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Basic Impact Analysis

Upper Spray River Bridge Replacement

Banff National Park, Banff Field Unit

October 2013



Title: Environmental Assessment Scientist

Date: October 1, 2013



Parks Canada
Parcs Canada

Canada



1. PROJECT TITLE

Upper Spray River Bridge Replacement

2. PROJECT LOCATION

Banff National Park

3. PROJECT SITE

Upper Spray River

4. PROPONENT

Parks Canada Banff Field Unit: Jaison Van Tine

5. PROPONENT CONTACT INFORMATION

403.762.1479

6. PROJECT DATES

Commencement: 2013-10-15

Completion: 2014-05-01

7. INTERNAL PROJECT FILE #

BNP-921

8. PROJECT DESCRIPTION

Goat Creek/Spray River Trail is an extremely popular trail providing year round recreation options for hikers, bikers and cross country skiers. The Goat Creek Trail is track set in the winter making it the most popular cross country ski offer for Banff. The Upper Spray River Bridge is the lower of 2 bridges on this trail and is required to provide this offer in winter. (Fig.1)

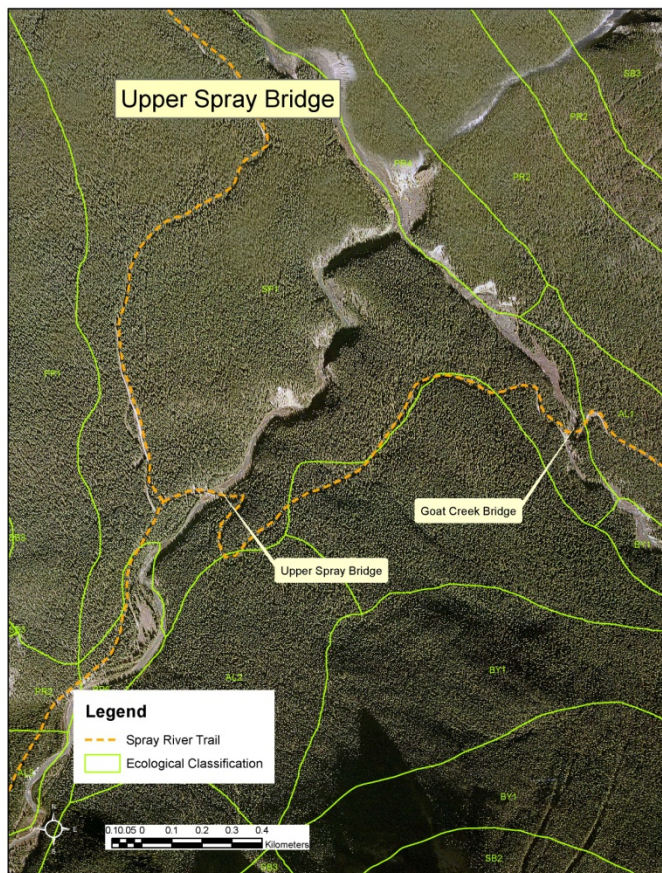
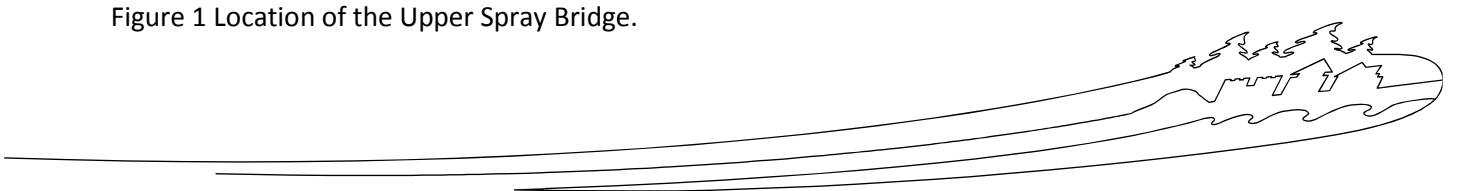


Figure 1 Location of the Upper Spray Bridge.





In fall of 2011, a TransAlta dam failed releasing an excessive amount of water into Spray River resulting in damage to the Spray River Pedestrian Bridge. The bridge is located on Goat Creek Trail 9.3 kilometers from the Canmore side and 9.8 kilometers from the Banff side. The previous bridge was comprised of wood stringers with wood decking, railing and abutments. The bridge was replaced by TransAlta through insurance coverage to a steel truss bridge with shallow concrete foundations. Construction was completed in the winter of 2011 and erosion protection (gabion bags) was constructed during the spring fish window of 2012.

In June 2013, a major flood event occurred damaging the recently constructed truss bridge. The steel truss members will be reusable but the east embankment and erosion protection failed resulting in the east abutment slumping into the river. As the bridge is very likely salvageable, the 21 meter long bridge will be reconstructed approximately 45 degrees from the original location with new and deeper foundations whilst still maintaining the existing span.

The location of the bridge makes design and construction challenging as no heavy equipment is allowed on the trail leading to the bridge. As such, much of the construction is completed via helicopter access and with small/compact equipment via Goat Creek Trail.

The project will consist of the following:

- 'Micropile' (deep) foundations on west and east side;
- Concrete pile cap and abutments on west and east side;
- Relocation and reuse of the existing weathered steel superstructure;
- Minor trail work (rerouting) on the east/Canmore;
- Construction of embankment armoring, removal of old concrete pier, removal of unused gabion baskets and installation of terracing using gabion baskets

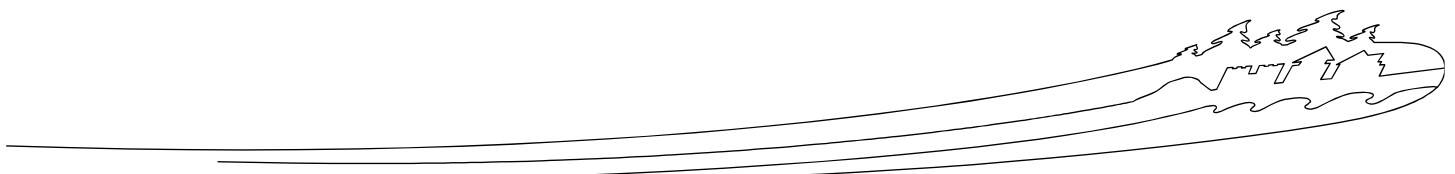
The majority of allowable light equipment will access the west/Banff side of the bridge or be brought by helicopter to site. Probable equipment to be used during construction to place deep piles includes the following:

- Air compressor unit, weight of around 6,000 lbs. This would generally be hauled behind a ¾ ton or could be coupled to a loader or a bobcat.
- One hydraulic pack – this unit would go in the same load as the compressor
- One drill rig
- Assorted hoses

Probably equipment to be used to be used for the remainder of the project includes but is not limited to the following. Note, the following equipment was used during previous bridge construction

- JD624 loader
- JD310 backhoe
- Kubota mini excavator
- Bobcat 331 mini excavator
- JD450 H dozer

The new bridge will also require a short section of trail to be built to match the new alignments; as well a guard rail will be needed to prevent people from falling over the newly eroded bank. Site plan and bank armoring details in Appendix 1.





Schedule

Construction of the bridge will be two phase:

1. For the substructure and superstructure which will provide access to winter recreation activities expected to commence mid to late October and lasting for approximately one month.
2. For the placement of embankment armoring, gabion baskets and minor bioengineering work, to occur during the spring fish window of May 1 to May 14.

9. ENVIRONMENTAL COMPONENTS LIKELY TO BE AFFECTED

Hydrology

Flows in the Spray River extending from Canyon dam to the Bow River are controlled largely in the area by the Canyon Dam located approximately 30km upstream of the which provides minimum maintenance flows of approximately 0.20 cubic meters per second through a riparian release valve located under Canyon Dam, into the Spray River. Additional flows in the River at this location are provided by seasonal rain and snowmelt events and a spring fed streams located in the valley upstream.

Fish and Fish Habitat

The Spray River is divided into the upper the lower Spray River. The upper Spray River will not be discussed in this EA as it is a separated from the lower Spray River by the Spray Reservoir. Between 1948 and 1950, the Spray River was dammed (Canyon Dam) to create a storage reservoir (Spray Reservoir) for power production (Mitchell and Prepas 1990). The Spray River flows approximately 40 km from Canyon Dam to the Banff townsite.

The fish community in the Spray River has undergone changes over time due to the construction and installation of the dam. Prior to the dam being constructed, fish species historically documented in the river from Canyon Dam to the Bow River include (Mudry and Green 1992):

- westslope cutthroat trout (*Salvelinus clarkii clarkii*);
- brook trout (*Salvelinus fontinalis*);
- bull trout (*Salvelinus confluentus*);
- rainbow trout (*Oncorhynchus mykiss*); and
- mountain whitefish (*Prosopium williamsoni*).

Within the vicinity of the bridge, substrate is composed of cobble, gravel and sand. Banks immediately upstream and downstream of the bridge are predominantly sloping and vegetated with grasses and coniferous trees. The habitat within the study area is predominantly run and riffle habitat with small pools adjacent to the existing abutments. Predominant cover types for fish species include surface turbulence and boulders with a small amount of cover attributed to deeper water in pool habitats. The quality of fish habitat in the vicinity of the bridge location is good. Surface waters are typically cold, clear and of high quality for most of the year. The river is susceptible to natural erosion during rapid snowmelt and heavy rainfall events with related temporary impacts to water





quality, especially during late spring and early summer.

Vegetation and Soils

The project area is located at an existing pre-disturbed trail location. Prior to being used as a recreational trail the site was used as a fire road access and the approaches to the river were built up using a combination of gravel/cobble and sand materials commonly used in construction practices.

The project area is in the Lower Sub-Alpine Ecosection within the Athabasca Ecosection (Holland and Coen 1982). The primary canopy tree of the Athabasca ecosite is lodgepole pine (*Pinus contorta* var. *latifolia*) with occurrences of Engelmann spruce (*Picea engelmannii*). Common species in the shrub layer are buffaloberry (*Shepherdia canadensis*), and juniper (*Juniperus communis*). In the herbaceous and low-shrub layer bearberry (*Arctostaphylos uva-ursi*), pine grass (*Calamagrostis rubescens*), hairy wild rye (*Elymus innovatus*), twinflower (*Linnaea borealis*), and showy aster (*Aster conspicuus*) are typically present and abundant.

Rocky mountain juniper (*Juniperus scopulorum*), ground juniper (*J. communis*), and shrubby cinquefoil (*Potentilla fruitcosa*) are typical of the shrub layer, while bearberry (*Arctostaphylos uva-ursi*) tends to dominate the herbaceous and low-shrub strata.

Wildlife and Wildlife Habitat

Mammals

Many large mammals occur within the bridge area including black bear (*Ursus americanus*), grizzly bear (*Ursus arctos*), wolf (*Canis lupus*), coyote (*Canis latrans*), cougar (*Puma concolor*), elk (*Cervus elaphus*), mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), and bighorn sheep (*Ovis canadensis*) (Holroyd and Van Tighem 1983). Large species tend to range widely and require access to widely distant habitats through various movement corridors. The Bow Valley, which the Spray River Valley is connected to, has been documented as a wildlife movement corridor for many species (Alexander and Gailus 2005).

Small mammals that may occur in the area include deer mouse (*Peromyscus maniculatus*), western jumping mouse (*Zapus princeps*), red-backed vole (*Clethrionomys gapperi*), long-tailed voles (*Microtus longicaudus*), meadow voles (*Microtus pennsylvanicus*), heather voles (*Phenacomys intermedius*), masked shrews (*Sorex cinereus*), vagrant shrews (*Sorex vagrans*), least chipmunks (*Tamias minimus*) and yellow pine chipmunks (*Tamias amoenus*). Slightly larger species that may occur with some frequency include red squirrels (*Tamiasciurus hudsonicus*) and snowshoe hare (*Lepus americanus*).

Birds

There are almost 300 species of birds which may occur in the region (Holland and Coen 1983; Holroyd and Van Tighem 1983; Poll et al. 1984). Most of these species are migratory, avoiding the harsh winter climate of the Rockies for southern and coastal regions. The wide range of elevation and varied terrain results in a diversity of habitats that contribute to a variety of bird life.

The ecosites associated with the bridge provide habitat for many bird species. In addition to the bird species shown in Table 1 many other bird species including pine siskin (*Carduelis*





pinus), gray jay (*Perisoreus canadensis*), boreal chickadee (*Poecile hudsonicus*), black capped chickadee (*Poecile atricapillus*), solitary vireo (*Vireo plumbeus*), chipping sparrow (*Spizella passerina*), northern three-toed woodpecker (*Picoides tridactylus*), red-breasted nuthatch (*Sitta canadensis*), blackpoll warbler (*Dendroica striata*), common raven (*Corvus corax*), hermit thrush (*Catharus guttatus*), spruce grouse (*Falci pennis canadensis*), pine grosbeak (*Pinicola enucleator*), and cedar waxwing (*Bombycilla cedrorum*).

Table 1: Bird Species Found in Region

Bird Species Often Occurring in Region	
American robin	dark-eyed junco
yellow-rumped warbler	olive-sided flycatcher
western tanager	Townsend’s solitare
goshawk	red-eyed vireo
sharp-shinned hawk	yellow-rumped warbler
rufous hummingbird	western tanager
common flicker	dark-eyed junco
dusky flycatcher	yellow-rumped warbler
American robin	brown-headed cowbird
Swainson’s thrush	
ruby-crowned kinglet	



Amphibians and Reptiles

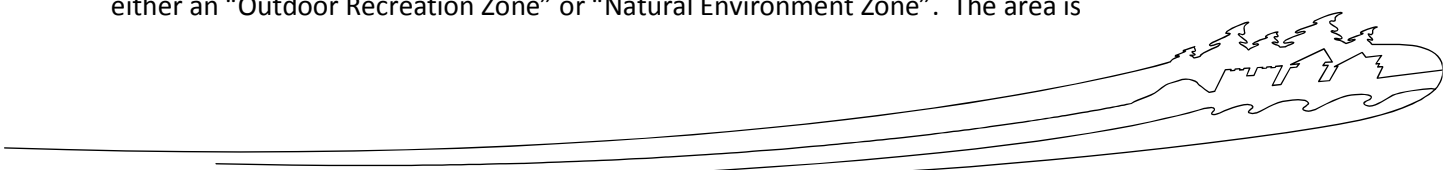
Species that may occur in the area include long-toed salamanders, tiger salamanders, boreal toads and wood frogs (Russell and Bauer 1993). The small ponds located within the neighbouring Bow Valley provide breeding habitat for long-toed salamanders. The habitat in the grassy wetland areas associated with the Spray River is presumed suitable for this species and therefore long-toed salamanders may be present.

Cultural Resources

Previous assessments identified the regional study area (i.e. Banff National Park) as having a high potential for artefacts (Dames and Moore 1992). Remnants of historical structures exist in the vicinity of the project. The areas of potential excavation are within the footprint of existing roads/trails, presenting limited risk for disturbance to cultural resources.

Visitor Experience

The location of the bridge, i.e., in Banff National Park, is in an area with access limited to non-motorized recreational activities. The location can be viewed by visitors accessing the area from both Banff and Canmore sides of the trail and is considered a popular day use destination in the park; Set in the National Park, in the Bow River basin and with a backdrop of the Canadian Rocky Mountains, the bridge location is considered to have high aesthetic value. The project is located within areas designated as either an “Outdoor Recreation Zone” or “Natural Environment Zone”. The area is





primarily used for day recreation, such as hiking, horseback riding, biking, cross-country skiing and other similar non-motorized activities. Vehicle access is restricted in the area which limits the number of people accessing the area.

10. IMPORTANT EFFECTS IDENTIFIED

Hydrology

The hydrology will not be affected during the project. Equipment will not ford the Spray River, no work will be conducted instream for the bridge construction in phase 1, phase 2 will have minor instream work at the bank edge and there will not be any isolation in the river during this phase of the work. The natural flow of the river will not be affected. The residual impact to hydrology will be negligible.

Fish and Fish Habitat

Sediment and other deleterious substances have the potential to be released through the cutting of the concrete pier, removal of the gabion bags, erosion of exposed surface soils, bank erosion, refuelling, leak, exposed grease or accidental spills from heavy and light equipment operating in and around the river. These potential effects will be mitigated by no equipment fording the river, proper construction staging practices, appropriate handling and storage of hazardous materials, and the use of erosion and sediment control measures. An environmental protection plan outlining staging areas, hazardous material storage procedures and erosion/sediment control measures will be provided to Parks Canada prior to construction. The work will be conducted several metres away from the wetted width of the river and therefore will have minimal to no effect of fish and fish habitat. There will not be a disruption of fish migration and passage, changes in channel morphology, hydrology or water quality nor a permanent loss of fish habitat as a result of this project. The residual impact to fish and fish habitat will be negligible.

Vegetation and Soils

Disturbance to the terrain will be minimal. Site access by the excavators will be along existing trails and will be limited to one trip (in and out). All other materials will be flown into site via helicopter. Disturbance to soils will be minimal, as equipment travel will be limited to existing hardened roads/trails. Any excavated soil from the abutment excavations will be re-contoured along the access path. The residual impact to soils and terrain will be negligible.

The construction associated with the bridge will disturb minimal vegetation around the abutment area including sparse grass and shrubs. The existing trail on the eastern side will require a short re-route to provide a short approach to the new bridge site. Access to the site via the existing trail is not expected to permanently disturb vegetation. Minor vegetation disturbance resulting from a single in and out passage is expected to recover naturally within one or two growing seasons. Any vegetation disturbed during construction activities will be replaced during the next available growing season (e.g. spring/summer 2014) at the direction of Parks Canada representatives. The residual impact to the vegetation is negligible.





Wildlife and Wildlife Habitat

Short-term disturbances are predicted for wildlife along the trail and in the vicinity of the bridge during the delivery of materials via helicopter and the operation of excavators at the bridge location. The temporary operation of equipment, helicopters, increased human presence and noise may lead to a temporary displacement of wildlife. Timely completion of the work will minimize the duration of impacts to wildlife from noise and increased human presence. Machine operators will be briefed on proper food and garbage disposal and other wildlife issues before the work begins. Helicopter traffic will be minimized at the site where possible, and staging will be conducted at an offsite location outside of the park boundary (e.g. Goat Creek Trailhead parking area). The residual impact to the wildlife is negligible.

Cultural Resources

Because no new areas will be disturbed from construction activities no effects to cultural or archaeological resources are expected. Workers will be notified to avoid historical structural remnants in the area and to protect and report any artefacts that are discovered during the project. The residual impact to cultural resources will be negligible.

Visitor Experience

The aesthetic and visual impacts of presence of machinery and helicopters along the Goat Creek Trail are expected to be minimal. The trail will be closed while work is underway, limited the potential for equipment-related disturbance to the public. Timely completion of the work will minimize the duration of any negative impacts from vehicles, machinery and increased activity in the area. The residual impact to aesthetic and visual resources will be negligible. The activities associated with this work will open an existing trail to the public and to nearby area used for hiking, biking, cross-country skiing and horseback riding.. The project will have a positive impact on land use and recreation in the area.

11. MITIGATION MEASURES

The site is in the same place as the original bridge. Minor adjustments to the alignment, abutments and span design will allow the bridge to be rebuilt and will reduce the project impact. Ultimately, keeping the project footprint as small as possible will further reduce potential effects. It is expected that all staff and contractors will understand and comply with all National Park regulations within the Park. Pre-work briefings/meetings are recommended to address environmental sensitivities within the Project Area, such as erosion, wildlife interaction and equipment spills, leaks and cleanup.

It is recommended that an Environmental Protection Plan (EPP) be prepared in accordance with DFO's Measures to Protect Fish and Fish Habitat when Constructing Clear-span Bridges (Attachment 3), PCA Environmental Procedures and the Banff National Park Directive (PCA 1998). To ensure mitigation of potential adverse effects identified, the EPP shall:

- Be available to all staff during project activities;





- Include an Erosion and Sedimentation Management Plan to the satisfaction of the Departmental Representative and Environmental Surveillance Officer (ESO). The plan shall detail appropriate work methods, best practices for working around water and proposed erosion control methods. Parks Canada's desired end result is to allow no release into any water body of sediments in levels that are deleterious to fish or fish habitat or wildlife habitat or that would alter growing or hydraulic conditions;
- Contain spill response procedures including appropriate spill kit requirements and spill and emergency response contacts;
- Include provisions to reduce human-wildlife interactions

All staff employed at the construction site shall be instructed by the ESO during an Environmental Briefing regarding their individual and collective responsibilities to ensure avoidable adverse environmental impact does not arise from their activities and personal choices.

Surface Water Quality

- The project is designed to minimize impacts to water quality by allowing construction to take place outside of the wetted perimeter of the creek. In particular, abutments will be supported by driven piles requiring minimal excavation that are located outside of the ordinary high water mark.
- Equipment access will be by helicopter and ultimately the bridge for the eastern side or road from the west without fording the creek.
- Work that will potentially be undertaken in water, e.g. concrete pier cutting and removal, gabion bag placement and removal is scheduled for early spring during the fish window. Downstream flows and fish passage will be maintained at all times.
- Only clean, washed gabion bag fill and rip rap will be used.
- If additional on-site material is needed for gabions, it will be obtained only from terrestrial locations or from deposits well outside of the current wetted perimeter of the creek. No excavation or removal of rock from the water will be allowed. If there is not enough material onsite, then material will be transported from the Spray Bridge stockpiles if some is leftover and/or material will be flown in, if possible.
- Install effective sediment and erosion control measures before starting work to prevent the entry of sediment into the watercourse. Sediment and erosion control measures shall be inspected regularly during the course of construction and repairs shall be made as necessary.
- The duration of instream work will be minimized;
- All instream work will be conducted by hand - gabion baskets will be removed and installed by hand to minimize disturbance to the river bed and suspended sediment.
- The site will be secured against erosion during any periods of construction inactivity or shutdown.
- Generally, work within a 30 m buffer of waterways or wetland requires the close oversight of the ESO and the Departmental Representative.





Stream Hydrology

- The proposed bridge has been designed as a clear-span bridge which meets the requirements of the DFO Operational Statement for Clear-span Bridges (Attachment 3). In addition, construction nearest the river (for abutment piers and pier caps) is anticipated to start during early/late fall when river levels are expected to be lowest.
- Placement of gabion bags and removal of concrete pier will occur in early spring during the fish window May 1 to May 14 the placement and filling of the bags will be done by hand with rock imported to the site by road.

Fish and Fish Habitat

- See measures identified above under Surface Water Quality.
- All work for the bridge is to occur above the high water mark and in a manner that minimizes disturbances to the banks of the watercourse.
- Machinery is to arrive on site in a clean condition and is to be maintained free of fluid leaks.
- Machinery is to be washed, refueled and serviced and fuel is to be stored at least 100 m away from the river to prevent any deleterious substance from entering the water.
- A Spill Response Plan will be prepared as part of the EPP and shall detail the containment and storage, security, handling, use and disposal of empty containers, surplus product or waste generated in the application of these products, to the satisfaction of the Departmental Representative and the ESO and in accordance with all applicable federal and provincial legislation. The EPP shall include a list of products and materials to be used or brought to the construction site that are considered or defined as hazardous or toxic to the environment, including but not limited to, sealer, grout, cement, concrete finishing agents, adhesives and sand blasting agents.
- In the event of a major spill, all other work shall be stopped and all personnel devoted to spill containment and cleanup.
- Wet and uncured concrete is an acutely toxic substance for an aquatic environment. Extra care not to introduce these materials into the environment is required. The Contractor's EPP shall address concrete plant location, operation and reclamation where required, to the satisfaction of the Departmental Representative and the ESO.
- Water contaminated in the placing of cement and curing of concrete shall be contained and removed from the site to an approved disposal facility.

Vegetation and Soils

- Equipment and materials laydown areas can use existing trails, roads and hard surfaces wherever possible to avoid disturbance to the riparian vegetation.





- The contractor shall ensure that all soil, seeds and any debris attached to construction equipment to be used on the project site has been removed (e.g. power washing) outside the Banff National Park before delivery to the work site to limit introduction of non-native or invasive vegetation species.
- Stripped soil (including fine forest litter) materials shall be placed and stored at locations, for later reclamation use on graded slopes. Stripping piles may require erosion control, sedimentation protection or stabilization, depending on the location and anticipated duration of storage.
- Restoration of disturbed areas shall be made required. The plan shall include only tree and shrub species native to the local area. Seeding shall be only an approved and recommended seed mix for Banff National Park.

Wildlife and Wildlife Habitat

- During the Environmental Briefing, all personnel shall be instructed by the ESO on procedures to follow in the event of wildlife appearance near or within the work site and any other wildlife concerns.
- Avoid or terminate activities on Site that attract or disturb wildlife and vacate the area and stay away from the immediate location if bears, cougars, wolves, elk or moose display aggressive behaviour or persistent intrusion. Extra care to control materials that might attract wildlife (e.g. lunches and food scraps) must be exercised at all times.
- Notify the ESO and Departmental Representative immediately about dens, litters, nests, carcasses (road kills), bear activity or encounters on or around the site or crew accommodation. Other wildlife related encounters are to be reported within 24 hours. If the ESO or Departmental Representative is not available, Banff Dispatch will be contacted at (403) 762-4506.
- Care will be taken to prevent the disturbance of nesting birds and/or the destruction of bird nests during construction activities. General breeding bird windows occur from April 1 to August 31 and any proposed tree felling during this period will require nest surveys.

Cultural Resources

- Artifacts, relics, antiquities and items of historical interest such as cornerstones, commemorative plaques, inscribed tablets and similar objects found on the work site shall be reported to the ESO or the Departmental Representative immediately. The Contractor and workers shall wait for instructions before proceeding with their work.
- All historical or archaeological objects found in Banff National Park are protected under the *National Parks Act* and Regulations and are the property of Parks Canada. The Contractor and workers shall protect any articles found and request direction from the ESO or the Departmental Representative.

Visitor Experience

- A construction traffic safety or management plan shall be incorporated into the EPP to address contractor and public safety around the site.





12. IMPACT SIGNIFICANCE

Provided the works adhere to the identified mitigation measures, including the criteria defined in DFO's Alberta Clear-span Bridge Operational Statement, project effects can be avoided or completely mitigated and are therefore not considered likely to result in significant adverse residual effects on the environment.

13. SITE INSPECTION

The intent of this section is to document consideration of need for a site inspection program during construction. Document if a site inspection is or is not required. If one is required, provide details such as:

- Responsibilities;
- Contact information;
- Proposed schedule;
- Focus of inspections

Site inspection not required

Site inspection required

14. EXPERTS CONSULTED (Including PC Experts)

Department/Agency/Institution Name of organization where expert is employed or studying

Contact Information

Expert's Name: Michael Hunka

Title: Fisheries Officer

Coordinates: Department of Fisheries and Oceans – Edmonton. AB 780.495.8468

Date of Request(2013-09-25)

Expertise Requested: Impacts and Mitigations required for protection of aquatic habitats.

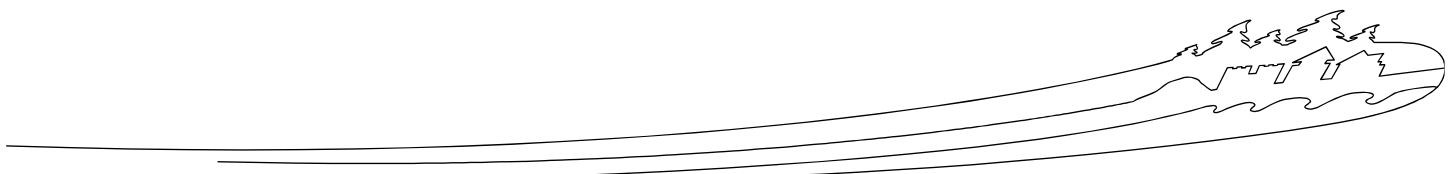
Response: as per Jaison Van Tine Sept. 28, 2013 "I spoke with Michael Hunka on the afternoon of September 25, 2013 about our two trail bridges (End of Loop and Trans Alta) on the Spray River. He does not have any concerns with the Trans Alta clear span bridge so I just need to submit a notice of project through the DFO website."

15. PUBLIC PARTICIPATION

Public participation required:

No Yes

If yes, describe process and summarize comments. Refer to results of previous planning consultations or need to notify stakeholders where relevant.





16. DECISION

Taking into account implementation of mitigation measures outlined in the analysis, the project is:

Not likely to cause significant adverse environmental effects.

Likely to cause significant adverse environmental effects.

