ECOSYSTEMS IN BRITISH COLUMBIA AT RISK

Antelope-Brush Ecosystems

The antelope-brush ecosystem of the Okanagan is one of the four most endangered ecosystems in Canada.

Province of British Columbia Ministry of Environment, Lands and Parks

Why are antelope-brush ecosystems at risk?

In the warmest part of the south Okanagan Valley is a pocket of dry grassland dominated by bunchgrasses, the wind, and the scraggly dark branches of antelope-brush. The antelope-brush ecosystems of the south Okanagan weren't extensive when European settlement began in the 1800s, and over the past century more than 60 percent of them have been destroyed and converted to vineyards, orchards, croplands, or urban residential and industrial areas. Much of the remainder has been disturbed and invaded by foreign plants such as knapweed and cheatgrass. Only 9 percent now remains relatively undisturbed.

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The most immediate danger facing this natural community is urban development. Gentle slopes, arid climate, and proximity to prime human habitats such as lake shores, towns and roads make development in this ecosystem very appealing. The antelope-brush ecosystem is poorly known, without the high public profile of an old-growth forest. In addition, grassland habitats are subtle in character, and changes may go unnoticed for a long time.

Unmanaged livestock grazing also takes its toll, resulting in exposed soil and stunted bunchgrass plants. The crust of lichens and mosses that supports the unusual plant community can be fragmented easily by hooves as well as machinery. We are beginning to understand the effects that such disturbance has on the shrubs and grasses of these ecosystems through studies concentrating on plant and animal species not normally considered in range management.

What is their history?

In British Columbia, these small ecosystems are remnants of communities with ancient origins, probably dating back 10 000 years. After the glaciers of the Pleistocene melted, plant migration and vegetation changes were widespread. In particular, Great Basin species (those from arid areas west of the Rockies) responded to a substantial warming about 8000 years ago by moving northward into the hot, dry valley bottoms of what is now southern British Columbia. Historically, antelope-brush occupied much greater tracts of land than it does now, stretching further north and to higher elevations. But with an increase in moisture and cooling that occurred 4000 to 5000 years ago, the extent of arid lands diminished and the antelope-brush ecosystems shrunk to the amount we see today.

What is their status?

The antelope-brush grasslands are part of the larger grassland communities connected to the Columbia Basin in Washington, Idaho, Montana and Oregon. British Columbia's grasslands are mostly confined to low elevations in southern valleys; they cover only 0.3 percent of the province. Antelope-brush ecosystems account for only 0.2 percent of this small grassland area – most of our grasslands are dominated by big sagebrush or perennial bunchgrasses.

The antelope-brush ecosystems that are widespread in the arid west of the United States are different from those that occur in British Columbia and very small areas of northern Washington and Montana. In British Columbia, these are restricted to the southern ends of two deep Interior valleys – the Okanagan Valley and the southern Rocky Mountain Trench. The communities of antelope-brush in the Trench are scattered in grassland patches and open ponderosa pine woodlands as far north as Columbia Lake. Because the climate and ecological histories are different, these communities are not the same as their Okanagan counterparts. Although they are undoubtedly affected by grazing and by forest fire suppression, the Rocky Mountain Trench habitats do not face the immediate and overwhelming threats that the Okanagan habitats do. Nor do they harbour the same diversity of rare species. For these reasons, this brochure will focus on the endangered antelope-brush ecosystems in the south Okanagan Valley.

Because of its small extent and the formidable threats to its integrity, the antelope-brush community on the lowland benches of the south Okanagan is considered one of Canada's four most endangered ecosystems (the other three are the Garry oak woodlands of British Columbia's south coast, the tall grass prairie of Manitoba and Ontario, and the Carolinian forest of southern Ontario). Although antelope-brush grows in small pockets as far north as Kelowna, ecosystems dominated by this species occur mainly south of Penticton, where they cover sandy or gravelly soils at lower elevations. Less than 5000 hectares remain, and over 60 percent of these areas lie within the Osoyoos Indian Reserve.

Very little of the antelope-brush steppe is preserved within protected areas – two small ecological reserves north of Osoyoos protect token tracts, and one of these was almost entirely burned in 1993. The South Okanagan Wildlife Management Area protects riverside wetlands and dry uplands, including some antelope-brush habitat, between Oliver and Osoyoos Lake.

THE GREAT BASIN POCKET MOUSE, WHICH CACHES SEEDS OF ANTELOPE-BRUSH, IS AN IMPORTANT PART OF THIS ECOSYSTEM.

Around Vaseux Lake the Vaseux Bighorn National Wildlife Area and The Nature Trust of British Columbia properties contain some arid benchlands.

What are they?

To most of us, antelope-brush ecosystems look at first glance like most other dry, shrubby grasslands. The large, dark antelope-brush grow scattered among the well-spaced grass clumps; there are few, if any, trees. For most of the year, the grass is the colour of straw and little other colour is noticeable. But what may look like a wasteland is actually a miniature world of special plants, unusual insects, amphibians, reptiles, birds, and mammals.

Lichens and mosses cover the sandy soils, forming a fragile crust.

These ecosystems are the product of a warm, dry climate and the coarse sediments left behind by Ice Age glaciers. Nestled in the rainshadow of the Cascade Ranges, the south Okanagan Valley receives only about 300 mm of precipitation annually and records the highest average July temperature in British Columbia.

Unlike the Great Plains, which get most of their moisture during the height of summer, the grasslands of British Columbia – and the antelope-brush ecosystems, in particular – receive most precipitation during the coolest time of the year, from late autumn to the beginning of summer. After the rain ceases, summer droughts can be intense, and evaporation under the hot summer sun adds to the problem of moisture stress. The grasses that thrive in this type of climate are bunchgrasses, which create ecosystems markedly different than those of the sod-forming grasses of the Canadian Prairies.

The soil of antelope-brush communities is special and determines the character of the ecosystem. Antelope-brush thrives in soil derived from windblown sand and the sands and gravels deposited by the meltwaters of the Ice Age glaciers. Since the glaciers didn't push very far south into Washington State, these particular ecosystems are very limited in area.

Moisture from precipitation travels quickly through sandy or gravelly soils, so few plants can grow in these soils in arid areas. Plants with roots near the surface must be able to absorb much of the water as it slides by and then be able to survive long periods of drought. Other plants, such as ponderosa pine and antelope-brush, grow long tap roots that can reach deep into moisture-bearing soil.

The physical nature of the soil is also critical to a number of animals. The Great Basin Pocket Mouse is an uncommon species in British Columbia, but is the most abundant mammal associated with this habitat because it prefers burrowing in the sandy soils. This mouse is also important for antelope-brush survival because it caches seeds in the soil – and seeds that are not eaten grow into new shrubs.

Over the sand and soil, a layer of lichens and mosses establishes a fragile crust. Some of these lichens and mosses are found only in these northern antelope-brush ecosystems. They help retain soil moisture, and are responsible for adding nitrogen to the soils, which is then used by other plants. This crust

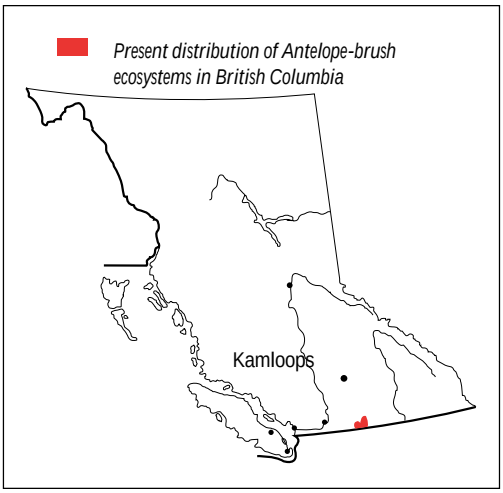
not remain intact under the hooves of grazing animals or the wheels of vehicles; soil is blown and washed away, and then the weeds invade, destroying the natural vegetation.

Antelope-brush is a yellow-flowering shrub in the rose family, and is usually less than three metres tall. The pale, grey forms of big sagebrush and rabbitbrush also share the arid benchlands; in pristine conditions they grow along with perennial bunchgrasses such as needle-and-thread grass, bluebunch wheatgrass, red three-awn grass and sand dropseed. Most of the plants hug the ground; prickly-pear cactus, lichens, mosses and common selaginella cover the sandy soil. Ephemeral flowers – bright yellow bells and bitterroot in the spring, followed by evening primroses, blazing-stars, gumweeds and the delicate mariposa lilies of the summer – add splashes of colour to the surroundings. Bitterroot has a large, attractive, pink flower that appears to spring directly from the ground; the Okanagan Nation called it 'speetlum' and went to great efforts to gather its starchy roots in the spring. They traded large quantities to the Thompson Nation for salmon.

Why are they important?

The preservation of antelope-brush habitat in the south Okanagan is vital to the conservation of biological diversity in British Columbia – 22 percent of all endangered and threatened vertebrates in the province are found here. The grasses and protective shrub layer give respite from the sun and provide feeding and nesting opportunities for a thriving, diverse community of mammals, birds, reptiles, and invertebrates. Scattered trees and snags provide nesting and roosting sites for birds and bats. Diversity is further enhanced by proximity to lakes, wetlands, ponderosa pine stands, cliffs, and talus slopes. This is a rich mosaic of habitats.

Many of the plants and animals of the antelope-brush ecosystems are rare or unusual. For example, two of British Columbia's most fascinating animals forage here. The Pallid Bat, a pale, ghostly creature, is known in Canada only from the south Okanagan. It hunts by night for crickets and scorpions on the ground and in shrubs by listening for its prey rather than using echolocation like most bats. And the search continues for the elusive Pygmy Short-horned Lizard, although there have not been any credible sightings for over half a century. Over 250 potentially rare and endangered invertebrate species occur in this ecosystem. The diversity of life in this ecosystem is nationally significant, and we have a responsibility to do what we can to conserve it.



Antelope-brush itself provides for many animals. Across its range, it hosts over 100 species of plant-feeding insects, and many more visit its fragrant yellow flowers for nectar and pollen. For larger grazing animals such as Mule Deer and California Bighorn Sheep, antelope-brush is a favoured and nutritious source of food. Humans have benefited from this shrub as well – aboriginal people from the Okanagan used a concoction of the fruits to treat constipation and hemorrhaging. Because of the oils present in the branches of this shrub, it was often used for firewood.

One must get down low to see all the beauty of this miniature world.

Unlike in a forest, one must get down low to see all the beauty of this miniature world; the plants and animals are mostly small and live close to the ground. The antelope-brush ecosystems support more species of insects than other grassland ecosystems, and many of these species are unique in Canada because they are the northernmost representatives of the Great Basin insect fauna. Patches of buckwheat sometimes produce colonies of the rare Mormon Metalmark butterfly. Bristly robber flies buzz past or wait in ambush on the sand. Peering among the tufts of needle-and-thread grass, you may turn up a scavenging Jerusalem cricket or a huge darkling beetle. Canada's only native praying mantis looks like a broken twig in its motionless wait for passing prey. At night, six species of wind scorpions (stingless relatives of true scorpions) hunt for a wide variety of insect prey. Three of them are not known from anywhere else in the world.

To some invertebrates, the sandy soils beneath the crust are critical for burrow construction. Ant lion larvae wait in the bottom of their small sand pits, their huge, sickle-shaped jaws hidden. Furry, rotund, bee flies with patterned wings hover over the sand in search of the bee burrows where they lay their eggs. Known only from two localities in the province, large grey and yellow scoliid wasps search the sand for scarab beetle larvae, hosts for their own young. The dry, sandy habitat also favours seed-feeding insects because seeds

canaccumulate instead of germinating quickly or rotting. The arid hillsides, where the soil is dry and cracked or rocky, are the preferred habitat of the Northern Scorpion.

Slithering over the sun-soaked soil are several species of snakes restricted to the Dry Interior – the Night Snake, Western Rattlesnake, Western Yellow-bellied Racer, and Gopher Snake. The deep clefts in nearby rock bluffs and the talus slopes at their bases are perfect winter retreats for these reptiles, and they move out from their hibernacula every spring in search of prey among the antelope-brush.

THESE SMALL ECOSYSTEMS ARE REMNANTS OF COMMUNITIES WITH ORIGINS PROBABLY DATING BACK 10 000 YEARS. *Jeff Shatford photo*

We do not usually associate amphibians with such arid conditions. Nevertheless, the Tiger Salamander and the Great Basin Spadefoot Toad are confined to the driest regions of the province. They require small, permanent or intermittent lakes or ponds to breed but spend most of their adult lives on dry land, often in burrows to avoid heat and desiccation.

On spring mornings, the melodic song of the Western Meadowlark fills the air. The flashing white tail feathers of the Vesper Sparrow are a common sight. Keep an eye open for the Lark Sparrow, an uncommon bird that is more abundant in these antelope-brush communities than anywhere else in the province. You might even see the rare Prairie Falcon, which requires cliffs for nesting and large expanses of open country for hunting. It was once almost gone from the Okanagan, but now may be making a comeback. Look for it flashing overhead in search of unwary meadowlarks.

What can we do?

Quick action is needed to save the antelope-brush ecosystem. It may not command the profile of an old-growth rainforest, but it is no less fragile and is even more threatened. What can you do? You can begin by spending time outdoors and getting to know this fascinating natural community. Enjoy its wide open spaces, warm breezes, and unusual inhabitants. You can increase public awareness through local or provincial natural history and conservation organizations. You can support habitat acquisition by government and by private agencies such as The Nature Trust of B.C. You can support stewardship programs that offer incentives to landowners to manage their natural lands with conservation in mind. And it is very important to help municipalities develop plans and bylaws that will protect these and other sensitive ecosystems.

In response to the threats to this and other endangered ecosystems in the south Okanagan Valley, the South Okanagan Conservation Strategy was established in 1990. This is a multi-agency initiative to inventory biological values, coordinate research, and set conservation management goals in the Valley. Other organizations involved in habitat conservation include the provincial Ministry of Environment, Lands and Parks; the Ministry of Forests; the Federation of B.C. Naturalists; the Okanagan-Similkameen Parks Society; and The Nature Trust of B.C. The Nature Trust of B.C. has been especially active in purchasing grasslands in the south Okanagan for their conservation values.

Much needs to be learned about the species that inhabit these communities and their interactions. Groups including Environment Canada (Canadian Wildlife Service), BC Environment, University of British Columbia, Royal British Columbia Museum, and B.C. Ministry of Forests are studying the effects of various disturbances, including grazing, on antelope-brush ecosystems and their wildlife inhabitants. This research will help range managers, planners, First Nations, and the public to design strategies that will better integrate land use with the conservation of the antelope-brush community.

Delay in conservation efforts will have disastrous consequences.

Delay in conservation efforts will have disastrous consequences. The White-tailed Jack Rabbit and Pygmy Short-horned Lizard are sad examples of species that used to live in this habitat but are apparently gone. We must preserve what is left so the other species that call this ecosystem home aren't eliminated as well. Perhaps this small, endangered antelope-brush ecosystem is coming to our attention just in time.

ANTELOPE-BRUSH ECOSYSTEMS ARE THREATENED BY URBAN ENCROACHMENT AND AGRICULTURAL DEVELOPMENT.
Jeff Shatford photo

BITTERROOT, KNOWN TO FIRST NATIONS AS "SPEETLUM," WAS SOUGHT AFTER FOR ITS STARCHY ROOTS.
Robert Cannings photo

AN INTACT LAYER OF LICHEN, SELAGINELLA, AND MOSS IS IMPORTANT TO PREVENT EROSION OF SOIL AND INVASION OF WEEDS. *Jeff Shatford photo*

THE NORTHERN SCORPION IS ONE OF MANY INVERTEBRATES THAT THRIVE IN THIS ARID HABITAT.
Robert Cannings and Brent Cooke, Royal BC Museum photo

ANTELOPE-BRUSH IS AN IMPORTANT FORAGE ITEM FOR MANY HERBIVORES SUCH AS CALIFORNIA BIGHORN SHEEP, MULE DEER, AND WHITE-TAILED DEER.
Robert Cannings photo

FOR MORE INFORMATION ON ANTELOPE-BRUSH ECOSYSTEMS, CONTACT:

Wildlife Branch
BC Environment
Ministry of Environment, Lands and Parks
780 Blanshard Street
Victoria, British Columbia V8V 1X4

BRITISH COLUMBIA CONSERVATION DATA CENTRE

Environnement Canada / Environment Canada
Service canadien de la faune / Canadian Wildlife Service

ROYAL BRITISH COLUMBIA MUSEUM

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BROCHURE FUNDING PROVIDED BY
B.C. Conservation Data Centre, Environment Canada (Canadian Wildlife Service), Royal British Columbia Museum, World Wildlife Fund

ISBN 0-7726-7545-7
ENV 202368.0395
MARCH 1995

TEXT BY **ANDREA SCHLUTER, TED LEA, SYDNEY CANNINGS** AND **PAM KRANNITZ**

DESIGN BY **ARIFIN GRAHAM, ALARIS DESIGN**
DISTRIBUTION MAP BY **MIKE PAWLAS**
PROJECT COORDINATION BY **LAURA FRIIS**

Printed in British Columbia on recycled paper with vegetable base inks.
Q.P. 13557