

KATHLYN CREEK CULVERT #2

WSC 460-345400-26700

Stream Assessment Report

Prepared for:



Ministry of
Transportation
and Infrastructure

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March 2012

MCSL File Number: 2331-30032-0 Task 2004

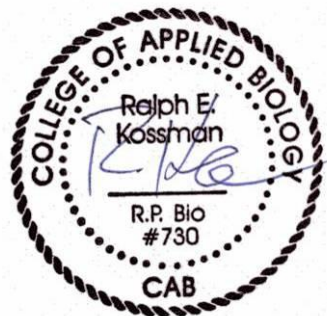


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1. Introduction

The British Columbia Ministry of Transportation and Infrastructure (MoTI) Bulkley-Stikine District Office plans to replace the BC MoTI Kathlyn Creek Culvert No. 2 (MoT Structure No. 8849) at Yellowhead Highway 16, Segment 1524 (New Hazelton – Houston), km 65.62 at a future date. McElhanney Consulting Services (MCSL) Ltd. was contracted by MoTI to prepare an aquatic and terrestrial resource assessment report for Kathlyn Creek Culvert No. 2 to support subsequent Fisheries Act and Water Act applications for approvals.

MCSL's environmental role in the project was to:

- Conduct an aquatic resource assessment of the identified watercourse.
- Confirm that Kathlyn Creek is a fish bearing stream at the BC MoTI No. 2 culvert crossing.
- Determine the average stream channel width of Kathlyn Creek at the crossing reach as per the Fish Stream Crossing Guidebook.
- Identify fish species present along with determination of the applicable in-stream timing window of least risk.
- Define the fish habitat type at the Kathlyn Creek crossing and characterization of habitat.
- Provide photo-documentation of the study area.
- Identify any unique habitat features potentially affected by the proposed culvert replacement.
- Identify the nesting bird window for this location.
- Prepare a report presenting the stream assessment and field finding results.

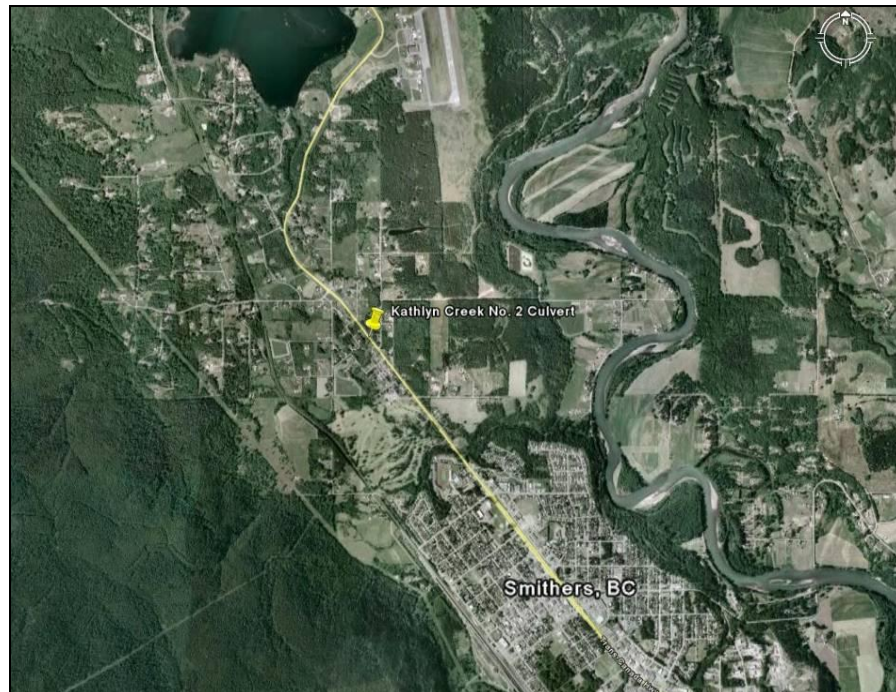


Figure 1. Key map showing location north of Smithers, BC. (Google Earth, 2012).

2. Methods

The Kathlyn Creek crossing assessment was completed through a one day site visit along with data gathering from available information sources. Prior to the field visit, available information sources were reviewed for fish inventory information for Kathlyn Creek (WSC 460-345400-26700) and downstream receiving waters. MCSL visited the site on September 24, 2011. It was determined that no fish sampling would be necessary as the information sources and database queries confirmed the presence of fish in Kathlyn Creek. The watercourse was surveyed upstream and downstream of the Highway 16 crossing for a distance of approximately 100 metres. Field observations looked for barriers to up-stream fish passage, the presence and quality of spawning, rearing and over-wintering habitat, and general remarks on fish habitat value. The stream channel width was measured at three evenly spaced intervals upstream and downstream of the Highway 16 culvert. The study area was assessed to identify any unique habitat features that could potentially be affected by replacement of the culvert including identification of amphibian and other aquatic and terrestrial resource values including wildlife trees, raptor nests, and the nesting bird window for the location. The study area was photo-documented.

3. Site Description

3.1 *Kathlyn Creek Watercourse Summary*

Watercourse Name: **Kathlyn Creek**

Watershed Code: **460-345400-26700**

UTM Coordinates: **09U, E: 616879, N: 6073174** (stream mouth)

UTM Coordinates: **09U, E: 616224, N: 6074104** (Highway 16 crossing No. 2)

Fish Habitat Characterization: **IMPORTANT**

Fish Habitat Type: **Rearing, Migratory Route**

3.2 *Landmark Kilometre Inventory*

MoTI's 2010 Landmark Kilometre Inventory (LKI) location description for the Kathlyn Creek Culvert No. 2 is: Yellowhead Highway 16, Segment: 1524 (New Hazelton – Houston), kilometre 65.62. The road crossing is approximately 2.6 kilometers northwest of the intersection of Highway 16 and Main Street in Smithers, BC.

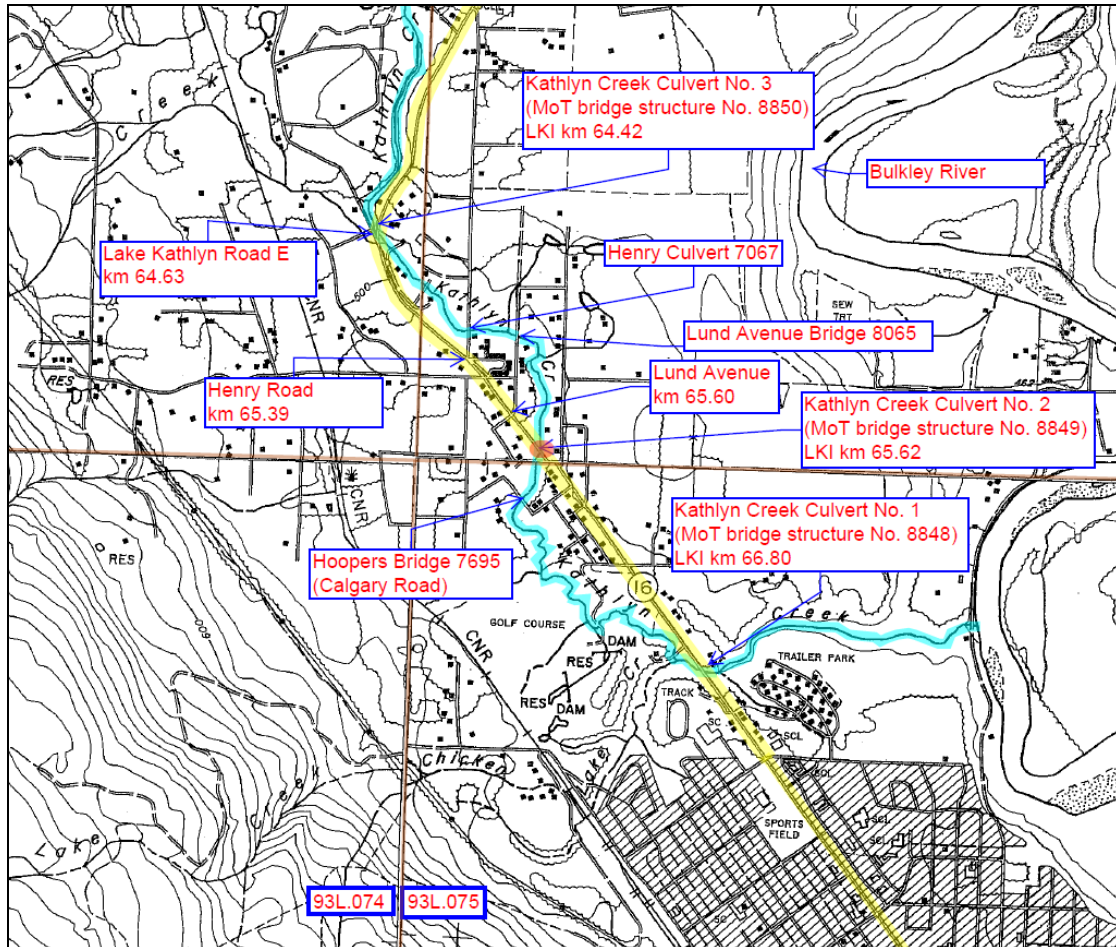


Figure 2. Map showing Kathlyn Creek No. 2 crossing on Yellowhead Highway 16 (map supplied by Daryl Nolan, MoTI).

3.3 Existing Crossing Conditions

The flow from Kathlyn Creek passes under Highway 16 through a large, closed bottom elliptical culvert, 3500 mm wide by 2200 mm high (Figure 3). The culvert was not embedded and was 22 m in length. Water depth in the culvert was approximately 30 cm at the time MCSL visited the study area. A small amount of bed material was noted at mid-length on the culvert floor. The culvert inlet is flush with the stream bed (Figure 5) and there was a drop of 20 cm at the culvert exit into an outlet pool during the site visit (Figure 3 and 4). Cobbles were the predominant bed material from approximately 3 m downstream of the culvert outfall (riffle crest of outlet pool) to 9 m downstream of the outlet, then the bed material became predominantly small gravels and fines.

No tributary streams, drainages, or wetlands were present in the study area. The Highway 16 ditchline on the northeast side of the crossing directly enters Kathlyn Creek at the No. 2 culvert inlet. Other aquatic resource values at the site are what appear to be domestic water intakes with pump houses immediately adjacent to Kathlyn Creek and pipes that extend into the creek. Two or three of these could potentially be affected by replacement of the culvert.



Figure 3. View upstream to outlet, 3500 mm wide by 2200 mm high elliptical culvert, 20 cm outlet drop (September 24, 2011).



Figure 4. View downstream showing outlet pool and short riffle section (September 24, 2011).



Figure 5. View downstream to inlet, inlet is flush with stream bed (September 24, 2011).

3.4 Average Channel Width

Stream channel widths were measured from top-of-bank to top-of-bank as per the Fish-stream Crossing Guidebook. Based on the first channel width measured (W4), subsequent channel widths were measured at 9 m intervals from the inlet and outlet of the culvert. Wetted width was measured from the wetted perimeter on one bank to the wetted perimeter on the opposite bank. Both parameters were recorded to obtain average channel and wetted widths (Table 1). Survey stakes were painted flo-pink, marked with the channel width station and driven into the stream bank to mark the channel width measurement locations (Figure 6). No stream training works were observed at the crossing.

Table 1. Stream channel widths for Kathlyn Creek No. 2 crossing

Station	Location	Wetted Width (m)	Channel Width (m)
W1	27 m u/s from inlet	6.1	7.1
W2	18 m u/s from inlet	5.4	6.1
W3	9 m u/s from inlet	5.8	6.9
W4	9 m d/s from outlet	6.9	8.7
W5	18 m d/s from outlet	5.5	7.8
W6	27 m d/s from outlet	7.3	8.5
Average Channel Width		6.2	7.5



Figure 6. Survey stake marking W4 channel width location (September 24, 2011).

4. Aquatic Inventory

4.1 *Fish Presence*

Kathlyn Creek is a direct tributary to the Bulkley River which subsequently drains into the Skeena River. A search of the Ministry of Forestry, Lands and Natural Resource Operations Fisheries Inventory Summary System (FISS) database indicated the presence of at least eleven fish species in Kathlyn Creek. The FISS inventory data for Kathlyn Creek indicates the presence of coho salmon (*Oncorhynchus kisutch*), cutthroat trout (*Oncorhynchus clarkii*), lamprey (general) (*Lampetra* sp), longnose dace (*Rhinichthys cataractae*), longnose sucker (*Catostomus catostomus*), mountain whitefish (*Prosopium williamsoni*), northern pikeminnow (*Ptychocheilus oregonensis*), pink salmon (*Oncorhynchus gorbuscha*), prickly sculpin (*cottus asper*), rainbow trout (*Oncorhynchus mykiss*), and steelhead (*Oncorhynchus mykiss*). The author has regularly observed steelhead spawning in Kathlyn Creek in the spring, where Kathlyn Creek runs through the Smithers Golf Course. Wilson and Rabnett (March 2007) report that the “Kathlyn Creek system has steelhead presence in Kathlyn Lake and spawning has been observed upstream of the Chicken Creek confluence”. The same report indicates the principal coho spawning is located in Simpson, Kathlyn and Chicken Creeks downstream of Lake Kathlyn. (Wilson and Rabnett, March 2007).

No sampling for fish presence was considered necessary as fish presence in Kathlyn Creek is well documented. No impassable barriers exist between the MoTI No. 2 culvert on Kathlyn Creek and the Bulkley River. As well, there are no known barriers to fish passage between the culvert and Lake Kathlyn upstream. Fish not included in the list above, but present in the Bulkley River, could also be present in Kathlyn Creek. Some likely species would be chinook salmon (*Oncorhynchus tshawytscha*), Dolly Varden (*Salvelinus malma*), and bull trout (*Salvelinus confluentus*). During the course of the assessment, several unidentified salmonid fry (4-7 cm) were observed upstream of the culvert.

None of the fish species identified as being present (or likely to be present) in Kathlyn Creek are listed under Schedule 1 of the Government of Canada's Species at Risk Act (SARA) Species at Risk Public Registry (2012). Coastal cutthroat trout, bull trout and Dolly Varden are provincial blue-listed species (BC Conservation Data Centre, 2012).

4.2 Habitat

Kathlyn Creek was surveyed for fish habitat quality and characteristics from the MoTI Highway 16 No. 2 Culvert crossing 50 m upstream and for approximately 100 m downstream.

4.2.1 Upstream of Highway 16

Assessment of the fish habitat upstream of Highway 16 began immediately upstream from the Kathlyn Creek No. 2 crossing. MCSL surveyed approximately 50 m upstream from the culvert inlet. At this point the stream was turning away from the highway and was well outside the area that could be impacted by replacement of the culvert. Cover along the stream banks consisted of deciduous shrubs such as willow (*Salix sp.*), red osier dogwood (*Cornus stolonifera*) and alder (*Alnus sp.*). A tended lawn formed the stream bank vegetation for 20 m on the south bank and a pump house for domestic water use was situated on the north bank approximately 10 m upstream of the culvert inlet (Figure 8). Large woody debris (LWD) was notably lacking in the section upstream of the culvert. The stream banks were usually moderately sloping and were comprised of gravels and fines covered in grasses, herbs and shrubs. The dominant bed materials were small gravels and fines. The fines filled in the interstitial space between the gravel particles, therefore good quality salmonid spawning habitat was limited. There were no redds observed during the field assessment.

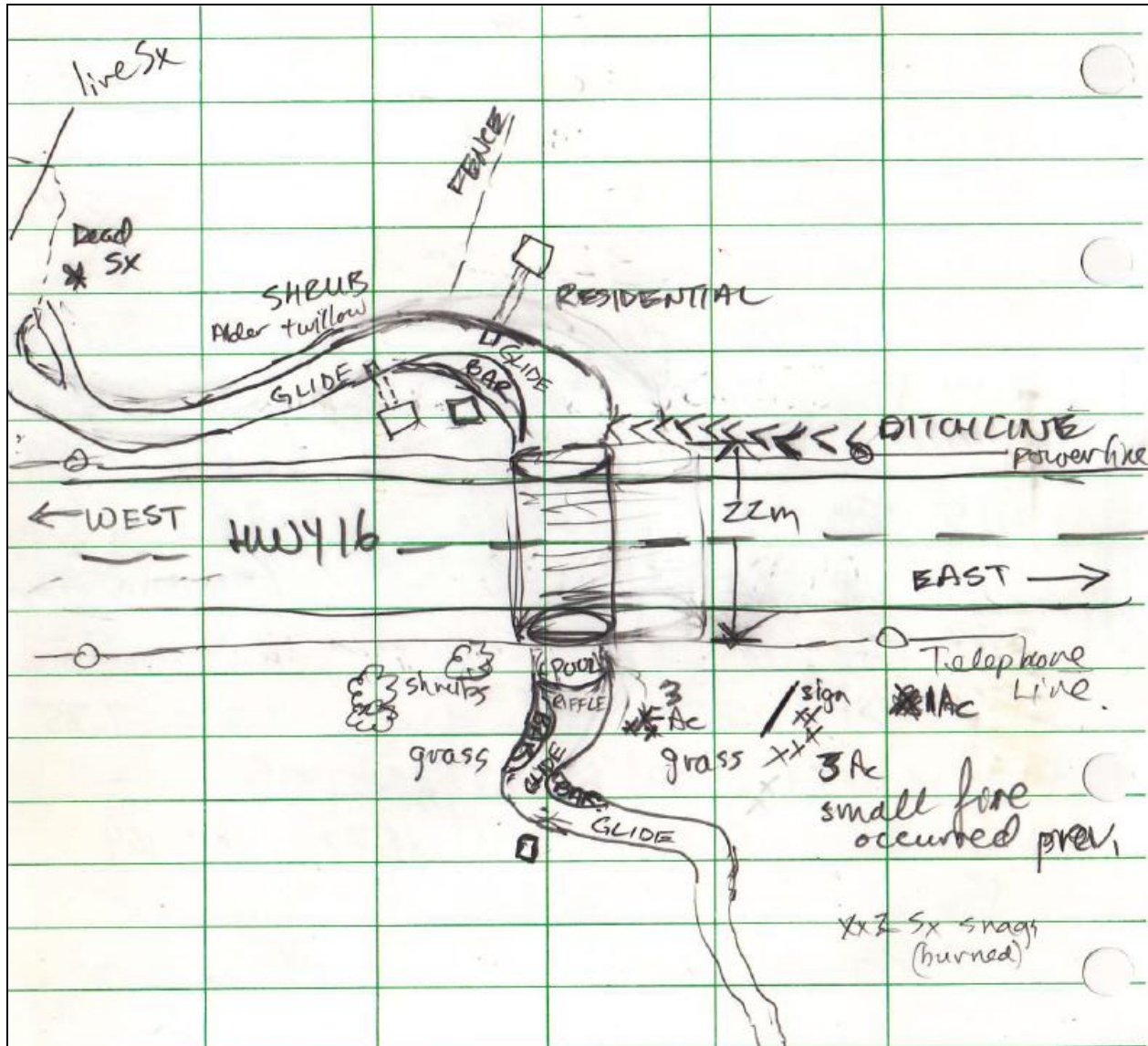


Figure 7. Field Sketch of Kathlyn Creek No. 2 Culvert crossing site, not to scale (MCSL, September 24, 2011).

Stream morphology in the assessed section was best described as large channel type as it consisted primarily of glide type habitat (Figure 8). Surface flow was smooth and undisturbed. The stream depth varied between very shallow to greater than 50 cm deep, and no distinct pools were observed in the first 50 m upstream. Stream gradient in this reach was around 0.5 - 1.0%. Cover for fish was provided primarily by the deciduous shrubs growing along the stream banks and to a lesser extent by the undercut banks occurring on the outside of the stream bends. Potential over-wintering habitat was limited to those areas where the residual pool depth was greater than 0.5 m deep.



Figure 8. View upstream from the Highway 16 culvert (September 24, 2011).



Figure 9. Increase in forest cover and habitat complexity ~50 m upstream of Highway 16. September 24, 2011.

Approximately 50 m upstream of the culvert, there was an increase in LWD and forest cover adjacent to the stream (Figure 9). Morphology changed from the large-channel type to a Riffle-Pool type with functioning LWD present. Substrates were still predominantly fines and small gravels.

4.2.2 Downstream of Highway 16

Assessment of the fish habitat downstream of Highway 16 began immediately below the Kathlyn Creek No. 2 crossing. MCSL surveyed approximately 100 m downstream from the culvert. Cover along the stream banks consisted primarily of tall grasses and scattered deciduous shrubs such as willow (*Salix sp.*), red osier dogwood (*Cornus stolonifera*) and alder (*Alnus sp.*) overhanging the channel (Figure 10 and 11). The habitat adjacent to Kathlyn Creek was predominantly open grassland with scattered larger deciduous trees on the south side of the creek (Figure 11). The open nature of the streamside vegetation provided virtually no shading for the stream.

Fish habitat immediately downstream of the Kathlyn Creek No. 2 culvert contained an outlet pool approximately 4 m long. Bed material at the riffle crest of the pool consisted predominantly of cobbles and continued for another 3-4 m downstream where the bed material transitioned to small gravels and fines similar to the bed material upstream of the culvert. As with the bed material on the inlet side of the culvert, there was poor quality salmonid spawning habitat as the fines filled the interstitial spaces between the gravel particles and tended to underlay the thin layer of gravel. No redds were observed during assessment of the channel downstream of the culvert.



Figure 10. Habitat immediately downstream of the Highway 16 culvert (September 24, 2011).

Other than the ~ 9 m of riffle-pool type habitat immediately downstream of the culvert, the remaining 90 m assessed downstream was primarily large channel type morphology. The shallow gradient and lack of functioning LWD (probably from anthropogenic influences) are likely the reason the stream exhibits this large channel morphology. The slow, smooth flows both upstream and downstream of the culvert provide good rearing conditions but suitable cover is limited. The section provides an important migration route to coho spawning locations in Simpson Creek



Figure 11. View of downstream habitat looking back towards Highway 16 (September 24, 2011).

4.3 Fish Habitat Summary

The slow, smooth flows characteristic of large-channel morphology both upstream and downstream of the culvert provide good rearing habitat but suitable cover is limited. The small gravels and fines which predominate the stream bed material are largely unsuitable as spawning habitat because the fines fill the interstitial space between the gravel particles. The gravel appears mostly as a thin veneer over the underlying fines. No spawning redds were observed during the assessment. Mature forest to provide stream-side shading is absent from the area likely to be affected by the replacement of the culvert. Scattered deciduous shrubs overhanging the stream provide minimal cover for fish while mildly undercut banks on the outside bends of the stream provide a small amount of security cover.

Fish habitat type at the Kathlyn Creek No. 2 crossing is primarily rearing habitat and a migration route. Overall the fish habitat type at the crossing is characterized as “Important”.

4.4 Reduced Risk Work Windows

The following reduced risk work windows apply to the fish species identified in Kathlyn Creek. In addition to the reported species, the presence of bull trout and/or Dolly Varden is highly probable. The reduced risk work window for bull trout and Dolly Varden in the Bulkley TSA is from June 1 to August 31.

Table 2. Fish species present in Kathlyn Creek, spawning season, and Reduced Risk Work Window.

Fish Species present	Anadromous species?	Red, Blue or SARA?	Spawning Season	Reduced Risk Work Window
Coho salmon	Yes		Fall	July 1 – August 31
Cutthroat trout	No	Blue-listed	Spring	September 1 – May 15
Lamprey	Yes		Spring	---
Longnose dace	No		summer	---
Longnose sucker	No		Summer (generally August)	---
Mountain whitefish	No		Winter (October-February)	June 1 – August 31
Northern pikeminnow	No		late Spring	---
Pink salmon	Yes		Fall	May 15 – August 1
Prickly sculpin	No		Spring	---
Rainbow trout	No		Spring	September 1 – May 15
Steelhead	Yes		Spring	September 15 – April 30
Bull Trout	No	Blue-listed	Fall	June 1 – August 31
Dolly Varden	No	Blue-listed	Fall	June 1 – August 31

There is no reduced risk work window that accommodates all the species reported to be present in Kathlyn Creek (Table 2). It is usually recommended that any proposed works be completed during periods of seasonal low flow, generally August through early September. However, the known use by anadromous species such as coho salmon, pink salmon and steelhead requires that migration routes be kept open from August through October. Any stream diversion proposed to facilitate the replacement of the MoTI Kathlyn Creek No. 2 would need to address the requirement to maintain upstream migration in the fall. Maintaining a migration route for outgoing anadromous fry in the spring is also an important consideration.

Table 3. Graphic presentation of Reduced Risk In-stream Work Windows (blocked out in yellow).

Species	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
BT												
CO												
CT												
DV												
MW												
PK												
RB												
ST												

The most important factors to consider in developing a timeframe for in-stream work are to avoid instream work during spawning periods, avoid disturbance of redds, select a period of lower stream flow to accommodate the works and maintain seasonal migration routes for migratory species. Given the species assemblage in Kathlyn Creek and the lack of a reduced risk work window that accommodates all the species, there are several timing options for completing the in-stream work.

The first timeframe would be from April to mid-May. This time frame includes the reduced risk work window for cutthroat and rainbow trout and steelhead but is in the time period when bull trout, Dolly Varden, coho, mountain whitefish and pink salmon eggs may still be incubating or alevins may be present in the stream bed substrate and fry may be emerging from the stream bed. Typically the hydrograph would be rising during this time frame.

The second possible timeframe would be July. This time frame includes the reduced risk work window for bull trout, Dolly Varden, coho, mountain whitefish and pink salmon. Cutthroat, rainbow and steelhead eggs may still be incubating or the eggs may have recently hatched and the alevins are still within the stream substrate or recently emerged. The stream hydrograph should be starting to subside during this timeframe.

The third potential timeframe is August – September. The stream hydrograph should be entering a seasonal low flow period during this timeframe. However, this timeframe is when anadromous species begin entering the stream system and migrating upstream to spawning locations. Maintaining migration routes is critical during this timeframe.

Of the three options, the July timeframe is recommended as the most suitable to minimize fish impacts associated with instream works. The timeframe is within the reduced risk work window for the fall and winter spawners and should fall on the subsiding hydrograph. Since the stream bed material is largely unsuitable as spawning habitat it is unlikely that cutthroat, rainbow and steelhead would spawn within the study area. As a precaution, the area should be revisited in May and June prior to any in-stream work to confirm that no fish are spawning within the study area.

5.0 Wildlife Inventory



Figure 12. View northward to Highway 16 with burned area on right (September 24, 2011).

5.1 **Wildlife General**

The culvert crossing site is in a semi-rural area on the western outskirts of the Town of Smithers. Reconnaissance of the site did not reveal any indication of wildlife use. There was no evidence of beavers (*Castor canadensis*) inhabiting the area. No ungulate signs were observed although the area may see occasional use by moose (*Alces alces*) and deer (*Odocoileus sp.*). Black bear (*Ursus americanus*) may also occasionally frequent the area. No raptor nests were observed at the site. No amphibians were observed during reconnaissance of the study area, however; the aquatic and riparian habitat reviewed provides the habitat attributes necessary to support amphibian populations. Provincial amphibians with species ranges within the study area include the Columbia Spotted Frog (*Rana luteiventris*), the Wood Frog (*Lithobates sylvaticus*), the Western Toad (*Anaxyrus borealis*) and the Long-Toed Salamander (*Ambystoma macrodactylum*) (BC Conservation Data Centre, 2012). The Western Toad is both provincially blue-listed and listed under Schedule 1 of SARA as a “species of concern” (BC Conservation Data Centre and Species at Risk Public Registry, 2012).

5.2 Habitat Description

Vegetation on the downstream side of the Kathlyn Creek No. 2 Culvert crossing consisted primarily of an expansive grassy area with scattered alder and willow shrubs along with a few mature cottonwood trees (*Populus trichcarpa*) south of Highway 16 and east of Kathlyn Creek (Figure 7). A small fire had burned some of the vegetation and trees on the southeast side of the crossing (Figure 12). A few of the cottonwood exhibited some fire damage around the base of the trunk but only one appeared to have been killed by the fire. The fire also killed two larger spruce (*Picea sp.*) trees further away from the highway. The cottonwood trees nearest the creek and highway may need to be removed to replace the culvert. Some shrubs on the northwest and southwest side of the crossing site will likely need to be removed as well.

Terrestrial habitat on the upstream side of the crossing is predominantly shrubs with a small amount of grass interspersed (Figure 13). Fifty metres upstream of the inlet the vegetation changes to mature spruce forest (Figure 13).



Figure 13. View to northwest side of crossing with predominantly shrub vegetation near Kathlyn Creek and spruce in the background (September 24, 2011).

5.3 Unique Features

A pump house, probably for domestic water supply, is situated approximately 10m upstream of the culvert inlet on the northwest side of the crossing. This structure will in all likelihood be affected when the culvert is replaced and may need to be permanently removed. There may be 1 or 2 more domestic water intakes that may be affected by replacement of the culvert.

The fire-killed cottonwood and spruce trees will recruit into wildlife trees over time but due to the proximity of some of the trees to Highway 16, they may be considered danger trees which will require removal.

5.4 Nesting-Bird Window

Birds are protected in British Columbia under Section 34 of the provincial *Wildlife Act, 1982* and the federal *Migratory Birds Convention Act, 1994* (Region 7 Omineca – Reduced Risk Timing Windows for Fish and Wildlife. April 2004). As such it is illegal to injure, molest or destroy a bird or its egg or the nest of a bird when the nest is occupied by a bird or its egg. Clearing of vegetation must not impact bird nests, young, or eggs and must be done within an approved vegetation clearing timing window which protects nesting birds.

The Skeena Region of the Ministry of Environment does not have an official Reduced Risk Timing Windows for Wildlife. Instead, they are using the Region 7 Omineca - Reduced Risk Timing Windows for Fish and Wildlife as the timing is the same as here (Anne Hetherington, MOE, pers. comm., March, 8, 2012). The Region 7 Omineca – Vegetation Clearing Timing Window for the protection of nesting birds is from August 1 through to April 30 (Region 7 Omineca – Reduced Risk Timing Windows for Fish and Wildlife. April 2004)

6.0 Summary

An assessment of fish and wildlife habitat adjacent to the Kathlyn Creek crossing of Highway 16 at culvert #2 was conducted in the fall of 2011 using existing information and recording observations during a single day site visit. Kathlyn Creek is a fish bearing stream that is known to provide habitat for 11 fish species and is defined as Important habitat. A review of potential least risk periods for instream works to minimize impacts to did not identify a reduced risk window for Kathlyn Creek due to the diversity of fish species identified in the stream. Instream works during July is anticipated to reduce risk to the majority of fish species. The Vegetation Clearing Timing Window is from August 1 through to April 30 to minimize potential risk to nesting birds. Because there is no overlap in the reduced risk windows for both fish and birds, an Environmental Management Plan should be developed in the project planning stage to design the necessary construction methods and timing and minimize potential environmental impacts.

7.0 References

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Appendix 1

Highway 16 Stream Crossing

East and Westbound Views



Figure 13. Eastbound view, crossing near sign September 24, 2011.



Figure 16. Eastbound view September 24, 2011.



Figure 14. Westbound view, crossing near sign September 24, 2011.



Figure 15. Westbound view September 24, 2011.