North Smithfield Middle School Unit Design- ECOLOGY

Grade Level 7

Text to be Used: McDougal Littell & *Unit Resource Book (URB) where noted

Ecology (E) Diversity of Living Things (DOL) Cells & Heredity (C&H)

RI Statements of Enduring Knowledge - (Established Goals):

LS1 – All living organisms have identifiable structures and characteristics that allow for survival (organisms, populations, & species).

LS2 – Matter cycles and energy flows through an ecosystem.

LS3 - Groups of organisms show evidence of change over time (structure, behaviors, biochemistry).

LS4 – Humans are similar to other species in many ways, and yet are unique among Earth's life forms.

Related Rhode Island GSE's (Understandings)	**RI Assessment Targets** **Assessment Evidence ***High Priority**
LS1 (7-8)-1 **Students demonstrate an understanding of biodiversity by…** 1a giving examples of adaptations or behaviors that are specific to a niche (role) within an ecosystem. 1b explaining how organisms with different structures and behaviors have roles that contribute to each other's survival and the stability of the ecosystem. **LS1 (5-6)-2** **Students demonstrate an understanding of structure and function survival requirements by…** 2a describing structures or behaviors that help organisms survive in their environment (e.g., defense, obtaining nutrients, reproduction, and eliminating waste).	***LS1 (5-8) – INQ + SAE –1 ***** *Using data and observations about the biodiversity of an ecosystem make predictions or draw conclusions about how the diversity contributes to the stability of the ecosystem.* **Text Reference: Chapter 1.1 (E)** pp.9-13 **Activity: How do plants react to sunlight?p.7(E)** **Activity: What is soil?p.7(E)** **Internet Activity, p.7(E)** **Text Reference: Chapter 2.1-2.3(E)** pp.45-68 **Activity: How many roles can living things have in an ecosystem?p.43(E)** **How do living things interact where you live?p.43(E)** **Estimating Populations, pp.52-53(E)** ***LS1 (5-8) – SAE + FAF –2 ***** *Describe or compare how different organisms have mechanisms that work in a coordinated way to obtain energy, grow, move, respond, provide defense, enable reproduction, or maintain internal balance (e.g., cells, tissues, organs and systems)*

LS1 (7-8)-3 **Students demonstrate an understanding of reproduction by…** 3a explaining reproduction as a fundamental process by which the new individual receives genetic information from parent(s). 3b describing forms of asexual reproduction that involves the genetic contribution of only one parent (e.g., binary fission, budding, vegetative propagation, regeneration). 3c describing sexual reproduction as a process that combines genetic material of two parents to produce a new organism (e.g., sperm/egg, pollen/ova). **LS2 (7-8)-5** **Students demonstrate an understanding of equilibrium in an ecosystem by…** 5a identifying which biotic (e.g., bacteria, fungi, plants, animals) and biotic (e.g., weather, climate, light, water, temperature, soil composition, catastrophic events) factors affect a given ecosystem. 5b analyzing how biotic and abiotic factors affect a given ecosystem. 5c predicting the outcome of a given change in biotic and abiotic factors in an ecosystem. 5d using a visual model (e.g., graph) to track population changes in an ecosystem	***LS1 (5-8) – POC–3 ****** *Compare and contrast sexual reproduction with asexual reproduction.* **Text Reference: Chapter 2.1, pp.48-49 (DOL)** **Text Reference: Chapter 1.2 p. 58 (C&H)** **Text Reference: Chapter 4.3, pp.118-124 (HB)** : ***LS2 (5-8) – INQ + SAE–5 ****** *Using data and observations, predict outcomes when abiotic/biotic factors are changed in an ecosystem.* **Text Reference: Chapter 1.1 pp. 10-13 (E)** **Text Reference: Chapter 1.1 (E) pp.10-13** **Text Reference: Chapter 2.1-2.2 (E) pp.45-61** **Activity-How do predator-prey populations interact? p.57(E)** **Activity- Estimating Populations, pp. 52-53(E)** ***LS2 (5-8) – INQ + SAE–6 ******

LS2 (7-8)-6 **Students demonstrate an understanding of energy flow in an ecosystem by…** 6a explaining the transfer of the sun's energy through living systems and its effect upon them. 6b describing the basic processes and recognizing the names and chemical formulas of the substances involved in photosynthesis and respiration. 6c explaining the relationship between photosynthesis and respiration. **Students demonstrate an understanding of food webs in an ecosystem by…** 6d creating or interpreting a model that traces the flow of energy in a food web. **LS2 (7-8)-7** **Students demonstrate an understanding of recycling in an ecosystem by…** 7a diagramming or sequencing a series of steps showing how matter cycles among and between organisms and the physical environment. 7b developing a model for a food web of local aquatic and local terrestrial environments. 7c explaining the inverse nature or complementary aspects of photosynthesis/respiration in relation to carbon dioxide, water and oxygen exchange. 7d conducting a controlled investigation that shows that the total amount of matter remains constant, even through its form and location change as matter is transferred among and between	*Given a scenario trace the flow of energy through an ecosystem, beginning with the sun, through organisms in the food web, and into the environment (includes photosynthesis and respiration).* **Text Reference: Chapter 1.1, p.12 (E)** **Text Reference: Chapter 1.2, pp. 16-18(E)** **Activity- What is one form in which carbon is stored on the ocean floor?(E)** **Text Reference: Chapter 1.1, pp. 12-13, 22(E)** **Activity-Bottle Biology as Teacher Demo/Generic Department Developed (Optional)** **Text Reference: Chapter 2.2, pp.48-49 (C&H)** **Elodea and B.T.B. Lab (**Department) **Text Reference: Chapter 1.3, pp. 26-28 (E)** ***LS2 (5-8) –SAE–7*** *Given an ecosystem, trace how matter cycles among and between organisms and the physical environment (includes water, oxygen, food web, decomposition, recycling but not carbon cycle or nitrogen cycle*). **Text Reference: Chapter 1.2, pp. 16-20(E)** **Activity-Temperature and the water cycle, p.21(E)** **Text Reference: Chapter 1.3, pp. 26-28 (E) (Use p.27 as model)** **Text Reference: Chapter 1.2, pp. 16-18(E)** **Activity- What is one form in which carbon is stored on the ocean floor?(E)** **Text Reference: Chapter 1.1, pp. 12-13, 22(E)**

organisms and the physical environment (e.g., bottle biology, mass of a closed system over time. **LS3 (7-8)-9** **Students demonstrate an understanding of Natural Selection/evolution by…** 9a explaining the genetic variation/traits of organisms are passed on through reproduction and random genetic changes. 9b gathering evidence that demonstrates evolutionary relationships among organisms (e.g., similar in body structure, early development, traits). 9c differentiate between acquired and inherited characteristics and giving examples of each. 9d explaining how natural selection leads to evolution (e.g., survival of the fittest). 9e describing how scientists' understanding of the way species originate or become extinct has changed over time. **LS4 (7-8)-11** **Students demonstrate an understanding of human heredity by…** 11a recognizing that characteristics of an organism result from inherited traits of one or more genes from parents and others result from interactions with the environment. 11b tracing a genetic characteristic through a given pedigree (e.g., genealogical chart, Queen Victoria-hemophilia or hypothetical example) to demonstrate the passage of traits. 11c identifying that genetic materials (i.e., chromosomes and genes) are located in the cell's nucleus.	***LS3 (5-8) – POC–9*** *Cite examples supporting the concept that certain traits of organisms may provide a survival advantage in a specific environment and therefore, an increased likelihood to produce offspring.* **Text Reference: Chapter 4.1-4.3(C&H) pp.101-122** **Activity: How are traits distributed?p.99(C&H)** **Internet Activity-Mendel's Experiment(C&H) p.99** **Text Reference: Chapter 4.1-4.3(C&H) pp.101-122** **Activity: How are traits distributed?p.99(C&H)** **Internet Activity-Mendel's Experiment(C&H) p.99** **Text Reference; Chapter: Chapter 1.2(LOT)** **Chapter Investigation: Modeling Natural Selection, pp.26-27(LOT)** ***LS4 (5-8) – INQ–11 ****** *Using data provided, select evidence that supports the concept that genetic information is passed on from both parents to offspring*. **Text Reference: Chapter 4.1-4.3(C&H)** **Activity: How are traits distributed?p.99(C&H)** **Internet Activity-Mendel's Experiment(C&H)** **Activity: How can probability help predict results?p.110 (C&H)** **Activity: Do probabilities affect each other?p.114 (C&H)** **Activity: Why does sexual reproduction need a special form of cell division?p.117(C&H)** **Text Reference: Chapter 5.2, p. 147(C&H)**

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	Focus Questions (Essential Questions)	**Instructional Activities & Investigations (INQ)**	**Big Ideas** (Understandings)
	What are the different factors that make up an ecosystem? How do biotic and abiotic factors affect an ecosystem?	Text Reference: Chapter 1.1 **(E) pp.9-13** Activity: How do plants react to sunlight?p.7**(E)** Activity: What is soil?p.7**(E)** Internet Activity, p.7**(E)** Math in Science p.21**(E)**	• Matter and energy together support life within an ecosystem. • An **ecosystem** is a system of interacting organisms and nonliving factors in a specified area.
	How is matter exchanged between organisms and their environment?	Text Reference: Chapter 1.2**(E)** pp.16-20 Activity: What is one form in which carbon is stored on the ocean floor?p.19**(E)**	• Matter cycles through ecosystems. • Water cycles through ecosystems.
	How do living things move energy through an ecosystem? How are feeding relationships important in an ecosystem? How does the amount of energy change as it flows through an ecosystem?	Text Reference: Chapter 1.3**(E)** pp.22-28 Activity: How can you observe energy changing forms?p.22**(E)** Activity: Where do decomposers come from?p.25**(E)** Text Reference: Chapter 1.4**(E)** pp.30-37 Activity :How can you graph climate data for your area?p.35**(E)**	• Energy flows through ecosystems. • The amount of energy changes as it flows through an ecosystem. • Biomes contain many ecosystems.

	How do organisms interact in an ecosystem? What effect do interactions have on an ecosystem? How does an ecosystem's population change over time?	Text Reference: Chapter 2.1-2.3**(E)** Activity: How many roles can living things have in an ecosystem?p.43**(E)** How do living things interact where you live?p.43**(E)** Estimating Populations, **URB, p.125(E)**	• Ecosystems interact with each other and the environment. • Ecosystems are defined by interactions among organisms and physical factors.
	How does sharing resources affect the ecosystem? How does pollution and a loss of diversity affect the environment? How do we use data and observations about the biodiversity of an ecosystem to help make predictions and/or draw conclusions about the stability of an ecosystem?	Text reference: Chapter 3.1-3.3**(E)** pp.81-105 Activity: How can you model resource distribution?p.81**(E)** Activity: Where do you find air pollution?p.91**(E)** Investigate- Particles in the Air,p.91**(E)** Activity: What happens when soil is compressed?p.98**(E)** Biomagnification, p.29**(E)** Text Reference: Chapter 4.1-4.3**(C&H)** pp.101-122 Activity: How are traits distributed?p.99**(C&H)** Internet Activity-Mendel's Experiment**(C&H)** p.99	• Humans and human population growth affect the environment.
	How are characteristics inherited? What is phenotype/genotype?	Activity: How can probability help predict results?p.110 **(C&H)** Activity: Do probabilities affect each other?p.114 **(C&H)** Activity: Why does sexual reproduction need a special form of cell division?p.117**(C&H)**	• Living things inherit traits in patterns. • Patterns of heredity can be predicted.