

**Biology II/Ecology Curriculum Guide
Lunenburg County Public Schools
June 2014**

Marking Period: Entire Semester

Days: 90

Reporting Category/Strand: Scientific Investigation/ Workplace Readiness Skills

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| <p>Competency: ECO 1 ECO 2 ECO 3 ECO 5</p> | <ul style="list-style-type: none"> ● Demonstrating Workplace Readiness Skills: Personal Qualities and People Skills ● Demonstrating Workplace Readiness Skills: Professional Knowledge and Skills ● Demonstrating Workplace Readiness Skills: Technology Knowledge and Skills ● Addressing Elements of Student Life |
| <p>Essential Knowledge/Skills/Understandings</p> | <ul style="list-style-type: none"> ● Demonstrate positive work ethic ● Demonstrate integrity ● Demonstrate teamwork skills ● Demonstrate self-representation skills ● Demonstrate diversity awareness ● Demonstrate conflict-resolution skills ● Demonstrate creativity and resourcefulness ● Demonstrate effective speaking and listening skills ● Demonstrate effective reading and writing skills ● Demonstrate critical-thinking and problem-solving skills ● Demonstrate healthy behaviors and safety skills ● Demonstrate and understanding of workplace organizations, systems and climates ● Demonstrate lifelong-learning skills ● Demonstrate job-acquisition and advancement skills ● Demonstrate time-, task-, and resource-management skills ● Demonstrate job-specific mathematics skills ● Demonstrate proficiency with technologies common to a specific occupation ● Demonstrate information technology skills ● Demonstrate and understanding of Internet use and security issues ● Demonstrate telecommunications skills ● Identify the purposes and goals of the student organization ● Explain the benefits and responsibilities of membership in student organization as a student in professional/civic organizations as an adult ● Demonstrate leadership skills through participation in student organization activities, such as meetings, programs and projects ● Identify Internet safety issues and procedures for complying with acceptable use standards |

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| <p>Essential Questions</p> | <ol style="list-style-type: none"> 1. What does it mean to show integrity? 2. Where is the cut off line between personal beliefs, and personal desires? 3. Why is internet research not the “safest” form of research? 4. Define positive work ethics. 5. Why is critical thinking and problem-solving skills, so important in the field of science? |
| <p>Primary Resources</p> | <ul style="list-style-type: none"> ● TrackStar ● NoteStar ● CTE Resource Center ● Virginia Employment Commission ● Discovery Education ● VDGIF ● enature ● Pearson: Environmental Science Text Book |
| <p>Essential Vocabulary</p> | <ul style="list-style-type: none"> ● <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>rational: having or exercising reason, sound judgment, or good sense integrity: adherence to moral and ethical principles; soundness of moral character; honesty moral: of, pertaining to, or concerned with the principles or rules of right conduct or the distinction between right and wrong; ethica right: in accordance with what is good, proper, or just dilemma: a situation requiring a choice between equally undesirable alternatives value: to consider with respect to worth, excellence, usefulness, or importance ethical: pertaining to or dealing with morals or the principles of morality; pertaining to right and wrong in conduct justify: to show (an act, claim, statement, etc.) to be just or right duty: something that one is expected or required to do by moral or legal obligation obedience: the state or quality of being obedient conflict: discord of action, feeling, or effect; antagonism or opposition, as of interests or principles</p> </div> |

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Marking Period: TBA

Days: 8

Reporting Category/Strand: Mammalogy

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| <p>Competency: ECO 7b ECO13a,b,i</p> | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Managing Fish and Wildlife |
| <p>Essential Knowledge/Skills/Understandings</p> | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Identify game, waterfowl, and fish ● Describe habitat requirements for various fish and game animals and fowl ● List ways to attract animals and birds to a local natural habitat |
| <p>Essential Questions</p> | <ol style="list-style-type: none"> 1. Give a list of Mammalian game species found in Lunenburg County. 2. When classifying mammals, how closely related are the American black bear, and the Eastern White-tailed deer? 3. Compare and Contrast the rut and estrus cycle. 4. What does it mean that science is “self-correcting”? 5. What is a worldview, and what impact does it have on science? |
| <p>Primary Resources</p> | <ul style="list-style-type: none"> ● eNature ● ARKive ● Virginia Department of Game and Inland Fisheries ● Field Guide of the Chesapeake Bay ● Video “Classification of Living Things” Discovery Education ● Video “World’s Best: All American Animals” Discovery Education ● Video “World's Best: Wild Cats” Discovery Education ● Video “Eyewitness: Mammals” Eyewitness Video ● Text: Pearson: Environmental Science Chapter 1 |
| <p>Essential Vocabulary</p> | |

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| | <p>antler: one of the solid deciduous horns, usually branched, of an animal of the deer family</p> <p>habitat: the natural environment of an organism; place that is natural for the life and growth of an organism</p> <p>rut: the periodically recurring sexual excitement of the deer, goat, sheep, etc.</p> <p>territory: the area that an animal defends against intruders, especially of the same species</p> <p>estrus: the period of heat or rut; the period of maximum sexual receptivity of the female</p> <p>home range: the area in which an animal normally lives</p> <p>carnivore: a flesh-eating mammal of the order Carnivora, comprising the dogs, cats, bears, seals, and weasels</p> <p>omnivorous: eating both animal and plant foods</p> <p>herbivorous: feeding on plants</p> <p>detritivore: an organism that uses organic waste as a food source, as certain insects</p> <p>scavenger: an animal or other organism that feeds on dead organic matter</p> <p>predator: any organism that exists by preying upon other organisms</p> <p>prey: an animal hunted or seized for food, especially by a carnivorous animal</p> | |
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Marking Period: TBA

Days: 8

Reporting Category/Strand: Ornithology

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| Competency: ECO 7b ECO13a,b,i | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Managing Fish and Wildlife |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Identify game, waterfowl, and fish ● Describe habitat requirements for various fish and game animals and fowl |

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| | <ul style="list-style-type: none"> ● List ways to attract animals and birds to a local natural habitat |
| Essential Questions | <ol style="list-style-type: none"> 1. What essentials to birds have that enable them to fly? 2. What are the avian game species in Lunenburg county? 3. What is the difference between commensalism and mutualism? 4. What is Symbiosis? 5. Why is energy transfer in a community best visualized as a pyramid? |
| Primary Resources | <ul style="list-style-type: none"> ● eNature ● ARKive ● Field Guide of the Chesapeake Bay ● What Bird ● All About Birds ● Video “A Summer of Birds” Discovery Education ● Video “North America: Learn Young or Die” Discovery Education ● Video “Bald Eagle versus Snow Goose” Discovery Education ● Video “The Ultimate Guide: Birds of Prey” Discovery Education ● Video “Eyewitness Birds” Eyewitness Video ● Video “Eyewitness Flight” Eyewitness Video ● Text: Pearson: Environmental Science Chapter 5 |
| Essential Vocabulary | <ul style="list-style-type: none"> ● Beak: the bill of a bird ● Migration: to pass periodically from one region or climate to another, as certain birds, fishes, and animals ● Preening: (of animals, especially birds) to trim or dress (feathers, fur, etc.) with the beak or tongue ● Bill: see beak ● Brood: a number of young produced or hatched at one time; a family of offspring or young ● Pitch: to set at a particular pitch, or determine the key or keynote of (a melody) ● Feather: one of the horny structures forming the principal covering of birds, consisting typically of a hard, tubular portion attached to the body and tapering into a thinner, stemlike portion bearing a series of slender, barbed processes that interlock to form a flat structure on each side ● Nest: a pocketlike, usually more or less circular structure of twigs, grass, mud, etc., formed by a bird, often high in a tree, as a place in which to lay and incubate its eggs and rear its young; any protected place used by a bird for these purposes |

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- Yaw: (of an aircraft) to have a motion about its vertical axis.
- Flight Feather: one of the large, stiff feathers of the wing and tail of a bird that are essential to flight.
- banding: a ribbonlike or cordlike structure encircling, binding, or connecting a part or parts
- Roll:(of an aircraft or rocket) to deviate from a stable flight attitude by rotation about its longitudinal axis
- Gizzard: Also called **ventriculus**. a thick-walled, muscular pouch in the lower stomach of many birds and reptiles that grinds food, often with the aid of ingested stones or grit
- Clutch: a hatch of eggs; the number of eggs produced or incubated at one time
- Nidifugous: leaving the nest shortly after hatching
- Crop: remaining in the nest for a period after hatching
- nidicolous: remaining in the nest for a period after hatching
- Crest: a tuft or other natural growth on the top of the head of an animal, as the comb of a rooster
- Ornithology: the branch of zoology that deals with birds
- Hovering: to keep lingering about; wait near at hand
- Diver: any aquatic bird of the genus *Gavia*, family *Gaviidae*, and order *Gaviiformes* of northern oceans, having a straight pointed bill, small wings, and a long body
- Thermals: a rising air current caused by heating from the underlying surface, especially such a current when not producing a cloud
- Dabbler: to feed on shallow-water vegetation with rapid, splashing movements of the bill
- Molting: (of birds, insects, reptiles, etc.) to cast or shed the feathers, skin, or the like, that will be replaced by a new growth
- Hatchling: a young bird, reptile, or fish recently emerged from an egg
- Roost: to sit or rest on a roost, perch, etc

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Days: 8

Reporting Category/Strand: Dendrology

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| <p>Competency: ECO 7b ECO 13c ECO 14 ECO 18</p> | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Managing Fish and Wildlife ● Protecting Woodland Management and Conservation ● Exploring Urban Forestry |
| <p>Essential Knowledge/Skills/Understandings</p> | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Identify local plants or trees that provide food and/cover for animals and birds ● Explain basic tree structure and growth ● Identify trees ● Differentiate between forest types ● Identify disease of trees caused by organic pathogens ● Identify forest insect pests ● Identify environmentally-caused diseases of trees ● Develop plan for managing forest insect pests and diseases ● Develop tree fertilization plan ● Use various methods of measuring wood and calculating volume of pulpwood ● Determine value of standing timber ● Describe different methods of harvesting trees ● Describe disadvantages and advantages of forest harvesting methods ● Determine undesirable trees for removal ● Describe methods of forest regeneration ● identify tree species best suited for conservation and replanting ● Identify new tree care practices ● Explain Forest management ● Develop a plan for managing a specific forest site ● Explain prescribed burns ● Explain the development and anatomy of a forest wildfire ● Explain climate effects which produces fires ● Describe the location of a fire using Forest Service Terminology ● Describe Forest wildfire prevention techniques ● Describe forest wildfire fighting techniques ● Explain how urban forests fit into urban ecosystem ● List and identify benefits of urban forests ● Explain the relationship between urban forest and air and water quality |

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| | <ul style="list-style-type: none"> ● Identify plant species appropriate to urban development ● Describe tree inventory of urban spaces ● Describe unfavorable conditions that urban trees experience ● Calculate cost of a “new” rehabilitated urban forest ● Explain a pruning, fertilization, and pest control plan for urban plantings |
| Essential Questions | <ol style="list-style-type: none"> 1. Give a list of trees found in Lunenburg County. 2. What was the primary requirement of the National Forest Management Act in 1976? 3. Explain how wildfires and prescribed burns differ. 4. List six steps in the cycle of adaptive management. 5. When managing resources, do you think it is more important to focus on a specific resource or to consider the entire ecosystem of which the resource is one part? |
| Primary Resources | <ul style="list-style-type: none"> ● eNature ● Dendrology at Virginia Tech ● Virginia Department of Forestry ● A guide for Virginia Forest Lovers ● Field Guide of the Chesapeake Bay ● Video “Eyewitness Trees” Eyewitness Video ● Video “Eyewitness Plants” Eyewitness Video ● Video “Enviro-Tacklebox: Module 04: Forces in the Environment” Discovery Education ● Text: Pearson: Environmental Science Chapter 11 |
| Essential Vocabulary | |

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alternate: being in a constant state of succession or rotation; interchanged repeatedly one for another

Sinus: a small, rounded depression between two projecting lobes, as of a leaf

legume: the pod or seed vessel of such a plant

apex: the tip, point, or vertex

Valvate: (of petals or sepals in the bud) having the margins touching but not overlapping

annual rings: an annual formation of wood in plants, consisting of two concentric layers, one of springwood and one of summerwood

imbricate: overlapping like tiles, as scales or leaves

Vein: one of the strands or bundles of vascular tissue forming the principal framework of a leaf

Dendrology: the branch of botany dealing with trees and shrubs

leaf scars: the mark left on a stem or twig after a leaf falls

Clear Cut: of or pertaining to a section of forest where all trees have been cut down for harvesting

Lobe: a roundish projection or division, as of an organ or a leaf

Seed Tree Cut: is a silviculture system that involves removing most trees from a stand and leaving only a few trees behind to produce seed

Mid rib: the central or middle rib of a leaf

Selection Cut: **Selection** cutting is the silvicultural practice of harvesting trees in a way that moves a forest stand towards an uneven-aged or all-aged condition, or structure

Naked: (of seeds) not enclosed in an ovary. (of flowers) without a calyx or perianth.

(of stalks, branches, etc.) without leaves.

(of stalks, leaves, etc.) without hairs or pubescence.

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| | <p>Prescribed Burn: Prescribed or controlled burning is a technique sometimes used in forest management, farming, or prairie restoration.</p> <p>Opposite shelter wood Cut: Shelterwood cutting refers to a progression of forest cuttings leading to the establishment of a new generation of seedlings</p> <p>Petiole: the slender stalk by which a leaf is attached to the stem; leafstalk</p> <p>serrated: having a notched edge or sawlike teeth</p> <p>Simple: not divided into parts</p> <p>vine: any plant having a long, slender stem that trails or creeps on the ground or climbs by winding itself about a support or holding fast with tendrils or claspers</p> |
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Marking Period: TBA

Days: 8

Reporting Category/Strand: Ichthyology

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| Competency: ECO 7b ECO 13a,b,j,k,l,m,n,o, p,q,r, | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Managing Fish and Wildlife |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Identify game, waterfowl, and fish ● Describe habitat requirements for various fish and game animals and fowl ● Explain main management procedures for freshwater fisheries ● Describe the aquaculture industry ● Explain difference between marine fish, marine shellfish, and marine mammals ● Identify diseases and parasites in fish ● Identify environmental conditions for a fish operation ● Identify appropriate fish for production ● Illustrate recording of fish operation data ● Explain the zones of the lake and habitat of each ● Determine and draw a site and size plan for a pond |

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| <p>Essential Questions</p> | <ol style="list-style-type: none"> 1. Give a list of all fish found in Lunenburg County. 2. What are the basic local problems that will affect fish populations in local waters? 3. Is pure water a solution? Explain. 4. Give an example of three unusual properties of water. 5. Compare and contrast fish and amphibians. |
| <p>Primary Resources</p> | <ul style="list-style-type: none"> • eNature • ARKive • Virginia Saltwater Fish Identification Guide • Field Guide of the Chesapeake Bay • Virginia Department of Game and Inland Fisheries • Video “North America: The Savage Edge” Discovery Education • Video “Oceans Alive: Marine Life” Discovery Education • Text: Pearson: Environmental Science Chapter 3 |
| <p>Essential Vocabulary</p> | <ul style="list-style-type: none"> • <div style="border: 1px solid black; padding: 5px;"> <p>Abdominal :of, in, on, or for the abdomen pelvicof or pertaining to the pelvis Game fish:an edible fish capable of affording sport to the angler in its capture Acclimation pond: Concrete or earthen pond or a temporary structure used for rearing and imprinting juvenile fish Gills: the respiratory organ of aquatic animals, as fish, that breathe oxygen dissolved in water Adipose fin: a small, fleshy fin, usually lacking rays, behind the main dorsal fin in trouts, catfishes, and other bony fishes Ichthyology: the branch of zoology dealing with fishes Anal fin: the median, unpaired fin on the ventral margin between the anus and the caudal fin in fishes Krill: any of the small, pelagic, shrimplike crustaceans of the family Euphausiidae, eaten as food by certain whales</p> </div> |

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| | <p>Barbel: any of the small, pelagic, shrimplike crustaceans of the family Euphausiidae, eaten as food by certain whales</p> <p>Lateral line: the line, or system of lines, of sensory structures along the head and sides of fishes and amphibians, by which the animal is believed to detect water current and pressure changes and vibrations</p> <p>Brood stock: production stages in fish farming</p> <p>Limnology: the scientific study of bodies of fresh water, as lakes and ponds, with reference to their physical, geographical, biological, and other features</p> <p>Cartilaginous fishes: elasmobranches because of their flexible endoskeleton made up of cartilage instead of bones</p> <p>Operculum: the gill cover of fishes and amphibians</p> <p>Caudal fin: the terminal vertical fin of a fish</p> <p>Pectoral fins: (in fishes) either of a pair of fins usually situated behind the head, one on each side, and corresponding to the forelimbs of higher vertebrates</p> <p>Dorsal fin: is located on the backs of various unrelated marine and freshwater vertebrates, including most fish, cetaceans</p> <p>Pelvic fins: (in fishes) either of a pair of fins on the lower surface of the body, corresponding to the hind limbs of a land vertebrate; ventral fin</p> <p>Fry: the young of fish</p> <p>Roe: the mass of eggs, or spawn, within the ovarian membrane of the female fish</p> | |
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Marking Period: TBA

Days: 5

Reporting Category/Strand: Entomology

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| Competency: ECO 7b ECO 14e,g | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Protecting Woodland Management and Conservation |
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| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Identify forest insect pests ● Develop plan for managing forest insect pests and diseases |
| Essential Questions | <ol style="list-style-type: none"> 1. Give a list of insects found in Lunenburg County. 2. Define and Describe the “Dirty Dozen”. 3. What are carcinogens and why are they difficult to identify? 4. While DDT caused the Eagle population to decline in the U.S, it helps control Malaria in 3rd World countries. Should it be allowed to be used? Explain. 5. What would you classify as “ethical annihilation” of pests ? |
| Primary Resources | <ul style="list-style-type: none"> ● eNature ● ARKive ● Virginia Insects and Bugs ● Virginia Tech Department of Entomology ● Field Guide of the Chesapeake Bay ● Video “Monster Bug Wars: Quick and Deadly” Discovery Education ● Video “Monster Bug Wars: Shape Shifters” Discovery Education ● Video “Monster Bug Wars: Death at Midnight ” Discovery Education ● Video “Monster Bug Wars: Enemy Empire” Discovery Education ● Video “Monster Bug Wars: When Tribes go to war” Discovery Education ● Video “Monster Bug Wars: Rainforest Rampage” Discovery Education ● Text: Pearson: Environmental Science Chapter 9 |
| Essential Vocabulary | <ul style="list-style-type: none"> ● |

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| | <p>dewlap Jacobson's organ terrapin dorsal larva terrarium dorsum neotenic toxin ectothermic neurotoxin venom endemic oviparous vernal pool fossorial ovoviviparous vivarium gravid posterior viviparous herpetology prehensile tailed hybrid semi-aquatic insectivore tetrapod</p> | |
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Marking Period: TBA

Days: 9

Reporting Category/Strand: Orienteering

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| Competency: ECO 7b ECO 16 | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Understanding Conservation Cartography and Orienteering |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Identify and describe topographic map, relief map, aerial photography and infrared photography ● Identify specific landmarks on a topographic land map |

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| | <ul style="list-style-type: none"> ● Reference known landmarks to topographic map and to relief map ● Demonstrate ability to read engineer’s scale in determining distance ● Use an engineer’s scale and topographic map to determine percentage slope ● Interpret various maps for correlation to geographic features ● Identify cardinal directions on maps and in the outdoors ● Use a compass to orient various locations on a map ● Use triangulation to estimate unknown location from one or more locations ● Use a compass and map to conduct a land navigation exercise ● Set up and operate a transit level and rod ● Read a rod and a level to calculate slope ● Use a transit level to lay out level and sloping contour lines on a sloping land ● Explain the parts of a field map ● Define GIS (Geographic Information System) ● Determine land use from aerial photography ● Use a GPS (Global Positioning Satellite) and map to navigate |
| Essential Questions | <ol style="list-style-type: none"> 1. Name the landmarks found on a topographic map of Lunenburg County. 2. Using a compass, GPS Unit, Meter Sticks, and Leveling rod; create a topographic map, giving landmarks. 3. Giving the coordinates, orienteer through the selected course accurately. 4. How much of the Nottoway River borders Lunenburg County? 5. Giving the slope of Lunenburg, which direction would you expect runoff to occur? |
| Primary Resources | <ul style="list-style-type: none"> ● How to Use a Compass ● Compass Dude ● National Map ● Google Maps ● Garmin Maps ● Video: “Reading Maps and Globes” Discovery Education ● Video: “Maps: Types, Symbols, and Terms” Discovery Education ● Text: Pearson: Environmental Science Chapter 16 |
| Essential Vocabulary | |

Marking Period: TBA

Days: 3

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Reporting Category/Strand: Soils

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| <p>Competency: ECO 7b ECO 9 ECO 20</p> | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Protecting the Environment---Soil ● Practicing Lawn Maintenance |
| <p>Essential Knowledge/Skills/Understandings</p> | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Define soil and materials it contains ● Explain soil formation process ● Evaluate soil texture ● Classify soils by soil taxonomy system ● Identify soil profiles ● Determine land capability classes ● Explain leaching in soils ● Test soil for water percolation ● Describe different types of soil ● Illustrate procedure for testing soil pH ● Collect and analyze samples of soil and identify composition ● Interpret soil tests results and make nutrient recommendation based on findings ● Explain how wind erodes soil ● Explain how water erodes soil ● Explain how weeds and grass protect the soil ● Explain the environmental impacts of sedimentation on plants and animals ● Discuss water erosion and effects on agricultural production ● Describe crop rotation ● Identify common vegetation materials used for soil conservation ● Explain vegetation erosion controls ● Explain mechanical erosion controls ● Describe ways to improve the soil ● Prepare land use plan ● Identify different types of fertilizers ● Determine fertilizer needs for a one-acre field of grass ● Describe weed control measures |
| <p>Essential Questions</p> | <ol style="list-style-type: none"> 1. How did agriculture allow for the development of civilization? |

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| | <ol style="list-style-type: none"> 2. How do market forces contribute to the loss of genetic diversity in our crop plants? 3. Why is it important to support small farms and urban community gardens? 4. What is the proper procedure for testing pH in yards and gardens? 5. Do you think it is necessary to safeguard native crop varieties? Explain. |
| Primary Resources | <ul style="list-style-type: none"> ● NRCS ● LaMotte ● Soil Testing ● Video: “Getting To Know Soil” Discovery Education ● Video: American History: The rise of the 20th century” segment of DUST BOWL Discovery Education ● Video: Enviro-Tacklebox: Module 05:Processes and Cycles in the Environment: Hypoxia; The O2 Blues” Discovery Education ● Text: Pearson: Environmental Science Chapter 12 |
| Essential Vocabulary | |

Marking Period: TBA

Days: 3

Reporting Category/Strand: Water

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| <p>Competency: ECO 7b ECO 10 ECO 13fq-r ECO 17 ECO 19</p> | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Protecting the Environment---Water ● Managing Fish and Wildlife ● Investigating Waste Management ● Understanding Watershed Management |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Define characteristics of water ● Draw and explain a hydrologic cycle ● Compute flux and residual time in the hydrologic cycle ● Design and construct a model to illustrate components of the riverine system ● Identify characteristics of the riverine system ● Describe ocean zonation |

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| | <ul style="list-style-type: none"> ● Discuss types of ocean water movements ● Explain the zones of the lake and the habitat of each ● Explain groundwater and sources ● Explain the role of ice in the water reservoirs ● Define water table ● Discuss the Safe Water Act ● Set up a distillation unit ● Discuss ways water is used at home and in industry ● Calculate the water needs for a farm or natural resource enterprise ● Define point and nonpoint pollution ● Identify major water pollutants and their effects on the environment ● Define causes of groundwater pollution ● Collect and analyze water samples and examine them for chemical pollutants and biological organisms ● Discuss effects of water pollution on agricultural production ● Define eutrophication and its relationship to nutrient-rich waters ● Discuss effects of polluted water on animals and humans ● Describe ways to control surface water pollution ● Discuss ways to manage groundwater contamination ● Discuss improving water quality by managing animal waste ● Develop a plan to manage a stream or lake to prevent pollution ● Identify BMPs for water ● Explain flood hazard analysis ● Evaluate a flood-damage area ● Explain how a flood-control structure (dam) functions ● Locate a flood-control structure in a given area ● Describe a conservation district ● Discuss measures to prevent stream bank erosion ● Develop a watershed management plan for a specific watershed ● Construct a stream bank protection measure ● Locate watersheds on map ● Identify characteristics of a watershed |
| <p>Essential Questions</p> | <ol style="list-style-type: none"> 1. What is the proper procedure for testing water? 2. Describe one way farmers can reduce the amount of water lost during irrigation. 3. Why is so little of Earth's water available for human use? |

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| | <p>4. Why do many scientists consider groundwater pollution a greater problem than surface water pollution?</p> <p>5. To conserve water, should communities limit how often people can do things such as water their lawns or wash their cars? Why or Why not?</p> |
| Primary Resources | <ul style="list-style-type: none"> ● EPA safe water ● Testing Your Water ● VDGIF ● DCR ● JH Kerr Dam ● Video: “Healing Our Troubled Planet” Discovery Education ● Video: “Water Smart: Water as a natural Resource” Discovery Education ● Text: Pearson: Environmental Science Chapter 14 |
| Essential Vocabulary | |

Marking Period: TBA

Days: 4

Reporting Category/Strand: Populations

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| Competency: ECO 7b,c,d,e,f,g,h,i,j, k, l,m,n,o,p ECO 13d | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Managing Fish and Wildlife |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Contrast the perspectives of “balance” and “dynamic change” in environmental stability ● Explain energy transfer ● Identify and describe effects of natural events and human influences on ecosystems ● Explain principles and processes of ecological succession ● Explain and illustrate geometric versus arithmetic increases in population growth ● Explain the role of biodiversity in ecosystem stability ● Describe effects of latitude on species diversity ● Explain the process of species differentiation ● Analyze a local ecosystem ● Explain essential components of a controlled living environment ● Describe and give examples of controlled living environment |

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| | <ul style="list-style-type: none"> ● Design a closed environment as an example of an ecosystem ● Explain measurement of wildlife and fish population |
| Essential Questions | <ol style="list-style-type: none"> 1. Why does examining population size, density, and distribution together give you a better understanding of a population than looking at these characteristics separately? 2. How does an increase in population size affect the impact of that population on the environment 3. Explain why even though the global human population's growth rate is declining, the human population is growing? 4. Which controls which, predator or prey? Explain. 5. Do you think that all of today's developing nations will complete the demographic transition? Why or why not? |
| Primary Resources | <ul style="list-style-type: none"> ● eNature ● ARKive ● Virginia Department of Game and Inland Fisheries ● Field Guide of the Chesapeake Bay ● Endangered Species ● National Geographic ● Video: "Planet Earth: Great Plains" Discovery Education ● Video: "Concepts in Nature: Animal Predators and the Balance of Nature" Discovery Education ● Text: Pearson: Environmental Science Chapter 8 ● Text: Pearson: Environmental Science Chapter 4 ● Text: Pearson: Environmental Science Chapter 10 |
| Essential Vocabulary | |

Marking Period: TBA

Days: 8

Reporting Category/Strand: Pollution

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| Competency: ECO 7a,b,c,d,e,f,g,h ECO 8 ECO 15 | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Protecting the Environment--Air and Noise ● Protecting Environmental Leadership |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Explain the importance of our environment ● Define basic terminology in ecology and other environmental sciences ● Contrast the perspectives of "balance" and "dynamic change" in environmental stability |

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| | <ul style="list-style-type: none"> ● Explain energy transfer ● Identify and describe effects of natural events and human influences on ecosystems ● Explain principles and processes of ecological succession ● Explain and illustrate geometric versus arithmetic increases in population growth ● Describe the composition of the atmosphere ● Describe and identify air pollutants and their effects on the environment ● Analyze and discuss the effects of air pollution on crops, plants and environment ● Take a sample of air and examine the pollutants ● Identify local sources of air pollution in the community ● Outline effective methods to control various air pollutants ● Explain effects of Greenhouse gases ● Explain sources and effects of acid rain ● Discuss ozone depletion controversy ● Explain the dynamic nature of global temperatures ● Discuss controversy over global warming ● Outline effects of potential global warming on agriculture ● Calculate air temperature at different altitudes ● Given an altitude, estimate the temperature ● Define noise pollution ● Identify different types of loudness rating ● Measure noise levels in different locations of the school ● Design a plan to control noise pollution in the school ● Explain FFA ● Demonstrate understanding of FFA ● Explain FFA awards programs for environmental management ● Develop a plan for participating in the Envirothon ● Participate in the Envirothon ● Develop a plan for recycling program in a community |
| <p>Essential Questions</p> | <ol style="list-style-type: none"> 1. Why isn't coal considered to be a mineral? 2. What are two ways to increase how long the reserves of a particular mineral will last? 3. Contrast the effects of stratospheric ozone and tropospheric ozone on people's health. 4. How do air pollutants contribute to emphysema asthma, and other respiratory conditions? 5. What four criteria are used to define hazardous wastes? |

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| <p>Primary Resources</p> | <ul style="list-style-type: none"> ● US EPA Noise Pollution ● NRDC Water Pollution ● Young People’s Trust for the Environment ● FFA ● Video: “the.News:Earth Day Chesapeake Cleanup Affects Nation” Discovery Education ● Video: “Healing our Troubled Planet: Volume 02” Discovery Education ● Video: the.News: Fracking: Positive or Negative Impact” Discovery Education ● Text: Pearson: Environmental Science Chapter 15 ● Text: Pearson: Environmental Science Chapter 13 ● Text: Pearson: Environmental Science Chapter 19 |
| <p>Essential Vocabulary</p> | |

Marking Period: TBA

Days: 5

Reporting Category/Strand: Endangered Species

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| <p>Competency: ECO 7b ECO 11 ECI 13e, f, g</p> | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Investigating Environmental Issues ● Managing Fish and Wildlife |
| <p>Essential Knowledge/Skills/Understandings</p> | <ul style="list-style-type: none"> ● Define the importance of our environment ● Define environmental programs: EPA, USDA, VADA, and others ● Identify local, state, and national problems and issues concerning the environment ● Discuss E. A. R. T. H. Environment, Agriculture, Research, and Technology in Harmony) ● Describe how agriculture and environment are related ● Describe human population curve ● Identify environmental management and conservation business in the community ● Describe multiple-use management ● Discuss Virginia erosion and sediment law ● Identify major land uses and their impact on the environment and ecosystems ● Explain the environmental impacts of sedimentation on plants and animals ● Collect or describe samples of plants and animals affected by pollution |

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| | <ul style="list-style-type: none"> ● Discuss the assistance available from the Natural Resources Conservation Service ● Define organic farming ● Define wetlands and uses ● Explain how technology has solved pollution problems ● Explain the difference between extinct, endangered, and threatened species of wildlife ● Identify Virginia’s threatened and endangered species ● Identify diseases and parasites in wildlife |
| Essential Questions | <ol style="list-style-type: none"> 1. Compare and Contrast Endangered, Threatened, Extinct in the Wild and Extinct. 2. What are mass extinctions? 3. What is a biodiversity hotspot? How does an area qualify to be a hotspot? 4. What are the top five causes for the endangerment of species? 5. If in order to save a species, humans would no longer be allowed to use any fossil fuel. How would you adapt? |
| Primary Resources | <ul style="list-style-type: none"> ● Virginia Endangered Species ● Fish and Wildlife Service ● WWF Endangered Species ● Endangered Species ● National Geographic ● Video: “Where Have All The Animals Gone? Endangered Species” Discovery Education ● Video: “Jeff Corwin’s Wildlife: The Year of the Polar Bear” Discovery Education ● Video: “Planet Earth: The Future: Saving Species” Discovery Education ● Video: “Eyewitness: Endangered Animals” Eyewitness Video ● Video: “Eyewitness: Extinct Species” Eyewitness Video ● Text: Pearson: Environmental Science Chapter 7 |
| Essential Vocabulary | <div style="border: 1px solid black; padding: 5px;"> <p>Endangered DNA Natural resource Extinct Ecosystem Poaching Biome Global Warming</p> </div> |

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| | Cloning Habitat Conservation Materialism | |
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Marking Period: TBA

Days: 3

Reporting Category/Strand: Virginia Game and Environmental Laws

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| Competency: ECO 7b ECO 6 ECO 12 ECO 13a | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Identifying Careers in Environmental Management ● Planning and Managing Land Use ● Managing Fish and Wildlife |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental science ● Describe occupations in environmental management ● Describe occupations in natural resource conservation areas ● Identify local, state, and federal agencies that work with the environment ● Identify environmental management and conservation businesses in the community ● Explain zoning classifications ● Explain effects of zoning ● Classify land zoning according to its capability to produce ● Describe how agriculture and environment are integrated ● Design a community with the environment as its major planning ● Identify activities of the conservation district in your area ● Describe a conservation district ● Determine and draw a site and size plan for a pond ● Identify game, waterfowl, and fish |
| Essential Questions | <ol style="list-style-type: none"> 1. What is the purpose of an EIS? 2. List four types of economic assumptions that can negatively affect the environment? 3. What are three actions an individual can take to influence an environmental policy? |

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| | <ol style="list-style-type: none"> 4. Name four ways that the environment contributes to economies? 5. Describe the EPA. |
| Primary Resources | <ul style="list-style-type: none"> ● Virginia Department of Game and Inland Fisheries ● North American Big Game ● Hunting Safety ● Video: “The Alaska Experiment: Hunt or be hunted” Discovery Education ● Video: “The Alaska Experiment: Into the Wilds” Discovery Education ● Text: Pearson: Environmental Science Chapter 2 |
| Essential Vocabulary | |

Marking Period: TBA

Days: 3

Reporting Category/Strand: Industry and Energy

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| Competency: EOC 7b EOC 21 | <ul style="list-style-type: none"> ● Developing Basic Environmental Science Concepts ● Managing Energy Resources |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental science ● Explain zoning classifications ● Explain effects of zoning ● Classify land zoning according to its capability to produce ● Describe how agriculture and environment are integrated ● Design a community with the environment as its major planning ● Identify activities of the conservation district in your area ● Describe a conservation district ● Determine and draw a site and size plan for a pond ● Discuss forms of energy useable to humans ● Outline energy production trends in the United States and worldwide ● Explain traditional, primary energy sources in use today ● Discuss alternative sources of energy ● Evaluate energy and use patterns in specific local situations ● Evaluate appliances for energy use and conservation |

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| | <ul style="list-style-type: none"> ● Describe how various energy sources are obtained, processed, distributed and used ● Explain problems associated with production, and use of various energy sources ● Develop an energy management plan for an individual and a community |
| Essential Questions | <ol style="list-style-type: none"> 1. What are the advantages of coal as a source of energy? 2. Why is the use of natural gas increasing? 3. Over the next few decades, what is likely to happen to the world's production of oil? 4. Explain what ocean thermal energy conversion (OTEC) is. 5. List four benefits of renewable energy resources. |
| Primary Resources | <ul style="list-style-type: none"> ● Alternative Energy ● NRDC ● Virginia Department of Environmental Quality ● Virginia Department of Agriculture ● Text: Pearson: Environmental Science Chapter 17 ● Text: Pearson: Environmental Science Chapter 18 |
| Essential Vocabulary | |

Marking Period: TBA

Days: 8

Reporting Category/Strand: Herpetology

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| Competency: ECO 7b ECO 13a,h | <ul style="list-style-type: none"> ● Developing "Basic Environmental Science Concepts ● Managing fish and wildlife |
| Essential Knowledge/Skills/Understandings | <ul style="list-style-type: none"> ● Define basic terminology in ecology and other environmental sciences ● Identify game animals and fowl ● Identify elements for maintenance of marsh for habitat |
| Essential Questions | <ol style="list-style-type: none"> 1. List the herps found in Lunenburg County. 2. What are the primary differences between reptiles and amphibians? 3. How has change in climate changed the population of bullfrogs in Lunenburg? 4. Why do warmer and wetter biomes have higher net primary productivity? 5. What would need to be done to create a vernal pool? |

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| <p>Primary Resources</p> | <ul style="list-style-type: none"> ● eNature ● ARKive ● Field Guide of the Chesapeake Bay ● Virginia Herpetological Society ● Video “The Jeff Corwin Experience: Morocco: Mysterious Desert Ecosystem” Discovery Education ● Video “The Jeff Corwin Experience: Asia: Land of the Komodo Dragon” Discovery Education ● Video “The Jeff Corwin Experience: The Galapagos Island: Land of Evolutionary Change” Discovery Education ● Video “The Jeff Corwin Experience: Spain: Diverse Ecosystem” Discovery Education ● Video “The Jeff Corwin Experience: Borneo: Island Ecosystem” Discovery Education ● Video “The Jeff Corwin Experience: Guyana: Rainforest Ecosystem” Discovery Education ● Video “The Jeff Corwin Experience: Anaconda” Discovery Education ● Video “The Jeff Corwin Experience: Arizona: Desert Ecosystem” Discovery Education ● Video “The Jeff Corwin Experience: Brazil: Exploring the Wetlands” Discovery Education ● Video “The Jeff Corwin Experience: Africa: Namibian Ecosystem” Discovery Education ● Video “Eyewitness Reptiles” Eyewitness Video ● Video “Eyewitness Amphibians” Eyewitness Video ● Text: Pearson: Environmental Science Chapter 6 |
| <p>Essential Vocabulary</p> | <div style="border: 1px solid black; padding: 5px;"> <p>ambient temperature carapace dewlap endemic hybrid middorsal poikilotherm supratympanic toxin albino carnivore dichromatism estivation insectivore midventral posterior tagma tympanum amniote casque dimorphism fossorial invertebrate neotenic posteroventral tetrapod venom anterior</p> </div> |

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cephalothorax
diurnal
genus
intergrade
neurotoxin
pectines
taxonomy
vent
anteroventral
chelonians
dorsal
gravid
jacobsons organ
nocturnal
prehensile tail
larsal spur
ventral
anus
cloaca
dorsolateral
hemipenis
keel
omnivore
race
terrapin
vernal pool
aquatic
cranial
dorsolateral ridge/fold
herpetology
lateral
oviparous
rostral
terrarium
vertebrate
arthropod
crepuscular
dorsum
herp
larva
ovoviviparous
scute
terrestrial
viquarium
arboreal
cryptic coloration
ecology
herbivore
melanism
pedipalps
semi-aquatic
thermoregulate
viviparous
autotomy
detritivore
ectothermic
hibernate
metamorphosis
plastron
species
thorax

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