

A MANAGEMENT STRATEGY FOR SPECIES AT RISK IN A SEMI-URBAN LANDSCAPE ON THE SHUSWAP RESERVE LANDS AT INVERMERE, B.C.



**For: KINBASKET DEVELOPMENT CORPORATION AND THE
SHUSWAP INDIAN BAND**

**By: Bob Jamieson
Mark Thomas
Trevor Kinley
Mike Worgan**

Funded by: Aboriginal Funds for Species at Risk, Environment Canada

April 20, 2009.

EXECUTIVE SUMMARY

The Shuswap Indian Reserve lands are part of a semi-urban landscape in a major second home development area near Invermere, B.C. Concerns over American Badger and other species at risk have arisen for the Kinbasket Development Corporation (wholly owned by the band) as they have proceeded with real estate development options on the reserve. This led to a realization that an overall plan for conserving species at risk was required for the reserve lands. Funding from the Aboriginal Fund for Species at Risk was provided for this project, to look at the entire range of species at risk (both aquatic and terrestrial) that occur in the area and the development of an overview, strategic plan for species at risk on reserve lands. A total of 53 species were considered. Most were federally or provincially listed but we also considered species that were of local concern. Two species were of special concern to band members, Chinook Salmon and Sharp-tailed Grouse. Based on this assessment, we identified the following major concerns:

1. The loss of Chinook salmon spawning in the Columbia River adjacent to the reserve as a result of downstream dams.
2. The loss of grassland habitat due to a variety of factors that has resulted in the loss of Sharp-tailed Grouse and impacts on the populations of other grassland species such as American Badger and Long-billed Curlew.
3. The loss of Northern Leopard Frog in adjacent wetland areas, apparently as a result of the continental scale impact of a fungal disease affecting amphibians.

Land use zoning was initiated by the band in 2007 and this was used as a basis for planning for species at risk and their habitats on the reserve. This zoning exercise and habitat mapping were used as a framework for discussing options for retaining species at risk. The plan also addresses the functional ecological processes that drive habitat quality in the long term (nutrient flows in aquatic habitats, long term fire regimes and exotic weed issues in grassland habitats, etc).

The overview plan provides:

1. Draft zoning for the reserve lands, for fish and wildlife species that provides habitat patches and movement corridors throughout the reserve.
2. Mapping of nine habitat types on the reserve lands, for assisting in future planning.
3. Options for maintaining a range of species at risk through habitat enhancement on reserve lands.
4. A set of best management practises (BMP's) for activities in these habitat zones.
5. An implementation strategy for further work on species at risk issues.
6. A proposal to create large, managed grassland areas in the traditional territory, on crown land, to provide options for maintaining grassland species in the long term.
7. A proposal to establish a position of environmental inspector to assist all parties in expediting the environmental review process on reserve lands.

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ACKNOWLEDGEMENTS

We wish to thank the band members and elders that assisted this work and the various biologists who contributed information on species information. The title page photo was taken by Larry Halverson.

Contact Information :

Bob Jamieson

BioQuest International Consulting
250-422-3322
bjamieson@cintek.com

Matt Ney

Chief Financial Officer
Kinbasket Development Corporation
250-427-5928
chapmanbusiness@xplornet.ca

Gretchen Harlow

Aboriginal Fund for Species at Risk
Canadian Wildlife Service –Pacific Region
Gretchen.Harlow@ec.gc.ca

CITATION: Jamieson, B. Thomas, M., Kinley, T. and M. Worgan, 2009. A management strategy for species at risk in a semi-urban landscape on the Shuswap Reserve lands at Invermere, B.C. For: Kinbasket Development Corporation and the Shuswap Indian Band, Invermere, B.C.

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1.0 INTRODUCTION

The Shuswap Native band is made up of some 250 people. Approximately 175 people live on the 2400 acres/1100 ha of reserve lands adjacent to the towns of Windermere and Invermere. The Shuswap reserve is located in one of the highest resort and second home development regions in BC. In 2007, the reserve was zoned into a development zone at the south end of the reserve, with farmland, natural areas and residences of band members retained at the north end. The Kinbasket Development Corporation (KDC) is wholly owned by the Shuswap Indian Band and is mandated to advance the development of lands within the Shuswap Indian Band reserve in a manner that supports the social, environmental and economic interests of the Shuswap Indian Band membership. The KDC is working with other surrounding jurisdictions to achieve orderly and ecologically and socially sustainable development on the reserve lands. Habitat retention for American badger and some other listed species has been a concern as commercial and residential development has proceeded in the south portion of the reserve. During that discussion it was realized that an overview of Species at Risk issues was required for the entire reserve.

The objective of this report is to provide a management plan for maintaining species at risk on the Shuswap lands. This will, in turn, facilitate development of portions of the reserve identified for development purposes, in the context of integrated planning for the entire reserve. The focus of this overview plan will be the development and successful implementation of species at risk habitat conservation and protection planning. Issues in the traditional territory are not addressed in this plan, though options exist for identifying larger scale habitat enhancement options for specific species at risk that may be of value in the longer term.

2.0 STUDY APPROACH AND TEAM

2.1 PROJECT TEAM

Bob Jamieson-Senior Land Use Planner and Project Lead: Bob Jamieson is a professional biologist and land use planner with 40 years of experience working on resource issues in the East Kootenay. He has been a part of many of the major environmental and resource issues in the Trench during that time. He has also played a role provincially as a member of Round Table on the Environment and Economy and other groups concerned with long term sustainability in the province.

Mark Thomas-Resource Consultant: Mark Thomas is a band member with experience in land management and fisheries issues. He was the Natural Resource Coordinator for the Shuswap lands from 2003-2005. He is presently the Salmon Restoration Coordinator for the Canadian Columbia River Inter-Tribal Fisheries Commission and is an Executive Council member for that organization. He provided fisheries information for this project and carried out the consultation with band members.

Trevor Kinley – Species at Risk Biologist: Trevor Kinley has more than 20 years of experience working in the East Kootenay. He has a Master of Environmental Design and has operated Sylvan Consulting Ltd. since 1987. He lives in Invermere. He has worked on badger, caribou, songbirds, small mammals, bobcats and cougar. He is a member of the badger and caribou recovery teams. He provided a review of the available information on American Bader.

Mike Worgan -GIS Assessment: Mike Worgan is an experienced GIS person with several years experience with the BC Forest Service. He lives in Brisco and has extensive experience with the data sets available for the Invermere area.

2.2 STUDY APPROACH

To carry out this project the team:

1. Carried out a literature review for each species, including status reports at a local, regional and provincial scale.
2. Developed a habitat map for the reserve lands.
3. Utilized local knowledge among naturalists and biologists in the Invermere area.
4. Reviewed the extensive work on badgers, based on observations of individuals and their feeding sites and data on movements from badgers carrying implanted radio transmitters.
5. Reviewed the Traditional Use Survey carried out previously for the area.

6. Interviewed elders and band members with an interest in fisheries and wildlife issues. We developed an interview form and then approached band members, with pictures of each species to discuss and learn what they knew about each of the species considered in this project.

We then assessed realistic options for maintaining each of these species on reserve lands. Land use zoning developed for the reserve in 2007, by the Band, identified potential development lands and areas where development would not occur in the near future. Based on this zoning, a land use zoning plan for species at risk was developed in late 2008, based primarily on data for American badger. This plan was checked against the requirements of other species at risk to see if their requirements were met by this plan. We then developed a set of recommendations for further action.

This report provides an overview of the issues of concern on reserve lands but does not attempt to provide detailed field data on any species other than badger. The report considers both aquatic and terrestrial species and habitats. It does not address invertebrate species at risk, listed plant communities or plant species at risk. In all three cases there very little data to work with for this area.

3.0 STUDY AREA

3.1 OVERVIEW

The Shuswap Reserve lands are located close to Invermere, B.C. They are located in the Rocky Mountain Trench, between the Purcell Mountains to the west and the Rocky Mountains to the east (Figure 1). The reserve lands are located in a semi-urban landscape with major second home development and commercial development occurring on both private and reserve lands (Figure 2.). A golf course and associated second home development, commercial property, an airport facility have been developed on the south portion of the Shuswap lands. Immediately to the south and west and across the river is Athalmer, where extensive condominium and commercial development is taking place. To the south of the reserve there is a strip of commercial development along the Invermere access road and then a mix of residential and commercial development and the Copper Point golf course. On the east side, adjacent to the west slope of the Rockies, there is a strip of forest and two small ranches. On the north side, west of the highway, there is a small residential development on a larger property and adjacent crown land that is part of the Columbia Wetlands Wildlife Management Area (WMA). Above and east of the highway there is a mix of crown forest and grassland, a trailer park and small acreage development. On the west side, the reserve is adjacent to the Columbia River and the Columbia Wetlands WMA and the Wilmer Unit of the Columbia National Wildlife Area. These are part of one of the largest riparian wetland complexes in the province that extends for some 150 km north along the Columbia River.

CLIMATE: The reserve lands are located in a very dry portion of the Rocky Mountain Trench. The effects of the mountains on either side of the East Kootenay Trench dominate the climate. Mountain ranges to the west create a barrier against moist maritime Pacific air. In the winter, the Rocky Mountains tend to protect the area from the cold, continental arctic air that covers the prairies for prolonged periods. These cold air masses cross the mountains once or twice a year and results in periods of -20°C temperatures for one to three weeks annually. Mean annual precipitation for the Invermere weather station (Environment Canada 2008) is 30 cm, with a peak in June of 4.2 cm and a minimum in March of 1.1 cm. The extreme range of temperatures recorded is from 37°C to -42°C, and mean daily temperature averages range from overnight lows of -15.7°C in January to daytime highs of 26.1°C in July.

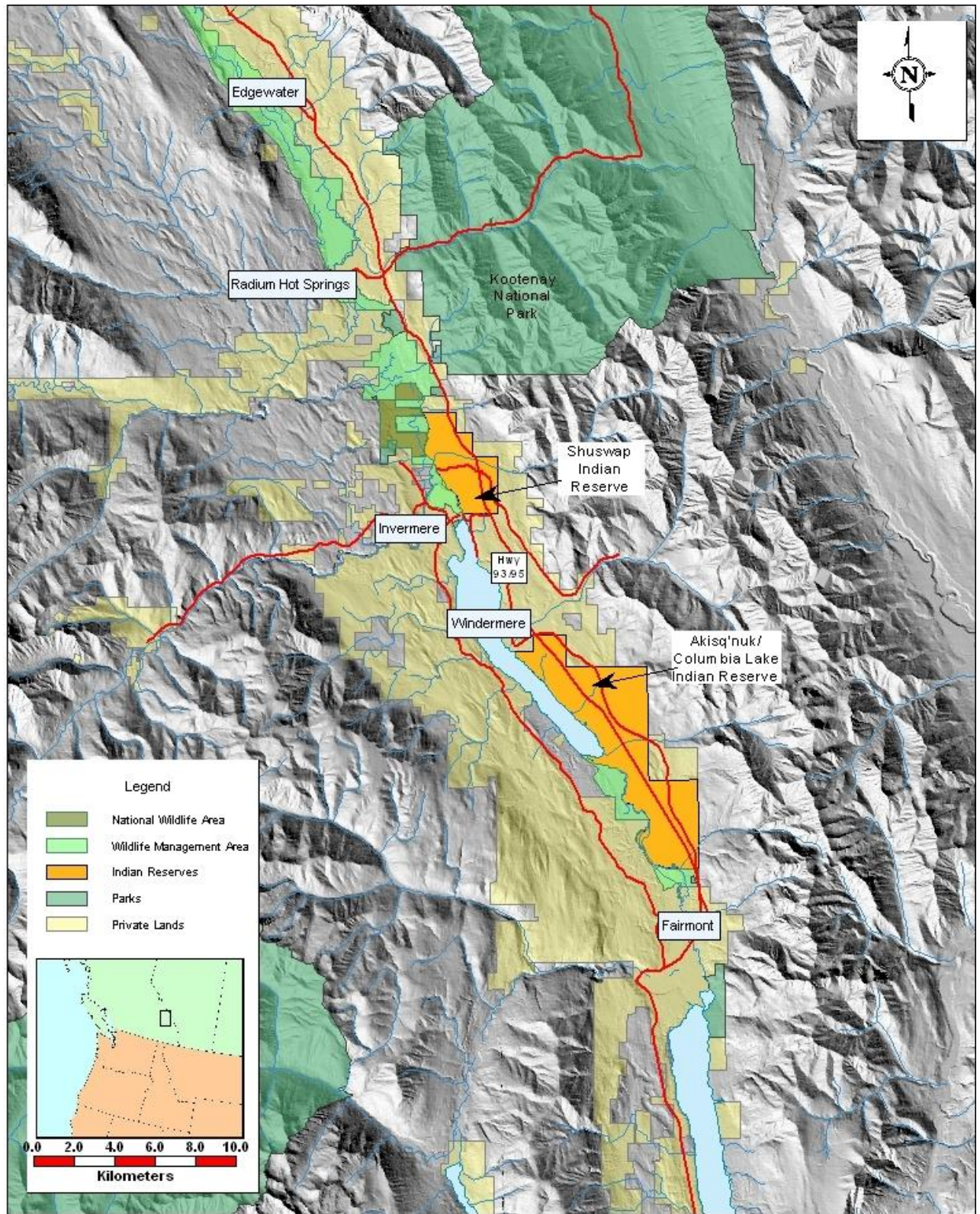


Figure 1. The location of the Shuswap Reserve in B.C.

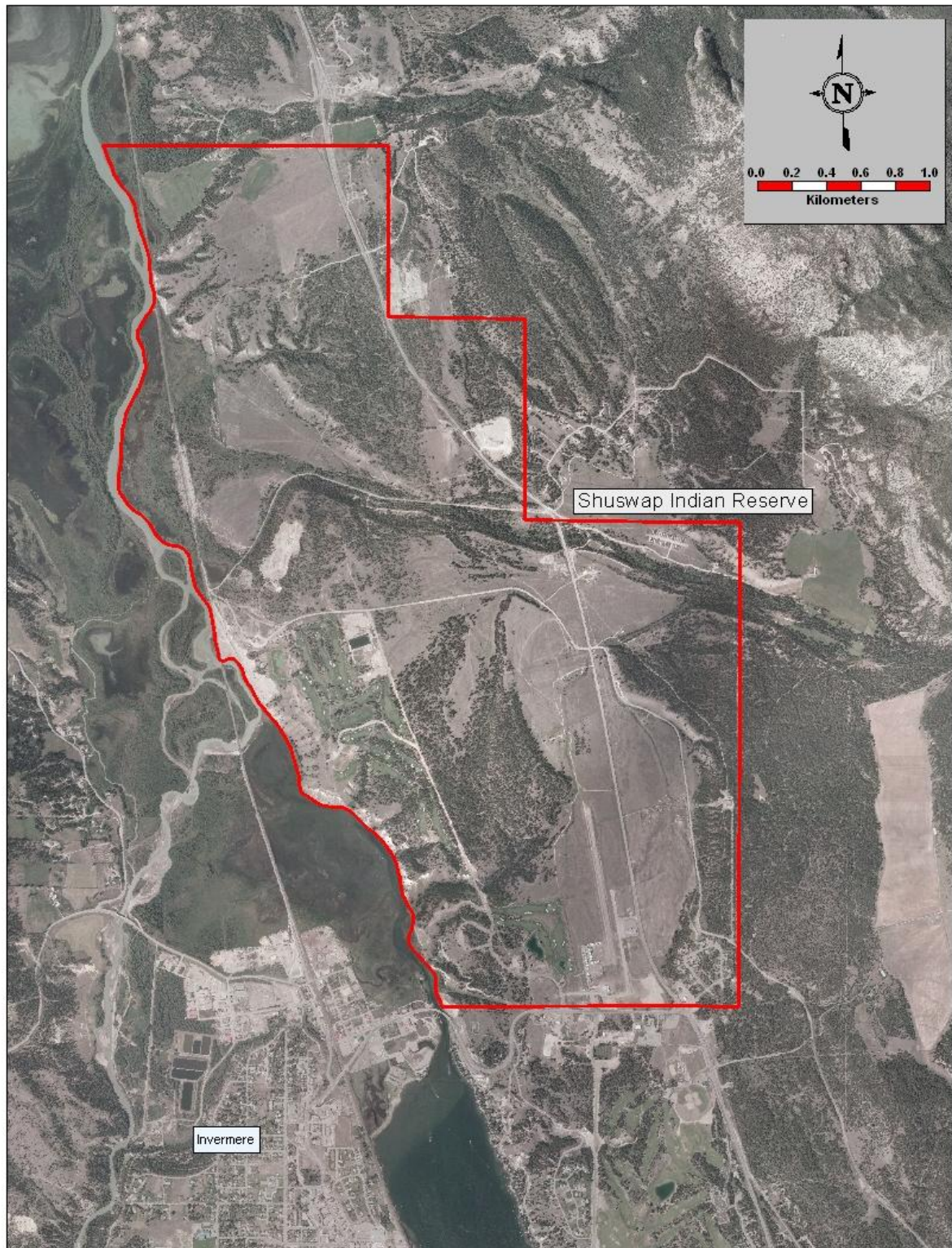


Figure 2. Land forms on the Shuswap Reserve and surrounding lands.

GEOLOGICAL HISTORY: The Rocky Mountain Trench exists because of movement along a major fault. The current landscape is largely a result of erosion and sediment deposition events during and following the last glaciation. A temporary post-glacial lake extended some 130 km north from Canal Flats and resulted in the deposition of deep silt deposits over much of the area. Subsequent erosion and deposition of gravel, sand and silts moved by rivers and streams further modified the landscape by creating terraces, scarps, erosion gullies and channels (Jamieson and Hennan 1997). The floodplain portion of the reserve contains deep alluvial deposits laid down by the Columbia River and Toby Creek from the post-glacial era to the present. The benches above the river are a mix of terraces composed of silt left by the post-glacial lake, glacial till on hills above the terraces, and glacio-fluvial or recent alluvial material on the outflow fans of Stoddart and Shuswap Creeks.

SOILS: Because the water table is at or near the surface on the Columbia floodplain, the Gleysolic and Regisolic soil orders occur there. Brunisolic soils dominate the upland areas, with small associated inclusions of luvisols and chernozems. Soil textures are moderately fine and mainly stone-free on lacustrine terraces, with highly variable but generally moderately coarse texture soils on the outwash fans, and moderately coarse to medium texture soils on glacial till sites (Wittneben 1980, Lacelle 1990).

VEGETATION: The reserve lands fall within the very dry, cool subzone of the Interior Douglas-fir biogeoclimatic zone (IDF_{xk}), which occurs on the valley floor from Canal Flats to Edgewater (BC Forest Service 2008). This subzone is distinguished from the surrounding Kootenay dry, mild variant (IDF_{dm2}) by having a tree composition made up of almost entirely of Douglas-fir (Braumandl and Curran 1992). The IDF_{xk} is also beyond the northern contiguous limit of ponderosa pine. Predictive Ecosystem Mapping (PEM) is used to classify expected climax vegetation. PEM mapping for this area shows almost half of the reserve to be of the pasture sage – bluebunch wheatgrass (XF) site series, generally found on open terraces and warm-aspect hillsides above these terraces. The Douglas-fir – Rocky Mountain juniper – bluebunch wheatgrass (DJ) site series is also common, mainly on hilly glacial till deposits. Much smaller areas are classified as river or wetland, with Douglas-fir – pinegrass – stepmoss occurring on north aspects in gullies and cottonwood – spruce – red-osier dogwood or spruce – trembling aspen – sarsaparilla riparian forests occurring along the Columbia River, along portions of the tributary streams and some moister sites in gullies. Much of the XF site series has been cultivated and irrigated historically, and is more accurately described as old field over most of its occurrence on the reserve. Conifers have recently encroached on parts of the XF. Similarly, the DJ site series has in most places experienced significant recent in-growth of conifers so its grass and forb understory is typically sparse.

3.2 HABITAT TYPES

Landforms, climate and vegetation define several obvious habitat types on the reserve, each with a distinct collection of fish and wildlife species. These habitat types are indicated in Figures 3 and 4 for the south and north portions of the reserve. The types identified are listed below.

RIVERS AND STREAMS: The Columbia River is a low gradient river, 50 to 200 m wide; that flows along the west edge of the reserve. The lower portions of Shuswap and Stoddart Creeks flow through the reserve. These are small streams, from 1-2m across.

WETLANDS: There are a series of small wetland areas on reserve lands along the Columbia River. There are no pothole wetlands on the bench portion of the reserve. There are extensive wetlands adjacent to the reserve lands on the west side.

RIPARIAN CORRIDORS: Mixed conifer and deciduous stands occur along the streams through the reserve and along parts of the Columbia River. Portions of the alluvial fans at the outflow of the streams have been converted to agriculture fields and in one area, a golf course.

CLAY SLOPES/STEEP GRASS SLOPES: There are several areas of south and west facing cliffs and steep slopes. The silt deposits in these slopes are used, in some areas, as nesting sites by swallows and other species of birds.

DOUGLAS FIR FOREST: Some portions of the reserve lands are occupied by stands of Douglas fir. Much of this type is made up of stands that have developed on sites that were grassland 100 years ago, as indicated in Figures 5 and 6 below. This kind of forest encroachment is common in the East Kootenay Trench and is a result of fire control on these sites since the early 1900's. Stand density and age class is variable with stagnant high density stands on north slopes and variable density stands on the benches.

GRASSLANDS: Native grassland occurs in many areas, with former farm fields in other areas. In general these are compromised grassland systems with significant weed issues. There are a few areas where domestic grazing has not occurred and grass stands are in reasonably good condition.

AGRICULTURAL FIELDS: Much of the reserve was cultivated by band members earlier in the last century (Shuswap Indian Band 2008). These farmlands are slowly returning to grassland condition, with significant domestic plants and exotic weeds in these grass stands.

DEVELOPED LANDS: There are several areas which are now urban landscapes (highways and roads, airport, commercial development and two golf courses). Other development is planned in the near future. There are also some areas with lower density development for band member homes.

INDUSTRIAL SITES AND HIGHWAYS: There are two gravel pits on the reserve, a former gypsum loading site by the river, and the sewage lagoons area north of the golf course. A major highway traverses the reserve.

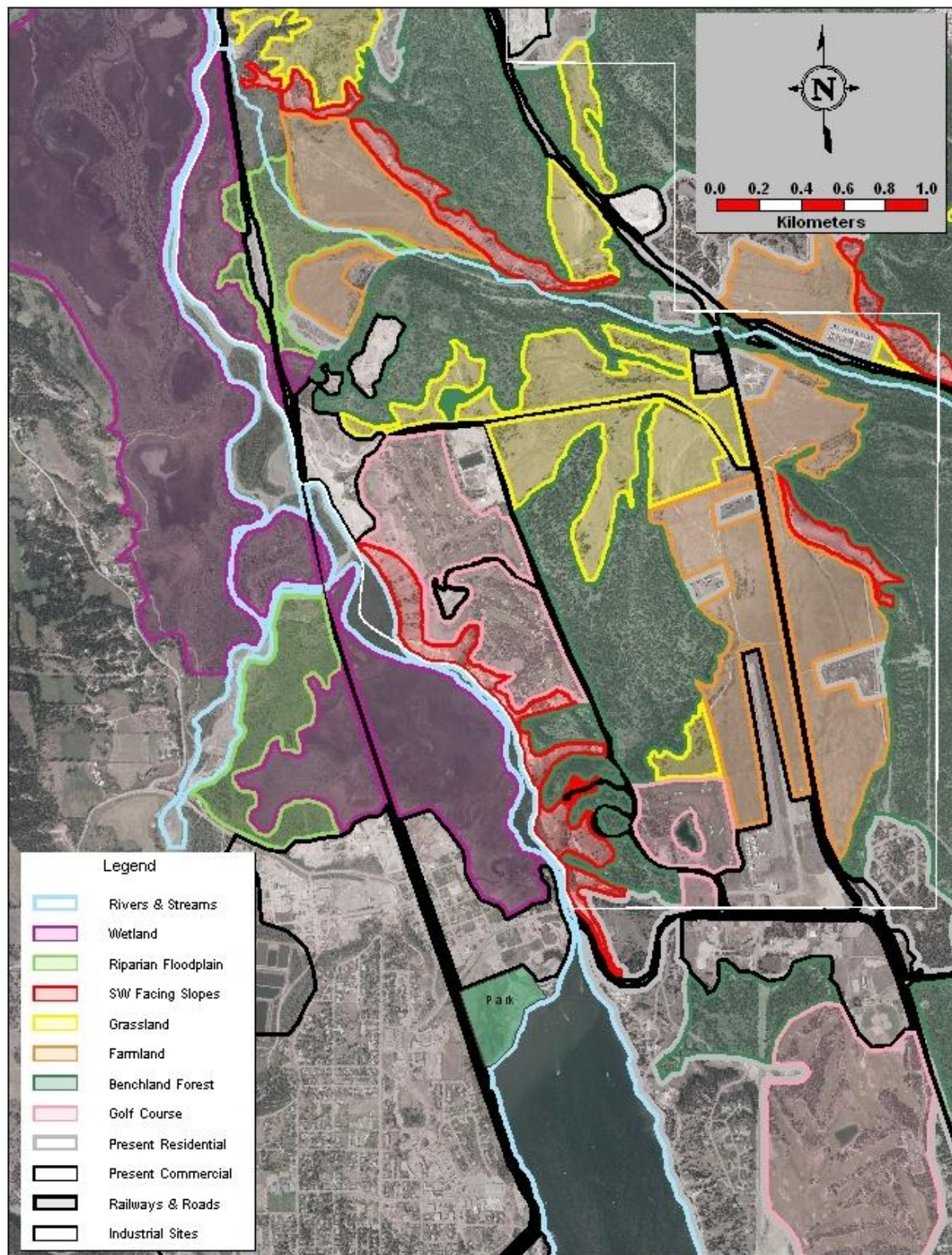


Figure 3. Habitat types on the Shuswap Reserve and adjacent lands, south portion.

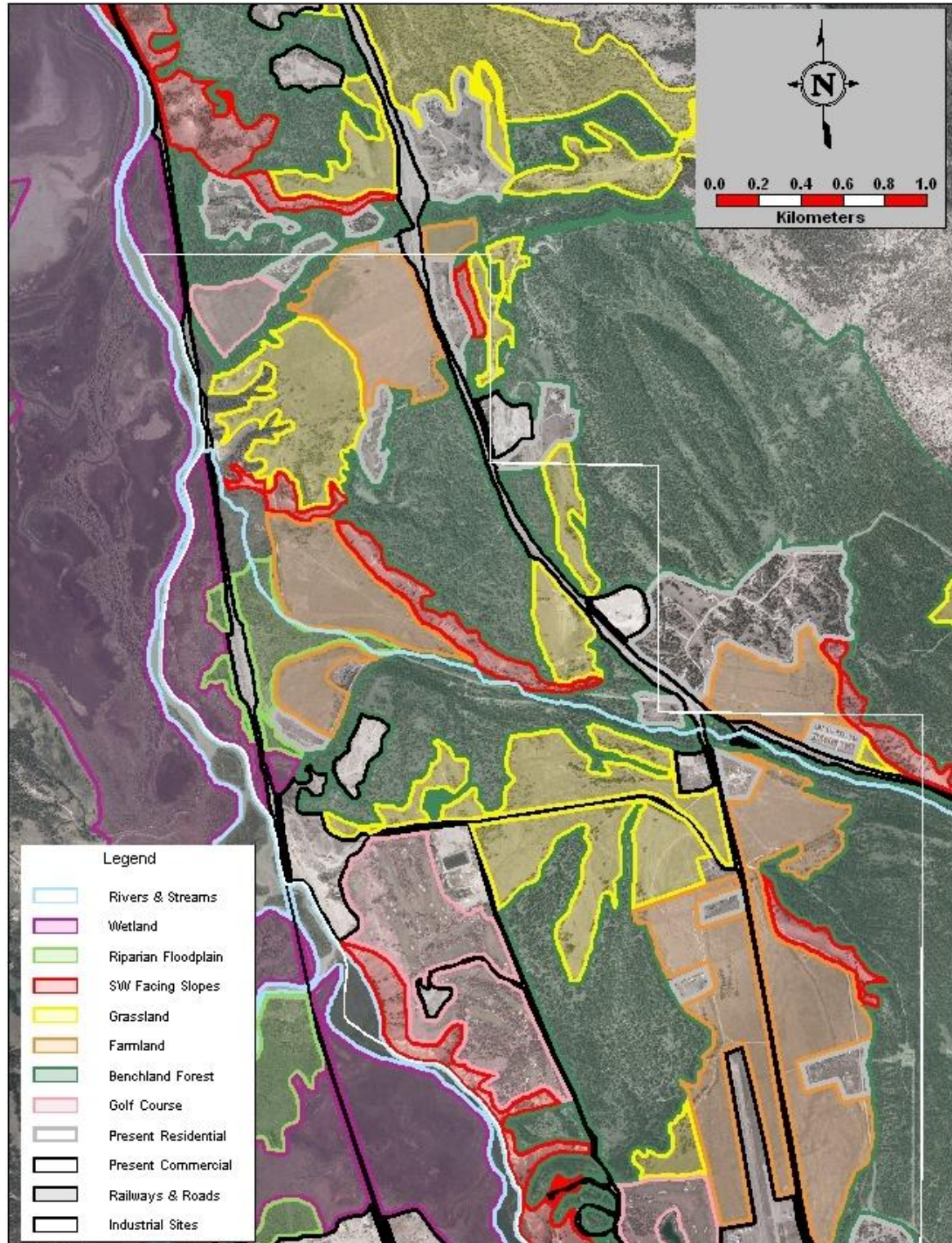


Figure 4. Habitat types on the Shuswap reserve and adjacent lands -north portion.

These habitat types occur in a regional context, as below.

1. The grasslands on the reserve are small and are at the north margin of the grassland habitats found in the Trench, with much larger areas to the south. Significant areas on forest in-growth sites are being returned to seral grassland and savannah conditions in the Trench, primarily south of Canal Flats. Restoration projects have been carried out in the Redstreak portion of Kootenay National Park and the Stoddart Creek area just north of the reserve.
2. The dry site Douglas fir forests found on the reserve are typical of those found in the Trench and represent a very minor percentage of this forest type in the Trench.
3. The riparian areas and wetlands that occur on reserve are very small and are part of the much larger complex of such habitat types found in the Columbia wetlands, a river and wetland complex that extends from the reserve lands north for 150 km.
4. The clay cliff habitat type extends north and south for 50 km along the Columbia wetlands.

The nearest provincial crown areas supporting similar habitat types are the adjacent Columbia Wetlands Wildlife Management Area, including wetland areas to the west and forest and grassland habitat types within the WMA just north of the reserve. A portion of the wetland system adjacent to the reserve is a National Wildlife Area. There is also crown land to the north-east of the reserve (see Figure 3). A portion of Kootenay National Park and adjacent federal crown land in the Trench 5 km to the north was recently converted to early seral grasslands as part of a grassland restoration project. There are also provincial crown lands between the park and the reserve lands. Further south there is little crown land except along the edge of the mountains until one is south of Fairmont Hot Springs. The only extensive area of relatively natural bench land habitats are found on the Akuisq'nuk band lands north of Fairmont. There are additional crown areas and the west side of the river and wetlands.

3.3 LAND USE ZONING ON THE RESERVE LANDS AND ADJACENT AREAS

The Shuswap Band went through a consultation with band members in 2006/07 to develop land use zoning for the band lands. This was refined in 2008 to provide for badger habitat patches and movement corridors, as indicated in Figure 5. On band lands there are crucial long term leases and legal agreements that need to be considered. Early in the last century several Shuswap families were issued "CPs", or "Certificates of Procession" that gave those families rights to the use of specific portions of the band lands "in perpetuity". About 50% of the reserve is covered by CPs. The Kinbasket Development Corporation plays a major role in development on both band lands (without CPs in place) and where CP holders wish to develop parts of their family CPs. All developments on CPs or band lands are based on 99 year leases to private parties that automatically revert to the band or CP holders when the lease terminates.

The Regional District of East Kootenay has developed land use zoning for the adjacent areas through an OCP (Official Community Plan) for the areas around the reserve. This zoning is based on a minimum lot size regulation. Most of the adjacent lands to the north and east are zoned for large acreages (300 ac minimum) though some small sub-divisions and mobile home park site development has occurred on these larger properties in the past. Intensive commercial and

residential development has occurred along the south and southeast portions on the reserve. The west boundary abuts the Columbia River and conservation lands.

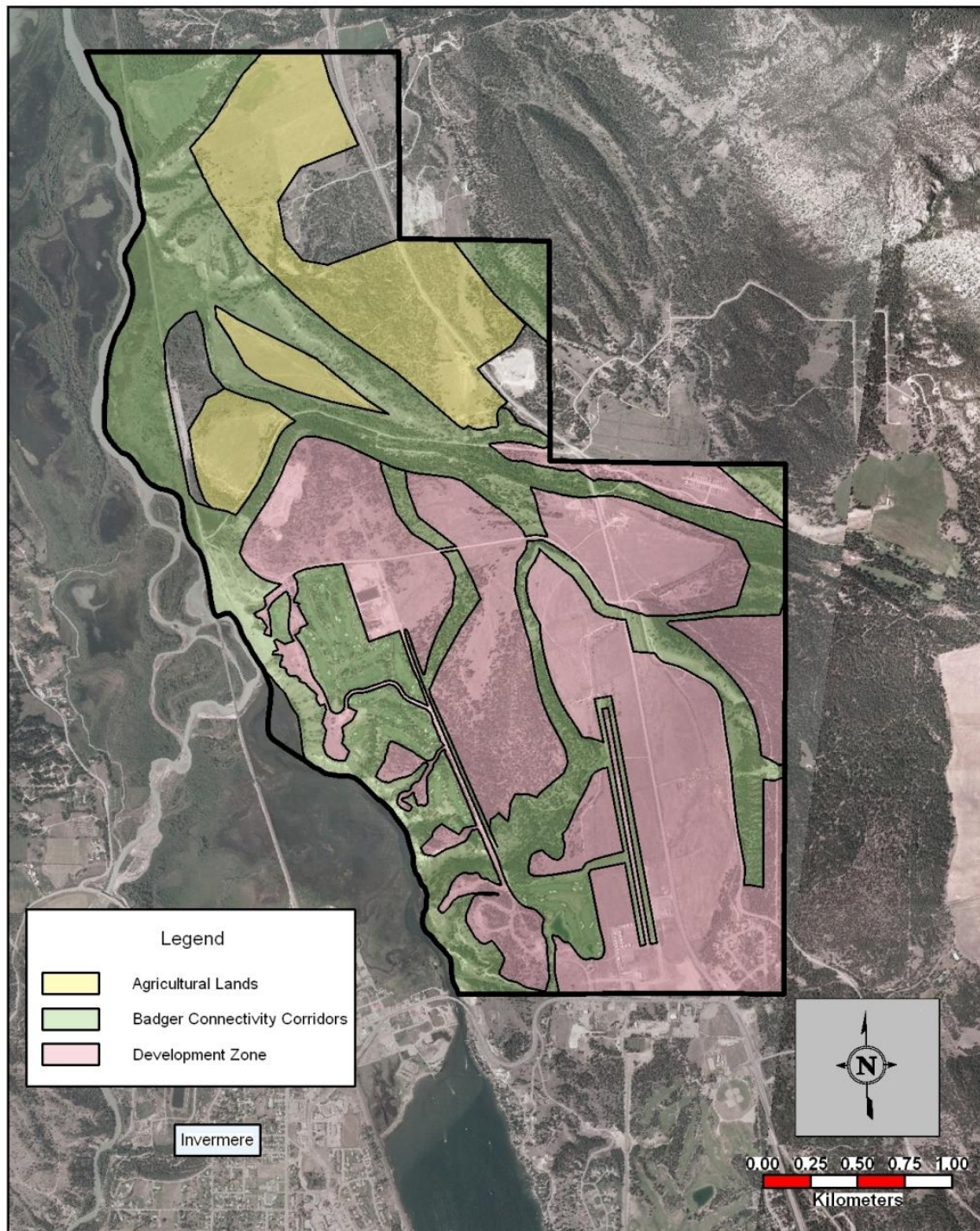


Figure 5. Land use zoning and a habitat network for American badger, as proposed for the Shuswap reserve in 2008.

3.4 PROCESSES DRIVING HABITAT STATUS

Assessing the options for species at risk management requires an understanding of the range of long term processes that affect habitat for these species.

3.4.1 NATURAL ONGOING PROCESSES

There are natural processes that will continue to operate on the reserve lands in the long term that drive the productivity of these systems and their ability to support species at risk.

AQUATIC AND RIPARIAN SYSTEMS: Plant and animal species in aquatic and riparian systems are adapted to a natural hydrograph with a spring freshette that plays a critical role in such systems (Jamieson et al 2001). In the case of the Columbia wetlands, the freshette is critical to maintaining wetland habitats (Jamieson and Hennan, 1997). Occasional fire, beaver (altering levees and water levels) and muskrats (altering aquatic vegetation), also play an important role in the dynamics of these habitat types. The productivity of the river system and the wetlands was maintained in pre-settlement times by inputs of organic nitrogen, potassium and other nutrients in the form of salmon carcasses (Reimchen et al. 2002). That input declined in the early 1900s due to overfishing lower in the system and ended in 1937 when Grand Coulee dam was built. However, the nutrients that originally flowed downstream into the lower system are now trapped in the Mica Reservoir and as a result, a significant kokanee (land-locked sockeye salmon) fishery has evolved that has, to a minor degree, re-started this nutrient pump in the upper system, bringing nutrients, in the form of kokanee salmon carcasses, (much smaller fish than the original salmon), back to sites such as the spawning beds at Athalmer. The band now relies heavily on kokanee for subsistence and cultural values (Band members, pers. comm.).

Predator prey relationships can alter options for maintaining species at risk. Machmer (2008) documents declines in nesting success for Great Blue Heron as a result of increasing populations of bald eagles, which in turn, are responding to increased food sources in the river due to higher nutrient levels and kokanee carcasses, and/or increased survival as a result of reduced pesticide use in their wintering habitat in the USA. Otters, osprey and other fish eating predators have responded to the expansion of kokanee numbers in the Upper Columbia system. The presence of predators in these systems may alter options for maintaining some species at risk.

TERRESTRIAL SYSTEMS: Prior to the recent impact of recreational home development in the Invermere area, the most important factor altering wildlife habitat in this area was the imposition of fire control by the BC Forest Service early in the century. The open forest/savannah like forests and grasslands that occurred in the area pre-settlement was maintained by regular fires, either from lightning strikes or fires set by First Nations people. These regular fires removed young conifer seedlings and maintained an open forest of very large trees with an extensive grassland layer. Over recent decades, in the absence of fire, Douglas fir saplings have established in grassland areas and have greatly increased stand density in forest stands. This process has reduced the overall extent of grassland area to a major degree, as indicated in Figures 6 and 7. This also means that most of the forests on the reserve date from 1900 or later and as a result, there is a striking lack of snags in

most of these stands. A walk through of several areas in November of 2008 including the two areas that supported forest in 1904 (Figure 6, left lower corner) located almost no snags.

These long term processes have several implications for species at risk management.

1. Forest stands that have grown up on former grassland areas are relatively young (<100 years) and contain few older trees or snags.
2. The shrinkage of grassland areas creates significant limitations for maintaining or returning grassland species (American Badger, Sharp-tailed Grouse, Long-billed Curlew) that require relatively large grassland areas for feeding or nesting.
3. Pileated Woodpecker and other primary cavity nesters provide cavity nesting sites for a variety of other species (Jamieson et al. 2001a). These species occur primarily in older forests on moister sites, with a longer fire return cycle and with larger diameter trees and snags. Such sites are found at the edge of the Trench and in riparian mixed deciduous and conifer stands, as found along the Columbia River. The presence of these primary cavity nesters is crucial to many species at risk including Flammulated Owl. A strategy for maintaining some species at risk must include the maintenance of snags and primary evacuators in the long term.
4. Natural barriers to migration in the form of large lakes, the relatively wide and very long wetland area provided by the Columbia wetlands (for some terrestrial species), and the large mountain blocks on either side of the valley, act as natural barriers to movement for many species. Many species have developed strategies to cope with these natural barriers to movement (long distance juvenile dispersal) and to seral stage progression (short term use of post fire snags by Lewis's woodpecker (Cooper et al. 2007). These issues need to be considered when designing strategies to deal with human created barriers to movement.
5. Predator prey relationships are also crucial in terrestrial systems. Columbia ground squirrel populations are a primary item in the diet of badgers and other predators and a crucial to their survival.

3.4.2 HUMAN INDUCED PROCESSES

DEVELOPMENT PRESSURE ON RESERVE AND ADJACENT LANDS: The reserve lands are located between the resort communities of Radium Hot Springs, Windermere, Invermere and Fairmont Hot Springs. All have experienced major development pressures in recent years. Much of the area surrounding the reserve has been converted from natural landscapes into urban and semi-urban landscapes in recent years. Although development pressure is likely to slow over the next few years as a result of the global recession and reductions in disposable income in Calgary, (as a result of declining crude oil prices), these forces will likely return where the economic picture improves 1-5 years from now. This conversion process severely limits options for maintaining many species at risk on the reserve and in the surrounding area in the longer term.



Figure 6. Reserve lands in 1906.



Figure 7. Reserve lands in 2004 (M. Oliver photo).

HUMAN INDUCED MORTALITY SINKS: Highways, the railway and human pets constitute sources of mortality for wildlife and further compromise options in this area.

MIGRATION BARRIERS: Communities, development, and highways also constitute barriers for travel by many species. These occur in addition to the major natural barriers identified above. The reserve lands are located in the middle of a very difficult situation for maintaining movement corridors for wildlife.

CLIMATE CHANGE IMPACTS ON AQUATIC AND RIPARIAN SYSTEMS: The effect of climate change is being felt in this area in the form of altered seasonal flows, with reduced annual flows in at least some systems (Rood et al. 2005) and earlier peak flows in most rivers and streams (Mote et al. 1999). Although most climate models indicate stable or increasing precipitation, the combination of increased winter temperatures, lower snow packs and increased evapo-transpiration rates will likely translate into reduced annual flows in many watersheds and more summer droughts (Hamlet and Lettenmaier 1999). This is further complicated in this area by reductions in the overall area of glaciers and snow fields and streams flows that are being augmented in the short term by increased melting of glacial ice. The Columbia River above its confluence with Toby Creek is fed by Windermere and Columbia lakes and one major tributary to Columbia Lake (Dutch Creek), that has only one small glacier at its source (B. Dubois, pers. comm.). The relatively low summer flows in the Columbia River at Athalmer may therefore result in problems in the future. Flows below the Toby Creek confluence will be affected by changes in that drainage, which presently includes some large glaciers. Shuswap and Stoddart creeks are sourced in relatively dry drainages in the Stanford Range and may face periods of drought in the future. The increase in major storm events, driven by climate change may also increase flood risk in these two systems and in the Columbia system generally.

CLIMATE CHANGE IMPACTS ON TERRESTRIAL SYSTEMS: The reserve lands are located on a very dry portion of the East Kootenay Trench. Impacts from climate change may increase in the future as a result of warmer temperatures, increased evapo-transpiration and reduced net soil moisture. This may alter grassland condition and productivity. Fire risk, disease and invasive plant issues may also increase in the future as grassland systems attempt to cope with relatively fast climate change (D. Gayton pres. comm.).

3.4.3 LAND AND WATER USE

PRESENT USE OF THE RIVER: There is low scale use by boats, mostly non-motorized at present, of the river below the Athalmer bridge. The KDC has plans to develop a marina 1 km downstream near the confluence with Toby Creek.

PRESENT USE OF STODDART AND SHUSWAP CREEKS: Water is drawn from both creeks for residential purposes by band members and for non-band members with residences on adjacent private lands. These uses may affect aquatic productivity (Kenton Andreashuk, pers. comm.).

GROUNDWATER USE: The KDC and the town of Invermere use deep wells in the floodplain of the Columbia River to source water for domestic use. There is no information available on if or how these deeper aquifers are connected to the sub-surface groundwater and river flows in the alluvial floodplain of Toby Creek and the Columbia River.

GRASSLAND USE: The reserve lands have been used for horse grazing for 200 years. Cattle ranching and farming were carried out by band members in earlier decades (Shuswap Native Band, 2008). In recent decades small scale farming and ranching has been uneconomic and has been largely abandoned. There are a few horses grazed on portions of the reserve.

3.4.4 PRESENT ECOLOGICAL CONDITION

AQUATIC AND RIPARIAN SYSTEMS: Flows and the annual hydrograph are close to natural in the Columbia River and Stoddart and Shuswap Creeks. Despite intensive development and heavy boating use on Windermere Lake, the reach below the Athalmer Bridge appears to be in good condition, judging from its use by kokanee and other aquatic species. Stoddart and Shuswap Creeks are in fair condition but have lost complexity and deep pool habitat. There is also an apparent decrease in flow in recent decades (M. Thomas, pers. comm., Andreashuk and Clairricoates, 2006). Band members indicated a concern over the health of these creeks. They indicated that there is a decrease in trout numbers in the creeks and say that the water levels are not as high as they used to be (Thomas 2009). The riparian habitats along the river and streams on reserve (cottonwood stands along the river and a mix of Douglas fir, aspen, birch and shrub species) appear to be in fair to good condition in most areas. Many snags occur in these riparian areas.

TERRESTRIAL SYSTEMS: The native grassland areas on the reserve are severely compromised by excessive grazing and exotic weeds in many areas. Forest encroachment is a major problem facing these native grasslands. Forest areas are made up of dense stagnant stands in some areas (north facing slopes) and stands of lower density in other areas. There is trailing as a result of ATV use in some areas. In general, the better native grassland stands are found on slopes.

4.0 RESULTS

4.1 SPECIES AT RISK ASSESSMENT

We considered a very wide range of species, as listed below in Table 1. Most are listed either provincially or federally. We did include some species that this work suggests should be considered for listing at some point. Only those in bold were considered in detail below. The other species reviewed but not included here, for a variety of reasons, are discussed in Appendix I.

A short assessment of the status of species that may occur on reserve lands is provided below. The review covers total population size for Canada, the province and the East Kootenay Trench. This is followed by a description of observations of each species by band members and local biologists. Species are listed by the habitat type they most commonly use.

Table 1. Fish and Wildlife species reviewed, by habitat type.

Aquatic Sp.	Wetland Sp.	Riparian Sp.	Grassland and farmland Sp.	Forest Sp.
Chinook Salmon	Great Blue Heron	Rubber Boa	American Badger	Flammulated Owl
Steelhead Trout	Northern Leopard Frog	Western Toad	Sharp-tailed Grouse	Northern Myotis
Bull Trout	Painted Turtle		Long-billed Curlew	
WS Cutthroat Trout	American Bittern		Lewis' Woodpecker	
Col. River Sockeye	Sandhill Crane	Western Screech Owl	Bighorn Sheep	Grizzly Bear
Col. River Coho	Western Grebe	Short-eared Owl	Burrowing Owl	Wolverine
White Sturgeon	American Avocet	Coeur D'Alene Salamander	Barn Owl	Fisher
Burbot	Forster's Tern	Long -toed Salamander	Williamson's Sapsucker	White-throated Swift
Rainbow Trout	California Gull		Common Nighthawk	Townsend's Big-eared Bat
Whitefish			Common Poorwill	
Pygmy whitefish			Grasshopper Sparrow	
Suckers, shiners, etc.	Columbian Spotted Frog		Brewer's Sparrow	
Freshwater mussels			Bobolink	
RM Tailed Frog			Olive-sided Flycatcher	
			Hawks and falcons	
			Western Skink	
			Northern Alligator Lizard	

4.1.1 RIVER AND STREAMS

UPPER COLUMBIA RIVER CHINOOK SALMON (*Oncorhynchus tshawytscha*) – Not listed

Chinook salmon spawned in large numbers in the Columbia River adjacent to the reserve until 1937, when the Grand Coulee dam was completed in Washington State. This species has been extirpated from most of the Canadian portion of the Columbia River since that time. The Okanagan population of Chinook salmon is listed as threatened, with less than 50 adults spawning per year in the lower end of the Okanagan valley (DFO 2008). The Okanagan River enters the Columbia below Grand Coulee dam. The Upper Columbia River population is listed as an endangered species in the U.S. Significant populations (250,000 to 900,000) (Columbia Basin Fisheries and Tribes, 2008) return annually to the lower portion of the Columbia, as the result of the activities of First Nations in that area, Bonneville Power Authority, the North West Power Planning Council and others.

Approximately 0.5 to 1.0 M salmon entered Canada in the early 1930's (Netboy 1980, cited by Oliver 1998). Numbers in that era were substantially below those found in the system in the 1800s due to overfishing in that era on the lower Columbia. It is difficult to specify what kinds of numbers or species returned to the spawning beds at Athalmer, however, their annual return was a spectacular event that is recorded in several historic journals. Spawning habitat at this site presently supports a spawning kokanee population of 15,000 (Oliver 1995). It is a challenge to try to estimate the numbers of salmon that spawned at this site pre-settlement, but it may be possible to do so based on estimates of the ha of available spawning gravel and the density of salmon on other similar spawning sites on other salmon rivers (G. Oliver, pers. comm.).

The return of this salmon species to the Canadian portion of the Columbia is a major issue for the Shuswap and other First Nations in the Basin and they have established the Canadian Columbia River Inter-tribal Fisheries Commission with a mandate to pursue the return of these populations to Canadian waters. They are pursuing an experimental, stepwise approach that will see Chinook salmon returned to Lake Roosevelt (above Grand Coulee dam) and the Columbia River below Keenleyside dam at Castlegar in the near future. The focus will be to analyze the habitat preferences of salmon in this portion of the river system as a first step in considering actions to move them into the upper system at some time in the future. Doing so will be a major challenge. There is one low head dam and two high head dams between Lake Roosevelt and the river system above the Mica dam.

COLUMBIA RIVER STEELHEAD (*Oncorhynchus mykiss irideus*) – not listed in Canada.

As with Chinook salmon, Columbia River steelhead were extirpated in the Canadian portion of the Basin when the Grand Coulee dam was completed in Washington State in 1937. Some 320,000 still occur in the lower river (Columbia Basin Fisheries and Tribes, 2008). They are listed as endangered in the U.S. Prior to 1937 they spawned in the Slocan River in the West Kootenay (Oliver 1998). There is some evidence that they spawned in the Upper Columbia. Very large trout

were seen spawning and were caught in the Brisco area prior to 1936 by Art Galbraith. Art was a fisherman and had lived on the coast so this seems to be a credible observation (P. Galbraith, pers. comm.). It is possible that large rainbows from Kinbasket or Arrow Lakes came up the river to spawn and/or feed on salmon spawn that could be mis-identified as sea run steelhead. Arguments based on body mass and fat storage and their spawning locations in other systems would suggest that Steelhead could have spawned in the Upper Columbia (B. Green, pers. comm.). There is little evidence that they spawned in the Columbia River adjacent to the reserve, though conditions were appropriate for this species.

The band members interviewed stated that large migrations of salmon were harvested at fishing areas along the Upper Columbia. One member had an historic photo of salmon fishing below the Athalmer bridge. CCRIFC and the Shuswap Band are interested in returning all species previously present to the upper system. Sockeye and Coho may have occurred but there is little evidence for their presence (see Appendix I.). Major effort has been put forth to identify the impact of the extirpation of salmon on the Shuswap and Ktunaxa people. The social, ecological and engineering issues related to returning these fish to the upper system are being examined by CCRIFC (B. Green, M. Thomas, pers. comm.).

COLUMBIA RIVER WHITE STURGEON (*Acipenser transmontanus*) – Red listed

Sturgeon occur in large numbers in estuary reach of the Columbia and about 1000 fish reside in the Columbia and Kootenay River systems above Grand Coulee dam. These populations have been the subject of intense study (Upper Columbia White Sturgeon Recovery Initiative 2008). There is some evidence that a small population may still occur above Mica Dam and some consideration has been given to re-introducing them in the Upper system (CCRIFC 2005). Prior to the construction of the dam at Mica, there were no major impediments to sturgeon movement upstream from the Arrow Lakes. Anecdotal evidence indicates sturgeon were present in the study area historically, however, it appears likely that sturgeon were transient in the upper system as sightings were infrequent. There may be a small population in the system that was trapped above Mica Dam when it was constructed. This population is being investigated in 2009 by CCRIFC (M. Thomas, pers. comm.). There is no evidence of their presence in the Invermere area. The Shuswap may not support the reintroduction of this species if that choice is considered in the future. CCRIFC 2005 indicates that First Nations do not consider sturgeon native to the upper system.

BURBOT (*Lota lota*) -Yellow listed

Burbot, or Ling Cod occur in Columbia Lake, Windermere Lake and spawn downstream in the Spillimacheen River (Bisset 2002, Price 2007, P. Galbraith, pers. comm.). Burbot may have been utilized area at the mouths of Stoddart and Shuswap Creeks for spawning (Thomas 2009).

OTHER FISH SPECIES

Interviews with band members identified several species of fish that were harvested historically. Practically all of the fish on the list provided to the interviewees were mentioned at least once during the interviews, except for Eastern Brook Trout, an introduced species. Bull trout and West Slope Cutthroat trout are known to occur in Stoddart and Shuswap Creeks. Rainbow trout occur in the Columbia River adjacent to the reserve. These species are discussed in Appendix I. The Mountain Whitefish, Pike Minnow, Peamouth, Long Nose Dace, Long nosed and Large scale suckers and shiners also occur in the Columbia River. These species are listed in Appendix I. There is a significant lack of information on all but two of these species (Dauble 1986, Radridge 1998). These fish play a significant role as a food source for other fish and for osprey, otter, etc. None played a major role as a food fish for the Shuswap traditionally although they were harvested in times of hardship (Thomas 2009). It is unlikely that species in this group will become of concern, given the present healthy status of the Columbia River and the associated wetlands complex. Natural flows and aquatic processes continue to operate in this area. The only species of potential concern is the Pygmy Whitefish. This species is unlikely in this portion of the system. It does occur in the Kicking Horse River further north in the system (Living Landscapes 2009).

FRESHWATER MUSSELS

The Western Ridged Mussel (*Gonidea angulata*) is listed in B.C. It is found in the Okanagan system. A recent survey (Gelling et al. 2008) of the Upper Columbia and Kootenay Rivers did not find any evidence of this species. They did find three populations of Winged Floaters (*Anodonta* sp.), including a large population at the north end of Windermere Lake. They are also been found in the Columbia River just downstream of Athalmer and adjacent to the reserve as far as the Toby Creek confluence (L. Halverson, pers. comm.). These mussels have been harvested by at least one band member and their family.

4.1.2 WETLANDS

GREAT BLUE HERON (*Ardea herodias fannini*)-Blue Listed

There is good data for this species provided by recent work (Machmer 2008). There are 12 breeding colonies (171 nests) in the East Kootenay. Five sites occur in the Columbia wetlands however some sites have been abandoned in recent years, apparently due to increasing bald eagle populations and resultant harassment and nest abandonment. Herons use deciduous and, in some cases, conifer sites close to water. One former site was near Wilmer and was right across the Columbia River from the reserve lands (L. Halverson, pers. comm.). Band members identified the presence of a large functioning rookery on reserve lands near the Setetkwa Golf Course (Thomas 2009). The Columbia River, Stoddart Creek, Shuswap Creeks and adjacent wetlands on reserve lands provide a relatively small area of feeding habitat for herons but there are stands of cottonwood and spruce that could provide nesting sites along the river.

AMERICAN BITTERN (*Botaurus lentiginosus*) - Blue-listed

The Bittern is a provincially blue listed species that lives in relatively large (>10 ha) wetlands, generally with stable water levels, extensive emergent vegetation and tall grass and sedge areas. Cooper and Beauchesne 2003 surveyed the Kootenay Region for Bittern in 2003 using play-back calls to attract the birds during the mating season. They found several bitterns at the Creston Valley WMA and several others in the Trench, including some observations at Lillian Lake, Bittern Lake and Twin Lakes in the Invermere area. Feguson 2004 notes that “During the nesting season, they have been recorded at many locations within the East Kootenay, including the Columbia Wetlands (near Parson, Spillimacheen, Brisco and Radium Hot Springs), Bummer Flats Conservation Area, slough habitats near Wasa, and in other marshes along the lower Kootenay River valley from Columbia Lake to Lake Koocanusa”. Bittern prefer large wetland areas and is unlikely to breed on reserve lands since there are no wetlands on reserve that are greater than 10 ha in size. Bitterns have been seen “down by the river” by band members (Thomas 2009).

NORTHERN LEOPARD FROG-South Mountain Population (*Rana pipiens*) –Red listed

The northern leopard frog is the amphibian of primary concern in this area. It has undergone a major die-off in recent decades across western North America. A survey of the East Kootenay (P. Ohanjanian, pers. comm.) did not find a single animal although this species was present in the Columbia wetlands 20-30 years ago (L. Halverson, pers. comm.). Leopard frogs were found in the Creston area. The primary issue is believed to be “chytrid” or chytridomycosis, a fungal disease caused by *Batrachochytrium dendrobatidis* that severely increases mortality in this species. A program is in place that is raising leopard frogs at the Creston Valley Wildlife Management Area for reintroduction (D. Adama, pers. comm.). They have been reintroduced, with some success, at Creston and at Bummer’s Flats north of Fort Steele. Amphibians as a group face problems around the globe. The Columbian Spotted Frog is similar in appearance and is still reasonably common and has been observed just to the west of the reserve in the wetlands (L. Halverson, pers. comm.). Frogs were identified by band members during the interview process but could not be identified by species. Frogs still occur along the creeks in the reserve and in the small marsh at the bottom of Pontoon Rd. There are two other small wetlands on the reserve along the river that could potentially support frogs.

WESTERN PAINTED TURTLE (*Chrysemys picta bellii*) –Blue listed

The Painted Turtle (Intermountain –Rocky Mountain Population) is a species of concern in the Okanagan and Kootenays (COSEWIC 2002, 2006). They are found at Creston and in several pothole wetland areas in the south end of the Trench. The ponds in Kikomun Creek Provincial Park near Jaffray support 800-900 turtles, one of the largest populations in B.C. (McCartney and Gregory, 1985). Their range seems to extend to Spillimacheen (P. Galbarith, pers. comm.), with reasonably continuous populations up the Trench to the Invermere area. Painted turtles are found in several wetlands in the Invermere area and in the Columbia River and its adjacent wetlands just west of the Shuswap reserve lands (Larry Halverson, pers. comm.). Turtles in the Invermere area

seem to have expanded their range in recent years, perhaps as a result of people moving them between ponds or as a response to climate change. Habitat on reserve lands is limited to ponds along the Columbia River, adjacent to much larger wetlands areas in the Columbia wetlands complex. Turtles require terrestrial nesting areas with easily excavated material such as sand, usually within 150 m of water bodies. Populations in the area appear to be healthy. Major habitat areas are protected as a wildlife management area and National Wildlife Areas. As with frogs, band members identified turtles as occurring on band lands.

A major restriction to their movements north and south along the Columbia system occurs at the outflow of the Columbia River at Athalmer. There are few options for them to move through the developed lands along the east side of the valley since there are few pothole wetlands, and the natural barrier created by the Toby Creek canyon on the west side benches limits their movement on that side of the valley. Maintaining this area as a corridor for turtle and other species should be considered.

4.1.3 RIPARIAN AREAS

RUBBER BOA (*Charina bottae*) - Special Concern

This snake species uses a variety of low elevation habitat types but is generally associated with broken rock areas or large wood debris adjacent, often associated with hot springs, especially at the northern limit of their range. They occur at Radium Hot Springs (St. Clair and Dibb 2004, Merillees and Halverson 2006) just north of the reserve lands. They also occur along the east side of Columbia Lake (P. Ohanjanian., pers. comm.) at hot springs in the Trench (Fairmont Hot Springs (Ferguson 2004) and Ram Creek Hot springs (B. Jamieson pers. obs.)). There are two old observations that have not been confirmed (Moberly Marsh (Ellen Zimmerman, pers. comm.), and at Thompson's landing north of Brisco adjacent to the Columbia River (I. Jack, quoted in Jamieson and Hennan 1997). This species is unlikely to occur on reserve lands due to lack of rocky habitat close to water that they use. They also seem to be limited to areas around the warmer winter conditions provided by hot springs in this area. No observations of this species were recorded during the interview process with band members.

WESTERN TOAD (*Bufo boreas*) - Special Concern

Western Toad is relatively common across a wide range of habitat types and elevations in the East Kootenay. It is listed because of declines in the US portion of the range and concerns with the coastal population in the lower mainland (COSEWIC 2002a, Ferguson 2004). The major concerns are the range of issues (disease, introduced fish populations, pesticides) which are affecting amphibians worldwide. In the Upper Columbia River drainage wetland and riparian habitat loss has been minimal, however toads are extremely vulnerable to highway mortality as they move from their terrestrial environments to breeding ponds in spring. The majority of wetland and riparian areas, the Columbia Wetlands, are protected as a Wildlife Management Area. On reserve lands, the most important habitat for Western Toad is restricted to the riparian areas along water courses and

the wetland areas along the river. Western Toad may have been observed by band members on reserve lands but further work is required to determine their presence or absence.

4.1.4 GRASSLANDS AND AGRICULTURAL FIELDS

AMERICAN BADGER (*Taxidea taxus jeffersonii*) – Red listed

The *jeffersonii* subspecies of badger is associated with grassland, open forest, dispersed agriculture and some other non-forested habitats of the BC Interior. It is nationally listed under SARA as endangered (COSEWIC 2006) and provincially it is red listed (Cannings et al. 1999). The provincial population is estimated to be 230-340 badgers, roughly half of which occur in the East Kootenay (*jeffersonii* Badger Recovery Team 2008). Columbian ground squirrels are the main prey, although badgers eat a wide variety of small burrowing mammals, other vertebrates and invertebrates, and carrion. Primary threats to population viability include vehicle collisions, other human-caused deaths of badgers or their prey, loss of habitat to development and the in-growth of forest caused by fire suppression. As such, the badger is of concern in the East Kootenay, although populations here seem to have recovered to some degree after an apparent low point in the mid 1900s (Kinley and Newhouse 2008). They occur throughout the southern Rocky Mountain Trench and in many disturbed areas (recent logging) and subalpine areas in the adjacent Rocky and Purcell mountains. Their northern limit appears to vary with population density but as of 2009 there is regular activity northward to about Spillimacheen and occasional sightings to the south end of the Kinbasket Lake/Mica reservoir.

Badgers are wide-ranging carnivores. In the East Kootenay, home ranges vary from less than 10 km² to >800 km² (Kinley and Newhouse 2008). They are typically about five times larger for males than females and home ranges of both sexes are generally larger in the Columbia valley than farther south. Movements are made to find ground squirrels and other prey, and in the case of males to maximize breeding opportunities. This suggests that the Columbia valley has somewhat less prey available (hence the large female home ranges here), and fewer females (possibly caused by less prey or more human-caused mortality, and resulting in large male home ranges). Regardless, home ranges throughout the entire East Kootenay are larger than in most other areas of North America (Kinley and Newhouse 2008). These large movements accentuate several threats to badgers: (a) they cross highways regularly so are susceptible to road collisions; (b) they must get past numerous natural or human-caused barriers to enable them to hunt, reproduce, and maintain genetic diversity; and (c) moving across many properties increases the odds of encountering problems with landowners.

Badgers regularly use the grassland, forest and clay bank habitats on the reserve. Given the reserve's small size, it would be expected to provide habitat equivalent to about 20-100% of a female home range (depending on prey conditions), and would normally be occupied by about zero to two adult badgers at any given time. However, the reserve land's value to badgers is disproportionately higher than its size would indicate because predicted habitat quality is very high on the reserve (Apps et al. 2002), and it acts as an important thoroughfare for badger movement through the Columbia valley. North-south movement is critical to encouraging reproduction, genetic diversity and re-colonization of areas where badgers populations have declined. Radio-

tagged badgers from Canal Flats to Spillimacheen had a much stronger tendency to occupy and travel through the east side of the Columbia valley on which the reserve is located than on the west side, especially near Lake Windermere (unpubl. map produced by Fish and Wildlife Compensation Program: Columbia Basin, Nelson, BC, 2006). Toby Creek Canyon on the west side of the valley appears to largely prevent movement (Figure 9). Thus, the reserve supports few badgers at any given time but it is key to the movements of perhaps three to ten badgers over the course of a year and is integral to the continued existence of the upper Columbia population of roughly 15 to 25 badgers. As a result of this and the restricted width of the Trench in the Columbia valley, existing and planned developments associated with the Village of Radium Hot Springs, the Shuswap Indian Reserve and the east side of Lake Windermere could potentially create significant “bottlenecks” for badger movement. That would increase the risk of a local extirpation to the north. Badgers have therefore been the major focus to date of species-at-risk concerns on the reserve lands. Badger or burrow locations recorded through radio telemetry, sightings by the public and surveys by resource professionals (Figure 8) were used in 2008 to negotiate a corridor and habitat patch system for the reserve (Figure 5). This incorporated existing fine-scale mapping of potential corridors through the Eagle Ranch development in the southeast part of the reserve (Jacques Whitford AXYS Ltd. 2008). Fine-scale mapping of badger reserves around Capilo Road is also being undertaken in a separate planning exercise (T. Lamb, Jacques Whitford AXYS Ltd., Calgary, pers. comm.). Interviews with band members identified several badger sightings and at least one sighting of young badgers seen frequently during the summer months (Thomas 2009).

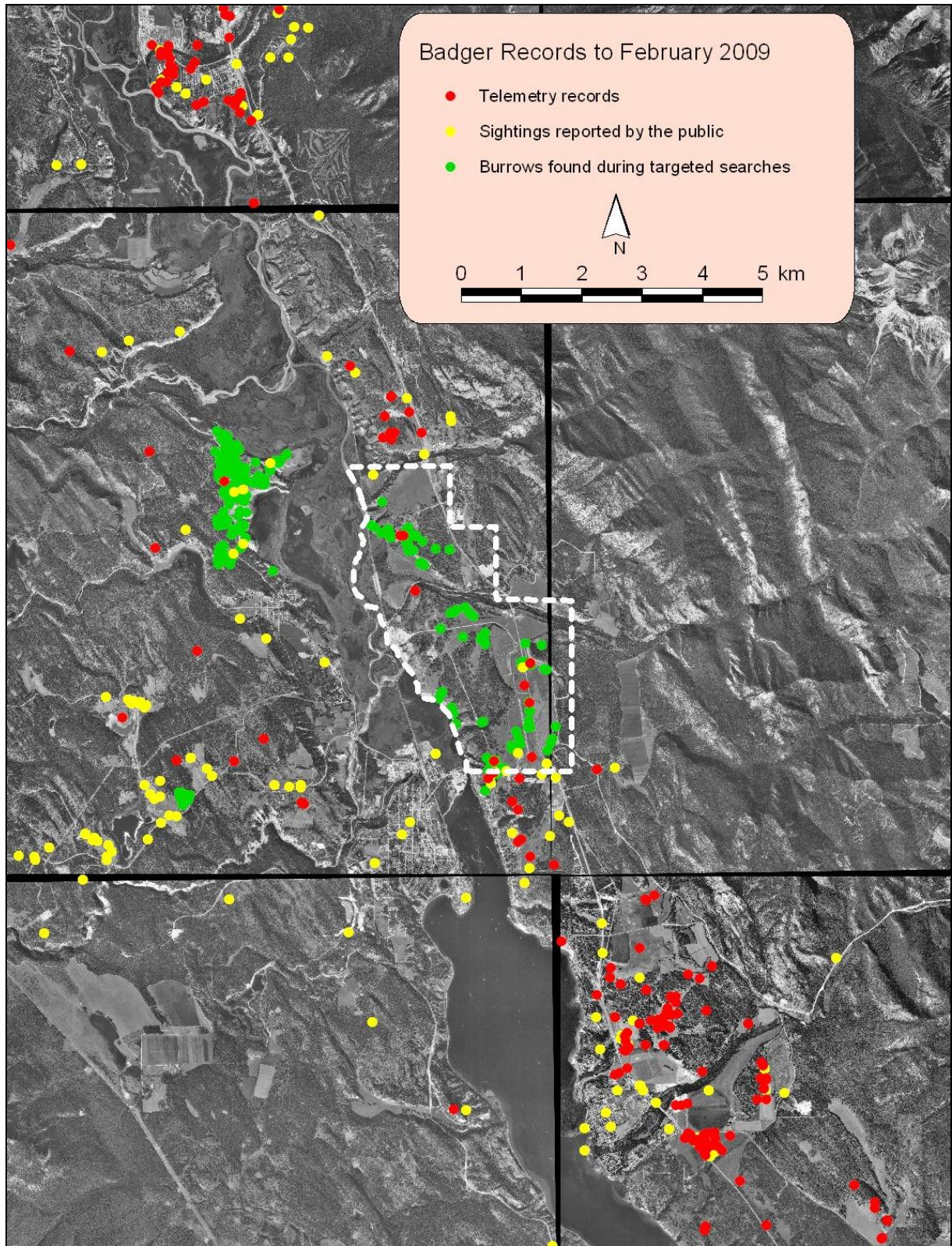


Figure 8. Badger observations in the Radium Hot Springs to Windermere area.

COLUMBIAN SHARP-TAILED GROUSE (*Tympanuchus phasianellus columbianus*) –Blue listed

Although other sub-species are relatively common in the north and on the Great Plains, the range of the Columbian race has shrunk extensively over the last 100 years in the western states and B.C. Once common in the East Kootenay (1930's and 40's), following the large fires in the Trench in that era, their numbers have declined substantially in recent decades. Ohanjanian (1990, 2006) documented the decline and some of the last observations of this species in the 1980's. By 1990 Sharptails appeared to be extirpated from the Trench, however, two very reliable reports in the Newgate area (close to the US border) suggests that they were still present in 2001-2002. They have also been observed in the Grasmere and Kikomun Creek Provincial Park areas (Leupin 2003), also close to the US border. These are likely birds moving north from an attempted re-introduction in the Tobacco Plains/Eureka area in northern Montana.

The reserve lands are at the north edge of their former range in the East Kootenay. (They did occur further north near Brisco in 1958-60, but were not common there (P. Galbraith, pers. comm.). They did occur on reserve lands until recent decades. Observations in the Invermere area include:

1. Early settlers on the Toby Benches across the river from the reserve reported hunting Sharp-tailed Grouse about 1912 (Harris and Phillips 1984).
2. Albert Cooper, an outfitter and naturalist from the area remembers seeing Sharp-tailed Grouse regularly in winter on the Athalmer Flats, 40-50 years ago. They also danced in the spring there.
3. Fritz Zehnder (D. Zehnder, pers. comm.) was working in "Block 17" between Horsethief and Frances Creeks, from September to November in the falls of 1953 and 1954. They regularly saw "prairie chickens" in big flocks that would flush at some distance and were difficult to hunt. It was in an area that had recently burned and was very open in that era.
4. Butch (Douglas) McKay saw about 25 Sharp-tailed Grouse "dancing" near the old Gypsum road about ¾ of the way down the road in 1963 or 1964. They would gather there each spring (D. McKay via L. Halverson, pers. comm.).
5. Bob Jamieson saw a single bird at the Juniper Heights turnoff on Highway 93, on reserve lands, in 1989 or 1990. Margret Eugene also saw a single bird in that same era. It may be that this bird was one of the introduced birds (1988) from the Tobacco Plains attempting to return to its capture site in the Kamloops area. Subsequent surveys with dogs failed to find this bird (L. Ingham, pers. comm.).
6. Xavier and Marg Eugene often watched Sharp-tails dancing at a lek located just south of their home on the large grassland area at the north end of the reserve, up until the 1980's.
7. A reliable observer (M. Koenig, via T. Kinley, pers. comm.) reported about a dozen sharp-tailed grouse on the benches north of Forster Creek about 1997.

Figure 9 shows the locations of these observations relative to the reserve. Sharp-tailed grouse habitat in the Trench consists of large grassland areas and/or burns in early seral condition, as were found at Ta Ta Creek, Wycliffe Prairie, the Grasmere/Elko and Newgate areas earlier in the last century (Leupin 2003). According to Lister Canning, they also occurred in the 1930's in the Lussier Creek/Sheep Creek area, where he grew up; on the Finlay Creek benches and the benches

above the Skookumchuck Flats where there were early seral grasslands and aspen/alder sites. They require extensive areas of grassland with good cover for nesting and shrub communities, riparian areas and/or aspen stands for wintering habitat (Leupin 2003). Up to 1980, the Shuswap Reserve provided these requirements with extensive seral grasslands on the benches providing nesting habitat and extensive riparian areas along the Columbia River providing winter habitat. However, extensive forest encroachment has occurred since that time (see Figures 3 and 4), limiting the extent of grasslands in the area. In addition, much of the available grassland in the area has been developed, with commercial and recreational development on the south portion of the reserve and on adjacent areas.

There is interest on the part of band members in returning Sharp-tailed Grouse to the area (X. Eugene, others, pers. comm.). However, options on reserve lands are now severely limited. The remaining grassland areas are small and are heavily grazed, reducing the grass cover required by Sharp-tailed Grouse for nesting. There are crown land areas north of the reserve that connect to the recent Redstreak area restoration site in Kootenay National Park. However, even with large scale conversion of these areas to grassland and open forest, it is unlikely that there would be sufficient grassland area to support Sharp-tailed Grouse in the long term on the reserve. The option may exist for a cooperative venture to return a large area of presently forested dry sites, to grassland and open forest on the west benches, i.e, from the Toby Bench to Frances Creek and the south end of Steamboat Mountain; that could allow the recovery of several grassland species (See Section 5.5). A recent assessment of recovery options for Sharp-tailed Grouse identified 4 impediments to recovery. These are: inadequate breeding season habitat, inadequate over-wintering habitat, disturbance and population isolation and habitat fragmentation. (Ohanjanian 2007). Connelly et al. (1998) report that 30 km² is the minimum total habitat area necessary for successful population persistence or reintroduction.

LONG-BILLED CURLEW (*Numenius americanus*) -Special Concern

This species uses larger grassland areas with sparse, low profile vegetation. Canning 1999 suggests a provincial population of 500 pairs. Saunders (2001) provides a population estimate for Alberta that is several orders of magnitude larger (approx 25,000) than that found in B.C. There are 49 known pairs in the East Kootenay, with most in the south end of the Trench on the larger open grassland sites there (Ohanjanian and Beaucher 2003). They have been seen historically on the reserve (L. Halverson, Cam Gillies, pers. comm.) along Highway 97 near the airport. They have also been observed at the Setetkwa Golf Course on reserve lands (Xavier and Marg Eugene, pers. comm.) and on the Zehnder ranch west of Invermere, where they have bred and produced young for 7 years (D. Zehnder, pers. comm.). They have also nested on the Kimpton Ranch east of Windermere (L. Halverson, pers. comm.). (See Figure 9). There is one nesting record for the south end of the reserve on the east side of the highway (L. Halverson, pers. comm.) and they have been seen fairly regularly in that area in recent years. No observations of this species by band members were noted during the interview process.

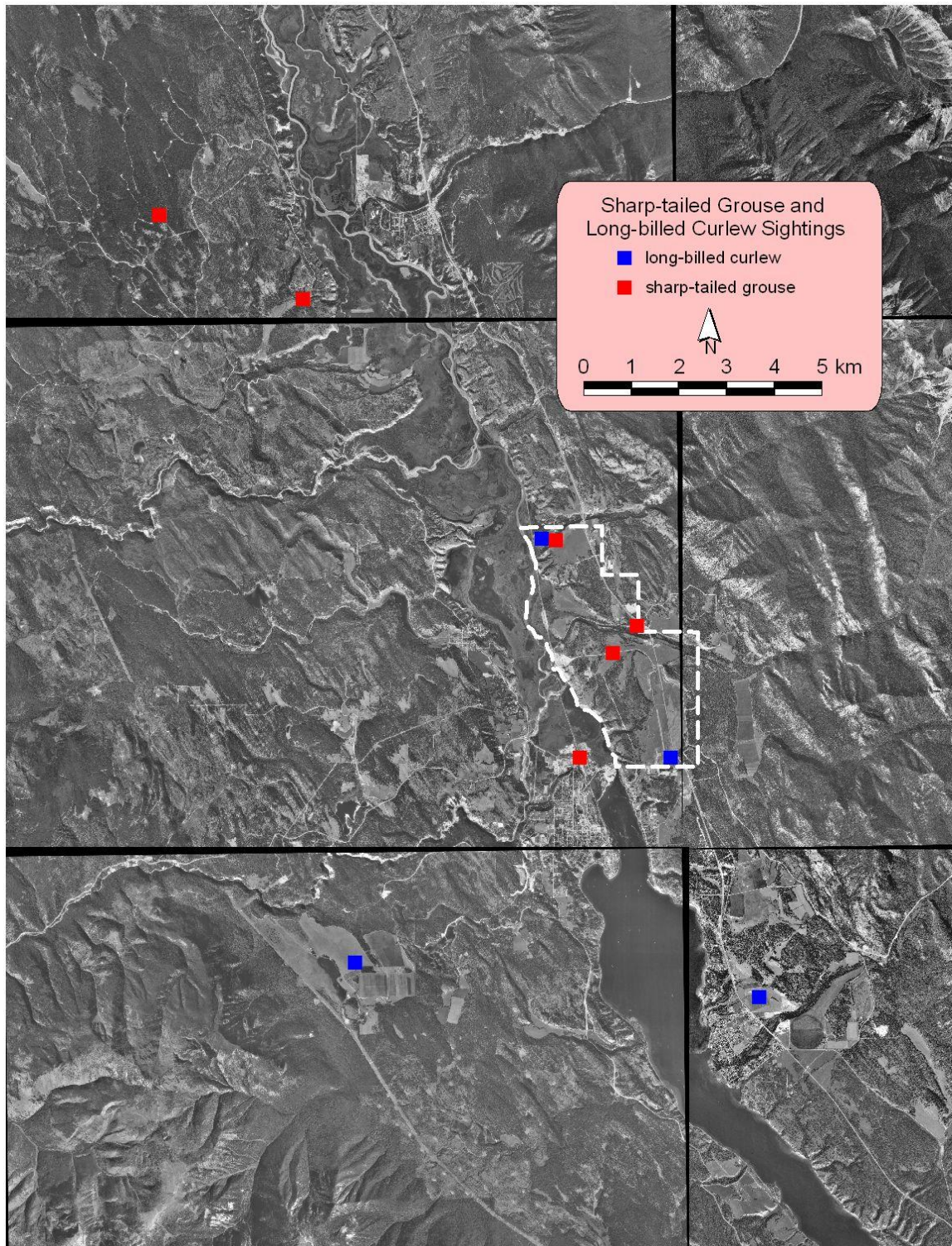


Figure 9. Observations of Sharp-tailed Grouse (historic) and Long-billed Curlew (recent years) in the Invermere area.

Most of the grasslands on the reserve are at the margin in terms of the size of grassland areas used by Long-billed Curlew. They prefer larger grassland areas as part of their predator avoidance strategy and presently nest primarily in large grassland areas at Skookumchuck Prairie, Wycliffe/St. Mary's Prairie, along the Koocanusa Reservoir and at Grasmere. Management objectives for curlew nesting suggested low profile vegetation (<30cm) in openings >250m in diameter, with preference for areas >500m in diameter (P. Ohanian, pers. comm.). None of the grassland and farmland blocks on the reserve is more than 500 m wide, which may explain the lack of nesting on much of the reserve lands. The one block they use at the south end is divided by the highway. Recent successful nesting in that area is unlikely given the extensive development on that site, highway traffic and the major weed problem there (leafy spurge). In addition, the profile or height of vegetation may be limiting in many areas since grazing by livestock has declined on the reserve in recent years.

LEWIS'S WOODPECKER (*Melanerpes lewis*) - Special Concern

Cooper and Beauchesne (2000) indicate that 100-150 pairs of Lewis's woodpecker are found in the East Kootenay, with larger populations in the Okanagan and other grassland areas in the province. There were significant populations 20 km south of the reserve lands on the Dutch Creek burn (7 pairs) and on the Findlay Creek burn (31 pairs) in 2000. These are populations that have responded to good feeding and nesting conditions created by large fires and are declining in numbers as forest regeneration occurs over time (Beauchesne and Cooper 2007). There is also a small population (6 pairs in 2000, 1 nest in 2007) near Fairmont Hot Springs, 20 km south of the reserve lands. They have been seen early in the breeding season at Wilmer, Invermere and near Spur valley north of Radium (Cam Gillies, pers. comm.). Beauchesne and Cooper 2007 identify one recording in the 1990's from the Radium Hot Springs area. There is one breeding record in an urban area in Invermere near Kinsmen Beach in 2006 (Avi Nichol, via L. Halverson, pers. comm.). Woodpeckers were identified as a general group during the interviews with band members. Some members were able to identify specific species when shown its image. Generally the Lewis's woodpecker was seen on telephone poles or on snags.

The habitat required by this species is grassland areas (where they forage for flying insects) with adjacent large diameter deciduous and conifer snags (>50cm) for nesting. There are several areas on the reserve that provide these conditions, generally along Shuswap and Stoddart Creeks and along the Columbia River, on reserve lands, where better soils have allowed the development of larger stem size trees and subsequent larger snags. The bench lands on the reserve provide poor habitat since tree diameters are smaller and there are few snags in locations adjacent to grasslands.

4.1.5 DOUGLAS FIR FOREST

FLAMMULATED OWL (*Otus flammeolus*) –Special Concern

The Flammulated owl is a small owl that feeds on insects and nest in cavities in forests at low to mid elevations. They feed generally in small forest openings. The population was estimated at several hundred for BC with 50 pairs in the Kootenays in 1999 (Van Woudenbreg, 1999). More recent work suggests a provincial population of 3000 birds, based on more extensive surveys (Manning, Cooper and Associates, 2005.). They identify approximately 20 observations in the Trench, as of 2005. The most northerly of these observations are near Invermere (Manley 2004). Nesting by this species has not been documented on the Shuswap reserve lands, though a fledging was apparently found in the reserve area in 2008 (Irene Manley, pers. comm.). The nearest observations are from the Mt. Swansea area southeast of reserve lands at mid elevations (Irene Manley, Cam Gillies, pers. comm.), fledglings at McKay Creek and above Radium Hot Springs Pools in Kootenay National Park (L. Halverson, pers. comm.). Ferguson (2004) identifies a nesting record at Brisco, 50 km north of the reserve. The reserve would appear to be at the north margin of their breeding range in the East Kootenay (page 5, Manning, Cooper and Associates, 2005) but there are indications that this species is more widespread than originally thought. The Conservation Data Centre no longer attempts to map observations for this species since there are now so many observation records that it is difficult to map them all.

This species generally requires relatively dense forest stands for nesting in the EK (Manley 2004), with stand densities of 300-400 stems/ha, >15cm dbh, and high densities of snags (16 stems/ha > 35cm dbh). Most of the nests sites found used the larger cavities created by Pileated Woodpecker in larger stems. They hunt in small forest openings and not in larger grassland openings. Presence on the reserve is unlikely, given historic forest distribution on the reserve (Figures 3 and 4), and the apparent lack of snags in forests (B. Jamieson, pers. obs.) on the reserve. Dense forest types on north and east slopes along Shuswap and Stoddart Creek could potentially provide nesting habitat. Band members could not identify the specific species of owls they have seen or heard in recent years, although one member thinks she has seen a Flammulated Owl near the Setetkwa Golf Course. Confirming their presence will require surveys by professionals using call response inventory tools and are proposed for 2009/10.

NORTHERN MYOTIS (*Myotis septentrionalis*) –Blue listed

This bat is one of four *Myotis* species listed for the province.. Caceres and Pybus 1997 indentifies its range in Alberta as north of Jasper N.P. in the boreal zone. In BC it occurs in the cedar hemlock zone and has been observed at Revelstoke (Ferguson 2004, Holroyd et al. 1993). Its range is likely continuous from the Revelstoke area in the wet forest belt through the upper portion of the East Kootenay Trench, north of the Spillimacheen River. There is one observation from Kootenay National Park (Ferguson 2004, L. Halverson, pers. comm.). They generally use cavities or under bark sites on large snags and trees (Vonhof, M.J. and L.C. Wilkinson. 2000). Holroyd et al. 1994 found Western or Northern Myotis in surveys in the bunchgrass zone in the Interior, but did not

survey the East Kootenay. Northern Myotis is unlikely in the dry forests types found on the reserve lands, but could potentially occur in the riparian areas on the reserve, where trees are larger and there are some larger snags. It is difficult to identify this species, except for experts. Western Myotis is more common and difficult to differentiate from Northern Myotis.

Several other bat species could potentially occur on the reserve lands. The only listed species is Townsend's Big-eared bat which occurs in drier habitats further south in the Trench in the St. Eugene Mission and Fort Steele areas). It may occur in old buildings on the reserve. Bats were identified as having occurred around the "old village area when the barn still existed". The old village area was located in the lower portion of Shuswap Creek.

4.1.6 SOUTH AND WEST FACING CLAY SLOPES

This habitat type provides nesting sites for Bank and Northern Rough-winged Swallows and sees occasional use by badgers, Canada goose, Belted Kingfisher and Great Horned Owl (L. Halverson, T. Kinley, pers. comm.). This habitat does not support breeding for any known species at risk.

4.1.7 OTHER MAJOR SPECIES GROUPS

SMALL MAMMALS: Several small mammals are listed for the East Kootenay. However there is very little data on their presence in the Invermere area. Attempting to indentify species of concern on the reserve lands was beyond the scope of this report.

BUTTERFLIES, DRAGONFLIES AND OTHER INSECTS: There is little information on these species groups for the Invermere area. Canning (2000) looked at a small wetland in Athalmer and found an extensive and diverse dragonfly fauna there and there is some information on butterflies and moths of concern. Looking at issues for this group was beyond the scope of this report.

LISTED PLANT COMMUNITIES: Several plant communities are listed for the East Kootenay. This issue was beyond the scope of this report.

LISTED PLANTS SPECIES: There are several plant species listed for the East Kootenay; many of them occur in grasslands. This set of concerns was beyond the scope of this report.

MEDICINAL AND FOOD PLANTS: Several native plants we identified as medicinal and food plants in the Traditional Use Survey (Shuswap Indian Band 2008). These plants are of special interest to members of the band. There is little data on their presence on reserve lands.

4.2 SPECIES THAT ARE CRITICAL ECOSYSTEM DRIVERS

Healthy, operative ecosystems are critical to the survival of species at risk. In most ecosystems and habitat types there are specific species that drive the productivity of those systems. Although these relationships are complex, the role that some prey species play is crucial. Other species that fundamentally alter critical ecosystem processes are also crucial. If, for example, a disease like chytrid disease affected one of these critical system drivers, entire systems could collapse. The major ecosystem drivers in systems present on the reserve are discussed below.

4.2.1 AQUATIC SYSTEMS

Kokanee Salmon (*Oncorhynchus nerka*), or land-locked Sockeye salmon, were introduced into the Upper Columbia system at Athalmer in the early 1980's. Nutrients retained in the Mica Reservoir have resulted in a massive increase in this kokanee population in the last two decades with close to a million fish spawning in the system each year (Oliver, 1995). Though not a listed species, they are critical to the health of the system and are a critical element of the diet of several species (grizzly bears, black bears, otter, osprey, Bald eagles, accipiters and bull trout. The spawning habitat in the Columbia River adjacent to the reserve from the Toby Creek confluence to Lake Windermere supports a spawning kokanee population of about 15,000 fish (Oliver 1995). This site is of minor importance relative to other spawning sites used in the Upper Basin. Band members indicated that kokanee do not spawn in Stoddart and Shuswap Creeks. Habitat exists and could provide spawning areas for kokanee (J. Clarricoates, pers. comm.), but there do not appear to be any impediments to movement up into these areas from the river. Spawning habitat is not limiting for kokanee in this system (J. Oliver, pers. comm.).

4.2.2 WETLAND SYSTEMS

Beaver and muskrat play important roles in altering flows and vegetation in wetland, riparian and river systems but are not discussed here since the wetland areas on the reserve are small.

4.2.3 RIPARIAN SYSTEMS

Pileated Woodpecker, Northern Flicker and Northern Three-toed woodpecker are not listed but are critical species since they provide nest cavities used by a variety of other species (Jamieson et al. 2001). Pileated Woodpeckers are the most critical species since they provide cavities that are used by larger species of cavity nesters (Jamieson et al 2001). The larger snags and partially dead trees required by Pileated Woodpecker are rare on the reserve except in the riparian areas along the Columbia River and along Stoddart and Shuswap Creeks (B. Jamieson, M. Thomas pers. obs.). Several band members commented on the presence of woodpeckers. Most could not remember which species they had seen but some were able to identify Pileated Woodpecker as being present on the reserve.

4.2.4 GRASSLAND SYSTEMS

Columbian Ground Squirrels are a critical prey species for badgers, coyotes, hawks, eagles and falcons. Their maintenance on the reserve and adjacent lands is crucial for badger survival. Band members however, see ground squirrels primarily as a nuisance to agricultural practises. “Ground squirrels used to occur in large numbers, but are fewer these days, thank goodness” was one comment. Ground squirrels occur near the junction of Pontoon Road and the highway and may also exist in the north end of the reserve. A program to inventory ground squirrel colonies is proposed for 2009/10.

A herd of 100-200 elk winter on the reserve lands, travelling between the forested areas north-east of the reserve lands and grazing on the domestic forage species found on the Eagle Ridge golf course (D. Martin, pers. comm.). Elk are now the major grazing species on reserve lands. For species such as Sharp-tailed Grouse that require significant carry-over of grass cover to provide for spring nesting cover, the presence of large grazers such as elk, during winter, can have a major impact on their nesting success. Deer and moose occur on the reserve but in low numbers. Travel corridors for use by elk based were identified in the corridor identification process in 2008 (Figure 5).

4.2.5 FOREST SYSTEMS

As in the riparian areas, snags and primary cavity creators are critical. Accessible snags on the reserve may have been harvested for firewood purposes (M. Thomas, pers. obs.).

4.3 ASSESSMENT OF OVERALL STATUS OF SPECIES AT RISK.

Table 2 below identifies the species, by habitat type, that are of concern in the Invermere area. It is mix of listed and unlisted species since we wanted to consider some species that may be listed in the near future, or are of major concern to band members.

In summary, there are:

1. Two anadromous salmonids (Columbia River Chinook Salmon and Columbia River Steelhead) that spawned adjacent to the reserve prior to 1936 that have been extirpated. Returning these salmon to the system would be a huge undertaking that would require getting salmon by three high head dams and two low head dams.
2. Two listed trout and char species that occur, but in both cases, the populations are in good condition. An introduced land-locked salmon (kokanee) that has developed into a million plus population and has altered the Upper Columbia system in a major way, with mostly positive impacts. Band members noted however, that though they harvest kokanee, they would still much prefer to have the anadromous stocks that used to occur instead of kokanee (M. Thomas 2009).
3. In general, aquatic habitats on and adjacent to the reserve are in good condition.
4. Several wetland species use the small wetlands on the reserve, generally as part of larger home ranges. One species, the northern leopard frog, is presently extirpated from the Invermere area and Upper Columbia. There are only a few small wetland areas on the reserve; they are in good condition.
5. Two riparian species are of concern. One is relatively common (Western Toad) and one is unlikely to occur (Rubber Boa snake), given its habitat requirements. Riparian areas along the Columbia River, Shuswap and Stoddart Creeks are in fair to good condition.
6. Sharp-tailed Grouse have been extirpated from the grasslands of the Trench and from the reserve lands. This species requires large areas of grassland with large areas of grass left over winter to provide nesting cover. Restoring a large grassland area in or adjacent to the reserve lands or in the Invermere area would be a major challenge.
7. Two other grassland species that are at risk occur on reserve lands (American Badger and Long-billed Curlew). Badger habitat requirements have been met the subject of prior planning for habitat patches and travel corridors. Long-billed Curlews are known to occur but will be difficult to maintain in the south portion of the reserve lands since they prefer relatively large grassland areas for nesting and extensive development is occurring. In both cases, the habitat provided by reserve lands makes up a very small proportion of available habitat for these species in the Trench.
8. One grassland edge species (Lewis's Woodpecker) may occur but is unlikely to breed on reserve lands. Grassland habitat on the reserve has been compromised by long term grazing impacts and exotic weed issues.
9. Two forest species (Flammulated Owl and the Northern Myotis species of bat) occur in the surrounding area. Both are unlikely to occur on reserve lands, given their habitat requirements. Snags are conspicuous in their absence in the Douglas fir forests on the reserve, as discussed, but do occur in the riparian corridors and riparian deciduous areas along the Columbia River.

Table 2. Species at risk by habitat, with reasons for concern

STATUS	AQUATIC SP.	WETLAND SP.	RIPARIAN SP.	GRASSLAND AND FARMLAND SP.	FOREST SP.
Species extirpated from the Invermere area**	Chinook Salmon	Leopard Frog*		Sharp-tailed Grouse	
	Steelhead Trout				
Listed species present on reserve lands				Long-billed Curlew	
				American Badger	
Listed species, with local populations and habitat in fair or good condition	Bull Trout	Great Blue Heron	Western Toad	Bighorn Sheep	Grizzly Bear
	WS Cutthroat Trout	Painted Turtle			White-throated Swift
	Burbot	Bittern			
Species for which there is little data on status	Freshwater mussels	Spotted Frog	Rubber Boa (snake)	Lewis' Woodpecker	Flammulated Owl
		Wood Frog	Long-toed Salamander	Burrowing Owl	Northern Myotis Bat
		Boreal Tree Frog	Short-eared Owl	Olive-sided Flycatcher	Townsend's Big-eared Bat
				Bobolink	
				Common Nighthawk	
				Common Poorwill	
Species that are not known to occur historically in the Invermere area***	White Sturgeon	Forster's Tern	W. Screech Owl	Barn Owl	Wolverine
	Pygmy whitefish	California Gull	Short-eared Owl	Grasshopper Sparrow	Fisher
	Col. River Sockeye		Coeur d'Alene Salamander	Brewer's Sparrow	Townsend's Big-eared Bat
	Col. River Coho				Williamson's Sapsucker
	RM Tailed Frog			Western Skink	
				N. Alligator Lizard	
Species reviewed that are unlikely occur only as migrants		Sandhill Crane		Peregrine Falcon	Broad-winged Hawk
		Western Grebe		Prairie Falcon	
		American Avocet		Swainson's Hawk	
Species that are critical ecosystem drivers	Kokanee	Muskrat and beaver	Primary cavity nesters	Elk	Primary cavity nesters

* -listed species in **bold**

** - Invermere area = the Trench from Fairmont to Edgewater, not including the surrounding mountain landscapes

*** - indicating presence and successful reproduction in the area

10. Grizzly bear and bighorn sheep do not use the reserve lands except on an irregular basis.
11. Several owl, hawks and eagle species that are listed use the reserve lands during migration.
There is no indication of nesting by any of these species on reserve lands.

The zoning and corridors developed in 2008 for badger requirements (Figure 5) appear to address, in general, the requirements of the wider range of species considered here without substantial alteration. Substantial areas of grassland, farmland, riparian areas, the clay cliff sites and steep grassland slopes, and riparian and wetland areas will be maintained as part of this zoning. Refinements based on better habitat mapping and inventories proposed in 2009/10 will be considered in the future.

5.0 MANAGEMENT PLAN

The management plan provided below is based on the assessment provided in the previous sections. Sections of the plan are:

- Overall objectives of the parties involved.
- Species specific objectives and proposed actions.
- Habitat specific objectives and proposed actions.
- Other actions, including education, interpretation and management capacity related to species at risk issues.
- An implementation strategy that considers practical scheduling, funding and legal issues.

5.1 OVERALL OBJECTIVES

The objectives of the Kinbasket Development Corporation are to:

- Maintain a viable water management system as a band owned business.
- Develop lands to provide a revenue stream for the KDC and provide employment for band members.
- Simplify the permitting process related to developments on the reserve to reduce investment risk and provide assurance that approvals will proceed on a reasonable timeframe.

The objectives of the Shuswap band are:

- Maintain financial viability for band members and CP holders.
- Maintain a good quality lifestyle, including access to natural areas near their homes.
- Maintain and enhance river and stream habitat values for salmon and other fish species.
- Promote opportunities to practice cultural activities associated with fish and wildlife species.
- Educate band members on species at risk and possible conflicts with developments on the reserve.

The objectives of the Canadian Wildlife Service are:

- To prevent Canadian indigenous species, and distinct populations from becoming extirpated or extinct, to provide for the recovery of endangered or threatened species, and to encourage the management of other species to prevent them from becoming at risk.
- To enforce prohibitions to protect listed threatened and endangered species and their critical habitats.
- To be consistent with Aboriginal and treaty rights and respect the authority of other federal ministers and provincial governments.

The shared objectives for all the players are:

- to maintain fish and wildlife values and address species at risk concerns in a rational and collaborative manner on reserve and in the semi-urban landscape of the Windermere to Radium Hot Springs area.

5.2 SPECIES SPECIFIC ACTIONS

Four different sets of actions are required to address the species at risk concerns identified in this report.

5.2.1 REINTRODUCTION OF EXTIRPATED SPECIES

Three species have been extirpated from this area. The species specific objectives, order of magnitude population objectives and proposed actions for these species are:

OBJECTIVE: The return of extirpated populations of Chinook Salmon and Steelhead to the Upper Columbia River and to spawning areas adjacent to the reserve lands at Athalmer.

Population Objective: Successful spawning in the Athalmer reach by extirpated stocks of Chinook salmon and Steelhead that approximate spawning populations prior to contact (circa 1800).

Potential Actions:

- Maintain habitat quality in the Athalmer spawning reach.
- Support CCRIFC strategies for the return of salmon to the Upper Columbia.
- Consider the option of introducing Chinook and or Steelhead into the Mica Reservoir to establish a resident population, as in the Great Lakes.
- Explore fertilization options in the Mica Reservoir to improve nutrient status in the reservoir to support kokanee populations as a food source, with subsequent potential impacts of resident trout, Chinook salmon, Steelhead, sturgeon and burbot populations.

Limiting Factors:

- The cost of moving ocean fish over several dams in the lower system may be prohibitive. (There are some new technologies that may assist with these problems. An initial document has been produced by CCRIFC that identifies engineering, economic, social concerns with feasibility, impacts and benefits to restoration of salmon in the upper Columbia.
- River temperature, nutrient levels and competition with local fish species may be limiting for a project to create a land-locked population of salmon and/or steelhead above Mica dam.

OBJECTIVE: The return of Sharp-tailed Grouse to the Upper Columbia River watershed.

Population Objective: 250-300 birds in the area in habitat that is viable in the long term (100 years).

Potential Actions:

- Identify and assess potential grassland restoration areas of sufficient scale to support this species in the long term.

Limiting Factors:

- Elk and cattle grazing impacts on grass profile may limit options for grouse nesting success.
- The complexity of working with multiple players on provincial lands would make such a project difficult.

Restoration projects in the south end of the Trench are now dependent on the sale of chips and hog (wood waste) to the Skookumchuck pulp mill. The use of hog at the mill as opposed to burning on site is major selling point in terms of minimizing the carbon footprint of restoration efforts. At present transport costs limit this strategy to areas within 50 km of that mill. However, the CANFOR mill at Radium is planning to install and bio-generation plant to provide process heat from wood waste (to replace propane). This facility would greatly improve the economics of utilizing hog from restoration sites in the Invermere area.

OBJECTIVE: The return of Leopard Frog to reserve lands and the Upper Columbia watershed.

Population Objective: 500-1000 frogs in the Columbia wetlands and adjacent pothole wetlands.

Potential Actions:

- Survey the Columbia wetlands to locate any northern leopard frog populations present.
- Identify potential sites for re-introduction in the upper portion of the Columbia wetlands and bench land pothole wetlands. (This option is presently being considered by the Columbia Wetland Stewardship Partners and the Northern Leopard Frog Recovery Team).

Limiting Factors:

- The annual flooding process in the Columbia wetlands system limits options through much of the area.

One other species is being considered for re-introduction. There is some uncertainty as to whether or not this species occurred or reproduced in the Upper System prior to the construction of the Grand Coulee dam.

OBJECTIVE: The return of Columbia River White Sturgeon to the reserve lands and the Invermere area.

Population Objective: 500-1000 fish (or as determined by CCRIFC) in the Upper Columbia system above Mica dam. The status of sturgeon in the Columbia above Mica dam is not known at this point in time.

Action:

- Support CCRIFC, the Upper Columbia Aquatic Management Partnership (UCAMP) and the Upper Columbia White Sturgeon Recovery Team with their efforts.

Limiting Factors:

- Stream temperature and nutrient levels may be limiting factors.

5.2.2 MAINTENANCE OF PRESENT POPULATIONS OF SPECIES OF CONCERN

There are three species of concern that are known to occur on the reserve. Objectives and actions to maintain these species are listed below.

OBJECTIVE: The return of Columbia River Burbot to spawning sites adjacent to the reserve lands.

Population Objective: 100-300 fish (or as determined by fisheries ecologists) spawning at the outflows of Shuswap and Stoddart Creeks, as part of the larger Upper Columbia system population.

Action:

- Investigate these sites for the presence of spawning burbot.
- Investigate water and substrate conditions at these sites.

Limiting Factors:

- Stream temperature, nutrient levels and substrate conditions in the Upper Columbia system may be limiting factors.

OBJECTIVE: The maintenance of American Badger on reserve lands and in the Invermere area.

Population Objective: Maintain habitat on reserve for a portion of the home ranges of 2-4 badgers and maintain the ability of the regional population to move through the reserve.

Potential Actions:

- Monitor the effectiveness of the habitat patch and corridor systems developed for the reserve.
- Work with adjacent land owners and crown land managers to maintain the ability of badgers to move through the landscape surrounding the reserve.
- Identify potential grassland restoration areas in the Invermere area.

Limiting Factors:

- The complexity of working with multiple interests and jurisdictions will make this task difficult.

OBJECTIVE: The maintenance of Long-billed Curlew in the Invermere area.

Population Objective: 5-10 nesting pairs in the Invermere area.

Potential Actions:

- Complete an inventory of the reserve and Invermere area in 2009/10.
- Maintain abandoned fields at north end of the reserve in present condition if curlews are found there.
- Identify potential grassland restoration areas of sufficient size to support this species.

Limiting Factors:

- Curlews require relatively large grassland areas for nesting. Such sites are rare in the Invermere area. Most sightings are on private ranchlands.

5.2.3 SPECIES AT RISK INVENTORY

Better information on the presence of some species at risk is required at two scales.

Reserve scale inventories of Species at Risk: Inventory surveys will be carried out in 2009/10 on reserve lands for:

- Long-billed Curlew
- Lewis' Woodpecker
- Flammulated Owl.

It would be more efficient if these were carried out as part of any regional scale surveys that are planned.

Regional scale inventories of Species at Risk: Other agencies may have plans for surveys of other species at risk. After review, the band will provide permission for researchers to include reserve lands in these larger inventory projects. Based on this work, priorities would be:

- Freshwater Mussels
- Amphibians and reptiles (frogs, turtles, western toad)
- Primary cavity creators
- Bats
- Invertebrates
- Listed plants, listed plant communities and traditionally used plant species of interest to band members.

5.2.4 SPECIES AT RISK MONITORING

Ongoing monitoring of badger presence and movements will be carried out as part of the requirements identified Environmental Assessment process for the Eagle Meadows project. Columbian ground squirrels are a major prey species for Badger and other species and will be monitored as part of proposed actions for 2009/10.

5.3 HABITAT MANAGEMENT OBJECTIVES AND ACTIONS

The most effective action for maintaining species at risk in the long term is the maintenance of their habitat and critical habitat components.

5.3.1 AQUATIC, RIPARIAN AND WETLAND HABITATS AND CORRIDORS

Aquatic habitat and corridors are identified in Figure 10. This mapping identifies major aquatic habitats and the crucial spawning habitat in the Athalmer reach of the Columbia River. This same reach is also important as a connecting corridor for aquatic species, wintering and early spring habitat for waterfowl and as a site supporting freshwater mussels. The extensive wetland and river complex of the Columbia wetlands provides good habitat values to the north; the reach adjacent to the reserve is a major pinch point for movement. Windermere Lake, with extensive development along its shores may also limit movement.

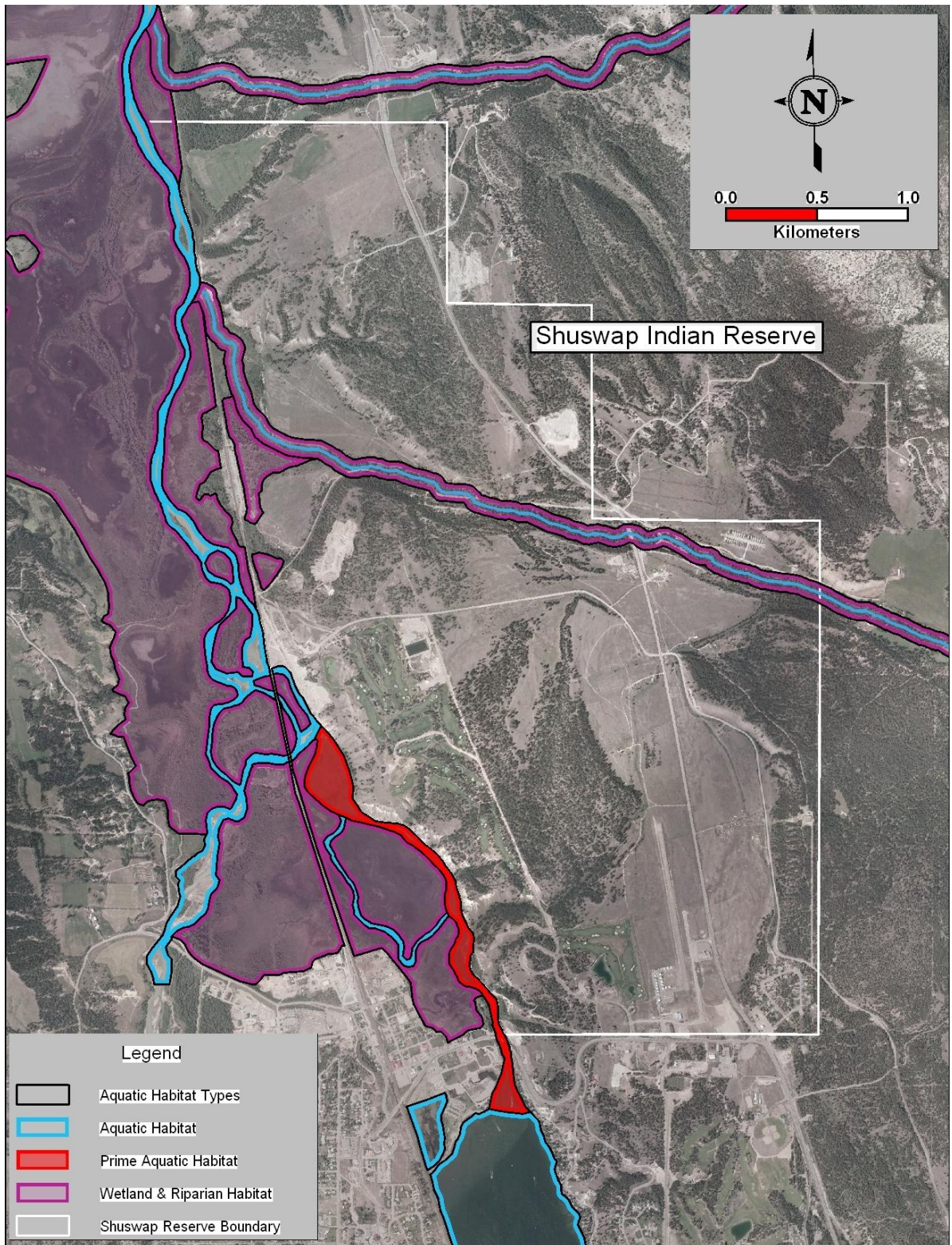


Figure 10. Aquatic and Riparian habitat patches and corridors for the Shuswap Reserve, February, 2009. (draft)

5.3.2 TERRESTRIAL HABITATS AND CORRIDORS

Terrestrial habitats and corridors are identified in Figure 11. This mapping should be considered draft until additional information on other species has been collected in the 2009/10 field season. At that point we will combine the habitat mapping with the zoning map and develop a more refined map that considers the following:

- The golf course areas should be considered as a separate habitat type that has some values for specific species and will play a role in wildlife movements. Golf course areas constitute a filter to wildlife movement for some species, but provide habitat and movement options for others.
- Industrial sites such as the gravel pits act in the same way, providing for wildlife movements for some species but are of little value as habitat per se. If such sites are eventually rehabilitated, they can become part of habitat network for the reserve. In some cases these sites may be developed for other uses.
- The mapping of residential areas and other uses will allow us to develop more precise mapping of habitat areas and corridors.
- The zonation may need to be altered if evidence of Long-billed Curlew, Lewis's woodpecker or Flammulated Owls are found, probably in minor ways only, given their habitat requirements.
- Development proposals that are ongoing, such as the Eugene and Capilo property developments, will have to be considered.
- How the proposed corridors will connect through private land on the north and east boundaries also need consideration, as part of the larger assessment that is underway (see section 5.5 below).

In general, the north half of the reserve will continue to provide good habitat values with both north to south and east to west connectivity to adjacent lands, subject to the limitations imposed by the highway corridor. As development proceeds in the south half of the reserve, options for maintaining habitat and corridors will be limited to those identified in Figure 11.

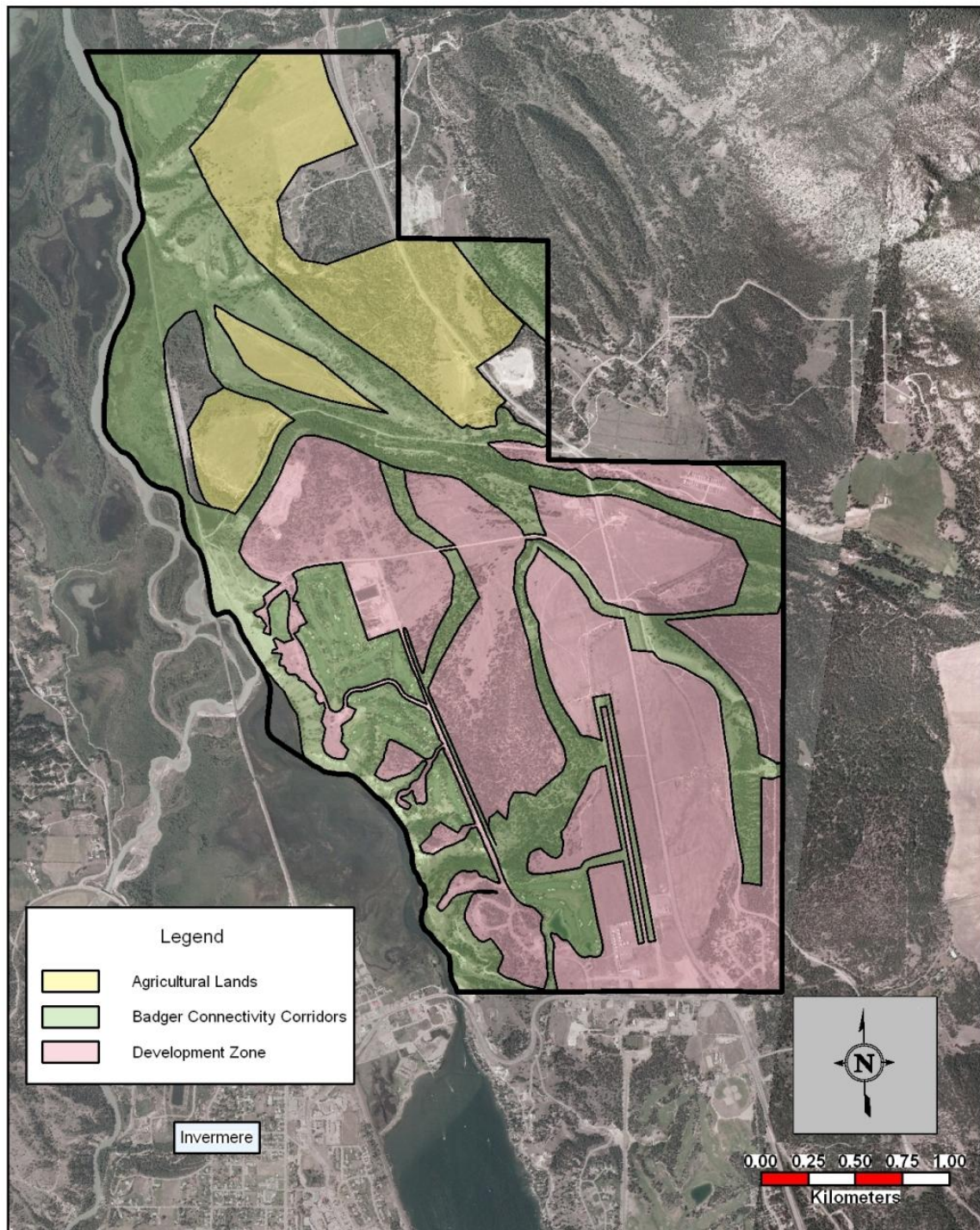


Figure 11. Terrestrial habitat patches and corridors for the Shuswap Reserve, February, 2009. (draft)

Table 3 below provides a description of the objectives, values in each type and proposed management actions. Detailed habitat objectives and best management practices for each habitat type are described in Appendix II, including details concerning how the terrestrial corridors for badger and other species will be managed.

Table 3. Habitat objectives, values and potential actions.

Habitat Type	Objective	Values	Actions
Columbia River*	Maintain in present condition, or enhance	Critical spawning area, freshwater mussel habitat Wintering sites for waterfowl, corridor for otter, painted turtle and other species	Inventory of burbot spawning sites
Shuswap and Stoddart Creeks	Maintain in present condition, or enhance	Salmonid spawning and holding habitat	Consider options for habitat enhancement
Riparian Corridors**	Maintain in present condition	Stream channel protection Habitat for riparian species	Maintain snags and class 2 wildlife trees in the long term
Wetlands	Maintain in present condition	Habitat for wetland species	Insert Turtle loafing logs, identify terrestrial egg-laying areas
Floodplain Forest Stands	Maintain in present condition	Habitat for riparian species	Maintain snags in the long term Establish Bird boxes
Clay Cliffs	Maintain in present condition	Habitat for swallows and other species	Inventory swallow nesting sites and other use
Grassland	Maintain in present condition, or enhance at north end of the reserve lands	Habitat for grassland species	Inventory of use
Farmland	Maintain in present condition, or enhance at the north end of the reserve lands	Habitat for species that use low profile grasslands (curlew)	Inventory of use
Bench Forests	Maintain in present condition, or enhance	Habitat for species using dry site Douglas fir forests	Snag and wildlife tree inventory
Terrestrial Corridors*	Maintain values to allow wildlife movement	Movement corridors for badger and elk	Develop better zoning in 2009/10
Developed Areas	Maintain urban wildlife presence	Maintain species that can live in urban landscapes	Explore options
Industrial Sites	Minimal values	Minimal values	
Golf course	Maintain some wildlife values	Maintain species that can use the habitats found	Explore options

*Adjacent to the reserve.

**Some home site development for band members has occurred in the riparian corridors along Shuswap Creek.

5.3.3 HABITAT INVENTORY

Surveys of habitat elements are planned for 2009/10. This will include:

- A grid based assessment of grass cover, weed presence, badger activity, ground squirrel activity, elk movement trails and evidence and grassland bird evidence.
- A grid based assessment of forest cover, stand density, snag presence and song bird nesting in forest lands.

An assessment of riparian forest sites will be carried out in future years. Assessments of stream condition for Shuswap and Stoddart Creeks has been completed (Andreashuk and Clairicoates, 2006, Artech 2002). An assessment of conditions in the Columbia River reach from Lake Windermere to the north end of the reserve boundary should be considered a priority.

5.3.4 HABITAT MONITORING

Ecosystem response to management actions and climate change occurs over decades and thus requires monitoring that will allow managers to compare the health of systems over long frames. Plots and transect- based surveys provide good long term data, however such work is expensive and unworkable with present budgets. Photo plots provide a good alternative that can be carried out at low cost. Photo plots should be located with a GPS, shot with lens of similar focal length and the data should be stored in 2-3 sites so then can be retained over long time frames. The re-taking of historic photos also provides a solid option for understanding past conditions and major habitat changes.

The monitoring of flows in the Columbia River, Toby Creek, Shuswap and Stoddart Creeks is also critical, given issues with climate change and water use in the area. The band and KDC should support efforts by local communities and NGOs such as Wildsight and the Columbia Wetlands Stewardship to improve the water monitoring network in the area.

5.4 EDUCATION, COMMUNICATION AND INTERPRETATION

The band is presently working with the Columbia Valley Greenways Alliance on a walking trail connecting Radium and Invermere. This trail crosses the reserve. There are interpretive signs planned for the trail. A discussion of species at risk could be included in that signage, indicating the issues and actions by the band to maintain species at risk.

A monument to commemorate the extirpated Chinook salmon and the initiative to restore the salmon has been proposed and will be displayed at a strategic location to educate the public of the importance of salmon to Shuswap Peoples and the larger community.

The band and KDC is also working with the Columbia Wetlands Stewardship Partners and others to develop the concept of a joint interpretive centre that would showcase Shuswap, Ktunaxa and Metis culture, local history and wetland and river ecology, at a site close to the Athalmer Bridge. Information on species at risk issues and actions by the band and the surrounding communities could also be presented at that centre.

5.5 ACTIONS IN THE TRADITIONAL TERRITORY

The reserve lands are just one small pieced in the puzzle of maintaining species at risk in the Invermere area and the East Kootenay. Larger scale strategies to maintain habitat are the only real answer for maintaining species at risk in the region. The Shuswap Band presently participates in the following actions on their traditional territory:

1. **The band presently plays a role in the Canadian Columbia River Intertribal Fisheries Commission (CCRIFC)**, who is taking the lead in returning salmon to the Canadian portion of the Upper Columbia system.
2. **The Shuswap Band is a key partner in the Upper Columbia Aquatic Management Partnership (UCAMP)** which provides for First Nation collaboration on Columbia River issues.
3. **The band is participating in the Columbia Wetlands Stewardship Partners**, a wide based group that is the lead in stewardship related to the Columbia wetlands. The band can work with this group to support leopard frog re-introduction in the wetlands and can assist in the conservation for aquatic, wetland and riparian species at risk throughout the wetland area.
4. **The band is participating in a regional scale planning linkage and habitat planning process that hopes to “stitch together” the land use zoning for the entire area from Edgewater to Fairmont Hot Springs.** Each of the various regional district, municipal and First Nations jurisdictions has developed zoning plans for their lands. This project will ensure that these plans work together to optimize options for maintaining species at risk.
5. **The band is represented at the East Kootenay Invermere Lake Management Partnership**, to provide input on lake management issues with regional and municipal government agencies.

Future options for Shuswap band and KDC participation include:

Grassland and Open Forest Restoration. Grassland dependent species are arguably the terrestrial species group of greatest concern in the Invermere area and the Trench. As part of mitigation for impacts of development on the reserve lands and private lands on the east side of the valley, a range of interests could consider a major grassland/open forest restoration project on crown land in the Invermere area. The objective would be to create a mix of grassland and open forest habitat types over a large area that would be of sufficient scale to support Sharp-tailed Grouse. This would require an area of at least 30 Km². On this scale, habitat would be provided for a range of other grassland species, including American Badger, Lewis’ Woodpecker, Long-billed Curlew and other grassland dependent species. Such a project could also accomplish objectives related to reducing

fire risk for communities, ranches and rural home sites, and the provision of forage for local ranchers and large ungulates. It could also create conditions for the return and/or maintenance of grassland plants that are traditional food sources and First Nations medicines. There are four potential areas for such a project.

1. **Grassland restoration on crown lands adjacent to the reserve** could result in the return of Sharp-tails to the reserve, but it is questionable if there is a large enough area that could be converted to grassland to allow their re-establishment in the long term.
2. **The Nature Trust of BC lands** near Fairmont (Hoodooos), encompasses a large area of low elevation landscape, however this option was not considered in the management plan for that property (R. Neil, pers. comm.).
3. **The west bench between Toby Creek and Horsethief Creek** would provide some options for restoration. This site is a complex mix of private and crown lands.
4. **The west side benches north of Horsethief Creek into the Frances Creek valley** is an extensive area with relatively dry site conditions. The south end near Horsethief Creek is a large block of private land.

Options 3 and 4 would have to be looked at in greater detail to make a realistic assessment of options. Support from several local interests and agencies would be required. Band and general public support would be crucial to any such project. The requirement for deciduous stands (crucial wintering habitat for Sharp-tailed Grouse) may be a limiting factor.

5.6 IMPLEMENTATION: OPTIONS, TIME FRAME AND BUDGET

Over the next decade, the following seem to be realistic options for managing for species at risk on the reserve:

- Support the efforts of CCRIFC and others to return Chinook Salmon and Steelhead to the Upper Columbia system.
- Support the White Sturgeon Recovery Team in their efforts to assess options for returning sturgeon to the system above the Mica Reservoir.
- Support the Leopard Frog Recovery Team and the Columbia Wetlands Stewardship Partners in their efforts to re-introduce Leopard Frog in the Upper Columbia.
- Support the efforts of the Jeffersonii Badger Recovery Team in their efforts to maintain this species in the Invermere area. This should include ongoing monitoring of badger movements and use of reserve lands, and working with the Ministry of Transportation and Infrastructure to install additional culverts to allow safe highway crossings by badgers.
- Maintain or enhance ground squirrel populations on reserve lands and crown land, on appropriate sites, to support badger and other species.
- Explore options for returning Sharp-tailed Grouse to the Invermere area.
- Maintain Long-billed Curlews and their habitat at the north end of the reserve, if they occur there.
- Create nesting sites for Lewis' Woodpecker and other species (Flammulated Owl, (if they occur) at the north end of the reserve.
- Maintain and enhance values in all habitat types on the reserve.
- Address weed issues in the grasslands on the reserve.
- Educate band members on ecological importance of specific species and how they are impacted by traditional or non-traditional land use.

Table 4 below identifies the actions to date relative to land management and species at risk management on the reserve, actions for which funding has been applied for in fiscal 2009/10 and future projects that would be part of a realistic plan for maintaining species at risk.

Table 4. Proposed actions, Timeline, potential budgets and Sources.

YEAR	PROJECT	COST	SOURCE
ACTIONS TO DATE			
2007	Zoning of Reserve	\$ 50,000.00	Band and KDC
2008/09	Corridor and habitat patch design	\$ 10,000.00	KDC
2008/09	Overview mgnt plan for species at risk	\$ 30,000.00	KDC, Shuswap Band and AFSAR
ACTIONS PROPOSED, FUNDING APPLIED FOR			
2009/10	Badger burrow and ground squirrel inventory	\$ 10,000.00	As above, proposal for funding with AFSAR
	Snag and wildlife tree inventory	\$ 3,000.00	As above
	Weed Inventory	\$ 2,000.00	As above
	Test of Inventory techniques	\$ 3,000.00	As above
	Bird boxes	\$ 1,000.00	Eagle Meadows project and KDC
	Surveys for Flammulated Owl, Long-billed Curlew, Lewis' woodpecker and other woodpeckers	\$ 2,000.00	KDC and AFSAR
FUTURE ACTIONS			
	Regional surveys for amphibians and reptiles	??	Multiple partners
	Regional survey for invertebrates	??	Multiple partners
	Regional survey for plant and plant communities at risk	??	Multiple partners
	Weed action plan	??	Multiple partners
	Snag creation?	??	Multiple partners
	Stream work	??	Multiple partners
	Assessment of grassland restoration options	??	Multiple partners
	Develop community awareness on fish and wildlife issues	??	Band and KDC

5.7 LEGAL FRAMEWORK FOR DEALING WITH SPECIES AT RISK

Issues related to the legal elements of species at risk management, as they play out on reserve lands, are discussed below.

Federal Species at Risk legislation applies primarily to federal land and requires the consideration of listed species in the Environmental Assessment process carried out on First Nations lands. In practice, these requirements do not apply to private lands nearby, except as required by regional district planners on an ad hoc basis. Developments on First Nations lands go through a detailed environmental review, with the Canadian Wildlife Service and Indian and Northern Affairs (INAC), to ensure due diligence is carried out relative to a range of issues as developments proceed. One element in this process is responding to issues related to species at risk.

This management plan will provide a solid data set on which to base future decisions relative to species at risk and the EA process. In this context, several issues need to be addressed cooperatively by the Band, the KDC and government agencies. The key questions are:

1. **How will the Environmental Assessment process proceed for projects in the development zone, with this overview plan in place?**
2. **How will this zoning and related regulations be enforced in the long term in this zone?**
3. **How will developments proposed in the farmland and forest zones be handled in the future?**
4. **How will development proceed where utilities and roads must cross riparian and terrestrial corridors?**
5. **How will the legislation concerning “residences” (occupied nesting sites and burrows) be applied in the future, with this overview plan in place?** (The SARA legislation requires the protection of specific nest sites or burrows when those sites are occupied. This represents a major challenge in interpretation for American Badger which may have numerous burrows that they use on an irregular basis across their home range).
6. **How will Critical Habitat be identified on First Nations lands?** (The SARA legislation provides for the identification of “critical habitat areas”, in cooperation with directly affected parties and aboriginal groups. This is complex issue for species with large home ranges, especially when crown, private and reserve lands are involved).
7. **How will the Migratory Bird Active Nest Surveys requirement operate in the context of the issues identified above?** (Regulations separate from the SARA legislation require that a survey be carried out prior to development actions on the ground to ensure that active nests are not disturbed during development).
8. **How would the compensation provisions in the SARA legislation apply when development options are compromised by the establishment of wildlife corridors?** (This provision has not been funded or utilized to date).

These are complex and difficult issues that will require further discussions between the various parties.

An option for dealing with all of these issues is suggested below.

Environmental Inspector Concept: The KDC presently has a building inspector on contract to deal with building code issues on reserve lands. They are considering the idea of having an “environmental inspector” identified for the KDC and band, probably on contract, to deal with the variety of variety on environmental and species at risk issues that have been identified here.

5.8 BUILDING RESOURCE MANAGEMENT CAPACITY

Given the issues around species at risk and the requirements for resource management capacity both for reserve lands and the traditional territory, there may be an option for creating a full time position for a band member to:

- Play a role as an “environmental inspector”, to ensure all regulations are adhered to.
- Manage habitat enhancement and inventory projects on reserve lands and participate in larger scale work in the traditional territory.
- Play a role as liaison with the various other groups involved in land management in the area.
- Help to stimulate interest in resource issues among young people on the reserve who could become the managers who will deal with these issues in the future.

Finding funding for such a position will be challenging in the present fiscal environment.

6.0 CONCLUSIONS

This plan provides an overview of options for maintaining species at risk in a semi-urban landscape on the Shuswap Reserve. Options are limited. The species at risk of most interest to band members will be the most challenging; i.e. bringing Chinook salmon back to their spawning beds adjacent to the reserve. There are few species at risk on reserve lands and even fewer realistic options for restoring species such as Sharp-tailed Grouse. Maintaining options for badger or Long-billed Curlew are being developed. For most species, the appropriate scale for management actions to maintain these species is at a regional scale (Invermere area) and not at the scale of the reserve lands. This plan will provide background data and support for future species at risk management in the area.

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8.0 APPENDICIES

APPENDIX I. SPECIES CONSIDERED BUT EXTREMELY UNLIKELY ON RESERVE LANDS.

APPENDIX II. MANAGEMENT OBJECTIVES AND ACTION BY HABITAT UNIT.

APPENDIX I. SPECIES CONSIDERED THAT ARE UNLIKELY TO OCCUR ON RESERVE LANDS.

AQUATIC SPECIES (RIVERS AND STREAMS)

COLUMBIA RIVER SOCKEYE SALMON (*Oncorhynchus nerka*) – listed in USA

This race of sockeye still occurs in the lower Columbia system, though not in large numbers (39,291) in the lower river (Columbia Basin Fisheries and Tribes, 2008). There is little historic evidence that sockeye spawned at the Upper end of the Columbia River. Green, B. 1995 notes that “Sockeye salmon juveniles reared in the Arrow Lakes, Slocan and Whatshan Lakes, and spawned either in tributaries or around the margins of these lakes. Sockeye salmon may also have utilized rearing habitat in Columbia and Windermere Lakes, although there is not a lot of evidence of this;...”. It is likely that his species would have been identified by First Nations people and by early white observers if they had occurred in significant numbers due to their bright red color. There is not definitive evidence of this species presence at Athamer, based on discussions with band members (Thomas 2009).

COLUMBIA RIVER COHO SALMON (*Oncorhynchus kisutch*)

Coho occur in substantial numbers (125,743 in 2007) in the lower system (Columbia Basin Fisheries and Tribes, 2008). Green 1995 suggests that Coho salmon did not enter the Canadian portion of the Columbia River basin; the Spokane River was apparently the upstream limit of coho spawning. It is unlikely that they ever occurred in the Columbia River at Athalmer.

BULL TROUT (*Salvelinus confluentus*) -Blue listed

There is a large, healthy population in bull trout upstream of the Mica dam, at least partially as a result of the expansion of the kokanee population in recent decades. They spawn in several of the downstream tributaries of the Columbia and occur in In Shuswap Creek above the reserve lands (Larry Halverson, pers. comm.). Artech 2002 surveyed both Stoddart and Shuswap Creeks in 2002. They found bull trout only in Shuswap Creek.

WESTSLOPE CUTTHROAT TROUT (*Oncorhynchus clarki lewisi*) -Blue listed

This trout is relatively common in the Upper Columbia River drainage. It is listed due to concerns around hybridization with rainbow trout. It is uncommon in the Athalmer reach of the Columbia River but occurs in Stoddart Creek (Artech 2002) and Upper Shuswap Creek (L. Halverson, pers. comm.).

RAINBOW TROUT (*Oncorhynchus mykiss*) -Yellow listed

Rainbow are common in the Columbia River and some downstream tributaries. They do not occur in Shuswap and Stoddart Creek (Artech 2002).

MOUNTAIN WHITEFISH (*Prosopium williamsoni*) -Yellow listed

Whitefish are a common fish in the Columbia River system. It occurs in the river adjacent to the reserve.

PYGMY WHITEFISH (*Prosopium coulteri*) -Yellow listed

This species is listed since it only occurs to two tributaries in the Upper Columbia (Kicking Horse and Duncan River systems) (D. Peterson, pers. comm.). There is no evidence that it is likely to occur on reserve lands.

NON-GAME FISH

There are several non-game fish present in the Upper Columbia, as indicated below.

Peamouth *Mylocheilus caurinus*

Northern Pikeminnow *Ptychocheilus oregonensis*

Longnose Dace *Rhinichthys catarractae*

Redside Shiner *Richardsonius balteatus*

Longnose Sucker *Catostomus catostomus*

Largescale Sucker *Catostomus macrocheilus*

Slimy Sculpin *Cottus cognatus*

Torrent Sculpin *Cottus rhotheus*

Prickly Sculpin *Cottus asper*

All are likely to occur in the adjacent reach of the Columbia River.

ROCKY MOUNTAIN TAILED FROG (*Ascaphus montanus*) Endangered

The Tailed Frog (*Ascaphus truei*) lives in clear, fast moving streams with a boulder substrate. The streams must be in forested areas since algae growth on the boulders affects the survivorship of tadpoles. In the East Kootenay it occurs only in the Moyie and Flathead drainages south of Cranbrook (Dupuis and Adams 2004, Ferguson 2004). This species is unlikely to occur on reserve lands.

WETLAND SPECIES

SANDHILL CRANE

Sandhill cranes prefer isolated marshes and wet areas in forest openings for breeding. They are common in the remainder of their range, with 3400 pairs in B.C., mostly in the Chilcotin. Their only known nesting site in the East Kootenay is at Bummers Flats north of Cranbrook (Cooper, 1996). They also nest in the Golden area in the Moberly Marsh and use areas on the Blaeberry River (Ferguson 2004, E. Zimmerman, pers. comm.). There are no records of nesting in the Invermere area, though some do pass through during migration (L. Halverson, pers. comm.). One pair was seen on July 3rd 2005 on the Firland ranch on the floodplain near Radium Hot Springs (T. Kinley, pers. comm.). As noted by Ferguson 2004, Sandhill cranes generally nest in wetlands >2 ha in size, which would make the wetlands on the reserve marginal for their use.

WESTERN GREBE

This species uses relatively warm water lakes with abundant fish, as at Duck Lake at Creston (Burger, 1997). They have been seen between Athalmer and Radium in the wetlands and occasionally occur in large migration congregations on Windermere Lake (1100 birds observed by L. Halverson, pers. comm.). These are birds that breed in medium to large colonies on many of the fish-bearing lakes of the boreal forests and parkland regions of Alberta. There are no breeding sites in the East Kootenay and are unlikely on the reserve lands.

AMERICAN AVOCET

The Avocet is a shorebird that relies on small grasslands ponds and marshes. Its primary range is on the great plains but a few pairs have recently arrived in B.C., breeding at Creston in 1968 and establishing a small nesting group (19 nests) at Alki Lake near Kelowna in 1997 (Gebauer 2000). In BC they nest only in pothole wetlands and alkali lakes, none of which are found on reserve lands. Ferguson 2004 notes “....small numbers of American Avocets have been observed in late April and May in shallow-water habitats in the Columbia Wetlands Wildlife Management Area near Spillimacheen and Parson However, breeding there is unlikely due to the inundation of potential nesting areas in June by rising floodwaters of the Columbia River. Other sites....where American Avocets have been recorded include Canal Flats, Wasa Lake and ponds in agricultural areas near Wycliffe”. They have also been observed in the wetlands near Radium Hot Springs (L. Halverson, pers. comm.).

FORSTER’S TERN (*Sterna forsteri*) Red-listed

A small breeding colony of Forster’s Tern (estimated at 12 pairs) occurs in the Duck Lake marshes within the Creston Valley Wildlife Management Area. There are no other known breeding sites in the province (Ferguson 2004). He notes “Nesting occurs in shallow-marsh habitats having heavy growths of submerged aquatic plants and dense stands of emergent vegetation. Stable water levels are believed to be necessary for successful breeding. The construction of dykes and other water control activities in the Creston Valley are likely responsible for the successful establishment of the breeding colony there in the 1970s. Within the Assessment Area, Forster’s Tern is recorded only

occasionally in the upper Kootenay River valley in early September. Between 1996 and 2002, there are two documented occurrences of terns feeding in wetlands within the Columbia Wetlands Wildlife Management Area near Golden.... Foraging may occur in shallow-water habitats in southern parts of the Columbia Wetlands as well, but breeding is very unlikely due to the inundation of shallow-marsh habitats by rising floodwaters of the Columbia River during June and July”.

CALIFORNIA GULL (*Larus californicus*) –Blue listed

Ferguson 2004 indicates that “The California Gull occurs primarily as a spring and autumn transient in the central southern interior. The species is known to breed in British Columbia at only four sites – Grant Island in Okanagan Lake, Ellis Island in Fraser Lake, Gravel Island on the Quesnel River, and Shuswap Lake (near Salmon Arm). The breeding population is estimated at 25-100 pairs, and appears to be increasing in British Columbia. The main breeding range of California Gulls in Canada occurs in the Prairie Provinces, as far north as Great Slave Lake in the Northwest Territories. There are no known nesting areas within the Assessment Area. Occurrences within the Assessment Area are characterized by irregular and infrequent visits by small numbers of individuals (generally <10 birds) during the spring and fall migration periods.

COLUMBIA SPOTTED FROG (*Rana luteiventris*) –yellow listed

This species is relatively common and widely distributed across elevations and habitat types (Klinkenberg 2008). It is yellow listed for the province. There is no status report and it does not seem to be susceptible to Chytrid disease (D. Adama, pers. comm.). They have been observed close to the reserve at the Toby Creek confluence (L. Halverson, pers. comm.).

WOOD FROGS AND TREE FROGS

Both of these frogs likely occur in the Upper Columbia watershed but little is known about their status.

RIPARIAN SPECIES

WESTERN SCREECH OWL (*Otus kennicottii macfarlanei*) Endangered

The *macfarlanei* subspecies occurs in the southern interior, primarily in the Okanagan. It uses low elevation deciduous forest sites for nesting, and is usually associated with riparian areas. They are cavity nesters, generally using deciduous species. The Interior population is estimated at 50-200 birds. It is considered rare in the East Kootenay and there are no documented breeding records. They have been observed recently at Creston and at Castlegar (COSEWIC 2002b).

Ferguson 2004 notes “A recent inventory in southern British Columbia during the breeding season documented only one occurrence outside the Okanagan – along the Granby River, north of Grand Forks. Western Screech-Owls are recorded very rarely in both the East and West Kootenay.”

There are no known records of Western Screech-Owl in the upper Columbia River valley. Habitat for this species (riparian deciduous) is common in the traditional territory but very limited on the reserve lands.

SHORT-EARED OWL (*Asio flammeus*) -Special Concern

Ferguson 2004 notes “Short-eared Owls have a spotty breeding distribution in British Columbia. In southern British Columbia, they nest in the lower Fraser valley, and in the south and central interior valleys from Creston and the Okanagan valley north to Prince George. In northern British Columbia, breeding is suspected in localized areas in the Peace River lowlands. A survey carried out in the Columbia Basin in south-eastern British Columbia during the 2003 breeding season did not detect any Short-eared Owls. Low prey availability during 2003 may account for the lack of owl observations, as this nomadic species tends to select areas with abundant vole populations for nesting (Cooper and Beauchesne 2003). The authors indicated that high quality nesting habitat is very scarce in the Columbia Basin due to current land use practices in grassland areas. Factors contributing to low habitat suitability included excessive human disturbance, cattle grazing and other agricultural practices, and natural flooding (e.g., Columbia River wetlands). Only 15 sites were rated as highly suitable within the Columbia Basin. Within the Assessment Area, they included areas within the Bummers Flats Conservation Area, agricultural fields near Windermere, and grassy islands in the Kootenay River near Wardner. A summer record also exists for the Premier Ridge area. It seems likely that Short-eared Owls nest in very low densities in suitable open-country habitats in the southern Rocky Mountain Trench, during years when vole populations are favourable for nesting.” Short-eared owls have been observed at the south end of the reserve (L. Halverson, pers. comm.), but there is no evidence of nesting. They have been observed and apparently nesting in some other areas (Zehnder ranch, T. Kinley, pers. comm.). The lack of dense grass stands on most of the reserve would suggest that this species is unlikely to occur on most reserve lands, though they could use the wetland and riparian areas along the Columbia River.

COEUR D’ALENE SALAMANDER (*Plethodon idahoensis*) –Special Concern

This species lives in seeps and low volume streams where fractured rocks and where wet talus slopes provide cover. They require humid conditions combined with cracked rock or talus to survive winter cold. They are considered vulnerable federally and are blue lists provincially (COSEWIC 2007). They occur primarily in the wetter conditions found in the West Kootenay, except for two locations in the St. Mary’s River drainage (Perry and Mark Creeks) in the East Kootenay in moist conditions in that watershed. It should be noted however, that the Rocky Mountains and tributaries of the Columbia River have not been surveyed. The drainages of the Columbia River north of Brisco support moist forest types and may provide habitat for this species. This species is unlikely on reserve lands due to climatic conditions.

LONG-TOED SALAMANDER (*Ambystoma macrodactylum*) – listed as not at risk

The Long-toed Salamander lives in down wood and logs close to small wetlands, generally those that do not support fish. They court and mate in wetlands, then return to live under down woody material nearby. Though secretive and rarely seen, this species occurs widely through BC. It is found on the Toby Creek Benches, in some cases in people’s basements (T. Kinley, pers. comm.) and may occur on the reserve close to the wetlands along the Columbia River.

GRASSLAND AND FARMLAND SPECIES

BIGHORN SHEEP (*Ovis canadensis*) –Blue listed

Bighorn sheep are blue listed provincially. A major herd occurs to the north at Radium Hot Springs and occasional move down the west slope of the mountains to Stoddart Creek and Shuswap Creek (Demarchi et al. 2000, Jalkotzy 2000). They occasionally use crown land adjacent to the reserve in the north east corner above Highway 97. Most of this area is heavily overgrown with conifer thickets that are of minimal use to bighorn sheep for forage or escape terrain. There is another herd to the south that winters on the east side of Columbia Lake. There are no options for maintaining winter habitat for this species on reserve lands. Any corridors considered for bighorn sheep would need to be located along the base of the mountains on private and crown land.

BURROWING OWL(*Athene cunicularia*) -Red listed

Ferguson 2004 notes “In British Columbia, the Burrowing Owl occurs mainly in the south Thompson and Okanagan basins, and on the Fraser River delta in the extreme south-western corner of the mainland. The current breeding range of Burrowing Owls in interior British Columbia is very small and is restricted to sites near Osoyoos and Kamloops, where intensive reintroduction programs have been established. Breeding sites in the interior British Columbia comprise open, treeless areas of short grasses, forbs and sagebrush in low-elevation (<500 m asl) rangelands and valley bottoms. There are no known breeding records for the Kootenay Region. Occurrences within the Assessment Area include three records of single birds between 1940 and 1984 at Wycliffe (northwest of Cranbrook), Ta Ta Creek (northeast of Kimberley) and at an unspecified location in the East Kootenay in 1940. Only one occurrence has been documented within the last 20 years – a single individual on farmland near Invermere in May 1999 and in the following year.”. This individual was observed on the Zehnder ranch south of Toby Creek (D. Zehnder, pers. comm.).

BARN OWL (*Tyto alba*) Special Concern

Ferguson 2004 notes “In British Columbia, the core breeding range of Barn Owls occurs in the lower Fraser River valley as far east as Hope, with secondary breeding habitats on south-eastern Vancouver Island and Saltspring Island. Breeding habitat generally comprises agricultural lands and abandoned fields where there are man-made structures (e.g., barns, sheds, silos) for nesting. Recent records of breeding indicate that populations may become established in the Okanagan and possibly in the West Kootenay. Populations experience sharp fluctuations in numbers in response to the population cycles of rodent prey and to severe winter conditions (snow depths). Within the East Kootenay, there are only two confirmed occurrences of Barn Owls, both road-kills during October 1999 – one north of Golden and one south of Parson”. For the East Kootenay “There is only one confirmed record, and climatic conditions (i.e., severe winter weather) are likely a major factor limiting their presence.”

SWAINSON’S HAWK (*Buteo swainsoni*) –red listed

Ferguson 2004 notes “In British Columbia, the small breeding population of Swainson’s Hawks (estimated at fewer than 100 pairs) is concentrated on the Douglas Plateau (east of Merritt) and on the Okanagan Plateau (near Vernon). This species also breeds locally in the Bulkley Basin near Smithers in the Prince Rupert Forest Region. The breeding habitat of Swainson’s Hawks comprises woodlands and small groves of trees adjacent to rangelands, pastures, farmlands, marshes and other

open areas. Prior to the 1940s, the Swainson's Hawk was reportedly "common" in the East Kootenay (and may have bred here historically), but there are no documented nesting records in the Kootenay Region within the last 50 years. An inventory in 1996 found no Swainson's Hawks in the East Kootenay, and Cooper (1998) concluded that they are extremely rare in the Kootenay Region. Forest encroachment into grassland habitats (as a result of prolonged fire suppression) and agricultural developments have been identified as contributing factors to provincial population declines. Within the Assessment Area, Swainson's Hawks have been observed near Wasa, Cranbrook, Canal Flats and Newgate in the 1940s and 1950s, but recent sightings are very rare".

PEREGRINE FALCON (*Falco peregrinus anatum*) -Threatened

Ferguson 2004 notes "The extent of the current breeding range of Peregrine Falcons (*anatum* subspecies) in British Columbia is largely unknown. There are currently about 20 known active nest sites in the province, and the breeding population in the southern interior is estimated to be fewer than 10 pairs. Nesting sites are typically on inaccessible cliff ledges overlooking wetlands or other open areas that support abundant prey populations (e.g., waterfowl or shorebirds). There are indications that Peregrine Falcons formerly bred in the East Kootenay (up to the early 1980s), but recent evidence of breeding in this area is lacking. No evidence of nesting was documented in a 1996 inventory in the East Kootenay, but only a small portion of the potential nesting sites was searched. Cooper (1998) speculated that small numbers of Peregrine Falcons possibly breed in the East Kootenay, and reported that considerable nesting habitat exists in the Rocky Mountain Trench and adjacent side valleys". This species uses cliffs for nesting, which do not occur on the reserve lands. They may use the reserve lands for hunting during migration.

PRAIRIE FALCON (*Falco mexicanus*) -Red listed

Ferguson 2004 notes “The Prairie Falcon breeds from south-eastern British Columbia, southern Alberta and southern Saskatchewan south to California, Arizona, New Mexico and Texas. In British Columbia, the Prairie Falcon is becoming increasingly rare (likely fewer than 25 breeding pairs in the province), with primary nesting areas in the Okanagan Valley, Nicola Valley and Thompson Basin. Prairie Falcons inhabit open, treeless country including arid grasslands, sagebrush steppes, and alpine meadows and ridges. Nests are usually placed on narrow ledges on cliff faces, frequently close to water. There are no documented nesting sites for the East Kootenay, but breeding is suspected at localized sites based on sightings of adults during the breeding season. Within the Assessment Area, Prairie Falcons have been observed occasionally near Columbia Lake, Skookumchuck, the White River, Canal Flats, Brisco and Invermere.”. This species uses cliffs for nesting, which do not occur on the reserve lands. They may use the reserve lands for hunting during migration.

BROAD-WINGED HAWK (*Buteo platypterus*) -Blue listed

Ferguson 2004 notes “Broad-winged Hawks have a large breeding range within North America – from eastern British Columbia, the central parts of Alberta, Saskatchewan, Manitoba and Ontario to southern Quebec and the Maritime Provinces, and south as far as Florida, Texas and the Gulf Coast. In British Columbia, the Broad-winged Hawk was first documented as a breeding species in 1986 near Boundary Lake (Fort St. John) in the Peace Lowlands. Since then, the species has been expanding its range within eastern British Columbia, and nesting has been documented or suspected at other sites in the Peace Lowlands, as well as in central and southern parts of British Columbia (e.g., near Chetwynd, Vanderhoof, Prince George and Golden). The first documented nesting in south-eastern British Columbia occurred west of Spillimacheen, within Tembec’s TFL #14, in 2002 (personal observations; nest details filed with the British Columbia Nest Record Scheme and the Conservation Data Centre). TFL #14 lies just to the west of the Assessment Area. Recently, Broad-winged Hawks are reported during the breeding season in increasing numbers in central and southern parts of British Columbia, so it may become established as a breeding species within the Assessment Area in the near future. Broad-winged Hawks generally nest in relatively dense deciduous or mixed forests (although the TFL #14 nest site was located in a coniferous stand), near wet areas and forest openings, and often on a slope.

COMMON NIGHTHAWK (*Chordeiles minor*) –listed nationally but not provincially

The Common Nighthawk is a relatively common species across North America, and has been the subject of a recent status report (Savignac 2007). They are most commonly seen feeding high in the air during the dusk and dawn hours. Nighthawks are well-known for the "booming" sound they make produced by air rushing through the primary feathers of males when they dive. Nighthawks breed during the summer months from the southern Yukon across most of southern Canada to the southern United States and parts of Mexico and Central America. Nighthawks have been reported to occur throughout British Columbia during the summer months. Nesting habitat is diverse, and includes logged or burned areas of the coastal forests, open ponderosa pine forest, the grassland habitat of the semi-arid interior, and sand and gravel habitats of marine and fluvial beaches. Less

common habitats include many human-made habitats such as farmland and pasture lands, old gravel pits, and even gravel roof-tops in urban areas. The population is estimated at 400,000 in Canada, but a significant decline in numbers has occurred in the last decade (49.5%). They are not listed at present. They are regularly seen above riparian floodplain areas on the Kootenay River at Ta Ta Creek and nest on the adjacent benches (B. Jamieson, pers. obs.). They also nest in Columbia National Wildlife Management area Wilmer Unit (L. Halverson, pers.comm.).

COMMON POORWILL (*Phalaenoptilus nuttallii*) – not listed

The Poorwill has a distinctive “poor-will” call. It is generally a night time feeder. Within Canada, Poorwills normally occur only in the southern interior of British Columbia, and in the Cypress Hills region on the Saskatchewan and Alberta border. These two areas represent the northernmost limits of the species breeding range. Within British Columbia, most breeding poorwills are found in the Okanagan valley. Poorwill nesting habitat appears very similar to that of nighthawks, and these two species are sometimes found in close proximity. The preferred poorwill nesting habitats are dry, open, grassy or shrubby areas on hillsides, but forested parkland margins and logged sites are also used. Like nighthawks, they “nest” are on the ground, usually in a small depression or hollow, and consist only of a bare patch of ground with no nesting material present. They were observed at the Hoodoos by Compensation Program inventory crew in 2008 (J. Krebs, pers. comm.). They may occur on reserve lands and have been heard at Dry Gulch (L. Halverson, pers. comm.).

OLIVE-SIDED FLYCATCHER (*Contopus cooperi*) –Blue listed

This species nests in trees adjacent to grasslands and fields. It is common in Canada with a population estimated at 450,000, but has declined markedly in recent decades (5% per year from 1968-2006); probably due to issues on its wintering ground in central and South America (COSEWIC 2007b). It may occur on reserve lands on Lower Stoddart and Shuswap Creeks.

BOBOLINK (*Dolichonyx oryzivorus*) -Blue listed

This grassland species that has been observed at several locations in the BC Interior (Arrow lakes, Creston, Castlegar, Grand Forks, Williams Lake). They use intermediate levels of grass cover, in grasslands and farm fields. The provincial populations is estimated at 500-1100 birds at 22 sites. They have been observed at Waldo, Ta Ta Creek, Radium Hot Springs and Parsons (Van Damme, 1999) and in farm fields at Brisco (L. Halverson, pers. comm.). Most grassland sites on the reserve lands have sparse cover so nesting by this species is unlikely.

GRASSHOPPER SPARROW

This grassland sparrow occurs in low numbers in the Okanagan (50 pairs) but does not occur or nest in the Trench (Canning 1995).

BREWERS SPARROW

There is a limited population (800-1000 birds) of this bird in the sagebrush dominated grasslands in the Okanagan south of Penticton and between Kamloops and Spences Bridge. It is red listed for B.C. It has not been observed in the Trench (Sarell and McGuiness 1996).

WESTERN SKINK (*Eumeces skiltonianus*)-Special concern

This species is relatively common at lower elevations in the West Kootenay, with two observations near Kimberley (Dulisse 2005). No extensive surveys have taken place in the East Kootenay. Their habitat is low elevation grassland and dry forest, in warm aspects with cover made up of large woody debris or rocky areas. They use habitats generally associated with rubber boa and alligator lizard. They may occur in the Invermere area but may be limited by cold periods in winter (J. Dulisse. pers. comm.).

NORTHERN ALLIGATOR LIZARD

Merilees and Halverson (2006) found evidence of this species near Kimberley, a major range extension from their known range at Creston.

FOREST SPECIES

GRIZZLY BEAR (*Ursus arctos*) –Special Concern

Grizzly bears are listed although their populations in BC and the Kootenays are healthy (D. Dunbar, B. McLellan, pers. comm.), except along the south margin of their range. They are seen occasionally in the Columbia wetlands and feed on spawning kokanee in some areas. They rarely use the reserve lands since the reserve and surrounding area are semi-urban in character. There are few bear foods in the dry forest and grassland types found on the reserve. One bear (a tagged, problem bear) was observed on the reserve in the 1980s (Xavier Eugene, pers. comm.).

WOLVERINE (*Gulo gulo luscus*) -Special Concern

This species is found in the surrounding mountains. Ferguson 2004 notes that “The provincial population is estimated to be in the range of 2100 to 3500 animals, and numbers are believed to be stable over much of British Columbia. In the southeast, however, Wolverines may be declining due to a number of habitat-related and human disturbance pressures, and to declining caribou herds”. They generally use alpine and subalpine habitats and are uncommon to rare in the Trench. This species is unlikely to occur on reserve lands.

FISHER (*Martes pennanti*) –Red listed

Ferguson 2004 notes “Fishers have been extirpated from large areas of their geographic range in British Columbia. Small populations of Fishers once occurred in most Wildlife Management Units in the Kootenay Region, but populations declined dramatically in the first part of the 1900s and they have not recovered. A large proportion of the most suitable, valley-bottom habitat in the Kootenay Region is believed to have been lost due to hydroelectric developments and associated flooding of riparian forests. In the Kootenay Region, historical trapping records since 1931 reveal that only one Fisher was trapped during the period from 1982 to 1997. In 1997, a Fisher was live-trapped near Revelstoke. A Fisher re-introduction project was undertaken by the provincial Wildlife Branch in the East Kootenay in the mid-1990s. Between 1996 and 1999, 61 adults and 23 kits were released into areas south of Cranbrook and west of Kimberley, in an attempt to re-establish a breeding population in the Kootenay Region. An assessment of the re-introduction project was carried out in 2002-2003, using live trapping, sightings, snow tracking and hair sampling methods to estimate the post-release population of Fishers in the East Kootenay. A conservative population estimate of 4-6 individuals was obtained, and Fishers were confirmed southeast of Cranbrook (in the Yahk River, Skookumchuk River, Bloom and Caven creeks watersheds), and north of Kimberley (in the Lost Dog Creek watershed). The data collected during this assessment suggest that the re-introduction did not result in a self-sustaining population.”. This is a forest species that is unlikely on reserve lands.

WILLIAMSON’S SAPSUCKER (*Sphyrapicus thyroideus nataliae*) - Red listed

Ferguson 2004 notes “Historically, the breeding range of *S.t. nataliae* occupied extreme south-eastern British Columbia, from the Cranbrook area south to Newgate, and in the Flathead River drainage. It has been suggested that Williamson’s Sapsucker has always been a rare bird in the East Kootenay, occurring in very low numbers in localized areas. It has a much larger distribution in the United States, in mountainous areas from Montana south to Arizona and New Mexico. Prior to

2004, there were only three documented breeding records for this subspecies in British Columbia – in 1937, 1938 and 1979, all near Cranbrook. Some authors had speculated that Williamson’s Sapsucker had been extirpated from southeastern British Columbia, but in 2004 a breeding pair nested successfully in a live western larch (in mixed mature forest) within the Kimberley Nature Park (Ruth Goodwin, personal communication). It is possible that small localized breeding populations also exist elsewhere, as inventories are lacking. Three sightings in the Flathead River area between 1986 and 1992 suggest that the species may still persist there in small numbers (Fraser et al. 1999). Williamson’s Sapsuckers feed mainly on coniferous trees such as Douglas-fir and western larch, and excavate nesting cavities in recently dead snags, or in live trees with advanced heartwood decay. Breeding in British Columbia occurs in the Interior Douglas-fir, Montane Spruce and lower Engelmann Spruce – Subalpine Fir biogeoclimatic zones, between 850 and 1200 m in elevation”. These forest types are not found on the reserve.

TOWNSEND’S BIG-EARED BAT (*Corynorhinus townsendii*) Blue listed

Ferguson 2004 notes “The Canadian distribution of Townsend’s Big-eared Bat is restricted to southern British Columbia, where it occurs in scattered locations within the drier biogeoclimatic zones of the southern coast, and southern and central interior. Generally, the species is confined to small areas of suitable habitat at low elevations, including the Interior Douglas-fir and Ponderosa Pine biogeoclimatic zones. In British Columbia *C. townsendii* has been found from Vancouver Island east to Cranbrook, and as far north as Williams Lake. The provincial distribution is strongly correlated with the availability of caves and cave-like roosts and hibernacula (e.g., abandoned mine shafts, military bunkers). In 1996, Townsend’s Big-eared Bat was first documented in the East Kootenay, when a maternity colony of approximately 100 bats was found at the St. Eugene Mission near Cranbrook.”. Since then, additional maternity colonies and hibernacula have been located in the southern part of the East Kootenay (Firman 2000). Maternity colonies have been found in buildings and other man-made structures near Fort Steele, Wasa, Bummer’s Flats and Newgate. This species may occur in old building on the reserve.

WHITE-THROATED SWIFT (*Aeronautes saxatilis*) –Blue listed

The White-throated swift is recorded from the northern end of the East Kootenay Trench (Summer 1995); however this species uses steep rocky cliffs for nesting. Ferguson 2004 notes “In British Columbia, the core breeding range comprises the Okanagan and Similkameen River valleys, with smaller populations in the Thompson, Clearwater, Fraser, lower Chilcotin and Columbia River valleys. Nesting occurs in small colonies and nest sites comprise cracks, crevices and small ledges on precipitous rocky cliffs and sides of canyons, generally in areas of hot, dry climates. Foraging for insects takes place in the air, generally not far from nesting sites. Within the Assessment Area, White-throated Swifts are regularly observed at only one locality – the Dutch Creek hoodoos west of Fairmont Hot Springs – where breeding is suspected. Up to 12 swifts have been observed at this site on a number of occasions during spring and summer”. Habitat for this species does not occur on reserve lands.”.

APPENDIX III. MANAGEMENT OBJECTIVES AND ACTION BY HABITAT UNIT.

AQUATIC HABITATS

ATHALMER REACH OF THE COLUMBIA RIVER

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Adhere to Department of Fisheries and Oceans (DFO) and other regulations, including municipal zoning.

Actions:

- Support spawning habitat surveys for the reach.
- Support a freshwater mussel survey for the reach.
- Consider the fisheries and wildlife values in any future developments in this area. The marina and Interpretative Centre proposals may have impacts in this area.

LOWER REACHES OF SHUSWAP AND STODDART CREEKS

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Adhere to Department of Fisheries and Oceans (DFO) and other regulations.

Actions:

- Consider fisheries habitat improvement where appropriate (Access from river and culverts may be issues).
- Manage water demand to maintain flows for fish.

WETLANDS

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Protect as part of the habitat protection zone

Actions:

- Maintain in their natural state.

FLOODPLAIN RIPARIAN AREAS ALONG THE COLUMBIA RIVER

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Protect as part of the habitat protection zone
- Protect and enhance multiple age class stands of cottonwood, conifers and other species.
- Maintaining a healthy shrub and small tree community along much of the river corridor, to provide songbird habitat and river bank stability.

Actions:

- Maintain in natural state, with enhancement as required in the future.
- Inventory snags, consider bird boxes if required.

RIPARIAN CORRIDORS ALONG SHUSWAP AND STODDART CREEKS

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Protect as part of the habitat protection zone
- Protect and enhance multiple age class stands of cottonwood, conifers and other species.
- Maintain a healthy shrub and small tree community, to provide songbird habitat and stream bank stability.

Actions:

- Maintain in their natural state, with enhancement as required in the future.
- Inventory snags, consider bird boxes if required.
- Limit development impacts to crossing roads and utilities.
- Protect from fire.
- Educate residents who live adjacent to these corridors concerning riparian values.

STEEP SOUTH AND WEST FACING CLAY SLOPES

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Protect as part of the habitat protection zone

Actions:

- Maintain in natural state
- Inventory use by swallows and other wildlife.

GRASSLANDS

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Maintain a healthy grassland community where possible.

Actions:

- Address the leafy spurge issue as a priority. Leafy spurge presents a major and very difficult problem on the reserve. Expensive herbicides are required over several years to kill this plant and bio-control is not particularly effective (K. Patterson, pers. comm.). There is a heavy infestation in the south portion of the reserve that will be difficult to control, but these are on portions that are slated for development. As development proceeds, these weed sites will be addressed in the remaining green areas. There are two smaller infestations near the old church and on private land just north of the reserve on Stoddart Creek. These sites are smaller and should be treated and killed out to stop their spread while it is still possible (P. Burk, pers. comm.). The northern site will require the cooperation with the land owner just north of the reserve. Treating these sites, and any found on farmland should be considered a priority.
- Inventory snags and consider bird boxes if required in forests adjacent to the grassland areas.
- Limit development impacts to crossing roads and utilities.
- Educate residents who live adjacent to these corridors concerning grassland values.

FARMLAND

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Maintain as a healthy domestic grassland community where possible, subject to the needs of CP holders and band members for grazing and agriculture.

Actions:

- Address the leafy spurge issue as a priority, as above.
- Maintain low profile grass cover in any areas used by Long-billed Curlews.

DOUGLAS FIR FORESTS

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Maintain as part of the habitat protection zone where they are included.
- Maintain a healthy forest and grassland community where possible.

Actions:

- Address the leafy spurge issue as a priority, as above.
- Inventory snags, consider bird boxes if required.
- Make a decision as to the long term status of these forest sites. As indicated earlier, these forests are an artifact of fire suppression earlier in the century. They can be managed to retain these areas as dry site Douglas fir forests over a range of stand densities, or they could be returned to grassland or open forest conditions that are closer to what occurred pre-settlement, through restoration efforts.

TERRESTRIAL CORRIDORS (in the development zone)

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Maintain travel corridors that are a minimum of 100 m wide.
- Maintain the function of the travel corridors as negotiations occur in the future as developments proceed. Detailed planning for new developments should consider these corridors as a function, not as hard lines on a map. The objective is to maintain movement through the various CP properties, not to stick specifically to the lines identified here.
- Where roads and utilities need to cross these corridors, due concern for the function of these corridors will be considered. Culverts will be needed to allow badger movement.
- Habitat enhancement options should be considered for other species subject to the overriding role as travel corridors.
- Maintain ground squirrel populations in the habitat patches identified.

Actions:

- Address the leafy spurge issue as a priority, where they occur in the corridors.
- Look at the proposed corridors in detail to ensure they address their stated objectives. Further work is needed on potential use by elk and badger.
- Inventory snags, consider bird boxes if required.
- Ensure that culverts are installed where needed under roads on the reserve.
- Ensure that culverts are considered in negotiations with the Ministry of Highways in their plans to expand the main highway through the reserve to four lanes.

INDUSTRIAL AREAS.

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Maintain travel corridors around these sites.
- In the long term, if these sites are no longer in use, develop plans for reclaiming the sites that add value to adjacent corridors and habitat patches.

Actions:

- None.

DEVELOPED AREAS

Values and Management Objectives: As indicated in Table 4.

Best Management Practices:

- Establish bird boxes and other nesting options for those species that can be maintained in developed landscapes.

Actions:

- Experiment with plantings of shrubs and trees that provide food sources for urban adapted species, based on experience in other areas.
- Consider bat and swallow houses as an option for reducing mosquito populations.
- Consider installing bird boxes for Lewis's woodpecker on the golf course in appropriate sites.
- Consider introducing Painted Turtles into the pond on the golf course, if mortality on adjacent roads is found to be of minor concern and there are nearby nesting sites available.