

# Fort Shepherd Conservancy Management Plan



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**MARCH 2008**

## Executive Summary

The Fort Shepherd Conservancy (FSC) is a 964 ha parcel of land located on the west side of Columbia River, 6 km south of Trail, in southeastern British Columbia. This area is the largest intact, contiguous parcel of land within the rare, very dry, warm Interior Cedar Hemlock biogeoclimatic subzone of BC. The area provides high capability ungulate winter range and is known to support an impressive diversity of flora and fauna, including several species of conservation concern. The property also has important historical, cultural, and recreational features.

The Land Conservancy of BC (TLC) acquired 779 ha (1924 ac) of Fort Shepherd Conservancy Area in late December 2007 from Teck Cominco Metals Ltd., with plans to purchase the remaining parcels in April 2008. Teck Cominco donated the land under the Federal Ecological Gifts Programme (60% of the value of the land was donated). A Stewardship Council comprised of representatives from TLC, the Trail Wildlife Association, and the Fish & Wildlife Compensation Program will manage the area, with input from an Advisory Committee comprised of various interested stakeholders. This Stewardship Council will help ensure that the property is managed in order to maintain the biodiversity and environmental heritage values in perpetuity, as required under the Ecological Gifts Programme. In acquiring Fort Shepherd Conservancy, TLC is committed to long-term protection of its importance to endangered and threatened species, its unique ecosystems, its rich winter habitat for deer and elk, and its natural and cultural values.

Pandion Ecological Research Ltd. was contracted to develop this land management plan which provides strategic management direction for the FSC. Its main objectives were to:

1. Solicit public input regarding management issues and concerns through a public meeting and direct contact with user groups, industry and government agencies.
2. Conduct field investigations to verify management actions required and identify areas where site-specific management plans and prescriptions are needed.
3. Develop and present a long-term vision and strategic goals for the FSC.
4. Provide habitat and species conservation and enhancement recommendations.
5. Co-ordinate with other land management planning processes and initiatives in the area.

The FSC has been subject to a various anthropogenic disturbances, including exposure to sulphur dioxide emissions, intensive timber harvesting, repeated severe forest fires, linear developments, gold and placer mining, and a range of recreational uses (e.g., hunting, fishing, camping, wildlife viewing, off-road vehicle activity). These uses have resulted in a proliferation of roads, trails, invasive weeds, garbage and campfires, with associated impacts and disturbance to soils, endemic vegetation and wildlife.

Past and current land uses and management issues and concerns were reviewed for this plan, based on available documents and input from land management personnel, various stakeholders and the public. Field assessments were conducted to identify ecological values and to verify land use impacts and issues of management concern on site. Based on all of the above information sources, a management vision and strategic management goals were developed. The latter emphasize those land uses that are compatible with the primary objective of conserving wildlife habitats, species and other unique values (heritage, archeological) of this property.

Specific management objectives focusing on representative habitats, habitat elements, plants species and communities, wildlife guilds, as well as heritage, archeological and recreational values were put forward. These objectives are linked to general and site-specific recommendations that are intended to conserve or enhance existing values, prevent or mitigate impacts, enhance or restore degraded areas, fill information gaps, and/or increase opportunities for public awareness, stewardship and learning with respect to this unique property.

## Table of Contents

EXECUTIVE SUMMARY .....	I
LIST OF TABLES.....	III
LIST OF FIGURES .....	III
ACKNOWLEDGEMENTS .....	III
1. INTRODUCTION AND BACKGROUND .....	2
1.1 The Plan Area .....	2
1.2 Plan Objectives .....	5
2. APPROACH AND METHODS .....	6
3. RESULTS .....	6
3.1 Past and Current Land and Resource Use .....	6
3.1.1 Mining.....	8
3.1.2 Forestry .....	8
3.1.3 Hydroelectric Power Development.....	8
3.1.4 Other Utility Corridors.....	10
3.1.5 Agriculture .....	10
3.1.6 Recreation.....	10
3.1.7 Access Management.....	12
3.1.8 Invasive Weed Management .....	13
3.1.9 Forest Health Management .....	15
3.1.10 Wildlife and Habitat Management.....	15
4. RELEVANT LEGISLATION AND GUIDELINES .....	16
5. PUBLIC CONSULTATION.....	18
6. WILDLIFE AND HABITATS .....	20
6.1 Biodiversity, Species Richness and Species at Risk.....	20
6.2 Wildlife Guilds of Management Priority .....	22
6.2.1 Ungulates .....	22
6.2.2 Wildlife Tree Users.....	23
6.2.3 Raptors.....	23
6.2.4 Other Wildlife Guilds of Interest .....	24
6.3 Plant Species and Communities .....	24
6.4 Ecosystems.....	25
6.4.1 Ecosystem Types.....	26
6.4.2 Vegetation Resource Inventory Habitat Types .....	27
6.4.3 Habitat Elements.....	28
7. MANAGEMENT PLAN .....	30
7.1 Management Vision .....	30
7.2 Strategic Management Goals .....	30
7.3 Management Objectives .....	30
7.3.1 General Objectives.....	31
7.3.2 Objectives by Habitat .....	31
7.3.3 Objectives for Habitat Elements.....	32
7.3.4 Objectives for Plant Species and Communities.....	32
7.3.5 Objectives for Wildlife Guilds .....	32
7.3.6 Objectives for Heritage and Archeological Values.....	33
7.3.7 Objectives for Recreational Values.....	33
7.4 Management Recommendations.....	33
8. LITERATURE CITED.....	40
APPENDIX 1: NAMES AND CONSERVATION STATUS OF VERTEBRATE WILDLIFE SPECIES..	45
APPENDIX 2: LIST OF PERSONS CONTACTED .....	49
APPENDIX 3: FORT SHEPHERD PUBLIC OPENHOUSE SUMMARY.....	50
APPENDIX 4: MAPS SHOWING CONFIDENTIAL LISTED OCCURRENCES .....	52
A. LISTED SPECIES DETECTED DURING 2007 FIELD ASSESSMENTS.....	52

B. LISTED SPECIES FROM CDC DATA AND PREVIOUS RECORDS .....	52
APPENDIX 5: ACCOUNTS FOR 12 SPECIES AT RISK .....	55
APPENDIX 6: TLC STATEMENT OF SIGNIFICANCE.....	68

## List of Tables

Table 1. Legal description and area (ha) of properties comprising the Fort Shepherd Conservancy. ....	5
Table 2. Invasive species confirmed in the FSC based on assessment and data from past surveys.....	14
Table 3. Management activities undertaken by TWA at the FSC.....	16
Table 4. Legislation relevant to private land, their main applications, and lead agencies responsible. ....	16
Table 5. Priority ranks assigned to wildlife guilds and habitat values in the FSC.....	18
Table 6. Summary of species richness and conservation status data.....	21
Table 7. Conservation status of listed terrestrial vertebrate species confirmed in the FSC. ....	21
Table 8. Conservation status of listed fish species confirmed in the FSC.....	21
Table 9. Scientific and english names, CDC conservation status and habitat associations of listed vascular plant species found close to the FSC. ....	25
Table 10. Target and minimum – maximum tree densities (sph) and maximum crown closure values for NDT4 ecosystem types as per KBLUP NDT4 management guidelines.....	26
Table 11. Breakdown of VRI habitats in the plan area, based on information from the VRI Database.....	28
Table 12. Range of average snag densities measured in unmanaged mature NDT4 stands.....	29

## List of Figures

Figure 1. Fort Shepherd Conservancy Area. ....	3
Figure 2. Vegetation Resource Inventory Habitats in the Fort Shepherd Conservancy.....	4
Figure 3. 2007 Listed Species Occurrences.....	53
Figure 4. Listed Species from CDC Data and Previous Records.....	53

## Acknowledgements

I would like to thank the many people from various agencies and affiliations that supplied information and resources to complete this project. They include Ted Antifeau, Steve Arndt, Larry Ballard, Chris Beers, Scott Benson, Lynn Betts, Carmen Cadrin, Julie Castonguay, Ross Clarke, Juliet Craig, Kevin Delgarno, Kat Enns, Bruce Enns, Rick Filmore, Jamie Forbes, Rob Frew, Angus Glass, Mike Guité, John Gwilliam, Larry Hildebrand, Steve Hilts, Graeme Kenyon, Mike Knapik, John Krebs, Genevieve LaChance, Irene Manley, Kathryn Martell, Llewellyn Mathews, Rick Mazzocchi, Val Miller, Ron Ozanne, Tracy Pearson, Doug Pickard, Ian Ramsey, Gail Rebelato, Chris Steeger, Craig Stemmler, Art Stock, Tim Thurston, Amy Waterhouse, Grant Sapruff, Lee Schaeffer, Ron Shafer, Willard Taylor, Tim Thurston, Amy Waterhouse, Darin Welch, Beth Woodbridge and Gerald York.

Special thanks to Grant Sapruff, Jamie Forbes and Eileen Pearkes for supplying helpful maps, raw data, background information and review comments. Thanks also to Kathryn Martell and the members of the Stewardship Council, who provided review comments and feedback.

I would like to acknowledge the contribution of the Conservation Data Centre in Victoria for providing staff time to assemble rare element occurrence records. Chris Steeger, John Gwilliam and Irene Manley came out to assist during the field assessment.

Finally, I would like to thank Amy Waterhouse and Darin Welch at the FWCP for preparing maps and Irene Manley for her patience and support in administering this project.

## 1. Introduction and Background

The Fort Shepherd Conservancy (FSC) is the largest intact, contiguous parcel of land in British Columbia found within the rare, very dry, warm Interior Cedar Hemlock (ICHxw) biogeoclimatic subzone. The area provides high capability ungulate winter range (Ferguson 1979; Gwilliam 1986; Trail Wildlife Association 2006) and is known to support an impressive diversity of other flora and fauna, including several species that are of conservation concern (Schaeffer et al. 2002; Kondla 2004; Machmer et al. 2005; Machmer and Ogle 2006; Machmer 2007; Machmer et al. 2007).

Ownership of a portion of the Fort Shepherd Conservancy (i.e., Sublot 8 and the eastern half of Sublot 12) has recently been transferred from Teck Cominco Metals Ltd. (TCML) to TLC, The Land Conservancy of BC. Remaining parcels comprising the Conservancy (i.e., Sublot 15 and District Lots 263 and 3384) will be transferred once funding has been secured (with the exception of right of way 116, to be retained by TCML). Historically, the property is connected to both the Dewdney Trail and the Hudson's Bay Company, as the HBC Fort was a stopping place on the route to the Kootenay Gold Rush. The Fort was also a trading place for the Sinixt people, who used the flat benches along the Columbia River as a traditional base for fishing and hunting. Although the Fort was destroyed by fire in 1872, a cairn remains to mark its location on the site.

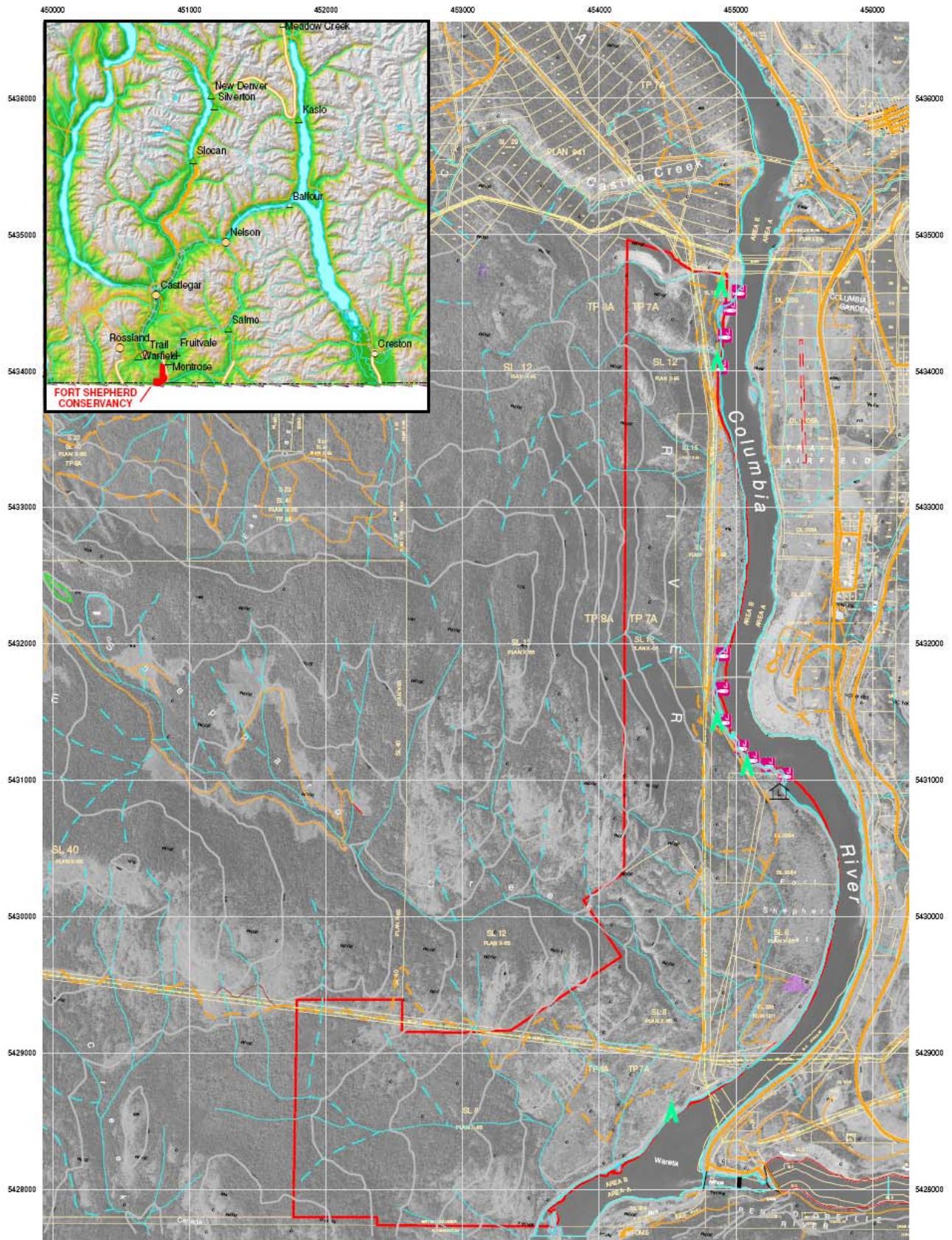
Located just 6 km south of Trail, BC, the area is integral to the local people who hunt, fish, hike, ride horses and picnic on the property. TLC recognizes the importance of these activities and encourages activities that are compatible with the natural and cultural values of the property. Consistent with this strong connection between the Fort Shepherd Conservancy Area and the local community, TLC is committed to working in partnership with representatives from local organizations. A signed agreement between TLC and the Trail Wildlife Association (TWA) will guide the future and current management of the property. A Stewardship Council comprised of representatives from the Fish & Wildlife Compensation Program (FWCP), TLC, TCML, and TWA was formed in winter 2006, to oversee the management planning process. The Council will receive feedback as requested from an Advisory Committee comprised of various interested stakeholders. TLC's Statement of Significance for Fort Shepherd Conservancy Area (Appendix 6) outlines character-defining elements and the rationale and vision in acquiring the property.

The FWCP commissioned Pandion Ecological Research Ltd. to develop a land management plan, under the direction of the Stewardship Council. This plan is required to provide strategic management direction for the FSC, with the primary objective of ensuring the long term maintenance of existing wildlife habitats and dependent wildlife populations. In this context, ungulates, rare and endangered species, and species dependent on wildlife trees are emphasized in the plan. The FSC also has significant cultural and heritage values and the plan addresses how these can best be protected and potentially enhanced.

The Conservancy has an extensive history of land use and anthropogenic disturbance. Past and current land and resource uses are reviewed, and those compatible with the primary objective of conserving wildlife habitats, species and other unique values are emphasized in the plan. A range of issues considered relevant to the management of the FSC are discussed, based on input from the public and consultation with various stakeholders and land management personnel. Recommendations are made to address land use concerns, prevent or mitigate impacts, restore degraded areas, fill information gaps, and pursue other initiatives with potential to maintain or enhance the area's values.

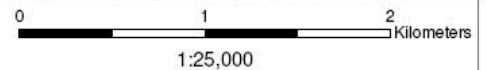
### 1.1 The Plan Area

The FSC is located approximately 6 km south of Trail in southeastern BC. The plan area encompasses 964 ha of land partitioned into six properties on the west side of Columbia River, from south of Casino Creek to south of Sheppard Creek (Table 1; Figure 1). The Canada-United States border forms the southern boundary of the area and semi-wildlands owned by TCML are found to the north and west. Crown forest land managed by Atco Lumber Co. Ltd. borders the FSC along Sheppard Creek. One main four-wheel drive road spans the full length



**Figure 1: FORT SHEPHERD CONSERVANCY**

- |                                 |                  |
|---------------------------------|------------------|
| Fort Shepherd Property Boundary | Various Features |
| Shore Fishing                   | Camp Site        |
| <b>TRIM Features (1:20,000)</b> | Old Cabin        |
| Road                            |                  |
| Transmission Line               |                  |
| Contour - Index                 |                  |



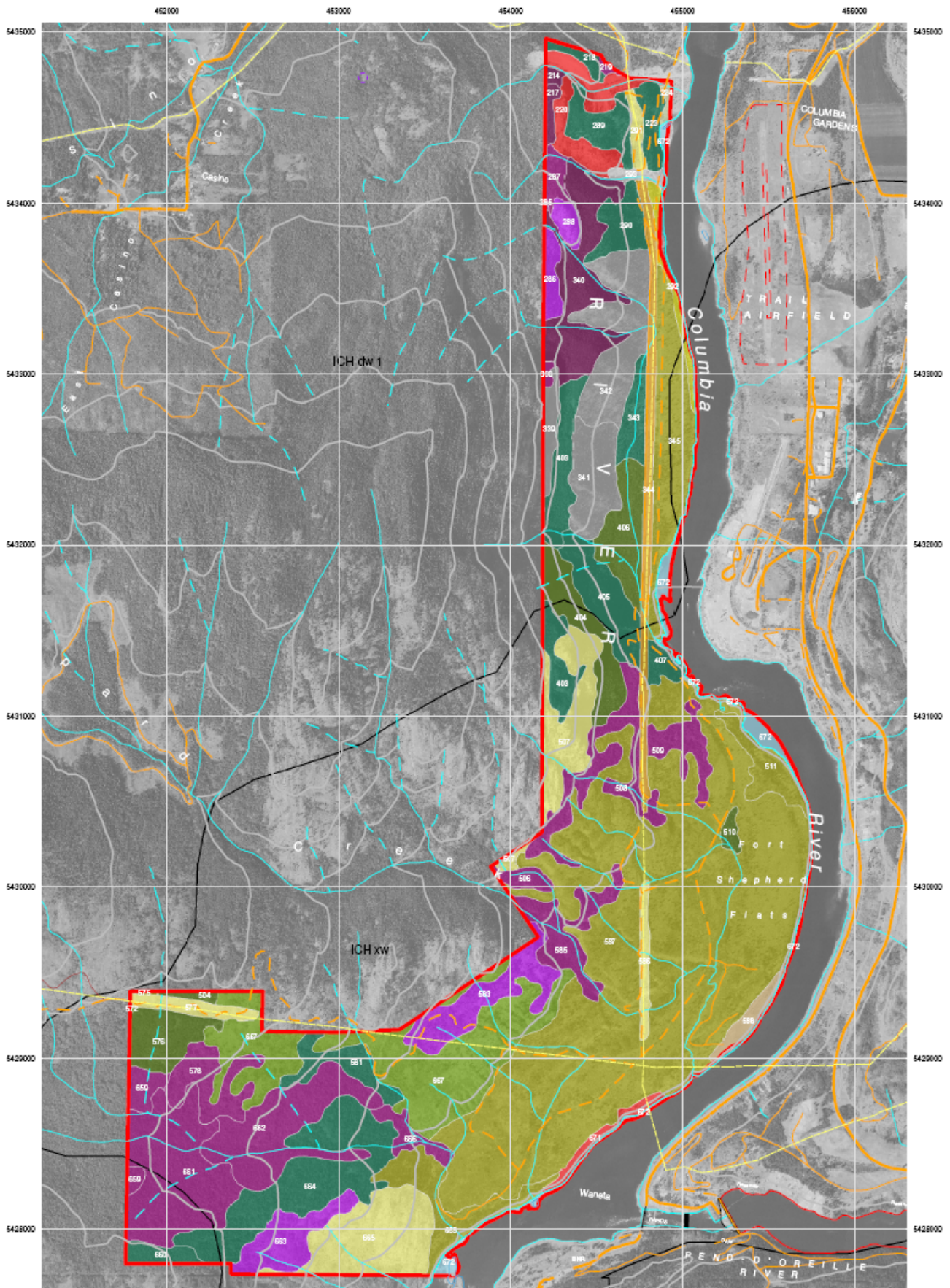


Table 1. Legal description and area (ha) of properties comprising the Fort Shepherd Conservancy.

Legal Property Description	Area (ha)
Sublot 12 Sections 7, 18, 19, and 30 Township 7A KD Plan X66 except Plan RW116	214
Sublot 8 Township 8A Kootenay District Plan X65 and Sublot 8 Township 7A Kootenay District Plan X66 except part shown outlined in red on Plan RW 116	565
DL 263 Kootenay District except part outlined in red on Plan RW 116	43
DL 3384 Kootenay District	57
Sublot 15 Township 7A Kootenay District Plan X66 formerly Lots 138 to 159 inclusive Plan 940 together with roads and highways shown on the said plan cancelled June 1953 under the Plans Cancellation Act 952871 except part included in Plan RW 116	85
<b>TOTAL</b>	<b>964</b>

of the plan area, and a network of roads weave through the properties. Most of these provide river access or service powerlines traversing north-south and east-west through the plan area.

The FSC lies within the Interior Cedar Hemlock biogeoclimatic zone (Braumandl and Curran 1992) and both the very dry warm (ICHxw) and dry warm (ICHdw) subzones are represented (Figure 2). The ICHxw subzone is found exclusively in the southernmost parts of the West Kootenay (from 450-1,100 m elevation), and is characterized by very hot, dry summers and very mild winters with very light snowfall. Snowpacks are very shallow and of very short duration and soils generally do not freeze. Although slightly wetter, climatic conditions in the ICHdw are similar and moisture is a major limitation to tree growth in both subzones.

Various terraces extend along the length of the FSC property from valley bottom ( $\approx$ 400 m elevation) westward to the height of land ( $\approx$ 1,600 m elevation). The northern portion of the plan area is dominated by steep sandy slopes with very coarse-textured disturbed soils and sparse forest and shrub cover. Invasive weeds have encroached through much of this area and it is highly disturbed. Proceeding further south, soils are more developed, but they are acidic and lack a well developed mineral-organic surface horizon. Terraces in lower Fort Shepherd are comprised of a mosaic of mixed open forest, shrubland and herb-dominated habitats interspersed with occasional rock outcrops and cliffs (Marcoux 1987; Novus consulting Ltd. 2002; Schaeffer et al. 2002; Deschenes 2003). These low elevation areas provide a good interspersed of high value browse with scattered coniferous cover and they are heavily used by ungulates and other wildlife during the winter months.

The FSC has been subject to a range of other anthropogenic disturbances, including long term exposure to sulphur dioxide emissions from the Trail smelter beginning after the turn of the century, coupled with intensive timber harvesting and repeated severe forest fires to facilitate mineral extraction during the 1920's and 1930's (Hamilton and McDonaugh 1999; McDonaugh and Hamilton 2000; Enns and Enns 2006). More recent impacts include linear developments (i.e., power lines, roads, gas lines; Norecol Environmental Consultants Ltd. 1991; Hamilton and McDonaugh 1997), gold and placer mining activity (Cantox 2003), intensification of recreational use (e.g., hunting, fishing, camping, wildlife viewing and off-road vehicle [ORV] activity). The latter activities have resulted in a proliferation of roads, trails, invasive weeds, garbage and campfires, with associated damage and disturbance to soils, endemic vegetation and wildlife.

## 1.2 Plan Objectives

Specific objectives of this land management plan, as outlined in a contribution agreement with the FWCP are as follows:

1. Solicit public input regarding management issues and concerns for the FSC through a public meeting and direct contact with user groups, industry and government agencies.
2. Conduct field investigations at the FSC to verify management actions required. Also identify areas where site-specific management plans and prescriptions are needed.
3. Develop and present a long-term vision and strategic goals for the FSC.
4. Provide habitat and species enhancement and conservation recommendations.
5. Co-ordinate with other land management planning processes in the area, such as that currently being undertaken by Teck Cominco.



## 2. Approach and Methods

This plan adopts a strategic approach to management of the FSC. It addresses an approximate 5-10 year time horizon and includes recommendations for both short and longer term management actions. The following methods were used to complete the plan:

1. Information relevant to the FSC was summarised through a literature review, queries of available species lists and databases (CDC, COSEWIC, Columbia Basin Database for Wildlife-Habitat Relationships; Johnson & O'Neil 2001; Steeger et al. 2001), and consultation with various subject experts, land management and agency/industry personnel, representatives of various user groups, and selected members of the Management and Advisory Boards (see Appendix 2 for a list of persons contacted). Types of information considered for this review included:
  - past and current land and resource use of the FSC and surrounding areas;
  - past and current management and enhancement activities;
  - archeological and heritage values of the plan area;
  - wildlife and habitat values of the plan area (emphasis on ungulates, listed species<sup>1</sup>, wildlife tree users);
  - inventory, research and monitoring initiatives in the plan area;
  - forest health and invasive weed conditions and applicable control strategies; and
  - relevant legislation and guidelines.
2. Input regarding management issues and concerns was gathered through an open house held in Trail on March 28<sup>th</sup>, 2007 (see Appendix 3 for a summary of the public openhouse). A questionnaire was developed and distributed to 63 attendees who were asked to provide written feedback on a variety of topics (e.g., wildlife, habitat and heritage values and management activities, silvicultural practices, invasive weed management, access management, recreational use, etc.). Participants were asked to respond in writing by faxing or mailing the completed form to the FWCP office in Nelson.
3. Orthophoto and Vegetation Resource Inventory [VRI] maps were prepared by FWCP staff (Amy Waterhouse and Darin Welch) to assist with field investigations.
4. Field investigations were conducted to verify the accuracy of information gathered from available photos, maps, literature and other sources, to identify management issues and concerns on the ground, and to develop, verify and/or refine required management actions. Fieldwork was conducted by Marlene Machmer and Chris Steeger on September 6, 13, 24 and October 8 and 17. Irene Manley (FWCP) and John Gwilliam (TWA) accompanied MM on the first site visit. Sites or VRI polygons with species features or requiring specific management attention were GPS-located or referenced on maps. The need for more site-specific management plans or prescription development was also identified on site.
5. Based on steps 1-4, a management vision, goals and objectives were developed.
6. Habitat and species conservation and enhancement recommendations were provided for priority guilds/species and for other identified values. Future monitoring, inventory and research needs were recommended and collaborative partnerships of benefit to the FSC were suggested.

## 3. Results

### 3.1 Past and Current Land and Resource Use

This section reviews historical and current land use of the FSC, as well as resource development activities and implications on lands adjacent to the Conservancy.

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<sup>1</sup> Listed species are native species listed as “endangered”, “threatened” or of “special concern” by the BC Conservation Data Centre (CDC) or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

The FSC and adjacent areas within the Lower Columbia Valley comprise part of the traditional territory of the Sinixt (Interior Salish or Lakes people). The traditional life of the Sinixt centred around the Columbia, Kootenay and Slocan Rivers and their tributaries, with their territory extending from Kettle Falls, Washington in the south to Revelstoke, BC, in the north. The Sinixt are a transborder indigenous people, with 20% of their traditional territory located south of the International Boundary and 80% of it located above. The establishment of the border in 1846 complicated and disrupted the free use of their territory and contributed to their gradual orientation south of the border. When they were declared "extinct" by the Federal Government in 1956, several hundred Sinixt were still living in Washington State on the Colville Indian Reservation (Pearkes 2002).

Prior to European contact, the Sinixt occupied several year-round villages near the plan area: at the mouth of the Pend d'Oreille River opposite Ft. Shepherd, at Northport, Washington, and at the mouth of Sheep Creek opposite Northport. Seasonal use has also been documented in the Beaver Creek Valley, in the vicinity of Trail, and at Rossland, an important huckleberry-gathering site. The village at the mouth of the Pend d'Oreille River was thought to be large and well-used up to the time of European contact (Pearkes 2002; Bouchard and Kennedy 2005).

Traditional land use around the Ft. Shepherd site would have included gathering of plant foods (e.g., the edible cambium layer of ponderosa pine, saskatoon berries, oregon grape, chokecherry, and possibly balsamroot sunflower shoots, yellow bell corms or bitter-roots). Bull Trout, sturgeon and other fish would have come from the Columbia and tributary streams, and ocean salmon could be harvested from the Pend d'Oreille River mouth. Marten, muskrat, weasel, bear, caribou, mule deer, mountain goat and coyote were all hunted by the Sinixt and would have been available in the vicinity of the plan area (Bouchard and Kennedy 1980, 2005).

Of several who collected cultural information in the region from elders about traditional use, only the respected ethnographer James Teit recorded that a pre-contact village once stood at the site later occupied by Fort Shepherd, though his identification was less than certain. Archeological remains do indicate that the Fort Shepherd Conservancy lands were used prior to contact (Bouchard & Kennedy 2005).

The establishment of trade forts all through the Pacific Northwest altered traditional use patterns and disrupted previous settlement patterns as native people grew reliant on the forts for trade goods and began to participate in the economic structures of resource extraction rather than gathering, hunting or fishing for subsistence. Between 1820 and the establishment of the border in 1846, Ft. Colville (located at Kettle Falls, Washington) was the centre for trade in the region. Ft. Shepherd was constructed in 1856-57 by the Hudson's Bay Company in response to British concerns that Ft. Colville would be closed by the Americans. Soon after the fort above the border began to operate, it became the headquarters for several hundred Sinixt people. When the fort was temporarily closed between 1860-63, it was left in the care of the Sinixt, and their use of this area continued well into the twentieth century (Pearkes, 2002; Bouchard and Kennedy 2005).

The Okanagan Nation Alliance (ONA) and the Ktunaxa/Kinbasket Tribal Council also claim the Fort Shepherd Conservancy as part of their traditional territory (Bouchard and Kennedy 2005). A survey of potential sites of archeological significance to First Nations was conducted from 1973-1974, in conjunction with hydroelectric development in the Lower Columbia and Pend d'Oreille River systems. Twelve sites of significance were mapped and registered with the province; six of these sites lie either directly within or adjacent to the boundaries of the FSC (J. Forbes; S. Benson, pers. comm.). BC Archeological Site Inventory Forms providing information and maps pertaining to these specific locations and the nature of the artifacts uncovered are on file at the Trail Museum.

The Fort was briefly reopened in 1863 with the discovery of gold in the neighbouring Pend d'Oreille Valley and the subsequent Kootenay gold rush. The Dewdney Trail traversed south through Fort Shepherd and then across the Columbia River and upstream along the Pend d'Oreille River. For a short time, use of the Fort increased and Chinese miners prospecting in the Pend d'Oreille Valley apparently also used the site. The Fort was closed for the last time in 1870, and in 1872, it was destroyed by fire (Turnbull 1954). All that remains is a series of rocks that defined the perimeter of the Fort and a commemorative cairn established in 1951 (Turnbull 1954; The Land Conservancy of British Columbia 2005).

### **3.1.1 Mining**

Local mining activity was prompted by the 1855 discovery of gold at the mouth of the Pend d'Oreille River, and a flurry of placer staking and mine development occurred in surrounding areas. The Trail smelter was built in 1895 and the FSC has been subject to SO<sub>2</sub> emissions and effluent discharge from the smelter since that time. A modernization program initiated in the 1970's and culminating with the 1997 start-up of the KIVCET smelting process has reduced emissions to air and improved water quality (TCML 2004). However, the FSC comprises part of the *Trail Ecological Risk Assessment Area* "area of interest", and a detailed evaluation was conducted to determine if potential metals of concern (e.g., cadmium, lead, arsenic, zinc) pose unacceptable risks to animals, plants, soils, sediments and water (TCML 2004; Enns and Enns 2006; TCML 2007). A stepwise risk assessment screening procedure has identified specific biophysical habitat polygons in the FSC north of Sheppard Creek which (a) do not display site-appropriate plant diversity and structure, (b) have soil metal concentrations that exceed BC CSR standards, and (c) have visible SO<sub>2</sub> injury (TCML 2007). Hence, screening was unable to rule out potential risks to selected biota in the latter polygons (TCML 2007).

An estimated 10% of the FSC is of placer interest and could potentially be affected by exploration activity if extraction proved commercially viable and economic conditions were favourable (G. York, pers. comm.). Currently, four placer mining tenures (#525203, #378512, #378515 and #378516) for FSC are held under *Section 14* of the *Mineral Tenures Act*. Mining activity has been fairly limited to date with only test pits excavated to evaluate mineral content. This work has focussed on foreshore land directly opposite the Trail Airport and downstream on a large gravel bar below the Flats (G. York, pers. comm.). The latter site is in the same area where a previous placer operation was active during the 1990's. Activities associated with working these placer claims include regular access (4x4 truck and/or power boat) to the sites for approximately 30 days per year and potential excavation and stockpiling of rocks and soil using hand tools or potentially also heavy equipment (G. York, pers. comm.).

### **3.1.2 Forestry**

The FSC is located in the Arrow Boundary Forest District of the Southern Interior Forest Region. Although it is located on private land outside the provincial forest land base, there is harvesting activity on adjacent lands to the west managed by ATCO Lumber Co. Ltd. In the last ten years, significant harvesting has been conducted along both sides of Sheppard Creek, and in spring of 2007, another 13.6 ha clearcut (with retention of 1.1 ha of mainly immature deciduous trees) was completed adjacent to the boundary with the FSC's Sublots 8 and 12. These logged areas were significant in terms of mature crown closure and value as wildlife connectivity habitat linking the Fort Shepherd winter range with summer ranges in the Violin Lake and Rosslund areas, as well as into the U.S. (J. Gwilliam, R. Filmore, pers. comm.). Additional harvesting is planned within leave strips along the main Sheppard Creek road over the next five years (R. Ozanne, pers. comm.). This activity is being driven mainly by forest health concerns, and in particular, by mountain pine beetle (*Dendroctonus ponderosae*).

### **3.1.3 Hydroelectric Power Development**

The plan area is characterized by a network of transmission lines and associated access roads owned and operated by a number of entities. These include TCML's four 63 kV lines (L14, L15, L16, L17 from Waneta to Emerald Switching Station in Trail) managed by FortisBC, and BC Hydro's 500 kV transmission line L598 (Waneta east to Christina Lake) managed by British Columbia Transmission Corporation (BCTC). Construction of these transmission lines and associated access roads involved various levels of vegetation clearing, removal of special attributes (veteran, dead and live defective trees), soil disturbance, and fragmentation or alteration of forest, shrubland, grassland and riparian communities.

To maintain transmission line right-of-ways (ROWs), regular aerial patrols and/or ground-based maintenance is required in spring and fall (D. Pickard, K. Dalgarno, pers. comm.). Vegetation management is conducted periodically to remove trees and shrubs that potentially pose a hazard to line security or workers. The latter typically involves cutting larger diameter trees and slashing to remove smaller stems of trees and capable shrubs (i.e., shrubs capable of growing to a height where they can interfere with the conductor). The frequency of vegetation maintenance activities is determined by the limits of approach, and influenced by species composition and topography. TCML lines in this area have relatively short poles requiring treatment every four years, although the relatively recent practice of herbicide treatment may extend this cycle by 1-2 years (D.

Pickard, pers. comm.). The BC Hydro line is treated once within a 6-8 year cycle (K. Dalgarno, pers. comm.). FortisBC typically conducts line maintenance in this area during September to October, whereas BCTC operates from spring through late fall, as dictated by access and snow-free conditions.

Both FortisBC and BCTC have approved Pest Management Plans which permit treatment of deciduous trees and shrubs with herbicide to prevent re-sprouting (D. Pickard, K. Dalgarno, pers. comm.). Such treatment generally targets aspen, birch, cottonwood, alder, maple, willow and other deciduous species. Herbicides (mainly Garlan 4 and Glyphosate) are applied using cut surface, basal bark and backpack foliar methods, depending on site-specific conditions (BCTC 2005). In riparian areas (i.e., herbicide free zones), deciduous trees are girdled to promote slow die-off and halt growth.

During 2007 site assessments, many low shrubs measuring from 0.5 - 2 m in height were noted dead along the TCML ROW. These did not pose a threat to line security and could have provided browse through another vegetation management cycle prior to treatment. Whereas mechanical vegetation methods increase forage availability by rejuvenating decadent browse, the recent switch to herbicides permanently reduces browse availability. Concerns have been raised regarding herbicide use to control shrubs that provide browse for wildlife in the Conservancy.

Vegetation management activities maintain ROWs in an early structural stage which potentially reduces the habitat suitability of affected areas for selected species dependent on snags, crown closure, mature forest, forest interior habitat and/or moist shady growing conditions. Maintenance conducted during the spring and summer months can also result in direct mortality and disturbance to cavity and open-nesting birds or roosting bats through removal of nest/roost trees or shrubs (Steeger and Machmer 1996). Efforts should be made to minimize tree removal in favour of other methods (e.g., topping, girdling, fungal inoculation, mechanical treatments) that retain some structure and/or create habitat, while simultaneously addressing safety concerns. Over time, vegetation maintenance also contributes to progressive warming and drying of the microclimate, predisposing sites to invasive weed encroachment.

Noxious weed species do not typically interfere with line security, hence they have not been a priority target for vegetation management. Nevertheless, BCTC and FortisBC acknowledge the biological impact of noxious weeds and have provided some funding through the Kootenay-Boundary Regional District Weed Program to carry out noxious weed control in the greater area. No funding has been allocated to the FSC (V. Miller, pers. comm.) and there is a perception that this would only be cost-effective if motorized use (the main vector for invasive weed spread) was restricted (D. Pickard, pers. comm.).

Powerline development has facilitated motorized use and there is general consensus that the number of access roads/trails within the FSC is excessive and that a significant percent of the roads could be reclaimed without negatively impacting access requirements to service powerlines (K. Dalgarno, D. Pickard, pers. comm.). BCTC, FortisBC and TCML are willing to meet on site to view the existing road infrastructure, identify essential and non-essential roads and undertake reclamation planning and implementation for the latter. BCTC has also committed to installing two heavy duty park-style gates near the north and west entrances in order to facilitate motorised vehicle use restrictions and ensure the effectiveness of road reclamation efforts (M. Guité, pers. comm.). Clear communication with ROW maintenance contractors will be required to improve the success of these efforts (K. Dalgarno, pers. comm.).

The Columbia Power Corporation has received approval for the construction of a 435 MW powerhouse adjacent to the existing Waneta powerplant, and an associated 10 km long 230 kV radial transmission line adjacent and north of the existing BC Hydro 5L98 line (between Waneta and Selkirk substation). Construction is tentatively scheduled to begin in spring 2009 (L. Mathews, pers. comm.). This project has potential to influence the FSC through increased activity (traffic, construction, animal disturbance and displacement) within the Lower Columbia River corridor. An aggregate crushing plant, rock disposal sites and various laydown and marshalling areas are planned for establishment directly across the river from the FSC on private (TCML) and public lands.

### **3.1.4 Other Utility Corridors**

The Southern Pipeline Crossing completed in late 2000 (Hamilton and McDonough 1997) is currently maintained by Terasen Gas Inc. It crosses the Columbia River at Beaver Creek Provincial Park and traverses along the northern boundary of the FSC. Line maintenance involves regular ground, leak and corrosion surveys that require the persistence of a clear unobstructed corridor. Vegetation management is carried out during the period from early spring to late fall by contractors at five year intervals (R. Shafer, pers. comm.). Treatment involves the removal/brushing of all trees and shrubby vegetation  $\geq 2$  cm in diameter (or with the potential to reach  $\geq 1.5$  m in height) along an 18 m wide ROW. Wildlife/danger trees outside of 18 m ROWs are removed if they can potentially fall on the ROW and/or endanger workers. Wherever possible, low herbaceous vegetation is retained and in riparian zones, cleared widths are reduced to 5 m (I. Ramsey, pers. comm.).

Herbicides are used on the ROW to control re-sprouting of deciduous trees, but invasive weeds are not targeted. To minimize invasive weed spread, contractors are instructed to clean their vehicles and conduct visual checks when moving between sites, and to pressure wash after completion (I. Ramsey, pers. comm.). Terasen considers measures to exclude unauthorized access to gas ROWs (e.g., signage, gates, fences, etc.) to be the responsibility of the landowner, although it may offer assistance to promote exclusion on a case by case basis (R. Shafer, pers. comm.).

### **3.1.5 Agriculture**

Land in the plan area generally has a low capability for agriculture, due to low moisture holding capacity and topographic limitations (Turnbull 1954; Marcoux 1997; Vold et al. 1980). Despite this, Sublots 8, 15, 12 (eastern half) and District Lots 263 and 384 are in the Agricultural Land Reserve.

The TWA apparently planted fruit trees grown at the TCML nursery to provide food (browse and fruit) for deer (R. Filmore, pers. comm.) but no other evidence of cultivation was noted during field surveys. Back in the 1960's, over a hundred cattle grazed on the Flats during spring, summer and fall and shrubs were severely over browsed (R. Filmore, pers. comm.). Grazing leases were terminated under pressure from the TWA and only occasional trespass grazing has occurred on FSC lands by cattle that have roamed into Canada from the US (TWA 2005; G. Rebelato, pers. comm.).

### **3.1.6 Recreation**

Recreation is an important component of land use within the Conservancy and both consumptive and non-consumptive activities are ongoing. TCML has had a land use agreement with the TWA to permit hunting access. Hunting targets mainly white-tailed and mule deer, and to a lesser extent elk, upland game birds (grouse spp., wild turkey), and some carnivores (cougar, coyote, bobcat). The FSC is closed to all motorized vehicles from December 1st to March 1st to limit disturbance to wildlife on the winter range. Hunting during the winter closure period (typically for cougar or coyote during open season) has only been permitted under special permit obtained from the TWA (R. Filmore, pers. comm.). Such hunting typically occurs about once per week, with access provided via a snowmobile or 4x4 and the aid of hunting dogs (R. Frew, R. Filmore, pers. comm.).

Sport-fishing is another popular activity year-round and mainly rainbow trout and walleye are targeted (Steve Arndt, C. Beers, pers. comm.). Popular spots for fishing are shown in Figure 1 (G. Sapruff, L. Hildebrand, pers. comm.). On weekdays, usually 3-4 vehicles plus a few boats frequent the Conservancy and on weekends, the numbers of fishermen and boats are at least double (G. Sapruff, pers. comm.). Based on a recent creel survey on the Lower Columbia, fishing effort has increased significantly since 1991 (C. Beers, pers. comm.). Fishermen have commented on broken glass and garbage accumulations in the areas that they frequent and dust and noise from dirt bikes has been noted as a disturbance during fishing activity (G. Sapruff, pers. comm.).

Non-consumptive uses of the plan area include wildlife viewing, picnicking, hiking, camping, horseback riding, swimming, boating, off-road vehicle (ORV) use (i.e., ATVs, 4x4's, dirt bikes, motorcycles, snowmobiles), snowshoeing and cross-country skiing. The openness of the area offers excellent visibility and an abundance of wildlife can be seen year-round (Appendix 1). On the eastern side of the Columbia River, the shoreline and the

Waneta-Nelway Road hillside also offer excellent wildlife viewing without causing any direct disturbance (R. Frew, pers. comm.).

There are no officially designated hiking trails in the FSC, other than a short trail leading to the Fort Shepherd cairn near the site of Fort Shepherd (the cairn plaque has been vandalized and requires replacement). No designated picnicking or camping facilities or associated amenities (e.g., toilets, potable water supply, parking facilities, etc.) are present. Some campers do use smaller non-designated pullouts and the locations of informal sites with evidence of use for picknicking and overnight camping are shown in Figure 1. They sites are characterized by various types of human impacts including accumulations of large amounts of garbage, broken glass and human waste, construction and use of fire pits, firewood cutting, defacing of trees, soil disturbance, vegetation trampling/loss and weed invasion. Some sites are also heavily infested with poison ivy, which poses direct risks to users.

Horseback riding occurs periodically in the FSC, and in the past, riders apparently used roads, trails and off-road areas (W. Taylor, pers. comm.). A concerted effort is now being made to confine horses to the main road (R. Filmore, pers. comm.). The Trail Horsemen and Backcountry Horsemen Societies apparently have 1-2 annual rides in FSC each spring. There have been some concerns expressed about the impacts of horses on soils and weed encroachment in off-road areas. Isolated conflicts and near-accidents resulting from the disturbance of horses and their riders by dirt bikers have also been reported (R. Filmore, pers. comm.). In general, there appear to be conflicts between various user groups, such as hunters, fishermen, wildlife and outdoor enthusiasts seeking viewing and photography opportunities and motorized recreationists (especially dirt bikers) that are perceived as making noise, stirring up dust and scaring away wildlife. Several people commented that noise, dust and disturbance associated with motorized use detracted from their enjoyment and experience of the area.

Boats frequenting the Conservancy are typically launched from across the Colimbia River near Fort Shepherd or upstream from Beaver Creek Provincial Park. Due to a lack of nearby facilities, swimming, mountain biking, snowshoeing and cross-country skiing appear to be conducted at relatively low levels (R. Filmore, R. Frew, E. Beynon, pers. comm.)

Unauthorized ORV use of the FSC area (as well as the properties directly to the north) has been an ongoing issue for land management personnel at TCML (S. Hilts, pers. comm.). Efforts to discourage ORV impacts and promote more responsible use have included (a) posting of restrictive signage, (b) creating berms/barriers to exclude ORV's from sensitive areas, (c) trucking out accumulations of garbage, bottles and debris dumped by ORV users at considerable expense, and (d) hiring a security company for a summer to patrol problem areas and hand out educational pamphlets with guidelines for responsible ORV use (W. Taylor, pers. comm.). Measures a, b and c had no effect because signs were ignored, routes were created around barriers and new garbage accumulated. Measure d had a short term benefit, but misuse of the area resumed once the on-site supervision was withdrawn (W. Taylor, pers. comm.). The general conclusion from these efforts appeared to be that without on-site surveillance and enforcement capability, ORV use impacts will be an ongoing problem.

The popularity of the FSC continues to grow among ORV users and several stakeholders commented that levels of activity have increased substantially in recent years, both within the Conservancy and on TCML lands to the north. ORV pressure may be increasing because (a) accelerated development in surrounding areas and (b) other nearby areas popular with ORV users have been blocked off in recent years and increased reliance on the FSC (e.g., Sunshine Road through Kelly Creek from Fruitvale and down into the Pend d'Oreille Valley; D. den Biesen, pers. comm.). Apparently, the Conservancy is one of the first areas accessible to ORVs in early spring and it remains usable until late fall, when other areas such as the Bombi Summit track area are under snow cover (W. Taylor, pers. comm.).

A variety of problems have been noted as a direct result of ORV use. These include the accumulation of large amounts of garbage (e.g., bottles, cans, plastics and debris), the construction of dirt jumps, and the building of illegal structures, fire pits and firewood cutting (Schaeffer et al. 2002; W. Taylor, pers. comm.). Many users do not stay on existing roads and there has been an alarming proliferation of new roads, dirt tracks and trails in recent years (J. Gwilliam, pers. comm.). Significant soil disturbance in the form of rutting, compaction and erosion has resulted. Vegetation loss and invasive weed spread are evident in disturbed zones and they are

also encroaching into surrounding areas (R. Filmore, pers. comm.). Invasive weeds are a serious concern in terms of their effects on the primary values of the Conservancy (e.g., wildlife habitat, biodiversity, archeological, heritage and recreational values).

ORV use results in direct disturbance to wildlife and biodiversity, caused by noise, dust, roadkill and/or off-road mortality (e.g., crushing of animals, their nests, burrows, dens, etc.). Two road-killed snakes were detected on the main FSC road during fieldwork, and roadkill mortality has been identified as a serious concern for herptiles throughout the Lower Columbia corridor and Pend d'Oreille valley due to the abundance of road-killed listed herptiles (e.g., racers, rubber boas, western skinks, western toads; see Machmer 2007, 2008). Such mortality is occurring both on paved roads and on secondary and more remote gravel and dirt roads (Machmer 2007, 2008). ORV impacts to wildlife habitat also occur indirectly through progressive trampling and loss of vegetation that provides forage, cover and breeding substrate for wildlife and their arthropod prey.

During field assessments, ORV use was observed seriously degrading two sensitive sites with demonstrated high wildlife/habitat value and one site with high habitat potential. The high value sites included the riverine mudflat, shorelines and shallows of high value to waterfowl and shorebirds (a) near the north boundary of the plan area and (b) opposite the TCML Reload facility (both in polygon 672 of Figure 2). In the case of both riverine sites, The mudflats and shallows were severely impacted by mudbogging and four-wheeling activity (by 4x4's and ATVs) resulted in an extensive network of tire tracks, depressions and deep ruts on the mudflat that were still 100% visible in late October. Extensive foraging and loafing activity by a large diversity of waterfowl and shorebirds, including listed great blue herons and western grebes was documented at both these sites through September. After the initial damage was noted in mid-September, no further wildlife use was observed. ORVs also impacted the steep sandy slopes on the south side of the gasline with potential nesting/roosting value to bank swallows (polygon 220 in Figure 2). Bank swallows were observed inspecting small cavities along the steep sandy slopes on the south side of the gas line in September. These holes have potential to provide nesting or roosting habitat for this species, if undisturbed. Dirt bikers used slopes in this area on several occasions and destroyed the cavity formations; severe erosion and mass wasting is now evident on the lower slope and into the unnamed ephemeral creek below. Dirt biking activity in this area is also undermining the revegetation effort along the adjacent gasline.

In addition to wildlife, biodiversity and habitat impacts of ORV use, there is considerable concern regarding unsafe ORV practices (e.g., excessive speed, high risk descents, lack of attention and safety protection) and the potential for collisions and accidents, possibly involving injuries or deaths. The new strategy for ORV use (Vold and Sranko 2005) can certainly provide some guidance to promote more responsible use, however the recommendations and pending legislation only address use of crown land. Questions have been raised about potential liability on the part of TLC, its Board of Directors, and the FSC Management Board if ORV use is permitted in the FSC, and a serious injury or casualty results (G. Kenyon, pers. comm.). Given the known wildlife-habitat impacts and the legitimate liability concerns that surround use of ORVs, coupled with the lack of enforcement capability or surveillance resources for private land (T. Pearce, pers. comm.), it ultimately remains the responsibility of the landowner to adequately protect their land and themselves.

### **3.1.7 Access Management**

There are two main four-wheel drive access routes into the plan area: (a) from the north via Riverside Road and Casino Creek onto main Fort Shepherd Road and (b) from the west through Maldie Creek drainage or from Violin Lake Road connecting to the BC Hydro powerline road. A forestry access road built by Atco Lumber Co Ltd. to log blocks in Sheppard Creek (cutting permit 161) may also provide access to FSC via the BC Hydro powerline, unless these roads are recontoured as soon as possible (C. Stemmler, pers. comm.).

The main road through the plan area traverses the entire length of the Conservancy and various dirt roads branch off this road to the cairn, flats, mouth of Sheppard Creek, and onto the BC Hydro and TCML powerline roads. A large number of access roads, spurs and trails were noted forking off the main road and the BC Hydro and TCML powerline access roads (many did not appear necessary to service the powerlines). Unfortunately, these roads are currently being used by ORVs and considerable damage. Concerns have been raised in relation to road damage and erosion, invasive weed spread, vandalism of signage, hydroelectric equipment (i.e., shooting of insulators, conductors, poles) inflicted by motorized users (D. Pickard, K. Dalgarno, pers. comm.).

Some parties see a need to restrict access to reduce damage, habitat degradation, wildlife disturbance and weed encroachment.

As previously mentioned, the entire plan area is closed to motorized vehicle use from December 1 to March 1. This closure was generally adhered to for many years, however signs posted along both the north and west access points fell down and were not immediately replaced, hence more violations have occurred in recent years (R. Filmore. pers. comm.).

### **3.1.8 Invasive Weed Management**

Invasive weeds are non-native species free of natural predators that colonize areas and replace endemic vegetation. By virtue of their aggressive growth and abundant seed production, these plants spread rapidly and extensively, often forming dense patches over large areas. Invasive weeds are considered one of the largest threats to biodiversity on the planet, second only to habitat loss (Cranston et al. 2005). Weed impacts include degrading wildlife habitat, reducing biodiversity and contributing to the extinction of rare and endangered native species, reducing crop yield/quality and forage availability for grazing species, increasing wildfire hazard and soil erosion, reducing riparian values and streambank stability, interfering with forest regeneration, and impacting recreational opportunities.

The dry climate and abundance of ROWs, roads and open terrain subject to anthropogenic disturbance in the FSC provide ideal conditions for the establishment and spread of weeds. Not surprisingly, weed abundance is very high in some areas. Data from field assessment, previous weed surveys (Schaeffer et al. 2002) and the MOFR (2007) Invasive Alien Plant Program (IAPP) website was used to develop a list of invasive weed species confirmed on the FSC properties. Information was also obtained from the Central Kootenay Weed Committee Coordinator (J. Craig), the MOFR Invasive Plant Officer (V. Miller) and an invasive plant strategy recently prepared for the Central Kootenay area (Wikeem 2007). Based on these sources, at least 12 species of invasive weeds are found on or relatively close to the FSC. Of these, 8 are classified as *noxious* under the *Weed Control Act* (5 provincially noxious and 3 noxious within the Kootenay- Boundary Regional District). Invasive species are itemized in Table 2 with brief comments regarding their status, distribution, abundance, past control, recommended control and priority for treatment (low, medium, high). Implementation of control recommendations will require partnerships with other stakeholders to be successful.

Spotted knapweed continues to be a high priority for control in the FSC. It is widespread and abundant, particularly at intersections, along roadsides (main road and especially along the BC Hydro and TCML access roads), on some ROW sections, and in other disturbed areas (e.g., trails, tracks, pullouts, informal campsites). Annual chemical treatment of infested areas with Tordan (a selective residual herbicide that can remain in the soil for several years) over many years, coupled with road closures and minimization of disturbance would be the most effective means to establish control (V. Miller, pers. comm.). This approach is acceptable to many stakeholders, but would need to be coupled with access restrictions to improve effectiveness.

A diffuse knapweed infestation is currently found in the Columbia Gardens area and there are small patches on the Fort Shepherd side, but this species is not as widespread (J. Craig, pers. comm.). Hoary alyssum along the road to Casino and across the river at Columbia Gardens (MOFR 2007) is a high priority and should be chemically treated to prevent its' spread into the Conservancy. Common tansy found isolated on the Flats along Sheppard Creek is a medium priority for treatment and can be dealt with through prevention of disturbance and manual removal of plants to prevent dispersal. Dalmation toadflax is a medium priority and several bio-control releases have been conducted targeting this species. Minimizing disturbance on the Flats and powerline access roads is critical to prevent further spread.

In addition to the species confirmed in the FSC, Wikeem (2007) lists many other invasive species known to occur in the Lower Columbia Valley and/or further west at Casino (e.g., burdock, common hound's tongue, curled dock, orange hawkweed, oxeye daisy, bull, nodding, plumeless and scotch thistles, etc.). He also lists other species likely to invade this area based on their recent establishment in other jurisdictions. Land management personnel involved in the FSC need to be aware of these species, in order to promote rapid detection and response to any new invasions.



Table 2. Invasive species confirmed in the FSC based on assessment and data from past surveys. Invasive species confirmed based on assessment and past surveys (Schaeffer et al. 2002; MOFR 2007). Weed status (P = provincially noxious; R = regionally noxious species; N = nuisance weed), distribution, abundance, and past and recommended current control strategies and methods (based on Wikeem 2007) are listed.

Weed Name	Status	General Distribution & Abundance/Location in FSC	Past Control and Recommended Current Control Strategy and Methods	Control Priority
Black locust <i>Robinia pseudoacacia</i>	N	Inventory incomplete, but widespread throughout lower drier variants of the CKIPC area; found along Casino Creek and along main road in FSC, but not yet very abundant.	Contain existing populations through mechanical means by cutting back main stem; hit with round-up when it sprouts. Eradicate new infestations through mechanical/chemical means, where feasible.	low
Canada thistle <i>Cirsium arvense</i>	P	Low density infestations that are widely distributed throughout the CKIPC area; isolated plants noted on the lowest bench of the Flats; also across the river at Beaver Creek Provincial Park.	Prevention by re-seeding sites and minimizing soil disturbance to contain existing populations.	low
Common tansy <i>Tanacetum vulgare</i>	R	Inventory incomplete but likely pockets scattered through drier variants of the CKIPC area; a few isolated patches on the Flats along the road and Fort Sheppard creek in polygons 587 & 671.	Priority is to control and contain populations near or in riparian habitat; monitor and eradicate by manually removing plants; limiting dispersal along riparian corridors is critical.	medium
Dalmation toadflax <i>Linaria dalmatica</i>	P	Established low to high-density infestations that are widely distributed throughout the CKIPC area; in FSC, occasional plants along the the lowest bench on the Flats in polygons 587, 588, 671 and 672; also isolated plants on BC Hydro ROW.	Several releases of bio-control agents in the Lower Columbia Valley at Beaver Creek beginning in 1994; monitor existing sites to make sure bio-control agents established on plants. Prevent disturbance and supplement with pulling/collecting flower heads.	high
Diffuse knapweed <i>Centaurea diffusa</i>	R	In CKIPC area, established infestations along transportation corridors and areas of concentrated activities. Current infestations in Waneta/Columbia Gardens; some plants noted along the roadsides and BC Hydro powerline in FSC.	Releases of multiple bio-control agents were initiated in the 1970's; containment of populations is current focus through mechanical, cultural and bio-control.	low
Mullein <i>Verbascum thapsus</i>	N	Widespread throughout CKIPC; widespread along roads, ROWs, trails and disturbed sites in the FSC.	Prevention by re-seeding disturbed sites and minimizing soil disturbance to contain existing populations.	low
Hoary alyssum <i>Berteroa incana</i>	R	Patchy distribution in with some established infestations along transportation corridors and/or disturbed areas; found along roadsides to Casino and at Columbia Gardens (MOFR 2007).	Eradication of small patches using chemical treatment and hand-pulling to contain existing populations in Casino and minimize further spread beyond current distribution and into FSC.	high
Spotted knapweed <i>Centaurea maculosa</i>	P	Ubiquitous and widespread throughout CKIPC, especially along roads, ROWs, and disturbed sites; widespread along roads, ROWs, trails and disturbed sites in the FSC.	Extensive releases of bio-control agents conducted 1987 to 2006. Eradicate new populations with chemical control (Tordon); supplement with mechanical, cultural and bio-control.	high
St. John's wort <i>Hypericum perforatum</i>	N	Established infestations that are widely distributed through the CKIPC area; isolated patches on dry slopes of FSC property; spread out in many polygons.	Several bio-control agents released but only established at low levels; some populations are out of phase with the agents. For new infestations, remove seed heads and dig up rosettes.	low
Sulphur cinquefoil <i>Potentilla recta</i>	P	Found on Trans Canada Trail and in Pend d'Oreille Valley (B. Stewart, pers. comm.); also on BC Hydro powerline access road.	Eradicate using herbicide (bio-control is not effective).	high
Witchgrass <i>Panicum capillare</i>	N	Isolated plants in disturbed portions of polygon 672 and 224 near the northern boundary of FSC. May also be found elsewhere.	Use mechanical control (to dig up plants and prevent seeding) to address isolated plants.	low
Yellow toadflax <i>Linaria vulgaris</i>	P	Schaeffer et al. 2002 reported this species on the lowest bench of the Flats; presence not re-confirmed during 2007 assessments.	Unlikely to be present (V. Miller, pers. comm.). If detected, eradicate new populations by pulling and collecting flower heads.	low

The MOFR has released several biocontrol agents to address spotted and diffuse knapweed, dalmation toadflax and St. John's wort in the Lower Columbia Valley with mixed success (V. Miller, pers. comm.). Although the neighboring Pend d'Oreille Valley has been the focus of considerable attention with respect to invasive weed control (reviews in Gwilliam 2003; Machmer et al. 2006), the FSC has received comparatively little attention.

### **3.1.9 Forest Health Management**

Based on field assessments, a review of fixed wing aerial overview survey data and discussions with MOF staff, forest health agents in the FSC are generally occurring at endemic levels (R. Mazzocchi, J. Castonguay, A. Stock, pers. comm.). The properties are too low in elevation to support large densities of mature lodgepole pine susceptible to mountain pine beetle. Mature ponderosa pine is also susceptible, but it typically occurs in mixed species stands with Douglas-fir, and sometimes a deciduous component. Douglas-fir beetle (*Dendroctonus pseudotsugae*) populations active at lower elevations peaked locally in 2002/2003 and they appear to be in decline in the Arrow-Boundary Forest District (J. Castonguay, pers. comm.). Although fir beetle infestations have the potential to be chronic on dryer, south-facing sites with ridges or steep slopes, they tend to be site-specific and localized (A. Stock, pers. comm.). Similarly, Armillaria root disease (*Armillaria ostoyae*), although present in isolated stands, is also typically patchy.

Paper birch (*Betula papyrifera*) decline is common in the Southern Interior Forest Region and appears to be the main forest health issue of concern in the FSC. Birch decline is actually the result of several factors working together or in sequence, including abnormally warm winters, root exposure, prolonged drought stress, old age and an insect complex of bronze birch borer (*Agrilus anxius*) and birch leaf miner (*Fenusa pusilla*). Over time, birch decline prevents normal tree growth and defensive processes, thereby hastening tree ageing and death. Symptomatic trees have sparse foliage and tops with dead branches, which are apparent in the FSC, particularly where birch makes up a large component of the existing forest cover (i.e., treed broadleaf and mixed polygons in Figure 2). The insect complex that contributes to birch decline has been increasing steadily in the southern interior over the last 3-4 years (Katovitch et al. 2006) and there is potential for significant birch tree mortality and failure in birch-dominated stands. Predisposing factors such as warm winters and drought stress associated with climate change are likely to exacerbate this forest health condition (A. Stock, pers. comm.).

### **3.1.10 Wildlife and Habitat Management**

Over the last 40 years, the TWA has worked in collaboration with TCML to manage the FSC's high value winter range (R. Filmore, G. Kenyon, R. Frew, pers. comm.). TWA members have undertaken a variety of initiatives aimed primarily at enhancing wildlife populations and their habitats in the FSC. These activities are summarized in Table 3, based on information supplied by Rick Filmore. In addition to the work undertaken by TWA, other student and community volunteers have participated in garbage cleanup drives and tree-planting in the FSC (W. Taylor, S. Hilts, G. Rebelato, pers. comm.).

Other wildlife-habitat related initiatives conducted on one or more properties that comprise the FSC include:

- a deer habitat restoration enhancement project to promote increased deer numbers; the latter involved a spotted knapweed mapping component (Gwilliam 1986);
- terrestrial ecosystem mapping (Marcoux 1997);
- a wildlife habitat inventory of Sheppard Creek focussing on game species (Hurlbert et al. 1998);
- an assessment of wildlife habitat enhancement potential in relation to fume kill impacts on the Lower Columbia River (McDonaugh and Hamilton 2000);
- a biodiversity inventory of Lower Fort Shepherd that addressed birds, small mammals, bats, reptiles, amphibians, selected arthropods and invasive weeds (Schaeffer et al. 2002);
- bat roost inventories (Vonhof and Gwilliam 2000; Sarrell et al. 2004; Hill et al. 2004) and an assessment of Townsend's big-eared bat roosting habitat (Deschenes 2003);
- a Yellow-breasted Chat survey (Machmer and Ogle 2006); and
- bio-physical habitat mapping (Enns and Enns 2006) and various vegetation, soil and wildlife inventories conducted in conjunction with the Trail Ecological Risk Assessment (Teck Cominco Metals Ltd. 2007).

Table 3. Management activities undertaken by TWA at the FSC (based on information supplied by R. Filmore, pers. comm.).

Time Frame	Wildlife and Habitat Management Activities
1968 - 1969	TWA approached TCML and requested that existing cattle grazing leases be revoked because of overgrazing. TCML prepared a habitat recovery plan to address deer starvation mortality that occurred during the cold, heavy snowfall winter of 1968/1969.
1970 - 1972	Volunteers initiated prescribed burns in an effort to rejuvenate decadent fire-dependent shrubs.
1973	Apple trees grown at TCML's nursery were planted to provide browse and fruit for deer.
1974 - 1979	Prescribed burning was continued in some areas and brushing was conducted in more sensitive zones to rejuvenate decadent browse.
1975 - 1980	Tons of TCML fertilizer were spread on the Flats in an effort to increase productivity.
1980	Volunteers planted browse shrubs along the newly constructed BC Hydro powerline right-of-way corridor, where motorized use was becoming an issue.
1982	TWA petitions the Nelson Fish & Wildlife Branch to close upper roads to motor vehicles during hunting season to protect wildlife.
1983	Spotted knapweed infestation becomes noticeable on ROW; TWA alerts BC Hydro to the issue.
1984 - 1989	Prescribed burning is continued and coniferous trees are pruned up to six feet high in order to fireproof trees and improve ungulate mobility in deep snow.
1984 - 1985	Numerous feeder boxes are built and installed on lands close to the Columbia River during a heavy snowfall winter. Volunteers supply hay and alfalfa pellets to feed deer through the winter.
1989	In conjunction with the Fish & Wildlife Branch, TWA trap six mule deer along the Flats and apply visual collars which are later spotted near Rossland.
1990 - 1992	Nearly 4000 Douglas-fir and ponderosa pine trees are planted on benches to provide cover and thermal breaks for deer; survival rate is low. Red stem ceanthosus plants are grown in home nursery and transplanted to north gullies.
1993	Bird boxes are established on trees along the Flats for use by cavity nesters.
1994	Feeding of approximately 250 deer continues during this heavy snowfall winter.
1995	TWA enters into a partnership with the FWCP to undertake a three year study to identify the condition of vegetation and soil for future prescribed burning.
1998	Five mule deer are captured, collared and monitored. Ongoing monitoring indicates that deer travel into the USA and northeast to Violin Lake area and Rossland.
1999	FWCP initiate a helicopter burn on upper ridges with help from volunteers.
Ongoing	TWA has made attempts to manage access to reduce damage by ORVs.

## 4. Relevant Legislation and Guidelines

As a private landowner, TLC is subject to federal, provincial and municipal laws. Acts and regulations relevant to the management of private land include (but are not limited to) those summarized in Table 4. The main applications of each Act are listed in the table, and links to the relevant legislation are provided. Acts considered a priority in the context of this land management strategy are elaborated on in this section.

### *Species At Risk Act (SARA)*

The federal Act established in 2002 makes it an offence to kill or harm listed species at risk (SARA Section 32) or damage their residence (SARA Section 33). These prohibitions apply directly to federal lands and to private lands in the case of terrestrial species listed under the Migratory Birds Convention Act and aquatic species under the jurisdiction of the Department of Fisheries and Oceans. For all other species at risk, the Act relies on a spirit of cooperation and good stewardship to ensure that provincial and private authorities address their responsibility to manage for listed species. The Province of BC is currently developing legislation to

manage species at risk on private land and provincial crown. Recovery strategies and action plans are being developed for all threatened and endangered species listed on SARA Schedule 1. We are not aware of any recovery plans that identify the FSC as critical habitat for listed wildlife.

Table 4. Legislation relevant to private land, their main applications, and lead federal, provincial and municipal agencies responsible.

Legislation	Main Applications	Lead Agency
Environmental Management Act	Regulations pertaining to environmental impacts and emergencies (spill prevention and reporting; hazardous waste disposal, storage, transport; waste management; contaminated site remediation) as well as clean air provisions ( <a href="http://www.qp.gov.bc.ca/statreg/stat/E/03053_00.htm">http://www.qp.gov.bc.ca/statreg/stat/E/03053_00.htm</a> )	Ministry of Environment
Heritage Conservation Act	Regulations pertaining to the conservation of heritage sites, objects or assets ( <a href="http://www.qp.gov.bc.ca/statreg/stat/H/96187_01.htm">http://www.qp.gov.bc.ca/statreg/stat/H/96187_01.htm</a> )	Ministry of Tourism, Sports and the Arts
Integrated Pest Management Act	Regulations pertaining to the sale and use of pesticides ( <a href="http://www.qp.gov.bc.ca/statreg/stat/I/03058_01.htm">http://www.qp.gov.bc.ca/statreg/stat/I/03058_01.htm</a> )	Ministry of Environment
Migratory Bird Convention Act	Regulations pertaining to the protection of birds migrating between Canada and the United States ( <a href="http://laws.justice.gc.ca/en/showtdm/cs/M-7.01">http://laws.justice.gc.ca/en/showtdm/cs/M-7.01</a> )	Environment Canada
Mine's Act	Regulation pertaining to all matters relating to energy, mineral and petroleum resources ( <a href="http://www.qp.gov.bc.ca/statreg/stat/M/96293_01.htm">http://www.qp.gov.bc.ca/statreg/stat/M/96293_01.htm</a> )	Ministry of Energy and Mines
Navigable Waters Protection Act	Regulations pertaining to the construction or placement of "works" on, over, under, through or across any navigable water ( <a href="http://laws.justice.gc.ca/en/notice/index.html?redirect=%2Fen%2FN-22%2F">http://laws.justice.gc.ca/en/notice/index.html?redirect=%2Fen%2FN-22%2F</a> )	Transport  Canada
Occupiers Liability Act	Regulations prescribing the duty and standard of care towards persons entering onto private lands or premises ( <a href="http://www.qp.gov.bc.ca/statreg/stat/O/96337_01.htm">http://www.qp.gov.bc.ca/statreg/stat/O/96337_01.htm</a> )	Ministry of Attorney General
Regional District Zoning Bylaws	Regulations pertaining to permitted land uses on private land ( <a href="http://www.rdck.bc.ca/publications/bylaws/1675.pdf">http://www.rdck.bc.ca/publications/bylaws/1675.pdf</a> )	Regional Districts
Species At Risk Act	Protection of species at risk, their residences and critical habitat ( <a href="http://www.sararegistry.gc.ca/the_act/default_e.cfm">http://www.sararegistry.gc.ca/the_act/default_e.cfm</a> )	Environment Canada
Trespass Act	Regulations pertaining to access to posted and enclosed land ( <a href="http://www.qp.gov.bc.ca/statreg/stat/T/96462_01.htm">http://www.qp.gov.bc.ca/statreg/stat/T/96462_01.htm</a> )	Ministry of Attorney General
Water Act	Regulations pertaining to the <i>licensing</i> , diversion and use of water and related matters ( <a href="http://www.qp.gov.bc.ca/statreg/stat/W/96483_01.htm">http://www.qp.gov.bc.ca/statreg/stat/W/96483_01.htm</a> )	Ministry of Environment
Weed Control Act	Protection of natural resources from the negative impacts of weeds ( <a href="http://www.qp.gov.bc.ca/statreg/reg/W/66_85.htm">http://www.qp.gov.bc.ca/statreg/reg/W/66_85.htm</a> )	Ministry of Agriculture, Food and Fisheries
Wildfire Act	Regulations for forest fire prevention, suppression and control of destructive agents ( <a href="http://www.for.gov.bc.ca/tasb/legsregs/wildfire/wildfireact/wildfire.htm">http://www.for.gov.bc.ca/tasb/legsregs/wildfire/wildfireact/wildfire.htm</a> )	Ministry of Forests and Range
Wildlife Act	Regulations pertaining to the possession, capture, handling, hunting, trapping and treatment of wildlife (this act is currently under revision) ( <a href="http://www.qp.gov.bc.ca/statreg/stat/W/96488_01.htm">http://www.qp.gov.bc.ca/statreg/stat/W/96488_01.htm</a> )	Ministry of Environment
Worker's Compensation Act	Industrial Health and Safety Regulations ( <a href="http://www.qp.gov.bc.ca/statreg/stat/W/96492_00.htm">http://www.qp.gov.bc.ca/statreg/stat/W/96492_00.htm</a> )	Worker's Comp. Board

#### *Migratory Bird Convention Act (MBCA)*

This federal Act was established in 1994 to implement a Convention for the protection of migratory birds in Canada and the US. The Act addresses the killing of migratory birds and damage, destruction, removal or disturbance of their nests. With respect to the occurrence of migratory birds on FSC lands, a relevant issue of concern is the effect of commonly used vegetation management practices (e.g., wildlife/danger tree removal, brushing, herbicide application to control deciduous tree re-sprouting) and associated impacts (e.g., invasive weed spread) on migratory birds breeding in these habitats.

#### *Wildlife Act*

The BC Wildlife Act protects most vertebrate animals from direct harm or harassment except as allowed by regulation (e.g., hunting or trapping). Legal designation provides additional protection for selected red- and blue-listed species and their residences. Section 34 of the Wildlife Act specifically protects the nests of

eagles, peregrine falcons, gyrfalcons, ospreys, herons and burrowing owls year-round, as well as the nests of all other birds when these birds or their eggs are in the nest. A new *Wildlife Act* is currently being drafted for introduction to the Legislature in 2008. Protocols for removing wildlife trees, raptor nest structures or other open nests from adjacent to roads, energized lines and ROWs should be reviewed.

#### *Weed Control Act*

The BC Weed Control Act imposes a duty on all land occupiers (landowner, renters, leasers, managers) to control designated noxious weeds. Plants confirmed in the FSC that are classified as noxious and subject to the provisions of the Act are listed in Table 2.

## 5. Public Consultation

A total of eight responses (from 63 attendees signed in) were received to a questionnaire distributed at the public openhouse on March 28, 2007. Responses are summarised in this section and the minutes of the openhouse are provided in Appendix 3. Overall, many of the comments made at the open house related to concerns regarding access to FSC and the area to the north owned by TCML. Concerns were expressed regarding motorized use (dirt bikes, ATVs and 4x4's) impacts, the current status and potential changes to motorized access on these lands, ORV legislation and enforcement, and the need to establish clear signage, rules, rider awareness and education, etc. Other human use impacts (garbage accumulation, vandalism, disturbance, invasive weed spread) were also frequently mentioned. Several people expressed the need for strategies to promote responsible use and stewardship of the area, and to lessen habitat and disturbance impacts. This same message was reiterated by most of the agency personnel and stakeholders interviewed directly.

Many participants want to see the area conserved for wildlife but also want to ensure that hunting and fishing use continues to be permitted. Placer miners representatives expressed concerns regarding their rights to access and work their claims. First Nations representatives stated that they were supportive and hoped to collaborate and potentially realize some educational or training benefits through this conservation initiative.

Attendees were asked to assign ranks (1 = highest; 5 = lowest) to various wildlife guilds and habitat types of the plan area. They ranked all wildlife guilds relatively high in terms of priority for management and/or conservation emphasis, but overall, ungulates, mammals and various rare and endangered taxa (vertebrates, plants and invertebrates) ranked highest (1.5 – 1.6; Table 5). Birds in general and raptors, cavity nesters and other wildlife tree users in particular ranked intermediate (1.9 – 2.0), whereas large carnivores, reptiles and amphibians were ranked lowest (2.1 – 3.0). In terms of habitat types, winter range ranked highest (1.3), coniferous, mixed and old forests and shrublands ranked intermediate (1.9 – 2.0), and deciduous forests, native grasslands, and riparian, wetland and rocky habitats ranked lowest (2.1 – 2.9) in priority.

Table 5. Priority ranks assigned to wildlife guilds and habitat values in the FSC. Priority ranks assigned to wildlife guilds and habitat values in the FSC. Participants were asked to assign ranks of 1 (highest) to 5 (lowest) to each guild/habitat type, and mean ranks (average of all responses per wildlife or habitat category) are shown.

Priority Rank (1-5) for Wildlife Guilds	Mean	Priority Rank (1-5) for HabitatTypes	Mean
ungulates	1.5	winter range	1.3
mammals	1.6	coniferous forests	1.9
rare and endangered vertebrates	1.6	mixed forests	1.9
rare and endangered plants	1.6	shrublands	1.9
rare and endangered invertebrates	1.6	old forests	2.0
birds	1.9	deciduous forests	2.1
raptors	1.9	native grasslands	2.3
cavity nesters & other wildlife tree users	2.0	riparian and wetland areas	2.7
large carnivores	2.1	rocky habitats	2.9
reptiles	2.7		
amphibians	3.0		

Participants were asked what heritage values of the FSC were most important to them and six responded that the site of old Fort Shepherd was very important to them. Values mentioned by two other respondents include the Dewdney Trail and First Nations occupation sites.

Participants were asked to rank (i.e., strongly agree, agree, disagree, strongly disagree) various silvicultural practices as a means to satisfy wildlife and habitat enhancement objectives. Most were in favour of a wide range of silvicultural practices, but a notable exception was clearcutting, which 62.5% strongly disagreed with and the remaining 37.5% disagreed. Only 25% disagreed with partial cutting and agreement rates (either strongly agree or agree) for spacing, pruning, brushing and tree planting were all 100%. In the case of prescribed burning, 25% of respondents disagreed with this practice and the remaining either agreed or agreed strongly. Two thirds of respondents agreed with the use of fertilizer. Herbicide use was a silvicultural practice flagged as unacceptable (strongly disagree) by one respondent and another mentioned their strong agreement with the need for weed control (type of control not specified).

When asked about concerns/comments regarding management activities potentially or recently used in the FSC, responses included the following: (a) clearcutting is damaging and should not be contemplated (1 respondent), (b) motorized vehicle use is destroying natural habitat and should not be permitted (1), (c) areas need to be limed before planting (1), (d) more burning should occur (2), and (e) power companies should not be able to drive over Sheppard Creek, other than on the main road (1).

With regards to wildlife feeding, wildlife hunting, wildlife human interactions and wildlife disturbance, there seemed to be some consensus that hunting should continue to be permitted. Specific comments included the following: (a) hunting should be permitted (2 respondents); (b) some access should be retained to keep cougar and coyote numbers in check during the winter (1), (c) snowmobiles should not be permitted, except for cougar hunting (1), (d) hunting should be allowed till the end of the bow season to keep wildlife from coming onto the winter range too early (1), (e) elk numbers should be kept lower as they outcompete deer on the range (1), (f) no off-roading at all should be permitted and only one main road should be open to vehicles (2), (g) no motorised vehicle use sign should be moved closer to the north end (1), (h) all wildlife disturbance should be avoided but wildlife feeding in hard winters is acceptable (1), (i) keep deer numbers down, so that the range is in good shape for a bad winter (1), and (j) hunting season closure and access restriction closure dates should be the same (1).

With respect to forest health, few concerns were expressed. One person felt pine beetle should be considered and that dead trees and brush should be cleared to avoid wildfires. A second felt that tent caterpillars should be controlled. In terms of weed control, all but one respondent agreed that there is a problem in the plan area and that various actions to control weeds are required. Use of chemical control (herbicides), biological control, mechanical control and education (prevention) were all mentioned as options and >50% of respondents felt herbicide use to be acceptable. One respondent stated that BC Hydro and FortisBC should be accountable for their role in the extreme spread of knapweed along powerline access roads. Another indicated that use of herbicides to kill shrubs under powerlines was not acceptable and detrimental to wildlife habitat.

Repondents indicated that they use the FSC area as follows: hunting (6 respondents), fishing (5), wildlife viewing/wildlife photography (5), hiking (2), camping (1), ATV use (1), dirt-biking (1), 4x4 use (1), access to placer claim (1) and youth-teaching (1). With regards to recreational activities currently or potentially conducted in the area, the following concerns were expressed: (a) motorized vehicles including trucks, 4x4's, ATVs, motorcycles and snowmobiles are causing impacts and no motorised vehicles should be permitted to leave the main road (6 respondents), (b) motorized vehicles (trucks, 4x4's, snowmobiles) are using the FSC in winter and should not be permitted to (2), (c) garbage-dumping by recreational vehicles is occurring (2), (e) overnight camping should not be permitted due to garbage, partying and disturbance (2), (f) activities like snowshoeing, cross-country skiing and hiking are not invasive and should be permitted (1), (f) horses and livestock should be excluded because of erosion and weed impacts (1), (f) boat and car wrecks should be removed from the river (1), (f) dirt bikes going uphill do cause ruts, but so do deer trails (1).

In terms of other land uses of the area, the following comments were made: (a) miners permitted to operate in the Conservancy is an issue of concern, and TLC needs to ensure that any mined areas are reclaimed to

their current condition (2 respondents), (b) mining plans need to be reviewed to ensure no impacts to the winter range (1), (c) mining activity is using hand equipment and there is only occasional use of the FSC area (1), (d) power companies have brought in weeds, caused site erosion and the increased snowpacks on cleared ROWs are impacting wildlife (1), (e) power companies should not be able to cross Sheppard Creek via other than the main road (1), (f) research studies and assessments are welcome or not a concern (3), and (g) cattle need to be kept out the the FSC (1).

With regard to access issues and management, the following comments were received: (a) limit motorized access to main road only (7 respondents), (b) block/reclaim all double roads and side roads and trails except main road (3), (c) ban noisier 2-cycle vehicles due to disturbance to wildlife and other users (2), (d) post signage at the beginning of the property to clearly outline all requirements (1), (e) post and enforce a speed restriction on the main road (1), (f) educate and enforce responsible use instead of taking away access (1), (g) allow only vehicles and horses on the main road and ban ORVs (1).

In terms of visions for the future of the FSC, the following views were expressed: (a) protect, manage and enhance the area to maintain wildlife and habitat values for future generations (3 respondents), (b) restrict ORV use and keep the area clean and pristine (1), (c) reduce current impacts and allow it to heal itself over time (1), (d) protect winter range to support 300-400 mule deer (1), and (e) provide a learning area to teach younger generations to be responsible users of the bush (1).

Other miscellaneous comments made were to: (a) educate the public on where the boundaries are and post clear signage (1 respondent), (b) have TCML, power companies, and users meet to discuss re-routing of main road through gravel pit rather than Casino Creek (1), (c) kids are smashing bottles and throwing garbage in the FSC because they don't care (1), and (d) users have been there for 40 years and the habitat has survived (1).

## 6. Wildlife and Habitats

This section describes the wildlife and habitat resources of the plan area. Feedback provided from agency representatives, stakeholders and the public indicated that preserving or enhancing wildlife and species diversity is a key component of the overall vision for the FSC.

### 6.1 Biodiversity, Species Richness and Species at Risk

There are confirmed records for 123 terrestrial vertebrate species in the FSC, including 2 amphibian, 6 reptile, 23 mammal and 92 bird species (Schaeffer et al. 2002; Machmer et al. 2005, Machmer and Ogle 2006, and 2007 field assessments; see Appendix 1). This total underestimates the true species richness of the plan area because it includes almost exclusively species detected during the summer and early fall months when surveys were conducted. Furthermore, surveys targeted only selected guilds and methods were not comprehensive enough to sample all wildlife species. With additional inventory conducted in the spring, fall and winter months, species richness for FSC would likely approach that reported for other nearby areas (e.g., 203 species for the Waneta Expansion Project area, Machmer et al. 2005; 205 species for the Pend d'Oreille Valley, Machmer et al. 2006).

Records for 7 additional species (2 amphibian, 2 mammal and 3 bird species) from locations directly adjacent to the Conservancy were added to Appendix 1 for management interest, however they are not included in the species tallies for the plan area. These records originate from shorelines adjacent to the Columbia River, from Beaver Creek Provincial Park south to the Waneta border crossing, based on information reported in Dulisse 1999, Machmer et al. 2005, Machmer and Ogle 2006, Machmer 2007 and Machmer et al. 2007.

Species richness and conservation status data for FSC are summarised in Table 6. The area supports a minimum of 8 terrestrial vertebrate species that are listed provincially (2 red-listed; 6 blue-listed). Five species are listed federally (1 threatened; 4 of special concern) and four of these currently appear on the SARA Schedule 1 list (SARA Public Registry 2007; Table 7). Maps showing the confidential occurrence locations of

Table 6. Summary of species richness and conservation status data available for selected terrestrial vertebrates, fish and insects confirmed in the FSC.

Conservation Status	Terrestrial Vertebrate Species					Fish <sup>3</sup>	Insects <sup>4</sup>
	Amphibians	Reptiles	Birds	Mammals	Total		
Total # of species	2	6	92	23	123	20	30
CDC Red List <sup>1</sup>	0	0	2	0	2	2	0
CDC Blue List <sup>1</sup>	0	2	3	1	6	2	0
Total Red & Blue	0	2	5	1	8	4	0
COSEWIC List – E <sup>2</sup>	0	0	0	0	0	1	0
COSEWIC List – T <sup>2</sup>	0	0	1	0	1	1	0
COSEWIC List – SC <sup>2</sup>	0	3	1	0	4	1	0
Total COSEWIC List	0	3	2	0	5	3	0

<sup>1</sup> CDC: Red List = indigenous species or subspecies that have or are candidates for extirpated, endangered or threatened status in BC; Blue List = any indigenous species or subspecies considered to be of special concern in BC.

<sup>2</sup> COSEWIC List: E = species considered endangered; SC = species considered of special concern; T = species considered threatened.

<sup>3</sup> Based on data reported in Golder Associated Ltd. (2002).

<sup>4</sup> Based on data reported in Schaeffer et al. (2002) and originally provided by Norbert Kondla and Jeffrey Jarrett.

Table 7. Conservation status of listed terrestrial vertebrate species confirmed in the FSC.

Common Name	Scientific Name	SARA Schedule 1	COSEWIC List	CDC List
Brewer's Sparrow	<i>Spizella breweri breweri</i>	-	-	R
Canyon Wren	<i>Catherpes mexicanus</i>	-	-	B
Common Nighthawk	<i>Chordeiles minor</i>		T	-
Great Blue Heron	<i>Ardea herodias herodias</i>	-	-	B
Lewis's Woodpecker	<i>Melanerpes lewis</i>	√	SC	B
Racer	<i>Coluber constrictor</i>	√	SC	B
Rubber Boa	<i>Charina bottae</i>	√	SC	-
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>	-	-	B
Western Grebe	<i>Aechmophorus occidentalis</i>	-	-	R
Western Skink	<i>Eumeces skiltonianus</i>	√	SC	B

Table 8. Conservation status of listed fish species confirmed in the FSC (Golder Associates Ltd. 2002).

Common Name	Scientific Name	SARA Schedule 1	COSEWIC List	CDC List
Bull Trout	<i>Salvalinus confluentus (Walbaum)</i>	-	-	B
Shorthead Sculpin	<i>Cottus confusus Bailey &amp; Bailey</i>	√	T	B
Umatilla Dace	<i>Rhinichthys umatillus</i>	-	SC	R
White Sturgeon (Columbia River)	<i>Acipenser transmontanus Richardson</i>	√	E	R

all listed species detected during field assessments in 2007 and from previous CDC and other records are provided in Appendix 5.

As indicated in Appendix 1, the western toad and yellow-breasted chat are two listed species that are known to occur adjacent to FSC (along the shorelines at Waneta and at Beaver Creek Provincial Park, respectively; Machmer 2007, 2008). There is a high probability that these species would use the plan area, given that appears to be suitable habitat. Both species are listed provincially and federally and are currently included on the SARA Schedule 1 list. To highlight the management of terrestrial species at risk, we compiled species accounts for all listed species in Table 7, and for western toad and yellow-breasted chat (Appendix 5). These species accounts contain information on conservation status, general habitat description, occurrence in the FSC, important habitat structures, essential habitat elements, best management practices, species occurrences in the plan area, and potentially suitable polygons or sites in the plan area. They area intended to



provide background and direction when considering management objectives and actions to address the needs of particular listed species.

The FSC supports a variety of insects and a minimum of 30 species representing at least nine families have been identified based on opportunistic data collection (Schaeffer et al. 2002). Systematic sampling would likely uncover many more insects, given that 80 butterfly species (including 6 listed species) have been confirmed in the nearby Pend d'Oreille Valley (Kondla 2004). Many of these species are associated with shrub-dominated and open forest habitats (Kondla 2004) that are also found in the FSC. Preferred habitats for butterflies have the potential to be impacted by weed invasion, and these species are also susceptible to roadkill mortality (Machmer et al. 2005).

At least 20 fish species have been confirmed along the Lower Columbia River, near FSC (Golder Associated Ltd. 2002; Appendix 1). Four species are listed provincially (2 blue-listed; 2 red-listed) and three are listed by COSEWIC as endangered, threatened and of special concern, respectively (Table 8). The shorthead sculpin and Columbia River white sturgeon are also listed on the SARA Schedule 1 list (SARA Public Registry 2007).

## 6.2 Wildlife Guilds of Management Priority

Based on direction from the FWCP, wildlife guilds of particular interest to resource managers (and apparently to the public as well; Table 5) include ungulates, wildlife tree users and raptors. These guilds are discussed below in relation to habitat requirements, conservation threats and management practices that are likely to benefit existing populations.

### 6.2.1 Ungulates

The FSC supports an estimated 250 mule and white-tailed deer, 30 rocky mountain elk and several moose. Half a dozen mountain goats also range mainly to the north of FSC, near Casino (Trail Wildlife Association 2006). Based on radio-telemetry data, deer overwintering at FSC range south and northeast to Violin Lake and Rossland areas during the snow-free months. Ungulate numbers in the Lower Columbia Valley have fluctuated considerably over the years and declines in the late 1980's and early 1990's are attributed mainly to severe winters (J. Gwilliam, pers. comm.). More recent (2000 and 2004) aerial surveys suggest that numbers are increasing (Robinson et al. 2005; R. Clarke, pers. comm.) and monitoring of radio-collared deer corroborates this finding (Robinson et al. 2005). Previous research identified cougar predation as a primary cause of mortality with vehicle accidents, hunting and poaching as other mortality factors (Robinson et al. 2002).

The FSC is classified as an important mule deer winter range (Ferguson 1979; Gwilliam 1986; Trail Wildlife Association 2006; M. Knapik, pers. comm.) and the plan area provides key habitat components required by mule deer during the winter months (i.e., shrublands and dry forests on steep slopes with broken terrain where low snowpack allows access to key winter foods, such as redstem ceanothus, snowbrush, saskatoon, rose spp., Douglas-fir foliage, and a variety of grasses and herbs; Blood 2000).

Habitat management objectives for mule deer, as described in the Kootenay-Boundary Land Use Plan Implementation Strategy<sup>2</sup>, include maintenance of a relatively high component of forest cover to support foraging, security cover, snow-interception cover and connectivity. Management for mule deer within the low-elevation, dry ecosystem at FSC would therefore include retention of mature forest cover and maintenance or enhancement of winter forage. This would involve activities such as coniferous tree planting, brushing of decadent shrubs, control of invasive weeds and/or prescribed burning.

Modeling of white-tailed deer winter habitat selection in the neighboring Pend d'Oreille Valley indicates deer preference for moderate to steep slopes on south and west-facing aspects at lower to mid-elevations (Boulanger et al. 2000). Douglas-fir stands with crown closure greater than 6 are most selected for, as they provide the greatest snow interception and thermal cover. Higher crown closure stands on steeper slopes are utilized to a greater degree during winters with higher snow accumulation. Overall, habitat management that

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<sup>2</sup> KBLUP: [http://ilmbwww.gov.bc.ca/ilmb/lup/lrmp/southern/kootenay/implementation\\_strat/3.htm#3.5](http://ilmbwww.gov.bc.ca/ilmb/lup/lrmp/southern/kootenay/implementation_strat/3.htm#3.5)

creates an interspersed of multi-aged stands and a juxtaposition of snow interception cover and forage is optimal (Boulanger et al. 2000).

Elk were first detected at FSC in the early 1970's. They are primarily grazers and habitat management to promote forage for this species relates to the maintenance and enhancement of existing herb-dominated sites. Weed control and prescribed burning are potential management tools to meet this objective. Moose are adapted to early successional stages and post-fire stands where browse is typically abundant. Their diets change seasonally, with deciduous leaves and aquatic vegetation preferred when available, and twigs comprising a major food source in winter. Forest development in the Sheppard Creek drainage has increased the proportion of young seral habitat, likely favouring moose populations.

### **6.2.2 Wildlife Tree Users**

Cavity nesters and other wildlife tree users comprise a guild of forest vertebrates with a high level of dependency on dead and dying trees, hence wildlife trees have become a focus of biodiversity management in BC<sup>3</sup>. At least 70 terrestrial vertebrate wildlife species are dependent on wildlife trees (Machmer and Steeger 2005) and at least 30 (43%) of these species have been confirmed in the FSC. Wildlife tree users confirmed in the plan area include listed Lewis's woodpecker, great blue heron and at least eight species of primary cavity excavators (6 woodpeckers, 1 chickadee and 1 nuthatch), 18 species of secondary cavity users (4 bat, 4 cavity-nesting duck, 2 owl, 1 raptor, 3 swallow, 1 swift, 1 chipmunk, and 2 squirrel species), three species that build stick nests in trees, and the black bear, which dens in trees (Appendix 1).

The above species require snags and defective live trees for nesting, roosting, denning and in some cases also feeding. Many species are selective in the wildlife tree species, sizes and decay characteristics they use (review in Machmer and Steeger 2005), hence a range of tree species and decay stages (from live defective trees to hard, moderate and soft snags) should be provided. Some species have additional requirements, including trees with heart rot, Armillaria root disease and broken tops, loose bark, mistletoe or recently burnt trees (Machmer and Steeger 1995; Steeger and Hitchcock 1999; review in Machmer and Steeger 2005). Most cavity nesters are insectivorous species and contribute to the regulation of forest insect pests (Machmer and Steeger 1995). Some woodpeckers eat large numbers of bark- and wood-boring beetles and selected beetle-infected trees must be maintained in stands to provide a stable food source for these beetle predators (Machmer and Steeger 1995). Conservation and enhancement of this guild requires an adequate supply of wildlife trees (Steeger & Machmer 2002; Province of BC 2005) in locations that meet their specific needs (e.g., near riparian and wetland areas, in grassland and edge habitats, and in open and closed forests), as well as healthy arthropod populations.

Wildlife tree-dependent bats in this area tend to use roost trees with holes excavated by primary cavity excavators or natural hollows, although loose bark and crack roosts can also be used (Vönhof and Gwilliam 2000; Hill et al. 2004). In contrast, blue-listed Townsend's big-eared bats roost in caves and mines within the plan area (roost locations in Appendix 4). Wetland and riparian areas are key foraging sites for most bat species and bat conservation depends largely on protection of existing and suitable roosts (wildlife trees and cave/mine sites) and maintenance of functional wetland and riparian habitats with healthy insect populations.

### **6.2.3 Raptors**

At least eight species of diurnal raptors are known to inhabit the FSC (Appendix 1). These include riparian species like bald eagle and osprey, open-country raptors such as American kestrel, red-tailed hawk and turkey vulture, as well as woodland species including merlin, Cooper's hawk and sharp-shinned hawk). Most of these species require wildlife trees (large live and/or dead and dying trees, broken-topped snags) for breeding and perching. Some also have specific nest and foraging habitat requirements. Open forest, open field and shrubland habitats in the plan area provide excellent foraging opportunities for the open-country raptors, and managed forests (conifer-dominated, mixed and deciduous stands) offer breeding and foraging opportunities for the woodland/forest species.

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<sup>3</sup> See BC Wildlife Tree Policy (<http://www.for.gov.bc.ca/hfp/values/wildlife/WLT/wlt-policy-01.htm>)

We detected an osprey nest on a power pole along the TCML powerline (Tower #14L74) and a second nest across from FSC on the southwest corner of the Waneta railroad bridge at the mouth of the Pend d'Oreille River. Both nests appeared to be occupied in 2007. In December 2007, the Waneta nest was relocated to a newly installed pole with platform on the FSC side (west bank of river in polygon 668). This was intended to facilitate bridge upgrades and reduce osprey disturbance at Waneta planned for spring 2008 (L. Ballard and L. Mathews, pers. comm.). Osprey use of this site should be monitored in spring 2008 to determine occupancy and ensure no human disturbance.

Two owl species (northern pygmy and northern saw-whet owl; Appendix 1) have been confirmed in the FSC and the area likely supports several additional species. These owls are cavity nesters dependent on wildlife trees. Again, maintaining current and future supplies of suitable wildlife trees (e.g., large-sized live and dead trees with cavities or broken tops) as well as healthy populations of small mammal prey will favour these species.

#### **6.2.4 Other Wildlife Guilds of Interest**

The FSC provides excellent habitat for herptiles, many of which are listed species (e.g. racer, rubber boa, western skink, western toad). These species den and overwinter locally using natural holes, rodent burrows and rock outcrops and fissures. Maintaining early seral habitats and nearby riparian zones free from disturbance, and ensuring an abundance of herb/shrub cover and denning opportunities is critical for these species.

Black bear and coyote sign was scattered in the plan area and cougars also occur, although the South Selkirk population appears to be limited by high mortality rates; immigration of sub-adults from Washington State is helping to maintain existing numbers in the area (Clarke 2003). Badgers were historically active in the Lower Columbia Valley, but the last confirmed sightings were from the neighboring Pend d'Oreille Valley in the early 1990's (J. Gwilliam, pers. comm.). This species is thought to be extirpated from the area but FSC offers potential opportunities for future reintroduction, if human disturbance can be minimized and adequate prey populations can be re-established (T. Antifeau, pers. comm.).

Based on the forest, shrubland and grassland habitats and habitat element requirements shared by many of the listed species (Appendix 5) and focal wildlife guilds in this section, the following habitat types and habitat elements require special management emphasis in the plan area:

- grassland/shrubland habitats well stocked with native plants and scattered large trees;
- wildlife trees in various size and decay stages including large snags and veteran trees with woodpecker or natural cavities, broken tops, heart rot, cracks, loose bark, etc.;
- intact riparian and wetland habitats;
- rocky and talus-like structures with crevices, cracks, fractures and caves within a matrix of other habitats (e.g., rocks within grassy fields);
- areas with friable soil for construction of burrows;
- large-sized hollow CWD and downed wood substrate;
- endemic shrub cover of varying height and density; and
- large diameter live mature coniferous trees to provide thermal/snow interception cover and nesting/perching substrate.

### **6.3 Plant Species and Communities**

There has been work undertaken in the FSC to survey and identify plant species. Marcoux (1997) developed a terrestrial ecosystem map and expanded legend describing the terrain, soils, humous form, exposure and seral stages of ecosystem units in the area at a scale of 1:20,000. A total of 96 plant species (11 trees, 25 shrubs, 45 herbs, 8 mosses and 7 lichens) were tallied for the FSC (see Appendix 5 in Marcoux 1997). None of the species identified are currently listed by the CDC, but a significant portion of the shrubs are species of high forage value for ungulates.

In association with the Trail Ecological Risk Assessment (ERA), vegetation surveys were undertaken in the Trail regional area (including FSC) and used to analyze the effects of smelter emissions on various receptors, including plant communities. This study reported a total of 293 plant species in the greater area, but the raw

data files would be required to tease out those species occurring specifically within FSC (Golder Associates 2004). Based on the vegetation data and additional bioterrain and soils data gathered, a 1:30,000 scale biophysical habitat map and expanded legend was developed (Enns and Enns 2006; Delphinium Holdings Inc. 2007). These products are of potential value for potential longterm monitoring purposes in FSC.

Vegetation surveys conducted at Beaver Creek Provincial Park (Dulisse and Wood 2000) and in the Waneta Expansion Project area (Machmer et al. 2005) are also relevant to the FSC. The latter studies reported a total of 170 and 210 plant species (including 2 and 5 listed species), respectively. Based on these studies and data obtained from the CDC (see map in Appendix 5), eight listed vascular plant species have been confirmed closeby and may occur in the FSC. Table 9 lists these species, their conservation status and their typical habitat association. All were found in relatively open habitats (e.g., open areas, dry open forests, rocky slopes, meadows, roadsides) hence weed encroachment, powerline and road maintenance activities, herbicide use, ORV and other recreational activities may impact these species.

Table 9. Scientific and english names, CDC conservation status and habitat associations of listed vascular plant species found close to the FSC.

Scientific Name	English Name	CDC	Habitat Association <sup>4</sup>
<i>Clarkia pulchella</i> <sup>3</sup>	pink fairies	B	dry open areas in the lower montane zone
<i>Clarkia rhomboidea</i> <sup>3</sup>	common clarkia	R	dry open areas in the lower montane zone
<i>Erysimum asperum</i> <sup>1</sup>	prairie rocket	R	dry roadsides & rocky slopes in the montane zone
<i>Lotus unifoliolatus</i> <sup>3</sup>	Spanish-clover	B	lowland wet/moist meadows, clearings, roadsides
<i>Scutellaria angustifolia</i> <sup>3</sup>	narrow-leaved skullcap	B	dry rocky areas in the lower montane zone
<i>Heterostipa spartea</i> <sup>2,3</sup>	porcupine grass	R	dry/mesic grassy slopes & open forests
<i>Salix boothii</i> <sup>2</sup>	booth's willow	B	moist to wet streambanks & meadows
<i>Aster ascendens</i> <sup>3</sup>	long-leaved aster	R	dry slopes & forest openings; steppe & montane zones

<sup>1</sup> Data provided by the CDC.

<sup>2</sup> Data reported in Dulisse and Wood (2000).

<sup>3</sup> Data reported in Machmer et al. (2005).

<sup>4</sup> Habitat associations were obtained from Douglas et al (1998) and the Klinkenberg (2007).

Two rare plant communities are known near the Waneta Dam (Machmer et al. 2005) and may also be represented on the Fort Shepherd side. One is an open mature forest community comparable to the S1<sup>4</sup> *Ponderosa pine – black cottonwood – poison ivy* community known within the Bunchgrass xh1 biogeoclimatic variant of the Kamloops Forest Region (C. Cadrin, pers. comm.). The second is a *Sumac - bluebunch wheatgrass* grassland community ranked G2<sup>5</sup> in Idaho, Oregon and Washington (C. Cadrin, pers. comm.). Some evidence of the latter community was found along the west-facing slope separating the two lowest terraces on Fort Shepherd Flats (see Figure 1). This area has been disturbed as a result of weed encroachment and trails, but the community may occur at other locations with similar exposure, terrain and soil conditions. Based on terrestrial ecosystem mapping (Marcoux 1997) and more recent biophysical habitat mapping (Enns and Enns 2006), a provincially red-listed plant community (*Douglas-fir - dull Oregon grape - parsley fern*) associated with the ICHdw02 site series apparently occurs within the FSC (Novus Consulting 2002). More work is required to determine the nature, location and geographical extent of the above communities, to ensure that they are adequately protected.

## 6.4 Ecosystems

The FSC is located within the Southern Columbia Mountains (SCM) ecosection and approximately 2/3 of the plan area (comprising the entire southern half; Figure 2) is classified within the ICHxw biogeoclimatic (BEC) subzone (Braumandl and Curran 1992). This relatively rare subzone is found exclusively in the West

<sup>4</sup> Critically imperiled in BC.

<sup>5</sup> Globally imperiled because of rarity or some other factors making it very susceptible to extirpation or extinction).

Kootenay region of BC, where it occurs in on the warmest low elevations aspects of the Lower Columbia, Pend d’Oreille and Creston Valleys. The northern portion of the Conservancy lies within the more widespread dry warm variant (ICHdw) of the ICH zone.

The entire plan area is classified as a fire-maintained ecosystem (Natural Disturbance Type 4; Province of BC 1995). Historically, NDT4 landscapes were comprised of a mosaic of grassland, shrubland, and open and closed-canopy forest communities, regulated through a regime of frequent, mostly low-intensity fires. There is no quantitative data available on fire return intervals for the ICHxw, but estimated intervals range from 4-50 years in other NDT4 ecosystems (Ponderosa Pine and Interior Douglas-fir ecosystems; Province of BC 1995). Although few natural fires have occurred at Fort Shepherd in recent years due to active fire suppression, TWA has conducted periodic prescribed burning on Fort Shepherd Flats to rejuvenate ungulate browse (R. Filmore, pers. comm.).

### 6.4.1 Ecosystem Types

Ecosystem types generally recognized within NDT4 landscapes include (i) *shrubland* (wetlands and permanently brushy areas dominated by woody-stemmed shrubs), (ii) *open range* (very few shrubs or trees with mostly grass cover), (iii) *open forest* (widely spaced trees with low crown closure and a grassy and/or shrubby understory), and/or (iv) *closed-canopy forest* (moderate to dense tree cover and crown closure; also known as *managed forest*). The Kootenay Boundary Land Use Plan provides guidelines for target tree densities and maximum percent crown closure values for these ecosystem types (Table 10).

Table 10. Target and minimum – maximum tree densities (sph) and maximum crown closure values for NDT4 ecosystem types as per KBLUP NDT4 management guidelines.

Ecosystem Type	Target Stocking (sph) <sup>1</sup>	Minimum - Maximum Stocking (sph) <sup>1</sup>	Maximum Crown Closure <sup>1</sup>
Shrubland	n/a	n/a	n/a
Open Range	20 (of the largest 1/3 of existing diameter range)	0 - 75	10%
Open Forest	250 (50 of the largest 1/3 of existing diameter range plus 200 well-spaced)	76 - 400	40%
Closed-Canopy Forest	1000	400 - 5000	80%

<sup>1</sup>Values (sph of trees > 0.5 m height) are for PP and IDF biogeoclimatic variants, but can be extrapolated to the ICHxw.

Based on visual assessment and Vegetation Resource Inventory (VRI) mapping (Figure 2), FSC currently appears to support primarily open forest and shrubland ecosystem types. Very little closed-canopy forest was confirmed within the boundaries of the plan area (if present, this type is limited to creek draws within polygons 403, 405 and 340 in the upper portions of the plan area). No natural self-maintaining open range types were identified in the plan area.

The open grassy areas in polygon 587 (mapped as *FdPy – mallow ninebark – bluebunch wheatgrass* (DN) and *FdPy – Oregon-grape – Birch-leaved Spirea* (DO) ecosystem units, respectively, by Marcoux 1997) are in fact disturbed ecosystems rather than natural self-maintaining grasslands. They occur on coarse-textured glaciofluvial river terraces and on rocky slopes in lower Fort Sheppard Creek. As indicated by Marcoux, these open sites have been negatively impacted by disturbances which include repeated and severe surface fire. The latter has impaired humous development and led to high level of mineral soil exposure, which in turn has reduced the moisture holding capacity of these sandy coarse-textured soils. Repeated burning will continue to disrupt the humous layer, impede humous development and increase mineral soil exposure, thereby predisposing these sites to further weed invasion. Furthermore, ORVs and other mechanical disturbances will destroy the dry cryptogammic crusts present that are critical to preventing soil moisture loss and weed establishment on such exposed soils. The optimal plant community in polygon 587 would be an open forest comprised of sparse mature Douglas-fir and ponderosa pine with an understory of shrubs and herbs with humus forms of 3-5 cm thick that cover about 95% of the ground surface (Marcoux 1997). To achieve this will

require exclusion of fire and ORV disturbance, coupled with manual brushing to maintain these sites and potentially also promote ungulate browse.

Apparently, some soil samples obtained from FSC exhibit arsenic, cadmium, lead and/or zinc concentrations that exceed BC contaminated sites regulation (CSR) standards (Teck Cominco Metals Ltd. 2007). There are potential concerns regarding prescribed burning effects on the volatilization of such heavy metals (K. Enns, pers. comm.). Site-specific volatilization risks require further investigation and burning should not be conducted until this issue has been resolved.

Shrubland habitat types cover a significant portion of the FSC (Figure 2). Abundant and common species include snowbrush (*Ceanothus velutinous*), redstem ceanothus (*Ceanothus sanguineus*), Saskatoon (*Amelanchier alnifolia*), mallow ninebark (*Physocarpus malvaceous*), snowberry (*Symphoricarpos albus*), oceanspray (*Holodiscus discolor*), tall Oregon grape (*Mahonia aquifolium*), bitter cherry (*Prunus emarginata*), choke cherry (*Prunus virginiana*), willow spp. (*Salix spp.*) and beaked hazelnut (*Corylus cornuta*). In general, shrub-dominated polygons had good cover, which likely explains the low level of forest ingrowth and encroachment observed. Rejuvenation of shrubs (usually mediated by fire) is lacking only in a few areas, likely because of the periodic prescribed burning undertaken on portions of the Flats since the early 1970's.

In the open forest polygons, stocking densities (at least for conifers) and crown closure appeared low, relative to target densities for these ecosystems. Furthermore many forested polygons were lacking trees in the larger mature to old diameter classes, although such trees would be expected to dominate in these ecosystems (Steeger and Hawe 1998).

The influence of anthropogenic factors (e.g., longterm SO<sub>2</sub> emissions, severe historical fire impacts, intensive logging, ROW establishment and maintenance, fire suppression, adjacent forest development, reservoir impoundments upstream on the Columbia, Kootenay and Pend d'Oreille systems) must be taken into consideration in judging the appropriateness of current stand structure and management intervention in the FSC. Much of the original forest cover in the Lower Columbia Valley consisted of mixed stands dominated by large diameter Douglas-fir (*Pseudotsuga menziesii*), ponderosa pine (*Pinus ponderosa*) and western larch (*Larix occidentalis*). Large open-growing ponderosa pine stands were apparently most common at low elevations from Trail to the border (Collins 1926 and McBride 1937 cited in Enns and Enns 2006). Smelter emissions, coupled with repeated severe forest fires and logging, low seed supply, drought-prone sandy soils and erosion have slowed natural succession. Forested portions of the plan area are currently comprised of seral stands in an immature structural stage dominated by Douglas-fir, ponderosa pine, paper birch (*Betula papyrifera*), trembling aspen (*Populus tremuloides*), Douglas maple (*Acer glabrum*) and western white pine (*Pinus monitocola*). With time and continued recovery, a gradual conversion to old-seral conifer-dominated stands is anticipated.

Fire suppression has the potential to promote high stand densities and overstocking, but only one example of an overstocked stand was found in the FSC (i.e., a patch in the northwest corner of polygon 511) which, because of its uniqueness, should be retained. No closed canopy forest stands were identified and in light of the extensive forest development and removal of mature timber that has occurred in the upper to middle portions of Sheppard Creek drainage, just west of the FSC, mature forest retention (and old-seral forest acceleration) appears to be an important management priority.

#### **6.4.2 Vegetation Resource Inventory Habitat Types**

VRI habitats mapped in Figure 2 refer to broad vegetation and biophysical habitats (Ministry of Sustainable Resource Management 2002). Table 11 provides a breakdown of the number of polygons, proportional area and percent for each of these types in the plan area. An estimated 96% of plan area is vegetated, with exposed land (2%), river sediment (1.8%) and rock/talus (0.2%) comprising the remainder. The exposed land/exposed soil type is related to previous mining activity and mass wasting on steep sandy slopes.

Riparian habitat in the FSC is comprised of riverine areas (typed "river" in Figure 2), Sheppard Creek banks, as well as intermittent streams shown in Figure 2. The FSC supports no true wetland habitat, although isolated segments of the river (in polygon 672, opposite the TCML Reload Facility) are relatively sheltered from the main current and have wetland characteristics. These riparian habitats represent a small but vital

Table 11. Breakdown of VRI habitats in the plan area, based on information from the VRI Database, supplied by Amy Waterhouse, FWCP.

VRI Habitat	#Polygons	Area (ha) <sup>1</sup>	Percent of Total (%)
River	18	13.0	1.3
Exposed Land – Exposed Soil	2	19.9	2.0
Exposed Land – River Sediments	1	5.0	0.5
Herb - Dense	1	19.1	1.9
Rock - Talus	1	2.4	0.2
Shrub Low - Open	6	68.4	6.8
Shrub Low - Sparse	1	4.8	0.5
Shrub Tall - Open	4	68.0	6.8
Shrub Tall - Sparse	1	1.2	0.1
Treed Broadleaf - Dense	3	33.9	3.4
Treed Broadleaf - Open	15	151.9	15.1
Treed Broadleaf - Sparse	4	41.5	4.1
Treed Coniferous - Open	5	48.5	4.8
Treed Coniferous - Sparse	5	347.9	34.6
Treed Mixed - Open	12	131.9	13.1
Treed Mixed - Sparse	4	48.2	4.8
All Combined	83	1005.6	100.0

<sup>1</sup>Total area values are not the same as those for property hectares due to inclusion of shoreline lands typed as “river” and “exposed land – river sediments”.

component of the plan area, and tend to support greater plant and animal diversity and abundance than adjacent upland areas.

The majority (79.9%) of FSC is treed and approximately equal proportions of coniferous (39.4%) versus broadleaf and mixed stands combined (36.4%) occur. Treed stands with sparse (10-25%), open (26-60%) and dense (61-100%) forest cover comprise 43.5%, 33.0% and 3.4% of the total area, respectively. The coniferous stands are important habitats for ungulates and wildlife tree users. Broadleaf forests (or broadleaf components within mixed forests) play important ecological roles as wildlife habitat (review in Bruce et al. 1985; Bunnell et al. 1999) and have a positive influence on vertebrate richness (Bunnell and Houde 2000). They also enhance soil quality and site productivity (Simard 1996).

The non-treed portion of the FSC is represented mainly by shrublands (14.2% by area) and both low and tall shrub habitats are represented. Shrublands are very important for ungulates, various other mammals, birds and herptiles, including several listed species (Appendix 5). A significant portion of the shrub-dominated habitats are ROWs created through periodic vegetation management (rather than climax shrublands). These are weedy and of marginal quality, especially where access roads occur nearby. Only one (1.9% by area) polygon (#344) located on the TCML ROW is typed as herb-dominated (dense). This ROW has an access road along its entire length, with very sandy soils. The ROW is only sparsely vegetated, mainly with weedy species and bracken fern, hence it provides only marginal habitat for grassland dependent species (e.g., some herptiles, small mammals and birds).

### 6.4.3 Habitat Elements

#### Wildlife Trees

Very few wildlife trees (dead trees or live trees with defects such as heart rot, stem decay, broken tops, mistletoe, large limbs, etc.) of functional size were noted during field assessments. The few such trees detected were mainly small (<20 cm) diameter dead or defective paper birch of limited use for cavity nesting and roosting. Large-sized snags and defective live trees were absent from ROWs, road margins and polygons assessed, although such trees should be an important component of NDT4 ecosystems (Steeger and Hawe 1996). We therefore conclude that current wildlife tree supply in the FSC is not adequate to satisfy the

requirements of  $\geq 30$  wildlife tree-dependent users. Wildlife tree creation techniques will be required to recruit representative densities. Table 12 provides recommended guidelines for target snag densities in NDT4 ecosystems based on data gathered from unmanaged stands; these data do not account for live defective trees that should also occur in these stands.

Table 12. Range of average snag densities (sph  $>20$  and  $>50$  cm in diameter) measured in unmanaged mature NDT4 (ICH and IDF) stands from several studies (reproduced from Steeger and Machmer 2002 and references therein).

Habitat Attribute	SPH in the ICH BEC Zone	SPH in the IDF BEC Zone
Snags $>20$ cm dbh	43.5-147.1	28.1-57.9
Snags $>50$ cm dbh	2.8-10.7	0.4-2.0

### Coarse Woody Debris

Based on field assessments, CWD appeared very sparse throughout the plan area. Although relatively low densities of CWD are expected in NDT4 ecosystems, valuable large hollow or partially hollow pieces were non-existent and should be present at low densities. Many herptiles, mammals, and selected birds require CWD (also referred to as “down wood” in Appendix 5), including three of the focal species at risk in the FSC (i.e., rubber boa, western skink, western toad). To ensure adequate CWD habitat, management actions should focus on retention of some existing CWD, retention of large-size snags, and creation of large hollow logs.

### Shrub Thickets

Low to tall shrub thickets, especially when close to productive riparian areas, are important to a large variety of early successional species (e.g., neotropical migrant songbirds, bats, small to large mammals, herptiles, as well as listed brewer's sparrow, canyon wren, common nighthawk, Lewis's woodpecker, racer, rubber boa, Townsend's big-eared bat, western skink, western toad and yellow-breasted chat; Appendix 5). Some native shrub planting could be undertaken along ROWs, roads and in riparian areas to improve habitat suitability for dependent guilds and reduce the potential for weed encroachment (see Section 6).

### Rocky Outcrops, Talus and Cliffs

Rock outcrops, talus-like areas and small cliffs exist within several upland and riparian polygons of the FSC, although only one VRI polygon (#293) was actually typed as “rock” habitat. These features are important habitat elements for many wildlife guilds (e.g., bats, birds, herptiles, small mammals, furbearers and wide-ranging carnivores, including listed Townsend's big-eared bat, canyon wren, common nighthawk, racer, rubber boa, western skink and western toad; Appendix 5). Several Townsend's big-eared bat roosts are associated with rock-talus habitats at higher elevations within the FSC (Appendix 5). Protection of critical roosting, nesting, denning and overwintering habitat can be promoted by limiting nearby disturbances (e.g., ORV use, rock climbing, caving, etc.).

### Friable Soil

Fine, sandy loam is a soil type important for wildlife that burrow. This habitat element is required by several listed herptiles known to occur in the plan area (i.e., western toad, rubber boa, racer; Appendix 5), and the primary prey of extirpated badgers (Columbian ground squirrel and northern pocket gopher). In low elevation sandy areas where friable soil conditions occur, management efforts should be directed toward avoiding soil compaction and degradation through the restriction of ORV use, livestock grazing and other soil disturbances.

### Fire

Fire influences the quantity and quality of habitat elements for wildlife species through rejuvenation of grasses/shrubs, and creation of wildlife trees, CWD and post-fire habitat for insectivorous species. At least six listed species (brewer's sparrow, common nighthawk, Lewis's woodpecker, racer, rubber boa, western skink) and a variety of early successional species are associated with habitat elements created by fire. Prescribed burning is generally consistent with the NDT4 management and it can be a useful tool where soil conditions are compatible.



### **Mudflats, Gravel and Sand Bars**

Mudflats, gravel and sand bars in the FSC (typed as “river” in Figure 2) provide specialized shallow water foraging habitats and relatively protected loafing and breeding areas for waterfowl, shorebirds, amphibians, fish and aquatic invertebrates, including listed great blue heron, western grebe and western toad (Appendix 5). These areas are subject to changing water levels and are seasonally inundated, and hence free from human disturbance and terrestrial predators. Preventing disturbance (mudbogging, ORV use, boating, etc.) is important to maintaining their productivity and use.

## **7. Management Plan**

This section integrates and interprets results from sections 3 to 6 and provides a management vision, strategic goals and objectives which comprise the framework and rationale for the accompanying management recommendations.

### **7.1 Management Vision**

Based on input from the public and various stakeholders, the following is a general vision statement for the future management of the Conservancy:

*The FSC is an ecologically unique wildland area with significant wildlife, habitat, heritage, archeological and recreational values that are well-acknowledged by the public. As such, this area merits special conservation efforts, and through committed management and stewardship, the Conservancy will serve as an ecological legacy for the appreciation of future generations. The FSC will be managed through a collaborative partnership among participating groups that uphold as their primary guiding principle the maintenance of ecosystem integrity<sup>6</sup>, ecosystem health<sup>7</sup>, biological diversity<sup>8</sup> and self-sustaining native wildlife populations. The significant values of the Conservancy will be protected, enhanced and restored, and opportunities for human activities compatible with this conservation vision will be encouraged.*

### **7.2 Strategic Management Goals**

Strategic management goals for the FSC include the following:

1. To maintain, enhance and restore the ecosystem integrity, health, biological diversity and habitat quality of the FSC for the benefit of its native wildlife populations;
2. To protect and enhance the ecological, heritage and archeological values of the FSC;
3. To manage the FSC for human land use opportunities that do not compromise the conservation and management of its' ecological values; and
4. To encourage initiatives that promote public awareness, stewardship and educational opportunities with respect to the FSC and its' unique values.

### **7.3 Management Objectives**

This section identifies management objectives that address general management issues as well specific VRI habitat types, habitat elements, wildlife guilds and other values. The management recommendations that pertain to these objectives are provided in Section 7.4.

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<sup>6</sup> The condition of an ecosystem where composition, structure and function are unimpaired by human-caused stresses, and ecosystem biological diversity and its supporting ecological processes still persist.

<sup>7</sup> A relative measure of the condition of an ecological system with regard to its resiliency to stress and its ability to maintain its organization and autonomy over time.

<sup>8</sup> The variability among living organisms from all sources, and the ecological complexes of which they are part: this includes diversity within species, between species and of ecosystems.

### 7.3.1 General Objectives

1. Maintain or create an appropriate interspersed of habitat types typical of fire-maintained, dry ecosystems. (24, 27-29, 35-39, 55-57)<sup>9</sup>
2. Maintain or create stand structural conditions typical of fire-maintained, dry ecosystems. (24, 27, 31-40, 55-57)
3. Improve ecosystem integrity and health by controlling invasive plants and favouring native vegetation. (2-11, 17, 19-23, 27-29, 43)
4. Re-introduce frequent low intensity fire, if and where appropriate. (55, 56)
5. Maintain, enhance or restore habitats of wildlife species adapted to fire-maintained, dry ecosystems. (24, 27, 29, 31-34, 41-44, 53, 55, 56)
6. Reduce existing levels of habitat degradation. (1-18, 19-23, 24-26, 35-36, 43, 48-50, 52, 58-59)
7. Reduce existing levels of wildlife disturbance. (1-18, 19-23, 24-26, 35-36, 43, 48-50, 52)
8. Provide opportunities for recreation that are consistent with objectives 6 and 7.
9. Promote greater awareness, stewardship and educational opportunities with respect to the values of the FSC. (5, 7, 8, 9, 19, 22, 23, 30, 41-42, 45-47, 52-54)

### 7.3.2 Objectives by Habitat

#### **Forested Habitats (Dense, Open and Sparse Coniferous, Mixed and Deciduous Forests):**

1. Maintain or create a tree species composition typical of fire-maintained, dry ecosystems. (24, 27-29, 35, 40, 55-57)
1. Maintain or create wildlife trees. (31-34, 56)
2. Maintain or create CWD. (33)
3. Improve vigour of the shrub understory. (24-25, 29, 35-40, 55)
4. Maintain or enhance pure broadleaf stands in the plan area. (35)
5. Maintain endemic levels of natural disturbance agents. (e.g., bark beetles, Armillaria)

#### **Shrub Habitats (Open and Sparse Tall and Low Shrub):**

1. Retain current tall and low shrub communities.
2. Enhance the composition, structure and health of native shrub communities. (24-26, 29, 36-39, 55)
3. Control weeds where necessary (i.e., along access roads and ROWs in combination with motorised restrictions) to promote a gradual conversion to a stable low-growing plant community. (1-18, 19-23, 24-26, 27-29, 35-36, 43, 48-50, 52, 58-59)

#### **Herb-Dominated Habitats (Herb Dense):**

1. Reduce disturbance in *Herb-Dense* polygons (588) and in portions of *Treed Coniferous Sparse* polygons (345, 511, 587, 668) that have cryptogamic crusts and are characterized by very poor mineral soil development. (2-23, 25, 29, 48, 50, 55)
2. Minimize weed invasion and encroachment. (19-23)
3. Allow herb-dominated areas to succeed to shrubland and forest. (10, 13-14, 29)
4. Reclaim (through re-seeding with native herbaceous and shrubby vegetation) exposed soil areas, all non-essential access roads, trails and non-designated recreational use sites. (10, 12, 14, 16, 17, 29, 58)

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<sup>9</sup> Numbers refer to specific management recommendations in Section 7.4.

**Riparian Habitats:**

1. Maintain or enhance the integrity and health of riparian and wetland habitats. (12, 17, 26, 35-36, 59)
2. Reduce disturbance to riparian and wetland habitats and dependent wildlife guilds. (13-14, 17, 35, 44-45, 51)

**Rock/Talus Habitats:**

1. Maintain the integrity and health of rock/talus habitats.
2. Minimize disturbance to rock/talus habitats and dependent wildlife guilds. (1-6, 12, 44)

**Unvegetated Habitats (Exposed Land, Exposed Soil, Roads):**

1. Reduce disturbance to unvegetated habitats. (1-18)
2. Minimize weed invasion and encroachment into unvegetated habitats. (19-23)
3. Reclaim unvegetated sites through re-seeding with native herbaceous vegetation. (13-14)

**7.3.3 Objectives for Habitat Elements**

1. Protect existing wildlife trees. (18)
2. Increase the abundance of functional wildlife trees through wildlife tree creation. (31-32, 34, 56-57)
3. Discourage campfires and firewood cutting within the plan area. (12)
4. Create functional CWD in the form of large hollow logs in selected areas. (33)
5. Protect existing areas with friable soils. (1-17)
6. Protect and create shrub thickets where ecologically appropriate. (24, 28)
7. Re-introduce fire into selected open forest polygons, if ecologically appropriate and benefits clearly outweigh the risks. (55)
8. Protect the integrity of muflats, gravel and sand bars and dependent wildlife species. (45, 51)

**7.3.4 Objectives for Plant Species and Communities**

1. Maintain or enhance existing listed plant species or plant communities. (43)
2. Improve the knowledge base regarding the abundance and distribution of listed plant species and communities in FSC. (43)
3. Minimize impacts and degradation to listed plant species and communities. (1-17, 19-23)
4. Promote greater public awareness, stewardship and educational opportunities with respect to plant species, communities and invasive plants. (7, 9, 14, 19, 22-24, 30, 43, 52-53)

**7.3.5 Objectives for Wildlife Guilds**

1. Maintain, enhance or restore existing populations of listed wildlife species and their habitats. (1-17, 19-23, 24-25, 27-29, 31-35, 41, 44-45, 51)
2. Improve the knowledge base regarding the abundance, distribution and management of confirmed and potentially occurring listed wildlife species. (7, 41, 43-45)
3. Maintain or enhance existing populations of listed invertebrate species and their habitats. (42)
4. Improve the knowledge base regarding the abundance, distribution and management of listed invertebrate species. (42)
5. Maintain existing ungulate populations and their habitats. (19-23, 24, 37-39, 41, 49, 54-55).
6. Maintain or enhance existing populations of wildlife tree users and their habitats. (27-29, 31-35, 41-44, 56)
7. Maintain or enhance raptor and owl populations and their habitats. (17, 25, 31-35, 41)

8. Maintain herptile populations and their habitats. (1-17, 26, 33, 35-36)
9. Promote greater public awareness, stewardship and educational opportunities regarding all wildlife guilds. (7, 17, 22, 41, 45, 53, 54)

### **7.3.6 Objectives for Heritage and Archeological Values**

1. Protect or enhance heritage and archeological values. (8, 12, 14, 46, 47, 53)
2. Promote opportunities for increased public awareness, stewardship and education with respect to heritage and archeological values. (8-9, 12, 14)

### **7.3.7 Objectives for Recreational Values**

1. Encourage recreational activities compatible with the protection of ecological, heritage and archeological values. (1-18, 48-53)
2. Minimize the potential for human disturbance and habitat degradation associated with recreational activities. (1-18, 48-53)

## **7.4 Management Recommendations**

Management recommendations are organized by management issue (e.g., access management, weed management, etc.) and the recommendations within each issue heading are listed in their perceived order of priority for implementation. An attempt was also made to list the issue headings in order of perceived priority; this was not always feasible since actions need to be taken on several issues concurrently to achieve a coordinated, successful outcome. It is envisioned that action on most of the management recommendations can at least be initiated in years 1-5 (2008-2012), although some recommendations will require an extended period of effort to fully implement.

### **Access Management**

1. Prepare FSC boundary signs and posts and install them as soon as possible in spring 2008. Establish a schedule of periodic monitoring and maintenance to ensure that property signs (as well as other signage; see recommendations below) is in place and legible.
2. Follow-up with BCTC regarding their commitment to fund and install two heavy park-style, double-locked gates (total estimated value of approximately \$16,000) near the north and west boundaries of the Conservancy prior to summer 2008. Locations should be selected to minimize the potential for ORV passage around gates. Contact Mike Guité (604 699-7413 or Mike.Guite@ bctc.com) as soon as possible regarding organization and installation. Gate installation must be coupled with awareness information provided to the public (see rec. 3). BCTC will also provide restrictive signage for its ROW (contact: K. Dalgarno), therefore obtain and install this signage on the BC Hydro ROW. Inquire regarding the availability of restrictive signage for the TCML ROW.
3. Draft an access management policy which provides seasonal use restrictions, closure areas, exemptions, speed limits, signage requirements and concurrent monitoring and enforcement needs, strategies and implementation actions. Publicize a summary of this new policy through various media outlets (newspaper, other print media, radio, TV, etc.). Also conduct community outreach directly with ORV user groups and ORV retail outlets in attempt to disseminate this information to the widest possible audience in a timely manner (TLC staff could assist with this task; see rec. 52).
4. A. To discourage uncontrolled ORV use and impacts, motorized access to FSC should be permitted **on a trial basis only** via the one main Fort Shepherd road, effective spring 2008 (see rec. 8 for the single exemption). A speed limit of 20 km/hr should be posted at the interpretive kiosk near the entrance (rec. 7) and at 500 m intervals along the road. Unlocked gates provided by BCTC (rec. 2) should remain unlocked as long as no ORV violations are occurring. If violations are occurring,

warnings should be provided and then the gate should be locked for a period of time (e.g., 1 day, 2 days, 1 week, 2 weeks, 1 month, 2 months for successive violations).

B. If violations and impacts persist and effective “self-policing” tactics do not become evident among ORV users of the area, then the area should be permanently closed to all motorized use effective spring 2009, to prevent further ecological impacts. Media releases regarding the **trial basis only** access policy and regulations, the need for self-policing among ORV users, and the consequences of violations will be necessary well in advance (see rec. 3), so users have had an opportunity to become well-informed prior to the 2008 season.

5. During spring to fall 2008 (March to October) an on-site caretaker (with a trailer stationed near the entrance to FSC) will be required. This measure is considered mandatory if past use patterns are to be effectively altered, and for rec. 4 to be effectively implemented. The caretaker can provide information to visitors, answer questions, clarify and enforce the new access policy, conduct on-site surveillance, take photographs/video, report any violators, as well as conduct implementation and effectiveness monitoring with regular feedback provided to TLC and the Management Board. Note that periodic monitoring will be required in future years, at least on weekends, perhaps with the aid of local TLC staff and volunteers. The utility of a surveillance camera positioned near the north entrance could also be evaluated. Encouraging local police to set-up road blocks to reduce weekend parties is also an option.
6. Continue with a complete seasonal access closure to all motorized vehicles in the FSC during the winter months (Dec 1 to March 1). Establish new signage at the north and west boundaries of the FSC, and at major intersections with the TCML and BC Hydro powerline access roads. The signs should read: “All motorized vehicle use of the Fort Shepherd Conservancy is strictly prohibited from December 1<sup>st</sup> to March 1<sup>st</sup>”. Periodic on-site monitoring and enforcement will be required during the 2008 winter closure period to ensure that no violations are occurring. Some monitoring can be conducted more practically from a viewpoint on the Waneta side (see rec. 57).
7. Establish an interpretive kiosk with a gravel parking site for 3-4 cars adjacent to the main road near the north entrance to the FSC. The kiosk should provide information on the history of the area and guidelines for responsible use (e.g., stick to the main road; no overnight camping, pack-in and pack out all gear; seasonal access restrictions, fire ban, overnight camping ban, weed concerns and prevention measures, how to report violators, etc.). A second panel could provide information on wildlife viewing opportunities and unique wildlife and habitat features present in the area. A few amenities (picnic table, bear-proof garbage container and outhouse) should be provided in this area, for use by an on-site caretaker in 2008 and members of the public.
8. Leave the south fork road (UTMs at junction with main road: 455156; 5429556) to the cairn site open part way and establish a well-delineated parking area for 3 vehicles (park area UTM; 455297; 5429545). Also establish a walking trail from the parking area through the pine forest to the cairn, and to the beach below. Have an interpretive sign or kiosk (near the forest opening) at the cairn with historical information about First Nations use, the Fort, the mining history of the area, the construction of the Dewdney Trail, etc. Consider establishment of a picnic site with amenities (table, bear-proof garbage container, outhouse) overlooking the beach.
9. Apply for up to \$15,000.00 in signage funding (i.e., to fund the interpretive kiosk at the north end and cairn) through BCTC’s community outreach program. The fund emphasizes environment, education and First Nations. Quarterly applications from non-profit organizations and NGO groups are accepted and information and the application form can be found at:  
[http://www.bctc.com/about\\_bctc/connecting\\_communities/community\\_investment/](http://www.bctc.com/about_bctc/connecting_communities/community_investment/)
10. Meet with BCTC, FortisBC and TCML representatives on site to conduct a powerline access road inventory – define and mark essential roads necessary for operations and identify non-essential roads/trails. All non-essential access should be reclaimed (e.g., several roads/trails in polygon 587, 687, 405, 407 and 223). Co-develop with these partners a plan for the design, implementation, scheduling and funding of reclamation work. Also discuss strategies for prevention of ORV

trespassing on access roads and ROWs and develop appropriate site-specific solutions (e.g., installation of gates, boulders, berms, planting of vegetation, etc.). Clear communication of revised access routes to power company vegetation management crews (by BCTC and FortisBC) will be required. Note that any reclamation work must be coupled with motorised access restrictions to the powerline access roads and ROWs, accompanied by signage and some monitoring and enforcement capability.

11. Meet with TCML and Terasen Gas to discuss continued damage and erosion on sand slopes around gas line area due mainly to dirt bikes. Consider possibly combining efforts regarding a caretaker, signage, enforcement, gates, other deterrents, etc.
12. Have a “walk in from the main road” policy for all river access spur roads, shoreline campsites and fishing sites. This will involve blocking off road access and installing restrictive signage (no motorized access), site clean up and re-vegetation with native species as appropriate. Designate parking spots adjacent to the main road, for users to leave their vehicles while walking in.
13. Block off all road access to polygons 588 (Sheppard Creek mouth to the south) and 671. This area has been heavily impacted and has disturbed soils and weed issues. This road is a vector for weed dispersal through the whole area so block off from main road or spur to cairn. If miners require access (rec. 14), then a double-locked gate should be placed at the junction to this road.
14. Arrange a meeting with the placer tenure holders to four claims in FSC (Columbia Power Corp., Gerald and Bruce York, Peter Durgosoff, Robert McQueen) to discuss essential requirements for access. Miners should be encouraged to adhere to winter motorized use restrictions, and access the foreshore by boat, rather than vehicle, if necessary. Activities which they undertake during other times of the year that result in surface soil disturbance should be discussed with TLC, so that reclamation plans can be made for these sites, as required. Local TLC staff should work collaboratively with miners on site to promote a greater awareness of weed issues and the potential for disturbance to exacerbate weed problems. TLC staff should encourage miners to take special precautions during their operations (minimize disturbance, re-seed, clean vehicles, etc.) and provide information and resources to assist them.
15. Liaison with ATCO Lumber Co. Ltd. regarding the need for recontouring (removal) of the road network through logging blocks in Sheppard Creek to discourage ORV access through this area. Also liaison with private landowner (Ted Nelson: 250 367-7449) in Casino whose property borders ATCO lands to ensure that secure gate prevents ORV access into the Sheppard Creek road network from Casino.
16. Block off south end of main road near feeder box intersection before junction of polygons 587 and 668 (UTMs: 454050 5428345). This road is too ingrown and roaded access further south is not necessary. There is also potential for motorized disturbance to habitat of value to listed species (Brewer’s sparrow, potentially also YBCH, by creek) in this area.
17. Block off road access to river from polygon 293 (UTMs 454857; 5434112). Also block off road access from main road Y-junction (UTMs: 454113; 5428480) to Waneta viewpoint and turn-around with newly installed osprey nest pole/platform (UTMs: 454526; 5428595). A walk in trail to viewpoint with some interpretative signage overlooking the river may be an option in future, but ospreys should be given a chance to establish and breed without human disturbance at this site in 2008/2009.
18. Block off motorized access adjacent to one hazardous cottonwood at north end near boundary to eliminate hazard to public (this is one of the few sites with defective live trees, so do not remove).

### **Weed Management**

19. Designate and send a TLC or FSC Management Board weed representative to the CKIPC meetings to discuss weed issues, weed control and associated funding requirements for FSC. Also explore collaborative partnerships with other local agencies and stakeholders to address weed issues.

20. Develop a weed management plan for the FSC in consultation with the CKIPC coordinator and the MORF Weed Officer that includes provisions for periodic surveys to determine priority weed distribution and abundance, various control actions (prevention and education, biocontrol, chemical, mechanical and cultural control), appropriate site-specific prescriptions, and actions for implementation and effectiveness monitoring and adaptive management. Explore weed funding opportunities, initiatives and partnerships with other agencies (e.g., CKIPC, BC Hydro, BCTC, FortisBC, TCML, MOFR, CPC, MOTH, FWCP, MOE, RDKB, CBT), NGO groups, or interested members of the public.
21. To address existing large spotted knapweed infestations on the BC Hydro and TCML access roads will require broadcast herbicide spraying of the roadside from a truck or ATVs in all severely affected areas (most of the BC Hydro access road and its junction with the TCML line, selected portions of the TCML line). This initiative would be a long term commitment best undertaken using a “top-down” approach (i.e., working progressively from year to year from the height of land downslope). This can only be contemplated if ORV use restrictions are imposed and appear effective along the BC Hydro access road. This initiative needs to be further discussed with Kevin Delgarno and Mike Guité (BCTC) once new access restrictions have been introduced and some monitoring of effectiveness has occurred.
22. Develop some invasive plant interpretive material with recommendations for preventative actions; display at the interpretive kiosk near the entrance to FSC (rec. 7), to increase weed awareness.
23. Organize a group outing and weed pulling session in the FSC with TLC, Management and Advisory board members and other public users. The CKIPC would be able to assist with organization and would provide a small donation to the FSC (J. Craig, pers. comm.). Hoary alyssum at Casino would also be a high priority. Dalmation toadflax, spotted knapweed and tansy ragwort are a problem in polygons 588 and 671, so these would be candidates for pulling (these polygons also need additional attention combining chemical and mechanical control).

### **ROW Management**

24. TLC and the Management Board should express their concerns to FortisBC and TCML regarding the impacts to low shrubs and browse availability along their ROW as a result of ROW herbicide spraying to control deciduous tree and shrub growth (polygon 344). They should also enter into proactive discussions with TCML/FortisBC and BC Hydro/BCTC to maintain ROWs in a manner that benefits wildlife, biodiversity and endemic plant communities and reduces the potential for weed encroachment and spread in FSC. A variance to the new standard practice of using herbicide (versus brushing) to address capable shrubs would be very helpful to promote browse re-sprouting. Mowing may also be appropriate to enhance winter browse in some flatter areas with denser growth. Minimizing tree removal in favour of other methods (e.g., topping, girdling, mechanical treatments) that retain some structure, while simultaneously addressing safety concerns should be encouraged.
25. Request assurances from BCTC and FortisBC that all vegetation management be conducted in fall (September to October) when breeding is completed, disturbance and mortality impacts can be minimized and the access roads are dry and passable to minimize soil disturbance.
26. Request that a culvert be installed along the TCML access road over Sheppard Creek bed (polygon 586) to reduce riparian impacts. This has been attempted, but has failed, and may require the services of a hydrologist to establish a permanent solution. Also discuss many other roads forking off the main access road in this area that should be blocked off and re-vegetated.

### **Vegetation Management**

27. Planted ponderosa pine and western larch in polygons 345 and 292 require tending; some ponderosa pine have survived but western larch mortality is very high. Remove protective plastic sheeting,

irrigate and pull weeds to improve vigour (note that trees are clumped and it would be better to spread plantings out in a scattered pattern).

28. Obtain information on appropriate soil amendments and fertilizer for the FSC based on soil samples obtained for the area. Apply amendments and plant and tend scattered Py seedlings in portions of the area that are lacking trees (e.g., polygon 345 and 587).
29. Need to revegetate sparsely vegetated/weedy polygons at the north end of FSC. Liaison with TCML on their Trail Area Wide-Remediation Plan efforts to assist with the re-vegetation of exposed land polygons in the northern portion of the FSC. Re-vegetation efforts will likely require soil preparation, application of lime and soil amendments, tree/shrub/herb planting and tending. Need fencing to prevent motorized use and disturbance. Plant advanced Py on road and put up fencing to protect (polygon 223 and 224).
30. Provide interpretive signage regarding the occurrence of poison ivy and how to identify this species.

### **Habitat Enhancement**

31. Create functional WTs on the BC Hydro powerline with assistance of BCTC (contact: Kevin Dalgarno). Use mechanical treatments (limb/notch tops/create crack/scars, etc.) on larger diameter Douglas-fir and ponderosa pine trees on the ROW growing close to the conductor (UTMs for excellent candidate trees: 453499; 5429170).
32. Create wildlife trees on the Flats in ponderosa pine stand (polygon 511; UTM: 455380; 5429526) using a combination of mechanical and fungal inoculation methods (this provides the potential to conduct comparative experimental trials and effectiveness monitoring using two approaches). Ensure that motorized use is blocked off here first (rec. 8) to prevent liability as a result of wildlife trees creating hazard to the public. Blocking off the access road through the stand to the cairn and replacing it with a trail will also eliminate the risk of experimentally created wildlife trees being taken for firewood. Explore possible funding from CPC's Waneta Expansion Project Terrestrial Compensation Fund (to create wildlife trees and improve breeding, roosting and feeding habitat specifically for Lewis's Woodpecker habitat enhancement on the Flats).
33. Explore opportunities to create wildlife trees and large hollow logs using mechanical means (see Steeger and Spalding 2004) in other *Treed Coniferous Open* and *Treed Coniferous Sparse* forest polygons.
34. Also consider using mechanical techniques to create wildlife tree features (e.g., cavities, cracks, crevices, etc.) in selected live aspen that are part of a maturing patch in polygon 583.
35. Promote vegetative screening between the main road and river shoreline areas (especially in polygons 292, 345, 587, 511, 668). Plant advanced cottonwood and ponderosa pine along shoreline banks to provide screening, create perch habitat, reduce wildlife disturbance by people and reduce bank erosion.
36. Undertake a riparian reconnaissance survey along Sheppard and other unnamed creeks to identify and mark good shrub planting sites. Plant native shrubs to improve riparian habitat suitability for shrub nesters and insects, bank stability, and to reduce the potential for weed encroachment. Tend and irrigate plantings periodically to promote accelerated growth.
37. Brush decadent shrubs in polygons 667 and 583 within the next 5 years.
38. Brush decadent shrubs within a depression area with high shrub diversity (polygon 587 with UTM: 455394; 5429432) within the next 5 years.



39. Identify sites for potential brushing of decadent shrubs in next 5 years in all *Treed Broadleaf Dense* and *Shrub Tall Open* stands.
40. Thin out ingrown patch in polygon 510 (kind of unique, so this is not a high priority in the next 5 years).

### **Biodiversity Management**

41. Undertake winter tracking surveys for mammals, and spring, summer and fall surveys for birds in order to develop more comprehensive wildlife species lists for all guilds. The latter could be provided to users at the interpretive kiosk near the entrance. Seek to collaborate with local naturalist, birding and outdoor groups on this initiative, or involve college students as an independent study project.
42. Undertake an insect inventory (butterfly, dragonfly, other insect) in the FSC, assemble a species list, and design a brochure to promote awareness of insects and their habitats in the FSC.
43. Conduct a survey for listed plant species and communities and then evaluate the need for protection of particular sensitive sites. The tiny patch of sumac bluebunch wheatgrass community on slope below cairn (UTMs 455377 5429446) should be protected and this community should be surveyed for on other similar aspects/sites. Conduct more work to determine the nature, location and geographical extent of the listed *Douglas-fir - dull Oregon grape - parsley fern* community associated with the ICHdw02 site series and develop recommendations for protection of sensitive sites, if necessary.
44. Undertake more targeted inventories in FSC focussing specifically on brewer's sparrow, yellow-breasted chat, common nighthawk, canyon wren, barn swallow and Lewis's woodpecker. Provide site-specific management recommendations for these species based on the findings of inventories.
45. Place interpretive sign on bench above sensitive waterfowl area (UTMs: 454814; 5431747). "Sensitive Waterfowl Area; Do Not Disturb". Panel should display photos of different waterfowl and shorebird species likely to be seen there and the habitat requirements of a few feature species.

### **Archeological and Heritage Values**

46. Re-visit the identified archeological sites previously mapped and surveyed on FSC property (contact: Jamie Forbes, Trail Historical Society). Survey and determine their status and evaluate if they require some form of special protection or management.
47. Replace the bronze plaque vandalized from the cairn site (UTMs: 455444; 5429510).

### **Recreational Values**

48. Horseback riding should be strictly confined to the main road to minimize the potential for soil disturbance and invasive weed spread.
49. Exemptions to the motorized use winter closure period (Dec. 1 to March 1) for the purposes of cougar/coyote/bobcat hunting through a special permit from the TWA should not be continued. This is consistent with TLC's "no predator control" policy for all conservation properties. There is no empirical evidence that cougar populations are elevated or requiring control in the West Kootenay (R. Clarke, pers. comm.). In fact, the South Selkirk population appears to be limited by high cougar mortality rates and immigration of sub-adults from Washington State appears to be required to maintain existing cougar numbers in the area (Clarke 2003). Maintaining a consistent policy with no exemptions will also facilitate implementation, enforcement and monitoring of the winter motorized closure policy.
50. Liaison with TCML to discourage dirt bike use of steep sand slopes on northern edge of Conservancy (polygons 220, 224, 219, 218, gas line and TCML lands to the north).

51. Recreational “trap shooting” on or near gravel bars, sand bars and mudflats should not be permitted from shoreline areas of the FSC. Signage indicating trap shooting restrictions are required on benches overlooking the shorelines and at the information kiosk near entrance to the property (the benches and gravel bars below were littered with gun shell cartridges and these sites are in need of a thorough clean up).

### **Public Education and Awareness**

52. Local TLC staff should undertake public education/awareness activities to engage local ORV user groups regarding ORV impacts and responsible use. Outreach could include presentations and brochures developed and distributed at ORV group meetings and/or at ORV retail outlets. Attending ORV group meetings could also provide an opportunity to present site-specific maps and information for FSC (e.g., boundaries, new access policy, trial basis open gate policy, monitoring, need for self-policing and enforcement, weeds, etc.) and to answer questions that may arise.
53. Promote and explore various awareness-building, education and training opportunities with potential partners (e.g., Selkirk College, local high schools, the Trail Historical Society, the Metis Association, Nelson Naturalists, other birding and outdoor groups, etc.) to be conducted in the FSC. FSC could provide a unique venue for outdoor classroom, field trip, workshop, seminar, or training sessions featuring hands-on learning opportunities. Care should be taken in the planning and implementation of such initiatives (site, scheduling, number of individuals) to ensure that any negative effects are minimized. Generally, activities involving small groups that walk-in off the main road for day-only trips and require minimal facilities are considered appropriate.
54. Establish a covered wildlife viewing platform (on the Waneta hillside near the new TCML switchyard or at river level) to view winter wildlife in the FSC. The upper vantage also offers the opportunity to monitor human activities with the aid of a spotting scope (including violations of winter closure and motorised use restrictions). Explore cost-sharing with CPC/TCML and develop some interpretive signage to establish here regarding the winter range and its significant values.

### **Research**

55. The practice of prescribed burning requires re-evaluation in light of heavy metal concentrations and lack of mineral soil horizon due to previous severe fire damage. From a metals expert at TCML (contact: Bill Duncan), seek clarification, site-specific data and interpretations regarding heavy metal concentrations in the FSC, so that the implications of burning to volatilization risk and wildlife exposure can be determined. Prescribed burning should not be conducted in the FSC until this issue has been satisfactorily clarified. If a thorough evaluation concludes that there is no risk, then prescribed burning can be considered in polygons where shrubs are becoming decadent and weed spread is not an issue of concern (weeds are likely to worsen as a result of burning in polygons where they already persist). In the meantime, use brushing as a tool to rejuvenate browse, if required.
56. To support recommendations regarding stand structure objectives for open forests, it would be valuable to undertake some stand structure sampling in representative forested VRI polygons of the FSC. Current stocking densities and crown closure levels could be determined and compared with KBLUP guidelines. Tree diameter distributions and snag densities could be evaluated relative to MOFR data for unmanaged stands (Province of British Columbia 2001; Steeger and Machmer 2002). This is necessary to assist in setting quantitative stand structure objectives for specific polygons and developing quantitative targets during future prescription development.
57. Birch dieback is resulting in increased mortality and loss of most birch in the area. Local research is underway on this issue and it may be advantageous to participate through use of the FSC as a research study site (contact: Dr. Suzanne Simard, UBC).

### **Area Maintenance and Clean-up**

58. Clean up destroyed cabin and associated garbage in polygon 511; block off access to this area and reclaim and revegetate trails.
59. Remove at least three vehicles floating in Columbia River near shoreline near the north end of FSC and along Casino Road. (collaborate with TCML).

### **Other**

60. Investigate the land ownership status on the south boundary of the property and establish a collaborative relationship with the adjacent landowner.
61. Establish a First Nations representative to sit on the Advisory Committee.

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## APPENDIX 1: Names and Conservation Status of Vertebrate Wildlife Species Confirmed In and Adjacent to the FSC.

Common Name	Scientific Name	COSEWIC <sup>1</sup>	CDC <sup>2</sup>	Confirmed in FSC <sup>3</sup>	Adjacent Records <sup>4</sup>
<b>AMPHIBIANS</b>					
Columbia Spotted Frog	<i>Rana luteiventris</i>	NAR	Y	√	
Long-toed Salamander	<i>Ambystoma macrodactylum</i>		Y		√
Pacific Chorus Frog	<i>Pseudacris regilla</i>		Y	√	
Western Toad	<i>Bufo boreas</i>	SC	Y		√
<b>REPTILES</b>					
Common Garter Snake	<i>Thamnophis sirtalis</i>		Y	√	
Northern Alligator Lizard	<i>Elgaria coerulea</i>	NAR	Y	√	
Racer	<i>Coluber constrictor</i>	SC	B	√	
Rubber Boa	<i>Charina bottae</i>	SC	Y	√	
Western Skink	<i>Eumeces skiltonianus</i>	SC	B	√	
Western Terrestrial Garter Snake	<i>Thamnophis elegans</i>		Y	√	
<b>MAMMALS</b>					
American Beaver	<i>Castor canadensis</i>		Y	√	
American Black Bear <sup>5</sup>	<i>Ursus americanus</i>		Y	√	
Big Brown Bat <sup>5</sup>	<i>Eptesicus fuscus</i>		Y	√	
Bobcat	<i>Lynx rufus</i>		Y	√	
Bushy-tailed Woodrat	<i>Neotoma cinerea</i>		Y	√	
Columbian Ground Squirrel	<i>Spermophilus columbianus</i>		Y	√	
Common Muskrat	<i>Ondatra zibethicus</i>		Y		√
Coyote	<i>Canis latrans</i>		Y	√	
Moose	<i>Alces americanus</i>		Y	√	
Mountain Goat	<i>Oreamnos americanus</i>		Y	√	
Mountain Lion	<i>Felis concolor</i>		Y	√	
Mule Deer	<i>Odocoileus hemionus</i>		Y	√	
North American Deer mouse	<i>Peromyscus maniculatus</i>		Y	√	
Northern Flying Squirrel <sup>5</sup>	<i>Glaucomys sabrinus</i>		Y	√	
Northern Pocket Gopher	<i>Thomomys talpoides</i>		Y	√	
Northern River Otter	<i>Lutra canadensis</i>		Y	√	
Red Squirrel <sup>5</sup>	<i>Tamiasciurus hudsonicus</i>		Y	√	
Rocky Mountain Elk	<i>Cervus elaphus</i>		Y	√	
Silver-haired Bat <sup>5</sup>	<i>Lasionycteris noctivagans</i>		Y	√	
Snowshoe Hare	<i>Lepus americanus</i>		Y		√
Townsend's Big-eared Bat	<i>Corynorhinus townsendii</i>		B	√	
Western Long-eared Myotis <sup>5</sup>	<i>Myotis evotis</i>		Y	√	
White-tailed Deer	<i>Odocoileus virginianus</i>		Y	√	
Yellow-pine Chipmunk <sup>5</sup>	<i>Tamias amoenus</i>		Y	√	
Yuma Myotis <sup>5</sup>	<i>Myotis yumanensis</i>		Y	√	
<b>BIRDS</b>					
American Coot	<i>Fulica americana</i>		Y	√	
American Crow	<i>Corvus brachyrhynchos</i>		Y	√	
American Dipper	<i>Cinclus mexicanus</i>		Y	√	
American Goldfinch	<i>Carduelis tristis</i>		Y	√	
American Kestrel <sup>5</sup>	<i>Falco sparverius</i>		Y	√	
American Redstart	<i>Setophaga ruticilla</i>		Y	√	
American Robin	<i>Turdus migratorius</i>		Y	√	



Common Name	Scientific Name	COSEWIC <sup>1</sup>	CDC <sup>2</sup>	Confirmed in FSC <sup>3</sup>	Adjacent Records <sup>4</sup>
American Wigeon	<i>Anas americana</i>		Y	√	
Bald Eagle <sup>5</sup>	<i>Haliaeetus leucocephalus</i>	NAR	Y	√	
Bank Swallow	<i>Riparia riparia</i>		Y	√	
Common Goldeneye <sup>5</sup>	<i>Bucephala clangula</i>		Y	√	
Barrow's Goldeneye <sup>5</sup>	<i>Bucephala islandica</i>		Y	√	
Belted Kingfisher	<i>Ceryle alcyon</i>		Y	√	
Black-capped Chickadee <sup>5</sup>	<i>Poecile atricapillus</i>		Y	√	
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>		Y	√	
Brewer's Sparrow	<i>Spizella breweri breweri</i>		R	√	
Brown-headed Cowbird	<i>Molothrus ater</i>		Y	√	
Bufflehead <sup>5</sup>	<i>Bucephala albeola</i>		Y	√	
Calliope Hummingbird	<i>Stellula calliope</i>		Y	√	
Canada Goose	<i>Branta canadensis</i>		Y	√	
Canyon Wren	<i>Catherpes mexicanus</i>	NAR	B	√	
Cassin's Vireo	<i>Vireo cassinii</i>		Y	√	
Cedar Waxwing	<i>Bombcilla cedrorum</i>		Y	√	
Chipping Sparrow	<i>Spizella passerina</i>		Y	√	
Cinnamon Teal	<i>Anas cyanoptera</i>		Y	√	
Clark's Nutcracker	<i>Nucifraga columbiana</i>		Y	√	
Clay-colored Sparrow	<i>Spizella pallida</i>		Y	√	
Cliff Swallow <sup>4</sup>	<i>Petrochelidon pyrrhonota</i>		Y	√	
Common Loon	<i>Gavia immer</i>		Y	√	
Common Merganser <sup>5</sup>	<i>Mergus merganser</i>		Y	√	
Common Nighthawk	<i>Chordeiles minor</i>	T	Y	√	
Common Raven	<i>Corvus corax</i>		Y	√	
Cooper's Hawk	<i>Accipiter cooperii</i>	NAR	Y	√	
Dark-eyed Junco	<i>Junco hyemalis</i>		Y	√	
Downy Woodpecker <sup>5</sup>	<i>Picoides pubescens</i>		Y	√	
Dusky Flycatcher	<i>Empidonax oberholseri</i>		Y	√	
Eastern Kingbird	<i>Tyrannus tyrannus</i>		Y	√	
European Starling	<i>Sturnus vulgaris</i>		E	√	
Evening Grosbeak	<i>Coccothraustes vespertinus</i>		Y	√	
Golden-crowned Kinglet	<i>Regulus satrapa</i>		Y	√	
Gray Catbird	<i>Dumetella carolinensis</i>		Y	√	
Great Blue Heron <sup>5</sup>	<i>Ardea herodias</i>	NAR	B	√	
Hairy Woodpecker <sup>5</sup>	<i>Picoides villosus</i>		Y	√	
Hammond's Flycatcher	<i>Empidonax hammondii</i>		Y		√
Harlequin Duck	<i>Histrionicus histrionicus</i>		Y	√	
Killdeer	<i>Charadrius vociferus</i>		Y	√	
Lazuli Bunting	<i>Passerina amoena</i>		Y	√	
Least Flycatcher	<i>Empidonax minimus</i>		Y	√	
Lewis' Woodpecker <sup>5</sup>	<i>Melanerpes lewis</i>	SC	B	√	
MacGillivray's Warbler	<i>Oporornis tolmiei</i>		Y	√	
Mallard	<i>Anas platyrhynchos</i>		Y	√	
Merlin	<i>Falco columbarius</i>		Y	√	
Mourning Dove	<i>Zenaida macroura</i>		Y	√	
Nashville Warbler	<i>Vermivora ruficapilla</i>		Y	√	
Northern Flicker <sup>5</sup>	<i>Colaptes auratus</i>		Y	√	
Northern Pygmy-owl <sup>5</sup>	<i>Glaucidium gnoma</i>		Y	√	
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>		Y	√	

Common Name	Scientific Name	COSEWIC <sup>1</sup>	CDC <sup>2</sup>	Confirmed in FSC <sup>3</sup>	Adjacent Records <sup>4</sup>
Northern Saw-whet Owl <sup>5</sup>	<i>Aegolius acadicus</i>		Y	√	
Northern Shoveler	<i>Anas clypeata</i>		Y	√	
Orange-crowned Warbler	<i>Vermivora celata</i>		Y	√	
Osprey <sup>5</sup>	<i>Pandion haliaetus</i>		Y	√	
Pacific-slope Flycatcher	<i>Empidonax difficilis</i>		Y	√	
Pileated Woodpecker <sup>5</sup>	<i>Dryocopus pileatus</i>		Y		√
Pine Siskin	<i>Carduelis pinus</i>		Y	√	
Red-breasted Nuthatch <sup>5</sup>	<i>Sitta canadensis</i>		Y	√	
Red-eyed Vireo	<i>Vireo olivaceus</i>		Y	√	
Red-naped Sapsucker <sup>5</sup>	<i>Sphyrapicus nuchalis</i>		Y	√	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	NAR	Y	√	
Ring-necked Duck	<i>Aythya collaris</i>		Y	√	
Ruby-crowned Kinglet	<i>Regulus calendula</i>		Y	√	
Ruffed Grouse	<i>Bonasa umbellus</i>		Y	√	
Rufous Hummingbird	<i>Selasphorus rufus</i>		Y	√	
Say's Phoebe	<i>Sayornis saya</i>		Y	√	
Sharp-shinned Hawk	<i>Accipiter striatus</i>	NAR	Y	√	
Song Sparrow	<i>Melospiza melodia</i>		Y	√	
Spotted Sandpiper	<i>Actitis macularia</i>		Y	√	
Spotted Towhee	<i>Pipilo maculatus</i>		Y	√	
Steller's Jay	<i>Cyanocitta stelleri</i>		Y	√	
Swainson's Thrush	<i>Catharus ustulatus</i>		Y	√	
Townsend's Solitaire	<i>Myadestes townsendi</i>		Y	√	
Tree Swallow <sup>5</sup>	<i>Tachycineta bicolor</i>		Y	√	
Turkey Vulture	<i>Cathartes aura</i>		Y	√	
Vaux's Swift <sup>5</sup>	<i>Chaetura vauxi</i>		Y	√	
Veery	<i>Catharus fuscescens</i>		Y	√	
Vesper Sparrow	<i>Pooecetes gramineus</i>		Y	√	
Violet-green Swallow <sup>5</sup>	<i>Tachycineta thalassina</i>		Y	√	
Warbling Vireo	<i>Vireo gilvus</i>		Y	√	
Western Grebe	<i>Aechmophorus occidentalis</i>	NAR	R	√	
Western Kingbird	<i>Tyrannus verticalis</i>		Y	√	
Western Tanager	<i>Piranga ludoviciana</i>		Y	√	
Western Wood-pewee	<i>Contopus sordidulus</i>		Y	√	
Wild Turkey	<i>Meleagris gallopavo</i>		E	√	
Yellow-breasted Chat	<i>Icteria virens</i>	E	R		√
Yellow Warbler	<i>Dendroica petechia</i>		Y	√	
Yellow-rumped Warbler	<i>Dendroica coronata</i>		Y	√	
<b>FISH<sup>5</sup></b>					
Bridgelip sucker	<i>Catostomus columbianus</i>		Y		√
Bull trout	<i>Salvelinus fontinalis</i>		B		√
Cutthroat trout	<i>Oncorhynchus clarki</i>		Y		√
Kokanee	<i>Oncorhynchus nerka</i> )		Y		√
Lake whitefish	<i>Coregonus clupeaformis</i>		Y		√
Largescale sucker	<i>Catostomus macrocheilus</i>		Y		√
Longnose dace	<i>Rhinichthys cataractae</i>		Y		√
Longnose sucker	<i>Catostomus catostomus</i>		Y		√
Mottled sculpin	<i>Cottus bairdi</i>		Y		√
Mountain whitefish	<i>Prosopium williamsoni</i>		Y		√
Northern pikeminnow	<i>Ptychocheilus oregonensis</i>		Y		√
Peamouth	<i>Mylocheilus caurinus</i>		Y		√

Common Name	Scientific Name	COSEWIC <sup>1</sup>	CDC <sup>2</sup>	Confirmed in FSC <sup>3</sup>	Adjacent Records <sup>4</sup>
Prickly sculpin	<i>Cottus asper</i>		Y		√
Rainbow trout	<i>Oncorhynchus mykiss</i>		Y		√
Redside shiner	<i>Richardsonius balteatus</i>		Y		√
Shorthead sculpin	<i>Cottus conufus</i>	T	B		√
Torrent sculpin	<i>Cottus rhotheus</i>		Y		√
Umatilla dace	<i>Rhinichthys umatillus</i>	SC	R		√
Walleye	<i>Sander vitreum</i>		Y		√
White sturgeon	<i>Acipenser transmontanus</i>	E	R		√

<sup>1</sup>COSEWIC: E = Endangered, T = Threatened, SC = Special Concern, NAR = Not At Risk, and DD = Data Deficient.

<sup>2</sup>CDC: R = Red (Endangered or Threatened), B = Blue (Special Concern), Y = Yellow (Apparently Secure), E = Exotic (Non-native), and U = Unknown (Data Deficient).

<sup>3</sup>Occurs in the FSC based on data reported in Schaeffer et al. 2002, Machmer et al. 2005, Machmer and Ogle 2006, and 2007 assessments conducted by M. Machmer and C. Steeger.

<sup>4</sup>Occurs locally near the Fort Shepherd Conservancy based on records in Dulisse 1999a, Dulisse and Wood 2000; Machmer et al. 2005, Machmer and Ogle 2006, Machmer 2007; Machmer et al. 2007.

<sup>5</sup>Wildlife tree users as defined in Machmer and Steeger (2005).

<sup>6</sup>Fish data are from Golder Associates (2002) based on 2001 fish captures and observations on the Lower Columbia River, including the confluence area and the Wanete Eddy.

## APPENDIX 2: List of Persons Contacted

Name	Affiliation
Antifeau, Ted	Rare & Endangered Species Biologist, MOE, Nelson, BC
Arndt, Steve	Fish Biologist, FWCP, Nelson, BC
Ballard, Larry	Area Manager, West Kootenay District, BC
Beers, Chris	Aquatic Ecologist, Columbia-Kootenay Fisheries Renewal Partnership, Crabbrook, BC
Benson, Scott	Curator, Trail Museum, BC
Betts, Lynn	Communications Consultant, FWCP, Nelson, BC
Cadrin, Carmen	Program Ecologist, CDC, MOE, Victoria, BC
Castonguay, Julie	Forest health Office, MOF, Kootenay Lake Forest District, BC
Clarke, Ross	Wildlife Biologist, MOE, Nelson, BC
Craig, Juliet	Coordinator, CKIPC, Nelson, BC
Den Biesen, Dean	Wildlife Specialist, BC Hydro, Castlegar, BC
Dalgarno, Kevin	Transmission Line Specialist, BCTC, Kamloops, BC
Enns, Kat	Botanist and Consultant, Delphinium Holdings Ltd., Castlegar, BC
Enns, Bruce	GIS Specialist, Delphinium Holdings Ltd., Castlegar, BC
Filmore, Rick	Trail Wildlife Association, Fruitvale, BC
Forbes, Jamie	Trail Historical Society, BC
Frew, Rob	Trail Wildlife Association, Trail, BC
Glass, Angus	Communications Consultant, FWCP, Nelson, BC
Guité, Mike	BC Transmission Corporation, Vancouver, BC
Gwilliam, John	Trail Wildlife Association, Nelson, BC
Hildebrand, Larry	Fish Biologist, Golder Associates Ltd., Castlegar, BC
Hilts, Steve	Superintendent, Environmental Remediation, TCML, Trail, BC
Kenyon, Graeme	Trail Wildlife Association, Trail, BC
Knapik, Mike	Ecosystem Biologist, MOE, Nelson, BC
Kondla, Norbert	Butterfly Biologist and Consultant, Genelle, BC
Krebs, John	Senior Wildlife Biologist, FWCP, Nelson, BC
LaChance, Genevieve	Stewardship Forester, MOF, Arrow-Boundary Forest District, Castlegar, BC
Manley, Irene	Wildlife Biologist, FWCP, Nelson, BC
Martell, Kathryn	TLC Coordinator, Kootenay Region, Kimberley, BC
Mathews, Llewellyn	Environmental Coordinator, Columbia Power Corporation, Castlegar, BC
Mazzochi, Rick	Stewardship Forester, MOF, Arrow-Boundary Forest District, Castlegar, BC
Miller, Valerie	Invasive Plant Officer, MOF, Nelson, BC
Ozanne, Ron	Forester, Atco Lumber Co. Ltd. Fruitvale, BC.
Pearson, Tracy	Enforcement Office, MOFR, Arrow-Boundary Forest District, Castlegar, BC
Pickard, Doug	Transmission Line Supervisor, Fortis BC, Trail, BC
Ramsey, Ian	Terasen Gas ROW Maintenance Supervisor, BC
Rebelato, Gail	Legal Services Coordinator, TCML, Trail, BC
Saprunoff, Grant	West Kootenay Fly Fishers, Trail, BC
Shafer, Ron	Terasen Gas ROW Manager, BC
Stemmler, Craig	Planner, Atco Lumber Co. Ltd.
Stock, Arther	Forest Entomologist, MOF, Kootenay Lake Forest District, BC
Taylor, Willard	Lands Management, TCML, Trail, BC
Thurston, Tim	Instructor, Selkirk College, Castlegar, BC
Waterhouse, Amy	GIS Specialist, FWCP, Nelson, BC
Welch, Darin	GIS Technician, FWCP, Nelson, BC
York, Gerald	President, BC Placer Miners Association

## APPENDIX 3: Fort Shepherd Public Openhouse Summary

(Notes prepared by Lynn Betts; Held March 28, 2007; 63 attendees signed in)

- Q. Is knapweed distributed on both the top and the bottom of the FSHEP property?  
(Marlene Machmer) - along roadsides, trails and disturbed areas in valley bottom and upland; appears to have increased between two surveys.
- (Lynn Betts) Q. Is there anything available to control knapweed?  
MM- Need to use all available means including biological controls, chemical control, mechanical control, cultural control, people management and awareness.
- (Terry) Q. Should use access control to control weeds, only use the main road in and out.
- (Marlene) - Have the attempts to block side roads on the property worked?  
(Terry) – No, uncontrolled access is the main problem. Roads have been there for years and the area is already under a road closure. Roads coming down banks have been there for 20 years.
- (Chris) Q. Don't want to lose the area for recreation (ORV). Where does the FSCA start?  
(Rob Frew) - North boundary is where gas line crosses the river. There was confusion about the property boundary. RF talked further about management/access.
- Q. Who owns the northern areas and what will be happening to them? TCML.
- Does TCML have a problem with the current use of these lands?  
(Steve Hilts) - It is private land, current use is not condoned; TCML has agreements with other user groups, but there is no such arrangement for Fort Shep.
- RF outlined the property boundary on the maps, mentioned ATCO cutblock and that TWA concerned about areas outside of FSCA boundary.
- (Bruce York) – Placer miner with title held in this area since 1852; have rights to access and mine the area. Once access is controlled then gating will happen; land to the north will be taken over, prospectors were never approached about the FSCA.  
MM - stakeholders (other than general public will be contacted in the fall)  
KS - TLC is aware of free minors rights; TLC not interested in acquiring TCML lands north of FSHEP due to condition and small lots.
- Q. Will fishing access be allowed?  
MM - yes for responsible users  
TWA - wants hunting and fishing to continue “responsibly”
- Q. What is TLC's history; do they allow access on other conservation properties?
- Q. Example of the Bombi ATV track. Suggestion that providing an area in FSHEP similar to this would solve some of the conflicts.  
(RF) Only restricted use of ATVs on main roads is compatible with the FSHEP area; an ORV track is not the best use of the areas values  
(MM) Such activity will impact the biological values that the Conservancy is intended to protect; ORV users should pick an area that's already degraded with low ecological values for such use.
- (Gerald York) – Placer miners have worked to create wildlife habitat.
- Q. How do you define responsible use? Need to have education about these expectations and take this into the communities.
- Q. Boundary of the area needs to be defined with property markers.  
(KS) – Yes, TLC plans to do this in 2008.
- (John Urqhart) - Needs quad due to disability; need for gates/signs; all groups need to work together on this.
- ATV's should not have more rights than bikes; need a level playing field.
- (Jeff) - Responsible use = stay on the main road; this applies to all vehicles.
- (Jason Tate, WKOR bike society) - Built Bombi track which is successful. There is a huge liability for TCML to have an OR track on their property. Need to work together, younger riders need areas to go to. Need signage on the property then people will know what they are commenting on. People will respect signs and this will eliminate a lot of the problems with ATVs.

- Q. Comment on ungulate winter range, does summer use by ORVs affect the quality of winter range MM – Yes, it causes soil disturbance, erosion, loss of vegetation and results in weed establishment and spread.
- Q. What about horse use of the property (RF) - The annual trail ride stays on the road now.
- Q. New ORV regulations for crown land; how will ORV use be policed at FSCA? KS – FSC is not crown land, it s private land. ORV use to be determined.
- Jason - Need to educate people about the changes and new expectations before you start policing and enforcing; defining the boundary is part of this.
- Placer miners; how is UWR classification determined? MM - explained Canada Land Inventory system for UWR classification.
- Placer miners - comment on biodiversity report, deer sightings and rare species sightings; question values.
- Terry - these comments are not helpful; we need to work together.
- Q. What will happen to areas north of FSHEP? (SH) - TCML may be sold, held or conserved;
- (Jerry Woodhouse) - Supports wildlife work at FSHEP; will management plan continue as a public process, in what form? Is there a way to let people know about any future changes?
- (Bushrat) - If north area is blocked, it will be a problem, concern about glass and garbage dumping in area from Casino Road to Casino Creek is the worst.
- Have had garbage pick-up days in the past using a loaned dump truck from TCML.
- SH comment – property went to TLC because they are qualified to receive Eco-gifts, TLC is required to place a top priority on conservation because of Eco-gifting policy & regulations.
- (Randy De Biagio) - Q. Management plans over 30 years; will need enforcement for management plan; who will do?
- KS - TLC uses paid and volunteer wardens for enforcement, when there are problems, they do enforce and they are legally responsible to do so.
- Mike – do any of TLCs other properties allow ATV use? KS - no this would be a first.

## **APPENDIX 4: Maps Showing Confidential Listed Occurrences**

**a. Listed Species Detected During 2007 Field Assessments (Figure 3)**

**b. Listed Species from CDC Data and Previous Records (from Machmer et al. 2007; Figure 4)**

Figure 3. 2007 Listed Species Occurrences (CONFIDENTIAL)



Figure 4. Listed Species From CDC Data and Previous Records (CONFIDENTIAL).

## **APPENDIX 5: Accounts for 12 Species at Risk**

Brewer's Sparrow  
Canyon Wren  
Common Nighthawk  
Great Blue Heron  
Lewis's Woodpecker  
Racer  
Rubber Boa  
Townsend's Big-eared Bat  
Western Grebe  
Western Skink  
Western Toad  
Yellow-breasted Chat

## Brewer's Sparrow - *Spizella breweri breweri*

**Status: BC – Red/IWMS/FRPA-GAR**

**COSEWIC – not listed**



Brewer's Sparrow

### General Habitat Description

Brewer's Sparrows in Southern British Columbia frequent mainly big sagebrush shrub-steppe communities at low elevations. Nests are usually located in shrubs or shrub tangle, sometimes also on the ground vegetation (BC Conservation Data Centre 2007<sup>10</sup> and references therein).

### Occurrence in the Plan Area

- In 2006, a single occurrence of Brewer's Sparrow was confirmed in the southern Fort Shepherd area. Recently, there have also been confirmed sightings of this a species along the West Arm of Kootenay Lake, east of Nelson (J. Arndt, pers. comm.).

### Important Habitat Structure

- Shrubland/Grassland Context (Shrub Height – Cover – Age Class)
  - Grass/Forb – Open, Closed
  - Low Shrub – Open, Closed Shrub Overstory – Seedling/Young, Mature, Old
  - Medium Shrub – Open, Closed Shrub Overstory – Seedling/Young, Mature, Old

### Essential Habitat Elements

- Shrubland/grassland Elements:
  - Herbaceous layer
  - Grasses
  - Forbs
  - Fruits/seeds/nuts
  - Small and medium shrubs
  - Shrub canopy layers (sub-canopy, above canopy)
- Ecological Elements:
  - Insect population irruptions
- Fire as a habitat element

### Best Management Practices

- Minimize disturbance and trampling by livestock.
- Retain density and structure of sagebrush habitat.
- Promote development of native perennial herbs and grasses.
- Maintain aspen-dominated stands in a properly functioning condition.
- Protect sagebrush during weed control programs.
- Implement protective measures to reduce the risk of fire that eliminates 100% of shrubs over a wide area.
- Do not conduct widespread range burning or shrub clearing
- Plant shrubs in areas where cover is lacking

### Potentially Suitable Management Units in the Plan Area

- South-facing dry low elevation shrubland and grassy areas in the Lower Fort Shepherd Conservancy potentially have suitable habitat for this species.

<sup>10</sup> BC Conservation Data Centre. 2007. Species Summary: *Dolichonyx oryzivorus*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 15, 2007).

## Canyon Wren - *Catherpes mexicanus*

**Current Conservation Status: BC – Blue    COSEWIC – Not At Risk**



Canyon Wren

### General Habitat Description

Canyon Wrens are restricted to rocky habitats situated in a variety of vegetation communities (from deserts to Douglas-fir stands). Their habitat is defined primarily by physical features of the landscape, such as rock canyons, fractured cliffs, large talus, and rock outcrops. The latter are often located in proximity to water (BC Conservation Data Centre 2007<sup>11</sup> and references therein).

### Occurrence in the Plan Area

- Canyon Wrens are heard frequently in rocky portions of the Lower Columbia valley close to water, and notably on the rocky hillsides near Trail, Warfield and Genelle. There are known occurrences on the hillsides of FSC.

### Important Habitat Structure (Shrub Height – Cover – Age Class)

- Shrubland/Grassland context:
  - Grass/Forb – Open, Closed
  - Low Shrub – Open, Closed Overstory – Seedling/Young, Mature, Old
  - Medium Shrub – Open, Closed Overstory – Seedling/Young, Mature, Old
  - Tall Shrub – Open, Closed Overstory – Seedling/Young, Mature, Old

### Essential Habitat Elements

- Non-vegetative, Abiotic Elements:
  - Rocks, talus, cliffs
  - Rocky outcrops and ridges
  - Rock crevices
- Riparian and aquatic bodies Elements:
  - Rivers and streams

### Best Management Practices

- Few specific management practices have been suggested, but some caution to minimize disturbance is advised with respect to development activities and recreational use (e.g., rock-climbing, dirt biking) in proximity to canyon wren breeding habitats.

### Potentially Suitable Management Units in the Plan Area

- There is an abundance of capable rock/talus habitat in close juxtaposition to water in the plan area, but some areas are subject to human disturbance and hence currently have low suitability.

<sup>11</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Catherpes mexicanus*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 16, 2007).

## Common Nighthawk – *Chordeiles minor*

**Status: BC – Yellow      COSEWIC – Threatened**



Common Nighthawk

### General Habitat Description

The Common Nighthawk lives in open and semi-open habitat such as open coniferous forests, savanna, grasslands, fields, and around cities and towns. It nests on the ground on a bare site in an open area. In some areas, it also nests on flat gravel roofs of buildings, perhaps related to prey availability at artificial lights. It feeds on flying insects (e.g., mosquitoes, moths, beetles, flies, caddis flies and catches insects high in the air or close to the ground. It may also forage on insects around artificial lights (BC Conservation Data Centre 2007<sup>12</sup> and references therein).

### Occurrence in the Plan Area

- Common nighthawks are known to occur in the Pend d'Oreille Valley, near Seven Mile and Waneta. Records are also available for the Columbia Gardens, Beaver Creek and Ft. Shepherd areas (pers. obs.)

### Important Habitat Structure

- Forest context (Tree Size – Canopy Layers– Canopy Cover)
  - Grass/Forb-Open, Closed
  - Shrub/Seedling-Open, Closed
  - Sapling/Pole-Open, Moderate
  - Small, Medium, Large Tree-Single, Multi Story-Open, Moderate, Closed
  - Giant Tree-Multi-Story
- Shrubland/grassland context (Shrub Size –Cover-Age Class)
  - Grass/Forb-Open, Closed
  - Low, Medium, Tall Shrub-Open, Closed Shrub Overstory-Seedling/Young, Mature, Old
- Agricultural context
  - Cultivated Cropland, Improved Pasture, Orchards/Vineyards/Nurseries
  - Modified Grasslands, Unimproved Pasture
- Urban context
  - High Density (>60% impervious surface development)
  - Moderate Density (30-60% impervious surface development)
  - Low Density (10-30% impervious surface development)

### Essential Habitat Elements

- Abiotic Elements: rock, gravel, talus-like habitats, rock substrates, rocky outcrops and ridges, barren ground, playa (alkaline, saline)
- Freshwater Riparian & Aquatic Bodies Elements: sand bars, gravel bars
- Fire as a Habitat Element
- Anthropogenic-related Elements: roads, buildings

### Best Management Practices

- Official management practices have not been developed yet, due to its recent listing (April 2007).
- Habitat management practices that control ground disturbance (e.g., livestock and ATV use), favour native insect abundance and avoid use of pesticides will benefit nighthawks.

### Potentially Suitable Management Units in the Plan Area

- Most areas in FSC have patches of suitable breeding and foraging habitat for this species.

<sup>12</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Chordeiles minor*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed July 16, 2007).

## Great Blue Heron - *Ardea herodias Herodias*

Status: BC – Blue/IWMS/FRPA-GAR COSEWIC - None



Great Blue Heron

### General Habitat Description

Great blue herons nest singly or in colonies. They build platform-style stick nests usually in the upper part of the main tree canopy in undisturbed, mature deciduous, coniferous, and mixed woodlands near riparian foraging habitats. Breeding sites in the southern interior are located primarily in mature and old stands with high crown closure. Nests are most often built in black cottonwoods, although a wide variety of conifer species may be used as well (Machmer and Steeger 2003, 2004; BC Conservation Data Centre 2007<sup>13</sup> and references therein). Herons forage in shallow water along banks of lakes, wetlands and slow-moving rivers; feed mainly on fish.

### Occurrence in the Plan Area

- Herons are regularly seen feeding singly or in small numbers along the Columbia and Pend d'Oreille Rivers. No breeding sites are currently known within the plan area, but there is suitable habitat and historical rookeries are known near Seven Mile Dam. Several herons at a time were detected foraging along the mudflats, gravel and sand bars in the FSC.

### Important Habitat Structure

- Forest Context (Tree Size – Canopy Layers– Canopy Cover)
  - Medium, Large Tree – Single, Multi-Story – Open, Moderate, Closed
  - Giant Tree – Multi-Story
- Shrubland/Grassland Context (Shrub Height – Cover – Age Class)
  - Grass/Forb – Open, Closed
  - Medium Shrub – Open, Closed Shrub Overstory – Mature, Old
  - Tall Shrub – Open, Closed Shrub Overstory – Mature, Old
- Agricultural Context
  - Cultivated Cropland, Improved Pasture, Unimproved Pasture

### Essential Habitat Elements

- Forest, Shrubland, & Grassland Elements:
  - Medium, large giant trees and snags; edges; herbaceous layer; medium, large shrubs
- Riparian and aquatic bodies Elements:
  - Shallow water depth
  - Rivers and streams, lakes/ponds/reservoirs, wetlands/marshes/wet meadows/bogs and swamps
  - Shoreline, ephemeral pools, emergent vegetation, islands, seasonal flooding
- Anthropogenic-related Elements:
  - Sewage treatment plant, irrigation ditches/canals, log boom, hatchery facilities and fish

### Best Management Practices

- Maintain large-sized black cottonwoods and conifers in riparian areas.
- Avoid human disturbance near nest sites and important foraging areas.

### Potentially Suitable Management Units in the Plan Area

- Riparian habitats on the Columbia River are important foraging and protected loafing sites. Sheppard Creek and other unnamed streams in FSC are also used for foraging. The FSC could potentially be used for breeding if large trees suitable for nesting or roosting were found nearby.

<sup>13</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Ardea herodias*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 16, 2007).

## Lewis's Woodpecker - *Melanerpes lewis*

**Status: BC – Blue/IWMS/FRPA-GAR  
COSEWIC - Special Concern (SARA Schedule 1)**



Lewis's Woodpecker

### General Habitat Description

Lewis's woodpeckers breed in open ponderosa pine forest, open riparian woodland, and logged or burned forest. Structural attributes necessary to provide good breeding habitat are a very open canopy and large dead or decayed trees or tree limbs for cavity nesting. A brushy understorey that provides abundant insects, perches, and ground cover is also important (BC Conservation Data Centre 2007<sup>14</sup> and references therein).

### Occurrence in the Plan Area

- Single active nests are previously known from the Beaver Creek Provincial Park and fields near the Teck Cominco Reload Facility just opposite FSC (Machmer et al. 2005, 2006). Other sightings are available for areas further north in the Columbia Valley and east to Creston.

### Important Habitat Structure

- Forest context (Tree Size – Canopy Layers– Canopy Cover)
  - Grass/Forb-Open, Closed
  - Shrub/Seedling-Open, Closed
  - Medium Tree-Single, Multi-Story-Open, Moderate
  - Large Tree-Single, Multi-Story-Open, Moderate
  - Giant Tree-Multi-Story

### Essential Habitat Elements

- Forest Shrubland/Grassland Elements: large, giant tree and snag, moderately decayed; dead parts of live trees; tree cavities; live remnant/legacy trees; fruits/seeds/nuts; edges
- Ecological Elements: insect population irruptions (mountain pine beetle)
- Fire as a habitat element
- Antropogenic-related Elements: guzzlers and waterholes; fences/corrals

### Best Management Practices

- Conservation of live and dead, large-sized ponderosa pine and black cottonwoods, including broken-top and large-limbed trees.
- Maintenance of open forest stand-structure with abundant shrub cover.
- Maintenance of riparian areas.
- Prescribed burning in or adjacent to riparian areas.

### Potentially Suitable Management Units in the Plan Area

- Open forest polygons with suitable dead and decaying ponderosa pine and/or cottonwood trees would be important for this species. Such trees are currently lacking but could be created through various techniques.

<sup>14</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Melanerpes lewis*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 17, 2007).

## Racer - *Coluber constrictor*

**Status: BC – Blue/IWMS    COSEWIC – Special Concern**



**Racer**

### General Habitat Description

Racers prefer grasslands or open, sparsely treed areas with a grass understorey. This snake overwinters in dens that are often on south-facing rocky slopes (BC Conservation Data Centre 2007<sup>15</sup> and references therein). This snake feeds on rodents, other small vertebrates and insects and foraging habitats are most often shrub-steppe and grasslands, although open forests and riparian areas are also used.

### Occurrence in the Plan Area

- There are occurrence records for racers and selected active dens within the southern drier portion of the Lower Columbia Valley from Warfield to Beaver Creek and Waneta and into the Pend d'Oreille Valley (Dulisse 2005; Machmer et al. 2005, Machmer 2007, 2008). Racers were detected within the FSC in 2007 and in previous surveys (Schaeffer et al. 2002).

### Important Habitat Structure

- Forest context (Tree Size – Canopy Layers– Canopy Cover)
  - Grass/Forb-Open
  - Shrub/Seedling-Open
  - Sapling/Pole-Open
  - Small, Medium, Large Tree-Single, Multi-Story-Open
- Shrubland/grassland context (Shrub Size –Cover-Age Class)
  - Grass/Forb-Open, Closed
  - Low, Medium, Tall Shrub – Open, Closed Shrub Overstory – Seedling/Young, Mature, Old
- Agricultural Context
  - Modified Grasslands
  - Orchards/Vineyards/Nurseries
  - Improved Pasture
  - Unimproved Pasture

### Essential Habitat Elements

- Forest/woodland and shrubland/grassland context: edges
- Ecological Elements: burrows
- Non-vegetative, Abiotic Elements: talus, rocky outcrops and ridges, rock crevices
- Fire as a habitat element

### Best Management Practices

- Restrict road access and deactivate roads to avoid direct roadkill mortality.
- Restrict use of off-road vehicles near snake habitats.
- Limit forest ingrowth in open forest ecosystems.
- Maintain open grasslands near known snake habitats.
- Reduce disturbance near critical den sites in spring and fall months.

### Potentially Suitable Management Units in the Plan Area

- Open, dry, warm aspects with rock and talus features and/or rodent burrows in relatively undisturbed sites provide suitable breeding habitat for this species. Roadkill mortality is a problem along the Columbia valley.

<sup>15</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Coluber constrictor*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 17, 2007).



## Rubber Boa - *Charina bottae*

Status: BC – Yellow COSEWIC – Special Concern (SARA Schedule 1)



Rubber Boa

### General Habitat Description

Rubber boas occur in woodlands, forests, shrublands, meadows, grassy areas, and wet and sandy edges of rocky streams. They are found under logs and rocks and under the bark of dead fallen trees (BC Conservation Data Centre 2007<sup>16</sup> and references therein). This snake feeds on mice, shrews, lizards, lizard eggs, snakes, and small birds.

### Occurrence in the Plan Area

- This species is potentially relatively widespread in the plan area within open forests, grassy areas, powerlines and shrublands on warm aspects, based on surveys and records for the Lower Columbia and Pend d'Oreille Valley (Dulisse 2005; Machmer et al. 2005, Machmer 2007, 2008).

### Important Habitat Structure

- Forest context (Tree Size – Canopy Layers– Canopy Cover)
  - Grass/Forb-Open, Closed
  - Shrub/Seedling-Open, Closed
  - Sapling/Pole-Open, Moderate, Closed
  - Small, Medium, Large Tree-Single, Multi-Story-Open, Moderate, Closed
  - Giant Tree-Multi-Story
- Shrubland/grassland context (Shrub Size –Cover-Age Class)
  - Grass/Forb-Open, Closed
  - Low, Medium, Large Shrub – Open, Closed Shrub Overstory – Seedling/Young, Mature, Old
- Agricultural context
  - Cultivated Cropland
  - Improved Pasture
  - Orchards/Vineyards/Nurseries
  - Modified Grasslands
  - Unimproved Pasture

### Essential Habitat Elements

- Forest/woodland context:
  - Down wood in riparian and upland areas, duff
  - Burrows (aquatic or terrestrial)
- Non-vegetative, abiotic context:
  - Rocks, talus, talus-like habitats, rock substrates and crevices, rocky outcrops and ridges
- Fire as a habitat element

### Best Management Practices

- Maintain CWD and rock cover in snake habitats.
- Restrict road traffic or deactivate roads in known snake habitats.
- Avoid cattle grazing and herbicide use in snake habitats

### Potentially Suitable Management Units in the Plan Area

- Has the potential to be abundant in the plan area if free from disturbance.

<sup>16</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Charina bottae*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 17, 2007).

## Townsend's Big-eared Bat - *Corynorhinus townsendii*

Status: BC – Blue COSEWIC – None



Townsend's Big-eared Bat

### General Habitat Description

In the southern interior, this species is associated with arid grassland habitat. Although it occurs up to an elevation of approximately 1000 m, low-elevations are preferred. Its distribution is strongly correlated with caves and cave-like roosts (Nagorsen and Brigham 1993) and it feeds for insects in open habitats (BC Conservation Data Centre 2007<sup>17</sup> and references therein).

### Occurrence in the Plan Area

- This species is relatively widespread on warm aspects and several roosting sites have been documented in the Fort Shepherd area and Pend d'Oreille Valleys.

### Important Habitat Structure

- Forest context (Tree Size – Canopy Layers– Canopy Cover)
  - Grass/Forb-Open, Closed
  - Shrub/Seedling-Open, Closed
  - Sapling/Pole-Open
  - Small Tree-Single Story-Open, Moderate
  - Small Tree- Multi-Story-Open
  - Medium Tree-Single-Story-Open, Moderate
  - Medium Tree-Multi-Story-Open
  - Large Tree-Single, Multi-Story-Open, Moderate, Closed
  - Giant Tree-Multi-Story

### Essential Habitat Elements

- Forest/woodland Elements: herbaceous layer; hollow living trees (chimney trees), live remnant/legacy trees; edges
- Shrubland/grassland Elements: shrubs, edges
- Ecological Elements: insect population irruptions
- Non-vegetative, Abiotic Elements: cliffs, caves, rocky outcrops and ridges, rock crevices
- Riparian Elements: rivers and streams, pools, lakes/ponds/reservoirs, riverine wetlands, marshes

### Best Management Practices

- Avoid road and other type of construction or disturbance near roost sites.
- Maintain riparian areas for foraging habitat.
- Avoid use of insecticides.

### Potentially Suitable Management Units in the Plan Area

- Riparian, open forest and shrubland habitats with an abundance are important for foraging; cave/talus features are selected for roosting and suitable habitat is abundant above Fort Shepherd benches.

<sup>17</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Corynorhinus townsendii*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 17, 2007).

## Western Grebe - *Aechmophorus occidentalis*

**Status: BC – Red    COSEWIC – Not Listed**



Western Grebe

### General Habitat Description

Western grebes are fish-eating birds that breed colonially in stands of emergent vegetation along the shallow margins of medium to large-sized freshwater lakes. They build their nests in or very close to water deep enough to allow birds to swim submerged. Nests are typically anchored to, or build up over emergent vegetation (BC Conservation Data Centre 2007<sup>18</sup> and references therein).

### Occurrence in the Plan Area

- This species uses portions of the plan area (Lower Columbia and Pend d'Oreille Rivers) during the spring and fall migration periods and some birds appear to be overwintering locally, but is not known to breed locally (Creston is the closest breeding site).

### Essential Habitat Elements

- Riparian and Aquatic bodies Elements:
  - Water characteristics: water deep enough to allow diving
  - Rivers and streams: lower perennial, open water
  - Lakes, ponds, reservoirs: open water, submergent and emergent vegetation, floating mats
  - Size of water bodies > 2 ha, marshes

- Avoid use of power boats in grebe staging and foraging habitat.
- Avoid disturbance of foreshore habitats where grebes loaf.
- Retain emergent vegetation near grebe habitats.

### Potentially Suitable Management Units in the Plan Area

- In late summer/fall, sightings can be reliably made from the foreshore at FSC, Waneta to Seven Mile areas of the Pend d'Oreille Valley.

<sup>18</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Aechmophorus occidentalis*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 17, 2007).

## Western Skink - *Eumeces skiltonianus*

**Status: BC – Blue COSEWIC – Special Concern (SARA Schedule 1)**



Western Skink

### General Habitat Description

Western skinks are found in a variety of habitats, including open woodlands, grassland, forest and dry hillsides. They are most commonly found in open, rocky areas with abundant cover in the form of logs, rocks, leaf litter and vegetation, especially along river banks (BC Conservation Data Centre. 2007<sup>19</sup> and references therein). They lay eggs in burrows or areas excavated under rocks and feed mainly on a wide variety of insects, spiders and earthworms.

### Occurrence in the Plan Area

- Skinks are relatively abundant in the Lower Columbia and Pend d'Oreille Valleys (Dulisse 2005, 2006; Machmer et al. 2005; Machmer 2007, 2008) where dry open rocky habitats are found, and especially in proximity to water. There were records from the FSC in 2007.

### Important Habitat Structure

- Forest context (Tree Size – Canopy Layers– Canopy Cover)
  - Grass/Forb-Open
  - Shrub/Seedling-Open
  - Sapling/Pole-Open
  - Small, Medium, Large Tree-Single, Multi-Story-Open
  - Giant Tree-Multi-Story
- Shrubland/grassland context (Shrub Size –Cover-Age Class)
  - Grass/Forb-Open, Closed
  - Medium, Tall Shrub – Open, Closed Shrub Overstory – Seedling/Young, Mature, Old
- Agricultural context
  - Modified Grasslands
  - Unimproved Pasture

### Essential Habitat Elements

- Forest, Shrubland/Grassland Elements: down wood (includes downed logs, branches, and rootwads, in any context; edges
- Non-vegetative, Abiotic Elements: talus, rocky outcrops and ridges, rock crevices
- Fire as a habitat elements

### Best Management Practices

- Avoid developments within and disturbance of riparian areas.
- Maintain or create important habitat elements such as downed logs and stumps in known skink habitats.
- Avoid human disturbance and particularly motorised use in known skink habitats.

### Potentially Suitable Management Units in the Plan Area

- Suitable habitat for this species is potentially found throughout the FSC where leaf litter, rocks and other cover are found in proximity to water.

<sup>19</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Eumeces skiltonianus*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 17, 2007).

## Western Toad – *Bufo boreas*

**Status: BC – Yellow COSEWIC – Special Concern (SARA Schedule 1)**



Western Toad

### General Habitat Description

Western toads occur in a variety of habitats including grasslands, woodlands, and mountain meadows. They are found in and near ponds, lakes, reservoirs, rivers, and streams. They dig their own burrows in loose soil or uses burrows of small mammals, or shelters under logs or rocks. The eggs and larvae develop in shallow areas of ponds, lakes, or reservoirs, or in pools of slow-moving streams (BC Conservation Data Centre. 2007<sup>20</sup> and references therein).

### Occurrence in the Plan Area

- There are available records for Waneta Dam (Machmer 2007), Lower Columbia (Machmer 2008) and Seven Mile Reservoir (Machmer & Steeger 1994) and Remac this species is likely much more widespread than available records suggest.

### Important Habitat Structure

- Forest context (Tree Size – Canopy Layers– Canopy Cover)
  - Grass/Forb-Open, Closed
  - Shrub/Seedling-Open, Closed
  - Sapling/Pole-Open, Moderate, Closed
  - Small, Medium, Large Tree-Single, Multi-Story-Open, Moderate, Closed
  - Giant Tree-Multi-Story
- Shrubland/grassland context (Shrub Size –Cover-Age Class)
  - Grass/Forb-Open, Closed
  - Low, Medium, Tall Shrub – Open, Closed Shrub Overstory – Seedling/Young, Mature, Old
- Agricultural context
  - Improved and Unimproved Pasture
  - Orchards/Vineyards/Nurseries
  - Modified Grasslands

### Essential Habitat Elements

- Forest/woodland Elements: down wood, edges
- Shrubland/grassland Elements: edges
- Ecological Elements: beaver/muskrat activity (dams, lodges, ponds); burrows (aquatic and terrestrial)
- Non-vegetative, abiotic Elements: rocks, talus, talus-like habitats
- Riparian and aquatic bodies Elements:
  - Water characteristics: shallow water depth, slow-moving or still water
  - Rivers and streams: oxbows, seeps or springs, lower perennial, open water, in-stream sand and mud, vegetation (food supply for tadpoles, detritus on bottom)
  - Ephemeral pools, sand and gravel bars
  - Lakes, ponds, reservoirs: open water, vegetation, floating mats
  - Riverine wetlands, marshes, wet meadows and seasonal flooding

### Best Management Practices

- Maintain and protect wetlands and other water bodies important for toads.
- Restrict road traffic, deactivate roads and avoid use of off-road vehicles and cattle grazing.
- Avoid use of pesticides and herbicides in toad habitats.

### Potentially Suitable Management Units in the Plan Area

- The entire plan area and particularly areas close riparian zones are potentially suitable.

<sup>20</sup> B.C. Conservation Data Centre. 2007. Species Summary: *Bufo boreas*. B.C. Ministry of Environment. Available: <http://srmapps.gov.bc.ca/apps/eswp/> (accessed April 17, 2007).

## Yellow-breasted Chat - *Icteria virens*

**Status: BC – Red/IWMS/FRPA-GAR  
COSEWIC – Endangered (SARA Schedule 1)**



Yellow-Breasted Chat

### General Habitat Description

The yellow-breasted chat breeds in dense, sometimes impenetrable thickets and tangles of tall shrubbery or brush around wood edges, streams, and ponds. In BC, it is typically found in low-elevation riparian areas with extensive thickets of wild rose or snowberry, or in upland thickets of hawthorn. Preferred habitats in the southeastern interior are mesic dense shrub thickets with mallow ninebark, oceanspray, Saskatoon, rose, willow, snowberry, etc. in association with small trees (Bishop et al. 2005; Machmer 2007, 2008 and references therein). Chats eat mostly insects gleaned from foliage and, in late summer, also small fruits.

### Occurrence in the Plan Area

- Yellow-breasted chats breed near the Waneta Dam (Machmer et al. 2005; Machmer and Ogle 2006; Machmer 2007) and at Beaver Creek Provincial Park (Machmer 2008).

### Important Habitat Structure

- Shrubland/Grassland Context (Shrub Height – Cover – Age Class)
  - Medium Shrub – Closed Shrub Overstory – Seedling/Young, Mature, Old
  - Tall Shrub – Closed Shrub Overstory – Seedling/Young, Mature, Old

### Essential Habitat Elements

- Shrubland/grassland Elements: tree size: shrub/seedling, sapling/pole, small, medium, & large trees (> 2.5 cm dbh); shrub size: medium, large; dense shrub thickets; sub-canopy shrub layer
- Riparian Elements: riverine wetlands

### Best Management Practices

- Avoid vegetation cutting, thinning, mowing, herbicide application or other activities that could reduce the density of suitable shrubland habitats for chats.
- To minimize risks of trampling, disturbance, habitat degradation and weed spread, do not permit livestock grazing in active and suitable chat breeding habitat.
- Conduct any mandatory vegetation management activities on powerline ROWs outside of the bird breeding season (i.e., mid-May to early August) to avoid disturbance impacts.
- Avoid use of motorized vehicles (ORVs, four wheel drives, etc.) and heavy equipment that is likely to result in vegetation trampling, soil disturbance, erosion and increased weed invasion in suitable chat habitat.
- Avoid development or disturbance in tall shrub habitats and retain taller shrub/tree substrates for perching.
- Avoid use of insecticides in chat habitat.

### Potentially Suitable Management Units in the Plan Area

- The FSC potentially supports suitable tall shrub-dominated habitat for this species (selected ROWs, polygons 665 and 667 and some smaller ticket areas near creeks) and enhancement in the form of shrub planting may improve habitat potential.

## **APPENDIX 6: TLC Statement of Significance: Fort Shepherd Conservancy Area**

The Fort Shepherd Conservancy Area is a property with outstanding ecological and historical features. Running for more than 8 km along the west side of the Columbia River, Teck Cominco Metals Ltd signed an agreement with TLC in 2006 to donate the 2200 acre property as a split receipt under the Ecological Gifts Program. The acquisition of this property protects the ecological, historic and recreational integrity of the area.

With the largest intact area of very dry, warm Interior Cedar Hemlock in British Columbia, the Fort Shepherd Conservancy Area is ecologically unique. The dry, rocky slopes contain crevices that shelter endangered or threatened wildlife, including Canyon Wrens, Townsends's Big-eared Bats and Racers. As many as 29 rare species of wildlife have been found or are expected to live on the property. During the winter, the property is home to deer and elk as the open benchlands provide critical food and shelter.

Historically, the property is connected to both the Dewdney Trail and the Hudson's Bay Company, as the HBC Fort (built in 1858) was a stopping place on the route to the Kootenay Gold Rush. The Fort was also a trading place for the Sinixt people, who used the flat benches along the Columbia River as a traditional base for fishing and hunting. Although the Fort was destroyed by fire in 1872, a cairn remains to mark its location.

Located just 6 km south of Trail, BC, the area is integral to the local people who hunt, fish, hike, ride horses and picnic on the property. TLC recognizes the importance of these activities and encourages activities that are compatible with the natural and cultural values of the property. The uniqueness of the property, combined with its prominence in the local community provides significant opportunities for research and education. Because of the strong connection between the Fort Shepherd Conservancy Area and the local community, TLC is committed to working in partnership with representatives from local organizations. A signed agreement between TLC and the Trail Wildlife Association will guide the future and current management of the property.

The Land Conservancy is committed to the protection of sensitive ecosystems and cultural resources in British Columbia. The protection of the Fort Shepherd Conservancy Area ecosystem is increasingly important as development pressures increase throughout the region. TLC will manage this land with a vision for the long-term protection of its importance to endangered and threatened species, its unique ecosystems, its rich winter habitat for deer and elk, and its natural, cultural and recreational values.

### **Character-Defining Elements**

Key elements that define the site's character are:

- the property's location as a large, contiguous unit within the ICHxw biogeoclimatic subzone, containing unique plant communities and habitat features
- the historic location of Fort Shepherd, a Hudson's Bay Company fort built to secure HBC interests on the Canadian side of the 49<sup>th</sup> parallel

Key elements that define the site in a landscape context are:

- the location of the property as part of an undeveloped and unfragmented area, running east-west between the Creston Valley Wildlife Management Area and Christina Lake
- the location of the property's eastern boundary along one of the last remaining free-flowing sections of the ecologically and culturally significant Columbia River
- the historic significance of Fort Shepherd as a stopping place along the Dewdney Trail during the Kootenay Gold Rush

Key elements that define the function of the site are:

- habitat features including cliffs, caves, wildlife trees, and dry, rocky slopes that support species-at-risk
- Class 1 and 2 winter range for white-tailed deer, mule deer and elk
- the stone cairn that marks and commemorates the historic location of Fort Shepherd
- the significance of the property to the Sinixt people and its unexplored archaeological potential