Green Eggs & Sand	Alignment with Maryland Voluntary State Curriculum – Middle School[1]

Module One – The Horseshoe Crab

Students learn biology and natural history of horseshoe crabs. This subject is the foundation of this project, which subsequent modules build upon.

HORSESHOES ALIVE – MIDDLE SCHOOL

Students read expository text from a natural history-oriented article on the horseshoe crab and list questions, answers, and details as they read.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text; 2. Identify & use text features to facilitate understanding (graphic aids such as charts, drawings, maps).	None	**1.0 Skills & Processes:** A.- D. **3.0 Life Science** **Grade 6 - D. Evolution: 1.** Organisms' growth & survival depend on physical conditions; **F. Ecology: 1.** Number of organisms environ. supports depends on physical conditions & available resources [need for sandy beaches]; a. populations increase/decrease re: available resources/ environ. conditions; b. limiting factors; c. resource competition. **Grade 7 - A. Diversity of Life: 1.** Features of organisms connect or differentiate them (external & internal features and behavioral patterns; classification).	None

GETTING TO KNOW THE HORSESHOE CRAB – MIDDLE SCHOOL

Students watch part of a video introducing the controversy of the horseshoe crab, build a model, and test their knowledge with a crossword puzzle.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **Grade 6-8** **Extension:** Students develop an acrostic poem about the lesson. **3.0 Comprehension of literary text: 4:** Use elements of poetry to facilitate understanding.	None	**1.0 Skills & Processes:** A- D **3.0 Life Science** **Grade 6 - D. Evolution: 1.** Organisms' growth & survival depend on physical conditions; **F. Ecology: 1.** Number of organisms environ. supports depends on physical conditions/available resources [need for sandy beaches]; a -c. (limiting factors & resource competition). **Grade 7 -A. Diversity of Life: 1.** External & internal features/behavioral patterns, connect or differentiate organisms.	None

[1] Activities meet learning outcomes as noted; meets all grades unless otherwise noted.

REACH THE BEACH – MIDDLE & HIGH SCHOOL

Students play a board game to learn factors that scientists believe influence horseshoe crab spawning. These factors include water temperature, tides, wind, wave action, pheromones, sediment particle size, and beach slope.

English/Language Arts	Social Studies	Science	Mathematics
4.0 Writing. 7. Locate, retrieve, & use information from a variety of sources.	**[Potential exists to meet: Grade 7 - 3.0 Geography**; **D. Modifying & Adapting to the Environment: 1.** a-d (land use issues)-*need to expand on how humans change the environment – structures on beach that limit crab spawning*]	**1.0 Skills & Processes:** A- D. (model). **Grade 6- 3.0 Life Science: D. Evolution: 1.** Growth/survival of organisms & species depend on physical conditions; **F. Ecology: 1.** Number organisms env. supports depends on physical conditions & available resources [need sandy beaches]; a. populations increase/decrease re: available resources & environ. conditions; b. limiting factors; c. resource competition; **6.0 Environ Science: B. Environ. Issues: 1.** Human-caused changes have consequences for local environ, other places & future times. **[Potential exists to meet 6.0 Grade 7 B. Env. Issues: 1.** Env. changes have local, regional, global consequences; **Grade 8 B. Env. Issues: 1.** Human activeties accelerate/magnify naturally occurring changes: *need depth how humans change envt; manmade structures limit spawning*).	None

HORSESHOE CRAB JEOPARDY – MIDDLE SCHOOL

This activity, presented in "Jeopardy" game format, serves as a wrap-up/review exercise for all the students have learned about horseshoe crabs during this module; it also provides information that sets the stage for material students will cover in the other three modules.

English/Language Arts	Social Studies	Science	Mathematics
None	**Grade 6** **3.0 Geography: B. Geographic Characteristics of Places & Regions:** a. world settlement patterns; c. human interactions w/environment; **Grades 7 & 8** **3.0 Geography: A. Using Geographic Tools.**	**1.0 Skills & Processes:** A. - C. **Grade 6 -3.0 Life Science D. Evolution: 1.** Growth/survival of organisms/species depend on physical conditions; **F. Ecology: 1.** Num. organisms environ. supports depends on physical conditions/available resources [need sandy beaches]; a. populations increase/decrease re: available resources & environ. conditions; b. limiting factors; c. resource competition. **Grade 7 - 3.0 Life Science A. Diversity of Life: 1.** Features of organisms connect or differentiate them (external & internal features/behavioral patterns; classification)	None

RAISING HORSESHOE CRABS IN THE CLASSROOM & EXPERIMENTS - MIDDLE SCHOOL

Students learn all about horseshoe crabs - their physical needs and interactions with abiotic factors as well as how they behave by raising HSC them selves in the classroom.

English/Language Arts	Social Studies	Science	Mathematics
None	None	**1.0 Skills & Processes:** A & B. **Grade 6 - 3.0 Life Science: D. Evolution: 1.** Growth & survival of organisms & species depend on physical conditions; **F. Ecology: 1.** Number organisms environ. supports depends on physical conditions & available resources [need sandy beaches]; a. populations increase/decrease re: available resources/env. conditions; b. limiting factors; c. competition for resources.	None

Module Two – Shorebird Connections

This module is a critical curricular link between horseshoe crabs and humans, just as the Delaware Bay provides a critical link in shorebird migration between South America and the Arctic. The module activities enable students to explore and broaden their understanding of shorebirds, with lessons on shorebird identification, feeding behaviors, adaptations and energentics. These lessons reveal the interdependence of species, and add complexity to the subject as students move on to study "Human Connections" (Module 3) and later, "Managing a Resource (Module 4).

BUILD A SHOREBIRD – MIDDLE SCHOOL

Students investigate physical adaptations that are unique to birds by using selected props to transform a volunteer into a "generic" bird. Thereafter the volunteer is transformed into a generic shorebird, and finally into a Red Knot.

English/Language Arts	Social Studies	Science	Mathematics
None	None	**1.0 Skills & Processes: A & B. Grade 6 - 3.0 Life Science: F. Ecology: 1.** Number organisms environ. supports depends on physical conditions/available resources: a. populations increase/ decrease re: available resources/environ. conditions; b. limiting factors; c. resource competition; d. niches reduce competition. **Grade 7 - 3.0 Life Science: A. Diversity of Life: 1.** Features of organisms connect or differentiate them (external & internal features/behaviors; classification). **Grade 8 - 3.0 Life Science: D. Evolution: 1.** Evol. change in species is a result of natural variation in organisms & env. changes (gradual/sudden env. changes; adaptations; extinction; species diversity).	None

BE SHORE ABOUT YOUR BIRDS – MIDDLE & HIGH SCHOOL

Students learn how scientists use dichotomous keys to identify organisms: students work through a hypothetical "sample key" to student faces. They use a DE Bay Shorebird brochure and apply keying skills to identify 10 species of shorebirds known to use Delaware, Maryland, and New Jersey as a pit stop on their migration to the Arctic breeding grounds. Students view live footage of shorebirds and key them as scientists do in the field. Finally, individuals or groups of students are assigned one of the shorebird species for follow up research using a "biological profile" form provided.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocab D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of info. text; 2. Id/use text features to facilitate understanding (graphic aids: charts, drawings, maps). **4.0 Writing. 7.** Locate, retrieve, & use information from a variety of sources.	None	**1.0 Skills & Processes:** A. Constructing Knowledge; B. Applying Evidence and Reasoning; C. Communicate Scientific Information; D. Technology. **Grade 7** **3.0 Life Science: A. Diversity of Life: 1.** Features of organisms connect or differentiate them (external & internal features/behavioral patterns; classification).	None

EAT AND GO – MIDDLE SCHOOL

Students role-play red knots to experience the interrelationships between shorebirds, the environment, and horseshoe crab eggs. They explore and discuss the hazards and benefits of migration and the importance of food resources on the Delaware Bay.

None	None	**1.0 Skills & Processes: A & B.** **Grade 6 - 3.0 Life Science: F. Ecology: 1.** Number organisms an environ. supports depends on physical conditions/available resources: a. populations increase/de-crease re: available resources & enviro. conditions; b. limiting factors; c. resource competition; d. niches reduce competition.	**7.0 Processes of Math A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate or apply mathematics within the discipline, to other disciplines, & to life (a-d).

AVIAN OLYMPICS – MIDDLE & HIGH SCHOOL

By competing in various physical and academic challenges, students learn about the Red Knot's incredible physical abilities and adaptations for long-distance migration. Students also learn about ecological connections between migratory shorebirds, the Delaware Bay, and horseshoe crabs. **Potential exists** to address Human Health topics (caloric needs; burning calories; types of food best for endurance (e.g., competing in a marathon).

English/Language Arts	Social Studies	Science	Mathematics
None	**Grades 7 & 8** **3.0 Geography: A. Using Geographic Tools.**	**1.0 Skills & Processes: A. - D** **3.0 Life Science** **Grade 6 - D. Evolution: 1. G**rowth & survival of organisms & species depend on physical conditions (selective breeding; competition for resources; environ. changes; fossils). **Grade 8 - D. Evolution: 1.** Evolutionary	**Grade 6-8** **1.0 Knowledge of Algebra, Patterns, & Functions: Measurement**: B. Expressions, Equations & Inequalities. 1. Write an algebraic equation to express unknown quantities. metric weights. **Grades 6 & 7**

		change in species is a result of natural variation in organisms & environ. changes (gradual & sudden environ. changes; adaptations; extinction; species diversity). **Grade 6 - F. Ecology: 1.** Num. organisms environ. supports depends on physical conditions/available resources: a. populations increase/decrease re: available resources & env. conditions; b. limiting factors; c. resource competition; d. competition is reduced w/niches.	**6.0 Knowledge of Number Relationships & Computation: C. Number Computation:** (percent). **7.0 Processes of Math** **A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate or apply mathematics within the discipline, to other disciplines, & to life (a-d).

RESEARCH TOPICS – MIDDLE AND HIGH SCHOOL

Alignment depends on topic selected. Based on the research topics outlined in the lessons, potential exists to meet the listed indicators. We suggest that the teacher review the listed indicators and assign students to address specific elements in their research. For example,

- What role (if any) does federal or state government play in migratory bird management?
- What regulations exist to protect migratory birds (or other natural resources related to your research topic)?
- How might current and/or projected coastal population trends impact horseshoe crab or migratory bird survival?
- What economic benefits are associated with migratory bird or horseshoe crab populations in Maryland?
- What food webs would be disrupted if either the horseshoe crab or Red Knots (or one of the other 3 migratory birds described) populations were disrupted?
- What are the main limiting factors associated with Red Knot survival? What threats exist (if any) that would impact the quality of these limiting factors (e.g., beach habitat: coastal population development)?

English /Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text; 2. Identify & use text features to facilitate understanding (graphic aids such as charts, drawings, maps). **4.0 Writing. 7.** Locate, retrieve, & use information from a variety of sources.	**Grade 6 - 3.0 Geog: B. Geog. Characteristics of Places & Regions:** c. human interactions w/environ; **D. Modifying & Adapting to the Environ: 1.** a. How early people modify environ; **4.0 Econ: A. Scarcity & Econ. Decision-making 1.** Early people made choices about resources; **3.** How tech. changes affect production & consumption. **Grade 7 - 1.0 Political Science: A. Foundations & Functions of Govt: 3.** Roles of govts around the world re: public issues a-b (environ. issues; conservation); **2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; **3.0 Geog: B. Geog. Characteristics of Places & Regions: 1. b.** environ. impacts; **C. Movement of People, Goods & Ideas: 1.** b. Consequences of world population settlement patterns; **c**. regional population	**1.0 Skills & Processes: A. - D.** **Grade 6 - 3.0 Life Science: D. Evolution: 1.** Growth & survival of organisms & species depend on physical conditions (selective breeding; resource competition; environ. changes; fossils); **F. Ecology: 1.** The number of organisms an environ. supports depends on physical conditions & available resources: a. populations increase/decrease relative to availability of resources & environ. conditions; b. limit-ing factors; c. competition for resources; d. competition is reduced w/niches; **6.0 Environmental Science B. Environ. Issues: 1.** Human-caused changes have consequences for the immediate enviro, other places & future times. **Grade 7 - 6.0 Environmental Science: A. Natural Resources & Human Needs. 1.** Impacts of a changing human	Varies, depending on focus of research topic.

	patterns or trends affect the environ [trend toward coastal living]; **D. Modifying & Adapting Environ: 1.** a-d (econ. trade offs w/resources use; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ. Decision-making 2.** Sustainable devt; **3.** Tech. changes affect production & consumption; c. Factors influence econ. development e.g., natural resources; public health issues; **B. Econ Systems & Role of Govt 2.** d. Impacts of regulatory agencies. **Grades 7 & 8 3.0: A. Using Geog Tools.** **All Grades - 6.0 Social Studies Skills & Processes: A**. Develop & apply SS vocab: econ. resources; interest groups; natural resources; natural/ physical features & characteristics; places; population distrib-ution; production; scarcity; settlement patterns; sustainable development).	population on the use of natural resources and on environ. quality; **B. Environmental Issues: 1.** Environ. changes have local, regional, and global consequences (ID stakeholders). **Grade 8 - 3.0 Life Science: D. Evolution: 1.** Evolutionary change is a result of natural variation in organisms & environ. changes (gradual & sudden environ. changes; adaptations; extinction; species diversity); **6.0 Environmental Science: B. Environ. Issues: 1.** Human activities can accelerate or magnify many naturally occurring changes.	

Module Three –Human Connections

This module provides an effective bridge between the Shorebird Connections module, and the Managing a Resource module. The Human Connections module focuses on introducing students to the many uses of crabs, the ways those uses and values have changed over time, and the unique and valuable biomedical applications. These activities use a combination of outdoor-interactive, indoor-laboratory, and internet exploration.

TIME TRACKING: A CRABS, BIRDS & HUMANS TIMELINE EXERCISE – MIDDLE & HIGH SCHOOL

Students work together laying out a spatial-linear timeline representation of the horseshoe crab's history (350 mya to present). Next, students position along the line a series of key dates in horseshoe crabs, humans and shorebirds story. Students answer questions relating to the timeline events. As a culminating exercise, students are asked to forecast the next 50 years of HSC/Humans timeline events.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text; 2. Identify & use text features to facilitate understanding (graphic aids such as charts, drawings, maps). **4.0 Writing: 2.** Compose oral, written, and visual presentations; e. write to learn	***Note:*** *to effectively address* ***any*** *of the following standards, the teacher will need to provide more depth and context than what is available on the event cards* **Grade 6 - 3.0 Geog: B. Geographic Characteristics of Places & Regions:** a. world settlement patterns; c. human interactions w/environ.; **D. Modifying & Adapting to the Environ.: 1.** a & b (how early people modify the environ.). **4.0 Econ: A. Scarcity & Econ. Decision-making 1.** Early people made choices	**1.0 Skills & Processes: A-D** **Grade 6** **3.0 Life Science: D. Evolution: 1**. Growth & survival of organisms & species depend on physical conditions (selective breeding; competition for resources; environmental changes; fossils); **F. Ecology: 1.** The number of organisms an environ. supports depends on physical conditions & available resources: a. popu-lations increase/decrease re: available resources & environ. conditions; b. limit-ing factors; c.	**7.0 Processes of Math** **A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate or apply mathematics within the discipline, to other disciplines, & to life (a-d) [students need to measure length accurately and calculate ratios]].

strategies (journals; logs; drawings).	about resources; **3.** tech. changes affect production & consumption; **4.** a. Specialization depends on available resources. **Grade 7 - 1.0 Political Science: A. Foundations & Functions of Govt: 3.** Roles of govts around world re: public issues a-b (environ. issues; conservation); **2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; c. health-care initiatives; **3.0 Geography: B. Geog Characteristics of Places & Regions: 1. b.** environ. impacts; **C. Movement of People, Goods & Ideas: 1.** b. consequences of world population settlement patterns [beach loss]; **c**. regional population patterns/trends affect the environ.; **D. Modifying & Adapting to the Environ: 1.** a-d (economic trade offs w/ natural resource use; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ. Decision-making 1**. Limited resources; **2.** Sustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specializa--tion c. Factors that influenced econ. devt e.g., natural resources; pop. growth; public health issues; **B. Econ Systems & Role of Govt 2.** d. Impacts of regulatory agencies (environ. protection). **Grades 7 &8 -3.0: A. Using Geog Tools. All Grades 6.0 Social Studies Skills & Processes: A**. Develop & apply SS vocab: economic resources; environment; geographic characteristic, features, and tools; interest groups; natural hazards; natural resources; natural/physical features & characteristics; places; population distribution; production; scarcity; settlement patterns; sustainable development).	resource competition s; d. competition reduced w/niches; **6.0 Environ Science A. Natural Resources & Human Needs. 1.** Different parts of the world have varying amounts & types of natural resources; how resource use impacts environ. quality; **B. Environ Issues: 1.** Human-caused changes have consequences for the immediate environ., for other places & future times (local issues impact other places; ecosystems can be impacted). **Grade 7** **6.0 Environmental Science A. Natural Resources and Human Needs. 1.** Impacts of a changing human population on the use of natural resources & on environ. quality; **B. Environmental Issues: 1.** Environ. changes can have local, regional, & global consequences (ID stakeholders). **Grade 8** **3.0 Life Science: D. Evolution: 1.** Evolutionary change in species is a result of natural variation in organisms and environmental changes. (gradual & sudden environmental changes; adaptations; extinction; species diversity); **6.0 Environmental Science: B. Environ. Issues: 1.** How human activities can accelerate or magnify many naturally occurring changes.	

ECONOMICS OF THE HORSESHOE CRAB – MIDDLE SCHOOL

Students explore three graphic exhibits from a recent real-life report to gain insights into the economic aspects of the horseshoe crab resource, including that attributed to eco-tourism (shorebird viewing), biomedical values, and use for bait in the conch and eel fisheries. An informational booklet is provided with the graphs to help students deepen their understanding of these uses, and how they vary from state to state along the coast.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text; 2. Identify & use text features to facilitate understanding (graphic aids such as charts, drawings, maps).	**Double –check SS standards - MVC** **Grade 6 - 3.0 Geog: B. Geog. Characteristics of Places/Regions:** c. human interactions w/enviro; **D. Modifying & Adapting to the Environ: 1.** a & b (early people modify the environ.); **4.0 Econ: A. Scarcity & Economic Decision-making 1.** Early people made choices about resources; **3.** Tech. changes affect production/consumption; **4.** a. Specialization depends on available resources. **Grade 7 - 1.0 Political Science: A. Foundations/Functions of Govt: 3.** Roles of govts around world re: public issues a-b (environ. issues; conservation); **2.0 Peoples of Nation/World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; c. healthcare initiatives; **3.0 Geog: B. Geog Characteristics of Places/Regions: 1. b.** environ. impacts; **C. Movement of People, Goods & Ideas: 1. c**. regional population patterns/ trends affect environ [beach devt]; **D. Modifying/Adapting to Environ: 1.** a-d (economic trade offs using resources; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity/Economic Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production/ consumption; **4.** Specialization c. Factors that influence econ devt: resources; pop. growth; public health issues; **B. Econ Systems/Role of Govt 2.** d. Impacts of regulatory agencies (environ protection). **Grades 7 & 8 - 3.0 Geog: A. Using Geographic Tools** **All Grades - 6.0 Social Studies Skills &**	**1.0 Skills & Processes: A. -C** **Grade 6 - 3.0 Life Science: D. Evolution: 1**. **G**rowth/survival organisms & species depend on physical conditions (selective breeding; resource competition; environ. changes; fossils); **F. Ecology: 1.** Number organisms environ supports depends on physical conditions/resources available: a. populations increase/ decrease re: available resources/environ. conditions; b. limiting factors; c. resource competition; d. competition is reduced w/niches; **6.0 Env. Science: A. Natural Resources/Human Needs. 1.** How different parts of world have varying amounts/types of resources; how resource use impacts environ quality; **B. Environ Issues: 1.** Human-caused changes have consequences for immediate env, other places & future times. **Grade 7 - 6.0 Env Science: A. Natural Resources/Human Needs. 1.** Impacts of a changing human population on use of natural resources & on environ. quality; **B. Environ Issues: 1.** Environ changes can have local, regional, & global consequences (ID stakeholders). **Grade 8 - 3.0 Life Science: D. Evolution: 1.** Evol. change in species is a result of natural variation in organisms & environ changes.(gradual/sudden environ changes; adaptations; extinction; species diversity); **6.0 Env. Science: B. Environ Issues: 1.** How human activities can accelerate/magnify many naturally occurring changes.	**Activity 1:** The teacher should guide students to create the **grade appropriate** graph and data analysis listed below: **4.0 Knowledge of Statistics** **A. Data Displays**: **Grade 6**. a. frequency table; b. stem and leaf; **Grade 7.** s. stem & leaf; b. circle graph; **Grade 8**. a. circle graph; b. box & whisker; c. scatter plot. **4.0 Knowledge of Statistics** **B. Data Analysis.** (See grades above: interpret data according to how it was displayed. **Grades 6 & 8**: a. Interpret frequency tables; **Grade 6 &7: 2.** Describe a set of data: a. mean, median, mode, range. **7.0 Processes of Math** **A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate or apply mathematics within the discipline, to other disciplines, & to life (a-d).

	Processes: **A**. Develop/apply SS vocab: economic resources; environment; geographic characteristic, features, & tools; interest groups; natural resources; natural/ physical features & characteristics; places; population distribution; production; scarcity; sustainable devt.).		

TREASURE HUNT – MIDDLE SCHOOL

This activity engages students in a web-based "treasure hunt" to discover important & interesting aspects of the biomedical uses of horseshoe crabs.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text; 2. Identify & use text features to facilitate understanding (graphic aids such as charts, drawings, maps).	**Grade 7 - 1.0 Political Science: A. Foundations/Functions of Govt: 3.** Roles of govt around world re: public issues a-b (environ. issues; pollution; conservation); **2.0 C. Conflict/Compromise 1.** a. Natural resource acquisition; c. health-care initiatives. **Grade 6 - 3.0 Geog: B. Geog. Characteristics of Places & Regions:** a. world settlement patterns; c. human interactions w/environ; **D. Modifying/Adapting to Environ: 1.** a & b (early people modify the environ); **4.0 Econ: A. Scarcity & Econ Decision-making 1.** Early people made choices about resources; **3.** Tech. changes affect production & consumption; **4.** a. Specialization depends on available resources. **Grade 7 - 3.0 Geog: B. Geog. Characteristics of Places & Regions: 1. b.** environ. impacts; **C. Movement of People, Goods & Ideas: 1.** b. consequences of world population settlement patterns; **c**. regional population patterns /trends affect the environ; **D. Modifying /Adapting to Environ: 1.** a-d (econ trade offs using resources; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ. Decision-making 1**. Limited resources; **2.** Sustainable devt; **3.** Tech. changes affect production/consumption; **4.** Specialization	**1.0 Skills & Processes: A. -D** **Grade 6** **3.0 Life Science: D. Evolution:** 1. **G**rowth & survival of organisms & species depend on physical conditions (selective breeding; competition for resources; environ changes; fo**ssils); F. Ecology: 1.** The number of organisms an environ supports depends on physical conditions & available resources: a. populations increase/decrease re: to available resources & environ conditions; b. limiting factors; c. competition for resources; d. niches reduce competition; **6.0 Environ Science: A. Natural Resources & Human Needs. 1.** How different parts of the world have varying amounts & types of natural resources & how the use of resources impacts environ. quality (distribution of natural resources around the Earth; human impacts & solutions); **B. Environ Issues: 1.** Human-caused changes have consequences for the immediate environ & other places & future times. **Grade 7** **6.0 Environ Science A. Natural Resources & Human Needs. 1.** Impacts of a changing human population on the use of natural resources & on environ quality; **B. Environ Issues: 1.** Environ changes have local, regional, & global	None

	c. Factors that influenced econ. devt e.g., natural resources; pop. growth; public health issues; **B. Econ. Systems & the Role of Govt 2.** d. Impacts of regulatory agencies (environ. protection). **Grade 8 - 1.0 Political Science: B. Individual & Group Participation: 2.** c. How groups provide opportunities to participate in the political process). **6.0 Social Studies Skills & Processes: A**. Develop & apply SS vocab: economic resources; environment; geographic characteristic, features, and tools; interest groups; natural resources; natural/physical features & characteristics; places; population distribution; production; scarcity; settlement patterns; sustainable development; urbanization).	consequences (ID stakeholders). **Grade 8** **3.0 Life Science: D. Evolu-tion: 1.** Evolutionary change in species is a result of natural variation in organisms & environ changes (gradual/sudden environmental changes; adaptations; extinction; species diversity); **6.0 Environ Science: B. Environ Issues: 1.** How human activities accelerate/ magnify many naturally occurring changes.	

LAL LAB: TESTING FOR ENDOTOXINS – HIGH SCHOOL – (MIDDLE SCHOOL WITH GUIDANCE)

This combination video/PowerPoint/lab activity is designed to deepen student understanding of the use of HSC blood in biomedical testing. The video introduces: how HSC are collected & bled; how the blood is centrifuged to collect the amoebocytes used in LAL media; & how the end product is used to test all vaccines & other injectable materials put into the human body. The PPT provides greater depth: how clotting properties of HSC blood were discovered; the nature of the crab's immune system compared to humans; what endotoxins are; and why we need to detect them.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text. **4.0 Writing. 7.** Locate, retrieve, & use info. from various sources. **6.0 Listening**: Attend & respond to the speaker; asking questions; summarizing; following a set of directions.	**Grade 7** **2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; c. healthcare initiatives.	**1.0 Skills & Processes: A. -D** **Grade 8 - 4.0 Chemistry: D. Physical & Chemical Changes: 1.** Compare com-pounds & mixtures: a. Components of mixtures can be separated. **6.0 Environmental Science** **Grade 6 - A. Natural Resources/Human Needs. 1.** Different parts of world have varying amounts & types of resources & how resources use impacts env. quality; **B. Environ Issues: 1.** Human-caused changes have consequences for immediate environ, other places & future. **Grade 7 - A. Natural Resources/Human Needs. 1.** Impacts of a changing human population on use of resources & on environ. quality; **B. Environ Issues: 1.** Environ changes have local, regional, &	None

		global consequences (ID stakeholders). **Grade 8 - B. Environ Issues: 1.** Human activities can accelerate/magnify many naturally occurring changes.	

Module Four Managing a Resource

Students learn the complexities of managing a multi-use natural resource: (1) multiple stakeholders' points of view, (2) management challenges to balance user groups' needs, (3) management decisions based on scientific data, & (4) importance of telling the harvesting controversy story.

2. TRAGEDY OF COMMONS – MIDDLE & HIGH SCHOOL

Students are assigned different stakeholder positions in a simulation game that helps them understand different demands placed on a "commons" resource and experience how easily common resources can become depleted.

English/Language Arts	Social Studies	Science	Mathematics
Grade 6-8 **1.0 General Reading Processes: Vocabulary D.** Vocabulary. Develop & apply vocabulary via a variety of texts.	**Grade 6 - 4.0 Econ: A. Scarcity & Econ Decision-making 1.** Early people made resource choices; **3.** Tech. changes affect production/consumption; **4.** a. Specialization depends on available resources. **Grade 7 - 2.0 C. Conflict/Compromise 1.** a. Acquisition of natural resources; c. healthcare initiatives; **3.0 Geog: B. Geog Characteristics of Places & Regions: 1. b.** environ impacts; **C. Movement of People, Goods & Ideas: 1. c**. regional population patterns/trends affect the environ; **D. Modifying & Adapting to the Environ: 1.** a-d (econ trade offs using resources; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tec. changes affect production & consumption; **4.** Specialization c. Factors that influenced econ. devt e.g., resources; pop. growth; public health issues; **B. Econ Systems & the Role of Govt 2.** d. Impacts of regulatory agencies. **Grade 8 - 1.0 Political Science: B. Individual & Group Participation: 2.** c. how groups provide opportunities to participate in the political process).	**1.0 Skills & Processes: A.- C.** **Grade 6 - 3.0 Life Science: F. Ecology: 1.** The number of organisms environ. supports depends on physical conditions & available resources: a. populations increase/decrease re: available resources & environ. conditions; b. limiting factors; c. competition for resources. **6.0 Environmental Science** **Grade 6 - A. Natural Resources & Human Needs. 1.** Different parts of the world have varying amounts/types of resources; resource use impacts environ. quality; **B. Environ Issues: 1.** Human-caused changes have consequences for immediate environ, other places & future times. **Grade 7 - A. Natural Resources & Human Needs. 1.** Impacts of a changing human population on the use of natural resources and on environ. quality; **B. Environ. Issues: 1.** Environ. changes can have local, regional, & global consequences (ID stakeholders). **Grade 8 - B. Environ. Issues: 1.** How human activities accelerate/magnify many naturally occurring changes.	None

3A. BELIEFS & VALUES & 3B. IDENTIFYING THE STAKEHOLDERS – UPPER MIDDLE SCHOOL– HIGH SCHOOL

This activity engages students in exploring the how's and why's of the beliefs and values that underpin the perspectives that different people bring to environmental issues. The activity begins with a discussion of values and identifying personal values, followed by a discussion relating to how people's beliefs and values shape their views. After watching a video clip, students identify the values and beliefs of different stakeholders in the horseshoe crab fishery. Through this process, students come to understand how different people can come to see the same issue in different ways.

None	**Grade 6** **3.0 Geography: B. Geographic Characteristics of Places & Regions:** c. human interactions w/environment; **D. Modifying & Adapting to the Environment: 1.** a (how early people modify the environment); **4.0 Economics: A. Scarcity & Economic Decision-making 1.** Early people made choices about resources; **3.** How tech. changes affect production & consumption; **4.** a. Specialization depends on availability of resources. **Grade 7** **2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; **3.0 Geography: B. Geographic Characteristics of Places & Regions: 1. b.** environmental impacts; **C. Movement of People, Goods & Ideas: 1. c**. regional population patterns/trends affect the environment; **D. Modifying & Adapting to the Environment: 1. E**conomic trade offs when using natural resources; consequences; **4.0 Economics: A. Scarcity & Economic Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specialization c. Factors that influenced economic development such as natural resources; pop. growth; public health issues.	**1.0 Skills & Processes: A & B** **[Potential exists to meet** (the following concepts are touched upon & can be elaborated upon during student discussion of stakeholder values): **6.0 Environmental Science Grade 6 –B. Environmental Issues: 1.** Human-caused changes have consequences for the immediate environ. as well as for other places & future times. **Grade 7 - A. Natural Resources and Human Needs. 1.** Impacts of a changing human population on the use of natural resources & on environ. quality; **B. Enviro. Issues: 1.** Environ. changes can have local, regional, & global consequences (ID stakeholders). **Grade 8 - B. Environmental Issues: 1.** How human activities can accelerate or magnify many naturally occurring changes.]	None

4. How Behavior Contributes to Natural Resources Challenges - high school (middle school w/guidance) In order to gain an understanding of waterman values toward horseshoe crab population issues, students are presented similar scenarios to examine and analyze their own behaviors in everyday life situations. By putting their selves in another's "shoes," students gain an understanding about what motivates people (resource uses) to do what they do. The scenarios are effective as "seeds" for fueling class discussions about waterman issues.

English/Language Arts	Social Studies	Science	Mathematics
None	**Grade 6** **3.0 Geography: 4.0 Economics: A. Scarcity & Economic Decision-making 1.** Early people made choices about resources. **Grade 7** **2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; **D. Modifying & Adapting to the Environ: 1.** Economic trade offs when using natural resources; consequences; **4.0 Economics: A. Scarcity & Economic Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specialization c. Factors that influenced economic development.	**1.0 Skills & Processes: A & B** **Grade 6 - 6.0 Environmental Science B. Environmental Issues: 1.** Human-caused changes have consequences for the immediate environ. as well as for other places & future times.	None

5. The Art of Argument – upper elementary, middle & high school

This activity engages students in exploring the art of argument. Throughout a series of 12 lessons, students read and write about the horseshoe crab and shorebird controversy in Delaware, Maryland, and New Jersey. Students will learn the concepts of "point of view, bias, and tone" as well as learn to discriminate facts from opinions as they read current and past articles on the subject. Students will complete journal activities, develop article reports on primary sources and write a five paragraph persuasive essay. Since there are multiple lessons here, you will need to repeatedly return to the handout menu to pull up the lessons you wish to use.
*This series of lessons focus on English and Language Arts skills, and the Social Studies and Science learning outcomes are "supported and reinforced" through the readings. If taught in a self-contained classroom or collaboratively with other subject teachers, the listed SS and Science standards could be more directly taught. No Mathematics learning outcomes are met.

Lesson	English/Language Arts	Social Studies*	Science*
Lesson One	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **3.a** Id & analyze organizational patterns (main idea; **4.b.** Id & explain author's opinion.	W/regard to Mid-Atlantic Commission policies: **Grade 7 - 1.0 Political Science: A. Foundations & Functions of Government: 3.** Roles of governments around the world regarding public issues a-b (environmental issues; pollution; conservation; energy sources); **Grade 8 - 1.0 Political Science: B.**	**1.0 Skills & Processes: A- C.** **6.0 Environ. Science:** [Interpret the following as: "How resource management relies on science" **Grade 6 - B. Environ. Issues: 1.** Human-caused changes have consequences for the immediate environ. & for other places & future times; **Grade 7 - A. Natural Resources & Human**

		Individual & Group Participation: 2. c. how groups provide opportunities to participate in the political process).	**Needs. 1.** Impacts of a changing human population on the use of natural resources & on environ. quality; **B. Environ Issues: 1.** Env. changes can have local, regional, & global consequences (Id stakeholders); **Grade 8- B. Environ. Issues: 1.** How human activities can accelerate or magnify many naturally occurring changes.
Lesson Two	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **3.a** Id & analyze organizational patterns (main idea; supporting details).	Teacher should discuss how Mid-Atlantic Commission policies help conserve HSC: **Grade 7 - 1.0 Political Science: A. Foundations & Functions of Government: 3.** Roles of governments around the world regarding public issues a-b (environmental issues; pollution; conservation; energy sources); **Grade 8 - 1.0 Political Science: B. Individual & Group Participation: 2.** c. how groups provide opportunities to participate in the political process).	**1.0 Skills & Processes: A- C.** See Science learning outcomes in Lesson One: Teacher will need to discuss authors' details about science in mgt.
Lesson Three:	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **3**.a Id & analyze organizational patterns (main idea; **4.b**. Id & explain author's opinion. **6.c.** Id & explain what makes the text a reliable source of information.	**Grade 7 - 4.0 Economics: A. Scarcity & Economic Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specialization c. Factors that influenced econ. devt e.g., natural resources; pop. growth; public health issues; **B. Econ Systems & Role of Govt 2.** d. Impacts of regulatory [regulations to restrict harvest].	**1.0 Skills & Processes: A- C.**
Lesson Four	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **4.b**. Id & explain author's opinion; **4.h.** Distinguish between fact & opinion.	See lesson three SS: this lesson builds upon prior lesson.	**1.0 Skills & Processes: A- C.**
Lesson Five	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **4.b**. Id & explain author's opinion; **4.d.**	None	**1.0 Skills & Processes: A- C.** **Grade 6 - 3.0 Life Science: D. Evolution: 1.** Growth & survival of organisms & species depend on physical conditions (selective breeding; resource competition; environ changes; fossils); **6.0**

	Summarize or paraphrase; **4.h.** Distinguish between fact & opinion; **Grade 3-6: 2.0A. 6.d.** Determine & distinguish whether or not the author's opinion is presented fairly**; Grades 7-8**: **2.0.A.6.d** Analyze the author's argument or position for clarity or bias; **6.e.** Analyze additional info. that would clarify or strengthen the author's argument or viewpoint.		**Environ. Science B. Environ. Issues: 1.** Human-caused changes have conesquences for the immediate environ. & for other places & future times. **Grade 7 - 6.0 Environ. Science A. Natural Resources & Human Needs. 1.** Impacts of a changing human population on the use of natural resources & on environ. quality; **B. Environ Issues: 1.** Env. changes can have local, regional, & global consequences (Id stakeholders). **Grade 8- 3.0 Life Science: D. Evolution: 1.** Evolutionary change in species is a result of natural variation in organisms & environ. changes. (gradual/sudden environ. changes; adaptations; extinction; species diversity); **6.0 Environ. Science: B. Environ. Issues: 1.** How human activities can accelerate or magnify many naturally occurring changes.
Lesson Six:	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **4.b**. Id & explain author's opinion; 4.**h.** Distinguish between fact & opinion; **Grade 3-6: 2.0A. 6.d.** Determine & distinguish whether or not the author's opinion is presented fairly**; Grades 7-8**: **2.0.A.6.d** Analyze the author's argument or position for clarity or bias.	**Grade 7 - 4.0 Econ: A. Scarcity & Econ Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specialization c. Factors that influenced econ. devt e.g., natural resources; pop. growth; public health issues; **B. Econ Systems & Role of Govt 2.** d. Impacts of regulatory [regulations to restrict harvest] **Grade 8 - 1.0 Political Science: B. Individual & Group Participation: 2.** c. how groups provide opportunities to participate in the political process).	**1.0 Skills & Processes: A- C.** **Grade 8 - 4.0 Chemistry: D. Physical & Chemical Changes: 1.** Compare compounds & mixtures: a. Components of mixtures can be separated; b. Why components of compounds cannot be separated using physical properties.
Lesson Seven	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **4.b**. Id & explain author's opinion; **4.h.** Distinguish between fact & opinion; **6.c.** Id & explain what makes the text a reliable source of information.	**Grade 7** **2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; c. healthcare initiatives.	**1.0 Skills & Processes: A- C.**

Lesson Eight	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **4.b**. Id & explain author's opinion; **4.h.** Distinguish between fact & opinion; **Grades 7-8**: **2.0.A.6.d** Analyze the author's argument or position for clarity or bias.	**Grade 7 - 4.0 Economics: A. Scarcity & Economic Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specialization c. Factors that influenced econ. devt e.g., natural resources; pop. growth; public health issues; **B. Econ Systems & Role of Govt 2.** d. Impacts of regulatory [regulations to restrict harvest].	**1.0 Skills & Processes: A- C.** **Grade 6 - 3.0 Life Science: F. Ecology: 1.** The number of organisms an enviro. can support depends on physical conditions & available resources: a. populations increase/decrease re: to available resources & environ. conditions.
Lesson Nine	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **6.c.** Id & explain what makes the text a reliable source of information; **6.f** Id or explain language & other techniques intended to persuade the reader.	**Grade 7** **2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; c. healthcare initiatives.	**1.0 Skills & Processes: A- C.** **Grade 6 - 3.0 Life Science: F. Ecology: 1.** The number of organisms an enviro. can support depends on physical conditions & available resources: a. populations increase/decrease re: to available resources & environ. conditions.
Lesson Ten	**2.0 Comprehension of Informational Text A.1.a.** Id characteristics of non-fiction materials to gain knowledge (reference materials; historical documents; newspapers; articles); **4.b**. Id & explain author's opinion; **4.h.** Distinguish between fact & opinion.	**Grade 7 - 3.0 Geog: D. Modifying & Adapting to the Environ: 1.** a-d (econ trade offs when using natural resources; consequences; how govt. addresses env. issues); **4.0 Economics: A. Scarcity & Economic Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specialization c. Factors that influenced econ. devt e.g., natural resources; pop. growth; public health issues.	**1.0 Skills & Processes: A- C.**
Lesson Eleven	**6.c.** Id & explain what makes the text a reliable source of information; **4.d.** Summarize or paraphrase; **6.c.** Id & explain what makes the text a reliable source of information; **4.0 2.a&c**. Compose oral, written or visual presentations that express personal ideas, inform and persuade**; 7.a.** Id, evaluate & use sources of info. on a given topic.	Depends on study focus: any of above learning outcomes might be supported.	**1.0 Skills & Processes: A- C.**
Lesson Twelve	**4.0 2.a&c**. Compose oral, written or visual presentations that express personal ideas inform and persuade.	Depends on study focus: any of above learning outcomes might be supported.	**1.0 Skills & Processes: A- C.**

6. WEBQUEST: THE HORSESHOE CRAB HARVESTING CONTROVERSY – MIDDLE & HIGH SCHOOL

Students explore the how's and why's of multiple points of view; identify major stakeholders in the horseshoe crab story, involves students in WebQuest-based research on the varying views of these stakeholders, and culminates with students presenting and defending a position on how the resource should be managed.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text; 2. Identify & use text features to facilitate understanding (graphic aids such as charts, drawings, maps). **4.0 Writing: 2.** Compose oral, written, and visual presentations; e. write to learn strategies (journals; logs; drawings); **4.0 Writing. 7.** Locate, retrieve, & use info. from various sources. **6.0 Listening**: Attend & respond to the speaker; asking questions; summarizing; following a set of directions. **7.0 Speaking:** Plan & deliver oral presentations; use props.	**Grade 6** **3.0 Geog: B. Geog Characteristics of Places & Regions** c. human interactions w/environ; **D. Modifying & Adapting to the Environ: 1.** a How early people modify environ; **4.0 Econ: A. Scarcity & Econ Decision-making 1.** Early people made choices re: resources; **3.** How tech. changes affect production/consumption; **4.** a. Specialization depends on available resources. **Grade 7 - 2.0 Peoples of the Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; c. healthcare initiatives; **3.0 Geog: B. Geog Characteristics of Places & Regions: 1. b.** environ impacts; **C. Movement of People, Goods & Ideas: 1. c**. regional population patterns/trends affect the environ; **D. Modifying & Adapting to the Environ: 1.** a-d (econ trade offs using resources; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech. changes affect production/consumption; **4.** Specialization c. Factors that influenced econ devt e.g., resources; public health issues; **B. Econ Systems & Role of Govt 2.** d. Impacts of regulatory agencies (environ. protection). **Grades 7 & 8 - 3.0 A. Geography Tools. Grade 8 - 1.0 Political Science: B. Individual & Group Participation: 2.** c. how groups provide opportunities to participate in the political process).	**1.0 Skills & Processes: A – D** **3.0 Life Science** **Grade 6 - 3.0 Life Science D. Evolution: 1.** Growth & survival of organisms & species depend on physical conditions; **F. Ecology: 1.** The number of organisms an environ. supports depends on physical conditions & available resources: a. populations increase/decrease re: available resources & environ conditions; b. limiting factors; c. resource competition; **6.0 Envir. Science**: **A. Natural Resources/Human Needs. 1.** Different parts of world have varying amounts & types of resources, resources use impacts environ. quality; **B. Environ. Issues: 1.** Human-caused changes have consequences for immediate environ, other places & future times. **Grade 7 – 3.0 Life Science A. Diversity of Life: 1.** Features connect/differentiate organisms (external/internal features; behavior patterns; classification); **6.0 Envir. Science: A. Natural Resources & Human Needs. 1.** changing human population impact natural resources & environ. quality; **B. Environ Issues: 1.** Environ. changes can have local, regional & global consequences (ID stakeholders). **Grade 8 3.0 Life Science: D. Evolution: 1.** Evol. change =natural variation in organisms & environ (gradual/sudden environ. changes; adaptations; extinction; species diversity); **6.0 Environ Science B. Environ Issues: 1.** How human activities accelerate/magnify many naturally occurring changes.	**7.0 Processes of Math A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate or apply mathematics within the discipline, to other disciplines, & to life (a-d).

8. THE REST OF THE STORY – HIGH SCHOOL (MIDDLE SCHOOL W/GUIDANCE)

Students are provided graphs of real data that has been collected from various sources (and were presented to the Atlantic States Marine Fisheries Commission) that essentially show a decline in the horseshoe crab population over recent years. After forming some conclusions from these data based on face value, students are presented with more information that relates some inconsistencies and other flaws in each of the data sets. From this investigation, students learn that for valid decisions to be made about management of a resource like this, the need for more solid, targeted scientific data is critical.

English/Language Arts	Social Studies	Science	Mathematics
None	Grade 6 - **3.0 Geography: 4.0 Economics: A. Scarcity & Economic Decision-making 1.** Early people made choices about resources; **3.** How tech. changes affect production & consumption. Grade 7 - **1.0 Political Science: A. Foundations & Functions of Govt: 3.** Roles of govts around world re: public issues a-b (environ. issues; conservation); **4.0 Economics: A. Scarcity & Economic Decision-making 1**. Limited resources; **2.** Sustainable devt; **3.** Tech. changes affect production & consumption; **4.** Specialization c. Factors that influenced economic development such as natural resources; pop. growth; public health issues; **B. Economic Systems & the Role of Government 2.** d. Impacts of regulatory agencies.	**1.0 Skills & Processes: A & B** Grade 6 - **3.0 Life Science: F. Ecology: 1.** The number of organisms an environ. supports depends on physical conditions & available resources: a. populations increase/decrease re: available resources & environ. conditions; b. limiting factors; **6.0 Environ Science B. Environ. Issues: 1.** Human-caused changes have cones-quences for the immediate environ, other places & future times. Grade 7 - **6.0 Environ Science B. Enviro. Issues: 1.** Environ. changes have local, regional, & global consequences (ID stakeholders). Grade 8 - **6.0 Environ Science: B. Environ. Issues: 1.** Human activities accelerate/ magnify many naturally occurring changes.	Grades 6-7 **1.0 Knowledge of Algebra, Patterns & Functions: C. Numeric & Graphic Representations:** 1. a. Identify & describe changes in a graph. **4.0 Knowledge of Statistics B. Data Analysis.** (See grades above: interpret data according to how it was displayed. Grades 6 & 8: a. interpret frequency tables. **7.0 Processes of Math A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate or apply mathematics within the discipline, to other disciplines, & to life (a-d).

9. OTHER VIEWS OF RESEARCH – HIGH SCHOOL (MIDDLE SCHOOL WITH GUIDANCE)

Students watch a video clip featuring four people expressing concerns relating to the collection, use and interpretation of data upon which management decisions about HSC are based. As they listen to the video, students summarize the important points each of the featured people (stakeholders) is trying to make.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **4.0 Writing: 2.** Compose oral, written, and visual presentations; e. write to learn strategies (journals; logs; drawings). **6.0 Listening**: Attend & respond to the speaker; asking questions; summarizing; following a set of directions.	**[Potential exists to meet – with further discussion & depth in the following:** Grade 6 **4.0 Econ: A. Scarcity & Econ Decision-making 1.** Early people made choices about resources; **3.** How tech. changes affect production & consumption; **4.** a. Specialization depends on available resources; Grade 7 - **1.0 Political Science: A. Foundations & Functions of Govt: 3.** Roles of govts around the world regard-ing public issues a-b (environ. issues; conservation); **D. Modifying & Adapting to the Environment: 1.** a-d	**1.0 Skills & Processes: A & B** **6.0 Environ. Science B. Environ. Issues** Grade 6 - **1.** Human-caused changes have consequences for the immediate environ. & for other places & future times. Grade 7 - **1.** Environ. changes have local, regional, & global consequences (ID stakeholders). Grade 8 - **1.** Human activities accelerate/ magnify many naturally occurring changes.	None

	(economic trade offs when using natural resources; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ Decision-making 1**. Limited resources; **2. S**ustain-able devt; **3.** Tech changes affect produc-tion & consumption; **4.** Specialization c. Factors that influenced econ devt such as natural resources; pop. growth; public health issues; **B. Econ Systems & Role of Gove\t 2.** d. Impacts of regulatory agencies; **Grade 8 - 1.0 Political Science: B. Individual & Group Participation: 2.** c. How groups provide opportunities to participate in the political process).		

10. ISSUES ANALYSIS – HIGH SCHOOL (MIDDLE SCHOOL WITH GUIDANCE)

This activity follows the video clip showing peoples views and concerns about the management of horseshoe crabs. Students learn that many sources of secondary data have inherent biases based on the view of the author, and sources of information gathered: working in groups, students analyze different newspaper articles and compare their analyses among groups, to see that, despite all the articles covering the same topic, not all journalists presented it in the same manner.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text. **4.0 Writing. 7.** Locate, retrieve, & use info. from various sources.	None	**1.0 Skills & Processes: A - C** **Grade 6 - 3.0 Life Science: F. Ecology: 1.** Number of organisms an environ. supports depends on physical conditions & available resources: a. populations increase/decrease re: available resources & environ. conditions; **6.0 B. Environ. Issues: 1.** Human-caused changes have consequences for the immediate environ, other places & future times. **Grade 7 - 6.0 A. Natural Resources & Human Needs. 1.** Impacts of changing human population on the use of resources & on environ. quality; **B. Environ Issues: 1.** Environ. changes have local, regional, & global consequences (ID stakeholders). **Grade 8 - 6.0 B. Environ Issues: 1.** How human activities accelerate/magnify naturally occurring changes.	None

13A. LET'S COUNT THE CRABS – MIDDLE SCHOOL

This activity helps students understand how the relative abundances of spawning horseshoe crabs are currently being surveyed on Delaware Bay and Chesapeake Bay beaches. Students work in teams to carry out a simulated survey in the classroom, using the paper horseshoe crab models they made previously (materials and directions included in this lesson as well). They then use the information gathered in the survey to calculate the total number of crabs in the classroom.

English/Language Arts	Social Studies	Science	Mathematics
None	None	**1.0 Skills & Processes: A - D**	**7.0 Processes of Math A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate/apply math to other disciplines, & to life (a-d). [**Potential exists to meet**: (the lesson could include graphing of survey data) **1.0 Knowledge of Algebra, Patterns & Functions: C. Numeric & Graphic Representations: Grades 6-8: 1.b.** Create a graph; **2.** Analyze linear relationships; **Grade 8:** 1.a. determine slope; **3.0 Knowledge of Measurement: C. Application of Measurement: 1. Apply Measurement Concepts: Grade 6 & 7:** a. area (measure area of survey quadrant); **4.0 Knowledge of Statistics A. Data Displays**: **Grade 6**. a. frequency table; b. stem & leaf. **Grade 7.** a. stem & leaf; b. circle graph; **Grade 8**. a. circle graph; b. box & whisker; c. scatter plot; **4.0 Knowledge of Statistics B. Data Analysis.** (See grades above: interpret data according to how it's displayed; **Grades 6 & 8**: a. interpret frequency tables; **Grade 6 &7: 2.** Describe a set of data: a. mean, median, mode, range; **Grades 6 & 7 6.0 Knowledge of Number Relationships & Computation: C. Number Comp:** (percent).]

13B. SPAWNING CRAB SURVEY – MIDDLE & HIGH SCHOOL

Students will learn the concepts of relative abundance, statistical sampling, and how to interpret data from sampling data. Students will simulate the sampling technique developed by the Atlantic States Marine Fisheries Commission (ASMFC) designed to determine the relative abundance of spawning horseshoe crabs.

English/Language Arts	Social Studies	Science	Mathematics
None	None	**1.0 Skills & Processes: A - D.**	**[Potential to meet/support: 3.0 Knowledge of Measurement: C. Application of Measurement: 1. Apply Measurement Concepts: Grade 6:** a. area; **Grade 7:** a. area; b. surface area; **4.0**

			Knowledge of Statistics B. Data Analysis. Grade 6 &7: 2. Describe a set of data: a. mean, median, mode, range; **Grades 6 & 7 6.0 Num. Relationships & Computation: C. Num Computation:** (percent; add, subtract, multiply, divide); **Grade 7 & 8:** (exponents); **7.0 Processes of Math A. Problem Solving; B. Reasoning; C. Communication; D. Connections: 1.** Relate/apply math to other disciplines, & to life (a-d).]

14A. WORKING ON SOLUTIONS –MIDDLE & HIGH SCHOOL

Students learn about what was being done, as of the summer of 2002, to help protect horseshoe crabs, and determine a way to share that information with others.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text. **4.0 Writing: 2.** Compose oral, written, and visual presentations; e. write to learn strategies (journals; logs; drawings); **4.0 Writing. 7.** Locate, retrieve, & use info. from various sources. **6.0 Listening**: Attend & respond to the speaker; asking questions; summarizing; following a set of directions. **7.0 Speaking:** Plan & deliver oral presentations; use props.	**Grade 6 - 3.0 Geog: B. Geog Characteristics of Places & Regions:** c. human interactions w/environ; **D. Modifying & Adapting to the Environ. 1.** a & b (how early people modify the environ). **4.0 Econ: A. Scarcity & Econ Decision-making 1.** Early people made choices about resources; **3.** Tech changes affect production/consumption; **4.** a. Specialization depends on available resources. **Grade 7 - 1.0 Political Science: A. Foundations & Functions of Gov: 3.** Roles of govts around world re: public issues a-b (environ issues; pollution; conservation; **2.0 Peoples of Nation & World: C. Conflict & Compromise 1.** a. Acquisition of natural resources; c. health-care initiatives; **3.0 Geog: B. Geog Characteristics of Places & Regions: 1. b.** environ impacts; **C. Movement of People, Goods & Ideas: 1. c**. regional population patterns/trends affect the environ; **D. Modifying/Adapting to the Environ: 1.** a-d (econ trade offs when using resources; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ Decision-making 1**. Limited resources; **2.** Sustainable devt; **3.** Tech. changes affect produc-	**1.0 Skills & Processes: A. & B** The following learning outcomes may be met, depending on the focus of students' outreach presentation: **Grade 6 - 3.0 Life Science: D. Evolution: 1.** Growth & survival of organisms & species depend on physical conditions (competition for resources; environ. changes); **F. Ecology: 1.** Number of organisms an environ. supports depends on physical conditions & available resources: a. populations increase/decrease re: available resources & environ. conditions; b. limiting factors; c. competition for resources; **6.0 Environ Science A. Natural Resources & Human Needs. 1.** Different parts of world have varying amount/types of resources. Resource use impacts environ. quality; **B. Environ Issues: 1.** Human-caused changes have consequences for immediate environ, other places & future times. **Grade 7 - 3.0 Life Science: A. Diversity of Life: 1.** Features connect/differentiate organisms (Internal/external; behavioral patterns); **6.0 Environ. Science A. Natural Resources & Human Needs. 1.** Impacts of a changing human population on resource use & environ. quality; **B.**	None

	tion & consumption; **4.** Specialization c. Factors that influenced econ devt such as resources; pop. growth; public health issues; **B. Econ Systems & Role of Govt 2.** d. Impacts of regulatory agencies. **Grade 8 - 1.0 Political Science: B. Individual & Group Participation: 2.** c. how groups provide opportunities to participate in the political process).	**Environ. Issues: 1.** Environ. changes have local, regional, & global consequences (ID stakeholders). **Grade 8 - 3.0 Life Science: D. Evolution: 1.** Evol. change in species is result of natural variation in organisms & environ changes (gradual & sudden changes; adaptations; extinction; species diversity); **6.0 Environ. Science: B. Environ. Issues: 1.** Human activities accelerate/magnify many naturally occurring changes.	

14B. PROBLEM SOLVING WITH THUMPER – HIGH SCHOOL (MIDDLE SCHOOL W/GUIDANCE)

Through watching interview snippets with a Delaware waterman, and answering a series of related questions relating, students discover practical use of the scientific method in real-world problem-solving - in this case, investigating the viability of an alternative bait strategy (using the waste product of horseshoe crab bleeding for biomedical use) that could greatly reduce or eliminate the need for harvesting horseshoe crabs for use as conch bait.

English/Language Arts	Social Studies	Science	Mathematics
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **6.0 Listening**: Attend & respond to the speaker; asking questions; summarizing; following a set of directions.	None	**1.0 Skills & Processes: A. - D** **Grade 6 - 3.0 Life Science D. Evolution: 1.** Growth/survival of organisms/ species depend on physical conditions (selective breeding; resource competition; environ changes); **F. Ecology: 1.** Num organisms environ. supports depends on physical conditions & available resources: a. populations increase/decrease re: available resources & env. conditions; b. limiting factors; c. resource competition; **6.0 B. Env. Issues: 1.** Human-caused changes have consequences for immediate environ, other places & future times. **Grade 7 - 6.0 Env. Science A. Natural Resources/Human Needs. 1.** Impacts of changing human population using resources & environ quality; **B. Env Issues: 1.** Env. changes have local, regional, & global consequences. **Grade 8 - 3.0 Life Science D. Evolution: 1.** Evol change in species a result of natural variation in organisms & env. changes (gradual/sudden; adaptations; extinction; species diversity); **6.0 Env Science B. Env Issues: 1.** Human activities accelerate/magnify natural changes.	None

15. GETTING MORE INVOLVED – ALL GRADES

ACTION PROJECTS are activities designed so students can apply knowledge gained from participation in The Green Eggs and Sand curriculum to real-life issues. Students are encouraged to get involved in projects about horseshoe crabs and shorebirds, or they can explore and undertake the challenges of understanding other natural resource management issues of concern in their communities.

The following indicators may be met, depending on the focus of students' outreach presentation:

English/Language Arts	Social Studies	Science
1.0 General Reading Processes: Vocabulary D. Vocabulary. Develop & apply vocabulary via a variety of texts. **2.0 A. Comprehension of Informational Text**. 1. Develop comprehension skills by reading a variety of informational text. **4.0 Writing: 2.** Compose oral, written, and visual presentations; e. write to learn strategies (journals; logs; drawings); **4.0 Writing. 7.** Locate, retrieve, & use info. from various sources. **6.0 Listening**: Attend & respond to the speaker; asking questions; summarizing; following a set of directions. **7.0 Speaking:** Plan & deliver oral presentations; use props.	**Grade 6 - 3.0 Geog: B. Geog Characteristics of Places/Regions** c. human interactions w/env; **4.0 Econ: A. Scarcity & Econ Decision-making 1.** Early people made choices re: resources; **3.** How tech. changes affect production/consumption; **4.** a. Specialization depends avail resources. **Grade 7 –2.0 Political Science: A. Foundations & Functions Govt: 3.** Gov. roles around world re: public issues a-b (env. issues; pollution; conservation); **2.0 Peoples of Nation/World: C. Conflict & Compromise 1.** a. Acquiring resources; c. healthcare initiatives; **3.0 Geog: B. Geog Characteristics of Places/Regions: 1. b.** environ impacts; **C. Movement: People, Goods & Ideas: 1. c**. regional population patterns/trends affect environ; **D. Modifying/Adapting to Environ: 1.**a-d (econ trade offs using resources; consequences; land use issues; how govt. addresses env. issues); **4.0 Econ: A. Scarcity & Econ Decision-making 1**. Limited resources; **2. S**ustainable devt; **3.** Tech changes affect production/consumption; **4.** Specialization c. Factors that influence econ devt e.g., resources; pop. growth; public health issues; **B. Econ Systems/Role of Govt 2.** d. Impacts of regulatory agencies. **Grades 8 - 1.0 Political Science: B. Individual/Group Participation: 2.**c. how groups provide opportunities to participate in political process); **3.0 Geog: A. Using Geog Tools.**	**1.0 Skills & Processes** **Grade 6 - 3.0 Life Science: D. Evolution: 1. G**rowth & survival of organisms & species depend on physical conditions (selective breeding; competition for resources; environmental changes; fossils); **3.0 Life Science: F. Ecology: 1**. The number of organisms an environ can support depends on physical conditions & available resources: **a**. populations increase/decrease re: to available resources & environ conditions; **b.** limiting factors; **c.** resource competition; **d.** competition is reduced w/niches; **6.0 Environ Science A. Natural Resources/Human Needs. 1.** Different parts of world have varying amounts & types of resources; how using resources impacts environ. quality; **B. Environ Issues: 1.** Human-caused changes have consequences for immediate environ, other places & future times. **Grade 7 - 3.0 Life Science: A. Diversity of Life: 1.** Features differentiate or connect organisms (external & internal features; behavioral pattern; classification); **6.0 Environ Science A. Natural Resources & Human Needs. 1.** Impacts of a changing human population on use of resources & on environ quality; **B. Environ Issues: 1.** Environ. changes can have local, regional & global consequences (Id stakeholders). **Grade 8 - 3.0 Life Science: D. Evolution: 1.** Evolutionary change in species is a result of natural variation in organisms & environ changes (gradual/sudden environ changes; adaptations; extinction; species diversity); **4.0 Chemistry: D. Physical & Chemical Changes: 1.a.** how components of mixtures can be separated; **6.0 Environmental Science: B. Environmental Issues: 1.** How human activities can accelerate or magnify many naturally occurring changes.