

# ADJUSTMENT TO ENVIRONMENTAL SCREENING REPORT

## TCH TWINNING PHASE IIIB

### ADJUSTMENT OVERVIEW

In December 2004, Parks Canada Agency (Parks Canada) issued an Environmental Assessment Determination document for the Trans-Canada Highway (TCH) Phase IIIB twinning project (Project), pursuant to the Canadian Environmental Assessment Act (CEA Act), and concluded that taking into account the implementation of mitigation measures, the Project was not likely to cause significant adverse environmental effects.

Subsequently, Parks Canada has determined that an additional extension of construction right-of-way length into Yoho National Park of Canada is desirable to more completely meet project objectives and the best interests of the People of Canada. This proposed extension (adjusted Project) would entail additional twinned highway from the British Columbia border at Km 81.9 to slightly to the west of Wapta Lake gravel pit, at approximately Km 88, and associated other project components within and adjacent to this area. It is conceivable and likely that this adjusted Project will be constructed in sections as a function of funds becoming available. This is a similar staged approach to what has been followed for the remainder of the TCH twinning phase IIIB project.

This proposed adjusted Project necessitates an adjustment of the environmental screening report prior to any management decisions being made or construction proceeding. The original Environmental Screening Report for the TCH Phase IIIB Project (original report) is largely applicable to this adjusted Project. Therefore, this document contains only additions to the original report.

### PROJECT IDENTIFICATION

<b>Project Title:</b>	TransCanada Highway Upgrade, Banff and Yoho National Parks
<b>Physical Work/Activity:</b>	Construction and operation
<b>Project Location:</b>	Yoho National Park (near West Lake Louise)
<b>CEA Registry No.:</b>	04-01-1367 original / 10-01-57984 adjustment
<b>CEA Act Registration Date:</b>	24 February 2004 original / 15 September 2010 adjustment
<b>CEA Act Trigger:</b>	Parks Canada Agency may provide federal lands for the purpose of enabling this project to be carried out, and is the proponent for the project
<b>Date of CEA Act determination for adjustment:</b>	<u>10</u> March 2011

## **Adjustments to the original Environmental Assessment Determination report**

The original decision report issued by Parks Canada in December 2004 for the TCH Twinning Phase IIIB Project was supported by the original assessment report (Golder 2004). These original documents contain material of relevance to the current length extension (adjustment). The only exceptions that are not covered by the original determination report and supporting assessment report are the following additions and adjustments.

Additional site information was also provided by the relevant portion of the report titled "Conceptual Study of Trans Canada Highway Twinning through Yoho National Park (Reid Crowther, 1994). Several site surveys were conducted by Parks Canada specialists, or by consultants retained for this purpose. Finally, Parks Canada possesses much data on this site, and this information was drawn upon to enhance this assessment, and will continue to be drawn upon during any future detailed design and construction phases.

This adjustment of the original Environmental Assessment (EA) assesses whether taking into account the implementation of mitigation measures, the adjusted Project is still not likely to cause significant adverse environmental effects or impairment of ecological integrity.

## **Introduction**

Similar to previous references in the previous Banff National Park Management Plan, the new Banff National Park Management Plan (Parks Canada 2010a), Yoho National Park's Management Plan (Parks Canada 2010b), and Kicking Horse Pass National Historic Site Management Plan (Parks Canada 2007) do specifically refer to and make allowances for upgrading of the Trans-Canada Highway and commensurate construction considerations (the latter including the extraction of construction aggregate/gravel). National Park zoning recognizes the transportation right-of-way. Similarly, when the declared wilderness zone was established, it was specifically established at 125 m away from the existing centerline so as to accommodate the twinning of the Trans-Canada Highway; with the exception of enhancements to the existing avalanche control system, the adjusted Project as planned would be within this 125 m. Also similarly, the Yoho National Park's Management Plan places a high priority on reducing wildlife mortality, including as it relates to the Trans Canada Highway, and also on visitor experience.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

## **The need for the Project**

No material changes from the 2004 Environmental Assessment Document in this subsection.

## **Scope of the project adjustment**

The proposed adjusted Project would entail twinning of the TCH from the British Columbia / Alberta border at Km 81.9 to slightly to the west of Wapta Lake gravel pit, in proximity to Km

88 (see Figure 1A, B, and C for a tentative alignment. At the east end of this section, the adjusted Project would tie in to the twinned highway that is pending construction. At the west end of this section, the adjusted Project would taper and tie in to the existing highway. It is anticipated that this adjusted Project twinning will most likely be predominantly in the form of a single ribbon highway divided by a median-barrier.

It is anticipated that the majority of the length extension will closely follow the current alignment. However, to accommodate the added width of the twinned highway, and to accommodate such matters as safer-radius curves, the adjusted Project would entail some lateral expansions or realignments. While not strictly speaking 'environmental' matters, additional considerations for this adjusted Project scope are: i) safe transition to/from four lanes, especially in the context of the adjacent steep Field Hill; and ii) the need to enhance the distinct sense of welcome, anticipation, arrival, departure, and orientation at the Banff/Yoho Park boundary.

Additional associated developments or allowances may include: i) new visitor pull-offs and enhanced welcome stations in both directions at the provincial boundary; ii) an access point for the Lake O'Hara trailhead and CP rail; iii) an access point for the West Lake Louise Outlying Commercial Accommodation (WLLOCA); iv) a west-bound brake check pad near Wapta lake or slightly to the west; v) an east-bound chain-off pad near Wapta Lake or slightly to the west; vi) an access point (either separate or combined with the WLLOCA) for the Sherbrooke Lake trailhead and potentially an associated new or enhanced visitor break stop at this latter location; and vii) an expansion and subsequent reclamation of the existing Wapta Lake gravel pit. Note that access to Wapta Lake by recreational users will be via the east-bound chain-off pad area; for safety reasons, cross-highway foot traffic from WLLOCA will be discouraged.

The environment already affects the existing TCH within this section, in the form of avalanches descending from the flanks of Mount Bosworth. Commensurately, much avalanche control already occurs for this risk. However, additional and alternative avalanche control measures may be warranted if the twinning proceeds; these new measures are assessed and considered in this adjusted assessment.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

It is important to remember that no funds have been allocated yet for construction of this extension. Furthermore, it is conceivable and likely that the extension will be constructed in sections as funds do become available. This is a similar staged approach to what has been followed for the remainder of the TCH twinning phase IIIB project. The implications of this staged approach were taken into consideration during this adjusted assessment.

### **Scope of the assessment adjustment**

No new elements were identified. All elements of the original assessment are still applicable, although only a few are notably pertinent and conversely several have only a mild relevance to the extension. Specific attention is now given in this adjustment to the use by mountain goats of a mineral lick. Specific attention is now also given to the unique proximity of the adjacent

mountains with commensurate implications to connectivity of alpine species such as mountain goats and wolverines. Similarly, the site is a rather unique multiple-valley-bottom focal point for wide-ranging species such as grizzly bears.

As a precautionary measure, this assessment addressed a lateral project area of 100 m from edge of the current highway prism, of which 20 m were intensively studied to a detailed design level for certain particularly critical elements. Avalanche paths were addressed much further, for the eventuality that additional or alternative protective measures are pursued. Regional and cumulative influences and implications were also taken into consideration.

In the original determination (Parks Canada 2004), the project was designed, and mitigations were developed, with the intent of accomplishing certain objectives. Sometimes these objectives were explicitly described, but often they were merely inferred. Since that original determination was rendered, Parks Canada has become increasingly and explicitly results-oriented when assessing and managing proposed projects. To this end, during the course of assessing this adjusted Project, Parks Canada closely considered Management Objectives/Desired End Results (MO/DERs). The majority of these MO/DERs are related to the ecological integrity, commemorative integrity, and visitor experience of Banff and Yoho National Parks. The remainder are related to other mandated aspects of the management of these parks, and as such will also be notable objectives faced by the adjusted Project if it should proceed.

For the purposes of clarity and certainty, several pertinent MO/DERs that were intended in the original determination, and that are certainly desired now, are below made explicit.

Any decision by Parks Canada regarding the proposed adjusted Project will be predicated upon the priority pursuit of these MO/DERs, unless explicitly and specifically exempted now or in the future by Parks Canada. Commensurately, for the purposes of making an environmental assessment decision on the proposed adjusted Project, reasonable comfort had to exist that the adjusted Project could be designed or mitigated to accomplish these MO/DERs, and reasonable comfort that these designs and mitigations will indeed be implemented. This will entail the appropriate use of the same or equivalent design and mitigation measures that were noted in the original assessment report and the original determination document; that such potential design and mitigation measures are known and viable adds to the comfort that the MO/DERs can be accomplished. Note that the previous potential mitigation measures were summarized in Appendix VII of the 2004 Environmental Assessment Document.

However, final details and decisions on *how* the MO/DERs will actually be accomplished for the adjusted Project will generally be settled during the ongoing design and tender stages. It is anticipated that many of the precise details will be settled through an Environmental Protection Plan. Importantly, the means of accomplishing these MO/DERs will have to be to the satisfaction of Parks Canada before construction may proceed. Similarly, these measures must then be implemented to Parks Canada's satisfaction during the construction stage. This approach is currently in use for the existing project components, and is working well.

As noted above, this assessment takes into consideration regional and cumulative matters that may arise from and to Yoho National Park further to the west of Km 88. However, to be clear,

this assessment does not cover environmental effects of future highway works to the west of around Km 88. Parks Canada has concluded that past this general reference point the setting is notably different from that of the TCH Phase IIIB project. Consequently, such future construction would be considered to be a new project, and thus a separate Environmental Assessment would be required.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

### **Terrain**

During a supplemental field assessment and review of existing information it was determined that due to the relatively narrow valley at this location and presence of the CPR tracks, the construction envelope is very restricted. There are several rock outcrops and small embankments that will likely be cut into. Most of these are already disturbed by construction of the original highway.

As with the prior components of the Project, the adjusted Project will use excavated materials from both within the right-of-way and from one or more borrow pits. For the latter, it is anticipated that in addition to current active pits, there will be a use and expansion of the Wapta Pit at Km 87.2. This will require the further excavation of the hillslope, especially to the west where there will be the con-current objective of creating a safer-radius roadway curve. However, as with prior pit use, and pursuant to the Parks Canada Management Directive 2.4.7 (Sand, gravel, and other earth material: excavation and site rehabilitation), this pit will be excavated with an eye towards future contouring and reclamation requirements, and an extraction and reclamation plan will be developed with the objectives of being physically stable, aesthetically pleasing, and maintaining or restoring ecological integrity.

It is anticipated that some biosolids that originate from within the National Parks will be used as a soil supplement during reclamation activities. Parks Canada has determined that such biosolids are generally acceptable in this context, notwithstanding some criteria for application (Van Tighem, pers comm.). Notable amongst these criteria are no over-application of the biosolids, with the intent of ensuring that nutrient levels remain typical for the region. Additionally, minimize any residual risks from invasive weeds and leachate or selenium, and similarly do not allow direct drainage or movement through the ground to surface waters in adjacent areas outside of the reclaimed areas (presumably factoring in any additional degradation or uptake that will occur as the biosolid components move through the ground).

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

Pertinent MO/DERs to be pursued are:

- Site Contours: Post-construction contours of the right-of-way and temporary work areas (including the roach and slump) match surrounding topography, and do not

create conditions that would hinder establishment of native plant communities or alter natural drainage patterns.

- Rock outcrops and embankments: natural appearing or visually non-intrusive.
- Soil Erosion: No acceleration of soil erosion rates, beyond pre-disturbance levels within the adjusted Project area and on specific soil conditions (the latter category includes sites with little or no topsoil, steep slopes, poor moisture availability, or exposure to high winds).
- Natural-like growing conditions.
- No increase in rate or quantity of movement of contaminants from previously contaminated sites, if any are discovered during construction.

Existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient. Commensurately, these measures were incorporated during the planning, design, and specification stages of the adjusted Project. Furthermore, during the detailed construction planning stage the Environmental Protection Plan developed by the contractor will have to address how construction will ensure the conservation and protection of this element of the environment.

### **Hydrology and Streams**

It is anticipated that the adjusted Project design can be modified (laterally constricted and curves realigned) so that there will be very little if any encroachment into Wapta Lake.

No material changes from the 2004 Environmental Assessment Document in this subsection.

See also the related 'Fisheries and Aquatic' section below.

Existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient. Commensurately, these measures were incorporated during the planning, design, and specification stages of the adjusted Project. Furthermore, during the detailed construction planning stage the Environmental Protection Plan developed by the contractor will have to address how construction will ensure the conservation and protection of this element of the environment.

### **Air Quality**

No material changes in this subsection.

See also the 'Other Considerations' section below.

Existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient. Commensurately, these measures were incorporated during the planning, design, and specification stages of the adjusted Project. Furthermore, during the detailed construction planning stage the Environmental Protection Plan developed by the contractor will have to address how construction will ensure the conservation and protection of this element of the environment.

## Vegetation

During a supplemental field assessment and review of existing information (including Reid Crowther, 1994, and McCallum Paquet, 1995), it was determined that vegetation resources within the adjusted Project area were generally similar to that which exists in other portions of the over-all Project area. As expected, one ecotype (BV2 – Bow Valley 2; is extremely restricted within Yoho National Park, although it is somewhat more plentiful in Banff National Park. The project site distribution of this ecotype is shown in Figure 2. While some of this BV2 ecotype exists adjacent to the proposed adjusted Project near the BC/Alberta border, it is anticipated that the adjusted Project design can be modified (laterally constricted) so that little of this ecotype will be lost, and that of the amount that will be lost the majority is already greatly disturbed.

During a supplemental field assessment (EBA, 2010a) and review of existing information it was determined that two rare plant species are known to exist in the study area. Specifically, tall white bog orchid (*Habenaria dilatata*, also known as *Platanthera dilatata*) and small northern grass-of-Parnassus (*Parnassia parviflora*). The observed locations of these rare species is shown as Site 1 and Site 4 on the attached EBA (2010a) Rare Species Figure 1. Note that Site 1 appears to be a historically disturbed area that has self-recovered to some extent; but it is still not a pristine area.

While these two species are not listed pursuant to the *Species At Risk Act* (SARA), they are still species of special interest to Parks Canada. During the construction stage, Parks Canada will address the conservation (including protection and salvage) of these plants and their habitat.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

Pertinent MO/DERs to be pursued are:

- For the species at risk component of ecological integrity:
  - that populations (and perhaps even individuals) of rare or endangered species be conserved; specifically, tall white bog orchid (*Habenaria dilatata*, also known as *Platanthera dilatata*) and small northern grass-of-Parnassus (*Parnassia parviflora*);
  - that there be appropriate subsurface and surface water movement in wetland areas to conserve habitats for populations of rare or endangered species; and

- Natural habitat conditions (including hydrological patterns and regimes) for rare or endangered plant species/communities are maintained or restored.
- Vegetation Composition: Native species of grasses, shrubs and forbs that are adapted to the respective Ecosites but that have reduced attractiveness to grazing wildlife (e.g. ungulates, bears).
- Vegetation Composition: Moderate and high priority (i.e. more invasive) nonnative plant species do not become established or set seed on the right-of-way or temporary work areas, or spread off of the right-of-way or temporary work areas. Existing infestations are eradicated.
- Vegetation Composition: Low priority non-native plant species do not occupy more than 2% of ground cover on the right-of-way and temporary work areas.
- Reclamation of disturbed areas outside of the right-of-way: establishment of an early seral stage and successional trajectory
- Vegetation Processes: Future land disturbance for maintenance purposes does not affect the composition, structure, quantity, function, or dynamics of the reclaimed system.

Existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient. Commensurately, these measures were incorporated during the planning, design, and specification stages of the adjusted Project. Furthermore, during the detailed construction planning stage the Environmental Protection Plan developed by the contractor will have to address how construction will ensure the conservation and protection of this element of the environment.

### **Fish/Aquatics**

During a review of existing information it was determined that historically there were no fish present in Wapta Lake or its tributaries, and that the watercourse downstream of Wapta Lake could not be traversed upstream by fish.

Unfortunately, there are now both Brook Trout (*Salvelinus fontinalis*) and Lake Trout (*Salvelinus namaycush*) present in these waters; evidently these species were introduced, although it is unclear by whom. Furthermore, a supplemental field assessment (EBA, 2010b) has determined that Brook Trout are passing through the culvert that exists between the West Lake Louise OCA and the truckers brake check. This creek is labelled as Site 1 on Fish Figure 1.

Note that the fish habitat at Site 1 appears to have been historically disturbed. The disturbed area has self-recovered to some extent; but it is still not a pristine site.



Given that the area historically and naturally had no fish present, pursuant to the Canada National Parks Act the Fisheries Management Objective for the Wapta Lake area would be to have no fish present. As such, no special allowances need to be made for the passage and presence of these species at this site. If, on the other hand, it is later determined that a native species of fish was historically present but is currently extirpated (no longer present but not extinct) and is to be reintroduced, then fortunately the proposed highways works probably can be retrofitted to allow for the passage of this native species.

Importantly, pursuant to the Parks Canada mandate, as much importance is placed on the aquatic ecology of non-fish-bearing as is placed on fish-bearing watercourses. As such, the aquatic ecosystems were treated as an important element during the Environmental Assessment. During a supplemental field assessment (Parks Canada, 2010c) and review of existing information it was determined that one rare amphibian species is known to exist in the study area. Specifically, western toad (also sometimes known as boreal toad; *Bufo boreas* also sometimes known as *Anaxyrus boreas*). The observed location of this rare species is shown as Site 3 on the attached EBA (2010a) Rare Species Figure 1; sites 1, 2, and 4 are thought to also have the potential to contain western toad.

Western toad is listed as a species of special concern pursuant to the *Species At Risk Act* (SARA), which means that it is particularly sensitive to human activities or natural disturbance but is not an endangered or threatened species (COSEWIC). Never-the-less, it is a species of particular interest to Parks Canada. During the detailed design stage, the Environmental Protection Plan to address the conservation (possibility including protection and salvage) of individuals and habitat of this species to the extent that is reasonably possible. This will include avoidance to the extent reasonably possible.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

Pertinent MO/DERs to be pursued are:

- No release into watercourses of sediments in levels that are deleterious to fish or other aquatic life, or that would harmfully alter, disrupt, or destroy fish or aquatic habitat. Similarly there is to be no sediment release into areas of vegetation growth or sensitive areas of sediments in levels that would adversely alter growing or hydraulic conditions. The target is 0 mg/L of Total Suspended Solids (TSS) over background levels. The threshold (as established by CCME 2006) that shall not be exceeded is:
  - During clear flow, maximum increase in TSS of 25 mg/L from background levels for any short-term exposure (e.g. 24 hour period). Maximum average increase in TSS of 5 mg/L from background levels for longer term exposures (e.g. inputs lasting between 24 hour and 30 days); and
  - During high flows, maximum increase in TSS of 25 mg/L from background levels at any time when background levels are between 25 and 250 mg/L. No increase in TSS more than 10% of background levels when background is greater than 250 mg/L.
- For the species at risk component of ecological integrity:

- that populations (and perhaps even individuals) of rare or endangered amphibian species be conserved; specifically, western toad (*Bufo boreas*);
  - that there be appropriate subsurface and surface water movement in wetland areas to conserve habitats for populations of rare or endangered amphibian species; and
  - Natural habitat conditions (including hydrological patterns and regimes) for rare or endangered amphibian species/communities are maintained or restored.
- Natural form, pattern, frequency, productivity, and function of aquatic ecological integrity, with fish-bearing and non-fish-bearing watercourses given equal importance. Qualifier: non-native species of fish are to be accorded low importance and in fact discouraged, pursuant to the mandate established in the *Canada National Parks Act*.
  - For wetlands, maintain natural levels and patterns of surface and subsurface hydrologic flow, with no unnatural impoundment of waters. Maintain natural composition, structure, quantity, and dynamics of wetland vegetation and growing conditions. No alteration or loss of wetland function for a period greater than 5 years.

Existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient. Commensurately, these measures were incorporated during the planning, design, and specification stages of the adjusted Project. Furthermore, during the detailed construction planning stage the Environmental Protection Plan developed by the contractor will have to address how construction will ensure the conservation and protection of this element of the environment.

Importantly, the TCH Phase IIIB Project has already created a number of aquatic betterments that were planned or that are above and beyond requirements arising from the 2004 determination; there has already been a great net-improvement for fish habitat, aquatic habitat, and wetlands. These improvements include: originally planned culvert improvements to enhance fish passage; now also additional culvert improvements to restore fish passage into historic habitat in which had been extirpated and excluded; similarly, creation of a new channel up a slope and the subsequent removal of a culvert that was a total fish barrier; restoring a creek into its historic channel through a forest; originally planned incorporation of ponds into the restoration of active borrow pits; and now also restoration of historic borrow pits, into the form of ponds with wetlands.

## **Wildlife**

It is well known and documented that a variety of wildlife do occupy and pass through the area of the proposed expansion, including across the highway within this area. This includes not just cross-highway (North-South) movements, but importantly also cross-region (East-West, BC-Alberta) movements through the Kicking Horse Pass by multiple species. Thus, the area is a very important multi-species regional movement corridor. In particular, note that the Kicking Horse Pass is one of the few passes across the continental divide, that is easily navigable by most terrestrial species; this includes by rare and wary species.

Similarly, it is well known and documented that mortalities and strikes along the existing highway and existing railway-line have occurred throughout this area, as is shown in Figure 5 'YNP Wildlife Mortalities and Strikes' (note that this figure provides a regional context, in that it shows both the proposed adjusted Project study area and adjacent portions of the Trans Canada Highway). The original Environmental Assessment and Decision documents addressed such matters.

However, unique to this area are the occurrence and possible passage of mountain goats, and the passage of wolverines.

The occurrence of mountain goats immediately next to the Trans Canada Highway is largely driven by the unique presence of a primary mineral lick at 85.400, and immediately adjacent to this a secondary mineral lick at Km 85.300. These mineral licks are the focus point of occurrence, although mountain goats have been observed elsewhere in the section; the location of all of these recorded observations can be seen in Figure 'Mtn Goat Observations'. Mineral lick activity appears to be most common during the spring and early summer (notably, May 15<sup>th</sup> to August 12<sup>th</sup>, with the majority being in June); of particular concern is the use of the lick by nannies who are replenishing minerals after kidding (birthing); care will be required during this period in order to minimize disturbance by construction activities. The distribution of mountain goat observations in a more regional context is shown in Figure 'Goat Observations Yoho Kootenay and Banff'.

Based on existing information, on supplemental field assessments, and on a Parks Canada commissioned geotechnical assessment of mineral lick composition and distribution, it was determined that the mineral licks are very restricted in their physical distribution. While some of the deposits are apparently found further back from the exposed face, the apparent highest quality deposit only appear to be present right at the face, especially for the main, west mineral lick. Furthermore, it appears that it is **not** feasible or likely that the main, west mineral lick can be excavated and subsequently effectively recreated or emulated. Thus, as part of the iterative process of 'preliminary design, concurrent environmental assessment, and then commensurate revision of design', Parks Canada has decided that, barring new compelling information, the best way forward is to realign the adjusted Project so as to retain the existing mineral exposure on the main, west mineral lick, likely without having to resort to the use of a retaining wall (although it is conceivable that such a wall could be installed without diminishing the functioning of the mineral lick).

Note that the secondary, east mineral lick is not felt to be as critical or as likely to be non-mitigable, although retention of this site too may well be deemed viable during the ongoing preliminary and the later detailed design stages.

Even with retention of the main, west mineral lick, Parks Canada is still sensitive to the disturbance of mountain goats using the site. This is particularly a concern for nannies and kids. As such, Parks Canada is placing a high priority on ensuring that nannies and kids are not hindered or discouraged from using the main, west mineral lick. It is feasible that this outcome may be accomplished via a variety of means, such as seasonal construction-timing constraints or

careful construction practices; importantly, whatever the approach ultimately used, it will have to be to Parks Canada's satisfaction and pre-approval.

Interestingly, there is the optional opportunity to actually enhance the ecological integrity of the mineral lick site for mountain goats, in the form of addressing habitat features that have been impaired by historic fire regimes; for example, perhaps emulating a fire regime by culling trees that provide unnaturally-enhanced cover for predators. This is a good example of not just mitigating negative effects, but also enhancing or facilitating positive effects. This possibility will be explored during the ongoing preliminary and detailed design stages.

Parks Canada is of the opinion that another driver for the occurrence of mountain goats in the 'BC border to Wapta Lake' study section is the close proximity on either side of high quality habitat on the steep, high mountains. Given the narrowness of the valley this creates a unique ability for mountain goats to pass from one section of high elevation habitat to another. The attribute of closeness of high quality habitat pertains particularly to habitat use by individuals, while the attribute of narrowness of the valley pertains particularly to metapopulation connectivity and the gene pool; both attributes are important considerations.

Parks Canada's specialists have developed a preliminary mountain goat habitat model for the region. This model is based on what are believed to be the most important habitat attributes; specifically: i) distance to escape terrain, ii) elevation, and iii) slope. The results of this model are shown in Figure 'Goat RSF Habitat Model'. As can be seen, high value mountain goat habitat exists in very close proximity and on both sides of the proposed adjusted Project location. The presence of the unique mineral lick (which could not be incorporated into the model since it was so unique and point specific) creates even more of a unique situation for mountain goat.

In contrast, the rest of the TCH twinning phase IIIB project area is a wide band of low goat habitat value, and this low value continues to the north and a lesser band to the south east. Mountain goats virtually never occur in or pass through these Bow River valley bottom areas.

Much less information exists for wolverines, but there is evidence that they also pass through this current study section (for example, Austin, 1998). While the habitat suitability/use has not been similarly modeled for wolverines, it is thought that the situation would be similar to that observed for mountain goats. This is because they both tend to exhibit roughly similar use of high elevation and open habitat, and because they both tend to avoid valley bottoms. Note that there is the additional confounding factor that wolverines tend to avoid human presence and disturbance, whatever the suitability of the habitat (Alan Dibb, pers. comm.).

Thus, in a situation that is unique for the broad TCH twinning phase IIIB project, mountain goats do use and likely pass across the adjusted Project area, and wolverines do pass across the adjusted Project area. While the number of such use, and particularly of such passage across, by mountain goats and wolverines may not be large, it is Parks Canada's opinion that they are ecologically important.

There is little precedent anywhere in the world for mitigating habitat use and passage across the roadway by mountain goats and wolverines. Based on current knowledge and experience,

however, it is thought by Parks Canada that the current model of approach of using a wide variety of wildlife passage structures and wildlife exclusion fencing is still likely the most viable way to mitigate the construction of a twinned highway and importantly to also concurrently restore ecological integrity that was impaired by prior stressors. Importantly, this addresses passage and protection of not just mountain goats and wolverines, but also of all other species of concern including grizzly bears.

Given the above understanding of the situation, Parks Canada has concluded that wildlife-crossing structures of some form would be required for and thus part of the adjusted Project.

The proposed adjusted Project east of the Lake O'hara turnoff does have some wildlife use and passage, but it is relatively modest. The proposed adjusted Project west of the Lake O'hara has notably more use and passage, particularly for unique species. It would be desirable to locate and design structures accordingly. That being said, most species are known to be able to go to where the structures are located, and to use a variety of structures.

Given the above understanding, based on current project knowledge and current wildlife passage knowledge, Parks Canada tentatively anticipates that an approximately 10 to 20 m wide (but subject to site constraints) underpass structure can be built near Sink Lake. In addition, within this section of highway the installation of several large diameter culverts that would function as both drainage and crossing opportunities in several existing drainages that cross the highway are proposed that would be sufficient for permeability and connectivity purposes on the eastern portion of the proposed expanded section (East of Lake O'Hara intersection). Parks Canada also anticipates that a larger crossing structure in the range of 50 to 60 m wide would be sufficient for the western portion (west of O'Hara intersection).

The final locations, structure type and design dimensions and specifications will be determined by Parks Canada during the on-going design stages, and will be based on knowledge and constraints of the day. As has occurred throughout the TCH twinning phase IIIB project, this knowledge includes on-going observations about passage and mortality 'hot-spots', and on findings from on-going monitoring of structure effectiveness. Similarly, structures would be located and tailored to opportunities and constraints of the specific sites, and to the species of most concern at those sites.

As with the remainder of the TCH Phase IIIB Project, exclusion fence would be installed to prevent wildlife from entering the active roadway area. Such fencing will never be able to prevent all incursions by wildlife, but there is abundant evidence that it greatly diminishes vehicle strikes and consequent wildlife mortality. Parks Canada will continue to strive to place this fencing in such a manner as to minimize alienation of wildlife habitat, while at the same time respecting vehicle safety margins and practical constraints. A special priority allowance will likely be taken to ensure that mountain goats are provided with sufficient escape routes.

It is conceivable that special design features will be used for sections of the exclusion fence that lie across the avalanche paths. These features would be intended to minimize the damage caused by periodic avalanches, and to ease the re-establishment of the exclusion zone and repair of such damage. Tentatively, these measures may include physically disconnecting ('joint') the

avalanche path fence section from the adjacent fence sections (so as to not pull down the adjacent fence sections during an avalanche). Also, perhaps using hinges on the bottom of the posts that are within the avalanche path fence sections, so as to have them pivot out of the way during an avalanche, rather than have them torn out or broken. Alternatively, it may be decided that standard fences will be used, with timely repair of damage and re-establishment of the exclusion zone after an avalanche.

Whatever the design of the exclusion fence in the avalanche pathways, periodically the fence may be damaged by an avalanche and thus not in place until it can be repaired. Parks Canada will be monitoring this situation, and will be adaptively managing the matter. Fortunately, it appears that such 'downed' fences will only occur every few years (based on an avalanche hazard assessment by Stethem & Associates, 2010), and will only occur during the period of the year when there are few wildlife moving through the area. For example, bears will be in hibernation, and mountain goats will not have yet descended to the mineral licks. Furthermore, no exclusion fence is ever 100% impermeable, and Parks Canada already has effective protocols established for dealing with wildlife that enter the highway corridor.

For both the wildlife crossing structures and the exclusion fencing, during the on-going design stages it will be necessary to take into consideration the effects of the nearby Canadian Pacific Railway-line (CPR) tracks, and both the opportunities and constraints that arise from these tracks.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

Pertinent MO/DERs to be pursued are:

- For long-term species-specific metapopulation viability component of ecological integrity:
  - reduce incidents of highway related wildlife mortality.
- For the wildlife habitat component of ecological integrity:
  - that there be wildlife habitat conservation ('maintenance or restoration'), including for the elements of:
    - quantity and effectiveness;
    - quantity of edge habitat;
    - sensory disturbance (indirect as a result of avoidance or diminished use) by members of wary species (such as wolves, bears, and cougars) and by other species of special interest (such as mountain goats);
    - air and water quality changes (physical effects to habitat from emissions);
    - mineral lick quality and availability; and
    - hydrology (wetland drainage or water drawdown).
  - that plant species diversity be conserved.
- For the wildlife connectivity component of ecological integrity:
  - that there be genetic connectivity, especially in the form of movement of adult male grizzly bears during mating season, and by other species of special interest (such as mountain goats);

- that there be demographic connectivity of wide-ranging species, in the form of migration and passage of animals of both sexes and all age groups, dispersal of juveniles away from natal, and recolonization influx into formerly inhabited areas, including in the context of Y-2-Y and landscape level;
- that there be high quality dispersal linkages (originally this was especially by grizzly bears, but it now is also especially for mountain goats and wolverines);
- that there be habitat accessibility and maintenance of travel patterns to fulfill biological requirements to maintain individual fitness (originally this was especially by grizzly bears, but it now is also especially for mountain goats); and
- that there be ecosystem processes connectivity (e.g., intact fire regime, herbivores/omnivores can access foraging areas, predators can access prey species).
- Reasonable passage by wildlife past construction activities, with only temporary prevention of passage and with minimal redirection. No wildlife injured or killed as a direct result of construction activities. No additional disturbance during sensitive or critical periods, such as during lambing or post-lambing periods.

In addition to the above possibilities, for most species of wildlife the existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient. Commensurately, these measures were incorporated during the planning, design, and specification stages of the adjusted Project. Furthermore, during the detailed construction planning stage the Environmental Protection Plan developed by the contractor will have to address how construction will ensure the conservation and protection of this element of the environment.

### **Related Effects (including Cultural Resources)**

Note that the proposed expansion is within the Kicking Horse Pass National Historic Site. As such, an extensive cultural resource survey of the region has been conducted (Perry and Langemann, 2005). Additionally, as part of this current assessment, field inspections were conducted by Parks Canada's Cultural Resource Management and Environmental Assessment specialists.

No Level 1 or Level 2 cultural resources are known or were identified within or immediately adjacent to the potential expansion zone, and the potential for such resources to be present is thought to be low for the region and for the expansion locations. Parks Canada's Cultural Resource Management sector further anticipates that if any resources are found during construction, that they can be managed through an Environmental Protection Plan response.

Recently there has been a growing recognition that the region may contain more outcrops of the unique Burgess Shale-type fossils in the rock layers of the Stephen Formation (EST). In consultation with an external specialist (Dr. Jean-Bernard Caron, Royal Ontario Museum, Pers. Comm. 2010) on the topic, it was determined that while some of this formation exists in close proximity to the adjusted Project, none exists within the adjusted Project area. Thus, it appears that the adjusted Project will not have any implications to such fossils.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

If during construction any cultural resources are identified, the pertinent MO/DERs to be pursued would be:

- The information that is potentially provided by insitu paleontological resources is not lost. The interpretative value of these resources is not lost.
- In cases where the disturbance of a cultural or archaeological resource (both Level 1 and Level 2) is proven to be unavoidable and can therefore be justified, there is to be no loss of the information, knowledge and records that is provided by the insitu cultural or archaeological resources, for the future understanding, appreciation and study for the benefit of present and future generations.

Existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient.

### **Avalanche considerations**

There are several avalanche chutes which cross over the Trans Canada Highway within the study area; these chutes are known as the Mt. Bosworth group. Furthermore, when large (size 4) avalanches occur, they effect both the highway and the adjacent downslope railway. In the future, they would also effect the wildlife exclusion fence. Parks Canada commissioned a study (Stethem and Associates, 2010) to assess the hazard to the highway that arises from these avalanche chutes. This study allowed Parks Canada to better understand the effect of the environment on the adjusted Project, and to determine suitable counter measures to those effects.

The Stethem and Associates (2010) study concluded that the Avalanche Hazard Index (AHI) for Yoho Park is Moderate, and that the majority of this risk is concentrated in the Mt. Bosworth group within the adjusted Project area. The level of AHI at the Mt. Bosworth group is deemed to be significant; this AHI warrants consideration. However, the study also concluded that there would be only a minor increase in risk with the wider, twinned highway; in other words, most of the AHI already exists for the current highway, and the proposed adjusted Project itself will not add greatly to this.

Given that the existing highway is already subject to avalanche hazards, Parks Canada already implements some avalanche risk mitigation measures. Currently, this is predominantly in the form of active and purposeful helicopter 'bombing'. The Stethem and Associations (2010) study recommended that the AHI mitigation program be upgraded as part of the adjusted Project.

Several options for such AHI mitigation upgrading were assessed by Stethem and Associates (2010): snowsheds, earthworks, and enhanced explosive avalanche controls. Only the enhanced explosive avalanche controls were deemed to be warranted or practical. These enhanced controls would most likely be in some form of remotely activated explosive systems located high up on the mountain slopes in the starting zones of several of the chutes. Thus, the likely AHI mitigation measures would be similar in both outcome and environmental implications as the current approach, with only readily mitigable small set-up implications (construction of small,



permanent, self-contained structures likely on bare rocks on the high mountain slopes) and readily mitigable timing of maintenance being different. For example, care would need to be taken so as to conduct and time construction and maintenance to avoid disturbing kidding and nursing mountain goats.

While these remote, self-contained avalanche control systems would be located within the Declared Wilderness zone, ss14(3)(b) of the Canada National Parks Act (2000) does allow for these systems, since they are for the purpose of public safety.

While snowsheds were not deemed by Stethem and Associates (2010) to be warranted for AHI mitigation purposes, consideration was given to also using them as wildlife crossing structures. However, because of site constraints (particularly topography and the presence of the adjacent downslope railway), variability of avalanche pathways, and high capital costs, this approach was still deemed to not be warranted.

### **Cumulative Effects**

As with the 2004 Environmental Assessment, the cumulative effects assessment focussed on wildlife connectivity, human conflict with wildlife, and wildlife mortality.

Importantly, as with the original Environmental Assessment and Determination, the presence and influence of the Canadian Pacific Railway-line (CPR) tracks was taken into consideration. For example, it is recognized that the railway-line does have an effect on wildlife health and movements. Furthermore, it is also recognized that having wildlife crossing structures in close proximity to the railway-line has the potential to introduce wildlife into a collision-prone location; however this also has the potential to allow a focussed and repeated presence of wildlife that can subsequently better acclimate to this hazard and also that can be better addressed for the railway-line crossing (as compared to dealing with a dispersed crossing, which would occur otherwise).

Similarly, another consideration arising from the proximity of the CPR tracks is that wildlife that are repulsed by the highway exclusion fence will be struck by trains. Fortunately, for most of the length of the adjusted Project there is a vegetated separation between the anticipated location of the fence and the tracks. Thus, there is a refuge, a buffer of sorts, between the fence and the tracks. For those areas where the highway and the tracks are in close proximity, and at times even immediately adjacent, it is felt that most wildlife will be quickly repulsed by the exclusion fence, and thus not be in notable increased risk of a railway strike. In any eventuality, it is anticipated that overall there will be a greatly diminished rate of wildlife strikes and consequent mortalities with the installation of the highway exclusion fence than without such a fence.

Most of the implications of this railway-line to cumulative effects would be addressed at the scale of detailed design. For example, in the locating and design of wildlife passage structures. Similarly, both within and outside the breadth of this adjusted Project, Parks Canada is actively pursuing cooperative investigations (for example, in regards to methods for excluding wildlife from fenced sections of railway-line) and actively considering cooperative actions (for example, wildlife structures which potentially cross both the highway and the railway-line, and exclusion

fencing which encloses both) with Canadian Pacific Railway to mutually address the ecological integrity associated with wildlife and wildlife passage through the region.

It is anticipated that the adjusted Project, including the roadway itself, the exclusion fence, and the wildlife crossing structures, will not notably increase the potential for wildlife and humans to come into contact and conflict, and thus not notably increase the potential for adverse management actions. In fact, by keeping wildlife off of the highway there would be fewer such conflicts. Similarly, the exclusion fence would create a buffer between wildlife and humans. West Lake Louise Outlying Commercial Accommodation (WLLOCA) remains the main high human use site within the adjusted Project area; wildlife already pass through this area, and movement along the periphery of the exclusion fence would likely not notably alter this frequency of conflicts.

Moreover, if the fence is placed on the wilderness side of WLLOCA (as is one option), this frequency of conflict would in fact diminish. Similarly, the truck pull-offs will be relocated to an area where fewer wildlife will be present. Moreover, the exclusion fence would be placed on the outside of these truck pull-offs and associated attractants. As such, there will be less opportunity for habituation by wildlife.

In conclusion, wildlife mortalities arising from wildlife-human conflicts are not expected to increase as a result of the adjusted Project, and in fact are likely to decrease.

Fence end treatment has been a concern for all stages of the Project, and will again be a concern for the adjusted Project. Fortunately, if the adjusted Project in its entirety is constructed, the fence end would be located in a location with steep slopes on either side, and thus would be far more effective at discouraging circumvention by wildlife than has existed for most of the earlier fence-end locations of the Project. Alternatively, if construction of the adjusted Project is phased such that only a portion is completed in the short-term, the fence end situation would be basically the same as what is already planned; thus, phasing of the adjusted Project does not change the implications of this matter.

To stress the point, existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient.

It is concluded that while there will be small incremental effects on wildlife connectivity, human conflict with wildlife, and wildlife mortality as a result of the adjusted Project, none of these are expected to contribute to an adverse cumulative effect, especially once typical approaches to mitigation are considered. Moreover, many of these mitigation measures will actually improve conditions over what currently exists. In conjunction with other management practices, such cumulative enhancements will likely positively contribute to restoring ecological integrity in Banff and Yoho National Parks.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

## **Public Consultation**

Public engagement and updating has always been an important aspect of the TCH Twinning Project, including during the Phase IIIB component and now during the adjustment of this component. For example, engagement and updating the public about the TCH IIIB Project has been a notable aspect of numerous Field Unit Superintendent meetings. Similarly, the Director of Highway Services holds an annual meeting with the established Stakeholder Advisory Group (SAC). During the 2010 annual SAC meeting, the SAC was informed and consulted about this adjustment to the Project and to the EA. Both the Superintendent and the Director also periodically engage with the Advisory Development Board (including on 27 January 2011, during which this adjusted Project was specifically addressed), and both have had numerous informal discussions with many other stakeholders. Similarly, the public has been consulted on this adjusted Project, including through notification on the CEA Registry and through an advertised invitation to review the draft adjusted EA report.

No new environmental or cultural resources issues were identified; all environmental and cultural resource matters of interest appear to have been addressed. Public safety was raised as an issue, in the context of west bound traffic transitioning from twinned to existing roadway near the top of the 'Field Hill'. Partially in response to this concern, the transition was placed on a still relatively flat section of roadway. Also, the trucker's brake-check pull-off was placed nearer to the hill itself; it will now be to the west of Wapta Lake, rather than to the east. This will result in trucks moving at a more appropriate speed as they enter the hill, and will create a more timely visual reminder to all traffic.

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

## **Other considerations**

The Government of Canada recently released the *Planning for a Sustainable Future: A Federal Sustainable Development Strategy for Canada* (FSDS) (Environment Canada, 2010). This strategy reaffirms the Government of Canada's commitment to promoting environmental sustainability. The FSDS has established four priority themes:

1. Addressing climate change and clean air;
2. Maintaining water quality and availability;
3. Protecting nature (notably Wildlife Conservation, Ecosystem/Habitat Conservation and Protection, and Biological Resources); and
4. Shrinking the environmental footprint (notably beginning with Government operations).

Importantly, the adjusted Project has elements that address all four priority areas established by the FSDS. For example, the current preliminary alignment already specifically addresses the latter three themes, and this consideration will be carried into the later detailed design stage. Similarly, the use of the immediately-adjacent Wapta Pit addresses the first theme, in that construction material will have to be transported only a short distance and thus air emissions will be greatly diminished relative to transporting from other sources.

### **Summary of issues and impacts**

Most aspects of the expansions will be managed in a similar manner to what is already being done for the existing Project. The new matter of conserving a mineral lick for mountain goats will require great sensitivity and care; however, it is anticipated that this can be addressed during ongoing preliminary design stage and the detailed design stage (for example, through a combination of refinement of project design and careful placement of the alignment, and development and implementation of a Environmental Protection Plan to Parks Canada's satisfaction).

There are no other material changes from the 2004 Environmental Assessment Document in this subsection.

For all other matters, the existing (see Appendix VII of the 2004 Environmental Assessment Document) and equivalent typical approaches to mitigation would still apply and are still felt to be feasible and sufficient.

### **Considerations of significant adverse effect.**

No material changes from the 2004 Environmental Assessment Document in this subsection.

### **Follow-up Program**

Given the uniqueness of the mineral licks and the apparent importance of these mineral licks to mountain goats, a follow-up program to assess the successful conservation/retention of these mineral licks is warranted. Furthermore, given the uniqueness of the site for potential north-south passage by mountain goats, a follow-up program to assess the use of crossing structures by mountain goats is warranted. However, a qualifier is necessary on the latter: this presumes that mountain goats do in fact require such passage at this site.

Note that the on-going follow-up monitoring program of TCH wildlife mitigations has to date concluded that wildlife do use crossing structures, but how often they are used and how well they are accepted by wildlife varies between species and geographic area, and the reasons why are unclear. Never-the-less, it is known that crossing structures are used extensively, especially once wildlife acclimate to them. It is also known that exclusion fencing does greatly decrease wildlife-vehicle collisions and thus mortality, especially for ungulates. The fence is less effective for carnivores, which can more readily circumvent the fence; a buried apron has been found to increase the effectiveness of the fence. Knowledge from this follow-up program has been incorporated on an on-going basis into the Project design and construction, and this will continue for the design and construction of the adjusted Project.

The on-going follow-up monitoring program has continued to evolve. For example, recently completed sections of TCH twinning phase IIIB Project are now included in the program. Similarly, monitoring of Harlequin duck passage at Moraine Creek has commenced, and

monitoring of wolverine genetics in relation to the Project will commence shortly (Miistakis Institute, 2010).

No other material changes from the 2004 Environmental Assessment Document in this subsection.

#### **CEA Act – Section 20 Determination**

Parks Canada has examined the environmental information, and has considered all of the information for the adjusted Project that is relevant to the scope of the environmental assessment. Pursuant to Parks Canada's duties as a Responsible Authority for the Trans-Canada Highway Phase IIIB twinning project, Parks Canada determines that taking into account the implementation of potential mitigation measures (including the typical approaches to mitigation that were set out in the original documents, or equivalents, as well as additional measures noted above), the adjusted Project with length expansions and associated other project components is not likely to cause significant adverse environmental effects or impairment of ecological integrity. Therefore, pursuant to Section 20(1)(a), CEAA (2003) Parks Canada may exercise any power or perform any duty or function that would permit the adjusted Project with expansions to be carried out in whole or in part.

Several matters are noted in this adjusted Project environmental assessment as requiring a future final decision by Parks Canada. These final decisions will be made by the Field Unit Superintendent, in consultation with the Director of Highway Service Centre, and also with consideration of advice from specialists from the field unit and from the West and North Service Centre.

**Approved by:**



**Pam Veinotte, Field Unit Superintendent**  
**Lake Louise, Yoho, Kooetnay National Park**  
**Date: 10 March 2011**

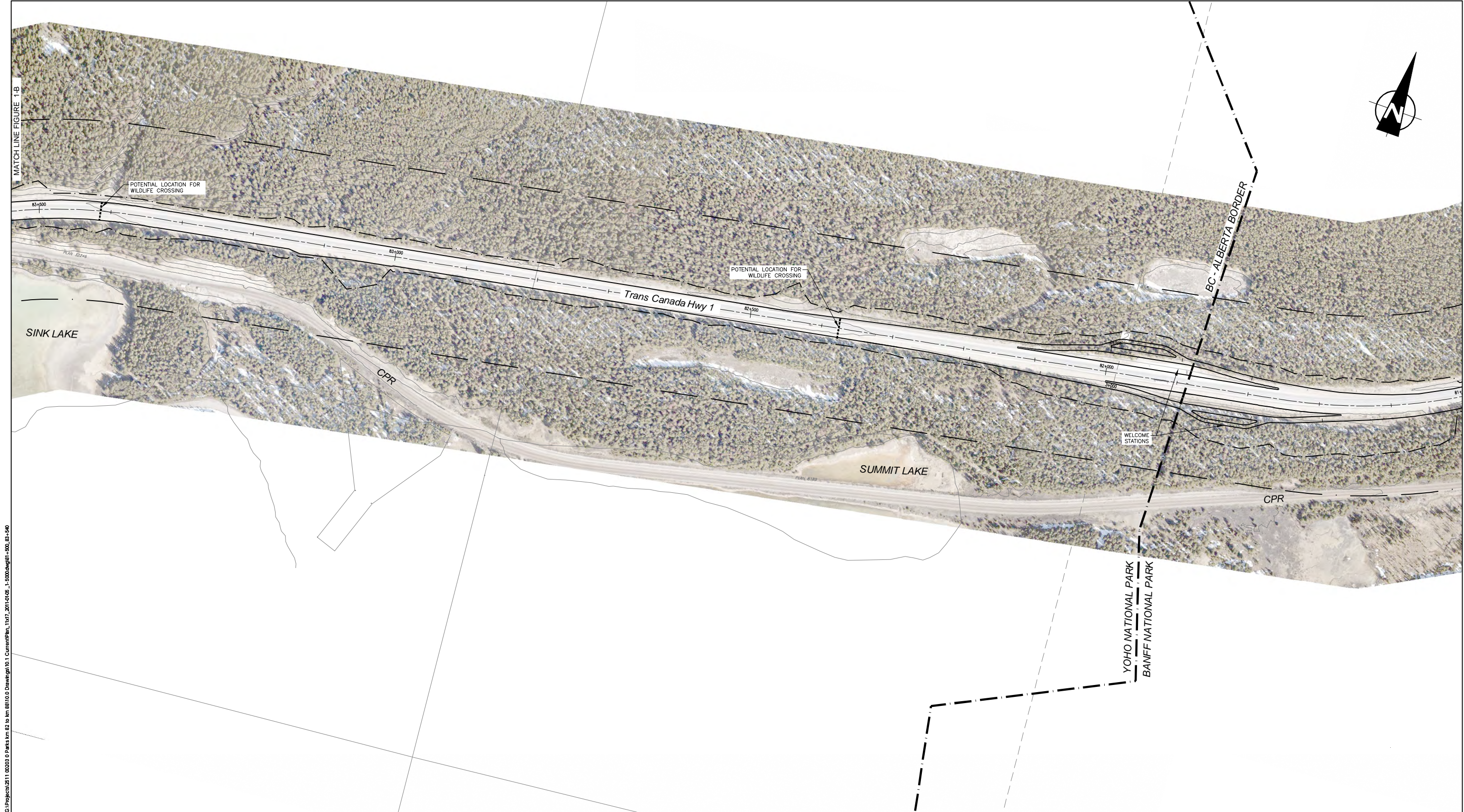
Conducted and prepared by:

N. John Olyslager, Senior Environmental Assessment Specialist

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---	CUT/FILL LINE
- - - - -	WILDERNESS ZONE BOUNDARY
---	TCH CENTER LINE
---	EDGE OF PAVEMENT

SCALE 1:5000

**CPR** CANADIAN PACIFIC RAILWAY

----- POTENTIAL LOCATION FOR FOR WILDLIFE CROSSINGS BASED ON TOPOGRAPHY AND ROADWAY ALIGNMENT. THE LOCATION AND TYPE OF STRUCTURE(S) REQUIRED IN THE CORRIDOR HAVE NOT BEEN FINALIZED.

Parks Canada Agency  
Western and Northern Region

L'Agence Parcs Canada  
Ouest et Nord Région



TRANS CANADA HIGHWAY TWINNING KM 82 - KM 88				
PLAN STA 81+500 TO STA 83+540				
PROJECT NO. 2511 00203-0	DWG VB	CKD RB	REV 0	Figure 1 - A
OFFICE: CALGARY	DATE December 2010			





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---	TCH CENTER LINE
---	EDGE OF PAVEMENT


**CPR**

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CANADIAN PACIFIC RAILWAY

POTENTIAL LOCATION FOR WILDLIFE CROSSINGS BASED ON TOPOGRAPHY AND ROADWAY ALIGNMENT. THE LOCATION AND TYPE OF STRUCTURE(S) REQUIRED IN THE CORRIDOR HAVE NOT BEEN FINALIZED.

SCALE 1:5000



Parks Canada  
Agency  
Western and  
Northern Region

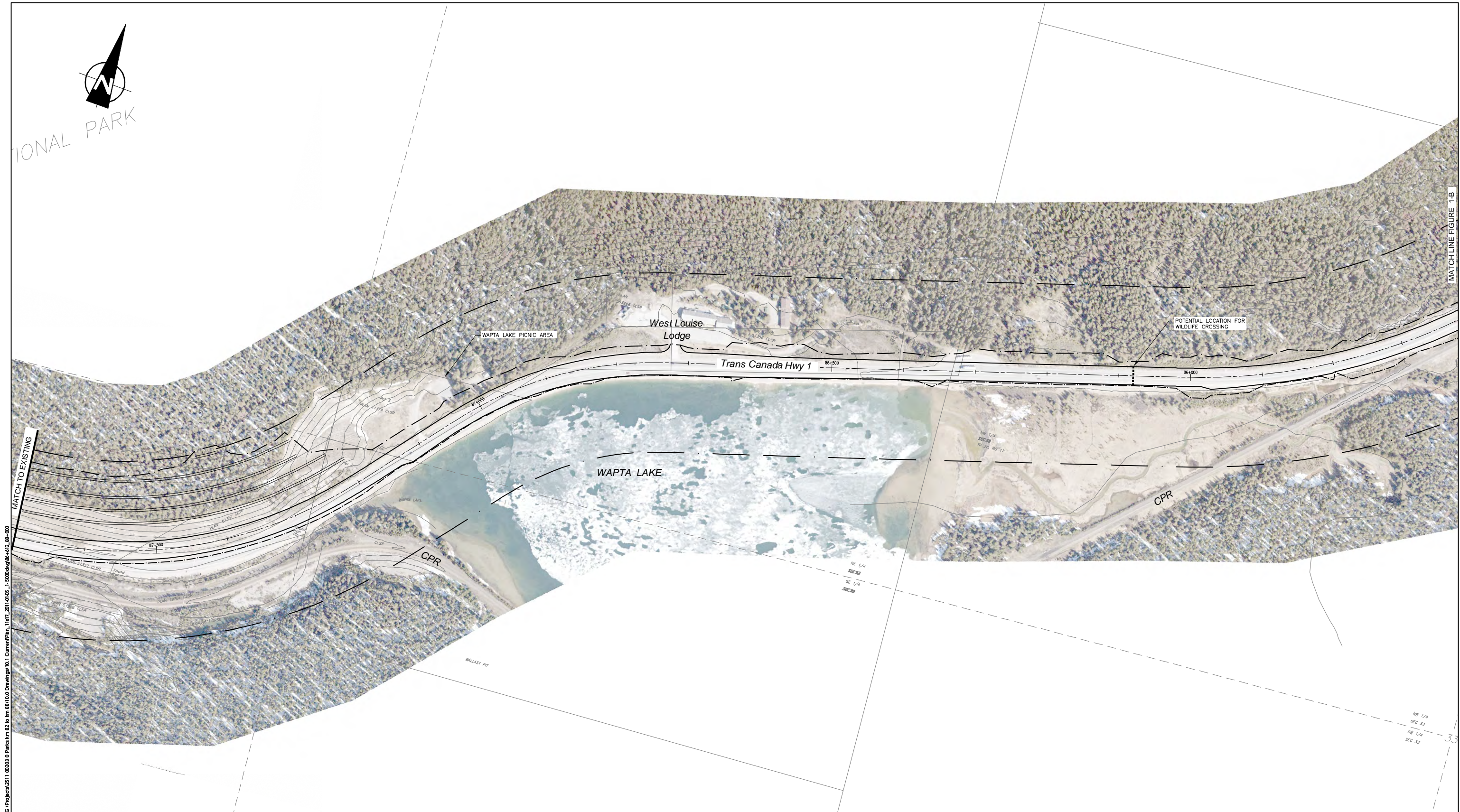
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Canada  
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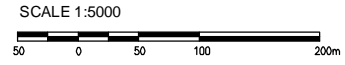
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OFFICE: CALGARY	DATE December 2010			





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  - - - WILDERNESS ZONE BOUNDARY
  - TCH CENTER LINE
  - EDGE OF PAVEMENT
  - CPR** CANADIAN PACIFIC RAILWAY
  - POTENTIAL LOCATION FOR WILDLIFE CROSSINGS BASED ON TOPOGRAPHY AND ROADWAY ALIGNMENT. THE LOCATION AND TYPE OF STRUCTURE(S) REQUIRED IN THE CORRIDOR HAVE NOT BEEN FINALIZED.



Parks Canada Agency  
Western and Northern Region

L'Agence Parcs Canada  
Ouest et Nord Région

**McElhanney**

TRANS CANADA HIGHWAY TWINNING KM 82 - KM 88				
PLAN STA 85+612 TO STA 88+000				
PROJECT NO. 2511 00203-0	DWG VB	CKD RB	REV 0	Figure 1 - C
OFFICE: CALGARY	DATE December 2010			



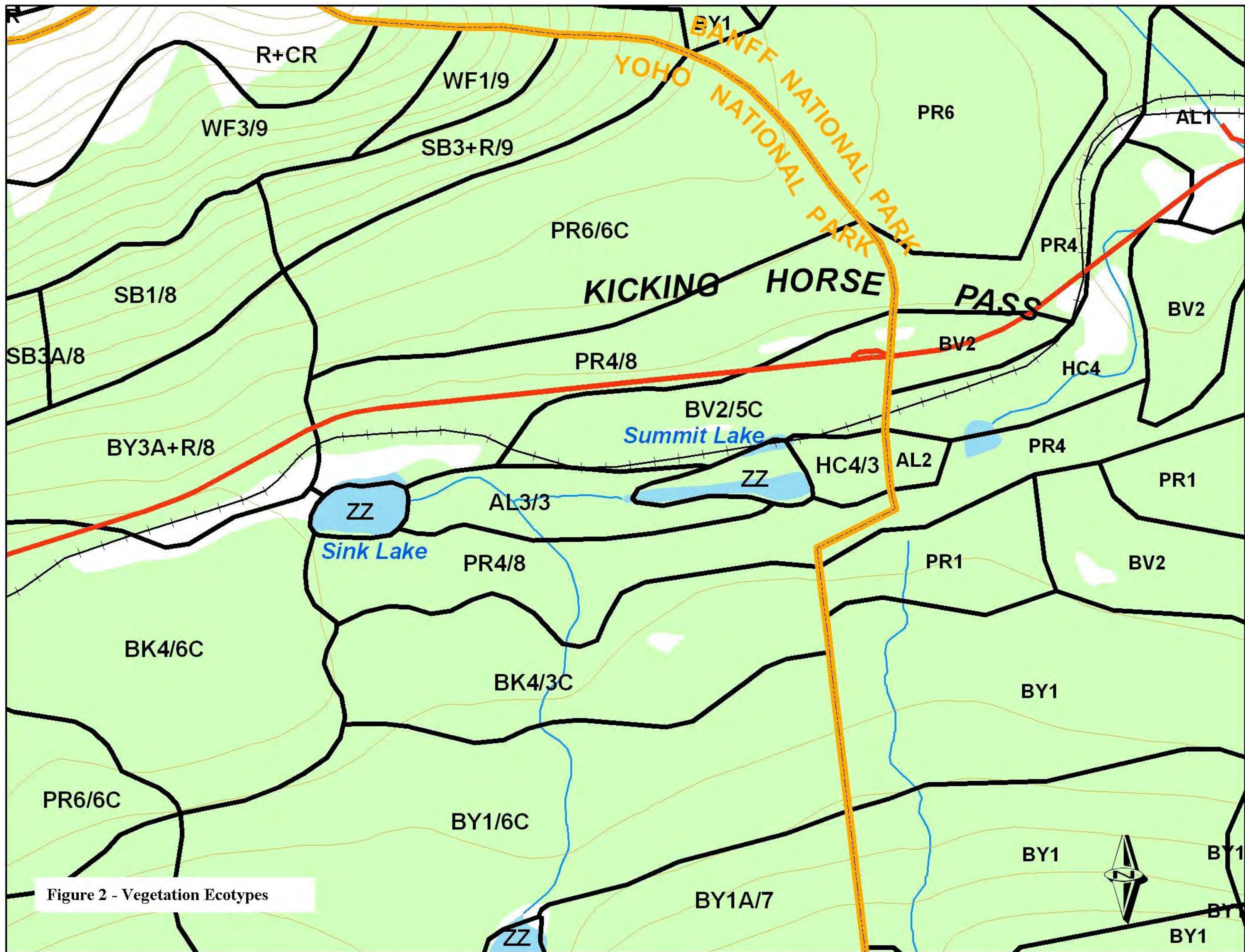
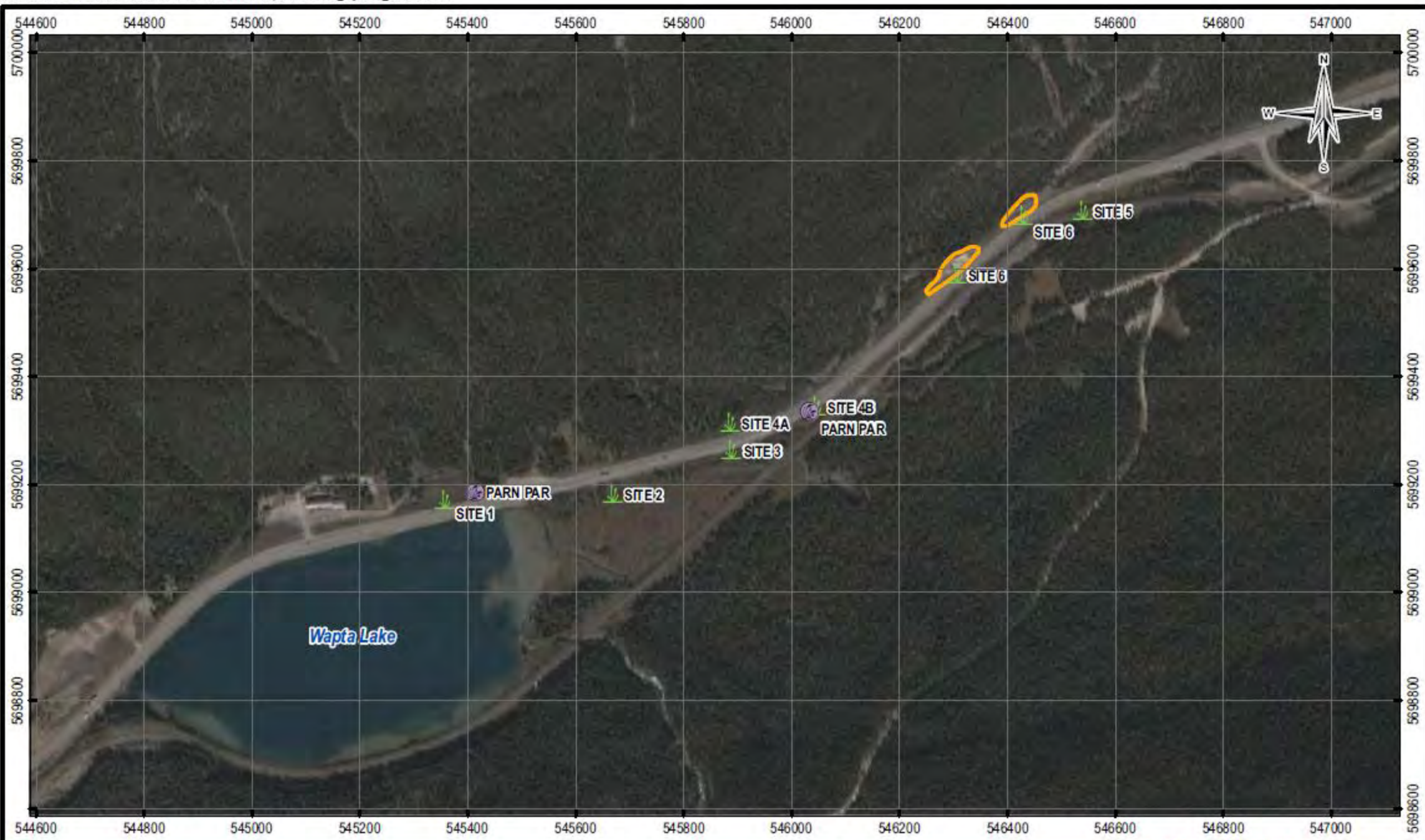





Figure 2 - Vegetation Ecotypes





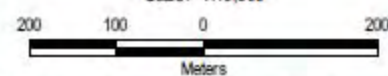
### LEGEND

-  Parn par (Small Northern Grass-of-Parnassus)
-  Rare Plant Survey Location
-  Mineral Lick

### NOTES


1. Base data source:  
Imagery from Google Earth Pro (September, 2002)
2. Tall White Bog Orchid was identified at all sites except Site 2 and Site 6

Scale: 1:10,000



PROJECTION: UTM Zone 11      DATUM: NAD83

FILE NO.: V33101067\_Figure01\_Wetlands.mxd

EBA Engineering Consultants Ltd. 

**PARKS CANADA**  
**KM 82-88 EA**

### Rare Plant Survey Locations and Identified Rare Plants

PROJECT NO. V33101067	DWN MEZ	CHK TP	REV 0
OFFICE EBA-VANC	DATE October 26, 2010		

Figure 1



ISSUED FOR REVIEW





## LEGEND

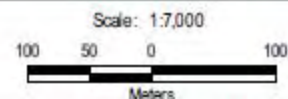
### Site Location

-  Fish Captured
-  No Fish Captured

### NOTES

Base data source:  
Imagery from Google Earth Pro (September, 2002)

ISSUED FOR REVIEW



PROJECTION  
UTM Zone 11

DATUM  
NAD83

FILE NO.  
V33101067\_Figure01\_FHA.mxd

EBA Engineering  
Consultants Ltd.



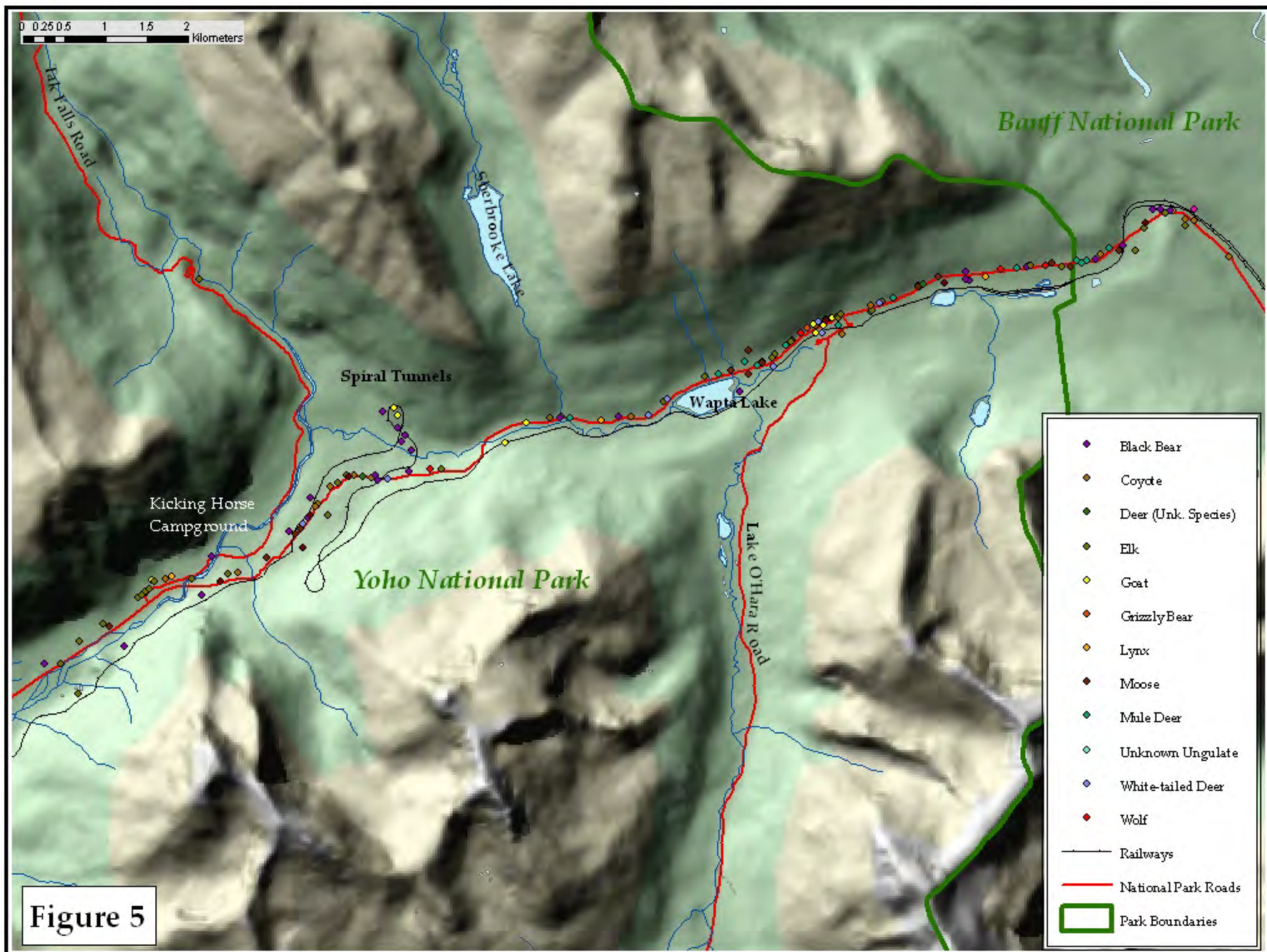
## FISH AND FISH HABITAT ASSESSMENTS TRANS CANADA HIGHWAY KM 82 TO 88

### Site Locations

PROJECT NO. V33101067	OWN MEZ	CKD TP	REV 0
OFFICE EBA-VANC	DATE October 14, 2010		

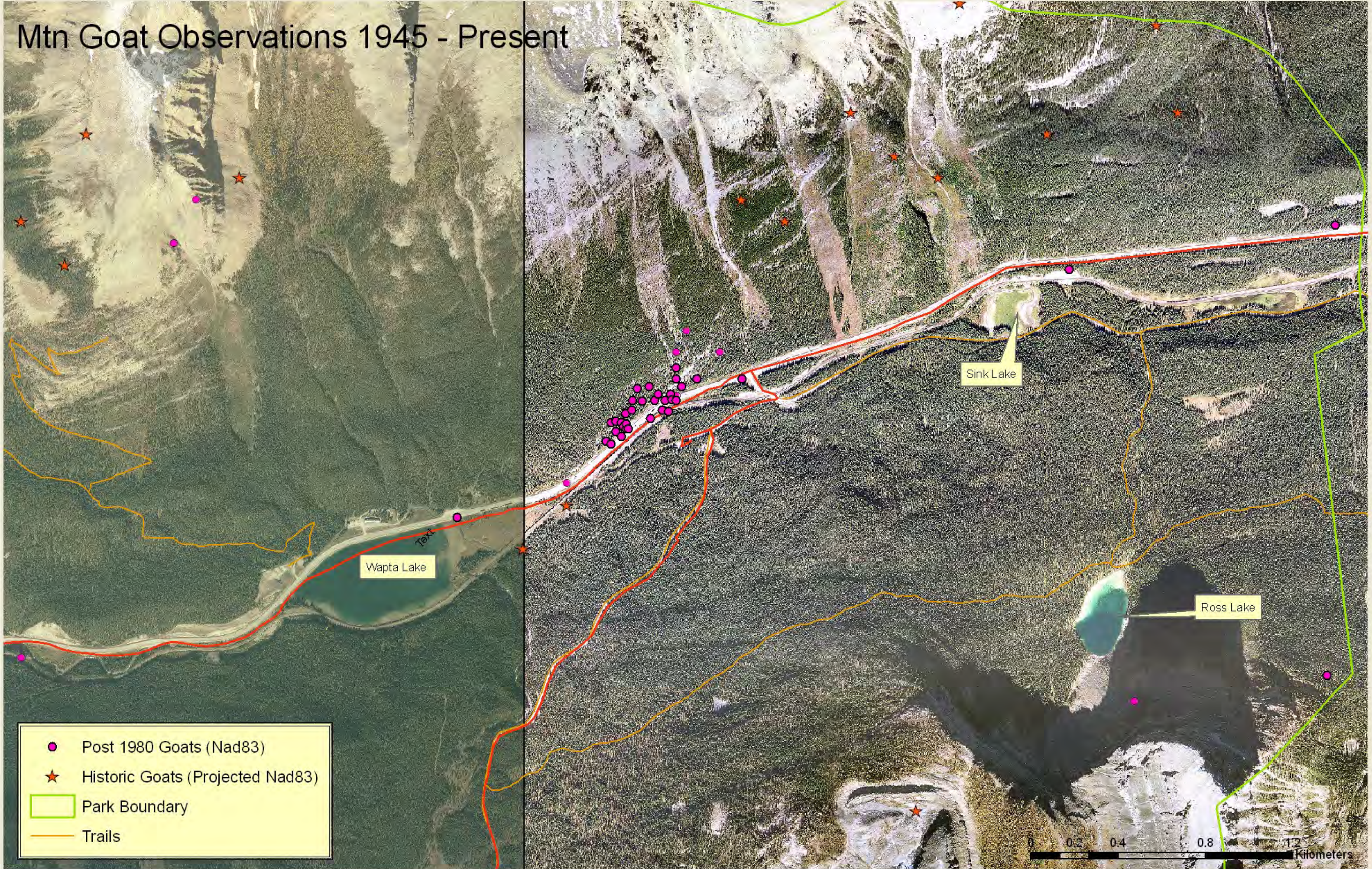
Figure 1



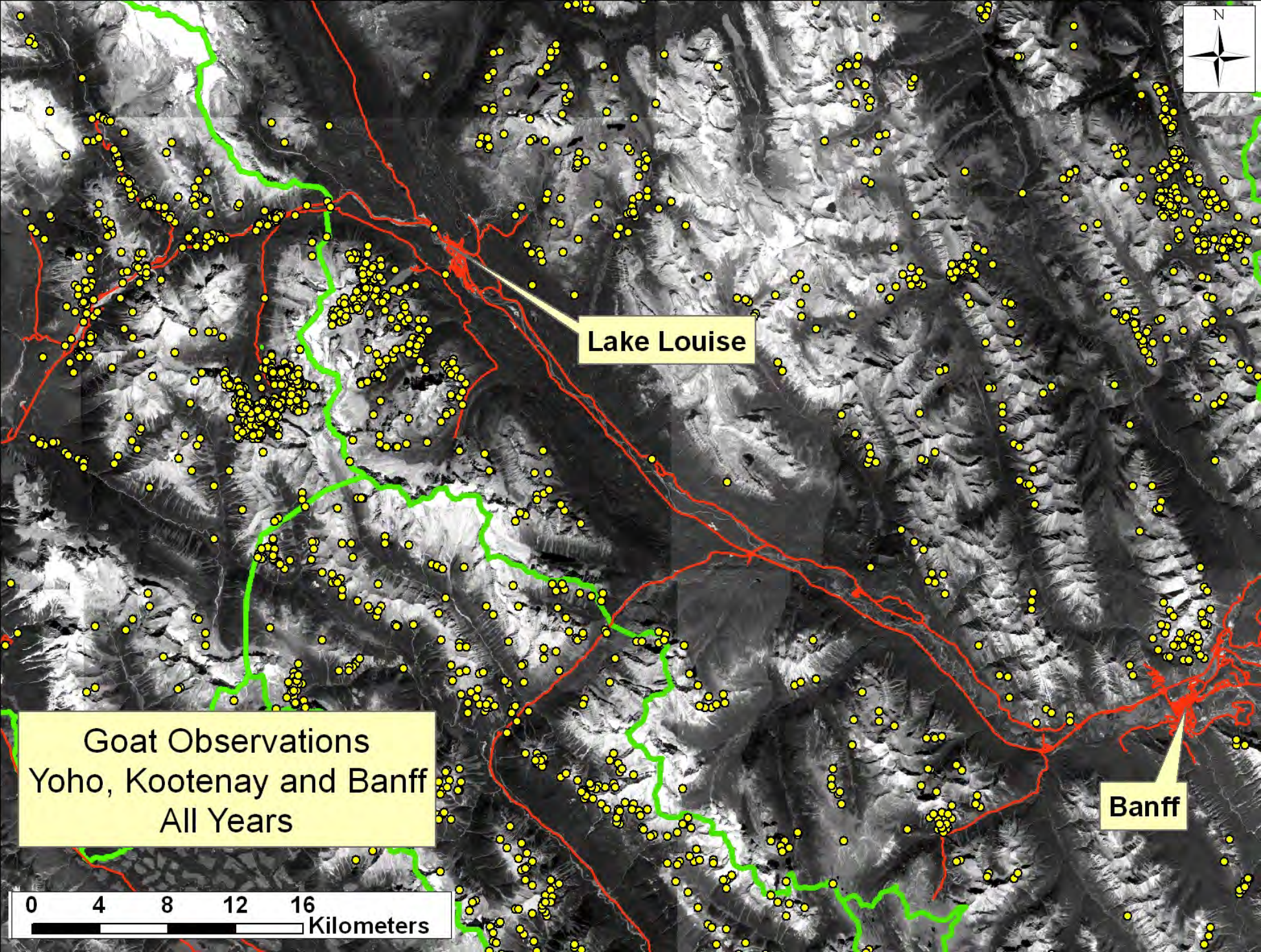




# Mtn Goat Observations 1945 - Present







Lake Louise

Goat Observations  
Yoho, Kootenay and Banff  
All Years

Banff

0 4 8 12 16 Kilometers



Goat RSF Habitat Model  
Yoho and Banff  
(Variables: Elevation, Slope,  
Distance to Escape Terrain)



Field

Lake Louise

Castle Junction

Banff

- Roads
- Escape Terrain
- RSF Value**
  - High
  - Low

