Antelopebrush (Purshia tridentata) in British Columbia's South Okanagan: A Literature Review

Discussion Paper

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Abstract

Antelopebrush is a component of the shrub steppe ecosystems of British Columbia's Southern Interior. The shrub is common in parts of the United States but has very limited distribution in BC. BC's Antelopebrush ecosystems have very high biodiversity and concentrations of at-risk species, but are also host to invasive plant species. The shrub is utilized by a variety of ungulates, rodents, and insects, and it has a complex relationship with fire.

Keywords: Antelopebrush, Antelope Bitterbrush, *Purshia tridentata*, Okanagan

Introduction

Antelopebrush (*Purshia tridentata* Pursh DC) is a native perennial shrub with wide distribution throughout the Western United States (Western US), but with very limited distribution in British Columbia's (BC's) Southern Interior. It occurs on warm, dry sites in steppe and forest zones and is considered a late successional species. However, it can be an early colonizer on disturbed sites with moist habitat (Walls & Zamora 2001). This article summarizes relevant research on this complex and ecologically important species. The shrub itself is not considered at risk, but the ecosystems where it is found contain high concentrations of Federally and Provincially listed species. Much of the Antelopebrush literature comes from the Western US; however, because of differences in climate, soils, and other factors, this review focuses only on studies directly relevant to the Okanagan.

The shrub has several common names, including Antelopebrush, Antelope-brush, Antelope Bitterbrush, Bitterbrush, Bitter-brush, Greasewood, and Black Sage. Although the Antelope is not found in BC (E-Fauna BC 2026), Antelopebrush is the simplest and most recognized common name for the shrub and is the one used in this article.

Botany

A member of the family Rosaceae, mature Antelopebrush shrubs range from 1 to 3 metres tall, typically with several woody stems emerging from ground level. The leaves are alternate, deciduous, wedge-shaped, mostly 1–2 cm long, and 3-toothed at the tip. They are sil-

Gayton. 2026. Antelopebrush (Purshia tridentata) in British Columbia's South Okanagan: A Literature Review. *Journal of Ecosystems and Management 26*(2):1–16 doi:10.22230/jem.2026v26n2a641

JEM
Vol 26, No 2
JOURNAL OF Ecosystems & Management

very-greenish in colour and slightly hairy (Figure 1). Some leaves do persist through the winter. The flowers are small and pale yellow; the seeds are black, pear-shaped, 6–8mm long, and encased in a papery husk (Young & Clements 2002). The shrub typically flowers in April and May (Dyer 2022). A Montana study indicated that individual flowers progressed from opening to dehiscence in 24 hours or less (Pendleton et al. 2012). The shrub is insect-pollinated and highly self-incompatible (United States Department of Agriculture [USDA] 2026). Documented bee pollinators include mining bees (*Andrena spp.*), mason bees (*Osmia spp.*), green metallic bees (*Agapostemon spp.*), and others (Mitchell et al. 2023). The seeds are relatively heavy, ranging from 5 to 46 milligrams per seed (Krannitz 1997; Dyer 2022). For comparison, a wheat seed weighs 30–50 milligrams (Alberta Grains 2026). Thus, the seeds are not wind-distributed. They are consumed by harvester ants, birds, and a variety of rodents. Rodent seed caching is a significant means of Antelopebrush propagation and spread; what appears to be a single multi-branched shrub may actually be several separate individuals growing from a former seed cache (Shatford 1997). Sherman and Chilcote (1972) found that rodents preferred open ground for seed caching; accumulating Ponderosa Pine litter reduced caching activity.

Figure 1. Antelopebrush in flower



A 3-metre-tall veteran, near Penticton



Mature shrubs can take on a complex variety of shapes, from erect to decumbent, single-stemmed or (more often) with multiple stems. In certain situations, ground-oriented decumbent branches can produce new plants via layering. The shrub has a deep taproot, allowing it to access moisture deep in the soil profile (USDA NRCS, n.d).

Antelopebrush, along with Redstem Ceanothus (*Ceanothus sanguineus*), is Actinorhizal, a class of plant species capable of forming symbioses with the nitrogen-fixing soil bacteria *Frankia*, an Actinomycete. *Frankia* are filamentous, branching, and primarily saprophytic bacteria. They can live both symbiotically in root nodules and saprophytically in soil (Paschke 1997). Root nodulation does not necessarily imply that nitrogen fixation is taking place; the process is influenced by soil moisture, soil nutrients, and the age and health of the individual shrub (Walls and Zamora 2001). Godek (2026), working in the South Okanagan, found higher amounts of available soil nitrate and potassium, and a lower carbon/nitrogen ratio, in an open Antelopebrush-dominated area than in an adjacent area with

a Ponderosa Pine overstory. However, the lower carbon/nitrogen ratio can result from several different factors, including plant community, soil chemistry, and litter input.

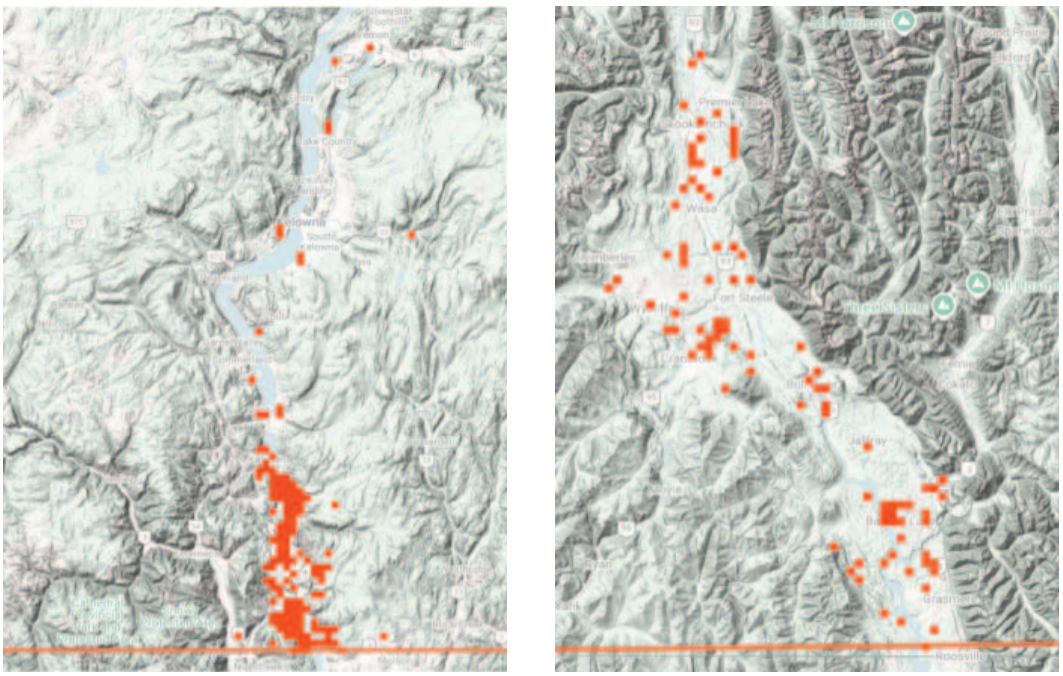
Antelopebrush prefers coarse-textured, well-drained soils (Nord 1959). The shrub's ability to fix atmospheric nitrogen is an advantage in nutrient-poor soils, and surplus free nitrogen accumulating around the roots may also support other plant species.

Antelopebrush is relatively long-lived. Despite its irregular stem bases, the shrub's annual growth rings are quite visible and datable. Nord (1959) found individual shrubs in California up to 160 years old, with an average age of 32 to 44 years. Quadvlieg (1969) analyzed three shrubs from the Vaseux Lake area and found ages of 45, 76, and 112 years. In a study of 11 South Okanagan sites, the largest shrubs (up to 4 metres tall and 16 cm stem diameter) were 40 years old or younger (Krannitz and Hicks 2000).

Distribution

Antelopebrush, like its counterpart Wyoming Big Sagebrush (*Artemisia tridentata*), is an icon of the Great Basin Biome, found throughout the drier portions of the Western US, down as far south as New Mexico and Arizona (USDA 2026). Both shrubs typically grow as a grassland overstory; this ecosystem type is commonly called shrub-steppe. In BC, Antelopebrush is at the far northern limit of its range. It is found sporadically in the Okanagan Valley, from the US border north to Penticton (Figure 2). Small, isolated populations occur between Penticton and Vernon, and around Kamloops. The shrub is not found in the Similkameen Valley, except for one small patch north of Princeton. Antelopebrush is fairly common in the Rocky Mountain Trench, from the US border north to Canal Flats (iNaturalist Canada 2026). E-Flora BC recorded Antelopebrush at 358 sites in the Bunchgrass, Ponderosa Pine, and Interior Douglas-Fir biogeoclimatic subzones. The average elevation was 727 meters, and the maximum was 1540 meters (E-Flora BC 2013). In the Okanagan Valley, the author has observed that Antelopebrush prefers deep, well-drained, coarse-textured or sandy soils. It is rarely found on silty or saline soils, or

Figure 2. Distribution of Antelopebrush in the Okanagan Valley (left) and the Rocky Mountain Trench (right).



Notes: Red squares are sightings; the red line is the U.S./Canada Border (iNaturalist Canada 2026).

shallow soils over bedrock. In the US, Antelopebrush and Wyoming Big Sagebrush commonly grow together, but the author has observed few instances of this in the Okanagan (see Appendix for a list of the larger Antelopebrush sites in the Okanagan).

Cultural uses

In Nsylixen, the traditional language of the Okanagan (Syilx) people, Antelopebrush is known as qʷlqʷlmniłp (pronounced *K'wull.K'wull.M'neesh'p*). The dried branches are quite flammable and were frequently used as firestarter. According to a Montana source, people consumed an infusion of the root for lung problems and coughs. The dry, ripe fruits were used to induce vomiting. Members of some tribes used the leaves as a poultice for skin problems, a general tonic, and a treatment for gonorrhea (Lloyd 2016). The Native American Ethnobotany Database documents 59 different uses for the plant (http://naeb.brit.org/uses/species/3231/).

Turner et al. (1980) recorded the following from Okanagan/Okanogan Indigenous informants:

> Deer like to eat it; you can smell it on their meat when they have been browsing it. It was formerly used as fuel. The branches were broken off at ground level. They make a good, hot fire. The Sanpoil-Nespelem used the bark for weaving bags, garments, and soft baskets. It is still used today by some people to make the initial fire used in the pit-cooking process. Children were cautioned not to play around this plant because it has lots of wood ticks. The "berries" were crushed and mixed with water to make a concoction for treating constipation and haemorrhaging. (p. 128)

Lewis and Clark were the first European settlers to collect Antelopebrush, in 1806. Upon return from their expedition, they engaged the German botanist Frederick Pursh (1774–1820) to catalogue their plant collection; hence the shrub's current genus name.

Conservation status

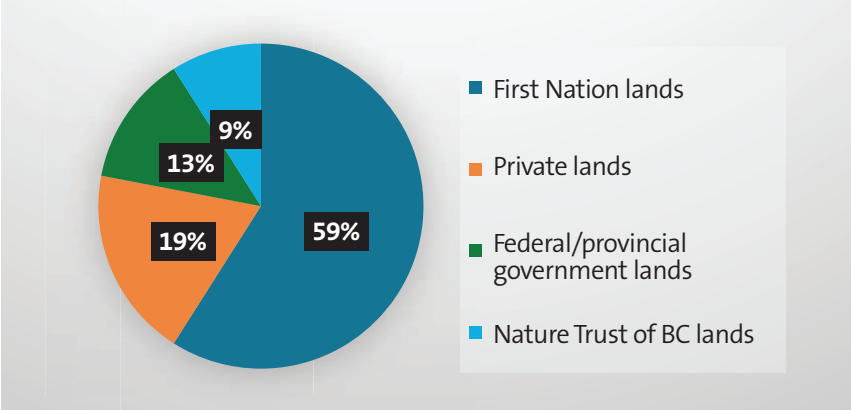
The BC Conservation Data Centre currently lists Antelopebrush as Yellow ("apparently secure"), but lists four Plant Associations containing Antelopebrush as Red ("either very small local populations or biological characteristics that imperil them") (Table 1).

Table 1. Red-Listed Plant Associations containing Antelopebrush (BC Species and Ecosystems Explorer)

Plant association scientific names	Plant association common names	Biogeoclimatic subzones where found	General locations
Purshia tridentata/ Hesperostipa comata	antelopebrush/ needle-and-thread grass	BGxh1/02; IDFxh1; PPxh1	Okanagan
Purshia tridentata/ Calamovilfa longifolia/ Hesperostipa comata/ Syntrichia ruralis	antelopebrush/ prairie sandgrass/ needle-and-thread grass /sidewalk screw-moss	IDFxx2	Rocky Mountain Trench
Purshia tridentata/ Pseudoroegneria spicata	antelopebrush/ bluebunch wheatgrass	IDFdm2; PPdh2	Rocky Mountain Trench
Purshia tridentata/ Symphoricarpos albus/ Pseudoroegneria spicata	antelopebrush/ common snowberry/ bluebunch wheatgrass	IDFdm2; IDFxx2	Rocky Mountain Trench

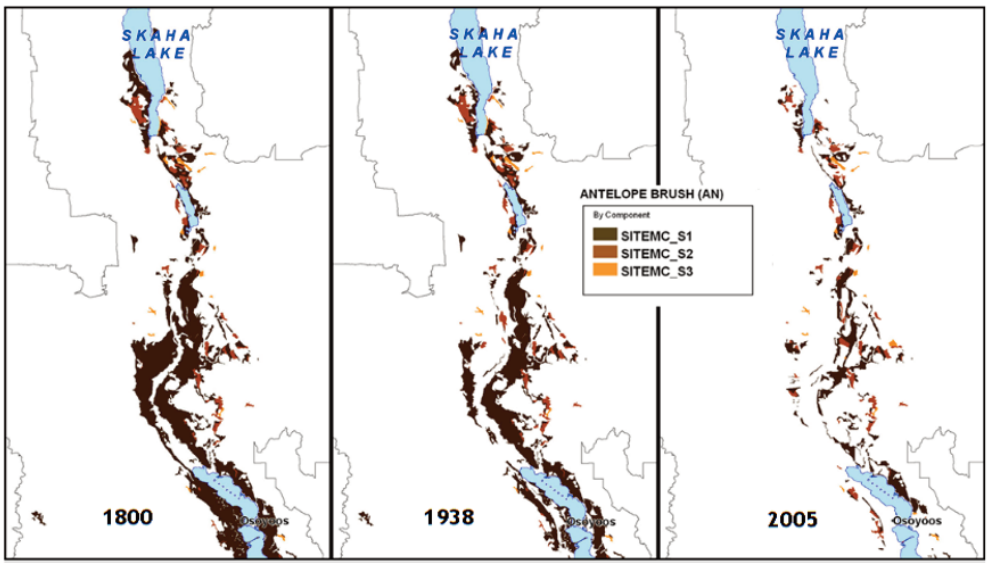
Notes: Antelopebrush ecosystems in the Okanagan Valley have substantially declined since European arrival: 61 percent of the Antelopebrush/Needle-and-thread grass plant community has been altered or lost to development, leaving only 3900 hectares, divided between various land ownerships (Figure 3) (Iverson 2012).

Figure 3. Land ownership of Red-listed Antelopebrush/Needle-and-thread Grass Plant Association in the Okanagan Valley (Iverson 2012).



This ecosystem loss (in descending order of magnitude) results from agriculture, housing, and road and infrastructure development (Iverson 2012). Because Okanagan Antelopebrush ecosystems occur at low elevations, on relatively level terrain and on good-quality soils, they are priority targets for agriculture and urban development. Most of the remaining Antelopebrush areas on private land are on slopes too steep for agriculture or housing (Figure 4).

Figure 4. An estimate of the historical and contemporary area of the Antelopebrush-Needle-and-thread grass ecosystem in the Okanagan region of BC (Lea 2008)



The Okanagan Antelopebrush shrub-steppe has some of the highest biodiversity and the highest number of species at risk of any ecosystem in Canada. Iverson (2012) identified 26 vertebrates, 13 plants, and three invertebrates associated with the Antelopebrush/Needle-and-thread Grass Plant Association that are provincially or federally at risk, or both. The at-risk vertebrates (in alphabetical order) include American Badger (*Taxidea taxus*), Bighorn Sheep (*Ovis canadensis*), Burrowing Owl (*Athene cunicularia*), Nuttall's Cottontail (*Sylvilagus nuttallii*), Western Harvest Mouse (*Reithrodontomys megalotis*), and Western Rattlesnake (*Crotalus oreganus*). Antelopebrush is also the obligate host for the larvae of Behr's Hairstreak Butterfly (*Satyrium behrii*) and the Nuttall's Sheep Moth (*Hemileuca nuttalli*), two federally endangered species. In Canada, the Behr's Hairstreak occurs in the South Okanagan Valley, from Penticton to the US border (Guppy & Shepard 2001). The Sheep Moth has been found only near Vaseux Lake, Oliver, and Osoyoos (BC

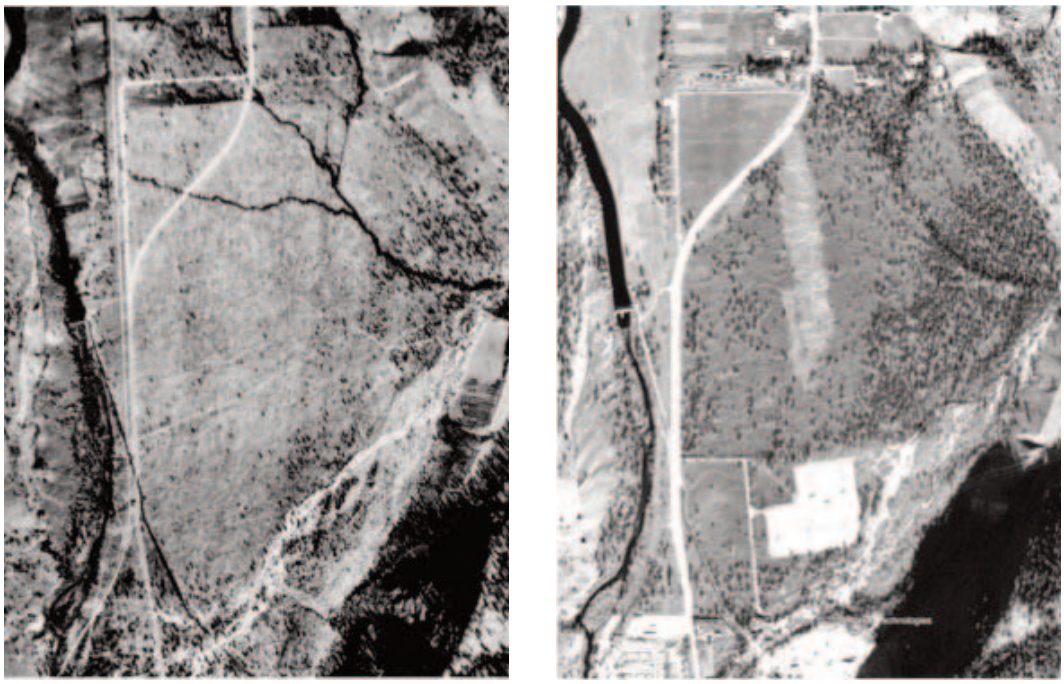
Conservation Data Centre 2026). A primary reason for this concentration of at-risk species is that the South Okanagan is at the very northern limit of the Great Basin biome. Many of the species that are designated as at risk here are common south of the US border.

Fire ecology

The relationship between Antelopebrush and fire, and between fire and fire suppression, is not only complex but is fundamental to our understanding and management of Antelopebrush ecosystems in the Okanagan. Like its counterpart, Wyoming Big Sagebrush, Antelopebrush is highly flammable, and as Mutch (1970) suggests, flammable species benefit from fire. Shrub steppes are disturbance-driven landscapes (Vreys 2025). Research in the Western United States suggests that Antelopebrush evolved under a frequent fire regime, but settler land management practices led to stagnant stands. Fires up to the mid-1800's were more frequent and resulted in grass ranges and pine forests with widely spaced shrubs, including Antelopebrush (Rice 1983).

In the Okanagan, Antelopebrush stands are frequently found adjacent to Ponderosa Pine forests (Figure 5). In the long-term absence of fire, trees encroach and suppress Antelopebrush through shading, water and nutrient competition, litter accumulation, and soil acidification.

Figure 5. Aerial/satellite imagery of the Nature Trust of BC Antelopebrush Conservation Area (ABCA) south of Vaseux Lake.



1938 **2021**

Notes: Comparison shows the encroachment of Ponderosa Pine over eight decades. The barren strip in the 2021 photo is from a July 2009 wildfire (Government of British Columbia 2026). In 2024, The Nature Trust began thinning some of the tree ingrowth at ABCA.

McConnell and Smith (1970) analyzed shrub recruitment in a young Ponderosa Pine stand in Okanogan County, Washington, eight years after Pine thinning to various spacing distances. The dominant shrub species was Antelopebrush, with lesser amounts of Redstem Ceanothus, Rose (*Rosa* spp.) and Saskatoon (*Amelanchier alnifolia*). Combined shrub weight increased about 7 kg per hectare for each one-metre increase in tree spacing.

A number of dendropyrochronological studies have documented frequent pre-European contact fire return intervals in BC's Ponderosa Pine forests. In a detailed study

of a low-elevation 400-hectare site containing Antelopebrush on the west side of Vaseux Lake, Pogue (2017) determined that between the years 1700 and 1810, the site had an average 13-year fire return interval. The actual fire return interval may have been even shorter, since minimal fuel accumulation periods likely meant some fires were so low-intensity that they did not scar any trees. Many of these fires were intentional cultural burns started by the local Syilx peoples to enhance food crops and forage for wild game (Simmons 2012).

Referring to the Antelopebrush/Bluebunch Wheatgrass plant association in the East Kootenays, the authors suggest renewal would be favoured by a frequent 5- to 25-year fire regime (Erickson 2004).

There is no direct evidence of pre-contact fire return intervals in the grasslands and shrub-steppes below the Ponderosa Pine forests. However, First Nations Elder accounts and logic strongly suggest that those pre-contact cultural burns were actually started in grassland and shrub-steppe, and then burned upward into Ponderosa Pine forests.

Crafts (2026), working in West Vaseux, sampled plant species composition in five vegetation types: two areas treated with prescribed burns (2004 and 2013), and three unburned areas (closed forest, open forest, and grasslands). Burned areas exhibited high plant diversity. The grasslands were dominated by Antelopebrush and prickly pear cactus (*Opuntia fragilis)* but had low species richness and diversity. Introduced species, particularly cheatgrass (*Bromus tectorum*), were most abundant in the grasslands (Crafts 2026).

The Haynes Lease Ecological Reserve, north of Osoyoos, is a valuable case study. This 100-hectare Reserve is the hottest, driest parcel of natural vegetation in Canada, and Antelopebrush is the dominant species there. The Reserve has experienced several wildfires over the last century: 1926, 1943, 1989, 1993, and 2011 (Government of British Columbia 2026). Ecologist Hans Roemer visited the Reserve six weeks after the August 1993 fire. His 15-page report includes a list of plants observed, plus a number of photographs. His comments on Antelopebrush are as follows: "Few survivors and only in less severely burnt areas. 95% or more of these shrubs were lost; survivors were of two kinds, large bushes resprouting from unburnt terminal twigs, and small bushes with 5-15 cm new shoots from the root crown." (p. 2) In a follow-up visit in November 1994, he reported, "Individuals observed resprouting from unburnt terminal twigs in 1993 appear to have also died. Basal re-sprouts in lightly burnt portions surviving, but not vigorous" (Roemer 1994, p. 1). On a June 2026 visit to the same area burned in the 1993 fire, the author observed a widely-spaced but healthy population of juvenile Antelopebrush. So, regeneration did occur, either via the surviving seed bank, delayed regeneration of burned shrubs, or postfire rodent caching.

The seasonal timing of Antelopebrush burns is critical. Clark et al. (1982) monitored mortality of individual shrubs one year after burning. Shrubs burned in the spring had lower mortality than those burned in the fall. Krannitz and Mottishaw (2003) determined postfire shrub mortality on three different sites in the South Okanagan. Two summer wildfire sites experienced over 80 percent mortality, whereas mortality on a spring prescribed burn site was around 50 percent. Wilderman (2006) conducted a prescribed burn in an Antelopebrush-dominated area in Okanogan County. Researchers took line-transect Antelopebrush cover measurements before and after an October burn. Four years after the burn, shrub cover had decreased from 37 percent to 7 percent. Godek (2026) reviewed research on postfire (both wild and prescribed fire) recovery of Antelopebrush from seven U.S. states. In nearly every case, mortality was lower and postfire recovery faster after prescribed burns compared to wildfires.

Prado-Tarango et al. (2025) examined soil microbial communities in burned and unburned Antelopebrush communities in Eastern Oregon. Burning did not change the microbial community in Antelopebrush. They also suggested the mycorrhizal organisms associated with Antelopebrush could be used in shrub-steppe restoration.

Antelopebrush and invasive species

Given their low elevation, disturbance history and proximity to disturbed ground, it is no surprise that Antelopebrush sites in the South Okanagan host significant populations of invasive plant species. Every Antelopebrush area the author has visited contains either Cheatgrass, Japanese Brome (*Bromus japonicus*), Bulbous Bluegrass (*Poa bulbosa*), or all three. Symonds and Pither (2012) collected vegetation data at 37 South Okanagan sites containing Antelopebrush, and compared the native-exotic richness relationship (NERR) at various scales. NERR describes how native plant species richness in an area correlates with exotic plant species richness. They found a significantly positive NERR relationship (i.e., as the number of native plant species increased so did the number of exotic plant species) at the finest grain (1 m^2), but no significant NERR relationship at any of the three broader grains (10, 100, and 1,000 m^2). Thus, at the fine grain, Antelopebrush foliar cover was an important positive predictor of exotic species cover. This supports Flores and Jurado (2003) who argued that Antelopebrush acts as a "Nurse-Protégé" plant, providing shade, grazing protection, and possibly nutrients and water to germinating seedlings of both native and exotic species. Lucero et al. (2021), working at several desert sites in the Southwest US, found greater Cheatgrass underneath shrubs (including Antelopebrush) than away from shrubs.

Krannitz and Bennett (1999) examined postfire Cheatgrass responses to the 1993 fire on the Haynes Lease Ecological Reserve. They established vegetation plots in five categories of burn severity, ranging from Intense to Unburned. Cheatgrass abundance was substantially reduced in the severely burned plots as the hot fire killed the existing seed bank. This created an opportunity for some of the native grasses to establish. However, by four years after the fire, Cheatgrass density was similar across all burn-severity plots.

Despite the prevalence of invasives, both historical and current data suggest Antelopebrush ecosystems retain some level of resilience despite ongoing pressures from development and invasive species (Vreys 2025).

Forage value

Much of the research work on Antelopebrush in the Western US relates to its forage value for Mule Deer (*Odocoileus hemionus*; see USDA FEIS *Purshia tridentata* for references). In the South Okanagan, juvenile stems and leaves of Antelopebrush have forage value for Mule and White-tailed Deer (*Odocoileus virginianus*), Bighorn Sheep and Elk (*Cervus canadensis*), particularly in fall, winter, and early spring (Dyer n.d.). Total digestible nutrient levels of Antelopebrush range from 40 to 55 percent. Dry-matter in vitro digestibility averages 25 percent. Crude protein can reach 14 percent or higher in the leaves in early summer, but is around 8 percent in winter. Antelopebrush forage contains calcium, phosphorus, carotene, and fat. It is an important source of carotene for rodents (USDA FEIS 2026). The shrub's height means ungulates can access its leaves and twigs, even during periods of deep snow.

Ungulate browsing can significantly affect Antelopebrush. Researchers determined the shrub's percent composition inside and outside a long-term ungulate (primarily Mule Deer) exclosure at the Sinlahekin Wildlife Area, Okanogan County, WA. The data in

Table 2, from an area similar to the South Okanagan, show a substantial impact of deer use on Antelopebrush cover over time (Rexroad et al. 2007).

Table 2. Change in Antelopebrush cover over time, with and without browsing

Percent cover of Antelopebrush				
Year	1952	1956	1966	2003
Inside exclosure	15.46	12.80	29.80	15.31
Outside exclosure	6.83	7.73	23.70	6.22

Krannitz (2008) measured shrub cover at 10 sites in the South Okanagan that were either ungrazed, lightly grazed, or heavily grazed by cattle and horses. Antelopebrush cover decreased with grazing intensity, and cover of the less palatable Wyoming Big Sagebrush increased (Krannitz 2008).

Krannitz and Hicks (2000) suggest that California Bighorn Sheep (*Ovis canadensis californiana*) strip Antelopebrush leaves in late summer, Mule Deer clip twigs in the winter, and cattle clip twigs in the summer, mainly on younger shrubs. In contrast, the authors found that larger and older shrubs were preferred for leaf stripping. Since twig clipping was more prevalent than leaf stripping, overall preference for younger shrubs may lead to difficulties in seedling establishment in regions where the shrub is heavily used as winter forage.

McConnell and Smith (1977) found significant relationships between ungulate forage yield and age of Antelopebrush in Eastern Oregon. Individual plants heavily grazed in spring and early summer produced more forage than plants moderately grazed in late summer and fall. Under the heavy grazing treatment, however, plant longevity was sharply reduced, and fewer plants survived until the age of maximum production.

Propagation and restoration

Antelopebrush reaches seed-bearing age in 8 to 20 years depending on growing conditions and competitive vegetation present (Giunta et al. 1979). Natural seedling establishment occurs only in years with normal to above-normal spring precipitation (USDA FEIS 2026). Prior to germination, Antelopebrush seeds must be husked and then subjected to cold stratification; four to six weeks of chilling at 2°C is sufficient to break dormancy. Field-dried seed can be stored in bags in a cool, dry place for up to five years without a decrease in germination percentage (Rose et al. 1998). An Antelopebrush propagation protocol for Eastern Washington lays out detailed seed storage, germination, and propagation processes (University of Washington 2008). A genetic study of seed from 12 widely distributed populations found moderate genetic differentiation, suggesting that seed from one geographical area can be used in another (Horning and Cronn 2009). Propagation can also be achieved by placing live twig cuttings in rooting media (Kituku et al. 1995). As Antelopebrush can fix atmospheric nitrogen, transplant soil can be inoculated with soil taken from underneath healthy mature shrubs (Clements and Young 2005).

Field propagation, either via seedlings or transplants, can be challenging. Without irrigation, hot dry spells will kill young seedlings. Deer and other ungulates will seek out new seedlings, causing high mortality from browsing. In Antelopebrush transplant projects, temporary caging of individual plants is essential to prevent ungulate browsing mortality (Dyer 2022). Mortality rates of around 50 percent for transplanted seedlings can be expected, even under good conditions (Vreys 2025). In the 1990s, the California Department

of Fish and Game transplanted 79,000 Antelopebrush seedlings; in a subsequent review, biologists estimated that five transplanted seedlings had survived (Clements & Young 2005). Nield (2013) established a trial with one-year-old Antelopebrush plugs at Inkameep Provincial Park in BC. She found no differences in survival rates between irrigated/non-irrigated and weed control/no weed control plots. Bunge (2022) resurveyed the same Antelopebrush plantings 10 years later. Total survival rates were 45 plants out of 352 (13%). When comparing planting seasons, fall planting showed a 17 percent survival rate compared with 7 percent for spring planting. In contrast, Atwood (1999) removed Antelopebrush shrubs during a summer pipeline excavation through West Vaseux, stored them over winter and replanted them the following March. She achieved 75 percent success with the replanting.

In 1998, the Osoyoos Desert Society acquired 50 ha of Antelopebrush shrub-steppe and began a five-year program for ecological restoration and habitat renewal, focusing primarily on native grasses and invasives. Treatments included hayseeding perennial bunchgrasses, manual weed control of invasives, and assessing plant community response without restoration (Atwood 1999; Atwood 2000; Atwood & Scudder 2003).

Several efforts to re-establish Antelopebrush have been undertaken, with varying levels of success. Environmental factors, competition from invasive species, browsing and improper planting techniques can all contribute to low seedling survival. Polster (2015) prepared a restoration plan for a former mine area near Oliver that previously contained Antelopebrush. He recommended establishing native grasses first, followed by transplanting Antelopebrush seedlings. Dyer (2022) reviewed Antelopebrush restoration projects in the South Okanagan and made several recommendations, including the following:

- Develop partnerships with local conservation groups for each restoration project.
- Establish short- and long-term vegetation monitoring for each project, and re-monitor previous monitoring installations.
- Use seed from local plants that are adapted to restoration microsites whenever possible.
- Provide greater support for involvement of the Syilx people in Antelopebrush restoration.
- Examine opportunities to restore small sites through xeriscape gardens, as education and involvement tools, and to create small patches for pollinators.
- Involve education programs wherever possible.

The 36-hectare Fairview Heritage Townsite, west of Oliver, is a ghost town. Landscape architect Ariel Vernon has had considerable success in re-establishing Antelopebrush at the Townsite (Delve Landscape Design 2026).

The South Okanagan Antelopebrush Planting Protocol (Anonymous, no date) contains a number of recommendations for seed harvesting, storage, cleaning and planting.

Reference ecosystems and long-term ecological monitoring

Restoration work should be guided by "reference ecosystem" parcels deemed to be in good condition, and in similar terrain, elevation and biogeoclimatic subzone as the parcel being restored. Vreys (2025), using an adapted Ecological Integrity Assessment methodology, surveyed 43 potential reference parcels containing Antelopebrush in the South Okanagan. The four parcels receiving the best assessment were (south to north):

- Haynes Lease Ecological Reserve and adjacent Wildlife Management Area
- Eastern portion of the Nature Trust Antelopebrush Conservation Area
- Test Orchard Road site
- Nature Trust property adjacent to Oliver Ranch Road

Furness (2002) surveyed 17 remnant Antelopebrush sites in the South Okanagan, and rated them based on several conservation criteria.

Ideally, reference ecosystems also serve as sites for long-term ecological monitoring. The resulting data can provide benchmarks against which comparisons to restoration and management projects in similar ecosystems can be made (Lindenmayer 2012). Long-term replicated data is particularly important now, in our era of accelerating climate change. Unfortunately, many of our ecological monitoring projects are one-offs. Funding gets cut, data are filed away, staff move on, monitoring methodologies change, plot locations get lost, and stored computer data gets deleted or becomes inaccessible. The Okanagan regional work cited here follows this pattern; most of it has never been revisited or re-monitored. The Haynes Lease Ecological Reserve studies are a good example: in the 1990s, two sets of permanent vegetation plots were established, monitored and photographed by different researchers at different times (Roemer 1993; Krannitz and Mottishaw 2003). In addition, the author has accumulated unpublished postburn and invasive plant monitoring data from the same location, dated 1994, 1995, 1997, and 2002. None of these installations have been relocated and re-monitored to date.

Public education

The Okanagan Antelopebrush shrub steppe has received some public exposure, notably by the Osoyoos Desert Centre, the Meadowlark Festival, and the Fairview Townsite. Public schools in Oliver have organized field trips. The BC Government has produced some public information bulletins on Antelopebrush. However, despite these efforts, the general public does not recognize the ecological importance of Antelopebrush shrub steppe. Part of the problem is the shrub's superficial similarity to two very common plants: Wyoming Big Sagebrush and Rabbitbrush (*Ericameria nauseosa*).

As the articles reviewed here attest, abundant scientific knowledge exists about this shrub, its habitat, and its ecological importance. This knowledge has been available for some time, but it has not triggered a general public awakening. It is time to find new and creative ways to bring that information into the hearts and minds of Okanagan citizens. The arts (in the broadest sense of the term) are a powerful intermediary for connecting people to nature. The mystery, complexity, and uniqueness of Antelopebrush make it an excellent candidate for arts explorations.

Conclusions

Based on this research review, and on several years of close field observation, the author suggests the following initiatives:

- Consider reviewing the Provincial status of Antelopebrush, as per Iverson (2012).
- Choose a long-term reference ecosystem from the list of four above, and a candidate site for restoration. The Haynes Lease Ecological Reserve is a logical restoration choice, given the previous monitoring efforts there. In both sites, establish (or relocate) appropriate vegetation monitoring plots, and ensure repeat monitoring over time.

- Select individual Antelopebrush shrubs in various stages of maturity; after gaining landowner/manager permission, measure and photograph them. Then harvest them, and using dendrochronology techniques, determine their ages. From this work, create approximate age-class categories (e.g., *shrub height times shrub width = Age Class X to Y years old*).
- Using the age-class data, choose a site dominated by mature and over-mature shrubs. Together with local First Nations and BC Wildfire Service, implement a thin/burn treatment, and a separate thin-only treatment.
- Investigate the possibility of using low-level drone imagery to determine shrub cover (and possibly age-classes) in a reference ecosystem. Use this data to evaluate the condition of other sites.
- Establish a publicly accessible website, upload Okanagan-relevant Antelopebrush research papers, and ensure that future papers get uploaded to the site.
- Support small-scale native seed harvesting, seed storage, and shrub propagation.
- Together with local First Nations, support local arts groups and individuals in creating Antelopebrush-related projects.

About the author

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Appendix
List of Okanagan sites containing Antelopebrush

Area	Landowner	Location
sẁiẁs Provincial Park	BC Parks	Osoyoos
Osoyoos West Bench	BC Government	Will be part of South Okanagan-Similkameen National Park Reserve
Osoyoos Desert Centre	Osoyoos Desert Society	North of Osoyoos
Fields Lease Ecological Reserve	BC Parks	Adjacent to Osoyoos Desert Centre
Haynes Lease Ecological Reserve	BC Parks	North of Osoyoos, east side of Valley.
South Okanagan Wildlife Management Area	BC WLRS	4 parcels north of Osoyoos; 5 parcels west of Oliver
Fairview Townsite	Oliver and District Heritage Society	West of Oliver
Inkameep Provincial Park	BC Parks	South of Gallagher Lake
Test Orchard Road	BW WLRS (SOWMA)	East of Willowbrook
Antelopebrush Consevation Area	Nature Trust of BC	North of Gallagher Lake
Vaseux-Bighorn National Wildlife Area	Canadian Wildlife Service	East and west sides of Vaseux Lake
Vaseux Lake	Nature Trust of BC	Seven parcels around Vaseux Lake and Okanagan Falls; additional parcel west of Kaleden
White Lake Grasslands Protected Area	BC Parks	Around Willowbrook, and west of Mahoney Lake
McTaggart-Cowan Wildlife Management Area	BC WLRS	East of Skaha Lake

Notes: These are areas either publicly owned or owned by conservation organizations. They are listed in roughly south-to-north order. There are additional small, scattered populations on Crown Land, particularly on the east side of the Okanagan Valley that are not listed here. Both the Osoyoos and Penticton Indian Reserves contain significant Antelopebrush populations.