REGIONAL DISTRICT OF THE OKANAGAN SIMILKAMEEN
ENVIRONMENTALLY SENSITIVE DEVELOPMENT PERMIT AREAS UPDATE:
PARCEL EXEMPTION REVIEW

Report for:

Regional District of the Okanagan Similkameen

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1 INTRODUCTION

The South Okanagan-Similkameen is recognized as a region that combines a wide range of natural habitat areas with a large number of unique species, many of which are not found elsewhere in the province or in Canada. The area is also home to the largest number of endangered and threatened species of plants and animals in BC and Canada (RDOS 2015).

Environmentally Sensitive Development Permit (ESDP) Areas are areas of land that have been designated under Section 919.1(a) of the *Local Government Act* for the purpose of protecting the natural environment, its ecosystems and biological diversity. Shortly after the Regional District of the Okanagan-Similkameen (RDOS) designated its first ESDP Area in 1997, the Regional District Board introduced a number of broad ESDP exemptions for residential development. As a result, only a small number (26) of ESDPs have since been issued, despite the Board's objective of minimizing the impact of development on the natural environment (RDOS 2015).

In 2013, the Regional District of the Okanagan-Similkameen (RDOS) resolved to accept *Keeping Nature in our Future: A Biodiversity Conservation Strategy for the South Okanagan-Similkameen,* prepared by the South Okanagan Similkameen Conservation Program (SOSCP 2012), as a guiding document for the RDOS and the amendment of Official Community Plans (RDOS 2015). The RDOS is now updating ESDP Areas mapping to reflect the conservation ranking maps from the Biodiversity Conservation Strategy, which are based on 2009 Terrestrial Ecosystem Mapping (TEM) for the region, and show the relative importance and sensitivity of its various ecosystems[1].

During the public review of the proposed new ESDP areas, however, several landowners made inquiries about their properties being included. This report addresses these inquiries by:

1) Providing an overview of the ecosystem mapping process used to derive the ESDP areas;
2) Presenting a discussion around the scales and levels of detail used for ESDP mapping versus environmental impact assessment; and
3) Examining the ESDP mapping in relation to concerns expressed by landowners in the review process.

The methodology involved a desktop review of existing information and some site visits[2] for a sample of five properties lying wholly or partly within the proposed ESDP area.

[1] See: http://www.soscp.org/wp-content/uploads/2012/11/Conservation-Ranking.pdf.
[2] Site visits were conducted from adjacent public land. The reviewer did not access private property.

2 ECOSYSTEM MAPPING, CONSERVATION RANKING & ESDP MAPPING

From 1991-1994, ecosystems of the south Okanagan and lower Similkameen Valleys were identified and delineated on 1:15,000 aerial photographs using a biophysical habitat mapping approach (Lea et al. 1991; Harper et al. 1996). This approach served as the groundwork for current ecosystem mapping methodology, which involves a series of steps whereby lines are drawn on air photos around areas containing similar climate, terrain, soils, and resulting vegetation communities. First, a geologist uses a stereoscope to examine a pair of air photos in 3D, and delineates polygons by terrain characteristics such as slope and aspect, and interprets soil characteristics including depth and texture. A vegetation ecologist then uses site and vegetation characteristics on the air photos to identify the ecosystems present and refine the mapping, if necessary. Field work is done to verify the draft mapping, and to gather additional information on the current condition of ecosystems in an area (e.g., prevalence of weeds, selective logging). Field checks vary from detailed full plots with complete soil pits, to road-side visual inspections. Typically 10 to 20% of polygons are field checked. The delineated polygons are then transferred from the air photos and digitized at a scale of 1:20,000.

Wherever possible, ecosystem polygons contain only one type of ecosystem. However, ecosystems may occur as patches that are too small to delineate individually, or as a mosaics of two or three habitat types, making them difficult to separate into distinct polygons. Therefore, ecosystem polygons may contain up to three different (but sometimes similar) ecosystems.

The original ecosystem mapping was updated in 2006 (Iverson & Haney 2006) to bring it up to Provincial Terrestrial Ecosystem Mapping (TEM) standards (RIC 1998, 2000a, 2000b; Ministry of Environment Ecosystems Branch 2006). Further refinements were carried out in 2009 to make the mapping more useful for land management decision-making (Iverson & Haney 2010). These included the following refinements specifically requested by the RDOS: divide sensitive from non-sensitive areas where possible; delineate wetland and riparian areas as separate polygons (where possible) and map continuous riparian corridors; and delineate areas of new development. Since then, updates to the ecosystem mapping have been ongoing, in order to maintain and continuously improve its accuracy (e.g., by incorporating recent development and correcting any previous errors). The most recent version of the updated mapping was posted online in 2012[3]. **Appendix 1** contains a complete list and descriptions of ecosystem units found in the RDOS**,** and **Appendix 2** contains an explanation of symbols used for the ecosystem mapping labels.

The Biodiversity Conservation Strategy used the most recent ecosystem mapping available at the time[4] to develop conservation ranking maps for the region. Conservation ranks were based on local sensitive ecosystem priorities (including regional rarity and habitat values to wildlife) as well as priorities from the provincial Conservation Framework (BC Ministry of Environment 2009). Global and provincial risk status[5] are key criteria used by the Conservation Framework for prioritizing species and ecosystems for conservation. The other priority criteria used by the Conservation Framework are trends, threats, feasibility of recovery and stewardship responsibility (BC Ministry of Environment 2009).

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[3] http://a100.gov.bc.ca/pub/acat/public/viewReport.do?reportId=29144.

[4] Conservation Rank maps were completed just prior to the 2012 sensitive ecosystems update report, but included **most** of the revisions that the sensitive ecosystems update provided.

[5] Species or ecosystems with risk status are those considered in danger of becoming extinct, extirpated, endangered or threatened, or those of special concern because of their sensitivity to human activity or natural events.

Four conservation ranking classes were used in the maps: Very High, High, Moderate, and Low (see **Appendix 3** for details on the methodology). **Table 1** shows the conservation rankings of different ecosystem types found in the RDOS. Because polygons may contain up to three ecosystems, each with a different conservation ranking, the polygons were given a weighted average based on the proportion of the polygon that each ecosystem comprised.

Table 1. Conservation rankings of different ecosystem types found in the RDOS.

Conservation Ranking	**Ecosystem types**
Very High	Wetlands; riparian; broadleaf woodlands (aspen copses); antelope-brush steppe in any condition; grassland and sagebrush steppe in good condition; old forest; low elevation and warm aspect rugged rock/cliff.
High	Disturbed grassland and sagebrush steppe; coniferous woodland (open Ponderosa pine forest/parkland); mature forest (closed, moister forest types); mid-elevation rock/cliff and higher elevation warm aspect rock/cliff, or low elevation rock outcrops of low relief and fracturing; seasonally flooded fields (generally hayfields and other areas that used to contain wetlands but have been filled/drained)
Moderate	Remainder of relatively natural habitats - higher elevation coniferous woodland (open Ponderosa pine forest); young forest (closed, mesic/moist types, including cut blocks and second growth); higher elevation cool aspect cliffs, and mid-elevation non-rugged rock outcrops; agricultural and rural areas; golf courses; gravel pits, cut banks, mines, etc
Low	Urban areas and road surface. Little or no value, and large areas may pose barriers to wildlife movement

Terrestrial ecosystem mapping (TEM) and associated sensitive ecosystem inventory was not completed for some of the higher elevation areas of the RDOS, however. Conservation ranks for these areas are based instead on Vegetation Resources Inventory (VRI) mapping (previously known as forest cover mapping). This mapping is completed at the same scale as TEM, but is more focused on forest type and age, and generally provides fewer details about non-forested ecosystems (e.g., various types of wetlands). For areas mapped with VRI, the Biodiversity Conservation Strategy applied a conservation ranking methodology similar to that used for areas mapped with TEM. Very High conservation ranking includes wetland, riparian, old forest, and warm aspect talus or rock outcrop. High conservation ranking includes mature forest, open woodland, and cool aspect talus or rock outcrop.

These ranking maps were then used by the RDOS to develop updated ESDP area maps. The ESDP areas comprise privately held lands not in the Agricultural Land Reserve (ALR) that have been classified as having “High” and “Very High” ecological sensitivity (i.e. conservation rank) by the Biodiversity Conservation Strategy.

Under the Okanagan Electoral Area OCP Bylaws, land identified as environmentally sensitive shall be retained in its natural state or developed according to guidelines which require the preparation of an Environmental Impact Assessment report by a Qualified Environmental Professional (QEP). The report will be referred to the Province, the Department of Fisheries and Oceans and/or the Technical Environmental Advisory Committee of the Regional Board. An EIA Report may be considered if any of the following are proposed within the ESDP Area:

- redesignating land to a higher density of use than currently permitted,

- subdivision of land,
- development of land.

Hence, the ESDP mapping is a useful tool for flagging lands that are likely to contain environmentally sensitive ecosystems. The presence of sensitive ecosystems can be confirmed on a site-by-site basis by Environmental Impact Assessment (EIA). The EIA allows the ecosystems on the property to be examined and delineated at a finer scale (e.g. 1:5,000) than the ecosystem mapping (1:20,000) upon which the ESDP mapping is based.

3 ESDP VS. EIA MAPPING

Common scales of ecological mapping are 1:20,000 or 1:50,000, as their purpose is mainly to provide a landscape-level perspective of a fairly large region. Finer resolution scales (e.g., 1:5,000) are typically reserved for localized planning, and are usually deemed impractical for mapping and planning at the regional level due to the extra time and cost required to delineate, digitize and enter data for a much larger number of polygons. In addition, very complex maps viewed at a regional scale can be hard to comprehend, as it becomes difficult to interpret the information and distinguish patterns in the mapping when polygons are too small and numerous and there is too much detail.

The ecosystem mapping upon which the ESDPs are based was mapped at a scale of 1:20,000 (see **Figure 1** for an example), meaning that one millimetre on the map represents 20,000 mm (or 20 metres) on the ground. At this scale, small or narrow patches of sensitive ecosystems usually cannot be delineated separately. Two hectares is the minimum polygon size allowed under provincial TEM standards, meaning features smaller than this cannot be mapped as individual polygons (RIC 2000b). Because the RDOS' ESDP mapping is a regional-level planning tool, it was developed at a scale of 1:20,000 as per the provincial TEM standard. However, because the RDOS desired finer detail, some sensitive ecosystems were delineated further whenever possible, particularly wetlands and riparian corridors (Iverson and Haney 2009).

The purpose of the ESDP mapping is to identify areas that *contain* sensitive ecosystems, rather than to portray *precisely* where these ecosystems are located within the ESDP (i.e., if the ecosystem polygon contains more than one ecosystem).

Because Environmental Impact Assessments (EIAs) typically focus on localized developments on individual parcels of land, they generally map natural features at a much finer scale (e.g. 1:5,000), so much smaller features can be identified and mapped[6] (e.g. **Figure 2**). A comparison of a map drawn at this scale, with the features on the ground, the qualified professional notes differences and refines assessment mapping to reflect that closer investigation.

The main purpose of an EIA is to direct development away from any sensitive areas. An EIA provides additional details and more precise locations of sensitive areas and features on the property, and recommendations on how to best protect them. If an EIA is done correctly, sensitive features would still remain even after development. Therefore, the ESDP designation would remain relevant for the parcel. If an EIA determines that no sensitive areas are present anywhere on the property, however, then the ESDP designation should be changed.

[6] For example, at the 1:5,000 scale (e.g. **Figure 2**), features as small as 0.125 ha can be mapped according to the provincial TEM standard (RIC 2000b).

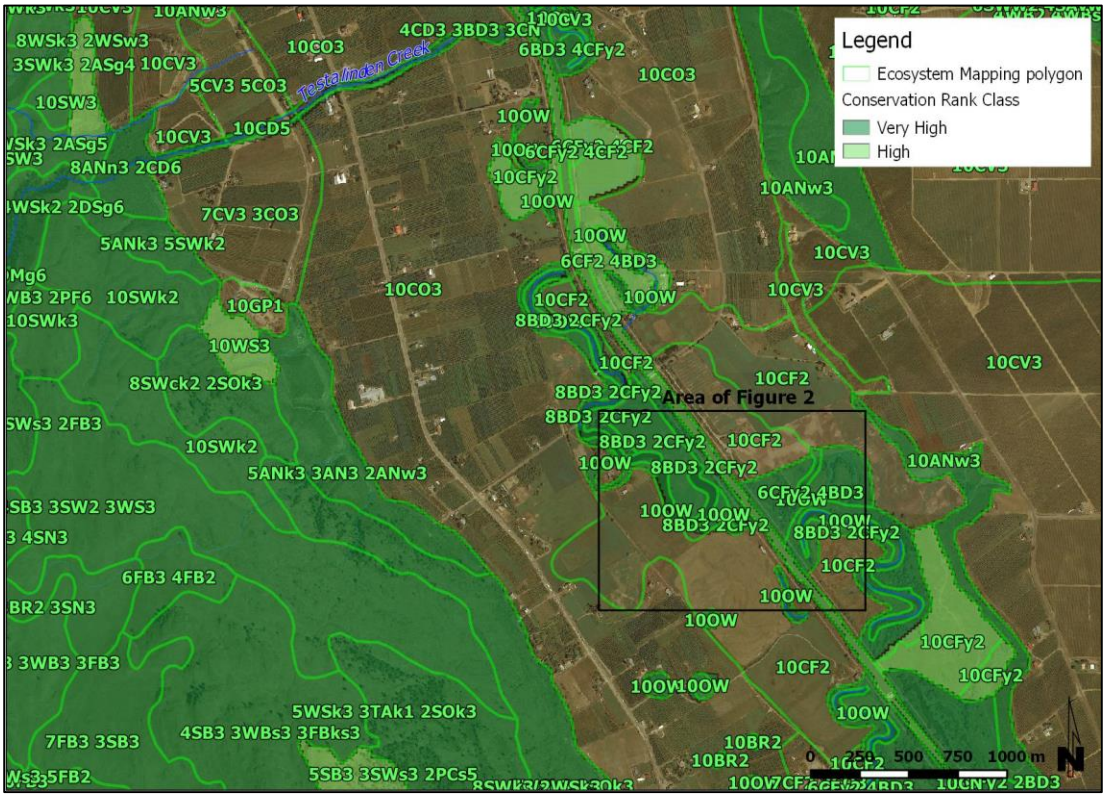

Figure 1. Ecosystem mapping shown at 1:20,000 scale, typically used for TEM and ESDP mapping.

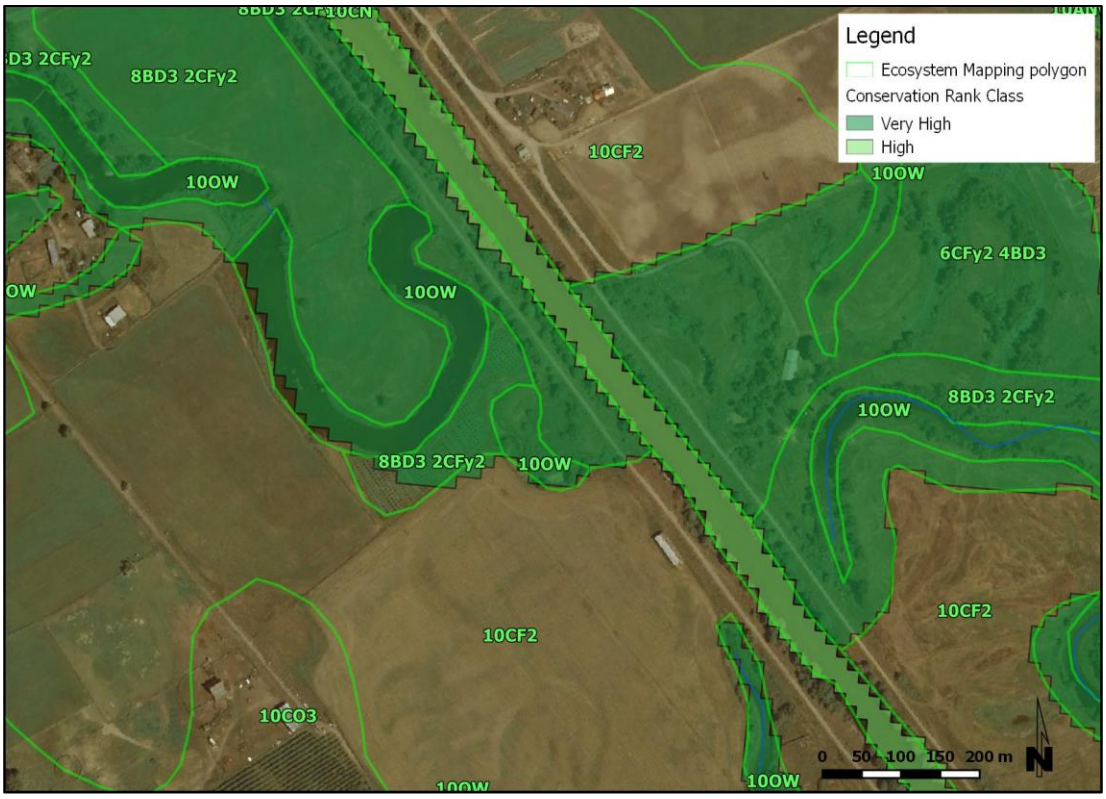

Figure 2. Ecosystem mapping shown at 1:5,000 scale, often used for Environmental Impact Assessments.

4 EXEMPTION REPORTS

4.1 Property #1

Location: Lot 2 Plan EPP47704 SDYD District Lot 2450S 3460S, Osoyoos, Electoral Area "A"
PID: 029-671-337

Assessment:

The property[7] and its conservation ranking as per the proposed ESDP mapping are shown in **Figure 3;** all of the subject property falls within the ESDP area (shaded green). The ecosystem units mapped for the property are described with their provincial conservation status in **Table 2.**

The owners commissioned an Environmental Impact Assessment (EIA) for this property in 2013 (Makonis Consulting 2013)[8], which they understood had identified no sensitive areas and therefore justified the removal of ESDP requirements.

The EIA describes three sensitive ecosystems[9]:

- CD – Cottonwood community, along lakeshore
- PR – Ponderosa pine / Cottonwood – Nootka rose – Poison ivy, on the slopes above the orchard
- SW – Big sage – Bluebunch wheatgrass, occurring as a small pocket at the west end of the property.

Disturbance is prevalent in much of the area containing sensitive ecosystems, particularly evidenced by the presence of Siberian elm and hound's tongue, and the absence of mature cottonwood[10]. However, the EIA assigned Environmentally Sensitive Area[11] categories of ESA1 (High value) to the cottonwood community along the lakeshore, and ESA 2 (Moderate value) to the sagebrush (SW) and pine- rose (PR) communities at each end, where they are less disturbed.

The presence of CD was confirmed by field checks of the property in 2016 (see **Figures 4** to **7**). Given that sensitive (albeit disturbed) ecosystem units with Very High and High conservation rankings have been confirmed on the property, it should **remain within the ESDP area.**

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[7] This property was originally two parcels (024-814-393 and 024-814-407). The eastern parcel was removed from ALR a few years ago. The western parcel was subdivided, and its lakeshore portion merged with eastern parcel. It was also recently removed from ALR, despite an existing orchard, indicating the owner may be interested in developing. Had the property remained in ALR it would not have been designated an ESDP area.

[8] Makonis Consulting (2013). *8902 168th Avenue: Terrestrial Environmental Assessment.* Makonis Consulting Ltd: Kelowna, BC.

[9] All three are Red-listed, meaning provincially extirpated, threatened or endangered.

[10] Although the EIA report mentions some mature cottonwood, none was observed during the site visit for the ESDP review (from the lakeshore, or from the road above the property or at the property's northwest end)

[11] ESA values range between 1 (high) and 4 (low), and are tied to the Sensitive Ecosystem Inventory rankings, communities listed by the Conservation Data Centre, and overall habitat position, condition and species value (Makonis 2013).

Summary:

PID	Assessment	Recommendation
029-671-337	Three sensitive ecosystems with very high and high conservation ranking confirmed on property: Cottonwood (CD); Ponderosa Pine – Nootka Rose – Poison Ivy (PR); and Sagebrush - Wheatgrass (ASg/SW)	Remain in ESDPA

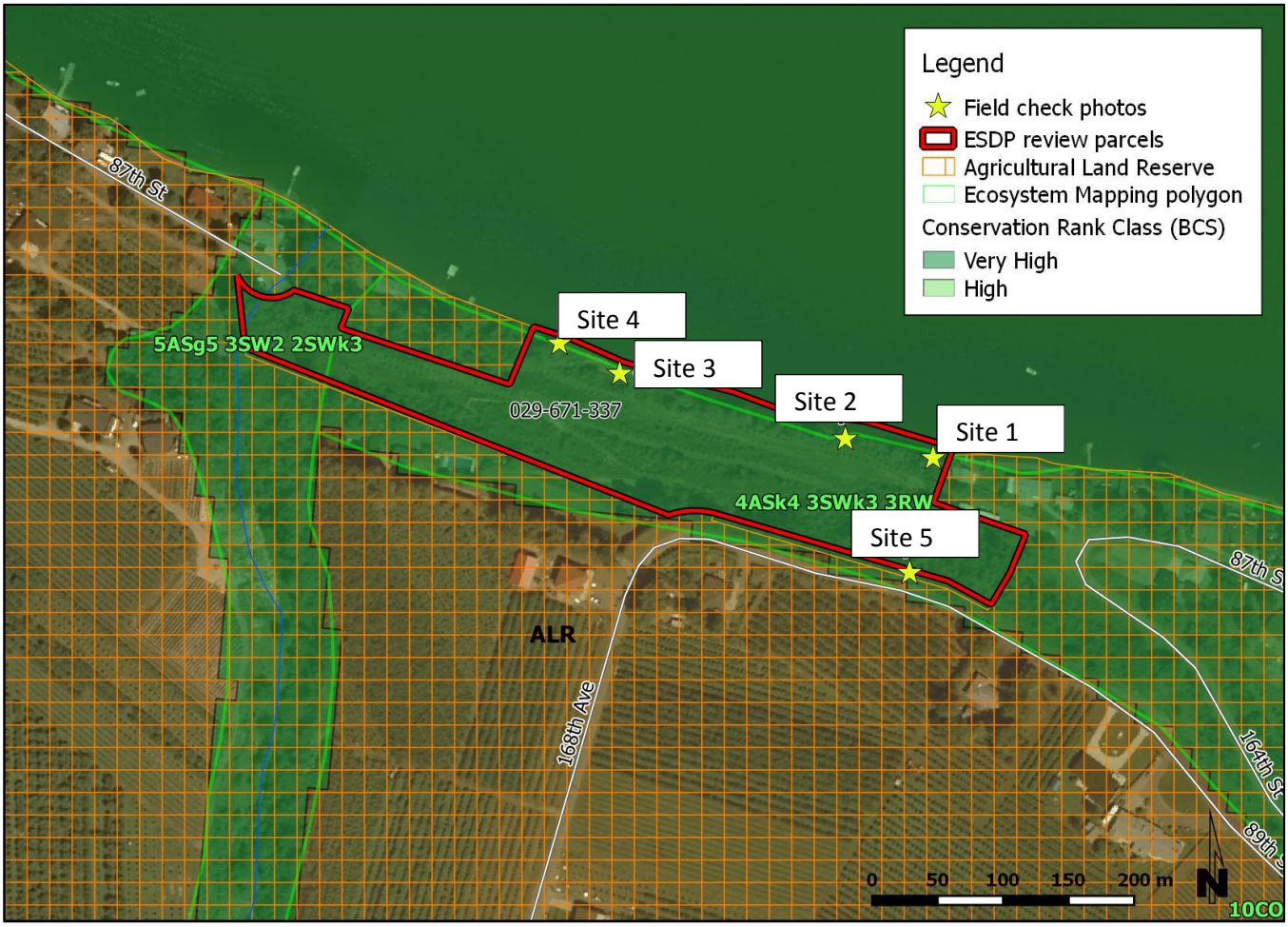

Figure 3. Map of Property #1, with conservation ranking, ecosystem mapping polygons, and field check photo locations indicated. The ESDP area is indicated by green shading.

Table 2. Descriptions of ecosystem units found on subject property, and their provincial conservation status.

Code	Name	Description & Mapping Notes	Provincial Conservation Status[12]
Non-vegetated, Sparsely Vegetated, and Anthropogenic Units common to all subzones			
CO	Cultivated Orchard	An agricultural area with fruit trees.	N/a
RW	Rural	An area where residences are scattered and intermingled with native vegetation or agricultural areas. Most areas mapped as rural were only mapped based on the remaining native vegetation in the biophysical mapping.	N/a
BGxh1: Bunchgrass Biogeoclimatic Zone (very hot dry subzone)			
AS[13]	Aspen – common snowberry	Moist gullies (ASg) and floodplains (ASa) with trembling aspen and a shrubby understory. Occurs on morainal materials. Non-standard unit retained from biophysical mapping. Similar to AS unit described for IDFxh1. Assumed modifiers: d, j, m	Red
CD	Cottonwood - Water birch	Active floodplain, coarse-textured fluvial soils. Cottonwood overstory with a shrubby understory.	Red
PR	Py – Nootka rose – Poison ivy	Moist ponderosa pine forests on morainal materials with some aspen or cottonwood and variable shrubby understories. Can occur in gullies (PRg) and on moist fans (PRn). Assumed modifiers: c, d, j	Red
SW	Big sagebrush – Bluebunch wheatgrass	Zonal and near zonal sites. Materials are typically morainal or medium-textured glacioufluvial (sandy loam) and often have an aeolian cap on them. Vegetation is a mixture of bunchgrasses with forbs and with big sagebrush (structural stage 3) or without big sagebrush (structural stage 2). Sites with coarse-textured soils tend to have less overall sand content than AN sites or sands are much finer; on such sites some 'AN' biophysical map units were re-interpreted as 'SW'. Assumed modifiers: d, j, m	Red

[12] Red-listed ecosystems are provincially threatened or endangered. Blue-listed ecosystems are provincially of Special Concern.
[13] Note that the EIA (Makonis 2013) and 2016 field checks show that the Aspen - Snowberry (AS) riparian area mapped along the foreshore is actually Cottonwood - Dogwood (CD) riparian. The abundance of Siberian elm, which resembles aspen on air phots, likely contributed to this inaccuracy.

Figure 4. Field check photo site #1 for the property, showing the cottonwood community along the lakeshore with young cottonwood and Siberian elm.

Figure 5. Field check photo site #2 for the property, showing cottonwood community with high disturbance.

Figure 6. Field check photo site #3 for the property, showing a culvert outflow in the cottonwood community.

Figure 7. Field check photo site #4 for the property, showing the pine/cottonwood – rose – poison ivy

4.2 Property #2

Location: Reflection Point, Electoral Area "A"
PID: 026-579-201 / 024-108-561 / 024-107-867 / 026-579-219

Assessment

The property and its conservation ranking as per the proposed ESDP mapping are shown in **Figure 8**; the upland part the subject property falls within the ESDP area (shaded green). The ecosystem units mapped for the property are described with their provincial conservation status in **Table 3.** Prior to 2009, all four parcels occurred within a single ecosystem polygon. During the 2009 ecosystem mapping update, this ecosystem polygon was split into two, with one polygon containing the lakeshore area and the other containing the cleared area (exposed soil). However, during data entry an error was made: the information was reversed and assigned to the wrong polygon.

Consequently, although PIDs 026-579-201 and 026-579-219 contain a Cottonwood - Dogwood riparian ecosystem (CD) along the lakeshore (**Figures 10 to 12**), the ecosystem polygon along the lakeshore was erroneously mapped as Exposed Soil (ES) in 2009. Conversely, despite being cleared (**Figure 8**), the ecosystem polygon intersecting PIDs 024-108-561 and 024-107-867 was erroneously mapped as cottonwood instead of Exposed Soil (ES). The ecosystem mapping (TEM) was rectified to correct this error in 2012[14] (**Figure 9**).

Hence, the ESDPA mapping should be updated to reflect the revised polygons in the 2012 ecosystem mapping, such that **the polygon labelled as CD in the 2012 ecosystem mapping is added to the ESDPA, and the polygon labelled as ES in the 2012 mapping is removed from the ESDPA.**

Summary

PID	Assessment	Recommendation
026-579-201 026-579-219	Cottonwood riparian ecosystem (CD) along the lakeshore erroneously mapped as Exposed Soil (ES)	Add polygon to ESDPA
024-108-561 024-107-867	Cleared area erroneously mapped as Cottonwood (CD) instead of Exposed Soil (ES)	Remove polygon from ESDPA

[14] This was *after* the conservation ranking maps, on which the ESDP mapping is based, had been produced.

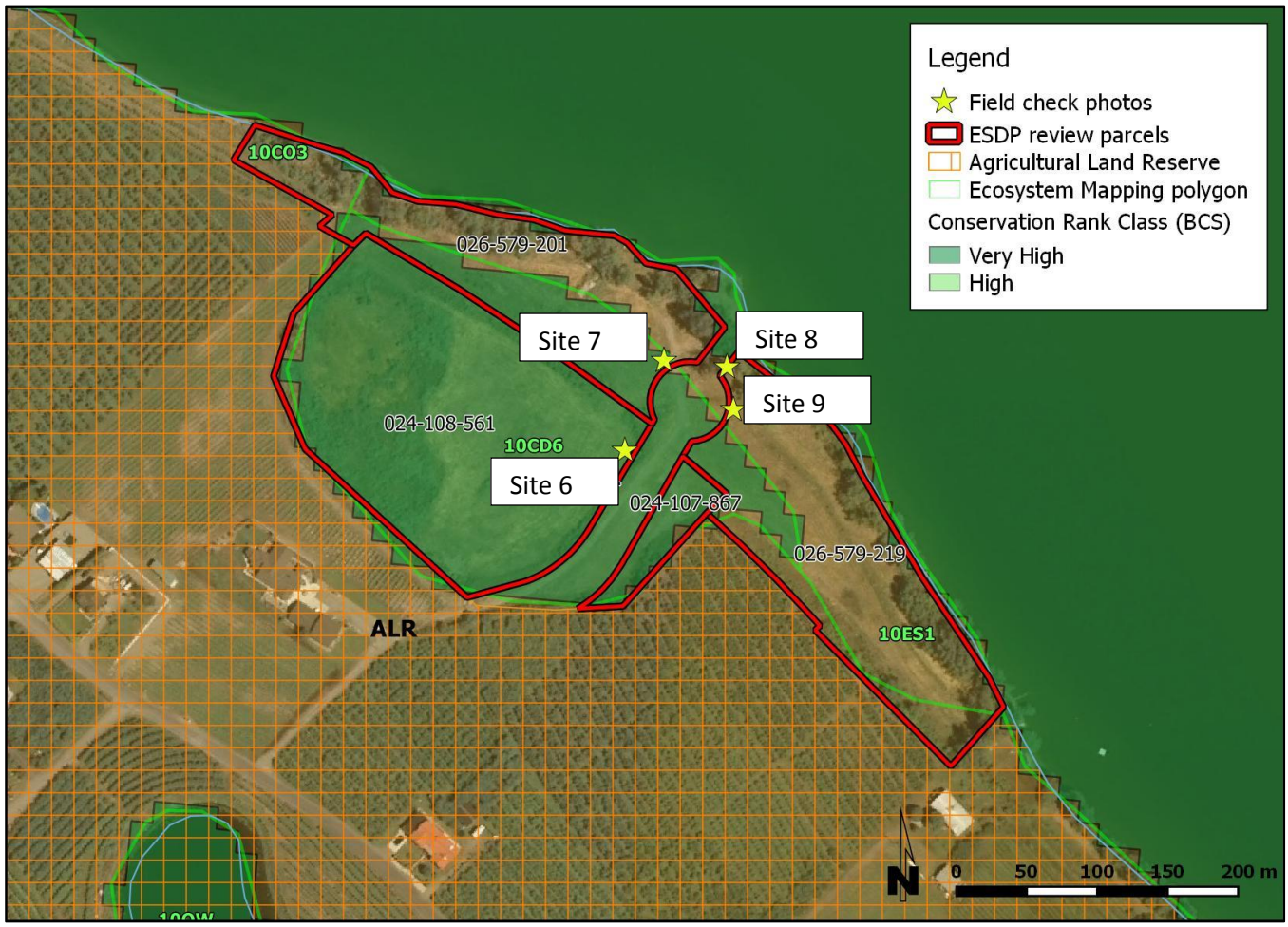

Figure 8. Map of property, with conservation ranking, 2009 ecosystem mapping polygons, and field check photo locations indicated. The ESDP area is indicated by green shading.

Table 3. Descriptions of ecosystem units found on subject property, and their conservation rankings.

Code	Name	Description & Mapping Notes	Provincial Conservation Status[15]
Non-vegetated, Sparsely Vegetated, and Anthropogenic Units common to all subzones			
CO	Cultivated Orchard	An agricultural area with fruit trees.	N/a
ES	Exposed soil	Areas of exposed soil with no vegetation. May be caused by natural erosion or human causes. Can occur on cool (ESk) or warm (ESw) aspects.	N/a
BGxh1: Bunchgrass Biogeoclimatic Zone (very hot dry subzone)			
CD	Cottonwood - Water birch	Active floodplain, coarse-textured fluvial soils. Cottonwood overstory with a shrubby understory.	Red

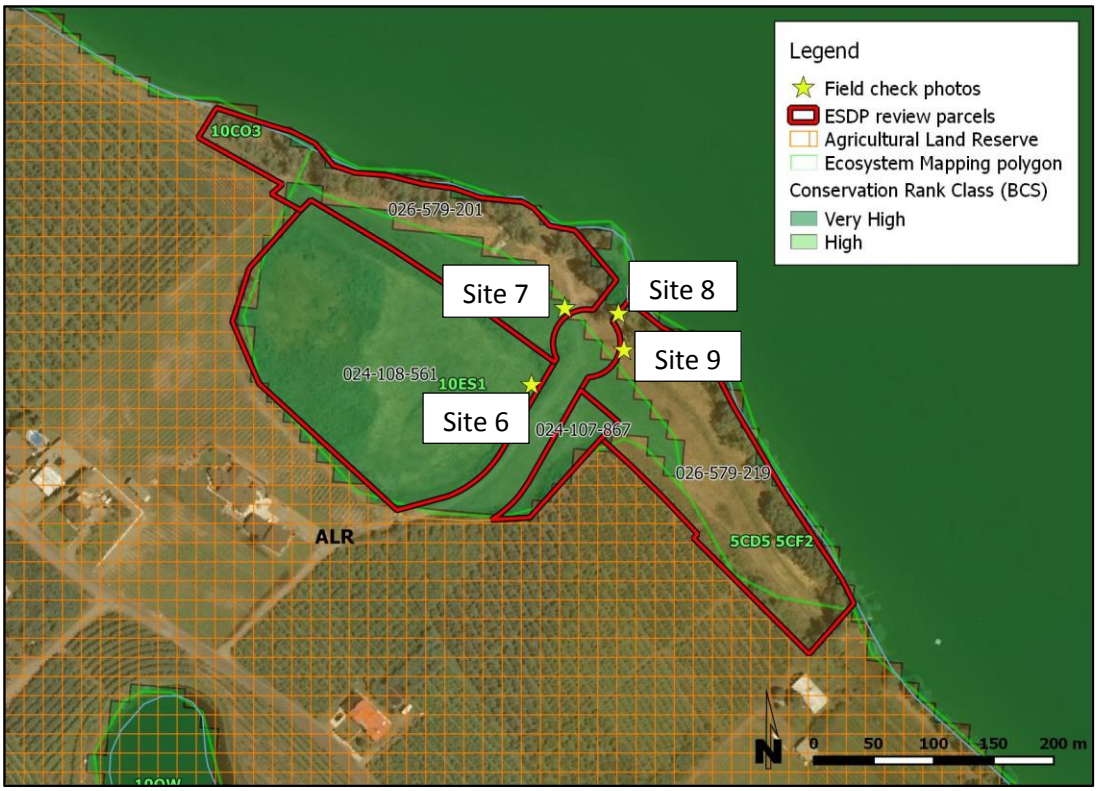

Figure 9. Map of property #2, showing the updated 2012 ecosystem mapping polygons16.

[15] Red-listed ecosystems are provincially threatened or endangered. Blue-listed ecosystems are provincially of Special Concern.
[16] Note that part of the cottonwood riparian ecosystem was cultivated after 2009; hence the updated 2012 ecosystem mapping now shows only 50% of this polygon being comprised Cottonwood – Dogwood (CD), with the other 50% being Cultivated Field (CF).

Figure 10. Field check photo site #6 for the property, showing area which should be mapped as exposed soil (ES), rather than cottonwood (CD), and therefore be removed from the ESDP.

Figure 11. Field check photo site #7 for the property (looking NE), showing riparian strip along the lakeshore that was mapped as exposed soil (ES) rather than cottonwood (CD), and should therefore be added to the ESDP.

Figure 12. Field check photo site #8 for the property (looking NE), showing riparian strip along the lakeshore that was mapped as exposed soil (ES) rather than cottonwood (CD), and should therefore be added to the ESDP.

Figure 13. Field check photo site #9 for the property (looking SE), showing riparian strip along the lakeshore that was mapped as exposed soil (ES) rather than cottonwood (CD), and should therefore be added to the ESDP.

4.3 Property # 3

Location: 226 Apex Mountain Road, Electoral Area "D-1"
PID: 010-397-035

Assessment:

The property and its conservation ranking as per the proposed ESDP mapping are shown in **Figure 14;** all of the subject property falls within the ESDP area (shaded green). No current / previous ESDPs are present in this area, as it is located above the elevation where the terrestrial ecosystem mapping (TEM) was completed. As such, the ESDP mapping for this area is based instead on Vegetation Resources Inventory (VRI) mapping (previously known as forest cover mapping; see **Section 2**).

Examination of satellite imagery reveals that the High ranked areas within this parcel appear to be mature forest (which is valuable to owls, woodpeckers and other cavity-nesters) and the Very High ranked areas contain warm aspect rock (which may support rare species of reptiles, bats, and cliff-nesting birds—many of which are species at risk). There is one roadkill record of the endangered Western Screech-owl[17] from the southern boundary of the property. Screech-owls may be nesting along the creek, and foraging on the property. Flammulated Owls[18] have also been recorded in the vicinity, and mature forest on this property contains potential nesting habitat for this species. Given that habitat for species at risk was one of the key criteria used to develop the conservation ranking maps on which the ESDP maps are based (see **Section 2**), this **property should remain in the ESDP area.**

Summary:

PID	Assessment	Recommendation
010-397-035	The area within the ESDPA contains mature forest and warm aspect rock, both sensitive ecosystems; red and blue listed owls which rely on mature forest have been recorded in the vicinity	Property should remain in ESDPA

[17] The Western Screech-owl is red-listed in BC, meaning it is provincially extirpated, threatened or endangered in BC; it is listed federally by COSEWIC as Endangered.
[18] The Flammulated Owl is blue-listed, meaning it is provincially of Special Concern, and federally listed by COSEWIC as Special Concern.

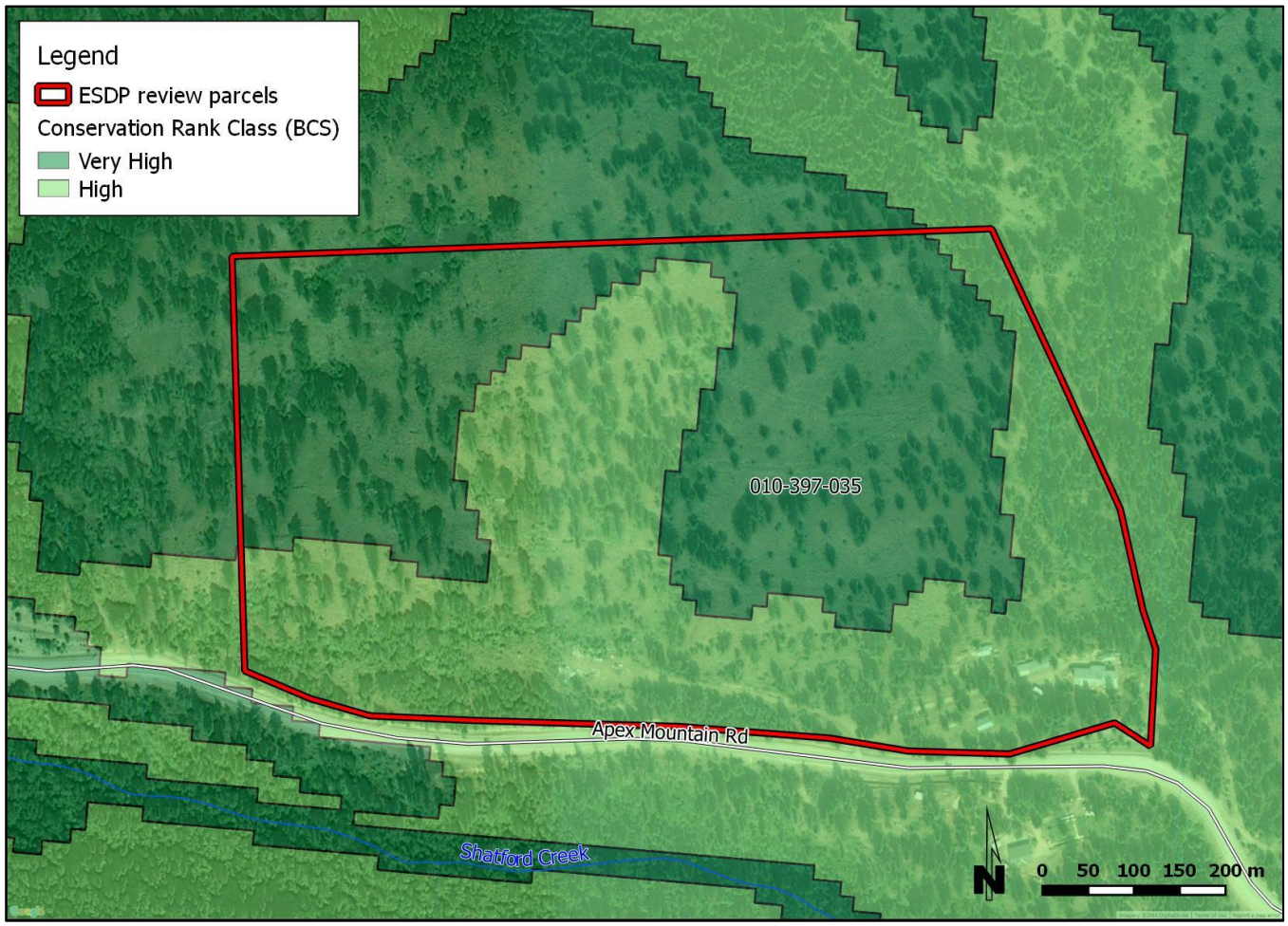

Figure 14. Map of property #3, with conservation ranking indicated. The ESDP area is indicated by green shading.

4.4 Property #4

Location: Lot A Plan KAP91675 DL 2711 SDYD*, Electoral Area "E" / 3480 & 3498 Arawana Foretsry Road, Electoral Area "E" / DL 3474 SDYD Except Plan KAP44343 KAP53674 KAP59640, Electoral Area "E" / Lot A Plan KAP59640 DL 3474 SDYD Manufactured Home Reg. # 74418, Electoral Area "E"
PID: 028-409-779 / 023-695-790 / 011-816-511 / 023-832-622

Assessment:

The property and its conservation ranking as per the proposed ESDP mapping are shown in **Figure 15;** most of the subject property falls within the ESDP area (shaded green). The ecosystem units mapped for the property are described with their provincial conservation status in **Table 4.**

The owners have requested that the property be removed from the ESDP area because of "dramatically reduced or eliminated" environmental values caused by logging, grazing and rough grading for a golf course, and because an Environmental Impact Assessment (Gyug 2005)[19] was commissioned.

The ecosystem mapping upon which the ESDP areas are based recognizes the logging and grading that was done, but indicates that the site contains sensitive ecosystems, including:

- riparian gully/corridor (Arawana Creek) running the length of the three adjacent parcels (PIDs: 023-695-790, 011-816-511, 023-832-622) as well as a riparian seep on the northern boundary of 011-816-511;
- grassland;
- mature coniferous woodland (although much is fragmented and/or logged, there is a fairly intact woodland area mixed with grassland south of the gully in parcel 023-695-790).

The EIA states that about one-third of the property is occupied by a combination old forest, coniferous woodland, grassland, sparsely vegetated (rock outcrops), and riparian habitat—all of which are sensitive ecosystems with High to Very High conservation ranking (**Table 1**).

In terms of species at risk (one of the key criteria used to develop the conservation ranking maps on which the ESDP maps are based), the EIA also indicates possible nesting sites for Flammulated Owl[20] in the SW corner of lower site. Western Screech-owls[21] have been recorded along Arawana creek, downstream of the property, indicating potential for this species to occur in similar riparian habitats on the subject property. The EIA also states

[19] Gyug, L. (2005). Ecological assessment of proposed housing development of Naramata Benchlands (DL 3474 and part of SL14 of DL 2711). Okanagan Wildlife Consulting. Report prepared for Brad Elenko, Urban Connections.
[20] The Flammulated Owl is blue-listed, meaning it is provincially of Special Concern, and federally listed by COSEWIC as Special Concern.
[21] The Western Screech-owl is red-listed in BC, meaning it is provincially extirpated, threatened or endangered in BC; it is listed federally by COSEWIC as Endangered.

that White-headed Woodpecker and Lewis' Woodpecker[22] might be expected on property if forest were old or mature and contained numerous potential nesting trees and snags. Given that mature forest is present, there is some current potential and high future potential for these species to occur. The EIA additionally mentions that the clearing for fairways has probably made the area more valuable to Elk.

The EIA discusses the relevance of the property as a low elevation corridor for Bighorn Sheep[23] migration between Okanagan Mountain Park and Penticton Creek. Gyug (2005) argues that having a low elevation corridor isn't crucial because: 1) there are no sheep north of Penticton Creek (although a transplant was planned); 2) the animals moving beyond traditional ranges are primarily rams and they use higher elevations; and 3) it is better to keep herds isolated to prevent disease spread. Since his 2013 report sheep have been transplanted to Okanagan Mountain Park, and contrary to his views it may be important to maintain a low elevation corridor to allow ewes to re-colonize depleted areas if a die-off does occur in either area.

Given the presence of sensitive ecosystems including habitat for species at risk, the **portions of the property currently within the ESDP area should remain.**

Summary:

PID	Assessment	Recommendation
028-409-779 023-695-790 011-816-511 023-832-622	The EIA's conclusion that "environmental values have been dramatically reduced or eliminated" on the property is not defensible—several sensitive ecosystems remain.	Should remain in ESDPA

[22] White headed and Lewis' Woodpeckers are red-listed in BC, meaning they are provincially extirpated, threatened or endangered in BC.

[23] Bighorn Sheep are blue-listed, meaning they are provincially of Special Concern.

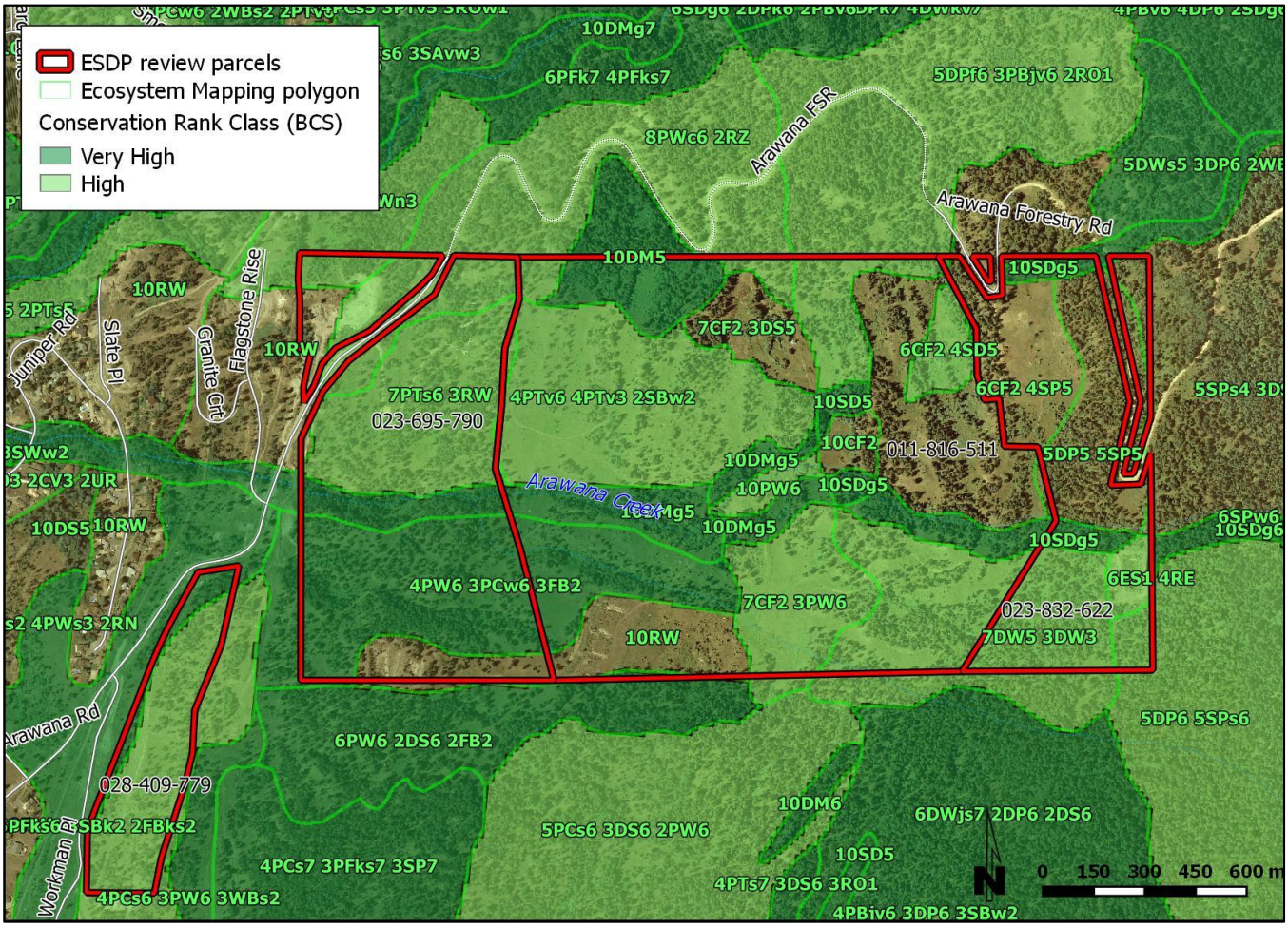

Figure 15. Map of property #4, with conservation ranking, ecosystem mapping polygons, and field check photo locations indicated. The ESDP area is indicated by green shading.

Table 4. Descriptions of ecosystem units found on subject property, and their conservation rankings.

Code	Name	Ecosystem Unit Description	Provincial Conservation Status[24]
Non-vegetated, Sparsely Vegetated, and Anthropogenic Units common to all subzones			
CF	Cultivated field	Cultivated areas or irrigated fields. The modifier 'x' is used to distinguish sites formerly mapped as dry pastures (PD); the modifier 'y' is used to distinguish sites formerly mapped as moist pastures (PM).	N/a
RO	Rock outcrop	A bedrock escarpment or outcropping with little soil development and sparse vegetation cover. Many sites originally mapped as RO are now mapped as SA. Very short steep rock outcrops are mapped as ROq (cool aspect) and ROz (warm aspect) rather than cliffs.	N/a
RW	Rural	An area where residences are scattered and intermingled with native vegetation or agricultural areas.	N/a
RZ	Road surface	An area cleared and compacted for the purposes of vehicular travel. Secondary roads are now included as a component of the polygon where they cover more than 10% and there are not already three ecosystem components in the polygon.	N/a
PPxh1: Ponderosa Pine Biogeoclimatic Zone (very dry hot subzone) & IDFxh1: Interior Douglas Fir Biogeoclimatic Zone (very hot dry subzone)			
DM	Douglas-fir – Water birch – Douglas maple	Moist gullies (DMg) or riparian fringes (DM), often with permanent or intermittent streams, usually with mixed Douglas-fir and paper birch overstories and rich, shrubby understories. Materials are generally morainal or fluvial. Assumed modifiers: d, j, m	Red
DP	Fd / Py – Pinegrass	Mesic and near-mesic sites on medium-textured morainal materials. Climax forests are dominated by a mixture of Douglas-fir and ponderosa pine with a pinegrass dominated understory. Assumed modifiers: d, j, m	Blue
DS	Douglas-fir / Ponderosa pine – Snowberry – Spirea	Moisture receiving sites with Douglas-fir overstories and mixed snowberry and spirea understories. Terrain is generally morainal. The old YS code is equivalent to DSn. Assumed modifiers: d, j, m	Red
DW	Fd / Py – Bluebunch wheatgrass - Pinegrass	Open Douglas-fir – ponderosa pine forests on moderate to steep warm aspects with deep, medium-textured colluvial or morainal soils. Understories are typically dominated by bluebunch wheatgrass with scattered forbs and shrubs at climax. Assumed modifiers: d, m, w	Blue
FB	Fescue – Bluebunch wheatgrass	Grasslands on gentle and cool aspects with medium-textured soils (and occasionally on sandy soils). Dominated by Idaho fescue and bluebunch wheatgrass at climax. Assumed modifiers: d, j, m	Red
PB	Fd / Py – Bluebunch wheatgrass – Balsamroot	Open Douglas-fir – ponderosa pine forests on shallow or very shallow morainal or colluvial soils on steep warm aspects. Understories have scattered shrubs such as saskatoon and mock orange with bunchgrasses, selaginella, and lichens. Assumed modifiers: m, s, w	N/a
PC	Ponderosa pine – Bluebunch	Submesic sites, often on slightly warmer or drier sites. Sites are not as steep or shallow-soiled as PT /02. Terrain is generally morainal or colluvial.	N/a

[24] Red-listed ecosystems are provincially threatened or endangered. Blue-listed ecosystems are provincially of Special Concern.

	wheatgrass – Cheatgrass	Open ponderosa pine overstory with bluebunch wheatgrass dominated understory (at climax). Assumed modifiers: d, j, m	
PT	Ponderosa pine – Red three-awn	Dry, open ponderosa pine forests on steep warm aspects. Frequently occurs on shallow (PTks, PTs) or very shallow colluvial or morainal materials (PTjv, PTkv, PTrv, PTv). Occasionally occurs on slightly cool aspects with shallow or very shallow soils (PTks, PTkv). Assumed modifiers: c, d, w	N/a
PW	Ponderosa pine – Bluebunch wheatgrass – Idaho fescue	Mesic and near-mesic ponderosa pine forests on medium-textured soils and level or gently sloping sites. At climax, understories are dominated by a mixture of bluebunch wheatgrass and Idaho fescue. Terrain is generally morainal or glaciofluvial. Assumed modifiers: d, j, m	Blue
SB	Selaginella – Bluebunch wheatgrass rock outcrop	Very shallow colluvial or weathered bedrock materials over bedrock. Bedrock is usually exposed in places. It is low relief and lacking large fractures. Vegetation is dominated by selaginella with bluebunch wheatgrass and other bunchgrasses, mosses, and lichens with scattered saskatoon. Some sites have moderate to high covers of big sagebrush or antelope-brush (structural stage 3). Assumed modifiers: j, v	N/a
SD	Sxw – Fd – Douglas maple – Dogwood	Moist forests often occurring in gullies, adjacent to streams and rivers, and around ponds and lakes. Has a mixed overstory that has Douglas-fir and may have hybrid white spruce, paper birch, and sometimes black cottonwood. The understory is shrubby and has red-osier dogwood, Douglas maple, snowberry and other species. Assumed modifiers: d, j, m	Red
SP	Douglas-fir / Ponderosa pine – Snowbrush - Pinegrass	Slightly drier than average Douglas-fir forests on slightly warm aspects or cool aspects with shallow soils. Sites usually have medium-textured morainal soils. Understories have a mixture of bunchgrasses and pinegrass. Assumed modifiers: d, j, m	Blue

4.5 Property #5

Location: 503 Newton Drive, West Bench, Electoral Area "F"
PID: 009-876-391

Assessment:

The property and its conservation ranking as per the proposed ESDP mapping are shown in **Figure 16;** most of the subject property falls within the ESDP area (shaded green). The ecosystem units mapped for the property are described with their provincial conservation status in **Table 5.**

The property was included in the EDSP area because it predominantly contains sagebrush grassland (mapped as SWf3/SWk2), which is a red-listed[25] plant community. This plant community appears to be in fair to good condition, which gives it a Very High conservation ranking (**Table 1**).

The landowner has questioned why the sagebrush community on his property has been included in the ESDP area, whereas sagebrush vegetated gullies and ravines in the surrounding West Bench area have not. He has also questioned why the KVR line (which is colonized with sagebrush) has been included in the area mapped as sagebrush where it runs through his property, but not on the adjacent property to the south (see **Figure 16**), and why the southern boundary of the ecosystem polygon stops so abruptly.

The reason why the sagebrush communities in the gullies and ravines were not mapped as ESDP is because they were too small[26] to be picked out by the 1:20,000 ecosystem mapping which served as the basis for the ESDP mapping. **Figure 17** shows how the ecosystem mapping looks when viewed at the 1:20,000 scale—small gully and ravine features are not visible to mappers working at this scale.

Similarly, the KVR line is too narrow a feature to be picked out in the 1:20,000 ecosystem mapping—rather than being mapped separately, it is incorporated into the polygons describing the adjacent vegetation communities. In the case of this property, the vegetation community adjacent to the KVR is a sagebrush community, so the KVR was combined with this vegetation community into a predominantly sagebrush (SW) polygon. Sagebrush ecosystems have high to very high conservation rankings depending on their condition (**Table 1**), hence this polygon was included in the ESDP area. In the case of the property to the south, the KVR is combined into a polygon containing the larger adjacent cultivated field, and therefore labeled CF. Cultivated fields only have Moderate conservation ranking (**Table 1**), which is why this polygon was not included in the ESDP area, despite the KVR being colonized by sagebrush.

The southern boundary of the sagebrush – wheatgrass (SW) ecosystem polygon ends so abruptly because it follows the edge of a map sheet (see **Figure 18**). The original 1990s ecosystem mapping was done over several years, and map sheets were sometimes used as partial study area boundaries for particular years.

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[25] Red-listed means it is provincially extirpated, threatened or endangered.
[26] According to the *Standard for Terrestrial Ecosystem Mapping (TEM) – Digital Data Capture in British Columbia* (RIC 2000b), for data captured at 1:20,000 scale (as for TEM) 2ha is a minimum polygon size, meaning features smaller than this cannot be mapped as individual polygons.

As such, ecosystem and ESDP mapping for this property and the surrounding area is confirmed as accurate and consistent, and **the property should remain within the ESDP area as mapped.**

Summary:

PID	Assessment	Recommendation
009-876-391	Ecosystem and ESDP mapping for this property and the surrounding area is confirmed as accurate and consistent.	Should remain in the ESDPA

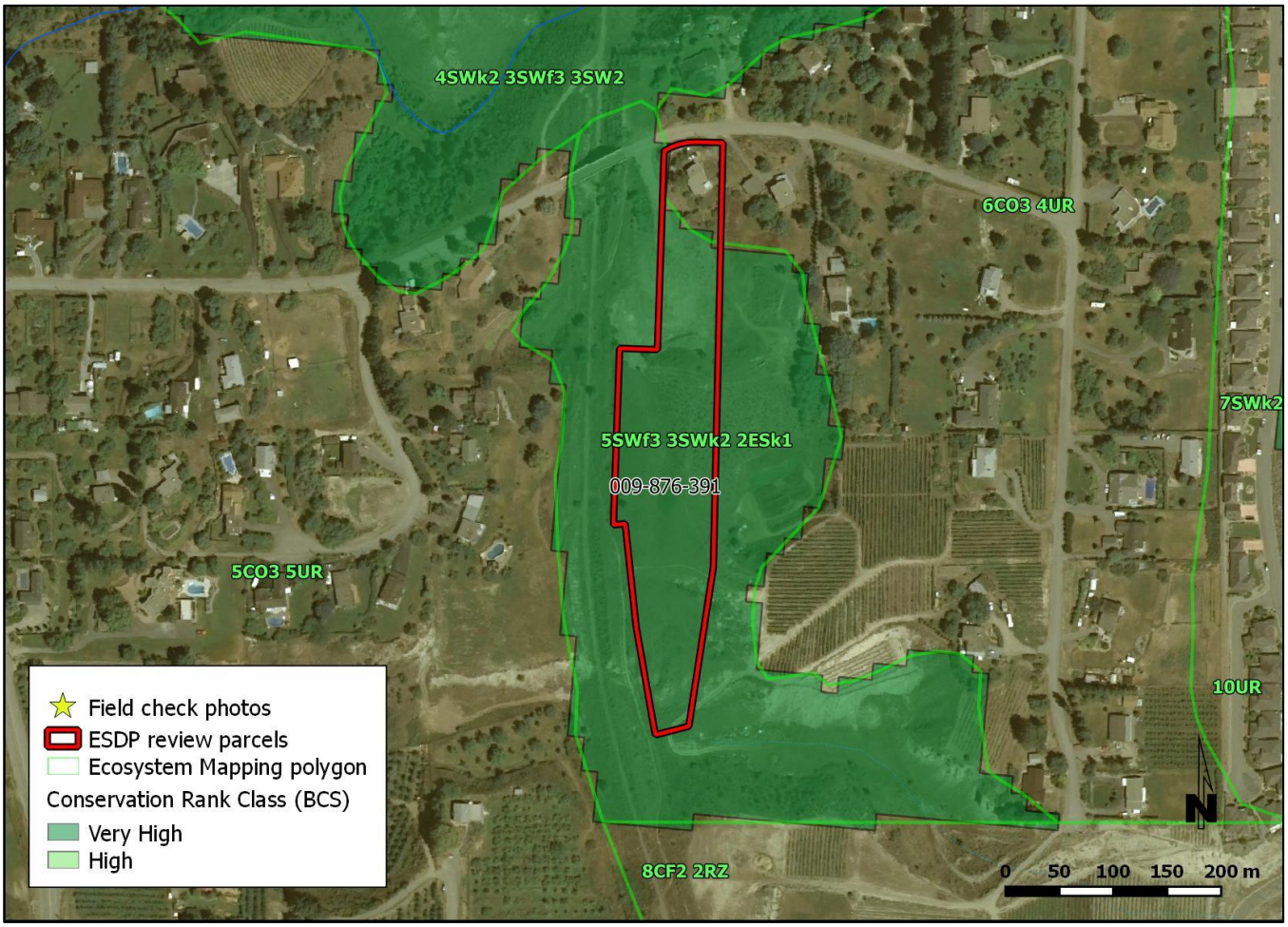

Figure 16. Map of property #5, with conservation ranking, ecosystem mapping polygons, and field check photo locations indicated. The ESDP area is indicated by green shading.

Table 5. Descriptions of ecosystem units found on subject property, and their conservation rankings.

Code	Name	Description & Mapping Notes	Provincial Conservation Status[27]
Non-vegetated, Sparsely Vegetated, and Anthropogenic Units common to all subzones			
CF	Cultivated field	Cultivated areas or irrigated fields. The modifier 'x' is used to distinguish sites formerly mapped as dry pastures (PD); the modifier 'y' is used to distinguish sites formerly mapped as moist pastures (PM).	N/a
CO	Cultivated Orchard	An agricultural area with fruit trees.	N/a
ES	Exposed soil	Areas of exposed soil with no vegetation. May be caused by natural erosion or human causes. Can occur on cool (ESk) or warm (ESw) aspects.	N/a
RZ	Road surface	An area cleared and compacted for the purposes of vehicular travel. Secondary roads are now included as a component of the polygon where they cover more than 10% and there are not already three ecosystem components in the polygon.	N/a
UR	Urban	Areas where residences or other human developments cover nearly all of the landscape.	N/a
BGxh1: Bunchgrass Biogeoclimatic Zone (very hot dry subzone)			
SW	Big sagebrush – Bluebunch wheatgrass	Zonal and near zonal sites. Materials are typically morainal or medium-textured glaciofluvial (sandy loam) and often have an aeolian cap on them. Vegetation is a mixture of bunchgrasses with forbs and with big sagebrush (structural stage 3) or without big sagebrush (structural stage 2). Sites with coarse-textured soils tend to have less overall sand content than AN sites or sands are much finer; on such sites some 'AN' biophysical map units were re-interpreted as 'SW'. Assumed modifiers: d, j, m	Red

[27] Red-listed ecosystems are provincially threatened or endangered. Blue-listed ecosystems are provincially of Special Concern.

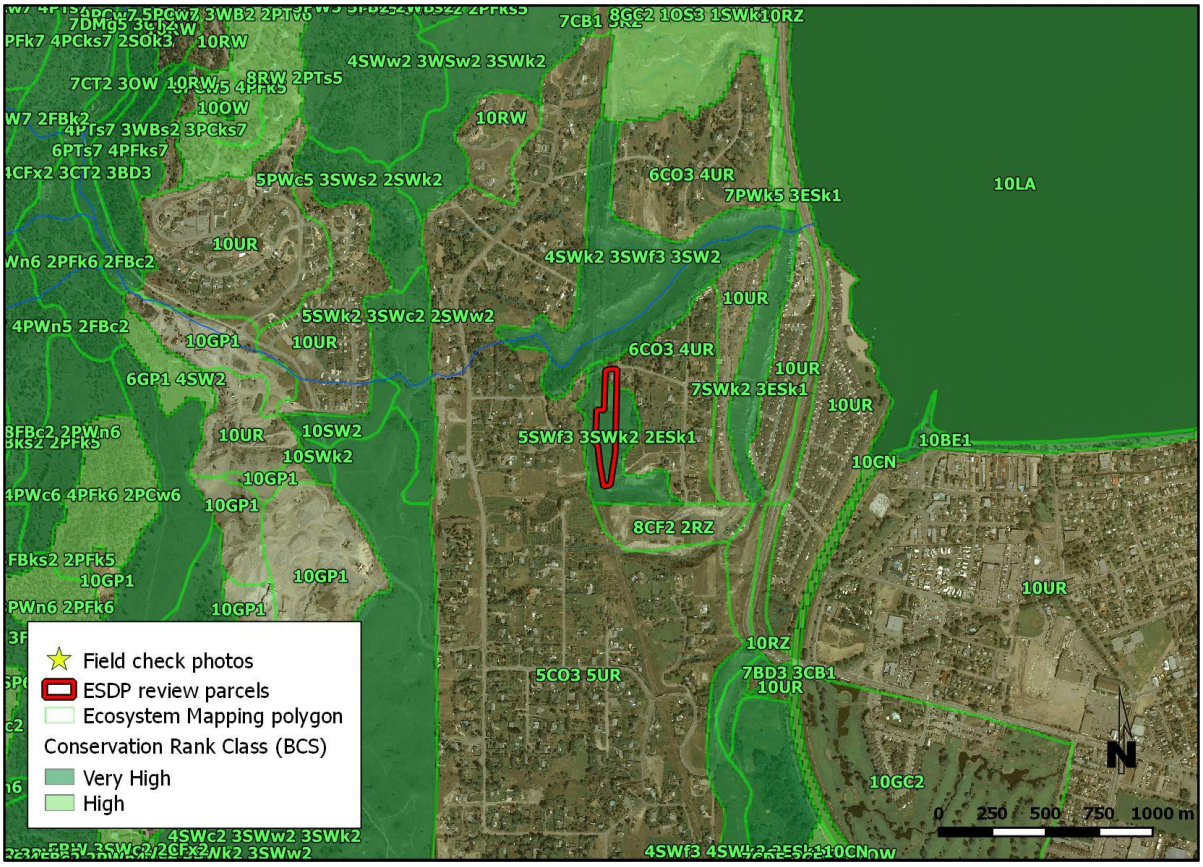

Figure 17. Illustration of how the ecosystem mapping looks when viewed at the 1:20,000 scale. Note that small gullies and ravines are not visible, and cannot be picked out by mappers working at this scale.

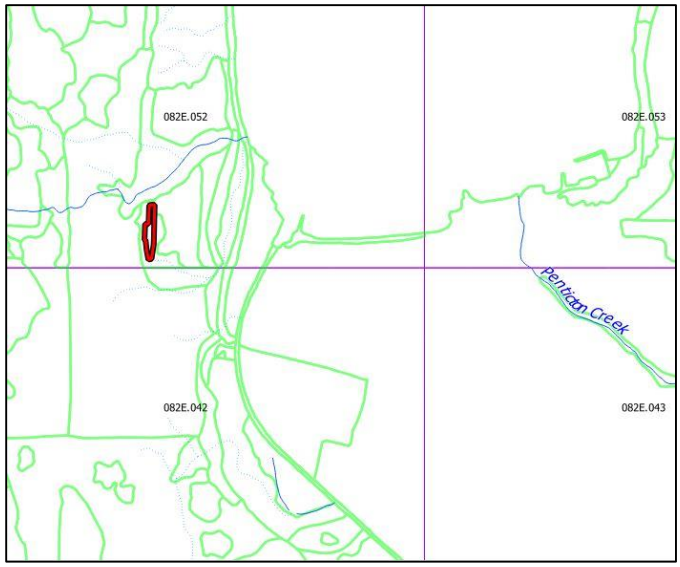

Figure 18. Terrestrial ecosystem mapping, with map sheet boundaries drawn in purple.

5 CONCLUDING REMARKS

This review of sample properties within the RDOS' proposed ESDP area supports the use of the SOSCP's (2012) conservation ranking maps as a basis for flagging areas containing sensitive ecosystems (in the ESDP mapping), and thereby requiring development permits. Concerns expressed by property owners in this sample largely related to confusion about the scale of resolution provided by the mapping and by misperceptions about how development and assessment reports interact with sensitive values. For example, some landowners question why completing an EIA, securing a development permit, and developing some of the property do not result in the property being removed from an ESDP area. The capability of the property to support environmentally sensitive features 'runs' with the property—it is not extinguished with the issuance of a development permit. This capability must be given continued consideration as future development occurs on property within the ESDP area.

ESDP mapping is *not* a substitute for environmental assessments, but *is* suitable for flagging properties that contain environmental values. Based on the analysis in this report, SOSCP recommends one adjustment to the ESDP layer, to reflect updates to sensitive ecosystem information. Supplying landowners with communication materials explaining the development permit process may help them better understand what it means to have property within an ESDP area.

6 REFERENCES

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APPENDIX 1:
DESCRIPTIONS OF ECOSYSTEM UNITS FOUND IN THE RDOS (BY BIOGEOCLIMATIC SUBZONE)

Biogeoclimatic zones: represent classes of ecosystems under the influence of the same regional climate. A large percentage of the plant communities within BGxh and PPxh biogeoclimatic zones are red or blue-listed (at risk) because of their limited distribution in the Province.

Code	Name	Description & Mapping Notes	BC Conservation Status[28]
Non-vegetated, Sparsely Vegetated, and Anthropogenic Units common to all subzones			
AK	Alkaline pond	A body of fresh water with a pH greater than 7 and less than 2m deep. Usually indicated by a white colour in the draw-down zone.	N/a
BE	Beach	Beaches on large lakeshores.	N/a
CB	Cutbank	Cutbanks of large roads or other sites.	N/a
CF	Cultivated field	Cultivated areas or irrigated fields. The modifier 'x' is used to distinguish sites formerly mapped as dry pastures (PD); the modifier 'y' is used to distinguish sites formerly mapped as moist pastures (PM).	N/a
CL	Cliff	Large steep, vertical or overhanging rock faces. The modifier 'b' is a non-standard modifier added to differentiate large cliffs (formerly mapped as CL) from moderate cliffs (formerly mapped as CM).	N/a
CN	Canal	An artificial watercourse including canals and channelized rivers.	N/a
CO	Cultivated Orchard	An agricultural area with fruit trees.	N/a
CV	Cultivated vineyard	An agricultural area with grape vines.	N/a
ES	Exposed soil	Areas of exposed soil with no vegetation. May be caused by natural erosion or human causes. Can occur on cool (ESk) or warm (ESw) aspects.	N/a
GB	Gravel bar	Gravel bars along rivers.	N/a
GC	Golf Course	Golf courses	N/a
GP	Gravel pit	Gravel pit – areas exposed through the removal of sand and gravel.	N/a
LA	Lake	Lakes – water bodies greater than 5ha in size and greater than 2m deep.	N/a
MI	Mine	An area of exposed rock where minerals or other materials are extracted.	N/a

[28] Red-listed ecosystems are provincially threatened or endangered. Blue-listed ecosystems are provincially of Special Concern. Status current as of Mar 2016.

OW	Shallow open water	Permanent shallow open water less than 2m deep with less than 10% cover of emergent plants.	N/a
PD	Pond	Small body of water less than 5ha in size and more than 2m deep.	N/a
RE	Reservoir	Man-made water bodies, including sewage lagoons.	N/a
RI	River	An intermittent or permanent water-course formed when water flows between two continuous, definable banks.	N/a
RO	Rock outcrop	A bedrock escarpment or outcropping with little soil development and sparse vegetation cover. Many sites originally mapped as RO are now mapped as SA. Very short steep rock outcrops are mapped as ROq (cool aspect) and ROz (warm aspect) rather than cliffs.	N/a
RW	Rural	An area where residences are scattered and intermingled with native vegetation or agricultural areas. Most areas mapped as rural were only mapped based on the remaining native vegetation in the biophysical mapping.	N/a
RZ	Road surface	An area cleared and compacted for the purposes of vehicular travel. Secondary roads are now included as a component of the polygon where they cover more than 10% and there are not already three ecosystem components in the polygon.	N/a
TA	Talus	Accumulated angular rock fragments at the base of rock outcrops or cliffs.	N/a
UR	Urban	Areas where residences or other human developments cover nearly all of the landscape.	N/a
BGxh1: Bunchgrass Biogeoclimatic Zone (very hot dry subzone)			
AN	Antelope-brush – Needle and thread grass	Occurs on level and gently undulating coarse-textured (sandy, and sandy gravely) glaciofluvial sites. This unit was not mapped on morainal or colluvial materials. Some areas with glaciofluvial materials have medium textured soils (sandy loam) or an aeolian cap (sandy loam); the soils on these sites allows for different vegetation development (mapped as SW). Can occur on cool aspects (ANk), fans (ANn, ANnw), warm aspects (ANnw, ANsw, ANw) and occasionally on shallow soils (ANsw). (Sometimes WA, WB, SW, WS biophysical map units were interpreted as AN in photo interpretation of antelope-brush units). Assumed modifiers: c, d, j	Red
AS	Aspen – common snowberry	Moist gullies (ASg) and floodplains (ASa) with trembling aspen and a shrubby understory. Occurs on morainal materials. Non-standard unit retained from biophysical mapping. Similar to AS unit described for IDFxh1. Assumed modifiers: d, j, m	Red
BD	Water birch – red-osier dogwood swamp	Swamps adjacent to streams or other wetlands. Non-standard unit retained from biophysical mapping. Assumed modifiers: d, j, m	Red
BR	Silverweed – Bulrush marsh	Marshes and wet meadows on lacustrine sites. Non-standard unit retained from biophysical mapping; code changed from SB to BR to avoid conflicts. Assumed modifiers: d, j, m	
CD	Cottonwood – Water birch	Active floodplain, coarse-textured fluvial soils. Cottonwood overstory with a shrubby understory. Assumed modifiers: a, c, d, j	Red

CM	Summer-cypress – bentgrass meadow	Pond edges with high water tables for much of the year; lacustrine soils. Non-standard unit retained from biophysical mapping; code changed from CB to CM to avoid conflicts. Variable vegetation sometimes dominated by non-native species. Assumed modifiers: d, j, m	N/a
CT	Cattail Marsh	Marshes on lacustrine soils, typically dominated by cattails and bulrushes. Non-standard unit retained from biophysical habitat mapping. Assumed modifiers: d, j, m	Blue
DS	Douglas-fir / Ponderosa pine – Snowberry – Spirea	Moisture receiving sites with Douglas-fir overstories and mixed snowberry and birch-leaved spirea understories. Terrain is generally morainal. Unit from the PPxh1. Assumed modifiers: d, j, m	Red
HA	Black Hawthorn Copse	Moist copses dominated by black hawthorn with other shrubs. Non-standard unit retained from biophysical habitat mapping. Assumed modifiers: d, j, m	N/a
OS	Oregon grape – Saskatoon Gully	Moist shrubby gullies. Non-standard unit retained from biophysical habitat mapping. Assumed modifiers: d, j, m	N/a
PA	Py – Antelope-brush – Red three-awn	Forested level and gently sloping sites with coarse glaciofluvial soils (sandy or sandy gravely). Open ponderosa pine overstories with mixed bunchgrass and antelope-brush understory. Most sites were historically AN with occasional trees; these sites are now dominated by encroached trees. Can occur on cool aspects (PAk, PAkn, PAks); they are particularly susceptible to encroachment. Can also occur on fans (PAkn, PAn), shallow soils (PAks, PAs), and warm aspects (PAw). Shallow soil sites likely always had trees historically. (Sometimes AN, PW, and YS biophysical map units were re-interpreted as PA in the photo interpretation for antelope-brush mapping.) Assumed modifiers: c, d, j	N/a
PR	Py – Nootka rose – Poison ivy	Moist ponderosa pine forests on morainal materials with some aspen or cottonwood and variable shrubby understories. Can occur in gullies (PRg) and on moist fans (PRn). Assumed modifiers: c, d, j	Red
PS	Py – Sumac	Slightly moister ponderosa pine forests on fans with sumac and scattered shrubs (PSn). Assumed modifiers: c, d, j	
PT	Ponderosa pine – Red three-awn	Dry forests on warm slopes. Open ponderosa pine overstory with bluebunch wheatgrass and selaginella dominated understory. Unit from the PPxh1. Assumed modifiers: c, d, w	Blue
PW	Py – Bluebunch wheatgrass	Forested sites on gently to moderately sloping medium-textured morainal materials. Open ponderosa pine forests with bunchgrasses and often with big sagebrush. Non-standard unit from biophysical mapping. Assumed modifiers: d, j, m	Blue
SA	Antelope-brush – Selaginella	Rocky areas with scattered shrubs and bunchgrasses. Terrain is mapped as rock. Rock is generally fractured and stepped with vegetation growing in cracks and in shallow soils on ledges. Shrubs (saskatoon, mock orange, antelope-brush, choke cherry, big sagebrush) together with bunchgrasses and lichens dominate the pockets of vegetation. Non-standard unit from the IDFxh1. Antelope-brush is limited to its core range in this unit; the unit itself is widely distributed. Occurs on both aspects and on gently sloping sites. Assumed modifiers: j, m, s	N/a

SB	Selaginella – Bluebunch wheatgrass rock outcrop	Very shallow colluvial or weathered bedrock materials over bedrock. Bedrock is usually exposed in places but is low relief and lacking large fractures. Vegetation is dominated by selaginella with bluebunch wheatgrass and other bunchgrasses, mosses, and lichens, with scattered saskatoon. Some sites have moderate to high covers of big sagebrush or antelope-brush (structural stage 3). This is a non-standard unit from the PPxh1 and IDFxh1. (AN and WS biophysical units were sometimes reinterpreted as SB in the antelope-brush mapping.) Assumed modifiers: j, v	N/a
SN	Big sagebrush – Needle-and-thread grass	Coarse glaciofluvial sites with sandy soils. Limited primarily to the Similkameen Valley where there is no antelope-brush. Similar site features to the AN unit. Grasses dominated by needle-and-thread grass with varying amounts of big sagebrush. Assumed modifiers: c, d, j	N/a
SO	Saskatoon – Mock orange talus	Colluvial talus slopes with more than 10% vegetation cover. Cover is usually dominated by shrubs such as mock orange, saskatoon, and choke cherry. Scattered ponderosa pine trees may occur. Some cliff ferns and bunchgrasses may occur in pockets. This is a non-standard unit from the PPxh1 and IDFxh1. Assumed modifiers: c, d	N/a
SW	Big sagebrush – Bluebunch wheatgrass	Zonal and near zonal sites. Materials are typically morainal or medium-textured glacioufluvial (sandy loam) and often have an aeolian cap on them. Vegetation is a mixture of bunchgrasses with forbs and with big sagebrush (structural stage 3) or without big sagebrush (structural stage 2). Sites with coarse-textured soils tend to have less overall sand content than AN sites or sands are much finer; on such sites some 'AN' biophysical map units were re-interpreted as 'SW'. Assumed modifiers: d, j, m	Red
WS	Bluebunch wheatgrass – Selaginella	Submesic areas usually with shallow sandy loam soils, mixed big sagebrush and antelopebrush and bunchgrasses (dominated by bluebunch wheatgrass) with selaginella. Soils are morainal, colluvial, or glaciofluvial. Due to site history (fire or other disturbance), some sites have few or no shrubs (structural stage 2). Soils tend to be shallower than in SWs and have some selaginella, which SWs is generally lacking. Assumed modifiers: j, m, s	N/a
PPxh1: Ponderosa Pine Biogeoclimatic Zone (very dry hot subzone)			
AN	Antelope-brush – Needle and thread grass	Occurs on level and gently undulating coarse-textured (sandy, and sandy gravely) glaciofluvial sites at lower elevations of the PPxh1. This unit was not mapped on morainal or colluvial materials. Non-standard unit from the BGxh1. Assumed modifiers: c, d, j	Red
AS	Trembling aspen – Common snowberry – Kentucky bluegrass	Moist gullies (ASg) and basins (AS) with trembling aspen overstory and a shrubby understory. Occurs on morainal materials. Non-standard unit retained from biophysical mapping. Assumed modifiers: d, j, m	Red
BD	Water birch – red-osier dogwood swamp	Swamps adjacent to streams, lake edges or other wetlands. Non-standard unit retained from biophysical mapping. Assumed modifiers: d, j, m	Red
BR	Silverweed – Bulrush marsh	Marshes and wet meadows on lacustrine materials. Non-standard unit retained from biophysical mapping; code changed from SB to BR to avoid conflicts. Assumed modifiers: d, f, j	N/a

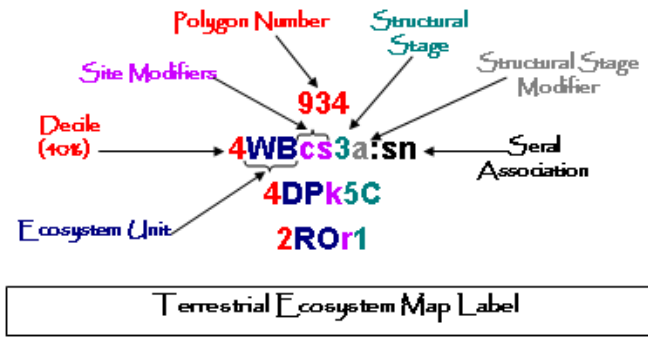
CD	Ponderosa pine - Black cottonwood – Snowberry riparian	Active floodplains, coarse-textured fluvial soils. Cottonwood overstory, sometimes with ponderosa pine, and with a shrubby understory. **Code originally mapped as PA during upgrade; TEM codes changed Jan. 2006 to 'CD' for this unit**. Assumed modifiers: a, c, d, j.	Red
CT	Cattail Marsh	Marshes on lacustrine soils, typically dominated by cattails. Assumed modifiers: d, j, m	Blue
DM	Douglas-fir – Water birch – Douglas maple	Moist gullies (DMg) or riparian fringes (DM), often with permanent or intermittent streams, usually with mixed Douglas-fir and paper birch overstories and rich, shrubby understories. Materials are generally morainal or fluvial. Assumed modifiers: d, j, m	Red
DS	Douglas-fir / Ponderosa pine – Snowberry – Spirea	Moisture receiving sites with Douglas-fir overstories and mixed snowberry and spirea understories. Terrain is generally morainal. The old YS code is equivalent to DSn. Assumed modifiers: d, j, m	Red
FB	Fescue – Bluebunch wheatgrass	Grasslands on gentle and cool aspects with medium-textured soils (and occasionally on sandy soils). Dominated by Idaho fescue and bluebunch wheatgrass at climax. Assumed modifiers: d, j, m	Red
PA	Ponderosa pine – Antelope-brush – Red three-awn	Mapped on level and gentle with coarse glaciofluvial soils (sandy or sandy gravely) at lower elevations of the PPxh1. Open ponderosa pine overstories with mixed bunchgrass and antelope-brush understory. Most sites were historically AN with occasional trees; these sites are now dominated by encroached trees. Can occur on cool aspects (PAk); they are particularly susceptible to encroachment. Can also occur on fans (PAn), and shallow soils (PAs). Non-standard unit from BGxh1; **code originally mapped as AP during upgrade to avoid conflict; TEM codes changed Jan. 2006 to 'PA'**. Assumed modifiers: c, d, j	N/a
PC	Ponderosa pine – Bluebunch wheatgrass – Cheatgrass	Submesic sites, often on slightly warmer or drier sites. Sites are not as steep or shallow-soiled as PT /02. Terrain is generally morainal or colluvial. Open ponderosa pine overstory with bluebunch wheatgrass dominated understory (at climax). Assumed modifiers: d, j, m	N/a
PF	Ponderosa pine – Bluebunch wheatgrass – Rough fescue	Cool aspect ponderosa pine forests with mixed bluebunch wheatgrass and fescue understory (at climax). Terrain is generally morainal or colluvial. Assumed modifiers: d, j, m	Red
PT	Ponderosa pine – Red three-awn	Dry, open ponderosa pine forests on steep warm aspects. Frequently occurs on shallow (PTks, PTs) or very shallow colluvial or morainal materials (PTjv, PTkv, PTrv, PTv). Occasionally occurs on slightly cool aspects with shallow or very shallow soils (PTks, PTkv). Assumed modifiers: c, d, w	Blue
PW	Ponderosa pine – Bluebunch wheatgrass – Idaho fescue	Mesic and near-mesic ponderosa pine forests on medium-textured soils and level or gently sloping sites. At climax, understories are dominated by a mixture of bluebunch wheatgrass and Idaho fescue. Terrain is generally morainal or glaciofluvial. Assumed modifiers: d, j, m	Blue

SA	Antelope-brush – Selaginella	Rocky areas with scattered shrubs and bunchgrasses. Terrain is mapped as rock. Bedrock is generally fractured and stepped with vegetation growing in cracks and in shallow soils on ledges. Shrubs (saskatoon, mock orange, antelope-brush, choke cherry, big sagebrush) together with bunchgrasses and lichens dominate the pockets of vegetation. Non-standard unit from the IDFxh1. Antelope-brush is limited to its core range in this unit; the unit itself is widely distributed. Assumed modifiers: j, m, s	N/a
SB	Selaginella – Bluebunch wheatgrass rock outcrop	Very shallow colluvial or weathered bedrock materials over bedrock. Bedrock is usually exposed in places. It is low relief and lacking large fractures. Vegetation is dominated by selaginella with bluebunch wheatgrass and other bunchgrasses, mosses, and lichens with scattered saskatoon. Some sites have moderate to high covers of big sagebrush or antelope-brush (structural stage 3). Assumed modifiers: j, v	N/a
SN	Big sagebrush – Needle-and-thread grass	Coarse glaciofluvial sites with sandy soils. Similar site features to the AN unit. Grasses dominated by needle-and-thread grass with varying amounts of big sagebrush. Assumed modifiers: c, d, j	N/a
SO	Saskatoon – Mock orange talus	Colluvial talus slopes with more than 10% vegetation cover. Cover is usually dominated by shrubs such as mock orange, saskatoon, and choke cherry. Scattered ponderosa pine trees may occur. Some cliff ferns and bunchgrasses may occur in pockets. Assumed modifiers: c, d	N/a
SP	Douglas-fir / Ponderosa pine – Snowberry - Pinegrass	Slightly moister or sheltered sites with mixed Douglas-fir and ponderosa pine overstories and an understory with pinegrass and some shrubs including snowberry. Assumed modifiers: d, j, m	N/a
SR	Snowberry – Rose – Kentucky bluegass	Moist shrubby areas in grasslands. Dominated by snowberry and rose. Assumed modifiers: d, j, m	N/a
SW	Big sagebrush – Bluebunch wheatgrass	Drier submesic to subxeric sites. Terrain is typically morainal or medium-textured glacioufluvial (sandy loam) and often has an aeolian cap. Vegetation is a mixture of bunchgrasses with forbs and big sagebrush. May occur on slightly coarse-textured soils (SWc), cool aspects (SWk, SWks), shallow soils (generally 50-100cm deep; SWks, SWs, and SWsw), and warm aspects (SWsw and SWw). Assumed modifiers: d, j, m	Red
WB	Bluebunch wheatgrass – Balsamroot	Warm aspect grasslands. Generally morainal materials with aeolian caps. Climax sites dominated by bluebunch wheatgrass with balsamroot, other forbs, and various lichens. Also occurs on coarse textured soils (WBc, WBcn) which have less vegetation cover, and fewer forbs and lichens. Assumed modifiers: d, m, w	N/a

IDFxh1: Interior Douglas Fir Biogeoclimatic Zone (very hot dry subzone)			
AS	At – Common snowberry – Kentucky bluegrass	Moist gullies (ASg) and basins (AS) with trembling aspen and a shrubby understory. Occurs on morainal materials and is most common in grassland dominated areas. Assumed modifiers: d, j, m	Red
BD	Water birch - red-osier dogwood swamp	Shrubby swamps dominated by water birch, red-osier dogwood, mountain alder and poison ivy. Occurs on active floodplains with imperfectly to poorly drained soils. Assumed modifiers: d, j, m	Red
BM	Bulrush Marsh	Bulrush dominated marshes associated with ponds and shallow open water. Old SB unit may be broader, this may actually include what is now BR and BM. Assumed modifiers: d, j, m	Blue
BN	Kentucky bluegrass – Stiff needlegrass	A moist grassland ecosystem found on deep, medium-textured soils, in small swales and depressions where moisture collects. Most sites are seral and are dominated by Kentucky bluegrass with a diverse mixture of forbs. Assumed modifiers: d, j, m	N/a
CD	Act – Fd – Common Snowberry – Red-osier Dogwood Riparian	Black cottonwood ecosystem commonly associated with active floodplains and fluvial terraces with subsurface water flow. It has a shrub-dominated understory. Assumed modifiers: a, d, j, m (**should be a, c, d, j** ?)	Red
CT	Cattail Marsh	Marshes on lacustrine soils, typically dominated by cattails or bulrushes. Non-standard unit retained from biophysical mapping. Assumed modifiers: d, j, m	Blue
DP	Fd / Py – Pinegrass	Mesic and near-mesic sites on medium-textured morainal materials. Climax forests are dominated by a mixture of Douglas-fir and ponderosa pine with a pinegrass dominated understory. Assumed modifiers: d, j, m	Blue
DS	Fd / Py – Snowberry – Spirea	Slightly moist forests on medium-textured morainal soils. Climax forests are dominated by Douglas-fir with a shrubby understory of common snowberry and birch-leaved spirea. Assumed modifiers: d, j, m	Red
DW	Fd / Py – Bluebunch wheatgrass - Pinegrass	Open Douglas-fir – ponderosa pine forests on moderate to steep warm aspects with deep, medium-textured colluvial or morainal soils. Understories are typically dominated by bluebunch wheatgrass with scattered forbs and shrubs at climax. Assumed modifiers: d, m, w	Blue
FW	Idaho fescue – Bluebunch wheatgrass	Level and cool aspect grasslands usually on materials with an aeolian cap. Dominated by Idaho fescue and a diverse community of forbs at climax. Most sites are seral and may be dominated by Bluebunch wheatgrass, junegrass, Sandberg's bluegrass, cheatgrass or other seral species. May be dominated by big sagebrush and Kentucky bluegrass ($vk: Big sagebrush – Kentucky bluegrass seral association). Assumed modifiers: d, j, m	Red

PB	Fd / Py – Bluebunch wheatgrass – Balsamroot	Open Douglas-fir – ponderosa pine forests on shallow or very shallow morainal or colluvial soils on steep warm aspects. Understories have scattered shrubs such as saskatoon and mock orange with bunchgrasses, selaginella, and lichens. Assumed modifiers: m, s, w	Status under review by the Province
SA	Antelope-brush – Selaginella	Rocky areas with scattered shrubs and bunchgrasses. Terrain is mapped as rock. Bedrock is generally fractured and stepped with vegetation growing in cracks and in shallow soils on ledges. Shrubs (saskatoon, mock orange, antelope-brush, choke cherry, big sagebrush) together with bunchgrasses and lichens dominate the pockets of vegetation. Antelope-brush is limited to its core range in this unit; the unit itself is widely distributed. Assumed modifiers: j, m, s	N/a
SB	Selaginella – Bluebunch wheatgrass rock outcrop	Very shallow colluvial or weathered bedrock materials over bedrock. Bedrock is usually exposed in places. It is low relief and lacking large fractures. Vegetation is dominated by selaginella with bluebunch wheatgrass and other bunchgrasses, mosses, and lichens with scattered saskatoon. Assumed modifiers: j, v	N/a
SD	Sxw – Fd – Douglas maple – Dogwood	Moist forests often occurring in gullies, adjacent to streams and rivers, and around ponds and lakes. Has a mixed overstory that has Douglas-fir and may have hybrid white spruce, paper birch, and sometimes black cottonwood. The understory is shrubby and has red-osier dogwood, Douglas maple, snowberry and other species. Assumed modifiers: d, j, m	Red
SM	Sedge marsh	Marshes dominated by sedges such as beaked sedge and water sedge. Fluctuating water tables; generally inundated for part of the year. Assumed modifiers: d, j, m	N/a
SO	Saskatoon – Mock orange talus	Colluvial talus slopes with more than 10% vegetation cover. Cover is usually dominated by shrubs such as mock orange, saskatoon, and choke cherry. Scattered Douglas-fir or ponderosa pine trees may occur. Some cliff ferns and bunchgrasses may occur in pockets. Assumed modifiers: c, d	N/a
SP	Douglas-fir / Ponderosa pine – Snowbrush - Pinegrass	Slightly drier than average Douglas-fir forests on slightly warm aspects or cool aspects with shallow soils. Sites usually have medium-textured morainal soils. Understories have a mixture of bunchgrasses and pinegrass. Assumed modifiers: d, j, m	Blue
WB	Bluebunch wheatgrass – Balsamroot	Grassland ecosystem commonly occurring on moderately steep to steep warm aspects with deep, medium-textured morainal or glaciofluvial soils with an aeolian cap. Dominated by bluebunch wheatgrass with balsamroot, other forbs, and lichens at climax. Assumed modifiers: d, m, w	Red
YS	Ponderosa pine - saskatoon fan	Open ponderosa pine forest with saskatoon, bluebunch wheatgrass, compact selaginella and some sumach, squaw currant, Sandberg's bluegrass, and timber milk-vetch. Occurs on fans with dry surfaces and subsurface moisture. Assumed modifiers: c, n	N/a

APPENDIX 2
LEGEND FOR TERRESTRIAL ECOSYSTEM MAP LABELS



Site Modifiers	
6.1.1.1. 6.1.1.1.2 Criteria	
c	Coarse-textured soils
f	Fine-textured soil
g	Site occurs in a gully
j	Gentle to moderate slope (<25%)
k	Cool aspect (25% - 100% slope, 285° - 135°)
n	Fan (glaciofluvial, fluvial, or colluvial fans) or cone
p	Peaty material (15-60cm organic material over mineral soil)
q	Very steep cool aspect (>100% slope, 285° - 135°)
r	Ridged or ridge crest
s	Shallow soil (20 – 100cm to bedrock)
t	Terrace or fluvial benches
v	Very shallow soil (<20 cm. to bedrock)
w	Warm aspect (>25% slope, 135° - 285°)
z	Very steep warm aspect (>100% slope, 135° - 285°)

Structural Stages	
6.1.1.1.2 6.1.1.1.3 Structural stage	
1	Non-vegetated / sparsely vegetated
2	Herb
2a	Graminoid dominated
2b	Forb dominated
3	Shrub/Herb
3a	Low Shrub (less than 2m tall)
3b	Tall Shrub (between 2m and 10m tall)
4	Pole/Sapling; dense, single layered forests
5	Young Forest; more open than stage 4; may have a few mature trees
6	Mature Forest; dominated by mature trees with some scattered old trees
7	Old Forest (generally >250 years old); dominated by old trees; generally open forests

APPENDIX 3:

METHODOLOGY USED TO DEVELOP CONSERVATION RANKING MAPS FOR THE SOSCP BIODIVERSITY CONSERVATION STRATEGY

As part of the Biodiversity Conservation Strategy for the South Okanagan – Similkameen (SOSCP 2012), all units mapped in the TEM were linked to the appropriate ecosystem in the provincial Conservation Framework[29] (BC Ministry of Environment 2009). These linkages were often made using biogeoclimatic site series or ecosystem name; when this was not possible, then linkages were made by cross-walking the ecosystem concept provided in the expanded legend. Several mapped units did not have equivalent ecosystems in the Conservation Framework, such units included non-vegetated units (i.e. talus or cliffs), or very rare ecosystems that are not included in the provincial ecosystem assessments completed by the Conservation Data Centre (CDC).

Once the initial link was made between the mapped TEM units and the CF ecosystems, the Conservation Framework data was filtered to ensure the greatest applicability to this project. Focus was given to the 'highest priority' in Goals 2 and 3 of the Conservation Framework, and the decision not to use Goal 1 was made, as Goal 1 in the ecosystems component of the Conservation Framework is currently being revised and is subject to change. This put emphasis on ecosystems that are provincially at-risk, as well as those that are showing significant downward trends.

All Conservation Framework (CF) priorities were reviewed by a group of ecology and wildlife experts and the ranking converted to a three-point scale to correlate with the Sensitive Ecosystem Ranks[30] (SER) that had been done in the area. These rankings are referred to as the "reconciled conservation ranking". When the SER and the CF priorities differed, a group of experts agreed upon a reconciled rank. These reconciliations were done consistently across the project area and the rationale behind these decisions can be found in the file "conservation framework TEM cross walk.xls". Local conservation priorities, threats, and wildlife values were incorporated into this process with priorities being adjusted slightly up or down depending on the significance of these values provided by the ecosystem. For some forested ecosystems, different structural stages were assigned different priorities (i.e. mature and old forests may be rarer or more threatened than younger structural stage).

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[29] The Conservation Framework is British Columbia's new approach for maintaining the rich biodiversity of the province. Developed by the Ministry of Environment in collaboration with other scientists, conservation organizations, industry and government, the Framework provides a set of science-based tools and actions for conserving species and ecosystems in B.C. The Framework ensures that British Columbia is a spectacular place with healthy, natural and diverse ecosystems that sustain and enrich the lives of all.
The Three Goals of the CF are:

1. Contribute to global efforts for species and ecosystem conservation
2. Prevent species and ecosystems from becoming at risk
3. Maintain the diversity of native species and ecosystems

Now being implemented, the Framework will determine the conservation actions needed for species and ecosystems of conservation concern in British Columbia for management action using the *Prioritization Tool* and the *Action Sorting Tool.*

[30] Sensitive Ecosystem Ranks represented relative conservation priorities for SEI units in the South Okanagan (SEI units were ranked from 1 to 3). Most TEM units were grouped in to SEI units and thus threats and rarity of the broad SEI unit were only considered, not the specific rarity of a particular site series or TEM unit. In a few cases, SEI units were ranked differently for different biogeoclimatic subzones or variants.

When the ecosystem did not occur in the CF, the SER was assigned; this was most often the case for non-vegetated units that provide high valued wildlife habitat (i.e. cliffs, talus).

Conservation rankings were applied to the database using the Sensitive Ecosystems ratings table. The following four conservation ranking categories were applied to the dataset:

- Very High
- High
- Moderate
- Low

The ratings table was used to generate conservation ranks for each component of the polygon, and the weighted average of the conservation ranks in each polygon. The ranks sometimes varied depending on elevation and slope (i.e., cliffs and rock outcrops) or habitat condition (e.g., fragmentation, weeds, forest harvesting)

Table A-1. Conservation rankings of different ecosystem types found in the RDOS.

Conservation Ranking	**Ecosystem types**
Very High	wetlands; riparian; broadleaf woodlands (aspen copses); antelope-brush steppe in any condition; grassland and sagebrush in good condition; old forest; low elevation and warm aspect rugged rock/cliff.
High	disturbed grassland and sagebrush; coniferous woodland (open Ponderosa pine forest/parkland); mature forest (closed, moister forest types); mid-elevation rock/cliff and higher elevation warm aspect rock/cliff, or low elevation rock outcrops of low relief and fracturing; seasonally flooded fields (generally hayfields and other areas that used to contain wetlands but have been filled/drained)
Moderate	remainder of relatively natural habitats - higher elevation coniferous woodland (open Ponderosa pine forest); young forest (closed, mesic/moist types, including cut blocks and second growth); higher elevation cool aspect cliffs, and mid-elevation non-rugged rock outcrops; agricultural and rural areas; golf courses; gravel pits, cut banks, mines, etc
Low	urban areas and road surface. Little or no value, and large areas may pose barriers to wildlife movement