

Rocky Mountain

National Park Service
U.S. Department of Interior
Rocky Mountain National Park



Elk Ecology and Management Teacher Guide



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Rocky Mountain National Park

Rocky Mountain National Park (RMNP) is defined by the rugged Rocky Mountains that cut through the heart of the park from north to south. These mountains have shaped the landscape and created the conditions for the ecosystems we find within the park. Three of the park's ecosystems, the montane, subalpine, and alpine tundra are delineated by elevation, with the montane ecosystem comprising the lowest elevations in the park (5,600 – 9,500 ft.) and the alpine tundra ecosystem comprising the highest elevations in the park (11,000 – 14,259 ft.). This fragile alpine tundra, which comprises 1/3 of the park, is one of the main scenic and scientific features for which the park was established and is one of the largest and best preserved examples of this ecosystem in the lower 48 states.

Environmental Education was formalized at RMNP with the inception of the Heart of the Rockies program in 1992. Our curriculum is built on the principles of RMNP's founding father, Enos Mills. Mills felt children should be given the opportunity to explore and learn in the outdoors for nature is the world's greatest teacher. A belief that is kept alive today through every education program.

RMNP was established on January 26, 1915 through the efforts of local residents, especially Enos Mills, Abner Spague, and F.O. Stanley. Today the park covers 415 square miles of beautiful terrain, most of which is designated Wilderness.

*Lessons Written and Compiled By
Rocky Mountain National Park Environmental Education Staff*

*Teacher Guide Created by Kayla Sullivan 11/2012; Updated by Katie Phillips 5/2013
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Teacher Guides

Teacher guides have been developed by the education staff at RMNP and each focuses on a topic of significance to the Park. These guides serve as an introductory resource to the topic and the information provided is used by park educators to develop curriculum based education programs. Guides benefit teachers by providing the background information necessary to build a strong foundation for teaching students about specific park related topics; they may also be used as a resource for preparing students for field trips to RMNP. Each guide contains a resources and references section to provide for more in-depth study.

Rocky Mountain National Park Education Program Goals

1. Increase accessibility to Rocky Mountain National Park for students from our gateway communities and under-served students who otherwise would not have the opportunity to visit the park.
2. Develop a variety of internal and external partnerships with other park operations, school districts, universities, professional educational organizations, agencies, friends groups, and various funding organizations.
3. Conduct workshops to train teachers to take a larger role in their student's experience at Rocky Mountain National Park.
4. Develop distance learning opportunities to serve students from outside our visiting area.

Schedule an Education Program with a Ranger

Field trips to national parks offer unique opportunities for studying and experiencing natural and cultural resources. Field trips are a great way to make abstract concepts from the classroom concrete. RMNP is an ideal outdoor classroom. It has a diversity of natural resources, easy spring and fall access, and is in close proximity to Front Range and Grand County communities.

Rocky Mountain National Park, like many national parks, offers ranger-led education programs. Heart of the Rockies, Rocky's education program, provides free field and classroom based education programs, aligned to Colorado education standards. School groups should make reservations at least 6 months in advance. National Park entrance fee waivers may also be available for school visits. For further information or to schedule a program please contact the Education Program Manager at (970) 586-1338.

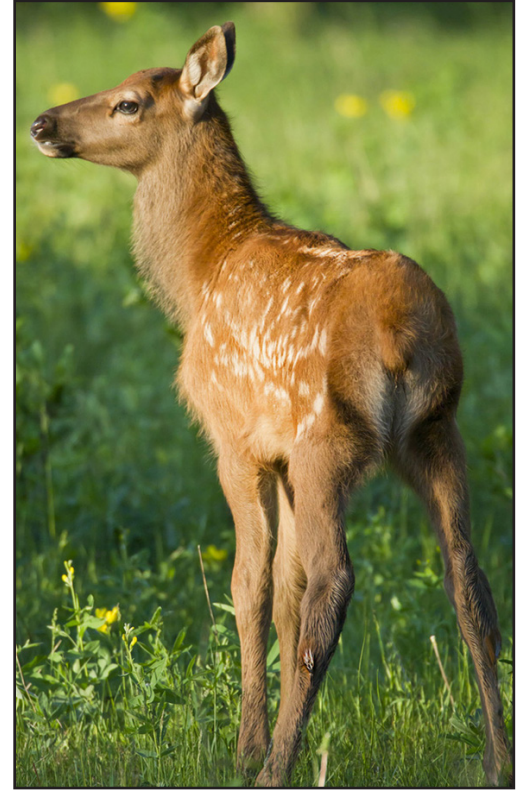
A variety of ranger-led education programs are offered seasonally. Programs in the spring and fall are generally similar focusing on a variety of park topics; programs in the winter are limited to snowshoeing programs and classroom programs focusing on winter. To see a list of the latest available programs please visit <http://www.nps.gov/romo/forteachers/planafielddtrip.htm>.

Elk Ecology and Management Background Information



Elk Ecology and Behavior

The life of an elk begins in the spring, after a near 9 month gestation period. Usually a single young calf is born to a female (cow) elk and learns to stand within the first hour of birth. In the early weeks, cow elk will hide their calves in shrubs and grasses. These young calves lie still and wait for their mothers to return. The stillness is integral to survival. Young elk do not have a scent, if they do not move predators will not be able to easily find them. The calves are brown with light brown spots on their back like other young deer. After they are a few weeks old they will begin to travel with their mother, who will then rejoin the larger herds of cows. Together they will travel from the valleys where they spent the winter and early spring to the higher regions of Rocky Mountain National Park, above the trees, to the alpine tundra. They will spend the summers with the rest of the elk in Rocky Mountain National Park grazing on nutritious plants and enjoying the cool temperatures afforded by the higher elevation.



Bull elk also seek refuge at this high altitude either solitarily or in bachelor herds. It is an important time of year for bulls. Throughout the winter they have been carrying their antlers and at the beginning of spring they will shed them as the new antlers begin to grow. Antlers grow similar to how a human child loses teeth. The new antler begins to grow beneath the old until the old becomes loose and falls off.

Bull elk must have a high caloric intake in order to grow an entire new set of antlers before the fall for the mating season. During the spring these antlers are covered in velvet, a fuzzy skin that carries blood to the growing bone. At the end of the summer their antlers will ossify (become solid) and the velvet will be rubbed off. If anything happens to the antlers during the growth period it can cause a bull elk great harm. They can suffer from bleeding and uneven growth of their antlers. Uneven antlers can lower a bull's chance of maintaining a harem to mate with during the fall rut.



Contrary to popular myth, the number of antler points or tines does not correspond with age, however, the size of antlers do. As a bull ages he will grow larger antlers because he has the experience to eat the right vegetation and keep his antlers safe.

Throughout the summer the elk will travel over the tundra landscape seeking vegetation to eat. Another benefit of the alpine is avoiding predators. The largest predators of elk will not travel to this high altitude, more often staying in the lower elevations. The major predators of elk are grizzly bears and wolves, which are no longer present in Rocky Mountain National Park. These predators were extirpated (regionally extinct) near the turn of the 20th century. The remaining predators in the park, mountain lions and coyotes, do not use elk as a primary source of food.

Summer is the time for grazing and elk will eat a variety of leafy vegetation (forbes) and some woody vegetation (shrubs). Many of their food sources during this time are similar to mule deer browse which causes the two species to compete. The mule deer population in Rocky Mountain National Park is much smaller than the elk population, possibly due to this competition since mule deer are more specific in their browsing choices.



The fall is the time when elk behavior becomes the most spectacular. It is the time of the elk rut and a very important season. The elk descend from the high peaks down to the open meadows of the montane ecosystem. Bull elk will compete for females. If he is successful he will win the right to mate with an entire herd, or harem. The bulls attract a herd by bugling which announces their presence and is a challenge to other males in the area. Bulls are generally not successful until they are older and sport larger antlers.

Keeping the harem together is the bull's main goal in the mating season. If the lead cow, often the oldest female, does not like the bull she will take the entire herd away. Bulls herd the cows by running around them with the heads tilted back. They will also bugle, signaling to the females that a male is nearby, to keep them in a group.



When confronted by another bull, bulls will first measure each other up in a behavior called “pacing”. The two bulls will walk side by side down the meadow and if one bull determines that he does not want to physically challenge the other male he will break off and walk away. Often the winning bull will chase him to a safe distance away. If the other bull does not break away they will turn and spar using their antlers. Sparring involves knocking their antlers together. This is a dangerous activity for both males because there is a risk of getting wounded or breaking an antler. Cow elk prefer bulls with large symmetrical antlers, so breaking off a piece of antler could ruin a bull's chances of keeping a harem.

A female elk is in estrus (in heat) for only 48 hours, thus the bulls stick close by due to the small window of opportunity to mate with the female. The rut is from late August to late October. At the end of the season the elk will generally congregate in single sex herds and migrate to their winter range.



By the time winter arrives an estimated 600 - 800 elk remain within the borders of Rocky Mountain National Park as of the 2011 count. In the winter seasons, due to lack of grasses and forbes to feed on, elk will switch to woody plants, including willow and aspen. Willow and aspen became an important resource for elk as their population got larger within the park. This forage is shared with animals such as beavers, and this competition can cause beavers to move out of an area when elk feed on the willow and aspen.

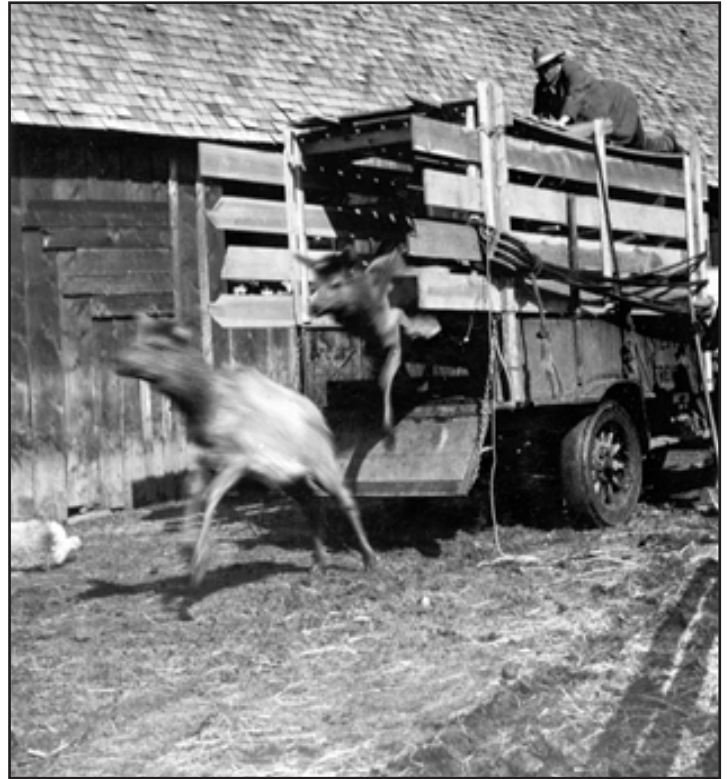
History of Elk in Rocky Mountain National Park

The story of elk and humans begins around 10,000 BCE when humans followed big game animals across the Bering Land Bridge and into North America. Paleoindian hunters hunted elk using a variety of techniques, such as game walls. A game wall was constructed using rocks and hunters would herd the elk to them in order to kill many animals at once. Elk materials were used for day to day items such as clothing and for tipis. Later, modern tribes such as the Ute and Arapaho also made use of the elk as a source of food and for other materials.

In the 1860s, Euro-American settlers began moving into and homesteading the Estes Park area. In 1859, gold was found in southern Colorado which brought many people into the territory. This created a market for elk meat. Hunters would come up to Estes Park to hunt many animals and ship them to Denver to be sold to miners and the towns springing up along the Front Range. This demand caused a quick decline in the elk population. Abner Sprague, a homesteader in the area that would become Rocky Mountain National Park, wrote that the elk were gone around 1900. Elk had become extirpated from the area. Around this same time the large predators such as wolves and grizzlies were also extirpated from Colorado.



This lack of large game species was concerning for the people of Estes Park. Abner Sprague and F.O. Stanley, both tourism operators in the area, wanted elk to be returned and in 1913 bought 48 elk from the Yellowstone area and had them shipped to Colorado by train. When the train arrived they loaded the elk into pens on the back of Stanley Steamer cars and brought them up into Estes Park. They were released into the area that was being lobbied to be made into a national park. Only about half of those original elk survived the first winter. A second shipment of elk was released in 1914.



In 1915, Rocky Mountain National Park was established, creating a new set of regulations regarding wildlife within park boundaries. The creation of a national park created a system of no hunting which allowed the elk population to flourish in the absence of both predators and human hunters.

Over the next several decades wildlife managers became concerned about the size of the elk herds and used several different methods of management. For about 20 years, beginning in the 1940s, park managers kept elk at a target population. They would cull (lethally remove) animals from the population. This practice ended in the late 1960s as public opinion shifted to a more natural way of regulating animal populations on public lands. The people of the United States wanted to see nature take its course. The park went into a “natural regulation” plan which essentially did not use any human means of controlling the elk population. This created a situation where the elk population was able to grow exponentially like it had in the early 1900s.

In 1994, a research initiative aimed at gathering critical information needed to provide a scientific basis for a management plan was started. Results from those and all other pertinent scientific

studies were and will continue to be used in management plans. In 2007, the park began implementing the current Elk and Vegetation Management Plan, designed to protect plant populations from the large elk herds.



Today, people come to Estes Park and Rocky Mountain National Park by the hundreds of thousands, many of them seeking wildlife. Elk are a favorite species to see by far, especially in the fall, as many visitors come just to get a look at the elk during their iconic mating season.

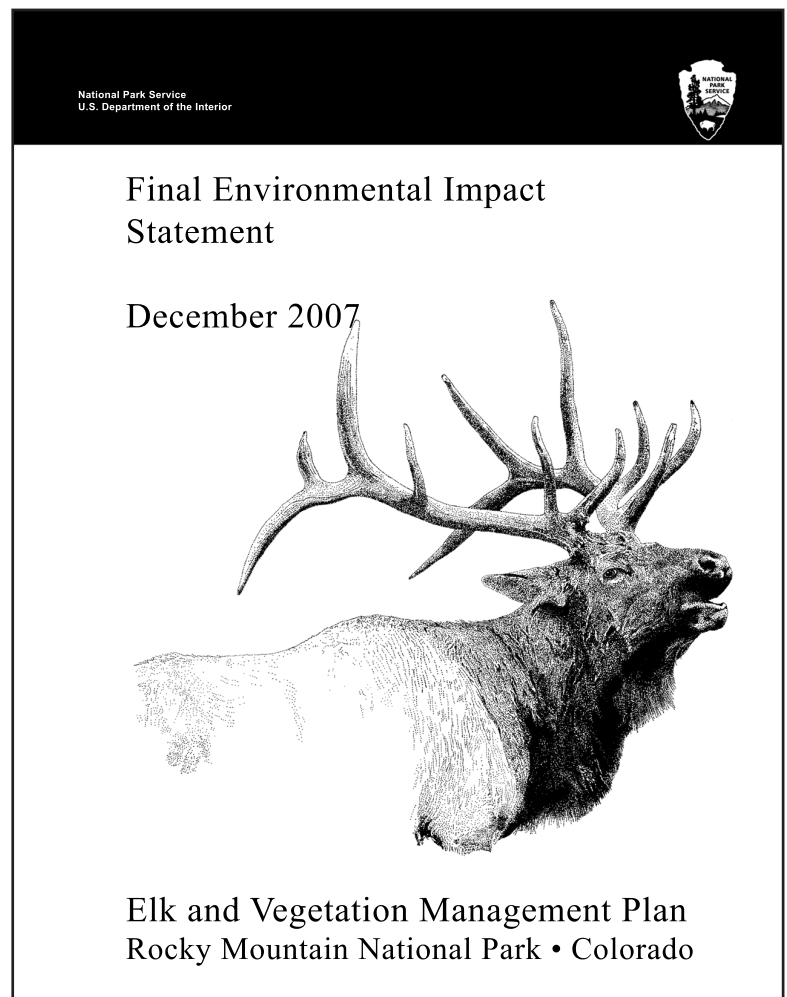
Elk and Vegetation Management Plan

The National Park Service is obligated by law and policy to maintain and restore, to the extent possible, the natural conditions and processes in the park. The RMNP elk population is larger, less migratory, and more concentrated than it would be under natural conditions. Elk heavily browse aspen and willow habitat, which support large numbers of bird, butterfly, and plant species; as a result, these communities may be declining where elk concentrate.

NPS management policies direct managers to strive to maintain the components and processes of naturally evolving park ecosystems. These policies also recognize that if biological or physical processes were altered in the past by human activities, they may need to be actively managed to restore them to a natural condition or to maintain the closest possible approximation of the natural condition. Elk are a natural component of the RMNP ecosystem.

Under natural conditions, the elk population size and distribution would be controlled by a number of factors, including predators such as wolves and grizzly bears, hunting by American Indians, and the presence of competitors such as bison. Ecosystem modeling has predicted that the elk population under natural conditions, given the current amount of available habitat, would fluctuate between 1,200 and 2,100 elk. With an intact predator base, elk would be less sedentary and more wary, resulting in lower concentrations of elk on the elk range. With elk less concentrated and less sedentary, willow and aspen would be more abundant with increased stand size and complexity; that is, stands would have a variety of age classes and stems of differing sizes. Under these natural conditions, beaver would be more abundant on the elk range and as a result, water levels on the primary elk winter and summer ranges would be higher, further encouraging the establishment and growth of willows.

The purpose of the Elk and Vegetation Management Plan is to guide management actions in RMNP to achieve these desired conditions by reducing the impacts of elk on vegetation and by restoring, to the extent possible, the natural range of variability in the elk population and affected habitat.



In order to develop a full range of reasonable alternatives, National Environmental Policy Act (NEPA) requires that issues, concerns, and ideas related to the project are identified as one of the initial steps in the planning process. Because elk migrate through the park and neighboring areas, a regional approach was essential to develop a management plan. Therefore, the NPS worked in partnership with nearby land managers and other federal, state, and local agencies. These partners worked together to prepare an Environmental Impact Statement (EIS) that evaluated the effects of different management alternatives on resources and values so that well informed management decisions could be made. Under the guidance provided by NEPA, public involvement plays a large role in evaluating the effects of potential management alternatives. In the initial phase of scoping, the public was asked to review potential management tools and suggest additional management actions. Responses were then considered in the development of the draft alternatives.

The Elk and Vegetation Management Plan consisted of five different alternatives. It took many years of research before it was ready to be presented to the public for comment. The public comment process is an important part of NEPA. In a series of public meetings, either offered in person or through a government web service, the people of the United States are able to voice their concerns by commenting on the alternatives that have been presented by the EIS. Approximately 2,700 responses were received on all of the alternatives including lethal reduction, intensively managed wolves, fertility control, elk redistribution, vegetation restoration, public hunting in the park, and restoration of a self-sustaining wolf population.

Alternative Three was selected as the preferred alternative because it relies on gradual lethal reduction of elk, which is less expensive and would minimize impacts on visitors compared to intensive culling, as proposed in the draft plan. The target elk population is the high end of the natural range, between 1,600 and 2,100 animals. This alternative would also include redistribution techniques, such as herding and aversive conditioning, and installing temporary fences in aspen and montane riparian willow habitat to meet vegetation objectives.

The Elk and Vegetation Management Plan was created through a long process of research, recommendations by the park, and public comment. The plan outlines a set of tools that wildlife managers can use to help mitigate the issues caused by elk overpopulation and the damage they are causing to willow and aspen stands within the park. The Record of Decision (ROD) for the Final Elk and Vegetation Management Plan at Rocky Mountain National Park was signed February 15, 2008 by Mike Snyder, Intermountain Regional Director for the National Park Service. Park staff has begun implementing alternative three as part of the 20 year plan.

Alternatives of the Elk and Vegetation Management Plan

- Alternative 1: Do nothing. Keep management practice of natural regulations in place.
- Alternative 2: Rapid decrease in elk population through culling.
- Alternative 3: Fencing to protect key vegetation populations and gradual decrease in elk population through culling. A variety of techniques to redistribute the elk and return them to natural migration patterns would also be used.
- Alternative 4: Gradual decrease in the elk population through culling and birth control. Redistribution through fencing and herding.
- Alternative 5: Gradual decrease in elk population through culling. Redistribution by a small and intensively managed group of wolves.

For more information on the alternatives see the appendix.

Plan Implementation

Rocky Mountain National Park's Elk and Vegetation Management Plan relies on a variety of conservation tools including fencing, vegetation restoration, culling, and elk redistribution to reduce the impacts of elk on vegetation and to restore the natural range of variability in the elk population and affected plant and animal communities. The plan continues to provide elk viewing opportunities for visitors. The plan defined specific objectives for the elk population and vegetation conditions, and monitoring progress toward these objectives is a key part of plan implementation. The plan will be implemented adaptively over a 20 year timeframe, from 2008 through 2028. An initial review of implementation and progress is planned for 2013.

The Elk and Vegetation Management Plan calls for maintaining an elk population of 600 to 800 animals on the winter range within RMNP. To achieve this objective, culling is the primary conservation tool that is being used for lethal reduction of the herd in the park. No elk were culled during the winter of 2011-2012 and a total of 130 female elk and 1 antlerless male elk were removed from the population during winters 2008-2009, 2009-2010, and 2010-2011 (33, 48 and 50 elk removed, respectively). A total of 52 of these elk were removed as part of park culling operations and 79 were removed in support of chronic wasting disease (CWD) and fertility control research. NPS, CPW staff, and authorized agents (including qualified volunteers), are part of the cull teams.



In January 2008, research began in Rocky Mountain National Park to evaluate procedures for testing live elk for chronic wasting disease (CWD). This was the first time free ranging elk have been tested for CWD using this live procedure. This research also examined multi-year fertility control in free ranging elk. Elk were captured from early January through mid-March 2008. Out of 136 female elk captured in Moraine Park and Beaver Meadows, 13 tested CWD suspect and were removed. Complete necropsies were performed and confirmed those results. At the time of capture, no elk exhibited obvious clinical signs of CWD. Until now, the disease could only be reliably diagnosed

after death in elk. From late 2008 through early 2011, research elk have been gradually removed from the population as part of the park's annual population reduction targets. Scientists performed postmortem examinations to evaluate CWD status and also determine efficacy and potential side-effects of the fertility control treatment. Twenty female elk were euthanized in 2009 as part of the research project, 25 female elk were euthanized for 2010, and 34 for 2011. Results from the CWD testing procedures and fertility control research are still being evaluated.

Beginning in December 2011, researchers from the NPS Biological Resources Management Division (BRMD) from Fort Collins will be starting a new research project studying the effects of chronic wasting disease on elk in RMNP. They will be capturing up to 100 female elk, collecting a series of biological samples, placing a brown colored radio collar on the animals and releasing them. The animals will be tracked over a five year period.

The Elk and Vegetation Management Plan also calls for temporary fencing to help protect and restore key vegetation, like aspen and willow, which will in turn help the wildlife that depend on aspen and willow for habitat. From 2008-2011, fencing was installed to protect approximately 190 acres of critical habitat on the elk winter range on the east side of the park, including about 145 acres in willow habitat and 45 acres in aspen habitat. In fall 2011, fencing was installed to restore approximately 16 acres of riparian habitat on summer range in the Kawuneeche Valley on the west side of the park. Park-wide, a total of 206 acres have been fenced to protect aspen and willow as part of implementing the Elk and Vegetation Management Plan, or just over one-third of up to 600 acres identified in the management plan.

The enclosures are approximately 76 inches tall (a little more than 6 feet), enough to keep elk out while also allowing smaller animals to enter under the 16 inch gap at the bottom. Gates are built into these enclosures, allowing visitors to enter and recreate within the enclosures.

The need for additional fences will be based on monitoring the response of vegetation to reduced elk numbers, lethal reduction activities, and potential use of redistribution methods. Monitoring of vegetation communities is necessary to determine how many acres of willow or aspen on the primary elk range need to be protected and to determine when fences can be removed once the plant communities are restored.



The fences are temporary and will be in place until monitoring results indicate plants can sustainably withstand browsing. Vegetation recovery is being monitored and results will be assessed every 5 years. Once vegetation has adequately recovered and when elk density, numbers, and browsing intensity are low enough, the fences will be removed.

In some locations, vegetation restoration is expected to occur inside fences without any additional management actions. In other fenced areas, additional vegetation restoration methods could be used to facilitate regeneration of vegetation, if needed. These could include actions such as planting vegetation and using prescribed fire or mechanical methods.

Once willow vegetation is restored to an acceptable level, beaver populations may increase or recolonize riparian areas on the elk range, which could improve hydrologic conditions that support additional restoration. Research estimated that a minimum of approximately 10 acres of restored tall willow would support a beaver family over the long term. If natural beaver recolonization does not occur, reintroduction could be considered.

Elk Ecology and Management Resources



Classroom Book List

These books are not endorsed by the National Park Service. They are intended to serve as classroom resources for students. Please be sure to preview books to ensure that they are appropriate for your classroom. This list is by no means inclusive of every book available on the topic.

Elementary Level Books

Seasons of the Elk by Michael Furtman and Stan Osolinski

Teddy Roosevelt's Elk by Brenda Z. Guiberson and Patrick O'Brien

Year at Elk Meadow by Jackie Gilmore

Antler's Forever by Frances Bloxam

My Water Comes From the Mountains by Tiffany Fourment

Above the Treeline by Ann Cooper

Wild Animal of the American Rockies by Vantighem

M is for Majestic - A National Parks Alphabet by David Domeniconi

Who Pooped in the Park: Rocky Mountain National Park by Gary D. Robson

A Pika's Tail by Sally Plumb

High School Level Books

Rocky Mountain Mammals by David M. Armstrong

Rocky Mountain Elk Portfolio by Donald M. Jones

The Elk of North America by Olaus J. Murie

Majestic Elk edited by Todd R. Berger

Elk Country by Valerius Geist

Among the Elk by David Peterson

*Students may also benefit from reading scholarly articles on elk research. Request a list of ongoing research that is occurring in the park from the Information Office, 970-586-1206.

Glossary

Abiotic - non-living components of an ecosystem.

Alpine - the highest ecosystem of Rocky Mountain NP. Alpine means the land without trees. Characterized by small plants and extreme weather.

Bull - adult male elk.

Calf - young elk of any sex.

Consumer - organism that gains energy from other living things (animals).

Cow - adult female elk.

Cull - lethal reduction of an animal. Culling is different from hunting in that it has a scientific process and lack of “fair chase”.

Decomposer - fungi, bacteria, and invertebrates that recycle material within the ecosystem.
Ecosystem - a biological community of interacting organisms and their physical environment.

EIS - Environmental Impact Statement.

Extirpated - Regional extinction, such as extinction from one area but not world wide.

Habitat - location where an organism lives that provides everything it needs to survive: food, water, shelter, and space.

Montane - the lowest ecosystem of Rocky Mountain NP. Characterized by open meadows and Ponderosa Pines.

NEPA - National Environmental Policy Act of 1970.

Producer - organism that produces energy from photosynthesis (plants).

Riparian - the ecosystem existing directly around streams, rivers, or lakes.

Subalpine - the highest ecosystem where trees can exist. Characterized by dense forests, dominated by spruce and fir trees.

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Appendix

Alternatives - Elk and Vegetation Management Plan

Actions that were common to all the alternatives were elk population management, vegetation density management, vegetation management, adaptive management, and continued data collection. For more information about the alternatives and specifics of techniques used please see the full Elk and Vegetation Management Plan.

Alternative 1

No change in management techniques, that all current management techniques would be continued.

Alternative 2

Quick lowering of the elk population through lethal means to a low population level. The population of elk in the park and surrounding areas would be lowered to 1200 to 1700 elk. There would be no fencing of vegetation under this plan.

Alternative 3

The alternative selected for the Elk and Vegetation Management Plan. This alternative called for gradual culling and a combination of fencing and other distribution techniques to distribute elk.

Alternative 4

A combination of fertility control and gradual reduction of elk by culling. Other distribution techniques including fencing and herding would be used under this alternative.

Alternative 5

Culling of elk and a release of a small and intensively managed group of wolves within the park. Culling would be the primary tool for elk reduction and wolves would mainly be a redistribution tool.

Pros/Cons of Alternatives

Culling – Definition: Lethal reduction of elk. Only female elk are culled. Culling is different than hunting in that it is a scientific, deliberate process. Volunteers for culling are screened for their skill with firearms so that the animals will be killed effectively. The elk meat is then screened for Chronic Wasting Disease, and donated to a lottery system that then distributes the elk meat to private citizens that will use it for food. Culling volunteers are not allowed to enter their names into the lottery.

Pros:

- Allows for rapid decrease in elk population.
- Efficient and cost effective

Cons:

- Involves the death of an animal that may not have otherwise died.
- Has a negative connotation in the public mind.

Redistribution by Human/Mechanical Means – Definition: Herding may be done by using dogs, ATVs, mounted rangers on horses, or by helicopter. The intent of herding is to recreate the natural migrations of elk populations.

Pros:

- Simulates natural migration patterns that would be present with large predators.
- Prohibits elk from overgrazing in an area.

Cons:

- Requires invasive techniques to herd elk.
- Potential negative effects from the use of other animals and machines.

Birth Control – Definition: The intent of the birth control will be to limit the success of elk reproduction. Calves in Rocky Mountain National Park have an unnaturally high survival rate which causes the population in the park to grow rapidly.

Pros:

- Limits the amount of elk added to the population for several years.
- Lowers the elk population gradually.

Cons:

- Requires invasive procedure (tranquilizing, human contact) to administer the drug.
- Long term effects of the drug are still unknown.

Fencing – Definition: Throughout the meadows in Rocky Mountain National Park fences have been constructed with the intent to keep elk and moose out of areas that have been designated as willow and aspen habitat so that plants can grow without browsing. The fences are constructed with a gap at the bottom that allows all other animals to the inside of the fences. The fences also have gates that allow humans to move in and out. These fences are temporary and will be removed once the vegetation is deemed a viable population.

Pros:

- Keeps large herbivores (elk and moose) out of an area for an amount of time for vegetation to recover from overgrazing.

- Cost effective protection of large tracts of key vegetation (willow and aspen).

Cons:

- Impacts visitor experience due to obstruction of views.

- Construction can damage habitats as materials are moved in and out of the area that could take time to recover.

Redistribution by intensively managed wolf pack – Definition: A small pack of sterile (non-breeding), radio-collared wolves would be released into the park and under 24/7 surveillance to avoid the animals leaving the park. The wolves' primary purpose would be to induce natural migratory patterns in the elk.

Pros:

- Wolves are historically natural to the ecosystem and wolves causing elk to return to historical migratory patterns has been successful in other places (Yellowstone).

- Opportunity for wolf viewing for visitors.

- Lower population of elk gradually through predation.

Cons:

- Animal welfare. The wolves would be held to strict constraints on where they were able to live.

- Not guaranteed to change elk behavior

- Public safety could be compromised. Elk are often found in the same places humans will often travel and camp in.