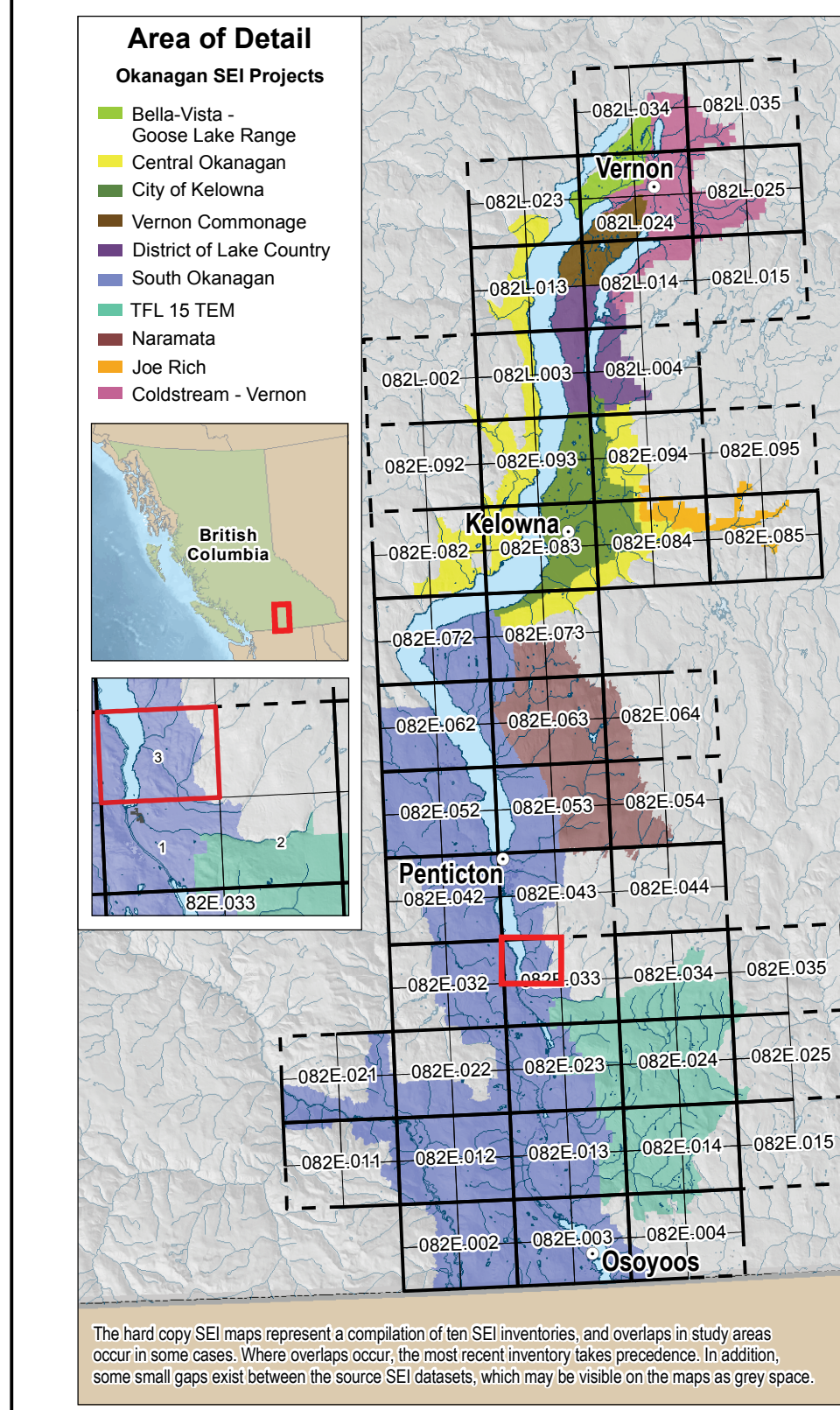


82E.033.3



Map Symbols

- Polygon Boundary
- Study Area Boundary
- Rivers
- Lake/Major River
- Buildings
- Roads
- Municipal Boundaries
- Rail Line
- Areas Outside the Okanagan Study Area

Sensitive Ecosystems (SE) Label

- Polygon Number
- % of polygon
- SE Class
- SE Subclass
- SE Subclass

The example label above indicates the SE attributes mapped for polygon 13788. 62% of the polygon is 102.00 - Coniferous Woodland. 38% is 102.00 - Old Forest. The label indicates the SE Class and SE Subclass. The label also indicates the SE Class and SE Subclass. The label also indicates the SE Class and SE Subclass.

NS are modified (non-sensitive) landscapes. Please refer to the legend for more information about these areas. More than one SE can be assigned to a SE Class and Subclass. Polygon labels that are not included in the SEI are not included in the SEI.

This cartographic product uses Data Density to indicate where more than one ecosystem class is mapped in a polygon. The number of data indicates the proportion of the polygon represented by the 2nd and 3rd ecosystem. The colour of the data indicates the 2nd and 3rd ecosystem class.

The base colour represents the first ecosystem component. Coloured dots overlaid upon the base colour indicate a second ecosystem component. Two colours of dots indicate a second and third ecosystem.

Note: The actual placement of the dots has no significance; they are randomly placed within each polygon.

The SEI data are based on 1:10,000 scale aerial photos but are displayed here at 1:100,000 scale. The SEI data are based on 1:10,000 scale aerial photos but are displayed here at 1:100,000 scale. The SEI data are based on 1:10,000 scale aerial photos but are displayed here at 1:100,000 scale.

* Written labels are based on a 30 x 40 inch paper size.

UTM Projection Zone 10 NAD83
100m Contour Interval
February 15, 2010

UTM Projection Zone 10 NAD83
100m Contour Interval
February 15, 2010

WHAT IS A SENSITIVE ECOSYSTEM?

For the purpose of this study, an ecosystem is considered to be a portion of the landscape with relatively uniform dominant vegetation. Sensitive Ecosystems are ecosystems that are ecologically sensitive and/or at risk in the landscape.

The Okanagan Valley region covers one of the most rapidly growing population centres of British Columbia, and development pressure is escalating. The area is under intense pressure due to urban and rural human settlement as well as extensive agricultural conversion, and has experienced significant changes to ecosystem structure and function through the spread of invasive alien species and fire exclusion. Very high ecological values, combined with the development pressure on the landscape, underscore the need for careful, conservation-based land use decision making throughout the Okanagan Valley.

Regional and municipal governments of the Okanagan Valley and conservation organizations, assisted by Environment Canada's Canadian Wildlife Service and the B.C. Ministry of Environment, have completed regional and local Sensitive Ecosystems Inventory mapping projects as a means to identify the remaining sensitive ecosystems in the Okanagan Valley. The SEI is intended to provide a tool that uses scientific information and mapping to encourage local governments, landowners, developers, and other citizens to become involved in protecting, conserving, and restoring sensitive ecosystems.

Conservation of these ecosystems is increasingly important as rapid population growth in the Okanagan continues to cause fragmentation, degradation, and loss of sensitive ecosystems. The SEI is intended to provide a tool that uses scientific information and mapping to encourage local governments, landowners, developers, and other citizens to become involved in protecting, conserving, and restoring sensitive ecosystems.

An ecosystem, for the purpose of this inventory, is a portion of the landscape with relatively uniform vegetation and soils. Sensitive ecosystems are those that are ecologically fragile and/or at risk, or that are ecologically sensitive. Within the province, at-risk status for species and ecological communities is determined by the B.C. Conservation Data Centre (CDC), a member program of the International NatureServe network. The CDC list of Ecological Communities can help to determine if a particular ecosystem is representative of an at-risk ecological community.

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species and ecological communities, including some ecosystems unique to Canada. Broadleaf woodlands, antelope-brush steppe, sagebrush steppe, wetlands and old forest ecosystems, once well-represented in the Okanagan Valley, have become rare. Historical ecosystem mapping (1800s to present) shows losses of greater than 90% of some ecosystem types in the Okanagan Valley.

Healthy, functioning ecosystems play an important role in adapting to and mitigating the impacts of climate change. Climate change adaptations such as reducing stressors, improving ecological resilience, and landscape connectivity contribute to ecosystem resilience and adaptive capacity in the future. The ecosystems mapped in this project are ecologically significant because of their rarity and fragility and also for the important ecosystem services they provide, such as climate regulation, water filtration, productive soil, carbon sequestration, nutrient cycling, pollination, wildlife habitat and more. Sensitive ecosystems must be considered in the context of the overall landscape, which includes other factors that also contribute to ecosystem services. The study found many SEIs that have been degraded by fragmentation, human use, livestock grazing, and alien species.

The services and benefits SEIs provide and the wildlife species they support are critically important to the quality of life in the Okanagan. With so few intact and fragile ecosystems remaining, it is essential that each site be carefully considered and all land use options be fully evaluated prior to initiating any changes in these areas.

The SEI information is intended to inform local and regional decision-makers to the presence of sensitive and other important ecosystems and ecotopes. The SEI mapping does not replace the need for on-site assessments in areas where land use changes are proposed. The accuracy of the polygon boundaries is limited by the scale (1:10,000) of all projects except the City of Kelowna which was based on 1:10,000 digital aerial photography and date of the aerial photography on which the sites are delineated (i.e., changes may have taken place since the photos were taken). It is recommended that digital data be enlarged significantly beyond the scale of the photos, as this may result in unacceptable distortion and faulty registration with other datasets. The ability to use specific distances (e.g., invasive plants) is limited when interpreting air photos, and field sampling is needed to supplement the interpretation. It can also be difficult to delineate small sensitive ecosystems. In many cases these ecosystems are considered as a small component of a larger polygon that is dominated by another ecosystem. It is important to remember that a polygon may contain a complex, or mosaic, of ecosystems, and sensitive ecosystems may only occupy a portion of that polygon.

The purpose of the SEI Okanagan Valley project is to combine all of the various SEI projects that have been completed in the Okanagan Valley from Vernon to Osoyoos, and to consider and present them as a whole in mapped form to aid use planning and to encourage landscape-level conservation planning at multiple scales, including regional and basin-wide. The project deliverables include 100 SEI maps at a 1:10,000 scale on a Terrain Raster Information Management (TRIM) base, and a series of reports. The individual project reports detail the methods used, study results, descriptions of the ecosystems, and conservation tools for management (see References section).

Sensitive Ecosystems Inventory Methods

Sensitive Ecosystems Inventory was developed as a conservation tool. It is flexible and can be completed in a short time with limited funding when necessary, or expanded to incorporate more information for advanced conservation planning and sustainable development.

Most Okanagan SEI projects were developed by first understanding Terrestrial Ecosystem Mapping (TEM) except in the Kamloops project area where the SEI polygons were mapped from air photos using a bottom-up approach. TEM provided the foundation for the SEI thematic mapping, and the TEM units were analyzed for at-risk status and ecological sensitivity. Sensitive ecosystems were grouped using the Ecosystem-based Resource Mapping (EBRM) table. The table lists SEI classes and subclasses to be assigned to each TEM unit. If the mapped TEM unit included within an at-risk ecological community as defined and listed by the CDC, or if it is ecologically sensitive, the unit was assigned to one of the applicable ecosystem classes and subclasses. In cases where a given ecosystem falls into more than one class, it is always assigned to the more sensitive class.

Within the province, species are assessed by the B.C. Conservation Data Centre. Species at risk are identified on the B.C. Red and Blue lists. Red-listed species are extirpated, endangered, or threatened. Blue-listed species are of special concern due to low declining populations and are sensitive to human activities or natural events. Nationally at-risk species are reviewed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) as Endangered, Threatened, or of Special Concern. Endangered species face imminent extinction or extirpation. Threatened species may become endangered if limiting factors are not reversed. Species of Special Concern are particularly sensitive to human activities or natural events. Endangered or

Threatened species that have been included in Schedule 1 of the Species at Risk Act are protected protection on federal lands, and the new B.C. Wildlife Amendment Act will protect their populations and habitats on provincial lands. Protection of Species at Risk and their important habitats on private lands is primarily achieved through careful land use planning and municipal bylaws.

Inventory Results

Many of the sites identified by the SEI are at high risk of conversion to other land uses or further degradation. Within the study area, 47.5% was mapped as Sensitive Ecosystems (SE) and 7.9% fell into the Other Important Ecosystems category (see Legend). The inventory results indicated that wetlands, broadleaf woodlands, antelope-brush steppe, sagebrush steppe and old forest ecosystems were extremely rare - covering less than 5% of the study area. Although areas of grasslands, coniferous woodlands, and mature forests remain, many have been altered significantly and therefore few high quality sites remain. The study found many SEIs that have been degraded by fragmentation, human use, livestock grazing, and alien species.

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Acknowledgements

Project partners include: B.C. Ministry of Environment, Environment Canada (Canadian Wildlife Service), the Allan Brooks Nature Centre, Regional District of Okanagan Similkameen, Regional District of Central Okanagan, City of Kelowna, City of Vernon, District of Lake Country, Weyhehauer Canada Ltd., District of Okanagan, City of Kelowna, and the Regional District of Okanagan Similkameen.

Financial or in-kind support for the projects was provided by: The B.C. Ministry of Environment (B.C. Conservation Data Centre), Environment Canada (Canadian Wildlife Service), the Allan Brooks Nature Centre, Regional District of Okanagan Similkameen, Regional District of Central Okanagan, City of Kelowna, City of Vernon, District of Lake Country, Weyhehauer Canada Ltd., District of Okanagan, City of Kelowna, and the Regional District of Okanagan Similkameen.

Cartography: Lisa Zedler and an Alibi (Calgary Consulting Ltd.) for the City of Kelowna, Environment Canada (Canadian Wildlife Service). Thanks to Alan Haney, Mike Savel, Kristi Vernon, Carmen Cadin, JoAnne Stacey, and Kim Everett for their assistance in developing the map key.

References

Information and access to full reports and map products for the Okanagan Valley SEI projects are available at www.env.gov.bc.ca/sei/ (Type in SEI Okanagan Valley or the project area name as a keyword).

SEI Report: Vernon, K. E., D.L. Curran, T.L. Fleming, and A.L. Haney. 2008. *Sensitive Ecosystems Inventory - Okanagan Valley*. Vernon to Osoyoos, 2009 - 2007. Methods, Ecological Descriptions, Results and Conservation Tools. Technical Report Series No. 495. Canadian Wildlife Service, Pacific and Yukon Region.

Namata: Dabell, Rod. 2006. *Namata Sensitive Ecosystems Inventory*. 1:20,000 maps.

Central Okanagan (including south slopes): Haney, A. and K. Vernon. 2009. *Conservation analysis and updated ecosystem mapping for the Central Okanagan valley*. Central Okanagan, South Slopes, Kelowna, Efton and Joe Rich project areas. Unpub. report prepared for the Okanagan Collaborative Conservation Program.

Vernon, K. and P. Erwin. 2001 and 2002. *Ecosystem Mapping of Portions of the PPH and DPH in the Central Okanagan*. Prepared for the Regional District of the Central Okanagan and the Ministry of Sustainable Resource Management. 1:20,000 maps.

South Okanagan: Vernon, K. and P. Erwin. 2001 and 2002. *Ecosystem Mapping of Portions of the PPH and DPH in the Central Okanagan*. Prepared for the Regional District of the Central Okanagan and the Ministry of Sustainable Resource Management. 1:20,000 maps.

Lake Country: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: Lake Country*. 2005. 1:20,000 maps.

TF 15: Buhaj, D. and S. Robertson. 1999. *Ecosystem Mapping of Weyhehauer Canada Ltd. Tree Farm License 15*. Prepared for Weyhehauer Canada Ltd., Okanagan Falls, in partnership with FRBC and Ministry of Forests, Kamloops, BC. 1:20,000 maps.

Vernon - Comox: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: Vernon Comox*. 2005. 1:20,000 maps.

Kelowna: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: City of Kelowna*. 1:20,000 maps.

South Okanagan: Vernon, K. and P. Erwin. 2008. *Refined and updated ecosystem mapping for the South Okanagan*. 2005. 1:20,000 maps.

Bellevue - Vernon: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: Bellevue Vernon*. 2005. 1:20,000 maps.

Kelowna: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: City of Kelowna*. 1:20,000 maps.

South Okanagan: Vernon, K. and P. Erwin. 2008. *Refined and updated ecosystem mapping for the South Okanagan*. 2005. 1:20,000 maps.

Bellevue - Vernon: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: Bellevue Vernon*. 2005. 1:20,000 maps.

Kelowna: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: City of Kelowna*. 1:20,000 maps.

South Okanagan: Vernon, K. and P. Erwin. 2008. *Refined and updated ecosystem mapping for the South Okanagan*. 2005. 1:20,000 maps.

Bellevue - Vernon: Vernon, K. and P. Erwin. 2008. *Sensitive Ecosystems Inventory: Bellevue Vernon*. 2005. 1:20,000 maps.

British Columbia Conservation Data Centre (CDC), Ecosystems Branch. B.C. Ministry of Environment. www.env.gov.bc.ca/sei/

Green Bytes Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure: www.greenbytes.ca

The Toolkit contains practical examples of bylaws provisions currently in use in B.C., including model provisions for regional governments, Official Community Plans, Development Permit Areas, Zoning, Tax Exemptions, Environmental Assessment, Stormwater Management and other regulatory tools. It includes several examples and case studies of successful green infrastructure projects and bylaws.

Climate Change: Wilson, S. and R.H. Hedden. *Mitigating and Adapting to Climate Change through the Conservation of Nature*. Available at www.landjustice.ca/climatechange/

Develop with Care: Environmental Guidelines for Urban and Rural Land Development in British Columbia. B.C. Ministry of Environment. www.env.gov.bc.ca/development/guidelines/developing_with_care_1_rto.html

Taking Nature's Pulse: The Status of Biodiversity in British Columbia. Austin, M.A., D.A. Butler, D.A. Johnston, G.E. Scudder, and V. Stevens (eds.). 2005. *Taking Nature's Pulse: The Status of Biodiversity in British Columbia*. Biodiversity BC, Victoria, BC. 288 pp. Available at www.biodiversitybc.ca

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Sensitive Ecosystems Legend

Sensitive ecosystems are fragile and/or rare, or are ecologically important because of the diversity of species they support and the ecosystem services they provide. Some at-risk wildlife and plant species are associated with Sensitive Ecosystems, and are listed below. Species at Risk are those species which are considered Endangered, Threatened or of Special Concern. Please note that many of the species listed in this map can be found in other sensitive ecosystems found throughout the Okanagan Valley.

Note: Information on Species at Risk is included in the map legend to highlight the species habitat values of the sensitive ecosystems. This map series does not include the actual mapping of species locations. For information on species location mapping see the B.C. Conservation Data Centre reference below.

Antelope-brush Steppe (AS):



Antelope-brush communities are dryland ecosystems characterized by abundant shrub dominated by antelope-brush. These communities occur in the southern portion of the Okanagan Valley, on sandy soils in the warm, dry valley bottoms. They commonly occur on sites that are very amenable to development - primarily for vineyards and housing. Overuse by domestic livestock and the introduction and spread of invasive plants threaten this ecosystem. Antelope-brush ecosystems are recognized as one of the four most endangered ecosystems in Canada. Antelope-brush Steppe ecosystems are dominated by antelope-brush and bunchgrasses. AS-adjacent and disturbed antelope-brush steppe dominated by antelope-brush and invasive alien plants (AS-adj).

Antelope Brush Steppe Ecosystems provide the following services:

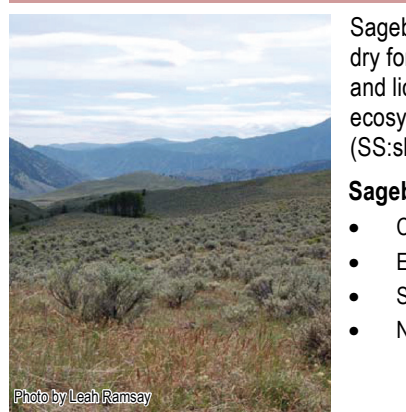
- Carbon storage
- Nutrient cycling and maintenance of productive soils
- Sediment retention
- Pollination
- Pest regulation
- Food production

Some species associated with Antelope-brush Steppe Ecosystems are:

- Great Basin Spadefoot
- Tiger Salamander
- Great Basin Gophersnake
- Racer
- Common Nighthawk
- Nuttall's Cottontail

Beaver's Haremsnake (Endangered, Special Concern) Photo by Mike Savill

Sagebrush Steppe (SS):



Sagebrush Steppe ecosystems are dryland ecosystems characterized by abundant big sagebrush. These communities occur on similar sites to grassland ecosystems, where conditions are too warm and dry for trees to establish. This ecosystem is mostly found in the southern reaches of the study area, where they are dominated by bunchgrasses with scattered forbs and a soil crust dominated by mosses and lichens. These ecosystems commonly occur on sites that are amenable to urban or agricultural development, where livestock trampling and invasive plants threaten remaining Sagebrush Steppe ecosystems. Sagebrush Steppe are pretty steppe ecosystems dominated by big sagebrush and bunchgrasses (SS-adj), steep, shallow soil sagebrush steppe (SS-adj), and disturbed sagebrush steppe dominated by big sagebrush and invasive alien plants (SS-adj).

Sagebrush Steppe Ecosystems provide the following services:

- Carbon storage
- Erosion control
- Sediment retention
- Nutrient cycling and maintenance of productive soils
- Pollination
- Pest regulation

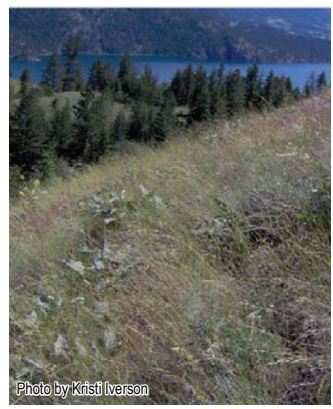
Some species associated with Sagebrush Steppe Ecosystems are:

- Great Basin Spadefoot
- Western Skink
- Western Snake
- Pacific Bat
- Peregrine Falcon
- Nuttall's Cottontail
- Half-moon Haresnake
- American Badger

Nuttall's Cottontail (Endangered, Special Concern) Photo by Steve Greenhalgh

Sage Thrasher (Endangered, Special Concern) Photo by Peter LaTourne

Grasslands (GR):



Grassland ecosystems occupy areas that are generally too hot and dry for forests to establish, and are dominated by bunchgrasses (grassland, GR-gr), steep slope grasslands (GR-st), steep, shallow grasslands (GR-sh), and disturbed grasslands dominated by invasive alien plants (GR-adj or GR-adj). Large areas of grasslands have been lost to agricultural and urban development and degraded by invasive alien plants. Most of the remaining grasslands have become wild and are considered to be Disturbed Grasslands through partial invasion by noxious weeds. Given the very limited extent of remaining grasslands, these are important sites for grassland restoration, soil conservation, and maintenance of many other grassland values, including habitat for many at-risk and endangered species.

Grassland Ecosystems provide the following services:

- Carbon storage
- Erosion control
- Nutrient cycling and maintenance of productive soils
- Pollination
- Pest regulation
- Food production

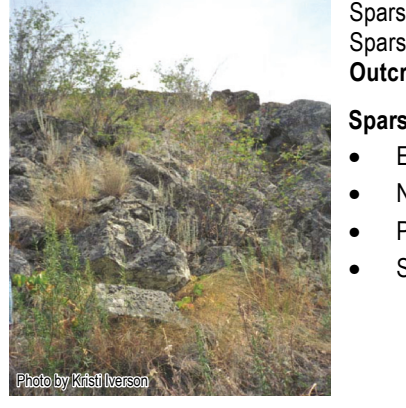
Some species associated with Grassland Ecosystems are:

- Burrowing Owl
- Shorebird
- Western Gull
- Western Skink
- Racer
- Spotted Bat
- Lemmon's Holy Fern
- Rubber Boe

Shorebird (Endangered, Special Concern) Photo by Chris Eyer

Long-billed Curlew (Endangered, Special Concern) Photo by Fred Long

Sparsely Vegetated (SV):



Sparsely vegetated ecosystems are sites where rock or talus (angular rock fragments) limits vegetation establishment; vegetation cover is discontinuous and interspersed with bedrock or blocks of rock. Sparsely vegetated ecosystems are subdivided into four sub-categories: shrub, talus, cliff, and rock outcrop ecosystems. Cliff (SV-cl), grassy or un-vegetated Rock Outcrop (SV-ro), Shrubby Rock Outcrop (SV-sh), and Talus Slope (SV-ts). Many of these ecosystems are at risk, and their coarse or shallow soils make them sensitive to disturbance and soil erosion.

Sparsely Vegetated Ecosystems provide the following services:

- Erosion control
- Nutrient cycling and maintenance of productive soils
- Pollination
- Soil formation

Some species associated with Sparsely Vegetated Ecosystems are:

- Great Basin Spadefoot
- Western Skink
- Pacific Bat
- Racer
- Spotted Bat
- Lemmon's Holy Fern
- Rubber Boe

Lemmon's Holy Fern (Endangered, Special Concern) Photo by Virginia Bolton

Pacific Bat (Endangered, Special Concern) Photo by JGGG

Old Forest (OF):



Old Forest Ecosystems are dominated by large, old trees, usually greater than 150 years of age. Most of these forests have been lost to selective logging of larger trees, ingrowth of dense trees resulting from the exclusion, and development. Only small remnants of these forests remain today. These old forests contribute to climate regulation, soil stability, moisture retention and the old trees in them provide important habitat for many species including many woodpeckers, owls, and mule deer. Old forest ecosystems include Coniferous Woodlands (OF-co) and Old Broadleaf Woodlands (OF-bw). Old forest forests are included in the Riparian category.

Old Forest Ecosystems provide the following services:

- Climate regulation
- Carbon storage
- Erosion control
- Air quality
- Sediment retention
- Pest regulation
- Food production

Some species associated with Old Forest Ecosystems are:

- Williamson's Sapsucker
- White-headed Woodpecker
- Western Toad
- Olive-sided Flycatcher
- Western Screech Owl
- American Badger
- Lewis's Woodpecker
- Lewis's Mariposa Lily
- Common Nighthawk
- Shorebird