Sciend	vestigationsinvestigations in the classroom, laboratory, and/or field to test students' ideas and questions, and will organize and collect data to provide evidence to support claims the students make about phenomena.the diversity of life in different habitats. (P: 3, CC: 1, CI: LS Emphasis is on the diversity of living things in a variety of different habitats and patterns across those habitats.Strand 2 - Looking at data and empirical evidence to understand phenomena or solve problemsOL.2.1.1.3 Record and use observations to describe patter what plants and animals (including humans) need to surv of those patterns, and possible relationships between variables.OL.2.1.1.3 Record and use observations to describe pattern animals need to take in food, but plants do not; different animals need different kinds of food; plants require light; that all living things need water.	cience	Wolves	Minnesota Raptors	Wild About Wildlife - Littles	Cold Blooded Creatures	Student Research	Outreach - Wolves	Outreach - Raptors	Outreach - Wildlife	Outreach - Unlovable Animals
	Kindergarten										
	Strand 1 - Exploring phenomena or engineering problems										
1.2 Planning and carrying out investigations	investigations in the classroom, laboratory, and/or field to test students' ideas and questions, and will organize and collect data to provide evidence to support claims the	OL.1.2.1.2 Make observations of plants and animals to compare the diversity of life in different habitats. (P: 3, CC: 1, CI: LS4) Emphasis is on the diversity of living things in a variety of different habitats and patterns across those habitats.	x	x	x	x	x	x	x	x	x
	• ·										
2.1 Analyzing and interpreting data	data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between	(P: 4, CC: 1, CI: LS1) Examples of patterns may include that animals need to take in food, but plants do not; different animals need different kinds of food; plants require light; and	x	x	x	x	x	x	x	x	x
	Strand 3 - Developing possible explanations of phenomena or designing solutions to engineering problems										
3.1 Developing and using models	3.1.1 Students will be able to develop, revise, and use models to represent the students' understanding of phenomena or systems as they develop questions, predictions and/or explanations, and communicate ideas to others.	OL.3.1.1.1 Develop a simple model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. (P: 2, CC: 4, CI: LS2) Examples of relationships may include that deer eat buds and leaves, therefore, they usually live in forested areas; and grasses need sunlight, so they often grow in meadows. Examples of models may include food chains, collages, and/or sorting activities.	x	x	x	x	x	x	x	x	x

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	First Grade										L
	Strand 1 - Exploring phenomena or engineering problems										
1.1 Asking questions and defining problems	1.1.1 Students will be able to ask questions about aspects of the phenomena they observe, the conclusions they draw from their models or scientific investigations, each other's ideas, and the information they read.	1L.1.1.1 Ask questions based on observations about the similarities and differences between young plants and animals and their parents. (P: 1, CC: 2, CI: LS3) Examples of observations may include leaves from the same kind of plant are the same shape but can differ in size; and a particular breed of dog looks like its parents but is not exactly the same.	x	x	x	x	x	x	x	x	x
	Strand 3 - Developing possible explanations of phenomena or designing solutions to engineering problems										
3.1 Developing and using models	3.1.1 Students will be able to develop, revise, and use models to represent the students' understanding of phenomena or systems as they develop questions, predictions and/or explanations, and communicate ideas to others	1L.3.1.1.1 Develop a simple model based on evidence to represent how plants or animals use their external parts to help them survive, grow, and meet their needs. (P: 2, CC: 6, CI: LS1) Examples of external parts may include acorn shells, plant roots, thorns on branches, turtle shells, animal scales, animal tails, and animal quills.	x	x	x	x	x	x	x	x	x
3.2 Constructing explanations and designing solutions	3.2.2 Students will be able to use their understanding of scientific principles and the engineering design process to design solutions that meet established criteria and constraints.*	1L.3.2.2.2 Plan and 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.* (P: 6, CC: 6, CI: LS1, ETS2) Examples of human problems that can be solved by mimicking plant or animal solutions may include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills, and detecting intruders by mimicking eyes and ears.	x	x	x	x	x	x	x	x	x
	Strand 4 - Communicating reasons, arguments and ideas to others										
	Second Grade										
	Strand 3 - Developing possible explanations of phenomena or designing solutions to engineering problems										

3.2 Constructing explanations and designing solutions	3.2.2 Students will be able to use their understanding of scientific principles and the engineering design process to design solutions that meet established criteria and constraints.*	2L.3.2.2.1 Engineer a device that mimics the structures and functions of plants or animals in seed dispersal.* (P: 6, CC: 6, CI: LS2, ETS1) Emphasis is on how specific structures have particular functions. Examples of seed dispersal by animals may include feeding and subsequent elimination of seeds, or attachment of seeds/pollen to animal structures. Examples of seed dispersal by plants may include various wind-catching designs (as in dandelions or maple trees) or colors and smells that attract pollinators.	x	x	x	x	x	x	x	x	x
	Strand 4 - Communicating reasons, arguments and ideas to others										
4.1 Engaging in Arguing from evidence	4.1.1 Students will be able to engage in argument from evidence for the explanations the students construct, defend and revise their interpretations when presented with new evidence, critically evaluate the scientific arguments of others, and present counter arguments.	2L.4.1.1.1 Construct an argument with evidence that evaluates how in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. (P: 7, CC: 2, CI: LS4, ETS2) Emphasis is on the interdependence of parts of a system (organisms and their habitat). Examples of habitats should include those found in Minnesota, such as a wetland, prairie, or garden. Examples of evidence may include needs and characteristics of the organisms and habitats involved.	x	x	x	x	x	x	x	x	x
	Third Grade										
	Strand 3 - Developing possible explanations of phenomena or designing solutions to engineering										
3.1 Developing and using models	3.1.1 Students will be able to develop, revise, and use models to represent the students' understanding of phenomena or systems as they develop questions, predictions and/or explanations, and communicate ideas to others.	3L.3.1.1.2 Develop multiple models to describe how organisms have unique and diverse life cycles but all have birth, growth, reproduction, and death in common. (P: 2, CC: 4, CI: LS1) Emphasis is on the pattern of changes organisms go through during their life. Examples of models may include diagrams, drawings, physical models, or computer programs.	x	x	x	x	x	x	x	x	X

3.2 Constructing explanations and designing solutions	3.2.1 Students will be able to apply scientific principles and empirical evidence (primary or secondary) to explain the causes of phenomena or identify weaknesses in explanations developed by the students or others.	3L.3.2.1.1 Construct an explanation using evidence from various sources for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing. (P: 6, CC: 2. CI: LS4) Examples of cause and effect relationships may include how individual plants of the same species with different length thorns may be more or less likely to be eaten by predators; or animals that have better camouflage coloration than others of their species may be more likely to survive and therefore more likely to leave offspring.	x	x	x	x	x	x	x	x	x
	Strand 4 - Communicating reasons, arguments and ideas										
4.1 Engaging in Arguing from evidence	to others 4.1.1 Students will be able to engage in argument from evidence for the explanations the students construct, defend and revise their interpretations when presented with new evidence, critically evaluate the scientific arguments of others, and present counter arguments.	3L.4.1.1.1 Construct an argument about strategies animals use to survive. (P: 7, CC: 2, CI: LS2) Emphasis is on group behavior and how being part of a group helps animals obtain food, defend themselves, and cope with changes. Examples of animals should include wolves or other animals that live in Minnesota.	x	x	x	x	x	x	x	x	x
4.2 Obtaining, evaluating and communicating information	4.2.1 Students will be able to read and interpret multiple sources to obtain information, evaluate the merit and validity of claims and design solutions, and communicate information, ideas, and evidence in a variety of formats.	3L.4.2.1.1 Obtain information from various types of media to support an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction.** (P: 8, CC: 4, CI: LS1) Examples of structures may include thorns, stems, roots, colored petals, heart, stomach, lungs, brain, and skin. Examples of media may include electronic sources.	x	x	x	x	x	x	x	x	x
	Fourth Grade										
	Strand 4 - Communicating reasons, arguments and ideas to other										
4.1 Engaging in Arguing from evidence	4.1.1 Students will be able to engage in argument from evidence for the explanations the students construct, defend and revise their interpretations when presented with new evidence, critically evaluate the scientific arguments of others, and present counter arguments.	4L.4.1.1.1 Construct or support an argument that traits can be influenced by different environments. (P: 7, CC: 2, CI: LS3) Emphasis of the practice is on using evidence, data and/or a model to support an argument. Examples of the environment affecting a trait may include the stunted growth of a typically tall plant grown with insufficient water or an animal's weight being influenced by the availability of food.	x	x	x	x	x	x	x	x	×

4.2 Obtaining, evaluating and communicating information	4.2.1 Students will be able to read and interpret multiple sources to obtain information, evaluate the merit and validity of claims and design solutions, and communicate information, ideas, and evidence in a variety of formats.	4L.4.2.1.2 Obtain information from various media sources to determine that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.** (P: 8, CC: 1, CI: LS3) Emphasis of the practice is to compare and/or combine information across texts and other reliable media. Emphasis is on organisms other than humans and the patterns in traits between offspring and their parents or among siblings.	x	x	x	x	x	x	x	x	x
	Fifth Grade										
	Strand - 3 Developing possible explanations of phenomena or designing solutions to engineering										
	4.1.2 Students will be able to argue from evidence to justify the best solution to a problem or to compare and evaluate competing designs, ideas, or methods.*	5L.4.1.2.1 Evaluate the merit of a solution to a problem caused by changes in plant and animal populations as a result of environmental changes.* (P: 7, CC: 4, CI: LS4, ETS1) Emphasis is on evaluating solutions (based on evidence and design criteria and constraints), not developing new solutions. Examples of environmental changes may include land characteristics, water distribution, temperature, food availability, or the presence of other organisms.	X	x	x	x		x	x	x	x
	Sixth Grade			_							<u> </u>
	Seventh Grade										
	Strand 1 - Exploring phenomena or engineering problems										
1.1 Asking questions and defining problems	1.1.1 Students will be able to ask questions about aspects of the phenomena they observe, the conclusions they draw from their models or scientific investigations, each other's ideas, and the information they read.	7L.1.1.2 Ask questions that arise from careful observations of phenomena or models to clarify and or seek additional information about how changes in genes can affect organisms. (P: 1, CC: 6, CI: LS3) Examples of changes may include neutral, harmful, or beneficial effects to the structure and function of the organism.	x	x	x	x	x	x	x	x	x
	Strand 2 - Looking at data and empirical evidence to understand phenomena or solve problems										

2.1 Analyzing and interpreting data	2.1.1 Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.	7L.2.1.1.1 Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.** (P: 4, CC: 2, CI: LS2) Emphasis is on cause and effect relationships between resources and growth of individual organisms and the number or organisms in ecosystems during periods of abundant and scarce resources. Examples may include populations of MN deer, moose, wolf, scavengers or aquatic populations in Lake Superior or algal blooms in lakes and ponds. Examples of evidence may include the use of flow charts to organize and sequence the algorithm, and to show relationships.	x	x	x	x	x	x	x	x	x
2.1 Analyzing and interpreting data	2.1.1 Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.	7L.2.1.1.2 Analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth. (P: 4, CC: 1, CI: LS4) Emphasis is on finding patterns of changes in the level of complexity of anatomical structures in organisms and the chronological order of fossil appearance in the rock layers.	x	x	x	x	x	x	x	x	x
	Strand 3 - Developing possible explanations of phenomena or designing solutions to engineering problems										
3.1 Developing and using models	3.1.1 Students will be able to develop, revise, and use models to represent their understanding of phenomena or systems as they develop questions, predictions and/or explanations and communicate ideas to others.	7L.3.1.1.3 Develop and use a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem. (P: 2, CC: 5, CI: LS2) Emphasis is on describing the conservation of matter and flow of energy into and out of various ecosystems.	x	x	x	x	x	x	x	x	x
	Ninth - Twelfth Grade										
	Strand 2 - Looking at data and empirical evidence to understand phenomena or solve problems										
2.1 Analyzing and interpreting data	2.1.1 Students will be able to represent observations and data in order to recognize patterns in the data, the meaning of those patterns, and possible relationships between variables.	9L.2.1.1.1 Apply concepts of probability to explain and predict the variation and distribution of expressed traits in a population. (P: 4, CC: 3, CI: LS3) <i>Examples of</i> <i>traits in human groups may include lactose</i> <i>intolerance, or high-altitude adaptation.</i>	x	x	x	x	x	x	x	x	x

	Strand 3 - Developing possible explanations of phenomena or designing solutions to engineering problems											
3.2 Constructing explanations and designing solutions	3.2.1 Students will be able to apply scientific principles and empirical evidence (primary or secondary) to explain the causes of phenomena or identify weaknesses in explanations developed by the students or others.	9L.3.2.1.5 Construct an explanation based on evidence for how natural selection leads to the adaptation of populations. (P: 6, CC: 2, CI: LS4) Emphasis is on using data to provide evidence for how specific biotic and abiotic differences in ecosystems contribute to a change in gene frequency over time, leading to adaptation of populations. Examples of selective forces may include long-term climate change, or variations in seasonal temperatures, pH, light cycles, geographic barriers, or in response to the evolution of other organisms.	x	x	×	x	x	×	×	×	x	x
	Strand 4 - Communicating reasons, arguments and ideas to others											
4.1 Arguing from evidence	4.1.1 Students will be able to engage in argument from evidence for the explanations the students construct, defend and revise their interpretations when presented with new evidence, critically evaluate the scientific arguments of others, and present counter arguments.	9L.4.1.1.1 Evaluate evidence for the role of group behavior on an individual's and species' chances to survive and reproduce. (P: 7, CC: 2, CI: LS2) Emphasis of the practice is on identifying evidence supporting the outcomes of group behavior, and developing logical and reasonable arguments based on evidence. Emphasis of the core idea is on distinguishing between group and individual behavior. Examples of group behavior may include herding, migratory behaviors, or various symbioses .		x	×	x	x		×	×	x	x