development of an hypothesis or research question
- design of an experiment or research
- use of cooperative teams composed of individuals with different kinds of expertise to conduct research
- collection of data
- evaluation of data in relation to the hypothesis
- communication of the problems, the evidence and the conclusions

SC5-E2 – Students will describe and use simple equipment, tools, techniques and a variety of information sources to gather data and extend the senses.

SC5-M2 – Students will employ equipment, tools, a variety of techniques and information sources to gather, analyze and interpret data.

CONTENT STANDARD #6 – Students will understand the process of scientific inquiry.

SC6-E1 – Students will describe the different methods used in the process of scientific investigation for—asking questions (formulating hypotheses), answering questions, comparing the answers to what scientists already know.

SC6-E2 – Students will explain that scientists develop explanations using observations (evidence) and what they already know about the world (scientific knowledge).

SC6-E4 – Students will explain that scientists use different kinds of investigations depending upon the questions they are trying to answer.

SC6-M1 – Students will use different kinds of methods, including observation, experiments, and theoretical and mathematical models to answer a variety of scientific questions.

SC6-M2 – Students will use their own understanding of science to guide their scientific investigations.

SC6-M4 – Students will choose appropriate methods and analytic techniques for specific science problems and investigations.

SC6-M5 – Students will use technology and scientific methods to gather evidence to enhance the accuracy of their findings.

SC6-M6 – Students will describe the result of investigations with teachers, peers, parents and others.

SC6-H1 – Students will develop causal functional questions to guide investigations.

SC6-H4 – Students will use evidence to understand data and to develop consistent arguments to logically explain data.

SC6-H6 – Students will explain and interpret the results of investigations to teachers, peers, parents and others.

Physical Science

CONTENT STANDARD #7 – Students will describe the observable properties of objects and materials.

SC7-E1 – Students will describe the observable properties of objects and materials.

CONTENT STANDARD #9 – Students will know and understand the concepts of energy and the transformation of energy.

SC9-E1 – Students will describe the basic characteristics of light, heat, sound and electromagnetism, and explain that energy exists in many forms and can be transformed.

SC9-E2 – Students will describe the process of chemical reactions and how time is a factor in chemical reactions.

SC9-M1 – Students will apply knowledge about energy and energy transformation to science problems.

SC9-M2 – Students will explain how chemical reactions can take place in time periods ranging from less than a second to million of years.

SC9-M3 – Students will explain how chemical reactions involve concentration, pressure, temperature and catalysts.

Life Science

CONTENT STANDARD #10 – Students will know and understand the characteristics that are the basis for classifying organisms.

SC10-E1 – Students will demonstrate awareness of living things

- as single or multicellular with basic needs
- as surviving in environments that meet their needs with different structures that serve different functions in growth, survival and reproduction
- as part of systems such as food chains as capable of gathering information about themselves and their environment through senses
- as similar within species but unique as individuals

SC10-E2 – Students will describe life cycles of plants and animals.

SC10-M1 – Students will use information about living things.

- the roles of structure and function as complementary in the organization of living systems
- cells as the fundamental unit of life
- the functions of cells which sustain life
cell division
- the use of nutrients by cells
- the role of heredity and environment in the characteristics of individual organisms

- that small differences between offspring and parents may accumulate in succeeding generations and may or may not be advantageous for the species

SC10-M2

Students will categorize organisms according to reproductive and other characteristics.

SC10-H2

Students will use biological classifications to sort organisms and understand how they are related.

CONTENT STANDARD #11 – Students will know and understand the synergy among organisms and the environments of organisms.

SC11-E1 – Students will explain how an organism’s patterns of behavior are related to its environment.

SC11-E2 – Students will describe how all animals depend on plants for food, either directly or indirectly.

SC11-E3 – Students will describe how organisms cause changes in their environments.

SC11-E6 – Students will describe the impact humans have on other species.

SC11-E7 – Students will describe various kinds of resources, such as food, fuel and building materials.

SC11-E9 – Students will describe basic human needs including air, food, water, safety and security.

SC11-E10 – Students will identify issues of responsibility for health.

SC11-M1 – Students will distinguish among organisms based on the way an organism regulates its internal environment in relation to changes in its external environment.

SC11-M2 – Students will describe how organisms obtain and use resources, grow, reproduce and maintain a stable internal environment while living in a constantly changing external environment.

SC11-M3 – Students will predict behavior in relation to changes in an organism’s internal and external environments.

SC11-M6 – Students will examine the impact humans have had on other species and natural systems over time.

SC11-M9 – Students will illustrate the role of personal control of basic needs on health outcomes.

SC11-H10 – Students will model responsible health behaviors for peers and others.

SC11-H3 – Students will predict an organism’s behavioral responses to external stimuli as a function of inherited and acquired characteristics.

SC11-H6 – Students will predict the impact humans might have on species and environmental systems.

SC11-H9 – Students will evaluate the interaction of multiple factors such as risk, environment and desire on choices for meeting basic human needs.

Earth and Space Science

CONTENT STANDARD #12 – Students will know and understand properties of Earth Science.

SC12-E1 – Students will describe the physical and chemical properties of Earth’s materials and the states of matter.

SC12-E2 – Students will describe the uses of Earth’s materials as resources and the sun as the major source of external energy for the Earth.

SC12-E3 – Students will describe changes in Earth’s surface.

SC12-E5 – Students will use fossil and other evidence to investigate how the Earth has changed or remained constant.

SC12-M3 – Students will model natural processes that shape the Earth’s surface.

SC12-M4 – Students will observe, measure and record weather changes daily.

SC12-M5 – Students will explain how fossils are formed and how fossils provide evidence of the complexity and diversity of life over time.

SC12-M6 – Students will use a rectilinear coordinate system such as latitude and longitude to locate points on the surface of Earth.

CONTENT STANDARD #13 – Students will know and understand basic concepts of cosmology.

SC13-E1 – Students will describe the pattern of movement of objects in the sky.

Technology and Science in Society

CONTENT STANDARD #16 – Students will know and understand the relationship between natural hazards and environmental risks for organisms.

SC16-E1 – Students will identify environmental risks including natural hazards related to internal and external processes of Earth’s systems (weather, geochemical) and social hazards (occupational, recreational and personal).

SC16-E2 – Students will describe methods to reduce environmental risks.

SC16-E3 – Students will identify factors that change environments rapidly and slowly.

SC16-E4 – Students will describe factors such as drugs, disease and environmental hazards that can have negative health consequences.

SC16-M2 – Students will determine options for reducing and eliminating environmental risks and for coping with natural catastrophic events.

SC16-H2 – Students will evaluate human activities for the potential they have for increasing or decreasing environmental risks.

Language Arts

Unifying Concepts

CONTENT STANDARD #1 – Students will understand and use language arts for communication.

LA1-E2 – Students will acquire, develop and use vocabulary and linguistic skills to communicate effectively.

LA1-M2 – Students will use expanded vocabulary and linguistic skills to communicate effectively.

CONTENT STANDARD #2 – Students will understand and use language as a learning tool.

LA2-E1 – Students will use language arts skills and knowledge in all curriculum areas.

LA2-E4 – Students will acquire critical thinking skills in listening, speaking, reading and writing.

LA2-M1 – Students will apply language arts knowledge and skills to solve problems that arise in other curriculum areas.

LA2-M2 – Students will use language to understand various sources of information, local traditions and cultural as resources for learning.

LA2-H1 – Students will analyze, understand and use the connections between language arts and other disciplines.

LA2-H2 – Students analyze and effectively understand and use the applications of language in the daily life of many cultures.

Receptive Language

CONTENT STANDARD #3 – Students will listen and read for a variety of purposes.

LA3-E3 – Students will acquire vocabulary through listening, reading, observing and interacting with others.

LA3-M3 – Students will increase and use vocabulary through listening, reading, observing and interacting with others.

LA3-H3 – Students will increase and refine the use of vocabulary appropriate to specific purposes.

CONTENT STANDARD #4 – Students will use a variety of listening and reading strategies appropriately.

LA4-E1 – Students will acquire basic listening skills.

LA4-E7 – Students will refine the use of social skills of audience behavior in a variety of settings.

LA4-M1 – Students will use active listening skills to acquire information.

LA4-M4 – Students will demonstrate comprehension of written and spoken language.

Expressive Language

CONTENT STANDARD #5 – Students will speak clearly and write effectively for a variety of audiences and purposes.

LA5-E1 – Students will develop and use a range of skills for speaking.

LA5-E2 – Students will develop a range of writing skills by writing on a regular basis.

LA5-E3 – Students will express facts, ideas and opinions in a variety of settings.

LA5-E5 – Students will participate in drama, music, poems and stories.

LA5-M3 – Students will express facts, ideas and opinions in a variety of settings in oral and written form.

LA5-H3 – Students will express facts, ideas and opinions clearly, articulately and appropriately for a specific purpose or audience.

Aesthetics

CONTENT STANDARD #8 – Students will appreciate and respect their own language, culture and literature, and will learn about the languages, cultures and literature of others.

LA8-E5 – Students will share responses with peers to oral and written materials.

CONTENT STANDARD #9 – Students will use language and literature to gain insight into their own and others' lives, and to build understanding of moral and aesthetic dimensions of human experience.

LA9-E1 – Students will use language to share experiences.

CONTENT STANDARD #10 – Students will use state-of-the-art computer and other technology to gather, use and synthesize information, and to create and communicate knowledge.

LA10-M3 – Students will use available technology to locate, organize and present information.

LA10-H3 – Students will use available technology to locate information and create quality products.

LA10-H4 – Students will develop documents and presentations for a variety of purposes using multiple types of technology.

Mathematics

Unifying Concepts

CONTENT STANDARD #1 – Students will understand and use mathematics in problem solving.

MA1-E1 – Students will use problem-solving approaches to investigate and understand mathematical content.

MA1-E4 – Students will verify and interpret results with respect to the original problem situation.

MA1-E5 – Students will use manipulatives, calculators, computers and other tools (as appropriate) in order to strengthen mathematical thinking, understanding and power to build upon foundational concepts.

MA1-M1 – Students will differentiate among problem-solving approaches to investigate and understand mathematical content.

MA1-M2 – Students will formulate problems from community mathematical situations.

MA1-M4 – Students will verify and interpret results with respect to the original problem situation.

MA1-M6 – Students will use manipulatives, calculators, computers and other tools (as appropriate) in order to strengthen mathematical thinking, understanding and power to build upon foundational concepts.

CONTENT STANDARD #2 – Students will understand and use mathematics in communication.

MA2-E2 – Students will use drawings, discussion, reading, writing and listening to access, learn and communicate mathematical ideas.

MA2-E3 – Students will use a variety of media and methods to communicate mathematical concepts, thoughts and problem solutions including charts, slides, graphs, maps, drawings, pictures, sound recordings, video, e-mail and others.

MA2-M2 – Students will use drawings, discussion, reading, writing and listening to access, learn and communicate mathematical ideas.

MA2-M3 – Students will create and use a variety of media and methods to communicate mathematical concepts, thoughts and problem solutions including charts, slides, graphs, maps, drawings, pictures, sound recordings, video, e-mail and others.

CONTENT STANDARD #3 – Students will understand and use mathematics in reasoning.

MA3-E1 – Students will describe logical conclusions in mathematics.

MA3-E2 – Students will use information sources, models, known facts, properties and relationships to explain mathematical thinking.

CONTENT STANDARD #4 – Students will understand and use mathematical connections.

MA4-E4 – Students will use mathematics in other curriculum areas.

MA4-M2 – Students will describe how mathematics is integrated throughout the school and surrounding environment.

MA4-M4 – Students will apply mathematical thinking and modeling to solve problems in other curriculum areas such as employability, health education, social studies, visual and performing arts, physical education, language arts and science.

Numbers and Operations

CONTENT STANDARD #7 – Students will understand and use computation and estimation.

MA7-E1 – Students will model, explain and develop proficiency with basic number facts and algorithms (be competent in addition, subtraction, multiplication and division of whole numbers).

MA7-M4 – Students will use computation, estimation and proportions to solve problems.

Geometry and Measurement

CONTENT STANDARD #9 – Students will understand and use measurement.

MA9-E3 – Students will make and use estimates of measurements.

MA9-M3 – Students will estimate, make and use measurements to describe and compare.

Statistics and Probability

CONTENT STANDARD #10 – Students will understand and use statistics.

MA10-M3 – Students will make inferences and convincing arguments based on data analysis.

Social Studies

Unifying Concepts

CONTENT STANDARD #3 – Students will know, understand and apply the language, tools and skills of social studies.

SS3-M2 – Students will interpret and report social studies information from diverse sources (people, media, technology, computers and libraries).

History

CONTENT STANDARD #4 – Students will know and understand the ways in which human beings view themselves and others over time.

SS4-E1 – Students will recognize that people may describe the same event or situation in different ways.

SS4-E2 – Students will describe how past events, people and places are recounted in stories, pictures and historical accounts.

SS4-E3 – Students will use various sources such as documents, letters, diaries, maps, textbooks, photos, petroglyphs and oral histories to understand the past.

SS4-E4 – Students will develop good questioning skills and techniques.

SS4-M4 – Students will investigate the past using a variety of sources in order to understand the present and prepare for the future.

CONTENT STANDARD #5 – Students will know and understand relationships and patterns in history in order to understand the past and present and to prepare for the future.

SS5-E2 – Students will identify the people, events, places and ideas that created the prehistory and history of New Mexico.

SS5-E3 – Students will identify the people, events, places and ideas that created the history and prehistory of the United States and the Americas.

SS5-M2 – Students will explain how the people, events, problems and ideas created the prehistory and history of New Mexico.

SS5-M3 – Students will explain how the people, events, places, problems and ideas created the prehistory and history of the United States and the Western Hemisphere.

SS5-H2 – Students will investigate and analyze the people, events, problems and ideas that created the prehistory and history of New Mexico and the Southwest.

SS5-H3 – Students will investigate and analyze the people, events, problems and ideas that created the prehistory and history of the United States and Western Hemisphere.

Cultures

CONTENT STANDARD #6 – Students will know and understand how personal and group identities are shaped by culture, physical environment, individuals, groups and institutions.

SS6-M2 – Students will evaluate ways regional, ethnic and national cultures influence individual's daily lives.

Geography

CONTENT STANDARD #11 – Students will know and understand the diverse, dynamic and ever-changing nature of culture.

SS11-E1 – Students will compare ways in which groups, societies and cultures address similar human needs.

SS11-E2 – Students will demonstrate how languages, stories, folktales, music, media, food and other artistic creations and performances serve as expressions of culture and influence the behavior of people.

SS11-E3 – Students will explore how people and their physical environments interact.

SS11-M2 – Students will demonstrate and explore how language, literature, the arts, media, architecture, other artifacts, traditions, beliefs, values and behaviors contribute to the development and transmission of culture.

SS11-M3 – Students will examine how people and cultures respond to, interact with and/or influence their physical environment.

CONTENT STANDARD #12 – Students will know and understand physical environments and their relationships to ecosystems and human activities.

SS12-E1 – Students will use geographic tools to find direction, size and shape, and show relative location.

SS12-E2 – Students will use basic spatial concepts such as location, distance, direction and scale as tools for mapping.

SS12-E3 – Students will identify varying land forms and geographic features such as mountains, plateaus, islands and oceans as components of Earth's physical systems.

SS12-E5 – Students will demonstrate how human interactions with the physical environment is reflected in the use of land, building of towns/cities and ecosystem changes in selected locales and regions.

SS12-E8 – Students will explain how people create uses for land and other resources.

SS12-M1 – Students will construct and interpret physical and mental maps of locales, regions of the world to show relative location, direction, size and shapes.

SS12-M2 – Students will use geographic tools and resources such as aerial photographs, satellite images, geographic information systems, map projections, atlases, gazetteers and other forms of cartography to generate and interpret information.

SS12-M5 – Students will understand the interrelated physical and cultural patterns reflected in land use, settlement patterns, cultural transmissions of customs and ideas and changes to the ecosystem.

SS12-M8 – Students will examine and debate uses of land and resources.

SS12-H7 – Students will evaluate information from different theories using a range of philosophies to explore diverse uses of land and resources.

SS12-H9 – Students will evaluate information from different theories using a range of philosophies to explore diverse uses of land and resources.

Arts Education

Unifying Concepts

CONTENT STANDARD #1 – Students will learn and develop the essential skills and technical demands unique to dance, music, theatre/drama and visual arts.

THEATRE

AE1-E10 – Students will imagine and construct technical elements for classroom dramatizations (e.g. simple sets, props, costumes, make up and/or sound effects).

AE1-M10 – Students will practice acting skills to develop characterizations that suggest or illustrate artistic choice.

VISUAL ARTS

AE1-E13 – Students will participate in the process of making art to understand the elements of art (line, shape, form, color and texture).

AE1-E14 – Students will explore and become familiar with art materials and their related techniques.

AE1-E15 – Students will use art materials and tools in a safe and responsible manner.

AE1-M14 – Students will explore art materials, techniques, qualities, characteristics and processes; understand what makes them effective in solving specific art problems and how they are used to enhance life experiences and ideas.

CONTENT STANDARD #2 – Students will use dance, music, theatre/drama and visual arts to express ideas.

VISUAL ARTS

AE2-E7 – Students will know and use art to interpret personal ideas, feelings and experiences through visual form.

CONTENT STANDARD #3 – Students will integrate understanding of visual and performing arts by seeking connections and parallels among arts disciplines as well as all other content areas.

THEATRE

AE3-E9 – Students will describe visual, aural and kinetic elements in theatre, dramatic media, dance, music and visual arts.

VISUAL ARTS

AE3-E11 – Students will identify and apply connections between the visual arts and other disciplines in the local curriculum.

CONTENT STANDARD #6 – Students will show increased awareness of diverse peoples and cultures through visual and performing arts.

VISUAL ARTS

AE6-E7 – Students will identify specific works of arts as belonging to particular cultures, times and places.

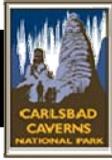
THEATRE

AE6-M6 – Students will explore similarities between life and theatre.

CONTENT STANDARD #8 – Students will contribute to communities by sharing expertise in dance, music, theatre/drama and visual arts and by participating in the activities of cultural institutions.

VISUAL ARTS

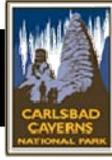
AE8-M9 – Students will create an exhibition showing artistic expertise of students.



Section 15 – References

- AIMS Education Foundation. *Bats Incredible*. Fresno CA 1993.
- American Cave Conservation Association, Inc. *Learning to Live with Caves and Karst. A Cave and Karst Curriculum and Resource Guide*. American Cave Conservation Association, Inc., Horse Cave KY, 1994.
- American Forest Foundation. *Environmental Education Activity Guide*. Washington, DC, 1993.
- American Geological Institute. *Dictionary of Geologic Terms*. Anchor/Doubleday, Garden City NY, 1976.
- Bat Conservation International. *Educator's Activity Book about Bats*. Austin TX, 1991.
- Bowden, Marica. *Nature for the Very Young*. John Wiley and Sons, 1989.
- Caduto, Michael J. and Bruchau, Joseph. *Keepers of the Earth*. Fulcrum, Inc., Golden CO, 1988.
- Collins, Jr., Henry Hill. *Complete Field Guide to American Wildlife*. Murray Printing, Forge Village MA, 1959.
- Cornell, Joseph. *Sharing Nature with Children*. Dawn Publications, Nevada City CA 1979.
- Cornell, Joseph. *Sharing the Joy of Nature*. Dawn Publications, Nevada City CA, 1989.
- Cottrell, Jr., William H. *The Book of Fire*. Mountain Press Publishing Company, 1989.
- de Golia, Jack. *Fire, A Force of Nature*. KC Publications, Las Vegas NV, 1989.
- Densmore, Frances. *How Indians Used Wild Plants for Food, Medicine and Crafts*. Dover NY, 1974.
- Educational Service, Inc. *Inquire*. Educational Service, Stevensville MI, 1976.
- Everglades National Park. *An Activity Guide for Teachers: Everglades National Park*. FL
- Hill, Carol, "Geological Walking Tour of Carlsbad Cavern." *New Mexico Geological Society Guidebook*. 44th Field Conference, Carlsbad Region, New Mexico and West Texas. 1993.
- Lawrence Hall of Science. *Earth, Moon and Stars*. University of California, Berkeley CA, 1986.
- Richmond Area Speleological Society. *Project Underground: A Natural Resource Education Guide*. Project Underground Inc., Richmond VA, 1993.
- Moore, George W. and Sullivan, G. Nicholas. *Speleology: The Study of Caves*. Cave Books, St. Louis MO, 1978.
- National Wildlife Federation. *Nature Scope*. National Wildlife Federation, 1989.

- Riverside Publishing Company. *Webster's II. New Riverside University Dictionary*. Houghton Mifflin, Boston MA, 1988.
- Seabury, Debra L. and Peeples, Susan L. *Ready-to-Use Science Activities for the Elementary Classroom*. The Center for Applied Research in Education, Inc. West Nyack NY, 1987.
- Silverstein, Shel. *The Giving Tree*. Harper & Row Publishers, NY.
- Stebbins, Robert C. *A Field Guide to Western Reptiles and Amphibians*. Houghton Mifflin, Boston MA, 1966.
- South Central Mountains RC&D and the New Mexico Forestry and Resources Conservation Division. *A Southwest Fire Ecology: A Teacher's Guide to Fire Ecology in New Mexico and the Southwest*. South Central Mountains RC & D and the New Mexico Forestry and Resources Conservation Division, 1990.
- United States Department of the Interior. *Meet the Wildfire Prevention Team*. The Firehouse, Clovis CA.
- United States Department of the Interior, National Park Service. *Carlsbad Caverns General Management Plan*. 1996.
- Vequist, Gary. *Research in Carlsbad Caverns National Park: Scientific Exploration and Discovery*. Caverns Guadalupe Mountains Association and the National Park Service, 1997.
- Western Regional Environmental Education Council. *Project Wild*. Western Regional Environmental Education Council, 1986.



Section 16 – Evaluation Forms

Evaluation Form About Bats, Caves and Deserts: Carlsbad Caverns National Park's Book for Teachers

Name of School _____

City or County, State _____

Grade Level of Students _____ Date(s) _____

List all the activities you used.

CIRCLE the ones you liked. DRAW A LINE THROUGH any that you did not like.

- 1.
- 2.
- 3.
- 4.

I recommend the following changes, additions or deletions to this book.

Were the activities developmentally and academically appropriate?

Did the activities reinforce your curriculum?

Did the activities stimulate your students' interests?

Were the information sheets in Section 2 helpful?

Evaluation Form
Carlsbad Caverns National Park's Report Card
Grades Assigned by Students Who Went on a Field Trip to the Park

Date you visited the park with your school group: _____

Your School: _____

Your Grade: _____

What did you do during your visit? _____

Please assign a grade – A, B, C, D, F

Park Rangers' Friendliness

Park Rangers' Knowledge

Exhibits in the Visitor Center

Informational Signs and Brochures

What did you like the most about your field trip?

What did you like the least about your field trip?

List three things you learned during your park visit.

- 1.
- 2.
- 3.

Evaluation Form
Carlsbad Caverns National Park's Report Card
Grades Assigned by Teacher Whose Students Participated in the Field Trip

Date of Field Trip: _____

School: _____

Grade Level(s): _____

Please rank your park experience on a scale of 1 to 7/ (1 represents the worse score possible experience and 7 represents the best possible experience)

Friendliness and Helpfulness of Park Rangers

Knowledge of Park Rangers

Fee Waiver Process

Reservation System

Self-Guided Tour of Big Room

Ranger-Led Program or Tour, if applicable

CD Audio Guide, if applicable

Comments:
