03 _ Life Science 1 - Where Have all the Creatures Gone?

Content Area: **Science**
Course(s):
Time Period: **Full Year**
Length: **8 Weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

Science and engineering—significant parts of human culture that represent some of the pinnacles of human achievement—are not only major intellectual enterprises but also can improve people's lives in fundamental ways. Although the intrinsic beauty of science and a fascination with how the world works have driven exploration and discovery for centuries, many of the challenges that face humanity now and in the future—related, for example, to the environment, energy, and health—require social, political, and economic solutions that must be informed deeply by knowledge of the underlying science and engineering.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Learning Set 1: What Can Cause Populations to Change?

How and why do organisms interact with their environment and what are the effects of these interactions? How do organisms interact with the living and nonliving environments to obtain matter and energy? What happens to ecosystems when the environment changes?

Learning Set 2: What Is Food for Living Things?

How do organisms live, grow, respond to their environment, and reproduce? How do the structures of organisms enable life's functions? How do organisms grow and develop? How do organisms obtain and use the matter and energy they need to live and grow? How do organisms detect, process, and use information about the environment? How do matter and energy move through an ecosystem? If energy is conserved, why do people say it is produced or used?

Learning Set 3: How Do Living Things Get Food from Other Organisms?

How do organisms live, grow, respond to their environment, and reproduce? How do organisms grow and develop? How and why do organisms interact with their environment and what are the effects of these interactions? How do matter and energy move through an ecosystem? What happens to ecosystems when the environment changes?

Learning Set 4: How Do Organisms Compete?

How and why do organisms interact with their environment and what are the effects of these interactions? How do matter and energy move through an ecosystem? What happens to ecosystems when the environment changes? What is the process for developing potential design solutions?

Learning Set 5 - Do Abiotic Factors Affect Populations?

Analyze and interpret data on abiotic factors that affect ecosystems and the organisms in them. Construct an

evidence-based explanation of what caused the trout population to change and apply this to other population changes in an independent research project.

CONTENT AREA STANDARDS

6-8.MS-ETS1-1	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.
6-8.MS-LS1-5	Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
6-8.MS-LS1-6	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.
6-8.MS-LS1-7	Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
6-8.MS-LS2-2	Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
6-8.MS-LS2-3	Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
6-8.MS-LS2-4	Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
6-8.MS-LS2-5	Evaluate competing design solutions for maintaining biodiversity and ecosystem services.
6-8.MS-LS1-4	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.
6-8.MS-LS2-1	Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.RST.6-8.1	Cite specific textual evidence to support analysis of science and technical texts.
LA.RST.6-8.2	Determine the central ideas or conclusions of a text; provide an accurate summary of the text distinct from prior knowledge or opinions.
LA.RST.6-8.7	Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table).
LA.WHST.6-8.2	Write informative/explanatory texts, including the narration of historical events, scientific

	procedures/experiments, or technical processes.
LA.WHST.6-8.7	Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
LA.WHST.6-8.8	Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.
LA.WHST.6-8.9	Draw evidence from informational texts to support analysis, reflection, and research.
MA.6.EE.C.9	Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation.
MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
MA.6.SP.A.2	Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
MA.6.SP.B.4	Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
MA.6.SP.B.5	Summarize numerical data sets in relation to their context, such as by:
MA.6.SP.B.5a	Reporting the number of observations.
MA.6.SP.B.5b	Describing the nature of the attribute under investigation, including how it was measured and its units of measurement.
MA.K-12.2	Reason abstractly and quantitatively.
TECH.9.4.8.CT.1	Evaluate diverse solutions proposed by a variety of individuals, organizations, and/or agencies to a local or global problem, such as climate change, and use critical thinking skills to predict which one(s) are likely to be effective (e.g., MS-ETS1-2).
TECH.9.4.8.CT.3	Compare past problem-solving solutions to local, national, or global issues and analyze the factors that led to a positive or negative outcome.

STUDENT LEARNING TARGETS

Declarative Knowledge

Students will understand that:

1. Food contains substances like protein, fat, sugar, and starch.
2. Food provides energy and building materials to organisms.
3. Animals get their energy and building materials from eating other animals and plants.
4. Plants make their energy and building materials using light and water.
5. Organisms in a food web are related through producer/consumer, predator/prey, and parasite/host relationships. Because of these relationships, one population affects others through direct and indirect interactions.
6. Organisms that live in an ecosystem are affected by the other organisms and by the abiotic factors in

that ecosystem.
7. All organisms in a food web are interconnected.
8. All plants and animals have special structures that perform the functions necessary for reproduction and eating.
9. Organisms in an ecosystem compete for limited resources like space, food, and water.
10. When there is not enough of a resource, individuals in the population die.

Procedural Knowledge

Students will be able to:

- 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.
- 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.
- Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- 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.
- Develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
- Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.
- Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.
- Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- Evaluate competing design solutions for maintaining biodiversity and ecosystem services.

EVIDENCE OF LEARNING

Formative Assessments

ETS1-1: The Engineering Design Concept Builder is designed to address the four Performance Expectations described in the Engineering and Design standards of the Framework for K-12. Etc.....

MS-LS1-4: Life Science 1: Reading 7.2: Sea Lamprey and Lake Trout, Reading 8.1: Plant Structures

MS-LS1-5: Life Science 1: Reading 4.2: Hydroponics

MS-LS1-6: Life Science 1: Activity 4.2: Do Plants Need Food?

MS-LS1-7: Life Science 1: Activity 3.1: What Do Organisms Use Food For?, Activity 3.2: Investigating What Is in Food, Activity 3.3: Investigation: Can We Prove a Substance Is Food?, Reading 3.3: Energizing Me, Activity 3.4: Writing a Scientific Explanation

MS-LS2-1: Life Science 1: Activity 2.1: Introducing the Trout Mystery, Activity 9.1: Exploring the NetLogo Model Ecosystem, Homework 9.2: Interpreting NetLogo Graphs

MS-LS2-2: Life Science 1: Activity 1.1: Interactions in Our World, Reading 1.1: Bacteria, Chimps, Peanuts, and Dolphins, Activity 1.2: Field Study, Homework 1.2: What Can Cause Populations to Change?, Activity 1.3: Setting Up the Driving Question Board, Reading 1.3: Wildlife Biologists at Work, Activity 6.1: Investigating the Sea Lamprey Background, Reading 6.2: There Are a Lot of Lamprey Out There!, Activity 7.3: Constructing a Scientific Explanation, Activity 9.2: Can All Three Populations Survive?, Reading 9.2: A Stable Ecosystem in the Park

MS-LS2-3: Life Science 1: Activity 4.1: Where Do Animals Get the Energy and Building Materials They Need?, Homework 4.2: What Do Trout Eat?, Activity 5.1: Food Chains and Food Webs, Activity 6.2: Adding the Sea Lamprey to the Great Lakes Food Web

MS-LS2-4: Life Science 1: Reading 2.1: What Caused These Population Changes?, Reading 5.1: Where Have All the Puffin Gone?, Activity 5.2: Changes in a Food Web, Reading 5.2: Fisherman's Journal, Activity 9.3: How Does an Invasive Species Affect a Food Web?, Homework 9.3: What Does the Invader Eat?, Reading 9.3: An Invader in Yellowstone National Park, Activity 10.1: How Does the Sea Lamprey Affect the Trout?, Activity 11.1: Worms and Moisture, Activity 13.1: What Is Causing the Trout to Change?, Activity 13.2: What Is Causing this Population Change?

MS-LS2-5: Life Science 1: Focal content of the unit is ecosystems.

Summative Assessments

- Benchmark Assessments
  - Multiple Choice Assessment administered at the end of each marking period.

Alternative Assessments

- Oral Presentations
- Questions for Comprehension

- Performance Tasks
- Scientific Journals/Notebooks
- Self-Assessment
- WebQuests

RESOURCES (Instructional, Supplemental, Intervention Materials)

IQWST Unit Materials for Life Science 1 Learning Set 1-4

A Framework For K-12 Science Education

Onlne Resources provided by IQWST not included in the program (to be used as support/reinforcement/enrichment): https://docs.google.com/spreadsheets/d/1VpyFCL4_50_-1w2NhcGpdNNZ2jj6aJJegcIUNCy_uzQ/pubhtml

INTERDISCIPLINARY CONNECTIONS

Collaboration with Math and Language Arts teachers is an essential part of the IQWST curriculum.

Information Writing

Current Events

Topography

Data collection/analysis

Computations

Statistics

Engineereering

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.

IQWST provides audio recording for all readings in student workbook-available through teacher portal online

Reading differentiation strategies are embedded in the IQWST program and all students prepare for reading through a 'Getting Reading' section which begins each reading.

The sections are desgined to engage students, generate interest, activate prior knowledge and provide a purpose for reading. Teachers use advance organizers for desired readings and to encourage students to plan and annote the passages.

A word wall is developed through vocabulary aquisition in the program. Students develop the word wall as words are learned in context and through experience in class. This helps to build meaning and understanding which support students when reading text.

Students are encouraged to ask questions and post them to the Driving Question Board. This DQB helps students develp a greater level of understanding and encourages students to work together to solve problems in and outside of class.

Supoort will be provided to students when writing in the student manual and use of teh computer, printing, and pasting into the manual is acceptable if there is a present need.