

Career & Technical Education (CTE) Standards Revision Project

Cluster: Agriculture & Natural Resources

Pathways: Animal Science, Agribusiness Systems, Environmental Service Systems, Food Products & Processing Systems, Natural Resources, Plant Science, Power, Structural & Technology Systems

The standards for this cluster were created under the direction of Dr. Kellie Enns with countless hours provided by the agriculture education instructors of Colorado. The finished product is the result of a compilation of existing Colorado secondary ag education standards, National AFNR standards created by the National Council on Agriculture Education and introductory course standards from Colorado community colleges. The attached standards for each of the pathways identify links to Colorado core content standards which have been validated by content specialists in each of the core content areas. Future work with this project will include linkage of the new standards to current Colorado curriculum in agriculture education, identification or development of curriculum in new areas and the creation of a course development website to facilitate effective utilization of the information by Colorado Agriculture Education instructors.

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Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Natural Resources / Environmental Science	
Prepared Completer Competencies: NRES 01. Identify and evaluate careers in the natural resources & environmental science systems		
High School Expectations		
Concepts and skills students know include: NRES 01. 01 Create an individualized career and academic plan (ICAP) correlating to opportunities in natural resources & environmental science systems		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>NRES 01. 01.a Identify careers in natural resource & environmental science systems and explore advantages and disadvantages of each</p> <p>NRES 01. 01.b Choose a career based upon skills and education necessary for a career</p> <p>NRES 01. 01.c Develop an ICAP specific to the natural resources systems (RWC04.10.c)</p> <p>NRES 01. 01.d Review, modify and implement natural resources system ICAP (RWC04.10.c)</p>	Academic Content Knowledge Alignment: RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i>	
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):	

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy
Pathway(s):	Natural Resources / Environmental Science
Prepared Completer Competencies: NRES 02. 01 Understand and apply the scientific principles of an ecosystem	
High School Expectations	
Concepts and skills students know include: NRES 02. 01 Describe the organization of life in an ecological system	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 02. 01.a Define biosphere, ecosystem, biomes, habitats (SCI 3.6a)</p> <p>NRES 02. 01.b Understand interactions of biosphere, ecosystem, biome, habitat (SCI 3.6a)</p> <p>NRES 02. 01.c Analyze factors which impact</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC4.2.a-Reading, Writing and Communicating, Research and Reasoning, Analyze and develop a logical argument that distinguishes facts, opinions, evidence and inferences. - Synthesize information logically: distinguish among facts opinions, evidence, and inferences; identify false premises or assumptions; and detect potential bias and “loaded” language (e.g., sarcasm, personal attack, appeal to pity)</p> <p>RWC4.2.b- Summarize ideas including alternate views, rich detail, well-developed paragraphs, and logical argumentation.</p> <p>RWC4.2.d- If the presentation is or oral a visual product: Prepare notes and visuals for clarity of content and effect, grammatically correct use of language, spelling, and mechanics.</p>

<p>each level</p> <p>(RWC 4.2.a; RWC 4.2.b RWC 4.2d; RWC 4.11.1; RWC 4.11.m; SCI 2.1c; SCI 2.1d; SCI 2.1e; SCI2.2a; b; SCI 3.6a ;)</p> <p>NRES 02. 01.d Hypothesize the impact of changing factors in a given level</p> <p>(SCI 3.6a)</p>	<p>RWC4.11.1-Reading, Writing and Communicating, Research and Reasoning, Use quality reasoning and effective problem solving strategies. - Monitor the implications of actions.</p> <p>RWC4.11.m- Be prepared to revise strategy if situation requires it.</p> <p>SCI2.1.c-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought</p> <p>SCI2.1.d-Science, Life Science, - Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy</p> <p>SCI2.1.e-Science, Life Science, - Define and distinguish between matter and energy, and how they are cycled or lost through life processes</p> <p>SCI2.2a-Science, Earth Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem – Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing non-native species into an ecosystem</p> <p>SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth’s surface with water, air, gravity, and biological activity</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include:	
NRES 02. 02 Recognize the importance of biotic and abiotic organisms in an ecosystem	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>NRES 02.02.a Define biotic and abiotic</p> <p>NRES 02.02.b Classify abiotic and biotic organisms</p> <p>NRES 02.02.c Explain the interaction of biotic and abiotic factors in an ecosystem (SCI 2.1c; SCI 2.1d; SCI 2.1e)</p> <p>NRES 02.02.d Hypothesize the impact of changing factors in a given level of an ecosystem</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI2.1.c-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought</p> <p>SCI2.1.d-Science, Life Science, - Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy</p> <p>SCI2.1.e-Science, Life Science, - Define and distinguish between matter and energy, and how they are cycled or lost through life processes</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: 02.03 Understand the variety of habitats and niches	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 02.03.a Identify and define niche as it relates to a habitat</p> <p>NRES 02.03.b Match habitat/niche to specific species</p> <p>NRES 02.03.c Describe environmental changes and their impacts on habitats/niches (SCI2.1b SCI2.2a; SCI2.2b)</p> <p>NRES 02.03.d Make recommendations for habitat improvement based on different scenarios (RWC04.10.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI2.1.b-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Evaluate the potential ecological impacts of a plant-based or meat-based diet</p> <p>SCI2.2.a-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem - Analyze and interpret data about the impact of removing keystone species from an ecosystem or introducing non-native species into an ecosystem</p> <p>SCI2.2.b-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem - Describe or evaluate communities in terms of primary and secondary succession as they progress over time</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations

Concepts and skills students know include:

NRES 02. 04 Understand the energy flow cycle in a given ecosystem

**Evidence Outcomes
Students can:**

21st Century Skills and Readiness Competencies

NRES 02. 04.a Identify energy sources within an ecosystem

(SCI2.1c; SCI2.1d)

NRES 02. 04.d Determine food chain tropic level

(SCI2.1c; SCI2.1d)

NRES 02. 04.c Determine the flow of energy in a food chain or food web

(SCI2.1c; SCI2.1d)

NRES 02. 04.d Analyze species changes based on food chain/food web

(RWC04.02.a; RWC04.02.e; RWC04.10.c)

Academic Content Knowledge Alignment:

RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Synthesize information to support a logical argument*

RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - *Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation*

RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*

SCI2.1.c-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought

SCI2.1.d-Science, Life Science, Develop, communicate, and justify an evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations

Concepts and skills students know include:

NRES 02. 05 Understand nutrient cycles and their impact on an ecological system

Evidence Outcomes Students can:

NRES 02. 05.a Identify nutrients that cycle in the ecosystem (carbon, nitrogen, phosphorus, water)

(SCI2.1e; SCI3.6a)

NRES 02. 05.b Identify specific components in a nutrient cycle

(SCI 2.1e ; SCI3.6a)

NRES 02. 05.c Diagram nutrient cycles

(SCI 2.1e; SCI3.6a)

NRES 02. 05.d Model the interaction of several cycles in an ecosystems

(SCI 2.1e ; SCI3.6a)

21st Century Skills and Readiness Competencies

Academic Content Knowledge Alignment:

SCI2.1.e-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem- Define and distinguish between matter and energy, and how they are cycled or lost through life processes

SCI3.6.a-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Develop, communicate, and justify an evidence-based scientific explanation addressing questions regarding the interaction of Earth's surface with water, air, gravity, and biological activity

Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: NRES 02. 06 Explain the role of succession in ecosystem establishment and sustainability	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 02. 06.a Define succession (primary, secondary, pioneer species, climax community) (SCI 2.2c)</p> <p>NRES 02. 06.b Distinguish the types and process of succession/compare and contrast primary and secondary succession (SCI 2.2c)</p> <p>NRES 02. 06.c Describe the progression of species after an event (natural (forest fire)/manmade (mining)) (SCI 2.2c)</p> <p>NRES 02. 06.d Apply succession principals given a scenario (SCI 2.2c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI2.2.c-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem. - Evaluate data and assumptions regarding different scenarios for future human population growth and their projected consequences</p> <hr/> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy
Pathway(s):	Natural Resources / Environmental Science
Prepared Completer Competencies: Recognize the importance of navigation and the variety of navigational tools	
High School Expectations	
Concepts and skills students know include: NRES 03.01 Understand topographical maps, their features and uses.	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 03.01.a Describe the purpose of a topographical map (SCI 3.6b)</p> <p>NRES 03.01.b Identify features of a topographical map (SCI 3.6b)</p> <p>NRES 03.01.c Utilize a map for a specific purpose (route an irrigation ditch, determine water shed, plot a route/migration) (MAT 1.4a SCI 3.6b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.2.e-Mathematics, Shape, Dimension, and Geometric Relationships, Relationships among two- and three-dimensional geometric figures, including congruence, similarity and symmetry. - Design a geometric structure with accurate and appropriate units of measure.</p> <p>SCI3.6.b-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes- Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create</p>

<p>NRES 03.01.d Create a topographical map of a local area.</p> <p>(MAT 1.4a MAT 4.2e SCI 3.6b)</p>	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: NRES 03.02 Understand the importance of the compass and orienteering	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 03.02.a Identify parts of a compass and determine true north</p> <p>NRES 03.02.b Describe steps to accurately reading a compass</p> <p>NRES 03.02.c Utilize compass in combination with map</p> <p>NRES 03.02.d Develop a compass course</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: NRES 03.03 Describe the functionality of global positioning systems	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 03.03.a Define GPS and identify equipment used in GPS.</p> <p>NRES 03.03.b Plot locations (way points) using GPS</p> <p>NRES 03.03.c Calculating area using GPS (MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1e;)</p> <p>NRES 03.03.d Utilize GPS data in wild life management case studies</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT4.1.b-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.dApply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include: NRES 03.04 Become familiar with modern mapping technology and software	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 03.04.a Explore current mapping technologies (map tech, Google earth, GIS)</p> <p>NRES 03.04.b Utilize modern mapping technology</p> <p>NRES 03.04.c Critique modern mapping technology</p> <p>NRES 03.04.d Compare and contrast modern mapping technologies with traditional map navigation</p>	<p>Academic Content Knowledge Alignment:</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Natural Resources / Environmental Science	
Prepared Completer Competencies: NRES 04. Recognize the components of wildlife management		
High School Expectations		
Concepts and skills students know include: NRES 04.02 Identify local wildlife species native to Colorado		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>NRES 04.02.a Identify aquatic, air land and wildlife species</p> <p>NRES 04.02.b Understand characteristics of species as related to their habitat</p> <p>NRES 04.02.c Describe taxonomic classification and labeling of wildlife species Identify species using scientific names</p>	Academic Content Knowledge Alignment:	
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):	

High School Expectations

Concepts and skills students know include:

NRES 04.03 Understand population dynamics related to wildlife management

Evidence Outcomes Students can:

NRES 04.03.a Define population, community and ecosystem
Explain carrying capacity and limiting factors of a variety of habitats

(MAT 1.4a MAT 3.3a)

NRES 04.03.b Interpret relationships between animals (predator/prey, competition, symbiotic relationships)

(SCI 2.1a; SCI 2.1c; SCI 2.1d)

NRES 04.03.b Develop and deliver a population management plan for a local wildlife habitat

(RWC04.10.a; RWC04.10.b RWC04.10.c; MAT 1.4a; MAT 2.6d MAT 3.3a; MAT 4.1d MAT4.1e;)

21st Century Skills and Readiness Competencies

Academic Content Knowledge Alignment:

MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.

MAT2.6.d-Mathematics, Patterns, Functions, and Algebraic Structures, Use of elementary functions (linear, quadratic, power, and exponential and their inverses) and their transformations to identify essential quantitative relationships in a situation and to model real world situations, using all available tools, including technology. - Represent and solve problems involving direct and inverse variations and a combination of direct and inverse variations.

MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.

	<p>MAT4.1.d-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI2.1.a-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Analyze how energy flows through trophic levels</p> <p>SCI2.1.c-Science, Life Science, - Analyze and interpret data from experiments on ecosystems where matter such as fertilizer has been added or withdrawn such as through drought</p> <p>SCI2.1.d-Science, Life Science, - Develop, communicate, and justify an</p>
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	evidence-based scientific explanation showing how ecosystems follow the laws of conservation of matter and energy
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: NRES 04.04 Recognize and explain wildlife animal adaptations	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 04.04.a Identify animal adaptations and their causes (SCI 2.9d)</p> <p>NRES 04.04.b Describe effects of adaptations on animal populations (camouflage can protect animals from predators) (SCI 2.9d)</p> <p>NRES 04.04.c Perform a case study on adaptation in local region (MAT 3.1a MAT 3.1b MAT 3.1c SCI 2.9d)</p> <p>NRES 04.04.d Predict future adaptations due to changes in local region (MAT 3.1a; MAT 3.1b; MAT 3.1c; MAT3.2a; MAT3.2b; RWC04.10.a; RWC04.10.b RWC04.10.c; SCI 2.9d)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.2.a-Mathematics, Data Analysis, Statistics, and Probability, Evaluation of the quality of observational studies, surveys, and experimental studies. - Identify the characteristics of a well designed and well-conducted survey.</p> <p>MAT3.2.b- Differentiate between the value of observational studies as useful for suggesting patterns in data and relationships between variables and experimental studies as useful for establishing cause and effect.</p>

	<p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI2.9.d-Science, Life Science, Evolution occurs as the heritable characteristics of populations change across generations and can lead populations to become better adapted to their environment. - Analyze and interpret data on how evolution can be driven by three key components of natural selection – heritability, genetic variation, and differential survival and reproduction</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>
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High School Expectations	
Concepts and skills students know include: NRES 04.05 Recognize the affects of human interaction in the form of hunting on a wildlife area	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 04.05.a Identify the pros and cons of hunting</p> <p>NRES 04.05.b Explain the utilization of hunting in population control</p> <p>NRES 04.05.c Critique the economic and community impact of hunting/guiding (RWC04.10.c)</p> <p>NRES 04.05.d Create a management plan to determine harvest rates for a local wildlife region (MAT1.4a; MAT 4.1e ; RWC04.03.d; RWC04.02.a; RWC04.08.a; RWC04.10.a; RWC04.10.b RWC04.10.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.e-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p> <p>RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others</i></p> <p>RWC04.08.a - Research and Reasoning - Informational materials, including electronic sources, need to be collected, evaluated, and analyzed for accuracy, relevance, and effectiveness for answering research questions - <i>Integrate information from different sources to research and complete a project</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies</p>

	<p>require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include:	
NRES 01.06 Recognize the importance of species management and management ethics	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>NRES 04.06.a Identify and describe management/interaction techniques (reintroduction/habitat development, fencing, protected species)</p> <p>NRES 04.06.b Compare and contrast the different types of management (RWC04.10.a; RWC04.10.b RWC04.10.c)</p> <p>NRES 04.06.c Analyze the need for a species specific management plan in a local region (RWC04.03.d; RWC04.08.a; RWC04.10.a; RWC04.10.b RWC04.10.c)</p> <p>NRES 04.06.d Develop a management plan for a specific species in local region (RWC04.03.d; RWC04.08.a; RWC04.10.a; RWC04.10.b RWC04.10.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others</i></p> <p>RWC04.08.a - Research and Reasoning - Informational materials, including electronic sources, need to be collected, evaluated, and analyzed for accuracy, relevance, and effectiveness for answering research questions - <i>Integrate information from different sources to research and complete a project</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy	
Pathway(s):	Natural Resources / Environmental Science	
Prepared Completer Competencies: NRES 05. Recognize the areas of resource management and understand their importance		
High School Expectations		
Concepts and skills students know include: NRES 05.01 Understand renewable and non renewable resources and their impact on society		
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies	
<p>NRES 05.01.a Define and identify natural resources (SCI 3.5a; SCI 3.5b)</p> <p>NRES 05.01.b Distinguish between renewable and non-renewable resources (SCI 3.5a ; SCI 3.5b)</p> <p>NRES 05.01.c Explore interconnectivity of natural resources and sustainable society (SCI 3.5a; SCI 3.5b)</p> <p>NRES 05.01.d Model sustainability in resource management (SCI 3.5a; SCI 3.5b)</p>	<p>Academic Content Knowledge Alignment:</p> <p>SCI3.5.a-Science, Earth Science, There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources - Develop, communicate, and justify an evidence-based scientific explanation regarding the costs and benefits of exploration, development, and consumption of renewable and nonrenewable resources</p> <p>SCI3.5.b-Science, Earth Science, - Evaluate positive and negative impacts on the geosphere, atmosphere, hydrosphere, and biosphere in regards to resource use</p>	
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>	

High School Expectations	
Concepts and skills students know include: NRES 05.02 Range Management	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 05.02.a Identify range plants in local area (grasses, forbs, shrubs)</p> <p>NRES 05.02.b Identify healthy ranges (17 keys from BLM/USDA)</p> <p>NRES 05.02.c Understanding the life cycle and grazing value of range plants</p> <p>NRES 05.02.d Evaluate and manage range scenarios and make recommendations on acceptable practices (Aum, stocking rate, rotations)</p> <p>(RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC04.08.a; RWC04.10.a; RWC04.10.b; RWC04.10.c; SCI 3.5a)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience</i></p> <p>RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources</i></p> <p>RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others</i></p> <p>RWC04.08.a - Research and Reasoning - Informational materials, including electronic sources, need to be collected, evaluated, and analyzed for accuracy, relevance, and effectiveness for answering research questions - <i>Integrate information from different sources to research and complete a project</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue,</i></p>

	<p><i>information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI3.5.a-Science, Earth Science, There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources - Develop, communicate, and justify an evidence-based scientific explanation regarding the costs and benefits of exploration, development, and consumption of renewable and nonrenewable resources</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: NRES 05.03 Forestry	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 05.03.a Explore importance of trees as natural resources</p> <p>NRES 05.03.b Identify life cycles, types and species of forest ecosystems (hardwood, softwood, deciduous, coniferous)</p> <p>NRES 05.03.c Describe forestry management strategies</p> <p>NRES 05.03.d Assess a forest for management decision (harvest methods, clear cutting, pest management, burning, seeding, establishment)</p>	Academic Content Knowledge Alignment:
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include:	
05.04 Soils	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 05.04.a Identify soil types and locations (SCI3.6b)</p> <p>NRES 05.04.a Recognize soil types</p> <p>NRES 05.04.a Analyze soil properties (physical characteristics, texture, ph, structure) (SCI 1.2b SCI 1.4b)</p> <p>NRES 05.04.a Interpreting data to make soil management decisions (RWC04.10.a; RWC04.10.b; RWC04.10.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI1.2.b-Science, Physical Science, Matter has definite structure which determines characteristic physical and chemical properties. -Gather, analyze and interpret data on chemical and physical properties of elements such as density, melting point, boiling point, and conductivity</p> <p>SCI1.4.b Atoms bond in different ways to form molecules and compounds that have definite properties- Gather, analyze, and interpret data on chemical and physical properties of different compounds such as density, melting point, boiling point, pH, and conductivity</p>

	SCI3.6.b-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes- Analyze and interpret data, maps, and models concerning the direct and indirect evidence produced by physical and chemical changes that water, air, gravity, and biological activity create
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: NRES 05.05 Land Use	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>NRES 05.05.a Identify land uses (cultivation, mining, wild lands, protected lands, land-fills, development) (SCI 3.6c)</p> <p>NRES 05.05.b Understanding the characteristics necessary for particular land use (SCI 3.6c)</p> <p>NRES 05.05.c Determine land use based on soil property, economic return, geographic location, topography, habitat (MAT 1.4a SCI 3.6c)</p> <p>NRES 05.05.d Develop a plan to manage land use (conservation, cultivation, development) (RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC04.10.a; RWC04.10.b; RWC04.10.c; MAT 2.6a; SCI 3.6c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.6.a-Mathematics, Patterns, Functions, and Algebraic Structures, Use of elementary functions (linear, quadratic, power, and exponential and their inverses) and their transformations to identify essential quantitative relationships in a situation and to model real world situations, using all available tools, including technology. - Represent and solve problems in various contexts using linear and quadratic functions.</p> <p>RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience</i></p> <p>RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources</i></p> <p>RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Use a variety of</i></p>

	<p><i>strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations	
Concepts and skills students know include: NRES 05.06 Water	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 05.06.a Identify the stages of the water cycle</p> <p>NRES 05.06.b Evaluate sources and uses of water</p> <p>NRES 05.06.c Understand water management (storage, distribution, irrigation, conservation, run-off control)</p> <p>(MAT 1.4a; MAT4.1a; MAT 4.1b; MAT 4.1c; MAT 4.1d; MAT 4.1e; SCI 3.7b)</p> <p>NRES 05.06.d Analyze impact of water management on sustainability</p> <p>(RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC04.10.a; RWC04.10.b; RWC04.10.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT4.1.b-Mathematics, Shape, Dimension, and Geometric Relationships, Determination and utilization of the area of irregular shapes, and surface area and volume of cones and pyramids, cylinders and prisms, and spheres. - Justify, interpret, and apply the use of formulas for the area, surface area, and volume of cones/pyramids, spheres, and cylinders/prisms.</p> <p>MAT4.1.c- Solve for unknown quantities of two-dimensional shapes involving area and perimeter and with three-dimensional shapes involving volume and surface area.</p> <p>MAT4.1.d- Apply the effect of dimensional change of length, area, and volume and utilize appropriate units and scales for problem solving situations involving perimeter, area, and volume.</p> <p>MAT4.1.e- Analyze real-world situations involving perimeter and area of irregular shapes and volume of cones/pyramids, cylinders/prisms, and spheres.</p>

RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience*

RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources*

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking*

RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision*

RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*

SCI3.7b- Science, Earth Science, Natural Hazards have local, national and global impacts such as volcanoes, earthquakes, tsunamis, hurricanes, and thunderstorms – Analyze and interpret data about natural hazards using direct and indirect evidence.

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include: NRES 05.07 Air	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 05.07.a Identify layers and make up of the atmosphere</p> <p>NRES 05.07.b Differentiate between weather systems and weather patterns</p> <p>NRES 05.07.c Understand interactions of the atmosphere as they relate to air quality</p> <p>NRES 05.07.d Determine how changes in atmosphere changes the ecosystem</p> <p>(RWC04.10.a; RWC04.10.b; RWC04.10.c; SCI3.4e)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p> <p>SCI3.4.e-Science, Earth Science, Climate is the result of energy transfer among interactions of the atmosphere, hydrosphere, geosphere, and biosphere. – Analyze the evidence and assumptions regarding climate change</p> <p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations

Concepts and skills students know include:

NRES 05.08 Mining and Mineral Resources

Evidence Outcomes Students can:

21st Century Skills and Readiness Competencies

NRES 05.08.a Identify valuable minerals in local area

(SCI 3.6c)

NRES 05.08.b Distinguish methods of mineral extraction and reclamation

(SCI3.5a;SCI3.5 b; SCI3.6c)

NRES 05.08.b Analyze impact of mineral extraction (economic, environmental)

(RWC04.03.d; RWC04.10.a; RWC04.10.b; RWC04.10.c; MAT 1.4a MAT 2.6d; SCI 3.5a; SCI3.5b; SCI 3.6c)

Academic Content Knowledge Alignment:

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking*

RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision*

RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*

SCI3.5.a-Science, Earth Science, There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources - *Develop, communicate, and justify an evidence-based scientific explanation regarding the costs and benefits of exploration, development, and*

<p>NRES 05.08.b Create a reclamation and extraction plan</p> <p>(RWC04.03.d; RWC04.10.a; RWC04.10.b; RWC04.10.c; SCI 3.5b)</p>	<p>consumption of renewable and nonrenewable resources</p> <p>SCI3.5.b-Science, Earth Science, - Evaluate positive and negative impacts on the geosphere, atmosphere, hydrosphere, and biosphere in regards to resource use</p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

High School Expectations

Concepts and skills students know include:

NRES 05.09 Recognize the importance and sources of energy resources

Evidence Outcomes Students can:

21st Century Skills and Readiness Competencies

NRES 05.09.a Define and classify energy sources (coal, oil, solar, wind, hydroelectric, geothermal, nuclear, biofuels)

(SCI 3.5a)

NRES 05.09.b Determine methods of generation, storage and distribution.

(SCI 3.5a)

NRES 05.09.c Compare and contrast energy sources (available, impact, economic, ecological)

(RWC04.10.a; RWC04.10.b; RWC04.10.c; SCI 3.5a)

NRES 05.09.d Analyze impact of utilization of different energy methods

(RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC04.10.a; RWC04.10.b; RWC04.10.c; SCI1.5a; SCI1.5 b; SCI1.5 d SCI3.5a SCI3.5b)

Academic Content Knowledge Alignment:

RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience*

RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources*

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking*

RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Assess strengths and weaknesses of their*

thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision

RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*

SCI1.5.a-Science, Physical Science, Energy exists in many forms (mechanical, chemical, electrical, radiant, thermal, and nuclear) that can be quantified and experimentally determined - Develop, communicate, and justify an evidence-based scientific explanation regarding the potential and kinetic nature of mechanical energy

SCI1.5.b-Science, Physical Science,. - Use appropriate measurements, equations and graphs to gather, analyze, and interpret data on the quantity of energy in a system or an object

SCI1.5.d-Science, Physical Science, - Identify different energy forms, and calculate their amounts by measuring their defining characteristics

SCI3.5.a-Science, Earth Science, There are costs, benefits, and consequences of exploration, development, and consumption of renewable and nonrenewable resources - Develop, communicate, and justify an evidence-based scientific explanation regarding the costs and benefits of exploration, development, and consumption of renewable and nonrenewable resources

SCI3.5.b-Science, Earth Science, - Evaluate positive and negative impacts on the geosphere, atmosphere, hydrosphere, and biosphere in regards to resource use

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations

Concepts and skills students know include:

NRES 05.10 Understand the necessity and process of making resource management decisions

Evidence Outcomes Students can:

21st Century Skills and Readiness Competencies

NRES 05.10.a Recognize a resource management problem in local region

NRES 05.10.b Compile data on a management problem in local region

(MAT 3.1a; MAT 3.1b; RWC 4.4.c)

NRES 05.10.c Analyze compiled data on a management problem

(MAT 3.1c ; MAT 3.3a; MAT3.3c; RWC04.10.a; RWC04.10.b; RWC04.10.c;)

NRES 05.10.d Draw conclusions and make recommendations about a resource management problem

(MAT 3.1c; MAT3.2b; MAT 3.3a; MAT3.3c; RWC04.10.a; RWC04.10.b; RWC04.10.c;)

Academic Content Knowledge Alignment:

MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.

MAT3.1.b- Determine appropriate data collection methods to answer a research question.

MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.

MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.

MAT3.3.c- Recognize association between two categorical variables.

	<p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>

Career Cluster/Cluster Grouping:	Agriculture, Natural Resources & Energy
Pathway(s):	Natural Resources / Environmental Science
Prepared Completer Competencies: NRES 06. Human Interactions with Natural Resources	
High School Expectations	
Concepts and skills students know include: NRES 06. 01 Identify and understand the role of governing agencies involved in natural resources	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 06. 01.a Identify main governing agencies of natural resources, their history and the areas they manage</p> <p>NRES 06. 01.b Determine how policy is made in regards to natural resources</p> <p>NRES 06. 01.c Determine how to utilize governing agencies</p> <p>NRES 06. 01.d Evaluate public policy/governing agencies and form personal opinions</p> <p>(RWC04.02.a; RWC04.02.e; RWC04.10.c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include: NRES 06. 02 Become familiar with laws relating to water, air, land, and outdoor recreation	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 06. 02.a Recognize laws that impact local resources</p> <p>NRES 06. 02.b Interpret the purpose of laws that relate to local resources</p> <p>NRES 06. 02.c Analyze the impact laws have on local resources (RWC04.02.a; RWC04.02.e; RWC04.10.c)</p> <p>NRES 06. 02.d Create a needs assessment for laws relating to natural resources (RWC4.10a; RWC 4.10b; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include: NRES 06. 03 Understand the impact of waste and pollution on resources	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 06. 03.a Define wastes and pollution (solid, water, hazardous) (SCI 3.6c SCI 2.1a SCI 2.2b)</p> <p>NRES 06. 03.a Identify waste treatment methods</p> <p>NRES 06. 03.a Determine the impact of waste and pollution on the ecosystem (SCI 2.1a; SCI 2.2b; SCI 3.6c)</p> <p>NRES 06. 03.a Analyze systems for improvement of waste and pollution management (RWC04.02.a; RWC04.02.e; RWC04.10.c; SCI 3.6c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.02.a - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Synthesize information to support a logical argument</i></p> <p>RWC04.02.e - Research and Reasoning - Logical arguments distinguish facts from opinions, and evidence defines reasoned judgment - <i>Summarize ideas that include alternate views, rich detail, well developed paragraphs, and logical argumentation</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i>SCI2.1.a-Science, Life Science, Matter tends to be cycled within an ecosystem, while energy is transformed and eventually exits an ecosystem - Analyze how energy flows through trophic levels</p> <p>SCI2.2.b-Science, Life Science, The size and persistence of populations depend on their interactions with each other and on the abiotic factors in an ecosystem - Describe or evaluate communities in terms of primary and secondary succession as they progress over time</p> <p>SCI3.6.c-Science, Earth Science, The interaction of Earth's surface with water, air, gravity, and biological activity causes physical and chemical changes - Evaluate negative and positive consequences of physical and chemical changes on the geosphere</p>

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include: NRES 06. 04 Explore concepts relating to resource quality such as air, water, and land	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 06. 04.a Define quality resources</p> <p>NRES 06. 04.b Evaluate how to measure quality</p> <p>NRES 06. 04.c Interpret data and reports related to resource quality (RWC04.03.a; RWC04.03.c; RWC04.03.d)</p> <p>NRES 06. 04.d Determine recommendations for improvement of resource quality</p>	<p>Academic Content Knowledge Alignment:</p> <p>RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience</i></p> <p>RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources</i></p> <p>RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - <i>Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others</i></p>
	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):

High School Expectations	
Concepts and skills students know include: NRES 06. 05 Resource Utilization (Outdoor Recreation)	
Evidence Outcomes - Students can:	21st Century Skills and Readiness Competencies
<p>NRES 06. 05.a Recognize outdoor recreation in local area</p> <p>NRES 06. 05.b Identify state and national programs for management (National Parks, State Wildlife Areas)</p> <p>NRES 06. 05.c Critique outdoor areas for cost analysis</p> <p>(MAT 1.4a; MAT 2.2a; MAT 2.2d)</p> <p>NRES 06. 05.d Create a local outdoor recreation program</p> <p>(RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC03.05.a; RWC03.05.b; RWC03.02.g; RWC4.10a; RWC4.10b; RWC4.10c)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT1.4.a-Mathematics, Number Sense, Properties, and Operations, Application of computation and estimation. - Use appropriate computation methods that encompasses estimation, calculation, and degree of precision.</p> <p>MAT2.2.a-Mathematics, Patterns, Functions, and Algebraic Structures, Analysis of elementary functions and their inverses, by investigating rates of change, intercepts, asymptotes, domain, range, and local and global behavior using all available tools, including technology. - Given a function in any representation, evaluate a function at a given point in its domain.</p> <p>MAT2.2.d- Make qualitative statements about the rate of change of a function, based on its graph or table or values.</p> <p>RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - <i>Draw a conclusion by synthesizing information</i></p> <p>RWC03.05.a - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Articulate a position through a concise and focused claim or thesis statement, and advance it using evidence, examples, and counterarguments</i></p> <p>RWC03.05.b - Writing and Composition - Elements of informational and persuasive texts can be refined to inform or influence an audience - <i>Locate and</i></p>

select appropriate information that clearly supports a definite purpose, topic, or position

RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience*

RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources*

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking*

RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Assess strengths and weaknesses of their thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision*

RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - *Implement a purposeful and articulated process to solve a problem*

	Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):
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High School Expectations	
Concepts and skills students know include:	
NRES 06. 06 Recognize issues and events related to natural resources on a local, state and national level	
Evidence Outcomes Students can:	21st Century Skills and Readiness Competencies
<p>NRES 06. 06.a Identify a current issue facing local resources</p> <p>(RWC04.10.c)</p> <p>NRES 06. 06.b Compile research on an issue related to natural resources</p> <p>(MAT 3.1a; MAT 3.1b; MAT 3.1c; MAT3.3a; RWC04.03.a; RWC04.03.c; RWC04.03.d; RWC04.06.a; RWC04.06.c; RWC04.06.d; RWC04.10.a; RWC04.10.b; RWC4.10c)</p> <p>NRES 06. 06.c Critique sources for validity of information</p> <p>(RWC04.07.a; RWC04.07.b)</p> <p>NRES 06. 06.c Develop and debate an opinion relating to natural resource use</p> <p>(RWC01.07.b; RWC01.07.c; RWC01.07.d; RWC01.07.e; RWC03.02.g)</p>	<p>Academic Content Knowledge Alignment:</p> <p>MAT3.1.a-Mathematics, Data Analysis, Statistics, and Probability, Design of censuses, surveys, observational and experimental studies to answer statistical questions and understand the types of inferences can legitimately be drawn from each. - Formulate appropriate research questions that can answered with statistical analysis.</p> <p>MAT3.1.b- Determine appropriate data collection methods to answer a research question.</p> <p>MAT3.1.c- Explain how data will be analyzed to provide answers to a research question.</p> <p>MAT3.3.a-Mathematics, Data Analysis, Statistics, and Probability, Selection of appropriate methods to collect, organize and analyze data (numerical and categorical, univariate and bivariate) using tables, graphical displays, and numerical summary statistics. - Identify and choose appropriate ways to summarize numerical or categorical data using tables, graphical displays, and numerical summary statistics.</p> <hr/> <p>RWC01.07.b - Oral Expression and Listening - Oral presentations require effective preparation strategies - <i>Use verbal and nonverbal techniques to communicate information</i></p> <p>.</p>

RWC01.07.c - Oral Expression and Listening - Oral presentations require effective preparation strategies - *Define a position and select evidence to support that position*

RWC01.07.d - Oral Expression and Listening - Oral presentations require effective preparation strategies - *Develop a well-organized presentation to defend a position*

RWC01.07.e - Oral Expression and Listening - Oral presentations require effective preparation strategies - *Use effective audience and oral delivery skills to persuade an audience*

RWC03.02.g - Writing and Composition - Ideas, evidence, structure, and style create persuasive, academic, and technical texts for particular audiences and specific purposes - *Draw a conclusion by synthesizing information*

RWC04.03.a - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Define and narrow a topic for research (thesis statement, hypothesis, research question) to address a specific purpose and audience*

RWC04.03.c - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Evaluate quality, accuracy, and completeness of information and the bias, credibility and reliability of the sources*

RWC04.03.d - Research and Reasoning - Self-designed research provides insightful information, conclusions, and possible solutions - *Use a variety of strategies (e.g technical reading, direct observation, survey development) to collect relevant information to support the thesis/research question and explain why specific strategies were used instead of others*

RWC04.06.a - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose

	<p>solutions, or share findings and conclusions - <i>Define and narrow a topic for research, developing the central idea, focus, or question at issue</i></p> <p>RWC04.06.c - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Identify and evaluate potential sources of information for accuracy, reliability, validity, and timeliness</i></p> <p>RWC04.06.d - Research and Reasoning - Collect, analyze, and evaluate information obtained from multiple sources to answer a question, propose solutions, or share findings and conclusions - <i>Use a variety of strategies (such as search engines, online databases, interview) to collect and organize relevant and significant information</i></p> <p>RWC04.07.a - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Analyze the logic (including assumptions and beliefs) and use of evidence (existing and missing information, primary sources, and secondary sources) used by two or more authors presenting similar or opposing arguments (such as articles by two political co</i></p> <p>RWC04.07.b - Research and Reasoning - An author's reasoning is the essence of legitimate writing and requires evaluating text for validity and accuracy - <i>Evaluate the accuracy of the information in a text, citing text-based evidence, author's use of expert authority, and author's credibility to defend the evaluation</i></p> <p>RWC04.10.a - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Analyze the purpose, question at issue, information, points of view, implications and consequences, inferences, assumptions and concepts inherent in thinking</i></p> <p>RWC04.10.b - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Assess strengths and weaknesses of their</i></p>
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	<p><i>thinking and thinking of others by using criteria including relevance, clarity, accuracy, fairness, significance, depth, breadth, logic and precision</i></p> <p>RWC04.10.c - Research and Reasoning - Effective problem-solving strategies require high-quality reasoning - <i>Implement a purposeful and articulated process to solve a problem</i></p>
	<p>Learning & Behavioral Skills (Inquiry, Application in Society & Technology & Nature of...):</p>