Strengthening the Curriculum Design and Enhancing the Educational Practices of the Resources Education Curriculum in Yellowstone Youth Conservation Corps

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Strengthening the Curriculum Design and Enhancing the Educational Practices of the Resources Education Curriculum in Yellowstone Youth Conservation Corps

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Plan B Project
Submitted in partial fulfillment of the requirements for the degree of Masters in Science in Natural Science/Mathematics in the Science and Mathematics Teaching Center at the University of Wyoming, 2013
Laramie, Wyoming

Masters Committee:
Dr. Ana Houseal, Chair
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Abstract

Our country’s first National Park is home to the Yellowstone’s Youth Conservation Corps (YELL-YCC); the YELL-YCC is a residential youth employment program founded on service learning concepts implemented through stewardship projects. Since 1989, this program has served as a pathway for career opportunities in the National Park Service (NPS). Education is an integrated into all work and recreational activities and five hours each week is dedicated to formal lessons known as the Resource Education Curriculum (REC). Prior to 2010, YELL-YCC ran a single eight-week session each summer. In 2010 a transition from a eight week session two four and a half-week session, model was implemented. The REC was scaled back and adapted, but the original lessons did not clearly define participant understandings, knowledge, and skills, nor did they include diverse instructional strategies.

This research aims to strengthen and enhance the REC by developing 17, one-hour educational lessons by answering the following research questions: What are the understandings, knowledge, essential questions, and skills that define the conceptual foundations that are central to the YELL-YCC REC? And how do place-based experiential, and collaborative instructional strategies support the teaching of the YELL-YCC REC? This research provided the YELL-YCC with a strengthened curriculum design and enhanced REC, which achieves overarching goals of educational programming. By focusing specifically on educational development, this study in intended to inform Youth Corps research in the area of participant educational outcomes.
The research is inspired by and dedicated to my crew members and co-crew leaders, environmental education professionals, and for my family, friends and professors who supported me in all my pursuits even when I had writing mistakes, I ah-dore you all.
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Chapter 1

Introduction

In 1872 the world’s first national park was created. Yellowstone National Park is located primarily in the state of Wyoming and extends into Montana and Idaho. The park is home to the Yellowstone’s Youth Conservation Corps (YELL-YCC), a residential youth employment program that is based on service learning concepts implemented through stewardship projects. The program has been operating annually since 1989 and is managed by the Division of Visitor Protection from 1989-2009 and the Division of Resource Education and Youth Programs (formerly known as the Division of Interpretation) since 2010. One goal of the Youth Conservation Corps (YCC) program is to help develop the next workforce of the National Park Service. YCC was created in 1984 under the Youth Conservation Corps Act, Public Law 91-378, (16 U.S.C. 1701-1706, 84 Stat. 794), which established the YCC model as a permanent program within the Department of the Interior and the Department of Agricultural. Young adults that participate in the YCC are between the ages of 15 and 18 years old and are employed to work on specific projects located on lands and waters administered under jurisdiction of these Departments, as shown in Figure 1.
As noted by *Yellowstone Youth Conservation Corps 2012 Season Summary* (2012), each summer season has approximately 67 youth and staff participate in YELL-YCC. The teens hail from diverse communities across the United States and come to Yellowstone National Park to participate in one of two separate four and a half week summer sessions. For their 40-hour week of work, they receive federal minimum wage. Each session incorporates a service-learning experience during which participant’s complete projects that complement the National Park Service (NPS) mission. YELL-YCC program goals include: (a) cultivating tomorrow’s leaders; (b) building stewardship ethics in the youth of America; and (c) diversifying the NPS workforce. This program serves as a launching pad and conduit for participants to gain experience that leads to federal career opportunities.

The original legislation that founded YCC incorporated education and participant development as key components. An Environmental Awareness model was developed and administrated to ensure the fulfillment of the intended education experience of participants. This
model focuses on connecting overall stewardship project goals to ecosystem concepts while developing a strong work ethic that is rooted to participants’ sense of place. This emphasis is incorporated during recreational activities, stewardship projects, and at meal times (“Yellowstone Youth Conservation Corps 2012 Manual”, 2012). For example, after a stewardship project, students could answer the following questions: what skills and knowledge can I bring to my crew and our stewardship project? What did Yellowstone National Park gain from our stewardship project? Why is this work important in relation to the Park Service mission? What have I gained from my stewardship projects? Throughout many YCC programs across the country, educational and participant development is accomplished through different avenues such as day-long education, hour-long education lessons, or impromptu learning.

In YELL-YCC, the Environmental Awareness (EA) model (renamed Resource Education Curriculum in 2013 to fully encompass all the areas taught in the curriculum) is an integrated part of all work and recreational activities. The Resource Education Curriculum (REC) utilizes a balance between formal and informal educational lessons. In total, at least five hours a week is dedicated to formal lessons throughout the participants’ four and a half week session. An example of a formal lesson from the REC might consist of students during their workday engaging in an hour-long lesson about fire ecology, taught by the YELL-YCC staff.

Statement of the Problem

Through 2009, YELL-YCC ran a single eight-week session each summer. However, in 2010 two sessions that were four and a half weeks in length were piloted. This model was continued. At the time, the EA lessons from the eight-week model were adapted to the 2010 YELL-YCC program. The previous lessons were retrofitted and new education lessons were added to fit the four and a half-week session.
In general, the old and new set of lessons lacked clarity in many areas including participant understandings and skills, and a diversity of instructional strategies relevant to the YELL-YCC experience. For example, some lessons consisted of students reading aloud and discussing their thoughts about chapters from the *Yellowstone Resource and Issues Handbook 2012*. This resource is an annual compendium of information about Yellowstone National Park, (“Yellowstone Resources and Issues Handbook: 2012”, 2012) and was not developed for use as an instructional piece but provided good background information. While direct lecture and discussion from an informational handbook may have its place in some educational settings, it should not be the main form of instruction in the YELL-YCC.

The National Research Council report titled *How People Learn: Brain, Mind, Experience, and School*, (2000) presents three principles of learning that are well accepted by educators in the field. Principle two is “the essential role of factual knowledge and conceptual frameworks in understanding.” The essential role described is important in two aspects. First, “factual knowledge must be placed in a conceptual framework to be well understood” (p. 6). Second, “concepts [need to be] given meaning by multiple representations that are rich in factual detail” (Bransford, 2000, p. 6). In the previous 2010 REC, it is evident that only the first aspect of factual knowledge is addressed of these two essential links described in principle two.

In the pre-2010 curriculum, the education content was out-of-date and consisted of an assortment of too many lessons with few meaningful topics. Breiting and Mogensen (1999), argue that too many activities create distractions acting as a barrier for educators to reflect on the central content and quality of an environment-based education to develop substantially. It is possible that these barriers prevented participants from engaging in valuable learning experiences.
Lessons used generic curricular models that often did not connect participants to place. An example of this was a lesson on water consumption that discussed water in a global sense that never made reference to anything about Yellowstone National Park or the Rocky Mountain area. In experiences where you are living in a National Park, it is key to immerse participants in the local cultures, landscapes, opportunities, and experiences. Place-based education emphasizes this way of learning.

Sobel (2004) discusses that educators who ground their curriculum in place-based education are not simply integrating “curriculum around a study of place” but they are “inspiring stewardship and an authentic renewal and revitalization of civic life” (p. 7). Woodhouse (2000) states:

Education should prepare people to live and work to sustain the cultural and ecological integrity of the places they inhabit. To do this, people must have knowledge of ecological patterns, systems of causation, and the long-term effects of human actions on those patterns (p. 2).

It is apparent the original lessons had underdeveloped content in geography, ecology, and as well as the politics of Yellowstone National Park.

The deficiencies are founded in four areas: clear participant understanding and skills, diversity of instructional strategies, out-of-date content, and a strong participant connection to place. These deficiencies are represented in Figure 2, and reflect the state of the YELL-YCC’s EA in 2009. These are a result of key components missing prior to the program transition as well as the actual transition from a single eight-week session each summer to two sessions that were four and a half-weeks in length.
Figure 2. Deficiencies of the YELL-YCC’s REC. Each area is placed on a continuum that is based on a rising scale of the levels of scoring.

**Purpose**

The purpose of this research is to strengthen the curriculum design and enhance the educational practices of the REC within YELL-YCC. This research project involved the development of 17, one-hour educational lessons, intended to replace the 2010 lessons. The enhanced REC seeks to increase the clarity of participant’s understandings and skills while using diverse instructional strategies, which are intended to enhance participants’ connection to place. In addition, content was updated to use current information. Figure 3 reflects the purpose of this research by moving each of the four deficiencies that are found below the satisfactory level of the continuum to the outstanding, clear, concise, and additional resources level of the continuum. In addition, this figure compares the purpose of this research to the statement of the problem illustrated in Figure 2.
Research Questions

The research was guided by the following research questions:

1. What are the understandings, knowledge, essential questions, and skills that define the conceptual foundations that are central to the YELL-YCC REC?

2. How do place-based, experiential education, and collaborative learning instructional strategies supporting the teaching of the YELL-YCC REC?

Significance of the Project

Due to the mission and goals of YELL-YCC REC, this program has the potential to impact participants’ understanding and skills in natural and cultural resources and sustainability. In addition, this program can have positive long-term impacts on participants’ personal and professional lives after their YELL-YCC experience. As noted by Yellowstone Youth Conservation Corps 2012 Season Summary (2012), each summer season approximately 67 participants and staff from across the United States are impacted by the program goals of YELL-YCC. One of the aspirations of YELL-YCC is to have participants leave the program with increased personal environmental ethics ("Yellowstone Youth Conservation Corps 2012 Manual", 2012)

Abt Associates Inc. (2011) revealed similar results on the impacts of Youth Corps in
terms of the educational development of participants. This study showed that Youth Corps increase 50 to 67 percent of participants’ enrollment in education and employment over the course of the six-year study (Gan, Jastrzab, Jefferson, Schneider, & Shlager, 2011). This demonstrates that when educational practices are present within Youth Corps, they support participants in educational and employment achievements. In addition, this aligns with the definition of Youth Corps in engaging participants, “in a combination of community service, workforce development and education” (Gan et al., 2011, p. 1). Youth Corps educational practices can push the bounds of formal education by engaging participants in practices that are not encountered in a typical classroom environment, and encouraging participants in successful career pathways (Price, Williams, Simpson, Jastrzab, and Markovitz, 2011).

In addition, this research will contribute significantly to the limited and out-of-date research about Youth Corps, particularly in the area of educational development and practices. As noted in the literature review, there are only a few examples of curricula that serve as a model framework.

**Definition of Terms**

For the purposes of this research, the following definitions will be used:

*Youth Corps*- are organizations invested in a “common mission of engaging participants, in a combination of community service, workforce development and education” (Gan et al., 2011).

*Yellowstone Youth Conservation Corps (YELL-YCC)*- is a particular residential youth employment program that is guided by service learning components through stewardship projects that promote the next workforce of the National Park Service.

*Youth*- refers to individuals between the ages of 15-25 years old.
Resource Education Curriculum (REC) is a curriculum developed for the YELL-YCC that focuses on connecting overall project goals to ecosystem concepts while developing work ethics that connect youth to a sense of place and community, which is utilized by the YELL-YCC for a minimum of five, one-hour lessons taught during the work week.
Chapter 2

Literature Review

Introduction

The purpose of this research is to strengthen the curriculum design and enhance the educational practices of the Resource Education Curriculum (REC) within Yellowstone Youth Conservation Corps (YELL-YCC). This research involved the development of 17, one-hour educational lessons, intended to replace the 2010 REC. The enhanced REC sought to increase the clarity of participant’s understandings and skills while using diverse instructional strategies, which are intended to enhance participants’ connection to place. In addition, content was updated to use current information.

This research was guided by the following research questions: (1) what are the understandings, essential questions, and skills that define the conceptual foundations that are central to the YELL-YCC Resources Education Curriculum? (2) How do place-based, experiential education, and collaborative learning instructional strategies support the teaching of the YELL-YCC REC? The literature review focuses on the pedagogical content knowledge by discerning key areas of the two research questions.

Selection of the Literature

The selection of the literature was discerned using different components of the research questions. This included student understandings, essential questions, and skills, as well as place-based, experiential education, and collaborative learning instructional strategies. These components were identified using the YELL-YCC mission and reviewing the statement of the problem. For example, collaborative learning instructional strategies were identified as
supportive strategies to be addressed in research question two because this strategy builds on the participants’ skills in teamwork and communication. These different components make up the selection of the literature, which garnered the ideas, arguments, and thoughts of others.

**Methodology of the Review**

The review of the literature consisted of an examination of peer-reviewed journals, government documents, reports, organizational websites, and dissertations. To guide the curriculum development, YELL-YCC was defined as a residential youth employment program that is guided by service learning concepts through stewardship projects that promote the next workforce of the National Park Service. This definition was derived from the review of Youth Conservation Corps (YCC), historical reports and manuals used in as well as the expertise of the Youth Program Manager at Yellowstone National Park.

Key search terms were derived using this definition to collect a representative sample of research related to the context of the REC in YELL-YCC. The following key terms were used: *service-learning concepts, residential youth employment program, Youth Corps, and curriculum development* all within the framework of either *environmental education* or *stewardship*. A search was then conducted using the following databases: Educational Resources Information Center (ERIC), ProQuest Education Journals, and Google Scholar.
Youth Corps Background

History of the conservation corps model. The Youth Corps model originated from the Civilian Conservation Corps (CCC), founded in 1933 (21st Century Conservation Service Corps Advisory Committee, n.d.; Civilian Conservation Corps Legacy, 2011). The CCC was originally developed as a temporary work relief program during the Great Depression under President Franklin D. Roosevelt. The CCC provided six million young men with jobs on lands owned by federal, state and local agencies. The work they completed brought young men to the forefront of conservation of the nation’s natural resources, increasing each participant’s awareness and appreciation of these resources (Civilian Conservation Corps Legacy, 2011). On June 30, 1942 Congress passed a vote eliminating funding for the CCC, and officially ceased operation of the program (21st Century Conservation Service Corps Advisory Committee, n.d.; Civilian Conservation Corps Legacy, 2011). The inherent value of their accomplishments survived; “3,470 fire towers erected, 97,000 miles of fire roads [were] built,” and “more than a billion trees [were] planted,” (Civilian Conservation Corps Legacy, 2011, para. 27) leading to the development of similar pilot programs for youth in years to follow.

By 1942, there had been several failed attempts by conservation groups to re-establish the CCC. It was not until 1955 that the conservation corps was reestablished, due to Elizabeth Cushman Titus Putnam, a student at Vassar College, who wrote her senior thesis titled, “A Proposed Student Conservation Corps,” (American Academy for Park and Recreation Administration, 2008). Her proposal introduced the idea of engaging young people as park volunteers to create a positive impact on the land. In 1957, Putnam, in partnership with the National Park Service, implemented her ideas by placing summer volunteers in Grand Teton and Olympic National Parks. This was the first incarnation of the program now known as the Student

**The beginning of the youth conservation corps.** Drawing from the success of these early models, on February 18, 1969 Senator Henry M. Jackson introduced a bill titled the *Youth Conservation Corps Act of 1970*. This law established permanent programs in the Department of Interior and the Department of Agriculture for youth between the ages of 15-18 (United States Department of Justice, 2000). This led to the creation of the Youth Conservation Corps (YCC). The bill emphasized the importance of youth development in the area of education. Senator Jackson stated that youth “would acquire an appreciation for our natural resources which cannot be taught in schools” (Civilian Conservation Corps Legacy, 2011). Although it faced resistance from the Nixon Administration, the YCC began a pilot program in the summer of 1971. After three successful seasons, in 1974 lawmakers permanently established the organization via Public Law 93-408 (“Yellowstone Youth Conservation Corps 2012 Manual”, 2012). The Act created employment for youth in the YCC and encouraged partnership agencies to invest in other qualified Youth Corps (21st Century Conservation Service Corps Advisory Committee, n.d.). In the mid-1970’s YCC reached its peak, providing 32,000 young adults with summer jobs (Jastrzab, Blomquist, Masker, & Orr, 1997; “A Brief History…”).

The majority of YCC projects are non-residential, however, there are exceptions. For example, the National Park Service has two residential programs. One is in Yosemite National Park and the other is in Yellowstone National Park. Historically, YCC programs have ranged in length from 4-10 weeks, and occurred during summer months.
Young adult conservation corps. The rebirth of Youth Corps continued as the Young Adult Conservation Corps (YACC) launched in the late 1970’s, creating an even larger federal program. The YACC was different than the YCC, because it provided year-round conservation-related employment and education opportunities for teenagers (21st Century Conservation Service Corps Advisory Committee, n.d.; The Corps Network, 2012). The YACC operated at the federal, state, and local agencies levels, employing approximately 25,000 participants, with an annual government appropriation of $260 million (21st Century Conservation Service Corps Advisory, n.d.; Committee United States 21st Century Conservation Service Corps, 2012). Like the CCC, the YACC provided youth with valuable conservation and community service projects while also providing opportunities to connect with America’s natural and cultural heritage. Yellowstone National Park operated a YACC program in the late 1970’s to early 1980’s. Although funding for the YACC program was discontinued during the Reagan Administration in the early 1980’s, the organization provided a working model that many future agencies and local conservation corps adopted (21st Century Conservation Service Corps Advisory Committee, n.d.; United States 21st Century Conservation Service Corps, 2012).

Growing from a Federal Movement to a State Movement

Building on the YCC & YACC programs, there was another growing movement, which transitioned from federal Youth Corps to state Youth Corps beginning in the late 1970’s (21st Century Conservation Service Corps Advisory Committee, n.d.; The Corps Network, 2012).

Additionally, in the 1980’s the Reagan Administration denied funding for YCC programs. The YCC program was highly regarded by some federal agencies and continued programing through funding appropriated directly from their existing budgets, while others were awarded grants to continue their YCC program (21st Century Conservation Service Corps}

In 1983, the first Urban Youth Corps in the state of California strived to engage diverse participants (The Corps Network, 2012; Civilian Conservation Corps Legacy, 2011). During the mid-1980s, new state and local corps continued to spring up across the country despite the absence of federal support (21st Century Conservation Service Corps Advisory Committee, n.d.).

Since the 1980’s, Youth Corps have been growing steadily, expanding the breadth and depth of the work by partnering with donors such as Hewlett, Rockefeller, Ford, and Kellogg. After more than a decade of no federal-base funding for conservation corps programs, in 1992 the federal government appropriated approximately $22.5 million in grants to federal, state, and local Youth Corps via the Commission on National and Community Service. Although this funding did not provide much assistance to existing organizations, it provided the finances needed for new organizations to be developed (Jastrzab et al., 1997; The Corps Network, 2012; Civilian Conservation Corps Legacy, 2011).

State, federal, local, and non-profit Youth Corps operate in a wide variety of communities across the country, such as urban areas and backcountry locations on public lands. Stewardship projects differ from site to site and might include hands-on conservation service and education,
training emergency response teams for natural disaster relief, and green job training. In addition, many Youth Corps provide education support to help participants obtain a high school or general education diploma and post-secondary education.

**The future of youth corps.** Building on America’s long history of taking action to conserve natural and cultural heritage, the Department of Interior in June 2009 made a significant commitment to the advancement of the Youth Corps model by establishing a cabinet-level office, which focused on supporting Service and Conservation Corps. It was designated as the Office of Youth in Natural Resources at the Department of the Interior and was supported by politicians like Secretary of the Interior Ken Salazar, who “believe that during tough economic times, a new national youth program is needed to provide jobs, outdoor experiences and career opportunities for young people” (21st Century Conservation Service Corps Advisory Committee, n.d., para. 7). The Office of Youth in Natural Resources was officially operating by January of 2010 and coordinates present and future youth initiatives, works to organize youth listening sessions, and contributes to the final America’s Great Outdoors (AOG) Report. The 2011 AGO report highlighted the 21st Century Conservation Service Corps (21CSC) as the signature program of the Office of Youth in Natural Resources.

This report calls on the Department of the Interior to “catalyze [in] the establishment of a 21CSC to engage young Americans in public lands and water restoration.” The AGO Report outlines specific recommendations including the formation of an Advisory Committee to advise the 21CSC interagency working group and to facilitate alignment with partners invested in the program (United States 21st Century Conservation Service Corps, 2012; 21st Century Conservation Service Corps Advisory Committee, n.d.). After the establishment of the 21CSC Advisory Committee in October 2011, the Committee released the *Full Report* by the 21CSC
Federal Advisory Committee on September 5th, 2012, which highlighted the mission and goals, made key recommendations, proposed innovative project-based approaches, and made plans for funding, obtaining resources, and management (United States 21st Century Conservation Service Corps, 2012).

The 21CSC provides an umbrella structure for Youth Corps as well as establishes operating partnerships with Youth Corps, that are supported under an accreditation process to “ensure that partners who operate 21CSC programs have significant expertise, experience and capacity to operate high quality programs,” (United States 21st Century Conservation Service Corps, 2012, p. 16).

All partners seeking accreditation are required to meet 21CSC standards and one-pathway endorsement criteria. The standards “ensure that accredited 21CSC programs operate a program consisting of competent, proven operational systems and infrastructure” (p. 52). A pathway endorsement incorporates training and development of life skills into project works and training programs. In total there are 15 standards and four pathways endorsements for partners to meet to become accredited. Of interest to this research is a standard titled “participant outcomes”, which refers to job skill development, community skill development, and connection to the natural environment. One of the qualifications for partners is to ensure that “participants acquire a greater understanding of the value and management of our natural resources” (United States 21st Century Conservation Service Corps, 2012, p. 43).

The 21CSC utilizes and builds upon the expertise and experience of both federal and non-profit agencies to facilitate conservation service work opportunities on public lands and promote a new generation of active citizen conservationists (United States 21st Century Conservation Service Corps, 2012). The 21CSC is an overarching structure that supports existing Youth Corps
program found in federal, state, tribal, and local governments as well as in non-profits.

In 2012, there were 142 Youth Corps with representation in all 50 states in the United States of America (21st Century Conservation Service Corps Advisory Committee, 2012). Youth Corps enroll more than 33,000 participants annually, hailing from diverse backgrounds including at risk and veteran youth. In addition, Youth Corps also mobilize approximately 265,000 community volunteers. Collectively, they generate a combined total of 21 million hours of service every year (United States 21st Century Conservation Service Corps, 2012). Table 1 shows an overview of the events that have occurred throughout the history of Youth Corps. The timeline reflects the progression of different programs and the support from federal and non-federal funding.

Table 1

History of Youth Corps

<table>
<thead>
<tr>
<th>Date</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1933</td>
<td>The Civilian Conservation Corps (CCC) is founded.</td>
</tr>
<tr>
<td>June 30, 1942</td>
<td>Congress passed a vote eliminating funding for the CCC, and officially ceased operation of the program.</td>
</tr>
<tr>
<td>1957</td>
<td>The National Park Service and Elisabeth Putnam placed summer volunteers in Grand Teton and Olympic National Parks; this is the first incarnation of the program now called the Student Conservation Association.</td>
</tr>
<tr>
<td>February 18, 1969</td>
<td>Senator Henry M. Jackson introduced a bill titled the “Youth Conservation Corps (YCC) Act of 1970”.</td>
</tr>
<tr>
<td>1974</td>
<td>Following three successful seasons, lawmakers permanently established the YCC via Public Law 93-408.</td>
</tr>
<tr>
<td>Mid 1970’s</td>
<td>YCC reached its height providing 32,000 young adults with summer jobs.</td>
</tr>
<tr>
<td>Late 1970’s</td>
<td>The Young Adult Conservation Corps (YACC) launched, creating an even larger federal Corps program.</td>
</tr>
<tr>
<td>1980’s</td>
<td>The Reagan Administration denied YCC and YACC funding.</td>
</tr>
<tr>
<td>Late 1970’s</td>
<td>The Youth Corps movement shifts from federal Youth Corps to state Youth Corps.</td>
</tr>
<tr>
<td>1976</td>
<td>With support from former governor Jerry Brown - the State of California launches a state-run conservation corps called the California Conservation Corps.</td>
</tr>
<tr>
<td>Early 1980’s</td>
<td>State operated conservation corps are in several states including Iowa, Ohio, Maryland, Minnesota, New Jersey, Ohio, Pennsylvania, Vermont,</td>
</tr>
</tbody>
</table>
1983  The first Urban Youth Corps is established in California.
Mid 1980’s  Youth Corps have been growing steadily, expanding the breadth and depth of the work by partnering with Hewlett, Rockefeller, Ford, and Kellogg.
June 2009  The Department of Interior forms a cabinet level office titled the Office of Youth in Natural Resources.
January 2010  The Office of Youth in Natural Resources is officially staffed.
October 2011  Establishment of the 21CSC Advisory Committee.
September 2012  The 21CSC Advisory Committee releases a final report.
2012  142 Youth Corps are represented in all 50 states.

Note. An overview of the events covered throughout the history of Youth Corp.

Yellowstone’s Youth Conservation Corps

The Yellowstone Youth Conservation Corps, (YELL-YCC) is a residential youth employment program that was established in 1989 under the Youth Conservation Corps Act of 1970. It was originally funded by generous donations from the Loyal Order of the Moose to the Yellowstone Park Foundation (“Yellowstone Youth Conservation Corps 2012 Manual”, 2012) with a total donation of more than $3,400,000 over 23 years. Yellowstone National Park currently seeks new funding sources, from both federal and private entities to secure program funding for the future (B. Fuhrmann, personal communication, March 29, 2012).

The overarching YELL-YCC program goals include cultivating tomorrow’s leaders; building a stewardship ethic by engaging them with our national parks; diversifying the NPS workforce by using this residential program as a launching pad and conduit through which participants may gain employment experience that lead to careers in the NPS or in conservation or education professions (“Yellowstone Resources and Issues Handbook: 2012”, 2012). These overarching goals can be accomplished as researchers support the premise that youth who participate in multi-day, residential education programs that compared to shorter visits to National Parks can have longer lasting impacts (Knapp & Benton, 2006). Since these studies have focused on four to five day programs, it is likely that the resulting experience of a four and
half week program will inevitably be more impactful.

Yellowstone National Park’s permanent full-time Youth Program Manager manages the YELL-YCC residential program and provides supervision and management. The seasonal staff consists of a Program Director, Work Coordinator, eight Crew Leaders, four Recreation Rangers, and a chef who provide daily supervision of the program while supporting the staff and youth. Staff and youth evaluate the YELL-YCC program at the end of their service by completing a standardized assessment form. The results are compiled and analyzed, and key themes are factored into improving the next year’s program. Currently, resources are being developed that allow the Program Manager to track youth long-term. Long-term tracking would help determine if experiences in YELL-YCC result in careers in conservation or with the National Park Service (B. Fuhrmann, personal communication, March 29, 2012).

Curriculum Planning

This section of the literature review will focus on the four main areas of conceptual foundation that support students’ desired results in YELL-YCC REC, including understandings, knowledge, skills, and essential questions.

Kauffmann and his colleagues (2002) define curriculum as that which “specifies content, skills, or topics for teachers to cover; suggest a timeline; and incorporates a particular approach or offers instructional material” (p. 274-5). Specific content, skills, or topics is not knowledge about content alone. Ball (1996) argues, “the enacted curriculum is actually jointly constructed by teachers, students, and materials in particular contexts” (p. 7). Advocating that curriculum planning often includes knowledge of students and institutions, developing curricula consequently requires “knowledge of students and their learning” (Graff, 2011, para. 8).
Backwards Design

One approach that has been highly effective in curriculum design is the *backward design* approach as it aids teachers in creating a scaffold-learning environment (Childre, Sands & Pope, 2009). This approach described by Wiggins and McTighe (2005) is “most popular in the K-12 instructional settings” (Allen & Tanner, 2007, p. 86). It provides a conceptual framework to assist teachers in “thinking more purposefully and carefully” about curriculum planning with student understanding as its base (Wiggins & McTighe, 2005, p. 7). It is referred to as backward design because it begins by considering assessment of the desired learning outcomes and then working backwards to develop the instruction (Allen & Tanner, 2007, p. 86).

Activity-oriented design, which is centered on activities rather than learning, is the opposite of backwards design. Wiggins & McTighe (2005) argue that activity-oriented design engages students in experiences that can only lead students mistakenly “to insight or achievement” (Wiggins & McTighe, 2005, p. 7). It is often referred to as “hands on with being minds off” (Wiggins & McTighe, 2005, p. 16). In addition, it is characterized as the *twin sins* of curriculum design coined by Wiggins and McTighe (2005). It is popular within many educational settings because of student’s instant achievement and positive attitudes that are perspective by the instructors (Aiken, 1976). This curriculum design process as well as the *twin sins* can be avoided when using a three-step approach to “backward design”.

Step One: Identify desired results: What is worthy of requiring student understanding? Step Two: Determine what constitutes acceptable evidence: What would demonstrate competency or gains in student understanding? Step Three: Plan learning experience and instruction: Which approaches promote understanding, interest, and competency in the subject matter? (Allen & Tanner,
The three-step approach to “backward design” focuses heavily on student learning and that instructors understand what their students are learning from each lesson. Childre, Sands & Pope (2009) suggest “learning outcomes clearly [also be] articulated as assessment, creating learning activities that scaffold understanding toward those outcomes” (p. 8). “Wiggins and McTighe are not the first to define backwards design (Graff, 2011, p. 155) as others in the field have thought of similar approaches to curriculum development, such as Ralph Tyler referenced by Wiggins & McTighe (2005). Tyler describes backwards design as:

Educational objectives [that] become the criteria by which materials are selected, content is outlined, instructional procedures are developed and tests and examinations are prepared…The purpose of a statement of objectives is to indicate the kinds of changes in the student to be brought about so that instructional activities can be planned and developed in a way likely to attain these objectives (p. 338).

Keeping the end in mind has been an approach that has been adopted in education since the early days (Allen & Tanner, 2007). While all three stages are important in curriculum development, this research used Stage One: Identify Desired Results as this was the focus of the research questions.

**Desired results.** Wiggin and McTighe three-stage approach to backwards design; incorporates desired results, which are described as the “intended outcomes of instruction” (p. 346). Consequently, Stage One, is titled “Identify Desired Results” and includes (1) “factual or rule-based declarative knowledge; (2) skills and processes; (3) understandings, insights derived from inferences into ideas, people situations, and processes; (4) habits of mind; (5) attitudes” (p.
This stage establishes a starting point for lesson development with “specific educational goal or an achievement target” (p. 341) for assessment and planned learning experience. For this reason the desired results must also be written in “measureable terms” (p. 341). In addition, connecting desired results to all levels of the curriculum development is important. Desired results should be created in the large scope of an entire course of study, to the level of each lesson plan and to the level of each students learning experience, likely influencing the degree of their learning (Wang & Allen, 2003). It is important not to overlook each student’s learning experience, as this is foundational to identifying desired results. When instructors consider students’ learning experiences such as “prior knowledge, experiences, and interest students bring” it can also influences the degree of student learning (Childre, Sands & Pope, 2009, p. 8).

Furthermore to assist with identifying the desired results, Wiggins and McTighe (2005) subdivided desired results into four simple areas of knowledge to demonstrate the goals for students learning. These include enduring understanding, knowledge, skills, and essential questions (Wang & Allen, 2003). The areas are described as.

**Enduring understandings.** When it comes to setting goals and objectives for students’ learning, Wiggins and McTighe (2008) “make a clear distinction between material that is simply worth covering and what they refer to as enduring understandings” (Allen & Tanner, 2007, p. 86). Enduring understanding can be defined as the process “to make connections and blind together knowledge into something that makes sense of things” (Wiggins & McTighe, 2005, p. 7). Enduring understandings provide a lens to which specific content can be addressed. (McTighe & Thomas, 2003) This can be accomplished by developing student understandings that are guided under the following questions:
(a) To what extent does the idea, topic, or processes being considered as an objective reside at the heart of the curriculum? (b) To what extent will the idea or process have enduring value beyond the classroom? (c) To what extent does the ideas, topic, or process offer potential for engaging students? (Allen & Tanner, 2007, p. 86).

In addition, students’ understandings need to go beyond a simple list “of objectives for content understanding” (Allen & Tanner, 2007, p. 86). An emphasis must be placed on learning that can transfer beyond a particular lesson and into other learning experiences that are in- and out-side of the school (Graff, 2011, p. 155). For example in a Wang and Allen (2003), a high school teacher remarks that “when a student retains an understanding of water resources and regional conflict ten years after they have graduated from their science class, we see enduring understandings at work” (Wang & Allen, 2003, p. 39). This high school teacher’s remark is at the heart of identifying enduring understands.

**Knowledge verse understanding.** When a student can “provide evidence of what [their] understanding [is] by showing that they know and can do certain specific things” (Wiggins & McTighe, 2005, p. 37) the instructors is increasing the student’s degree of learning. This is not always easily accomplished. For example, distinguishing the difference between student “knowledge” and “understanding” can be challenging, as they are often interchangeable. Wiggins & McTighe (2005) argue that this difference is that understanding is “simply a more complex form of knowledge” (p. 39). Table 2 supports this argument by describing “Knowledge Versus Understanding” (p. 38) and provides helpful distinctions between the two terms (p. 37).
Table 2

Knowledge Versus Understanding

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Understanding</th>
</tr>
</thead>
<tbody>
<tr>
<td>The facts</td>
<td>The meaning of the facts</td>
</tr>
<tr>
<td>A body of coherent facts</td>
<td>The “theory” that provides coherence and meaning to those facts.</td>
</tr>
<tr>
<td>Verifiable claim</td>
<td>Fallible, in process theories</td>
</tr>
<tr>
<td>Right or wrong</td>
<td>A matter of degree or sophistication</td>
</tr>
<tr>
<td>I know something to be true</td>
<td>I understand why it is, what makes it knowledge</td>
</tr>
<tr>
<td>I respond on cue with that I know</td>
<td>I judge when to and when not to use what I know</td>
</tr>
</tbody>
</table>

Note. Describes “Knowledge Versus Understanding” (Wiggins & McTighe, 2005, p. 38) and provides helpful distinctions between the two terms.

Understanding the different between understanding and knowledge can be helpful in identifying the desired results of Stage One.

Knowledge and skills. Knowledge and skills are often discussed together but are two different types of student understandings. The first type is called resultant knowledge and skills. It is described as a “meant to result from a unit of study. In addition to the targeted understanding, teachers identify other desired outcomes” for example skills in listening. (Wiggins & McTighe, 2005, p. 348)

In contrast is the second type, called prerequisite knowledge and skills, is defined as a requirement to “successfully perform a culminating performance task or achieved a targeted understanding.” Naturally, prerequisites knowledge and skills can “identify the more discrete knowledge and know-how required to put everything together in a meaningful final performance.” For example having knowledge of the different leadership styles would be considered a prerequisite to the task of leading a group in the wilderness (Wiggins & McTighe,
Resultant knowledge and skill can differ from prerequisite knowledge and skill. Resultant knowledge is the objective of the curriculum and prerequisite knowledge is required to accomplish the objective of the curriculum. These can be combined in one lesson. For example, if a lesson uses historical role-playing, the prerequisite knowledge involves the factual information of the historical figures being portrayed while the prerequisite skill is the ability to role-play (Wiggins & McTighe, 2005).

Educators using *Understanding by Design* use resultant knowledge and skill in Stage One, which identifies the desired results and then intertwines the prerequisite knowledge into Stage Three of the curriculum (Wiggins & McTighe, 2005).

**Skills.** Similarly to knowledge acquisition “knowledge production is embedded and acquired during social activity” (Nygaard, Hojlt & Hermansen, 2006, p. 36). While a skill can be “acquired by training or experience to perform a task or activity”, this mastery requires more than just knowledge (Nygaard, Hojlt & Hermansen, 2006, p. 36). When students do not learn skills, it is arguably a weakness of secondary curriculum (Wiggins & McTighe, 2008). When instructors do not incorporate students’ skill acquisition, they bypass the importance of teaching with meaning and transferences in curriculum design, and these key facts falls to the side. Polanyi (1962) argues that the role of higher education is to support students becoming “aware of and reflexive about their use and linking of theories, methods and practice” (Nygaard, Hojlt & Hermansen, 2006, p. 36; Polanyi, 1962).

**Essential questions.** Essential questions are an additional key area to identify during Stage One. An essential question can be defined as a “question that lies at the heart of a subject or a curriculum” that promotes inquiry based learning. Essential questions do not have a “single
straightforward answer”, and they have different possible responses. (Wiggin, & McTighe, 2005, p. 342). Essential questions are more about searching for answers from a provocation question that students already innately ask about the world and themselves (McTighe & Thomas, 2003). Thus, Essential Questions become a tool that can be used to direct learning in the scope of the curriculum of for a specific lesson (Wiggin & McTighe, 2005).

**Concluding Stage One: Identifying Desired Results**

Stage one offers assistance in creating curriculum that is learning centered. This includes identifying desired results, enduring understandings, knowledge, skills and essential questions. As Bloom (1956) says,

> Understanding is the ability to marshal skills and facts wisely and appropriately, through effective application, analysis, synthesis, and evaluation.

Doing something correctly, therefore, is not, by itself, evidence of understanding. It might have been an accident or done by rote. To understand is to have done it in the right way, often reflected in being able to explain why a particular skill, approach, or body of knowledge is or is not appropriate in a particular situation. (Wiggins & McTighe, 2005, p. 39; Bloom, 1956).

**Instructional Strategies**

When student understandings, knowledge, skills and essential questions are all identified in the desired results of a curriculum, how does an instructor go about planning, supporting, and instructing towards these desired results? It is essential for instructors to then weave together different instructional approaches to create meaningful learning experiences (Wiggins & McTighe, 2008).

The three main instructional strategies provide an understanding of how to support the
teaching of the YELL-YCC REC. These include place-based education, experiential learning, and collaborative instructional strategies.

**Place-Based Education**

United States studies suggest that only 40 to 60 percent of students are engaged in classroom learning (Blum, 2005). Such disengagement is not surprising if students see little relationship between what is being taught in the classroom and what is happening in the rest of their lives. Furthermore, if students see little relationship between the efforts required to engage in a learning experience verses the risk associated with learning something new and the anticipated benefits for themselves or the people who matter to them, they will disengage in a learning experience.

“Dewey suggested that the problem lay in the fact that children possess minds that are primarily drawn to actual phenomena rather than to ideas about phenomena” (Smith, 2002, p. 585). Education requires a conversation with place to engage students (Orr, 1994) that goes beyond the walls of a classroom or educational setting to encompass the meanings and sense of attachment local residents feel for places” (Membiela, DePalma & Pazos, 2011, p. 361; Semk & Butler Freeman, 2008).

**Sense of place.** Many scholars suggest that sense of place is a combination of components, which are broken down into two principals. These are known as placement attachment and place meaning (Kudryavtsev, 2011). Although often defined differently for example Ludtke (1972) states that the “identification with place resembles, place attachment”. Other literature suggests that place attachment is a “bond between people and place, or the degree to which a place is important to people” (Kudryavtsev, 2011, p. 231). For instance, a statement that someone might make about place attachment is, “I identify strongly with St.
Louis. It is the best place for what I like to do”.

A place meaning refers to the “symbolic meanings that people ascribe to settings. Place meaning is defined by answering to descriptive questions such as “What does this place mean to you?” or “What kind of a place is this?” For instance, a statement that someone might make about place meaning might be, “For me, St. Louis is a city with botanical gardens, the Mississippi River, and my family.”

These two components intertwine with one another. Kudryavtsev (2011) states that “place meaning may serve as the reason for place attachment and depend on the value that people put on these meanings” (p. 232). A sense of place is valuable to understand and incorporate into curriculum. When students can relate to the environment, they create place meaning that could translate into concerns or take action to protect that environment or natural resource (p. 234). This is because students tend to care about what they know (Smith & Sobel, 2010). Many educators that use a place-based education approach claim that “place is the guiding construct associated with this approach” (Gruenewald, 2003).

**What is place-based education?** Place-based education goes beyond simply embedding local knowledge of place. Sobel (2005) describes it as:

The process of using the local community and environment as a starting point to teach concepts in language arts, mathematics, social studies, and other subjects across the curriculum. Emphasizing hands-on, real-world learning experiences, this approach to education increases academic achievement, helps students develop stronger ties to their community, and creates a heightened commitment to serving as active, contributing citizens. Community vitality and environmental quality are improved through the active engagement of local citizens, community
organizations, and environmental resources in the life of the school (p. 7).

John Dewey (1959) supported similar aspects of place-based education in his work arguing that walls had grown between schools and the communities and that they need to be more permeable (Smith & Sobel, 2010). Smith (2002) states “educators who ground their curriculum in place are now offering alternative approaches to schooling” (p. 588). This addresses John Dewey’s aspirations of a classroom with no walls. Place-based education can create learning environments proving that students can exercise leadership and address dilemmas within the scope of their own influence.

Smith (2002) also argues that place-based education does not always “require the elimination of nonlocal knowledge so much as the simple inclusion of local. From this vantage point, teachers can then direct their students to the regional, national or international interest” (p. 588). Place based education demonstrates in obvious ways how school activities can connect to students’ lives in and outside of a school setting.

**Design principles for place-based education.** Smith (2002) argues that place based education by nature is specific to certain settings making generic curricular models in appropriate for the most part (Smith, 2002, p. 587). Similarly, Sobel (2008) provides examples of place based curriculum approaches with the use of seven design principles that can be used as design components for curriculum development when generic curricular will not suffice (p. 20). Sobel (2008) highlighted that this is a similar approach to how Howard Gardener identified a set of intelligence in children. He has identified seven play styles and argues that “regardless of socioeconomic status, ethnicity, or ecosystem, children play in similar ways when they have safe free time in nature” (p. 20). Garner thus challenges the reader that if you spend any time outside observing students in a safe, woodsy playground, you’ll find them doing one of seven play
styles: “(a) making forts and special places; (b) playing hunting and gathering games; (c) shaping small worlds; (d) developing friendships with animals; (e) constructing adventures; (f) descending into fantasies; (g) and following paths and figuring out shortcuts.”

Although Sobel (2008) does not support these play styles directly, Sobel (2008) does state, “there are evolutional reasons why children do all of these things” (p. 20). Each of these play styles manifested in a different way in each principle and are described with a principle title and short description:

**Principle one: adventure.** “Environmental education needs to be kinesthetic, in the body. Children should stalk, balance, jump, and scamper through the natural world. Activities with a physical challenge component speak directly to children via the mind/body link” (p. 21).

**Principle two: fantasy & imagination.** “Young children live in their imaginations. Stories, plays, puppet shows, and dreams are preferred media for early childhood. We need to structure programs like dramatic play; we need to create simulations in which students can live the challenges rather than just study them” (p. 24).

**Principle three: animal allies.** “Brenda Petersen said, “In our environmental wars, the emphasis has been on saving species, not becoming them” (1993). If we aspire to developmentally appropriate science education, the first task is to become animals, to understand them from the inside out, before asking children to study them or save them” (p. 29).

**Principle four: maps and paths.** “Finding shortcuts, figuring out what’s around the next bend, following a map to a secret event. Children have an inborn desire to explore local geographies. Developing a local sense of place leads organically to a bioregional sense of place and hopefully to biospheric consciousness” (p. 34).
Principle five: special places. “Almost everyone remembers a fort, den, tree house, or hidden corner in the back of the closet. Especially between ages eight and eleven, children like to find and create places where they can hide away and retreat into their own found or constructed spaces” (p. 38).

Principle six: small worlds. “From sand boxes to doll houses to model train sets, children love to create miniature worlds that they can play inside of. Through creating miniature representations of ecosystems, or neighborhoods, we can help children conceptually grasp the big picture. The creation of small worlds provides a concrete vehicle for understanding abstract ideas” (p. 45).

Principle seven: hunting & gathering. From a genetic perspective, we are still hunting and gathering organisms. Gathering and collecting anything compels us; searching for hidden treasure or the Holy Grail is a recurrent mythic form. Look at the success of “Where’s Waldo?” How do we design learning opportunities like treasure hunts? (p. 50).

These seven design principles can be intertwined, and using more than one is encouraged by Sobel (2008). Incorporating two or three principles is even more powerful than just one (p. 21). They complement each other very well and are only separated into principles one through seven for the ease of understanding and presentation.

Summary of Place-Based Education. Smith (2002) highlights that “place-based education has the potential to transform the very nature of schools” (p. 594). Similarly McInerney, Smyth, & Down (2010) state what is missing for this transform:

Without detracting from the merits of PBE, we believe that it should be regarded as one of a number of pedagogies that have the potential to promote civic engagement, democratic practices, an ethic of care for others and the
environment, and the fostering of values that are largely absent from individuals and utilitarian approaches to schooling. It is more than a case of ‘not putting all the eggs in one basket’. Rather it recognizes that a primary focus on ‘place’ does not necessarily encompass all the elements that make for critically engaged forms of learning. (p. 13).

For example authentic place based education is frequently associated with experiential education (Semken & Freeman, 2008).

**Experiential Education**

An ancient Chinese saying that is often a good reminder to instructors when diving into curriculum design is “What I hear I forget, what I see I remember, what I do I understand” (Howden, 2012, p. 43). In other words, the physical experience of learning is fundamental if instructors are to truly transfer students’ understandings. This approach is generally referred to as experiential education (Howden, 2012).

The terms experiential learning and experiential education have often been used interchangeably. Often there are numerous misunderstandings between the terms experience learning as well as experiential education within the literature (Itin, 1999). To address these misunderstandings, a review of the definition of experiential education follows.

**Defining experiential education.** The notion of experiential education is not simply defined by “learning by doing” although this is often how the literature refers to it (Kolb, 1984; Kraft 1986; & Itin, 1999, p. 91). Chickering states “experiential learning occurs when changes in judgment, feeling, knowledge or skills result for a particular person from living through an event” (Chickering, 1976, p. 63) In addition the *Association for Experiential Education* (1994) defines experiential education as, “a process through which a learner constructs knowledge, skill,
and value from direct experiences” (p. 1).

This definition is further described by the *Association for Experiential Education* (2000) in twelve different principles, including three that are directly connected to student learning:

(a) Experiential learning occurs when carefully chosen experiences are supported by reflection, critical analysis, and synthesis, (b) the results of the learning are personal and form the basis for future experience and learning, (c) Opportunities are nurtured for learners and educators to explore and examine their own values (p. 5).

Similarly Chickering (1986) and the *Association for Experiential Education* (2000) definitions state similar attributes.

**Experiential learning cycle.** Experiential education is deeply rooted in educational theory, and often outdoor educators use experiential education “as a way of learning in the outdoors” (Adkins & Simmons, 2002, p. 3). Kolb established the most popular model of experiential learning (Cano, 2005) “by melding the educational theory of “Lewin (cyclical feedback processes), Dewey (cyclical with integration of judgment, impulse, observation, knowledge, and purpose) and Piaget (assimilation of events and experience from the world into existing concepts and schemas) in order to formulate a experiential learning with the student’s subjective experience at the forefront” (Kolb, 1984 as cited in King, Goodkin & Chan, 2012, p. 25).

Experiential learning cycle can typically involve four steps: (a) concrete experience, (b) observation and reflection, (c) abstract conceptualization (conclude/learning from the experience), and (d) active experimentation (Petkus, 2000 as cited in King, Goodkin & Chan 2012, p. 25). As a field of practice, experiential education is vast in descriptions and educational
theory. Stehno (1986) found similar aspects as Kolb in the experiential learning cycle. Itin (1999) found that after reviewing seven models of experiential learning, there were four common elements found similarly to Kolb experience learning cycle. These include (a) action that creates an experience, (b) reflection on the action and experience, (c) abstractions drawn from the reflection, and (d) application of the abstraction to a new experience or action” (p. 91).

In experiential education students can become actively involved in their own learning rather than in traditional education (Cano, 2005). Reflection is often the identifying element to experimental education. For instance “students are monitored and receive feedback on their performance and thinking; permitting reconstruction of problems and designing new approaches” (Moore, 1983 as cited in Miller, 2001, p. 13). Typically experiential learning programs can include different components such as in-classroom, work components, or experiences in the natural world (Miller, 2001).

**Concluding experiential education.** So, why include experiential education in programs? The answer is straightforward, as Miller (2001) explains; it promotes “real learning by students. It is not just work experience for the sake of experience, but a way to provide a connectedness between theory and practice” (p. 13). Itin (1999) builds on Millers (2001) explanation stating that experiential education requires “the learner to take initiative, make decisions and be accountable for the results” (Adkins & Simmons, 2002, p. 3).

Organizations are increasingly relying on teams to complete work using a team approach. Experiential learning “provides a framework for understanding and managing the way teams learn from their experience” (A. Kayes, C. Kayes & Kolb, 2005, p. 350). An experiential education approach to team learning can be successful as teamwork can take many forms in personal and professional lives.
Collaborative Instructional Strategy

Tinto (2003) states “despite [of] recent innovations, it remains the case that most students experience universities as isolated learners whose learning is disconnected from that of others” (p. 1). Over the past decade there has been a surge of interest in teamwork experience and skill building educational settings. Prevalently used is a collaborative learning approach. Randolph (2000) states this approach “not only does a better job of engaging all learning styles, but also does a better job of preparing students for the real world where teams are in the norm in modern organizations” (p. 120). As it has been practiced in different educational subjects such mathematics, science, social studies, and languages (Oxford, 1997).

**Defining collaborative learning.** Collaborative learning can be defined as a “group learning activity organized so that learning is dependent on the social structure exchange of information between learners in a group and in which each learner is held accountable for his or her own learning and is motivated to increase the learning of others” (Oxford, 1997, p. 443). Various studies have demonstrated that collaboration is beneficial; such benefits can include “improving social relations or increasing students’ motivation” (Jeong & Chi, n.d.).

**Benefits of collaborative learning.** Collaborative learning also seems to have varying benefits among students when some are giving help and while others are receiving help from their peers. Webb, Troper & Fall (1995) found that the process of giving explanation may encourage explainers to clarify or reorganize material in a new way, recognize and fill in gaps in understanding, recognize and resolve inconsistencies develop new perspectives, and construct more elaborate conceptualizations than they would when learning material themselves (p. 406). Students help each other by filling gaps in their understanding, correcting
misconceptions and strengthening connections between new information and previous understandings (Webb, Troper, & Fall, 1995). Fellow students may be particular good sources of help because they may comprehend student understanding and misconceptions better than the teacher. This in turn can direct other students’ attention to the relevant features of a problem that they do no understand, which helps to explain concepts in familiar terms (Brown & Palincsar, 1989; Nodding, 1985; Vedder, 1985; Vygotsky, 1981).

Webb, Troper & Fall (1995) state that collaborative learning has also shown to “increase the incidence of explaining in groups. They could also be used to encourage students to formulate explanations of how to solve a problem after they receive help” (p. 421). Although Jeong and Chi (Year) argue that “these benefits are not universal and vary across the task and individual students, students seem to learn better or solve more problems correctly when they collaborate with other people” (n.d.).

**Cooperative verse collaborative.** A common practice is to treat cooperative and collaborative learning the same; each has developed special connotations and classroom applications. Oxford (1997) states that cooperative as compared with collaborative “is considered more structured, more prescriptive to teachers about classroom techniques, more directive to students about how to work together in groups” (p. 443). This is suggestive to what Olsen & Kagan (1992) argue that the definition of cooperative learning is a “group learning activity organized so that learning is dependent on the socially structured exchange of information between learners in groups and in which each learner is held accountable for his or her own learning and is motivated to increase the learning of others” (p. 8).

In contrast, the concept of collaborative learning “derives from different intellectual roots”, as supported in its definition according to Bruffee (1993) where “collaborative learning is
a acculturative process that helps students become members of the knowledge communities whose common property is different from the common property of knowledge communities they already belong to” (p. 3). Where as Qually and Chriseri-Strater (1995) describe it as “reflexive dialog, a knowing deeper than reason” (p. 111). This is reflective of its roots in theoretical, political, and philosophical issues such as the nature of knowledge suggest Oxford (1997). As collaborative learning is much more than just small group work, Oxford (1997) states that it “acculturates learners into knowledge communities” (p. 444). Oxford (1997) then argues that cooperative learning, “enhances cognitive and social skills via set of know techniques” (p. 444).

**Concluding collaborative learning.** Christen (2009) found that incorporating teamwork experiences for students develops “soft skills such as collaboration, customer satisfaction, and cross functional leadership that are important attributes of many 21st century jobs often do not find a place in the fact-based pedagogical approaches that still dominate many classrooms” (p. 28).

Randolph (2000) offers collaborative learning as an “example of the many ways to better engage more types of learning and reach a higher level of learning according to Bloom’s taxonomy” (p. 120). The standards have changed to make collaborative learning relevant to education as “being a team player has become a requirement and leadership skill rather than a role” (Paice & Heard, 2003, p. 758) in students professional lives.

**Summary of Findings**

The literature review serves as a primary resource for informing the development of the REC. Specifically, it is important to understanding and supporting the desired results by intertwining together instructional approaches to create meaningful learning experiences (Wiggins & McTighe, 2010). Key findings from the literature review stated the definitions of the
desired results and instructional approaches while also addressing the differences and similarities of interchangeable words. For example, under instructional strategies, experiential education and experiential learning were often used interchangeably.

In addition, complementary aspects of each of the areas to the REC that were established in the review paralleled the historical aspects of youth corps educational development. The literature review also supported how desired results and instructional approaches connected or shared similar theory and practice with one another, such as the principles of design developed by Sobel (2008) in place based education. The only remaining question for the researcher after reading other scholarly work revolved around application of this theory into practice. How does a curriculum developer or a practitioner implement a balanced approach to such educational theory? This relates to this research because it is key to understand this during the development stages of the REC. The Methods section of this research paper detail the process of developing the REC in Chapter Three.
Chapter 3
Methodology

Introduction

The purpose of this research is to strengthen the curriculum design and enhance the educational practices of the Resource Education Curriculum (REC) within Yellowstone Youth Conservation Corps (YELL-YCC). Seventeen, one-hour lessons were developed to be piloted in 2013 and ultimately replace the previous REC.

Research Questions

This research was guided by the following two research questions: (1) what are the understandings, essential questions, and skills that define the conceptual foundations that are central to the YELL-YCC REC? (2) How do place-based, experiential education, and collaborative learning instructional strategies support the teaching of the YELL-YCC REC?

The research involved collection of data through two phases. It was crucial to divide the data collection and the development of the REC into two phases to identify the connections and relationship between the curriculum design and the enhancement of educational practices used in developing the REC. The first phase involved interviewing four current environmental educators with the purpose of gaining an understanding of their experiences and knowledge because the literature base was limited in addressing the research questions. The second phase addressed the practices and processes used to develop the REC. Although these phases are addressed separately, there is overlap between the interviews and the process and practice used to develop the REC.
Phase One: Interviews

Introduction

While an extensive literature review provided valuable insights into research questions; a large gap in the field of environmental education needed to be addressed. These gaps were tackled using in-depth interviews with environmental educators for the purpose of gaining an understanding of their experiences.

Population. The volunteer participants were selected from a pool of environmental educators that attended the 2012 North American Association for Environmental Education (NAAEE) Conference in Oakland, California. Approximately 700 professional environmental, conservation and outdoor educators and practitioners (North American Association for Environmental Education, n.d.) attended from North America, Japan, Canada, and United Arab Emirates (A. Simmons, personal communication, April 22, 2013). This population was chosen as the application pool because of the unique diversity, sizable knowledge base of educators, and their accessibility within the time frame of this research. The requirement for interview participants was having a minimum of two years of environmental education experience.

Participants. Four participants from California, Colorado, and the District of Columbia volunteered to participate. Each participant will be described individually as expertise and experiences were diverse.

In 2009, John received a prestigious award for outstanding service in Environmental Education.

Kirsten, the second participant, has worked as an environmental educator since 1986. Kirsten is currently the Managing Director and Branch Manager at Beaver Ponds Environmental Education Center located in Colorado. Kirsten has a B.A. in Parks and Recreation from the University of Wyoming and a M.A. in Wilderness Ecosystem Planning from Colorado State University. After college Kirsten became a facilitator for the Division of Wildlife and Colorado State Forest Service presenting teacher workshops for over 20 years. Kirsten is also a trail crew leader and stewardship advisor for Volunteers for Outdoors Colorado program.

Amtchat, the third participant, has worked as an environmental educator for approximately ten years. As a Washington D.C. native, Amtchat formally worked for the Student Conservation Association for seven years as the outreach and education coordinator in the district, with a program called D.C. Urban Tree House on the banks of the Anacostia River.

Kevin, the fourth participant, has worked in environmental education since 1981. Currently, Kevin is a curriculum specialist and professional developer in education at the Lawrence Hall of Science in Berkeley California. In spring 2012, Kevin implanted the Better Environmental Education Teaching, Learning, Expertise and Sharing (BEETLES) Project at the Lawrence Hall of Science, to create and provide a series of professional development modules and videos for environmental education program leaders to use.

**Participant Recruitment**

Potential participants were contacted at the NAAEE conference during the opening celebration, keynote presentation, exhibit hall grand opening, and plenary and concurrent sessions. During these times, the researcher had informal conversations about the research with a
random selection of attendees. Additionally, the researcher presented information about the opportunity to participate in research interviews, during a formal 20-minute traditional conference presentation called, *Nerding Out! Developing Curriculum for the Yellowstone Youth Conservation Corps* (Schulte, 2012). Interested participants provided their contact information during these times.

Participant information was gathered until a sufficient number (15) of participants were recruited. To ensure that the criteria were met, a larger applicant pool was drawn upon in case of unintended participant withdraw. E-mail inquires were sent asking for participation and the volunteers were interviewed several weeks later (see Appendix A). The first four participants who responded were selected to participate. Interviews were conducted with the participants during December 2012 and January 2013 after they signed a Participation of Informed Consent Form (see Appendix B).

**Interview Processes**

In an in-depth interview approach, the researcher primarily used open-ended questions with the following guidelines. As suggested by Seidman (2005) the first guidelines of an in-depth interview approach are as follows: (a) participant experience was initially evaluated to establish the context of their experiences. (b) Participant experiences were then evaluated within the context of the research. (c) Participant was then encouraged to reflect on what their experience meant to them. Seidman (2005) also suggests to “not ask for opinions, but rather the details of their experiences upon which their opinions may be built” (p. 18).

By implementing these guidelines into the research questions, an outline of several open-ended questions was created to allow for the emergence of novel themes (see Appendix C for research questions). Each interview participant agreed to the terms and conditions set by the
researcher and were approved by the University of Wyoming Institutional Review Board, (see Appendix D for letter of approval). Participants received the outline of the research questions prior to the interviews, which were conducted via telephone and lasted a minimum of 25 minutes.

Interview data was collected by telephone. Interviews were not transcribed verbatim, though general ideas and themes were entered into electronic documents. Participants were given a copy and the opportunity to strike anything they did not want in the final copy. All participants were also given the option to use pseudonyms. If the participant did not choose to use a pseudonym their name, professional title, and background experience was included.

Qualitative Interview Analysis

While reviewing participant’s responses, the researcher sought to connect general themes and ideas of the environmental educators current practices. For example, when asked what the top four aspects of student understanding were in outdoor settings, all participants discussed the importance of observation. This analysis simply reviewed participant’s responses to recognize similarities and extract ideas that were then applicable to the development of the REC.

Phase Two: Curriculum Development

Introduction

The following is an overview of the practices and processes used to develop the REC in sequential order. In total, there were 12 stages in the process that guided the REC curriculum development.

Understanding the desired intent. This stage included multiple conversations that were conducted with the Youth Program Manager at Yellowstone National Park. The conversations consisted of convergent questions such as: In the context of adaptability, do you see the REC
being something that uses a static or plastic curriculum? These questions were divided into the following areas: the vision for the REC, crew leader traits (as they would be the instructors of the REC; also referred to as staff), and curriculum design. The conversations later moved from a big picture of the REC then to the nuts and bolts of lesson topics. The complete series of questions are addressed in Appendix E.

**Reviewing YELL-YCC program goals.** YELL-YCC’s program goals were reviewed to better understand the broader purpose that they aim to achieve. This review involved identifying the values and principles to better shape the philosophical position so that the new developed REC could complement the program goals.

**Review of the previous curricula.** The next step was to identify the strengths and weaknesses of the 2010 REC. The review consisted of evaluating each lesson and identifying gaps and holes in the 2010 curriculum. Areas for improvement were identified regarding the extent to which the curricula need to develop student understanding and skills, use diverse instructional strategies, and be relevant to place and up-to-date lessons.

**Feedback from YELL-YCC crew leaders.** To better understand the 2010 REC learning, experienced feedback was sought from YELL-YCC crew leaders. This stage included a one-hour informal feedback session that revolved around five convergent questions. For instance, crew leaders were asked: what would you like to see incorporated in the REC? The informal feedback session included six crew leaders from 2012 YELL-YCC, five of whom had been crew leaders in previous years.

**Establishing the Bodies of Knowledge.** Identifying the bodies of knowledge of the REC was the next stage. A brainstorm session was graphed into a chart (see Table 3) with elements that had triggered thoughts for the core subject areas.
Table 3

Core Subject Areas with Elements

<table>
<thead>
<tr>
<th>Knowledge</th>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td>Communication, Risk Management, Styles</td>
</tr>
<tr>
<td>Community &amp; Culture</td>
<td>Meaning, Ecological Correlation, Individuality</td>
</tr>
<tr>
<td>Service &amp; Stewardship</td>
<td>Stewardship Project Competence,</td>
</tr>
<tr>
<td>Wilderness</td>
<td>Land Ethic, Leave No Trace, Simple Living</td>
</tr>
<tr>
<td>Scientific Literacy</td>
<td>Scientific Processes, Multiple Perspectives</td>
</tr>
<tr>
<td>Eco Literacy</td>
<td>Ecological principles, Natural &amp; Cultural Resources</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Complex Systems, Reactions, Systems Thinking</td>
</tr>
</tbody>
</table>

Note. Core Subject Areas with Elements. The bodies of knowledge were derived from understanding the desired intent and a review of YELL-YCC program goals.

Table 3 was presented to the Youth Program Manager at Yellowstone National Park to aid in the selection of the bodies of knowledge. This assisted in the next stage where the desired results of participants learning experience in each core subject area were identified.

Developing student understandings, knowledge, skills, and essential questions. This is where the desired results in the context of each body of knowledge (i.e. leadership or sustainability) were identified. This included the student understanding, knowledge, skills, and essential questions. Guided by the suggestion of Wiggins and McTighe (2005), questions including, “(a) What understandings are desired? (b) What essential questions will be considered?” and (c)“What key knowledge and skills will [participants] acquire as a result of this [curriculum]?” (p. 17-18) were used to identify desired results. The results were then presented to the Youth Program Manager at Yellowstone National Park to assure that all goals were aligned. This process was revisited multiple times throughout the research.

Determining acceptable evidence. Methods of assessments were then identified. Assessment provides the instructors with insight into students’ rates of progress in
understanding. Doran, Chan, Tamir (1998) suggest that when students have recurring, systematic and regular assessment, they understand their own strengths and capabilities of their learning, as well as identify areas for improvement with the purpose of measuring how well students learn new concepts and skills. Diagnosis, formative, and summative assessments were selected based on the suggestions of Doran, Chan, and Tamir (1998). Assessments were then included in each lesson to meet the desired results of participants learning experiences.

**Identifying desired learning experiences and instruction.** This stage determined the learning experiences and instruction for the purpose of connecting the teaching methods and sequencing the lessons. This incorporated the desired results as a guiding post for selection, without being overly mechanistic. Wiggins and McTighe (2005) suggest that being overly mechanistic would lead to less engaged, incoherent lesson plan development. To better understand what learning experiences were necessary the following question a reflected occurred on: What learning experiences and instruction will enable participants to achieve the desired results? Once determined, the results were then presented to the Youth Program Manager at Yellowstone National Park to determine learning experiences.

**Developing the lesson plan format.** Developing a lesson plan format to provide a consistent organization of the entire REC followed. The first step identified format elements (i.e. background knowledge). This process used examples of environmental education curricula from different resources. For instance, the Project WET curriculum (2000), which is intended for use in both classroom and informal settings, was reviewed. Examples such as this were located through the Internet using the search engine Google. Key components were identified after reviewing 13 lessons. A lesson was then drafted and presented to the Youth Program Manager at Yellowstone National Park, to determine the acceptable format.
**Sequencing the REC progression.** This stage sequenced each body of knowledge (i.e. ecological relationships) into a progression that complemented the desired results. Connections and relationships between each knowledge base needed to be determined. To do this, a mapping process was utilized in Figure 4 titled *Resource Education Curriculum Overview*, to create weekly themes and essential questions. This assisted with addressing the redundancies and gaps that could negatively affect a curriculum.

<table>
<thead>
<tr>
<th>Days</th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Ecological Relationship</td>
<td>Speaker Series</td>
<td>Speaker Series</td>
<td>Speaker Series: Career Session</td>
<td>All Bodies of Knowledge: Emphasizing Stewardship</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Cultural Heritage</td>
<td>Ecological Relationship</td>
<td>Ecological Relationship</td>
<td>Ecological Relationship</td>
<td>All Bodies of Knowledge: Wolf Debate</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Leadership</td>
<td>Stewardship</td>
<td>Leadership</td>
<td>Sustainability</td>
<td></td>
</tr>
<tr>
<td>Thursday</td>
<td>Cultural Heritage</td>
<td>Stewardship</td>
<td>Cultural Heritage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>Leadership</td>
<td>Sustainability</td>
<td>Leadership or Ecological Relationships</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 4.* Resource Education Curriculum Overview demonstrates a coherent curriculum across the YELL-YCC experience.

In Figure 4, the days of the week are found along the x-axis and the week’s progression are found along the y-axis. The lighter gray days represent days where REC are not used and the darker gray day represent speaker series days, where guest speakers attend.

**Developing the lesson plan evaluation.** To better evaluate each lesson of the enhanced REC, a lesson plan assessment was needed. This was essential in identifying YELL-YCC program goals and desired results were and were not being accomplished. This process involved identifying examples of lesson plan assessments through the use of the Internet search engine Google. This review identified key components of lesson assessment. For instance, the
assessment considered the lesson plan clarity of learning outcomes that unified and directed the learning. This assessment acted as a tool in identifying areas of strength and weakness.

**Crowd sourcing the resource education curriculum.** After each lesson was developed, they were crowd-sourced by colleagues, educators, and former YELL-YCC crew leaders. Each was reviewed using track changes to make corrections and comments within the lesson. Each of the 17 REC lessons were sent to two individuals who were identified as being experts or having a passion for the core subject of the lessons. In total 34 individuals received lessons. The researcher then reviewed and incorporated the feedback.

**Limitations**

As with any type of research, this project had several limitations. First, the curriculum does not necessarily lend itself to all within the YCC programs. The REC was created specifically for the YELL-YCC and is unique to the Greater Yellowstone Ecosystem. In addition, this may limit its usability for other Youth Corps, although it may be adapted and serve as a model framework for other Youth Corps.

Second, it has potentially unreliable information, as many of the documents were not peer-review. These included government documents, reports, and organizational websites. To avoid this, an examination of the document’s quality along with checking multiple resources for the same information was conducted to find a consensus in the information.

Third, the interview process is an area of limitation as the interview questions where rooted in the participants’ experience, training, and education. If the participant lacked these experiences, responses did not reveal significant data.

Finally, this research did not align with the newly released (2013) Next Generation Science Standards (Achieve, 2013), which were developed through a collaborative, state-led
process. However, this was not within the scope of the current research.
Chapter 4
Results

Overview

The Resource Education Curriculum (REC) is an educational resource developed for the Yellowstone Youth Conservation Corps (YELL-YCC) for high school aged youth, taught by YELL-YCC staff. The curriculum was created to be used outdoors. These lessons and activities are supported by research that combines a review of educational literature and interviews with experts in the field of environmental education. This chapter provides the basis of each area of the REC. These areas are the: bodies of knowledge, desired results, weekly themes, overview of the curriculum progression, lesson plan format, lesson evaluation, as well as the 17 one-hour lessons. For the REC see Appendix F.

Bodies of Knowledge

REC lessons are divided into five bodies of knowledge. These bodies include: leadership, cultural heritage\(^1\), stewardship, ecological relationships, and sustainability. Each body of knowledge contains topics or themes related to Yellowstone National Park (refer to Figure 5).

Desired Results

Incorporated under the bodies of knowledge are the desired results of the REC. These specific educational goals fall into the following categories: student understandings, knowledge, skills, and essential questions (refer to Figure 5).

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\(^1\) The term Cultural Heritage encompasses the tangible and intangible representations of the past and the future cultures; that are relevant to Yellowstone National Park.
Weekly Themes

The YELL-YCC program operates in four and a half week summer sessions, with a weekly theme and essential question guiding each week (refer to Table 4).

Overview of the REC Progression.

Each body of knowledge (i.e. ecological relationships) was sequenced into a progression that complemented the desired results, reducing redundancies and gaps in the REC (refer to Figure 6).

Lesson Format

Each lesson plan in the REC curriculum follows a carefully prepared format. The purpose of this format is to provide consistency throughout the REC that is easily understood for instruction. The format elements of the lesson plans include: (a) title, (b) overview of the lesson, (c) learner outcomes, (d) the area, relating to the bodies of knowledge that are presented in the REC, (e) background, (f) getting ready, (g) suggested procedure, including: instruction, transitions, and embedded assessment of each activity with recommend units of time, (h) conclusion, including: youth outcomes, connections, and applications, (i) assessment check ins, recognized by a symbol similar to this (D1), (j) staff notes, (k) references, (l) handouts (refer to Table 5).

Lesson Plan Evaluation

In order to pinpoint the strengths and weaknesses of the REC in meeting YELL-YCC program goals and desired results, a lesson plan evaluation was created to evaluate the different aspects of the lesson such as the plan clearly addresses and communicates learning outcomes, which unify and direct learning (see Figure 7).
**Figure 5. Resource Education Curriculum Desired Results**

<table>
<thead>
<tr>
<th>Bodies of Knowledge</th>
<th>Desired Results: Understanding, Knowledge, Skills, &amp; Essential Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leadership</td>
<td><strong>Youth will understand:</strong></td>
</tr>
<tr>
<td></td>
<td>- Leadership within group dynamics.</td>
</tr>
<tr>
<td></td>
<td>- A diverse range of effective leadership styles and roles.</td>
</tr>
<tr>
<td></td>
<td>- The power of skillfully applying communication strategies.</td>
</tr>
<tr>
<td></td>
<td><strong>Youth will know…</strong></td>
</tr>
<tr>
<td></td>
<td>- How to employ conflicts resolution through active listening.</td>
</tr>
<tr>
<td></td>
<td>- How to exemplify adaptability and resiliency.</td>
</tr>
<tr>
<td></td>
<td><strong>Youth will be able to…</strong></td>
</tr>
<tr>
<td></td>
<td>- Articulate goals, inspires vision and contribute to crew success</td>
</tr>
<tr>
<td></td>
<td>- Practice sound judgment and decision-making skills to enhance their leadership.</td>
</tr>
<tr>
<td></td>
<td>- Demonstrate awareness of self, others and place</td>
</tr>
<tr>
<td></td>
<td><strong>Essential questions</strong></td>
</tr>
<tr>
<td></td>
<td>- What are the top three characteristics of a competent leader?</td>
</tr>
<tr>
<td></td>
<td>- What roles does communication play in leadership?</td>
</tr>
<tr>
<td></td>
<td>- In your personal view, what characteristics differ in an effective vs. an ineffective leadership?</td>
</tr>
<tr>
<td></td>
<td>- Which leadership characteristics do you posses? Or would like to work on?</td>
</tr>
<tr>
<td></td>
<td>- What does high performing team look like?</td>
</tr>
<tr>
<td>Cultural Heritage</td>
<td>Youth will understand:</td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td></td>
<td>• The significances of protecting our nation’s cultural resources and heritage.</td>
</tr>
<tr>
<td></td>
<td>• The connection between the National Park Service Mission and present day management.</td>
</tr>
<tr>
<td></td>
<td>• The connection between the National Park Service Mission and action (i.e. present day management).</td>
</tr>
<tr>
<td></td>
<td>• The historical significances of Yellowstone National Park.</td>
</tr>
</tbody>
</table>

**Youth will know…**

- Why the National Park Service manages cultural resources
- Basic historical concepts, events, and people of Yellowstone National Park.
- Different historical perspectives of Yellowstone National Park
- How management practices have changed over time.

**Youth will be able to…**

- Identify cultural resources of Yellowstone National Park
- Explain the goals of protecting our nation’s cultural resources and heritage.
- Articulate the dual purpose of the National Park Service Mission

**Essential questions**

- What have I learned that can inform my own cultural heritage?
- In what ways have other cultures contributed to Yellowstone National Park’s cultural heritage?
- How does the National Park Service address a dual mission purpose?
- How do historical concepts, events, and people from Yellowstone’s past influence the present and future of the Park?
Stewardship

Youth will understand:

- How to transfer stewardship knowledge and skills from one setting to another. E.g. from Yellowstone National Park to their own community.
- The application of service learning principles to their local communities.
- How reflection tools can expand the analysis of a problem.

Youth will know…

- The positive and negative implications, of each stewardship project.
- The diversity of careers available in the National Park Service.
- The responsibilities of youth and staff involved on a stewardship project.

Youth will be able to…

- Analyze different points of view to gain an understanding of multiple perspectives.
- Investigate potential careers available through the National Park Service.
- Apply stewardship ethics while living and learning in a community.

Essential questions

- What did Yellowstone National Park gain from our stewardship project?
- Why is this work important in relation to the Park Service Mission?
- What careers would I like to explore?
- What have I gained from my stewardship projects?
- What reflection tools are helpful to me in exploring who I am?
- What skills and knowledge can I bring to my crew and our stewardship project?
<table>
<thead>
<tr>
<th>Ecological Relationships</th>
<th>Youth will understand:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Ecological processes and systems and natural history.</td>
</tr>
<tr>
<td></td>
<td>• Fundamental geological concepts and processes.</td>
</tr>
<tr>
<td></td>
<td>• Abiotic and biotic factors are interrelated.</td>
</tr>
</tbody>
</table>

**Youth will know…**

- Basic abiotic and biotic functions of an ecosystem.
- Basic natural history of flora and fauna.

**Youth will be able to…**

- Articulate ecological and conservation issues.
- Skillfully use scientific practices in different settings
- Demonstrate observation skills through listening, exploring and journaling.

**Essential questions**

- What is the relationship between humans and nature?
- What are the interacting components of an ecosystem?
- How are species interdependent and interrelated?
- How do organisms adapt to changes in their environment?
<table>
<thead>
<tr>
<th>Sustainability</th>
<th>Youth will understand:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• The dynamic nature of social, economic and ecological changes over time.</td>
</tr>
<tr>
<td></td>
<td>• All systems function because of variety.</td>
</tr>
<tr>
<td></td>
<td>• How natural and human communities form our environment.</td>
</tr>
<tr>
<td>Youth will know…</td>
<td>• Personal actions have effects beyond immediate reactions.</td>
</tr>
<tr>
<td></td>
<td>• All organisms and systems have balanced cycles.</td>
</tr>
<tr>
<td></td>
<td>• System parts are connected through larger patterns.</td>
</tr>
<tr>
<td>Youth will be able to…</td>
<td>• Show a commitment to sustainable practices at local and global scales.</td>
</tr>
<tr>
<td></td>
<td>• Recognize the interconnection and interactions between the social, the economic, and ecological community.</td>
</tr>
<tr>
<td></td>
<td>• Effectively practice sustainable decision-making.</td>
</tr>
</tbody>
</table>

**Essential Questions**

- What factors influence a sustainable community?
- What can people learn from natural systems to improve our common future?
- What is your responsibility to yourself, your community, and the world?

*Figure 5.* The REC is divided into five bodies of knowledge, including: leadership, cultural heritage, stewardship, ecological relationships, and sustainability. Each body of knowledge contains specific educational goals, which are then divided into the following categories: student understandings, knowledge, skills, and essential questions.
Table 4

*Resource Education Curriculum Weekly Themes*

<table>
<thead>
<tr>
<th></th>
<th>Week 1</th>
<th>Week 2</th>
<th>Week 3</th>
<th>Week 4</th>
<th>Week 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Themes</strong></td>
<td>Connecting to Place</td>
<td>The Only Constant in this Place is Change</td>
<td>Exploring Perspective</td>
<td>Building Relationships</td>
<td>Transferring the Learning</td>
</tr>
<tr>
<td><strong>Essential Questions</strong></td>
<td>How do we explore our connection to this place?</td>
<td>What are the driving forces in this place?</td>
<td>What factors influence perspective?</td>
<td>How do we function symbiotically in this place?</td>
<td>How have I been empowered by these experiences?</td>
</tr>
</tbody>
</table>

Note. The YELL-YCC program operates in two separate four and a half week summer sessions, each session is guided by a weekly theme and essential question of the REC. Each weekly theme is the main idea that connects all of the lessons of a specific week.
**Figure 6. Overview of the Resource Education Curriculum Progression**

<table>
<thead>
<tr>
<th></th>
<th>WEEK 1</th>
<th>WEEK 2</th>
<th>WEEK 3</th>
<th>WEEK 4</th>
<th>WEEK 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>Speaker Series</td>
<td>Speaker Series</td>
<td>Speaker Series</td>
<td>Speaker Series</td>
<td>Speaker Series</td>
</tr>
<tr>
<td>Tuesday</td>
<td>Ecological Relationships #1: What is the Story Here?</td>
<td>Ecological Relationship #2: Geology Shapes the Landscape</td>
<td>Ecological Relationship #3: Clark The Nutcracker Story</td>
<td>Ecological Relationship #4: Up in Smoke!</td>
<td>Ecological Relationship #5: Wolf Reintroduction</td>
</tr>
<tr>
<td>Wednesday</td>
<td>Cultural Heritage #1: Voices from the Past</td>
<td>Stewardship #1: Connecting to the Land</td>
<td>Leadership #3: Judgment &amp; Decision Making</td>
<td>Sustainability #2: The Big Ideas of Sustainability</td>
<td>Stewardship #3: Reflection-Transference</td>
</tr>
<tr>
<td>Thursday</td>
<td>Leadership #1: Understanding Leadership Styles</td>
<td>Cultural Heritage #2: Yellowstone in Time</td>
<td>Stewardship #2: Thinking Like a Mountain</td>
<td>Cultural Heritage #3: It’s a Dilemma-You Decide</td>
<td></td>
</tr>
<tr>
<td>Friday</td>
<td>Leadership #2: Communication with Clarity</td>
<td>Sustainability #1: Perspective on Sustainability</td>
<td>Leadership #4: Peer Coaching Finding Resolution</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 6. Each body of knowledge and lesson is sequenced into a progression that complements the desired results, reducing redundancies, and gaps of the REC in the YELL-YCC programs. Light gray days indicate days the REC is not taught, because of training or program closure. Dark gray days indicate speaker series days.*
Table 5

*Lesson Plan Format*

<table>
<thead>
<tr>
<th>Format Elements</th>
<th>Format Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title</td>
<td>The name of the lesson</td>
</tr>
<tr>
<td>Overview:</td>
<td>An overview of core content instructed in the lesson plan.</td>
</tr>
<tr>
<td>Learner Outcomes:</td>
<td>This refers to what youth will learn from the lesson. For example the youth will: (a) increase their self-awareness of their default leadership styles. (b) Understand that different leadership styles are valid and that each has strengths and weaknesses.</td>
</tr>
<tr>
<td>Area</td>
<td>Relates to the bodies of knowledge that are presented in the REC. These areas can include leadership, cultural heritage, stewardship, ecological relationships, and sustainability.</td>
</tr>
<tr>
<td>Background</td>
<td>This refers to key information for instructing the lesson or is additional information. The purpose of the background will be noted in each lesson.</td>
</tr>
<tr>
<td>Getting Ready</td>
<td>This refers to the materials required, preparation, and location. If one of these elements is not included, consider it non-essential for the lesson.</td>
</tr>
<tr>
<td>Suggested Procedure</td>
<td>This refers to the heart of instruction of the lesson. This can include instruction, transitions, and assessments to each activity with recommended unit of times.</td>
</tr>
<tr>
<td>Conclusion</td>
<td>This refers to the activities that conclude the lesson with youth outcomes, connections, or applications for the lesson.</td>
</tr>
<tr>
<td>Assessment Check Ins</td>
<td>This refers to the assessments throughout the suggested produces. They can be recognized by this symbol (D1). For instance (D1), the D refers to diagnostic assessment and the 1 refers to the number of each assessment. Some lessons have more than. Each of these symbol correlate to a description under the Assessment Check In’s this includes the purpose of the assessment.</td>
</tr>
<tr>
<td>Staff Note</td>
<td>Refers to a mixture of helpful hints, predicted outcomes of activities, and suggests for adapting different activities.</td>
</tr>
<tr>
<td>Reference</td>
<td>This refers to the resources that were used or adapted to create the lesson.</td>
</tr>
<tr>
<td>Handouts</td>
<td>This refers to the additional resources that are included in the handout. These are typically handed out to youth.</td>
</tr>
</tbody>
</table>

*Note.* Each lesson plan in the REC curriculum follows a carefully prepared format in order to provide consistency throughout the REC that is easily understood during instruction.
Figure 7. A lesson plan evaluation was essential in pinpointing where YELL-YCC program goals and desired results that were and were not being accomplished.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5: Outstanding</td>
<td>Clear, concise, additional resources available, no changes needed.</td>
</tr>
<tr>
<td>4: Excellent</td>
<td>All there and clear.</td>
</tr>
<tr>
<td>3: Satisfactory</td>
<td>Everything is present.</td>
</tr>
<tr>
<td>2: Fair</td>
<td>Missing several components</td>
</tr>
<tr>
<td>1: Poor</td>
<td>Missing many components</td>
</tr>
<tr>
<td>0: Not included</td>
<td></td>
</tr>
</tbody>
</table>

### Assessment Criteria

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5: Outstanding</td>
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</tr>
<tr>
<td>0: Not included</td>
<td></td>
</tr>
</tbody>
</table>

**Lesson plan clearly addresses and communicates learning outcomes, which unify, and direct learning.**

**Comments:**

Lesson plan clearly addresses core competence such as youth understandings, knowledge, skills, and essential questions.

**Comments:**

Lesson plan addresses logistics (timing, hiking, materials, etc.) and context (population, location, resources, etc.).

**Comments:**

Lesson plan provides a sequence of activities including transitions between ideas/topics to provide a clear progression of learning.

**Comments:**

Lesson plan incorporates place as an educational tool through intentional content and activities based upon core competence.

**Comments:**

Lesson plan has appropriate timed diagnostic, formative, and summative assessment opportunities.

**Comments:**

Lesson plan incorporates a variety of educational strategies and theories.

**Comments:**

Lesson plan is appealing and engages youth higher-level thinking.

**Comments:**

Lesson plan encourages youth to take responsibility for their own learning.

**Comments:**

Lesson plan is organized and formatted in a comprehensive manner.

**Comments:**

**Overall Score**

*Figure 7.* A lesson plan evaluation was essential in pinpointing where YELL-YCC program goals and desired results that were and were not being accomplished.
Chapter 5
Discussion

Introduction

The purpose of this research was to strengthen the curriculum design and enhance the educational practice of the Resource Education Curriculum (REC) within Yellowstone Youth Conservation Corps (YELL-YCC). Seventeen, one-hour lessons were developed to replace the 2010 REC. This chapter discusses the considerations that influenced the development of the enhanced REC including: factors that informed the REC development, research implications, future research recommendations, and conclusions.

Factors that Informed REC Development

To develop the YELL-YCC REC, information was gathered from multiple sources to include the perspectives of all stakeholders. These perspectives included interviews with environmental educators, crew leader feedback, crew leaders’ prior knowledge, and logistics. This discussion is sequenced in this order.

Interviews. Participant interviews played a key role in the development of the REC. The two main emerging categories were (a) student understandings gained from teaching in an outdoor setting, and (b) instructional strategies that are utilized for teaching in outdoor settings. Overlap occurred in these two categories with the interview participant responses. In the following section, these categories and subsequent themes are presented with quotes from participants to reemphasize the findings (see a summary of the findings in Table 6 titled Core Categories and Subsequent Themes with Quotes).
Table 6

**Core Categories and Subsequent Themes with Quotes**

<table>
<thead>
<tr>
<th>Student Understandings Gained From Teaching in Outdoor Setting</th>
<th>Quotes From Interview Participants:</th>
<th>Instructional Strategies Utilized for Teaching in Outdoor Settings</th>
<th>Quotes From Interview Participants:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observation</strong> “Teaching people how to observe is a way that they will personally connect with and remember. By doing this, you are helping people learn how to be in nature and how to fall in love with nature. One of the most useful definitions of love I’ve ever encountered is: sustained compassionate attention” (John).</td>
<td><strong>Inquiry</strong> “I don’t stand up there and lecture. . . (my students) develop critical thinking skills through inquiry”. For example, inquiry can be used through the use of water sampling to monitor wetland water quality” (Kirsten).</td>
<td><strong>Discussion</strong> “If you don’t use discussion and you’re a teacher, you are [teaching] at a lower level. And if you want to be a great teacher you have got to learn to lead discussion and its messy and it challenging” (Kevin).</td>
<td></td>
</tr>
<tr>
<td><strong>Interconnectedness</strong> “Interconnectedness of organisms with the nonliving environment and with each other, . . . (and the) cycle of matter and the flow of energy through ecosystems” (Kevin).</td>
<td></td>
<td><strong>Moving Away From Fun Game</strong> “We [as educators] think we’re teaching food webs and the kids are actually playing tag. When you sit down and debrief and explain how this relates … [they] don’t really remember that and formulate it into understandings, because we were playing tag” (John).</td>
<td></td>
</tr>
</tbody>
</table>
**Student understanding.** The first category that emerged from the interview was student understandings. These subsequent themes included observation, interconnectedness, and respect.

*Observation.* John supported observation skills. As a seasoned environmental educator, John found that observation skills were important for student understanding in his teaching and described how this evolved in his lessons. In the past, John focused on teaching students about topics like life cycles. John stated that he was interested in, “(teaching) about biogeochemical cycles. I think it’s important that people understand the water cycle, that they understand the nitrogen cycle, the carbon cycle.” To this end, John had very clear teaching objectives. However, in reflection, John believes that this approach “really misses the mark”.

What John emphasized in his current teaching is facilitating student’s personal connections with nature, and he suggested that one way of accomplishing this is by teaching students how to observe. John notes that educators often assume that students know how to make observations. John explains that,

> Teaching people how to observe is a way that they will personally connect with and remember. By doing you are helping people learn how to be in nature and how to fall in love with nature one of the most useful definitions of love I’ve ever encountered is: sustained compassionate attention.

According to John, sustained compassionate attention is the ability to “focus and observe deeply to maintain your attention”. He stressed that this is a type of attention and was the “first and most important suggestion” before teaching a lesson on the water cycle.

*Interconnectedness.* Kevin supported interconnectedness. Kevin highlighted that in terms of content, the main focus (is) adaptations, evolution and ecosystems.” Kevin noted that in regard to the latter, it is important for students to understand the “interconnectedness of
organisms with the nonliving environment and with each other, . . . (and the) cycle of matter and the flow of energy through ecosystems.”

Kevin highlighted an important point that, “even a lot of environmental educators have misconceptions around this topic themselves.” For instance, “even the people that are arguing about climate change, they often don’t understand the carbon cycle.” Kevin discussed his teaching approach to teaching basic ecosystem principles that apply to complex topics.

…I feel like if I can help kids understand the carbon cycle a little bit better, and even if I don’t talk about climate change, … that can help them to understand the issue better…. We are doing some climate change, but in an outdoor science school setting it is really hard to talk about global [concepts], like plate tectonics and climate change….

Kevin elaborated on this latter point, “when you’re outdoors (students) can’t see the world, whereas when you’re in a classroom you can see digital photos and have other opportunities maps and things like that and images of the world to look at.” Thus, he highlighted the importance of considering global issues, such as interconnectedness on small scales in the outdoors, are taught.

Similarly, Amtchat found that teaching interconnectedness on a small scale was helpful when teaching about watersheds. Amtchat used watersheds as a foundation for teaching in outdoor settings and noted, “watersheds [are used] because [of] how it connects everybody together and ties ecosystem pieces together [including] the land, water and the people”. Amtchat stressed that watersheds are a common element that connected them. Amtchat emphasizes that he “always [teaches] the system first before … looking at human interactions.” In this way, the bigger concepts of watersheds showed that interconnected related to the students’ lives.
*Respect.* Kirsten highlighted that, “respect for each other and nature, and … what is out there” is the most important student understanding to her teaching. Amtchat also spoke of the importance of students’ understanding environmental ethics, including elements of their “personal health as well as environmental health”. Amtchat uses the “Leave No Trace Principles” as a lens in regard of the latter.

**Instructional Strategies.** The second category that emerged from the interviews was instructional strategies. The subsequent themes included inquiry, discussion, and moving away from fun games.

**Inquiry.** Inquiry refers to a pedagogical method that emphasizes constructivist ideas of learning. Inquiry-based learning is “not singular construct but rather a range of approaches that are form on a continuum” (Miranda, & Hermann, 2012). It covers a range of approaches to learning and teaching.

Banchi and Bell (2008) suggest that there are four levels of inquiry-based learning in science education: confirmation inquiry, structured inquiry, guided inquiry and open inquiry. In addition, *scientific inquiry* is the process of developing an explanation of a question by testing, investigating and collecting data that will either support or refute your original explanation of your question (Hanauer, Jacobs-Sera, Pedulla, Cresawn, Hendrix, & Hatfull, 2006). These definitions are important, as interviewees Kevin and Kirsten explained the types of inquiry they focused on in their teaching.

Kevin stated the most important instructional strategies techniques included “making explanations from evidence, making observations, and asking questions . . . are . . . [important] processes [and] skills that are crucial to anything in science and falling in love with the outdoors.”
Kirsten emphasized the importance of observation skills or learning the basics of observation. She noted that it was from this place of respect and observation that her students began to “identify things”, such as plants and animals. This was accomplished through what she termed, “scientific inquiry”; though she spoke of it more as an instructional strategy she enjoyed using. “I don’t stand up there and lecture… [My students] develop critical thinking skills through inquiry”. For example, successful minds-on inquiry opportunities could be created when she used these key instructional strategies to teach a typical “cookbook” activity such as a water sampling to monitor wetland water quality.

**Discussion.** Kevin emphasized the importance of discussion, and said that it was “crucial for kids to make sense of things.” Kevin noted that in both classrooms and Environmental Education [outdoor settings], students are not given the opportunity to discuss. He noted that there is “research (saying) that discussion is so crucial” to students’ understanding, but teachers are afraid of the students getting out of control or wondering how they will know that students are on task when we are in small group discussion.” Kevin said this is similar in outdoor settings; he has observed that many naturalists do not use discussion while teaching in the field. Kevin stressed, “This is appalling, considering its importance…. When it comes to science, a lot of naturalists look at science as information that I must tell them (students) about.”

Kevin stated that the key to engaging students in discussion was to “focus on asking broad questions that have multiple answers”. He explained that a discussion that starts with a narrow question and has only one response is not a discussion and would not result in student understandings. With narrow questions, “the leader has an answer and an interest at what they want the kids to arrive at, a true discussion has to be open”.

Kevin stressed, “If you don’t use discussion and you’re a teacher, you are [teaching] at a
lower level. And if you want to be a great teacher you have got to learn to lead discussion and it’s messy and it’s challenging.”

Moving away from fun game. In the past, John had students playing fun environmental education games like “Bat vs. Moth”. However, through “candid feedback from students,” John discovered that students were not making connections to the larger concepts being taught. John explained,

We [as educators] think we’re teaching food webs and the kids are actually playing tag. When you sit down and debrief and explain how this relates … [they] don’t really remember that and formulate it into understandings, because [they thought] we were playing tag.

John noted that many of these types of games are present in environmental education programs and noted he had moved away from this approach.

Implications from the Interviews

This qualitative research added breadth and depth to the researchers’ understanding of student-desired results. This knowledge gained influenced the selection and progression of the REC. For example, each interviewee felt that the skills used to make observations in the outdoors were key for students to make a greater connection to the outdoors. The first lesson in the Ecological Relationships unit titled, What is the Story Here? (Chapter 4) used observation as the cornerstone for the four lessons found under the ecological relationships body of knowledge. Each of the following lessons progressively builds students’ skills in observation. The third ecological relationship lesson titled, Clark the Nutcrackers Story, included an activity in which students create macro and micro drawings by observing a plant or an animal.

The second ecological relationship lesson titled Geology Shapes the Landscape, (Chapter
4) addressed concerns that Kevin highlighted. He mentioned, “teaching in an outdoor science school setting is really hard to talk about global things, like plate tectonics, and climate change and global issues”. This was incorporated into Yellowstone’s geological story in the REC.

Yellowstone’s physical landscape is an example of how geologic processes work on a planetary scale. “It has been and is currently being created by many geological forces” such as active volcanic, hydrothermal and earthquake systems (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p.43), creating a very geologically complex system and robust geological history. Teaching in a outdoor setting with a very geologically complex system with robust geologic history is challenging. The solution to this challenge was identified in Sobel’s (2008) place-based design principles for educators. These different principles are manifested in students different play styles outdoors, and seven principles were developed, one of which is titled “small worlds”. Small world can be described as follows:

From sand boxes to doll houses to model train sets, children love to create miniature worlds…. Through creating miniature representations of ecosystems, or neighborhoods, we help children conceptually grasp the big picture. …[and provide] a concrete vehicle for understanding abstract ideas (p. 45).

The small worlds principle assisted in the development of the lesson titled Geology Shapes the Landscape, (Chapter 4). Students develop small worlds to understand the geological process of Yellowstone. The lessons discussed are a few examples of how these interviews greatly contributed to the development of the YELL-YCC REC.

Feedback from 2012 crew leaders. Some of the 2012 season crew leaders provided feedback used for incorporating new, diverse instructional strategies and identifying specific lesson topics. They made the following suggestions: (a) incorporate storytelling to convey
historical events to engage students, (b) foster creativity in students by using techniques such as sketching (c) emphasize transference of learning from students YELL-YCC experience back to their communities (The important of this is highlighted by Howden (2012) who stressed that if instructors really want to transfer students understandings, the physical experience of learning is fundamental), (d) incorporate multiple perspectives of stakeholders on conservation related issues, (e) emphasize leadership styles and skills development, and (f) address different learning styles.

This feedback from crew leaders played a key role in the selection of the lessons used in the REC. For instance, 2012 crew leaders suggested the incorporation of storytelling and the use of creativity techniques. These two suggestions were considered when developing the third ecological relationships lesson titled Clark the Nutcrackers Story (Chapter 4). This lesson engages students by imagining they are on the Lewis and Clark Expedition through storytelling using original excerpts from the Lewis and Clark Journals to discover an unknown species (“The Journals of the Lewis and Clark Expedition”, 2005). The students then take a different perspective and critique the account that Clark made of the species to lead into a sketching activity of discovering their own unknown species.

**YELL-YCC staff prior knowledge.** YELL-YCC Staff’s (i.e. the instructor of the REC) experience and knowledge ranged from being novices to experts in understanding the REC’s five bodies of knowledge. This created an imbalance in the knowledge and skill levels of the instructors. This was addressed in the REC by including background knowledge sections in each lesson plan. The background section covered information that was essential to understand the topic before instructing the lesson with the intent of narrowing the gap between novice and expert instructors.
The background information strived to balance introductory information and specific information about a topic. This material in intended help to ensure that crew leaders feel secure in what they are instructing and provide very specific information related to Yellowstone National Park that helps engage crew leaders’ sense of place while teaching. For instance, the background section and suggested procedure of the lesson titled, *Yellowstone in Time*, was specifically focused on the history of Native Americans, trappers, and explorers in Yellowstone National Park. It is assumed that most crew leaders would not have a strong knowledge base in this area because this history is very specific to Yellowstone. To support instruction, this lesson used student-directed learning. Saltman (2012) argues that when students manage their own learning, they become more engaged and invested. This lesson in designed to engage student’s imagination by role-playing historical figures in Yellowstone National Park by conducting interviews with one another while in character. Handouts of each historical character are provided to assist with character development. This lesson provides students with the different historical perspectives that influenced Yellowstone National Park’s history without being simply a list of historical facts and information.

**Logistics.** The REC is integrated into all work and recreational activities. However, a minimum of five hours of the workweek is dedicated to formal lessons. This may happen on the trail as the crew leader and students pause to engage in an hour-long lesson about fire ecology. Since, taking time in the middle of a workday can be logistically challenging, both time constraints and locations were considered.

**Time constraints.** A shortage of time available to engage in a stewardship project or lesson emerged as a factor when considering that each lesson is one-hour and is taught during the workday. Often crew leaders are transferring their attention from the stewardship projects to a
REC lesson and then back to the stewardship projects, with limited time to prepare for instruction of that lesson.

To accommodate this factor each REC lesson requires approximately ten minutes for lesson preparation. This includes scanning the lesson, comprehending the suggested procedures and in some rare instances physically setting up the lesson. In one example, the fourth ecological relationships lesson titled, *Up in Smoke!* (Chapter 4) uses short activities that allow students to direct their own learning by making decision and thinking critically while crew leaders review the next procedure in the lesson. Saltman (2012) highlights that, at the core of student directed learning (SDL), decision-making helps “students’ focus on what is discoverable on their own about the subject matter in order to foster critical and creative cognition” (p. 5).

**Location.** The REC is often taught in different locations around the park. For instance, in 2012, all of the participants in YELL-YCC were assigned and divided into multiple stewardship projects that were located across Yellowstone National Park as shown in Figure 8.

While a variety of work project locations is a great way for many participants to see Yellowstone National Park, but it creates a challenge because the locations of the stewardship projects are not consistent. Smith (2002) states that students tend to disengage when they see little relationship between what is being taught and what they find in their surroundings. To minimize this challenge, lesson topics were selected that could be taught anywhere in Yellowstone National Park.
Figure 8: Stewardship Project Locations (referred to as work project) locations in Yellowstone National Park in 2012 season. The orange circles represent the stewardship projects completed in the first session and the purple circles represent the second session projects (Reprinted from “Yellowstone Youth Conservation Corps 2012 Season Summary” 2012, p. 8).

This was especially important when considering lessons that included Ecological Relationships. There were a few exceptions to this consideration, where additional resources were pulled to assist in the instruction of the lesson. For example, the fourth Ecological
Relationships lesson titled, *Up in Smoke!* (Chapter 4) focuses on fire ecology. Fire ecology can be a concept that is difficult to instruct when students cannot see the effects of fire ecology on the landscape (Smith, 2002). Through a process of gathering information on the fires in Yellowstone National Park, it became clear there were many areas that had been impacted by fire. Figure 9 is a map of fires visible from the road, and Figure 10 is a map of historical fires from the 1988 fires.

![Figure 9](image.png)

Figure 9 compares the fire perimeters on this map with those of the 1988 fires. So far, the large fires of the 21st century are burning in areas largely unaffected by the 1988 fires. Research shows that areas of stand-replacing fires can affect future fire behavior for up to 200 years.

When comparing Figure 10, the historical fires of 1988, to the fires that are visible from the road, fires burned in areas largely unaffected by the 1988 fires. The YELL-YCC stewardship
projects found in Figure 8 occurred in or near the fire areas. These maps are included in the fourth Ecological Relationships lesson titled, *Up in Smoke!* (Chapter 4) to support YELL-YCC staff in choosing a location that is close in proximity to a stewardship project site. The *Up in Smoke!* lesson is one example of how locational challenges were addressed in the REC.

**Research Implications**

As noted in the statement of the problem, there were deficiencies noted in the 2010 REC in four areas: clear participant understanding and skills, diversity of instructional strategies, out-of-date content, and a need for stronger participant connections to place. The reviewed literature and interviews with a sample of four expert environmental educators provided supporting evidence that the researcher addressed the deficiencies in the enhanced REC.

In addition, this research provides a model framework for one way to develop educational curriculum in Youth Corps that impacts participants’ understanding and skills in natural and cultural resources and sustainability. Most importantly, the results of this study provide an example of how Youth Corps educational practices can push the boundaries of formal education by engaging youth in practices that are not encountered in a typical classroom environment (Price et al., 2011).

The REC is important to the growing field of Youth Corps, as the literature review revealed limited research about Youth Corps, particularly in the area of educational development. This research is important in that it will add to this growing body of knowledge.

**Recommendations for Further Expansions of the REC**

As suggested by the literature review, as far as I know, this research is the first of its kind. The results in the recommendation section are intended to guide further research and development of the REC.
Curriculum as a living document. By regarding the REC as a living document, it can continuously be updated to meet the needs of participants and the YELL-YCC program goals in the years to come. This may be accomplished by seeking feedback from YELL-YCC staff and participants.

REC instructional training. Because a curriculum is only as good as the instruction provided by the staff, focusing on REC staff training will be key to accomplishing the goals of YELL-YCC. Investing in training components such as demonstrating instructional strategies, teaching in outdoor setting, and implementing assessment techniques should be the focus of REC training.

Weekend educational experiences. The REC could be expanded to include weekend discussion questions or lessons that connect the previous weekly theme with weekend recreation. In this way, weekend educational experience linked to the REC weekend recreational experiences, could create more opportunities for students to build their understandings.

Instructional strategies handbook. An instructional strategies handbook could be developed to supplement the REC. Many REC lessons include instructional strategies, but do not go into depth (i.e. learning theory behind the use of a think-pair-share instructional strategy). A handbook would allow staff the opportunity to explore a strategy, answer questions about strategy, and assist in honing their instructional skills. In addition, this could aid new and returning staff in developing their understanding of instructional strategies at a deeper level.

Additional team builders. The REC could be expanded to include team-building activities. Often returning YELL-YCC staff bring with them a “toolbox” of team building activities at hand that they can use at any moment during the program (Fuhrmann, personal communication, March 29, 2013), so this resource would provide new staff with access to team
building activities that would otherwise be difficult to learn in a short time frame.

**Student pre- & post assessment.** It will be important to evaluate the effectiveness of the program. This could be done by conducting specific research regarding outcomes of student’s educational experience as it relates to the REC with a focus on assessing the desired results of the REC. Using pre- and post-assessments would illuminate the strengths and weakness of the REC and provide further insight into the audience that the REC serves. It could also provide perspectives on the short- and long-term effects of the REC on student understandings.

**Conclusion**

This new REC has the potential to make positive changes on the lives of the students that it serves in the YELL-YCC. The YELL-YCC will continue to provide participants with educational experiences and opportunities for learning, as this is an essential part of the YELL-YCC program goals which include: (a) cultivating tomorrow’s leaders; (b) building stewardship ethics in the youth of America; and (c) diversifying the NPS workforce (“Yellowstone Youth Conservation Corps 2012 Manual”, 2012). This is why it is essential that staff are equipped with educational resources such as the REC to meet program goals.

As the Youth Corps continue to engage youth in practices that are not encountered in a typical classroom environment (Price et al., 2011), the importance of research and developing these educational resources will become more relevant. This study highlights the importance of providing research-based educational curriculum to enhance participant’s overall experience. This ultimately impacts participants’ understanding and skills in both natural and cultural resources and sustainability. This research provides the groundwork for continued research in Youth Corps on the development of these types of educational resources.
References


Association for Experiential Education. (2002). What is the definition of experiential education? Boulder, CO: Association for Experiential Education.


Appendix A

Recruitment E-Mail

Hello XXXXX,

I would like to introduce myself again. My name is Kristen Schulte; we met at the NAAEE Conference in Oakland. I am contacting you with regard to my thesis work, the development of an Educational Curriculum for the Yellowstone Youth Conservation Corps.

I would like to invite you to help build this curriculum by participating in a research interview. As you have been selected for the value of your thoughts and insights from your experience and expertise in Environmental Education. The interview will consist of four to six questions, which will be e-mailed to you ahead of time, and will not extend over the length of an hour.

This information will be utilized to inform the development of my thesis research, ultimately strengthening the design, and practice of the curriculum.

Please e-mail me with your level of interest and any questions you may have, as I would like to start scheduling interviews for the first two weeks of December.

Thank you for your time, I look forward to hearing from you.

Sincerely,

Kristen Schulte
Appendix B

Participation Informed Consent Form

RESEARCH STUDY

DESCRIPTION OF THE RESEARCH I’m Kristen Schulte a graduate student at the University of Wyoming in the Masters of Natural Science Education with a dual major in Environment & Natural Resources. I am working under the supervision of Dr. Ana Houseal. I would like to invite you to participate in a research study. You have been selected as a possible participant in this study because you have more than two years of experience in the field of environmental. By doing this study I hope to gain an insight into some of the best practices in the field of service learning and environmental education. I am interested in this as it pertains to curriculum concepts, instructional strategies and curriculum development in an Resources Education Curriculum for the Yellowstone Youth Conservation Corps.

WHAT YOU WILL BE ASKED TO DO If you decide to participate, you will be asked to answer four-six open-ended research questions via schedule phone interview, not excited 60 minutes. The interview will be recorded and your ideas, general themes, and quotes will be transcribed. You will be sent a copy of the interview document and will be given the opportunity to strike anything they do not want in the final copy. These questions will be structured around a sample overview of a curriculum structure I have designed. You will also be given the purpose and definition of the Yellowstone Youth Conservation Corps via e-mail around the following research questions.

1. What are the key concepts, processes and skills that support the teaching of the development of service learning curriculum?

2. How do these three instructional strategies support the teaching of the development of service learning curriculum?

3. How do these two theatrical curriculum designs support the teaching of the development of the service-learning curriculum?

RISK AND POSSIBLE BENEFITS There will be minimal risk involved in this study. It is possible a subject may become embarrassed or uncomfortable about not knowing enough or wanting to provide more knowledge to an interview question. Therefore the risk is minimal and not greater than that of ordinarily encounters in daily life conversations. If you feel uncomfortable in any way, you may ask at any time to be removed from the study. There is no cost for participating. This study is intended to further knowledge in the fields of environmental education and conservation corps in the area of environmental awareness curriculum design. It may also provide you with the opportunity for you to think critically about your own work in the field of environmental education. A direct research benefit to you will be access to the completed research.

PROTECTION OF PRIVACY AND CONFIDENTIALITY
It is optional to use pseudonym or not. If you choices to not use pseudonym, your name, professional title and background experience will be included in the research study. If you choice to use pseudonym, your information and interview responses will be kept confidential using a code procedure so that your not identified by name. Only the researcher and her advisor, Dr. Ana Houseal will have access to this information in its raw form. Data will be stored in a digital format on a password protected hard drive and stored for five years and destroyed in May 2018.

CHOOSING TO BE IN THE STUDY  Your participation is voluntary. Your decision to participate or not in this study will not affect any of your personal or professional relationships. If you decided to participate, you are free to withdraw your consent and discontinue participation at any time without any repercussions.

CONTACT INFORMATION  If you have any questions about the study, please feel free to contact, Kristen Schulte, (636) 288-5570, at the University of Wyoming, or her University of Wyoming major advisor, Dr. Ana Houseal, at (307) 766-4925. If you have questions regarding your rights as a research subject, please contact the University of Wyoming IRB Administrator at 307-766-5320. You will be offered a copy of this form to keep.

CONSENT  Your signature indicates that you have read and understand the information provided above, that you willingly agree to participate. You may withdraw your consent at any time and discontinue participation without penalty, that you will receive a copy of this form, and that you are not waiving any legal claims.

If you wish to remain anonymous, please write below ANONYMOUS.  

____________________________________________

Sign for consent to be audio recorded: ________________________________

Consent to participate: ____________________________________________

Printed name of participant _________________________________________

Participant signature _____________________________________________

Date ______________________
Appendix C

Research Questions

Participant Information:

1. Could you please spell your preferred name?

It is optional to use a pseudonym. If you choose to not use a pseudonym, your name, professional title, and background experience will be included in the research study. If you choose to use a pseudonym, your information, and interview responses will be kept confidential by using a code procedure so that you are not identified by name.

1. What would you prefer?
2. What is your professional title?
3. How did you come to participate in environmental education field (or use organizational name)?

Purpose & Definition:

PURPOSE
The purpose of my research is to strengthen the design and practice of a resource education curriculum in the Yellowstone Youth Conservation Corps. In addition I hope this will serve as a model framework for Youth Corps at a national level, in support of the 21CSC accreditation standards.

DEFINITION
A Youth Corps is a residential youth employment program that is guided by a program mission and service learning concepts, through hands on service to our public lands.

Research Questions:

1. What are your top four student understandings or skills that you focus when teaching in outdoor settings?
   a. Are there topics, themes or content that you specifically focus on?
2. What are two of your favorite instructional strategies you use in outdoor settings?
   a. Are there any that you now know of that you would have used?
3. Are you familiar with backwards design, i.e. teaching with the end in mind?
   a. Do you use it?
   b. In what ways?
   c. How does it influence the way you design lessons or think about curriculum?
October 19, 2012

Kristen Schulte, Science and Math Teaching Center, University of Wyoming, Wyoming Hall, CAMPUS


Dear Kristen:

The proposal referenced above (proposal received October 3, 2012) qualifies for expedited review and is approved as one that would not involve more than minimal risk to participants. Our expedited review and approval will be reported to the IRB at their next convened meeting February 15, 2012.

IRB approval for the project/research is for a one-year period. If this research project extends beyond October 11, 2013, a request to extend the approval accompanied by a report on the status of the project (Annual Review Form) must be submitted to the IRB at least one month prior to the expiration date. Any significant change(s) in the research/project protocol(s) from what was approved should be submitted to the IRB (Protocol Update Form) for review and approval prior to initiating any change. Per recent policy and compliance requirements, any investigator with an active research protocol may be contacted by the recently convened Data Safety Monitoring Board (DSMB) for periodic review. The DSMB’s charge (sections 7.3 and 7.4 of the IRB Policy and Procedures Manual) is to review active human subject(s) projects to assure that the procedures, data management, and protection of human participants follow approved protocols. Further information and the forms referenced above may be accessed at the “Human Subjects” link on the Office of Research and Economic Development website: http://www.uwyo.edu/research/human-subjects/index.html

You may proceed with the project/research and we wish you luck in the endeavor. Please feel free to call me if you have any questions.

Sincerely, Colette Kuhfuss, IRB Coordinator, on behalf of the Chairman, Institutional Review Board
# APPENDIX E

## Corps Accreditation Standards

### 21ST CENTURY CONSERVATION SERVICE CORPS (21CSC) ACCREDITATION STANDARDS

The 21CSC Accreditation standards are designed to ensure programs have the capacity to meet the desired outcomes for the participants as well as meet the quality and production requirements of resource management partners. The standards listed below illustrate the commitment of the 21CSC to high-impact programming that directly addresses the needs of our communities.

<table>
<thead>
<tr>
<th>Category</th>
<th>Standard</th>
<th>Definition/Qualifier</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Universal Standards</strong></td>
<td>Each 21CSC program applicant must meet all standards listed below and at least one of the endorsement categories to become accredited. These standards may be accomplished in-house or via committed and intentional partnerships.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Capacity/Format Standards</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population served</td>
<td>Youth ages 15-19, and/or Young adults 18-25, and/or Military veterans of recent conflicts up to age 35</td>
<td>Participant capacity</td>
<td>ICC model</td>
</tr>
<tr>
<td></td>
<td>Young adult 20-29, and/or in advanced capacity only, age limits at time of entry</td>
<td>Participant or advanced capacity</td>
<td>ILC model</td>
</tr>
<tr>
<td>Emphasis on Diversity and Inclusion</td>
<td>21st CSC opportunities are intended for all young Americans. 21st CSC programs should promote opportunities to low-income, disadvantaged and underserved populations</td>
<td>Participant recruitment should make deliberate outreach efforts to traditionally underserved communities, including low-income and disadvantaged populations</td>
<td>Further description in appendix</td>
</tr>
<tr>
<td>Term of Service</td>
<td>Minimum of 140 hours of on the ground, hands-on direct service for full-time students and summer only participants.</td>
<td>May include other activities, but 140 hours must be in direct, on-the-ground service</td>
<td>Further described in appendix with examples</td>
</tr>
<tr>
<td></td>
<td>Minimum of 300 hours of on the ground, hands-on direct service for non-full-time student participants</td>
<td>May include other activities, but 300 hours must be in direct, on-the-ground service</td>
<td>Further described in appendix with examples</td>
</tr>
<tr>
<td></td>
<td>Maximum of 3,500 hours of on the ground, hands-on direct service</td>
<td>21st CSC opportunities are transitional and time-bound, not career positions</td>
<td>Further rationale in appendix</td>
</tr>
<tr>
<td>Organization of Work</td>
<td>Crew/team based; and/or Individual or small team based</td>
<td>Groups of participants working collectively and intensely together. Crews/teams are directly supervised by trained and experienced Crew leaders or Conservation professionals</td>
<td>Further described in appendix with examples</td>
</tr>
<tr>
<td>Types of work</td>
<td>Includes significant outdoor activity, and/or Include projects that help young people connect with America’s Great Outdoors</td>
<td>Significant amount of the service takes place in the outdoor environment</td>
<td>Examples in appendix</td>
</tr>
<tr>
<td></td>
<td>Direct service results in the outreach or education of young people to the benefit of public land and water</td>
<td>Examples in appendix</td>
<td></td>
</tr>
<tr>
<td>Limited Exception</td>
<td>Include “hands on” direct impact, and/or May include work that is primarily indoors, that has a clear and direct benefit to public cultural and historical resources.</td>
<td>Examples in appendix</td>
<td>Examples in appendix</td>
</tr>
<tr>
<td>Participant Outcomes</td>
<td>Job skills development</td>
<td>Preparing participants to be successful in the 21st century workforce</td>
<td>Explanation in Appendix</td>
</tr>
<tr>
<td></td>
<td>Community skill development</td>
<td>Participants acquire and utilize service to others and learn to become better resource and community stewards</td>
<td>Explanation in Appendix</td>
</tr>
<tr>
<td></td>
<td>Connection to the natural environment</td>
<td>Participants acquire a greater understanding of the value and management of natural resources</td>
<td>Explanation in Appendix</td>
</tr>
</tbody>
</table>

(Reprinted from United States 21st Century Conservation Service Corps, 2012)
### Infrastructure Standards

See Appendix for clarification on demonstrating Infrastructure compliance

<table>
<thead>
<tr>
<th>Infrastructure Standards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Management</td>
<td>Incorporates institutional best practices Includes organizational governance, accountability structure, staffing, and hiring standards Further described in appendix</td>
</tr>
<tr>
<td>Financial Management</td>
<td>Financial Policies and Procedures reflect general accepted accounting principles Includes financial P&amp;L, insurance coverage, audit history, and overall financial strength Further described in appendix</td>
</tr>
<tr>
<td>Sustainability</td>
<td>Demonstrate Organizational experience Programs must be have two years of corps operating experience. New programs, and existing programs with less than 7 years experience can be accredited in a provisional status, with an emphasis to help them achieve a sustainable model Further rationale in appendix</td>
</tr>
<tr>
<td>Need</td>
<td>Program must demonstrate a need in the area Each accreditation applicant will be asked to provide a statement of need for the geographic area they wish to operate. The National Council will consider this statement of need and emphasize accreditation for programs emerging in underserved areas and/or focusing on underserved populations Further rationale in appendix</td>
</tr>
<tr>
<td>Risk Management</td>
<td>Risk Management policies reflect industry standards and best practices Includes safety P&amp;L, comprehensive trainings, and incident reporting Further described in appendix</td>
</tr>
<tr>
<td>HR and Administration</td>
<td>Committed to Human Resource and Administrative assets Includes HR policies, accurate file keeping, compliance with applicable employment laws Further described in appendix</td>
</tr>
<tr>
<td>Commitment to Program Quality</td>
<td>Commitment to meeting the needs and purpose of the 21st CSC Includes program designed to put young Americans to work on conservation projects, provides pathways for participant development, and encourages a new generation of outdoor enthusiasts Further described in appendix</td>
</tr>
<tr>
<td>Commitment to Project Quality</td>
<td>Ability to meet the technical and logistical needs of 21st CSC resource management projects Includes organizational capacity, properly trained supervisors, and appropriate participant training and support Further described in appendix</td>
</tr>
<tr>
<td>Accountability and Reporting</td>
<td>Will comply with all 21st CSC compliance and reporting requirements Includes signing a Memorandum of shared mission statement that illustrates alignment with the core values of the 21st CSC Further described in appendix</td>
</tr>
</tbody>
</table>

**Pathway Endorsements:** Each Accredited 21CSC operator must meet all standards listed above and at least one pathway endorsement criteria below for their participants. Any particular organization may meet separate endorsement criteria for specific program models, but each 21CSC participant must receive the benefit of one of the four listed endorsement pathways. These pathways can be accomplished in-house or via committed and intentional partnerships.

<table>
<thead>
<tr>
<th>Pathway Endorsements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical/Vocational Pathway Endorsement</td>
<td>Program offers an industry recognized technical or vocational certification Examples include certifications in Chainsaw, Wildland Fire Fighting, Emergency Medical, disaster response, etc.</td>
</tr>
<tr>
<td>Educational Pathway Endorsement</td>
<td>Program offers high school or college credit to participants for their service. Also includes opportunities to earn tuition award for post-secondary education Successful completion results in the award of academic credit or a tuition award to help participant achieve academic goals</td>
</tr>
<tr>
<td>Career Pathway Endorsement</td>
<td>Program includes job shadowing, apprenticeships, job coaching, and/or direct placement/CASE management for participants Successful completion leads directly to post-program job and/or career opportunities</td>
</tr>
<tr>
<td>Youth Development Pathway Endorsement</td>
<td>Program achieves intensive and transformational youth development outcomes Increase in core life skills development, communication, critical thinking, judgment, leadership</td>
</tr>
</tbody>
</table>

(Reprinted from United States 21st Century Conservation Service Corps, 2012)
Yellowstone’s Youth Conservation Corps Resource Education Curriculum

Leadership

Lessons Include:

Leadership lesson #1: understanding leadership styles
Leadership lesson #2: communicate with clarity
Leadership lesson #3: judgment & decision making
Leadership lesson #4: peer coaching—finding resolution
**Leadership Lesson #1: Understanding Leadership Styles**

**Title:** Understanding Leadership Styles  
**Overview:** This lesson encourages youth to discuss the nature of leadership.  
**Learner Outcomes:** The youth will:  
1. Be able to increase their self-awareness of their leadership styles.  
2. Understand that different leadership styles are valid and that each has strengths and weaknesses.  
3. Know how to give others constructive feedback.  
4. Know how to recognize their leadership style and adapt to change better  
5. Know how to receive feedback about their leadership.  

**Area:** Leadership  
**Background:** The following information is used in the suggested procedure and is necessary to instruct this lesson.

On every successful crew, each youth and staff fills a variety of leadership roles in order to achieve the stewardship project goals. There are four types of leadership roles and seven leadership skills as describe by NOLS (National Outdoor Leadership School), which all are equally important.

A. Types of Leadership Roles  
1. Designated Leadership  
   a. Taking responsibility for the group and guiding the crew toward its goals.  
   b. Determining how the crew will achieve the goals.  
2. Active Followership  
   a. Supporting and following the designated leader.  
   b. Participating in crew decision making by giving input and seeking clarity.  
3. Peer Leadership  
   a. The crew works together and supports each other in achieving stewardship project goals.  
   b. Each youth sees what needs to be done and does it.  
4. Self-Leadership  
   a. Each youth takes care of self so he/she can take care of the group.  
   b. Everyone shows personal initiative and character.  

B. Seven Leadership Skills. There are certain skills that will make you a quality leader. These skills are the same — whether you are at YCC or in your home community.

1. Crew Behavior  
   a. Cooperation and conflict resolution, and teamwork.  
   b. Keeping yourself and others motivated.  
   c. Getting along in a crew of very diverse people.  
2. Vision and Action
a. Seeing the possibilities in any situation and finding creative ways to move the crew forward, motivating, initiating, and using crew goals to guide your actions.

3. Communication
   a. Using timely, specific, clear feedback, and listening actively.
   b. Having courage to state what you think, feel, and want.
   c. Trying to put yourself in other people's shoes during conflicts.

4. Judgment and Decision-Making
   a. Situational-appropriate decision-making, using your experience to develop good judgment, and harnessing the strengths and knowledge of other youth to solve problems.

5. Self Awareness
   a. Knowing yourself and your strengths and weaknesses, learning from experience, being aware of your own leadership style and how you influence others, and realizing how your words and actions impact others.

6. Tolerance for Adversity and Uncertainty
   a. Learning to endure, even enjoy, hard work and challenge, adapting to changes, unknowns and turning challenging situations into opportunities.
   b. Using humor to keep things in perspective, and making focused decisions under stress.

7. Competence
   a. Knowledge and skills
   b. Organization and management
   c. Technical ability
(Northhouse, 2013)

Getting Ready:
Materials: Journal and pencil, dry erase board, and dry erase marker, and handouts.
Preparation: Staff should prepare for this lesson by creating two long continuum lines that cross in the middle for the lesson called No-Doze Leadership.

Suggested Procedure:

Leadership Roles and Skills (15 minutes)

The staff will:
1. Ask youth to think about one person who they regard as being a quality leader. Have youth write down four things they feel makes this person a leader (encourage them to think of leaders in their lives).
2. Lead a discussion about the feedback from this exercise - create a collective list together of characteristics that define (at this stage of the lesson) what makes a good leader. (D1)
3. From this discussion and the collective list of characteristics, form a group definition of leadership.
a. For example: Leadership is a process whereby an individual influences a group of individuals to achieve a common goal (Northouse's 2007, p. 3). (F1)

4. Review the four leadership roles and the seven leadership skills (refer to background information for detail on leadership roles and skills)
   a. Encourage youth to think of scenarios when these skills or roles are most appropriate as the background information is reviewed.

No-Doze Leadership (20 minutes)
In this activity youth will have the chance to explore their own leadership styles.

The staff will:
1. Introduce the activity explaining the goals:
   a. “To look at how you relate to others and how you define your position within a group setting. It also allows others to show how they perceive your position within a group setting.”
2. Create a long continuum line (an x-axis) on the ground.
3. The two ends of the continuum are defined as: Water and Wind, which refer to how you are in situations with others and how others perceive you. Pay close attention to the figure in this lesson to correctly complete the exercise.
   a. (Extreme far left side): Water (or some other funny name like “marshmallow” or “amoeba”) - Say out loud the following “I don’t often voice strong opinions, particularly if I think it will cause hurt or be a waste of time. I put others before myself pretty consistently. I’m very flexible. You probably don’t really know where I stand on issues, or what I think about you, unless you ask very fiercely. It’s hard for me to state my own needs.”
   b. (Extreme far right side): Wind (or some other funny name like “pitbull”) “I state my opinion and take stands easily. People know exactly what I think, feel, and want. I’m an open book, and you don’t have to read the words because I tell them to you, especially if you try to cross one of my lines. Fight or flights? Let’s get real-I stay right here and tell it like it is. I don’t have a problem saying “my way or the highway” if need be.
4. Instruct youth to place themselves on the continuum where they perceive themselves to be. *Hint:* Call the exact middle “out of bounds”. Explaining to youth that they need to make a decision. The middle is viewed as not making a decision.
5. **Extension Part 1:** Ask the youth if they are willing to give and receive some information about how others perceive their leadership style in where they have placed themselves on the continuum.
   a. If the youth answer yes, ask those who want to, one at a time, to step out of the line and move people to where they see them on the continuum. Then step back into their last place in line and have someone else take a turn.
   b. It generally works best if people do not feel they need to justify why they moved anyone yet. Use silence or a few words like “I’m going to put you here.”
6. After those who want to have taken their turn moving people, tell everyone to go back to standing in their place of choice.
7. Now without moving from their place in the x-axis (left/right line), next have youth move themselves along a second continuum line (y-axis) created on the ground with the far ends of top and bottom defined as:

8. **Cool cucumber** and **red-hot tamale** refer to how you feel you are internally, yourself in the context of just you. Define the continuum using the following descriptors:
   a. Top- emotionally cool (cool cucumbers)
      i. “I am calm and rational, and I do not get flustered about anything. I even have difficulty getting excited about things most people think are neat and exciting. My emotions are a glassy pond.”
   b. Bottom- emotionally hot (red hot tamales)
      i. “I tell people how I feel about everything. I am angry about social injustice. I cry at sad movies. My emotions are extremely active the perfect storm.”

9. **Extension Part 2**: After youth find their place, other youth can move individuals to how they “see” them, as before in extension part 1.

10. At this point everyone will be standing somewhere in one of four quadrants: Explain each quadrant factors of the continuum in a non-judgmental way or else everyone will want to be on top of each other in the middle.

11. Read the characteristics of each quadrant to the group (see the No-Doze handout).

12. While reading the handout explain that each quadrant has different responses to similar situations. Not everyone in your quadrant would react the same even though they have the same style.

**Discussion of No Doze Leadership** (15 minutes)

1. Explain that if someone is in the far corner of one particular quadrant, it indicates, at least in a certain situation, they are heavily oriented to one role.

2. Discussion questions to pose to the youth: *(F2)*
   a. What are the benefits and drawbacks to this activity?
   b. Have youth sit down with the others in their main quadrant and talk about what it is like to lead from their place. Then have them report this back to the larger group.
   c. Have the youth in quadrant discuss what it is like to follow that style of leadership, what they want more of or less of from that style when leading, and what they like about that style.
   d. Come up with leadership situations where certain functions are critical.

**Conclusion:** (10 minutes) The four quadrants represent key aspects needed in leadership and functional groups. Leaders come from all quadrants. Preferred style is less important than maturity of that style and the ability to move around the quadrants as needed. It is important to lead with a style that fits you, fits the situation, and fits the crew.

1. Have youth set a goal in the area of developing themselves as a leader, provide an example of a goal. Explain to them to be aware of your comfortable quadrants and less comfortable quadrants. This can help you know your strengths and work on your weaker areas, listen to other ways of doing things, try new things, and seek appropriate help. *(S1)*
Assessment Check Ins:

(D1): look at youth prior knowledge and interests in their experience with leadership characteristic. This information will assist the staff in understanding the experiences that youth have had with different leadership styles.

(F1): Provides information on what youth are learning from each other’s leadership experiences at this point of the lesson. This assessment will encourage youth to create a collaborative group definition of leadership to connect all of the youth’s leadership experiences to guide the instruction.

(F2): Provides information on what youth are learning, reflecting, and connecting (i.e. deeper thinking) within their personal leadership style and how they relate to others styles at this point of the lesson. This assessment will provide insight into the degree and depth of their understanding to guide and adjust the conclusion of the lesson.

(S1): Assess what youth have learned and transfers it into their experience at YELL-YCC.

Staff Notes:

No-Doze Leadership:

a. This exercise often acts as a segue for subsequent discussions about such topics as gender and leadership styles, how your role and situations can dictate your style, what style society or YELL-YCC views or prefers as good leadership, whether is it possible to be a good leader if you reside mainly in one quadrant. What happens to leadership styles under stress, etc.

b. Watch the time on this lesson, as you could easily exceed one hour. Or if your youth need some extra prompts, see the discussion questions below.

Other Discussion Questions:

a. How differently do you act in different situations? Could you fit into two different quadrants? Three? All four?

b. Have you changed over time? Did you previously fit into one quadrant more so than you do now? Any specific thing initiate that change?

c. What quadrant would you like most to fit into? What would you have to do to mold yourself into what you want to become?

d. Relating to others: Which quadrant type do you relate to best? Worst? Anyone you just couldn’t work with?

Reference:


1. The lesson plan titled: No-Doze Leadership served as the central activity in this lesson.
This lesson was then modified in the following ways:
- Instructional language was used to match the Resource Education Curriculum.
- The introduction and conclusion are additions to this lesson.


1. The instructional activity served to be an additional example of the lesson titled No-Doze Leadership. This content was then modified in the following ways:
- Some instructional language was used to match the Resource Education Curriculum.


Handouts:

(Reprinted from Doran, 2009).

**ARCHITECTS & ANALYSTS**

*Emphasizes meaning and conceptual functions*

- Information and opinion seekers
- Good at analysis and process observation
- Prefer to make decisions based on facts
+ Prefer as much information as possible before deciding
+ Can come out with totally off the wall solutions, that work
+ Translate feelings and experiences into ideas
Δ Can be slow in making decision or dogged in the facts
Δ Can happily leave most decision to others and focus on only one decision
Δ Have to watch out for non-involvement or unrealistic ideas if they get into their world

- If a leader has this style, honor their need for information while also requesting them to tell you how they will decide or delegate and when.

**Some Affects on Groups**

Architects and analysts are often in the minority but the function is essential. If a group does not pay attention to this area, it will miss out on significant leaning that comes from observation and analysis. This group may also be missing important process steps or other ways to view a situation. Too much of this style in a group and the group may not move on much, because the discussion, laissez-faire attitude and analysis allows opportunity to pass.

**DRIVERS**

*Emphasizes actions and directing functions*

+ Information and opinion givers
+ Decision-making is easy for them
+ Often the keeper of the vision in a group
+ Great at taking a stand, being direct and making things happen
+ Usually not too shaken by critical feedback
Δ Often will urge “let’s decide” as indecision can drive them crazy
Δ Will sometimes decide without input from others and step on toes
Δ Make mistakes when moving too quickly without adequate info
Δ Can come across as too impersonal and lose connection with their group
Δ Have to be careful not to “over-lead” if strongly in this quadrant

- If a leader has this style, be as direct as possible. Bring problems and opinions to them since they expect this.

**Some Effects on Groups**

If a group does not have drivers, they must pick up driver functions or they can fail to meet far-reaching goals. Mature drivers are non-reactionary individuals with much ability in the other quads and help ground a group. When this style is not mature, there may be too much individuality or structure. Turf battles or a lack of member autonomy and collaboration ensue.

**RELATIONSHIP MASTERS**

*Emphasizes caring function*

+ Excellent at building and sustaining community
+ Work well on a team
+ Great at building rapport, consensus, commitment, seeking feedback
+ Support, praise, are concerned
+ Display high regard for other’s wishes, viewpoints, and actions
Δ May not take an unpopular stance if it puts a relationship at risk
Δ Can put so much emphasis on relationship that task and decision-making fall behind
Δ Can forget or down play their own needs, to their detriment

- If a leader has this style, you may need to ask them to be more specific in outlining their expectations. Encourage critical feedback from them and tell them when you want to know what they think and want.

**Some Effects on Group**
You cannot have too much caring and respect as part of your capacity. It is the connective glue that is essential for a functional group. As a leader, it is powerful when combined with other quadrant functions. If it is the only style a group has, the group may not take enough risks or make enough decisions to move forward significantly. The group may also avoid conflict to the extent that there is lack of depth in genuine connection and innovation.

**SPONTANEOUS MOTIVATORS**
*Emphasizes emotional stimulation function*

+ Often voices their ideas and supplies passion to follow those ideas; energizers
+ Great at motivating people as they possess a sense of mission or vision
+ Good at energetic dialogues with other group members
Δ Can be emotionally bound to their ideas; objectivity can be their biggest challenge
Δ Can create a highly emotionally charged climate if they put too much emphasis on challenging others and confronting

- If a leader has this style, know your own stance/position and do not be afraid to voice it. Ask them to give concrete examples to back up their viewpoints.

**Some Effects on Groups**
Spontaneous motivators are often light bulbs. Groups need this function to sparkle, create, prod, stir the pot, and impassion. A group without this style may be functional, but somewhat lackluster. When mature, people with this style can choose to be detached or attached and monitor their emotional involvement. This is highly effective. If too much of this style is present in a leader, or when not mature, a group can be overly reactive, or so impassioned around their ideals, that they loose touch with other realities. Interestingly many charismatic leaders and cult leaders come from this quadrant.
Leadership Lesson #2: COMMUNICATE WITH CLARITY

Title: Communicate with Clarity
Overview: In this lesson youth are introduced to a deceptively but simple and powerful exercise for learning how to work together and communicate in groups.
Learner Outcomes: The youth will:
1. Understand how they communicate within a group.
2. Know the how to use I-language, paraphrasing and VOMP as conflict resolution models.
3. Know how to craft a message for maximum effectiveness.
Area: Leadership
Background: The following information is used in the suggested procedure and is necessary to instruct this lesson.

V.O.M.P. Ventilation, Owning & Empathy, Plan

Ventilation
This is the stage of taking turns airing your feelings and thoughts and making sure you understand what the other person is saying. It is very important that this stage not be skipped by either person and that one person has the floor at a time. Take turns with one person actively listening and paraphrasing, while the other talks. The goal is not to agree or disagree, but to make sure you both understand how the other person views the problem and to express your view. Ventilation does not mean abuse or cheap shots; it means being candid and saying what is going on for you.

Guidelines
a. Be candid and let yourself discover what is really bothering you.
b. Expect to hear a version different than your own.
c. Paraphrase what you think the other person is saying; make sure he or she paraphrases you.

Traps
a. Avoid expressing what is going on just for you. Not accepting the other person’s view of the situation or how she or he feels about it- you don’t have to agree with their personal view of the situation, you just have to be able to say “This is how I’m hearing you view the situation and asking is that correct?”
b. Not accepting how someone expresses himself or herself. We all do it differently (however if it is abusive then you should stop immediately).
c. Sarcasm, angry questions, cheap shots, etc. make it hard to get past ventilation.
d. Focusing only on one person in a situation.

Owning and Empathy
After you have both aired your feelings and thoughts and paraphrased the other person, you move into ownership and empathy. This is the stage where you say what you do that contributes to the conflict and where you imagine what it is like to be in the other person’s shoes.
Guidelines
   a. Own what you believe you actually did or said- not more, not less.
   b. Set your own experience aside for a moment and try to imagine why they reacted to you as they did. Try walking in his or her shoes and let him or her know how you imagine that feels.

Traps
   a. Still needing to vent more- it is important that both of you are in the same stage together, so if one of you is still venting, you both need to go back to the ventilation and paraphrasing stage.
   b. Believing in your total innocence- you usually have contributed something to the problem.
   c. Trying to move to this stage before ventilation is finished so that residue is left for future conflicts.

Plan
   This is the stage where you talk about how things will be different, what each of you wants, your expectations, and what you are each willing to do ‘next time’ to avoid ‘it’ happening again.

Guidelines
   a. Make sure you do this stage! People often do not and then the conflict resurfaces. Keep it realistic, and do not make promises you will not be able to keep.
   b. Expect that you both may slip up occasionally.
   c. Say very clearly what you want. Accept that the other person has a choice whether he or she can give all of that to you. Negotiate. Be honest.
   d. Collaboratively plan and problem-solve.

Traps
   a. Planning before the other stages are done.
   b. Not saying what you are committed to do or change differently or getting a commitment from the other.
   c. Not saying what you want the other to do differently and hearing their response to that.
   d. Thinking that the other person is bad if they cannot give you what you want.

Getting Ready:
Materials: Journal and pencil, and 1 thin, light-weight, 10 foot pole aka the Helium Stick.

Suggested Procedure:

Helium Stick (20 minutes)
The staff will:
   1. Introduce the Helium Stick (have in hand), by saying that this is not a stick, because it is full of helium (act as if the stick is floating out of your hands, be playful). The youths goal is to lower the helium stick to the ground in this activity.
   2. Invite youth to line up in two even rows, facing each other. Present the Helium Stick, a long, thin, lightweight rod.
   3. Ask youth to point their index fingers and hold their arms out.
4. Lay the Helium Stick down on their fingers. Ask the group to adjust their finger height until the Helium Stick is horizontal level and everyone’s index fingers are touching the stick.
5. Again explain the challenge is to lower the Helium Stick to the ground. Here is the catch: Each person’s fingers must be in contact with the Helium Stick at all times. Pinching or grabbing the pole is not allowed – it must rest on top of fingers.
6. Reiterate to the group that if anyone’s finger is caught not touching the Helium Stick at all times, the group will have to restart. (D1)
7. Let the task begin...
   a. Warning: Particularly in the early stages, the Helium Stick has a habit of mysteriously ‘floating’ up rather than coming down, causing much laughter. A bit of clever humorizing can help – e.g. act surprised and ask what are they doing raising the Helium Stick instead of lowering it! For added drama, jump up, and pull it down anytime a youth’s finger is not touching or the group starts to lose control of it!
   b. Extension: If the group starts to become frustrated in their communication or they are a very high functioning group, you can add further difficulty by creating a new rule in the middle of the activity, that either they have to finish in silence or they must choose only one youth to speak, be creative about making this task a challenge, and communication as the key element to complete it.

Debrief the Helium Stick (10 minutes)
Once the group has successfully completed the task, celebrate the group’s accomplishment. Then invite the youth to join in a discussion of what worked and what did not work. (F1)
1. Discussion Ideas
   a. What was the initial reaction of the crew?
   b. How well did the group cope with this challenge?
   c. What skills did it take to be successful as a crew?
   d. What creative solutions were suggested and how were they received?
   e. What would an outside observer have seen as the strengths and weaknesses of the crew?
   f. What did each youth learn about him/herself as an individual?
   g. What other situations (e.g., at YCC, in your community or at school) are like the Helium Stick?
   h. (Required question) What role did communication play in this crew?

Application of Communication (4 minutes)
1. Explain to youth that this task mirrored the communication dynamic of what it is like to have a stewardship project that starts out well, but quickly goes wrong.
2. Ask the youth: Why that might be? (F2)
3. Explain that sometimes the best laid out stewardship projects do not always go according to plan and it may become an area of conflict.

V.O.M.P. Ventilation, Owning & Empathy, Plan (18 minutes)
Using the Helium Stick task as a springboard, for identifying conflict resolution strategies such as the VOMP strategy.

1. Explain that conflict can be defined as differences existing between two people or groups of people which, should they persist, and remain unsolved, serve to keep the parties apart in some way (J. Hall, Telometrics, 1994).
   a. Conflict is a natural part of the human condition. We hold different values, we interpret differently, we make mistakes, and there is not always enough to go around. All these things create the potential for conflict. The manner in which you respond to conflict determines the probability of it being resolved.
2. Explain that two of the best things you can do is deal with a conflict, rather than avoid it is use:
   a. “I”-language and ownership
      i. Central to communication is awareness that your thoughts, sensations, feelings and desires originate inside you. Youth may feel empowered when they switch from saying “You make me mad,” to “I feel mad at you.”
      ii. The purpose of “I”-language is to take ownership. When you perceive in terms of “I”, your experience changes, you recognize that you create your own experience and people “out there” do not do it to you (that way of seeing the world is called blaming).
      iii. This does not mean it cannot be abused. An example of “I”-language abuse is “I feel angry when you act like a jerk.”
3. Give the youth four examples of silly and realistic statements that are NOT I-language form, and ask youth to rephrase them using “I” statements.
4. The second strategy to deal with a conflict is:
   a. Paraphrasing or Active Listening
      i. Active Listening is the key to good dialogue. It includes listening to the other person as well as checking to see how what you said was received. A good listener uses lots of paraphrasing.
      ii. Paraphrasing means checking and clarifying what the other person intended, before responding. There are several types of paraphrasing:
         1. *Parrotting* is repeating back exactly what was said. For example, “OK, you want me to go to the trailhead, pick up your dog from your parents that are visiting, smuggle it into our backcountry site”. It is very useful when someone has asked you to go to the store and, in general, for making sure you understand directions, expectations, and requests. You re-state information in your own words to test your understanding.
         2. *Paraphrasing Plus* is when you paraphrase and then add your own thoughts or intuitions. Use this to pursue the fullest meaning and feelings of the other. It often takes the conversation to another level. Here’s an example of such an exchange:
            a. A: “Ralph should have never become a crew leader.”
            b. B: “You mean he isn’t a very good crew leader?”
c. A: “Oh no, I meant that he has such expensive tastes, that he’ll never earn enough.”

d. B: “Oh, so you think he should have gone into a profession where he could earn more money.”

e. A: “Yep, YELL-YCC just isn’t where he needs to be to pay off the loan on his Ferrari.”

5. Explain that these are important strategies to use, but when a conflict escalates the VOMP Model can serve both people (or groups) to proceed through stages in an order that brings about a high likelihood of a conflict being a positive, creative, and effective process, rather than a destructive or non-effective one.

6. Discuss the VOMP (refer to background information for details). The staff may want to model the different phases of VOMP to engage youth.

Conclusion: (8 minutes) Ask the youth to take a moment to reflect and analyze their own style of communication during conflicts. Have youth identify one area of improvement and what communication or conflict resolution strategy would be important to incorporate (They may use their journals to do this). (S1)

Assessment Check Ins:

(D1): To observe how youth’s behavior and communication styles demonstrate their prior self-awareness of their personal or group communication style. This information will assist the staff in understanding the youth’s individual communication styles.

(F1): Provides information on individual youth experience and reflection of the helium stick activity (i.e. deeper thinking) within the dynamics of a group. This assessment will provide insight into the degree and depth of youth’s self-awareness of their communication style to guide and adjust the instruction of the lesson.

(S1): Assess what youth have learned and transfer it into their experience at YELL-YCC.

Staff Notes:

• **Helium Stick:** How does it work? The stick does not contain helium. The secret (keep it to yourself) is that the collective upwards pressure created by everyone’s fingers tends to be greater than the weight of the stick. As a result, the more a group tries, the more the stick tends to ‘float’ upwards. Youth may be confused initially about the paradoxical behavior of the Helium Stick.
  o Some crews after 5 to 10 minutes of trying may be inclined to give up, believing that it is not possible or that it is too hard. The facilitator can offer direct suggestions or suggest the group stops the task, discusses their strategy, and then try again. Less often, a crew may appear to be succeeding too fast. In response, be particularly vigilant about fingers touching the pole. Also make sure participants lower the pole all the way onto the ground. They key is for the group to calm down, concentrate, and very slowly, patiently lower the Helium Stick –easier said than done.

Reference:

1. The instructional activity content served to be a central activity in this lesson. This content was then modified in the following ways:
   - Some instructional language was used to match the Resource Education Curriculum.


2. The lesson plan titled: Helium Stick served as the central activity in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
   - The introduction and conclusion are additions to this lesson.


   - The instructional activity content served to be as the background knowledge in this lesson. This content was then modified in the following ways:
   - Some instructional language was used to match the Resource Education Curriculum.

Handouts: None
Leadership Lesson #3: Judgment & Decision Making

Title: Judgment & Decision Making
Overview: This lesson illustrates to youth the dynamics of critical decision-making in different scenarios. It highlights how hidden assumptions may drive our decision-making in particular directions.
Learner Outcomes: The youth will:
1. Be able to examine their own decision making style.
2. Understand the impact of the decision making style on the quality of the decision made.
3. Be able to build on each other’s thinking to clarify and deepen their thinking about the decision-making styles.

Area: Leadership
Background: The following information is additional reading for the staff. It is not required to instructing this lesson.

What does Judgment and Decision Making mean? As an example, explain that you are setting up a bear hang in the backcountry and looking for a bear hang that is just at the right height. Finally, you find just the right one, a guaranteed bear safe height, but is it too close to the camp kitchen? Even though your entire group wants to set the bear hang at that location, you have to use your best judgment, check the distance from the camp kitchen, and make a good decision.

Simply defined, decision-making is the process of selecting among alternative choices. A basic decision-making model consists of the following steps:
- Identifying and defining the problem.
- Generating solutions.
- Evaluating solutions.
- Selecting a solution (making a choice).
- Implementing the solution.

Evaluating the outcome: Some decisions can be made slowly over a long period of time, others must be made in an instant. In some situations there is a vast amount of reliable information, in others there is very little. Sometimes we can make our decisions when we are calm and relaxed, other times we must make them when we are under severe stress. In some situations, there may be an optimal solution—which we can identify if we work at it. But many times there is none—we must make a choice and hope for the best. If we are lucky, when we make a poor choice, we can begin the process again and hope for a better outcome.

Getting Ready:
Materials: Journals and pencil, and handouts.
Preparation: The staff must be familiar with the process, direction of the activity, and the introduction of the survival story.

Suggested Procedure:
**Just Decide!** (20 minutes)
The staff will:

1. Begin by presenting the following scenario to the crew: They are traveling together on the first organized attempt to explore the Yellowstone Plateau in 1860 with Captain William E. Raynolds on a military expedition. The late spring snow leaves the Yellowstone Plateau unable to explore. (Although Yellowstone had been thoroughly tracked by fur trappers and tribes, in the view of the nation at large it was really “discovered” by formal expeditions). The wagons that they are traveling in were loaded and packed prior to leaving on the expedition. Thus they all know exactly what is in both wagons. The wagons each contain enough equipment for the group to survive.
   a. The groups are told that they are also familiar with their destination. However, both wagons are stuck and wrecked in a river crossing. The current is strong and the water is cold from the spring mountain runoff. They can safely retrieve items from only one of the wagons because the risk for hypothermia or drowning in saving the other wagon is certain.
2. The participants are instructed to look at the list of items in each wagon and choose just ten survival items. They are to answer 2 questions:
   a. What items will they take out of the wagon?
   b. Which of the two wagons (only one) will they choose?
3. Tell the participants they have only ten minutes to make their selections. **(D1)**
4. When a majority has selected a wagon, or are clearly focused on just one of the lists of items, give a two-minute warning for the groups to wrap up their discussions of the items to take.
5. Stop the discussion and ask those that selected wagon one to raise their hands. Then ask some of those folks to explain what they chose and why. Now ask for a show of hands of those that selected wagon two. Ask them to explain what and why.
6. Let the participants share their choices and thoughts about their items amongst themselves.

**Possible Debrief Questions** (10 minutes) **(F1)**

a. How were decisions made?
b. Who influenced the decisions and how?
c. How could better decisions have been made?
d. Did people listen to each other? If not, why not?
e. What roles did group members adopt?
f. How was conflict managed?
g. What kinds of behavior helped or hindered the group?
h. How did people feel about the decisions?
i. How satisfied was each person with the decision (ask each participant to rate his / her satisfaction out of 10, then obtain a group average and compare / discuss with other groups' satisfaction levels).
j. What have you learned about the functioning of this group?
k. How would you do the activity differently if you were asked to do it again?
l. What situations at work YCC/home/school do you think are like this activity?
Conclude: The staff should conclude the exercise by pointing out that we may have an unspoken assumption about what we are looking for or about the nature of the items that are appropriate. Guide them to the conclusion that it is the underlying question of whether to stay or go

a. Wagon 1: Has items for staying
b. Wagon 2: Has items for travel

**Complete Decision Making** (3 minutes)
Serves as transition from one activity to another.

The staff will:
1. Explain that when we make decisions, we often rely on information that is faulty, irrelevant and incomplete. In our day-to-day lives, we are constantly making decisions—some of which are insignificant and others that have long-term consequences. When we make our decisions, we often do not pay too much attention to the information or thought processes we utilize. Most of us like to view ourselves as informed, responsible, rational, human beings who exercise good judgment. But in reality, when we make decisions we often rely on information that is faulty, irrelevant, and incomplete. We allow our decision-making processes to be influenced both by peer pressure and by our own personal desires, prejudices, and deeply engrained behavior patterns.
2. Explain to youth that they will be exploring how faulty, irrelevant, and incomplete information can effect decision making in two different scenarios.

**Save the Last Word Scenarios** (27 minutes) *(F2)*
The purpose of this activity is to clarify and deepen youth thinking about decision-making. It is designed to build on each other’s thinking, not to enter into a dialogue. Designate a timekeeper to keep the process moving along.

The staff will:
1. Create two equal groups.
2. Hand out the scenarios with the outcomes. Direct youth to read them and silently identify what they consider to be the most significant idea addressed and the best outcome for the scenario by documenting it in their journal.
3. When the group is ready, complete the following:
   a. A group member states what they identified as most significant idea addressed and the best outcome (i.e. 1-4) for the scenario.
   b. The first person says nothing about why they chose that particular point of view.
   c. The other 2 participants each have 1 minute to respond to that idea.
   d. The first participant then has 3 minutes to state “the last word” why they chose that point and to respond to their colleagues based on what they heard.
4. The same pattern is followed until all three members of the group have had a chance to have “the last word”.

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Conclude: (5 minutes) (S1) Ask all of the youth in the entire group to explain what their scenario was about and the outcome that was most favored. Then ask youth if there was something that a group member shared that you did not think of. What was your favorite idea shared in your group? How do these scenarios relate to decision making from the first activity?

Assessment Check Ins:

(D1): observe how youths’ behavior and decision-making styles demonstrate their prior self-awareness of their personal or group decision-making style. This information will assist the staff in understanding the youth s’ individual decision-making styles.

(F1): Provides information on individual youth experience and reflection of the “just decide” activity (i.e. deeper thinking) within the dynamics of a group. This assessment will provide insight into the degree and depth of youth s’ self-awareness of their decision-making styles.

(F2): To observe how youth thoughts and reflections connect with other youth s’ experiences and rationales when applying them to different decision making scenarios. This assessment will provide insight into the degree and depth of their understanding to guide and adjust the conclusion of the lesson.

(S1): Type: Summative-Purpose: Assess what youth have learned by reflecting on their partner discussions transfers it into their experience at YELL-YCC.

Staff Notes:
1. **Just Decide:** The purpose of the activity is to highlight how people frequently have hidden tactics, or unquestioned assumptions when they go into decision-making situations. In this activity, the decision is whether or not the group is going to stay at or leave the wagon wreck site. The two wagons clearly represent these two options without saying so, i.e. wagon one has large bulk items in it and enough building material to construct a shelter. The second wagon has enough lightweight and appropriate materials for traveling quickly and safely to civilization.
   a. The staff should walk around the room and observe how the youth are progressing; you are watching to see when a majority is focused exclusively on one wagon in their discussion. Some will have questions about particular items that may be answered as long as it is done in such a way to not reveal the hidden agenda of the activity. The youth usually spend most of their time talking about specific items and debating how appropriate they are to survival and do not usually openly discuss the “stay or go” question. There is usually one group, sometimes two, that begins to talk openly about staying or going. Keep them under observation without being obvious.
   b. Do not overemphasize that the youth must choose a wagon. It will be obvious during your observations that the youth are focused on one or the other, or are engaged in a discussion about staying or going from the crash site. If you see people jumping back and forth between, you should remind them that they can access only one wagon.
   c. Usually a majority has selected wagon one and their reasons are usually based
on how much water they will need and may include some discussion about making or building things. They may or may not say that they had decided to stay near the river. Do not push for this answer at this point. There is usually only one group that chooses wagon two. They almost always have discussed the issue of surviving as they travel away from the site and head on towards their destination.

d. The debrief questions for both activities are to make sure that youth process what just happened in each activity rather than assuming they have made connections to the youth outcomes.

Reference:


1. The instructional activity content served to be a background knowledge in this lesson This content was then modified in the following ways:
   - Some instructional language was used to match the Resource Education Curriculum.


1. The instructional activity content served to be a within the activity in this lesson This content was then modified in the following ways:
   - Some instructional language was used to match the Resource Education Curriculum.


- The instructional activity content served as the selection list for Wagon one and two handouts in this lesson This content was then modified in the following ways:
- Some instructional language was used to match the Resource Education Curriculum.

Handouts:

Wagon One Items

1. Small Ax
2. Sack of sugar
3. 2 Hammers
4. 5 lbs of Cheese
5. Case of Nails  
6. Fry Pan  
7. Set of dishes  
8. 3 pillows  
9. Barrel of Water  
10. 2 large canvas tarpaulins  
11. Coffee  
12. Sack of Flour  
13. 1Tent  
14. Loaded .45-caliber pistol

**Wagon Two Items**

1. 1 lbs bag of raisins  
2. One 10’ x 10’ plastic tarpaulin  
3. Three 1 qt. canteens of water  
4. A coiled rope  
5. 3 pair of boots  
6. Hunting knife  
7. dried beef  
8. 2 pair woolen mittens  
9. One 1 lb. bag of rice  
10. 2 pillow cases  
11. Animal trap  
12. A small metal box of matches  
13. 2 Snow shoes  
14. Compass and Map
SAVE THE LAST WORD SCENARIOS

Scenario One: No Clear Solution

You are leading a group of ten people on a day hike up Observation Peak in Yellowstone National Park on a Sunday in early August and the weather is sunny and warm. After lunch, two hikers inform you that instead of continuing with the group, they would like to leave early. One of them is an experienced hiker in his seventies who has participated on many group hikes in the park, the other is an inexperienced hiker in her late twenties. You discuss with them the quickest, easiest way out and provide them with a map on which you have outlined their route. The two of them depart and the rest of the group continues the hike.

When you return to the parking lot at the conclusion of your hike, shortly after 3 p.m., you discover the cars of the two hikers parked in the parking lot with the hikers nowhere in sight. The boyfriend of the missing female hiker had remained with the group, and he informs you that his girlfriend had planned to wait in the car until he returned. (You learn that one of her reasons for leaving early was so that the older hiker would not have to walk back alone.) You wait another fifteen minutes, but still the hikers have not appeared. As a leader what should you do?

The problem is that two hikers have failed to return to the meeting location at the expected time. Neither you nor anyone at the scene knows what became of them. They may be lost, one of them may be hurt or ill, or they may simply be slow in walking back.

Outcomes
Alternative approaches to addressing this problem might include the following:

(1) Assume that the two missing hikers are seriously lost or that one of them is hurt or ill, and immediately call the park rangers for help. This would be the safest choice—but not necessarily the most practical. Just because the experienced hiker has participated on many group hikes in the park does not mean that he knows how to navigate on his own. If either of the two were hurt or ill, the victim might require medical attention as soon as possible. But, calling the rangers immediately might be over-reacting. The two missing hikers are not unreasonably late. The weather is warm and dry, and about four more hours of daylight remain.

(2) Assume the missing hikers are either walking very slowly or became temporarily lost, and that they will appear soon. Plan to remain in the parking lot and wait at least an hour before doing anything else. This might be a sensible approach. After lunch, your group proceeded at a relatively fast pace with only brief stops for water. Maybe the two who left early decided to walk slowly and make frequent rest stops. Even if the hikers did get lost, if they studied the map, they might be able to find their way, and they also might encounter other hikers who could give them directions.

(3) Start looking for the missing hikers yourself accompanied by any volunteers. This might also be a sensible approach. As long as you are careful about hiking out only a set distance or amount of time and there is someone to remain behind in the parking lot, this approach might help you solve your problem more quickly than other alternatives. However, if the missing hikers were on an alternate trail or if the search was too lengthy, this process might create additional problems.

(4) Adopt the attitude because these two individuals chose to leave the hike, you are not
responsible for them. This approach would be careless and irresponsible, since the two hikers are obviously missing. One of them is over 70 years old and the other is a very inexperienced hiker.

SAVE THE LAST WORD SCENARIOS

Scenario Two: A Risk/Benefit Approach

You are leading a group of ten hikers in a remote wilderness area called the Thorofare in Yellowstone National Park that is unfamiliar to everyone in the group. The group is on a marked trail when one hiker notices a nearby hill and suggests that it would be fun to “bushwhack” to the top. Four other members of the group think this is a great idea. The hill is well below tree line, and off-trail hiking is permitted in the area. As you survey the steep slope leading to the summit, you notice many rocks and boulders. From the way they are perched, you become concerned that the rocks and boulders might be unstable. The five hikers are eager to get started and they are trying to sell you and the others on their plan. As a leader what should you do?

The problem is that members of your group are proposing a route that you believe might be hazardous. In a situation such as this, evaluating risks, and benefits can greatly simplify the decision-making process.

Outcomes

Approaches to addressing this problem might include:

(1) Solicit everyone’s opinion and if the group is in favor of the excursion, agree to proceed with the assumption that if all are careful, the group can avoid any hazards posed by unstable rocks and boulders. If you had reason to believe the rocks and boulders on the steep slope were unstable, then this approach would be reckless and irresponsible. There would be little or no time for people to get out of the way of falling rocks or boulders, which would be likely to kill or seriously injure anybody in their path.

(2) Mention your concerns to the group and agree to proceed to the foot of the hill where you will then reassess the hazards. This approach might not be viable because even at the foot of the hill, it would probably be difficult for you to determine the stability of the rocks and boulders. Also, once the group began the excursion, people might be reluctant to turn back.

(3) Carefully explain your concerns to the group, stressing that if any rocks or boulders became dislodged, they could easily kill or seriously injure anyone in their path. Emphasize the challenges and benefits of your intended route. In this situation, the third alternative would offer the best solution. The risk of death or serious injury resulting from someone being hit by a falling rock or boulder would outweigh the feelings of satisfaction for the hikers by scrambling up an interesting but untested slope. (Hopefully during its “adolescence” phase, the group adopted a workable decision-making process, and those who originally favored the excursion will accept this as a sensible decision. If not, the leader might need to employ an “authoritarian” style.)
Leadership Lesson #4: Peer Coaching—Finding Resolution

Title: Peer Coaching--Finding Resolution

Overview: This lesson introduces youth to the practice of peer coaching, in addition to refining this skill. Peer coaching can be a great way to work through whatever is troubling you in life, bounce ideas off a trusted thinking partner, and overcome unnecessary stress or worry.

Learner Outcomes: The youth will:
1. Practice their peer coaching skills.
2. Know a tool to use during conflict resolution.
3. Develop awareness of self, others, and place.

Area: Leadership

Background: The following information is used in the suggested procedure and is necessary to instruct this lesson.

Here are some tips to get started at home with peer coaching.

i. Identify a partner you trust.

ii. Your peer coach could be someone in another school, someone on your sports team, or a co-worker.

iii. One critical factor: whomever you choose, you must trust him/her to maintain confidentiality.

Invite them to partner with you as your peer coach. Tell them what you would like to get out of peer coaching, and why you think the two of you would work well together. Schedule a time to meet. Face-to-face meetings can be great, but do not let geographic barriers stop you. Skype video or audio-only calls can be highly effective.

Getting Ready:

Materials: Journals and pencil, glue or tape to put the handout “Balancing Inquiry and Advocacy” in youth journals, and the handouts.

Preparation: Both YELL-YCC staff should practice demonstrating peer coaching before this lesson or have a rough outline of what coaching will look like.

Suggested Procedure:

Peer Coaching (15 minutes)

The staff will:
1. Introduce the concept of Peer Coaching. Ask youth if they are familiar with Peer Coaching? (D1)
2. Define Peer Coaching: A confidential process through which two or more peers work together to reflect on new skills, share ideas, teach one another, or solve problems in the work place, school, or other parts of one’s life.
3. Explain that in this lesson everyone will have an opportunity to practice their peer coaching skills and receive feedback from an observer. By using the following
progression in the conversation between coach and coachee, to assist: (draw this figure on the dry erase board)

4. The roles of each group are described as the following:
   a. Coach: is driving coaching process.
   b. Coachee: Invites a coach to listen.
   a. Observer: Focuses on the coach's behavior during the observation and manages the groups time. Provides feedback to coach at the end of the peer coaching session.

5. Explain the following for each area as you draw them. If needed, refer to the background information to expand any of the following areas.
   a. **Listen**: Find a partner whom you have respect and empathy; clarify roles and goals
   b. **Learn**: Understand, develop the issue; paraphrase; go for concreteness
   c. **Empower**: Confront the issue; use immediacy; minimize self-disclosure
   d. **Recap**: Coachee provides summary
   e. **Action**: Plan, where to next?

6. Suggest the following questions to use throughout these areas
   a. What is the change you want to make? How will it benefit you?
   b. What do you want and feel?
   c. What steps would you take if you had no fear?
   d. What do you know to be true?
   e. What are the resources or help that you will need to succeed?
   f. What are the obstacles that might get in your way?
   g. What accountability will you structure to ensure your success?
   h. What are you willing to do to make this change happen?

7. Staff should then demonstrate with a co-leader the above peer process. Emphasize the incorporation of the sample coaching questions.

8. Introduce the Coaching Feedback Form, review the process involved in the form. Emphasize the role of the observer in this step. (Pass the handout titled “Coaching Feedback Form” to youth).

9. Introduce the “Balancing Inquiry and Advocacy” handout; allow time for youth to review these as a guide.

**Peer Coaching Practice** (45 minutes) (**F1**)

Now it is the students’ turn.

1. Divide into groups of three. There will be three rounds of peer coaching and feedback given, as demonstrated by the staff.

2. The roles of each group are defined as
   a. Coach: is driving coaching process.
   b. Coachee: Invites a coach to listen.
c. Observer: Focuses on the coach's behavior during the observation and manages the groups time. Provides feedback to coach at the end of the peer coaching session.

Assessment Check Ins:

(D1): To gain an understanding of youths’ prior knowledge of peer mentoring. This information will assist the staff in planning instruction.

(F1): To demonstrate how youth thoughts and reflections are articulated with other students’ experiences when applying them in a peer coaching scenarios. This assessment will provide insight into how students might implement peer-coaching skills.

(S1): Assess what youth have learned by reflecting on their observations of other students peer coaching practice.

Staff Notes:

1. **Peer Coaching:** This might be a little bit more serious, talk about real issues.
   a. Practice your demonstration of peer coaching before instructing the lesson.

Reference:


1. The instructional activity content served to be a figures and sequences in this lesson. This content was then modified in the following ways:
   - Some instructional language was used to match the Resource Education Curriculum.


1. The instructional activity model and content served as the central activity in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
   - The introduction and conclusion are additions to this lesson.


1. The instructional activity content served to be figures in the handout titled Balancing Inquiry and Advocacy in this lesson. This content was not modified.
Handouts:

BALANCING INQUIRY AND ADVOCACY

(received from Bergh & Smithhammer, 2012).
COACHING FEEDBACK FORM

COACH: Self evaluate (2 minutes)

Did you use the model?
What went well for you? What was challenging?

COACHEE: Evaluate coach (2 minutes)

How was their presence as a coach?
Did you feel as if the coach listened well and asked relevant questions?
Was the coaching helpful in moving you forward?

OBSERVER: Evaluate coach (3 minutes)

What did they do well? What could they develop for next time?
Give them feedback on their body language and/or facial expressions.
Did they exhibit empathy and respect?
Did they use immediacy?
Yellowstone’s Youth Conservation Corps Resource Education Curriculum

Culture Heritage

Lessons Include:
Culture Heritage Lesson #1: VOICES FROM THE PAST
Culture Heritage Lesson #2: YELLOWSTONE IN TIME
Culture Heritage Lesson #3: IT’S A DILEMMA- YOU DECIDE
Title: Voices From the Past
Overview: This lesson introduces students to the beginning of the National Parks Idea and the National Park Service’s dual mission, while exploring the perceptions or “voices” of early visitors to Yellowstone National Park through a letter reading and writing activity.
Learner Outcomes: The youth will:
1. Understand that past events are relevant and helpful in making present and future decisions.
2. Be able to explain the mission of the National Park Service and describe the resources Yellowstone National Park protects.
3. Be able to identify two major types of resources for which National Parks are established to protect.
Area: Cultural Heritage
Background: The following information is used in the suggested procedure and is necessary to instruct this lesson.

“One of the most enduring legends of Yellowstone National Park involves its beginning. In 1870, explorers gathered around a campfire at the junction of two pristine rivers, overshadowed by the towering cliffs of the Madison Plateau. They discussed what they had seen during their exploration and realized that this land of fire and ice and wild animals needed to be preserved. Thus, the legend goes, the idea of Yellowstone National Park was born.

It is a wonderful story—and a myth. But those men were real, and so is this land they explored. Thanks to their reports and the work of explorers and artists who followed, the United States Congress established Yellowstone National Park in 1872. The Yellowstone National Park Protection Act says “the headwaters of the Yellowstone River ... is hereby reserved and withdrawn from settlement, occupancy, or sale ... and dedicated and set apart as a public park or pleasuring-ground for the benefit and enjoyment of the people.” In an era of expansion, the federal government had the foresight to set aside land deemed too valuable to develop.

As an older state park, Yosemite did have a strong influence on the founding of Yellowstone in 1872 because Congress actually used language in the state park act as a model. It is entirely possible that Congress may have preferred to make Yellowstone a state park in the same fashion as Yosemite, had it not been for an accident of geography that put it within three territorial boundaries. Arguments between Wyoming and Montana territories that year resulted in a decision to federalize Yellowstone.

A generation later in 1906, Congress passed the Antiquities Act, which gave the president authority to establish national monuments. By 1914, the United States had 30 national parks and monuments, each managed separately and administered by three different federal departments—Interior, Agriculture, and War. No unified policy or plan provided for the protection, administration, and development of these parks and monuments.

The management of Yellowstone from 1872 through the early 1900s, helped set the stage for the creation of an agency whose sole purpose was to manage the national parks. Promoters of this idea gathered support from influential journalists, railroads likely to profit from increased park tourism, and members of Congress. The National Park Service Organic Act was passed by Congress and approved by President Woodrow Wilson on August 25, 1916:
There is created in the Department of the Interior a service to be called the National Park Service, \[\text{which}\ldots\text{shall promote and regulate the use of the Federal areas known as national parks, monuments, and reservations\ldots by such means and measures as conform to the fundamental purpose to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them un-impaired for the enjoyment of future generations}\] (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 15-16).

Getting Ready:

Materials: Journals and pencil, a dry erase board with markers, postcards for each student, and handouts.

Suggested Procedure:

Mission Statement (25 minutes)
The staff will:
1. Briefly introduce the beginning of the National Park Idea (refer to the background information).
   a. Explain that Yellowstone National Park was set aside by congress in 1872 and was the first national park in the system and the world. Yellowstone is the birthplace of the National Park Idea. It is a place where people changed their outlook on the land, instead of looking out on land they had changed.
2. Write the National Park Service Mission on the dry erase board.
   a. Mission: “Preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations” (National Park Service).
   b. Ask students to list the two major purposes of National Parks on the board. (D1) (Answer: Preservation of resources and for the enjoyment and education of the people.)
3. Under the heading “purpose,” discuss why preservation and recreation are important in our society.
4. Ask students to define “Natural Resources” and “Cultural Resources”. (D1)
   a. Natural Resources: occur naturally within environments that exist relatively undisturbed by humankind, in a natural form. A natural resource is often characterized by amounts of biodiversity that exist in various ecosystems.
   b. Cultural Resources: the collective evidence of the past activities and accomplishments of people. Buildings, objects, features, locations, and structures with scientific, historic, and cultural value are all examples of cultural resources. Cultural resources are finite and non-renewable resources that once destroyed cannot be returned to their original state.
5. Present three pictures of the following resources (ie: Orange Spring Mound, Bison, and Old Faithful Inn) and have students determine if it is a cultural or natural resource. What are the differences?
6. Challenge the students to complete the mission statement in the order it is written with just the individual words, as if the words are puzzle pieces. Provide the words on notecards for the statement, to the group. (S1)
7. Mix up the words and have students line up in the order in which the words form together to create the NPS mission statement.

8. After successful completion, have the students read aloud the mission and correct any words that may be out of order.
   a. Emphasize the importance of each word. Ask students “what if one of these words was missing or a different word was chosen.

9. Transition to Yellowstone Letters, by connecting how we communicate this mission and the experiences of the first visitors to Yellowstone National Park.

Yellowstone Letters (25 minutes)
The staff will:
1. Ask students what they think were some of the first forms of communication about the National Park Idea or Yellowstone National Park?
2. Explain that in the not so distance past, letters were the only way to communicate with loved ones far away. There were no telephones, no quick trips in the car or an airplane for a visit.
3. To understand Yellowstone’s past we must understand the perspectives that visitors brought with them when visiting the first National Park.
4. Read “Yellowstone Letters” from Expedition: Yellowstone! Read two or three letters and be conscious of time. The staff should aim for buy-in because you want them to ruminate on Yellowstone, but not draw on others’ thoughts too much.
5. Discuss how Jo included historical information merely by writing about what she observed and by describing her experience. Tell students that they too, will one day be a “voice from the past” by writing about their experiences in YELL-YCC. (F1)

Conclusion: (15 minutes) (S2) Ask youth to write a letter home to a parent, grandparent, or another person whom might never get a chance to visit Yellowstone National Park. The letter should tell that person about their life in Yellowstone, giving the reader in years to come some information about today’s Yellowstone and the experience of being in YELL-YCC, similar to the letters written in “Yellowstone Letters”.

Extension: Provide students with blank postcard sized paper and have students illustrate their own postcards, to demonstrate another type of early communication about Yellowstone National Park.
1. Collect postcards and return them to YCC camp to be mailed later in the year.

Assessment Check Ins:

(D1): To understand students’ prior knowledge and interests with a little prompting around cultural and natural resources. This information will assist the staff in understanding the knowledge that students have of the national park service mission and meaning.

(F1): Provides information on individual students understanding of the Letters from Yellowstone reading. This assessment will provide insight into the degree and depth of students understanding of Jo’s experiences in Yellowstone to guide and adjust the expectations of the letter that students will be writing, in the next step of the lesson.
(S1): This assessment demonstrates students’ ability to work together in recreating the National Park Service mission statement.

(S2): This assessment assesses the students ability to articulate their experience in Yellowstone in a similar perspective as Jo from the Yellowstone Letters.

Staff Notes:
- **Yellowstone Letters:** When reading Yellowstone Letters, spice it up a little with a fun accent or have students take turns reading the letters.
  - If students struggle with thinking of someone significant to write a letter to in the activity Yellowstone Letters. Then brainstorm with the youth about someone back at the YCC camp that they could write too or present the idea of them writing a letter to themselves to read when they return home.

Reference:


1. The lesson plan titled: Letters to Yellowstone served as the central activity in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
   - The introduction and conclusion are additions to this lesson.


1. The instructional activities content that is central activity in this lesson, located in the Letter from Yellowstone handout. This content was not modified.

Handouts:
preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations
LETTERS FROM YELLOWSTONE

Letter Title: Calamity Jane

June 25, 1902
Mammoth Hot Springs, Wyoming

Dear Grandmother Chinook,

I have not been eaten by a grizzly bear! But I have been busy with my new horse (yes, Papa kept his promise). And I am having many exciting adventures at Fort Yellowstone.

First, let me tell you about our trip west. As you know we took the train from St. Louis. What a great, open country we passed through! But nothing extraordinary happened until we arrived at Livingston, Montana. Between trains Mother suggested we take some exercise, so we strolled Main Street. I am not sure if it was Mother’s “condition” (why can’t we just say she’s having a baby?) or the mountain lion chained before the taxidermist’s store, but Mother became quite faint. As she sank down on a rough wooden bench, she told me to fetch a glass of water. She was pale.

In my excitement I ran into the nearest open doorway and was brought up short by a rough hand on my collar.

“No girlies in here- now out with ya,” said a man in a rough voice. “No girlies? Don’t be insultin’, Patsy, I don’t take kindly to it,” replied a woman, her voice cracked with age. Calamity, tis a long time since you have been a girlie,” Patsy guffawed.

This exchange game me a moment to look around. After the bright sunlight of the street, I was blind in the darkened room. But my nose sensed the sharp, biting odor of Grandmother’s rheumatism remedy. In the corner a man coughed. Relieved, I though I had stumbled into a hospital with several patients lined up at a long, shiny bar and “taking their medicine.”

Suddenly I remember my poor Mother. “Sir, please my mother is ill. May I trouble you for a glass of water, or if you are the doctor, perhaps you will have a look at her?”

The man called Patsy threw his head and roared with laughter. The “patients” joined him, and the small room echoed with their raw merriment. Hot tears of shame ran down my cheeks.

Suddenly I felt a gentle arm around my shoulders. “Come on, child, perhaps I can help your mama.”

I looked into a weathered face lined with age, but the eyes were bright and kind. The old woman wore buckskins, boots and a sweat-stained Stetson. I took the old woman to Mother, who was soon revived under her gentle care.
The woman walked with us to the train. After we were settled into our seats, she slipped me a photography and a little pink pamphlet. She winked at Mother and told us “to give her best to the ‘boys in blue’ at Fort Yellowstone.” Then she was gone.

On the way to Cinnabar, I opened the pink leaflet and began to read. Grandmother, that old woman was Calamity Jane! Reading the booklet, I learned she had been a scout with General Custer and had ridden into the thick of an Indian battle to rescue a fallen Captain Egan. She had been a pony express rider. A friend of Wild Bill Hickock, she rounded up his murderer and, threatening him with a meat cleaver, had brought him in to face justice.

Glancing at Mother finally resting with a pink flush to her pale cheeks, I hid the pamphlet. I think it best Mother remember her only as that kind old woman.

I must close now. From my window I can see that the soldiers have finished their drill. Mother is calling me. We are going for a buggy ride and a picnic. Will tell more in my next letter.

Your loving granddaughter,
Jo

P.S. Grandmother, that was not a hospital at all! It was the “Bucket of Blood Saloon,” a hangout of Calamity Jane’s. (Mother doesn’t know that either.)

P.S.S. If the baby is a girl, I think we should name her Jane. What do you think?
Letter Title: Fort Yellowstone

July 28, 1902
Mammoth Hot Springs, Wyoming

Dear Grandma Chinook,

I have made a wonderful friend at Fort Yellowstone. Her name is Sarah. We are the same age. As her mother is also having a baby, we have a lot in common. Her father is a sergeant, and her mother takes in laundry. When Sarah’s mother was quite young, she was an army laundress who followed the soldiers and did their washing. They live in a row of houses called “Soap-Suds Row” or sometimes “Hungry Hill.” They do not have much money, but they do not go hungry.

The only “fly in the ointment” (as Papa says) is Mother. She forbids me to play with Sarah as Sarah’s father is not an officer. Mother and I had a terrible row about it, and to spite her I went to my room and scissored off all my blonde curls (I now have bangs and a Dutch-boy cut). Papa tried to console Mother by saying it was a “practical cut,” but to no avail. This will be a long letter, Granny; I am in “solitary confinement” for a week. At least it is only my room in which I am locked, and not Barracks 13.

I am wasting a lot of paper in telling you my troubles. In your last letter you asked me to describe the fort. I shall do my best. We live in one of the four officers’ houses. It is a double house, that is, another family lives on the other side of the plaster wall. It is another officer and his wife.

The house is two stories; it is white and made of wood, with a red tin roof and red trim. Mother loves it as it is very spacious. You know how worried she is about being “ranked out.” If an officer should move in who has a higher rank than Papa, and if he likes our house, he can command us to move. Then of course Papa must move out someone of lesser rank than himself, and on and on it goes. Mother has been assured by the other wives that it probably won’t happen at Fort Yellowstone.

I have my own room. Mother and Papa have a room, Mother has hung blue curtains in the nursery (her heart is set on a boy), and there is an extra room for guests. Our Chinese cook works in the large kitchen and pantry, and we take our meals seated around the oval oak table in the dining room. Mother has done the parlor in blue velvet, and of course her little porcelain treasures are everywhere. It takes hours to dust them, and Mother insists they be done every day!

Much to Mother’s relief, the bathroom is in the house. Mother has a small garden in the backyard, but she is constantly waging war against the little ground squirrels who love to nibble the tender leaves.

From my window I can see the parade ground with the tall flagpole. To the left of the parade ground is Capitol Hill, where the cannon stands. It is fired for the sunrise and sunset salutes each day. (I think the sun most be quite proud to have such a fuss made over its comings and goings.)
There has been much activity on the parade ground this summer. Not with soldiers’ drills, but with the manure-spreading and seeding. The dust is awful and Captain Hiram Chittenden, and officer with the Army Corps of Engineers, was determined to defeat it. So our roads are now graveled, and we have concrete sidewalks. The parade ground, once chalky white and painful to the eyes because of the harsh glare from the sun, is green.

There are caves beneath the parade ground. Sarah’s father told me that one day the ground collapsed beneath a calvary horse. There is now a small fence around this dark, steaming hole in the ground.

Every night when Mother puts on her night cap, she says our house is sure to sink to the ground while we sleep, and tomorrow morning we’ll have our tea in China. A friend of Mother’s says she hears sounds like those of a geyser beneath her husband’s quarters.

The fort also has a hospital (and morgue), headquarters, stables, barracks (for the enlisted soldiers), guardhouse, granary, bakery and other buildings.

Across from the fort is the National Hotel. It is a large, awkward, red and green building with a veranda running the entire length of it. The tourists often sit on the porch and sip cool drinks as they watch the soldiers drill or the stagecoach drivers put on a bucking bronc show.

So, Grandmother, that is Fort Yellowstone. I shall end my letter with a funny story. Perhaps that will cheer us both.

Earlier I mentioned our Chinese cook- he is really our second cook. Our first cook, Chan, has returned to Billings, Montana.

Early one morning Chan began preparations for a formal dinner that Mother had planned for that evening. It was for a senator who was touring the Park. As Chan stepped into our backyard to put garbage in one of the cans he came face-to-face with a large, angry bear.

With his baggy pants flapping and his queue streaming behind him, he raced back into the house. You have never heard such a flood of words. Mother said for once she had no trouble understanding him- and it was all in Chinese!

When he finally calmed down, he turned to Mother and said, “I go ‘way now, Missy.” Mother was sympathetic, but as Papa heard the story from the little man, she raced to Chan’s room and hid his trunk.

The dinner that night was delicious: oyster stew, potato, cabbage, and onion salad, boiled ham, roast goose, tender beef, sweet spuds, fresh rye bread, gooseberry jelly and chocolate, apple, peach, and rhubarb pies. But when Chan brought in the decorated cake thick with icing and set it before mother it read: “Goodbye Missy, I leave tomorrow.” Yes, Mother did give the poor man back his trunk.

Do take of yourself for I miss and love you much.
Your granddaughter,
Jo
Letter Title: Paradise ‘n’ Pranks

November 5, 1902
Fort Yellowstone, Wyoming

Dear Grandma Chinook,

I guess summer cannot last forever, but fall certainly gives in quickly to winter in the mountains.

After Miss Pinshaw’s Academy for Young Ladies, the post school is easy. A soldier who was once a teacher in Chicago instructs us. Sarah and I are the oldest, so we help the little ones with their ciphers.

Papa knows that Sarah is my best friend in the whole world. He says we are lucky, because on some posts the officers’ children and the enlisted men’s children attended separate schools. Mother is so occupied with getting ready for the baby that she pays little attention to my comings and goings.

But Sarah and I had a grand time this summer. We rode Spanky (my horse), had picnics, and went fishing every sunny day. Though we are as close as sisters, Sarah and I are quite different looking. My hair and skin are so light and sensitive to the sun, but Sarah is tanned brown as an Indian, with heavy black hair and dark eyes. Papa says we shall both be beauties one day. Isn’t that silly?

There are other children at the fort. The Scoyen boys, Clarence and Eivind are young, but they make up for it by being daring. Clarence got into trouble with the officers. The officers are encouraging the deer to stay on the parade ground by feeding them. One day Clarence hid in the sagebrush close to the parade ground and howled like a coyote. You should have seen those deer scatter! As you might expect, Major Pitcher, the commander and acting superintendent of the Park, was not amused.

I had a scary experience at Devil’s Kitchen. This is a cavern on top of the Mammoth Hot Springs Terraces. At the urgings of my friends, I climbed into this dark, hot hole by means of a rickety wooden ladder. As I climbed deeper and deeper, it became hotter and hotter. My heart beat furiously, for I imagined that at any moment I would meet the devil himself. But I survived and occasionally made things exciting for the tourists who went there.

Porters from the hotel took groups of tourists into the cavern by means of the same shaky spruce-tree ladder. My friends and I hid in the trees and just as they reached the bottom of the cheerless hole, we dropped lighted papers into it. This stirred up the bats, who flew madly about. You should have seen the ladies screaming and flinging their arms about their heads to keep the bats out of their hair. (Please don’t tell Mother or even Papa about this.)

Sometimes Papa allowed Sarah and I to peek in on the dances held at the National Hotel. What a beautiful sight! With fresh flowers twisted in their hair, ladies in colorful gowns whirled about the room in the arms of a young tourist or dashing soldiers.
The boys were always spying on the soldiers “rotten-logging” with their sweethearts (generally maids from the hotel). Sarah and I thought that terribly childish.

The summer was fun, but it is nice to have Papa home. With his bedroll, coffee pot, frying pan, and fishing rod, he was gone most of the time. He was inspecting the soldier stations throughout the Park. During the year the soldiers live at many different outposts. In summer they watch the tourists and in winter the poachers.

According to Papa, the Park was saved by the cavalry, who “came to the rescue” in 1886. Before that the civilian superintendents were allowing fingers to burn out of control, poachers to kill the animals, and tourist with their rock hammers to chip away the Park’s wonders. Papa says the cavalry restored order to the Park. He is proud of his work and his men.

Yet, as the duty is lonely, there are deserters. I heard Papa tell a young man who works at the hotel and is interested in soldiering that the work of a cavalryman includes: guard duty, kitchen detail, patrols (on horseback and skis), target practice, foot and mounted drills, and stable call.

Papa recently went out on an unusual detail. One officer had the idea to supply the soldiers at the outposts with piglets to raise for food. Papa laughingly admits that it was fine idea, but difficult in practice. It seems that after raising the baby pigs, the soldiers could not bring themselves to butcher their pets. So Papa is now exchanging the pigs from station to station so that no one will have to eat bacon for breakfast that once was affectionately called “Sparky.”

Much love,
Your Granddaughter,
Jo
Culture Heritage Lesson #2: Yellowstone In Time

Title: Yellowstone In Time
Overview: This lesson introduces youth to the different historical perspectives of concepts, events and people that influenced Yellowstone National Park by conducting interviews and building a timeline of Yellowstone’s human history.
Learner Outcomes: The youth will:
1. Know basic historical concepts, events, and people of Yellowstone National Park.
2. Know different historical perspectives of Yellowstone National Park.
3. Understand the historical significances of Yellowstone National Park.
Area: Cultural Heritage
Background: The following information is used in the suggested procedure and is necessary to instruct this lesson.

“The human history of the Yellowstone region goes back more than 11,000 years. How far back is still to be determined—there are no sites that date to this time—but humans probably were not here when the entire area was covered by ice caps and glaciers. The last period of ice coverage ended 13,000–14,000 years ago, and sometime after that, humans arrived here.

The Earliest Humans in Yellowstone

Human occupation of the greater Yellowstone area seems to follow environmental changes of the last 15,000 years. Glaciers and a continental ice sheet covered most of what is now Yellowstone National Park. They left behind rivers and valleys people could follow in pursuit of Ice Age mammals such as the mammoth and the giant bison.

The first people arrived in this region sometime before 11,000 years ago. Archeologists have found little physical evidence of their presence except for their distinctive stone tools and projectile points. From these artifacts, scientists surmise that they hunted mammals, and gathered berries, seeds, and roots.

As the climate in the Yellowstone region warmed and dried, the animals, vegetation, and human life-styles also changed. Large Ice Age animals that were adapted to cold and wet conditions became extinct. The glaciers left behind layers of sediment in valleys in which grasses and sagebrush thrived, and pockets of exposed rocks that provided protected areas for aspens and fir to grow. The uncovered volcanic plateau sprouted lodgepole forests. People adapted to these changing conditions and were eating a diverse diet of medium- and small-sized animals as early as 9,500 years ago. They could no longer rely on large mammals for food. Instead, smaller animals such as deer and bighorn sheep became more important in their diet as did plants such as prickly pear cactus. They may have also established a distinct home territory in the valleys and surrounding mountains.

This favorable climate would continue more than 9,000 years ago. Evidence of these people in Yellowstone remained uninvestigated, even long after archeologists began excavating sites elsewhere in North America. Archeologists used to think high altitude regions such as Yellowstone were inhospitable to humans and thus, did little exploratory work in these areas. However, park superintendent Philetus W. Norris (1877–82) found artifacts in Yellowstone and sent them to the Smithsonian Institution in Washington, D.C. Today, archeologists study environmental change as a tool for understanding human uses in areas such as Yellowstone.

Approximately 1,900 archeological sites have been documented in Yellowstone National Park, with the majority from the Archaic period. Sites contain evidence of successful hunts for
bison, sheep, elk, deer, bear, cats, and wolves. Campsites and trails in Yellowstone also provide evidence of early use, some trails have been used by people since the Paleoindian period.

Some of the historic peoples from this area, such as the Crow and Sioux, arrived sometime during the 1500s and around 1700, respectively. We have little scientific evidence to conclusively connect other historic people, such as the Salish and Shoshone, to prehistoric tribes, but oral histories provide links. Prehistoric vessels known as “Intermountain Ware” have been found in the park and surrounding area, and link the Shoshone to the area as early as ~700 years ago.

**Increased Use**

People seem to have increased their use of the Yellowstone area beginning about 3,000 years ago. During this time, they began to use the bow and arrow, which replaced the atlatl, or spear-thrower, that had been used for thousands of years. With the implementation of the bow and arrow, people hunted more efficiently. They also developed sheep traps and bison corrals used in the region. This increased use of Yellowstone may have occurred when the environment was warmer; favoring extended seasonal use on and around the Yellowstone Plateau. Archeologists and other scientists are working together to study evidence such as plant pollen, land-forms, and tree rings to understand how the area’s environment changed over time.

**The Little Ice Age**

Climatic evidence has already confirmed the Yellowstone area experienced colder temperatures during what is known as the Little Ice Age—mid-1400s to mid-1800s. Archeological evidence indicates fewer people used this region during this time, although more sites dating to this period are being discovered. Campsites appear to have been used by smaller groups of people, mostly in the summer. Such a pattern of use would make sense in a cold region where hunting and gathering were practical for only a few months each year.

**Historic Tribes**

Tribal oral histories indicate more extensive use during the Little Ice Age. Kiowa stories place their ancestors here from around 1400 to 1700. Ancestors to contemporary Blackfeet, Cayuse, Coeur d’Alene, Bannock, Nez Perce, Shoshone, and Umatilla, among others, continued to travel the park on the already established trails. They visited geysers, conducted ceremonies, hunted, gathered plants and minerals, and engaged in trade. The Shoshone say family groups came to Yellowstone to gather obsidian, which they used to field dress buffalo. Some tribes used the Fishing Bridge area as a rendezvous site.

The Crow occupied the country generally east of the park, and the Blackfeet occupied the country to the north. The Shoshone, Bannock, and other tribes of the plateaus to the west traversed the park annually to hunt on the plains to the east. Other Shoshonean groups hunted in open areas west and south of Yellowstone. In the early 1700s, some tribes in this region began to acquire the horse. Some historians believe the horse fundamentally changed lifestyles because tribes could now travel faster and farther to hunt bison and other animals of the plains.

**The “Sheep Eaters”**

Some groups of Shoshone who adapted to a mountain existence chose not to acquire the horse. These included the Sheep Eaters, or Tukudika, who used their dogs to transport food, hides, and other provisions.

Sheep Eaters acquired their name from the bighorn sheep whose migrations they followed. Bighorn sheep were a significant part of their diet, and they crafted the carcasses into a wide array of tools and implements. For example, they soaked sheep horn in hot springs to make them pliable for bows. They traded these bows, plus clothing and hides, to other tribes.
European Americans Arrive

In the late 1700s, fur traders traveled the great tributary of the Missouri River, the Yellowstone, in search of Native Americans with whom to trade. They called the river by its French name, “Roche Jaune,” meaning Yellow Rock. As far as we know, pre-1800 travelers did not observe the hydrothermal activity in this area but they probably learned of these features from Native American acquaintances.

The Lewis and Clark Expedition, sent by President Thomas Jefferson to explore the newly acquired lands of the Louisiana Purchase, bypassed Yellowstone. They had heard descriptions of the region, but did not explore the Yellowstone River beyond what is now Livingston, Montana. A member of the Lewis and Clark Expedition, John Colter, left that group during its return journey to join trappers in the Yellowstone area. During his travels, Colter probably skirted the northwest shore of Yellowstone Lake and crossed the Yellowstone River near Tower Fall, where he noted the presence of “Hot Spring Brimstone.”

Not long after Colter’s explorations, the United States became embroiled in the War of 1812, which drew men and money away from exploration of the Yellowstone region. The demand for furs resumed after the war and trappers returned to the Rocky Mountains in the 1820s. Among them was Daniel Potts, who also published the first account of Yellowstone’s wonders as a letter in a Philadelphia newspaper.

Jim Bridger also explored Yellowstone during this time. Like many trappers, Bridger spun tall tales as a form of entertainment around the evening fire. His stories inspired future explorers to discover the truth. As quickly as it started, the trapper era ended. By the mid-1840s, beaver became scarce and fashions changed. In reaction many Trappers turned to guiding or other pursuits.

Looking for Gold

During 1863–1871, prospectors crisscrossed the Yellowstone Plateau every year and searched every crevice for gold and other precious minerals. Although gold was found nearby, no big strikes were made inside what is now Yellowstone National Park.

Expeditions “Discover” Yellowstone

Although Yellowstone had been thoroughly tracked by trappers and tribes, in the view of the nation at large it was really “discovered” by formal expeditions. The first organized attempt came in 1860 when Captain William F. Raynolds led a military expedition, but it was unable to explore the Yellowstone Plateau because of late spring snow. The Civil War preoccupied the government during the next few years. Afterward, several explorations were planned but none actually got underway.

The 1869 Folsom-Cook-Peterson Expedition

In 1869, three members of one would-be expedition set out on their own. David E. Folsom, Charles W. Cook, and William Peterson ignored the warning of a friend who said their journey was “the next thing to suicide” because of “Indian trouble” along the way. From Bozeman, they traveled down the divide between the Gallatin and Yellowstone rivers, crossed the mountains to the Yellowstone and continued into what is currently inside park territory. They observed Tower Falls, the Grand Canyon of the Yellowstone—saying it was a “master-piece of nature’s handiwork”—continued past Mud Volcano to Yellowstone Lake, then south to West Thumb. From there, they visited Shoshone Lake and the geyser basins of the Firehole River. The expedition updated an earlier explorer’s map (DeLacy, in 1865), wrote an article for Western Monthly magazine, and refueled the excitement of scientists who decided to see for themselves the truth of the party’s tales of “the beautiful places we had found fashioned by the practiced
hand of nature, that man had not desecrated."

The 1870 Washburn-Langford-Doane Expedition

In August 1870, a second expedition set out for Yellowstone, led by Surveyor-General Henry D. Washburn, politician and businessman Nathaniel P. Langford, and attorney Cornelius Hedges. Lt. Gustavus C. Doane provided military escort from Fort Ellis (near present-day Bozeman, Montana). The explorers traveled to Tower Fall, Canyon, and Yellowstone Lake, followed the lake’s eastern and southern shores, and explored the Lower, Midway, and Upper geyser basins (where they named Old Faithful). They climbed several peaks, descended into the Grand Canyon of the Yellowstone, and attempted measurements and analyses of several of the prominent natural features.

The 1871 Hayden Expedition

Ferdinand V. Hayden, head of the U.S. Geological and Geographical Survey of the Territories, led the next scientific expedition in 1871, simultaneous with a survey by the U.S. Army Corps of Engineers. The Hayden Survey brought back scientific corroboration of the earlier tales of thermal activity. The expedition gave the world an improved map of Yellowstone and visual proof of the area’s unique curiosities through the photographs of William Henry Jackson and the art of Henry W. Elliot and Thomas Moran. The expedition’s reports excited the scientific community and aroused even more national interest in Yellowstone“ ("Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 19-24).

Getting Ready:

Materials: Journals and pencil, and handouts.

Suggested Procedure:

Historical Skits Interviews (30 minutes)
The staff will:

1. Introduce the three main cultural groups of Yellowstone National Park (refer to background information).
2. Explain that youth will be traveling back in time to interview historical figures of Yellowstone National Park.
3. Pass out the historical figure cards, have youth review the cards and prepare to be in character (there are 7 Character Cards in the handouts).
4. Have youth then brainstorm a list of questions that they would like to ask the other historical figures in the group (dates are excluded from asking about)
   a. Such as, when did you visit Yellowstone National Park
   b. What is your name? Why were you important to Yellowstone’s history?
5. Youth then get into “character” by becoming their cultural figure on the card that was passed out to them. Emphasize staying in character and being appropriate. (F1)
6. Have youth rotate the role of interviewer and interviewee within pairs, until they have interviewed everyone. (F1)
7. Tell the youth that at the end of the interview they will line each other up in the order in which they think that each cultural figure visited Yellowstone.
8. Conclude this activity by having youth who interviewed each other last, introduce one another. Include their name and one interesting fact about the other person.
9. Then based on interviews with each other, have youth line up in order of when they felt each of them visited Yellowstone National Park, similar to a timeline. (S1)

**Telling a Story through Time** (20 minutes)

1. Explain that the youth are going to make a timeline with a focus of Human History of Yellowstone National Park, open the discussion to a larger time scale that goes back more than a 11,000 years ago. The timeline will help us understand when events happened in history.
2. With the following event cards, work as groups to put them in chronological order.
3. Review the order with the youth, as you will have a cheat sheet. Do not just move through this activity and give them the correct answers. Ask them why they put each event in that place. Help them solve the event timeline until they have it correct. Ask youth if there are events in Yellowstone history that are celebrated and others that are not?

**Concluded:** (10 minutes) (S1) Discuss with youth the different historical perspectives throughout time. Ask how Yellowstone’s history might influence its future? Were there any events that were surprising to them? Ask if they could go back to any event in Yellowstone’s human history, which event would it be and why? In what ways have other cultures contributed to Yellowstone National Park’s cultural heritage?

**Assessment Check Ins:**

**F1:** To demonstrate how youth’s thoughts and reflections are articulated in their cultural characters when applying them in their interview skits. This assessment will provide insight into how youth implement their understanding through “being in character”.

**S1:** Assess what youth understanding of the cultural figures within the timeline, confronting any misconceptions of who and when.

**S2:** Assess youth learning by discussing the influences Yellowstone past on the future.

**Staff Notes:**

**Telling a Story through Time:** ANSWER KEY

- 1450 Little Ice Age Begins
- 1600s Ancestors of the Crows may have come into Yellowstone
- 1700s Lakota Sioux begin exploring the Yellowstone Area
- Late 1700s Fur Traders Travel the Rivers into the Yellowstone Region. Tribes in the Yellowstone Area begin using horses
- 1804-1806 The Lewis and Clark Expedition passes within 50 miles of Yellowstone
- 1807-1808 John Colter explores part of Yellowstone
- 1812 The War of 1812 begins off the Atlantic coast of the U.S.
- 1820’s Trappers return to Yellowstone Area
- 1834-1835 Trapper Osborne Russell encounters Sheep Eaters in Lamar Valley
- 1840s Trapper Era ends
- 1850s Little Ice Age ends, climate begins to warm
1860 First organized expedition attempts but fails to explore the Yellowstone Plateau
1861 Civil War begins
1869 Folsom-Cook-Peterson Expedition
1870 Washburn-Langford-Doane Expedition; Old Faithful Geyser named
1871 First Hayden Expedition to Yellowstone
1872 Yellowstone National Park Protection Act establishes the first National Park

Reference:


Handouts:

Background on each Cultural Figure

Sheep Eater Native

“Some groups of Shoshone who adapted to a mountain existence chose not to acquire the horse. These included the Sheep Eaters, who used their dogs to transport food, hides, and other provisions. Sheep Eaters acquired their name from the bighorn sheep whose migrations they followed. Bighorn sheep were a significant part of their diet, and they crafted the carcasses into a wide array of tools and implements. For example, they soaked sheep horn in hot springs to make them pliable for bows. They traded these bows, plus clothing and hides, to other tribes.

As the only permanent residents of Yellowstone National Park, they are frequently in historical and popular literature of northwestern Wyoming (Allen 1913; Chittenden 1940:6–7; Frost 1941; Norris 1880:11, 26; Norris 1881:35; Sheridan 1882:12; Tholson 1966; Thompson 1941; Topping 1983:6).

Because no Sheep Eaters remain and little factual information exists about them, these Indians are shrouded in mystery (Hultkrantz 1970:246; Murphy and Murphy 1960:309). According to tradition, all that remains of their presence are primitive timber structures such as conical timber lodges, sheep traps, and other wood and brush structures located at high elevations in the Rocky Mountains (Frost 1941:17; Norris 1881:35; Tholson 1966; Hultkrantz 1970: 257).

Norris provides a classic description of these people in his 1881 report on Yellowstone Park:

The only real occupants of the Park were the pigmy tribe of three or four hundred timid and harmless Sheep Eater Indians, who seem to have won this appellation on account of their use of the flesh and skin of the bighorn sheep for food and clothing, and their skill in hunting these animals amid the cliffs, crags, and canons of the snowy mountains….Whether these people are the remnant of some former race, as the legendary wild men of the mountains, or are descendants of refugees from the neighboring Bannock and Shoshone Indians, is not known, although their own traditions and the similarity of their languages and signals indicate a common origin, or at least, occasional intermingling. These Sheep Eaters were very poor, nearly destitute of horses and firearms….On account of this lack of tools they constructed no permanent habitations, but as evinced by traces of smoke and firebrands they dwelt in caves and nearly inaccessible niches in the cliffs, or in skin-covered lodges, or circular upright brush-heaps called wickiups….Other traces of this tribe are found in the rude,
decaying, and often extensive pole or brush fences for drive-ways of the deer, bison, and other animals… (Norris 1881:35)” (Schullery, P., & Stevenson S., 2004).

**Shoshone**

“After obtaining the horse in the early eighteenth century, the Indian nations of southern Idaho and western Montana began using the Bannock Trail through what is now the park as a route to the buffalo on the Montana Plains. After the buffalo went almost extinct in southern Idaho in the 1830s, the use of the Bannock Trail increased. While used most frequently by the Shoshone Indian people camped and hunted in the park, and used the hot springs for both cooking and for preparing hides, conducted ceremonies, gathered plants and minerals, and engaged in trade. [In addition to the tribes in the Plateau area, the Crow and the Cheyenne also used Yellowstone Area]. It was not uncommon for Blackfoot war parties to come into the area to raid Crow and Shoshone hunting parties, and later the American trappers” ("Yellowstone Resources And Issues Handbook: 2012", 2012).

**Jim Bridger**

Jim Bridger also know as “Old Gabe” was among the foremost mountain men, trappers, scouts and guides who explored and trapped the Western United States and explored Yellowstone during the decades of 1820-1850, as well as mediating between native tribes and encroaching whites. He was of English ancestry, and his family had been in North America since the early colonial period.

He was in good company when he signed on with Hugh Glass, Jedediah Smith, and Thomas Fitzpatrick to be a member of General Ashley's Upper Missouri expedition. At the age of 17, he was the youngest member of the expedition. Bridger rose to the status of the quintessential mountain man. Biographer Grenville Dodge described him as:

"a very companionable man. In person he was over six feet tall, spare, straight as an arrow, agile, rawboned and of powerful frame, eyes gray, hair brown and abundant even in old age, expression mild and manners agreeable. He was hospitable and generous, and was always trusted and respected."

Bridger had a remarkable sense of humor and he especially loved to shock tenderfeet and easterners with his tall tales. While Bridger’s stories are enjoyable, people wondered why he told such preposterous tales. Did he really expect anyone to believe him? Actually, no. Bridger got so upset when people didn’t believe the truth that he told the fantastic stories on purpose. He said it didn’t hurt to fool people who begged for information and then didn’t even say “than ye”. He also said he “didn’t think it proper to spoilt a good story just for the sake of the truth.”

One of Bridger’s favorite stories evolved from the Obsidian Cliff found in Yellowstone. To understand this story it is important to know that obsidian is a natural glass formed when lava cools quickly. He told stories of an “invisible mountain” he discovered while hunting. He
claimed that one day he saw and fired at a magnificent elk. To his surprise, the shot not only missed completely, but the animal didn’t even seem frightened. He tried again and again with the same result. Finally he ran forward to investigate, but was suddenly stopped by a mountain of perfectly clear glass. Bridger claimed that the mountain had acted like a magnifying glass, making the elk seem only a few hundred yards away when really it was 25 miles in distance. Bridger was indeed a seasoned mountain men. Once when he was with another explorer, he pointed to a tall, flat mountain and said “Son, when I first came here, that was merely an anthill.” He called this mountain his alarm clock, and claimed that every night before he went to bed he would yell “Wake up Jim Bridger, you frost-but, no account rascal!,” and exactly 7 hours and 56 minutes later the mountain would echo the message back and wake him up.

Another of Bridger’s favorite stories was of a lake where the surface of the water was boiling, but the waster underneath was cool. He professed that he would catch a fish in the cool water below the surface, and he brought it up through the hot water, it was all cooked and ready to eat” ("James Bridger", para. 1).

Osborne Russell

"Was a mountain man and politician who helped form the government of the U.S. state of Oregon, his connection to Yellowstone is found in a book about fur trapping in and around Yellowstone from 1820’s-1830’s.

Although not published until well after the establishment of Yellowstone National Park, Osborne's Journal of a Trapper contains an early description of the Lamar Valley or Osborne's Secluded Valley in Yellowstone.

Osborne Russell (1921) Journal of a Trapper described the Lamar as follows:

Chapter-VI-In the Yellowstone Country-A Garden of Eden Inhabited By a Small Party of Snake Indians - On the 28th [July 1834] we crossed the mountain in a westerly direction through the thick pines and fallen timber, about twelve miles, and encamped in a small prairie about a mile in circumference. Through this valley ran a small stream in a northerly direction, which all agreed in believing to be a branch of the Yellowstone. 29th-We descended the stream about fifteen miles through the dense forest and at length came to a beautiful valley about eight miles long and three or four wide, surrounded by dark and lofty mountains. The stream, after running through the center in a northwesterly direction, rushed down a tremendous canyon of basaltic rock apparently just wide enough to admit its waters. The banks of the stream in the valley were low and skirted in many places with beautiful cottonwood groves. Here we found a few Snake Indians comprising six men, seven women and eight or ten children, who were the only inhabitants of the lonely and secluded spot" ("Osborne Russell", para. 1).

John Colter
“When Captains Meriwether Lewis' and William Clark's Corps of Discovery neared the Mandan villages on their return trip in 1806, most of the men were good and ready for the comforts of home. Not John Colter. When two trappers headed up the Missouri invited him to join them, he accepted and received his discharge. John Colter was the prototypical mountain man. By 1806, he had already crossed the continent twice with Lewis and Clark, gaining valuable experience in the rigors of wilderness life. Colter was also not a stranger to dealing with the Indians; he had been involved in Captain Lewis' conflict with the Blackfeet on the return trip from the Pacific.

In 1807, Colter joined Manuel Lisa's newly formed Missouri Fur Company on an expedition to the Rocky Mountains. The party was successful in getting up the Missouri and establishing Fort Raymond. That winter, Lisa sent Colter out to all the winter Indian camps to alert them of his presence and desire to trade. Alone, with only his rifle and a 30lb pack, Colter traveled an estimated 500 miles that winter with the help of Indian guides. His route has been disputed, but general consensus is that he was the first white man to see Jackson's Hole and Yellowstone Lake. He also saw part of the thermal wonders of Yellowstone and through the tales he told it would come to be called "Colter's Hell."

The next year, while trapping beaver he and a partner were attacked by Blackfeet Indians.” “They killed his partner and Colter awaited his own execution. To his puzzlement, they set him free and told him to run. He took off and soon realized this was a game of "human hunt". After running a couple of miles, Colter turned around and killed the only Indian that was close with his own spear. He stole his blanket and continued to run until he came to a river. By hiding in the river under a pile of logs, Colter was able to evade his pursuers. He walked the 200 miles back to Fort Raymond with only a blanket for warmth and bark and roots to eat. After eleven days, he stumbled into the stockade, more dead than alive.

The Blackfeet would not leave Colter alone, however, and eventually they would drive him to leave the mountains for good. After gaining strength at Fort Raymond, he returned to the site of the attack to retrieve the traps he had thrown in the river. Again he was attacked, but this time he escaped unscathed. Shaken, but not ready to give up his exciting and dangerous life, Colter signed on to lead another Missouri Fur Company party in 1810. True to past experience, the group was attacked by the Blackfeet and Colter finally vowed to leave the west. He did just that, using his fur trade profits to buy a plot of land in Missouri and build a cabin. There he married a woman remembered by history simply as "Sally" and had a son. It was jaundice, not the Blackfeet that killed John Colter in 1813.

Colter left no records of his journeys, what we do know about him came from the random writings of others. He also left no map of his own, but he did have a conversation with his former leader, William Clark, in 1810” (Shelly, “Exploring the History of Yellowstone with John Colter”).

Nathaniel P. Langford
“Born in Oneida County, N.Y., Aug. 9, 1832; A member of the 1870 Washburn party of Yellowstone explorers, author of a book on the expedition and one of the group that worked for establishment of Yellowstone National Park.

As the 11th of 13 children born to George and Chloe (Sweeting) Langford, his formal education was limited to what was available at a rural district school, where the schooling was fitted into the slack season between fall harvesting and spring plowing. Though his youth included more farming than schooling, he developed into a well-informed young man—probably one of the advantages of having many older sisters.

Langford remained at home until after the death of his father in 1853, when he removed to St. Paul, Minn., and entered the banking business (he already had 2 years experience as a clerk in the Oneida Bank of Utica). He stayed in St. Paul until 1862, and in June of that year he joined an expedition bound for the Idaho gold fields under the guidance of James L. Fisk.

The overland trip, accomplished by following a route north of the Missouri River, required 3 months, during which the party had many adventures. Arriving first at Gold Creek in Deer Lodge County, they went next to Bannack after the discovery of gold there. In 1863, Langford moved to yet another strike—at Alder Gulch—and he was present when the first building was erected at Virginia City. He returned to the East that year and en-route his party had a narrow escape from the desperados of Plummer's gang.

Two months after the establishment of the Territory of Montana, Langford was commissioned Collector of Internal Revenue on July 15, 1864. He held the position until 1868, when he was removed by President Andrew Johnson, but reinstated by the Senate. Almost before the tumult had died down, Langford resigned his position of collector on the understanding that Johnson would appoint him to the governorship of Montana. However, the Senate, having fought to secure one position for him, refused to confirm another, so Langford was out of a job.

The year following his visit to the Yellowstone region Langford lectured in the East and worked for reservation of its wonders for the public benefit. After a national park was established, he became its first superintendent, holding that position from May 10, 1872, until Apr. 18, 1877, when he was replaced by Philetus W. Norris. The first superintendency was a sterile period during which the park was neither developed nor protected; indeed, one man, without appropriated funds and already fully employed as U.S. Bank Examiner for the Territories and Pacific Coast States, could hardly have been expected to do more than he did—make three brief visits to the area and prepare one report.

Langford married Emma Wheaton, the daughter of a St. Paul physician, Nov. 1, 1876, but his bride died soon after. Eight years later, he married again—to Clara Wheaton, sister of his first wife” (Wheeler, "Nathaniel Pitt Langford).

Ferdinand V. Hayden

“Born in Westfield, Mass., Sept. 7, 1829; The U.S. Geologist and head of the Geological Survey of the Territories (Hayden Survey), which made the first official investigation of the Yellowstone region in 1871. Hayden's boyhood was brief. His father died when he was 10 and
he went to live with an uncle in Ohio. There, he began teaching in country schools at the age of 16 and entered Oberlin College 2 years later. Following graduation in 1850, he studied at the Albany Medical School in New York, where he also obtained a sound education in paleontology and geology while earning his medical degree. The diploma proved less important to Hayden than his introduction to the sciences.

Upon leaving medical school in 1853 he was induced to spend a summer collecting tertiary and cretaceous fossils in the White River Badlands near Fort Pierre, Dakota Territory. That adventuring turned Hayden's interest irrevocably toward geology. With financing supplied by individuals, organizations, and the Federal Government, he continued his field work which was his apprenticeship as a scientific explorer.

The Civil War years were passed as a surgeon in the Union Army, from which he was mustered out in 1865 with the rank of brevet lieutenant colonel. Immediately following that conflict Hayden was elected a professor of mineralogy and geology in the medical department of the University of Pennsylvania, but that wedding of his two fields of interest did not last.

Hayden was able to obtain $5,000 of unexpended Federal funds in 1867 for use in conducting a geological survey of the new State of Nebraska. That modest budget launched the Hayden Survey, which was thereafter financed by a combination of appropriated funds and contributions from private sources. When his fledgling organization came under the control of the Secretary of the Interior in 1869, it also received a formal title, becoming "The U.S. Geological Survey of the Territories."

The Washburn expedition of 1870 created a public interest in the Yellowstone region, and Hayden—who had come so close to penetrating its mysteries while a geologist with the Raynolds expedition in 1860—capitalized upon that interest by persuading the Congress to grant him $40,000 for a scientific investigation of its features. The work of the Hayden Survey during the summer of 1871 established a basis of facts that was undoubtedly of crucial importance in obtaining passage of the act that created Yellowstone National Park. But, as certainly, there would have been no legislation without Hayden's persistent efforts on its behalf during the winter of 1871-72.

The Hayden Survey accomplished important work in Yellowstone Park and the surrounding area in 1872 and 1878, before its merger with the surveys of King and Powell to form the U.S. Geological Survey (1879). It has been claimed that Hayden "worked so rapidly and published so quickly that shoddiness became the hallmark of his reports"; yet, overall, he was essentially correct in his geological interpretation of a staggering extent of the unknown West.” (Powell, "Ferdinand V. Hayden").

**Timeline of Events**

1450
1600’s
1700’s
Late 1700s
1804-1806
1807-1808
1812
1820’s
1834-1835
1840’s
1850’s
1860
1861
1869
1870
1871
1872

• Little Ice Age Begins
• Ancestors of the Crows may have come into Yellowstone
• Lakota Sioux begin exploring the Yellowstone Area
• Fur Traders Travel the Rivers into the Yellowstone Region. Tribes in the Yellowstone Area begin using horses
• The Lewis and Clark Expedition passes within 50 miles of Yellowstone
• John Colter explores part of Yellowstone
• The War of 1812 begins off the Atlantic coast of the U.S.
• Trappers return to Yellowstone Area
• Trapper Osborne Russell encounters Sheep Eaters in Lamar Valley
• Trapper Era ends
• Little Ice Age ends, climate begins to warm
• First organized expedition attempts but fails to explore the Yellowstone Plateau
• Civil War begins
• Folsom-Cook-Peterson Expedition
• Washburn-Langford-Doane Expedition; Old Faithful Geyser named
• First Hayden Expedition to Yellowstone
• Yellowstone National Park Protection Act establishes the first National Park
Title: It’s a Dilemma- You Decide
Overview: In this lesson youth will be faced with the difficult management decisions of balancing a dual mission statement in the National Park Service.
Learner Outcomes: The youth will:
1. Describe two cultural management dilemmas facing Yellowstone National Park
2. Understand the pros and cons associated with the management of Yellowstone’s cultural resources
Area: Cultural Heritage
Background: The following information is used in the suggested procedure and is necessary to instruct this lesson.

“The notion of a national park may be confusing for many. To most, the term “park” has no more meaning than “forest,” or “monument,” or any of the other titles the federal government has bestowed upon its holding. It may have less, because other parks they are familiar with are amusement parks and city parks. Many people view all parks simply as public places of recreation.

The basic premise that has long distinguished national parks from other federal lands is that of preservation versus conservation. Most federal lands, such as national forests (US Department of Agriculture), are managed for a variety of purposes including timber, minerals, water, power and recreation, with a management goal of providing the greatest good for the greatest number of people. National park lands set aside for their natural significance, constitute a tiny fraction of the public domain. They are set aside to preserve a few undisturbed samples of natural America so that we can enjoy them and learn from them. The product is much less tangible- and less economically quantifiable- than the products of the multiple-use lands. In its purest form, the idea is appealing. The resource is naturalness, or wildness and if it were this simple, management would entail nothing more than leaving the places alone.

Parks are not ecological islands, even the largest of them. Exotic fauna and flora move into the park, and native fauna and flora move out onto lands with other legislative mandates. Of other importance is the National Park Service mandate that requires human fauna be able to move about in the parks as well, and their migration routes become paved and buildings appear near them. Very quickly the challenge to use and yet preserve becomes overwhelming.

Park legislation offers some guidance. Yellowstone became the world’s first national park with the signing of the Yellowstone Park Act on March 1, 1872. The act is only a few paragraphs and leaves much open to interpretation. It reads that Yellowstone is to be “a public park or pleasing-ground for the benefit and enjoyment of the people.” The act also states “…regulations shall provide for the preservation, from injury or spoliation, of all timber, mineral deposits, natural curiosities, or wonders… and their retention in their natural condition.” Park managers must forever struggle with this dual mandate to both preserve and use, and the challenge becomes increasingly difficult as more people desire to visit parks. As the value of wild places becomes increasingly clear, we are struggling to decide, with limited resources, just what can and should be saved” (National Park Service, 1997).
Getting Ready:
Materials: Journals and pencil, and handouts.
Preparation: Although not completely necessary, if you have the opportunity, review the issues of Bison and Brucellosis in the park. The Yellowstone Resources and Issues Handbook is a good resource for such information.

Suggested Procedure:
It’s a Dilemma - You Decide (30 minutes)
The staff will:
1. Explain to youth that the park staff is often faced with difficult management decisions. Refer to the background information to introduce youth to the dual mandate of preservation and use.
2. Divide the youth into two groups. Tell youth that their work groups will play the part of Yellowstone National Park officials attempting to make wise cultural management decisions. Both groups will work on the same issues -- Bison/Brucellosis and receive a Bison Dilemma Card relevant to a specific park area.
3. They should read the card and individually choose the best course of action from those proposed.
   a. Encourage youth to analyze their choices by listing the pros and cons of the various options they consider in their journal.
4. After youth have reached their own, personal decision, begin group discussion.
   a. Youth should attempt to reach a consensus on one best course of action or formulate their own solution. Have the youth consult with you if they need additional information. (F1)
5. The opinions and consequences material should be distributed to each group after the first five minutes of group discussion as a means of providing more complete information.
6. After eight minutes, ask the youth about the opinions and consequences, identify which of these are opinions and which are facts, and consider all information provided in reaching a preferred course of action. (F2)

Discussion (20 minutes) (S1)
1. After each small group has had a chance to discuss among themselves, a spokesperson from each group will present the group’s solution.
2. Present the following questions to each youth presentation group:
   a. What decision did your group reach?
   b. What were three key factors/reasons for your group’s decision?
   c. What additional information did you need to make an informed decision?
3. After both groups have presented, ask the youth “how is your decision different than the other groups?” Invite group as a whole to build on each other’s thoughts and ideas from the presentations. If time allowed, discuss the issues as it currently stands in the park.

Conclude: (10 minutes) (S2) National Parks belong to all of us. It is everyone’s responsibility to learn about and care for the parks not only in your backyard but also across the country.
   a. What insights or challenges could you reflect on from this activity?
   b. How did you overcome those challenges?
I would like to leave you with the words of the 32nd President Franklin D. Roosevelt,
“There is nothing so American as our National Parks. The scenery and wildlife are native. The fundamental idea behind the parks is native. It is, in brief, that the country belongs to the people that it is in process of making for the enrichment of the lives of all of us. That parks stand as the outward symbol of this great human principle” (National Park Service, 1997).

**Assessment Check Ins:**

**F1:** Provides information on youth understanding of the complexity of making management decisions. This assessment will provide insight into the degree and depth of student’s analysis by listing pros and cons around the dilemma.

**F2:** Provides information on youth understanding of facts and opinions. This assessment will provide insight into the degree and depth of youth’s analysis by considering all the information to take into account during a course of action.

**S1:** Assess what youth have learned by reflecting on their decision made during their small group discussions and transferring it into understanding the complexity of different dilemmas that park management faces.

**S2:** Assess what youth learned by transferring it into their understanding the complexity of different dilemmas that park management faces.

**Staff Notes:**
- This lesson is discussion orientated to keep youth on track and setting the expectation that everyone voice or opinion has the right to be heard.

**Reference:**


2. The lesson plan titled: It’s a Dilemma from the Explore Your National Park Yellowstone Teachers Guide served as the central activity in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
   - The introduction and conclusion are additions to this lesson.
   - The station handouts language was slightly modified to emphasize cultural heritage and current management practices.
   - Some stations were not included because of the time frame of this lesson.


1. The content used on the handout titled Bison Dilemma Card for this lesson was modified in the following ways:
Some instructional language was used to match the Resource Education Curriculum.

Handouts:

Bison Dilemma Card

MAMMOTH HOT SPRINGS

The Mammoth Hot Springs area is at a lower elevation than most of the park, so winter is not as severe. Large herds of elk, and other grazing animals move down to this area, known as the northern range, in search of vegetation.

Bison were and remain critical to the indigenous cultures of North America. Bison were an important part of the landscape of over half the continent because they provided food, clothing, fuel, tools, and shelter, and were central to Plains tribal spiritual culture, and were viewed as an earthly link to the spiritual world. For many tribes, bison represent power and strength. For example, the Shoshone believe that spiritual power is concentrated in the physical form of the bison. Many contemporary tribes maintain a spiritual connection with bison.

Traditional use of bison by humans centers on hunting and is evidenced in the archeological record. The remains of game drives, including both fences and bison jump sites, as well as chipping stations, wickiups, and weapons, are all associated with the importance of hunting bison for tribal economy and culture.

Lately, more of these animals have begun to migrate out of the park onto surrounding ranches and other private lands. Some people do not like bison on their land. These large wild animals can damage fences and may be capable of passing on a disease (brucellosis) to cattle that causes them to abort, decreased milk production, and infertility. Although there is a low risk, many people do not want to risk the chance and are seeking action from the park. Should you:

- Prevent bison from leaving the park, even if it means having to shoot them?
- Allow bison to leave the park whenever and wherever they want to?
- Test all bison leaving the park for the disease. If they test positive, do not let them leave.
  (Note: Not all bison that test positive are infectious. A positive test result may simply indicate the presence of antibodies, not the disease. Testing requires corraling and confining them. This is hazardous to bison and people. Some bison will die from injuries sustained during capture operations.)
- And how does your group decision take into account the bison’s importance to some indigenous cultures of North America?
- Other:

The Opinions and Consequences

Mammoth Hot Springs- The Dilemma: Bison/Brucellosis

Background/Status: Free-ranging bison have lived in the Yellowstone region since prehistoric times. “The Great Plains and the northern Rocky Mountains of western Montana and Wyoming served as feeding grounds for bison. This region is also the homeland of
various native peoples who hunted these herds. Bison were and remain critical to the indigenous cultures of North America and were an important part of the landscape covering over half the continent.”

“The numbers were so great that early Euro-American explorers could only describe them as “numberless,” and wrote that the plains were “black and appeared to be moving” with the herds of bison. The most commonly used estimates of their numbers were between 30 and 65 million.

By the time Yellowstone National Park was established in 1872, bison herds outside the park were almost eliminated. Primarily because of poaching, Yellowstone bison numbers declined until just after the turn of the century when fewer than 50 were known to exist in the park.

After conservation efforts were enacted, their numbers gradually began to increase. Today bison are not threatened or endangered. The U.S. population is approximately 100,000 animals and Yellowstone’s population numbers approximately 4,200 (2013). This number fluctuates from year to year. The Yellowstone bison have enormous symbolism as descendants from the last free-roaming bison herd in the nation.

Now that bison have occupied all suitable habitat in the park, they are trying to recolonize onto lands suitable for bison beyond park boundaries. Because humans now occupy much of what used to be bison habitat, bison are not always welcome beyond the park boundary. Bison can be a risk to human safety and can cause damage to fences, crops, and landscaping. A small percentage of bison is infected with brucellosis, a disease that can also infect elk and domestic cattle, causing cows to abort. While the disease seems to have little effect on bison and elk herds, some people are concerned that if bison transmit the disease to uninfected cattle herds it could be very costly for Montana’s cattle industry. Current regulations restrict transport of Yellowstone bison.

Opinions/Consequences
1. Billions of dollars have been spent trying to eradicate brucellosis from cattle herds. Many agencies and individuals who have worked long and hard at trying to eliminate brucellosis from the United States see Yellowstone bison as a threat to their mission.
2. Killing bison that leave the park may be the simplest route. In hard winters, with large numbers of individuals migrating to lower elevations, this may mean killing many hundreds of animals.
3. Bison would be killed while occupying their historic range. This would have a minor to major positive impact on tribes and individuals who regard wild and free-ranging bison as culturally important.
4. When tested, about half of Yellowstone’s bison show exposure to brucellosis. However, this rarely means the disease infects them. Not all bison that test positive are infectious. Transmission to cattle under free-ranging conditions will not readily occur, even when bison are infected.
5. Sometimes, bison are marked with visible metal ear tags, paper back tags, and paint/peroxide stripes to indicate management techniques used. This action then alters the historic image of the bison and would have a temporary, moderate impact on the historic landscapes.
6. Bison should be managed on a regional basis, not strictly by park boundaries. This would require an agreement between many different state and federal agencies as well as private landowners, which would be a difficult challenge.

7. Restrictions on bison movements and moderate or major reductions in the size of the herd would have a major adverse impact on tribes viewing bison as culturally important.

8. No matter what we do to bison, we will not be able to eliminate the disease, because elk also carry it. There are many more elk than bison in the Greater Yellowstone Ecosystem.

The Great Plains and the northern Rocky Mountains of western Montana and Wyoming served as feeding grounds for bison. This region is also the homeland of 26 associated tribes who hunted these herds.

Bison were and remain critical to the indigenous cultures of North America and were an important part of the landscape covering over half the continent. They once ranged from the Appalachian Mountains to the “deserts” of the Great Basin, south into Mexico and as far north as the Yukon territory in Canada. English settlers arriving in what is now Georgia wrote of the “innumerable” bison they encountered.

Most archeological sites in the Yellowstone area have not been evaluated according to the National Register of Historic Places criteria, although Obsidian Cliff, an area particularly rich in cultural remains, is a National Historic Landmark. Several others, including the Yellowstone road system, one archeological site in the Stephens Creek area, and one archeological site in the Eagle Creek area, are considered to be eligible for inclusion in the national register.

Since the Draft Environmental Impact Statement was published, many alternative plans for the bison management plan were proposed. They range in extremity in their proposed impact on the bison’s geographic distribution and population size. A site-specific archeological investigation of resources found in the vicinity of Seven-Mile Bridge was conducted for alternative 6. Possible bison capture facilities proposed there would have major impacts on archeological resources, but with mitigation, could be minor. However, the cost of mitigation could reach over a million dollars.

In all alternatives, bison would be killed while occupying their historic range outside of Yellowstone. Bison populations would be slightly higher under alternative 1 for the first 10 years of the modified preferred alternative and slightly lower for the remaining five years of this bison management planning period. In addition, some alternatives, including 2, 3, and the modified preferred alternative, would allow bison to occupy a greater portion of their historic range. This would have a minor to major positive impact on tribes and individuals who regard wild and free-ranging bison as culturally important. Reductions in the population size compared to the no-action alternative (alternative 1) would occur on a short-term basis in alternatives 5 and 6, might occur on a short-term basis in alternative 4, and would occur on a long-term basis in alternative 7. Alternative 5 and phase 2 of alternative 6 are also more restrictive than under current management. Those alternatives that restrict bison movements and result in moderate or major reductions in the size of the herd would have a major adverse impact on tribes viewing bison as culturally important. These include alternative 5 and phase 2 of alternative 6.
In most alternatives, the process of monitoring and vaccinating bison would change their appearance. Bison would be marked with visible metal ear tags, paper back tags, and paint/peroxide stripes to indicate to managers and others that they have tested negative for the Brucella organism. These actions alter the historic image of the bison and would have a temporary, moderate impact on the historic landscapes. This would not be true of alternatives where untested bison would be allowed outside the park,

The construction of new capture or quarantine facilities would have the potential to affect archeological resources. In all alternatives proposing construction of bison management facilities (all except alternative 2), site-specific surveys would be conducted prior to ground-disturbing activities, and every effort would be made to avoid known archeological resources. Should avoidance prove impossible, the National Park Service, U.S. Forest Service, and state agencies would develop mitigating measures in consultation with the state historic preservation officer and the advisory council. Therefore, the impact would likely be negligible or minor.

Removal of the capture facilities, as proposed in alternative 2, would have a beneficial impact on the historic landscape. The construction of several new capture facilities in alternatives 5 and 6 would have a temporary but significant adverse impact on the historic landscape of Yellowstone National Park.
Yellowstone’s Youth Conservation Corps Resource Education Curriculum

Stewardship

Lessons Included:
Stewardship Lesson #1: CONNECTING TO THE LAND
Stewardship Lesson #2: thinking like a mountain
Stewardship Lesson #3: reflection - transference
Stewardship Lesson #1: Connecting to the Land

Title: Connecting to the Land
Overview: This lesson uses a variety of activities that explore what youth believe are the essential ingredients of stewardship and how their connection to their special place contributes to their sense of stewardship.
Learner Outcomes: The youth will:
1. Share their connection to nature through their special place.
2. Know what skills and knowledge they can bring to their stewardship project.
3. Understand how to transfer stewardship knowledge and skills from one setting to another.

Area: Stewardship
Background: The following information is additional reading for the staff and is not required to instruct this lesson.

Environmental stewardship refers to responsible use and protection of the natural environment through conservation and sustainable practices. Aldo Leopold championed environmental stewardship based on a land ethic “dealing with man’s relation to land and to the animals and plants, which grow upon it” (Leopold, 1986).

Getting Ready:
Materials: Journals and pencil, colored pencils, and handouts.
Preparation: Example of special place map, pre-drawn.

Suggested Procedure:

Connection to Stewardship through Special Places (30 minutes)
The staff will:
1. Ask the youth what makes a special place? (D1)
   a. Places are special to people for many different reasons. Some people remember childhood places where they were happy, built forts, or found a place away from adults. Other people remember places are special because famous events occurred there. Some places are special to groups of people or to just one person.
2. Show an example of their special place map and share thoughts and details identifying significant objectives or ideas.
3. Ask youth to draw their own special place maps.
4. Ask youth to share their special place map, including why this place is special to them. (F1)
   a. Encourage youth to ask questions about each other’s special places.
      i. What does it smell like?
      ii. What sounds do you hear?
      iii. Who is there with you?
5. Discuss the relationship between youths’ special place and stewardship.
   a. Ask youth:
i. Have they considered a stewardship project in their special place or in other parts of their community?
ii. How does their special place root them in the stewardship projects?
iii. How does their special place connect us to our stewardship projects in YELL-YCC?

**Silent Conversation** (25 minutes)

The staff will:
1. Form the youth into a circle. Make sure that every youth has a pen.
2. Introduce the activity
   a. Explain that youth may be given the same stimuli paper and asked to reply to the thoughts of their peers.
   b. Read off the Stimuli Papers: (see handouts for group copies)
      i. Define stewardship and give an example.
      ii. How does this quote connect to Stewardship? “I am only one; but still I am one. I cannot do everything, but still I can do something. I will not refuse to do the something I can do.” – Helen Keller
      iii. What do you bring to a stewardship project?
      iv. What does this quote remind you of? “We must strive to be good ancestors.” – Ralph Nader
      v. How does stewardship connect us to our past and our future?
   c. Ask youth to write responses to the stimuli in the center and their peers’ thoughts in the areas surrounding the stimuli. Explain to youth that they will be writing sentence stems around the stimuli to guide responses.
   d. Present youth with an example on the dry erase board:

![Diagram of Silent Conversation activity]

**Staff Notes:** this discussion strategy uses writing and silence as tools to help youth explore a topic in-depth. Slowing down youths’ thinking process and gives them an opportunity to focus on the views of others and build on each other’s thoughts.

e. Emphasize that the conversation is silent: youth must write to express their thoughts, questions, and connections. All communication is done in writing. Tell youth they will have time to speak in the large groups later. *(D1)*
f. Ask youth if they have questions, to minimize the chance that youth will interrupt
the silence once it has begun.
g. Spread the 5 papers around the group. Youth begin by reading and responding to their stimuli. When time is called, individual papers are passed to the person on the left within each group.
h. Repeat the process until everyone in the group has contributed to everyone else’s thoughts.
i. Break the silence. When youth receive their original paper, ask them to read through all comments.
j. At this point, ask youth to take out their journals and identify a question or comment that stands out to them at this moment. (F1)

Conclusion: (5 minutes) (S1) Finish with a group discussion about the questions and ideas arising from the activity.
   1. Begin conversation with a simple prompt such as,
      a. “What did you learn from having a silent conversation?”
      b. This is the time to delve deeper into the content and use ideas on the papers to bring out the youths' thoughts. The discussion can also touch upon the importance and difficulty of staying silent and the level of comfort with this activity.
      i. If time allows: create a group definition of stewardship using the list of examples you outlined in the. Have youth write this definition in their journal.

Assessment Check Ins:

(D1): To look at youths’ prior knowledge and interests in their experience with special places. This information will assist the staff in understanding the experiences that youth have had with special places as well as urge youth to identify a place that is special to them.

(D2): For youths’ to demonstrate their prior knowledge and interests in stewardship. This information will assist the staff in understanding the experiences that youth have had with stewardship.

(F1): Provides information on what youth are learning from identifying their special place experiences at this point of the lesson. This assessment encourages youth to creatively explore their connections to their special place.

(F2): Provides information on what youth are reflecting or connecting with at this point of the lesson. This assessment will provide insight into the degree and depth of their understanding to guide and adjust the lesson to their interest.

(S1): Assess what youth have learned and transfers it into their experience at YELL-YCC.

Staff Notes:
1. Silent Conversation: This discussion strategy uses writing and silence as tools to help youth explore a topic in-depth. Having a written conversation with peers slows down youths’ thinking process and gives them an opportunity to focus on the views of others. This
strategy also creates a visual record of youths’ thoughts and questions that can be referred to later in the YCC program. Using the small paper strategy can help engage shy youth who are not as likely to participate in a verbal discussion.

2. Connection to Stewardship through Special Places: This activity can be a moving activity by walking from one location to another on a trail.

Reference:


1. The instructional activity served to be central activity in this lesson. This lesson was then modified in the following ways:
   • Some instructional language was used to match the Resource Education Curriculum.

Handouts:

Define stewardship and give an example
How does this quote connect to Stewardship?

“I am only one; but still I am one. I cannot do everything, but still I can do something. I will not refuse to do the something I can do.”

- Helen Keller
What do you bring to a stewardship project?
What does this quote remind you of?

“We must strive to be good ancestors.”
– Ralph Nader
How does stewardship connect us to our past and our future?
Stewardship Lesson #2: Thinking Like A Mountain

**Title:** Thinking Like A Mountain

**Overview:** This lesson introduces youth to the art of reflection by completing a sound map and analyzing different points of view. In the essay, “Thinking like a Mountain,” author Aldo Leopold speaks of the need to respect the natural balance of nature.

**Learner Outcomes:** The youth will:
1. Know how to focus on their auditory awareness.
2. Understand the need to respect the natural balance of nature.
3. Identify the genre and theme of Leopold’s “Thinking like a Mountain.”

**Area:** Stewardship

**Background:** The following information is additional reading for the staff and is not required to instruct this lesson.

“Aldo Leopold, the naturalist and author, once wrote, “We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect.” With these words, Leopold began a philosophy known as the stewardship ethic. You may not be aware, but as a forest landowner, you can already practice stewardship on your land by managing. Stewardship is the use and care of your property so that it remains fruitful and healthy for future generations.

The practice of stewardship is not limited by the size of a woodlot, the type of ownership, or even the boundaries of the property. The stewardship ethic can be employed by any landowner, and implemented by those with a wide variety of ownership objectives” (Fallone, Gailor, & Selleck, 2006).

**Getting Ready:**

**Materials:** Journals and pencil and handout.

**Location:** A site where the youth are likely to hear a variety of sounds such as: meadows, streams, or forests.

**Suggested Procedure:**

**Sound Map** (15 minutes)

A thrilling chorus of natural sounds delights the youth while creating a Sound Map.

The staff will:
1. Begin by showing the group a piece of paper with an X in the center. Tell the youth the paper is a map, and that the X shows where they are sitting.
2. When they hear a sound, they should make a mark on the card that aptly describes the sound.
3. The mark's location should indicate as accurately as possible the direction and distance of the sound. The marks should be interpretive, not literal; the players do not have to draw pictures of plants and animals, just a few lines indicating wind or a musical note.
indicating a songbird. In other words, they should spend little time drawing and more of the time listening.

4. Tell the players to keep their eyes closed while they listen. Explain that cupping their hands behind their ears provides a reflective surface for catching sounds, creating a shape like the sensitive ears of a fox. To hear sounds behind them, they do not need to turn their heads, but rather cup their hands in front of their ears.

5. Ask youth to select a listening place quickly, so that some are not walking around while others are already listening. Give the group one minute to find a spot, and tell them to stay in the same spot until the end of the activity. Giving the youth enough time to disperse will ensure a diversity of sound maps and greater interest in sharing.

6. How long you should play depends on the attention span, and how well supplied the environment is with sounds. A good basic guideline is a maximum of 10 minutes.

7. After time is up, ask the players to assemble and share their maps with a partner.

8. Then ask the entire group to gather and discuss the following questions. (F1)
   a. How many different sounds did you hear?
   b. Which sounds did you like best? Why?
   c. Which sounds did you like least? Why?
   d. Which sounds had you never heard before? Do you know what made the sounds?

9. Transition into the Aldo Leopold Reading...

**Aldo Leopold Reading (25 minutes)**

The staff will:

1. Start off this section of the lesson by having the youth read “Thinking Like A Mountain” (see handouts) aloud taking turns.
   a. Encourage youth to write down their thoughts or ideas on the reading as they are listening.
   b. Provide youth the opportunity at the end of the reading to arrive at what they found to be the most important lesson
   c. In small groups, have the youth create a Venn diagram to explore and discuss the relationship between stewardship and the Aldo Leopold reading. (F2)
   d. Youth will then do a gallery display and their responses & walk through the gallery to explore how other groups defined and connected the two topics. Youth will have the opportunity to question one another about the process of how other groups have defined and differentiated the defining & differentiating these concepts.
   e. Once the gallery walk is complete, youth will choose an area for discussion that connects to the youth’s Venn diagram.

**Optional Questions for Discussion (15 minutes) (S1)**

a. Compare your values with Leopold’s: Is the ability to see geese more important to you than television? Are you one who can live without wild things or one who cannot? How do various groups in American society currently determine the value of wild things? How is this demonstrated? How do disagreements about values play out?

b. Who is part of your community? Your family, friends, or neighbors? Does it include the trees in your yard or the birds at your feeder? How have attitudes toward the natural world changed since Leopold’s time? Since the first settlers arrived in America?
Assessment Check Ins:

(F1): Provides information on what youth are learning about their observation skills in connecting to the natural world at this point of the lesson. This assessment will encourage youth to creatively explore their observation skills.

(F2): Provides information on youths’ understanding of stewardship and the Aldo Leopold reading by comparing and contrasting at this point of the lesson. This assessment will provide insight into the degree and depth of their understanding, which allows staff to guide and adjust the lesson as it is taught.

(S1): Assess what youth have learned and transfers it into their experience at YELL-YCC and beyond.

Staff Notes:

a. **Key Concept of the Reading:** Leopold encouraged people to expand their vision of the world around them and to include the natural world in their community as they would their neighbors. When people begin to look at plants, animals, soils, and waters in this context, they begin to consider them in a different way.

Reference:


1. The instructional activity content served to be a concluding activity in this lesson This content was then modified in the following ways:
   - Some instructional language was used to match the Resource Education Curriculum.


1. The instructional activity served as an example of the Sound Map activity in this lesson. This content was then modified in the following ways:
   • Some instructional language was used to match the Resource Education Curriculum.


1. The instructional activity served as an example of the Sound Map activity in this lesson. This content was then modified in the following ways:
   • Some instructional language was used to match the Resource Education Curriculum.

Handouts:

**Thinking Like a Mountain**

**By Aldo Leopold**

“A deep chesty bawl echoes from rim rock to rim rock, rolls down the mountain, and fades into the far blackness of the night. It is an outburst of wild defiant sorrow, and of contempt for all the adversities of the world. Every living thing (and perhaps many a dead one as well) pays heed to that call. To the deer it is a reminder of the way of all flesh, to the pine a forecast of midnight scuffles and of blood upon the snow, to the coyote a promise of gleanings to come, to the cowman a threat of red ink at the bank, to the hunter a challenge of fang against bullet. Yet behind these obvious and immediate hopes and fears there lies a deeper meaning, known only to the mountain itself. Only the mountain has lived long enough to listen objectively to the howl of a wolf.

Those unable to decipher the hidden meaning know nevertheless that it is there, for it is felt in all of wolf country, and distinguishes that country from all other land. It tingles in the spine of all who hear wolves by night, or who scan their tracks by day. Even without sight or sound of wolf, it is implicit in a hundred small events: the midnight whinny of a pack horse, the rattle of rolling rocks, the bound of a fleeing deer, the way shadows lie under the spruces. Only the ineducable tyro can fail to sense the presence or absence of wolves, or the fact that mountains have a secret opinion about them.

My own conviction on this score dates from the day I saw a wolf die. We were eating lunch on a high rim rock, at the foot of which a turbulent river elbowed its way. We saw what we thought was a doe fording the torrent, her breast awash in white water. When she climbed the bank toward us and shook out her tail, we realized our error: it was a wolf. A half-dozen others, evidently grown pups, sprang from the willows and all joined in a welcoming melee of wagging tails and playful maulings. What was literally a pile of wolves writhed and tumbled in the center of an open flat at the foot of our rim rock.
In those days we had never heard of passing up a chance to kill a wolf. In a second we were pumping lead into the pack, but with more excitement than accuracy: how to aim a steep downhill shot is always confusing. When our rifles were empty, the old wolf was down, and a pup was dragging a leg into impassable slide-rocks.

We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes - something known only to her and to the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view.

Since then I have lived to see state after state extirpate its wolves. I have watched the face of many a newly wolfless mountain, and seen the south-facing slopes wrinkle with a maze of new deer trails. I have seen every edible bush and seedling browsed, first to anaemic desuetude, and then to death. I have seen every edible tree defoliated to the height of a saddlehorn. Such a mountain looks as if someone had given God a new pruning shears, and forbidden Him all other exercise. In the end the starved bones of the hoped-for deer herd, dead of its own too much, bleach with the bones of the dead sage, or molder under the high-lined junipers.

I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades. So also with cows. The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea.

We all strive for safety, prosperity, comfort, long life, and dullness. The deer strives with his supple legs, the cowman with trap and poison, the statesman with pen, the most of us with machines, votes, and dollars, but it all comes to the same thing: peace in our time. A measure of success in this is all well enough, and perhaps is a requisite to objective thinking, but too much safety seems to yield only danger in the long run. Perhaps this is behind Thoreau's dictum: In wildness is the salvation of the world. Perhaps this is the hidden meaning in the howl of the wolf, long known among mountains, but seldom perceived among men” (Leopold, A. 1986).
Stewardship Lesson #3: Reflection - Transference

Title: Reflection - Transference
Overview: This lesson allows youth to solidify what they have learned during their YELL-YCC stewardship experience through the process of reflection. Youth then use what they have learned to brainstorm stewardship project possibilities applicable to their home communities.

Learner Outcomes: The youth will:
1. Evaluate their YCC experience in regards to personal success achieved and breadth of understanding developed.
2. Understand how to transfer stewardship principles and skills from one setting to another.
3. Create a stewardship project proposal, including a clearly defined goal and an extensive list of resources, that complements their own stewardship ethics.

Area: Stewardship
Background: This lesson is rooted in reflection and does not include background information.

Getting Ready:
Materials: Masking tape, large sheet or tarp, and markers or pens
Preparation: Staff prepares by reviewing the staff notes and becoming familiar with Think—Pair—Share strategy and its purpose.

Suggested Procedure:

Warm Up Activity (10 minutes) (D1)
1. Discussion on youth stewardship experience during YELL-YCC.
2. Use the following prompts:
   a. What have you learned about stewardship through your projects?
   b. How could you apply what you have learned about stewardship to your community?
   c. What type of stewardship project could your community benefit from?

Turning the Page (25 minutes) (S1)
Youth will work as a team to reflect on their YELL-YCC experience and formulate a future program of action. Youth will participate in the “Turn the Page” group initiative.

Staff will:
1. Have youth respond to the following questions in writing, on two separate pieces of tape:
   a. “One idea of a stewardship project you could complete in your community.”
   b. “One thing you have learned about yourself that you can use in your stewardship project idea.”
2. Youth will place pieces of tape that contain their “One idea of a stewardship project you could complete in your community” responses on the same side of the large sheet/tarp.
3. Youth will read off what they wrote on the second piece of tape, regarding “One thing that you have learned about yourself that you can use in your stewardship project proposal”, and place this piece of tape on the opposite side of the large sheet/tarp.
4. After all of the youth have placed their pieces of tape on the sheet/tarp, they all gather and stand on top of it. The youths’ objective is to try to turn the sheet/tarp over (“Turning the Page”) without stepping off the sheet onto the ground, under, or outside the tarp/sheet. Anytime a youth steps off the sheet, the whole group has to try again.

5. Staff’s goal is to be overdramatic and to stress the importance of creating a plan and working together.

6. After “turning the page,” the youth remain on the sheet/tarp. Youth find and share their pieces of tape that list “One thing you have learned about yourself that you can use in your stewardship project proposal.” When all youth have shared, they can then step off the tarp.

Conclude: What will the “One idea of a stewardship project you could complete in your community” look like? Describe it! Describe what this project will provide for your community at home.

Leading question for the next activity: Can you elaborate on how you will use others to help implement your learning into action?

Resource List (25 minutes)
The main objective of this activity is to:

a. Revisit the youth’s definition of stewardship from week two.

b. Set a stewardship project goal.

c. Compile a list of community resources youth have available to use during their stewardship project.

d. Emphasize teamwork during the process of stewardship project idea completion.

   a. For Example:

      i. Goal: Do a river clean at a local park with the Girl Scouts Club.
      
      ii. Resources List: Local state or city park, newspaper, high school club ie: stream team club, city officials, related businesses or friends and family.

   e. Describe the Think—Pair—Share strategy and its purpose with your youth, and provide guidelines for discussions that will take place.

   f. Explain to youth that they will (1) think individually about a goal and compile a resource list that complements their goal of their stewardship project; (2) pair with a partner and discuss their goal and resource list; and (3) share ideas with the rest of the group.

   g. Using a youth or youth(s) from you’re group, model the procedure to ensure that youth understand how to use the strategy. Allow time for youth to ask questions that clarify their use of the technique.

   h. Once youth have a firm understanding of the expectations surrounding the strategy, begin the Think—Pair—Share. The staff should monitor and support youth as they work through the steps.

   i. After the group “share,” you may choose to have partners re-convene to talk about how their stewardship ethic is reflected in their stewardship project idea (S2)

      a. For example: Completing a river clean-up at a local park with the Girl Scouts, reflects on my personal responsibility to protect the natural environment through a river clean up. Additionally, incorporating youth in my stewardship project is important in encouraging the next generation of land stewards.
Conclude: (2 minute) Following the group discussion, challenge youth to take their YELL-YCC experience to another level, by bringing it back to their home community and applying it there.

Assessment Check Ins:

(D1): To examine youths’ prior knowledge and overall interest in YELL-YCC stewardship experience. This information will assist the staff in understanding the relevance of experiences youth might transfer back to their communities.

(S1): This assessment validates what youth learn, and it facilitates the transfer into their lives and also to their home communities.

(S2): This assessment gives volume to what youth have learned and transforms their learning into steps they can put into action once back in their communities.

Staff Notes:

What is Think—Pair—Share?

a. Think-Pair-Share is a strategy designed to provide youth with "food for thought" on given topics, enabling them to formulate individual ideas and share these ideas with another youth. It is a learning strategy developed by Lyman and associates to encourage youth participation. Rather than using a basic recitation method in which a teacher poses a question and one youth offers a response, Think-Pair-Share encourages a high degree of peer response and can help keep youth on task.

What is its Purpose?

b. Providing "think time" increases quality of youth responses.

c. Youth become actively involved in thinking about the concepts presented in the activity.

d. Research tells us that we need time to mentally "chew over" new ideas in order to store them in memory. When staff present too much information all at once, much of that information is lost. If we give youth time to "think-pair-share" throughout the lesson, more of the critical information is retained.

e. When youth talk over new ideas, they are forced to make sense of those new ideas in terms of their prior knowledge. Their misunderstandings about the topic are often revealed (and resolved) during this discussion stage.

f. Youth are more willing to participate since they don't feel the peer pressure involved in responding in front of the whole class.

How Does it Work?

a. Think: Staff begins by asking or creating a topic that youth will discuss. Youth "think" about what they know or have learned about the topic for a given amount of time (3-5 minutes).

b. Pair: Each youth should be paired with another youth. The staff may choose whether to assign pairs or let youth pick their own partner. Remember to be sensitive to learners' needs (reading skills, attention skills, language skills) when creating pairs. Youth share their thinking with their partner, discuss ideas, and ask questions of their partner about their thoughts on the topic (2-5 minutes).
c. Share: Once partners have had ample time to share their thoughts and have a discussion, the staff expands the "share" into a whole-group discussion. Allow each partner to choose who will present their thoughts, ideas, and questions they had to the rest of the group. After the group “share,” you may choose to have partners re-convene to talk about how their thinking perhaps changed as a result of the “share” element.

Reference:


1. The instructional activity served to be central activity in this lesson This lesson was then modified in the following ways:
   • Some instructional language was used to match the Resource Education Curriculum.


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Handouts: None
Yellowstone’s Youth Conservation Corps Resource Education Curriculum

Ecological Relationships

Lessons Include:

Ecological Relationships Lesson #1: WHAT IS THE STORY HERE?
Ecological Relationships Lesson #2: GEOLOGY SHAPES THE LANDSCAPE
Ecological Relationships Lesson #3: CLARK THE NUTCRACKER STORY
Ecological Relationships Lesson #4: UP IN SMOKE!
Ecological Relationships Lesson #5: WOLF REINTRODUCTION
Ecological Relationships Lesson #1: What Is The Story Here?

Title: What is the Story Here?
Overview: This lesson is made up of three activities that progressively introduce youth to making careful observations, asking questions about an object, and creating connections to their own lives while learning about the classification of abiotic and biotic factors.

Learner Outcomes: The youth will:
1. Understand the interrelationship between abiotic and biotic factors.
2. Know the difference between looking and seeing.
3. Be able to use three sentence starters, “I notice,” “I wonder,” and “It reminds me of” to focus their observations and make connections.

Area: Ecological Relationships

Background: The following information is used in the suggested procedure and is necessary to instruct this lesson.

Abiotic vs. Biotic
“Abiotic= non-living things that make life on earth possible. Material such as air, water, carbon, sunlight, climate, oxygen, nitrogen, rocks, the moon, and soil make life, as we know it, possible.

Abiotic Factors- Make life possible while shaping earth’s ecosystems.

a. Sunlight- The amount of available sunlight varies from place to place on earth and within individual ecosystems. Producers, organisms that can produce their own food, rely on sunlight to photosynthesize.

b. Geology- Geology investigates the earth we stand upon and it varies widely from place to place. For example, soil can be coarse sand on beaches and deserts, or fine clay in river banks and marshes. The shape of the land, or topography, also helps to determine the makeup and water availability of any ecosystem.

c. Water- Availability of water directly affects the organisms of an ecosystem. The biological diversity of an area is dependent on the presence of water. Different organisms are adapted to surviving in and depending on different types of water.

d. Temperature-Varies widely between ecosystems and seasonally within an ecosystem. The majority of biotic factors are unable to maintain an internal temperature more than a few degrees above or below the surrounding temperature, there for limiting where different species are found.

e. Wind- Is the driving force behind weather patterns, and aids evaporation. Wind provides a constant threat of desiccation to terrestrial organisms, while shaping ecosystems daily through seed dispersal, shifting substrate, and storm damage.

f. Periodic Disturbance- Most ecosystems undergo periodic disturbance of some kind or another that interrupts the “normal” functioning of the ecosystem. For an ecosystem like a forested area, disturbance can take the shape of floods, fire, or encroaching geothermal activity. These disturbances happen on a frequent enough basis so that species have developed adaptations which help them survive or take advantage of the disruption. In many cases, organisms absolutely rely on disturbances for their survival. What are some disruptions from your community back home?
Biotic- Living Organisms. Organisms, adapted to living in certain habitats of an ecosystem, can engage in competition for food and other resources like water, sunlight, space, and nutrients. They sometimes work together symbiotically, engaging in actions that are mutually beneficial to each species. The most important ecological distinction between organisms is how they get their nutrients. Organisms get their nutrients in three basic ways: the producers though photosynthesis, consumers through ingestion, and decomposers through absorption” (Schutsky, Kaufman, & Signell, 2006).

Getting Ready:
**Materials:** Journals and pencil, and handout.
**Preparation:** This is an extensive lesson that may require dividing between staff to implement effectively, reviewing the entire lesson before hand is highly encouraged. **Location:** Best if done on a trail system for the goal of exploring different organisms. Many parts of the lesson work well as walking activities.

**Suggested Procedure:**
**Warm Up Activity: The More You Look, the More You See** (10 minutes)
The staff will:
1. Prep the youth by telling them you are going to give them a quick eye exam. It will be nothing to worry about. just a quick activity to make certain they have their eyes open.
2. Hold the “Spring in the the Woods” sign so the writing is facing you and tell them you are going to flip it around for a brief moment.
3. They must try and read what it says. Give your youth a moment or two to position themselves where they can see the piece of paper in your hands.
4. Show them the written words for 2-3 seconds and then remove the sign out of view. Ask the youth “What did the sign say?”
5. Most youth will not see that there is two identical words, the word “the” is back to back. Give the youth a second chance to read the sign by showing them the written words for 2-3 seconds and then remove the sign out of view. Ask the youth again “What did the sign say?” By the second time youth have figured out what the sign says.
6. Ask youth “Why is it important to look closely in the natural world?” (D1)
7. Explain to youth that one of the most important aspects of being a park ranger or an ecologist is to look closely at the world around you and make connections. There is an infinite amount of activity in the natural world around us, whether it is in a forest or in your own community it is important to stop, be patient, and really see what is happening. The human brain is a powerful organ that can jump to conclusions based on what it knows to be correct. Looking at something is a superficial act, and seeing is understanding what it is you are looking at.

**Transition:** Explain that we are surrounded by huge amounts of information, and our brains are capable of taking in and making sense of much of what we are exposed to in our environment. Processing every bit of information would be overwhelming. We continually use our hypothalamus to filter what is important for survival and what is not to make unconscious decisions about the appropriate level of detail and priority of the information we attend to. Deep observation is a skill that must be learned. The next activity develops an observation routine.
I Notice, I Wonder, It Reminds Me Of (30 minutes) (F1)

I Notice…Making Observations
1. Find an interesting organism or object on the trail and have your group circle around it. Tell them the whole group will be making observations together of an object/organism.
2. Explain the first prompt, “I notice…”
   a. Explain to youth that they will be making observations quickly, without pausing. Tell youth that, saying them out loud is important, because we tend to remember much better this way.
      i. They should be saying as many things they notice as possible, even if they seem obvious, and just loud enough for people close to hear them.
   b. Tell youth to use the sentence starter, “I notice…” and just see what comes out of your mouth next.
      i. Tell youth that it is normal for this to be challenging at first. Say, If you notice that you stop talking, your brain may have slipped back into “idle” mode. If this happens, listen to what others are saying; which can inspire you to come up with more observations.
3. Tell youth they will have one minute to make “I notice…” observation. After about a minute call for everyone’s attention.
4. Youth discuss their observations and share. Tell youth to first turn and talk to a partner about their observations.
   a. After a minute, ask,
      i. What is a new observation you learned from your partner?
      ii. Is there something you observed that no one else observed?
      iii. Was there anything you both observed?
5. Explain the importance of corroboration and redundancy in science. If more than one person saw the same thing, that is important scientifically. If only one person sees something, that can be important too because it may have been missed. Once it is pointed out, it can be something that others can explore.

I Wonder…Asking Questions
1. Explain second prompt, “I wonder…”
   a. Tell s they will once again be speaking out loud as thoughts come into their heads, but now they will make “I wonder” statements and ask questions. Tell youth that, “Like before, don’t edit yourself, just keep asking questions. If you get stuck listen to someone else to see if they inspire you.”
2. Youth make “I wonder” statements. Allow about one minute, and then get youths’ attention.
3. Discuss youth questions. Ask,
   a. What were some of the best questions you came up with?
      i. Have youth share out a few of their wonderings. Take a sample question that could be answered through observation or investigation and explain how it could be explored further.
4. Introduce three types of questions. Explain that there are usually three different types of questions that come up:
a. Questions we can answer through more observations. These are especially useful when observing, because they often lead to more and deeper observations.
b. Questions we can look up because others have wondered about the same thing and they’ve already researched it.
c. Questions we can’t answer, either because they are outside the realm of science or they are unknowable. These questions are fun and interesting to wonder about, just for the sake of wondering.

5. Pick a questions that is answerable through more observation. Ask if they can answer it and how long they would have to observe to get an answer.
Optional: Have the youth write down questions that they’d like to look up later.

It Reminds Me Of…Making Connections
1. Explain third prompt, “It reminds me of…” Remind youth that they will be completing this sentence starter out loud, without pausing, and they should try to come up with as many statements as possible.
2. Youth make “It reminds me…” of statements. Allow about a minute for making statements, and then call for youths’ attention.
3. Discuss connections. Ask youth,
   a. What were some of your favorite “It reminds me of statements?
   b. Have them turn and talk to a partner. Ask a few to share out with the group.
4. Form groups of 2-3 to make more observations. At this point you can have youth form small groups and find their own organisms or objects to observe using the same three prompts.
5. Conclude activity. Give youth opportunity to report out to partners and/or the whole group. Explain that these three prompts are very useful in investigating nature, discovering new things, and keeping us curious.

Transition: Explain that science is about coming up with the best explanation for all the available evidence. It’s also about being open-minded about another explanation that could be better. In science, nothing is ever proven. That’s why scientists tend to use categories to classify observations.

Abiotic Simon Says (15 minutes)
The staff will:
1. Refer to the background information to explain Abiotic and Biotic factors. Ask youth if they are familiar with what an Abiotic and Biotic factors
2. Play a version of “Simon Says” where youth perform the action called out by the teacher only if the action involved something abiotic. (F2)
3. For instance, if the staff says “Simon says…pick up soil,” the youth are to pick up soil. If the leader commands “Simon says…touch a tree,” any youth who moves towards a tree is out for that round.
4. Activity is continued while walking from one location to another. Repeat using various living and non-living objects until youth understand the difference between abiotic and biotic factors.

Possible Abiotic Simon Says Commands:
Abiotic Simon Says
Conclude: (5 minutes) Developing the skill of observation will change the way you experience the world. When you move through the natural world making deep observations, generating questions and making connections, you experience wonder and curiosity, as you directly engage and interact with the natural world. Ask youth how they might further develop the skill of observation on their own through their time in Yellowstone National Park? (S1)

Assessment Check Ins:

(D1): To look at youths’ prior knowledge and interests in making observations in the natural world. This information will assist the staff in understanding the youth have had with observation.

(F1): Provides information on what youth are learning from making observations, questions that relate to their understands of important idea in science, and analogies connecting observations to prior experience or ideas. This assessment will encourage youth to practice the skill of observation.

(F2): Provides information on what youth are learning, about abiotic and biotic organisms at this point of the lesson. This assessment is a creative way to explore youth understandings in an applicable way.

(S1): Assess what youth have learned and transfers it into their experience at YELL-YCC.

Staff Notes:

Teaching Knowledge

Spirit of Scientific Inquiry and Investigation

a. Scientists who study memory functions in the brain have found that making connections is what keeps our memories stable and accessible. This is because accessing memory involves making associations between new information and what we already know. The more connections that can be made to prior knowledge, the more stable the memory, as it is more firmly placed within an existing conceptual framework. The “it reminds me of” exercise specifically helps youth make connections to what they already know. Creating metaphors and analogies also help to generate more interesting questions. In addition, it can be easier to remember things that you’ve said out loud, because information is processed in both the speech and the auditory centers of the brain.

Introducing Content:
b. Avoid providing information that might discourage youth from investigating for themselves. Focusing on facts, like identifying the organism can switch youth into a more passive mode. Waiting till after they’ve made observations and explanations and generated questions of their own will often make youth more receptive to hearing interesting facts about an object. As you ask youth to share their sources of information, make sure that you share yours as well.

Common Relevant Misconceptions

c. *The best way to learn is to be told lots of information.* We often assume that when we tell someone something, they will learn it. However, people learn in all kinds of different ways and hands-on learning is one of the best. When youth observe and start asking questions, they are engaging their curiosity. When teachers provide a quick answer or a set of facts, it tends to shut down this curiosity. The idea is that when youth are excited about something and full of questions, they’re more likely to keep learning and investigating the natural world.

d. *Identifying organisms is the primary goal of outdoor experiences:* Once we have identified something in nature, often we don’t notice much else. Identification sometimes substitutes for deeply observing what something really is. When organisms are reduced to a species, we can fail to notice the details of the individual we are observing. Exploring the complexity and nuances of nature by observing and asking questions can be more useful that just receiving an answer.

e. *Observing in nature means being still and quiet.* You don’t have to be quiet and still to observe. Saying things out loud helps cement them in our memories and talking with peers helps spark new ideas and open windows for new observations and connections. Sometimes, being quiet and still in nature is the perfect tool for observing, but sometimes thinking out loud and discussing is also the perfect tool.

Reference:


1. The lesson plan titled: I notice…I wonder…It reminds me of… from the BEETLES program served as the central activity in this lesson. This lesson was then modified in the following ways:
   - Some instructional language was used to match the Resource Education Curriculum.
   - The introduction and conclusion are additions to this lesson.
   - Some instructional notes were not included based on relevant.


1. The lesson plan titled: Spring in the Woods from the ABC’s of Ecology served as the warm up/intro activity in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
2. The lesson plan titled: Abiotic Simon Says from the ABC’s of Ecology served as the closing activity in this lesson. This lesson was then modified in the following ways:
   • Instructional language was used to match the Resource Education Curriculum.


Handouts:

Spring in the Woods
Ecological Relationships Lesson #2: Geology Shapes the Landscape

Title: Geology Shapes the Landscape

Overview: This lesson assesses youths’ prior knowledge of Yellowstone’s geological landscape and introduces youth to the development of the ecosystem over a long period of geologic time. In addition to the natural process of plant communities and subsequent ecosystems changing over time can begin from any starting point.

Learner Outcomes: The youth will:
1. Understand the fundamental geological concepts and processes of Yellowstone

Area: Ecological Relationships

Background: The following information is additional reading for the staff and is not required to instruct this lesson.

“Yellowstone’s geologic story provides examples of how geologic processes work on a planetary scale. The foundation to understanding this story begins with the structure of the Earth and how this structure gives rise to forces that shape the planet’s surface.

The Earth is frequently depicted as a ball with a central core surrounded by concentric layers that culminate in the crust or surface layer. The distance from the Earth’s surface to its center or core is approximately 4,000 miles. The core of the earth is divided into two parts. The mostly iron and nickel inner core (about 750 miles in diameter) is extremely hot but solid due to immense pressure. The iron and nickel outer core (1,400 miles thick) is hot and molten. The mantle (1,800 miles thick) is dense, hot, semisolid layer of rock. Above this layer is the relatively thin crust, three to forty-eight miles thick, on which the continents and ocean floors are found.

The Earth’s lithosphere (crust and upper mantle) is divided into many plates, which are in constant motion. Where plate edges meet and one plate may slide past another, one plate may be driven beneath another (subduction). Upwelling volcanic material pushes plates apart at mid-ocean ridges. Continental plates are made of less dense rocks (granites) that are thicker than oceanic plates (basalts) and thus, “ride” higher than oceanic plates. Many theories have been proposed to explain crustal plate movement. Currently, most evidence supports the theory that convection currents in the partially molten asthenosphere (the zone of mantle beneath the lithosphere) move the rigid crustal plates above. The volcanism that has so greatly shaped today’s Yellowstone is a product of plate movement combined with upwelling’s of molten rock” (Yellowstone National Park, 2012, p. 43).

Getting Ready:
Materials: Journals and pencil, colored pencils, youths’ water bottles for “mini glaciers”, an outcropping of large rocks (to be platforms for youth to create their Yellowstone geological landscapes) along with small amounts of the following small rocks, different colors of sand and soil, twigs, and leaf litter (as the material for their landscapes), and handouts.
Location: An area that has the material described for the lesson close at hand for youth to grab. Often areas close to water have this material close and easily exposed.
Preparation: Review this lesson thoroughly and keep it close while teaching. Do not be afraid to read off the lesson if you are unfamiliar with the content.

Hint: This is difficult lesson to teach if the staff gets caught up in the geological facts. The goal of this lesson is that the youth understand the geological scale not the details of every geological process. But the details are present in the lesson for the youth who want to know more.
Suggested Procedure:

**Concept Maps: Assessment of Prior Knowledge (15 minutes) (D1)**
In this activity youth will reflect on their current knowledge and misconceptions of the geological landscape of Yellowstone National Park.

1. Provide youth with a concept map as an example with unrelated key concepts (terms) in the middle like (i.e., work safety). Complete the example as a group together on the dry erases board.
2. Then give youth the following concept “Geology”, with the following instructions.
   a. On your paper draw a circle at the top of it.
   b. Write the following concept in the middle of this circle “Geology.”
   c. Now think of all the knowledge you have about this concept and draw that knowledge into circles with level of the hierarchy that shows importance.
   d. Draw lines between the terms you see to be related to one another.
   e. Write on each line the nature of the relation between the terms.
   f. Provide crosslinks to illustrate a synthesis between concepts.
   g. Show examples of the concept used.
3. Youth will individually complete concept maps of the information that they know about “Geology”.
4. Youth will then pair off and share what they know.
5. The staff needs to pay close attention to what the youth are saying to assess youth’s prior knowledge and misconceptions.
   a. For example if youth are lacking concepts (i.e. rock types/cycle) then spend more time teaching to the basics or if youth are presenting larger concepts (i.e. the theory of the Hot Spot) than spend more time teaching to larger concepts.
   b. This is important to adjust the lesson and meet youth where they are, otherwise you might be teaching above their level or you might be boring them.

**Building Yellowstone’s Geologic Landscape (35 minutes) (F1)**
In this activity youth will create “mini” Yellowstone Geologic Landscapes to understand that the vegetation of Yellowstone today is shaped by its geologic past.

The staff will:
1. Jump start the youths’ imagination, by telling them that they are going to simulate in 35 minutes of time what would naturally take millions of years.
2. They are going to develop their own Yellowstone geologic landscape starting completely from scratch on bare bedrock.
3. Divide youth into pairs and give out task cards (see handouts). Each pair will get to work on a large rock (or another surface). This will be the bedrock on which they will build their own Yellowstone geologic landscape.

**Conclusion:** (4 minutes) Discuss with youth the following questions: How does a glacier or volcanic activity disrupt the process of soil formation? (Answer for Glaciers: They interrupt soil formation in that they completely destroy ecosystems located within the path of the glacier. In their scourging of the land, glaciers pick up available sediments and deposit them elsewhere.)
Does glacier or volcanic disturbance serve any other role in soil formation?

**Revisit Concept Maps:** (10 minutes) (S1)
In this activity youth will revisit their understanding of the geologic landscape of Yellowstone National Park.

1. Present the following concept “Geology” again to youth.
2. Instruct the youth to follow the same directions as the previous concept map. (On your paper draw a circle at the top of it, write the following concept in the middle of this circle “Geology”, now think of all the knowledge you have about this concept and draw that knowledge into circles with level of the hierarchy that shows importance.)
3. Youth will then pair with another youth and share what they have learned.
4. The staff needs to pay close attention to what the youth are saying to assess what youth’s understand of the learner outcomes.

**Assessment Check Ins:**

(D1): To look at youths’ prior knowledge, skills, interests, and misconceptions. This information will assist the staff in determining the level of geologic instruction to cover.

(F1): Provides information on what youth are learning about Yellowstone Geologic Landscape, by demonstrating it in their “mini” Yellowstone worlds at this point of the lesson. This assessment will encourage youth to think

(S1): Assess what youth have learned from the lesson

**Staff Notes:** In this task youth will be creating a concept map. Concept maps come in four major categories. The one the youth will be creating is called a “Systems Map with Annotated Relations”. The systems concept map organizes information in a format, which is similar to a flowchart. *Examples* below follow a scale from a basic outline to the goal.
(Reprinted from Novak & Canas, 2008).

Reference:


1. The lesson plan titled: Building a Forest from the ABC’s of Ecology served as the central activity in this lesson renamed Building Yellowstone’s Geological Landscape. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
   - Instructional handouts were added to this lesson as the instruction of the lesson changed to a different format.


Handouts:

**Building Yellowstone’s Geological Landscape Action Cards**

The objective of this activity is to understand the geology and vegetation of Yellowstone while creating a “mini” Yellowstone Geologic Landscape.

Have these materials close at hand, but there is no need to collect them prior:

**Materials:** Journals and pencil, one water bottle for “mini glaciers”, an outcropping of large rocks (to be platforms to create your Yellowstone geologic landscape) along with small amounts of the following small rocks, different colors of sand and soil, twigs, and leaf litter (as the material for your landscapes).

**Read:** “Most of Earth’s history (from the formation of the earth 4.6 billion years ago to approximately 542 million years ago) is known as the Precambrian time. Rocks of this age are found in northern Yellowstone and in the heart of the Teton, Beartooth, Wind River, and Gros Ventre mountain ranges. During the Precambrian and the subsequent Paleozoic and Mesozoic eras (542 to 66.5 million years ago), the western United States was covered at times by oceans, sand dunes, tidal flats, and vast plains. Near the end of the Mesozoic, mountain-building processes created the Rocky Mountains” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 44).

**Step 1:** Find a bare and flat-topped ROCK (look for an outcropping of large rocks). This rock is the beginning of your Yellowstone Geologic Landscape.

**Read:** “Made up of Sedimentary sandstones and shales, deposited by seas during the Paleozoic and Mesozoic era (570 million to 66 million years ago)” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 51).

**Imagine:** This is what the land looked like a long time ago before any plants were growing on it.

**Answer Some Questions:**
   a. What does the rock feel like?
b. What other abiotic factors are present?
c. Does this bedrock have all the components of an ecosystem?

Imagine: Your fingers as roots of plants.

Answer a Question: Can their roots penetrate the rock for stabilization? Are there any nutrients available for plants or animals?

Read: Weathering: breaks down earth materials from large sizes to small particles, happens in place. The freeze/thaw action of ice is one type of weathering common in Yellowstone. Agents of erosion like wind, water, ice, and waves—move weathering materials from one place to another.

Simulate: Rub smaller rocks over the larger rock. Place a thin layer of sand/or other material atop the boulder to represent thousands of years of weathering and sediment deposition.

Read: Plant succession and formation of topsoil—small plants begin to grow on the thin soil. Youth then return to their own landscape and simulate this by placing very small twigs and leaves on the soil. In the natural world, as these plants die and decompose, they add nutrients to the soil.

Simulate: Crumple the leaves and twigs and sprinkle dark soil over sand to represent topsoil.

Create a Question: What is a question that you could ask about the formation of soil?

Read: Later successional species. Larger trees and shrubs then replace these pioneer species. This is called plant succession or the progressive pattern of different forms of vegetation cover that dominate a given ecosystem.

Simulate: Place larger sticks and leaves on the rock to show more extensive forest growth.

Read: As more organic matter accumulates, a thicker layer of soil forms.

Simulate: Sprinkle additional dark soil/or other material around the plants.

Read: “Disturbance such as volcanic activity. During the Cenozoic era (approximately the last 66.5 million years of Earth’s history), widespread mountain building, volcanism, faulting, and glaciation sculpted the Yellowstone area. The Absaroka Range along the park’s north and east boundaries was formed by numerous volcanic eruptions about 50 million years ago. This period of volcanism is not related to the present Yellowstone volcano.

Approximately 30 million years ago, vast expanses of the West began stretching apart along an east-west axis. This stretching process increased about 17 million years ago and continues today. This created the modern Basin and Range topography (north-south mountain ranges with long north-south valleys) characterizing much of the West—including around Yellowstone.
About 16.5 million years ago, an intense period of volcanism appeared near the area now marked by the convergence of the Nevada, Oregon, and Idaho state lines” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 44).

Observe: Figure 1

Figure 1: The Locations of Yellowstone’s 3 Calderas and 2 Resurgent Domes


Observe: Figure 2
### Yellowstone Geologic History

Ma = mega annum, or millions of years ago  
ka = kilo annum, or one thousand years ago

<table>
<thead>
<tr>
<th>Time (Ma)</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>542 to 66</td>
<td>Area covered by inland seas</td>
</tr>
<tr>
<td>50 to 40</td>
<td>Absaroka volcanics</td>
</tr>
<tr>
<td>30 Ma to present</td>
<td>“Basin and Range” forces creating Great Basin topography</td>
</tr>
<tr>
<td>16 Ma</td>
<td>Volcanics begin again in present day Nevada and Idaho</td>
</tr>
<tr>
<td>2.1 Ma</td>
<td>1st Yellowstone eruption</td>
</tr>
<tr>
<td>1.3 Ma</td>
<td>2nd Yellowstone eruption</td>
</tr>
<tr>
<td>640 ka</td>
<td>3rd Yellowstone eruption</td>
</tr>
<tr>
<td>174 ka</td>
<td>West Thumb eruption</td>
</tr>
<tr>
<td>157 to 151 ka</td>
<td>Bull Lake Glaciation underway</td>
</tr>
<tr>
<td>20 to 16 ka</td>
<td>Pinedale Glaciation maximum</td>
</tr>
</tbody>
</table>


**Read:** “Repetitive volcanic eruptions can be traced across southern Idaho into Yellowstone National Park. This 500-mile trail of more than 100 calderas was created as the North American plate moved in a southwestern direction over a shallow body of magma. About 2.1 million years ago, the movement of the North American plate brought the Yellowstone area into proximity with the shallow magma body” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 44).

**Create a Question:** What is a question that you could ask about volcanic eruptions in Yellowstone National Park?
Observe: Figure 3 Yellowstone Magma Plume

“New technology has allowed scientists to map a magma plume (orange) originating several hundred miles away from Yellowstone, and far deeper than previously thought. It feeds magma into a reservoir (red in detail) beneath Yellowstone. Diagram courtesy Robert B. Smith; appeared in *Journal of Volcanology and Geothermal research*, 2009” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 46)

Read: “Volcanism remains a driving force in Yellowstone today. Explain that magma (molten rock from Earth’s mantle) has been close to the surface in Yellowstone for more than 2 million years. Its heat “melted” rocks in the crust, creating a magma chamber of partially molten, partially solid rock. Heat from this shallow magma caused an area of the upper crust to expand, rise, and erode. Pressure also caused rocks overlying the magma to break, forming faults and causing earthquakes. Eventually, these faults reached the deep magma chamber. Magma oozed through these cracks, releasing pressure within the chamber and allowing trapped gases to expand rapidly” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 45).

Simulate: Take your boot and stomp just one section with a little earthquake action on their geological landscape.

Observe: Figure 4: Volume Comparison of Volcanic Eruptions
Read: “These massive eruptions often occurred, spewing volcanic ash, and gas into the atmosphere and causing fast superhot debris (pyroclastic) flows on the ground. As the underground magma chamber emptied, the ground above it sunk, creating the first of Yellowstone’s three calderas.

The volume of material ejected during this first eruption is estimated to have been 6,000 times the size of the 1980 eruption of Mt. St. Helens in Washington, and ash has been found as far away as Missouri. Approximately 1.3 million years ago, a second, smaller volcanic eruption occurred within the western edge of the first caldera. Then 640,000 years ago, a third massive volcanic eruption created the Yellowstone Caldera, the floor lifts up or subsides, too, but not as much as the domes. In the past century, the net result has been to tilt the caldera floor toward the south. As a result, Yellowstone Lake’s southern shores have subsided and trees stand in water” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 45).

Simulate: Cover a layer of ash, lightly colored soil, over the volcanic section (where they stomped their boot) of their landscape.

Read: “Yellowstone and much of North America have experienced numerous periods of glaciation during the last two million years. Succeeding periods of glaciation have destroyed most surface evidence of previous glacial periods, but scientists have found evidence of them in sediment cores taken on land and in the ocean. In Yellowstone, a glacial deposit near Tower Fall dates back 1.3 million years. Evidence of such ancient glaciers is rare” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 50-1).
Read: “Disturbance such as Glacier Activity- Glaciers result when, for a period of years, more snow falls in an area than melts. Once the snow reaches a certain depth, it turns into ice and begins to move under the force of gravity or the pressure of its own weight. During this movement, rocks are picked up and carried in the ice, and these rocks grind Earth’s surface, eroding and carrying material away. Glaciers also deposit materials. Large U-shaped valleys, ridges of debris (moraines), and out-of-place boulders (erratics) are evidence of a glacier’s passing” ("Yellowstone Resources and Issues Handbook: 2012", 2012, p. 51).

Observe: Figure 5: Two Glacier periods the Bull Lake (orange outline) and Pinedale (blue outline).


Read: “The Bull Lake glaciation covered the region about 151,000 to 157,000 years ago. Evidence exists that this glacial episode extended farther south and west of Yellowstone than the subsequent Pinedale Glaciation, but no surface evidence of it is found to the north and east. This indicates that the Pinedale Glaciation covered or eroded surface evidence of Bull Lake Glaciation in these areas.

The Yellowstone region’s last major glaciation, the Pinedale, is the most studied. Its beginning has been hard to pin down because field evidence is missing or inconclusive and dating techniques are inadequate. Ages of Pinedale maximum varies around the Yellowstone Ice Cap from 20,000 years ago on the east to 16,000 years ago on the north and possibly as young as 14,000 years ago on the south. Other than the Pitchstone Plateau, most of the Yellowstone Plateau was ice free between 13,000 to 14,000 years ago.
During this period, glaciers advanced and retreated from the Beartooth Plateau, scouring the landscape we know today as the northern range. Glacial dams backed up water over Hayden Valley depositing glacial sediment. Similar glacial dams also backed up water over the Lamar Valley; when these dams broke or melted, catastrophic floods sculpted the valleys, forming the modern landscape around the North Entrance of the park.

During the Pinedale’s peak, nearly all of Yellowstone was covered by an ice cap 4,000 feet thick. Mount Washburn and Mount Sheridan were both completely covered by ice. This ice cap was not part of the continental ice sheet extending south from Canada. The ice cap occurred here, in part, because the magmatic activity beneath Yellowstone had pushed up the area to a higher elevation with colder temperatures and more precipitation than the surrounding land” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 51).

Simulate: Use a water bottle to stimulate a glacier bulldozing the opposite section of the landscape as the volcanic activity. This shows how the Yellowstone ecosystem was shaped by glacier and volcanic disturbance. Although these two disturbances where not happening side by side they do influence the ecosystems that can now be found side by side.

Read: “An important part of these disturbances was their influences on the formation of soils. Vegetation communities present in any area of the park reflects a complex interaction between many factors including the regional flora, the climate, the topography, and the local substrates/soils. The vegetation of the park is interrelated with the geology of the park” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 67).

Simulate: recreate the vegetation community found in the volcanic area. Plant twigs to represent the lodgepole pines found in this area as a factor of local substrate and soils.

Read: As you have seen, miles and miles of lodgepole pine forest characterize the Yellowstone, especially within the Yellowstone Caldera. These rhyolitic soils are poor in nutrients needed by fir and spruce. Therefore lodgepole pine remains dominant.

Answer a Question:

- What affects do disturbances have on Yellowstone’s vegetation?
- How does Yellowstone’s vegetation respond to change?
  - For example: “Hydrothermal plant communities demonstrate in very short periods of time that change is fundamental in any natural system. In a few days, the ground can heat up, perhaps triggered by an earthquake, and kill plants, while an adjacent area may be turning cooler, allowing plants to invade a previously inhospitable place” (Yellowstone National Park, 2012).
- What other disturbances effect Yellowstone’s vegetation?
  - For example: Changing Climate
Ecological Relationships Lesson #3: CLARK THE NUTCRACKER STORY

Title: Clark the Nutcracker Story
Overview: This lesson introduces youth to the art of creating a species account that identifies important qualities through a scientific drawing, while connecting to the discovery of the Clarks nutcracker on the Lewis and Clark Expedition. This leads to exploring the interdependent and interrelationship of the Clarks nutcracker, the whitebark pine and the threats to white bark pine, specifically mountain pine beetle.
Learner Outcomes: The youth will:
1. Know how to complete a species account that identifies the important aspect through a scientific drawing.
2. Be able to appreciate the various naturalist skills that Lewis and Clark obtained and the adverse conditions under which they used them.
3. Know the life history of the clark’s nutcracker.
5. Know how to define whitebark pine ecosystem functions.
Area: Ecological Relationships
Background: The following information is additional reading for the staff and is not required to instruct this lesson.

Forest Insect Pest
“The conifer trees of Yellowstone face six major insect and fungal threats. The fungus is an exotic species, but the insects are native to this ecosystem. They have been present and active in cycles, probably for centuries. A scientist studying lake cores from the park has found some of their insect remains in the cores, indicating their presence even millions of years ago. However, in the last ten years, all five insects have been extremely active, which may be due to the effects of climate change.

The primary cause of tree mortality in Yellowstone is native pine bark beetle. The beetles damage trees in similar ways: their larvae and adults consume the inner bark. If the tree is girdled, it dies. Their feeding activity can girdle a tree in one summer. The needles usually drop within the next year, leaving a standing dead tree. Pockets of red-needled trees are evident throughout the park. Forest structure, tree health, and climate are the major factors determining the extent of an outbreak; drought and warmer temperatures can make a forest more venerable to infestation.

Pest Activity
The severity of insect-caused tree mortality has increased in recent years throughout the West, and the insects have spread to previously unaffected plant communities. Several native bark beetle species in the Scolytidae family are altering extensive areas within Greater Yellowstone. Forest structure, tree health, and climate are the major factors in determining whether an outbreak expands; drought and warmer temperatures can make forest more vulnerable to infestation. Mountain pine beetle activity in 2010 was largely confined to the northwest part of the park, in high-elevation whitebark pine and lower elevation lodgepole pine. Defoliation of Douglas fir and Englemann spruce by the western spruce bud-worm is present in the park throughout the lower Lamar and along the Yellowstone and Lamar River valley, but spread considerably less in 2010 than in recent years. These trends appeared to continue in 2011,
when the park was only partially surveyed.

**Future of Insect Outbreaks in Yellowstone**

Landscape-scale drought and the availability of suitable host trees have contributed to the initiation and persistence of insect outbreaks. Healthier trees can defend themselves from beetle attack by “pitching out” adult females as they try to bore into the tree. Extreme winter temperatures can kill off overwintering broods and wet summer weather impedes the insect’s from invading additional trees. Insect activity also decreases as the older and more susceptible trees are killed off. Spruce beetle have declined because they have killed almost all of their preferred food sources (spruce trees more than 10 inches in diameter).

Researchers, supported by the National Park Service, will investigate the interactions between insect’s infections and wildfire. Recent and ongoing studies are focusing on how bark beetle epidemics may affect fire behavior in lodgepole-dominated forest and comparing the resulting fire hazard with that in Douglas fir forests” (“Yellowstone Resources and Issues Handbook: 2013”, 2013).

**Getting Ready:**

**Materials** Journals and pencil, colored pencils, poker chips, and handout.

**Preparation:** Set up the whitebark pine food sources in 4 piles of cards/poker chips spread them out in the center of the area. The 3 cache sites should not be more than 5 feet apart and should be on the outside circle of the food source. Assign cache sites to each group. Use different objects to mark the cache sites. Refer to the diagram in the Staff Notes of this lesson.

**Location:** Large Area 25 by 25 yards preferred.

**Suggested Procedure:**

**Species Accounts (25 minutes)**

The staff will:

1. Frame this lesson by asking youth to close their eyes and *imagine* the place, the people, and yourself in what you are about to describe next.
   a. The day is August 22, 1805. We are along the Lemhi River in Idaho, sent on the Lewis and Clark Expedition to assist in taking field notes of new species along the way. You are a naturalist/explorer and this is your first time out West. You will never make it to Yellowstone on the Lewis and Clark Expedition but in a year from now (1806) you will camp with Captain William Clark on the outskirts of present day Livingston, Montana, which is on your return trip back east. (The Journals of the Lewis and Clark Expedition, 2005).
   b. You awake to a “great white frost” and it is cold as usual. “Our hunter returned late last night.” He “had killed only a fawn deer”. You begin your journey today “at 7 o’clock; and having traveled about a mile, crossed a branch of rivers.” You notice that “here the mountains come so close on the river,” making it impossible to “get through the narrows, and hard to cross” the “very steep high and rocky mountains.” “It is incredible to describe the rock in many places loose and skipped.” You have to cross the mountains though. It is “about 3 miles over”, until you strike the river again. Over the mountain crossing you come upon a species that you have never seen before. You quickly pull out your sketchpad and a pencil (The Journals of the Lewis and Clark Expedition 2005).
2. Ask youth to open their eyes. Explain to the youth that it is their job is to record everything they see about this species.

3. Instruct youth that they will be creating a species account of either a plant or animal of their choosing in the nearby area. A species account is the name for a detailed record of an observation you are making on a species. Making these detailed records will improve your observation skills. *(D1)*
   a. Collect the following information while observing:
   b. Macro picture of the species
   c. Micro picture of one specific part of the specimen (i.e. leaf, petals, feather, foot, tail, etc.)
      i. A written description that captures subtle markings and general observations of the specimen.
      ii. Written Description Examples: For plant observations - size, color, shape, phenology (stage of development: for example buds, leaves or flowers present, % flowering, leaf color, leaf development), habitat, micro habitat, signs of browse, insects present, abundance in the area, possible associations with other species, other interesting notes.

4. Written Description Examples: For animal observations - size, age, sex, fur or plumage colors, appearance or condition of the individual, location and plant community where you observe it, behaviors, interactions with other animals, vocalizations, and anything else that is of interest or significance to you.

5. Give youth 15 minutes to create a species account, work with youth to create thoughtful species accounts.

6. Return to the group and ask each youth to present their species account.

7. After each youth has presented, debrief by asking these possible questions: *(F1)*
   a. What was the most interesting detail you noticed about your specimen?
   b. What information did you discover about your specimen that you did not expect to find out from simply observing and sketching it?
   c. Who do you know that uses these skills in their life? — Explain
   d. In what areas of science do you think these skills would be most helpful?

**Clarks Nutcracker and Whitebark Pine** (10 minutes)

1. Read the following passage from Clark’s journal from August 22, 1805
   a. “Saw to day Bird of the wood pecker kind which fed on Pine burs its Bill and tale white the wings black every other part of a light brown, and about the size of a robin” *(Lewis & Clark Interactive Journey Log: Clark’s Nutcracker, 1996).*

2. Ask the youth two questions (1) “What do you think of the quality of this description?” Brainstorm a list of important details that should be communicated about the specimen. (2) “Can you identify the bird?” (answer: Clark’s nutcracker)

3. Explain to youth that this was the first account of the Clark’s nutcracker and what we have learned about the Clarks Nutcracker today is a collection of many observations over time. Biotic organisms sometimes work together symbiotically, engaging in actions that are mutually beneficial to each species. This unique relationship is present between the Clark’s nutcracker and the whitebark pine.
4. Divide the youth into pairs, present a Clark’s nutcracker and the whitebark pine Species account to each group. Ask each group to review the species account and present out to the rest of the group.

**Made for Each Other** (25 minutes)
In this activity youth will transform into Clark’s nutcracker to demonstrate how seed caching, whitebark pine seed dispersal, and mountain pine beetle are interconnected.

1. Roles: Youth work in pairs for this activity. The staff acts as the timekeeper.
2. Each youth pair will have three cache sites where they will bring their food collected from whitebark pine trees (also now as the food sources).
3. A large space is required for this set up (25 by 25 yards)
   a. Set up the whitebark pine food sources in 4 piles of cards/poker chips spread them out in the center of the area.
   b. The 3 cache sites should not be more than 5 feet apart and should be on the outside circle of the food source. Assign cache sites to each group. Use different objects to mark the cache sites.
4. Explain the rules: only one youth from the pair may leave the cache sight to collect the food sources (cards/poker chips). This must be done by picking up the food sources one at a time. Then carrying it back balanced on only two fingers. The other youth must stay behind to guard the food source at the three cache sites from other predators.
5. Youth will have 3 minutes to collect food from the four parent trees. At the end of the three minutes, have youth count how many seeds they have in their cache, record the names of youth who were not able at cache any seeds. If a youth goes without caching any seeds, they have died from starvation and are out of the next round.
6. After this 1st round introduce mountain pine beetle. Share with youth how mountain pine beetles infect whitebark pine and the impact of the beetle in conifer forests. The mountain pine beetle attacks two of the food sources, decreasing the amount of available seeds available for caching.
7. Play a second round for 3 minutes to collect food from the two parent trees.
8. After the 2nd round and the available food sources have been lost to mountain pine beetle, have youth count the number of tokens collected.
9. Each food token represents 50 pine seeds because Clark’s nutcracker can carry multiple seeds in their sublingual pouch.
10. Youth must have collected at least 500 seeds (10 tokens) to survive the winter. Discuss with youth why some pairs were able to cache enough seeds to survive and some were not. What are three adaptations that Clark’s nutcrackers have to aid in seed caching? Discuss with youth how losing whitebark pine trees to mountain pine beetle affected the amount of pine seeds available. Do you think that the mountain pine beetles limited the amount of seeds you were able to cache? What ecosystem functions do you think whitebark pines play a role in? Answer: Whitebark pine forests provide many important ecosystem functions to subalpine environments. They are important food sources for not only Clark’s nutcracker, but other species of birds, red squirrels, and even bears. In addition to the food supply, whitebark pine help to control run off and erosion of heavy snow melts in the summer by stabilizing the rocky soils and providing shade, delaying patches of snow melt.
Conclusion: (10 minutes) **(S1)** Discuss some of the relationships addressed in the lesson. What importance did the plants and animals of the forest have for each other? Brainstorm the connections (water, soil, bugs, salmon, plants, trees, etc). What was the special relationship that the Clark’s nutcracker had the whitebark pine trees of the forest? How is the whitebark pine dependent on Clark? How is Clark dependent the whitebark pine? What importance did the whitebark pine have in the forest? What animals would be affected if all the whitebark pine were to die? What could happen to the whole forest as a result? What would happen if Clark were to disappear from the forest? (Alternatively, what would happen to Clark if all the pine trees were to die?) What other relationships are similar in Yellowstone National Park? (ie. bees/flowers)

**Assessment Check Ins:**

**(D1):** For youths’ to demonstrate prior knowledge and interests in making deep observations through words and drawings. This information will assist the staff in understanding how clearly they came to understand their subject though this activity.

**(F1):** Provides information on what youth are learning from their observations each other’s observation at this point of the lesson. This assessment will encourage students to think critically about their observation.

**(S1):** Assess what youth have learned and transfers it into similar ecological relationships.

**Staff Notes:**

![Suggested Layout of the Made for Each Other Activity](image)

**KEY**
- Green circle represents a Parent Tree
- 3 black circles represents a Cache Site

**Reference:**
The Journals of the Lewis and Clark Expedition. (2005). Retrieved from the University of Nebraska: http://lewisandclarkjournals.unl.edu/read/?_xmlsrc=1805-08-22.xml&_xslsrc=LCstyles.xsl


1. The lesson plan titled: Clark the Nutcracker served as the central activity in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
   - The introduction and conclusion are additions to this lesson.


Handouts:

Species Account of the Clarks Nutcracker

Name: Clark’s Nutcracker- Nucifraga columbiana
Family: Corvidae
Physical Description: 12-13” (30-33 cm). “Black wings and tail with large white patches; gray body with white undertail coverts; dark bill and eyes.
Song: A guttural kraa-kraa, and a repeated, dry krak-krak-krak-krak-krak
Distribution: Resident from central British Columbia, southwestern Alberta, western and central Montana, and western and southeastern Wyoming, south through mountains of central Washington, eastern Oregon, and central and eastern California and Nevada, to northern Baja
California. Also present in Rockies to east-central Arizona and southern New Mexico. Wanders irregularly beyond normal range.

**Habitat:** Found in open coniferous forests and in forest edges and clearings (primarily in mountains, but also in lowlands in winter). Preliminary results of Idaho-Montana study suggest Clark's Nutcrackers are more common in rotation-aged than old-growth Douglas-fir stands.

**Diet:** Pine seeds are primary food for both adults and nestlings, but individuals will also eat insects, acorns, berries, snails, carrions, and, sometimes, eggs and young of small birds.

**Ecology:** To survive long winters of the subalpine environment, Clark’s nutcracker caches (or stores) whitebark pine seeds by burying the seeds on southern slopes where less snow accumulation occurs. A sublingual pouch below their tongue allows Clark’s Nutcrackers to transport 55 to 75 seeds at a time to cache sites. Clark’s Nutcracker’s cache the harvested seeds in multiple sites at different elevations. A remarkable spatial memory allows Clark’s Nutcracker to remember where they cached tens of thousands of seeds in thousands of cache sites for up to nine months. One observer recorded a single bird caching 35,000 seeds at 9,500 different cache sites. Studies show that Clark’s Nutcrackers remember exact locations of cache sites by using landmarks.

**Reproduction:** Both sexes incubate 2-6 eggs (usually 2-3), for 17-18 days. Young leave nest at 24-28 days” (Karl, 2000).

**Species Account of the Whitebark Pine**

**Name:** Whitebark Pine- *Pinus albicaulis*

**Family:** Pinaceae

**Physical Description:** “It is often found as krummholz, trees dwarfed by exposure and growing close to the ground. In more favorable conditions, trees may grow to 20 meters (66 ft.) in height, although some can reach up to 27 meters (89 ft.).

**Distribution:** Whitebark pine is limited in distribution to the high mountains of western North America, where it has been present for the past 8,000 years. It occurs along high-elevation ridges, and is therefore not contiguous. In the USA the range extends from the Canadian border of the Cascade Mountains through Washington and Oregon to southern California and is at high altitudes throughout the Rocky Mountains of Montana, Idaho and Wyoming.

**Ecology:** Whitebark pine is a keystone species of the upper subalpine ecosystem and serves several important ecological functions throughout its range. Clark’s Nutcrackers and whitebark pines have evolved a special ecological relationship: they are co-evolved mutualisms. Mutualism is an ecology term that refers the interaction between two species in which both benefit. Whitebark pine seeds are high in fat and protein providing an important food source to clark’s nutcrackers. The cones of the whitebark pine do not open naturally to drop seeds like most other conifers. Instead, scientists believe that the whitebark pine relies on the Clark’s nutcracker to prey open cones and disperse the seeds. Clark’s Nutcracker’s cache seeds to feed on during the winter months. Seeds that are left in caches will establish new stands of whitebark pine. Thus both Clark’s Nutcrackers and whitebark pines benefit from one another. Nutcrackers receive a high fat and protein food source and the whitebark pine receives a seed dispersal agent. Scientists believe that a single Clark’s Nutcracker will plant an entire forest of whitebark pines in its lifetime. Whitebark pine forests provide many important ecosystem functions to subalpine environments. They are important food sources for not only Clark’s Nutcracker, but also other species of birds, red squirrels, and even bears. In addition to the food supply, whitebark pine help
to control run off and erosion of heavy snow melts in the summer by stabilizing the rocky soils and providing shade, delaying patches of snow melt. Whitebark pine forests are being threatened across their entire range by mountain pine beetle.

**Mountain Pine Beetle:** Since 2000, the climate at high elevations has been warm enough for the beetles to reproduce within whitebark pine, often completing their life cycle within one year and enabling their populations to grow exponentially. These higher temperature trends have been attributed by some researchers to climate change. Regardless of cause, the mountain pine beetle upsurge has killed large numbers of whitebark pines jeopardizing current and future whitebark pine restoration efforts, because they are killing trees genetically resistant to white pine blister rust” (USDA Forest Service, 2013).
Title: Up in Smoke!
Overview: This lesson introduces youth to the effects of fire on the Greater Yellowstone Ecosystem. This lesson includes observations and guided inquiry based learning.
Learner Outcomes: The youth will:
1. Be introduced to basic fire ecology
2. Be introduced to conifer adaptations to fire.
3. Be introduced to the fire-related natural history of Yellowstone.
4. Understand the steps involved in the succession of a field of grass to a forest.
Area: Ecological Relationships
Background: The following information is additional reading for the staff and is not required to instruct this lesson.

“Fires need heat, fuel, and oxygen to burn. Remove any of these elements and a fire will go out. In the Northern Rockies, lightning provides a ready source of ignition or heat. Fuels in the form of dead and downed trees accumulate at a steady rate because the process of decay is slow in this region. Conditions in Yellowstone, however, are usually much too cold and wet for larger-scale, sustained burnings.

For the first 100 years of the park’s existence, managers believed fires had to be extinguished to preserve park resources. Fires play a critical role in creating the vegetation patterns of the landscape that sustain biodiversity by offering different habitats. Fire is a part of the ecosystem that park managers want to preserve the role of fire in landscape ecology. Suppressing fires leads to homogeneity in the age and physical structure of vegetation communities, decreasing biodiversity. In 1972, Yellowstone began using natural fire management. Between 1972-2005, 397 natural unsuppressed fires burned 66,354 acres.

The severity of the drought of 1988, unprecedented in the park’s 112 years written record, was the key event that changed conditions in favor of fire. Unusually high winds fanned the fires beyond the control of firefighters. Burning 793,880 acres or 36% of the park, five fires burned into the park that year from adjacent public lands. One of the largest fires, called the North Fork fire, started accidentally and burned more than 410,000 acres.

In the first years after a major fire, young trees emerge from the burned ground. Years later after the 1988 fires, those young trees are renewed forests; once again filling it’s vistas. The current fire management policy follows the guidelines of the 2003 Federal Wildland Fire Policy, which allows firefighter to manage fires for multiple objectives. Yellowstone is a functioning ecosystem in which fire plays a vital role” (Yellowstone National Park, 2011).

Getting Ready:
Location: Is key; recommended at the end of a workday. This lesson is specific to its location, a conifer grove with signs of fire. Included is a map of fires visible from park roads.

Suggested Procedure:
Conifer + Fire= Adaptation (35 minutes)
The staff will:
1. Invite youth to explore the conifer grove and look for signs of a new abiotic disturbance. Ask them to return with evidence of their finds.
2. Lead a discussion about what they found and what abiotic disturbance they saw signs of (Possible Questions, Prompts) (D1)
3. Divide youth into 4 equal groups and pass out four task cards. Have youth review the cards together and complete the task. After each group has worked through their task cards, exchange the task card with another group and repeat the process until all groups have completed all four-task cards. (F1)
4. Bring the youth back together for an energizer activity on succession. (make the transition here)

Succession Ro-Sham-Bo (15 minutes)
In this game, youth will play four different roles in succession — fire, grass, lodgepole pine seedling, lodgepole pine.
1. When youth are fire, they wave their hands around like flames. When students are grass, they lay on the ground. When youth are lodgepole pine seedling, they crawl around on their knees, and if they are lodgepole pines, they walk upright.
2. As the game begins, everyone starts out as fire. Youth find a partner and play “rock, paper, scissors”.
3. This process is continued; grass becoming lodgepole pine seedling, and then lodgepole pine. When a youth becomes a lodgepole, they freeze in the lodgepole formation (hands over head). Once a youth is a lodgepole pine seedling, they may only play Ro-Sham-Bo with other lodgepole pine seedlings. Once the lodgepoles compete with other lodgepoles—the winner remains a lodgepole and the loser goes back to grass.
4. Continue until you call “freeze”, and then the makeup of the community is evaluated. How many youth are grasses, lodgepoles, and lodgepole pine seedling? Throw in a disturbance such as a fire sweeps through, and then evaluate the effect of a major disturbance on a forest community.

Conclusion: (10 minutes) (S1)
Conclude the lesson, by asking students to explain succession. Succession is the natural replacement of one community of plants by another over time. Disturbance is an event that interrupts the “normal” functioning of the ecosystem.
   a. Discuss and present the following questions: What stages are involved in the natural succession from field of grass to a forest? How does fire affect the landscape in Yellowstone National Park? What might interrupt the process of succession?

Assessment Check Ins:

(D1): To look at youths’ prior knowledge, interests and recall from previous lessons taught on ecosystem disturbance, this is a good time to catch misconceptions. This information will assist the staff in determining the level of instruction appropriate for students.

(F1): Provides information on what youth are learning from completing the task on each of the cards at this point of the lesson. This assessment will provide insight into the degree and depth of
their understanding to guide and adjust the lesson.

(S1): Assess what youth have learned and transfers it into their experience to Yellowstone’s natural history.

Staff Notes:
   a. This lessons starts with an exploration first, to continue the practice of youth using their observation skills and fine-tuning them. It also serves to interest youth.
   b. After the Conifer + Fire= Adaptation activity, youth often fell restless that is why this activity moves straight into an energizer called Succession Ro-Sham-Bo.

References:


Handouts:
Fires visible from park roads. Compare the fire perimeters on this map with those of the 1988 fires. So far, the large fires of the 21st century are burning in areas largely unaffected by the 1988 fires. Ongoing research is showing that areas of stand-replacing fires can affect future fire behavior for up to 200 years. (Reprinted from “Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 77).
This map uses colors only to help you see **fire boundaries**. Colors do not indicate intensity, duration, or anything else (Reprinted from “Yellowstone Resources and Issues Handbook: 2012”, 2012, p. 82).
Map of Vegetation in Yellowstone National Park

- **Lodgepole pine forests**
  - Dominate more than 80% of the total park forested area.
  - Can be seral (developing) or climax.
  - Climax forests underlain by rhyolite.

- **Douglas-fir forests**
  - Associated with the Lamar, Yellowstone, and Madison river drainages below 7,600 feet.
  - Often less than 20 inches annual precipitation.
  - More frequent historic fire interval (25–60 year) than other forest types in the park.

- **Spruce-fir forests**
  - Engelmann spruce and subalpine fir dominate older forests.
  - Usually found on moist and/or fertile substrates.
  - Climax forests underlain by andesitic soils.

- **Whitebark pine forests**
  - Major overstory component above 8,400 feet.

- **Major understory component of lodgepole-dominated forests from 7,000 to 8,400 feet.**
  - Seeds are ecologically important food for a variety of wildlife species.
  - Non-forest
    - Includes grasslands, sagebrush, alpine meadows, talus, and hydrothermal environments.
    - Encompasses the moisture spectrum from dry sagebrush shrublands to wet alpine meadows.
    - Provides the winter and summer forage base for ungulates.
  - Other types not shown on map
    - Aspen—found in small clones interspersed among the sagebrush/forest ecotone (transition zone) along the Yellowstone, Madison, and Snake river drainages.
    - Wetland—includes various grass, forb, rush, sedge, and woody species.
    - Riparian—typically streamside vegetation includes cottonwoods, willows, and various deciduous shrubs.

Yellowstone’s Coniferous Tree Key

Conifers are cone-bearing trees of ancient origin. Most have needles instead of broad leaves. All produce “naked seeds” and no flowers. There are seven conifers in Yellowstone. Lodgepole pines cover 80% of the park’s forests. However, the northern end of Yellowstone has a great variety of conifers.

1. Are leaves overlapping scales (dagger-like), lying closely against the branches, and does the tree have berries?
   - NO  Go to #2.
   - YES It is a ROCKY MOUNTAIN JUNIPER (Juniperus scopulorum).

2. Does the tree have needles?
   - NO  You’re barking up the wrong tree!
   - YES Go to #3.

3. Are the needles attached to the twig in bundles?
   - NO  Go to #8. It is a spruce, fir, or a Douglas fir.
   - YES It’s a pine. Go to #4.

4. Are there two needles in each bundle?
   - NO  Go to #5.
   - YES Then it is a LODGEPOLE PINE (Pinus contorta). Look for its cones. Some of them are sealed with resin that only the heat of a fire can open; 80% of the park’s forest is this type of tree.

5. Are the bundles attached in groups of 5?
   - NO  Go to #8.
   - YES Go to #6.

6. Are the cones long (greater than three inches) and columnar with scales that thicken but are not pointed at the ends?
   - NO  Go to #7.
   - YES Then it’s probably a LIMBER PINE (Pinus flexilis). Bend the outer twigs and you’ll understand this tree’s Latin name. This tree is very similar to the whitebark pine but is usually found below 7,000 feet.

7. Are the cones round, purplish, and short (less than three inches) with scales that have pointed ends?
   - NO  Go to #6.
   - YES Then it’s probably a WHITEBARK PINE (Pinus albicaulis). This tree is very similar to limber pine but is usually found above 7,000 feet.
8. Pull a needle off. Roll it between your thumb and first finger. Does it roll easily? Snap the needle in half. Is its cross section square? Are the needles spiky and sharp?
   NO  Go to #9.
   YES It’s an ENDELMANN SPRUCE (Picea engelmanni).

9. The needle’s cross section should be flat. Is the bark silvery with groups of small black marks across most of the trunk?
   NO  Go to #9.
   YES It’s a SUBALPINE FIR (Abies lasiocarpa). Look for cones. They may be impossible to find! Fir cones grow upright from the branch and disintegrate at maturity.

10. Look for cones either on the tree or on the ground. Do they have three-pronged, tongue-like protrusions (bracts)?
    NO  Go to #9.
    YES It’s a DOUGLAS FIR (Pseudotsuga taxifolia).

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**FIRE DYNAMICS**

**There are three kinds of fires!**

1. **Surface Fire** - this is the most common type of fire. It burns only the very top layer of soil.
2. **Crown Fire** - this fire is the most INTENSE. It burns the trunks, limbs, and tops of the trees as well as the soil. In a crown fire, flames may shoot 200 feet above the trees!
3. **Ground Fire**- This fire is the most DESTRUCTIVE. It burns topsoil as well as underneath the soil. It is often flameless but consumes everything down to the bare rock in the ground.

**TASK**
Finding the age of a lodgepole pine stand. Count the **whorls** of 5 different trees to find the age of the lodgepole pine stand. To practice, pick a small tree first. What information can whorls tell us about the last fire in this area?

**FIRE & SUCESSION**

**Why is fire needed in Yellowstone National Park?**

Fire is important for maintaining a healthy forest in the ecosystem.

1. Fire will create a mosaic pattern of forested and non-forested (burned) communities. Animals like to live on the edges of these communities. They can hide in the trees and eat the new growth in the burned areas.
2. Fires rid forest of disease, such as pine bark beetles, which kills lodgepole pine trees.
3. Fires increase species diversity. After a fire the number of different kinds of plants and animals increases!

**TASK**
Disturbance encourages a natural process called succession. Succession is a natural pattern of change that takes place over time in a natural community. For instance after a landslide happens (the disturbance), lichens then begin to develop on the rocks (primary succession). After many layers of lichens build up on the rocks, mosses colonize over the lichens, and then the growth and death of mosses creates soil for grasses.

In Yellowstone National Park a common form of disturbance is fire. Fire in this area is commonly started by a lightning strike. Individually in your journal, sketch or describe with words: First, what this area would have looked like before the fire. Second, 1 year after the fire, Third 15 years after the fire and then finally 40 years after the fire. Compare with your group members.

**FIRE & SNAGS**

**Snag: is a dead standing tree, after a fire**

- Snags provide homes for 19 species of birds of prey, 9 woodpeckers, 22 species of songbirds, 15 species of small mammals, and 6 species of squirrels/chipmunks.
- Over 30 snag-associated species feed on snag insects.
- Snags are often nesting areas for cavity nesters (nuthatches, woodpeckers) and secondary cavity nesters (bluebirds, kestrels, and small owls).
- Many birds of prey that utilize snags eat small mammals such as mice, rabbits and gophers, which are often destroyers of young trees.
TASK
When fire burns a living tree, the burned or charred side is the downwind side of the tree. When fire burns a dead tree, the charred part of the tree faces into the wind. Wildland fighters often call these trees totems because of their resemblance to totem poles.
1. Examine 3 snags
2. What direction was the fire moving?

LODGEPOLE PINE

1. Lodgepole pines have two types of cones. Serotinous cones are produced when the tree is 20-50 years old and remain closed for many years unless heated above 113 degrees F. Non-Serotinous cones open shortly after becoming ripe, usually in September.
2. Lodgepole pines produce many seeds; estimates of annual yields may average 790,000 seeds/hectare.
3. After lodgepole pine stands attain an age of 80-100 years, they become susceptible to attack by mountain pine beetles

TASK
Use the Rocky Mountain Treefinder book to Key out two different conifer trees.
Ecological Relationships Lesson #5: Wolf Reintroduction

Title: Wolf Reintroduction
Overview: This lesson introduces youth to thinking critically about wolves in Yellowstone National Park while understanding the importance of having an informed knowledge base; while looking to resources to build their understanding when resolving ecological and conservation issues.

Learner Outcomes: The youth will:
1. Know about the wolf reintroduction and background biology on wolves.
2. Know what their personal perspective is on wolves in Yellowstone National Park.
3. Be able to articulate their thoughts on a specific topic: the presence of wolves in Yellowstone National Park.

Area: Ecological Relationships

Background: The following information is additional reading for the staff and is not required to instruct this lesson.

Wolf Restoration

“The gray wolf (Canis lupus) was present in Yellowstone when the park was established in 1872. Predator control, including poisoning, was practiced within the park in the late 1800s and early 1900s. Between 1914 and 1926, at least 136 wolves were killed in the park; by the 1940s, wolf packs were rarely reported. An intensive survey in the 1970s found no evidence of a wolf population in Yellowstone, although an occasional wolf probably wandered into the area. A wolf-like canid was filmed in Hayden Valley in August 1992, and a wolf was shot just outside the park’s southern boundary in September 1992. However, no verifiable evidence of a breeding pair of wolves existed in Yellowstone.

Restoration Proposed

NPS policy calls for restoring native species when: a) sufficient habitat exists to support a self-perpetuating population, b) management can prevent serious threats to outside interests, c) the restored subspecies most nearly resembles the extirpated subspecies, and d) extirpation resulted from human activities.

The U.S. Fish & Wildlife Service (USFWS) 1987 Northern Rocky Mountain Wolf Recovery Plan proposed reintroduction of an “experimental population” of wolves into Yellowstone. (An experimental population, under section 10(j) of the Endangered Species Act, is considered nonessential and allows more management flexibility.) Most scientists believed that wolves would not greatly reduce populations of mule deer, pronghorns, bighorn sheep, white-tailed deer, or bison; they might have minor effects on grizzly bears and cougars; and their presence might cause the decline of coyotes and increase of red foxes.

In 1991, Congress provided funds to the USFWS to prepare, in consultation with the NPS and the U.S. Forest Service, an environmental impact statement (EIS) on restoration of wolves. In June 1994, after several years and a near-record number of public comments, the Secretary of the Interior signed the Record of Decision for the final EIS for reintroduction of gray wolves to Yellowstone National Park and central Idaho.

Staff from Yellowstone, the USFWS, and participating states prepared for wolf
restoration to the park and central Idaho. The USFWS prepared special regulations outlining how wolves would be managed as an experimental population.

Park staff completed site planning and archeological and sensitive plant surveys for the release sites. Each site was approximately one acre enclosed with 9-gauge chain-link fence in 10 x 10 foot panels. The fences had a two-foot overhang and a four-foot skirt at the bottom to discourage climbing over or digging under the enclosure. Each pen had a small holding area attached to allow a wolf to be separated from the group if necessary (i.e., for medical treatment). Plywood boxes provided shelter if the wolves wanted isolation from each other” (“Yellowstone Resources and Issues Handbook: 2012”, 2012, p.181).

Legal Status of a Recovered Wolf Population

“The biological requirements for removing the wolf from the endangered species list have been achieved: at least 300 wolves and three consecutive years of at least 30 breeding pairs across three recovery areas. The US Fish and Wildlife Service approved wolf management plans in Idaho and Montana, and in 2008 it delisted wolves in these two states and in Yellowstone and Grand Teton National Parks. Several environmental groups sued to stop the delisting, however. They successfully argued that the Wyoming wolf management plan was flawed and that genetic connectivity had not been established between the Greater Yellowstone Ecosystem and the other recovery areas. A court decision required the wolf to be listed again as an endangered species. In 2009, the US Fish and Wildlife Service again delisted wolf populations in Montana and Idaho, but not in Wyoming. A legal challenge resulted in the Northern Rocky Mountain wolf population being returned to the federal endangered species list.

As of May 2011, wolf populations had again been delisted in Montana and Idaho by action of Congress within the previous year, and an October 2011 proposal by the US Fish and Wildlife Service to delist wolves in Wyoming was still pending. A bill under consideration in the state legislature calls for state management in the northwest portion of Wyoming and acknowledges federal authority of wildlife within Yellowstone and Grand Teton National Parks, the Wind River Indian Reservation, and the National Elk Refuge. The state would maintain a breeding population of at least 100 wolves and 10 breeding packs outside of Yellowstone and the Wind River Indian Reservation. Wolves would be protected as trophy animals subject to hunting in a trophy game area in northwestern Wyoming. But elsewhere in the state, wolves would be classified as predators that could be shot on sight” (“Yellowstone Resources and Issues Handbook: 2013”, 2013).

Getting Ready:  
**Materials:** Journals and pencils, whiteboard, dry erase marker, handouts.

**Suggested Procedure:**

**Creating a Safe Environment**

Explain to youth the heated nature of wolf reintroduction in Yellowstone.

1. Ask youth how we might create a safe environment for our group to express their thoughts and ideas about wolves.
   a. For example: respect others’ opinions, put yourself in their shoes, or valuing what others have to say and listening actively.

**Personal Opinion about Wolves** (20 minutes)
Exploring the personal opinions about wolf reintroduction

The staff will:
1. Read to youth a passage from the story of Little Red Riding Hood. Do not reveal the name of the story, until finished reading the story.

She was surprised to find the cottage-door standing open, and when she went into the room, she had such a strange feeling that she said to herself: 'Oh dear! How uneasy I feel today, and at other times I like being with grandmother so much.' She called out: 'Good morning,' but received no answer; so she went to the bed and drew back the curtains. There lay her grandmother with her cap pulled far over her face, and looking very strange.

'Oh! grandmother,' she said, 'what big ears you have!'
'All the better to hear you with, my child,' was the reply.
'But, grandmother, what big eyes you have!' she said.
'All the better to see you with, my dear.'
'But, grandmother, what large hands you have!'
'All the better to hug you with.'
'Oh! but, grandmother, what a terrible big mouth you have!'
'All the better to eat you with!' (Brothers Grimm: Little Red Riding Hood, 2010)

And scarcely had the wolf said this, than with one bound he was out of bed and swallowed up Red Riding Hood.

1. Explain to the youth that our perceptions of wolves are greatly influenced by cultural history such as fairytales.
2. Ask youth to reflect on their current perceptions about wolves and what has influenced these perceptions in their journals. (D1)
3. For example: “My perceptions about wolves have been shaped by fairy tales like Little Red Riding Hood and movies and TV shows. In Twilight some of the characters are wolves and they are portrayed pretty viciously.”
4. Or, “I saw a National Geographic documentary about a wolf pack and I have heard in the news that states are having wolf hunts.”
5. In partners, share your current perceptions. Have youth record similarities and differences between their responses on a T-Chart in their journal. (D1)

   a. **T-Chart**: A T-Chart is used for listing two separate viewpoints of a topic.

<table>
<thead>
<tr>
<th>Differences</th>
<th>Similarities</th>
</tr>
</thead>
</table>

**WOLF Jigsaw** (38 mintues)
Delve further into the culture of wolves in Yellowstone National Park with the jigsaw approach—creating groups of youth that develop expertise on one topic, dividing them into new groups to share their expert topics, and then return back to their original group.

1. Explain to youth that they will be in working groups. First youth will work in “expert” groups to become familiar with one topic (ex. Wolves and livestock). Then the groups will “jigsaw” and split into mixed groups consisting of one representative from each of the topic groups.
2. Then ask youth to focus on their thought processes when reviewing the handout such as: (the staff may want to present these on the dry erase board)
   a. How can I put these ideas into my own words?
   b. What connections do I see between this material and things we have already learned, or from my own life?
3. How will I tell the members of my jigsaw group about this material?
4. Divide youth into four expert groups
   a. Wolves and economics
   b. Wolves and ungulates
   c. Wolves and livestock
   d. Ecological benefits of wolves
5. Throughout the jigsaw process, circulate the room and observe the groups as they read and discuss. When you notice difficulties, try to put the responsibility for finding a solution back on youth to enhance the cooperative benefits of jigsawing.
6. Youth should read the text and make sure everyone in their expert group has a strong enough understanding to share with their jigsaw groups. Encourage youth to produce a short list of ideas they plan to share.
7. Re-organize youth into jigsaw groups (so that one youth from each expert group makes up a jigsaw group).
8. Ask youth to share their expertise with one another in their jigsaw group and ask youth to monitor their communication by asking themselves: (F1)
   a. Is what I’m saying helping the others learn the material?
   b. Do others understand what I’m saying and making connections between their reading and mine?
   c. How can I check to see if I’m being clear?
9. Reconvene all the groups back together and ask youth:
   a. To share: What ways their expert knowledge was changed or enhanced by listening to their peers.
   b. Then ask a youth from each group to present one important idea from their jigsaw group that was discussed.

Conclusion: (10 minutes) (S1) Present the group with the optical illusion picture/drawing. Ask the youth to observe it carefully.
1. Ask the youth what each of them sees.
   a. Relate the optical illusion to perspectives.
2. Ask the youth if they felt as if their personal perspective shifted or not from the lesson.
a. Progress to a discussion on the importance of having an informed knowledge base and looking to different resources or others to expand the depth of your own understanding when resolving ecological and conservation issues.

Assessment Check Ins:

(D1): To look at youths’ prior knowledge, perceptions, and misconception of their current perceptions of wolves. This information will assist the staff in understanding the experiences that youth have surrounding wolves.

(F1): Provides information on what youth are learning based on the dialogue between youth and group discussion. This assessment will provide insight into the degree and depth of their understanding to guide and adjust the conclusion of the lesson.

(S1): Assess what youth have learned and transfers it into their own lives and experiences.

Staff Notes:
   a. Set high expectations with youth in respecting the safe environment that the group creates.
   b. The jigsaw approach is supported by research by XYZ that pointed to improved attitudes towards school and each other and positive interdependence in the classroom (92).

Reference:


1. The lesson plan incorporates Jigsaw Cooperative Learning Technique in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.


Handouts:

Old Women/Young Women Optical Illusion
WOLVES AND LIVESTOCK

Wolves predation causes relatively few livestock losses compared to other sources of loss, but even at this percentage might be, any losses to individual livestock producers can have profound effects on it at individual’s livelihood. To mitigate these impacts, government and private funds are available to compensate producers for their losses. Deep be the challenges of raising livestock in areas with predators, many producers remain successful and some are discovering that certain husbandry techniques used to protect livestock from wolves can actually lead to reduced predation by other animals, higher stock weights and survival, and increased profits. Current research suggests that livestock production may indirectly benefit wolves since the habitat and open space provided by ranch lands is crucial for big game animals, which are the primary prey of wolves. Successful wolf conservation may ultimately depend on wolves and livestock producers working to cooperate.

ACTUAL LIVESTOCK LOSSES

In 2007, there were an estimated 1,311,749 cattle and 412,804 sheep in Wyoming. Wolves depredated 47 livestock (61 cattle and 26 sheep) in Wyoming in 2008. The National Agriculture Statistics Service completes a census detailing the causes of livestock deaths in the lower 48 states. According to this report, non-predator losses including weather, respiratory losses, digestive problems and calving complications cause over 90 percent of cattle losses in Wyoming.

Based on the report:
- Livestock were five-times more likely to be stolen than depredated by wolves.
- Only 5% of all cattle losses in the U.S. were attributed to predators.
- In Wyoming less than 1% of sheep losses were attributable to wolves.
- In Wyoming less than 1% of cattle losses were attributable to wolves.
- Domestic dogs killed almost five times as many cattle as did wolves.

METHODS TO PREVENT DEPREDAITION

Individual, non-profit organizations, and state and federal agencies are engaged in a variety of efforts to minimize conflicts between people and wildlife in the West. Ongoing research and the development of new tools and techniques also may assist livestock producers with protecting their stock. These include practical techniques as well as shepherding methods, as well as more traditional methods such as fencing and predator proofing. The use of dog involves stringing flags or flags that act as a visual deterrent. Fencing is being used successfully to deter wolves from entering pastures and, in some cases, has been electrified to increase its effect. Researchers also are working to develop new products to minimize wolf predation. Primary tools include the use of chemicals that deter wolves from preying on carcasses, the use of sound devices such as VAG (Vocal Animal Growth) devices. When VAG devices detect the presence of radio-collared wolves in the vicinity of livestock, they are programmed to emit loud disruptive sounds. Some of these tools are 80 percent effective and the use of certain tools may be less labor-intensive for a particular producer. However, there are a large number of tools available that producers who are new world in potentially work to protect their livestock can use.
COMPENSATION FOR LOSSES DUE TO WOLVES

Defenders of Wildlife, a non-profit conservation organization, supported wolf reintroduction legislation that could be conflict with livestock producers in areas where wolves live. To compensate for these losses, the organization has paid 102 percent of the market value of confirmed livestock losses attributable to wolves and 30 percent of the total value of probable losses attributable to wolves where wolves have been listed as an endangered species. To date, Defenders has established over 230 payments to livestock producers, totaling more than $1,000,000 in Wyoming alone. It has also committed funds for over $500,000 in livestock losses.

The state of Wyoming created its own wolf compensation program in preparation for eventual wolf delisting. However, the Wyoming program only compensates producers within the state, and the state where wolves are reintroduced as “predator’s game.” Producers outside of the trophy game area, where wolves are classified as “predators,” receive no compensation by the state for those losses and are expected to deal with this hardship alone. This is one reason conservation groups advocate trophy game status statewide for wolves in Wyoming, so that livestock producers can continue to harvest wolves. Within the trophy game area, the state of Wyoming compensates ranchers for seven times the actual number of cattle confirmed lost to wolves, or a 7:1 ratio.

LETHAL CONTROL OF WOLVES

Where wolf predations on livestock are chronic, the U.S. Fish and Wildlife Service typically has responded by lethally removing wolves. The Service allows lethal removal to be issued as a permit for wolves as a part of killing, wounding, or driving livestock on private lands, and it is a reactive solution to livestock depredation. By proactively managing livestock and using non-lethal tools, producers can minimize their losses and perhaps reduce other potential costs of wolf/livestock interactions, such as livestock harvesting and weight loss.

CONCLUSION

While the wolves garner a great deal of attention, they are only one of many concerns for ranchers, in Wyoming and elsewhere. The impacts of the wolves are far-reaching, and livestock producers are in need of a solution. The future of wolf management, ranching in wolf country, and wildlife conservation will no longer be separate endeavors. A coordinated effort is needed to address the needs of both livestock producers and wildlife managers.

For more information visit www.westernwolves.org


WOLVES AND UNGULATES

Many sportspersons in Wyoming worry about the impact wolves might have on elk and other big game species. In early 2009, 792 wolves lived in Wyoming, including Yellowstone National Park. Although wolves prey on elk, most elk herds in Wyoming are above the population objectives set by the Wyoming Game and Fish Department (WGFD). Elk may be harder to find since they move around more to evade wolves. But hunter success rates in Wyoming remain higher than in most states in the West.

WYOMING'S BIG GAME POPULATIONS

The WGFD conducts annual surveys to monitor Wyoming's elk herds, including those that experience wolf predation. In 2009, the WGFD counted 6,978 elk in 25 of the 35 state elk herds and estimated that the population numbered 93,983 elk, or 12.3 percent above their objective of 83,160 animals.1 Despite these numbers, game managers keep a careful eye on elk distribution and calf recruitment, factors that could be affected by local wolf predation. Wolves may have a localized impact on cow to calf ratios, but overall, herd numbers and hunter success rate are higher.

Mule deer populations in northwest Wyoming have declined significantly. In the past 10 years, 65,540 elk has been 3 percent of the state's elk.2 Research near Piney Lake has documented a 27 percent decline in mule deer populations as a result of natural gas development.3 Loss of winter habitat due to natural resource and residential development continues to be a primary threat to deer populations.

Pronghorn populations have increased during the past decade as wolves have reduced the number of coyotes. Pronghorn numbers have increased because of the reduction in coyote numbers by wolves.4

Moose populations in northwest Wyoming have dropped sharply in recent years, though wolves do not appear to be responsible.5 Recent research indicates that wolf predation has minimal impact on population declines in the north Jackson moose herd.6 Instead, the researchers found that moose numbers are more likely to be limited by habitat quality and availability.

WHAT DO WOLVES EAT?

In 2006, the U.S. Fish and Wildlife Service documented that Wyoming's wolves preyed primarily on:

- Elk (80%)
- Bison (4%)
- Deer (2%)
- Moose (1.8%)
- Other predators, scavengers, and small animals (2.2%).

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CHANGES IN ELK BEHAVIOR

When wolves returned to Yellowstone, scientists expected that abundant elk populations would serve as the wolves’ primary prey. Yet, wolf predation is just one of many factors that contribute to overall big-game survival. Habitat conditions, disease incidence, hunter success, and prey-size ratios all play a role in maintaining healthy big-game populations. 1, 2

Because wolves lack a top predator for decades, elk populations exploded in the northern Rockies and in Wyoming. Furthermore, elk often grazed in highly visible areas, such as open meadows and along streams, known as riparian areas, sometimes damaging these areas by over-browsing. 3, 4 The tendency for elk to forage in the open may have made it easier for hunters to find elk.

With the return of the wolf, researchers have documented changes in elk behavior, such as elk spending less time grazing in open meadows and riparian areas. 5 Instead, elk often seek cover at higher altitudes and in timbered areas. As a result, hunters found it harder to adapt and keep up with elk in those areas.

By storing elk browsing patterns, wolves have enabled riparian vegetation to regenerate for the first time in decades, creating habitat for beavers, songbirds, elk, amphibians, and a host of small mammals. 6 Additionally, wolves have improved the health and safety of prey species by selecting young, old, diseased, or physically impaired animals. 7 8

WOLVES AND FEEDGROUNDS

In northwest Wyoming, elk feedgrounds cause additional controversy. Elk congregate in artificially high numbers at these visible locations during the winter, thereby attracting wolves. Wolves have killed every elk in foraging areas near feedgrounds. During the winter of 2007-2008, wolves killed at least 5 of the 22 state feedgrounds. Feedground personnel documented only 1 individual elk killed by wolves in 2007. The state of Wyoming, however, reported a winter mortality rate of 1.3 percent on these feedgrounds. In 2007, which amounts to over 2,000 elk and suggests that climate and other factors are the biggest contributors to elk mortality at feedgrounds. Furthermore, according to state reports, approximately 15 percent of the deer that would be born each year are lost because of bruisefever, a disease that is exacerbated by the density of elk on these feedgrounds. By decreasing these numbers on the landscape, and reducing sick animals, wolves may reduce the transmission and prevalence of wildlife diseases such as chronic wasting disease and blue tongue.

THE FUTURE OF HUNTING IN WYOMING

The biggest threat to big game populations in the northern Rockies and Wyoming is a loss of habitat due to residential and natural resource development. Wolf predation may play a less significant role than habitat in shaping big game populations. Nonetheless, it is vital to maintaining healthy ecosystems. Despite their concern about wolves, Wyoming hunters continue to have some of the greatest hunting opportunities of any western state, with abundant and diverse big game and high hunter success.

For more information visit www.westernwolves.org

WOLVES AND ECONOMICS

Travel and tourism make up a significant portion of Wyoming's economy. More than 1 million overnight visitors traveled to Wyoming in 2008, and visitors to Wyoming spent $2.7 billion, or $7.4 million each day in 2007.1 Wildlife watching is one of the top reasons people choose to visit Wyoming.2 In fact, 31 percent of visitors to Wyoming percent of visitors to Wyoming in 2006 participated in wildlife watching.3 Fifty percent of tourists said they visited a state or national park – prime wildlife watching locales – in Wyoming 4.

Visitors to Wyoming spend an average of 3.9 days in the state, with an average party size of 3.1 people, spending an average of $1,207 on their trip, or approximately $108 per person per day.5 Often, these tourism dollars are spread across multiple communities.

WHY DO TOURISTS CHOOSE YELLOWSTONE?

Yellowstone National Park is world-renowned for its scenery, wildlife, and geothermal features. Although viewing wildlife was the primary activity for visitors to Yellowstone, wildlife watching was the second most popular activity.6 Eighty-five percent of visitors to Yellowstone participated in wildlife watching, bird watching, or wildlife photography across the four seasons.7

For many visitors, watching wolves is a significant attraction. Eighty-four percent of visitors to Yellowstone National Park in 2003 wanted to see wolves. The only species that they wanted to see more was the grizzly bear.8 Depending on the season, 20 percent or more of Yellowstone visitors were specifically interested in the possibility of seeing wolves in the park.9 In winter, when wolves are most visible in the park, 59 percent of visitors came to Yellowstone specifically to see or hear wolves.10

Visitors to Yellowstone National Park spend close to one-third of the total cost of their trip in the counties around the park.11 An average of 3.3 percent of park visitors indicated that they would not have come to Yellowstone if they had not had an opportunity to see or hear wolves.12 Based on the average spending of visitors in the 17 counties around Yellowstone, across the four seasons, about $22.5 million are directly attributable to the presence of wolves in the park.13 Based on the amount of money spent in the entire three-state area around Yellowstone National Park, visitors who specifically want to see or hear wolves generate approximately $35.5 million.14
ECOLOGICAL TOURISM

Many businesses depend on wolves and other wildlife species to help their bottom line. For example, one Jackson-based ecotourism company offers single and multi-day wildlife viewing trips in Grand Teton National Park, Yellowstone National Park and Jackson Hole. The company also offers trips catered specifically toward seeing wolves and bears. From the winter of 2006 through the end of winter 2009, approximately 650 people participated in multi-day, overnight wolf and bear watching trips. The cost of these trips ranges from $650 to $2,000, resulting in estimated revenues of $422,500 to $1,300,000.

CONCLUSION

Although the perceived economic costs of having wolves in Wyoming are often misperceived, the economic benefits that wolves provide by drawing visitors and their valuable tourist dollars to the state far outweigh the costs.

For more information visit www.westernwolves.org

ECOLOGICAL BENEFITS OF WOLVES

Wolves play a vital role in maintaining the health and sustainability of the landscape in the greater Yellowstone region and our western lands. They are a keystone species, one that has a disproportionate impact on its environment relative to its abundance. Since their return in 1995, wolves have benefitted this ecosystem by regulating prey numbers and movements—allowing streambank habitats to recover, reducing densities of coyotes, and providing food for scavengers.

The most recognized and well-documented ecological benefit of wolves is that they have resumed the important role of maintaining healthy wildlife herds in the northern Rockies by selecting young, old, physically impaired, or diseased animals. By reducing prey numbers, dispersing these animals on the landscape, and removing sick animals, wolves also may reduce the transmission and prevalence of wildlife diseases such as chronic wasting disease and brucellosis.

In addition to improving the overall fitness of wildlife herds, wolves have also altered the behavior of their prey, leading to a cascade of beneficial effects on the landscape. In the absence of wolves, elk tended to browse heavily in the open flats along rivers and wetlands, since they did not need to evade predators by seeking thicker cover. Without fear of wolves, elk over-browsed the vegetation inhibiting the growth of new trees. Since the reintroduction of wolves in Yellowstone, elk spend more time in the safety of thick cover or on the move. As a result, riparian areas and aspen groves that had been suppressed by decades of over-browsing are regenerating, improving habitat for species like beavers and songbirds. Beavers, which create wetland habitats with their dams, have improved water quality in streams by trapping sediment, recharging groundwater, and cooling water.

Species that rely on healthy riparian habitats and benefit from the presence of wolves in Yellowstone National Park include:

- Yellowstone cutthroat trout and other native fish
- Moose
- Waterfowl (ducks, geese, trumpeter swans)
- Songbirds (such as warblers, wrens, and thrushes)
- Small mammals (such as beavers, muskrats, and other rodents)
- Insects, amphibians, and countless other species

WOLVES AND COYOTES

In the absence of wolves, coyotes became a top predator in the ecosystem, but they are not large enough to regulate elk, deer, and moose populations. The return of the wolf restored a natural complement of predators to northwest Wyoming and returned the coyote to its role as a mid-level predator. Wolves will kill coyotes and outcompete them at kill sites. Coyotes also prey heavily on pronghorn fawns.
Since wolves returned to the landscape, pronghorn populations have increased in northern Yellowstone as a result of declining coyote populations and densities.10

**WOLVES AND SCAVENGERS**

Scavengers, such as ravens, eagles, and bears, also benefit heavily from the return of wolves. Wolf kills provide scavengers with an important source of protein, particularly in winter. Twelve species of scavengers are known to visit wolf kills in Yellowstone National Park.11 Ravens are especially attuned to wolves and may fly over wolf packs as they pursue prey, allowing them quick access to wolf kills. In turn, wolves may benefit from ravens by following them to carcasses that can feed both species.

Prior to the reintroduction of wolves, scavengers were more dependent on animals that died due to harsh winters. Since snow is thawing earlier as a result of a warming climate, there are fewer winter kills available for scavengers. Wolf kills may help buffer the impacts of climate change for scavengers by providing them with a food source in the winter.

**CONCLUSIONS**

The return of the wolf to Wyoming has had significant ecological benefits in a relatively short period of time. Ecological concerns contributed to the decision to return wolves and should play a role in how the state manages this keystone species. Although it is easy to focus on the perceived negative impacts of wolves, it is important to recognize the actual benefits they provide to our ecosystem. By regulating wildlife herds and reducing the prevalence of diseases, maintaining riparian zones, reducing coyote densities, providing food for scavengers, and indirectly improving conditions for a host of other species, wolves play an essential role in maintaining the ecological health and integrity of the landscape.

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For more information visit www.westernwolves.org

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Yellowstone’s
Youth Conservation Corps
Resource Education Curriculum

Sustainability

Lessons Include:

Sustainability Lesson #1: perspectives on sustainability
Sustainability Lesson #2: THE BIG IDEAS OF SUSTAINABILITY
Title: Perspectives on Sustainability
Overview: This lesson introduces youth to various definitions of sustainability. Youth will identify which definitions resonate with them and discuss the common elements of the definitions. Youth will begin to create their own working definition of sustainability.
Learner Outcomes: The youth will:
1. Understand that sustainability is a concept with multiple meanings and definitions.

Area: Sustainability
Background: The following information is additional reading for the staff and is not required to instruct this lesson.

“Sustainability—What Is It? Sustainability has many definitions, all having a common theme: meeting the needs of today without compromising the ability of future generations to meet their needs. Recognizing the nature and complexity of the interdependence of natural systems and its inhabitants is fundamental to understanding the concept and for evaluating what is and what is not sustainable decision making. Sustainability is understood to refer to conditions that promote a healthy, safe, and economically secure environment for people and all living things, and that do not exceed the limits of the natural environment to renew itself.” (Sustainability Background, 2009).

Getting Ready:
Materials: Journals and pencil, a dry erase board with a dry erase marker, handouts.
Preparation: For this lesson display the perspectives quotations (in the handouts) on to a flat surface for youth to observe.

Suggested Procedure:
Part I - Perspectives on Sustainability (20 minutes)
1. Introduce the activity by having youth discuss what sustainability is to them to a partner for two minutes. (2 minutes)
2. Layout the Sustainability Perspective quotations on a flat surface or a table. Have youth walk around the quotes and do the following: (8 minutes) (D1)
   a. Find one perspective that resonates with them.
   b. Find one perspective that surprises or challenges them.
3. Debrief by asking youth to share the perspectives that resonated with them and challenged their thinking. Ask them to discuss what it is about the perspectives that resonated and challenged them. Ask youth to discuss, and write down the common elements or key words that come up in the group discussion. (F1) Demonstrate this along with youth on the dry erase board. (5 minutes)
4. Review the list of common elements and key words. Ask the youth if they see any patterns or themes.
5. Reflection: Ask youth to turn back to their partner and revisit their original idea of sustainability. How has it been effected by this activity? (3 minutes)
Part II - Creating Our Definition of Sustainability (25 minutes)

1. Divide participants into groups. Direct them to use the common elements, words, and phrases from the previous discussion (on the dry erase board) to come up with their own working perspective or definition. Tell the youth it is their job to come up with a perspective or definition that will help guide sustainability in the Yellowstone YCC community. (10 minutes) (F2)

2. Allow youth to share their definitions and why they chose to include what they did. (8 minutes)

Conclude: (10 minutes) Follow up the activity by sharing Yellowstone’s Vision of Sustainability. “Yellowstone strives to demonstrate exemplary leadership for sustainability and climate change mitigation by managing operations and adapting facilities in a sustainable manner to preserve our resources for this and future generations.” Ask youth to reflect on how this definition compares with their own definition of YELL-YCC community. (S1)

Assessment Check Ins:

(D1): To look at youths’ prior knowledge, interests and misconceptions of sustainability. This information will assist the staff in planning instruction.

(F1): Provides information on what youth are learning from each other’s discussions about sustainability at this point of the lesson. This assessment will provide insight into the degree and depth of their understanding to guide and adjust the conclusion of the lesson.

(F2): Provides information on what youth are collectively thinking about sustainability at this point of the lesson. This assessment will provide insight into the degree and depth of their understanding to guide and adjust the conclusion of the lesson.

(S1): Assess what youth have learned and transfers it into their experience at YELL-YCC.

Staff Notes:

1. Many youth come from diverse backgrounds and experiences that have influenced and shaped their personal views of sustainability. This lesson is to expand the depth of their personal understanding; because of this, there is no right answer.
2. Keep the tone of the lesson positive and proactive. The staff controls the tone of this class.

Reference:


2. The lesson plan titled: Perspectives on Sustainability served as the central activity in this lesson. This lesson was then modified in the following ways:

- Instructional language was used to match the Resource Education Curriculum.
- The conclusion is in addition to this lesson.
- Additional quotes were added for example the National Park Mission.


Handouts:

“... to promote and regulate the use of the ... national parks ... which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.”

*National Park Service Organic Act of 1916*

“The primary duty of the National Park Service is to protect the national parks and national monuments under its jurisdiction and keep them as nearly in their natural state as this can be done in view of the fact that access to them must be provided in order that they may be used and enjoyed. All other activities of the bureau must be secondary (but not incidental) to this fundamental function relating to care and protection of all areas subject to its control.” –

*Stephen Mather, internal document, February 1925*

No generation can contract debts greater than may be paid during the course of its own existence.

*Thomas Jefferson, Letter to James Madison, 1789*

Improving the quality of human life while living within the carrying capacity of supporting ecosystems.

IUCN – The World Conservation Union, United Nations Environmental Programme, World Wide Fund for Nature; *Caring for the Earth: A Strategy for Sustainable Living*
Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

World Commission on Environment and Development, *Our Common Future*

Sustainability is an economic state where the demands placed upon the environment by people and commerce can be met without reducing the capacity of the environment to provide for future generations.

Paul Hawken, *The Ecology of Commerce*

Long term social, economic, and environmental health. A sustainable society is one that can persist over generations, one that is far-seeing enough, flexible enough, and wise enough not to undermine either its physical or its social systems of support.

Donella Meadows et al., *Beyond the Limits*

In order to be socially sustainable the combination of population, capital, and technology in the society would have to be configured so that the material living standard is adequate and secure for everyone. In order to be physically sustainable the society’s material and energy through puts would have to meet economist Herman Daly’s three conditions:

- Its rates of use of renewable resources do not exceed their rates of regeneration.
- Its rates of use of nonrenewable resources do not exceed the rate at which sustainable renewable substitutes are developed.
- Its rates of pollution emission do not exceed the assimilative capacity of the environment.

Donella Meadows et al., *Beyond the Limits*

Diversity is both a cause of and a result of sustainability in nature, and it would be in human society as well.
A sustainable society would not freeze into permanence the current inequitable patterns of distribution. It would certainly not permit the persistence of poverty. To do so would not be sustainable for two reasons. First the poor would not and should not stand for it. Second, keeping any part of the population in poverty would not, except under dire coercive measures, allow the population to stabilize. For both moral and practical reasons any sustainable society must provide material sufficiency and security for all. To get to sustainability from here, the remaining material growth possible—whatever space there is for more resource use and pollution emissions, plus whatever space is freed up by higher efficiencies and lifestyle moderations on the part of the rich—would logically be allocated to those who need it most.

Donella Meadows et al., *Beyond the Limits*

A condition of ecological and economic stability that is sustainable far into the future. The state of global equilibrium could be designed so that the materials needs of each person on earth are satisfied and each person has an equal opportunity to realize his individual human potential.

*The Limits to Growth*

Long-term cultural, economic, and environmental health and vitality.

*Sustainable Seattle*

Sustainability is not environmentalism. While the former grew out of the latter, “sustainability” and “environmentalism” are now very different causes. Many environmentalists distrust the word “sustainable,” while practitioners of sustainability (myself included) sometimes distance themselves from the environmentalist label—not because they don’t support green causes, but because activism to protect Nature from the ravages of the economy is different from working to redesign the economy itself...for environmentalism’s “No” to be effective, there must also be sustainability’s “Yes.”

Alan AtKisson, *Believing Cassandra*
We want all of our citizens to play critical roles in decision-making about our future. This is the essence of becoming a sustainable city—meeting our current needs without compromising our values, or the lives and health of future generations.

*Burlington Legacy Project*

In our every deliberation, we must consider the impact of our decisions on the next seven generations.

*Great Law of the Iroquois Confederacy*

Five major themes emerged in the common vision that Burlington residents hold for the future of the city. These are:

- maintaining Burlington as a regional population, government, cultural, and economic center with livable-wage jobs, full employment, social supports, and housing that matches job growth and family incomes
- improving the quality of life in neighborhoods
- increasing participation in community decision-making
- providing youth with high-quality education and social supports, and lifelong learning opportunities for all
- preserving environmental health

*Burlington Legacy Project*

The 4 Es of Sustainability:
- Environmental protection
- Social Equity
- Education
- Economic development

*Burlington Legacy Project*

Do all your work as if you had a thousand years to live, and as you would if you knew you must die tomorrow.

*Mother Ann Lee, Shaker saying*
Students make decisions that demonstrate understanding of natural and human communities, the ecological, economic, political, or social systems within them, and awareness of how their personal and collective actions affect the sustainability of these interrelated systems.

*Vermont’s Framework of Standards and Learning Opportunities*

Increasing incomes, improving public health, and sustaining critical natural systems.

*The National Academies Science and Technology for Sustainability Program*

United Nations Development Programme advocates the realization of human rights as part of sustainable human development, an approach that places people at the center of all development activities. The central purpose is to create an enabling environment in which all human beings lead secure and creative lives. Sustainable human development is thus directed towards the promotion of human dignity— and the realization of all human rights, economic, social, cultural, civil and political.

*James Gustave Speth, Vermont Law School & Yale School of Forestry and Environmental Studies*

No net per capita loss of natural or human capital.

*Christopher Juniper and L. Hunter Lovins, Natural Capitalism, Inc.*

A dynamic process which enables all people to realize their potential and to improve their quality of life in ways that simultaneously protect and enhance the Earth’s life support systems.

*Forum for the Future*

Society is indeed a contract...between those who are living, those who are dead, and those who are to be born.

*Edmund Burke, philosopher*

- Connectedness
- Interdependence
- Community
• Justice
• Civic Engagement
• Future
• Resources (Not Using Resources Faster Than Their Ability To Regenerate)

*Common elements of sustainability identified by the staff of the Sustainability Academy, Burlington, VT*

Sustainability is another word for justice, for what is just is sustainable and what is unjust is not.

*Matthew Fox, theologian*

(Reprinted from Shelburne Farms, 2001)

A view of community as three concentric circles: the economy exists
within society, and both the economy and society exist within the environment.

Sustainable Measures

There are four primary types of capital that contribute to our wellbeing: natural capital, human capital, built capital, and social capital. When economic analyses, strategies, and policies understand the links and interdependencies that exist between these different types of capital, they are better able to meet the goals of sustainable human health and contentment.

**Natural Capital** refers to land and the many natural resources it contains, including ecological systems, mineral deposits, and other features of the natural world. **Human Capital** includes both the physical labor of humans and the know-how stored in their brains. **Built Capital** encompasses all the machines and other infra-structure like buildings, roads, and factories that compose the human economy. **Social (or Cultural) Capital** includes the web of interpersonal connections, institutional arrangements, rules, and norms that facilitate individual human interactions.
Managing for the “Triple Bottom Line” of economy, society and environment.

*John Elkington, SustainAbility*

The difference between traditional environmentalists and “sustainability folks” is the ability [of the sustainability folks] to keep the welfare of both humans and the environment in focus at the same time, and to insist on both.

*Donella Meadows*

Thriving within the carrying capacity of the systems on which we depend.

*Cloud Institute for Sustainability Education*

Sustainability is the possibility that humans and other life will flourish on Earth forever.

*John Ehrenfeld, International Society for Industrial Ecology*

Earth Charter Principles: To preserve humankind in its integrity, unity and diversity must be reconciled; The recognition of others is the foundation of all relationships and all peace; Acceptance of the constraints imposed by the preservation of the common good is indispensable to the exercise of freedom; Material development must advance human development; Innovation is not an aim in itself; it is a means to serve human development and the safeguarding of the planet.

*Earth Charter Initiative*

The human community consists of 3 elements: Those who went before us, Those who are with us here and now, And those who are yet to come.

*Traditional African concept, referred to in Bishop Desmond Tutu’s sermons*

*UNESCO Bangkok (United Nations Educational, Scientific, & Cultural*
Walmart’s Sustainability Index will provide data for every product in the following four categories:
1. Energy and Climate
2. Natural resources
3. Material efficiency
4. People and Community

*Wal-Mart Stores, Inc.*

Balancing human and economic well-being with cultural traditions and respect for the earth’s natural resources.

*UNESCO (United Nations Educational, Scientific, & Cultural Organization)*

Sustainability is seeing things whole and acting accordingly.
Sustainability promotes vibrant communities that are rooted in place and participation, celebrate diverse social and cultural landscapes, enrich learning, and stimulate both engaged scholarship and public discourse.

Sustainability is not a problem, a condition, or a program; it’s a way of life, a relationship in which humanity and the rest of nature become, in the words of Thomas Berry, “mutually enhancing presences to each other.” In this respect, sustainability resembles love, health, or peace. Pursued with deliberate imagination, it becomes a life practice for both individuals and communities.

*John Tallmadge*

Think of sustainability as a type of infinite game, in which the goal is not to win (which would end the game), but to keep on playing forever.

*John Tallmadge*

In practical terms, sustainability must always manifest itself in some
place with some people; it always has a local, personal flavor. And because conditions and people change, sustainability always appears dynamic and evolving. It involves learning and transformation: this is where creativity comes in. You can’t have sustainability without imagination.

*John Tallmadge*

“improving quality of life—economically, socially, and environmentally—for all, now and for future generations.”

*Equity Environment*

System Conditions for Sustainability: *In a sustainable society, nature is not subject to systematically increasing...*

- Concentrations of substances extracted from the Earth’s crust
- Concentrations of substances produced by society
- Degradation by physical means and in that society...
- People are not subject to conditions that systematically undermine their capacity to meet their needs

*The Natural Step*
Sustainability Lesson #2: The Big Ideas of Sustainability

Title: The Big Ideas of Sustainability
Overview: This lesson explores the main concepts of sustainability through activities at various stations.
Learner Outcomes: The youth will:
1. Understand the complex concept of sustainability can be understood by exploring the Big Ideas found within it.
Area: Sustainability
Background: The following information is used in the suggested procedure and is necessary to instruct this lesson.

“The Big Ideas of Sustainability - when we talk about sustainability, especially with youth, it is critical to break out important concepts and ideas to make the word come alive. Below is a list of big ideas used to frame this lesson and build youth understanding.

- **Ability to make a difference:** everyone has the ability to affect change or impact a system, community, self.
- **Change over time:** all organisms, places, and systems are constantly changing.
- **Community:** all communities involve nested economic, environmental, and social systems. We need to understand the interconnections to come up with sustainable solutions.
- **Cycles:** every organism and system goes through different stages.
- **Diversity:** systems and places function because of variety.
- **Equilibrium:** a state of balance.
- **Equity/Fairness:** resources need to be shared to meet the needs of living things across places and generations.
- **Interdependence:** all living things are connected. Every organism, system, and place depends on others.
- **Limits:** every system has a carrying capacity.
- **Long-term effects:** we can project that actions will have effects beyond immediate reactions.
- **Place:** natural and human communities together make up one’s place. Every place has its own needs and limits.
- **Systems:** elements that affect each other and are connected through larger patterns.”
  (Shelburne Farms, 2001)

The following information is additional reading for the staff and is not required to instruct this lesson.

“Sustainable and Greening Practices in Yellowstone National Park

In 1997, when Yellowstone National Park celebrated its 125th anniversary, one of the questions asked was what can we do to preserve and protect this national treasure for the next 125 years? The result was “The Greening of Yellowstone” which enabled the park and various partners to address a variety of sustainable and greening issues to increase environmental conservation in the park and surrounding communities.
Meeting to “Green” Yellowstone

Yellowstone National Park, the states of Montana and Wyoming, the U.S. Department of Energy (DOE), and private groups hosted three-day conferences in October 1996 and May 1998. Participants developed a vision for sustaining the park’s values and improving environmental quality. They considered strategies such as developing a regional composting facility, operating alternatively fueled vehicles, replacing toxic solvents, using more environmentally sound products, and modifying the energy infrastructure to make it more environmentally friendly. In 2003 and 2007, Yellowstone hosted additional greening conferences that highlighted environmental stewardship and successes in the region, and identified future initiatives. In 2011 a “Greening Yellowstone Symposium” brought together private and corporate partners to develop a vision and strategy for future sustainability in Yellowstone” (“Yellowstone Resources and Issues Handbook: 2013”, 2013).

Sustainable and Greening Practices in the Park


Getting Ready:
Materials: Journals and pencil, 2 bike tire tubes, and handouts.
Prepare: This lesson consists of five 10-minute stations total, and a group debrief. Can be shortened if youth visit fewer stations. For this lesson by setting out each the five stations on a flat surface. Which include: Community – Venn Diagram worksheets, Interdependence – Diversity – Human/Nature Scavenger Hunt worksheets, Change over time – Outdoor space for participants to find a quiet spot to sit, Cycles – Cutthroat Trout Life Cycle Picture

Suggested Procedure:

“The Big Ideas of Sustainability Stations” (50 minutes)
1. Journaling prompt: Ask youth to journal about the following: (D1)
   a. What does sustainability have to do with me? Us?
2. Have youth share their thoughts with the group.
3. Explain the Big Ideas of Sustainability on the dry erase board (refer to the background information).
   a. Make sure youth have an understanding of the definition of terms in the background information.
4. Have the Big Ideas stations set up prior to commencing this activity.
5. Introduce the activity by explaining that youth will be exploring the Big Ideas of Sustainability more in depth through an activity at each station.
6. At each station youth will:
   a. Read the Big Idea
   b. Complete the activities at the station
   c. Debrief the activity
7. Divide youth into groups among the stations. Tell youth to follow the instructions at each station. Allow 7 minutes per station, and then rotate through as many stations as your time allows (Shelburne Farms, 2001) (35 minutes). (F1)
8. Debrief: Gather youth back together to debrief as a whole.
   a. Ask youth: What ah-ha’s did you have?
   b. What was your favorite idea that someone in your group discussed?

Conclude: Bumper Stickers (10 minutes) (S1)
This conclusion is designed for youth to think about transference back to their lives and communities in what they learned from this lesson.
1. Instruct the youth to think about some of their favorite bumper sticker slogans.
2. Explain to the youth they will be designing their own bumper sticker.
3. Instruct youth to think about something they learned from this lesson that they would want to communicate back to their community (i.e. teach others about). Encourage clever, creative, or a drawing.
   a. For example: Youth could brainstorm answering the following question with their slogan.
      i. What can people learn from natural systems to improve our common future?
      ii. “Be a Good Ancestor”
4. Have youth present their bumper stickers and ask them how their bumper sticker might influence others.
5. Wrap up the discussion with how Yellowstone National Park addresses the Big Ideas through management practices? (Share some of the background knowledge on the Sustainable and Greening Practices).
6. Post Lesson: Ask youth to reflect about what kind of bumper sticker Yellowstone National Park might have to teach visitors and employees about the Big Ideas of Sustainability?

Assessment Check Ins:

(D1): To look at youths’ prior knowledge, interests and misconceptions of sustainability. This
information will assist the staff in planning instruction.

(F1): Provides information on what youth are learning from each station at different points of the lesson. This assessment will encourage youth to think about sustainability in the big picture sense.

(S1): Assess what youth have learned and transfers it into their experience at YELL-YCC and beyond.

Staff Notes:
1. Make sure that youth have an understanding of the definition of terms in the background information, which will contribute to their understanding throughout the lesson and stations.
2. This activity engages youth in the process of exploring the Big Ideas of Sustainability through each station, which may require going around and asking youth questions or just observing youth learning.
3. This active engagement will inform you as an staff in leading the conclusion of the lesson.
4. It is important to connect these stand-alone stations and create a greater understanding that draws on the learning experience of each station. Really draw these understandings out during the conclusion with youth. Push them to think deeply about their bumper slogan.

Reference:

1. The lesson plan titled: Big Ideas of Sustainability served as the central activity in this lesson. This lesson was then modified in the following ways:
   - Instructional language was used to match the Resource Education Curriculum.
   - The introduction and conclusion are additions to this lesson.
   - The station handouts language was slightly modified to reflect place (i.e. youth communities and Yellowstone National Park).
   - Some stations were not included because of the time frame of this lesson.


Handouts:
The Big Ideas of Sustainability: Community

A community is a place where different living things share a common space. All communities involve nested economic, environmental, and social systems. We need to understand the interconnections and commonalities to come up with sustainable solutions.

**Material:** Venn diagram handout

**Activity:**
Draw a large Venn diagram in your journal (see example at station). Then fill in the Venn diagram:
1. Make a list of all the things you have in common in the human world circle.
2. Make a list of all the things the natural world around you has in common in the Natural World circle.
3. Write the things that the Human World and the Natural World have in common where the circles overlap.
4. Reflect by discussing the following questions in your groups
5. What communities are you a part of?
6. How is Yellowstone National Park a community?
(Reprinted from Shelburne Farms, 2001)
The Big Ideas of Sustainability: Interdependence

Interdependence is where both living and non-living things depend on each other to survive. All living things are connected. Every organism/system/place depends on others.

**Material:** 2 bike tire tubes

**Activity:**
1. Gather the group into a circle and hold hands. Put ONE bike tire tube over one person’s arm and reconnect hands.
2. Ask the group to move the bike tire tube around the circle without releasing hands. You will need to step in and through the bike tire tube to make it work!
3. Next add another bike tire tube and send it around the circle in the opposite direction.
4. Reflect by discussing the following questions:
   a. Were you successful getting the bike tire tube around the circle? If so, what made you successful? If not, why were you not successful?
   b. How did each member of the group depend on the other members of the group?
   c. How do we as humans depend on each other (in our neighborhoods, communities, states, countries, world)?
   d. How do we depend on Nature? How does Nature depend on us?
The Big Ideas of Sustainability: Diversity

Diversity is many different kinds of living things. Systems and places function because of variety.

**Material:** Human/Nature Scavenger

**Activity:**
1. Complete the Human/Nature Scavenger Hunt. Look around you to find the answers. If you cannot find examples in this place, you can come up with another example.
2. After you complete the scavenger hunt, reflect by answering the following questions:
   a. How is nature diverse?
   b. How are humans diverse?
   c. What would happen to both our natural/human communities if we lacked diversity?
   d. How are the systems and markets we create diverse? What happens if they are not?
## Human/Nature Scavenger Hunt

<table>
<thead>
<tr>
<th>Think of someone you know that produces food</th>
<th>Find something that stores energy</th>
<th>Think of someone who is good at bringing people together</th>
<th>Find something that keeps systems in check</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find something that produces oxygen</td>
<td>Think of someone that is good at solving problems</td>
<td>Find something that stores water</td>
<td>Think of someone who makes decisions</td>
</tr>
<tr>
<td>Think of someone that is good at helping people visualize things</td>
<td>Find something that absorbs CO₂</td>
<td>Think of someone that is nature smart</td>
<td>Find something that produces energy</td>
</tr>
<tr>
<td>Find something that filters waste</td>
<td>Think of someone that is good at building</td>
<td>Find something that eats debris</td>
<td>Think of someone who cares for others</td>
</tr>
</tbody>
</table>
The Big Ideas of Sustainability: Change Over Time

Change over time is how the human/natural world changes throughout time. All organisms/places/systems are constantly changing. The only constant is change.

Activity:
1. Each member of the group should find a spot to sit alone for five minutes. At the chosen sit spot, each member should observe the changes that are occurring or have occurred over time.
2. When the five minutes is over, the group should come back together to discuss the following question:
   a. What changes did you observe?
   b. How does nature change over time?
   c. How do humans change over time?
   d. How does nature document change?
   e. How do humans document change?
The Big Ideas of Sustainability: Cycles

Cycles are the fundamental pattern in the natural world. Every organism/system goes through different stages.

Activity:
1. Together draw the Yellowstone Cutthroat Trout Life Cycle in order.
2. Individually pick an item from the list below. Draw the Life Cycle of the item. When everyone is finished share your drawings.
3. Discuss as a group some cycles that are already part of the YELL-YCC Community.
    a. Newspaper
    b. Computer
    c. Tea/Coffee
    d. Pencil
    e. Jeans
    f. Shoe
    g. Cell Phone
    h. Can of Soda
    i. Water Bottle
    j. Granola Bar
    k. Olive Oil
Author’s Biography

Kristen Schulte has a wealth of passion for Youth Corps programs that was first ignited during a backcountry trail crew with the Student Conservation Association. Ever since this experience, she has dedicated her life to a myriad of organizations that emphasize environmental education and service while working with youth. She has been afforded the opportunity through these organizations to live, work, and play in our National Parks across the country. Kristen completed her Bachelor of Arts degree at Southeast Missouri University in Health, Human Performance and Recreation with in emphasis in Outdoor Leadership. These experiences inspired Kristen to complete a professional residency graduate program at the Teton Science Schools in Jackson, Wyoming in Place Based Teaching and Environmental Field Science where she excitedly taught students from around the country about the Greater Yellowstone Ecology System. Afterwards, she attended the University of Wyoming to pursue her masters in Natural Science Education as well as in Environmental & Natural Resources. Kristen is proud to give back to Youth Corps in the form of her research and she invites you to contact her to aid in this endeavor.

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