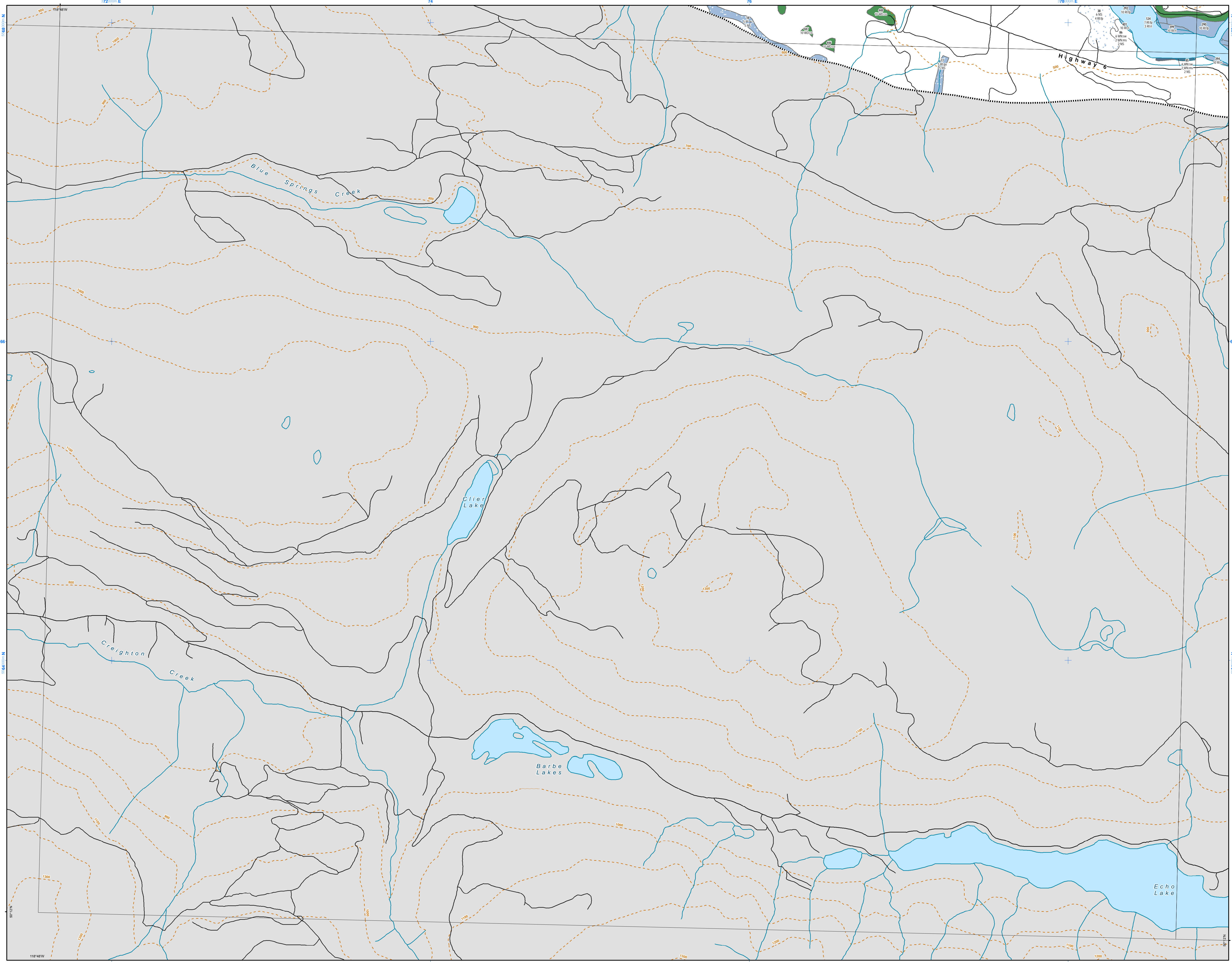




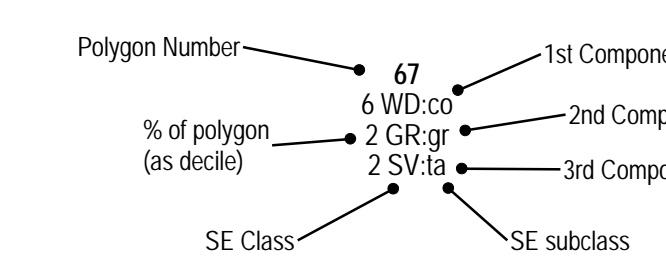
Sensitive Ecosystems Inventory: Middle Shuswap River - 2011



82L.027.1

Map Symbols
Polygon Boundary
Study Area Boundary
Roads
100m contours
Rivers
Lakes/Major Rivers
Areas Outside the Study Area

Sensitive Ecosystems (SE) Label



The example label above indicates the SE attributes mapped for polygon 64. 50% of the polygon is W/100 - Coniferous Woodland, 20% is C/50 - Sparsely Vegetated talus slope. 20% of the polygon is S/10 - Sparsely Vegetated talus slope.

Ecosystem Components

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 component.

WHAT IS A SENSITIVE ECOSYSTEM?

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

Rationale
The Middle Shuswap River valley is both ecologically and biologically diverse and is home to many at-risk species and ecological communities. Upland old forest ecosystems, once well-represented, have been eliminated from the study area.

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 ecosystems that also contribute to ecosystem services. Healthy, functioning natural ecosystems play an important role in adapting to, and mitigating the impacts of climate change.

Ecological Significance
The Middle Shuswap River valley is characterized by complex terrain including gently rounded uplands and moderately steep to steep valley sides. The Shuswap River has carved a path through a series of terraces and benches that stretch about a kilometre across the valley bottom.

The soils that support plant communities within the study area vary in thickness - the thicker soils tend to exist on gentler terrain and on lower slopes. Soils tend to become thinner on the upper slopes and where slopes are steeper. There are scattered rock outcrops throughout the study area. Soil texture varies throughout the study area where common textures include sand, sand and gravel, mixed sand, silt and gravel, and a combination of silt, fine sand and clay.

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, 27.3% was mapped as Sensitive Ecosystems (SE) and 4.8% fell into the Other Important Ecosystems category (see Legend). The inventory results indicated that wetlands, grasslands and sparsely vegetated ecosystems were extremely rare, covering just 3% of the study area. There were no old forests remaining in the study area except within riparian ecosystems. Although areas of riparian and coniferous woodlands ecosystems remain, many have been altered significantly and therefore few high quality sites remain. The study found many SEs that have been degraded by fragmentation, illegal harvesting, human use, livestock grazing, and alien species.

Study Area
The Middle Shuswap River SEI project covers a swath varying from about 200 m to over two kilometers on either side of the Shuswap River between the Wiley and Sugar Lake (Peery) dams and approximately two kilometers up Cherry, Fory, and Woodward creeks, and some areas below Wiley Dam.

The purpose of this SEI is to aid land use planning and to encourage landscape-level conservation planning. The project presents the SEI maps with a Terrain Resource Information Management (TRIM) base. The project report (see References section) details the methods used, study results, descriptions of the ecosystems, and conservation tools for management.

It is important to remember that a polygon may contain a complex mosaic of ecosystems, and sensitive ecosystems may only occupy a portion of that polygon.

Species at Risk
The large variety of ecosystems in the Middle Shuswap River valley provide for diverse habitat needs of many wildlife and plant species, including a number of at-risk animal species. Many of these species rely on the habitat values found only in the at-risk and sensitive ecosystems of the valley.

Data Limitations
The SEI information is intended to alert local and regional decision-makers to the presence of sensitive and other important ecosystems and ecological features. The SEI mapping does not replace the need for on-site assessments in areas where land use changes are proposed. The accuracy of polygon boundaries is limited by the scale (1:15,000) and date of the orthophotos (2007) used for the final mapping (i.e., change may have taken place since the photos were taken). It is recommended that digital data not be enlarged beyond the scale of the photos, as this may result in unacceptable distortion and faulty registration with other datasets. The ability to see specific disturbances (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 captured as a small component of a larger polygon that is dominated by another ecosystem.

Base Terrestrial Ecosystem Mapping
Poly Umla, P. Gea (Pinar Geosystems Ltd.) and Kristi Vernon, R.P. Bio, Iverson & MacKenzie Biological Consulting Ltd., with draft ecosystem mapping by John Grods (Makins Consulting Ltd.).

GIS
Ben Lee, Baseline Geomatics Inc., Victoria, B.C., with Arcview and Google Earth digitizing also completed by Poly Umla, Allison Haney, and Kristi Vernon.

Photographs
A number of local photographers have allowed the use of their photos for this project. Credits are provided beside each photo. See also the electronic atlas for fauna in B.C. at the following website: www.faua.bc.ca

Financial or in-kind support for the project was provided by: The Okanagan Collaborative Conservation Program, B.C. Hydro Fish and Wildlife Compensation Program Coastal (on behalf of its program partners BC Hydro, the Province of B.C., and Fisheries and Oceans Canada who work together to conserve and enhance fish and wildlife impacted by the construction of BC Hydro dams); Regional District of the North Okanagan; and the Splish First Nation.

Base Mapping Data: selected digital layers from the Terrain Resources Information Management (TRIM) Program, Base Mapping and Geomatics Services Branch, Integrated Land Management Bureau, Ministry of Forests, Lands, and Natural Resource Operations.

Species at Risk Act
For more information on Species at Risk, visit the following web sites:
• B.C. Species and Ecosystems Explorer
• www.speies.gov.bc.ca/atrisk/colombio.html
• Species at Risk Act: www.sirregistry.gc.ca
• Committee on the Status of Endangered Wildlife in Canada (COSEWIC): www.cosewic.gc.ca
• Species at Risk & Local Governments: A Primer for British Columbia: www.speciesatrisk.ca

Climate Change
Wilson, S.J., and R.H. Hebb. *Mitigating and Adapting to Climate Change Through the Conservation of Nature*. Available at: <http://www.landstrategies.ca/ccc/sectors.html>

Develop with Care
Environmental Guidelines for Urban and Rural Land Development in British Columbia, B.C. Ministry of Environment
http://www.env.gov.bc.ca/wld/documents/empd/wilw/care2006/develop_wilw_care_1910.html

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Related Publications and Links
Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure
www.eyenbylows.ca

Map by: CALSIS CONSULTING

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 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 as well as non-sensitive ecosystems found throughout the Middle Shuswap River 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.

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), low shrubs (shrubland GR-sh) and disturbed grasslands dominated by invasive alien plants (GR-ig). Given the very limited extent of grasslands, these are important sites for grassland restoration, soil conservation, and maintenance of many other grassland-associated species.

Grassland ecosystems provide the following services:
• Carbon storage
• Nutrient cycling and maintenance of productive soils
• Pollination
• Pest regulation
• Food production
• Erosion control
• Sediment retention
• Nutrient cycling and maintenance of productive soils

Some at-risk species associated with Grassland ecosystems are:
• Western Skink
• Northern Rubber Boa
• American Badger
• Lewis's Woodpecker
• Common Nighthawk

Some at-risk species associated with Grassland ecosystems are:
• American Badger
• Lewis's Woodpecker
• Common Nighthawk

Sparsely Vegetated (SV):



Sparsely vegetated ecosystems are sites where rock (angular rock fragments) limits vegetation establishment, vegetation cover is discontinuous and interspersed with boulders or blocks of rock. Sparsely vegetated ecosystems are subdivided into Talus Slope (SV-ts) and Rock Outcrop (SV-ro) ecosystems. The coarse or shallow soils of these ecosystems make them sparsely to disturbed and soil erosion.

Sparsely vegetated ecosystems provide the following services:
• Erosion control
• Nutrient cycling and maintenance of productive soils
• Pollination
• Soil formation

Some at-risk species associated with Sparsely Vegetated ecosystems are:
• Northern Rubber Boa
• Western Skink

Some at-risk species associated with Sparsely Vegetated ecosystems are:
• Northern Rubber Boa
• Western Skink

Coniferous Woodlands (WD):



Coniferous Woodlands are open stands of Douglas fir, sometimes with ponderosa pine (WD-co), often on shallow soils, with grass and shrub-dominated understoreys. They most commonly occur on steep warm slopes and on rocky knolls with very shallow soils. Numerous sites have been altered by forest harvesting, removal of trees associated with fire exclusion, domestic livestock grazing, and other human disturbances.

Coniferous woodland ecosystems provide the following services:
• Climate regulation
• Air quality
• Erosion control
• Sediment retention
• Carbon storage
• Pest regulation
• Nutrient cycling and maintenance of productive soils

Some at-risk species associated with Coniferous Woodland ecosystems are:
• Northern Rubber Boa
• Olive-sided Flycatcher
• Lewis's Woodpecker
• Flammulated Owl
• Common Nighthawk

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• Northern Rubber Boa
• Olive-sided Flycatcher
• Lewis's Woodpecker
• Flammulated Owl
• Common Nighthawk

Riparian (RI):



Riparian ecosystems are rivers, streambeds, diverse and gully ecosystems or sites with significant seepage; includes ecosystems on floodplains and benches along creeks and rivers (bench, RI-b), ecosystems in gullies, often with creeks (gully, RI-g), fringe ecosystems associated with significant seepage (fringe, RI-f), and the river bed of large systems (river, RI-r). These sites frequently form natural corridors through the landscape, connecting other ecosystems and providing passages for animals. Damming and diversions have seriously affected many riparian ecosystems.

Riparian ecosystems provide the following services:
• Fresh water
• Flood control
• Drought recovery
• Storm protection
• Drainage and natural irrigation
• Nutrient cycling and maintenance of productive soils

Some at-risk species associated with Riparian ecosystems are:
• Western Toad
• Flood control
• Nutrient and nitrogen deposition
• Pollination
• Food production

Some at-risk species associated with Riparian ecosystems are:
• Western Toad
• Western Painted Turtle
• Lewis's Woodpecker
• Grizzly Bear
• Mountain Caribou (Historically)

Wetlands (WN):



Wetland ecosystems occur on sites where the water table is at, near, or above the soil surface for a sufficient period of time to influence soil and vegetation development; includes marshes (WN-m) and shallow open water (WN-w) ecosystems. They are typically associated with old back channels of the Shuswap River. They are extremely important because of their natural (or historic) area and their critically important ecosystem services they provide.

Wetland ecosystems provide the following services:
• Drought recovery
• Flood control
• Storm protection
• Drainage and natural irrigation
• Fresh water
• Filtration and pollution control
• Nutrient cycling and maintenance of productive soils

Some at-risk species associated with Wetland ecosystems are:
• Western Toad
• Western Painted Turtle

Some at-risk species associated with Wetland ecosystems are:
• Western Toad
• Western Painted Turtle

Other Important Ecosystems

Seasonally Flooded Agricultural Fields (FS):



Seasonally Flooded Agricultural Fields ecosystems are cultivated fields that flood most years, providing important migration and wintering habitat for birds. They provide important habitat for amphibians, waterfowl and other bird species, small mammals, and many types of predators. They are located along low-lying areas or floodplains that have been tilled and planted. In some cases, these areas could be restored to Wetland or Riparian ecosystems if a flood regime and vegetation are re-established.

Seasonally Flooded Agricultural Fields provide the following services:
• Flood control
• Drought recovery
• Storm protection
• Drainage and natural irrigation
• Fresh water

Some at-risk species associated with Seasonally Flooded Agricultural Fields are:
• Western Toad
• Barn Swallow
• Common Nighthawk
• American Badger

Some at-risk species associated with Seasonally Flooded Agricultural Fields are:
• Western Toad
• Barn Swallow
• Common Nighthawk
• American Badger

Mature Forest (MF):



Mature Forest ecosystems are dominated by mature trees, including coniferous (BF-co) forests and mixed BF and deciduous and coniferous forests; however it excludes mature riparian forests, and mature coniferous woodlands. Mature Forests are important buffers to sensitive ecosystems. They provide recruitment for Old-Forest ecosystems which have been eliminated from the upland portion of the study area. Mature forest ecosystems have many important structural attributes, including some remaining large, old trees.

Mature Forest ecosystems provide the following services:
• Climate regulation
• Carbon storage
• Air quality
• Erosion control
• Sediment retention
• Nutrient cycling and maintenance of productive soils

Some at-risk species associated with Mature Forest ecosystems are:
• Flood control
• Pest regulation
• Pollination
• Food production

Some at-risk species associated with Mature Forest ecosystems are:
• Olive-sided Flycatcher
• Western Woodpecker
• Flammulated Owl
• Grizzly Bear
• Wolverine
• Mountain Caribou (Historically, in old-growth)

Some at-risk species associated with Mature Forest ecosystems are:
• Flammulated Owl
• Olive-sided Flycatcher
• Western Woodpecker
• Flammulated Owl
• Grizzly Bear
• Wolverine
• Mountain Caribou (Historically, in old-growth)

Non-sensitive Landscapes (NS): (Areas not mapped as sensitive or other important ecosystems are depicted in white)

Non-sensitive Landscapes are modified areas not occupied by sensitive or other important ecosystems. They include disturbed natural landscapes, agricultural areas and young forests. Disturbed natural areas can be interspersed with dense, farmland and native vegetation, or cultivated crops. Young forests have an age range between 0 and 80 years. Non-sensitive landscapes are shown in white in the areas that are not designated by a sensitive ecosystem. In addition, many sensitive ecosystem polygons, close to urban or disturbed areas, may have a modified landscape interspersed with the sensitive ecosystem(s). In such cases, the sensitive ecosystem(s) are depicted in the same colour as the non-sensitive landscape.

