Pocatello/Chubbuck School District #25
GATE 2019/2020

Grade: 5/6 **Unit 1:** Disruptions and Ecosystems **Pacing: All Year**

Unit Overview: The purpose of this unit is to help learners understand the connections between populations of organisms within a specific ecosystem and the effects disruptions have on the biodiversity of that ecosystem. Learners will research and construct a potential solution to a challenge faced by local animal populations and present an evidence-based argument for their solution.

This unit will begin with a hands-on activity where learners investigate different methods such as aeration and filtering for removing pollutants from water. Working in teams, learners will design, build and test their own water filters—essentially conducting their own "dirty water projects." Questions from this experience will lead learners to investigate the impact water quality has on living organisms in an ecosystem.

FOCUS STANDARDS The FOCUS and accompanying standards are clustered with Learning Intentions and Success Criteria (LI/SC) identified to provide coherence in teaching and learning. It is from these standards, LI/SC, and Tasks/Assessments that PLCs create weekly learning intentions, success criteria and lesson plans.	**Learning Intentions**
LS2-MS-6. Evaluate competing design solutions for maintaining biodiversity and ecosystem services. • Further Explanation: Examples of ecosystem services could include water purification, nutrient recycling, and prevention of soil erosion. Examples of design solution constraints could include scientific, economic, and social considerations. LS2.C: Ecosystem Dynamics, Functioning, and Resilience • Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological components of an ecosystem can lead to shifts in all its populations. (LS2-MS-5) • Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (LS2-MS-6)	In this unit, learners will understand how disruptions to any physical or biological components of an ecosystem can lead to shifts in all its populations. In this unit, learners will understand effective components of design solutions for

	maintaining biodiversity.

ACCOMPANYING STANDARDS
LS2-MS-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem. • Further Explanation: Emphasis is on cause and effect relationships between resources and growth of individual organisms and the numbers of organisms in ecosystems during periods of abundant and scarce resources. LS2-MS-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. • Further Explanation: Emphasis is on predicting consistent patterns of interactions in different ecosystems in terms of the relationships among and between organisms and abiotic components of ecosystems. Examples of types of interactions could include competitive, predatory, and mutually beneficial. LS2-MS-5. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations. • Further Explanation: Emphasis is on recognizing patterns in data and making warranted inferences about changes in populations, and on evaluating empirical evidence supporting arguments about changes to ecosystems. LS2.A: Interdependent Relationships in Ecosystems • Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (LS2-MS-1) • In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (LS2-MS-1) • Growth of organisms and population increases are limited by access to resources. (LS2-MS-1) • Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (LS2-MS-2) LS2-5-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all.

- Further Explanation: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.

LS2-5-4. 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.

- Further Explanation: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.

UNIT LEARNING INTENTIONS
● In this unit, learners will understand how disruptions to any physical or biological components of an ecosystem can lead to shifts in all its populations. ● In this unit, learners will understand effective components of design solutions for maintaining biodiversity.

SCIENCE SUCCESS CRITERIA ALIGNED TO UNIT LEARNING INTENTIONS		
SURFACE **(I can understand foundational ideas and/or use skills.)**	**DEEP** **(I can relate multiple ideas and/or skills.)**	**TRANSFER** **(I can apply ideas and/or skills in different contexts/disciplines.)**
● I can recognize patterns in data. ● I can explain how organisms, and populations of organisms, are dependent on environmental interactions. ● I can explain how the growth of organisms and population increases are limited by access to resources.	● I can analyze how disruptions to any physical or biological components of an ecosystem can lead to shifts in all its populations. ● I can analyze cause and effect relationships between resources and growth of individual organisms. ● I can compare competitive, predatory, and mutually beneficial interactions and how they vary across ecosystems.	● I can evaluate competing design solutions for maintaining biodiversity and ecosystem services. ● I can construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems. ● I can formulate an argument supported by empirical evidence

	• I can make a claim about the merit of a solution to a problem.	that changes to physical or biological components of an ecosystem affect populations.

INFORMATION AND COMMUNICATION TECHNOLOGY SUCCESS CRITERIA ALIGNED TO 6-8 STANDARDS		
SURFACE **(I can understand foundational ideas and/or use skills.)**	**DEEP** **(I can relate multiple ideas and/or skills.)**	**TRANSFER** **(I can apply ideas and/or skills in different contexts/disciplines.)**
• I can select technology to demonstrate my learning in a variety of ways. • I can practice defining problems to solve by computing for data analysis, modeling or algorithmic thinking. • I can find or organize data.	• I can actively seek performance feedback from people, including teachers, and from functionalities embedded in digital tools to improve my learning. • I can create original works or responsibly repurpose or remix other digital resources into new creative works. • I can communicate complex ideas clearly using various digital tools to convey the concepts textually, visually, graphically, etc. • I can use technology to analyze and represent data to solve problems.	• I can navigate a variety of technologies and transfer my knowledge and skills to learn how to use new technologies. • I can explore real-world issues and problems and actively pursue an understanding of them and solutions for them. • I can engage in a design process and employ it to generate ideas, create innovative products or solve authentic problems.

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ELA SUCCESS CRITERIA ALIGNED TO SIXTH GRADE ELA STANDARDS		
SURFACE (I can understand foundational ideas and/or use skills.)	**DEEP** (I can relate multiple ideas and/or skills.)	**TRANSFER** (I can apply ideas and/or skills in different contexts/disciplines.)
● I can delineate a speaker's argument and specific claims, distinguishing claims that are supported by reasons and evidence from claims that are not.	● I can cite textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text. ● I can determine a central idea of a text and how it is conveyed through particular details; provide a summary of the text distinct from personal opinions or judgments. ● I can analyze in detail how a key individual, event, or idea is introduced, illustrated, and elaborated in a text (e.g., through examples or anecdotes). ● I can determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings. ● I can integrate information presented in different media or formats (e.g., visually, quantitatively) as well as in words to develop a coherent understanding of a topic or issue. ● I can engage effectively in a range of collaborative discussions. ● I can include multimedia components	● I can produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience. ● I can develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach. ● I can conduct short research projects to answer a question, drawing on several sources and refocusing the inquiry when appropriate. ● I can draw evidence from informational texts to support analysis, reflection, and research.

	(e.g., graphics, images, music, sound) and visual displays in presentations to clarify information.	

MATH SUCCESS CRITERIA ALIGNED TO SIXTH GRADE MATH STANDARDS		
SURFACE **(I can understand foundational ideas and/or use skills.)**	**DEEP** **(I can relate multiple ideas and/or skills.)**	**TRANSFER** **(I can apply ideas and/or skills in different contexts/disciplines.)**
● I can summarize numerical data sets in relation to their context, such as by: ○ a. Reporting the number of observations. ○ b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement. ○ c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were gathered	● I can use ratio and rate reasoning to solve real-world and mathematical problems. ● I can make tables of equivalent ratios relating quantities with whole- number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios. ● I can convert like measurement units within a given measurement system. 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. ● I can read, write, and compare decimals to thousandths	● None

• I can understand a rational number as a point on the number line. Extend number line diagrams and coordinate axes familiar from previous grades to represent points on the line and in the plane with negative number coordinates		

LEARNING PROGRESSION (DAILY/WEEKLY READING, WRITING, TALKING)
• Community Presenters/Kick-off Phenomenon file: ○ water filtration lab- test filtration systems and questions/cause and effect • Pioneers of life science ○ Richard McFarland - fish ladder ○ Pete Ceglinski and Andrew Turton- SeaBin ○ Grant 1871 US Fish Commission ■ Baird Hatchery 1872 • Fish and local ecosystems (lake trout) ○ data manipulation- Fish and Game website ○ dissections • Ecosystems/labs ○ deer populations- Colorado ○ build models of healthy ecosystems, models of disrupted ecosystems • Disruption Effects/Presenting solution w/ evidence ○ What would happen if dams on the Snake River were removed? ○ water quality/litter & pollution ○ overfishing/overhunting • Final project work - Create models of disrupted ecosystems using cospaces.io and merge cubes ○ Community presenters work with and give feedback to learners

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REQUIRED SUMMATIVE ASSESSMENT	
Performance Task	Learners will create a digital model of a local ecosystem using cospace.io/edu with Mege Cube add-on extension software. The model will show a healthy ecosystem along with the impact of 2-3 viable separate disruptions on that ecosystem. Students will present their model with evidence-based justification of the effects of the disruptions to their ecosystems and potential solutions.
Learning Intention	● In this unit, learners will understand how disruptions to any physical or biological components of an ecosystem can lead to shifts in all its populations. ● In this unit, learners will understand effective components of design solutions for maintaining biodiversity.
Success Criteria	Links to success criteria checklist: https://docs.google.com/document/d/1wGLjc-fvzJo7JzSMtkQc0TSnKDf6dbzspt8DFdh3lgA/edit?usp=sharing
Exemplars	Link to sample on demand prompts/exemplars

VETTED MATERIALS/RESOURCES
https://www.isu.edu/news/2018-fall/idaho-state-university-professors-identify-some-of-last-remaining-populations-of-native-cutthroat-troutin-the-portneuf-river.html Stanford short performance assessment: https://drive.google.com/file/d/1jJ-p_8TbzlGZIfma48PMxPM_UsTB1A0p/view . PE: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem (LS2-1) More Stanford short performance assessments: https://snapgse.stanford.edu/snap-assessments/short-performance-assessments