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Horsefly River Riparian Conservation Area Management Plan

The Land Conservancy of BC
Northern Office

Draft Management Plan

February 2007

1. Foreword

1.1 The issue

Riparian areas are vital interfaces between terrestrial and aquatic ecosystems that have a wide range of ecological functions and associated social benefits. These areas exert strong influences on the character of stream environments, and are important habitats for a wide range of terrestrial and aquatic plant and animal species. Riparian habitat has been lost at an alarming rate throughout BC. Losses of habitat have occurred due to urbanization, channelization of natural river systems, the construction of dams, and draining and filling of wetlands. In addition, significant degradation of many riparian areas has occurred as a result of many factors including: recreational use, agriculture, forestry, and the introduction of non-native plant species. The purchase of a portion of the Black Creek Ranch by TLC and its partners was seen as a means by which to reverse this trend in the Horsefly River Valley.

1.2 Summary

This management plan provides an overview of the ecological significance of the Horsefly River in general, and the HRRCA in particular. It discusses the issues that may affect the species and habitats that are found in this area, discusses some of the initiatives that have addressed these issues, and establishes future activities that are required to address identified concerns. This plan was written in conjunction with a number of government and non-government organizations active in the region, and is intended to facilitate future work.

1.3 Availability of report:

This report is available in digital format from the TLC website at www.conservancy.bc.ca.

2. Executive Summary

The **purpose** of this conservation plan is to elucidate the wildlife values in the Horsefly River valley in general and the Horsefly River Riparian Conservation Area in particular. This plan highlights conservation achieved at the site in the past, and outlines priority endeavors for the short-, medium- and long-terms. NEEDS WORK

3. Acknowledgements

This management plan builds on the initial draft management plan for the Horsefly River Riparian Conservation Area that was been prepared by the Ministry of Environment, Lands and Parks, Fisheries Branch. It has been written in consultation and agreement with the Horsefly River Riparian Conservation Area Advisory Committee to establish long a term management plan for the property. This document reflects the interests and contributions of the members of the advisory group, which includes representatives of the Department of Fisheries and Oceans, Quesnel River Watershed Alliance, interested community members, and The Land Conservancy. It sets out goals, objectives and actions for fish and wildlife restoration activities, conservation, development, public use and interpretation. Each section of this plan provides a statement of direction and a brief summary of relevant background information.

4. Introduction

The value of riparian habitat to salmon, birds, bears and other species of wildlife and the significant historic loss of this habitat, and the future threats to remaining riparian habitat are well documented. TLC's purchase of 300 ha along the Horsefly River in 1999 (renamed the Horsefly River Riparian Conservation Area (HRRCA)) was inspired by the opportunity to protect and enhance a large portion of interior riparian habitat that also represents some of BC's best salmon spawning habitat. In fact, the Horsefly sockeye run is considered one of the most prolific sockeye salmon runs in the world and has surpassed the world famous Adams River run in escapement numbers on peak years. The Horsefly is also used for spawning and rearing by rainbow trout, Chinook and Coho salmon. In 1997 the Department of Fisheries and Oceans (DFO) figures show this fishery to be worth over $68 million to the BC economy and the sockeye run on the Horsefly to comprise over 50% of the Fraser River sockeye or 36% of the total salmon catch for provincial coastal water. On average it is estimated that all the fish stocks in the Horsefly combined, generate a more than $30 million a year for the regional and provincial economies (MWLAP 1993 as cited in HRSRMP 2003).

Because the HRRCA is exclusively low elevation riparian habitat, it represents extremely valuable habitat for a wide range of terrestrial species. This includes nesting habitat for a variety songbirds that frequent riparian areas, and breeding and migratory habitat for a diversity of other birds including sandhlill cranes, great blue herons, bald eagles, ospreys and waterfowl. It also represents prime moose winter habitat.

In an effort to reverse this trend approximately 320 ha of the flood plain property on the upper Horsefly River was purchased with funds from a variety of sources in 1999. These included the Provincial Habitat Conservation Trust Fund, the Department of Fisheries and Oceans, Mountain Equipment Coop, T. Buck Suzuki Environmental Foundation, the BC Conservation Foundation, the Sierra Legal Defence Fund, and Ducks Unlimited Canada. In 2004 and 2005 an additional 72 ha was purchased with funds from the Donner Canada Foundation, the Federal Habitat Stewardship fund, and the BC Ministry of Transportation Environmental Fund. In 2007 a further additional 9 ha was added with funds from the Ministry of Transportation. Since 1999 the HRRCA has grown to approximately 390 ha of floodplain habitat. This encompasses a total of 8 km river front habitat.

Under the original agreement, the provincial Ministry of the Environment managed the initial 320 ha purchase, which was named the Horsefly River Riparian Conservation Area (HRRCA) under a 99-year lease. While this lease is still in effect, the management of the entire HRRCA has fallen to TLC due to provincial government budget cutbacks. TLC has now assumed the responsibility to recover and protect riparian habitat critical for fish and wildlife within the area.

While it is acknowledged that the purchase and the subsequent restoration efforts within the HRRCA is in itself and important achievement, it is also further acknowledged that riparian management in general (either in terms of stewardship or acquisition as subsequent restoration) along the entire Horsefly River is imperative in order to sustain salmon habitat in this system.

This management plan is intended to provide a overview of the ecological significance of the HRRCA, an synopsis of the restoration that has taken place within the HRRCA since the initial purchase in 1999, an action plan for future restoration initiatives.

5. Location/Site information

The Horsefly River Riparian Conservation Area is located approximately 30 km. from the community of Horsefly B.C., on the banks of the Horsefly River in the Central Interior Region of British Columbia (Figure 1). The Horsefly River, part of the Fraser River drainage basin, originates in the Cariboo Mountains in proximity to Watchman Mountain, Eureka Peak and Mount

Perseus. The Horsefly River watershed is 276,600 hectares in size. Within the watershed there are a multitude of small and large streams and lakes that make up the Horsefly River Watershed, many of which provide critical fish habitat (Figure 2). The Horsefly River itself flows for approximately 103 km in a generally westerly direction from its headwaters in the Cariboo Mountains to its terminus at Quesnel Lake. The river flows through a wide variety of riverine habitats of variable gradient and complexity. There are four naturally occurring waterfalls on the Horsefly River that act as barriers to fish movement. These are located at km 57, 96, 118 and 121 kms from the mouth of the Horsefly River. Anadramous fish are confined to the lower 57 km by

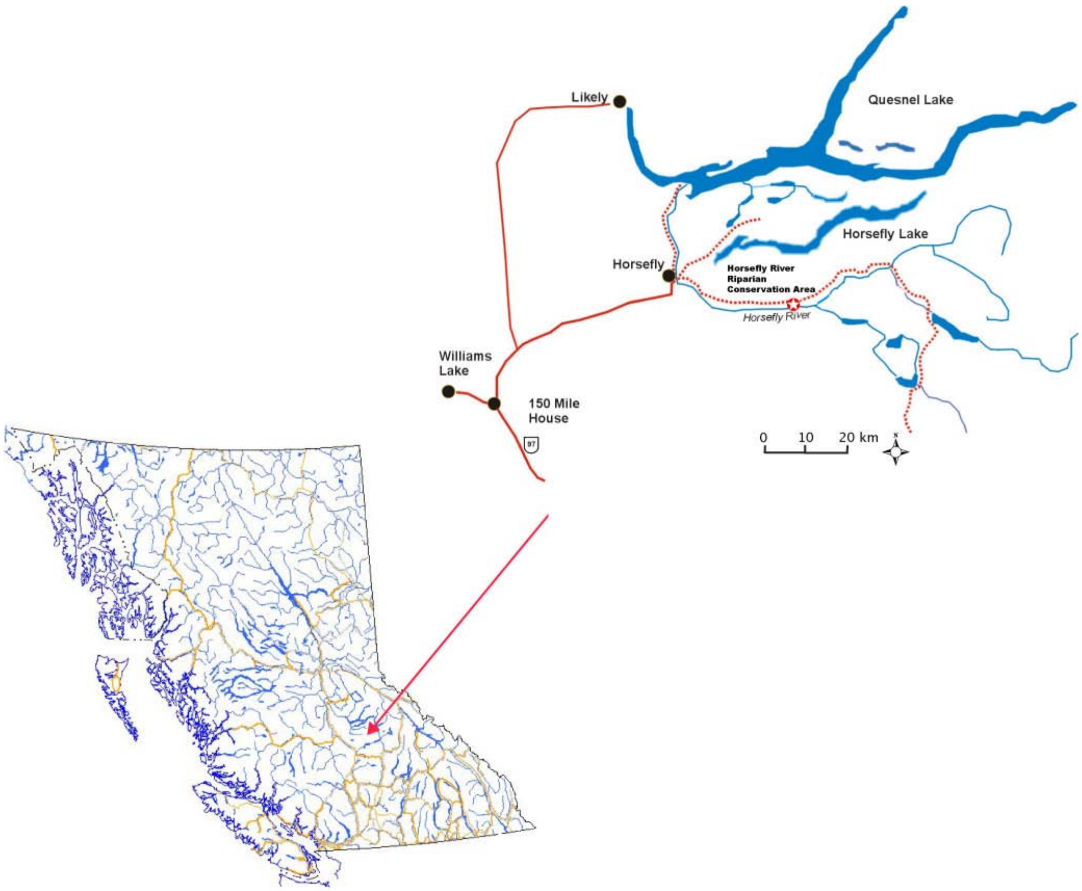

Figure 1. Location of Horsefly River Riparian Conservation Area

the 10 m falls that occur upstream of McKinley Creek. Rainbow trout have found between the first and third falls, while no fish have been found above the third or fourth sets of falls (Lawrence 2002).

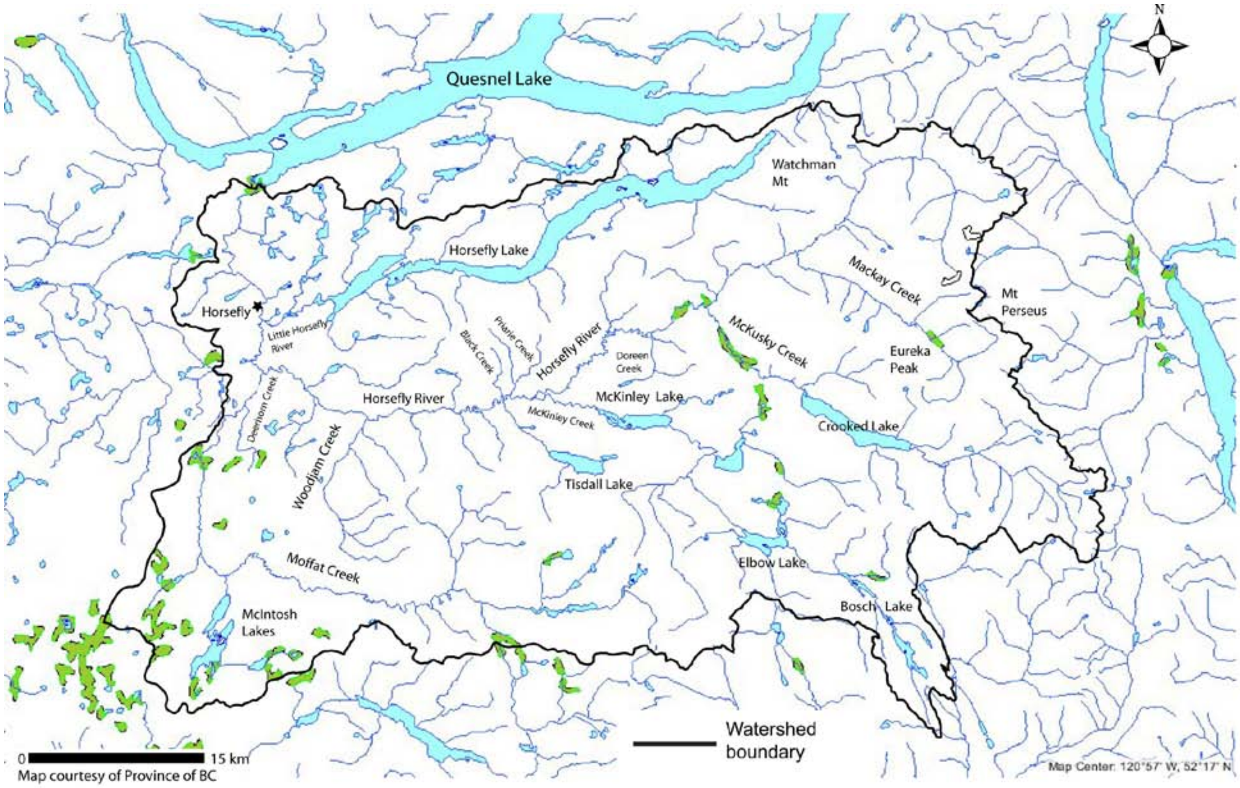

Figure 2. Horsefly River Watershed Boundary

The Horsefly River is well known as a high profile fish-bearing river. The river is inhabited or utilised for spawning and rearing by six species of fish of recreational and commercial value including rainbow trout, sockeye salmon, chinook salmon, Coho salmon, steelhead and mountain whitefish. Major tributaries, also important as fish habitat of the Horsefly system include Moffat and McKinley Creeks, as well as the McKay, McKusky and Little Horsefly Rivers. In accordance with the recognition of the importance of the fishery along the Horsefly River, the Horsefly Sustainable Resource Management Plan (HSMP 2004) has classified much of the Horsefly River and it's tributaries as critical fish habitat (Figure 2). The Horsefly also provides an important habitat corridor to Quesnel Lake; an area designated a special management zone by the Cariboo LRMP.

Present economic activity in the Horsefly River drainage area includes logging, mining, ranching, trapping and tourism. Harvesting activity has dramatically increased in the Horsefly Valley as a result of the response to the Mountain Pine Beetle outbreak. The majority of recreational activity is associated with fishing, hunting, and various water sports. The town of Horsefly provides general supplies to the area and is located on the Horsefly River, 20 km upstream of Quesnel Lake. Williams Lake is the main service centre for the Horsefly region and is accessible by paved highway, 65 km to the southwest.

6. General Description of the Horsefly River Riparian Conservation Area

The HRRCA encompasses Cariboo District Lots. 9176, 2567, 9828, 9678, 2566, 9178 and Lot 1 Block B of DL 8979 (Figure 3). The elevation of the property ranges between 824 meters to 829 m. Annual precipitation as recorded by the BC Forest Service in Horsefly, is 564 mms (Case 1999). Natural flood plain vegetation for this area is characteristic of site series 6-9 of the SBSdw1 (Steen and Coupe 1977 as cited in Case 1999).

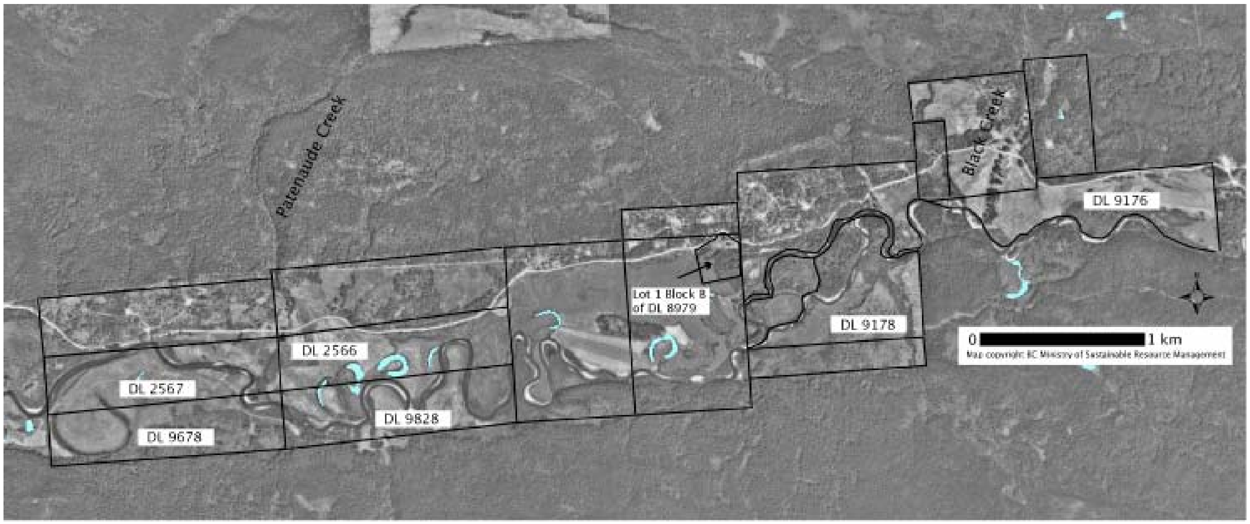

Figure 3. The District Lots that make up the Horsefly River Riparian Conservation Area

The Horsefly River, below or downstream of Black Creek, floods on an annual basis, due to spring snow melt. This seasonal flooding affects the lower properties of the HRRCA (DLs 2567, 9828, 9678, 2566) and can last for several weeks in May and June (Case 1999). Daily discharge ranges from a low of approximately 3.8 m^3/s in February to a high of approximately 75 m^3/s in June (Figure 4). The width of flood plain of the Horsefly ranges between 300 and 800 m. Consequently during high water much of the HRRCA resembles a large lake. The wetted width at low flows ranging from 19-38 meters making it a 6^{th} order stream (Case 1999, BC habitat wizard- http://www.env.gov.bc.ca/habwiz/)

7. Ecological setting: the Horsefly River Riparian Conservation Area

Case (1999) identified two ecologically distinct regions within the HRRCA that are formed, or based on, the flood plain topography, soils and flooding regime of the area (Figure 5). The border of these two ecological areas is formed in part by a change in overall stream gradient and by the presence of five tributaries of the Horsefly and their associated alluvial fans in and around Black Creek. It is at this point that the nature of the Horsefly River changes from a relatively fast moving river constrained by a steep walled valley to a slower moving, meandering river that flows through a wide, flat valley. In addition, the topography of the valley bottom is irregular due to the presence of these alluvial fans and the extensive deposition of coarse gravels by at these locations. Consequently, the flood plain in this area is relatively narrow. As a result, flooding is rare in this section of the river.

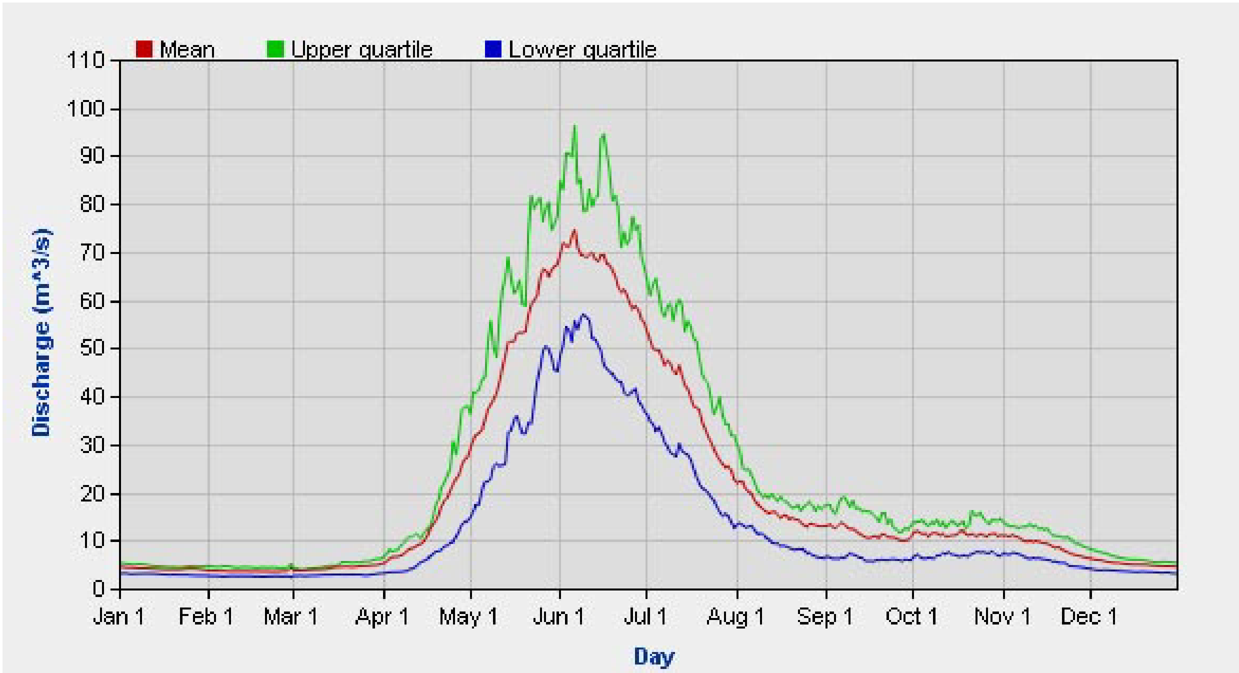

Figure 4. Daily discharge for Horsefly River above McKinley Creek 08KH010 Statistics presented here range from 1955-2003.

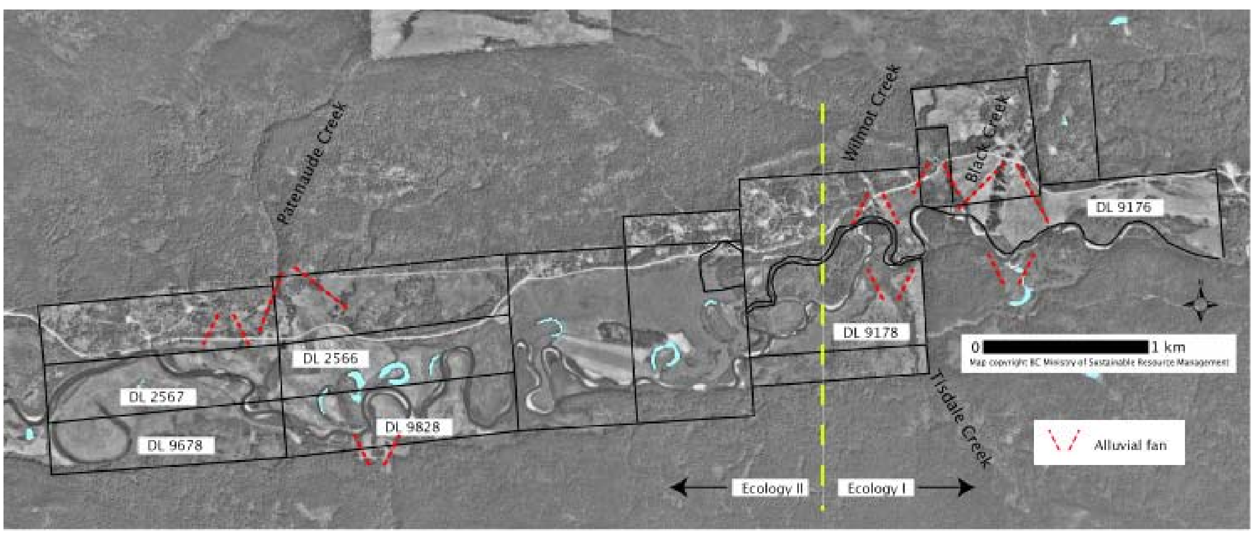

Figure 5. The two distinct ecologies of the HRRCA as determined by Case 1999.

The higher, more well drained soils (soils deposited by these alluvial fans) in this area support open and mixed conifer/hardwood forests (Case 1999). Sorted gravels and cobbles that are deposited down stream of these tributaries represent some of the best spawning sites for salmon in the entire Horsefly drainage.

Downstream of this area finer sediments transported by the Horsefly and these five tributaries settle out creating a broad, low gradient, fine textured floodplain. In this section of the drainage, the Horsefly River winds across the river valley creating a series of torturous meanders that can cut back on themselves resulting in side channel loops and in some instances, oxbow lakes (Case 1999). It is in this area where flooding is common and soils can experience extended periods of saturation. Consequently a dramatically different habitat can be found in this section of the river. Only those plants that can endure extended periods of flooding can survive in this section of the HRRCA. This section of the river is dominated by extensive areas of flood ecosystems (Mackenzie and Moran 2004). As a result, these areas are comprised mostly of shrub (e.g., willow and alder) and sedge communities which can tolerate mechanical disturbance that is common as a result of flooding was well as the anaerobic conditions that occur in seasonally inundated areas.

8. Ecological significance - species information

8.1 Fish

The Horsefly River supports one of the most important sockeye salmon runs in the world, and is home to unique runs of chinook salmon, coho salmon, and rainbow trout. In accordance with the recognition of the importance of the fishery along the Horsefly River, the HSMP has classified much of the Horsefly River and McKinley and McKusky Creeks critical fish habitat *(*Figure 2; Table 1*).* The Horsefly River system also supports a variety of other commercial and non-commercial species (Table 2).

Table 1. Salmonids that occur and or spawn in the Horsefly River system.

Creek/River name	Chinook		Coho		Kokanee		Rainbow Trout		Sockeye		Steelhead	
Black Creek[1]	-	-	-	-	-	-	-	p	-	-	-	-
Deerhorn Creek	-	-	-	-	-	-	-	p	-	-	-	-
Doreen Creek	-	-	-	-	-	-	-	p	-	-	-	-
Horsefly River	p	s	p		-	p		p	s	p	p	-
Little Horsefly River	-	-	-	-	-	p	s	p	s	-	-	-
MacKay River	-	-	-	-	-	-	-	p	-	-	-	-
McKinley Creek[2]	p	s	p	s	-	p	s	p	s	p	p	-
McKusky Creek	-	-	-	-	-	-	-	p	-	-	-	-
Prairie Creek[3]	-	-	-	-	-	-	-	p	-	-	-	-
Moffat Creek	p	-	p	-	-	-	s	p	-	p	-	-
Tisdall Creek[4]	-	-	-	-	-	-	-	p	-	-	-	-
Woodjam Creek	p	-	p	-	-	-	-	p	-	-	-	-

Data on presence / absence and spawning (p, -, s respectively) are from FISS.
[1] The lower 800 m of Black Creek before it enters the Horsefly River is used extensively

by rainbow trout and other salmonids for spawning and rearing (R. Dolighan, personal communication, July, 2002).

[2] Spawning on the McKinley occurs between McKinley Lake and the Horsefly River (Lawrence 2002)

[3] The Presence of rainbow are assumed, however no inventory has been done on this creek (FISS)

[4] The confluence of Tisdall Creek and the Horsefly River is one important spawning areas for sockeye, chinook, coho salmon, and rainbow trout in the Horsefly system (Lawrence 2002)

Table 2. Non-salmonid fish that occur in the Horsefly River system.

Species	Horsefly River	Little Horsefly River	McKinley Creek	Moffat Creek	Woodjam Creek
Brassy Minnow	x	-	-	-	-
Burbot	x	-	x	-	-
Dace (General)	-	-	-	-	x
Dolly Varden	x	-		-	-
Lake Trout	-	x	x	-	-
Largescale Sucker	-	-	x	-	-
Leopard Dace	x	-	-	x	-
Longnose Dace	x	-	x	x	-
Longnose Sucker	-	x	x	x	-
Mountain Whitefish	x	x	x	x	-
Northern Pikeminnow	x	x	x	x	-
Peamouth Chub	-	-	x	-	-
Redside Shiner	x	-	x	x	-

Data on presence / absence are from FISS

8.1.1 SOCKEYE

The Horsefly is recognized as a river that has one of the highest returns of sockeye salmon in the province (HRSMP 2004). In 1993, the sockeye run in the Horsefly River comprised over 50 per cent of the Fraser River sockeye production and 36 per cent of the total salmon catch for the provincial coastal waters, yielding a catch worth approximately $68 million (DFO 1993, as cited in HRSRMP 2003). On peak years sockeye escapement has reached over 2 million fish (Lawrence 2002). Sockeye spawning occurs along the Horsefly from Quesnel Lake to aapproximately 15 km upstream of the confluence with McKinley Creek where a 10-meter high waterfall obstructs further upstream movement for migrating fish. Sockeye also spawn along McKinley and Moffat Creeks as well as the Little Horsefly River (Lawrence 2002). The spawning reaches from McKinley Creek to Black Creek (within the HRRCA) supported approximately 270,000 spawners in 1997 (BCMOE 1999).

8.1.2 COHO SALMON

The Coho that inhabit the Horsefly River are considered part of the federally endangered Interior Fraser Coho (COSEWIC 2002). Little is known about Coho in the Horsefly system; however, it is believed that McKinley Creek has the largest resident population in the Horsefly watershed. It is also believed that coho use the Little Horsefly River, Lower Moffat Creek, Lower Woodjam Creek, Lower Black Creek and Tisdall Creek for spawning and/or rearing (Lawrence 2002). Few data for coho escapement exist. However, recent estimates indicate that escapement on the main stem of the Horsefly range from less that 100 fish to a high of over 600, while escapement on McKinley Creek ranged from low of 200 to a high of 2000 fish (Lawrence 2002).

8.1.3 CHINOOK SALMON

Chinook are the least common of all the salmon that occur within the Horsefly River system. Escapement estimates for Horsefly River Chinook are typically less that 500 fish. In only two instances did escapement exceed this (1000 in 1991 and 4000 in 1995; Lawrence 2002).

8.1.4 RAINBOW TROUT

Rainbow trout occur throughout the Horsefly system. The productivity of the habitat and the genetic makeup of the rainbow trout allow them to grow to a trophy size that is the second largest in the world. The Horsefly River itself produces an estimated 75 per cent of the total rainbow trout in Quesnel Lake, which has the second largest sport fishery in the Cariboo region (MWLAP 1990, as cited in HRSRMP 2003). The Horsefly River is a classified river under the regulations in recognition of its world-class trophy fishery. Rainbow trout primarily spawn in the Horsefly and Mitchell Rivers. McKinley Creek is also used, but to a lesser extent (Sebastian et al., 2003, p.48 and 49, as cited in Lawrence 2002).

8.2 Wildlife

The Horsefly River Corridor supports a wide range of wildlife species. Although no detailed inventories have been undertaken, wildlife species found immediately adjacent to and within the boundaries of the HRRCA likely include several species of big game, numerous furbearers, upland game birds, raptors, waterfowl and a large diversity of non-game wildlife. Unfortunately, no estimates of the amount of use the area receives or local abundance estimates of most species are available at this time.

Anecdotal information suggests that mule deer and moose are common to the area year round. Additionally, the Horsefly River valley is known to be home to large carnivores such as grizzly bear (blue-listed), black bear, cougar and the grey wolf. Furbearer species known to occur within the watershed include red squirrel, beaver, muskrat, coyote, red fox, marten, fisher (blue-listed), long-tailed weasel, mink, and lynx. Frequent sightings of river otters indicate a relatively high population in this area relative to the rest of the Cariboo. Although their presence has not been documented, habitat within the area is suitable for the red-listed Northern Long-eared Myotis.

8.3 Birds

Migratory and breeding bird surveys were conducted on the HRRCA during the spring and early summer of 2000. The surveys were designed to document the diversity and richness of the bird community in the HRRCA and to monitor changes to the bird community over time that result from the riparian restoration activities carried out on the HRRCA.

One hundred species of birds have been detected in the HRRCA (Mackenzie 2000, 2001, Appendix 1). Several of the priority species in the Canadian Intermountain Joint Venture are known to either breed or occur within the HRRCA (Table 3).

Table 3. Priority birds in the CIJV that have been detected in the HRRCA[1] (CIJV 2003)

Species	***Status***	***Species***	***Status***
Willow Flycatcher	B[2]	**Gadwall**	P
Dusky Flycatcher	B	Mallard	P
Olive-sided Flycatcher	B	Cinnamon teal	M
Western wood peewee	B	**Ring-necked duck**	P
Warbling Vireo	B	**Lesser Scaup**	P
Vaux's Swift[4]	P	**Bufflehead**	P
Northern Rough-winged Swallow	P	**Barrow's goldeneye**	P
Red-breasted nuthatch	B	**Hooded merganser**	B
Veery	B	**Wood duck**[3]	P
Yellow Warbler	B	Wilson's phalarope	M
Townsend's Warbler	B	Belted Kingfisher	B
McGillivray's Warbler	B	Sandhill crane[4,5]	B
Wilson's Warbler	B	Rufous Hummingbird	B
Chipping sparrow	B	American Dipper	W
Red-naped Sapsucker	P		

[1] focal species within the CIJV in bold
[2] **B** Breeds in study area, **P** Occurs in area, survey technique did not allow for determination of breeding activity, **W** Winter resident, **M** Uses area for migration
[3] anecdotal report from local resident
[4] observation from B. Booth, TLC Northern Regional Manager
[5] Provincial blue-listed species

From these surveys it has been shown that

1. Residual riparian habitat within the study area supported significantly more species and more individuals than areas where restoration has occurred
2. Several species of passerines were detected only in these residual patches of riparian habitat.
3. Of the 100 species detected in the area, many were restricted to large patches of mature forests outside of the study area (valley bottoms).

These results illustrate that the bird community within the HRRCA have been severely impacted by past land uses, restoration efforts have had a demonstrable affect at providing habitat for species impacted by this land use, and that further restoration efforts are and concomitant monitoring are required.

9. Conservation concerns: human impacts

9.1 Habitat alteration and fish and wildlife habitat.

Fish and wildlife diversity and abundance is strongly influenced by the availability of suitable habitat. Fish distribution and abundance is closely linked with river channel structure as channel structure dictates the abundance and diversity of habitats that are utilized by different species of fish or different life stages of fish (Schlosser 1987 as cited in Rosenfeld et al. 1999). General land clearing and forest harvesting can have significant impacts on fish habitat because removal of overstory vegetation can either directly or indirectly effect channel structure (Rosenfeld et al 1999). Clearing in and around riparian areas can lead to impacts such as increased sedimentation, decreased bank stability, alteration of the input of large woody debris. These impacts directly effect fish by reducing critical habitat or indirectly by leading to increases in water temperature due to the remove of overstory vegetation cover. Fluctuations in water temperature have significant impacts on fish populations as temperature plays a central role in a wide variety of biological processes including metabolic rates, growth, behaviour and survival of fish populations (Shrimpton et al. 1999). This is of paramount importance for salmonids as this group of fish thrives in a narrow range of temperatures (Shrimpton et al. 1999). In addition, associated activities such as road construction, log storage and herbicide spraying can also lead to further fish habitat degradation. Poorly planned logging road construction has, in specific instances, resulted in severe sedimentation of salmon spawning and rearing habitat (Slaney et al. 1977). In addition, poorly constructed road crossings have dramatically affected the movement of fish throughout BC and within in a specific locations within the HRRCA.

It is also widely acknowledged that the diversity of terrestrial vertebrate and invertebrate species is closely linked with habitat structure and complexity (MacArthur and MacArthur 1961, Anderson and Shugart 1974, Balda 1975, Maurer et al. 1981, Morgan et al. 1989 Downes et al. 1998, Tews et al. 2004). Alterations in habitat structure that leads to increases in habitat complexity usually result in increases in species diversity (MacArthur and MacArthur 1961, Karr 1961, Meslow 1978, Morrison and Meslow 1983). Conversely, changes that lead to the elimination or reduction of specific habitat components, such as shrubs or standing dead trees, can lead to the reduction in abundance and potential extirpation of some species (Pryah and Jorgensen 1974, and Alleye-Chan 1984, Raphael and White 1984, Petit et al. 1985, Tews et al. 2004).

9.2 Impacts in the Horsefly River Valley

9.2.1 LAND CLEARING FOR AGRICULTURE

Over several decades various agricultural activities have caused extensive damage to the floodplain of the Horsefly. Mixed wood riparian forests, as well as shrub meadows and native grass communities were converted to hay fields. Consequently, native riparian areas have been greatly reduced and simplified. Furthermore, connectivity between upland and riparian habitat has been severed throughout the HRRCA.

Land clearing, while impacting the quantity and quality of riparian habitat, can also lead to increase incidence of stream bank erosion. It has been clearly demonstrated that intact, native riparian vegetation (trees and shrubs) are far more effective at controlling shoreline erosion than non-native grasses or cultivated annuals (Fitch and Adams 1998). The deep roots of trees and shrubs are more able to bind the fine sediments common in riparian areas than annual grasses and perennial herbs. Erosion as a result of the removal of native riparian vegetation is evident throughout the Horsefly River system: in many locations the slumping of large portions of the shoreline has been an ongoing event.

9.2.2 ALTERATION OF RIVER PATHWAYS

The construction of dykes along the Horsefly has resulted in an indirect impact of fish species. These containment dykes have been built in places along the Horsefly in hopes of moderating springtime flooding. During high water resident fish have access to a larger areas of flood plain habitat. However, when floodwaters recede fish can become stranded as dykes can prevent movement from flood plain areas to the main stem of the Horsefly. This stranding has resulted in significant fish die-offs (Hillaby, DFO restoration biologist, pers. comm.). In addition, oxbows have been cut off from the river channel and high water sinuous side channel developments have been blocked by revetments or in-filled. The building of dykes and the filling in of oxbows for cultivation, as is sometimes the case in riparian areas, while reducing the overall amount of riparian habitat also effectively straightens rivers. This straightening causes an increase of velocity and volume of flow that can result in increased downstream erosion and higher downstream water levels, both of which can negatively impact downstream landowners and wildlife habitat. This pattern of agricultural activity is evident along much of the entire Horsefly River corridor.

9.2.3 INTRODUCTION OF NON-NATIVE SPECIES

Almost all of the native riparian vegetation on the HRRCA has been replaced by reed canary grass (*Phalaris arundinacea*). This species of grass is well suited for cultivation in wet areas. While providing a good forage crop, it has become a major nuisance species on the HRRCA, and throughout the wetland and riparian areas of North America as it can supplant native species. Once established, it is very difficult to remove (Reinhardt and Galatowitsch 2004).

9.2.4 UPLAND FOREST MANAGEMENT

Forest harvesting has been ongoing in the Horsefly River watershed for the last 50 years. Much of the past forest harvesting has been concentrated in valley bottoms. There are few riparian areas within the Horsefly Watershed that have been untouched by forest harvesting. The increased harvesting seen throughout BC as a result of Mountain Pine bark beetle is now becoming apparent in the Horsefly River system. Large scale plans to increase the cut within the upper Horsefly, especially in the McKinley River drainage, is occurring while this report is being written. This is of significant concern as the McKinley River is recognized as one of the most valuable Coho salmon spawning rivers in BC.

9.2.5 MINING

There are 3 inactive mines in the Horsefly drainage that may be having impacts on water quality. Two inactive gold mines, one on Black Creek and the second on MacKay River have been identified as potential causal factors in increasing sediments in adjacent streams (Chapman and Dobson, 1997, p.93 as cited in Lawrence 2002). The Boss Mountain Mine is molybdenum mine owned by Noranda Mine is situated in the headwaters of Molybdenite Creek. This mine has also been identified as a mine that may require rehabilitation in order to control drainage and erosion problems (Beaudry, 2002, McKinley section, p.3, as cited in Lawrence 2002).

9.3 Habitat impacts: summary

Overall, land management activities in the area have resulted in a cumulative reduction in habitat quality throughout much of the Horsefly River corridor and most of the HRRCA. Intact riparian areas are restricted to thin patches along the main stem of the Horsefly, or to narrow leave strips along tributaries. This is of concern because riparian areas are one of the most diverse ecosystems in BC: a wide variety of wildlife use riparian areas for one or more of their life stages and some are wholly dependent upon intact riparian ecosystems. This reduction of riparian habitat has raised significant concerns for the long-term ability of this section of the river to support the current population of spawning sockeye salmon. It is also likely that the reduction of riparian habitat has significantly reduced the abundance and diversity songbirds as well as numerous other wildlife species.

10. Conservation objectives

10.1 Conservation goal: mission statement

The initial HRRCA management committee established the following vision statement for the HRRCA.

"To restore and protect fish and wildlife riparian and aquatic habitat along the Horsefly River property held by The Land Conservancy through planned rehabilitation and cooperative arrangements with local landowners and local governments with provisions for public access, and recreational and educational use where feasible and appropriate. To ensure that the resources on the property are available for the use and enjoyment of future generations and to ensure that the public is informed about the corridor and engaged in its protection and enhancement".

This management plan, and all following plans will follow the sprit and intent of the initial mission statement.

10.2 Scale of conservation initiatives: within vs. outside the HRRCA

The initial management plan written for the HRRCA focused exclusively on the properties that were a part of the initial purchase. To more adequately manage the values for which this property was initially acquired, it is necessary to expand the focus of management objectives to include areas outside of the HRRCA. However, at this point, management outside of the HRRCA, while extremely important is beyond the scope of TLC's mandate with the exception of TLC's participation in any ongoing community-based planning at the watershed level.

10.3 Conservation in HRRCA: guiding principals

The ultimate goal of any management activities within or outside of the HRRCA will be guided by the goals as set out by the initial management plan.

These being:

- Re-establish streamside vegetation in order to maintain a healthy and functional riparian zone within the HRRCA.
- Restore and protect eroded stream banks where necessary.
- Re-establish off-channel, mainstream and tributary juvenile salmonid rearing habitat

- Re-iintroduction of large woody debris (LWD) and other in-stream rearing components
- Manage existing indigenous frontages to retain a diverse, weed free vegetation community that will regenerate and expand throughout nearby disturbed sites
- Use wildlife friendly fencing to exclude all livestock from the property and protect both intact indigenous vegetation and managed sites

11. Conservation achieved on the Horsefly River system

11.1 The Horsefly Spawning Channel

DFO built a 1700 m long and 9 m wide artificial spawning channel in 1988 near the town of Horsefly. The channel, with a designed capacity of 23,300 sockeye spawners, was built in order to increase the sockeye runs sub-dominant and low cycle years (Lawrence 2002). This site also provides educational opportunities for the public as a trail system lines much of the spawning channel.

11.2 The McKinley Siphon

In an attempt to mitigate increases in water temperature that had caused pre-spawn mortality of Horsefly River sockeye in the 1960s, a siphon was installed in McKinley Lake in 1966. This device was designed to draw cool water from below the thermocline of the lake and discharge it into McKinley Creek and subsequently in to the Horsefly River (Lawrence 2002).

11.3 Riparian restoration on tributaries

11.3.1 KROENER RANCH

DFO has engaged in a series of restoration efforts on the Kroener Ranch, downstream of the HRRCA. These have included: the replacement of two culverts with small cattle guard bridges, to ensure fish passage up two small creeks, the removal of an old dam to also remove a fish barrier, the use conventional and brush fencing on a number of small tributaries to exclude cattle and improve in-stream habitat and ecology, the planting of willow and poplar whips, as well as a variety of potted plants in various locations, and the construction of dugouts for cattle watering to provide cattle with an alternative source of water.

11.3.2 WOODJAM RANCH

On the Woodjam ranch, also downstream of the HRRCA, DFO established a variety of bank revetments up and down a small Coho creek to control erosion. Bank revetment was also combined with planting of a variety of riparian plants. In addition, large stock was planted on gravel bars in order to restore vegetation on degraded gravel bars. Recent visits indicate that fences protecting these sites have failed and that cattle are have had a negative impact on some of these sites (Booth, pers. obs 2005).

12. Conservation achieved on the HRRCA

12.1 Changes to land management and restoration efforts

12.1.1 REMOVAL OF LIVE STOCK AND AGRICUTURAL ACTIVITIES IN THE RIRARIAN AREAS

The purchase of the properties that now make up the HRRCA has allowed for the removal of livestock grazing from the areas immediately adjacent to riparian areas with the use of fencing. Likewise, cultivation up to the river’s edge has been curtailed. The area does, however, continue to be a working agricultural area as the areas immediately outside the riparian areas have been leased back to local ranchers for spring calving, horse grazing, and hay production.

There have, on occasion, been incursions by livestock in restored areas. Three separate circumstances have allowed livestock access to restricted areas: 1) fence gates have been opened, 2) fences have been allowed to fall into disrepair, and 3) cattle have crossed the Horsefly River during low water. In each instance, livestock have inflicted significant damage to restored areas.

12.2 Restoration efforts: synopsis of restoration efforts

There have been considerable efforts to re-establish native vegetation in order to improve both fish and wildlife habitat. Restoration has been planned and implemented according to a riparian assessment (Case 1999) to restore a variety of different habitats that were thought to occur prior to the establishment of agriculture in the valley. Case (1999) prepared a detailed evaluation of the restoration needs for the HRRCA. With this evaluation, Case divided the entire HRRCA into 21 habitat polygons and eight riparian vegetation types (RVTs) based upon natural communities derived from forest cover maps, topographic maps and low elevation air photos. From this analysis Case determined cost-effective restoration prescriptions for each of the 21 polygons along with a schedule for restoration activities that included a priority setting exercise. Restoration efforts have more or less followed prescriptions established by Case (1999), however, documentation of restoration efforts (stocking type, planting dates, exact locations of planting) have been less than rigorous making assessment problematic.

In general terms the restoration activities have included the following:

1. bank stabilization and associated re-vegetation using machinery on over 1 km of river front
2. construction of a 555 m side channel near Patenaude Creek designed to provide late fall and winter rearing habitat for rainbow trout and coho salmon juveniles
3. planting of native riparian plants by hand and with the use of machinery over a significant portion of the area
4. construction of over 500 m of fencing
5. "planting" of large woody debris to function as wildlife trees, and the erection of artificial nesting platforms
6. reconnection of large section of floodplain to the Horsefly River by breaching containment dykes
7. Placement of logs in the main stem of the Horsefly to function as debris catching devices

12.2.1 SUMMARY OF RESTORATION EFFORTS

In an examination of the restoration efforts on the HRRCA between 1999 and 2002 by Hemphill et al. (2003) further divided Case's original 21 polygons into 39 polygons. Of the 39 polygons identified, a total of 9 were identified as controls or templates, 2 represent hay leases, and 28 were identified treatment areas. An additional 2 polygons were added in 2004 as a result of the acquisition of DL 9178. These two polygons will not be included in the discussion of restoration efforts and evaluation.

Treatments were applied to 26 of the 28 treatment polygons. These treatments encompass 3 coarse treatment types: plantings, site preparation, and other habitat manipulations (Table 4). Within each treatment type there were a variety of specific treatments applied. For example, plantings included the use of cuttings and plugs of a variety of species, site preparation involved scarification by three different means, and three types of habitat modification. The use of wildlife fencing as a treatment is not included in this discussion because where fencing is used; it effectively affects all polygons over a wide geographic area.

Most of Case's original prescriptions were met. However, plowing was absent from 11 of the 25 polygons where this treatment was recommended, planting was missed in 2 of 28 polygons, and coarse woody debris was not distributed in any of 7 polygons where this treatment was recommended. Whether the stocking densities and distributions recommended by Case (1999) were met is difficult to ascertain.

Table 4. Summary of treatment types by polygon

Treatment type	Specific treatment	Number of polygons
Plantings	Cuttings of willow and Cottonwood	24
	Conifer plugs	21
	Deciduous plugs	3
	Plugs of mixed species of shrubs	21
	Grass seeding	2
	Transplantation of willow clumps	1
Site preparation	Plowing of trenches	13
	Scarification with discs	2
	Scarification by other means	2
	Machine pullback of stream bank	3
	Bioengineering	3
Other habitat manipulations	Placement of wildlife trees	5
	Placement of deflector logs	2
	Dyke breach	1

In addition to the wide range of treatments used from 1999-2002, numerous polygons were subject to multiple treatments. In some instances specific polygons were subject to as many as 7 different treatments.

Table 5. Summary of the number of treatments that occurred in individual polygons

Number of treatments/polygon	Number of polygons receiving treatments
1	3

2	1
3	6
4	6
5	5
6	4
7	1

12.2.2 EVALUATION OF RESTORATION EFFORTS

The wide range of treatments applied over the 5 years in question, and the lack of documentation of restoration efforts (stocking type, planting dates, exact locations of planting) has made the assessment of these efforts problematic. The overall numbers of the number of cuttings and plugs planted within the HRRCA is not known, however, there have been in excess of 74,000 cuttings of willow and cottonwood and 8800 plugs of mixed species of trees and shrubs planted between 1999 and 2003. Hemphill et al. 2003 was able to conduct assessments of 20 of the 28 polygons that received treatment. A total of 14 polygons still require assessment, 5 of which have been deemed as controls by Case (1999).

Restoration success as measured by survival of planted stock varied widely. Cuttings of willow and cottonwood had a survival rate of 52% +/- 32% (n=16) while survival of plugs averaged 88 % +/- 6% (n=12). This result includes the plantings of poor stock in the bioengineering work that occurred in 1999. When this stock is removed from this summary, survival of cuttings increases to 58% +/- 32% (n=13).

This success was been governed by a wide range of factors. These include planting with poor stock, desiccation, grazing by livestock subsequent to restoration, and competition by reed canary grass. In some specific instances Hemphill et al. (2003) found that grazing has resulted in the removal of up to 75% of the plantings. Furthermore, Hemphill et al. (2003) found that many of the areas that were planted, either with cuttings or plugs were severely impacted by competition with reed canary grass. This grass species grows such that by mid summer willow cuttings are unable to leaf out due to shading. In addition, dead grasses from the previous season had collapsed over cuttings because of snow press, thereby further inhibiting growth of cuttings.

12.2.3 RECOMMENDATIONS FOR FUTURE RESTORATION EFFORTS

Despite high survival of plantings, Hemphill et al. (2003) has recommended either additional treatments or repeats (e.g., replanting) of previous treatments in each of the 20 polygons that were assessed (Table 6). This indicates that while survival of planted stock has been reasonably high, significant areas of the HRRCA still require additional planting in order if restoration of these sites is a priority in the short- to long-term.

Table 6. Summary of additional treatments recommended by Hemphill et al. 2003 for the 20 polygons that were assessed.

Treatment	Number of polygons requiring treatment
Construction of a new fence to control livestock	2
Re-plant with willow or cottonwood cuttings	13
Re-plant willow but as thick posts	1

Re-plant with conifers	13
Re-plant with deciduous trees	9
Re-plant with shrubs	16
Transplant willow clumps	8
Distribute coarse woody debris on site	3
Plant cottonwood palisades	1
Plowing	1
Control of reed canary grass	13

Hemphill et al. (2003) also made recommendations for the 14 polygons that they did not assess. These recommendations are based on anecdotal observations and the lack execution of original prescriptions made by Case (1999) (Table X). Detailed summaries of treatments for all polygons are presented in Appendix 1 Section 14.2.1

Table 7. Summary of additional treatments recommended by Hemphill et al. 2003 for the 14 polygons that were not assessed.

Treatment	Number of polygons requiring treatment
Re-plant with willow or cottonwood cuttings	5
Re-plant willow but as thick posts	3
Re-plant with deciduous trees	1
Re-plant with shrubs	5
Transplant willow clumps	4
Distribute coarse woody debris on site	3
Plowing	3
Control of reed canary grass	1

13. Future conservation actions

Future restoration efforts need to be guided by the initial work done between 1999 and 2002, the assessments conducted in 2003 and by a more stringent protocol that will help focus and evaluate restoration efforts. A commitment needs to be made to adequately address the inadequacies of past restoration efforts. Prior to any future restoration efforts, two main items should be addressed. This includes the development of a working GIS database and mapping system and a monitoring program.

13.1 Conservation at a fine and coarse scale: a working digital data base

The establishment of a working, coarse and fine scale, digital database is required. A coarse-scale database would indicate, at the minimum, the riparian areas along the Horsefly River corridor where restoration work is required. This database would include cadastral data (land ownership) that will help elucidate restoration and enhancement needs along the main stem of the Horsefly and associated major tributaries. Further data to be incorporated into this database would be fish distribution, the location of spawning habitat and specific wildlife habitat features. These data would then be use to help shape future acquisition and stewardship initiatives.

A fine scale, digital database would be used to monitor and update restoration efforts within the HRRCA and to delineate and prioritize conservation needs. The polygons delineated by Case (1999) should be digitized, and refined, if required. Layers should include riparian vegetation type, prescription, treatment, and status of restoration. This database should be flexible enough to incorporate wildlife sightings, research results, etc.

13.2 Establishment of conservation goals and measures to meet them.

Since the purchase of this property in 1999 restoration efforts have been inadequately documented and monitored. There is currently a poor record of previous restoration efforts in terms of what was done and where, by whom and with what kind of stock. In addition, there has been a lack of monitoring of restoration efforts. Consequently, it is difficult to determine what specific treatments have been effective in the HRRCA.

Future treatments need to be documented as to where planting occurred (which polygon(s)) what kind of stock was used, who did the planting, what the conditions were, an assessment of the quality of stock and quality of planting. Treatments need to be geo-referenced preferably on GIS mapping file on air photos at a minimum. Treatments must be revisited and sampled on a consistent schedule (e.g., 1,2 5, 10, 15 years after treatment). Data need to be collected in order to ascertain change over time. Sampling protocol and habitat variables need consistent.

Efficacy of treatment should also be monitored from a target species perspective. For example, fish rearing channel that was constructed in 2000 should be examined from a fisheries perspective.

Major restoration interventions need to be revisited. The debris catchers installed in 1999 have undergone significant degradation since they were installed (Booth, pers. obs. 2005) and they need to be examined by professionals to determine if they are functioning as initially intended or if they are contributing to any further stream bank erosion.

13.3 Restoration needs

Hemphill et al. (2003) have provided information pertinent to future restoration efforts in the HRRCA on a polygon-by-polygon basis. Instead of following this protocol, it is recommended that a more careful examination of restoration needs, past successes and failures should be followed to chart future restoration efforts. Future restoration efforts will be directed towards the following:

1. Areas of greatest need
2. Areas of greatest probability of success (non-reed canary grass sites)
3. Strategies and techniques that will perform best given conditions (large stock in reed canary grass sites)
4. Experimental plantings
5. Targeted, strategic restoration efforts
6. Control of reed canary grass
7. Replacement of fencing
8. Opportunistic restoration projects
9. Re-introduction of large woody debris

13.3.1 AREAS OF GREATEST NEED

Given the limited amount of resources available on an annual basis, it is imperative to direct restoration effort to those places that are in most need of attention. These would include eroding stream banks and areas of high value fish habitat, including the elimination of barriers to fish passage. An overall assessment of these areas is on going. Currently DL 9178 and portions of DL 9176 are of highest importance because of their value as sockeye spawning habitat and the slumping of river banks that is currently taking place on both of these lots (especially on DL 9178).

13.3.2 AREAS WITH GREATEST PROBABILITY OF SUCCESS

Until we are able to control reed canary grass, we are likely going to be limited to those areas that are less heavily impacted by reed canary unless we can demonstrate how we can control, or compete with reed canary (see sections 14.2.1.3, 4, &7). This will, unfortunately limit much of the area that comprises the HRRCA, or restoration will have to be undertaken in a much smaller scale with strategic objectives and plans.

13.3.3 STRATEGIES AND TECHNIQUES THAT WILL PERFORM BEST GIVEN CONDITIONS

In 2005 and 2006, cottonwood in 1-gallon pots were planted well within areas dominated by reed canary grass. Initial indications were that these plants were able to persist throughout one summer suggesting that using large stock (stock whose stems over top reed canary) may be the most effective way of planting in heavily infested areas. Assessment in the spring of 2007 will further reveal whether this is a viable restoration treatment.

13.3.4 EXPERIMENTAL PLANTINGS

More effort has to be given to experimental, or quasi-experimental trials to determine what species or techniques are effective in areas where reed canary grass is problematic. This should include: cottonwood palisades (large cuttings of cottonwood ~10 cm in diameter) placed in problem reed canary areas; small scale experimental use of ground cloth to kill reed canary coupled with subsequent planting.

13.3.5 TARGETED, STRATEGIC RESTORATION EFFORTS

Restoration efforts beyond those identified in sections 14.3.1x will be guided by areas where restoration will yield the greatest benefit from an overall habitat diversity perspective. These areas will include edges of oxbows, locations to enhance real and potential connectivity. In other words, restoration efforts may occur at the sub-polygon level and may be limited in overall size.

13.3.6 CONTROL OF REED CANARY GRASS

Previous attempts to control reed canary grass with ploughing and subsequent planting have proven to be only moderately successful. Alternate, more cost effective means to control this invasive species are required. In 2005, 20 x 20 foot enclosures were built to limit exclude horses from feeding on reed canary and willow to determine if short duration high intensity grazing will: 1) result in a demonstrable reduction in percent cover and stem count of reed canary; and 2) that horses will not negatively impact desirable plant species (e.g., naturally regenerating willow).

Grazing trials began in the summer of 2007. Monitoring of the impact of horses on reed canary grass and on non-target species (planted riparian stock) will be evaluated to determine if horses could be used to enhance additional portions of the HRRCA.

13.3.7 REPLACEMENT OF FENCING AS AN ON-GOING PROGRAM

Previous restoration activities in the HRRCA have been hampered by the incursion of cattle and horses. In 2005, cattle spent approximately 2 weeks on potions of DLs 2566 and 2567 because of failing fence lines. This problem was partially corrected in the fall of 2005 with the construction of 500 m of new fencing. A similar project was carried out on DL 9176 to control feral horses. Consideration has to be given to repairing or replacing the remainder of the existing perimeter fences on the HRRCA.

13.3.8 RESPONDING TO OPPORTUNISTIC RESTORATION PROJECTS

TLC and its partners have to be able and willing to respond to opportunistic restoration projects. Opportunities will undoubtedly present themselves over time. These will likely take the form of opportunities on adjacent lands and may include acquisitions and subsequent leases, fencing, riparian plantings, repair of fish passageways. These projects will undoubtedly involve other partners with TLC play a role either as lead organization or a facilitator.

13.3.9 RE-INTRODUCTION OF LARGE WOODY DEBRIS (LWD) AND OTHER IN-STREAM REARING COMPONENTS

Lateral or stream bank logjams are a common structure in streams with mature or old growth forests and provide a vast amount of rearing habitat for juvenile salmonids. Removal of the riparian zone throughout the HRRCA for agricultural use has disrupted the supply of coniferous and deciduous large woody debris (LWD) to the river channel, reducing the amount and quality of rearing areas for juvenile rainbow trout, chinook and Coho salmon.

Using experienced personnel and proven fish habitat rehabilitation procedures to accelerate the recovery of log –jam habitats and large woody debris – boulder complexes to increase overall productivity for rearing salmonids.

13.4 Public Education, Research, Recreation and use.

13.4.1 RESEARCH PROGRAM DEVELOPMENT.

The HRRCA, and in fact the entire Horsefly River corridor, lends itself to research both from and applied and a curiosity-driven perspective. Initial inventories have been conducted on vegetation, songbirds, and amphibians. There are also opportunities for more intensive work on songbirds, vegetation and restoration, fish and fish habitat. Some research is ongoing, not specifically within the HRRCA, but within the Horsefly River system, especially the McKinley Creek area. The HRRCA management committee should revisit the idea and determine if they should be pursuing a research program.

13.4.2 EDUCATIONAL STRATEGY

The development of an designed to use the HRRCA as a demonstration project to promote the benefits of riparian restoration / erosion control to neighbouring ranches. Imperative in this strategy will be the selection of appropriate sites that both provide examples of suitable restoration efforts and are safe for viewing by the public.

Humans are recognized as an integral part of ecosystems. One of the greatest benefits of restoration is its value as an opportunity for education and raising public awareness of the value of what is being restored. For this reason, public participation and field visits to view restoration programs and natural flood plain recovery processes will be encouraged. Other contributions to public education supported by this plan include media exposure and interpretive materials such as brochures or on-site kiosk displays. The design and location of potential on-site illustrative materials should be planned and constructed in a manner that does not retard or prevent attainment of riparian restoration objectives.

13.4.3 THE DEVELOPMENT OF A VISITOR MANAGEMENT STRATEGY TO GUARD AGAINST SITE DEGRADATION AND TO ENSURE PUBLIC SAFETY.

The development of a visitor management strategy to address the potential use of the HRRCA for public enjoyment without causing habitat degradation is required. This should include the delineation of sites suitable for public access, the feasibility of constructing structures on site for wildlife viewing, the establishment of trails for public access etc.

13.4.4 OUTDOOR RECREATION AND ACCESS

Recreation within the river corridor encompassed by the HRRCA is highly valued. At present, recreational activities includes fishing, wildlife viewing and canoeing / kayaking. The majority of users launch drift boats, canoes or kayaks at the Forestry recreation site located upstream of the property and follow the river downstream to a rough access point where the river approaches the main highways right of way at the north west end of D.L. 2567 (km.118, Horsefly River FSR).

Although an all season public road parallels the Horsefly River for it's entire length, the river section encompassed by the property or the HRRCA land itself had not been accessible to the general public without permission from the manager/owner of the Black Creek Ranch. Use of the property for access to the river and south side of the valley has been reported by Mr. Stuart Maitland for his fish and game guiding operations and by Mr. Clarence Hooker for his trapping territory.

Most outdoor recreational use of the property is compatible with overall management intent providing that motorised vehicles are prohibited from entering the property during the spring to fall growing season. Site-specific access for motorised vehicles will be permitted for riparian and aquatic enhancement projects only.

Hunting on the property with the use of single projectile bullets is currently being reviewed. Options to vary the regulations to restrict single projectile bullets in the floodplain area between the Woodjam bridge and the confluence of McKinley Creek is being discussed with the Ministry of Environment Wildlife Branch.

13.4.5 GUIDING AND TRAPPING

As well as providing traditional outdoor recreational activities, populations of large mammals on the south side of the property partially support a big game guiding industry for one licensed guide. As reported by the license holder Stuart Maitland, a limited number of hunts for moose occur each year as clients on horseback are guided across the HRRCA to access trails to adjacent hunting areas.

Similarly, and is the case in much of British Columbia, the area surrounding the property also supports a trapping industry. The boundaries of two trapping areas merge on the south side of the river slightly downstream of D.L. 9176. In order to access legal trapping areas within the high water mark of the Horsefly River and the forested land to the south, access across the property on snow machines has been reported.

There will be no restrictions placed on this traditional use at this time; however, riparian recovery will take precedence over all other types of use. This may include alterations in conventional access methods and/or the locations of right of entry points.

13.5 Conservation outside of the HRRCA

13.5.1 STEWARDSHIP INITIATIVE

The formulation of a stewardship initiative, the aim of which would be to improve protection of critical riparian habitat outside of the current boundaries of the HRRCA, is clearly required. There are several models that could be used to establish or shape this initiative. Ducks Unlimited Canada has initiated a similar project on the San Jose River Watershed near Williams Lake. A similar, but more community driven process has been on going in the Chilako River Watershed since 1999, near Prince George. In each instance landowners have been encouraged to embark on a variety of initiatives to enhance riparian habitat.

13.5.2 LONG-TERM ACQUISITION STRATEGY

Changes in lifestyles have seen a gradual movement away from family run ranches. Consequently there has been a growing trend of larger ranches being broken up and sold in smaller parcels throughout BC. This fragmentation of larger ranches to smaller “ranchettes” has raised concerns in various sectors as more, smaller parcels of land that are owned and managed by more people present significant land management challenges. The formulation of an acquisition strategy is required to combat this trend and to further secure priority salmon and other wildlife habitat within the Horsefly River Corridor.

It is important to note that acquisition need not exclude agriculture in the Horsefly River Corridor: ranching/agriculture can occur in conjunction with the protection of riparian habitat. The model that is currently used in the HRRCA, where local ranchers utilize portions of land held by TLC, could be employed in other places within the HRRCA.

Currently, TLC in conjunction with DFO Williams Lake, has determined a short list of properties. This list includes a total of 924 acres (373 ha) of high-priority properties from willing landowners at the following sites (Table 1). Each of these lots represents excellent fish and wildlife habitat. Priority sites are the properties that make up what is currently referred to as the Kroener Ranch.

Table 1. Proposed acquisitions for the expansion of the HRRCA.

Lot numbers	Property	**Size (acres)**	**Habitat value**
DL 3782	Kroener Ranch	121	Riparian
DL 8978	Kroener Ranch	139	Riparian
DL 9579	Kroener Ranch	173	Riparian
Block A 9829	Kroener Ranch	74	Riparian
Block B 9829	Kroener Ranch	51	Riparian
DL 8977	Schumacher Ranch	187	Riparian
2568 PL 12779	Zimmer	26.5	Riparian
DL 2568	Black Creek Ranch	128	Riparian
DL 12327	Webb	82	Riparian/fossil

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Appendix I. Projected Horsefly River Riparian Conservation Area Rehabilitation Timefr

Treatment/Area	Key Process						Restoration Considerations		
	Sedimentation Erosion	Water Temperature	Off Channel Habitat	In Channel Habitat	Riparian Recovery	Fish Access	Priority	Implementation Timeframe	Relative Costs
Lot# L2567									
Overwintering Channel			99-00		99-00	99-00	H	I	M-H
Bank Stabilisation	99-05	99-05		99-05	99-05		H	I	M-H
Cattle Removal	99-05	99-05		99-05	99-05		H	I	L
Stream Bank Revegetation	99-05	99-05		99-05	99-05		H	I	M-H
Floodplain Roughness	00-05				00-05		M	L	L
Lot# 9678									
Bank Stabilisation	00-03	00-03			00-03		H	I	L
Cattle Removal	99-05	99-05		99-05	99-05		H	I	L
Stream Bank Revegetation	00-05	00-05		00-05	00-05		H	I	L
Floodplain Roughness	00-05	00-05			00-05		M	L	L
Dyke Removal	00-01				00-01		H	I	L
Lot# 2566									
Bank Stabilisation	01-03	01-03			01-03		H	I	L
Cattle Removal	99-05	99-05		99-05	99-05		H	I	L
Stream Bank Revegetation	01-05	01-05		01-05	01-05		H	I	L
Floodplain Roughness	00-05	00-05			00-05		M	L	L
Lot# 9828									
Bank Stabilisation	01-03	01-03			01-03		H	I	L
Cattle Removal	99-05	99-05		99-05	99-05		H	I	L
Stream Bank Revegetation	01-05	01-05		01-05	01-05		H	I	L
Floodplain Roughness	00-05	00-05			00-05		M	L	L
Lot# 9176									
Cattle Removal	99-05	99-05		99-05	99-05		H	I	L
Stream Bank Revegetation	01-05	01-05		01-05	01-05		H	I	L
Floodplain Roughness	00-05	00-05			00-05		M	L	L

Numbers indicte year activity is to take place.
Priority/Cost: H = High, M =Medium, L = Low.

Implementation Time: I = Intermediate, L = Long Term.

Action Items identified in the Whole Farm Plan

AI #	Action	Priority	Responsibility	Timing	Progress
1		H	TLC/Lessee	Annually	
2		H	TLC/Lessee	2006	
3		M	TLC/Lessee	2006	
4		M	TLC	2006	
5		M	TLC	2006-2007	
6		H	Lessee	Annually	
7		H	Lessee	As needed	
8		H	Lessee	As needed	
9		M	TLC	Biannually	
10		H	TLC/Lessee	2006/7	
11		L	Lessee		
12		L	Lessee	As needed	
13		M	Lessee	2006	
14		M	TLC		
15		L	TLC	2005	
16		L	TLC/Lessee	2005/6	
17		L	TLC	2006	
18		M	Lessee	As needed	
19		H	TLC and lessee	2005/6	

Action Items identified in the Whole Farm Plan continued

AI #	Action	Priority	Responsibility	Timing	Progress
20		M	Lessee	As needed	
21		M	Lessee	As needed	

22		M	TLC	2005/6	
23		L	TLC	2006/7	