
Human Shielding
(Photo – RL Beschta)

Human Shielding of Ungulate Prey

When human presence in an area sufficiently limits predator activity so that their ungulate prey are locally protected from predation, we call this human shielding — a situation that may also contribute to the demise of surrounding plant communities.

The following case studies provide examples of human shielding, and some ecological repercussions, from three national parks in western North America.

(Photo- WJ Ripple)

A Three-Park Primer on Human Shielding

Jasper National Park
Alberta, Canada

Yellowstone National Park
Wyoming, USA

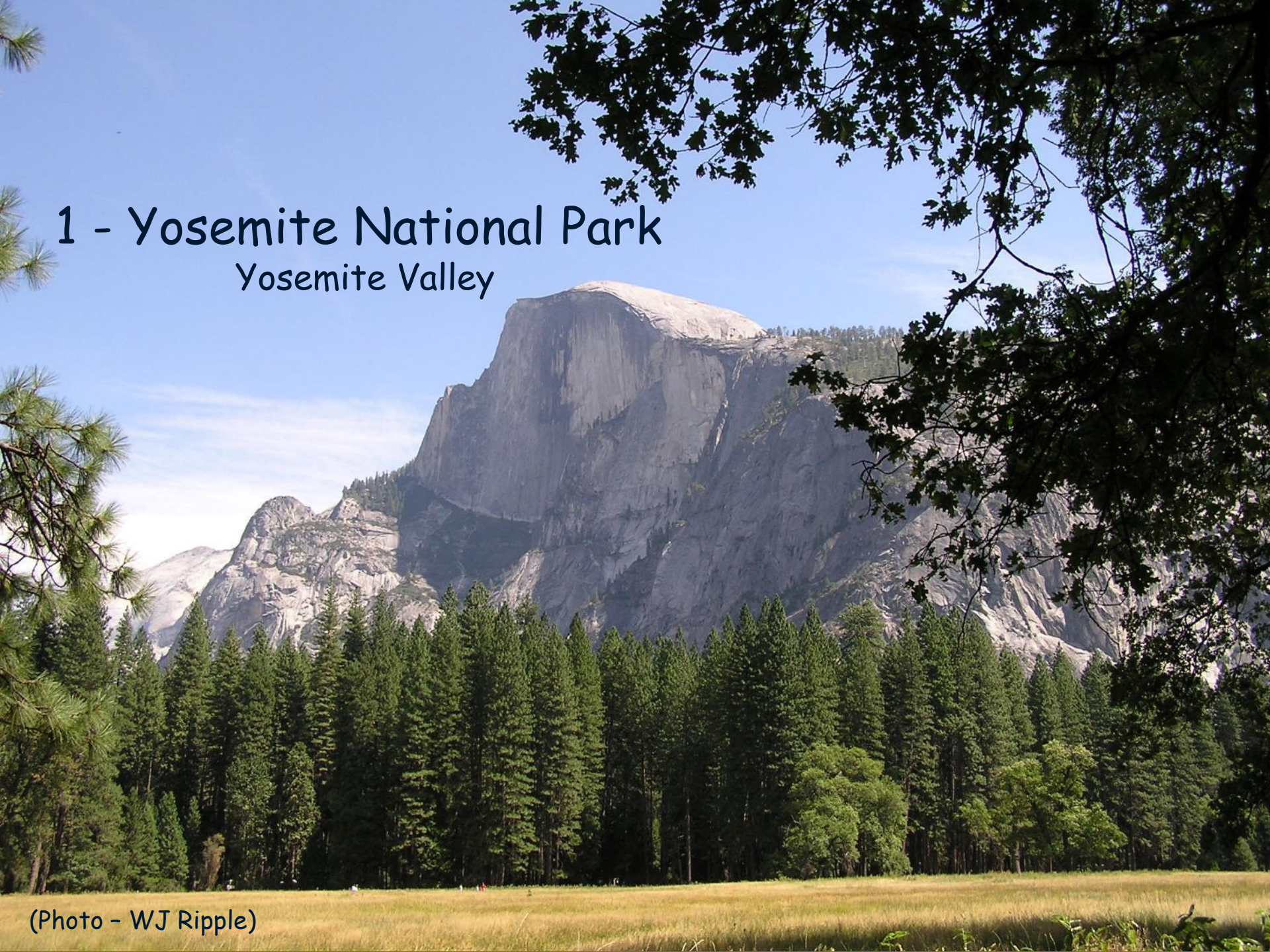
Yosemite National Park
California, USA

Predators and Prey, by Park

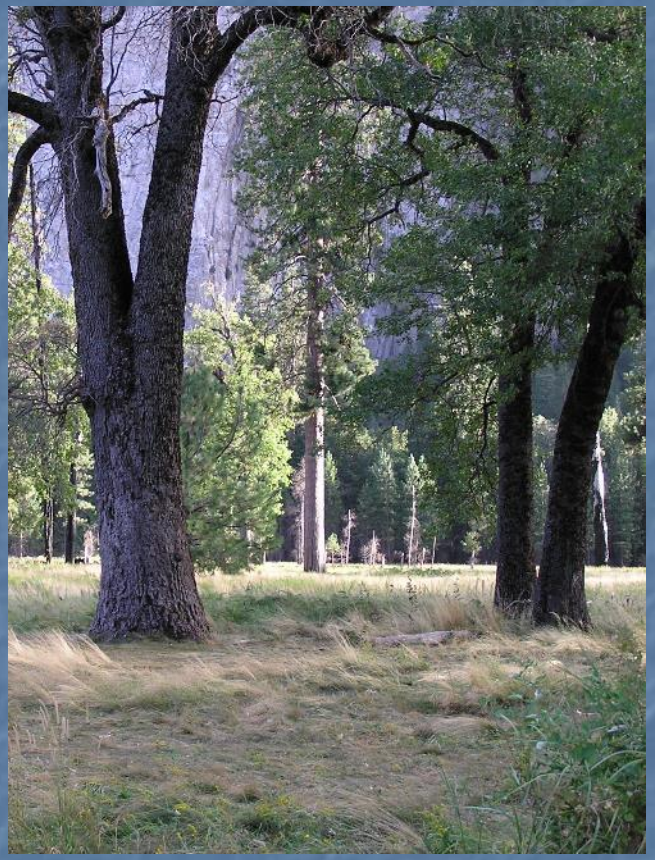
1 – Yosemite National Park
Sierra Nevada Mountains
Apex predator – cougar
Ungulate prey – mule deer

2 – Yellowstone National Park
Rocky Mountains
Apex predator – gray wolves
Ungulate prey – Rocky Mountain elk

3 – Jasper National Park
Northern Rocky Mountains
Apex predator – gray wolves
Ungulate prey – Rocky Mountain elk


1 - Yosemite National Park
Yosemite Valley
(Photo – WJ Ripple)

California Black Oak Under Siege



(Photo - WJ Ripple)

California black oak trees are commonly found on the valley floor in Yosemite Valley and their acorns, seedlings, and sprouts are highly palatable to mule deer.

Cougars were displaced from much of the valley early in the 20th century followed by an increased mule deer population.

In the early 2000's, an assessment of oak trees that had become established since 1920, found that recruitment in oak stands 4-8 km (2.5-5 mi) from the park's main visitor's center in Yosemite Valley was nearly 10 times greater than for oak stands within 4 km (0-2.5 mi) from the visitor's center, consistent with the occurrence of human shielding. *

* Ripple & Beschta 2008

Human Shielding Creates Black Oak Barrens

The black oak trees below occur along a heavily used trail within a few hundred meters from the park's visitor center. This is an area that cougar typically avoid.

(Photo – WJ Ripple)

Only mature black oak trees are present in this stand due to the intense browsing of seedlings by mule deer over a period of many decades. Human shielding has promoted unhindered foraging by mule deer at this site, resulting in a lack of black oak recruitment and similar impacts to other palatable plants.

Humans and Ungulates, Side-by-Side

This area is close to the park's main visitor center in Yosemite Valley. Here human activity is high, cougars are scarce, and mule deer walk without fear.

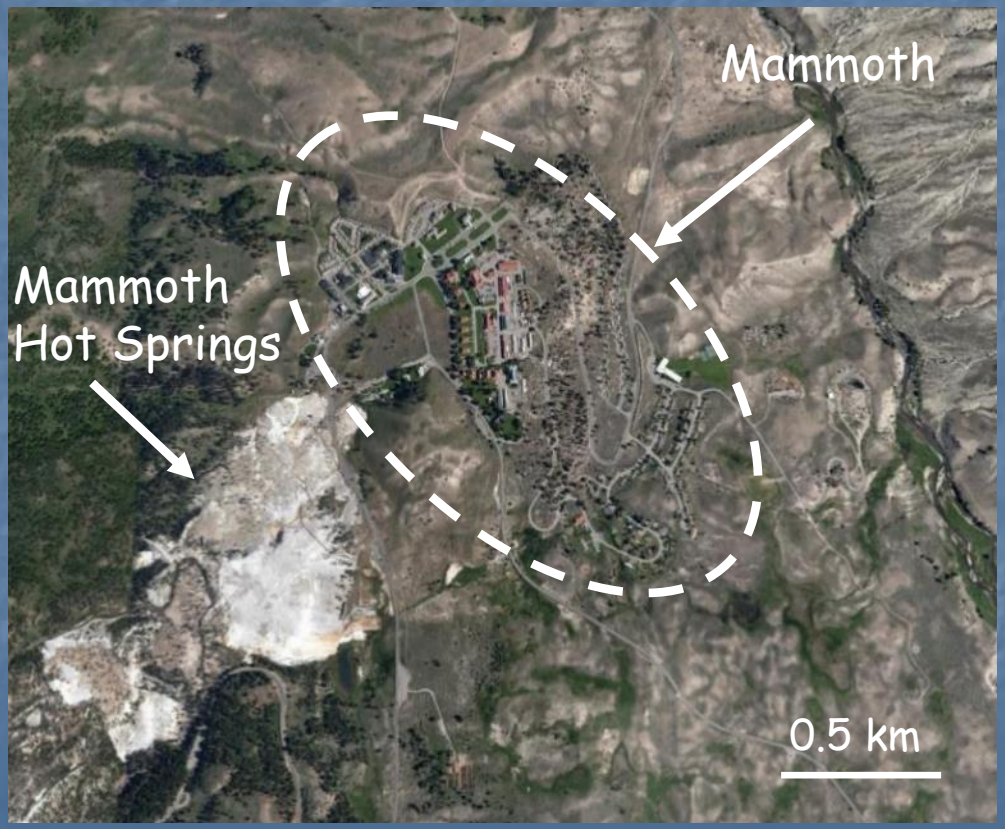
(Photo – WJ Ripple)

2 – Yellowstone National Park

(Photo – WJ Ripple)

Mammoth: A Town of Tourists and Elk

Mammoth lies within the western portion of the park's northern ungulate winter range. This townsite is a northern gateway to Yellowstone National Park and thus each year hundreds of thousands of vacationers stop at, or pass through, Mammoth.



(Aerial image - Google Earth©)

Because wolves and other large predators tend to avoid areas of major human activity, elk are relatively safe from predation in and around Mammoth.

Human Shielding and a Lack of Vigilance

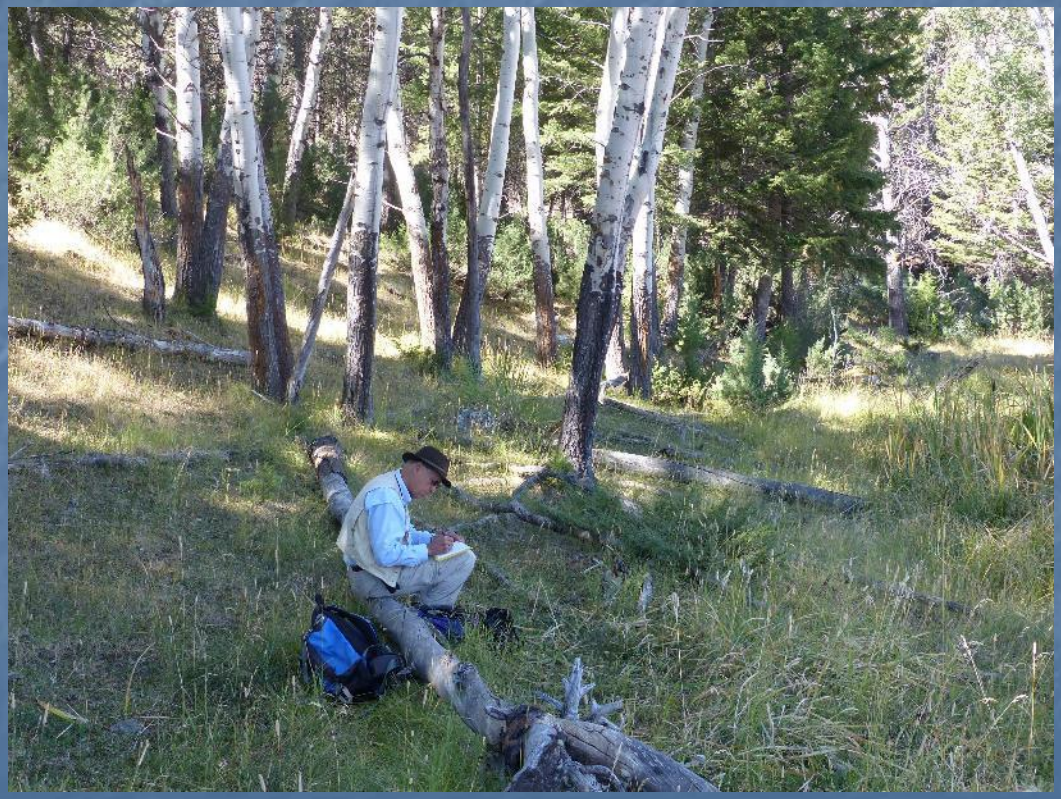
Along this busy highway near Mammoth Hot Springs, most elk are grazing with their heads down, suggesting little concern about predators – a low level of vigilance.

In contrast, if these elk were uneasy about the presence of predators, they would frequently have their heads up to monitor their surroundings.

(Photo – WJ Ripple)

Human Shielding and Deteriorating Aspen Stands

Numerous aspen stands occur around Mammoth. Because human shielding provides elk a relatively safe harbor from gray wolf predation, these stands are exposed to relatively high browsing pressure.

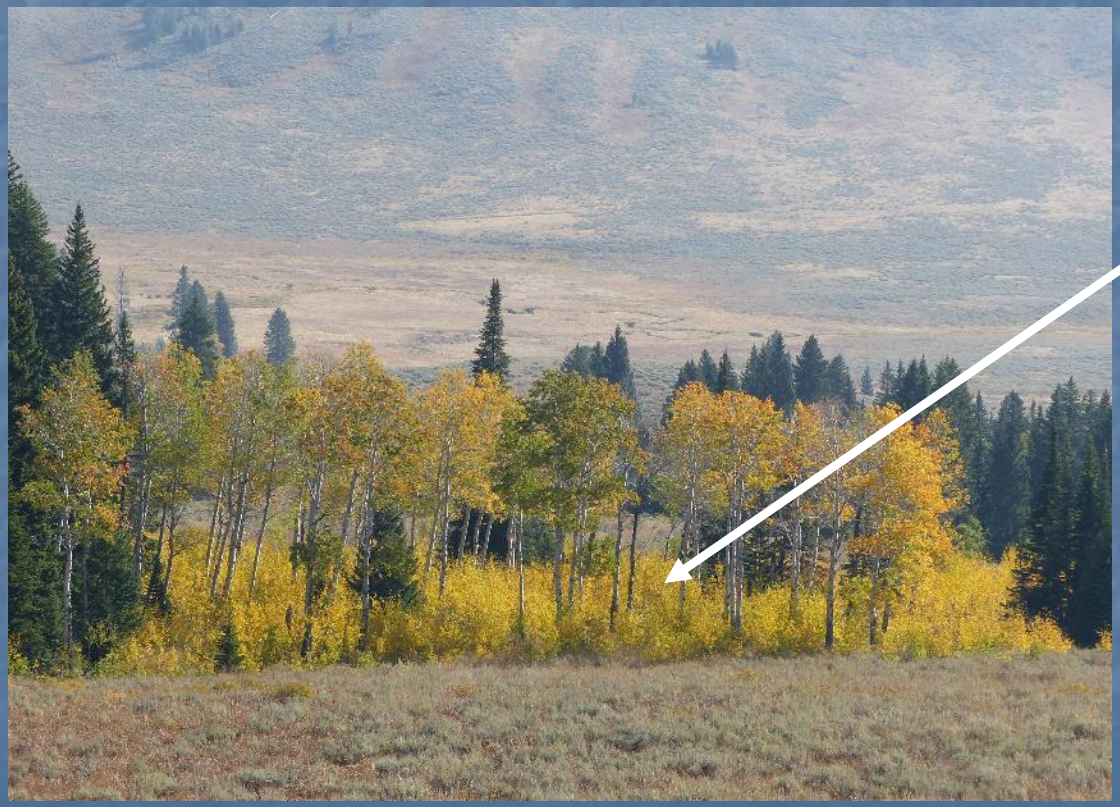


(Photo – WJ Ripple)

This aspen stand consists only of mature trees. Even with wolves back in the park, heavy elk browsing continues to prevent aspen sprouts from growing taller and understory shrubs have been eradicated. Like in Yosemite, intensive ungulate herbivory in areas of human shielding can radically alter native plant communities.

Aspen Stands away from Mammoth

A few kilometers from Mammoth, where human shielding is not a factor, aspen stands have a different dynamic. After the reintroduction of wolves in the mid-1990s, aspen sprouts in many stands began to grow taller.*



Here, young aspen have attained a height of more than 4 m (13 ft), indicating they now exceed the reach of elk and thus may eventually grow into trees.*

* Beschta & Ripple 2018

(Photo – RL Beschta)

Food Subsidy, an Alternative Hypothesis

In Mammoth, there are numerous areas where the Park Service waters lawns throughout the summer to keep them green. These lawns are a source of continual forage for elk and thus it has been suggested that this may be the primary reason why elk concentrate in Mammoth.

(Photo – WJ Ripple)

The "food subsidy" and "human shielding" hypotheses are both likely contributing to the abundance of elk in Mammoth. Because both factors are operating at the same time, it is difficult to ascertain which of the two might be having a stronger effect on the elk's affinity for largely staying in and around Mammoth.

3 - Jasper National Park

Alberta, Canada

(Photo – RL Beschta)

(Photos – Top, RL Beschta; Bottom - WJ Ripple)

Human Shielding in the Athabasca Valley

With the recovery of Jasper's wolves in the 1970s (after heavy persecution in the late 1940s and 1950s) many of the park's elk became increasingly concentrated along the Athabasca Valley where human activities are most common.

Areas of high human presence and activity, such as that occurring along the park's trans-continental highway (photos to the left), are typically avoided by wolves. These areas thus provide local protection from predation and represent another example of human shielding.

Summary

In landscapes with large predators, areas of high human presence and activity are likely to provide safe havens for ungulate prey -- because these predators tend to avoid humans.

Where human shielding occurs, the closeness of humans to wild ungulates may enhance the experience of park visitors.

In areas of human shielding, high levels of ungulate herbivory can significantly impact native plant communities.

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Cited Literature

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Related Literature

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Scientific literature associated with wolves, elk, and vegetation in northern Yellowstone, as well as others on trophic cascades and related topics, can be accessed at:

http://trophiccascades.forestry.oregonstate.edu/publications

Scientific Names of Plant and Animal Species

Plants

California black oak – *Quercus kelloggii*
Quaking aspen – *Populus tremuloides*

Animals

Cougar – *Puma concolor*
Gray wolf – *Canis lupus*
Mule deer - *Odocoileus hemionus*
Rocky Mountain elk – *Cervus canadensis*

Glossary of Selected Terms

Herbivory – The feeding or foraging of animals on living plants; browsing is used in reference to their feeding on woody plants.

Large predators – A predator is an animal that lives by killing and eating other animals. A "large predator" is one that normally exceeds 15 kg (33 lbs) at maturity.

Plant communities - Groups of interacting plants sharing a common environment, for example: aspen community, willow community, sagebrush community.

Ungulates – Hooved animals, such as elk, deer, moose, and bison.