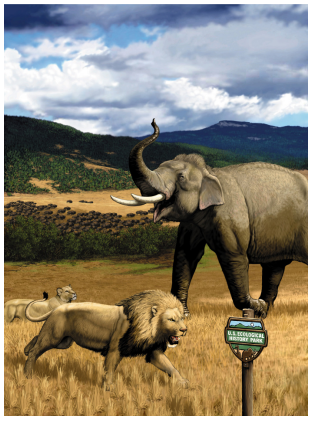
Re-wilding North America

Level: High School, Introductory College Biology
Time: Two to three 45 minute class periods


Carl Buell

Overview: A class discussion on various aspects of "re-wilding" – the concept of reintroducing large vertebrates, such as elephants and lions, that became extinct in North America at the end of the Pleistocene. A key concept in ecology is that organisms evolve within a particular environment. The pathway of evolution is influenced by interactions among organisms, the landscape, and the weather. Changes in any of these areas can impact evolutionary pathways, disturbing balances and creating new selective pressures. Can the environment present at the end of the Pleistocene be re-established? Should it? This lesson should have wide spread appeal as topics include ecology, evolution, conservation, economics, aesthetics, and ethics.

Background for teachers

Evolution, Adaptation, and Keystone Species

Organisms evolve within a particular environment. Adaptations develop over time that allow each organism population to thrive, based on interactions with other organisms in the environment. Changes in the environment may render some of those adaptations meaningless, although they may be retained, such as the speed of the pronghorn antelope maintained in the absence of very fast predators, like cheetahs. Often we think of the physical environment as stable, while dynamic interactions between animals, birds, and insects create most of the pressures. However, in many cases, organisms shape and maintain the environment which then dictates which other organisms may be present. For example, beavers change the environment creating habitats for a large number of organisms. For this reason, beavers can be considered a keystone species.


Photo by Steve Barrett 2001

Keystone species are a species within an environment with a disproportionately large impact on the environment (. Often removal of a keystone species causes major changes in the environment leading to a loss of biodiversity, as organisms adapted for life in one environment are pushed out of the changing environment. Loss of a keystone species can lead to changes in the habitat, the organisms within the habitat, and

interactions between organisms. Keystone species are characterized by a high number of interactions with other organisms, either directly or indirectly.

Conservation Biology

It has been proposed that it is time for a new approach to conservation biology. Conservation efforts are often desperate, costly, interfere with humans, and are not always successful. Conservation biologists deliver messages of impending doom, and carefully hedge announcements of success with requests for more space, time, and money. As a result, conservation biology has a negative image. This is important in the hunt for funding and public support.

Currently, most conservation biology efforts are targeted at a single organism teetering on the brink of extinction. Sometimes conservation efforts are successful and a population is saved, and sometimes, despite the best efforts of everyone involved, the organism cannot be saved. Even in cases where a population is saved, multiple populations are necessary to ensure the continued existence of the species. Often an entire environment, including other plants, animals, insects, and birds, must be maintained to save a single inhabitant.

Conservation biology is a controversial subject because it touches our moral and ethical obligations as high impact inhabitants of Earth, and on the other hand affects our lifestyle and livelihoods. Often when conservation measures are taken in an area, they are designed to reverse the impact of recent human effects. For example, removing goats from an island where sailors introduced them to serve as a steady food supply, or re-introducing wolves in Yellowstone after they were eradicated by hunting. In some cases conservation measures are enacted to prevent further environmental impact, such as limitations on logging in spotted owl territories. These measures are often controversial for a variety of reasons. They may be expensive, people may be more comfortable with the current situation, the new situation may force changes in lifestyles, and the projected outcome and benefits of that outcome may not be clear. The decisions are complicated by the fact that there is no right or wrong choice; science provides options, everyone must contribute to the final decision on the appropriate action.

Photo by Steve Barrett 2005

Re-Wilding

In this lesson, students consider a novel approach to conservation biology in which the goal is not to preserve a particular organism or even a habitat, but to actively promote the reestablishment of the late Pleistocene environment. This plan is referred to as "re-wilding" and is based on the idea that animals take an active role in shaping the environment, and the consequent maintenance or development of biodiversity. Plants and animals that evolve in response to each other and the environment will be impacted by any changes in that system, and many will die out or leave the habitat without the interactions on which they depend.

Photo by David Morafka

There was a large extinction event at the end of the Pleistocene, in which over 60 species of large mammals were lost, substantially changing the environment for the remaining organisms. For example, much as modern elephants do today in Africa, the mastodons and mammoths of the late Pleistocene were responsible for creating and maintaining grasslands by destroying trees and shrubs. Re-wilding proponents suggest that the current environment suffers from "ecosystem decay" because so many large impact species are not present. A modern example of ecosystem decay is the North Pacific Ocean where the sea otter, sea lion, and seal populations have dropped drastically (Springer, 2003). One explanation is increased predation by killer whales. Killer whales normally prey on other whales, however when whale populations were decimated by extensive whaling activity after World War II killer whales may have shifted to smaller prey, such as seals, sea lions and sea otters. The ripple effect of these changes can be seen in many areas such as destruction of coastal kelp forests by rising numbers of sea urchins, normally kept in check by sea otters.

There are many modern species which are closely related to Pleistocene species that have since become extinct in North America. Extinct camelids were related to modern camels; modern elephants have a connection with mammoths and mastodons; extinct American cheetahs resembled the current African cheetah. Various factors such as climate changes are indicated in the Pleistocene extinction, however growing evidence suggests a substantial role for humans migrating into North America across the land bridge. Currently, many of these modern animals are threatened with extinction and humans are playing a clear and active role in this round of extinction.

Proponents of re-wilding argue that reintroduction of several large vertebrate species including a tortoise, camels and elephants, and lions and cheetahs might restore the

environment to the conditions under which many plants and animals evolved, encouraging an increase in biodiversity. An additional advantage is conservation of various endangered animals by generating new populations. Re-wilding is an expensive plan, but the authors suggest that not developing radical new approaches to conservation biology may have far greater costs in the long run. Potential benefits for the human population include the aesthetic pleasure of seeing such animals in the wild, as well as possible economic benefits of tourism in the plains areas.

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Arguments against re-wilding are various and abundant. The concept of introducing non-native species when so much effort is currently being expended on removing or controlling invasive species seems somewhat counter intuitive. There is concern about introduction of disease, and expenses involved in containing and controlling the animals, particularly the large carnivores and elephants. Interactions between these animals and either people or livestock could be devastating. There is also some concern about where the animals might come from. Depleting wild populations to build new populations would not be productive. The expenses associated with a plan of this magnitude are staggering. Acquiring and preparing containment areas, breeding, releasing, and monitoring the animals, developing an infrastructure to allow tourism, and other unforeseen costs make this long term project a substantial investment.

"Re-wilding" as this plan is called, is interesting on a variety of levels and involves discussions of biodiversity, evolution, ecology, economics, politics, and ethics. Initially, the concept of reintroducing these animals sounds bizarre, yet closer investigation reveals sound scientific reasoning. This lesson allows students to examine this concept from a variety of angles, not all of which are biological, but all of which are relevant because biology is rarely the sole deciding factor in these types of decisions.

About the Lesson

This lesson is structured using the BSCS 5E model. In this model, students are first *Engaged*, in this case by presenting them with an interesting scenario. Once the students are interested, they move to a combined *Explore* and *Explain* sections. This gives students an opportunity to explore the concept by collecting information about the proposed scenario. Much of this information explains why the proposal is valid. Students then move to an *Elaborate* section, in which they apply the information they have just learned at a more advanced level. *Evaluation* can be conducted throughout the inquiry based lesson, but a formal evaluation opportunity is suggested in the form of presentations or written reports reflecting the students' conclusions about the proposal.

Teacher's Note

Asses are one of the species discussed in this proposition. This includes the feral asses in North America, which are wild burros, as well as the wild and domesticated asses in Asia and Africa, including onagers, kulan, and kuhr. Depending on the maturity of your students, you may wish to drop this group entirely, refer to them as donkeys, or substitute just onagers, leaving out the other wild asses. If students are having difficulty locating information searching for "donkey", using more specific terms, such as onager or ass will yield more information.

National Science Standards

Content Standard C: Life Science	Biological Evolution	• Species evolve over time. • The great diversity of organisms is the result of more than 3.5 billion years of evolution that has filled every available niche with life forms. • The millions of difference species of plants, animals, and microorganisms that live on earth today are related by descent from common ancestors. • Organisms are classified into a hierarchy of groups and subgroups based on similarities which reflect their evolutionary relationships.
	Interdependence of Organisms	• Organisms both cooperate and compete in ecosystems. The interrelationships and interdependencies of these organisms may generate ecosystems that are stable for hundreds or thousands of years. • Human beings live within the world's ecosystems. Increasingly, humans modify ecosystems as a result of population growth, technology, and consumption. Human destruction of habitats through direct harvesting, pollution, atmospheric changes, and other factors is threatening current global stability, and if not addressed, ecosystems will be irreversibly affected.
	Behavior of Organisms	• Like other aspects of an organism's biology, behaviors have evolved through natural selection. Behaviors often have an adaptive logic when viewed in terms of evolutionary principles.
Content Standard F: Science in Personal and Social	Natural Resources	• Human populations use resources in the environment in order to maintain and improve their existence. Natural resources have been and will continue to

Perspectives	Environmental Quality	be used to maintain human populations. • The earth does not have infinite resources; increasing human consumption places severe stress on the natural processes that renew some resources and it depletes those resources that cannot be renewed. • Natural ecosystems provide an array of basic processes that affect humans. Those processes include maintenance of the quality of the atmosphere, generation of soils, control of the hydrologic cycle, disposal of wastes, and recycling of nutrients.
Content Standard G: History and Nature of Science	Science as a Human Endeavor	• Scientists are influenced by societal, cultural, and personal beliefs and ways of viewing the world. Science is not separate from society but rather science is a part of society. • Occasionally, there are advances in science and technology that have important and long-lasting effects on science and society. Examples of such advances include the geologic time scale and biological evolution.

Preparation

- Prepare a transparency of Master 1.1, Re-Wilding North America, Master 1.3, Re-introduction of Wolves in Yellowstone, or alternatively have access to a computer and projector and use the Power Point presentation version.
- Make one copy each of Master 1.2 Worksheet for Conservation Impact Assessment, Master 1.4, Analyzing Re-Introduction for each student
- Students will need access to the library, internet, and media to gather information on animals.
- Access to a computer with speakers to play interview. Check your computer to be sure that you have a program that allows access to the interview. (http://www.sciencefriday.com/pages/2005/Aug/hour2_081905.html) This site includes a link to the original Nature article.

Lesson

Engage: In this section, students are introduced to the idea of "re-wilding".

1. Ask the students to define conservation biology. Ask them what the goals are and what conservation means. Ask them to give some examples. Give students about 5 minutes for this and write key words on the board.

Students will probably be aware of conservation biology in general, although they may not be able to provide specific examples or describe what it means in detail.

2. Put up an overhead of Master 1.1 or give the students copies. Have someone read the text aloud. Alternatively, use a computer and projector to take the students through the same material as a Power Point presentation.

3. Ask students for their overall impression of the re-wilding concept. Give students about 5 minutes to express themselves and write some key ideas on the board.

Initially, students will probably find this proposal pretty ridiculous. Ask for specific reasons for objections or support. Students may also talk about other reintroduction efforts such as wolves, or peregrine falcons. Others may mention accidental re-introductions, such as horses. They should keep these examples in mind when analyzing the proposal in more detail, especially the impacts on human populations.

4. Explain to students that conservation is a global issue and many different approaches have been suggested. Issues that must be considered include environmental impacts of conservation efforts vs. no conservation effort, increase or decrease in biodiversity, space requirements for successful conservation, as well as the impact on humans including access and economics.

Explore/Explain: In this section students have the opportunity to investigate conservation biology, in particular the environment and animals in question.

5. Break the class into groups of 3-4. Tell the students that they will been serving as a conservation biology advisory group. They will assess the viability of the proposed "re-wilding" project by gathering data and assessing the overall impact including environmental, social, and economic. Ultimately, they will prepare a report on the impact of reintroducing their assigned animal.

There is no "right" or "wrong" answer to this assessment. Students will be required to gather and analyze the information and make a suggestion based on their assessment of the situation. Students' suggestions may vary regionally, based on their understanding and evaluation of the potential impacts.

6. Give each student a copy of Master 1.2 "Worksheet for Conservation Impact Assessment". Assign each group an animal or let them choose one. Animals include: Asian (*Elephas maximus*) and African (*Loxodonta Africana*) elephants,

Bactrian camels (*Camelus bactrianus*), African cheetahs (*Acinonyx jubatus*), Bolson's tortoise (*Gopherus flavomarginatus*), lions (*Panthera leo*), horses and asses (both wild, *Equus przewalskii* and *E. hemonius*, and feral, *E. caballus* and *E. asinus*). Have students find the requested information for their animal using reliable resources including library, internet, and media. Give students the remainder of the period to complete this section.

Remind students that they are looking for basic information which they will then use to assess positive and negative impacts. This is also a good opportunity to remind students how to evaluate a source for reliability.

In some cases, students may have to substitute closely related species and extrapolate likely information. For example, there is not much information available on Bolson's tortoise; however it is closely related to and subject to the same pressures as other desert tortoises. This is perfectly acceptable since conservation biologists may have to rely on data gleaned from similar organisms to make predictions about rare or less well-studied organisms.

Students may disagree about how an organism impacts its environment. Groups should discuss their varying viewpoints and come to a consensus for presentation. When facilitating this discussion, suggest that students clearly delineate the impacts and the surrounding circumstances. For example, horses can impact a limited environment by overgrazing and trampling growth, however, given adequate space, they will not have a major impact.

Suggested web sites:
Wild burros (http://www.desertusa.com/magjan98/jan_pap/du_wildburro.html)
Wild asses
(http://www.arkive.org/species/GES/mammals/Equus_hemionus/more_info.html)
Bactrian camel
(http://www.ultimateungulate.com/Artiodactyla/Camelus_bactrianus.html)
Cheetah (http://www.cheetah.org/?nd=42)
Asian elephant (http://www.elephant.se/asian_elephant.php)
African elephant (http://nature-wildlife.com/eletxt.htm)
Feral horse
(http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Equus+caballus)
Przewalski's horse (http://www.treemail.nl/takh/horse/index.htm)
Lion (http://www.redlist.org/search/details.php?species=15951)
Bolson's tortoise (http://www.thewildones.org/Animals/bolson.html)

7. As homework, have students complete the collection of information.

Day 2

Explore/Explain: In this section students will learn about important biological considerations in conservation biology such as keystone species and important social considerations such as funding and access issues.

8. Write the word "keystone" on the board. Ask students what they think a "keystone" species in an environment might be. Ask for specific examples and supporting reasons.

Students may not be familiar with the term "keystone" however they should be able to guess that it is an important species within the ecosystem. These are often, but not always, large vertebrates. Examples include the original keystone species - a starfish, as well as elephants and sea otters.

9. Tell the students that the concept of a keystone species is important in conservation biology because a keystone species is responsible for maintaining the environment on which other organisms depend. Keystone species are usually considered to be those which have an impact on their community far greater than their abundance or biomass would suggest.

It is important to note that keystone species is a poorly defined term. Because ecosystems are often delicately balanced, loss or addition of even an apparently non-keystone species can have a noticeable impact. One way to look at keystone species is as one with many interactions within the environment.

10. Put up an overhead of Master 1.3, Re-introduction of Wolves in Yellowstone. Do not show the Social Impacts section at this time. Read the text or have a student read it. Ask students for their responses. Ask students if they feel wolves are a keystone species and why.

This is a good example of a keystone species because removal of the species had an environmental impact far beyond its immediate predator-prey interactions.

11. Explain that the scientist proposing re-wilding feel that many of the organisms that became extinct were keystone species and could play that role again. They predict the re-introduced species would recreate the habitats present at the end of Pleistocene, increasing biodiversity.

Elaborate: In this section students will consider what they know about their organism and the proposed re-entry to determine whether or not re-wilding will be beneficial.

12. Give the students copies of Master 1.4, Analyzing Re-Introduction. Ask the students to analyze their organism's role in the environment. Give the students ten to fifteen minutes to work on this.

Again, there is no right or wrong answer. The predicted impact is just a prediction and depending on what data students have gathered and how they interpret that data, very

different conclusions may be reached. While students are working on this, circulate and help groups that are having trouble agreeing on an interpretation by guiding them to ideas they already agree on. Help groups with no discussion by playing devil's advocate and pointing out opposing views or alternative interpretations.

Students working on horses, asses, and elephants may have found information about current problems that have arisen between these groups and humans. In the case of feral horses and asses (burros), the animals are considered pests. They compete for range land with livestock, they wander onto roads and runways causing accidents, and because their population is virtually unchecked by predators, they have substantial destructive impact on the habitat. Elephants have also caused problems for people, damaging structures and competing with livestock for resources. In addition, an angry elephant can do serious harm to buildings as well as humans. Have students consider possible solutions to these problems.

13. Tell the students that another important consideration for conservation biologists is the effect the proposed conservation action will have on humans. Show the students the second half of Master 1.3, Re-Introduction Effects on Humans.

14. Have the students continue their work on Master 1.4, analyzing the potential impact in human populations. Have students complete the worksheet as homework.

DAY 3
Evaluate: Use the group presentations, or individual reports to assess student understanding of the concept.

15. Have groups prepare a brief presentation for the class. Presentations should give an overview of the organism's ecology (life cycle, habitat, diet, behavior), an evaluation of the organism's keystone status, proposed reintroduction site and potential impact on a new habitat, and the effect of the reintroduction on the local human population, especially the economy. After summarizing the pros and cons of the reintroduction, the group should give their recommendation to reintroduce the organism or not.

If time is limited, combine two or three groups for each presentation. Give the students about ten minutes to discuss how their organisms might interact (i.e. Predator-prey, elephants generating grass lands which horses could eat, etc). Another alternative is to have students write up group or individual reports using their data sheets.

16. Have students listen to the NPR Science Fridays interview with Josh Donlan (http://www.sciencefriday.com/pages/2005/Aug/hour2_081905.html) . Josh Dolan wrote the Nature article "Re-wilding North America". He discusses the reasoning behind the proposal, as well as potential advantages and problems. Following the interview, ask the students if they feel any differently about the idea of "re-wilding" than they did when they started the lesson.

You may wish to show students Master 1.5, the following two letters to the editor which were also published in Nature:

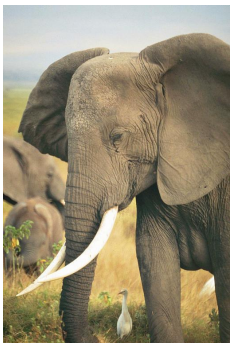
http://www.nature.com/nature/journal/v437/n7058/full/437476b.html

http://www.nature.com/nature/journal/v437/n7058/full/437476a.html

Transparencies/Handouts
Master 1.1 Re-Wilding North America (also available as powerpoint presentation)
Master 1.2 Worksheet for Conservation Impact Assessment
Master 1.3 Re-Introduction of Wolves in Yellowstone (also available as powerpoint presentation)
Master 1.4 Re-Introduction Analysis and Report
Master 1.5 Letters to Editor
Power Point Presentation "Re-Wilding North America"

Re-Wilding North America

The overall goal in conservation biology is to promote, protect, and restore biodiversity. One thing that conservation biologist do is determine what point in time to use as a goal for restoration efforts. For example, North America as it was in 1492 is a common choice. This would include cougars throughout the East, bison in the Central Plains, and grizzly bears in the West. This is a rather arbitrary choice, since humans had been living in North America for several thousand years prior to Columbus. The impact of humans on North American flora and fauna is still being debated, but there is little doubt that humans did have an effect prior to 1492.



Steve Barrett, 2001

A novel proposal suggests that a more appropriate point for restoration efforts would be the late Pleistocene, about 10,000 years ago. Humans were just entering North America at this time. At the end of the Pleistocene many large vertebrates became extinct. Some were replaced by smaller equivalents, but many of them were never replaced at all. For example, camels, mastodons, and cheetahs all disappeared from North America at the end of the Pleistocene, and no equivalent organisms took their places. Horses became extinct, but have been reintroduced from Europe.

The "re-wilding" proposal suggests repopulation of North America with modern equivalents of extinct species. The equivalents of these animals still exist in Africa and Asia, where many of them are now endangered. Bringing them to the United States would have the two-fold benefit of restoring the North American continent to its pre-human state, while conserving several endangered species.

Steve Barrett, 2001

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The proposal suggests reintroducing Bolson's tortoise, modern horses as well as wild horses such as Przewalski's horse, and introducing proxies for extinct native species such as the Bactrian camel in the mid-west and southwest United States. Larger and more dangerous animals, such as elephants, lions, and cheetahs would be fenced and managed, much like a wild animal park, but on a grander scale. Tourists would be encouraged to visit these areas, promoting currently stagnating economies in rural areas. The proposers suggest that the presence of these large vertebrates will encourage the development of a healthy and diverse ecosystem.

Modern Animal	Scientific Name	Pleistocene Equivalent	Modern Location	Status
Wild burros	*Equus asinus*	Extinct American species	North American deserts	Flourishing
Wild asses (onagers, kulan, khur)	*E. hemonius*	Extinct American species	Limited throughout Asia	Vulnerable/Endangered
Bactrian camel	*Camelus bactrianus*	*Camelops*	Gobi Desert	Endangered
African cheetah	*Acinonyx jubatus*	American cheetah	Africa	endangered
Asian elephant	*Elephas maximus*	Mammoths, mastodons, gompotheres	Asia	Endangered
African elephant	*Loxodonta Africana*	Mammoths, mastodons, gompotheres	Africa	Endangered
Feral horses (mustangs)	*E. caballus*	Extinct American species	Western U.S.	Flourishing
Przewalski's horse	*E. przewalskii*	Extinct American species	Mongolia	Extinct in wild, reintroduced in Mongolia
Lion	*Panthera leo*	American lion (*Panthera leo atrox*)	Asia, Africa	Endangered to critically endangered
Bolson's tortoise	*Gopherus flavomarginatus*	Bolson's tortoise	Northern Mexico	Critically endangered

David Morafka

Steve Barrett 2003

Master 1.2

Worksheet for Conservation Impact Assessment

Organism:

Dietary Requirements:

Territory Requirements:

Herd, small family group, or solitary lifestyle?

Life Span:

Reproductive rate:

Does this organism depend on any other organisms for survival?

Describe the natural habitat environment (mountains, plains, forested, grasslands, wet, dry, temperature range, etc):

How does this organism interact with the environment:

Impact Level	Low	Med	High
Does this organism impact other animal populations?			
Does this organism impact the plant population?			
Does this organism impact the landscape?			
Does this organism impact human lifestyles?			
Does this organism impact the economy?			

Describe any major interactions with the environment.

Describe any human and/or economic impacts.

Master 1.3

Re-Introduction of Wolves in Yellowstone

The reintroduction of wolves in Yellowstone National Park has been a carefully studied experiment. This has been a successful reintroduction in that a sufficient number of animals was introduced, with sufficient space and resources to support them. Wolves were expected to control the elk population, and this did happen. As the elk adjusted to the return of a major predator, unforeseen consequences arose. Elk had been heavily grazing riparian areas, consuming trees and shrubs and preventing the development of groves and thickets in these areas. As elk moved away from these areas to more open areas where they could more easily detect and escape wolves, the riparian areas began to recover. With the return of the natural vegetation, birds and animals that had been absent returned. This increase in biodiversity was not a predicted outcome of the return of the wolf – a keystone species – to its native environment. The presence of wolves changed the environment, restoring a healthy, diverse environment in which many organisms had evolved, and to which they quickly returned to thrive.

Impact on Humans

The reintroduction of wolves was not welcomed by many people who make a living raising livestock. There was, and remains, concern that wolves will prey on cows and sheep causing a loss of income. There has been some predation of livestock in some areas. The government provides monetary compensation for lost livestock, but ranchers and farmers would rather have safer livestock. Bear hunters in Wisconsin have complained about loss of hunting dogs in areas where wolves have been reintroduces. These are expensive animals with a great deal of training time invested by their owners.

On the positive side, there is a tourist industry niche related to watching and hearing the wolves. Also, the increased biodiversity is good for tourism as well. Finally, the waterworks built by beavers returning to recovering riparian habitats have proved to be extremely valuable in water management. The meandering streams and wetlands created by beavers have increased the amount of water absorbed into the water table, helping to recharge depleted water supplies.

Master 1.4

Re-Introduction Analysis and Report

Organism

Briefly describe the current habitat.

Is the organism a keystone species? If so, how?

Suggested relocation area in North America

What general area?

Predicted impact on habitat?

Predicted effect on biodiversity in that habitat?

Predicted impact on humans

Reduced human access to area? Impact on local lifestyles/livelihoods?

Danger to humans? Danger to livestock?

Other potential problems?

Do you recommend re-wilding North America with this organism? Why or why not?

Letters to the Editor at Nature in Response to the Re-wilding Article

Nature 437, 476 (22 September 2005) | doi: 10.1038/437476b

Re-wilding: don't overlook humans living on the plains

Steven Shay1

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Sir:
Proposals made by Josh Donlan and colleagues to "re-wild" the Great Plains ("Re-wilding North America" Nature 436, 913-914; 2005) assume that if the land is void of people, it is necessarily open to exotic megafauna. As a historian of the twentieth-century American West, I disagree, and I believe the re-wilding plan would be harmful to current environmental efforts in the area.

The human population may be sparse, but people on the plains use large areas of land to drive the economies of the towns that dot the landscape. In the late 1980s, a group of well-meaning people tried to gather support for the Big Open project. This was part of a larger proposal, called the Buffalo Commons, to establish a huge preserve for bison covering 139,000 square miles in ten states from Texas to Montana. Local people overwhelmingly rejected the proposal.
Subsequent anti-environmentalist and anti-government feeling damaged efforts that were being made towards environmental sustainability.

But local alliances can be productive, and the stubborn search for middle ground has led to some recent victories for biodiversity in the region. Bison have been reintroduced to Native American reservation lands, land has been restored by Nature Conservancy, plans are in progress to pay ranchers to reduce the number of cattle grazing, and coal bed methane pollution has been opposed by the Northern Plains Resource Council. Some ranchers have taken up environmentally friendlier practices, such as adjusting cattle grazing on the Plains, by use of fencing, to mimic the habits of
bison: intensive grazing for a shorter period of time.

Politicians, ranchers and academics have started talking to each other constructively. Can we honestly now ask the region to ingest lions and cheetahs?

Master 1.5, page 2

Correspondence

Nature 437, 476 (22 September 2005) | doi: 10.1038/437476a

Re-wilding: no need for exotics as natives return

Eric Dinerstein1 and W. Robert Irvin2

Conservation Science, World Wildlife Fund, 1250 Twenty-Fourth Street, NW, Washington DC 20036, USA US Ecoregional Conservation, World Wildlife Fund, 1250 Twenty-Fourth Street, NW, Washington DC 20036, USA

Sir:
In their Commentary "Re-wilding North America" (Nature 436, 913-914; 2005), Josh Donlan and colleagues propose introducing Asian and African species to the Great Plains. But they do not discuss a real effort that is already under way to restore native North American prairie wildlife on the Northern Great Plains.

The World Wildlife Fund and its partner, the American Prairie Foundation, have launched an ambitious programme to purchase, from willing sellers, property in north-central Montana. When combined with adjacent public lands, this would provide the habitat for nearly the entire suite of North American grassland species that have lived here within the past 10,000 years.

These efforts envisage reintroducing bison from remaining genetically pure herds and providing habitat that will support increasing populations of nearly extinct species such as black-footed ferrets.
If all goes well, there will be an increase in populations of pronghorns, elks, mountain plovers, burrowing owls and large predators such as mountain lions — our native felid, which has already recolonized this area without human intervention. At least parts of the megafauna-dominated landscape can be restored in a few decades, and Pleistocene survivors such as bison will once again be able to play their role as ecological engineers.

This restoration of native prairie wildlife is being carried out in cooperation with local landowners and communities. It addresses concerns about the return of prairie species that, in some cases, have been absent for a century or more. Restoring the native fauna of this region first is a more economically viable and ecologically sound approach, if the goal is to energize positive support for conservation in general.

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