Unit 02: Web of Life

Content Area: **Template**
Course(s):
Time Period: **Full Year**
Length: **FY**
Status: **Published**

Standards Alignment

New Jersey Student Learning Standards

Practice 1. Asking questions (for science) and defining problems (for engineering)
Asking questions and defining problems in 3–5 builds on K–2 experiences and progresses to specifying qualitative relationships.

Ask questions about what would happen if a variable is changed.

Identify scientific (testable) and non-scientific (non-testable) questions.

Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.

Use prior knowledge to describe problems that can be solved.

Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.

Practice 2. Developing and using models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

Collaboratively develop and/or revise a model based on evidence that shows the relationships among variables for frequent and regular occurring events.

Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.

Develop and/or use models to describe and/or predict phenomena.

Develop a diagram or simple physical prototype to convey a proposed object, tool, or process.

Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.

Practice 3. Planning and carrying out investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.

Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered.

Evaluate appropriate methods and/or tools for collecting data.

Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.

Make predictions about what would happen if a variable changes.

Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.

Practice 4. Analyzing and interpreting data
Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.

Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.

Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.

Practice 5. Using mathematics and computational thinking
Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.

Organize simple data sets to reveal patterns that suggest relationships.

Describe, measure, estimate, and/or graph quantities (e.g., area, volume, weight, time) to address scientific and engineering questions and problems.

Create and/or use graphs and/or charts generated from simple algorithms to compare alternative solutions to an engineering problem.

Practice 6. Constructing explanations (for science) and designing solutions (for engineering)
Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).

Use evidence (e.g., measurements, observations, patterns) to construct or support an explanation or design a solution to a problem.

Identify the evidence that supports particular points in an explanation.

Apply scientific ideas to solve design problems.

Practice 7. Engaging in argument from evidence
Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

Use data to evaluate claims about cause and effect.

Connections to the Nature of Science: Most Closely Associated with Practices
Scientific Investigations Use a Variety of Methods

Science methods are determined by questions.

Scientific Knowledge is Based on Empirical Evidence

Science findings are based on recognizing patterns.

Scientific Knowledge is Open to Revision in Light of New Evidence

Science explanations can change based on new evidence.

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

Science theories are based on a body of evidence and many tests.

Science explanations describe the mechanisms for natural events.

Crosscutting Statements
2. Cause and Effect: Mechanism and Prediction – Events have causes, sometimes simple, sometimes multifaceted. Deciphering causal relationships, and the mechanisms by which they are mediated, is a major activity of science and engineering.

Cause and effect relationships are routinely identified, tested, and used to explain change.

4. Systems and System Models – A system is an organized group of related objects or components; models can be used for understanding and predicting the behavior of systems.

A system is a group of related parts that make up a whole and can carry out functions its individual parts cannot.

A system can be described in terms of its components and their interactions.

Connections to the Nature of Science: Most Closely Associated with Crosscutting Concepts
Science is a Way of Knowing

Science is a way of knowing that is used by many people.

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

Science assumes consistent patterns in natural systems.

Science is a Human Endeavor

Science affects everyday life.

LS1: From Molecules to Organisms: Structures and Processes
LS1.C: Organization for Matter and Energy Flow in Organisms

Plants acquire their material forgrowth chiefly from air and water. (5-LS1-1)

LS2: Ecosystems: Interactions, Energy, and Dynamics
LS2.A: Interdependent Relationships in Ecosystems

The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

Matter cycles between the air and soil and among plants, animals, andmicrobes as these organisms live and die. Organisms obtain gases,and water, from the environment,and release waste matter (gas,liquid, or solid) back into theenvironment. (5-LS2-1)

PS3: Energy
PS3.D: Energy in Chemical Processes and Everyday Life

The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)

SCI.4-PS3	Energy
SCI.2-LS2	Ecosystems: Interactions, Energy, and Dynamics
SCI.4.PS3.D	Energy in Chemical Processes and Everyday Life
SCI.2.LS2.A	Interdependent Relationships in Ecosystems
SCI.5-LS1	From Molecules to Organisms: Structures and Processes
SCI.5.LS1.C	Organization for Matter and Energy Flow in Organisms
SCI.5.LS2.B	Cycles of Matter and Energy Transfer in Ecosystems

Integration of Career Readiness, Life Literacies and Key Skills

CRP.K-12.CRP1	Act as a responsible and contributing citizen and employee.
CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP3	Attend to personal health and financial well-being.
CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP5	Consider the environmental, social and economic impacts of decisions.
CRP.K-12.CRP6	Demonstrate creativity and innovation.
CRP.K-12.CRP7	Employ valid and reliable research strategies.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP9	Model integrity, ethical leadership and effective management.
CRP.K-12.CRP10	Plan education and career paths aligned to personal goals.
CRP.K-12.CRP11	Use technology to enhance productivity.
CRP.K-12.CRP12	Work productively in teams while using cultural global competence.

Technology / Integration of Computer Science and Design Thinking

TECH.8.1.5	Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
TECH.8.1.5.A	Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations.
TECH.8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
TECH.8.2.5	Technology Education, Engineering, Design, and Computational Thinking - Programming: All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.
TECH.8.2.5.D	Abilities for a Technological World: The designed world is the product of a design process that provides the means to convert resources into products and systems.
TECH.8.2.5.D.3	Follow step by step directions to assemble a product or solve a problem.

Interdisciplinary Connections: NJSLS for ELA, Social Studies, Science and/or Math Section

LA.K-12.NJSLSA.R3	Analyze how and why individuals, events, and ideas develop and interact over the course of a text.
	Craft and Structure
LA.K-12.NJSLSA.R4	Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.
	Integration of Knowledge and Ideas
LA.K-12.NJSLSA.R7	Integrate and evaluate content presented in diverse media and formats, including visually and quantitatively, as well as in words.
LA.K-12.NJSLSA.R9	Analyze and reflect on how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.
	Range of Reading and Level of Text Complexity
LA.K-12.NJSLSA.R10	Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed.
LA.RI.5	Reading Informational Text
LA.RI.5.3	Explain the relationships or interactions between two or more individuals, events, ideas, or concepts in a historical, scientific, or technical text based on specific information in the text.
LA.RI.5.4	Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area.
LA.RI.5.7	Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently.
LA.RI.5.9	Integrate and reflect on (e.g., practical knowledge, historical/cultural context, and background knowledge) information from several texts on the same topic in order to write or speak about the subject knowledgeably.
LA.RI.5.10	By the end of year, read and comprehend literary nonfiction at grade level text-complexity or above, with scaffolding as needed.
LA.K-12.NJSLSA.SL	Speaking and Listening
	Comprehension and Collaboration
LA.K-12.NJSLSA.SL1	Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.
LA.K-12.NJSLSA.L	Language
	Vocabulary Acquisition and Use
LA.K-12.NJSLSA.L4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases by using context clues, analyzing meaningful word parts, and consulting general and specialized reference materials, as appropriate.
LA.SL.5.1	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly.
LA.SL.5.1.A	Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.
LA.SL.5.1.B	Follow agreed-upon rules for discussions and carry out assigned roles.

LA.SL.5.1.C	Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.
LA.SL.5.1.D	Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.
LA.L.5.4	Determine or clarify the meaning of unknown and multiple-meaning words and phrases based on grade 5 reading and content, choosing flexibly from a range of strategies.

Integration of Diversity, Equity and Inclusion; Climate Change; Informational and Media LiteracyNew Section

see Crosswalks

21st Century Life and Careers

Stage I: Desired Results

Transfer/Overview/Rationale

Transfer / Overview / Rationale
Unit Rationale The purpose of this unit… This unit on ecology helps students develop the idea that plants, animals, and fungi form a system of interdependent parts, with each part dependent on the other parts for its material nourishment. By the end of the unit, teachers will be able to guide their students to the conclusion that organic matter is cycling through the living world.

Meaning

Essential Questions

Essential Questions

- What role would a hawk play in a city's ecosystem?
- What do plants eat?
- Where do fallen leaves go?
- What part do worms play in an ecosystem?
- How does the ecosystem of a pond function?
- Why did dinosaurs go extinct?

Enduring Understanding/Indicators of Understanding

Enduring Understanding/Indicators of Understanding

(Crosscutting Concepts)

- Animals can be sorted into prey and/or predators as part of the food chain.
- Plants derive their materials from air, water, and soil and their energy from the sun.
- Decomposers consume dead plants and animal material and create soil.
- Earthworms are decomposers that add nutrients to the soil.
- An ecosystem has a flow of energy and matter.
- The sun is the ultimate source of energy in an ecosystem.

Acquisition (Student Learning Objectives)

Knowledge

Knowledge

Students will know…

- Organisms can be classified as predators or prey.
- Plants are the basis of the food chain, taking in water and air to grow.
- Decomposers, such as fungi, play an important role in the matter cycle.
- Earthworms are decomposers and part of the matter cycle.

- Ecosystems are dependent on their many parts for flow of energy and matter.
- The sun is the ultimate source of energy in an ecosystem.

Skills

Skills

Student will be skilled at …

- Construct models of food chains/webs showing the relationships between predators and prey.
- Explain how plants take in water and carbon dioxide in order to grow.
- Support the claim that decomposers change organic material into soil.
- Describe how earthworms work as decomposers as a part of the food chain.
- Analyze the value of each part of a pond ecosystem.
- Identify how important the sun's energy is to the web of life by analyzing the mass extinction of the dinosaurs via an asteroid theory.

Stage 3: Learning Plan

Resource and Mentor Texts

Resources and Mentor Texts

- Mystery Science Web of Life Videos

MS WL1: Why would a hawk move to New York City?

MS WL2: What do plants eat?

MS WL3: Where do fallen leaves go?

MS WL4: Do worms really eat dirt?

MS WL5: Why do you have to clean a fish tank but not a pond?

MS WL6: Why did the dinosaurs go extinct?

Collingswood Guided Reading Suggestions

- *Edible Sunlight by* Tara Haelle
- *Life and the Flow of Energy by* William Rice
- *Forest Food Webs in Action* by Paul Fleisher
- *Insects as Decomposers* by Lyn Sirota
- *Cacti Barely Need Water* by Taylor Cole
- *How Does a Seed Sprout? by* Melissa Stewart
- *The Life Cycles of Plants* by Rebecca Hirsch

Cross-content Non-fiction

- McKinney, B. Pass the energy please (2000).

Each of nature's creatures "passes the energy" in its own unique way. In this upbeat rhyming story, the food chain connects herbivores, carnivores, decomposers, and plants together in a fascinating circle of players.

- Bang, M. (2012). Ocean sunlight: How tiny plants feed the seas.

Explains how energy from the sun moves from tiny phytoplankton up to the largest whale in the deep sea food web.

- Bradley, K. (2002). Energy makes things happen.

This book introduces the concept of energy and explains how it is used through examples such as kites flying in the wind, moving rocks, and sunlight helping plants make food.

- Bang, M. (2009). Living sunlight: How plants bring the earth to life.

Written from the point of view of the sun, this lyrical book teaches the basics of photosynthesis and the role the sun plays in keeping plant and animal life alive and thriving on earth.

- Lauber, P. (1994). Be a friend to trees.

Demonstrate the process of photosynthesis, step-by-step: how trees make food in their leaves and how they release the oxygen we need to breathe, as well as other information on why we need trees to survive.

- Notkin, L. (1997). The magic school bus gets planted: A book about photosynthesis.

Busy, colorful illustrations and dialogue tell a story about Mrs. Frizzle and her class exploring photosynthesis.

- O'Donnell, L. (2007). Understanding photosynthesis with Max Axiom, super scientist.

Follows the adventures of Max Axiom as he explains the science behind photosynthesis. Written in graphic-novel format.

- Heinz, B. (2006). Butternut hollow pond.

In the course of a full day at Butternut Hollow Pond, readers meet water striders, snapping turtles, herons, woodchucks, and other animals that live in the pond. As each one is introduced, readers learn how that creature fits into the habitat's food chain.

- Lauber, P. (2016). Who eats what? Food chains and food webs.

Part of the Read-and-Find-Out series, this book explores food webs and why every link in a food chain is important.

- Slade, S. (2010). What if there were no gray wolves?

Deciduous forest ecosystems can be found on nearly every continent. Countless animals and plants live in them. So what difference could the loss of one animal species make? Follow the chain reaction, and discover how important gray wolves are.

- Bial, R. (2001). A handful of dirt.

Soil may not be alive, but amazingly, multitudes of microscopic creatures live there, battling it out in an eat-or-be-eaten world. These tiny creatures, invisible to our eyes, provide food for the insects that in turn feed the reptiles and mammals that live in and above the soil.

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MS WL2: What do plants eat?
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Formative Assessment Strategies

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- Answering questions posted within Mystery Science videos
- Working with small groups to discuss observations during lab work
- Analysis of student-side pages of Interactive Notebooks

Learning Activities/Unit of Study

Learning Activities/Unit of Study

- Mystery Science Spaceship Earth videos
- Hands-on lab activities for each lesson from Mystery Science
- Note-taking in teacher-led pages of Interactive Notebooks
- Non-fiction read-alouds and discussions
- Lecture

Modifications and/or Accommodations

Suggested Modifications (ELL, Sp. Ed, GIfted, At-risk of Failure)

English Language Learners

Native language support: The teacher provides auditory or written content to students in their native language.

Adjusted Speech: The teacher changes speech patterns to increase student comprehension. This could include facing the students, paraphrasing, clearly indicating the most important ideas, and speaking more slowly.

Visuals: The teacher uses graphics, pictures, visuals, and manipulatives. This helps ELL students better understand and comprehend the subjects at hand.

Front-Loading Vocabulary: The teacher front loads vocabulary. This means providing students with a list of important vocabulary words they will need to know for a book, lesson, etc. prior to the lesson being taught. Including pictures to go with the vocabulary words is also very beneficial for the students.

Special Education Students

Chunking: The teacher presents information in a way that makes it easy for students to understand and remember. Chunking is based on the presumption that our working memory is easily overloaded by excessive detail. The best way to deliver information is to organize it into meaningful units. Because students with special needs get overloaded easily, chunking is an effective strategy to use with them.

Checking for Understanding: It is important to constantly check for understanding, especially for students who have accommodations. Teachers want to make sure students understand the concepts being covered in a way that makes sense to them.

Extra time: The teacher provides students with special needs extra time to complete work or answer questions. It is important to give students enough time to process their thoughts.

Oral Reading: The teacher will read work orally to students. Class work such as tests and literature circles may need to be read aloud to the student.

Timers: The teacher will use timers as an instructional tool. The use of timers is beneficial for students who have trouble completing tasks. Timers can be helpful so the student is aware of how much time they have to complete an assignment.

Students with 504 Plans

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Gifted & Talented Strategies

Extensions/Enrichments: Teachers will provide gifted and talented students with extension/enrichment projects. Students will be challenged to further their understanding, to apply acquired knowledge, and/or to produce something in reference to acquired knowledge.

Modify/Change Activities: Teachers will monitor and modify activities to accommodate those students who need to be challenged further. Additional reading, problem-solving, writing, or project work is necessary for those students who are ready to move on at a rate more accelerated than their peers. In this way, G & T students are provided the same opportunity for support as special needs students.

Students at Risk of School Failure

Directions or Instructions: Make sure directions and/or instructions are given in limited numbers. Give directions/instructions verbally and in simple written format. Ask students to repeat the instructions or directions to ensure understanding occurs. Check back with the student to ensure he/she hasn't forgotten.

Peer Support: Peers can help build confidence in other students by assisting in peer learning. Many teachers use the 'ask 3 before me' approach. This is fine, however, a student at risk may have to have a specific student or two to ask. Set this up for the student so he/she knows who to ask for clarification before going to you.

Alternate or Modified Assignments: Always ask yourself, "How can I modify this assignment to ensure the students at risk are able to complete it?" Sometimes you'll simplify the task, reduce the length of the assignment or allow for a different mode of delivery. For instance, many students may hand something in, the at-risk student may jot notes and give you the information verbally. Or, it just may be that you will need to assign an alternate assignment.

Increase One to One Time: When other students are working, always touch base with your students at risk and find out if they're on track or needing some additional support. A few minutes here and there will go a long way to intervene as the need presents itself.

Contracts: It helps to have a working contract between you and your students at risk. This helps prioritize the tasks that need to be done and ensure completion happens. Each day write down what needs to be completed, as the tasks are done, provide a checkmark or happy face. The goal of using contracts is to eventually have the student come to you for completion sign-offs.

Hands On: As much as possible, think in concrete terms and provide hands-on tasks. This means a child doing math may require a calculator or counters. The child may need to tape record comprehension activities instead of writing them. A child may have to listen to a story being read instead of reading it him/herself.

Tests/Assessments: Tests can be done orally if need be. Break tests down in smaller increments by having a portion of the test in the morning, another portion after lunch and the final part the next day.

Seating: Seat students near a helping peer or with quick access to the teacher. Those with hearing or sight issues need to be close to the instruction which often means near the front.