NEPTUNE CITY SCHOOL DISTRICT

Environmental Science
Curriculum
Kindergarten-Grade 5

NEPTUNE CITY SCHOOL DISTRICT
Office of the Chief School Administrator, Principal
210 West Sylvania Avenue
Neptune City, NJ 07753

The Neptune City School District is appreciative and proud to accept and align the curriculum of the NEPTUNE CITY School District to properly prepare the Neptune City students for successful integration into the NEPTUNE CITY High School Educational Program.

April 1, 2025 Document C1#1

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SCHOOL DISTRICT MISSION STATEMENT

The Neptune City School District, in partnership with the parents and the community, will support and sustain an excellent system of learning, promote pride in diversity, and expect all students to achieve the New Jersey Student Learning Standards at all grade levels to become responsible and productive citizens.

NEPTUNE CITY SCHOOL DISTRICT

ENVIRONMENTAL SCIENCE
KINDERGARTEN-GRADE 5
CURRICULUM

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Curriculum

NEPTUNE CITY SCHOOL DISTRICT

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Acknowledgements

The Environmental Science Kindergarten-Grade 5 curriculum was developed through the dedicated efforts of Joe Woerner, elementary environmental science teacher, with guidance of the district's curriculum steering committee members including Stacie Ferrara, Ed.D., STEM Supervisor, and Sally A. Millaway, Ed.D., Director for Curriculum, Instruction and Assessment.

Mr. Woerner is commended for his dedication in creating this curriculum utilizing the UbD format. The curriculum guide was written in alignment with the 2020 New Jersey Student Learning Standards for Science and highlights the 3-dimensional nature that these standards bring to the teaching and learning of science. The guide also includes alignment to the 2016 New Jersey Student Learning Standards for Mathematics and English language Arts and the 2020 New Jersey Student Learning Standards in Computer Science and Design Thinking and Career Readiness, Life Literacies, and Key Skills. This curriculum guide includes instructional strategies and resources that focus on developing scientifically literate students and provides opportunities for students to make sense of science.

NEPTUNE CITY SCHOOL DISTRICT

DISTRICT MISSION STATEMENT

The primary mission of the NEPTUNE CITY School District is to prepare all of our students for a life-long learning process and to become confident, competent, socially- and culturally-conscious citizens in a complex and diverse world. It is with high expectations that our schools foster:

- A strong foundation in academic and modern technologies
- A positive, equitable, and varied approach to teaching and learning
- An emphasis on critical thinking skills and problem-solving techniques
- A respect for and an appreciation for our world, its resources, and its diverse people
- A sense of responsibility, good citizenship, and accountability
- An involvement by the parents and the community in the learning process

NEPTUNE CITY School District

Educational Outcome Goals

The students in the NEPTUNE CITY schools will become life-long learners and will:

- Become fluent readers, writers, speakers, listeners, and viewers with comprehension and critical thinking skills.
- Acquire the mathematical skills, understandings, and attitudes that are needed to be successful in their careers and everyday life.
- Understand fundamental scientific principles, develop critical thinking skills, and demonstrate safe practices, skepticism, and open-mindedness when collecting, analyzing, and interpreting information.
- Become technologically literate.
- Demonstrate proficiency in all New Jersey Student Learning Standards (NJSLS).
- Develop the ability to understand their world and to have an appreciation for the heritage of America with a high degree of literacy in civics, history, economics and geography.
- Develop a respect for different cultures and demonstrate trustworthiness, responsibility, fairness, caring, and citizenship.
- Become culturally literate by being aware of the historical, societal, and multicultural aspects and implications of the arts.
- Demonstrate skills in decision-making, goal setting, and effective communication, with a focus on character development.
- Understand and practice the skills of family living, health, wellness and safety for their physical, mental, emotional, and social development.
- Develop consumer, family, and life skills necessary to be a functioning member of society.
- Develop the ability to be creative, inventive decision-makers with skills in communicating ideas, thoughts and feelings.
- Develop career awareness and essential technical and workplace readiness skills, which are significant to many aspects of life and work.

ENVIRONMENTAL SCIENCE PROGRAM
Kindergarten - Grade 5

COURSE DESCRIPTION

The elementary Environmental Science Curriculum makes every effort to engage students in memorable, real-life outdoor experiences to produce well-equipped environmentally literate citizens. Neptune's commitment to building and operating Green Schools has drawn attention from across the United States. The Neptune community is proud of the district's "green" initiatives.

Summerfield Elementary School was the first LEED Gold public school in New Jersey. The most unique aspect of Summerfield is that these innovative technologies and programs allow the building and its campus to serve as a "living textbook".

The Elementary Environmental Science program includes the SummerWood Program, LEED Green Schools Curriculum, and a Gardening Program conducted in coordination with classroom instruction to fulfill the Next Generation Science Standards. The SummerWood program includes a fall and spring field trip. These trips include experience observing nature and answering one's own questions, a study of birds to understand the relationship between form and function, surveying different types of habitats, investigating water pollution and participating in the NJDEP Biological Water Monitoring Program that uses benthic macroinvertebrates to determine the water quality of the Jumping Brook Stream (NJDEP Category One Stream), exploring soil erosion, and tracking carbon as it flows through the forest ecosystem.

INTEGRATED SOCIAL AND EMOTIONAL LEARNING COMPETENCIES
The following social and emotional competencies are integrated in this curriculum document:

Self-Awareness	
x	Recognize one's own feelings and thoughts
x	Recognize the impact of one's feelings and thoughts on one's own behavior
	Recognize one's personal traits, strengths and limitations
x	Recognize the importance of self-confidence in handling daily tasks and challenges
Self-Management	
x	Understand and practice strategies for managing one's own emotions, thoughts and behaviors
	Recognize the skills needed to establish and achieve personal and educational goals
	Identify and apply ways to persevere or overcome barriers through alternative methods to achieve one's goals
Social Awareness	
x	Recognize and identify the thoughts, feelings, and perspectives of others
x	Demonstrate an awareness of the differences among individuals, groups, and others' cultural backgrounds
x	Demonstrate an understanding of the need for mutual respect when viewpoints differ
x	Demonstrate an awareness of the expectations for social interactions in a variety of setting
Responsible Decision Making	
x	Develop, implement and model effective problem solving and critical thinking skill
x	Identify the consequences associated with one's action in order to make constructive choices
x	Evaluate personal, ethical, safety and civic impact of decisions.
Relationship Skills	
x	Establish and maintain healthy relationships
x	Utilize positive communication and social skills to interact effectively with others
	Identify ways to resist inappropriate social pressure
x	Demonstrate the ability to present and resolve interpersonal conflicts in constructive ways
x	Identify who, when, where, or how to seek help for oneself or others when needed

Unit Plan Title	Safety
Suggested Time Frame	Throughout lessons when outside, observing demonstrations and doing hands on activities

Overview / Rationale
Safety is the laboratory and classroom setting is important for students and teachers. Personal safety is reviewed at the beginning of each school year in science lessons and should be demonstrated and adhered to by teachers and students in all activities including class demonstrations, lab investigations, gardening, outdoor classroom settings and SummerWood.

Stage 1 – Desired Results	
Established Goals: *Although there are no specific NJSLS describing safety procedures or rules, teachers should refer to the standards in each unit that requires and utilizes laboratory activities, demonstrations and investigations to support meeting the standard(s).*	
Essential Questions: ● How can accidents and injuries be avoided in the classroom and laboratory settings? ● What steps should be taken to respond to emergencies and accidents in the classroom, laboratory and workplace setting?	**Enduring Understandings:** ● Safety precautions are important for all areas of life and should be practiced by everyone on a daily basis. ● It is important that safety practices are understood and exercised in the classroom, laboratory, and on the job.
Knowledge: *Students will know…* ● Lab safety rules and expectations ● Names and uses of lab equipment ● Location and use of safety equipment	**Skills:** *Students will be able to…* ● Explain appropriate health and safety practices in the classroom and laboratory. ● Identify common hazards in the classroom and laboratory. ● Identify name and use of lab equipment ● Explain how to respond to various safety situations and accidents. ● Demonstrate how to use basic lab equipment and safety equipment.

Interdisciplinary Connections
New Jersey Student Learning Standards- English Language Arts (2016) NJSLSA.R10. Read and comprehend complex literary and informational texts independently and proficiently with scaffolding as needed. **New Jersey Student Learning Standards- Comprehensive Health and Physical Education(2020)** 2.1.2.EH.2: Identify what it means to be responsible and list personal responsibilities. • 2.1.2.EH.3: Demonstrate self-control in a variety of settings (e.g., classrooms, playgrounds, special programs). 2.1.2.EH.4: Demonstrate strategies for managing one's own emotions, thoughts and behaviors. 2.2.2.MSC.1: Perform a combination of sequences of locomotor movements and rhythmic activities (e.g., walking, balancing, hoping, skipping, running). 2.2.2.MSC.3: Demonstrate manipulative movements (e.g., throwing, catching, dribbling, running, kicking) while moving in personal and general space, time, directions, pathways and ranges 2.2.2.MSC.6: Execute appropriate behaviors and etiquette while participating in activities, games, sports, and other events to contribute to a safe environment. 2.3.2.PS1: Demonstrate personal habits and behaviors that contribute to keeping oneself and others healthy and the environment clean and safe. 2.3.2. PS.3: Recognize and demonstrate safety strategies to prevent injuries at home, school, in the community (e.g., traffic safety, bicycle/scooter safety, fire safety, poison safety, accident prevention). 2.3.2. PS.4: Develop an awareness of warning symbols and their meaning (e.g., red light, stop sign, poison symbol).

Teacher Resources
Flinn Safety Course for teachers online (free with registration) https://labsafety.flinnsci.com/ NSTA Safety Resources https://www.nsta.org/topics/safety Duty of Care https://static.nsta.org/pdfs/DutyOfCare.pdf Safety and the NGSS https://static.nsta.org/pdfs/Safety%20and%20the%20Next%20Generation%20Science%20Standards_29Oct2020_FINAL.pdf Safety Practices with Demonstrations

https://static.nsta.org/pdfs/MinimumSafetyPracticesAndRegulations.pdf

Labeling of Chemicals
https://static.nsta.org/pdfs/GloballyHarmonizedSystemOfClassificationAndLabelingOfChemicals.pdf

Eye Protection
https://www.nsta.org/eye-protection-and-safer-practices-faq

Stage 2 – Assessment Evidence

Pre-Assessments:

What do you know about safety?

Formative Assessments:

Lab equipment- names and uses
Room layout and safety equipment location
Use of Safety equipment- eye wash, hood, fire blanket, fire extinguisher
Fire drill exit
Call for help in school

Stage 3 – Learning Plan

- Explain and demonstrate safety expectations.
- Safety tour of classroom or space.
- Practice fire drill procedures.
- Review safety equipment - name, location, use.
- Review scenarios and how to call for help.
- Model how to handle materials and equipment.
- Review safety procedures throughout the year and before any activity.
- Explain how to dispose of materials and broken glass.

Unit Plan Title	Kindergarten: Nature Detectives
Suggested Time Frame	Fall field trip (2hrs) Winter lesson (1.5 hours) at home school Spring field trip (2hrs)

Overview / Rationale
Students are expected to develop an understanding of what plants and animals need to survive and the relationship between their needs and where they live.

Stage 1 – Desired Results	
Established Goals: **New Jersey Student Learning Standards in Science (2020)** K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.[Clarification Statement: Examples of patterns could include that animals need to take in food but plants do not; the different kinds of food needed by different types of animals; the requirement of plants to have light;and that all living things need water.]	
Essential Questions: What are the basic needs of plants and animals?	**Enduring Understandings:** In order to survive, plants and animals meet their basic needs in their habitats.
Knowledge: *Students will know…* … animals and plants native to SummerWood (squirrels, groundhogs, Robins, Blue Jays, woodpeckers, deer, snakes, worms, spiders, maple trees, pine trees, oak trees, black walnut trees, garlic mustard, moss, spicebush, raspberries, sassafras…) … their 5 senses. … animals, like caterpillars, eat plant/tree leaves, to survive. … animals move through the forest to find food and water, leaving tracks behind. …trees are used by many animals as both a source of food and a home/shelter. …many animals in the forest are safe to touch (worms, harvestmen, pill/sowbugs, millipedes…). … plants need both water and sunlight to survive. … animals need both water and food to survive.	**Skills:** *Students will be able to…* … recognize you can learn about animals existence and behavior from direct observation but also from clues/evidence found in the forest. ... formulate a hypothesis/prediction about their SummerWood experience. …explore the natural word (SummerWood) using all 5 senses … make observations using basic tools such as a magnifying glass, a bug box, a measuring tape, a bug box. …infer the existence of SummerWood animals and their behavior from clues found in the forest (deer tracks, snake skin…). …create a visual representation of their observations in SummerWood. … organize water, sunlight, and food cards into groups for animals and plants. … categorize foods for different SummerWood animals.

… a variety of plants and animals use different parts of SummerWood to obtain their basic needs (sunlight, streams, other plants & animals).	…investigate a variety of SummerWood plants and animals and how they obtain their basic needs.

Interdisciplinary Connections
New Jersey Student Learning Standards - English Language Arts (2016) W.K.7 Participate in shared research and writing projects (e.g., explore a number of books by a favorite author and express opinions about them). **New Jersey Student Learning Standards - Mathematics (2016)** K.MD.A.2 Directly compare two objects with a measurable attribute in common, to see which object has “more of/less of " the attribute, and describe the difference. **New Jersey Student Learning Standards- Comprehensive Health & Physical Education (2020)** 2.2.2.MSC.6: Execute appropriate behaviors and etiquette while participating in and viewing activities, games, sports, and other events to contribute to a safe environment. 2.2.2.PF.1: Explain the benefits of regular physical activity and what it means to be physically fit in relation to personal health. (e.g., healthy heart, strong bones, increased energy, strong muscles). 2.2.2.LF.2: Perform movement skills that involve controlling and adapting posture and balance, to successfully negotiate different environments (e.g., mats, turf fields, grass fields, hard surfaces, gym floors, sand, water, snow) during physical activity. 2.3.2.PS.2: Discuss healthy and safe choices both indoors and outdoors (e.g., using equipment, wearing bike helmets, vehicle, water, weather safety). **New Jersey Student Learning Standards- Computer Science and Design Thinking (2020)** 8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats. 8.1.2.AP.4: Break down a task into a sequence of steps. **New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (2020)** 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2). 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a). 9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3). 9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive). 9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10)

Student Resources
Remote Lessons: *https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/kindergarten-summerwood-trip* *https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/winter-summerwood-lessons* *https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/k-spring-trip*
Teacher Resources
Texts: In the Woods: Who's Been Here? by Lindsay Barrett George (ISBN 978-0688161637; First Edition) In the Snow: Who's Been Here? by Lindsay Barrett George (ISBN 978-0688170561; First Edition) Around the Pond: Who's Been Here? by Lindsay Barrett George (ISBN 978-0688143763; First Edition) **Videos:** Temperate Forest Biome https://www.youtube.com/watch?v=K8i0K0pZlCM Living Planet- Northern Forests https://www.youtube.com/watch?v=ds2K5qm6bZM Plants Following the Light https://www.youtube.com/watch?v=zHe7y8cy-7Y Spring Leaves https://www.youtube.com/watch?v=B8vRvN69esE **Google Drive:** **https://drive.google.com/drive/folders/1PtMKxaiinPD-rNaAGh-QF_oJCi9EB5XF?usp=sharing** **K-12 NJDOE Legislation** **Lyme Disease Prevention (N.J.S.A. 18A:35-5.1)** Requires the development of Lyme disease curriculum guidelines. The guidelines shall emphasize disease prevention and sensitivity for victims of the disease. The Commissioner of Education shall periodically review and update the guidelines to ensure that the curriculum reflects the most current information available. **Amistad Law N.J.S.A. 18A 52:16A-88** Every board of education shall incorporate the information regarding the contributions of African Americans to our country in an appropriate place in the curriculum of elementary and secondary school students. **Diversity and Inclusion Law (N.J.S.A. 18A:35-4.36a)** Beginning in the 2021-2022 school year, each school district shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards.

Holocaust Law (N.J.S.A. 18A:35-28) Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens.

LGBT and Disabilities Law (N.J.S.A. 18A:35-4.35) A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards. N.J.S.A.18A:35-4.36 A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35.

Stage 2 – Assessment Evidence

Pre-Assessments:
Think-Pair-Share with the "Opening" question (fall, winter, & spring).
Formative Assessments:
"Exploring the Forest" teacher observations and questions (fall).
"Basic Needs Cards" Turn & Talk (winter)
"Nature Detective Stations" teacher observations and questions (winter)
"Search for Spring Peepers" teacher observations and questions (spring)
"Oxbow Wetland Nature Detectives Turn & Talk (spring)
Summative Assessments:
Drawing of their favorite part of the SummerWood trip (fall).
"Matching Animal and Food Cards" (winter)
SummerWood plant & animal drawings (spring)
Performance Task(s):
Drawing of their favorite part of the SummerWood trip (fall)
Matching Animal and Food Cards (winter)
SummerWood plant & animal drawings (spring)

Stage 3 – Learning Plan

<u>Fall Trip</u>
Opening: What questions do you have about SummerWood (Think-Pair-Share)?
Activities:

- My First Nature Walk: Read "In the Woods: Who's Been Here?" to help students see how observations can provide clues to what they cannot see. Students will share their predictions about what they will see, taste, touch, hear, and smell in SummerWood.

Students will be lead on a sensory walk deep into the forest where each student will visit sensory stations along the trail: smell garlic mustard, taste maple syrup, smell spicebush, observe colors, listen to sounds, touch mystery items, listen to birds and frogs, taste wild raspberries, smell sassafras leaves, feel pine tree bark and needles, touch moss, look for frogs, see the Jumping Brook.

- Exploring the Forest: In small groups students will explore one tree in SummerWood. Groups will find a tree and make observations of, and around, the tree: feel the trunk/bark, measure it, do a rubbing, use magnifiers to observe tree parts, collect tree parts, compare and contrast leaves. As a group, still around the same tree, students will look for eaten leaves, insects on leaves and bark, piles of nuts, and think about how the trees provide habitat for other animals.
- "Forest Foray" Scavenger Hunt: On the way back to SES students will search for objects along the trail (or anything else that they find interesting along the trail).

Closure: For each sense, students draw or write one thing they observed in SummerWood. Review the Summerwood questions and predictions on the whiteboard in light of the day's observations. Each student will draw their favorite part of the SummerWood trip. For students that need guidance they can draw their tree and surrounding area.

Differentiation:SummerWood Lost Letters scavenger hunt for more advanced students. Students can record their SummerWood observations and present their findings in a variety of ways – words, pictures, diagrams, explaining, showing it, acting it out; teacher may choose to divide students into pairs rather than smaller groups.

Winter Lesson

Opening: Show first 75 seconds of Temperate Forest Biome video clip. Ask students what they remember from the fall SummerWood trip (Think-Pair-Share)?

Activities:

- Plant & Animal Basic Needs Cards: In pairs organize the cards into two groups without help from teachers.
- Review of Fall Trip (with student generated questions): snake skin (What does a snake eat?); raspberries (Who eats them?); maple syrup (Is this a tree's food?); acorns/pine cones (Is this food for animals?); tracks by the stream (Why are the tracks down by the stream?); frogs (Why do they live down by the stream?). Highlight the needs of water, food, and sun.
- Redo Basic Needs Cards: In the same pairs students re-organize their cards into the basic needs of plants and animals. Turn & Talk: Which basic need is shared between plants & animals?
- Living Planet - Northern Forests Animals Video Clip: Starting at 24:26 to 30:48; highlight the different ways forest animals get their food.
- In the Snow: Who's Been Here?: Read selected portions and ask students to predict which animal left each clue.
- Nature Detective Stations: Who's Been Here? 1. Deer antlers, tail, and skull; 2. Snake skin; 3. Turtle shell; 4. Bird feathers; 5. Bark beetle tracks; 6. Gall; 7. Tree cookie; 8. Squirrel skull & tail; 9. Racoon tracks in sand tray; 10. Hornet's nest.

Closure: Matching Animal and Food Cards: In pairs students are given a variety of plant and animal cards and asked to pair each animal with a food it eats. Turn & Talk: Could the cards be paired up in any other way?

Differentiation: Teacher may choose to divide students into small groups rather than pairs or work with students individually to check for understanding.

Spring Trip

Opening: Show students tree cookies and deer antlers and ask them the basic needs of plants and animals (Think-Pair-Share)

Activities:

- Nature Detectives: Ask students to make predictions for what they will find in SummerWood and list on the whiteboard. Read Around the Pond: Who's Been Here? Remind students that we are looking for clues of animals and plants meeting their basic needs.
- Search for Spring Peepers: Explain that we will be going to a very special location in SummerWood where they have never been and they will use a map to find it on their own. Lead students to checkpoint #1/the classroom patio and instruct them to look for clues/checkpoints that will guide them to the "Spring Peepers." At each checkpoint discuss with students their observations of plants and animals meeting their basic needs (roots going into the ground, branches and leaves reaching up to the sun, footprints by the water, evidence of animal food…).
- Oxbow Wetland Trail Nature Detectives: Stop at each location to allow students to Turn & Talk about each observation, ask questions, and highlight how each clue shows plants and animals finding their basic needs (acorns along the trail, groundhog hole, termites & bark beetles in dead trees, woodpecker homes, uprooted trees, squirrel & bird nests).
- It's Spring Scavenger Hunt: Allow students to walk back to SES and explore along the trail with only two structured stops (Hankins Brook to see racoon tracks & smell skunk cabbage; Knoll & Hollow trail to find invertebrates under logs).

Closure: In the classroom students will mark scavenger hunt items they found and review predictions on whiteboard and add any unexpected SummerWood observations. Each student uses the back of their scavenger hunt paper to draw a SummerWood plant and animal getting at least one of their basic needs.

Differentiation:Students can record their SummerWood observations and present their findings in a variety of ways – words, pictures, diagrams, explaining, showing it, acting it out; teacher may choose to divide students into pairs rather than smaller groups.

Unit Plan Title	Grade 1: Plant & Animal Survival
Suggested Time Frame	Fall field trip (2hrs) Winter lesson (1.5 hours) at home school Spring field trip (2hrs)

Overview / Rationale
Students are expected to develop understanding of how plants and animals use their external parts to help them survive, grow, and meet their needs as well as how behaviors of parents and offspring help the offspring survive.

Stage 1 – Desired Results	
Established Goals: **New Jersey Student Learning Standards in Science (2020)** 1-LS1-1 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.[Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could 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.] 1-LS1-2Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive. [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make(such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding,comforting, and protecting the offspring).	
Essential Questions: What are some ways plants and animals meet their needs so they can survive and grow?	**Enduring Understandings:** Plants and animals use both external parts and behaviors that allow them to solve the problem of surviving and growing in their habitats.
Knowledge: *Students will know…* … the function of basic plant parts such as roots, stems, leaves, flowers, seeds, thorns, and bark. …the function of animal parts such as shells, fur, feathers, and camouflage. …how the basic needs of plants (sunlight & water) and animals (food & water) are met using their parts in their environment. …that engineers solve many problems by mimicking the ways plants and animals solve similar problems in the natural world.	**Skills:** *Students will be able to…* …make and record observations of plant and animal structures like root, bark, thorns, shells, fur, feathers, camouflage…). …understand that animals & plants have parts that help them survive. . …solve an engineering problem of creating a tower that can stand on its own. …use materials to design and build a tower relate its design and function to a plant's roots. … observe videos, animal parts, and photos to identify the parts that the animals use to meet their needs.

…bird beaks are used to get a variety of foods and as a result come in a variety of shapes and sizes. … the beak and food types for cardinals, woodpeckers, hawks, pelicans, hummingbirds, and herons. … that throughout human history people have copied/mimicked plant and animal structures to solve their own problems. …human parents provide water, food, shelter, protection/safety. and keep their offspring healthy. …adult birds build nests, protect eggs, as well as protect and feed nestlings. …bird food includes seeds, acorns, nectar, worms, spiders, bugs in dead trees, and berries. …water sources for birds include puddles, streams, lakes/ponds, and wetlands. … nest materials for birds include sticks, grass, mud, moss, feathers, spider webs, tree bark, leaves, roots, pine needles, cocoons, and animal hair. … different types of birds make different types of nests to suit their nestlings and habitat.	… learn how an animal part's structure relates to its function. … compare the parts that plants and animals use to human-made objects. … identify animal body parts that influence the design of human-made products. …design a tool that could be used to solve a human problem by mimicking a bird beak. …make observations of parents and their young in the wild and identify ways parents keep their young safe. …identify patterns in the natural world to understand how parents take care of their young. …look for patterns in how young respond to and communicate with their parents to get their needs met. …use observations and data to answer questions about ways different animals take care of their young. …compare and contrast bird and human parenting behaviors.

Interdisciplinary Connections
New Jersey Student Learning Standards - English Language Arts (2016) RL.1.1 Ask and answer questions about key details in a text. RL.1.2 Identify the main topic and retell key details of a text. RL.1.20 With prompting and support, read and comprehend stories and poetry at grade level text complexity or above. W.1.7 Participate in a shared research and switching project (e.g. explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). **New Jersey Student Learning Standards - Mathematics (2016)** 1.NBT.B.3 Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symboles >, =, and <. 1.NBT.C.4 Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones, and sometimes it is necessary to compose a ten. 1.NBT.C.5 Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used.

1.NBT.C.6 Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

New Jersey Student Learning Standards- Comprehensive Health & Physical Education (2020)

2.2.2.MSC.6: Execute appropriate behaviors and etiquette while participating in and viewing activities, games, sports, and other events to contribute to a safe environment.
2.2.2.PF.1: Explain the benefits of regular physical activity and what it means to be physically fit in relation to personal health. (e.g., healthy heart, strong bones, increased energy, strong muscles).
2.2.2.LF.2: Perform movement skills that involve controlling and adapting posture and balance, to successfully negotiate different environments (e.g., mats, turf fields, grass fields, hard surfaces, gym floors, sand, water, snow) during physical activity.
2.3.2.PS.2: Discuss healthy and safe choices both indoors and outdoors (e.g., using equipment, wearing bike helmets, vehicle, water, weather safety).

New Jersey Student Learning Standards- Computer Science and Design Thinking (2020)

8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats.
8.1.2.DA.3: Identify and describe patterns in data visualizations.
8.1.2.DA.4: Make predictions based on data using charts or graphs.
8.1.2.AP.4: Break down a task into a sequence of steps.
8.2.2.ED.2: Collaborate to solve a simple problem, or to illustrate how to build a product using the design process.
8.2.2.ED.3: Select and use appropriate tools and materials to build a product using the design process.
8.2.2.ITH.1: Identify products that are designed to meet human wants or needs.
8.2.2.NT.2: Brainstorm how to build a product, improve a designed product, fix a product that has stopped working, or solve a simple problem.

New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (2020)

9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10)
9.4.2.CT.1: Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).

Student Resources
Remote Lessons: https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/first-grade-summerwood-trip https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/winter-summerwood-lessons https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/1st-grade-spring-summerwood-trip
Teacher Resources
Videos: Camouflaged Animals: https://www.youtube.com/watch?v=XpdoDBYuHIA Hummingbird: https://www.youtube.com/watch?v=QYoYQAbPXbU Great Blue Heron: https://www.youtube.com/watch?v=vLKqrHWM-Ro Pelican: https://www.youtube.com/watch?v=wfLl26yzpk8 Woodpecker: https://www.youtube.com/watch?v=Pe0CAaJDAm8 Cardinal: https://www.youtube.com/watch?v=dHiM-eo9FgI Red Tailed Hawk: https://www.youtube.com/watch?v=gurUQAM-ijM Cardinals in the Nest: https://www.youtube.com/watch?v=1tWLDhJ6mjQ Robins in the Nest: https://www.youtube.com/watch?v=bkkMc9tU-CI Killdeer Protecting Nest: https://www.youtube.com/watch?v=Tytzi6Tf1v4 Blue Jay Protecting Nest: https://www.youtube.com/watch?v=yxlYIf0fYd8 Life in the Nest/Purple Martins: https://www.youtube.com/watch?v=m3GLYvxV3pU **Website:** Humans Copying Animals Copying Mother Nature | 8 amazing examples of biomimicry | MNN - Mother Nature Network Human-made inventions that already exist in nature - Business Insider Here's 7 of the Best Examples of Biomimicry and Nature-Inspired Design | Digital Trends **Google Drive:** https://drive.google.com/drive/folders/1GmFhaC5gN0SzMA6sKaN8Irq9oEoxxUx0?usp=sharing

Stage 2 – Assessment Evidence
Pre-Assessments: Think-Pair-Share with opening questions (fall & spring). Four Corners with opening question (winter). **Formative Assessments:** “Plant and Animal Problems” teacher observations and questions (fall). “Bird Beak”teacher observations and questions (winter). “Baby Care in the Wild,” “Birds in the Nest,” and “Feathering Your Nest” teacher observations and questions (spring). **Summative Assessments:**

Tower building - prototyping & testing (fall).
Survivor Design Challenge (winter).
Compare and Contrast human and bird parenting behaviors (spring).

Performance Task(s):

See Tower building - prototyping & testing (fall).
Survivor Design Challenge (winter).
Compare and Contrast human and bird parenting behaviors (spring).

Stage 3 – Learning Plan

Fall Trip

Opening: What are the basic needs of plants and what parts do they use to meet them (Think-Pair-Share)?

Activities:

- Student volunteers draw plants with all their parts (root, stems/trunk, leaves, flowers/seeds) on the board and link each to its job (water, sunlight, holding it up, connecting parts, making seeds).
- Plant & Animal Problems Part 1: Distribute student sheets and discuss problems for plants (protection, standing up) and animals (keeping warm, protection, and camouflage) in the first column of a table. Students identify each plant or animal structure used to solve each problems at each station (#1: Camouflaged animals video; #2: Rose stems with thorns & tree bark; #3: Garlic mustard plant & roots; #4: Bird feathers & mink fur; #5: Box turtle shell).
- Plant & Animals Problems Part 2: In SummerWood students will look for, and find, structures of plants and animals that help them solve each problem (camouflage plastic animals, thorns & bark, tree roots, animals with fur & feathers, box turtle or sow bug).
- Building a Tower: Review parts of a plant when discussing the need for towers in building homes & decks (empathize & define). Examine materials with students and allow them 5 minutes to plan individually on the back of the student sheet (ideate). Use a Round Robin strategy for each student to share their design with their group and pick the best elements from each design.

Closure: Teams build their tower collaboratively (prototype) and then test it in front of the class (test) highlighting how they mimicked plant roots and suggesting how they could improve their design.

Differentiation: Students can record their SummerWood observations in a variety of ways - words, pictures, diagrams; teacher may choose to divide students into pairs or groups depending on the class dynamic.

Winter Lesson

Opening: Which animal need is the most important - food, water, shelter, other (4 Corners)?

Activities:

- Bird Beaks Introduction: Review animal problems covered in the fall (staying warm, hiding, protection) and how they solved them. Read "Bird Beaks" digital book on the smartboard (take out from the library) to help them answer the first three questions on their student sheet.
- Bird Beak Stations: At each beak station (Cardinal, Hummingbird, Hawk, Woodpecker, Pelican, Heron) students will explore the station/model of how each beak works, examine the beak, match the beak and food type, and then draw the beak on the student sheet for that station.
- Bird Beak Videos: Review each bird, beak type, and food by watching each bird use its beak to eat. Were the models accurate (actually how the birds used their beaks)? If not, explain how they could be improved (Turn & Talk)?
- Humans Copying Animals: Show examples of how humans have copied animals using recommended websites.

Closure: 1st Grade Survivor Design Challenge: As a class review where each basic need can be found in California's Redwood forest. Allow the students to pick a basic need (water deep in the ground, shelter in Redwood trees, little fish in tide pools, or big fish in the bay) and design a tool to obtain it. Before designing the tool the type of bird beak being used should be identified.

Differentiation: Advanced students can design tools for all 4 basic needs; design a Make Believe Animal student sheet for students that complete the closure activity; teacher may choose to divide students into pairs or groups depending on the class dynamic.

<u>Spring Trip</u>

Opening: How do your parents help you survive (Think-Pair-Share)?

Activities:

- Baby Care in the Wild/Observing Nature Videos (TCI Unit 1, Lesson 8): Have students complete the 5 ways human parents take care of their young on the student sheet (food, water, shelter, safe, health). Watch video clips of parents and offspring in the wild, discuss how many parents are in each video, and how the parents are caring for their young.
- Birds in the Nest: Students watch videos of birds in the nest to identify how nestlings communicate their needs to their parents and how their parents respond. Students will also identify parent/nestling behaviors and parts used by both the parents and offspring. Walk though SummerWood looking for, and recording on their student sheet, food types, water sources, and nest materials birds use in the spring. Look for birds finding food, drinking water, making nests, and sitting on their eggs.
- Feathering Your Nest: Provide each table with a bird nest and introduce the O-W-L chart on the back of their student sheet. Each group should list three observations in the OBSERVE portion of the chart (materials used to make it, size, color, shap). Students can then write three questions they have about the nest in the WONDER portion of the chart. One "wonder" must be "I wonder what kind kind of bird made this nest." Distribute bird nest guides and have groups work to identify which type of bird made their nest. Record the bird name in the LEARN portion of the chart. Rotate each bird nest so each group

gets a chance to see and identify a variety of nests. Discuss the differences between bird species, their needs, and their nests.

Closure: Ask students to turn and talk about different ways (behaviors) parent birds help their offspring survive. Revisit the 5 ways humans take care of their offspring. Ask students to circle the things that birds and humans both do to take care of their young on the student sheet.

Differentiation: Students can record their SummerWood observations in a variety of ways - words, pictures, diagrams; teacher may choose to divide students into pairs or groups depending on the class dynamic.

Unit Plan Title	Grade 2: Life in Different Habitats
Suggested Time Frame	Fall Field Trip (2hrs) Winter Lesson (1.5 hours) at Home School Spring Field Trip (2hrs)

Overview / Rationale
This unit will allow students to explore the diversity of life in different habitats. Students will be able to compare the diversity of life in a variety of local Neptune habitats.

Stage 1 – Desired Results	
Established Goals: **New Jersey Student Learning Standards in Science (2020)** 2-LS4-1 Make observations of plants and animals to compare the diversity of life in different habitats.[Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]	
Essential Question: What kind of living things are there in different habitats?	**Enduring Understandings:** The Earth's habitats foster a unique diversity of life.
Knowledge: *Students will know…* ...the difference between land and water habitats. ...different animal parts including: legs, tail, wings, beak/mouth, coverings (skin, fur, feathers, shell, scales). …different plant parts including: shape, size, color of seeds and leaves. ...different animals like snails, slugs, worms, millipedes, sow bugs, pill bugs. … ocean animals including whales, squid, crabs, jellyfish, sharks, pelicans, sea turtles, and sea stars. … ocean habitats such as tide pools, coastal waters, deep waters, open water, and land/beach. … specific characteristics about ocean animals such as how deep in the ocean they live, weight, length, how they move, their lifespan, how they breathe, and if they live in groups or not.	**Skills:** *Students will be able to…* … make observations of plants and animals in different areas. … record observations by writing or drawing and analyze data. … use observations and data to make comparisons of different kinds of living things. … make a graph to represent living things on land and in water. … use a graph to identify patterns of living things on land and in water. … compare plants and animals based on physical characteristics. … observe images and gather facts about different kinds of ocean animals. … collect data about ocean animals in order to answer questions and make comparisons. … communicate information about ocean animals, using data to support facts. ...make observations of different kinds of animals in a parking lot, a grass field, and the

… 3 habitats in SummerWood: parking lot, grassfield, forest. … different habitat components including trees, shrubs, ground cover, water, rocks, logs. … animals in SummerWood habitat including, but not limited to earthworms, squirrels, chipmunks(see student sheet for complete list).	forest. … record and collect data about different habitats. .... use data from observations as a basis to compare three habitats and describe them as having more or less habitat components (tress, shrubs, ground cover, water, rocks, logs).

Interdisciplinary Connections
New Jersey Student Learning Standards - English Language Arts (2016) W.2.8 Recall information from experiences or gather information from provided sources to answer questions. **New Jersey Student Learning Standards - Mathematics (2016)** MP.2 Reason abstractly and quantitatively MP.4 Model with mathematics 2.MD.D.10 Draw a picture and a bar graph (with single unit scale) to represent a data set with up to four categories. Solve simple put-together, tak e-apart, compare problems using information presented in a bar graph. **New Jersey Student Learning Standards- Comprehensive Health & Physical Education (2020)** 2.2.2.MSC.6: Execute appropriate behaviors and etiquette while participating in and viewing activities, games, sports, and other events to contribute to a safe environment. 2.2.2.PF.1: Explain the benefits of regular physical activity and what it means to be physically fit in relation to personal health. (e.g., healthy heart, strong bones, increased energy, strong muscles). 2.2.2.LF.2: Perform movement skills that involve controlling and adapting posture and balance, to successfully negotiate different environments (e.g., mats, turf fields, grass fields, hard surfaces, gym floors, sand, water, snow) during physical activity. 2.3.2.PS.2: Discuss healthy and safe choices both indoors and outdoors (e.g., using equipment, wearing bike helmets, vehicle, water, weather safety). **New Jersey Student Learning Standards- Computer Science and Design Thinking (2020)** 8.1.2.DA.1: Collect and present data, including climate change data, in various visual formats. 8.1.2.DA.3: Identify and describe patterns in data visualizations. 8.1.2.DA.4: Make predictions based on data using charts or graphs. 8.1.2.AP.4: Break down a task into a sequence of steps. **New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (2020)** 9.4.2.CI.1: Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2). 9.4.2.CI.2: Demonstrate originality and inventiveness in work (e.g., 1.3A.2CR1a).

9.4.2.CT.2: Identify possible approaches and resources to execute a plan (e.g., 1.2.2.CR1b, 8.2.2.ED.3).
9.4.2.CT.3: Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
9.4.2.IML.2: Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).

Student Resources
Remote Lessons: https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/second-grade-summerwood-trip https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/winter-summerwood-lessons https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/2nd-grade-spring-trip
Teacher Resources
Videos: Blue Planet II: The Prequel https://www.youtube.com/watch?v=_38JDGnr0vA Shark https://www.youtube.com/watch?v=UNOKO0rFfgg Whale https://www.youtube.com/watch?v=1fzT6ifrhL8 Crab https://www.youtube.com/watch?v=ILBQKe51xzg Jellyfish https://www.youtube.com/watch?v=ZZLHi4Kduvg https://www.youtube.com/watch?v=-dMcUH2rMnY Squid https://www.youtube.com/watch?v=okBpSCqrNFA Sea Turtle https://www.youtube.com/watch?v=zE0qp3Yje6Q Sea Star https://www.youtube.com/watch?v=h8YLADeiYyU Pelicans https://www.youtube.com/watch?v=YLN32hiMoFc **Google Drive:** **https://drive.google.com/drive/folders/17vSmzMjHh97j6rN9eLmMqfIAhNidPJZt?usp=sharing**

Stage 2 – Assessment Evidence
Pre-Assessments: Think-Pair-Share with the "Opening" question. (fall, winter, & spring) ***Formative Assessments:*** Turn & Talk combine with teacher observations of student notes (fall). Stand Up-Hand Up-Pair Up & Student Presentations (winter) Observations of student habitat animal lists (spring). ***Summative Assessments:*** Independent sorting of leaves & seed by species (fall). Show What You Know student habitat drawings (winter). Pine forest habitat analysis (spring). ***Performance Task(s):*** Independent sorting of leaves & seed by species (fall). Show What You Know student habitat drawings (winter). Pine forest habitat analysis (spring).

Stage 3 – Learning Plan

Fall Trip

Opening: How do you know the difference between a frog and a bird (Think-Pair-Share)?

Activities:

- Frog vs Bird: Based on student responses, the teacher creates a comparison table with class (legs, tail, wings, mouth/beak, covering) for birds & frogs.
- Using a series of photos of animals from the Shark River, students identify how many different animals they see (Turn & Talk).
- I Spy Nature Investigation: Students observe and record SummerWood land and water plants and animals (SummerWood stops include Access Trail to Knoll HallowTrail to Jumping Brook to Hankins Brook to Access Trail). Students tally observations and create a bar graph of plants and animals found on land and in the water. Students draw conclusions by comparing the plants and animals found on land vs in the water (I Spy Nature student sheet/Table Talk or Round Robin).
- Animal Examination: Each pair/group compares two soil animals from SummerWood (snail, slug, worm, millipede, sow bug, pill bug) and shares with the class one similarity difference between the animals.
- Plant Parts: Teacher leads a discussion of how plant parts (leaves, seeds, flowers, stem/trunk) are different (size, shape, color, texture).

Closure: Your little sister has collected many leaves and seeds from the local NEPTUNE CITY woods. She wants to know how many different types of trees are in the woods she visited. Help her explore the diversity of tree types in NEPTUNE CITY's woods by putting them in groups of leaves and seeds from the same type of tree.

Differentiation: Students can record their SummerWood observations in a variety of ways - words, pictures, diagrams; students can also share their data in a format that best suits their group; teachers may choose to divide students into a pair or groups depending on the class dynamic. Before students go outside, spend time modeling how and where to record the names of plants and animals. Make sure all students know how to record tally marks before having them count up the organisms they found. Make sure students understand how to create a bar graph by filling in the boxes in each column, starting from the bottom.

Winter Lesson

Opening: What habitats did we visit on our fall SummerWood trip? What animals were in each habitat (Think-Pair-Share)?

Activities:

- Introduction to Ocean Habitats: Show the Blue Planet II: The Prequel Video and have students discuss what they noticed about ocean habitats (Stand Up-Hand Up-Pair Up).
- Ocean Animal Reports: Each student group gets a different Ocean Animal Card and talks about what they already know about the animal and what they would like to know about each animal. Students rotate through the 8 Ocean Animal Stations learning about their animal and answer one question at each station (3 - 5 minutes per station). Students prepare and present the facts they learned about their ocean animal to the class. After each presentation the teacher shows a short video clip of that ocean animal.

Closure: Show What You Know: Imagine you are SCUBA diving underwater in an ocean habitat near the shore and deep in the ocean. On your student sheet draw pictures of at least two animals you might see in each habitat.

Differentiation: Don't do formal presentations. Highly scaffold the discussion and decrease student anxiety about presenting. Have groups come stand at the screen with you. Then, one at a time, go through the questions in the notebook, and have students present each answer as you go. Spend more time analyzing each of the Ocean Animal Stations as a class. Help students understand the type of information that is shown in each placard. Also help them identify where the specific data for their assigned animal is on each placard (some animals look similar). Then students can move around the room to record observations for their assigned animal.

Spring Trip

Opening: How would you organize your data/observations if we were to visit three different different habitats and record all the animals we found in each (Think-Pair-Share).

Activities:

- Data Collection: Model ways the teacher could group students in the class - by age, color of home they live in, month they were born. Students then discuss and set up a possible data collection system for the day's observations. Students can organize observations based on the habitat they find animals in, how they move, what they eat, or type of organism (mammal, bird, invertebrate, reptile amphibian etc). Each group will share their system with the class.
- Habitat Study: Teacher discusses with students that because 3 habitats will be compared they will be recording animals found in each different habitat. Review the student sheet with the class to ensure they understand the habitat tracker and habitat components (trees, shrubs, ground cover, water, rocks, logs). At three different habitats (parking lot, grass field, forest) students work to both identify the habitat components and complete the animal tracker portion of the student sheet. The teacher will collect soil invertebrates in the forest habitat. Once back in the class students identify the soil invertebrates and tally up the total number of animals in each habitat.

Closure: Teacher draws a pine forest habitat on the board and asks students: If you were a squirrel would you like to live in this habitat? Students should answer the questions (make a claim) and explain why (support it with evidence).

Differentiation: Students can record their SummerWood observations in a variety of ways - words, pictures, diagrams; teacher may choose to divide students into pair or groups depending on the class dynamic.Instead of students preparing statements about the Pine forest habitat they can answer questions like: Does this forest have water? Plants (tree, shrubs, ground cover)? Rocks? Logs?

Unit Plan Title	Grade 3: Organisms in Changing Environments
Suggested Time Frame	Falls Field Trip (2 hours) Winter Lesson (1.5 hours) at Home School Spring Field Trip (2 hours)

Overview / Rationale
Students are expected to develop an understanding of the idea that when the environment changes some organisms survive and reproduce, some move to new locations, some move into the transformed environment, and some die.

Stage 1 – Desired Results	
Established Goals: **New Jersey Student Learning Standards-Science (2020)** 3-LS4-4 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. [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]	
Essential Questions: What happens to organisms when their environment changes?	**Enduring Understandings:** As environments change, so do the composition of species that live there.
Knowledge: *Students will know…* …normal development leads to pollution that flows into storm drains when it rains and ends up in our streams, and eventually the ocean. …examples and sources of sediment, chemical, nutrient, and bacterial pollution. …potential solutions to stormwater pollution include public education, enactment and enforcement of laws, and employing technological fixes. …steps in the design and decision making process involved in making claims about proposed solutions. …how criteria and constraints guide the decision making process. …rain gardens are the best option to control Neptune's water pollution problem.	**Skills:** *Students will be able to…* ...support an argument about an environmental change using a drawing as a model. …identify cause and effect relationships between development and water pollution and the resulting consequences to the water environment and the organisms that live there. …survey Green Grove road and SummerWood to identify both different types of water pollution and their sources. ...study a hypothetical proposal from NEPTUNE CITY with the request to find a water pollution solution that best fits its needs. …use different engineering design processes and design criteria and constraints, based on what Neptune needs, and analyze possible

…the location of major sources of water pollution around the Jumping Brook. …macroinvertebrates have distinct parts (shell, legs, tails) that can be used to identify them. …how to use a dichotomous key to identify common macroinvertebrates in the Jumping Brook. …the term water quality is used to describe how clean/dirty or polluted a body of water is. …the water quality of the Jumping Brook has changed over the past 200 years and as a result the macroinvertebrates have also changed. …macroinvertebrates common in the Jumping Brook today include damselflies, dragonflies, riffle beetles, midge flies, and various aquatic worms. …these species of invertebrates indicate that the water quality of the Jumping Brook for the portion that runs through SummerWood is poor to fair.	pollution solutions and choose the best solution for Neptune. …communicate to others about proposed solutions. …choose a solution, present an argument, and provide evidence to support it. …learn that stream macroinvertebrates in the Jumping Brook have changed as pollution has changed the stream habit where they live. …recognize that the water quality of a stream can be determined by the macroinvertebrates that live there. …collect and identify macroinvertebrates from the Jumping Brook. …analyze the macroinvertebrate sample to determine the water quality of the Jumping Brook. …explain how when environments change, some kinds of organisms survive well, some survive less well, and some cannot survive at all.

Interdisciplinary Connections
New Jersey Student Learning Standards- English Language Arts (2016) RI.3.1 Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. RI.3.2 Determine the main idea of a text; recount the key details and explain how they support the main idea. RI.3.3 Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. W.3.1 Write opinion pieces on topics or texts, supporting a point of view with reasons. W.3.2 Write informative/explanatory texts to examine a topic and convey ideas and information clearly. SL.3.4 Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. (3-LS4-4) **New Jersey Student Learning Standards-Math (2016)** MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. **New Jersey Student Learning Standards- Comprehensive Health and Physical Education (2020)**

2.1.5.CHSS.2: Describe how business, non-profit organizations, and individuals can work cooperatively to address health problems that are affected by global issues, including climate change.
2.2.5.MSC.1: Demonstrate body management skills and control when moving in relation to others, objects, and boundaries in personal and general space (e.g., coordination, balance, flexibility, agility).
2.3.5.PS.1: Develop strategies to reduce the risk of injuries at home, school, and in the community.

New Jersey Student Learning Standard-Computer Science and Design Thinking (2020)
8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.
8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system
8.2.5.ED.6: Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.
8.2.5.ETW.5: Identify the impact of a specific technology on the environment and determine what can be done to increase positive effects and to reduce any negative effects, such as climate change.

New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (2020)
9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue
9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem.
9.4.5.IML.2: Create a visual representation to organize information about a problem or issue.
9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data

Student Resources
Remote Lessons: **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/third-grade-summerwood-trip** **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/winter-summerwood-lessons** **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/3rd-grade-spring-trip**

Teacher Resources
Websites: Macro Invertebrate Identification Game https://sites.allegheny.edu/creekconnections/classroom-resources/macroinvertebrate-identification-game/ **Videos:** Storm Water Pollution (Remote Lesson "Classroom Video" from 7:52 until 11:37) https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/third-grade-summerwood-trip Pervious Pavement Demo https://www.youtube.com/watch?v=BREd1TbF_MQ Jellyfish Filter https://www.conteches.com/stormwater-management/treatment/jellyfish-filter Asbury Park Rain Garden https://drive.google.com/file/d/1Agz3HIg8n9FoQPAJUlfvphY9UQ_Wsxpu/view?usp=sharing Dragonfly Life Cycle Introduction https://www.youtube.com/watch?v=T0Rf8dxRHHs Dragonfly Life Cycle Details https://www.youtube.com/watch?v=Ezq_JWd1Sd8 **Google Drive:** https://drive.google.com/drive/folders/1Pqy2VCN3XmWM9ljOUOvwrFJselN-6PAu?usp=sharing

Stage 2 – Assessment Evidence
Pre-Assessments: **"**Sum of the Parts" questions and observations (fall). NEPTUNE CITY water pollution diagram questions and observations (winter). Water quality timeline Think-Pair-Share (spring). ***Formative Assessments:*** Teacher questions and observations of students' work during "Neptune Water Pollution" and "SummerWood Pollution Hotspots" activities (fall). Teacher questions and observations of students' work during "Stormwater Pollution Solutions" and "Jumping Brook Pollution" activities (winter). Teacher questions and observations of students' work during "Stream Stressors" and "Jumping Brook Macroinvertebrates" activities (spring). ***Summative Assessments:*** Water Pollution Solutions activity (fall). Presentation of Neptune's Stormwater Pollution Solution (winter). Closing questions about water pollution and rain gardens (spring) ***Performance Task(s):*** "SummerWood Water Pollution Hotspots" survey (fall). "Stormwater Pollution Solutions" activity (winter). "Jumping Brook Macroinvertebrates" activity (spring).

Stage 3 – Learning Plan

Fall Trip

Opening: Project Wet's "Sum of the Parts" activity that provides each student with an inherited piece of riverfront property and a million dollars (piece of cut up poster board and markers) allowing them to do whatever they want on the land. Once the watershed and stream are put back together (poster board), different pollution types and sources are identified (sediment, chemical, nutrient, bacteria) from each property. Teacher adds to the riverfront property a normal street with storm drains leading to the Jumping Brook to show the connection between Development→ Pollution→Stormwater→ Jumping Brook→Shark River→Ocean

Activities:

- Neptune Water Pollution: Using Google Maps identify the major sources of pollution surrounding the Jumping Brook. Students complete the Water Pollution Types table on the student sheet. Watch the storm water pollution videos to review all concepts.
- SummerWood Water Pollution Hotspots: Survey pollution problems in Summerwood's streams. Start at the storm drain on Green Grove road and then visit Hankins Brook and Jumping Brook. Observe and record evidence of pollution such as areas of erosion, storm drain pipes, plastic/floatables, and evidence of different types of chemical and bacterial pollution.

Closure: Based on SummerWood observations (increased pollution problem) brainstorm possible solutions to solve the following water pollution problems: oil & gas on the road, fertilizers from lawns, pet waste on the sidewalks and yards. In groups students create a list of possible solutions for each problem on their student sheet. Each problem is then discussed by the class.

Differentiation: Students can record their SummerWood observations in a variety of ways – words, pictures, diagrams; students can also present their potential solution in a format that best suits their group; teacher may choose to divide students into pairs rather than smaller groups.

Winter Lesson

Opening: Teacher draws the diagram (from fall lesson) of NEPTUNE CITY water pollution silently on the board while the students describe what is being drawn. As a class they concisely identify that "Development in Neptune has led to stormwater pollution entering the Jumping Brook."

Activities:

- Stormwater Pollution Solutions: Defining the problem (#1 on the student sheet) using the statement identified by the class. Have the groups read the letter from the engineering company outloud to identify the criteria (2a on the student sheet) and constraints (2b on the student sheet) of the project. Review the slides and videos for each of the three solutions and have each group work to rank their solution. Each group then presents the solution they chose and explains the reasons this solution fits Neptune's needs best.
- Jumping Brook Pollution: Review the area around the Jumping Brook on Google Maps again to identify key pollution sources and predict the water quality of the stream. Pass out invertebrate dichotomous key and macroinvertebrate cards. Ask students to break

invertebrate cards into two groups based on shells vs no shells, legs vs no legs, tails vs no tails until they are successful with using the key.

Closure: Use the Macro Invertebrate Identification Game to informally quiz students on common macroinvertebrates they will find in the Jumping Brook.

Differentiation: Groups can be set up so that there is one strong reader in each group or the teacher may read the letter from the engineer company outloud and check for understanding with each group.

Spring Trip

Opening: Put a timeline on the board showing the last 220 years and the water quality of the Jumping Brook. Ask students to describe what the timeline is showing without using the words "water quality" (Think-Pair-Share).

Activities:

- Stream Stressors: Hand out macroinvertebrate cards to students and play game that shows how different types of pollution impact stream macroinvertebrates by introducing different types of pollution along the timeline and then "sampling" the macroinvertebrates to show how pollution changes the species composition in the stream.
- Dragonfly Life Cycle Videos: Further introduce stream macroinvertebrates with videos of dragonfly nymphs. Discuss the life cycle of insects and the idea of incomplete metamorphosis.
- Jumping Brook Macroinvertebrates: Students complete the top box of the student sheet before visiting the Jumping Brook. Once at the Jumping Brook students guide the collection by completing the habitat types checklist. Once back in the classroom stream water samples are given to each group and students collect macroinvertebrates for later identification. Students use the macroinvertebrate dichotomous key and color cards to identify collected invertebrates. As a class, confirm all identified macroinvertebrates using the Proscope to show each invertebrate on the Smartboard.

Closure: Students calculate the water quality rating of the Jumping Brook based upon the invertebrates that they collected and explain how the Jumping Brook is polluted (answer should include the pathways of pollution, types of pollution, and pollution sources). Students should also describe how the solution they chose in the winter (rain gardens) will reduce stormwater pollution and impact invertebrates.

Differentiation: For the closing questions students can answer in written form, with a diagram or drawing, or in any other way that answers the questions.

Unit Plan Title	Grade 4: How Water Changes the Earth's Surface
Suggested Time Frame	Falls Field Trip (2 hours) Winter Lesson (1.5 hours) at Home School Spring Field Trip (2 hours)

Overview / Rationale
Students are expected to develop an understanding of the effects of weathering and the rate of erosion by water, ice, wind, or vegetation.

Stage 1 – Desired Results	
Established Goals: **New Jersey Student Learning Standards-Science (2020)** 4-ESS2-1.Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]	
Essential Questions: How does water, ice, wind, and vegetation change the Earth's surface?	**Enduring Understandings:** The Earth's surface is constantly being changed and shaped by the processes of weathering and erosion.
Knowledge: *Students will know…* …scientists think the Grand Canyon was formed through weathering and erosion over the last 7 to 12 million years. …two types of weathering: chemical and physical weathering. … the different forces of erosions including wind, water, ice, animals and gravity. …plants and their roots are very effective at holding onto, and preventing, soil erosion. …soil on a hill or slope that is not covered with vegetation is vulnerable to erosion, especially by water. …the four major variables that impact the rate of erosion by water: amount of water, materials on ground, slope of the land, and how fast the water comes down.	**Skills:** *Students will be able to…* …infer the processes that helped to form the Grand Canyon. …distinguish between different types of weathering and erosion as well as the impact that plants have on erosion. …observe and measure areas of SummerWood that have been subject to soil erosion. …formulate explanations as to why areas in SummerWood are subject to erosion. …create a 3-D model of an area in SummerWood that has an erosion problem. …understand the process of erosion by seeing how a stream table works to simulate water flow and erosion. …gather data by testing different variables on their own stream tables such as material,

…the steeper the slope, the more erosion that will occur. …the larger the volume of water, the more erosion that will occur. … large heavy materials, like rocks, erode at a slower rate than smaller light materials. …the impact of time on the rate of erosion. …the combination of a steep slope and little to no vegetation leads to severe erosion problems. …materials such as pebbles/rocks, toothpicks, sponges, felt/carpet, pipe cleaners, straws mimic real world materials and can be used to mitigate erosion problems and that each material serves a different purpose. …it is very hard to solve a problem the first time and an effective strategy is trial and error.	amount of water, time poured, and the slope of the table. …make simple cause and effect claims after discussing their data as a class. …re-evaluate SummerWood erosion hotspots after the winter season. … analyze the reasons for that change in each eroded area in SummerWood. …observe a home along the Jumping Brook with serious erosion issues. ...act like engineers to design and build an erosion mitigation model and test their designs by simulating heavy rainfall. …test their initial designs and then improve them to better address scientific and engineering questions and problems.

Interdisciplinary Connections
New Jersey Student Learning Standards- English Language Arts (2016) RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. W.4.7 Conduct short research projects that build knowledge through investigation of different aspects of a topic. W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. **New Jersey Student Learning Standards- Mathematics (2016)** MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically. 4.MD.A.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table. 4.MD.A.2 Use the four operations to solve word problems involving distances, intervals of time, liquid volumes, masses of objects, and money, including problems involving simple fractions or decimals, and problems that require expressing measurements given in a larger unit in terms of a smaller unit. Represent measurement quantities using diagrams such as number line diagrams that feature a measurement scale. **New Jersey Student Learning Standards- Comprehensive Health and Physical Education (2020)**

2.2.5.MSC.1: Demonstrate body management skills and control when moving in relation to others, objects, and boundaries in personal and general space (e.g., coordination, balance, flexibility, agility).
2.3.5.PS.1: Develop strategies to reduce the risk of injuries at home, school, and in the community.

New Jersey Student Learning Standards- Computer Science and Design Thinking (2020)
8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data.
8.2.5.ED.2: Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models
8.2.5.ITH.1: Explain how societal needs and wants influence the development and function of a product and a system
8.2.5.ETW.2: Describe ways that various technologies are used to reduce improper use of resources.
8.2.5.ETW.3: Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.

New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (2020)
9.4.5.CI.2: Investigate a persistent local or global issue, such as climate change, and collaborate with individuals with diverse perspectives to improve upon current actions designed to address the issue
9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.
9.4.5.CT.2: Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem.

Student Resources
Remote Lessons: **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/fourth-grade-summerwood-trip** **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/winter-summerwood-lessons** **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/4th-grade-spring-trip**
Teacher Resources
Videos: Grand Canyon Formation **https://www.youtube.com/watch?v=lN0cZg_9XeM&app=desktop** **Google Drive:** **https://drive.google.com/drive/folders/1y0mGncZIloK8tcQfs53t3MOXj6PzuGh1?usp=sharing**

Stage 2 – Assessment Evidence
Pre-Assessments: Write-Pair-Share with "Opening" question (fall). Think-Pair-Share with "Opening" question (winter). Four Corners with "Opening" question (spring). ***Formative Assessments:*** Teacher questions and observations of students' work during "Weathering & Erosion Stations" and "SummerWood Erosion Hotspots" activities (fall). Teacher questions and observations of students' work during "Stream Table Experiments" activity (winter). Teacher questions and observations of students' work during "Erosion Hotspots Revisited" and "Slipping Soil" activities (spring). ***Summative Assessments:*** 3-D Model of SummerWood Hotspots (fall). Evaluation of original research questions (#6 on the student sheet) (winter). Making Global Connections closing question (spring). ***Performance Task(s):*** 3-D Model of SummerWood Hotspots (fall). Designs Stream Table Experiment (winter). Building erosion mitigation models in "Slipping Soil" activity (spring).

Stage 3 – Learning Plan
<u>Fall Trip</u> ***Opening:*** How do you think the Grand Canyon was formed (Write-Pair-Share Grand Canyon Student Sheet)? ***Activities:*** - Grand Canyon Formation Video: As a follow up to the opening question review how the Grand Canyon was formed and watch a video simulation of its formation. - Weathering & Erosions Stations: Students will rotate through 6 stations, follow the directions provided on the station cards to explore each station, and then answer questions on the Weathering & Erosion student sheet. Teacher shows slides of each type of erosion with 5 slides at the end to informally quiz the class on each force of erosion. - SummerWood Erosion Hotspots: Discuss with the class what evidence of water erosion will look like in SummerWood. Review water erosion slides to show examples of water erosion in forests. Also show the 5 hotpots before major erosion took place in each location. Discuss how evidence will be collected of past water erosion and erosion that is currently taking place in SummerWood (photos, drawings, measure depth of soil loss and distance of eroded area… now and in the spring). Visit 5 locations in SummerWood and complete the SummerWood Hotspots student sheet – observations, drawings, and measurements.

Closure: Each group creates a clay 3 – D model of one of the SummerWood hotspots using their notes and drawing. Students will present the 3 – D models for each location and make a prediction about how it will change over the next 5 months.

Differentiation: For Weathering & Erosion Stations students can explore one station only and then explain to the class what happened at each station instead of students rotating to explore each station and answer questions; students can record their hotspot observations in a variety of ways – measurements, pictures, diagrams; students can also present their 3-D model in a format that best suits their group.

Winter Lesson

Opening: Show the class a stream table & how water erodes the sand in the table. Ask students to identify variables that impact how much erosion occurs (Think-Pair-Share)?

Activities:

- Stream Table Investigation: After observing the stream table, ask the students to discuss how to design an experiment to test the impact different materials (soil, sand, gravel, large rocks) would have on erosion. Discuss the experimental set-up and then have the class vote on which variable they would like to test: amount of water, how fast the water comes down, or slope of hill? Use a variable that was not selected by to model how to do the experiment; keep all variables constant except the one being tested. Work with class to develop a research question (#1 on the student sheet) and a way to keep all variables constant except the one being experimented on (#2-3 on the student sheet). Allow each group to set up their experiment and choose their roles: timer, pourer of water, catcher/measurer of sand, recorder. During experiment students record their data on their students sheet (#4). After experiment has been cleaned up have each group graph their results (#5 on the student sheet).

Closure: Students individually answer their research question (#1) on the student sheet (#6) and then the class discusses the answer.

Differentiation: Place students in mixed-ability groups so that students with varying strengths can support each other. Instead of having students choose their own roles, assign them during set-up.

Spring Trip

Opening: Which variable has the biggest impact on soil erosion by water: amount of water, materials on the ground, slope of the ground, or how fast the water comes down (Four Corners)?

Activities:

- Review of Terms: Using the drawing on the Soil Erosion student sheet to match terms and definitions for weathering, erosion, and deposition.
- Erosion Hotspots Revisited: Using the student sheets and photos from the fall, review each hotspot location. Students predict changes to each hotspot.Visit each location to make new observations and measurements on the old student sheets (in blue or green pen). Discuss observations with your group.
- Slipping Soil: Students create a model of a home they observed along Jumping Brook in SummerWood. The teacher will then create a heavy rain (watering can) to model what happens when it rains (extreme soil erosion). Students will then choose 4 of 6 materials

(pebbles/rocks, toothpicks, sponges, felt/carpet, pipe cleaners, straws) to formulate an erosion control plan. The teacher, with the help of other groups, will provide each group with a positive – negative – positive critique of their plan prior to recreating the heavy rain. After the heavy rain make observations and review strategies. Students can then redesign and rebuild their erosion mitigation model that will then be tested.

Closure: Making Global Connections - If all other geological processes stopped (building mountains mainly) except weathering and erosion, what would the surface of the Earth look like?

Differentiation: If time runs short, students do not need to redesign and rebuild their models but simply reflect and communicate what improvements they could have made; students can be placed in mixed-ability groups so that students with varying strengths can support each other.

Unit Plan Title	Grade 5: Movement of Matter In Ecosystems
Suggested Time Frame	Falls Field Trip (2 hours) Winter Lesson (1.5 hours) at Home School Spring Field Trip (2 hours)

Overview / Rationale
Students develop an understanding of the idea that plants get the materials they need for growth chiefly from air and water. Using models, students can describe the movement of matter among plants, animals, decomposers, and the environment and that energy in animals' food was once energy from the sun.

Stage 1 – Desired Results	
Established Goals: **New Jersey Student Learning Standards-Science (2020)** 5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.[Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.] 5-LS2-1. Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.[Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]	
Essential Questions: How does matter cycle through ecosystems? Where does the energy in food come from and what is it used for?	**Enduring Understandings:** Plants are essential to life on earth because they are the only living things that can create food from air and water.
Knowledge: *Students will know…* … plants/producers are the only group of organisms on the planet that can turn carbon dioxide into food (sugar/glucose). …producers need sunlight, water, and carbon dioxide to produce food (they don't need soil). …parts of plants such as roots, leaves, and stomata. …fungi, bacteria, and invertebrates are decomposers that consume dead organisms. …leaves and other matter get eaten and turned back into CO2 and soil. …producers, consumers (herbivores, omnivores, carnivores), and decomposers can	**Skills:** *Students will be able to…* …understand that plants acquire most of their material for growth from carbon dioxide in the air, and their energy from the sun. …analyze the idea that all food started as carbon dioxide taken in by a plant. …learn that some organisms, such as fungi, bacteria, and some invertebrates operate as decomposers by breaking down dead organisms. …develop a conceptual model about the role of decomposers in an ecosystem …present a model of a food chain to the class

be linked in a food chain that shows how the sun's energy flows through an ecosystem. …owls eat small mammals and birds but can not digest the fur, feathers, and bones so they regurgitate those parts of their meal in the form of a pellet. …owl pellets can be used to determine what an owl ate. …humans are also part of food chains and our energy comes from the sun. …food chains from the same ecosystem can be linked to form food webs. …organisms of a pond ecosystem like dragonflies, bass, ducks, herons, groundhogs, frogs, algae, deer turtles, bats, hawks, racoons, opossum, deet, flowers, grass, algae. …pesticides impact food webs. …the meaning of photosynthesis, respiration, consumption, and decomposition in relation to the carbon cycle. …at least three producers, consumers (herbivore, omnivore, carnivore), and decomposers from SummerWood.	…discuss how matter and energy flow through the food chain. …learn about consumers by dissecting an owl pellet to identify what owls eat. …use tools in an investigation to pull apart and separate parts of an owl pellet. …use a diagram to show how energy transfers from the sun to plants, to a consumer, then to another consumer. …provide evidence that supports that energy humans use was once energy from the sun. …connect food chains together to create a food web to show relationships between organisms. …research organisms that live in a pond ecosystem to create a food web of those organisms. …predict the impact of pesticides on a pond food web. …relate the movement of energy through food webs to the movement of matter (carbon as food) through the carbon cycle. …create a diagram that describes the movement of matter among plants, animals, and the environment.

Interdisciplinary Connections
New Jersey Student Learning Standards- English Language Arts (2016) RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. 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. SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. **New Jersey Student Learning Standards- Mathematics (2016)** MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems.
2.2.5.N.1: Explain how healthy eating provides energy, helps to maintain healthy weight, lowers risk of disease, and keeps body systems functioning effectively.
2.3.5.PS.1: Develop strategies to reduce the risk of injuries at home, school, and in the community.

New Jersey Student Learning Standards- Comprehensive Health and Physical Education (2020)
2.2.5.MSC.1: Demonstrate body management skills and control when moving in relation to others, objects, and boundaries in personal and general space (e.g., coordination, balance, flexibility, agility).
2.2.5.N.1: Explain how healthy eating provides energy, helps to maintain healthy weight, lowers risk of disease, and keeps body systems functioning effectively.
2.3.5.PS.1: Develop strategies to reduce the risk of injuries at home, school, and in the community.

New Jersey Student Learning Standards- Computer Science and Design Thinking (2020)
8.1.5.DA.1: Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.DA.3: Organize and present collected data visually to communicate insights gained from different views of the data
8.2.5.ED.1: Explain the functions of a system and its subsystems.

New Jersey Student Learning Standards- Career Readiness, Life Literacies, and Key Skills (2020)
9.4.5.IML.2: Create a visual representation to organize information about a problem or issue.
9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data.

Student Resources
Remote Lessons: **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/fifth-grade-summerwood** **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/winter-summerwood-lessons** **https://sites.google.com/neptune.k12.nj.us/summerwood-5thgrade/5th-grade-spring-trip**
Teacher Resources
Videos: Introduction to Matter: https://www.youtube.com/watch?v=2l_gJaLABS0 Decomposing Leaf: https://www.youtube.com/watch?v=IBvKKMzXYtY Fruit & Vegetable Decomposition: *https://www.youtube.com/watch?v=c0En-_BVbGc* Energy In Food: https://www.generationgenius.com/food-energy-basics-lesson-for-kids/

Energy Flow In Ecosystems:
https://www.britannica.com/video/152191/ecosystems-components-organisms-consumers-producers-plants-harness
Owl Pellet: https://www.youtube.com/watch?v=gYvBWcF6YFA
https://www.youtube.com/watch?v=waLiTmLr1nM
Butternut Hollow Pond: https://www.youtube.com/watch?v=XEHcFTAWeqI
https://www.youtube.com/watch?v=1-sjNE5HCtM
https://www.youtube.com/watch?v=8JecCHG6Soo

Google Drive:
https://drive.google.com/drive/folders/1yVKycfJuH5empdDGCtdTXXaxI-KuI1SI?usp=sharing

Stage 2 – Assessment Evidence
Pre-Assessments: Think-Pair-Share with the "Opening" question (fall, winter, spring). ***Formative Assessments:*** Teacher questions and observations of students' work during "Air Plants" and "The Disappearing Leaf" activities (fall). Teacher questions and observations of students' work during "Owl Pellets" and "Butternut Hollow Pond" activities (winter). Teacher questions and observations of students' work during "Carbon Pathways" and "Mapping Carbon" activities (spring). ***Summative Assessments:*** Carbon Dioxide diagrams of movement from the atmosphere to a plant to a decomposer back to the atmosphere (fall). Butter Hollow food web description after pesticide treatment (winter). Carbon Cycle "Exit Slip" (spring) ***Performance Task(s):***. Carbon Dioxide diagrams of movement from the atmosphere to a plant to a decomposer back to the atmosphere (fall). Butter Hollow food web description after pesticide treatment (winter). Carbon Cycle "Exit Slip" (spring)

Stage 3 – Learning Plan
<u>Fall Trip</u> ***Opening:*** What do plants need from, and give to, their surrounding environment (Think-Pair-Share)? ***Activities:*** - Air Plants Introduction: Show Introduction to Matter Video. Draw a tree on the board and work with students to identify types of matter that go in (water & carbon dioxide) and out

of plants (water & oxygen) when they produce food. Use Air Plants Notebook photos to help guide the discussion. Highlight that non-food matter (air & water not soil) are used to make food (glucose/sugar + oxygen). Challenge students to identify one food they've eaten that did not start at CO2 turned into sugar by a plant. Student then complete questions #1 and #2 on the student sheet.

- Air Plant Providing Evidence: Use the Plant in a Bag Demo to prove plants give off oxygen. Answer question #1. Use Leaf in a Bag demo to prove plant release water. Answer question #2. Discuss how plants produce food that we eat and how all parts of plants are food for some type of living thing. Answer question #3. Students then complete Show What You Know: Imagine you are a plant!
- The Disappearing Leaf: Revisit the earlier discussion about plant parts that don't get eaten by any animal. Introduce the FBI (Fungi-Bacteria-Invertebrates) as decomposers. Introduce the activity by explaining that each student will collect leaves at successive stages of decomposition. Show Teacher Demonstration Chart.Students will also collect any organism they find on the leaves as they collect them.Complete the Disappearing Leaf Chart. Watch two videos on leaf and fruit decomposition. Answer closing questions 1 -3.

Closure: Draw a diagram showing how carbon moves from carbon dioxide in the atmosphere into a tree (leaf) and how the carbon in that leaf (food/sugar) goes back into the atmosphere with the help of a decomposer.

Differentiation: Students can write a story about the "Life of a Leaf" instead of closing questions; teacher may choose to divide students into pairs rather than smaller groups.

<u>Winter Lesson</u>

Opening: What is the difference between consumers and decomposers (Think-Pair-Share)? Review "The Disappearing Leaf" activity from the fall and.

Activities:

- Review of fall lesson activity"The Disappearing Leaf" by contrasting fungi, bacteria, and invertebrates (FBI) with top-level consumers like sharks, bears, and owls. Review "Air Plants" by highlighting that although today's lesson focuses on energy transfer it is actually matter, in the form of food originating from plants as glucose, where the energy is stored. Show Energy in Food and Energy Flow in Ecosystems video to wrap up review.
- Owl Pellet Videos: Ask students what we can learn from Owl Pellets? What would be the best bone to find to identify the owl's last meal?
- Dissecting Owl Pellets: Introduce activity and provide materials to students. Once students have removed almost all of the fur from each bone, have them draw 4 different bones on their student sheet and use the bone chart to identify which animal the owl ate. Create three energy transfer models: using the Owl Food Web, Mr. Woerner, and themselves.
- Butternut Hollow Pond: Read or show a read aloud of "Butternut Hollow Pond" and have the students study the food chain afterward, checking to make sure it is consistent with the story. Answer any questions.

Closure: Students will complete the Butter Hollow Pond food web activity by answering questions 1 - 4 on the final page of the student sheet. Students will also predict the impact on the food web if someone sprayed pesticides around the pond and all the insects died.

Differentiation: Students can focus on one Butternut Hollow Pond food chain for the performance task; teacher may choose to divide students into pairs or groups depending on the class dynamic.

Spring Trip

Opening: Write what you know about carbon (Think-Pair-Share).

Activities:

- Carbon Pathways Introduction: Discuss where carbon can be found, how it gets into out bodies, how it leaves our bodies. Students help draw a simple carbon cycle on the board with a plant and human as review of the fall lesson. Review the winter lesson by showing on the board the owl food chain. Connect the fall and winter lessons by showing how carbon flows parallel with energy flow/transfer.
- Carbon Pathways: Explain to students that they will be a carbon atom traveling through the environment. For detailed "Carbon Pathways" instructions see page 129 of Carbon on the Move (in Google Drive). At the conclusion of the game, complete the Mapping Carbon portion of the student sheet as a class.
- Mapping Carbon in SummerWood: Students will visit SummerWood to find 3 producers, 3 decomposers, and at least one herbivore, omnivore, and carnivore. Back in the class they will work in groups to create a carbon cycle map/diagram for SummerWood on extra large Post-It notes that will be reviewed with the class and given a point total (1 point for each arrow and each box that got carbon via an appropriate transfer).

Closure: Students will complete the Exit Slip portion of their student sheet that asks them to create their own carbon cycle that includes a producer, consumer, decomposer, and one element of the non-living environment.

Differentiation: Students can choose a different way to model the carbon cycle as long as they show appropriate storage and movement of carbon within the ecosystem.

Accommodations and Modifications:
Below please find a list of suggestions for accommodations and modifications to meet the diverse needs of our students. Teachers should consider this a resource and understand that they are not limited to the recommendations included below.

An **accommodation** *changes* HOW *a student learns*; the change needed does not alter the grade-level standard. A **modification** *changes* WHAT a *student learns*; the change alters the grade-level expectation.

Special Education and 504 Plans
All modifications and accommodations must be specific to each individual child's IEP(Individualized Educational Plan) or 504 Plan.
Provide redirection
Provide notes and copies of handouts
Have student highlight in notes
Pre-teach or preview vocabulary
Have students repeat directions
Pair visual prompts with verbal presentations
Ask students to restate information, directions, and assignments
Model skills/techniques to be mastered
Provide a copy of class notes
Emphasize key words or critical information by highlighting
Use of graphic organizers
Teachers should note any issue that may impact safety- ex. contact lenses, allergies.

English Language Learners
All modifications and accommodations should be specific to each individual child's LEP level as determined by the WIDA screening or ACCESS, utilizing the WIDA Can Do Descriptors.
Pre-teach or preview vocabulary
Repeat or reword directions
Have students repeat directions
Use of small group instruction
Scaffold language based on their Can Do Descriptors
Alter materials and requirements according to Can Do Descriptors

Allow naming of plants and animals in native language or even to describe the organism or give it their own name; use small groups with bi-lingual students; repeat directions/instruction; more frequency of formative assessments/check-ins.

Students at Risk of Failing
Provide more guidance during SummerWood trips: invite parent helpers; assign adults to pairs that may need more assistance; have some (or all) students stay with you as a group instead of

moving in pairs/small groups; provide additional guidance to a group by walking with that group; help with data collection by spending time modeling how and where to record observation; model observations/activities/techniques more explicitly; more frequency of formative assessments/check-ins.

High Achieving
Allow for student choice to further develop ideas or expand activities by making more detailed observations, adding levels of complexity to student work, as well as self directed learning by asking and answering their own questions.

NEPTUNE CITY SCHOOL DISTRICT
Office of the Chief School Administrator, Principal
210 West Sylvania Avenue
Neptune City, NJ 07753

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