Adaptive Management of Blind Bay White Lake Trail System

Environmental Monitoring Plan

Prepared For: Columbia Shuswap Regional District and Shuswap Trail Alliance
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First Monitoring Report
November 4, 2010

Background and Rationale

Trail monitoring efforts will include: 1. Compilation and review of trail user forms, 2. General notes made during routine trail maintenance and 3. Site-specific details collected at pre-defined monitoring sites during scheduled monitoring visits in the spring and fall. General notes made during routine trail maintenance will record conditions of the natural features and functions in the Blind Bay White Lake area that were determined to be vulnerable to impact by trail use through the Environmental Screening process (see Blind Bay White Lake Environmental Screening Report 2010).

The first fall-season monitoring of five specific sites has been completed and results are provided near the end of this report. For each site a field form has also been developed along with a sketch of the site and directions for future monitoring.

The Blind Bay White Lake Trails long-term adaptive management plan follows this framework:

Results: What we are attempting to achieve?

1. Avoid removal of large standing dead trees and coarse woody debris on the forest floor
2. Avoid trampling and trail widening near riparian areas.
3. Avoid sediment and erosion into streams
4. Minimize spread of invasive plant species.
5. Minimize physiological or behavioural disruption of wildlife.
6. Avoid increased threat of wildfire along the private land interface.

Desired Behaviours: Actions most likely to achieve results?

1. Promote the conservation of wildlife habitat trees.
2. Use existing trails, boardwalks and bridges, avoid heavy use during muddy conditions, obey all trail closures.
3. Monitor stream banks at crossing points. Conduct a baseline inventory.
4. Learn to identify invasive plants, monitor for new introductions and spread. Conduct a baseline inventory.
5. Do not harass wildlife. Record wildlife encounters on trail use forms provided at trail heads.
6. No open fires except in designated campsites, no trail use during high fire risk periods when back country closures are in effect. No smoking.

Indicators: Measurables to determine if results are achieved?

1. Loss of standing snags and nest trees along the trail corridors.
2. Trail widening, trail braiding. Reports of trail use during closed periods.
3. Evidence of erosion and bank instability within riparian areas (30 m from water course).
4. Introduction of new invasive species within 5M of trails.
5. Proportions of wildlife encounters resulting in an alarm response (movement by animals to safer locations), population abundance and distribution trends (check with Min. of Environment for updates on wildlife inventory data)
6. Observations of fire rings and fire scars along the trails.

Limits: Acceptable bounds of the measured indicator?

1. No trees with large open nests removed as a consequence of trail activities.
2. No increase in trail width.
3. No erosion near waterways, no bank instability as a consequence of trail construction (including concentration of cattle at trail stream crossings)
4. No increase in invasive species, stem densities or spatial extent of current infestations.
5. No increase in rate of alarm responses over time, no harassment reported, no abandonment of habitats caused by trail activities
6. No increase in fire scars outside of campsites.

Monitoring Schedule: How often the indicators will be measured?

1. Specific monitoring information will be collected at a five monitoring sites on the Blind Bay White Lake Trails (see Monitoring Plan below).
2. During maintenance inspections, trail stewards should be aware of all of the concerns listed above and note any changes to the natural features and functions surrounding the trail.
3. Both general and site-specific monitoring will be conducted during the two scheduled maintenance inspections (spring and fall).
4. The first fall environmental monitoring was conducted October 7, 2010.
5. Trail user survey forms will also encourage local user-stewardship of the trail. Forms should be made available at trail heads and include a column for wildlife observations. This form may also provide a process for people to record and report observations non-conforming use of the new trail (e.g., motorized use in riparian area, open fires outside of campsites) without being adversarial. It may be useful to digitally enter pertinent information on trail user forms into excel templates. This would allow a more convenient method to summarize and analyze trail use and

observations over time. The average number of hikers (and dogs), peak use periods, and the proportion of visits where wildlife was observed are all examples of useful information for long-term adaptive management.

6. A critical component of adaptive management is planning a protocol for storing, accessing and reporting on monitoring information. A central repository is required to store and access this information. A protocol for reviewing and reporting on environmental monitoring information will complete this effort. Staff with the CSRD Area C Parks should consider these aspects of how to manage and organize this information.

Corrective Actions: Actions triggered if limits are surpassed?

1. Increase user education efforts
2. Seasonal trail closures (e.g., high water in spring, invasive plant seed dispersal periods)
3. Invasive plant removal programs (support is available through the BC Invasive Plant Council)
4. Construction of structures to limit cattle use of trail, concentrating crossings and resulting in sediment and erosion as well as riparian vegetation trampling
5. Trail relocation (specific thresholds that would trigger this level of corrective action will require more discussion)

Site Specific Monitoring:
Blind Bay White Lake

Concerns

We have selected five monitoring sites. They are representative of concerns along the trail system or specific to concerns at that selected site. These sites will allow long-term monitoring of the most sensitive features on these trails. All sites should be monitored for the spread of invasive species.

Site 1 McArthur Heights Switchback below cliff (UTM 333773,5641308)
There are concerns that trail erosion and braiding will damage vegetation and habitat on this scree slope.

Site 2 Blind Bay Viewpoint (Above McArthur Heights at UTM 334187,5641251)
Concerns here are related to the destruction of vegetation as people congregate at this viewpoint.

Site 3 ATV Access at Middle Viewpoint (UTM 334358,5641077)
This site is being accessed by ATV's through the adjoining cutblock. Trail erosion is already evident. Monitor further trail erosion using the same method used on the first monitoring visit of October 7, 2010. (Described below)

Site 4 Tappen Valley Viewpoint (UTM 335650,5638708)
This site on the White Lake trail is an open meadow area which is a natural stopping place. There will be heavy use. Monitoring should track the growth of social trails around the site, trail widening, vegetation trampling and destruction.

Site 5 Bridge 2 (UTM 336764,5639445) at 1012M west of White Lake Lookout Junction
Concerns here are related to horses bypassing the bridge. This is causing erosion of the streambank into the streambed. The sloughed area also provides disturbed ground conducive to the growth of invasive species. Remedial actions have been suggested but monitoring for these concerns are still important.

Methods

Photo documentation will be the primary method to document change over time. Monitoring of these sites will be conducted during the 2 scheduled maintenance inspections (spring and fall). The first fall environmental monitoring has been conducted (October 7, 2010). A secondary measurement of change will be to monitor for the introduction of new species. A list should be compiled for each site as the species are noted. Site 3 uses a tread depth measurement system that entails measuring from a permanently installed peg.

Results

Trail braiding, proliferation, and erosion must be avoided for long-term sustainability and low-impact of the trail system. As trail users and stewards, we must avoid creating unstable

banks beside streams where sediment flow and erosion into streambeds will degrade water quality. Protecting bank stability will also protect the structural integrity of the trail's clear-span bridge abutments. Although invasive weeds are not ubiquitous adjacent to the Blind Bay White Lake trails we want to avoid any further introduction or spread of invasive species through increased recreational use of this area. Expanding footprints of viewpoints where vegetation becomes trampled will change the composition of the plant community and will tend to favour those invasive plant species that are resistant to trampling.

Desired Behaviours
Users staying on the trails, not widening tread or viewpoints. Trail users avoid trampling vegetation and creating short, redundant social trails. Trail users recognize invasive plants and their seeds and avoid introducing or spreading invasive species.

Indicators
Any increase in trail widening, bank instability adjacent to bridge crossings (such as sloughing banks), destruction of vegetation, or trampled vegetation will indicate that we are not meeting the objective of avoiding impacts and protecting water quality. Expanding view point areas and observations of new invasive plants species or the spread of current invasive species will indicate that trail use is negatively impacting the natural features in the Blind Bay White Lake area.

Limits
The following is a list of acceptable limits for the indicators that we will be monitoring at these sites. If we observe indications that we have surpassed these limits, corrective actions will be required.

- No increase in size or number of unstable banks adjacent to hiking trail bridges.
- No bank instability at clear-span bridge abutments.
- No new invasive species.
- No spread of invasive species beyond current noted locations.
- No increase in social trails, trail braiding or tread erosion.
- No increase in areas with trampled or destroyed vegetation at viewpoints

Corrective Actions
Options for corrective actions if we observe that acceptable limits have been surpassed include:

- Design and construct structures (e.g., styles, benches) to direct and focus movements along hiking trails and viewpoints.
- Pull new invasive species and those spreading beyond current locations by their roots.
- Contact the Invasive Plant Council of BC for advice when needed.

Blind Bay – White Lake Field Form (following page)

- Use 1 field form for all 5 sites during a scheduled trail monitoring session
- If all sites are not monitored by the same person use one field form for the 2 White Lake sites and another field form for the 3 Blind Bay sites
- Use the photo site locations on each site sketch as a general guide, the important point is that your photos should document the current conditions of the issue of concern. The issues are described in the “View Content” column of the field form.
- Provide comments and feedback to help improve the field form

Blind Bay - White Lake Trail System

Evaluator: _____ **Date of Evaluation:** _____

Site Name	GPS coordinates: Easting	Northing	Check Sites Monitored
MacArthur Heights Switchback	333773	5641308	
Blind Bay Viewpoint	334187	5641251	
ATV Trail at Middle Viewpoint	334358	5641077	
Tappen Viewpoint	335650	5638708	
Bridge 2 - Horse crossing	336764	5639445	

Site Measurements:

Site	Concern / Indicator / Measureable	Measurement (include units)							Comments
MacArthur Heights Switchback	Depth of exposed root below large Douglas fir								
Blind Bay Viewpoint	Area of viewpoint with exposed soil (top of ridge)	%							
ATV Trail at Middle Viewpoint	Soil compaction from ATV traffic (measure depth at each foot)	4 ft:	5 ft:	6 ft:	7 ft:	8 ft:	9 ft:	10 ft:	
Bridge 2 - horse crossing	Photo collection only - Bank instability adjacent to bridge								
Tappen Viewpoint	Area of viewpoint with exposed soil below climbing tree	%							

Photo Documentation:

Photo #	Location	View Content - Issues of Concern	Comments
MH 1	MacArthur Heights Switchback, view up trail from switchback	unstable slope, exposed large Douglas fir root	
MH 2	MacArthur Heights Switchback, view down trail from switchback	rafted debris on smaller D. Fir trees	
MH 3	MacArthur Heights Switchback, view up toward switchback		
BB 1	Blind Bay Viewpoint, from center rock, view north	exposed soil and trampled veg	
BB 2	Blind Bay Viewpoint, from center rock, view south	exposed soil and trampled veg	
BB 3	Blind Bay Viewpoint, from south side, view north	exposed soil and trampled veg	
BB 4	Blind Bay Viewpoint, from south access, view south	trail braiding on viewpoint access	
ATV 1	ATV trail, view up slope	ATV tire ruts on slope	
TV 1	Tappen viewpoint, from northwest	open meadow, width of traili coming into viewpoint	
TV 2	Tappen viewpoint, from viewpoint back to northwest	open meadow, width of traili coming into viewpoint	
TV 3	Tappen viewpoint, from below viewpoint	area of exposed soil at rest stop	
TV 4	Tappen viewpoint, from viewpoint down to southeast	open meadow, width of traili coming into viewpoint	
TV 5	Tappen viewpoint, from climbing tree down to viewpoint	area of exposed soil at rest stop, trail braiding up to climbing tree	
BG 1	Bridge 2 horse crossing, either side of the bridge	bank instability caused by horse traffic	
BG 2	Bridge 2 horse crossing, either side of the bridge	bank instability caused by horse traffic	

Invasive Plant Species List:

Site	Location	Common name	Comments

Results of Site Monitoring – October 7, 2010

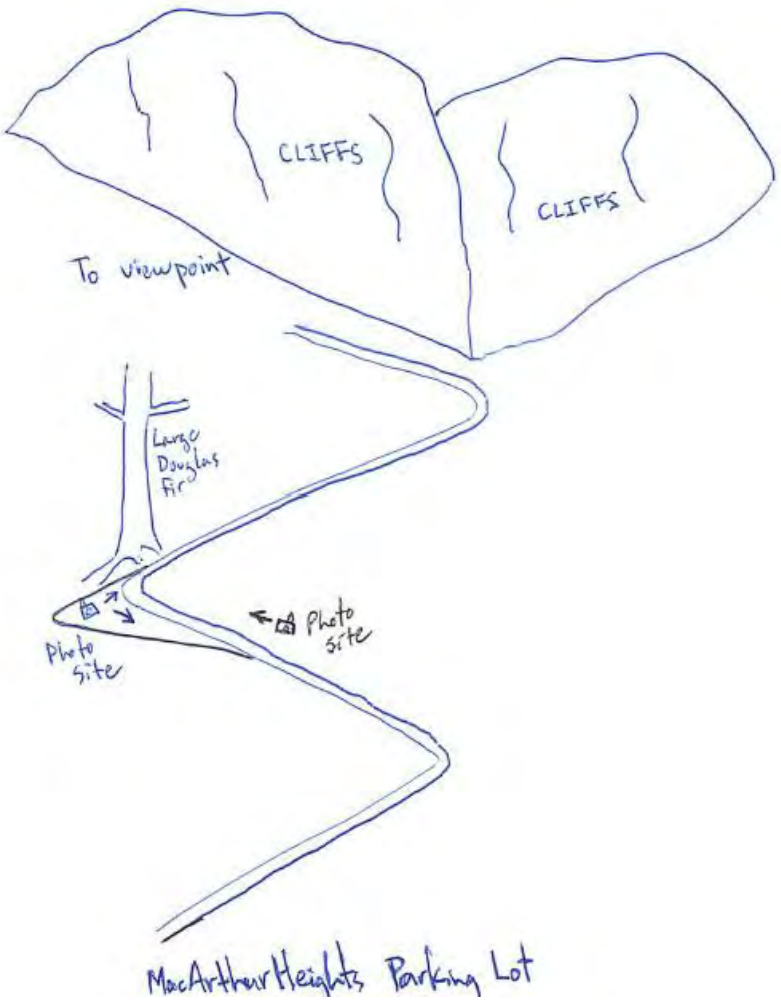
Site 1 McArthur Heights Switchback below cliff (UTM 333773,5641308)

Site Description

This monitoring site is on the steepest most challenging section of the hiking trail below the MacArthur Heights cliffs. The slope is ~50% at this switchback and the trail bed is composed of loose flat stone.

During the first fall monitoring visit, we observed severe erosion indicated by the large exposed roots at the base of a Douglas fir tree adjacent to this switchback. There has been significant degradation of the native vegetation in the area of the switchback where the mobile scree surface has uprooted existing plants. Outside of the trail corridor Douglas maple, Mock orange, Birch-leaved spirea, Saskatoon, Hazelnut, Snowberry (waxberry), Oregon Grape, Boxwood, Sumac, Prairie rose, Beard's tongue, Artemesia and Rock moss spp are common. No invasive species were noted.

Photos provide documentation of conditions at this time. We also measured the vertical exposure of one of the Douglas fir roots, which appeared to be down below the original grade by ~ 12 inches (see photos). The large Douglas fir on the uphill side of the switchback monitoring site, and the group of smaller Douglas fir trees just downhill from the switchback are currently healthy and do not appear to be leaning. Future monitoring should note the health of these trees, which may decline if further undermining and debris rafting stresses these trees on this dry talus slope.



Switchback Site Photos (see field form for photo locations)

Photo 1. View uphill from switchback monitoring site (Oct, 2010). Douglas fir roots appear exposed ~0.3 m below original grade. Further undermining of these large roots may stress and destabilize this large veteran tree.

Photo 2. Typical undisturbed vegetation outside of the eroded trail corridor (Oct, 2010). This photo was taken for comparison purposes and is not required for future monitoring.

Photo 3. View downhill from switchback monitoring site (Oct, 2010). Note eroded rock and debris rafted up against Douglas fir trees on lower side of trail.

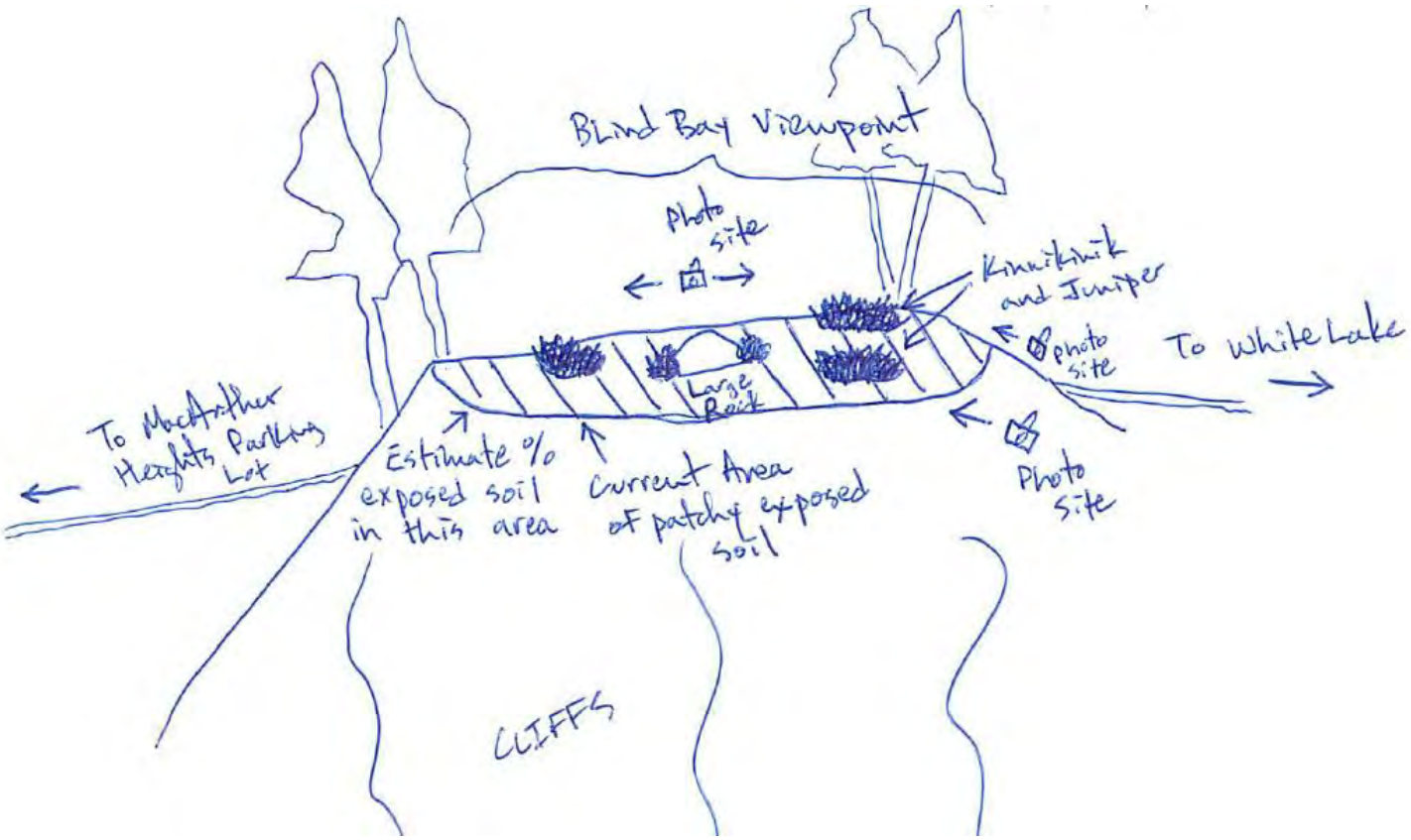
Photo 4. View uphill toward switchback monitoring site (Oct, 2010). Note secondary short cut trail increasing disturbance and causing further erosion at this site.

Site 2 Blind Bay Viewpoint (Above McArthur Heights at UTM 334187,5641251)

Site Description

This monitoring site is on the prominent rocky viewpoint on top of MacArthur Heights cliffs. Given the spectacular views of Blind Bay and surrounding areas, and the arduous climb up from the trail head, this viewpoint is a destination. The viewpoint currently has no benches or railings to control trampling and expansion of the viewpoint footprint. This is a dry, open site with a specialized plant community adapted to tough conditions. Trampling will create more exposed soil and increase the potential for invasive plants species more tolerant of trampling. A typical plant list collected at this site includes Kinnikinnick, Juniper, Rocky Mountain juniper, Bluebunch wheatgrass, Saskatoon, Boxwood, Shrubby Penstemon, Douglas fir, Oregon grape, Alum, Yarrow, Lance-leaved stonecrop, Artemesia and Willow ssp. No invasive species were noted on this visit.

During the first fall site monitoring at the Blind Bay viewpoint, we observed a sprawling Common Juniper with red needles near the centre of the viewpoint that may be a casualty of heavy use at this site. Currently we estimated that 30% of the area we considered to be directly part of the viewpoint was bare ground and exposed soil. Future monitoring should attempt to quantify the amount of bare ground as an indication of impact beyond acceptable levels.



Blind Bay Viewpoint Site Photos (see field form for photo locations)

Photo 1. View south from large rock centred on the Blind Bay viewpoint (Oct. 7, 2010). The most vulnerable vegetation to trampling is the shrubs along the centre ridge. Note the dead Juniper in the background and the fire pit in the centre of the photo.

Photo 2. View north from the large rock centred on top of the Blind Bay viewpoint (Oct. 7, 2010). If the viewpoint expands north, this Juniper will show signs of stress (e.g., red needles, bare branches).

Photo 3. View of entire viewpoint from the south (Oct. 7, 2010). We estimated that there was currently ~30% exposed soil across the small ridge of the viewpoint. The Kinnikinnick and Juniper shrubs that remain will be useful indicators to monitor continued impact from trampling and viewpoint expansion.

Photo 4. View south from the viewpoint down the access trail (left photo) and back up toward the viewpoint (right photo). Note the single main trail and lack of braiding or social trails (circled backpack provided as reference). If secondary trails develop they will likely be along this slope and to the north (right side of right photo) above the trail descending to the MacArthur Heights parking lot (Oct. 7, 2010).

Site 3 ATV Access at Middle Viewpoint (UTM 334358,5641077)

Site Description

This monitoring site is on the trail connecting the Blind Bay (MacArthur Heights) viewpoint with the rest of the Blind Bay trail system to the south, ~200 m southeast of the Blind Bay viewpoint. This site was selected as a monitoring site because a new ATV trail was discovered connecting with the hiking trail at this point, providing motorized access to a small meadow viewpoint adjacent to the monitoring site. The section of trail we chose to monitor is on a short 35% slope where tire tracks are just starting to degrade the vegetation and expose soil, becoming ruts.

We adapted BC Parks Backcountry Recreation Impact Monitoring (BRIM) techniques to monitor the depth of the trail profile across the short steep hill where ATVs are descending to the small meadow viewpoint. We have left a steel pin (rebar) in the ground at the base of a birch tree on the cliff side of the trail (see sketch and photos).

To repeat trail depth measurements:

1) Attach a string line to the top of the pin and pull taut across (perpendicular) to the trail.

2) Attach sliding level to string line and adjust end of string until it is level.

3) Using one tape measure attached to the pin for horizontal measurements, measure vertical distance between the string and the ground with a second tape measure (see photos and sketch).

4) Record vertical measurements for each predetermined horizontal distance in the field form.

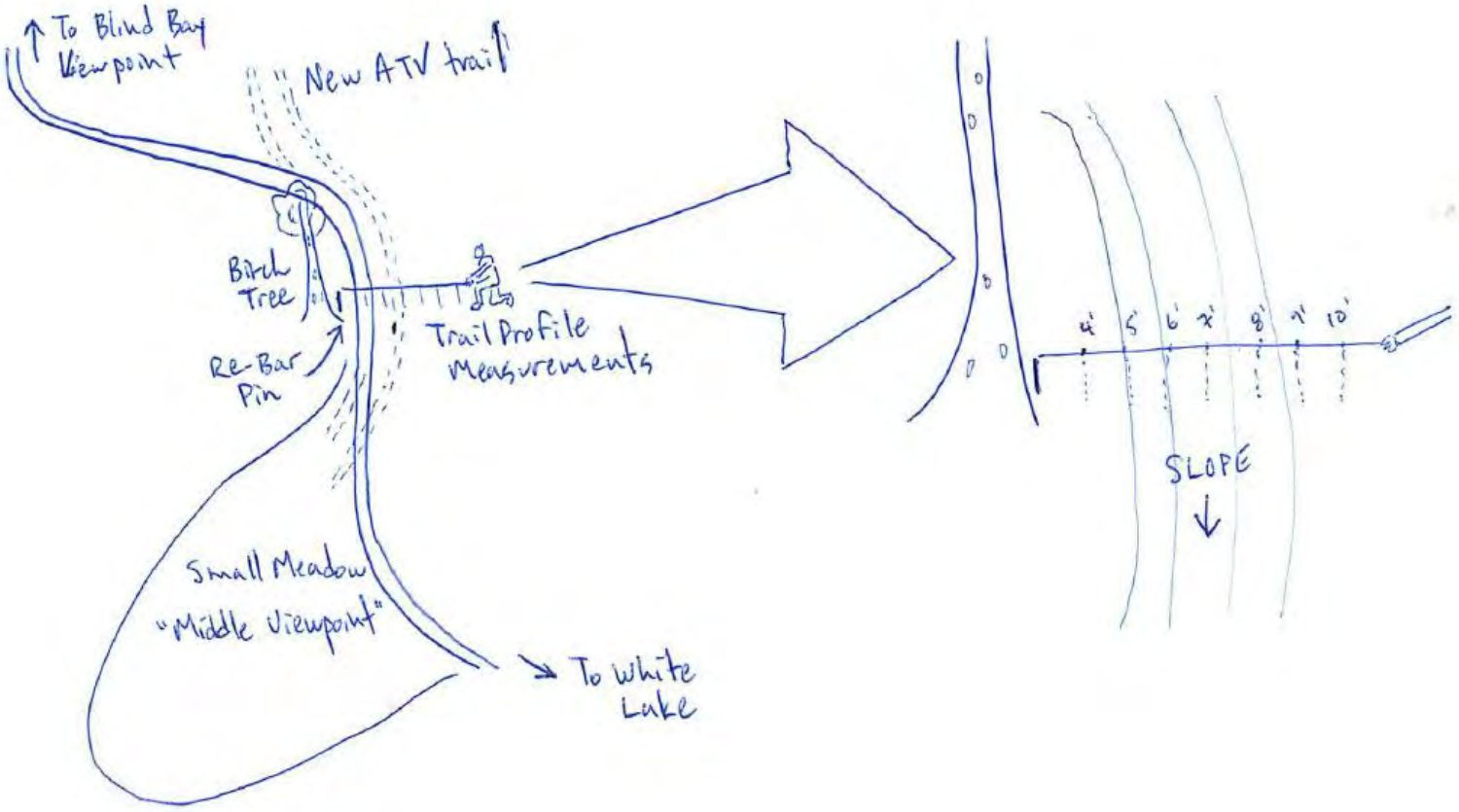
The results of the first fall monitoring measurements were:

Feet east of steel pin	Height in inches
4	20.75
5	21.75
6	23
7	25.25
8	26.75
9	23.5
10	19.25

Plants noted along the measurement line: Birch-leaved Spirea, Prairie Rose, Boxwood, Paper Birch, Snowberry, Twinflower.

During the first fall site monitoring at this site we observed 4 people arrive on 2 ATVs to take in the view from the small meadow viewpoint just below the monitoring site. Although we focused monitoring at this sight on documenting the degradation to the trail bed and the expected increase in ruts on the hill above the viewpoint, it may also be useful in the future to monitor impact in the small meadow viewpoint where the ATVs will be turning around. There is currently one small fire pit on this viewpoint.

ATV Trail Site Sketch



ATV Access, Middle Viewpoint Site Photos (see field form for photo locations)

Photo 1. Demonstration of BC Parks trail profile measurement technique. The new ATV access trail travels up this slope. A small steel pin (rebar) has been left at the base of a birch tree on the left of the photo. Trail depth is measured from a level string down to the trail bed at preset distances from the steel pin. This photo does not need to be repeated for future monitoring.

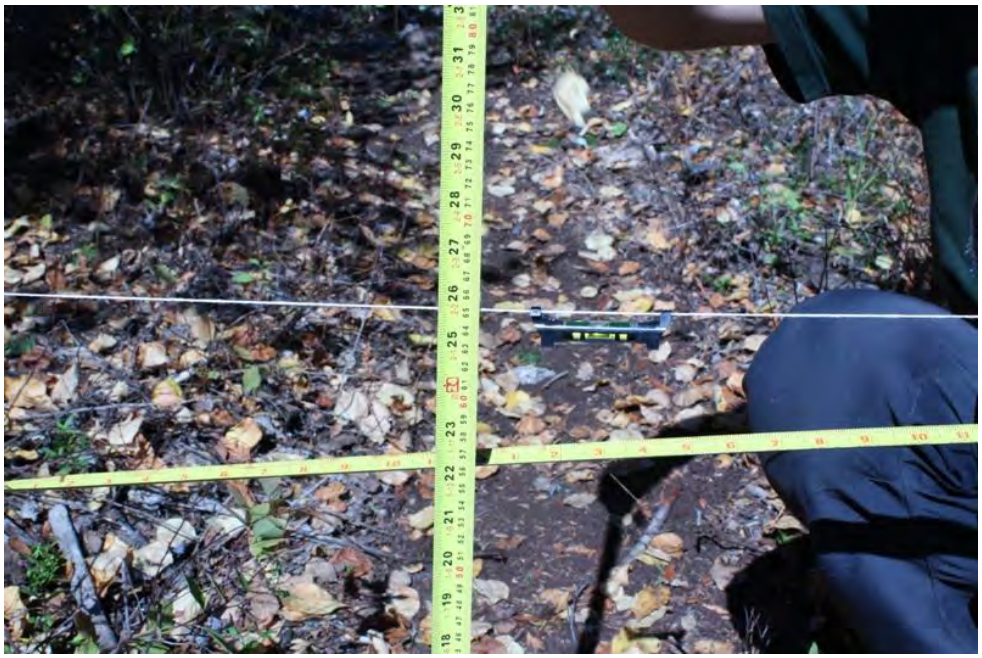


Photo 2. Two tape measures are used to determine trail profile across the section of trail recently accessed by ATVs. This photo does not need to be repeated for future monitoring.

Photo 3. The ATV trail continues down the short slope and out to a small meadow viewpoint. If trail profile measurements indicate continued use by ATVs, it may also be useful to monitor impact of machines in the viewpoint area. Currently there is one old fire pit in the viewpoint that should be dismantled to prevent continued use (Oct. 7, 2010).

Site 4 Tappen Valley Viewpoint (UTM 335650,5638708)

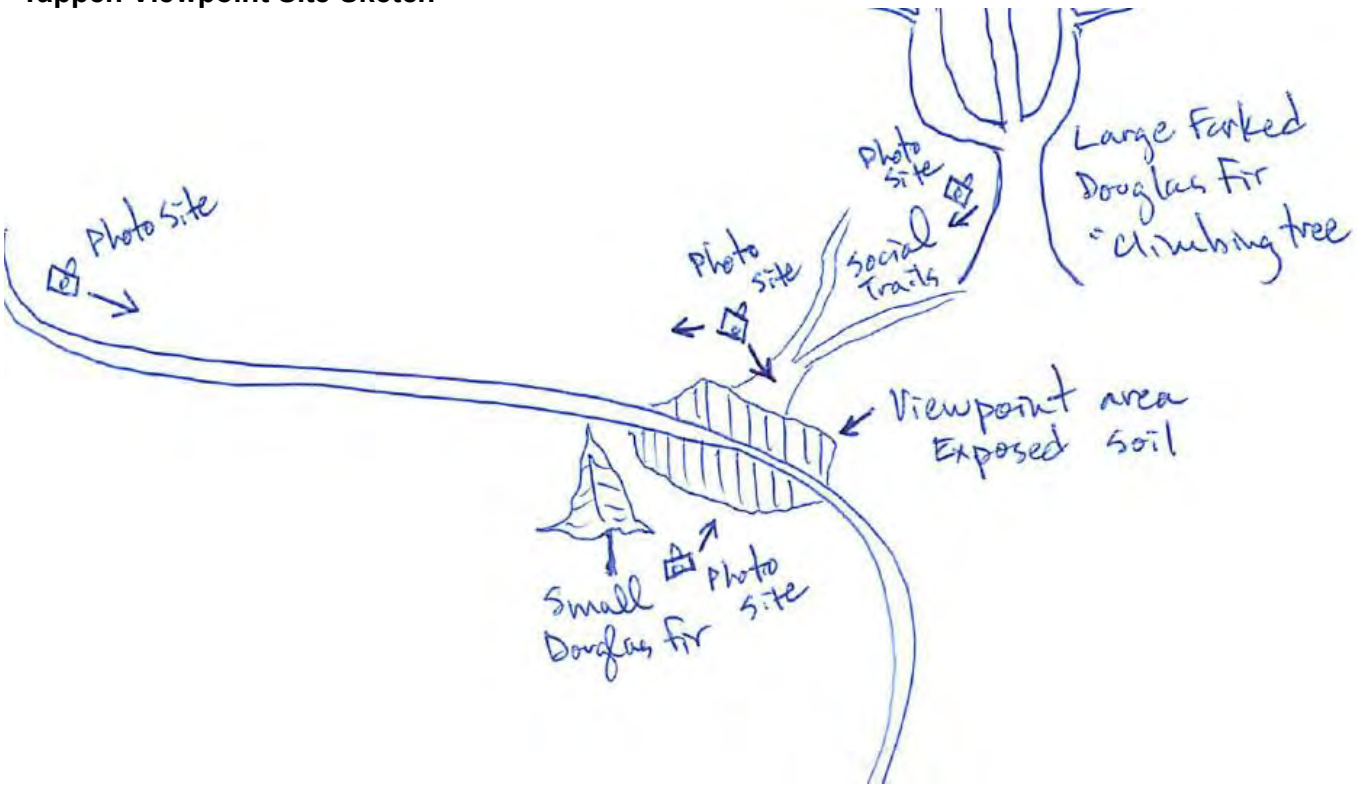
Site Description

This monitoring site is at the popular viewpoint south overlooking Tappen and Salmon Arm. The viewpoint currently has no benches or railings to control trampling and expansion of the viewpoint footprint. This is a small pocket-meadow site with a specialized plant community. Trampling will create more exposed soil and increase the potential for invasive plants species more tolerant of trampling. Currently social trails are braiding out from the viewpoint where people are accessing the climbing potential an impressive large forked Douglas fir tree. Plants observed at this site includes Douglas fir, Pine grass, St John's wort, Oregon grape, Yarrow, Mock Orange, Common Juniper, Snowberry, Ocean spray, Strawberry, Prairie Rose and Shrubby Penstemon. While the site appears free of invasive species there is one unidentified clover-like plant on the south side of the trail from the exposed soil site described below. It is worth monitoring this plant for identification and possible removal.

During the first fall site monitoring at the Tappen viewpoint, we estimated that the area of exposed soil where people are stopping to rest and enjoy the view is ~ 20 m^2 (8 m long by 2.5 m wide). At its widest pointwe measured the exposed soil to be 3.2 m.

Photos will be the most useful method to document change through time at this meadow viewpoint. Consult the sketch map to find photo location points. At this point with high potential for impacting plant communities in this meadow through trampling and transfer of invasive plants, we suggest a bench and a defined trail to the "climbing tree" would be prudent corrective actions to control the expanding footprint.

Tappen Viewpoint Site Sketch



Tappen Valley Viewpoint Site Photos (see field form for photo locations)

Photo 1. Trail opening into the Tappen Valley viewpoint from the northwest (Oct, 2010).

Photo 2. View back to the northwest from the main Tappen Valley viewpoint (Oct, 2010).

Photo 3. This is the main rest stop at the Tappen viewpoint and the largest area of exposed soil. We averaged length and width measurements to estimate the exposed area at 20 m^2 (Oct. 7, 2010). A bench at this location would ideally control trampling of vegetation and limit the potential for introduction of invasive plant species.

Photo 4. The view to the southeast where the trail continues through to White Lake (Oct. 7, 2010).

Photo 5. The view from a large forked Douglas fir “climbing tree” back down to the main rest stop. Secondary trails are being developed in this area above the view point that may be controlled by a single designated trail to the featured “climbing tree”.

Site 5 Bridge 2 (UTM 336764,5639445) west of White Lake Lookout Junction

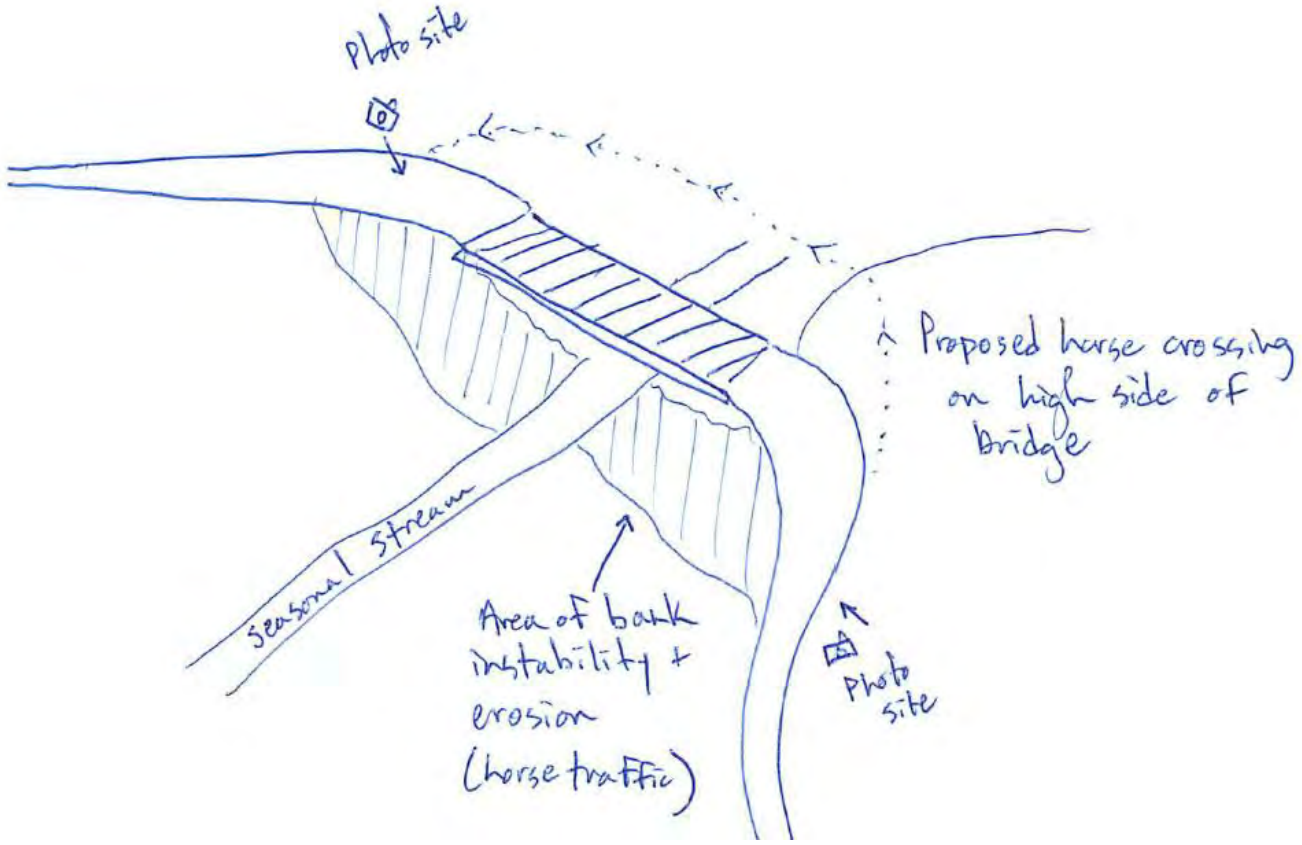
Site Description

This monitoring site is at a bridge crossing of a seasonal creek where horse travel has severely eroded the bank above the channel. Reluctant to cross the small foot bridge horses are instead taking the only other option and descending the steep bank below the bridge. The steeper bank and greatest area of erosion is on the south side of the bridge. During high water in the spring the loose exposed soil on the side of the channel will wash downstream and effect water quality. Given the current instability of the bank, we suggest immediate corrective action as well as ongoing monitoring. Corrective actions could include providing an alternate crossing point for horses above the bridge where the channel is much shallower and bank instability less of an issue. Some work will be required to excavate the shoulder above the trail to allow horses to access this high-side crossing.

The area disturbed by horse traffic currently has several invasive plants common to areas of disturbed soil. These include Golden Corydalis and invasive species such as Canada thistle, Sow thistle, Bull thistle and Oxeye daisy. Native species noted include Thimbleberry, Ocean Spray, Mock Orange, Showy Aster, Paper Birch, Snowberry, Oregon grape, Strawberry, Boxwood, Black Gooseberry and Willow ssp.

Photo documentation will be the main measure of success for any corrective action taken at this site. Consult the site sketch for photo locations.

Bridge 2 Site Sketch



Bridge 2 – White Lake Lookout Junction (see field form for photo locations)

Photo 1. Horses are crossing this seasonal creek just downstream of the foot bridge (right side of far bridge abutment) causing bank instability and erosion into the channel (Oct. 7, 2010).

Photo 2. Loose exposed soil where horses have been descending the channel bank will likely degrade downstream water quality during high flow periods in the spring (Oct. 7, 2010).

Photo 3. One option to correct the current situation is to excavate the shoulder on the right of the photo above the trail to encourage horses to cross the channel above the bridge where the channel is shallow and the banks less-steep (Oct. 7, 2010).