Blaine Wetland Sanctuary
Connecting State and National Science Standards

This resource is designed for educators working to connect their Blaine Wetland Sanctuary field study experience with learning targets, both content and skills, in the classroom. Educators may also choose to use this document in deciding which field trip is best for their grade level(s) within their school or district.

Please keep the following in mind when using this tool:

- Blaine Wetland Sanctuary has 5 eSTEM lessons that were designed with both Minnesota State Science Standards and national Next Generation Science Standards in mind. A trip to Blaine Wetland Sanctuary includes content knowledge, but also develops skills of a scientist through use of tools, activities, and scientist's stories.

- Blaine Wetland Sanctuary has 5 eSTEM lessons which can be catered to the learning targets and grade level of your group. Most groups are 15-30 at a time, however, larger groups have utilized surrounding parks and trails to rotate student groups through stations of activities.

- The first lesson is an overview of the Blaine Wetland Sanctuary and makes for a great science field experience during most seasons, with four additional BWS lessons that have been designed to be seasonal experiences for students.

- This key and codes applied to the academic standards charts by grade level will help you understand which lessons best fit your needs:

    - ALL SEASONS ……...Blaine Wetland Sanctuary Welcome Hike & Belly Biology (**BB**)
    - FALL……Fall FUNology with Phenology (**F**)
    - WINTER……..Frozen Secrets of the Fen (**W**)
    - SPRING……Blaine Wetland Sanctuary Springs Alive! (**Spr**)
    - SUMMER…….Superheroes & Systems at Blaine Wetland Sanctuary (**Su**)

- This BWS lessons connections summary document contains the science standards revised in 2009 and put into rule effective May 24, 2010. As described by the Minnesota Department of Education (MDE):

    - " The 2009 *Minnesota Academic Standards in Science* set the expectations for achievement in science for K-12 students in Minnesota. The standards are grounded in the belief that all students can and should be scientifically literate. Scientific literacy enables people to use scientific principles and processes to make personal decisions an d to participate in discussions of scientific issues that affect society (NRC, 1996). The standards and benchmarks describe a connected body of science and engineering knowledge acquired through active participation in science experiences. These experiences include hands-on laboratory activities rooted in scientific inquiry and engineering design. The standards are placed at the grade level where mastery is expected with recognition that a progression of learning experiences in earlier grades builds the foundation for mastery later on."

    - "The *Minnesota Academic Standards in Science* are organized by grade level into four content *strands*: 1) The Nature of Science and Engineering, 2) Physical Science, 3) Earth and Space Science, and 4) Life Science. **It is important to note that the content and skills**

in The Nature of Science and Engineering are not intended to be taught as a stand-alone unit or an isolated course, but embedded and used in the teaching, learning and assessment of the content in the other strands. Each strand has three or four *substrands*. Each substrand contains two or more *standards* and one or more *benchmarks.* The benchmarks supplement the standards by specifying the academic knowledge and skills that schools must offer and students must achieve to satisfactorily complete a standard. Not all standards are found at every grade level. The strands, substrands and standards are organized as follows."

- The performance expectations that are the Next Generation Science Standards (NGSS) weave together: 1) core ideas with 2) cross-cutting concepts and 3) practices/skills. You will find the Blaine Wetland Sanctuary lessons are also rooted in these best practices for three-dimensional learning. NGSS is described at www.nextgenscince.org, including:
    - "The Next Generation Science Standards (NGSS) were developed by educators, content experts and policymakers, using as a guiding document the Framework for K-12 Science Education from the National Research Council. The K-12 academic standards in science were developed by and for educators and school leaders, and as such states, districts, schools, teachers and non-profit education entities may copy, reproduce, alter, adapt, edit, delete and rearrange any and all parts of the NGSS as they see fit and without permission."
    - "Through a collaborative, state-led process, new K-12 science standards have been developed that are rich in both content and practice, and arranged in a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education. The NGSS were released in 2013 and are being implemented in states and districts across the nation."
    - Minnesota is not one of the 26 lead states in adoption of NGSS.

Minnesota Academic Standards in Science

National Research Council (1996). *National Science Education Standards.* Washington D.C.:National Academy Press.

BWS Lessons		**Strand**	**Substrand**	**Standard** "Understand that ...	**Code**	**Benchmark**
BB = Welcome Hike & Belly Biology All Seasons F = Fall FUNology with Phenology W= Winter Frozen Secrets of the Fen Spr = BWS Springs Alive! Su = Superheroes & Systems Summer at BWS						
BB, F, W, Spr, Su	**K**	1.The Nature ofScience and Engineering	1.The Practice of Science	2.Scientific inquiry is a set of interrelatedprocesses used to pose questions about the natural world and investigate phenomena.	0.1.1.2.1	Use observations to develop an accurate description of a natural phenomenon and compare one's observations and descriptions with those of others.
BB, F, Spr, Su	**K**	1.The Nature ofScience and Engineering	2.The Practice of Engineering	1.Some objects occur in nature; others havebeen designed and processed by people	0.1.2.1.1	Sort objects in to two groups: those that are found in nature and those that are human made. *For example:* Cars, pencils, trees, rocks.
	K	2.PhysicalScience	1.Matter	1.Objects can be described in terms of thematerials they are made of and their physical properties.	0.2.1.1.1	Sort objects in terms of color, size, shape, and texture, and communicate reasoning for the sorting system.
F, W	**K**	3.Earth Science	2.Interdependence within the Earth system	2.Weather can be described in measurablequantities and changes from day to day and with the seasons.	0.3.2.2.1	Monitor daily and seasonal changes in weather and summarize the changes. *For example:* Recording cloudiness, rain, snow and temperature.
F, W, Spr	**K**	3.Earth Science	2.Interdependence within the Earth system	2.Weather can be described in measurablequantities and changes from day to day and with the seasons.	0.3.2.2.2	Identify the sun as a source of heat and light. *For example:* Record the time of day when the sun shines into different locations of the school and note patterns.
BB, W, Spr, Su	**K**	4.Life Science	1.Structure andFunction of Living Systems	1.Living things are diverse with many differentobservable characteristics.	0.4.1.1.1	Observe and compare plants and animals.
BB, Spr, Su	**K**	4.Life Science	2.Structure andFunction ofLiving Systems	1.Living things are diverse with many differentobservable characteristics.	0.4.1.1.2	Identify the external parts of a variety of plants and animals including humans. *For example:* Heads, legs, eyes and ears on humans and animals, flowers, stems and roots on many plants.
BB, F, W, Spr, Su	**K**	4.Life Science	1.Structure andFunction of Living Systems	1.Living things are diverse with many differentobservable characteristics.	0.4.1.1.3	Differentiate between living and nonliving things. *For example:* Sort organisms and objects (or pictures of these) into groups of those that grow, and reproduce, and need air, food, and water; and those that don't.
BB, F, W, Spr, Su	**K**	4.Life Science	2.Interdependence Among Living Systems	1.Natural systems have many components thatinteract to maintain the system.	0.4.2.1.1	Observe a natural system or its model, and identify living and nonliving components in that system. *For example:* A wetland, prairie, garden or aquarium

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BB, F, W, Spr, Su	1	1.The Nature ofScience and Engineering	1.The Practice ofScience	1.Scientists work as individuals and in groupsto investigate the natural world, emphasizing evidence and communicating with others.	1.1.1.1.1	When asked "How do You Know?", students support their answer with observations. *For example:* Use observations to tell why a squirrel is a living thing.
BB, F, W, Spr, Su	1	1. The Nature of Science and Engineering	1. The Practice of Science	1. Scientists work as individuals and in groups to investigate the natural world, emphasizing evidence and communicating with others.	1.1.1.1.2	Recognize that describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.
BB, F, W, Spr, Su	1	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	1. Designed and natural systems exist in the world. These systems are made up of components that act within a system and interact with other systems.	1.1.3.1.1	Observe that many living and nonliving things are made of parts and that if a part is missing or broken, they may not function properly.
	1	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	1.1.3.2.1	Recognize that tools are used by people, including scientists and engineers, to gather information and solve problems. *For example:* Magnifier, snowplow, calculator.
	1	3. Earth Science	1. Earth Structure and Processes	3.Earth materials include solid rocks, sand, soil and water. These materials have different observable physical properties that make them useful.	1.3.1.3.1	Group or classify rocks in terms of color, shape and size.
BB, W	1	3. Earth Science	1. Earth Structure and Processes	3.Earth materials include solid rocks, sand, soil and water. These materials have different observable physical properties that make them useful.	1.3.1.3.2	Describe similarities and differences between soil and rocks. *For example:* Use screens to separate components of soil and observe the samples using a magnifier.
BB, Su	1	3. Earth Science	1. Earth Structure and Processes	3.Earth materials include solid rocks, sand, soil and water. These materials have different observable physical properties that make them useful.	1.3.1.3.3	Identify and describe large and small objects made of Earth materials.
BB, F, W, Spr, Su	1	4. Life Science	1. Structure and Function of Living Systems	1. Living things are diverse with many different observable characteristics.	1.4.1.1.1	Describe and sort animals into groups in many ways, according to their physical characteristics and behaviors.
BB, F, Spr	1	4. Life Science	2. Interdependence Among Living Systems	1. Natural systems have many components that interact to maintain the system.	1.4.2.1.1	Recognize that animals need space, water, food, shelter and air.
BB, F,	1	4. Life Science	2.	1. Natural systems have many components	1.4.2.1.2	Describe ways in which an animal's habitat provides for its basic

Spr,			Interdependence Among Living Systems	that interact to maintain the system.		needs. *For example:* Compare students' houses with animal
F, W,	**1**	4. Life Science	3. Evolution in Living Systems	1. Plants and animals undergo a series of orderly changes during their life cycles.	1.4.3.1.1	Demonstrate an understanding that animals pass through life cycles that include a beginning, development into adults, reproduction and eventually death. *For example:* Use live organisms or pictures to observe the changes that occur during the life cycle of butterflies, meal worms or frogs.
F	**1**	4. Life Science	3. Evolution in Living Systems	1. Plants and animals undergo a series of orderly changes during their life cycles.	1.4.3.1.2	Recognize that animals pass through the same life cycle stages as their parents.

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BB, F, W, Spr, Su	**2**	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	2.1.1.2.1	Raise questions about the natural world and seek answers by making careful observations, noting what happens when you interact with an object, and sharing the answers with others.
F, W, Spr, Su	**2**	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying a problem and devising a product or process to solve the problem.	2.1.2.2.1	Identify a need or problem and construct an object that helps to meet the need or solve the problem. *For example:* Design and build a tool to show wind direction. *Another example:* Design a kite and identify the materials to use.
F, W, Spr, Su	**2**	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying a problem and devising a product or process to solve the problem.	2.1.2.2.2	Describe why some materials are better than others for making a particular object and how materials that are better in some ways may be worse in other ways. *For example:* Objects made of plastic or glass.
F, W, Spr, Su	**2**	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying a problem and devising a product or process to solve the problem.	2.1.2.2.3	Explain how engineered or designed items from everyday life benefit people.
Spr, Su	**2**	2. Physical Science	1. Matter	1. Objects can be described in terms of the materials they are made of and their physical properties.	2.2.1.1.1	Describe objects in terms of color, size, shape, weight, texture, flexibility, strength and the types of materials in the object.
BB, W, Spr, Su	**2**	2. Physical Science	1. Matter	2. The physical properties of materials can be changed, but not all materials respond the same way to what is done to them.	2.2.1.2.1	Observe, record, and recognize that water can be a solid or a liquid and can change from one state to another.
BB, F, W, Spr, Su	**2**	2. Physical Science	2. Motion	1. The motion of an object can be described by a change in its position over time.	2.2.2.1.1	Describe an object's change in position relative to other objects or a background. *For example:* Forward, backward, going up, going down.
	2	2. Physical Science	2. Motion	1. The motion of an object can be described by a change in its position over time.	2.2.2.1.2	Demonstrate that objects move in a variety of ways, including a straight line, a curve, a circle, back and forth, and at different speeds. *For example:* Spinning toy and rocking toy. *Another example:* Construct objects that will move in a straight line or a curve such as a marble or toy car on a track.
	2	2. Physical Science	2. Motion	2. The motion of an object can be changed by a push or a pull forces.	2.2.2.2.1	Describe how push and pull forces can make objects move. *For example:* Push and pull objects on smooth and rough surfaces.
	2	2. Physical Science	2. Motion	2. The motion of an object can be changed by a push or a pull forces.	2.2.2.2.2	Describe how things near Earth fall to the ground unless something holds them up.
W	**2**	3. Earth Science	2. Interdependence within the Earth system	2. Weather can be described in measurable quantities and changes from day to day and with the seasons.	2.3.2.2.1	Measure, record and describe weather conditions using common tools. *For example:* Temperature, precipitation, sunrise/sunset, and wind speed/direction.
F, Spr, Su	**2**	4. Life Science	1. Structure and Function of Living Systems	1. Living things are diverse with many different observable characteristics.	2.4.1.1.1	Describe and sort plants into groups in many ways, according to their physical characteristics and behaviors.

BB, F, Spr, Su	**2**	4. Life Science	2. Interdependence Among Living Systems	1. Natural systems have many components that interact to maintain the system	2.4.2.1.1	Recognize that plants need space, water, nutrients and air, and that they fulfill these needs in different ways.
BB, F, Spr, Su	**2**	4. Life Science	3. Evolution in Living Systems	1. Plants and animals undergo a series of orderly changes during their life cycles.	2.4.3.1.1	Describe the characteristics of plants at different stages of their life cycles. *For example* : Use live organisms or pictures to observe the changes that occur during the life cycle of bean plants or marigolds.

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F, Spr	3	1. The Nature of Science and Engineering	1. The Practice of Science	1. Scientists work as individuals and in groups; emphasizing evidence, open communication and skepticism.	3.1.1.1.1	Provide evidence to support claims, other than saying "Everyone knows that," or "I just know," and question such reasons when given by others.
F, W	3	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	3.1.1.2.1	Generate questions that can be answered when scientific knowledge is combined with knowledge gained from one's own observations or investigations. *For example:* Investigate the sounds produced by striking various objects.
BB	3	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	3.1.1.2.2	Recognize that when a science investigation is done the way it was done before, even in a different place, a similar result is expected.
BB, F, W, Spr, Su	3	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	3.1.1.2.3	Maintain a record of observations, procedures and explanations, being careful to distinguish between actual observations and ideas about what was observed. *For example:* Make a chart comparing observations about the structures of plants and animals.
BB, F, W, Spr, Su	3	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural world and investigate phenomena.	3.1.1.2.4	Construct reasonable explanations based on evidence collected from observations or experiments.
	3	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	3.1.3.2.1	Understand that everybody can use evidence to learn about the natural world, identify patterns in nature, and develop tools. *For example:* Ojibwe and Dakota knowledge and use of patterns in the stars to predict and plan.
	3	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	3.1.3.2.2	Recognize that the practice of science and/or engineering involves many different kinds of work and engages men and women of all ages and backgrounds.
BB, W, Spr, Su	3	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	3.1.3.4.1	Use tools, including rulers, thermometers, magnifiers and simple balance, to improve observations and keep a record of the observations made.
	3	2. Physical Science	3. Energy	1. Energy appears in different forms, including sound and light.	3.2.3.1.1	Explain the relationship between the pitch of a sound, the rate of vibration of the source, and factors that affect pitch. *For example:* Changing the length of a string that is plucked changes the pitch.

W	**3**	2. Physical Science	3. Energy	1. Energy appears in different forms, including sound and light.	3.2.3.1.2	Explain how shadows form and can change in various ways.
	3	2. Physical Science	3. Energy	1. Energy appears in different forms, including sound and light.	3.2.3.1.3	Describe how light travels in a straight line until it is absorbed, redirected, reflected or allowed to pass through an object. *For example:* Use a flashlight, mirrors and water to demonstrate reflection and bending of light.
F, W, Spr,	**3**	3. Earth Science	3. The Universe	1. The sun and moon have locations and movements that can be observed and described.	3.3.3.1.1	Observe and describe the daily and seasonal changes in the position of the sun and compare observations.
F	**3**	3. Earth Science	3. The Universe	1. The sun and moon have locations and movements that can be observed and described.	3.3.3.1.2	Recognize the pattern of apparent changes in the moon's shape and position.
	3	3. Earth Science	3. The Universe	2. Objects in the solar system as seen from Earth have various sizes and distinctive patterns of motion.	3.3.3.2.1	Demonstrate how a large light source at a great distance looks like a small light that is much closer. *For example:* Car headlights at a distance look small compared to when they are close.
F, Spr	**3**	3. Earth Science	3. The Universe	2. Objects in the solar system as seen from Earth have various sizes and distinctive patterns of motion.	3.3.3.2.2	Recognize that the Earth is one of several planets that orbit the sun, and that the moon orbits the Earth.
BB, F, Spr,	**3**	4. Life Science	1. Structure and Function of Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	3.4.1.1.1	Compare how the different structures of plants and animals serve various functions of growth, survival and reproduction. *For example:* Skeletons in animals and stems in plants provide strength and stability.
BB, W, Spr, Su	**3**	4. Life Science	1. Structure and Function of Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	3.4.1.1.2	Identify common groups of plants and animals using observable physical characteristics, structures and behaviors. *For example:* Sort animals into groups such as mammals and amphibians based on physical characteristics. *Another example:* Sort and identify common Minnesota trees based on leaf/needle characteristics.
BB, Spr	**3**	4. Life Science	3. Evolution in Living Systems	2. Offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.	3.4.3.2.1	Give examples of likenesses between adults and offspring in plants and animals that can be inherited or acquired. *For example:* Collect samples or pictures that show similarities between adults and their young offspring.
BB, F	**3**	4. Life Science	3. Evolution in Living Systems	2. Offspring are generally similar to their parents, but may have variations that can be advantageous or disadvantageous in a particular environment.	3.4.3.2.2	Give examples of differences among individuals that can sometimes give an individual an advantage in survival and reproduction.

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BB, F, W, Spr, Su	4	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers design, create, and develop structures, processes, and systems that are intended to improve society and may make humans more productive.	4.1.2.1.1	Describe the positive and negative impacts that the designed world has on the natural world as more and more engineered products and services are created and used.
F, W, Spr, Su	4	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.	4.1.2.2.1	Identify and investigate a design solution and describe how it was used to solve an everyday problem. *For example:* Investigate different varieties of construction tools.
F, W, Spr, Su	4	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.	4.1.2.2.2	Generate ideas and possible constraints for solving a problem through engineering design. *For example:* Design and build an electromagnet to sort steel and aluminum materials for recycling.
F, W, Spr, Su	4	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of identifying problems, developing multiple solutions, selecting the best possible solution, and building the product.	4.1.2.2.3	Test and evaluate solutions, considering advantages and disadvantages for the engineering solution, and communicate the results effectively.
W, Spr, Su	4	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	3. The needs of any society influence the technologies that are developed and how they are used.	4.1.3.3.1	Describe a situation in which one invention led to other inventions.
W, Spr, Su	4	2. Physical Science	1. Matter	1. Objects have observable properties that can be measured.	4.2.1.1.1	Measure temperature, volume, weight and length using appropriate tools and units.
BB, F, W, Spr, Su	4	2. Physical Science	1. Matter	2. Solids, liquids and gases are states of matter that each have unique properties.	4.2.1.2.1	Distinguish between solids, liquids and gases in terms of shape and volume. *For example:* Liquid water changes shape depending on the shape of its container.
BB, W, Su	4	2. Physical Science	1. Matter	2. Solids, liquids and gases are states of matter that each have unique properties.	4.2.1.2.2	Describe how the states of matter change as a result of heating and cooling.
BB, W, Su	4	2. Physical Science	3. Energy	1. Energy appears in different forms, including heat and electromagnetism.	4.2.3.1.1	Describe the transfer of heat energy when a warm and a cool object are touching or placed near each other.
	4	2. Physical Science	3. Energy	1. Energy appears in different forms, including heat and electromagnetism.	4.2.3.1.2	Describe how magnets can repel or attract each other and how they attract certain metal objects.
W, Su	4	2. Physical Science	3. Energy	1. Energy appears in different forms, including heat and electromagnetism.	4.2.3.1.3	Compare materials that are conductors and insulators of heat and/or electricity. *For example:* Glass conducts heat well, but is a poor conductor of electricity.
	4	2. Physical Science	3. Energy	2. Energy can be transformed within a system or transferred to other systems or the environment.	4.2.3.2.1	Identify several ways to generate heat energy. *For example:* Burning a substance, rubbing hands together, or electricity flowing through wires.

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	4	2. Physical Science	3. Energy	2. Energy can be transformed within a system or transferred to other systems or the environment.	4.2.3.2.2	Construct a simple electrical circuit using wires, batteries, and light bulbs.
	4	2. Physical Science	3. Energy	2. Energy can be transformed within a system or transferred to other systems or the environment.	4.2.3.2.3	Demonstrate how an electric current can produce a magnetic force. *For example:* Construct an electromagnet to pick up paperclips.
	4	3. Earth Science	1. Earth Structure and Processes	3. Rocks are an Earth material that may vary in composition.	4.3.1.3.1	Recognize that rocks may be uniform or made of mixtures of different minerals.
	4	3. Earth Science	1. Earth Structure and Processes	3. Rocks are an Earth material that may vary in composition.	4.3.1.3.2	Describe and classify minerals based on their physical properties. *For example:* Streak, luster, hardness, reaction to vinegar.
BB, F, W, Spr, Su	**4**	3. Earth Science	2. Interdependence within the Earth system	3. Water circulates through the Earth's crust, oceans and atmosphere in what is known as the water cycle.	4.3.2.3.1	Identify where water collects on Earth, including atmosphere, ground, and surface water, and describe how water moves through the Earth system using the processes of evaporation, condensation and precipitation.
BB, F, W, Spr, Su	**4**	3. Earth Science	4. Human Interaction with Earth Systems	1. In order to maintain and improve their existence, humans interact with and influence Earth systems.	4.3.4.1.1	Describe how the methods people utilize to obtain and use water in their homes and communities can affect water supply and quality.
	4	4. Life Science	4. Human Interactions with Living Systems	2. Microorganisms can get inside one’s body and they may keep it from working properly.	4.4.4.2.1	Recognize that the body has defense systems against germs, including tears, saliva, skin, and blood.
	4	4. Life Science	4. Human Interactions with Living Systems	2. Microorganisms can get inside one’s body and they may keep it from working properly.	4.4.4.2.2	Give examples of diseases that can be prevented by vaccination.

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BB, F, W, Spr, Su	**5**	1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	5.1.1.1.1	Explain why evidence, clear communication, accurate record keeping, replication by others, and openness to scrutiny are essential parts of doing science.
BB, F, W, Spr, Su	**5**	1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	5.1.1.1.2	Recognize that when scientific investigations are replicated they generally produce the same results, and when results differ significantly, it is important to investigate what may have caused such differences. *For example:* Measurement errors, equipment failures, or uncontrolled variables.
BB, W, Spr, Su	**5**	1. The Nature of Science and Engineering	1. The Practice of Science	1.Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	5.1.1.1.3	Understand that different explanations for the same observations usually lead to making more observations and trying to resolve the differences.
BB, F, W, Spr, Su	**5**	1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world, is done by individuals and groups, and is characterized by empirical criteria, logical argument and skeptical review.	5.1.1.1.4	Understand that different models can be used to represent natural phenomena and these models have limitations about what they can explain. *For example:* Different kinds of maps of a region provide different information about the land surface
BB, F, W, Spr, Su	**5**	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	5.1.1.2.1	Generate a scientific question and plan an appropriate scientific investigation, such as systematic observations, field studies, open-ended exploration or controlled experiments to answer the question.
F, W, Spr, Su	**5**	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	5.1.1.2.2	Identify and collect relevant evidence, make systematic observations and accurate measurements, and identify variables in a scientific investigation.
W, Su	**5**	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations.	5.1.1.2.3	Conduct or critique an experiment, noting when the experiment might not be fair because some of the things that might change the outcome are not kept the same, or that the experiment isn't repeated enough times to provide valid results.
	5	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	5.1.3.2.1	Describe how science and engineering influence and are influenced by local traditions and beliefs. *For example:* Substainable agriculture practices used by many cultures.
Spr, Su	**5**	1. The Nature of Science and Engineering	3. Interactions Among Science,	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise	5.1.3.4.1	Use appropriate tools and techniques in gathering, analyzing and interpreting data. *For example:* Spring scale, metric measurements, tables, mean/median/range, spreadsheets, and

			Engineering, Technology and Society	accomplish.		appropriate graphs,
BB, F, W, Spr, Su	**5**	1. The Nature of Science and Engineering	3. Interactions Among Science, Engineering, Technology and Society	4. Tools and mathematics help scientists and engineers see more, measure more accurately, and do things that they could not otherwise accomplish.	5.1.3.4.2	Create and analyze different kinds of maps of the student's community and of Minnesota. *For example:* Weather maps, city maps, aerial photos, regional maps, or online map resources.
	5	2. Physical Science	2. Motion	1. An object's motion is affected by forces and can be described by the object's speed and the direction it is moving.	5.2.2.1.1	Give examples of simple machines and demonstrate how they change the input and output of forces and motion.
	5	2. Physical Science	2. Motion	1. An object's motion is affected by forces and can be described by the object's speed and the direction it is moving.	5.2.2.1.2	Identify the force that starts something moving or changes its speed or direction of motion. *For example:* Friction slows down a moving skateboard.
	5	2. Physical Science	2. Motion	1. An object's motion is affected by forces and can be described by the object's speed and the direction it is moving.	5.2.2.1.3	Demonstrate that a greater force on an object can produce a greater change in motion.
BB, F, Su	**5**	3. Earth Science	1. Earth Structure and Processes	2. The surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	5.3.1.2.1	Explain how, over time, rocks weather and combine with organic matter to form soil.
Su	**5**	3. Earth Science	1. Earth Structure and Processes	2. The surface of the Earth changes. Some changes are due to slow processes and some changes are due to rapid processes.	5.3.1.2.2	Explain how slow processes, such as water erosion, and rapid processes, such as landslides and volcanic eruptions, form features of the Earth's surface.
	5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.1	Identify renewable and non-renewable energy and material resources that are found in Minnesota and describe how they are used. *For example:* Water, iron ore, granite, sand and gravel, wind, and forests.
	5	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.2	Give examples of how mineral and energy resources are obtained and processed and how that processing modifies their properties to make them more useful. *For example:* Iron ore, biofuels, or coal.
BB, F, W, Spr, Su	**5**	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	5.3.4.1.3	Compare the impact of individual decisions on natural systems. *For example:* Choosing paper or plastic bags impacts landfills as well as ocean life cycles.
BB, F, Su	**5**	4. Life Science	1. Structure and Function of Living Systems	1. Living things are diverse with many different characteristics that enable them to grow, reproduce and survive.	5.4.1.1.1	Describe how plant and animal structures and their functions provide an advantage for survival in a given natural system. *For example:* Compare the physical characteristics of plants or animals from widely different environments, such as desert verses tropical, and explore how each has adapted to its environment.
BB, F, W, Spr, Su	**5**	4. Life Science	2. Interdepen-dence Among Living Systems	1. Natural systems have many components that interact to maintain the living system	5.4.2.1.1	Describe a natural system in Minnesota, such as a wetland, prairie, or garden, in terms of the relationships among its living and nonliving parts, as well as inputs and outputs. *For example:* Design and construct a habitat for a living organism that meets its

						need for food, air and water.
BB, F, W, Spr, Su	**5**	4. Life Science	2. Interdepen-dence Among Living Systems	1. Natural systems have many parts that interact to maintain the living system	5.4.2.1.2	Explain what would happen to a system such as a wetland, prairie or garden if one of its parts were changed. *For example:* Investigate how road salt runoff affects plants, insects and other parts of an ecosystem. *Another example:* Investigate how an invasive species changes an ecosystem.
BB, F, W, Spr, Su	**5**	4. Life Science	4. Human Interactions with Living Systems	1. Humans change environments in ways that can be either beneficial or harmful to themselves and other organisms.	5.4.4.1.1	Give examples of beneficial and harmful human interaction with natural systems. *For example:* Recreation, pollution, wildlife management.

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BB = Welcome Hike & Belly Biology All Seasons F = Fall FUNology with Phenology W= Winter Frozen Secrets of the Fen Spr = BWS Springs Alive! Su = Superheroes & Systems Summer at BWS						
BB, F, W, Spr, Su	**6**	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers create, develop and manufacture machines, structures, processes and systems that impact society and may make humans more productive.	6.1.2.1.1	Identify a common engineered system and evaluate its impact on the daily life of humans. *For example:* Refrigeration, cell phone, or automobile.
BB, F, W, Spr, Su	**6**	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers create, develop and manufacture machines, structures, processes and systems that impact society and may make humans more productive.	6.1.2.1.2	Recognize that there is no perfect design and that new technologies have consequences that may increase some risks and decrease others. *For example:* Seat belts and airbags.
Spr,	**6**	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers create, develop and manufacture machines, structures, processes and systems that impact society and may make humans more productive.	6.1.2.1.3	Describe the trade-offs in using manufactured products in terms of features, performance, durability and cost.
BB, F, W, Spr, Su	**6**	1. The Nature of Science and Engineering	2. The Practice of Engineering	1. Engineers create, develop and manufacture machines, structures, processes and systems that impact society and may make humans more productive.	6.1.2.1.4	Explain the importance of learning from past failures, in order to inform future designs of similar products or systems. *For example:* Space shuttle or bridge design.
F, W, Spr, Su	**6**	1. The Nature of Science and Engineering	2. The Practice of Engineering	2. Engineering design is the process of devising products, processes and systems that address a need, capitalize on an opportunity, or solve a specific problem.	6.1.2.2.1	Apply and document an engineering design process that includes identifying criteria and constraints, making representations, testing and evaluation, and refining the design as needed to construct a product or system to solve a problem. *For example:* Investigate how energy changes from one form to another by designing and constructing a simple roller coaster for a marble.
BB, F, W, Spr, Su	**6**	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	1. Designed and natural systems exist in the world. These systems consist of components that act within the system and interact with other systems.	6.1.3.1.1	Describe a system in terms of its subsystems and parts, as well as its inputs, processes and outputs.
BB, Spr, Su	**6**	1. The Nature of Science	3. Interactions Among Science,	1. Designed and natural systems exist in the world. These systems consist of components that act within the system and interact with other	6.1.3.1.2	Distinguish between open and closed systems. For example: Compare mass before and after a chemical reaction that releases a gas in sealed and open plastic bags.

		and Engineering	Technology, Engineering, Mathematics and Society	systems.		
	6	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	4. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	6.1.3.4.1	Determine and use appropriate safe procedures, tools, measurements, graphs, and mathematical analyses to describe and investigate natural and designed systems in a physical science context.
	6	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	4. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	6.1.3.4.2	Demonstrate the conversion of units within the International System of Units (SI, or metric) and estimate the magnitude of common objects and quantities using metric units.
	6	2. Physical Science	1. Matter	1. Pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.	6.2.1.1.1	Explain density, dissolving, compression, diffusion and thermal expansion using the particle model of matter.
BB, W, Spr, Su	**6**	2. Physical Science	1. Matter	2. Substances can undergo physical changes which do not change the composition or the total mass of the substance in a closed system.	6.2.1.2.1	Identify evidence of physical changes, including changing phase or shape, and dissolving in other materials.
Su	**6**	2. Physical Science	1. Matter	2. Substances can undergo physical changes which do not change the composition or the total mass of the substance in a closed system.	6.2.1.2.2	Describe how mass is conserved during a physical change in a closed system. For example: The mass of an ice cube does not change when it melts.
Su	**6**	2. Physical Science	1. Matter	2. Substances can undergo physical changes which do not change the composition or the total mass of the substance in a closed system.	6.2.1.2.3	Use the relationship between heat and the motion and arrangement of particles in solids, liquids and gases to explain melting, freezing, condensdation and evaporation.
	6	2. Physical Science	2. Motion	1. The motion of an object can be described in terms of speed, direction and change of position.	6.2.2.1.1	Measure and calculate the speed of an object that is traveling in a straight line.
	6	2. Physical Science	2. Motion	1. The motion of an object can be described in terms of speed, direction and change of position.	6.2.2.1.2	For an object traveling in a straight line, graph the object's position as a function of time, and its speed as a function of
	6	2. Physical Science	2. Motion	2. Forces have magnitude and direction and affect the motion of objects.	6.2.2.2.1	Recognize that when the forces acting on an object are balanced, the object remains at rest or continues to move at a constant speed in a straight line, and that unbalanced forces cause a change in the speed or direction of the motion of an object.
	6	2. Physical Science	2. Motion	2. Forces have magnitude and direction and affect the motion of objects.	6.2.2.2.2	Identify the forces acting on an object and describe how the sum of the forces affects the motion of the object. *For example:* Forces

						acting on a book on a table or a car on the road.
	6	2. Physical Science	2. Motion	2. Forces have magnitude and direction and affect the motion of objects.	6.2.2.2.3	Recognize that some forces between objects act when the objects are in direct contact and others, such as magnetic, electrical, and gravitational forces can act from a distance.
	6	2. Physical Science	2. Motion	2. Forces have magnitude and direction and affect the motion of objects.	6.2.2.2.4	Distinguish between mass and weight.
	6	2. Physical Science	3. Energy	1. Waves involve the transfer of energy without the transfer of matter.	6.2.3.1.1	Describe properties of waves, including speed, wavelength, frequency and amplitude.
	6	2. Physical Science	3. Energy	1. Waves involve the transfer of energy without the transfer of matter.	6.2.3.1.2	Explain how the vibration of particles in air and other materials results in the transfer of energy through sound waves.
W	**6**	2. Physical Science	3. Energy	1. Waves involve the transfer of energy without the transfer of matter.	6.2.3.1.3	Use wave properties of light to explain reflection, refraction
	6	2. Physical Science	3. Energy	2. Energy can be transformed within a system or transferred to other systems or the environment.	6.2.3.2.1	Differentiate between kinetic and potential energy and analyze situations where kinetic energy is converted to potential energy and vice versa.
BB, W	**6**	2. Physical Science	3. Energy	2. Energy can be transformed within a system or transferred to other systems or the environment.	6.2.3.2.2	Trace the changes of energy forms, including thermal, electrical, chemical, mechanical or others as energy is used in devices. For example: A bicycle, light bulb or automobile.
BB, W	**6**	2. Physical Science	3. Energy	2. Energy can be transformed within a system or transferred to other systems or the environment.	6.2.3.2.3	Describe how heat energy is transferred in conduction, convection and radiation.

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BB, F, W, Spr, Su	7	1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	7.1.1.1.1	Understand that prior expectations can create bias when conducting scientific investigations. For example: Students often continue to think that air is not matter, even though they have contrary evidence from investigations.
Spr	7	1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	7.1.1.1.2	Understand that when similar investigations give different results, the challenge is to judge whether the differences are significant, and if further studies are required. For example: Use mean and range to analyze the reliability of experimental results
BB, F, W, Spr, Su	7	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	7.1.1.2.1	Generate and refine a variety of scientific questions and match them with appropriate methods of investigation, such as field studies, controlled experiments, review of existing work, and development of models.
W	7	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	7.1.1.2.2	Plan and conduct a controlled experiment to test a hypothesis about a relationship between two variables, ensuring that one variable is systematically manipulated, the other is measured and recorded, and any other variables are kept the same (controlled). For example: The effect of various factors on the production of carbon dioxide by plants.
W, Spr	7	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	7.1.1.2.3	Generate a scientific conclusion from an investigation, clearly distinguishing between results (evidence) and conclusions (explanation).
BB, W, Spr, Su	7	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry uses multiple interrelated processes to investigate questions and propose explanations about the natural world.	7.1.1.2.4	Evaluate explanations proposed by others by examining and comparing evidence, identifying faulty reasoning, and suggesting alternative explanations.
BB, F, W, Spr, Su	7	1. The Nature of Science and	3. Interactions Among Science, Technology,	3. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	7.1.3.4.1	Use maps, satellite images and other data sets to describe patterns and make predictions about natural systems in a life science context. For example: Use online data sets to compare wildlife populations or water quality in regions of Minnesota.

		Engineering	Engineering, Mathematics and Society			
BB, F, W, Spr, Su	**7**	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	3. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	7.1.3.4.2	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in a life science context.
Su	**7**	2. Physical Science	1. Matter	1. The idea that matter is made up of atoms and molecules provides the basis for understanding the properties of matter.	7.2.1.1.1	Recognize that all substances are composed of one or more of approximately one hundred elements and that the periodic table organizes the elements into groups with similar properties.
Su	**7**	2. Physical Science	1. Matter	1. The idea that matter is made up of atoms and molecules provides the basis for understanding the properties of matter.	7.2.1.1.2	Describe the differences between elements and compounds in terms of atoms and molecules.
	7	2. Physical Science	1. Matter	1. The idea that matter is made up of atoms and molecules provides the basis for understanding the properties of matter.	7.2.1.1.3	Recognize that a chemical equation describes a reaction where pure substances change to produce one or more pure substances whose properties are different from the original substance(s).
	7	4. Life Science	1. Structure and Function of Living Systems	1. Tissues, organs and organ systems are composed of cells and function to serve the needs of all cells for food, air and waste removal.	7.4.1.1.1	Recognize that all cells do not look alike and that specialized cells in multicellular organisms are organized into tissues and organs that perform specialized functions. For example : Nerve cells and skin cells do not look the same because they are part odifferent organs and have different functions.
	7	4. Life Science	1. Structure and Function of Living Systems	1. Tissues, organs and organ systems are composed of cells and function to serve the needs of all cells for food, air and waste removal.	7.4.1.1.2	Describe how the organs in the respiratory, circulatory, digestive, nervous, skin and urinary systems interact to serve the needs of vertebrate organisms.
	7	4. Life Science	1. Structure and Function of Living Systems	2. All living organisms are composed of one or more cells which carry on the many functions needed to sustain life.	7.4.1.2.1	Recognize that cells carry out life functions, and that these functions are carried out in a similar way in all organisms, including, animals, plants, fungi, bacteria and protists.
	7	4. Life Science	1. Structure and Function of Living Systems	2. All living organisms are composed of one or more cells which carry on the many functions needed to sustain life.	7.4.1.2.2	Recognize that cells repeatedly divide to make more cells for growth and repair.
	7	4. Life Science	1. Structure and Function of Living Systems	2. All living organisms are composed of one or more cells which carry on the many functions needed to sustain life.	7.4.1.2.3	Use the presence of the cell wall and chloroplasts to distinguish between plant and animal cells. *For example:* Compare microscopic views of plant cells and animal cells.
BB, F, W, Spr, Su	**7**	4. Life Science	2. Interdependence Among Living Systems	1. Natural systems include a variety of organisms that interact with one another in several ways.	7.4.2.1.1	Identify a variety of populations and communities in an ecosystem and describe the relationships among the populations and communities in a stable ecosystem.
Su	**7**	4. Life Science	2. Interdependence Among Living Systems	1. Natural systems include a variety of organisms that interact with one another in several ways.	7.4.2.1.2	Compare and contrast the roles of organisms within the following relationships: predator/prey, parasite/host, and producer/consumer/decomposer.

BWS Lessons		Strand	Substrand	**Standard** "Understand that ...	Code	Benchmark
BB, F, Spr, Su	**7**	4. Life Science	2. Interdependence Among Living Systems	1. Natural systems include a variety of organisms that interact with one another in several ways.	7.4.2.1.3	Explain how the number of populations an ecosystem can support depends on the biotic resources available as well as abiotic factors such as amount of light and water, temperature range and soil composition.
BB, Spr, Su	**7**	4. Life Science	2. Interdependence Among Living Systems	2. The flow of energy and the recycling of matter are essential to a stable ecosystem.	7.4.2.2.1	Recognize that producers use the energy from sunlight to make sugars from carbon dioxide and water through a process called photosynthesis. This food can be used immediately, stored for later use, or used by other organisms.
Su	**7**	4. Life Science	2. Interdependence Among Living Systems	2. The flow of energy and the recycling of matter are essential to a stable ecosystem.	7.4.2.2.2	Describe the roles and relationships among producers, consumers, and decomposers in changing energy from one form to another in a food web within an ecosystem.
Su	**7**	4. Life Science	2. Interdependence Among Living Systems	2. The flow of energy and the recycling of matter are essential to a stable ecosystem.	7.4.2.2.3	Explain that the total amount of matter in an ecosystem remains the same as it is transferred between organisms and their physical environment, even though its form and location change. *For example:* Construct a food web to trace the flow of matter in an ecosystem.
	7	4. Life Science	3. Evolution in Living Systems	1. Reproduction is a characteristic of all organisms and is essential for the continuation of a species. Hereditary information is contained in genes which are inherited through asexual or sexual reproduction.	7.4.3.1.1	Recognize that cells contain genes and that each gene carries a single unit of information that either alone, or with other genes, determines the inherited traits of an organism.
	7	4. Life Science	3. Evolution in Living Systems	1. Reproduction is a characteristic of all organisms and is essential for the continuation of a species. Hereditary information is contained in genes which are inherited through asexual or sexual reproduction.	7.4.3.1.2	Recognize that in asexually reproducing organisms all the genes come from a single parent, and that in sexually reproducing organisms about half of the genes come from each parent.
	7	4. Life Science	3. Evolution in Living Systems	1. Reproduction is a characteristic of all organisms and is essential for the continuation of a species. Hereditary information is contained in genes which are inherited through asexual or sexual reproduction.	7.4.3.1.3	Distinguish between characteristics of organisms that are inherited and those acquired through environmental influences.
	7	4. Life Science	3. Evolution in Living Systems	2. Individual organisms with certain traits in particular environments are more likely than others to survive and have offspring.	7.4.3.2.1	Explain how the fossil record documents the appearance, diversification and extinction of many life forms.
	7	4. Life Science	3. Evolution in Living Systems	2. Individual organisms with certain traits in particular environments are more likely than others to survive and have offspring.	7.4.3.2.2	Use internal and external anatomical structures to compare and infer relationships between living organisms as well as those in the fossil record.
	7	4. Life Science	3. Evolution in Living Systems	2. Individual organisms with certain traits in particular environments are more likely than others to survive and have offspring.	7.4.3.2.3	Recognize that variation exists in every population and describe how a variation can help or hinder an organism’s ability to survive.
	7	4. Life Science	3. Evolution in Living Systems	2. Individual organisms with certain traits in particular environments are more likely than	7.4.3.2.4	Recognize that extinction is a common event and it can occur when the environment changes and a population's ability to adapt

				others to survive and have offspring.		is insufficient to allow its survival.
	7	4. Life Science	4. Human Interactions with Living Systems	1. Human ativity can change living organisms and ecosystems.	7.4.4.1.1	Describe examples where selective breeding has resulted in new varieties of cultivated plants and particular traits in domesticated animals.
BB, F, W, Spr, Su	**7**	4. Life Science	4. Human Interactions with Living Systems	1. Human ativity can change living organisms and ecosystems.	7.4.4.1.2	Describe ways that human activities can change the populations and communities in an ecosystem.
	7	4. Life Science	4. Human Interactions with Living Systems	2. Human beings are constantly interacting with other organisms that cause disease.	7.4.4.2.1	Explain how viruses, bacteria, fungi and parasites may infect the human body and interfere with normal body functions.
	7	4. Life Science	4. Human Interactions with Living Systems	2. Human beings are constantly interacting with other organisms that cause disease.	7.4.4.2.2	Recognize that a microorganism can cause specific diseases and that there are a variety of medicines available that can be used to combat a given microorganism.
	7	4. Life Science	4. Human Interactions with Living Systems	2. Human beings are constantly interacting with other organisms that cause disease.	7.4.4.2.3	Recognize that vaccines induce the body to build immunity to a disease without actually causing the disease itself.
	7	4. Life Science	4. Human Interactions with Living Systems	2. Human beings are constantly interacting with other organisms that cause disease.	7.4.4.2.4	Recognize that the human immune system protects against microscopic organisms and foreign substances that enter from outside the body and against some cancer cells that arise from within.

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BB, F, W, Spr, Su	**8**	1. The Nature of Science and Engineering	1. The Practice of Science	1. Science is a way of knowing about the natural world and is characterized by empirical criteria, logical argument and skeptical review.	8.1.1.1.1	Evaluate the reasoning in arguments in which fact and opinion are intermingled or when conclusions do not follow logically from the evidence given. *For example:* Evaluate the use of pH in advertizing products such as body care and gardening.
Spr, Su	**8**	1. The Nature of Science and Engineering	1. The Practice of Science	2. Scientific inquiry is a set of interrelated processes incorporating multiple approaches that are used to pose questions about the natural and engineered world and investigate phenomena.	8.1.1.2.1	Use logical reasoning and imagination to develop descriptions, explanations, predictions and models based on evidence.
	8	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	2. Men and women throughout the history of all cultures, including Minnesota American Indian tribes and communities, have been involved in engineering design and scientific inquiry.	8.1.3.2.1	Describe examples of important contributions to the advancement of science, engineering and technology made by individuals representing different groups and cultures at different times in history.
BB, F, W, Spr, Su	**8**	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	3. Science and engineering operate in the context of society and both influence and are influenced by this context.	8.1.3.3.1	Explain how scientific laws and engineering principles, as well as economic, political, social,and ethical expectations, must be taken into account in designing engineering solutions or conducting scientific investigations.
BB, F, W, Spr, Su	**8**	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	3. Science and engineering operate in the context of society and both influence and are influenced by this context.	8.1.3.3.2	Understand that scientific knowledge is always changing as new technologies and information enhance observations and analysis of data. *For example:* Analyze how new telescopes have provided new information about the universe.
BB, F, W, Spr, Su	**8**	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	3. Science and engineering operate in the context of society and both influence and are influenced by this context.	8.1.3.3.3	Provide examples of how advances in technology have impacted how people live, work and interact.

BB, F, W, Spr, Su	**8**	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	4. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	8.1.3.4.1	Use maps, satellite images and other data sets to describe patterns and make predictions about local and global systems in Earth science contexts. *For example:* Use data or satellite images to identify locations of earthquakes and volcanoes, ocean surface temperatures, or weather patterns.
BB, F, W, Spr, Su	**8**	1. The Nature of Science and Engineering	3. Interactions Among Science, Technology, Engineering, Mathematics and Society	4. Current and emerging technologies have enabled humans to develop and use models to understand and communicate how natural and designed systems work and interact.	8.1.3.4.2	Determine and use appropriate safety procedures, tools, measurements, graphs and mathematical analyses to describe and investigate natural and designed systems in Earth and physical science contexts.
W, Spr, Su	**8**	2. Physical Science	1. Matter	1. Pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.	8.2.1.1.1	Distinguish between a mixture and a pure substance and use physical properties including color, solubility, density, melting point and boiling point to separate mixtures and identify pure substances.
	8	2. Physical Science	1. Matter	1. Pure substances can be identified by properties which are independent of the sample of the substance and the properties can be explained by a model of matter that is composed of small particles.	8.2.1.1.2	Use physical properties to distinguish between metals and nonmetals.
	8	2. Physical Science	1. Matter	2. Substances can undergo physical and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	8.2.1.2.1	Identify evidence of chemical changes, including color change, gas evolution, solid formation and temperature change.
W, Su	**8**	2. Physical Science	1. Matter	2. Substances can undergo physical and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	8.2.1.2.2	Distinguish between chemical and physical changes in matter.
W, Su	**8**	2. Physical Science	1. Matter	2. Substances can undergo physical and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	8.2.1.2.3	Use the particle model of matter to explain how mass is conserved during physical and chemical changes in a closed system.
Su	**8**	2. Physical Science	1. Matter	2. Substances can undergo physical and chemical changes which may change the properties of the substance but do not change the total mass in a closed system.	8.2.1.2.4	Recognize that acids are compounds whose properties include a sour taste, characteristic color changes with litmus and other acid/base indicators, and the tendency to react with bases to produce a salt and water.
	8	2. Physical Science	3. Energy	1. Waves involve the transfer of energy without the transfer of matter.	8.2.3.1.1	Explain how seismic waves transfer energy through the layers of the Earth and across its surface.
	8	3. Earth Science	1. Earth Structure and Processes	1. The movement of tectonic plates results from interactions among the lithosphere, mantle, and core.	8.3.1.1.1	Recognize that the Earth is composed of layers, and describe the properties of the layers, including the lithosphere, mantle and core.

	8	3. Earth Science	1. Earth Structure and Processes	1. The movement of tectonic plates results from interactions among the lithosphere, mantle, and core.	8.3.1.1.2	Correlate the distribution of ocean trenches, mid-ocean ridges and mountain ranges to volcanic and seismic activity.
	8	3. Earth Science	1. Earth Structure and Processes	1. The movement of tectonic plates results from interactions among the lithosphere, mantle, and core.	8.3.1.1.3	Recognize that major geological events, such as earthquakes, volcanic eruptions and mountain building, result from the slow movement of tectonic plates.
Su	**8**	3. Earth Science	1. Earth Structure and Processes	2. Landforms are the result of the combination of constructive and destructive processes.	8.3.1.2.1	Explain how landforms result from the processes of crustal deformation, volcanic eruptions, weathering, erosion and deposition of sediment.
W, Su	**8**	3. Earth Science	1. Earth Structure and Processes	2. Landforms are the result of the combination of constructive and destructive processes.	8.3.1.2.2	Explain the role of weathering, erosion and glacial activity in shaping Minnesota's current landscape.
	8	3. Earth Science	1. Earth Structure and Processes	3. Rocks and rock formations indicate evidence of the materials and conditions that produced them.	8.3.1.3.1	Interpret successive layers of sedimentary rocks and their fossils to infer relative ages of rock sequences, past geologic events, changes in environmental conditions, and the appearance and extinction of life forms.
	8	3. Earth Science	1. Earth Structure and Processes	3. Rocks and rock formations indicate evidence of the materials and conditions that produced them.	8.3.1.3.2	Classify and identify rocks and minerals using characteristics including, but not limited to, density, hardness and streak for minerals; and texture and composition for rocks.
Su	**8**	3. Earth Science	1. Earth Structure and Processes	3. Rocks and rock formations indicate evidence of the materials and conditions that produced them.	8.3.1.3.3	Relate rock composition and texture to physical conditions at the time of formation of igneous, sedimentary and metamorphic rock.
F, Spr	**8**	3. Earth Science	2. Interdependence Within the Earth system	1. The sun is the principal external energy source for the Earth.	8.3.2.1.1	Explain how the combination of the Earth's tilted axis and revolution around the sun causes the progression of seasons.
	8	3. Earth Science	2. Interdependence Within the Earth system	1. The sun is the principal external energy source for the Earth.	8.3.2.1.2	Recognize that oceans have a major effect on global climate because water in the oceans holds a large amount of heat.
BB, W	**8**	3. Earth Science	2. Interdependence Within the Earth system	1. The sun is the principal external energy source for the Earth.	8.3.2.1.3	Explain how heating of Earth's surface and atmosphere by the sun drives convection within the atmosphere and hydrosphere producing winds, ocean currents and the water cycle, as well as influencing global climate.
BB	**8**	3. Earth Science	2. Interdependence Within the Earth system	2. Patterns of atmospheric movement influence global climate and local weather.	8.3.2.2.1	Describe how the composition and structure of the Earth's atmosphere affects energy absorption, climate, and the distribution of particulates and gases. For example: Certain gases contribute to the greenhouse effect.
W	**8**	3. Earth Science	2. Interdependence Within the Earth system	2. Patterns of atmospheric movement influence global climate and local weather.	8.3.2.2.2	Analyze changes in wind direction, temperature, humidity and air pressure and relate them to fronts and pressure systems.
W	**8**	3. Earth Science	2. Interdependence Within the	2. Patterns of atmospheric movement influence global climate and local weather.	8.3.2.2.3	Relate global weather patterns to patterns in regional and local weather.

			Earth system			
BB, W, Spr	**8**	3. Earth Science	2. Interdependence Within the Earth system	3. Water, which covers the majority of the Earth's surface, circulates through the crust, oceans and atmosphere in what is known as the water cycle.	8.3.2.3.1	Describe the location, composition and use of major water reservoirs on the Earth, and the transfer of water among them.
BB, F, Spr, Su	**8**	3. Earth Science	2. Interdependence Within the Earth system	3. Water, which covers the majority of the Earth's surface, circulates through the crust, oceans and atmosphere in what is known as the water cycle.	8.3.2.3.2	Describe how the water cycle distributes materials and purifies water. For example: Dissolved gases can change the chemical composition of substances on Earth. Another example: Waterborne disease.
F	**8**	3. Earth Science	3. The Universe	1. The Earth is the third planet from the sun in a system that includes the moon, the sun seven other planets and their moons and smaller objects.	8.3.3.1.1	Recognize that the sun is a medium sized star, one of billions of stars in the Milky Way galaxy, and the closest star to Earth.
F, Su	**8**	3. Earth Science	3. The Universe	1. The Earth is the third planet from the sun in a system that includes the moon, the sun seven other planets and their moons and smaller objects.	8.3.3.1.2	Describe how gravity and inertia keep most objects in the solar system in regular and predictable motion.
	8	3. Earth Science	3. The Universe	1. The Earth is the third planet from the sun in a system that includes the moon, the sun seven other planets and their moons and smaller objects.	8.3.3.1.3	Recognize that gravitational force exists between any two object and describe how the masses of the objects and distance between them affect the force.
	8	3. Earth Science	3. The Universe	1. The Earth is the third planet from the sun in a system that includes the moon, the sun seven other planets and their moons and smaller objects.	8.3.3.1.4	Compare and contrast the sizes, locations, and compositions of the planets and moons in our solar system.
	8	3. Earth Science	3. The Universe	1. The Earth is the third planet from the sun in a system that includes the moon, the sun seven other planets and their moons and smaller objects.	8.3.3.1.5	Use the predictable motions of the Earth around its own axis and around the sun, and of the moon around the Earth, to explain day length, the phases of the moon, and eclipses.
	8	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	8.3.4.1.1	Describe how mineral and fossil fuel resources have formed over millions of years, and explain why these resources are finite and nonrenewable over human time frames.
BB, F, W, Spr, Su	**8**	3. Earth Science	4. Human Interactions with Earth Systems	1. In order to maintain and improve their existence humans interact with and influence Earth systems.	8.3.4.1.2	Recognize that land and water use practices affect natural processes and that natural processes interfere and interact with human systems. *For example:* Levees change the natural flooding process of a river. *Another example:* Agricultural runoff influences natural systems far from the source.

Next Generations Science Standards

In this section the performance expectations of the Next Generation Science Standards that have great potential to be met in partnership with a field experience at the Blaine Wetland Sanctuary. The academic standards (aka performance expectations) are listed by grade level, from Kindergarten through 8th grade. Each contains a web link, and a more complete listing can be found at www.nextgenscience.org.

K-LS1-1 From Molecules to Organisms: Structures and Processes
Use observations to describe patterns of what plants and animals (including humans) need to survive.
Performance Expectation
Grade: K-2

K-ESS2-1 Earth's Systems
Use and share observations of local weather conditions to describe patterns over time.
Performance Expectation
Grade: K-2

K-ESS2-2 Earth's Systems
Construct an argument supported by evidence for how plants and animals (including humans) can change the environment to meet their needs.
Performance Expectation
Grade: K-2

K-ESS3-1 Earth and Human Activity
Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.
Performance Expectation
Grade:
K-2

K-ESS3-2 Earth and Human Activity
Ask questions to obtain information about the purpose of weather forecasting to prepare for, and respond to, severe weather.*
Performance Expectation
Grade: K-2

K-ESS3-3 Earth and Human Activity
Communicate solutions that will reduce the impact of humans on the land, water, air, and/or other living things in the local environment.*
Performance Expectation
Grade:
K-2

1-LS1-1 From Molecules to Organisms: Structures and Processes
Use 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.*
Performance Expectation
Grade: K-2

1-LS1-2 From Molecules to Organisms: Structures and Processes
Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.
Performance Expectation
Grade: K-2

1-LS3-1 Heredity: Inheritance and Variation of Traits
Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
Performance Expectation
Grade: K-2

1-ESS1-2 Earth's Place in the Universe
Make observations at different times of year to relate the amount of daylight to the time of year.
Performance Expectation
Grade: K-2

2-PS1-1 Matter and Its Interactions
Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
Performance Expectation
Grade: K-2

2-PS1-2 Matter and Its Interactions
Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.*
Performance Expectation
Grade: K-2

2-PS1-3 Matter and Its Interactions
Make observations to construct an evidence-based account of how an object made of a small set of pieces can be disassembled and made into a new object.
Performance Expectation
Grade: K-2

2-PS1-4 Matter and Its Interactions
Construct an argument with evidence that some changes caused by heating or cooling can be reversed and some cannot.

Performance Expectation
Grade: K-2

2-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Plan and conduct an investigation to determine if plants need sunlight and water to grow.
Performance Expectation
Grade: K-2

2-LS4-1 Biological Evolution: Unity and Diversity
Make observations of plants and animals to compare the diversity of life in different habitats.
Performance Expectation
Grade: K-2

2-ESS1-1 Earth's Place in the Universe
Use information from several sources to provide evidence that Earth events can occur quickly or slowly.
Performance Expectation
Grade: K-2

2-ESS2-1 Earth's Systems
Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*
Performance Expectation
Grade: K-2

2-ESS2-2 Earth's Systems
Develop a model to represent the shapes and kinds of land and bodies of water in an area.
Performance Expectation
Grade: K-2

2-ESS2-3 Earth's Systems
Obtain information to identify where water is found on Earth and that it can be solid or liquid.
Performance Expectation
Grade: K-2

K-2-ETS1-1 Engineering Design
Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
Performance Expectation
Grade: K-2

K-2-ETS1-2 Engineering Design
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.
Performance Expectation
Grade: K-2

3-LS1-1 From molecules to Organisms: Structures and Processes
Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
Performance Expectation
Grade: 3-5

3-LS3-2 Heredity: Inheritance and Variation of Traits
Use evidence to support the explanation that traits can be influenced by the environment.
Performance Expectation
Grade: 3-5

3-LS4-3 Biological Evolution: Unity and Diversity
Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.
Performance Expectation
Grade: 3-5

3-LS4-4 Biological Evolution: Unity and Diversity
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.*
Performance Expectation
Grade: 3-5

4-LS1-1 From Molecules to Organisms: Structures and Processes
Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.
Performance Expectation
Grade: 3-5

4-LS1-2 From Molecules to Organisms: Structures and Processes
Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways.
Performance Expectation
Grade: 3-5

4-ESS2-1 Earth's Systems
Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.
Performance Expectation
Grade: 3-5

4-ESS2-2 Earth's Systems
Analyze and interpret data from maps to describe patterns of Earth's features.
Performance Expectation
Grade: 3-5

4-ESS3-2 Earth and Human Activity
Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.*
Performance Expectation
Grade: 3-5

5-PS1-2 Matter and Its Interactions
Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved.
Performance Expectation
Grade: 3-5

5-PS1-3 Matter and Its Interactions
Make observations and measurements to identify materials based on their properties.
Performance Expectation
Grade: 3-5

5-PS1-4 Matter and Its Interactions
Conduct an investigation to determine whether the mixing of two or more substances results in new substances.
Performance Expectation
Grade: 3-5

5-PS2-1 Motion and Stability: Forces and Interactions
Support an argument that the gravitational force exerted by Earth on objects is directed down.
Performance Expectation
Grade: 3-5

5-PS3-1 Energy

Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.
Performance Expectation
Grade: 3-5

5-LS1-1 From Molecules to Organisms: Structures and Processes
Support an argument that plants get the materials they need for growth chiefly from air and water.
Performance Expectation
Grade: 3-5

5-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
Performance Expectation
Grade: 3-5

5-ESS1-2 Earth's Place in the Universe
Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.
Performance Expectation
Grade: 3-5

5-ESS2-1 Earth's Systems
Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
Performance Expectation
Grade: 3-5

5-ESS2-2 Earth's Systems
Describe and graph the amounts and percentages of water and fresh water in various reservoirs to provide evidence about the distribution of water on Earth.
Performance Expectation
Grade: 3-5

5-ESS3-1 Earth and Human Activity
Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
Performance Expectation
Grade: 3-5

3-5-ETS1-1 Engineering Design

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
Performance Expectation
Grade: 3-5

3-5-ETS1-2 Engineering Design
Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
Performance Expectation
Grade: 3-5

3-5-ETS1-3 Engineering Design
Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.
Performance Expectation
Grade: 3-5

MS-PS1-2 Matter and its Interactions
Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.
Performance Expectation
Grade: Middle School (6-8)

MS-PS1-3 Matter and its Interactions
Gather and make sense of information to describe that synthetic materials come from natural resources and impact society.
Performance Expectation
Grade: Middle School (6-8)

MS-PS1-4 Matter and its Interactions
Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.
Performance Expectation
Grade: Middle School (6-8)

MS-PS3-3 Energy
Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.*
Performance Expectation
Grade: Middle School (6-8)

MS-LS1-4 From Molecules to Organisms: Structures and Processes
Use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.

Performance Expectation
Grade: Middle School (6-8)

MS-LS1-5 From Molecules to Organisms: Structures and Processes
Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
Performance Expectation
Grade: Middle School (6-8)

MS-LS1-6 From Molecules to Organisms: Structures and Processes
Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
Performance Expectation
Grade: Middle School (6-8)

MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics
Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
Performance Expectation
Grade: Middle School (6-8)

MS-LS2-2 Ecosystems: Interactions, Energy, and Dynamics
Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
Performance Expectation
Grade: Middle School (6-8)

MS-LS2-3 Ecosystems: Interactions, Energy, and Dynamics
Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
Performance Expectation
Grade: Middle School (6-8)

MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics
Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
Performance Expectation
Grade: Middle School (6-8)

MS-LS2-5 Ecosystems: Interactions, Energy, and Dynamics
Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*
Performance Expectation
Grade: Middle School (6-8)

MS-ESS2-1 Earth's Systems
Develop a model to describe the cycling of Earth's materials and the flow of energy that drives this process.
Performance Expectation
Grade: Middle School (6-8)

MS-ESS2-2 Earth's Systems
Construct an explanation based on evidence for how geoscience processes have changed Earth's surface at varying time and spatial scales.
Performance Expectation
Grade: Middle School (6-8)

MS-ESS2-4 Earth's Systems
Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.
Performance Expectation
Grade: Middle School (6-8)

MS-ESS3-1 Earth and Human Activity
Construct a scientific explanation based on evidence for how the uneven distributions of Earth's mineral, energy, and groundwater resources are the result of past and current geoscience processes.
Performance Expectation
Grade: Middle School (6-8)

MS-ESS3-2 Earth and Human Activity
Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.
Performance Expectation
Grade: Middle School (6-8)

MS-ESS3-3 Earth and Human Activity
Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.*
Performance Expectation
Grade: Middle School (6-8)

MS-ETS1-1 Engineering Design
Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
Performance Expectation
Grade: Middle School (6-8)

MS-ETS1-2 Engineering Design

Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
Performance Expectation
Grade: Middle School (6-8)

MS-ETS1-3 Engineering Design
Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
Performance Expectation
Grade: Middle School (6-8)

MS-ETS1-4 Engineering Design
Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.
Performance Expectation
Grade: Middle School (6-8)