**NACA Yearlong UbD Template**

**UbD Curriculum Template 2.0  
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| **Stage 1 Desired Results** | | | |
| **Directions:** Choose multiple CCSS (or other standards), copy and paste them here, and unpack them for big ideas and assessment verbs by highlighting.  **Common Core State Standards (**[**www.corestandards.org**](http://www.corestandards.org)**), Next Generation Science Standards (**[**http://www.nextgenscience.org**](http://www.nextgenscience.org)**), Indigenous Standards (found in Course Sites).**  **Science investigations use diverse methods and do not always use the same set of procedures to obtain data.**  **Strand I: Scientific Thinking and Practice**  **Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.**  **9-12 Benchmark I: Use accepted scientific methods to collect, analyze, and interpret data and observations and to design and conduct scientific investigations and communicate results.**  **I.I.I.1. Describe the essential components of an investigation, including appropriate methodologies, proper equipment, and safety precautions.**  **I.I.I.2.Design and conduct scientific investigations that include: testable hypotheses, controls and variables, methods to collect, analyze, and interpret data, results that address hypotheses being investigated, predictions based on results, re-evaluation of hypotheses and additional experimentation as necessary, and error analysis.**  **I.I.I.3.Use appropriate technologies to collect, analyze, and communicate scientific data (e.g., computers, calculators, balances, microscopes).**  **I.I.I.4.Convey results of investigations using scientific concepts, methodologies, and expressions, including: scientific language and symbols, diagrams, charts, and other data displays, mathematical expressions and processes (e.g., mean, median, slope, proportionality), clear, logical, and concise communication, and reasoned arguments.**  **I.I.I.5.Understand how scientific theories are used to explain and predict natural phenomena (e.g., plate tectonics, ocean currents, structure of atom).**  **9-12 Benchmark II: Understand that scientific processes produce scientific knowledge that is continually evaluated, validated, revised, or rejected.**  **I.I.II.1. Understand how scientific processes produce valid, reliable results, including: consistency of explanations with data and observations, openness to peer review, full disclosure and examination of assumptions, testability of hypotheses, and repeatability of experiments and reproducibility of results.**  **I.I.II.2. Use scientific reasoning and valid logic to recognize: faulty logic, cause and effect, the difference between observation and unsubstantiated inferences and conclusions, and potential bias.**  **I.I.II.3. Understand how new data and observations can result in new scientific knowledge.**  **I.I.II.4. Critically analyze an accepted explanation by reviewing current scientific knowledge.**  **I.I.II.5. Examine investigations of current interest in science (e.g., superconductivity, molecular machines, age of the universe).**  **I.I.II.6. Examine the scientific processes and logic used in investigations of past events (e.g., using data from crime scenes, fossils), investigations that can be planned in advance but are only done once (e.g., expensive or time-consuming experiments such as medical clinical trials), and investigations of phenomena that can be repeated easily and frequently.**  **9-12 Benchmark III: Use mathematical concepts, principles, and expressions to analyze data, develop models, understand patterns, and relationships, evaluate findings, and draw conclusions.**  **I.I.III.1. Create multiple displays of data to analyze and explain the relationships in scientific investigations.**  **I.I.III.2. Use mathematical models to describe, explain, and predict natural phenomena.**  **I.I.III.3. Use technologies to quantify relationships in scientific hypotheses (e.g., calculators, computer spreadsheets and databases, graphing software, simulations, modeling).**  **I.I.III.4. Identify and apply measurement techniques and consider possible effects of measurement errors.**  **I.I.III.5. Use mathematics to express and establish scientific relationships (e.g., scientific notation, vectors, dimensional analysis).**  **Strand II: The Content of Science**  **Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.**  **9-12 Benchmark I: Understand how the survival of species depends on biodiversity and on complex interactions, including the cycling of matter and the flow of energy.**  **Grade Performance Standards**  **9-12 Ecosystems**  **1. Know that an ecosystem is complex and may exhibit fluctuations around a steady state or may evolve over time.**  **2. Describe how organisms cooperate and compete in ecosystems (e.g., producers, decomposers, herbivores, carnivores, omnivores, predator-prey, symbiosis, and mutualism).**  **3. Understand and describe how available resources limit the amount of life an ecosystem can support (e.g., energy, water, oxygen, nutrients).**  **4. Critically analyze how humans modify and change ecosystems (e.g., harvesting, pollution, population growth, technology).**  **Energy Flow in the Environment**  **5. Explain how matter and energy flow through biological systems (e.g., organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment.**  **6. Describe how energy flows from the sun through plants to herbivores to carnivores and decomposers.**  **7. Understand and explain the principles of photosynthesis (i.e., chloroplasts in plants convert light energy, carbon dioxide, and water into chemical energy).**  **Biodiversity**  **8. Understand and explain the hierarchical classification scheme (i.e., domain, kingdom, phylum, class, order, family,**  **genus, species), including:**  **• classification of an organism into a category**  **• similarity inferred from molecular structure (DNA) closely matching classification based on anatomical**  **similarities**  **• Similarities of organisms reflecting evolutionary relationships.**  **9. Understand variation within and among species, including:**  **• mutations and genetic drift**  **• factors affecting the survival of an organism**  **• Natural selection.**  **Strand II: The Content of Science**  **Standard III (Earth and Space Science): Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth’s systems.**  **9-12 Benchmark II: Examine the scientific theories of the origin, structure, energy, and evolution of Earth and its atmosphere, and their interconnections.**  **Grade Performance Standards**  **9-12 Characteristics and Evolution of Earth**  **1. Describe the characteristics and the evolution of Earth in terms of the geosphere, the hydrosphere, the atmosphere, and the biosphere.**  **2. Recognize that radiometric data indicate that Earth is at least 4 billion years old and that Earth has changed during that period.**  **3. Describe the internal structure of Earth (e.g., core, mantle, crust) and the structure of Earth’s plates.**  **4. Understand the changes in Earth’s past and the investigative methods used to determine geologic time, including:**  **• rock sequences, relative dating, fossil correlation, and radiometric dating**  **• Geologic time scales, historic changes in life forms, and the evidence for absolute ages (e.g., radiometric methods, tree rings, paleo magnetism).**  **5. Explain plate tectonic theory and understand the evidence that supports it.**  **Energy in Earth’s System**  **6. Know that Earth’s systems are driven by internal (i.e., radioactive decay and gravitational energy) and external (i.e., the sun) sources of energy.**  **7. Describe convection as the mechanism for moving heat energy from deep within Earth to the surface and discuss**  **how this process results in plate tectonics, including:**  **• geological manifestations (e.g., earthquakes, volcanoes, mountain building) that occur at plate boundaries**  **• Impact of plate motions on societies and the environment (e.g., earthquakes, volcanoes).**  **8. Describe the patterns and relationships in the circulation of air and water driven by the sun’s radiant energy,**  **including:**  **• patterns in weather systems related to the transfer of energy**  **• differences between climate and weather**  **• global climate, global warming, and the greenhouse effect**  **• El Niño, La Niña, and other climatic trends.**  **Geochemical Cycles**  **9. Know that Earth’s system contains a fixed amount of natural resources that cycle among land, water, the atmosphere, and living things (e.g., carbon and nitrogen cycles, rock cycle, water cycle, ground water, aquifers).**  **10. Describe the composition and structure of Earth’s materials, including:**  **• the major rock types (i.e., sedimentary, igneous, metamorphic) and their formation**  **• Natural resources (e.g., minerals, petroleum) and their formation.**  **11. Explain how layers of the atmosphere (e.g., ozone, ionosphere) change naturally and artificially.**  **12. Explain how the availability of ground water through aquifers can fluctuate based on multiple factors (i.e., rate of use, rate of replenishment, surface changes, and changes in temperature).**  **Strand III: Science and Society**  **Standard I: Understand how scientific discoveries, inventions, practices, and knowledge influence, and are influenced by, individuals and societies.**  **9-12 Benchmark I: Examine and analyze how scientific discoveries and their applications affect the world, and explain how societies influence scientific investigations and applications.**  **Grade Performance Standards**  **9-12 Science and Technology**  **1. Know how science enables technology but also constrains it, and recognize the difference between real technology**  **and science fiction (e.g., rockets vs. antigravity machines; nuclear reactors vs. perpetual-motion machines; medical**  **X-rays vs. Star-Trek tricorders).**  **2. Understand how advances in technology enable further advances in science (e.g., microscopes and cellular structure; telescopes and understanding of the universe).**  **3. Evaluate the influences of technology on society (e.g., communications, petroleum, transportation, nuclear energy, computers, medicine, genetic engineering) including both desired and undesired effects, and including some historical examples (e.g., the wheel, the plow, the printing press, the lightning rod).**  **4. Understand the scientific foundations of common technologies (e.g., kitchen appliances, radio, television, aircraft, rockets, computers, medical X-rays, selective breeding, fertilizers and pesticides, agricultural equipment).**  **5. Understand that applications of genetics can meet human needs and can create new problems (e.g., agriculture, medicine, cloning).**  **6. Analyze the impact of digital technologies on the availability, creation, and dissemination of information.**  **7. Describe how human activities have affected ozone in the upper atmosphere and how it affects health and the environment.**  **8. Describe uses of radioactivity (e.g., nuclear power, nuclear medicine, radiometric dating).**  **Science and Society**  **9. Describe how scientific knowledge helps decision makers with local, national, and global challenges (e.g., Waste Isolation Pilot Project [WIPP], mining, drought, population growth, alternative energy, climate change).**  **10. Describe major historical changes in scientific perspectives (e.g., atomic theory, germs, cosmology, relativity, plate Tectonics, evolution) and the experimental observations that triggered them.**  **11. Know that societal factors can promote or constrain scientific discovery (e.g., government funding, laws and regulations about human cloning and genetically modified organisms, gender and ethnic bias, AIDS research, Alternative-energy research).**  **12. Explain how societies can change ecosystems and how these changes can be reversible or irreversible.**  **13. Describe how environmental, economic, and political interests impact resource management and use in New**  **Mexico.**  **14. Describe New Mexico’s role in nuclear science (e.g., Manhattan Project, WIPP, national laboratories).**  **(**[**http://www.nextgenscience.org**](http://www.nextgenscience.org)**) High School 9-12**  **Disciplinary Core Ideas**  **LS2.A: Interdependent Relationships in Ecosystems**  **•Ecosystems have carrying capacities, which are limits to the numbers of organisms and populations they can support. These limits result from such factors as the availability of living and nonliving resources and from such challenges such as predation, competition, and disease. Organisms would have the capacity to produce populations of great size were it not for the fact that environments and resources are finite. This fundamental tension affects the abundance (number of individuals) of species in any given ecosystem. (HS-LS2-1),(HS-LS2-2)**  **LS2.B: Cycles of Matter and Energy Transfer in Ecosystems**  **•Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes. (HS-LS2-3)**  **•Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved. (HS-LS2-4)**  **•Photosynthesis and cellular respiration are important components of the carbon cycle, in which carbon is exchanged among the biosphere, atmosphere, oceans, and geosphere through chemical, physical, geological, and biological processes. (HS-LS2-5)**  **LS2.C: Ecosystem Dynamics, Functioning, and Resilience**  **•A complex set of interactions within an ecosystem can keep its numbers and types of organisms relatively constant over long periods of time under stable conditions. If a modest biological or physical disturbance to an ecosystem occurs, it may return to its more or less original status (i.e., the ecosystem is resilient), as opposed to becoming a very different ecosystem. Extreme fluctuations in conditions or the size of any population, however, can challenge the functioning of ecosystems in terms of resources and habitat availability. (HS-LS2-2),(HS-LS2-6)**  **•Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, overexploitation, and climate change—can disrupt an ecosystem and threaten the survival of some species. (HS-LS2-7)**  **LS2.D: Social Interactions and Group Behavior**  **•Group behavior has evolved because membership can increase the chances of survival for individuals and their genetic relatives. (HS-LS2-8)**  **LS4.D: Biodiversity and Humans**  **•Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). (secondary to HS-LS2-7)**  **•Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value. (secondary to HS-LS2-7) (Note: This Disciplinary Core Idea is also addressed by HS-LS4-6.)**  **PS3.D: Energy in Chemical Processes**  **•The main way that solar energy is captured and stored on Earth is through the complex chemical process known as photosynthesis. (secondary to HS-LS2-5)**  **ETS1.B: Developing Possible Solutions**  **•When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts. (secondary to HS-LS2-7)** | | | |
| Other than the big ideas explicitly in the standards you chose, what big ideas might frame this yearlong curriculum?   1. Students will demonstrate an understanding of interactions between living things including organisms existing in communities, populations and ecosystems. 2. Students will investigate a problem and solve to provide solutions in current environmental issues. 3. … | | | |
| CHOSEN BIG IDEAS(S):  The Native student will be able to define environmental sciences, classify environmental issues on their native lands, and students will realize that energy conversions underlie all ecological processes. | ***Transfer*** | | |
| *Students will know biotic and abiotic factors affecting the environment and their impact on ecosystems, a population consists of individuals of a species occurring at a given place in a given time, current environmental issues and the positive/negative impacts on the earth, so that in the long-run, on their own, they will be able to identify environmental factors unique to an ecosystem, describe relationships between populations in an ecosystem and their impact on the environment, and develop, research a current environmental topic and communicate the impact this environmental issue has on the Earth and human existence.* | | |
| ***Meaning*** | | |
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| **UNDERSTANDINGS**  *Students will understand that…*   * Humans have a need to organize, understand, and classify the natural world * The interrelationships exist in the biosphere. Abiotic and Biotic factors depend on each other * Personal choices of humans have major impact globally, small changes which create long lasting consequences in our ecosystems. * Population changes overtime * Scientific knowledge relies on the Scientific Method, technology. The advancements of technology directly affects questions we can discuss. New Ideas, hypotheses and observations can be made. | | **ESSENTIAL QUESTIONS**   * Why should young Native people care about complex interaction in our ecosystem? * How do abiotic factors impact biotic factors in an ecosystem? * How we all are connected? * Do humans always have a negative impact? * Has technology bettered the world? * Why should we care? * Do we need nature? |
| ***Acquisition*** | | |
| ***Students will know…***     * **Unit 1: Introduction to Environmental Science** * What science is. * The importance of the metric system * How scientist communicate their experimental results. * **Unit 2: Ecology** * The parts of a dynamic earth * Ecosystems are interconnected * Biomagnification. * The importance of biodiversity. * Many ways energy flows in an ecosystem. * Ecosystems change over time. * The characteristics of terrestrial and aquatic biomes. * **Unit 3: Populations** * Populations change over time. * Species interact with each other. * The need to study human populations. * Types of information population trends give us. * Biodiversity can be at risk. * The difference between primary and secondary succession. * Different populations’ response to traumatic events. * **Unit 4: Resources** * Different resources we have on earth. * How to use the resources we have? * Cause of pollution. * Resource usage affect climate. * Land management and conservation is important. * Creative alternative energies being developed. * Importance of dealing with waste. * **Unit 5: Human Impact** * Pollution affects human health. * Biological hazards are we facing. * Biomagnification is becoming more of a human issue. * Financial resources affect our responses to environmental disasters. * Governments have to pass and enforce environmental policies on native lands. * All individuals can have an impact on the planet. | | ***Students will be skilled at…***   * **Unit 1: Introduction to Environmental Science** * **Evaluating the importance of curiosity, honesty, openness, and skepticism in science.** * Using standard safety practices for all classroom laboratory and field investigations. * Identify and investigating problems scientifically. * Demonstrating the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations. * Analyzing how scientific knowledge is developed. * Understanding important features of the process of scientific inquiry and method. * **Unit 2:** * **Investigating the flow of energy and cycling of matter within an ecosystem and relate these phenomena to human society.**  1. Interpreting biogeochemical cycles including hydrologic, nitrogen, phosphorus, oxygen, and carbon cycles. Recognize that energy is not recycled in ecosystems. 2. Relating energy changes to food chains, food webs, and to trophic levels in a generalized ecosystem, recognizing that entropy is a primary factor in the loss of usable food energy during movement up the trophic levels. 3. Relating the cycling of matter and the flow of energy to the Laws of Conservation of matter and energy. Identify the role and importance of decomposers in the recycling process. 4. Distinguishing between abiotic and biotic factors in an ecosystem and describe how matter and energy move between these.  * **Demonstrating an understanding that the Earth is one interconnected system.**  1. Describing how the abiotic components (water, air, and energy) affect the biosphere. 2. Recognizing and give examples of the hierarchy of the biological entities of the biosphere (organisms, populations, communities, ecosystems, and biosphere). 3. Characterizing the components that define a Biome. Abiotic Factors – to include precipitation, temperature and soils. 4. Identifying Biotic Factors – plant and animal adaptations that create success in that biome. 5. Characterizing the components that define fresh-water and marine systems. 6. Identifying Abiotic Factors – to include light, dissolved oxygen, phosphorus, nitrogen, pH and substrate. 7. Identifying Biotic Factors – plant and animal adaptations characteristic to that system.  * **Describing stability and change in ecosystems.**  1. Describing interconnections between abiotic and biotic factors, including normal cyclic fluctuations and changes associated with climatic change (i.e. ice ages). 2. Explaining succession in terms of changes in communities through time to include changes in biomass, diversity, and complexity. 3. Explaining how succession may be altered by traumatic events.  * **Unit 3:** * **Investigating the flow of energy and cycling of matter within an ecosystem and relate these phenomena to human society.**  1. Relating food production and quality of nutrition to population growth and the trophic levels.  * **Demonstrating an understanding that the Earth is one interconnected system.**  1. Describing how the abiotic components (water, air, and energy) affect the biosphere.  * Students will describe stability and change in ecosystems.  1. Explaining succession in terms of changes in communities through time to include changes in biomass, diversity, and complexity. 2. Explaining how succession may be altered by traumatic events. 3. Explaining how biotic and abiotic factors influence populations. 4. Describing interactions between individuals (i.e. mutualism, commensalisms, parasitism, predation, and competition).  * Recognizing that human beings are part of the global ecosystem and will evaluate the effects of human activities and technology on ecosystems.  1. Describing factors affecting population growth of all organisms, including humans. 2. Relating these to factors affecting growth rates and carrying capacity of the environment. 3. Describing the effects of population growth, demographic transitions, cultural differences, emergent diseases, etc. on societal stability. 4. Explaining how human activities affect global and local sustainability.  * **Unit 4:** * **Understanding and describing availability, allocation and conservation of energy and other resources.**  1. Differentiating between renewable and nonrenewable resources including how different resources are produced, rates of use, renewal rates, and limitations of sources. Distinguish between natural and produced resources. 2. Describing how technology is increasing the efficiency of utilization and accessibility of resources. 3. Describing how energy and other resource utilization impact the environment and recognize that individuals as well as larger entities (businesses, governments, etc.) have impact on energy efficiency. 4. Describing the relationship of energy consumption and the living standards of societies. 5. Describing the commonly used fuels (e.g. fossil fuels, nuclear fuels, etc.) and some alternative fuels (e.g. wind, solar, ethanol, etc.) including the required technology, availability, pollution problems and implementation problems. Recognize the origin of fossil fuels and the problems associated with our dependence on this energy source. 6. Describing the need for informed decision making of resource utilization. (i.e. energy and water usage allocation, conservation, food and land, and long-term depletion).  * **Recognizing that human beings are part of the global ecosystem and will evaluate the effects of human activities and technology on ecosystems.**  1. Explaining how human activities affect global and local sustainability. 2. Describing the actual and potential effects of habitat destruction, erosion, and depletion of soil fertility associated with human activities. 3. Describing the effects and potential implications of pollution and resource depletion on the environment at the local and global levels (e.g. air and water pollution, solid waste disposal, depletion of the stratospheric ozone, global warming, and land uses).   **Unit 5:**   * **Demonstrating an understanding that the Earth is one interconnected system.**  1. Describing how the abiotic components (water, air, and energy) affect the biosphere.  * **Understanding and describe availability, allocation and conservation of energy and other resources.**  1. Describing how technology is increasing the efficiency of utilization and accessibility of resources. 2. Describing how energy and other resource utilization impact the environment and recognize that individuals as well as larger entities (businesses, governments, etc.) have impact on energy efficiency. 3. Describe the relationship of energy consumption and the living standards of societies. 4. Describe the commonly used fuels (e.g. fossil fuels, nuclear fuels, etc.) and some alternative fuels (e.g. wind, solar, ethanol, etc.) including the required technology, availability, pollution problems and implementation problems. Recognize the origin of fossil fuels and the problems associated with our dependence on this energy source. 5. Describe the need for informed decision making of resource utilization. 6. (i.e. energy and water usage allocation, conservation, food and land, and long-term depletion).  * Recognizing that human beings are part of the global ecosystem and will evaluate the effects of human activities and technology on ecosystems.  1. Describing factors affecting population growth of all organisms, including humans. 2. Relating factors affecting growth rates and carrying capacity of the environment. 3. Describing the effects of population growth, demographic transitions, cultural differences, emergent diseases, etc. on societal stability. 4. Explaining how human activities affect global and local sustainability. 5. Describing the actual and potential effects of habitat destruction, erosion, and depletion of soil fertility associated with human activities. 6. Describing the effects and potential implications of pollution and resource depletion on the environment at the local and global levels (e.g. air and water pollution, solid waste disposal, depletion of the stratospheric ozone, global warming, and land uses). 7. Describing how political, legal, social, and economic decisions may affect global and local ecosystems. |
| **Stage 2 – Evidence** | | | |
| **Evaluative Criteria** | | **Assessment Evidence** | |
| Standards-based A+ Rubric in Student-friendly Language   |  |  |  | | --- | --- | --- | | Performance Assessment Criteria and Standard Alignment | Complete | Needs Revision | | *Ex. CCSS.ELA-LITERACY.W.8.1.B*  *I can use relevant, accurate information to support a claim.* |  |  | | Can Categorizing renewable and non-renewable resources. |  |  | | Can Identify a local or regional environmental issue that is currently a focus of written news coverage. |  |  | | Gain an understanding of how scientists study the natural world.  Develop the ability to conduct investigations.  Students can explain causes of Environmental Issues as determined by leading scientist.  Students know possible effects of Environmental problems  Students can explain controversies surrounding environmental problems on homelands.  Students can support information with facts from scientific articles. |  |  | | | PERFORMANCE TASK(S):   * Evaluate population sizes using sampling methods. * Technology based product demonstrating the unique qualities of the different biomes. * Create a persuasive presentation to influence peers about the role they should take in helping and protecting our Earth.     What (cognitive verb + big idea):  Through discovery and exploration, students will be researching how environmental factors and biological factors can cause change in the ecosystems and populations. Utilize past and present evidence and ideas to make meaningful connections that produce inquiry, curiosity about the real and natural world.  Why (copied and pasted EUs from Stage 1):   * Humans have a need to organize, understand, and classify the natural world * The interrelationships exist in the biosphere. Abiotic and Biotic factors depend on each other * Personal choices of humans have major impact globally, small changes which create long lasting consequences in our ecosystems. * Population changes overtime * Scientific knowledge relies on the Scientific Method, technology. The advancements of technology directly affects questions we can discuss. New Ideas, hypothesis and observations can be made.   How (GRASPS, written to and for students):  **Goal:**   * **Students will demonstrate an understanding of interactions between living things including organisms existing in communities, populations and ecosystems.** * **Students will investigate and problem solve to provide solutions to current environmental issues on homelands.**   **Role: Students are the Environmental Scientist. They must advocate for Earth.**  **Audience: Native American Community Academy Administration**  **Situation: Environmental Catastrophe.**  **Product, Performance, and Purpose: Illustrations, reports, Dioramas, Trophic Level Pyramids.**  **Standards and Criteria for Success: Using Voice.** | |
| <type here> | | OTHER EVIDENCE: | |
| |  | | --- | | **Stage 3 – Learning Plan** *What units will you teach, and what skills will students master, as a result of this yearlong curriculum?* |   \_\_\_2015\_\_\_\_\_\_ - \_\_2016\_\_\_\_\_\_\_\_ Academic Year Curriculum Map Template   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Unit Big Idea (Title) | Unit Essential Question(s) | Unit Standard(s) | Assessment(s) | Time Frame | | What big idea anchors this unit? | What EQ will anchor conceptual, critical thinking related to the big idea? | What core standard(s) anchors this unit, and therefore what observable skills will you evaluate? | What summative assessment will provide you evidence of skills and understanding? | What is the approximate time frame for the teaching and learning in this unit? | | Unit 1:  Introduction to Environmental Sciences  Scientists use tools of the mind; mental and conceptual tools to explore and understand the environment. | * What is science? * Why is it important that we understand the metric system? * How do scientists communicate their experimental results? | Standard I: Understand the processes of scientific investigations and use inquiry and scientific ways of observing, experimenting, predicting, and validating to think critically.  Design and conduct an experiment to determine how temperature effects seed germination. | Summative:  Unit Test, Lab reports/revising and peer review.  Formative:  Alien Lab  Gum Lab/Peer Review with Power Point/Poster or Movie  Quiz  Ticket out the Door-Answer the essential question  Venn diagram  Lab questions  Graphic organizer  Foldable | August 2015  First 9 weeks. | | Unit 2:  Ecology  There are many elements of  Ecological studies. | * What are the parts of a dynamic earth? * How are ecosystems interconnected? * What is Bio magnification? * Why is biodiversity important? * How does energy flow in an ecosystem? * How do ecosystems change over time? * What are characteristics of terrestrial and aquatic biomes? | Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their environments.  Construct a model of an ecosystem.  Example of The Golden Toad extinction.  Illustrate examples of both artificial selection and natural selection.  Collect data on several species regarding their value to you as a consumer. Compare the relative values of the species the students have selected. Can they reintroduce an extinct species?  Take a trip around school grounds to identify the natural flora using field guides at UNM.    Identify the components to be included in a small closed system. Describe the changes within the system over time and interactions that occur between the components.  Trophic Level pyramids. | Summative:  Unit Test, Interactive notebook.  Formative:  Golden Toad Case Study/Project  Illustrate examples of both artificial selection and natural selection.  “What’s for Dinner?” Food Chain.  Collect data on several species regarding their value to you as a consumer. Compare the relative values of the species the students have selected.  Quiz  Ticket out the Door-Answer the essential question  Venn diagram  Lab questions  Graphic organizers  Foldables  4 corners (pick the answer and go to that corner of the room) 3-2-1 (3 things you learned,  2 things you want to know, 1 thing you are confused about)  Draw a picture  Write a letter to an absent student.  Trophic Level Pyramids | August to October 2015  First 9 weeks | | Unit 3:  Populations  Populations are collections of organisms of the same species. | * How do populations change over time? How do species interact with each other? * Why do we study human populations? * Why types of information do population trends give us? * Why is biodiversity at risk? * What is the difference between primary and secondary succession? * How do the different populations respond to traumatic events? | Standard II (Life Science): Understand the properties, structures, and processes of living things and the interdependence of living things and their  Benchmark I  Explain how matter and energy flow through biological systems (e.g., populations, organisms, communities, ecosystems), and how the total amount of matter and energy is conserved but some energy is always released as heat to the environment.  Modeling Population Changes through graphing and worksheets.  Evaluate the utility of population projections.  Organize information about modeling population change.  Analyze information about population projections and population growth change.  Describe different scenarios of population projections.  Determine the limiting factors for a population in an ecosystem  Understand competition within animal species and also plant species.  Describe special adaptations that an animal has that helps it survive. | Summative:  Quizzes  Formative:  Modeling Population Changes  Evaluate the utility of population projections.  Organize information about modeling population change.  Analyze information about population projections and population growth change by producing a map.  Describe different scenarios of population projections on PowerPoint.  Explore possible ways to count populations.  Determine the limiting factors for a population in an ecosystem  Understand competition within animal species and also plant species.  Describe special adaptations that an animal has that helps it survive. | October to December 2015  Second 9 weeks | | Unit 4:  Resources  Earth’s natural resources are not infinite | * What resources do we have on earth? * How do we use the resources we have? * What causes pollution? * How does resource usage affect climate? * Why is land management and conservation important? * What types of alternative energies are being developed? * How do we deal with waste? | Standard III (Earth and Space Science):  Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth’s systems.  9-12 Benchmark II: Examine the scientific theories of the origin, structure, energy, and evolution of resources, Earth and its atmosphere, and their interconnections.  Interpret natural resource graphs and apply data to determination of the Demographic Transition including resources found on Native lands.  Illustrate components of the Water Cycle  Complete a pie chart of the distribution of water resources and on native land.  Design and conduct experiments to test the effectiveness of various methods of cleaning oil off feathers, fur, and inanimate objects.  Peer conversation on problems resulting from oil spills.  Determine student’s actual water use in one day through dialogue.  Determine suitable sites for water sample collection. Hike to the Duck Pond at UNM.    Completing the group activity regarding articles.  A huge cave has an ecosystem with a previously unknown species on a reservation. Navajo Nation leaders of the land have to decide whether to sell the land to a resort company or to the National Park Service. Collaboration of petition. | Summative:  Promethean Game Quiz  Formative:  Categorizing objects in the classroom in terms of renewable and non-renewable resources.  Identify a local or regional environmental issue that is currently a focus of written news coverage. Create a news article that explores all sides of your topic.  Graph the ecological footprint of several countries. Select two countries with different sized footprints and research the lifestyles of the citizens in the countries you selected.  Predicting Coastal Winds – Prepare a model of a coast on a sunny day using a lamp, sand, and water. Compare the energy gained by the sand and water. Predict which way the wind is likely to blow. | January to March 2016  Third 9 weeks | | Unit 5:  Human Impact  Human activities place stress on processes that renew some resources and deplete resources that cannot be renewed. | * How does pollution affect human health? * What biological hazards are we facing? * How is Bio magnification becoming more of a human issue? * How do financial resources affect our response? * Why do governments have to pass and enforce environmental policies? * What impact can an individual have on the planet? | Standard III (Earth and Space Science):  Understand the structure of Earth, the solar system, and the universe, the interconnections among them, and the processes and interactions of Earth’s systems.  Describe the patterns and relationships in the circulation of air and water driven by the sun’s radiant energy, including:  •patterns in weather systems related to the transfer of energy  • Differences between climate and weather  • Global climate, global warming, and the greenhouse effect  • El Niño, La Niña, and other climatic trends.  Geochemical Cycles  Students discuss; possible effects of global warming, environmental predictions, and why countries oppose the reduction of fossil fuel use.  Describe what scientists believe is the problem of ozone depletion in the stratosphere.  Understand the difference in parts per million and parts per billion with respect to greenhouse gases.    List possible solutions to reduce Green House gas concentrations.  Investigate how Methane is produced in ruminant animals, and its effects on the atmosphere as Green House gas. | Summative:  Revising and Peer Reviews  Quiz  Exit Slips-Answer the essential question  Venn diagram  Lab questions  Graphic organizer  Foldable  Formative:  Describe how the size and growth rate of the human population has changed in the last 200 years by analyzing graphs.  Define properties that scientists use to predict population sizes.  Make predictions about population trends based on age structure.  Describe the four stages of the demographic transition.  Explain why different countries may be at different stages of the demographic transition.  Describe three problems caused by rapid human population growth.  Compare population growth problems in more developed countries and in less developed countries.  Analyze strategies countries may use to reduce their population growth.  Describe worldwide population projections into the next century. | March to May 2016  Final 9 weeks | |  |  |  |  |  | |  |  |  |  |  | |  |  |  |  |  | | | | |