

Science & Language Arts

Interdisciplinary Assessment Activity #4:

Coordinated Resource Management

in the Classroom

Introduction

The American poet, Robert Frost (1874-1963), recited his poem, “The Gift Outright” at John F. Kennedy’s inauguration in January of 1961.



The land was ours before we were the land's.
She was our land more than a hundred years
Before we were her people. She was ours ...

Occupying a piece of land or buying it does not make us part of it. A piece of land can become *ours* with a signature on a piece of paper, but we cannot become *the land's* so easily. When settlers first came to America from Europe, they were still attached to “the old country” -- the seasons, the rhythms, the products of places of which they had grown to be a part. As pioneers boarded Conestoga wagons to head west, the new land they came to seemed foreign to them. Years of walking the land, of herding cattle, of digging down into its secrets would be necessary before they would say, “we were the land’s.”

Robert Frost wanted Americans to realize that when the land possesses *us* as we have possessed *it*, a special relationship develops – as the land sustains us, so we work to sustain the land. This assessment activity, *Coordinated Resource Management*, seeks to help Wyoming teachers and students develop that depth of knowledge to foster good stewardship of natural resources, one small parcel of land at a time.

Working with the Wyoming Department of Agriculture and the Institute for Environment and

SC/LA Skills and Knowledge Assessed:

- ❖ The interaction of science and technology in social, political, and cultural contexts
- ❖ Application of political process in problem-solving
- ❖ Use of the consensus model for decision-making and conflict resolution
- ❖ Use of scientific observation, research, and analysis
- ❖ Communication skills demonstrated in a complex process, involving cooperative decision-making

Natural Resources at the University of Wyoming, you and other members of your class will have the opportunity to work on real-life problems applying your knowledge of science, math, history, economics, and group problem solving to unlock the secrets of the land.

In this assessment activity, you will:

- Write a comprehensive land parcel case study;
- Develop a management plan for the parcel through an oral process;
- Write a report on the management plan; and
- Design a data collection and analysis plan to monitor the management plan.

Part I - Write a Comprehensive Land Parcel Case Study: You will complete a comprehensive case study of an assigned parcel of land.

In most cases, the land will be part of a ranch, but other sites such as environmental study sites owned by the school district, city parks, or others public parcels may be used. Different tasks will be divided among the team members, each being responsible for collecting data and observations, taking notes on facts and interviews, and maintaining a careful record of sources (e.g., Internet sites, official state or county documents, other publications as well as audio-visual and oral sources). The final case study document could be a paper supplemented with slides or prints or an electronic slide show (a Power Point, for example). Use of word processing is required.

In your research, you are to address the following questions and write your findings including at least three supporting graphics (map, photos, data tables, etc.) for each section:

Section 1 (For this section, provide historical evidence - from interviews, geographic and legal documents, technical readings, etc. - to support your findings.)

- What is the history of the area?
- How has the land been used and managed in the past?
- How has the adjoining land been used and managed in the past?
- What evidence exists regarding the land's condition in the past?

Section 2 (For this section, provide historical evidence and field research data - from soil and water testing, field observations, geographic documents/maps, and interviews - to support your findings.)

- What is the current condition of the land?
- What plants and animals live there?
- Describe the food web on the land parcel. Has this changed over time given different land usages?
- What is the nature of the soil and water chemistry? Is there evidence that this has changed over time?
- What is the physical and chemical makeup of the landscape? Is there evidence that this has changed over time?

Section 3 (For this section, provide evidence and research data – from interviews and review of written documents - to support your findings.)

- Is there currently a management plan for the land?
- How does the present condition of the land compare to the goals of the management plan?
- In addition to the landowner, what individuals and agencies have an interest in this land (e.g., Department of Game and Fish, Bureau of Land Management, conservation groups, Wyoming Outdoor Council, recreation groups)?
- What biases or viewpoints do they have about this parcel of land?
- What economic, environmental, aesthetic, political, historical, or other issues should be addressed in managing this land?

Part II – (Optional-not assessed for BOE purposes) Reach an Agreement on a Management Plan:

Your team will consider the information collected during the research phase of the project and participate in a decision-making process to agree on a plan for the future management of the area.

Student teams meet to consider the information collected during the research phase of the project. Your group's goal is to agree on a plan for the future management of the area. The group process by which this management plan is to be developed can take any of three forms:

1. A consensus-building process: Your teacher or an outside advisor will introduce the process to the class. A chairperson selected either by the group or by the teacher will lead the discussion. An adult advisor will monitor the process and serve as a resource to the leader and the group.
2. A role-play simulation: Students select and play the roles of various stakeholders at a hearing where they attempt to reach a consensus with the help of a mediator.
3. If a CRM group exists in the area, students may make a recommendation to the group or participate in the deliberations of decision-making of this group.

In each option mentioned above, students must include visual displays - electronic or paper or artifacts - to support their oral presentations.

Part III – (Optional) Write a Report on the Management Plan: Each student will write one of the following reports regarding the Management Plan:

1. A press release from the entire group to the local newspaper announcing the management plan, giving the background on the study and deliberation process, and providing the justification for the plan.
2. An article for a newsletter to the group of particular stakeholders explaining the Management Plan and why it is the best outcome possible to satisfy that group's interests in the land, as well as accommodating many interests.
3. A report to a science journal about the ecological analysis of the land, explaining how the Management Plan will provide reasonable protection and productivity for the area.

Part IV – (Optional) Design a Data Collection and Analysis Plan: You will design a data collection and analysis plan to monitor the effectiveness of the management plan.

This data collection and analysis plan will allow students now and in the future to evaluate the effectiveness of the management plan and to recommend future changes as needed. Use your data collection process for your case study as a guide. *(This is an especially challenging task.)*

CRM Coordinated Resource Management

Go to the Website for further information about the CRM program through the University of Wyoming. (Although the site provides considerable background information, the schedule of events may not be current). Dr. Pete Ellsworth is the contact. He can provide support and assistance to teachers and their students who wish to get involved in Coordinated Resource Management opportunities in their area.

[Http://nasc.uwyo.edu/crm/](http://nasc.uwyo.edu/crm/) (307) 766-6671 E-mail: Peterc@uwyo.edu

Interdisciplinary SC/LA Assessment Activity #4 - CRM

Standards and Benchmarks Science Assessment

An “A” in the table below indicates the standards and benchmarks in this assessment activity that have the potential to elicit evidence of student learning. An “T” indicates the instructional strategy that is assumed, but not assessed. An “A*” indicates the standards and benchmarks that are assessed only by an optional component. This activity has been recoded to the revised Wyoming 2003 Standards by members of the Wyoming Body of Evidence Activities Consortium.

11.1 CONCEPTS AND PROCESSES

In the context of unifying concepts and processes, students develop an understanding of scientific content through inquiry. Science is a dynamic process; concepts and content are best learned through inquiry and investigation.

UNIFYING CONCEPTS AND PROCESSES

Concepts in LIFE SYSTEMS and EARTH, SPACE, and PHYSICAL SYSTEMS are taught within the context of the following Unifying Concepts and Processes of Science:

- Systems, classification, order and organization
- Evidence, models, and explanations
- Change, constancy, and measurement
- Evolution and equilibrium
- Form and function

LIFE SYSTEMS Benchmarks

	11.1.1 <u>The Cell:</u> Students explain the processes of life, which necessitates an understanding of relationship between structure and function of the cell and cellular differentiation. They identify activities taking place in an organism related to metabolic activities in cells, including growth, regulation, transport, and homeostasis. Students differentiate between asexual and sexual reproduction.
	11.1.2 <u>Molecular Basis of Heredity:</u> Students demonstrate an understanding that organisms ensure species continuity by passing genetic information from parent to offspring. They utilize genetic information to make predictions about possible offspring. Students apply concepts of molecular biology (DNA and genes) to recent discoveries.
	11.1.3 <u>Biological Evolution:</u> Students explain how species evolve over time. They understand that evolution is the consequence of various interactions, including the genetic variability of offspring due to mutation and recombination of genes, and the ensuing selection by the environment of those offspring better able to survive and leave additional offspring. Students discuss natural selection and that its evolutionary consequences provide a scientific explanation for the great diversity of organisms as evidenced by the fossil record. They examine how different species are related by descent from common ancestors. Students are able to explain how organisms are classified based on similarities that reflect their evolutionary relationships, with species being the most fundamental unit of classification.
A	11.1.4 <u>Interdependence of Organisms:</u> Students investigate the inter-relationships and interdependence of organisms, including the ecosystem concept, energy flow, competition for resources, and human effects on the environment.

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	11.1.5 <u>Matter, Energy, and Organization in Living Systems</u> : Students describe the need of living systems for a continuous input of energy to maintain chemical and physical stability. They explain the flow of energy and organic matter through a series of trophic levels in living systems. Students investigate the distribution and abundance of organisms in ecosystems, which are limited by the availability of matter and energy and the ability of the system to recycle materials.
	11.1.6 <u>Behavior and Adaptation</u> : Students examine behavior as the sum of responses of an organism to stimuli in its environment, which evolves through adaptation, increasing the potential for species survival. They identify adaptation as characteristics and behaviors of an organism that enhance the chance for survival and reproductive success in a particular environment.
EARTH, SPACE, AND PHYSICAL SYSTEMS Benchmarks	
A	11.1.7 <u>Geochemical Cycles</u> : Students describe the Earth as a closed system and demonstrate a conceptual understanding of the following systems: geosphere, hydrosphere, atmosphere, and biosphere. Students explain the role of energy in each of these systems, such as weather patterns, global climate, weathering, and plate tectonics.
	11.1.8 <u>Origin and Evolution of the Earth Systems</u> : Students investigate geologic time through comparing rock sequences, the fossil record, and decay rates of radioactive isotopes.
	11.1.9 <u>Origin and Evolution of the Universe</u> : Students examine evidence for the Big Bang Theory and recognize the immense time scale involved in comparison to human-perceived time. They describe the process of star and planet formation, planetary and stellar evolution including the fusion process, element formation, and dispersion.
	11.1.10 <u>Structure and Properties of Matter</u> : Students describe the atomic structure of matter including subatomic particles, their properties, and interactions. They recognize that elements are organized into groups in the periodic table based on their outermost electrons and these groups have similar properties. They explain chemical bonding in terms of the transfer or sharing of electrons between atoms. Students describe physical states of matter and phase changes. Students differentiate between chemical and physical properties, and chemical and physical changes.
A	11.1.11 <u>Chemical Reactions</u> : Students recognize that chemical reactions take place all around us. They realize that chemical reactions may release or consume energy, occur at different rates, and result in the formation of different substances. They identify the factors that affect reaction rates.
	11.1.12 <u>Conservation of Energy and Increase in Disorder</u> : Students demonstrate an understanding of the laws of conservation of mass and energy within the context of physical and chemical changes. They realize the tendency for systems to increase in disorder without an input of energy.
	11.1.13 <u>Energy and Matter</u> : Students demonstrate an understanding of types of energy, energy transfer and transformations, and the relationship between energy and matter.
	11.1.14 <u>Force and Motion</u> : Students develop a conceptual understanding of Newton's Laws of Motion, gravity, electricity, and magnetism.

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11.2 SCIENCE AS INQUIRY

Students demonstrate knowledge, skills, and habits of mind necessary to safely perform scientific inquiry. Inquiry is the foundation for the development of content, teaching students the use of processes of science that enable them to construct and develop their own knowledge. Inquiry requires appropriate field, classroom, and laboratory experiences with suitable facilities and equipment.

SCIENCE AS INQUIRY Benchmarks

A	11.2.1	Students research scientific information and present findings through appropriate means.
A*	11.2.2	Students use inquiry to conduct scientific investigations. <ul style="list-style-type: none"> ▪ Pose problems and identify questions and concepts to design and conduct an investigation. ▪ Collect, organize, and analyze and appropriately represent data. ▪ Give priority to evidence in drawing conclusions and making connections to scientific concepts. ▪ Clearly and accurately communicate the result of the investigation.
A	11.2.3	Students clearly and accurately communicate the result of their own work as well as information from other sources.
	11.2.4	Students investigate the relationships between science and technology and the role of technological design in meeting human needs.
	11.2.5	Students properly use appropriate scientific and safety equipment, recognize hazards and safety symbols, and observe standard safety procedures.

11.3 HISTORY AND NATURE OF SCIENCE IN PERSONAL AND SOCIAL DECISIONS

Students recognize the nature of science, its history, and its connections to personal, social, economic, and political decisions. Historically, scientific events have had significant impacts on our cultural heritage.

HISTORY AND NATURE OF SCIENCE Benchmarks

A	11.3.1	Students examine the nature and history of science. <ul style="list-style-type: none"> ▪ As scientific knowledge evolves, it impacts personal, social, economic, and political decisions. ▪ The historical misuse of scientific information to make personal, social, economic, and political decisions.
A	11.3.2	Students examine how scientific information is used to make decisions. <ul style="list-style-type: none"> ▪ Interdisciplinary connections of the sciences and connections to other subject areas and career opportunities. ▪ The role of science in solving personal, local, national, and global problems. ▪ The origins, limitations, and conservation of natural resources, including Wyoming examples.

Interdisciplinary Social Studies/Language Arts Assessment Activity #4: Coordinated Resource Management

Language Arts Standards and Benchmarks

An “A” in the table below indicates the standards and benchmarks in this assessment activity that have the potential to elicit evidence of student learning. An “T” indicates that instructional strategy that is assumed, but not assessed. An “A*” indicates the standards and benchmarks that are assessed only by the optional component. This activity has been recoded to the revised Wyoming 2003 Standards by members of the Wyoming Body of Evidence Activities Consortium.

11.1 READING

Students use the reading process to demonstrate understanding of literary and informational texts.

	Benchmarks
	11.1.1 Students use the reading process to apply a variety of comprehension strategies before, during and after reading.
	11.1.2 Students demonstrate an understanding of literary texts.
	11.1.3 Students demonstrate understanding of informational texts.

11.2 WRITING

Students use the writing process and use appropriate strategies to write a variety of expressive and expository pieces.

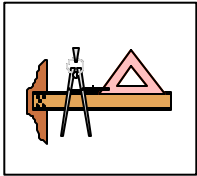
	Benchmarks
A	11.2.1 Students apply writing skills to plan, draft, revise, and publish writing for intended audiences.
A	11.2.2 Students use appropriate strategies to write a variety of expressive and expository pieces.

11.3 SPEAKING AND LISTENING

Students use listening and speaking skills for a variety of purposes and audiences.

	Benchmarks
	11.3.1 Students speak for a variety of purposes.
	11.3.2 Students use others' works for models for effective speaking.
	11.3.3 Students use strategies to organize formal presentations.
	11.3.4 Students use strategies to make persuasive presentations.
	11.3.5 Students present oral interpretations of literature.

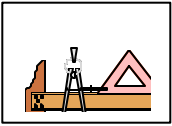
	11.3.6 Students use effective delivery skills (tone, eye contact, rate, volume, pitch, gesture, pronunciation and enunciation) appropriate to audience and purpose.
	11.3.7 Students use visual aids or technology (charts, photographs, transparencies, slides, electronic media, text, images, and sound effects) to support presentations.
I	11.3.8 Students use strategies to contribute to group discussions.
	11.3.9 Students listen and respond to listener feedback and adjust delivery techniques and content, provide useful feedback to speakers to indicate understanding, and synthesize relevant data from presentations and discussions using strategies such as note-taking and questioning, and observe the techniques and impact of visual media.



Assessment Guide: Interdisciplinary SC/LA Assessment Activity #4 – CRM

Criterion: Group Process *Student participates in group process to formulate a land management plan.*
Standards and Benchmarks: LA 11.3.8
Source: Part II Management Plan/Group Process **Intended Depth of Knowledge: Level 3**

Level 4	Level 3	Level 2	Level 1
<p>Fulfills requirement of Level 3, AND</p> <ul style="list-style-type: none"> • Demonstrates leadership in the discussion by moving discussion in a logical, coherent direction through use of appropriate examples and facts. • Develops transitions in arguments. • Summarizes and/or synthesizes arguments and opinions to draw valid conclusions. 	<p>Participates in open forum discussion on land management plan with relevant, informed comments and appropriate feedback by consistently:</p> <ul style="list-style-type: none"> • Asserting an active role in expressing valid, informed point of view that influences discussion. • Following up on others' comments with respectful refutation or by adding support to an argument. • Participating frequently, but yielding to others in a respectful and inclusive manner. • Using respectful body language. <p>There may be minor departures from the stated expectations.</p> <p>Support: Student received no support or minor support.</p>	<p>Participates in open forum discussion on land management plan, but comments are not consistently relevant or accurate,</p> <p>OR</p> <p>Feedback to others is not consistently appropriate.</p> <p>OR</p> <p>Support: Response fulfills requirements of a Level 3, but the student received support without which the work would not be of a Level 3 quality.</p>	<p>Participates in the discussion, but uses unreliable or incorrect information</p> <p>OR</p> <p>Feedback and interaction are generally inappropriate.</p> <p>OR</p> <p>Participates minimally.</p> <p>OR</p> <p>Support: Response fulfills requirements of a Level 2, but the student received support without which the work would not be of a Level 2 quality.</p>



Assessment Guide: Interdisciplinary SC/LA Assessment Activity #4 - CRM

Criterion: CRM Plan *Student develops, explains, and supports a land management, using multiple sources.*

Standards and Benchmarks: SC11.1.4, SC11.1.7, SC11.1.11, SC11.3.1, SC11.3.2, LA 11.2.2.3 LA11.2.1; LA11.2.2

Sources: Part I Case Study of Land Parcel Part III Public Report on Land Management Plan

Intended Depth of Knowledge: Level 3

Level 4	Level 3	Level 2	Level 1
<p>Fulfills requirements of a Level 3</p> <p>AND</p> <p>Presents a justification that links scientific arguments to a set of priorities for various community needs, supported by research in documentation and in the field.</p> <p>Response may also include:</p> <ul style="list-style-type: none"> • Additional models that demonstrate a deeper level of conceptual understanding; or • An in-depth analysis of the concepts applied, not required by the activity; or • Counter arguments or ideas about the concepts. 	<p>The case study presents:</p> <ul style="list-style-type: none"> • an accurate history of the land area; • the current condition of the land; and • support with scientific and research data. <p>The management plan presents:</p> <ul style="list-style-type: none"> • a logical plan of management supported with scientific data and references to the various needs of major community stakeholders—environmental, aesthetic, political, and recreational. <p>Facts, theories, principles, and models are accurate and appropriately applied.</p> <p>Multiple sources used to support aspects of the plan are cited.</p> <p>There may be minor inconsistencies in the evidence provided or in the community needs addressed.</p> <p>Support: Student received no support or minor support.</p>	<p>Elements of history of the land area and the current condition of the land and/or plan of management are accurately presented, but the information is incomplete and/or there is only minimal factual support provided;</p> <p>OR</p> <p>The management plan does not address the needs of all major community stakeholders;</p> <p>OR</p> <p>Facts, theories, principles, and models are appropriately applied, but may include some inaccuracies;</p> <p>OR</p> <p>Support: Response fulfills requirements of a Level 3, but the student received support without which the work would not be of a Level 3 quality.</p>	<p>The report(s) attempts to present elements of history of the land area, the current condition of the land, and a plan of management, but the supporting information is inaccurate, inconsistent, or inadequate to fully complete the task;</p> <p>OR</p> <p>The proposed plan is illogical or fails to address significant needs of major community stakeholders.</p> <p>OR</p> <p>Support: Response fulfills requirements of a Level 2, but the student received support without which the work would not be of a Level 2 quality.</p>

Assessment Guide: Interdisciplinary SC/LA Assessment Activity #4 - CRM

Criterion: Communication <i>Student writes with appropriate word choice, sentence structure, and conventions.</i> (NOTE: This criterion assess communication, not conceptual understanding.) Standards and Benchmarks: SC11.2.1, SC11.2.3, LA 11.2.1 Sources: Part I Case Study Part III Report on Mgt. Plan			
			Intended Depth of Knowledge: Level 2
Level 4	Level 3	Level 2	Level 1
Word choice, sentence structure, paragraphing, and conventions enhance the clarity and meaning of the written reports. Explanations are strengthened by the use of such things as: <ul style="list-style-type: none"> • Graphic organizers • Diagrams • A keying system • Cross-referencing • Additional tables, models, graphs 	Minor errors in word choice, sentence structure, paragraphing, and conventions do not get in the way of the reader's understanding of the content. AND Scientific and/or technical terms are used appropriately throughout the report. Support: Student received no support or minor support. ____ Check here for evidence of skills in word processing observed by the teacher, required by the task.	Errors in word choice, sentence structure, paragraphing, and conventions get in the way of the reader's understanding of the content; OR There is inconsistent use of scientific and/or technical terms throughout the report. Support: Response fulfills requirements of a Level 3, but the student received support without which the work would not be of a Level 3 quality.	Errors in word choice, sentence structure, paragraphing, and conventions make it difficult for the reader to understand the content; OR Used common terms instead of appropriate technical terminology; OR Vocabulary is used, but inaccurate throughout the report or not used when the opportunity exists; OR Support: Response fulfills requirements of a Level 2, but the student received support without which the work would not be of a Level 2 quality.

Assessment Guide: Interdisciplinary SC/LA Assessment Activity #4 - CRM

Criterion: Representation – Tables, graphs, models, diagrams, or other appropriate representations *Student uses representations to communicate and apply scientific concepts, in lab reports and technical writing.*

Standard(s) and Benchmark(s): SC11.2.3

Sources: Part I Case Study Part IV Data Collection

Intended Depth of Knowledge: Level 2

Level 4	Level 3	Level 2	Level 1
<p>Representations are accurate and appropriate, meeting requirements of Level 3, and include other elements, such as:</p> <ul style="list-style-type: none"> Data set is displayed in multiple ways, to provide additional analysis or information; Data is represented multiple ways to make a point; Data is represented multiple ways to show a trend; Additional representation(s) used to explain a concept, solve a problem, or as an extension of the situation. 	<p>Any tables, graphs, models, or diagrams <i>are appropriate</i> for representing the observations, measurements, or concepts. There may be some flaws, but the flaws do not negatively impact the understanding or use of the data, diagram, model, etc.</p> <p>Conventions of representation to consider:</p> <ul style="list-style-type: none"> Data tables have accurate titles, correct values, and labels; Graphs have appropriate titles; correct scaling; independent and dependent variables labeled correctly; and values accurately plotted. Models and diagrams are labeled. <p>Support: The student received no support or minor support.</p>	<p>Tables, graphs, models, or diagrams used have a significant flaw(s) that negatively impacts the understanding or use of the representation, such as:</p> <ul style="list-style-type: none"> Data is collected in tables, but not organized or correctly labeled and titled; The graph selected is not appropriate for representing the situation; Graphs contain errors or inconsistencies in scaling, labeling, or plotting; The diagram or model is unclear (no labels, titles, explanation). <p>OR Support: Response fulfills requirements of a Level 3, but the student received support without which the work would not be of a Level 3 quality.</p>	<p>An attempt is made to organize or graph data (observations and/or measurements), or to use a diagram or model, but the representation chosen cannot be used to effectively communicate the concept for the given situation;</p> <p>OR Tables, graphs, diagrams, or models are missing or have errors in the conventions throughout;</p> <p>OR Support: Response fulfills requirements of a Level 2, but the student received support without which the work would not be of a Level 2 quality.</p>

Teacher Supplement

Social Studies/Language Arts/Science Interdisciplinary Assessment Activity #4

Coordinated **R**esource **M**anagement

in the Classroom

Description:

In cooperation with a local adult CRM group, students gather formal historical and current research, as well as field research data, on a designated parcel of land, in order to write a comprehensive case study. After a group process in which students participate with community representatives and stakeholders in the designated parcel, students write a management plan for the parcel and a report publicizing and supporting the plan. Finally, students develop a data collection and analysis plan to monitor the implementation of the management plan.

Prerequisite Skills:

Before engaging in a CRM project, students should have opportunities to learn about the interrelationship of the three levels of government and to experience working on extended team projects with various individual responsibilities.

- Library and Internet research skills and documentation of sources
- Field research skills
- Fundamentals of applicable governmental structures
- Report writing
- Interviewing skills
- Experience in a group decision-making process

Intended Depth of Knowledge (DOK) Levels

Part I Comprehensive Case Study:

Level 3

(Social Studies descriptors)

- Drawing conclusions.
- Citing evidence.
- Applying concepts to new situations.
- Analyzing similarities and differences in issues and problems.

(Language Arts descriptors)

- Explain, generalize, and/or connect ideas.
- Summarize information from multiple sources to address specific topic.

(Science descriptors)

- Drawing conclusions from observations.
- Citing evidence.
- Developing a logical argument for concepts.
- Explaining phenomena in terms of concepts.

Part II (Optional) Open Forum Group Process: Level 3

(Social Studies descriptors)

- Recognizing and explaining misconceptions or making connections across time and place to explain a concept or big idea.
- Proposing and evaluating solutions to problems.

(Language Arts descriptors)

- Comparing and contrasting viewpoints.
- Synthesizing information using sequencing, predicting, drawing conclusions, comparing and contrasting.
- Developing and explaining arguments.

(Science descriptors)

- Using concepts to solve non-routine problems.
- Develop a scientific model for a complex situation.

Part III (Optional) Public Report on the Plan: Level 3

(Social Studies descriptors)

- Connecting and relating ideas and concepts within content areas or among content areas.
- Analyzing and synthesizing information from multiple sources.
- Examining or explaining alternative perspectives across a variety of sources.

(Language Arts descriptors)

- Analyzing and synthesizing from multiple sources.

(Science descriptors)

- Draw conclusions from observations.
- Using concepts to solve non-routine problems.

Part IV (Optional) Data Collection and Analysis Plan: Level 2

(Social Studies descriptors)

- Convert information from one form to another.
- Classify or sort items into meaningful categories.
- Describe, interpret, or explain patterns.

(Language Arts descriptors)

- Collect information from multiple sources.
- Apply strategy such as sequencing, predicting, drawing conclusions, comparing and contrasting.

(Science descriptors)

- Collect, display, and compare data.
- Select a procedure according to specified criteria and perform it.

Suggested Use in the BOE System and Curriculum

Coordinated Resource Management (CRM) will be best used as an assessment activity in the Body of Evidence System for high school graduation in any environmental or earth science course, any social studies courses where government is studied, and/or any language arts courses which include group problem solving and research activities.

Getting Started:

- Contact Pete Ellsworth at the University of Wyoming [E-mail: Peterc@uwyo.edu or (307) 766-6671] who will introduce you to the program and assist with further contacts. University credit is available for teachers who use this activity with their students.
- Contact your local conservation district, or
- Contact The Natural Resources Section of the Wyoming Department of Agriculture at (307) 777-6579

Try to set up a partnership with at least one teacher in your building to make this a truly interdisciplinary experience with the opportunity to devote some class time in more than one discipline. This would help to avoid having the activity cut too deeply into other parts of the curriculum.

**Interdisciplinary Assessment Activity # 4: Coordinated Resource Management
Evidence Documentation Form for Open Forum/Group Process**

Student: _____ Date _____

Teacher/Reviewer: _____ Score _____

(This form may be used during open forum/group process to document evidence of meeting requirements, as described in assessment rubrics for this activity.)

Document Selected Element (Information, Historical current condition, Impact on stakeholders, Relevant scientific and geographic concepts and knowledge)	Document Supporting Evidence (Explains connection to data collected, provides impact context, elaborates on details, provides examples, uses visuals/graphics/data tables, etc.)
Information about history and/or past land management of area:	
Current condition of land:	
Impact on stakeholders:	
Relevant scientific and/or geographic concepts and knowledge:	
Other Notes/Comments about oral skills:	
Other Notes/Comments about group process skills:	

Science, & Language Arts
Interdisciplinary Assessment Activity # 4: CRM

Anchor Papers:

This section contains sample student work that has been assessed by Wyoming teachers who participated in the Wyoming Activities-Based Consortium. Using the rubrics for this assessment activity, each example has been assigned score levels and includes accompanying annotated student work and "justifications" explaining assignment of scores.

These examples represent a range of student work, collected as a result of piloting in Wyoming high schools during the 2002 - 2003 school year. In some cases, sample student work for particular score points or for particular parts of assessment activities was not available at the date of publication. The BOE Activities Consortium will add sample student work for those parts and at those score points as they become available.

The student work samples that follow are not to be considered “Anchors” for different score points, but rather are examples taken from a small piloting sample that demonstrate possible performance levels for this assessment.

Sample papers in this set include:

CRM3 – 306

CRM3 – 303

Interdisciplinary Assessment Activity # 4: Coordinated Resource Management
Anchor #CRM3-306
<p>Criterion: Explains and Supports a Land Management Plan Level 2</p> <p>This is a Level 2 response. A natural history of the area was provided, however the discussion was incomplete and had little factual support. (After several heating and cooling periods, terraces were formed. ... The water used to be over our heads.) Facts and theories were presented for the history of the area, but included some inaccuracies (...the whole area of Red Canyon was flipped upside down. First it exploded, flipped and then split away.). A previous management plan was provided. The current condition of the area was described with a data table, but evidence that the condition of the area is stabilizing is missing. A list of animals inhabiting the area was presented, but no specific data or clear connection to the current condition of the area was provided. While a food web was included, it was incomplete and lacked connections between organisms. Soil types were listed; however, they were in isolation with no support and no description of the soil make up.</p>
<p>Criterion: Communication Level 2</p> <p>Communication was scored as a Level 2, because there were numerous errors in word choice which got in the way of understanding. Some scientific terms were used, but their employment was inconsistent. For example, the word “bug” was used in three of the data tables as a header for a column that included organisms that were not insects. A more appropriate scientific term would have been “invertebrate.”</p>
<p>Criterion Representation Level: 2</p> <p>This is a Level 2 response. Although data tables were present, they had significant flaws - data tables were inadequately labeled- which negatively impacts understanding. Tables of bug data listed the common name of an organism followed by a number. The meaning of these numbers was not clear and was not discussed in the report. No graphs were provided.</p>

Anchor #CRM3-306
Interdisciplinary Assessment Activity #4 CRM

Red Canyon Ranch

CRM3-306

Communication:
Errors in word choice get in the way of overall understanding.

Red Canyon Ranch has been a working operation for decades. Prior to the Nature Conservancy's ownership and Bob Bud's management, of the area, it was the same place with many noticeable differences. In the past, the whole area of Red Canyon was flipped upside down. First, it exploded, flipped, and then split away. After several heating and cooling periods, terraces were formed. The water in Red Canyon used to be over our heads. With such high water levels, all of the debris would be pushed out until the water froze once again continuing the cycle.

CRM Plan:
Historical information is incomplete and has minimal factual

Red Canyon was managed differently years ago. There were five to ten million Big Horn Sheep, Elk, Deer, and Antelope grazing this area. In Wyoming there were one million cows and ¼ to ½ million sheep dispersed throughout the state. There was a lot of grazing concentrated in the Red Canyon area because of the way the plants had evolved there. The plants had an ability to develop even if they were eaten.

CRM Plan:
Natural history of area is inadequately discussed. History is not supported by research or facts.

Communication:
There is inconsistent use of scientific terms.

More recently, Red Canyon Ranch 40 years ago ran 1,200 cows. They managed the cows by splitting the area up into little grazing pieces. This was a bad management strategy because the animals were unable to move naturally in these small areas. When the quality of the land started to deteriorate, the ranchers would downsize the herd. This was one of the worst ideas because then the smaller number of cattle were able to concentrate in one area really disturbing that area

CRM Plan:
Use and management of adjoining areas is described.

Many different people have managed the adjoining land in the Red Canyon area in the past. Families like the Young's, MacPhie's, Guinard's, Tweed's, Foster's, Goen's and Hancock's had the ecology of this area in their hands. They all lived in homesteads

CRM Plan:
A previous management plan is discussed.

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Interdisciplinary Assessment Activity #4 CRM

CRM3-306

on 160 acre parcels. During this time they managed apples, vegetables, hogs, and dairy.

All of these items were mostly shipped to South Pass and sold to the people there.

Red Canyon Ranch's current condition is stabilizing. It is the home for many

different species of vegetation and animals including the following:

Sagebrush-Mixed Grass (30%)

Wyoming Sagebrush
 Rabbit brushes
 Indian Ricegrass
 Western Wheatgrass
 Mutton Blue grass
 King-Spike Fescue
 Kentucky bluegrass

Black Sagebrush
 Needleandthread Grass
 Threadleaf Sedge
 Bluebunch Wheatgrass
 Idaho Fescue
 Prairie Junegrass
 Balsamroot

Conifer Woodland (10%)

Lodgepole Pine
 Subalpine Fir
 Grouse Whortleberry
 Pinegrass
 Kinnikinnick

Utah Juniper
 Limber Pine
 Douglas Fir
 Creeping Juniper
 Needlegrass
 Heartleaf Arnica

Riparian Zones and Meadows (5%)

Willow
 Aspen
 Nebraska Sedge
 Beaked Sedge
 Kentucky Bluegrass
 Bullrush

Rose
 Waterbirch Cottonwood
 Tufted Hairgrass
 Northern Reedgrass
 Cattail
 Shrubby Cinquefoil
 Redtop

Aspen Woodland (5%)

Aspen
 Buffalo Berry
 Snowberry
 Needlegrass
 Bluegrass

Creeping Juniper
 Oregon Grape
 Elk Sedge
 Wildrye

Mountain Shrubland (50%)

Wyoming Sagebrush
 Three Tip Sagebrush

Snowberry
 Currant

50A

CRM Plan:
 Current condition is described with a data table, but evidence that condition is stabilizing is missing.

Communication:
 Some scientific terms are used in the report.

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Interdisciplinary Assessment Activity #4 CRM

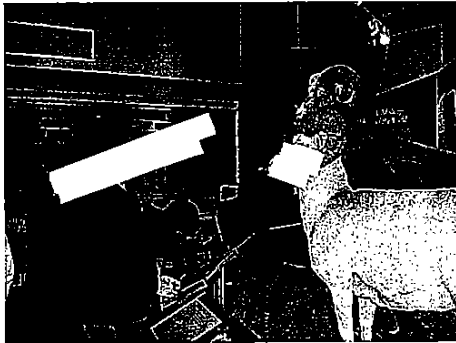
Idaho Fescue
Mutton Bluegrass
Kenucky Bluegrass
Chokecherry Bitterbrush
Snowbush Ceanothus
Oceanspray
King-spike Fescue

CRM3-306
Needlegrass
Western Wheatgrass
Bluebunch Wheatgrass
Balsamroot
Letterman Neddlegrass

CRM Plan:

A list is of animals is presented with no specific data or connection to support condition to the land's ecosystem.

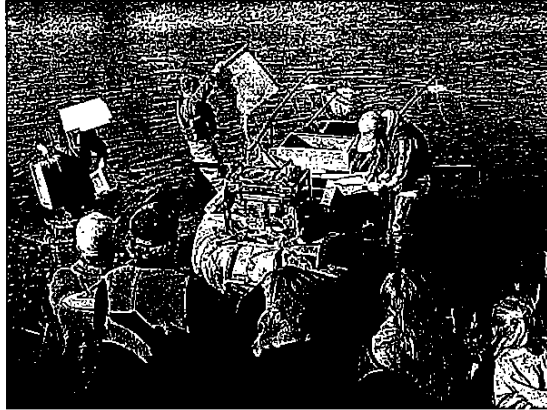
There are also a variety of animals living in the Red Canyon area. They are as follows: 270 bird species, all Wyoming fish except for golden trout, mice, deer, elk, antelope, rabbits, snakes, aquatic insects, and insects, sheep, moose, domestic animals, coyotes, and mountain lions.



51A

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The class electro fishing.

CRM Plan:

Elements of the food web are incomplete and interconnections between organisms are not made.

The Food Web

- Macro Invertebrates-decomposed food in streams
- Birds-macro invertebrates
- Coyotes-birds
- Humans-Coyotes

Soil and Water Chemistry

CRM Plan:

Soils are listed in isolation, with no support of connection made.

The nature of the soil in Red Canyon is Blazon-Rock outcrop association, Cotha-Rock outcrop Blazon association, Duncom Farlow-Rock outcrop association, Farlow-Duncom association, Sapphire-Duncom association, Sinkson-Thermopolis association, Thermopolis-Sinkson association, and Ustic Torrifluvents-Aeric Fluvaquents complex.

The water in Red Canyon area was tested in Red Canyon Creek and Cherry Creek with the following results:

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Interdisciplinary Assessment Activity #4 CRM

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Red Canyon Creek:

Dissolved Oxygen: 5
Temperature: 13°C
Ph: 7
Turbidity: 70
Conductivity: 783
Nitrate: 0

Bug Data Sheet

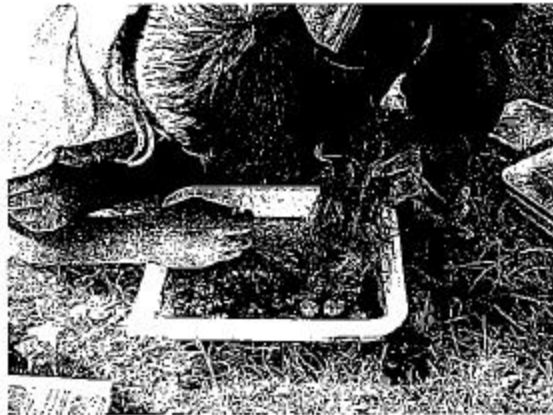
Date 10/10/2002 Location Red Canyon Creek

Observer

Bug	Number
Stoneflies	18
Mayflies	8
Free LCF	12
Cat's Flies	6
Midges	10
Blood Worms	21
Snails	14
Mites	4
Beetle	2

Representation:

Data tables present, but inadequately labeled and no graph included.



53A

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Interdisciplinary Assessment Activity #4 CRM



Looking for aquatic insects.

Cherry Creek:

Dissolved Oxygen: 65
Temperature: 64 degrees F
Ph: 7.4
Turbidity: 54
Conductivity: 605
Nitrate: 0

Bug Data Sheet

Date 10/10/2002 Location Red Canyon Creek

Observer

Bug	Number
Stoneflies	18
Mayflies	8
Free LCF	12
Catis Flies	6
Midges	10
Blood Worms	21
Snails	14

54A

Anchor #CRM3-306
Interdisciplinary Assessment Activity #4 CRM

Mites 4
Beelle 2

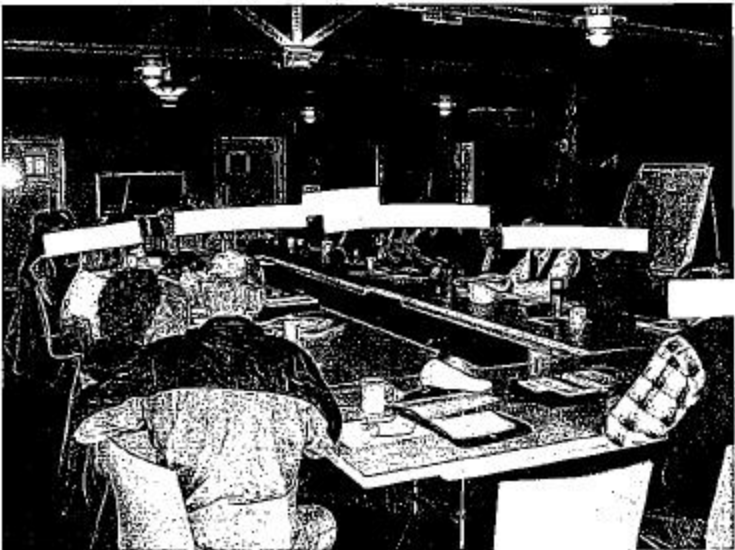
CRM3-306

CRM Plan:
Stakeholders in plan are listed, but management plan does not address needs of all stakeholders.

Red Canyon Ranch's EMP

The Red Canyon Ranch as an Ecological Management Plan that is supported by many different groups: Managers, The Nature Conservancy, Forest Service, Bureau of Land Management, Game and Fish, Weed and Pest, Extension, Natural Resource Conservation, Conservation District, Staff/Interns, Partners, Customers, and Neighbors. These people's main goal is to prove to the community the compatibility of ranching and conservation. Red Canyon area is very pleasing to the owners presently. The system should be changing all the time because the cycle is never ending. The best thing to hope for is to have all the pieces of environment in Red Canyon. This provides all the animals with the proper tools to sustain life and conserve the environment.

CRM Plan:
Plan is not supported with relevant data.

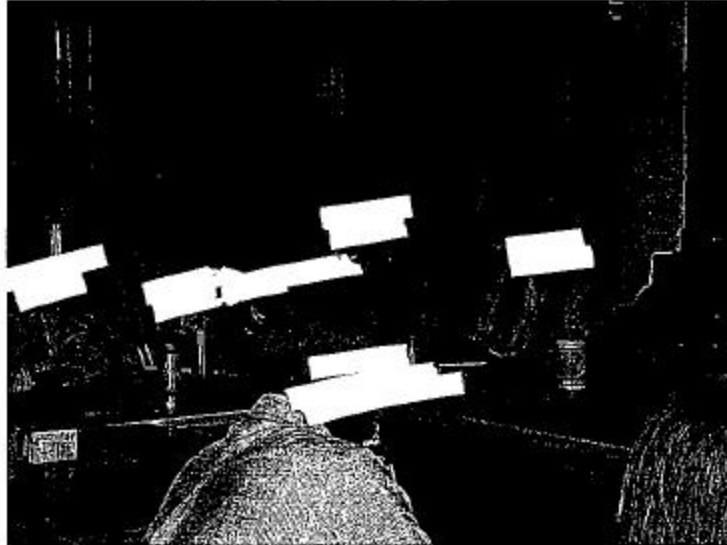


The seniors at a CRM meeting.

55A

Anchor #CRM3-306
Interdisciplinary Assessment Activity #4 CRM

CRM3-306



References:

1. Red Canyon Ranch-Lander, Wyoming-ECOLOGICAL MANAGEMENT PLAN-2000
Pages: (9-10)
2. Soil Survey of Fremont County, Wyoming Lander Area USDA.
Pages: (Map 38)

56A

<p>Interdisciplinary Assessment Activity #4: Coordinated Resource Management</p>
<p>Anchor #CRM3-303</p>
<p>Criterion: Explains and Supports a Land Management Plan Level 1</p> <p>Although the report attempts to present elements of history of the land area, the current condition of the land, a plan of management this is a level one response because supporting information is inaccurate and inadequate to fully complete the task.[Bob Budd purchased the ranch...]</p>
<p>Criterion: Communication Level 1</p> <p>This is a Level 1, because errors in word choice, sentence structure, and conventions make it difficult for the reader to understand (...invertebrates, some of them can determine water quality. If they die water is terrible.”).</p>
<p>Criterion: Representation Level 1</p> <p>This is a Level 1, because graphs or tables are missing.</p>

Anchor# CRM3-303

Interdisciplinary Assessment Activity #4 CRM

CRM3-303

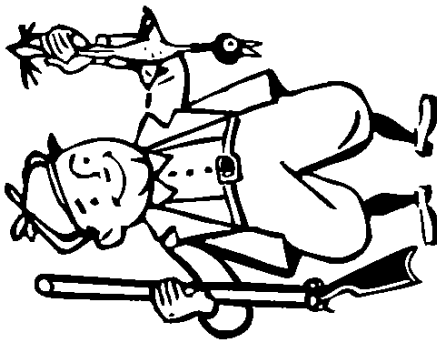
Coordinated Resource Management

7A

CRM Plan:

The report attempts to present elements of history, but the supporting information is not accurate.

CRM3-303
Red Canyon Ranch History



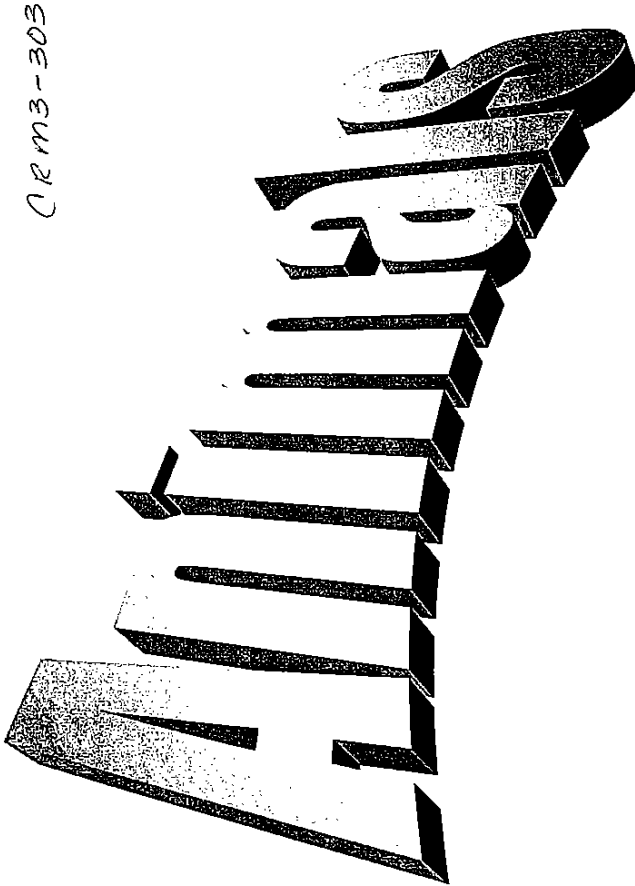
The ranch was founded in the 1870's. Bob Budd purchased the ranch from the Slingerly family in 1993 to highlight capability of ranching and conservation.

Homesteaders first acquired the land. 160 acres to be exact.

RCR was carved by a large glacier. That is why the ranch has such a beautiful looking landscape.

8A

Anchor# CRM3-303
Interdisciplinary Assessment Activity #4 CRM



9A

Anchor# CRM3-303

Interdisciplinary Assessment Activity #4 CRM

CRM3-303

Communication:

Errors in word choice and run-on sentences make it difficult for the reader to fully understand.

At Red Canyon Ranch there are at least 270 bird species. 160 alone live at deep creek alone. The ranch is an (IBA) Important Bird Area. There at least fifty types of mice on the ranch. Back in the day Big Horn Sheep Flourished at the ranch, but now there are only a few out there. There are other types of animals they are called invertebrates, some of them can determine the water quality. If they die the water is terrible. Some of their names are caddis fly, mayfly, ect.

10X

Anchor# CRM3-303
Interdisciplinary Assessment Activity #4 CRM

CRM3-303

There is vegetation in those hills!

There are many different types of plant species at Red Canyon Ranch. There are the cheat grass, silver sage, Rubber Rabbit brush, Red Osier Dogwood. Antelope love sage. The deer love their Choke cheery tree. It is their version of ice cream.

CRM Plan:

An attempt is made to describe the current condition of the land (animals and vegetation), but information is not adequate to fully complete the task.

11A

CRM3-303

Pass Creek Fire



Communication:
Minor error in word use does not impede understanding.

There was a lot of misconceptions around the Pass
Creek fire.

12A

Anchor# CRM3-303
Interdisciplinary Assessment Activity #4 CRM

CRM Plan:
The proposed plan fails to address significant needs of major community stakeholders

CRM3-303

One of the main misconceptions of this fire was that the local towns people thought that the Pass Creek fire was started by a prescribed burn that went out of control. The fire was actually started by natural causes, a lightning strike in a fourth year of severe drought. One of the locals decided to shoot off their mouth and talking about subjects that they weren't even qualified to discuss. They said that they were more qualified than the Forest Service, the Game and Fish, and even the BLM.

Communication:
Errors in word choice, sentence structure, and conventions get in the way of understanding.

13A

Anchor# CRM3-303
Interdisciplinary Assessment Activity #4 CRM

Representation:

Tables and graphs of related data to support claims are not included.

Communication:

Errors in sentence structure make it difficult for the reader to understand.

CRM3-303

He thought that there was very valuable timber up there at the fire site . When in reality there was only little could be saved. When I visited the site, when I volunteered for the Forest Service, I noticed that the roads were tiny and very bumpy. So timber companies couldn't get there vehicles or equipment Up there on the mountain. At the Community Resource meeting they talked about the hassle that the road s being closed presented.

14A

CRM3-303

Sources

Mrs. [redacted]

By [redacted]

Mr. [redacted]

Radio Public announcement

By [redacted]

15A

