

Upper Bulkley Fish and Aquatic Review

Summary of Data, Methodology, Results, and Thresholds

For Stream Crossing Density Indicator

The road and stream crossing data is a derived product from the BC Environment Provincial Stream Crossing Information System (PSCIS)¹. The PSCIS model generates a point data layer representing potential stream crossings cross-referenced to a fish habitat model. The fish habitat model assigns three fish habitat classes to the stream crossings: fish presence – observed, fish presence – inferred, or none.

As this indicator focuses on access to fish habitat, crossings determined unlikely to bear fish were removed for this analysis. In addition, only closed-bottom structures (CBS), such as corrugated metal pipes, are included in the PSCIS data. Open-bottom structures (OBS), such as bridges and some larger culverts, typically retain or emulate natural stream channel morphology and fish habitat, whereas smaller closed-bottom structures, such as corrugated metal pipes, often do not. The change to stream morphology created by installation of a CBS often creates a barrier to fish passage¹.

The stream crossing data does not include any culvert information collected directly by industry.

1.0 GIS Data

- Salmon presence and spawning data produced by SkeenaWild 2010-2014
- Update to salmon presence by Eclipse Geomatics Feb. 2016
- Road Stream Crossings (BC Environment PSCIS Version 1.0 2012)
- Digital Road Atlas (DRA)
- Forest Tenure Roads (FTEN roads)
- Freshwater Atlas Streams (1:20,000)
- Freshwater Atlas Lakes (1:20,000)
- Freshwater Atlas Assessment Watersheds (edited by K. Rabnett Jan. 2016)
- Wet'suwet'en House Territory boundaries
- Wild Salmon Policy (WSP) Chinook Conservation Unit
- Bulkley River Floodplain (delineated area only)
- Morice Resource Management Zone (RMZ) for Bulkley River

2.0 Methodology

The spatial overlay tool in QGIS was used to assign analysis units to stream crossings. The resultant table was exported to excel where a pivot table was generated to summarize results.

3.0 Thresholds

Categorical risk thresholds applied have been determined by the Wild Salmon Policy.

Threshold Rating	WSP)
Low	< 0.20
Medium	≥0.20
High	≥0.58

¹ Technical specifications as to how stream crossings were derived is detailed in Fish Passage GIS Analysis, Methodology and Output Data Specifications. BC Ministry of Environment. Prepared by S. Norris, Hillcrest Geographics, Victoria BC. March 19, 2009.

4.0 Results

The results of the stream crossing density indicator are reported out by a variety of boundaries including the Upper Bulkley Watershed, twenty-two sub-watersheds and face units within the Upper Bulkley basin, fifteen Wet'suwet'en house territories within the Upper Bulkley Watershed, the WSP Chinook Conservation Unit, and the Bulkley River Resource Management Zone as determined by the Morice LRMP.

4.1. Upper Bulkley Watershed

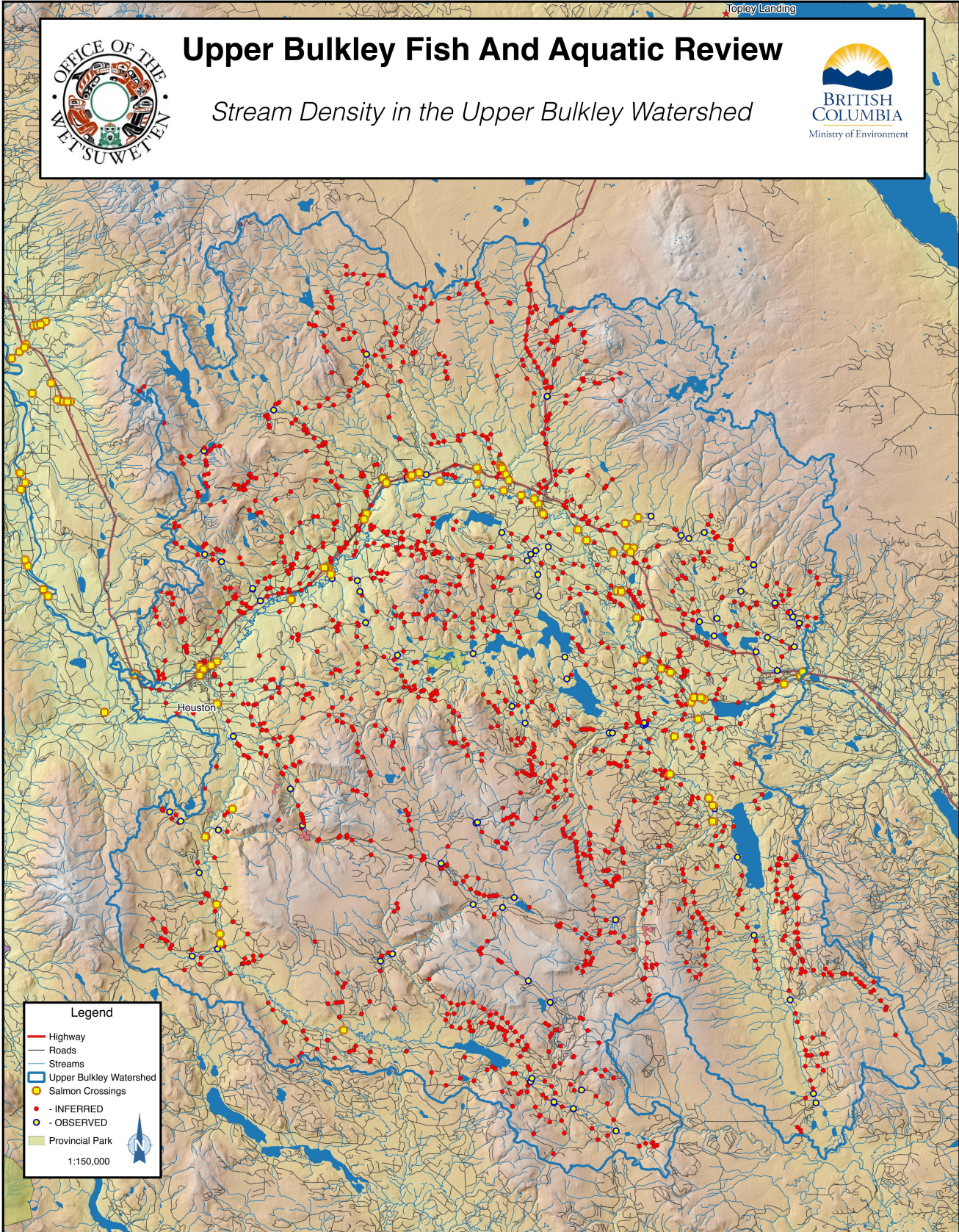
The Upper Bulkley Watershed contains a potential 1,825 total road/stream crossings. 9.7 % (177) of these crossings have confirmed fish presence and 90.3% (1,648) are designated with inferred fish presence. The total stream crossing density is 0.79 crossings/km².

**Table 4.1.1. Stream Crossing Density in Upper Bulkley Watershed
(Number of crossings/km²)**

Area (km ²)	Salmon Presence Observed	Fish Presence Observed	Fish Presence Inferred	Total Crossings	Stream Crossing Density
2,315.07	71.00	106.00	1,648.00	1,825.00	0.79

Within the Upper Bulkley Watershed, 40.1 % of the 177 stream crossings designated with confirmed fish presence are situated directly over salmon bearing streams.

Figure 4.1.1 Stream Crossings in the Upper Bulkley Watershed



4.2. Wet'suwet'en House Territories within the Upper Bulkley Watershed

The fifteen Wet'suwet'en House Territories intersecting the Upper Bulkley Watershed contain 3,030 potential stream crossings, with 13.2 % (400) situated in observed fish habitat and 86.8 % (2,630) situated over inferred fish habitat. The stream crossing density for the house territories ranges from 0.22/km² in the Bikh C'idilyiz Ts'anli Territory to 1.10/km² in the Tse Zul Territory. The overall stream crossing density for the fifteen Wet'suwet'en House Territories is 0.64 crossings/km². 5.2% (158) of the stream crossings are situated over salmon bearing streams.

Table 4.2.1 Stream Crossing Density in Wet'suwet'en House Territories within Upper Bulkley Watershed (Number of crossings/km²)

House Territories	Area (km ²)	Salmon Bearing Stream	Fish Presence - Observed	Fish Presence - Inferred	Total	Total Stream Crossing Density
'Ilh K'il Bin	305.26	32.00	8.00	175.00	215.00	0.70
Bi Wini	883.29	8.00	43.00	264.00	315.00	0.36
Bikh C'idilyiz Ts'anli	142.48	0.00	8.00	24.00	32.00	0.22
C'idi To Stan	505.42	18.00	22.00	192.00	232.00	0.46
C'iggiz	177.29	12.00	13.00	133.00	158.00	0.89
C'inilh K'it	396.40	5.00	30.00	198.00	233.00	0.59
Cosl'et Bin	361.06	15.00	41.00	266.00	322.00	0.89
Dets'inegh	70.79	4.00	6.00	46.00	56.00	0.79
Ggusgi Be Wini	288.66	16.00	2.00	215.00	233.00	0.81
Gguzih Keyikh	54.13	0.00	1.00	51.00	52.00	0.96
Nelgi Cek	214.98	11.00	11.00	166.00	188.00	0.87
Nelhdzi Tezdli Bin	417.79	1.00	19.00	235.00	255.00	0.61
Tasdleg	477.18	22.00	22.00	432.00	476.00	1.00
Ts'in K'oz'ay	280.41	11.00	11.00	97.00	119.00	0.42
Tse Zul	131.12	3.00	5.00	136.00	144.00	1.10
Total	4,706.26	158.00	242.00	2,630.00	3,030.00	0.64

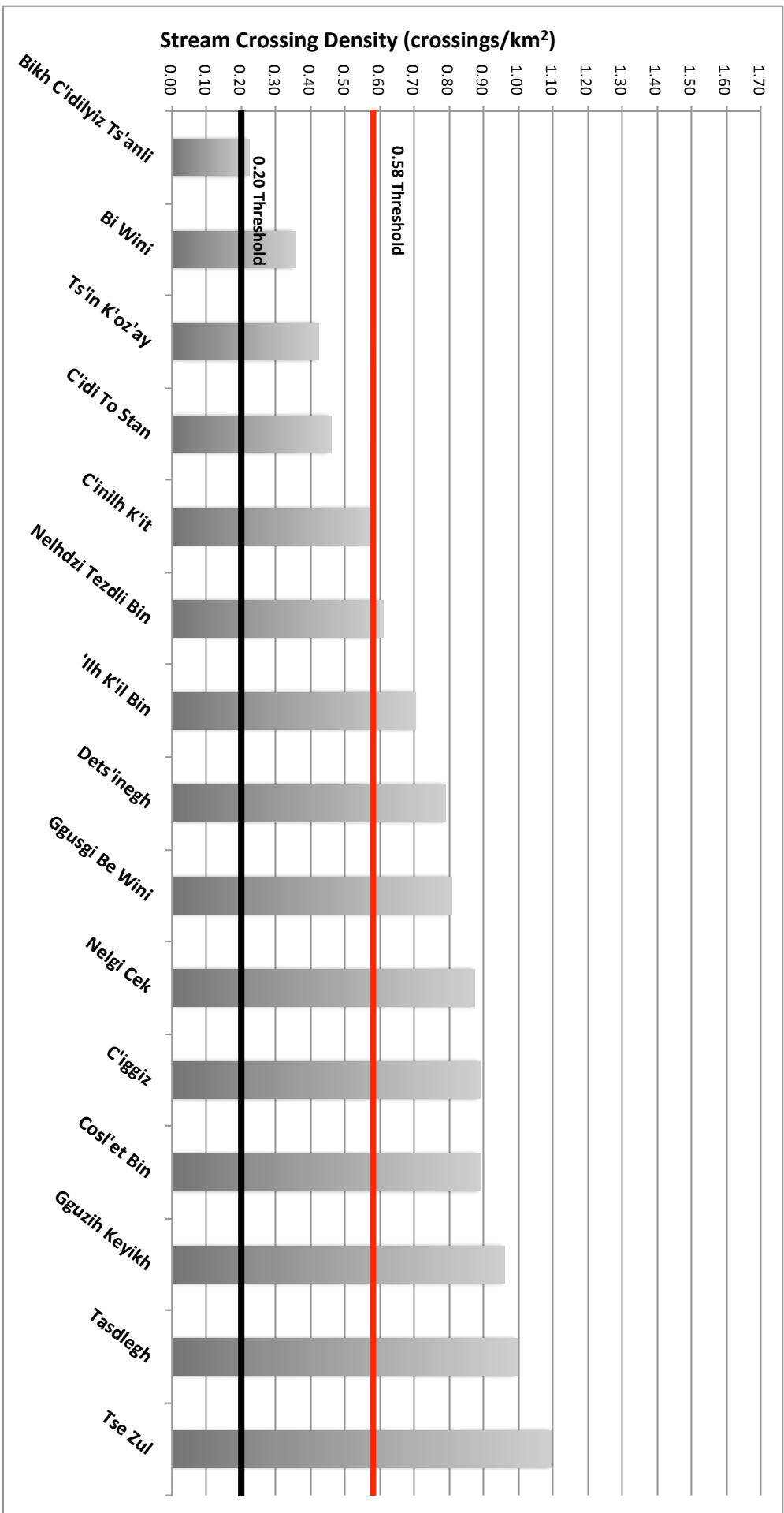
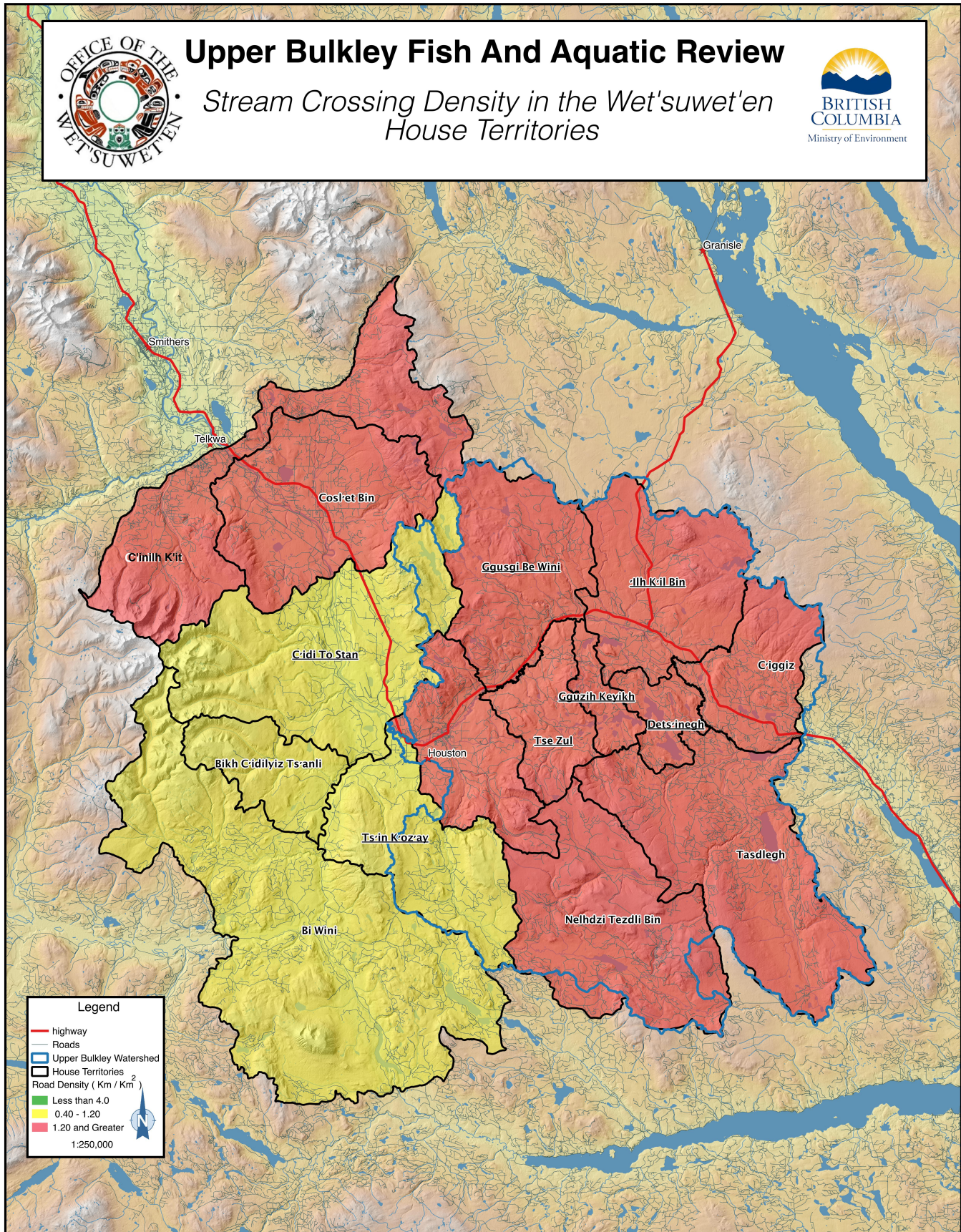


Figure 4.2.1 Stream Crossing Density in Wet'suwet'en House Territories within Upper Bulkeley Watershed

Figure 4.2.2 Stream Crossing Density within Wet'suwet'en House Territories



4.3. Upper Bulkley Sub-Watersheds

The 22 sub-watersheds within the Upper Bulkley Watershed contain a total of 1,825 potential stream crossings. The stream crossing densities for the remaining sub-watersheds range from 0.35 crossings/km² in the Cesford Creek sub-watershed to 1.54 crossings/km² in the Crow Creek sub-watershed. Seventeen of the twenty-two sub-watersheds have a calculated stream crossing density above the high threshold value. Within the nine face units, 16.2% (96) of the stream crossings consist of observed fish habitat and 83.8% (498) are situated over inferred fish habitat.

Table 4.3.1 Stream Crossing Density in Upper Bulkley sub-watersheds (Number of crossings/km²)

Sub-watershed	Area (km ²)	Salmon Presence Observed	Fish Presence Observed	Fish Presence Inferred	Total Crossings	Stream Crossing Density
Ailport	97.13	8.00	4.00	36.00	48.00	0.49
Aitken	148.66	0.00	6.00	145.00	151.00	1.02
Barren	25.81	2.00	0.00	27.00	29.00	1.12
Buck	566.77	0.00	33.00	292.00	325.00	0.57
Byman	94.04	0.00	2.00	35.00	37.00	0.39
Cesford	36.70	0.00	0.00	13.00	13.00	0.35
Crow	73.96	0.00	7.00	107.00	114.00	1.54
Johnny David	43.73	0.00	0.00	34.00	34.00	0.78
Maxan	370.73	0.00	13.00	265.00	278.00	0.75
Mckilligan	38.20	0.00	0.00	29.00	29.00	0.76
Mcquarrie	114.62	0.00	3.00	55.00	58.00	0.51
Perow	20.63	0.00	1.00	17.00	18.00	0.87
Richfield	161.81	0.00	2.00	95.00	97.00	0.60
Sub-total	1,792.79	10.00	71.00	1,150.00	1,231.00	0.69
Bulkey River Face Units						
Bulkley River 1	78.47	10.00	0.00	80.00	90.00	1.15
Bulkley River 2	51.21	4.00	5.00	53.00	62.00	1.21
Bulkley River 3	75.84	4.00	1.00	103.00	108.00	1.42
Bulkley River 4	30.07	0.00	1.00	39.00	40.00	1.33
Bulkley River 5	36.87	19.00	0.00	27.00	46.00	1.25
Bulkley River 6	59.21	0.00	8.00	35.00	43.00	0.73
Bulkley River 7	64.63	22.00	4.00	78.00	104.00	1.61
Bulkley River 8	32.23	2.00	2.00	19.00	23.00	0.71
Bulkley River 9	93.77	0.00	14.00	64.00	78.00	0.83
Sub-total	522.29	61.00	35.00	498.00	594.00	1.14
Total	2,315.07	71.00	106.00	1,648.00	1,825.00	0.79

Figure 4.3.1 Stream Crossing Density within Upper Bulkeley Sub-watersheds

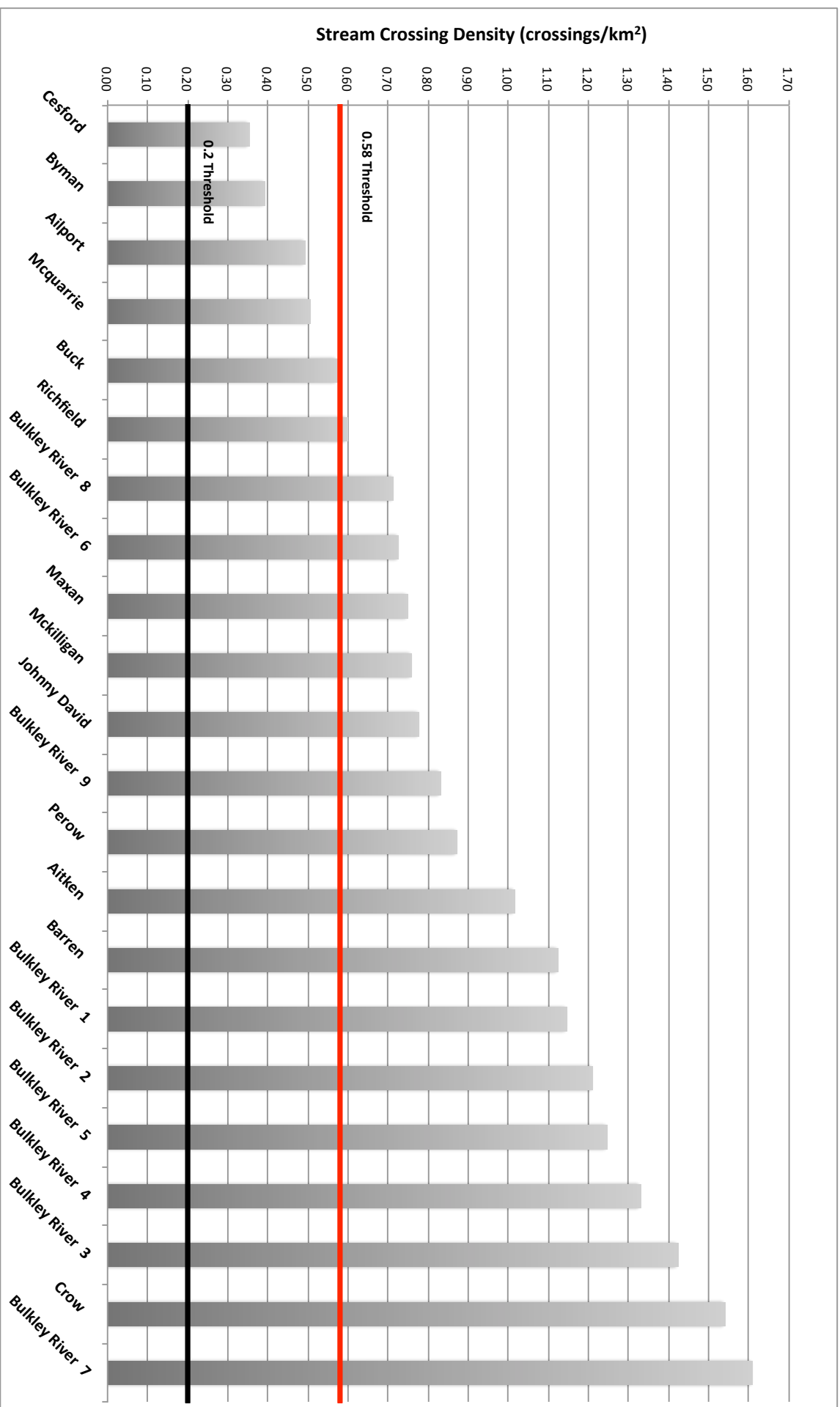
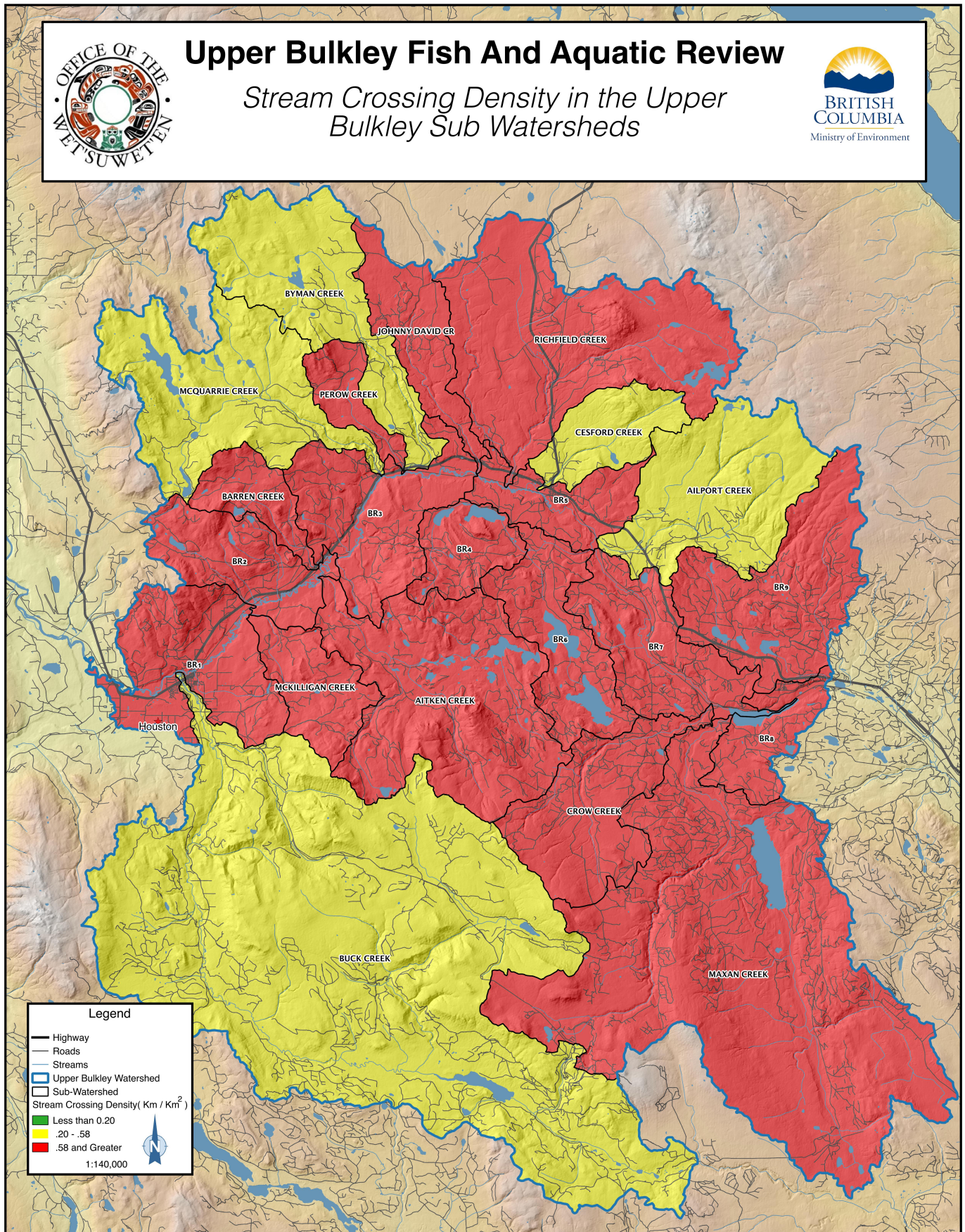


Figure 4.3.2 Stream Crossing Density within Upper Bulkley Sub-watersheds



4.4. Additional Management and Resource Zones

This report includes two additional management and resource zones related to aquatic objectives situated within the Upper Bulkley Watershed. These areas include the Wild Salmon Policy Chinook Conservation Unit and the Bulkley River Resource Management Zone as determined by the Morice LRMP. The stream crossing density values in both management units fall in the high risk category.

Table 4.4.1 Stream Crossing Density within Additional Management Areas (Number of crossings/km²)

Management Area	Area (km ²)	Salmon Presence Observed	Fish Presence Observed	Fish Presence Inferred	Total Crossings	Stream Crossing Density
Bulkley River RMZ	53.20	6.00	5.00	61.00	72.00	1.35
WSP Chinook Conservation Unit	117.88	16.00	13.00	123.00	152.00	1.29

Figure 4.4.1 Stream Crossing Density Thresholds Applied to the Additional Management and Resource Zones.

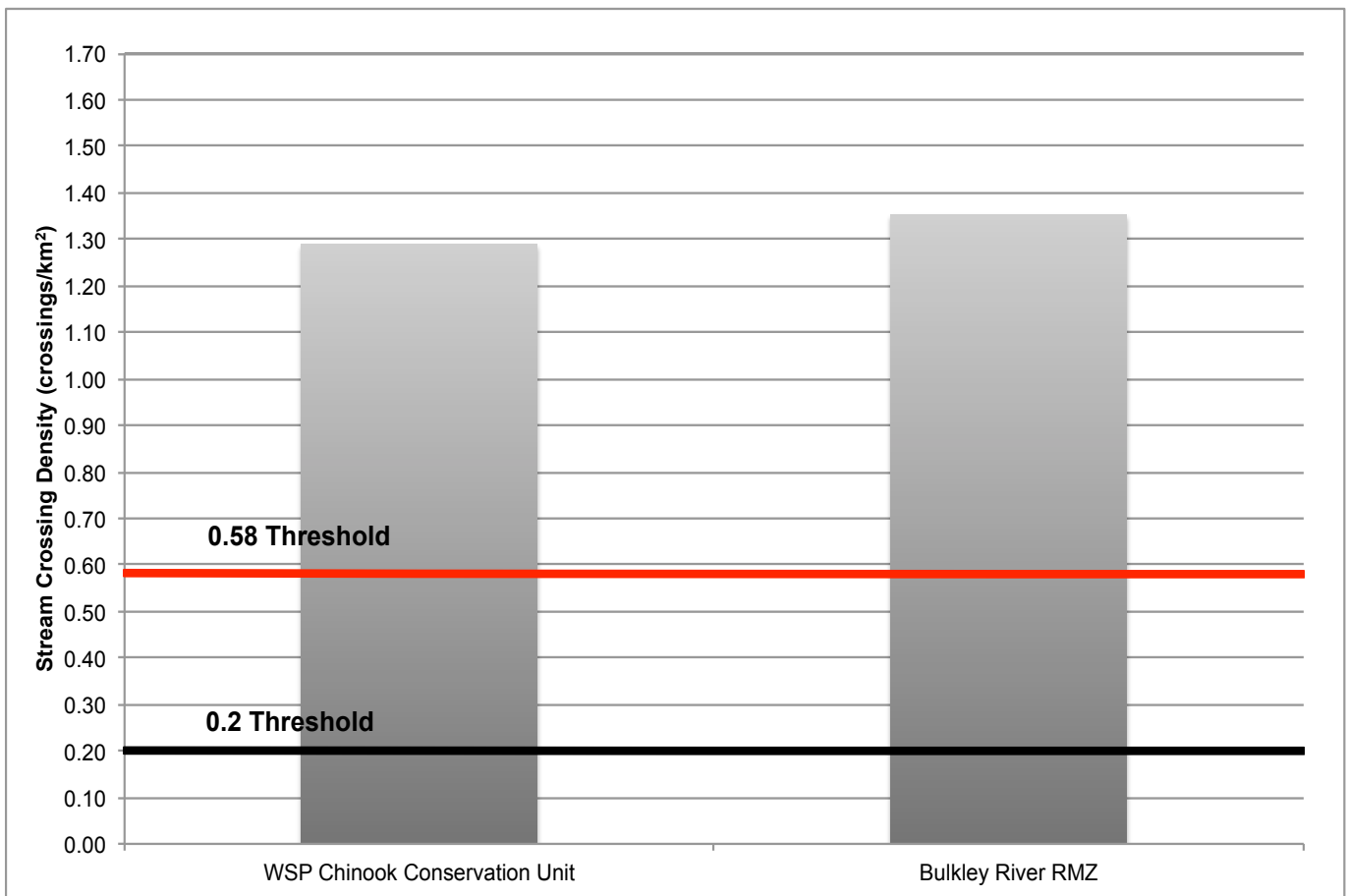


Figure 4.4.2 Stream Crossings in Additional Management and Resource Zones.

