3CW Cottonwood Project Report for CWSP and Kootenay Connect-2021-2022

By

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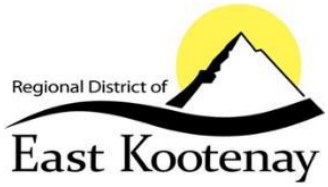

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3CW Cottonwoods: Monitor and mitigate impact of beaver on cottonwood/aspen stands

The purpose of the cottonwood/beaver project is to assess the status of important cottonwood stands and install wire protectors if they are required to protect critical stands from beaver harvesting. If feasible, start to assess the regeneration of cottonwood on the levees. This subproject used the wetland mapping from Yr1 to identify the stands of cottonwoods, used a survey of important wildlife cottonwood trees to identify critical trees and small stands, and then after seeking permission of selected landowners, installed wire around selected cottonwood trees. In total 45 large trees, often near active beaver colonies were protected. The project brought in a Youth Climate Corp to assist with the installation of the wire.

Work plan: 1. Assess the status of wire guards put on in previous years to protect cottonwood- did they protect the trees?

The CWSP team assessed one stand that had had historic wire guards in place, the wire appeared to be very effective at protecting cottonwood stand. There is one other stand in Columbia Wetlands which we know able but were unable to access due to high water.

Examples:

- Davdison Marsh-Near Parson, a private landowner has approximately 25 cottonwoods wired near their yard alongside a large wetland complex. This appeared to be very effective and has halted any major cottonwood damage or harvest despite the thriving beaver population in the adjacent wetland. They used chicken wire which is often discouraged as it can rust away however, in their case it appears to be effective.

2. Locate the large stands of cottonwoods & aspens in CW using the CWSP wetland mapping and LiDAR from Yr 1. This requires locating mature stands with structural stage attributes and software script with the LiDAR to determine the density and height of the forests.

CWSP LiDAR mapping from Yr 1 was used to locate areas with important cottonwood stands in the Columbia wetlands from Invermere to Golden. Georeferenced maps of the cottonwood stands made on ArcGIS Pro 2.8.0 were used while locating cottonwood stands in the field.

Examples:

- See Appendix D for maps of cottonwood stands.

3. Visit the most important sites to assess the status of beaver damage.

Cottonwood Stand Surveys occurred in partnership with Living Lakes Canada over several days to investigate as many stands as possible along different stretches of the Columbia River. The team completed surveys via canoe on the following stretches:

- Invermere to Radium (16km), Radium to Brisco (29km), Brisco to Spllimacheen (main channel-

15km and Bott's channel-7km), and Nicholson to Golden (10km), totalling in approximately 77 km surveyed.

The surveyors tracked the following information for each survey stretch at sites where significant cottonwood presence was observed using the CWSP wetland mapping and LiDAR from Yr 1. as a reference:

- time
- location (GPS waypoint)
- side of the river
- snag class (using BC's wildlife tree classification system-native broad leaved deciduous trees)
- observed wildlife use (cavities, nests, perching or notable bird species sighted)
- access note (poor, moderate, good-river or road)
- beaver activity (type and proximity)
- Other (Stand size, circumference, additional notes)

This information was collected from canoe, often while still floating by to cover the area in good time. Periodically surveyors would go to shore to measure some of the trees and check for beaver activity or damage to cottonwoods. The completed datasheets can be found in Appendix A.

Additionally, incidental information was tracked and collected while conducting other CWSP field work throughout the Columbia Wetlands and while engaging with landowners throughout the field season.

4. Locate where to install wire guards on large trees in important stands of aspen/cottonwood.

Once surveys were completed the CWSP team was able to compare significant cottonwood sites observed, beaver activity level, and access to determine multiple candidate stands for wire guard application. Access was deemed a significant factor to ensure that team members could safely get to selected stands with all the equipment needed to apply wire guards. It was also considered to facilitate easy follow up visits and maintenance over the following years. Beaver activity was also considered an important factor to determine where wire guard application should occur.

5. In winter 2021-2022, install wire protectors in most critical cottonwood stands

In November of 2021 wire guards were successfully installed at 4 different stands, with a total of 45 cottonwood trees.

- Methods and Materials: Heavy stucco wire (16 gauge) 4 feet tall, with 2"x 2" spaced mesh was installed around moderately mature cottonwood trees throughout selected stands. Approximately a 4" space was left between the tree and the wire to allow for growth and keep beavers from chewing between wire squares. Wire was secured together using rebar ties, and to the ground using stakes made from nearby shrubs.
- Installation Crew: The wire was installed over several days by the CWSP team, Living Lakes Canada staff, and 6 crew members from Wildsight's Youth Climate Corps (YCC). The involvement of the YCC crew was an excellent addition to the project, providing them with

hands-on learning, and this project with significant in-kind contributions and overall cost reductions. CWSP hopes to continue working with LLC, and Wildsight's YCC for support with labour intensive projects.

- Site Details: The wire guards were applied at the following sites (see Appendix D, Map 6).

Site Name	Notes
Spillimacheen Bridge	● 11 trees had wire guards applied. ● Access was good, right next to the road. ● Beaver activity was moderate. Lodge nearby, but no recent damage to any cottonwoods. Historic cuts and felling were minimal. ● Average tree circumference was 1.69m
Brisco area	● 11 trees had wire guards applied. ● Access was moderate, 1km walk from the road. ● Beaver activity was high. Lodge nearby, historic cuts and felling. Recent feeding on small woody debris nearby ● Average tree circumference was 1.70m
Beaver Dam Analogue-Brisco site	● 7 trees had wire guards applied. ● Access was poor, quad access ¾ of the way or long hike. ● Beaver activity was high. Lodge nearby, and BDA constructed nearby. A few historic cuts on trees. ● Average tree circumference was 1.69m
Radium	● 16 trees had wire guards applied. ● Access was good, able to walk from the road. ● Beaver activity was high. Historic cuts and felling, along with multiple lodges nearby. ● Average tree circumference was 1.49m

6. If feasible, bring in Stewart Rood to access the status of cottonwood and popular rejuvenation along the levees. Yr 4 will continue the installation of wire guards on mature cottonwood trees, especially the wildlife trees.

Dr. Stewart Rood, Canada's preeminent expert on cottonwood, was able to join CWSP on one of the survey routes earlier in the field season (July 2021) to provide a coarse assessment of overall cottonwood stand health, and rejuvenation. He visually determined that most stands were in good condition, especially near large alluvial fans where significant substrate is moved and deposited. The undammed nature of the Upper Columbia River and its tributaries appears to provide ideal conditions for Cottonwood health and regeneration increasing their value. This makes the Columbia Wetlands

especially valuable considering many Interior BC floodplains have been flooded or altered by human dams which radically alter the hydroperiod reducing the viability of cottonwoods. Dr. Rood determined that the Columbia Wetlands has healthy populations of cottonwoods but that most of the natural levees were not ideal for regenerating cottonwoods, as the sediment is too fine. That makes the good cottonwood stands located on the alluvial fans even more valuable, and important to protect. It also makes the few large cottonwoods on the natural levees very important for nesting eagles, ospreys and other birds. Another good feature that Dr. Rood noted was that cattle grazing in the floodplain in minimal, again another important cause of damage elsewhere. However, given the fine sediment on the levees, the few large remaining trees on the levees are important to protect. In year 4, after the fledging of the eagles and ospreys, we will install wire on selected wildlife trees.

Measurable outcomes

1. Map & assess the success of previous wire guards in protecting from beaver harvesting on aspen/cottonwoods in CW

See above

2. Map of large and important cottonwood/aspen stands in CW, especially those that contain SAR and concern.

See above

3. Assess the status of beaver damage on important cottonwood stands

Beaver damage was assessed while completing the cottonwood stand surveys, where beaver activity noted during (feeding sites, lodges etc.) which helped determine which stands were a priority and at risk of being damaged or felled. Additionally, more intensive surveys were completed near each of the 4 wire guard application sites to confirm beaver presence, and document historic damage/felling with GPS locations and photos.

Beaver activity was rated high in 3 of out 4 wire guard application sites due to the presence of close proximity lodges, active feeding signs along banks, and varying density of relatively recent cottonwood damage and felling.

4. Map locations where wire protectors will be installed on important cottonwood stands

Map of wire guard locations

- Shared Google Drive folder with KML and GPX files for wiring locations. 2021_wireapplication_GPXandKMLfiles

5. Install wire protectors in at least 3 stands of cottonwood/aspens in winter 2021.

Completed. We explained the partnership with YCC, engaged youth etc. and described the selected locations and amounts, and tree size, along with beaver activity.

As noted in the work plan section 5 above, wire protectors were installed at 4 different stands on a

total of 45 trees in November 2021. This increased effort was made possible by a partnership with Living Lakes Canada (LLC) team members, and Wildsight's Youth Climate Corp team. The YYC crew was made up of 6 individuals between 20-30 years old, working on various projects in the East Kootenays to gain environmental experience and training with a focus on projects related to climate mitigation. LLC team members worked with the crew for 2 weeks providing training in various water quality and quantify monitoring protocols before helping with this project. The crew was able to help perform some maintenance on the Beaver Dam Analogue in the area, and then spent 2 ½ days assisting with wire guard application and beaver activity surveys. This partnership was extremely successful, provided a significant in-kind benefit to the project, and CWSP looks forward to continuing working with LLC and YYC team members moving forward.

List of Appendices:

Appendix A. Cottonwood Stand Survey, and Wire Guard Application Datasheets

CWSP Cottonwood Stand Survey Data 2021
Notes on Data Collection
Data was collected via canoe.
Photos were taken at almost all sites.
Periodic stops on river banks were made to measure tree circumference.
snag class was determined based on using BC's wildlife tree classification system-native broad leaved deciduous trees)
all significant wildlife sightings and use of trees were recorded (cavities, nests, perching or notable bird species sighted)
Access notes were taken to quickly capture feasibility of returning to access the stand. Poor indicates opposite side of river bank from highway, or far from river bank. Moderate, river- indicates easily accessed via canoe. Good indicates road or bridge.
Beaver activity and close proximity to trees were noted.
Other (Stand size, circumference, additional notes)

Date	Aug 18th, 2021			Crew	KP and GP	Area	Radium to Brisco						
Time	GPS Wypt	GPS Lat	GPS Long	Avenza Pt	Photo	Snag Class	Wildlife Use	Accessibility	Beaver	Circumference	Circumference	Circumference	Circumference
8:41	203	50.632912	-116.10973	placemark 2	Y	4	Cavities						
8:55	204	50.637773	-116.11005	placemark 3	Y	2	Nest (BAEA)						
9:15	206	50.647029	-116.11128	edgewater-place	Y	2 (stand)	Cavities						
9:18	207	50.648672	-116.11132	edgewater-place	Y	3 (stand)	BAEA perch, Cavities						
9:30	208	50.653543	-116.11823	edgewater-place	Y	3	Cavities						
9:45	211	50.661333	-116.11924	edgewater-place	Y	2 (stand ~ 20 tre	Cavities both sides						
9:54	212	50.666262	-116.12211	edgewater-place	Y	2 (stand ~ 10 tre	Cavities, TUVU						
10:00	213	50.668299	-116.12492	edgewater-place	Y	2 (stand ~ 6 tree	Cavities	poor, river acces	N/A				
10:21	214	50.671294	-116.12747	edgewater-place	Y	2 (stand)	Cavities	poor, river acces	N/A	260	220	330	155
11:02	216	50.690941	-116.13863	edgewater-place	Y	2 (stand ~ 5 tree	N/A	moderate, river a	N/A				
11:30	218	50.69888	-116.14514	edgewater-place	Y	2/3 (stand ~ 10 t	N/A	poor, river acces	N/A				
11:33	219	50.701137	-116.14767	edgewater-place	Y	3 (stand ~ 6 tree	N/A	Moderate, river a	Bank Lodge				
12:10	227	50.721429	-116.1728	edgewater-place	Y	3 (stand ~ 5 tree	Cavities	poor, river acces	beaver signs				
12:23	228	50.721451	-116.17361	edgewater-place	Y	2 (stand ~ 3 tree	blue heron neart	mod, river acces	wetland sub-bas	195	150	190	
12:36	230	50.724053	-116.17982	edgewater-place	Y	2 (~ 2 trees)	Cavities	mod, river acces	active lodge				
12:50	231	50.725863	-116.18847	edgewater-place	Y	2	Cavities, small n	poor, river acces	N/A	240			
13:09	232	50.733167	-116.19549	edgewater-place	Y	2 (stand ~ 10 tre	Cavities in bare t	Mod, river access. Possible road access on either side					
13:30	233	50.745767	-116.20959	edgewater-place	Y	2	Unknown	poor, creek acce	N/A				
13:43	234	50.752731	-116.21961	edgewater-place	Y	2 (stand)	Cavities	Mod, river acces	N/A				
13:51	235	50.757655	-116.22381	edgewater-place	Y	2 (stand ~ 5 tree	Cavities, snag n	mod, river acces	N/A				
13:55	236	50.760038	-116.22381	edgewater-place	Y	2 (stand)	Snag, cavities	mod, river acces	N/A	trees on both sides			
14:03	238	50.765216	-116.22692	edgewater-place	Y	2 (stand ~ 10 tre	Cavities	Mod, river acces	Lodge east bank	trees both sides			
14:30	239	50.766487	-116.22648	edgewater-place	Y	2	Cavities	Mod, river	Old beaver dama	195	154	155	133
15:32	240	50.76943	-116.2273	edgewater-place	Y	2/1/3 (stand ~ 1(	Cavity	mod, river	historic crossing (old roadway)				
15:38	241	50.772505	-116.2283	edgewater-place	Y	2 (stand ~ 20 tre	Cavities, BAEA p	mod, river	N/A				
15:53	243	50.781442	-116.23321	edgewater-place	Y	2 (stand spread	BAEA nest with a	poor, river acces	Lodge	100m from river			
16:15	244	50.79316	-116.24622	spilli-brisco-place	Y	2 (stand ~ 10 tre	Cavities	poor, river acces	N/A	50-100m from river			
16:25	245	50.795721	-116.25188	spilli-brisco-place	Y	2	Cavities	porri river	active beaver sig	trees on both sides			
16:34	246	50.798414	-116.26128	spilli-brisco-place	Y	2 (stand ~ 5 tree	cavities, AMCR p	mod, river acces	N/A				
16:39	247	50.800111	-116.26779	spilli-brisco-place	Y	2	Nest, BAEA nea	mod river	N/A				
16:43	248	50.801697	-116.27172	spilli-brisco-place	Y	2	BAEA nest, 2 juv	poor river	N/A				
17:00	249	50.814397	-116.28046	spilli-brisco-place	Y	2	cavity	poor river	beaver lodge nearby				
17:10	251	50.822835	-116.27788	spilli-brisco-place	Y	2 (stand ~ 10 tre	cavities, snag ne	poor river	N/A				
17:17	252	50.82652	-116.28208	spilli-brisco-place	Y	2	cavities	good river	N/A	thing band of valuable trees			

Date	Aug 19th, 2021			Crew		KP and GP	Area	Brisco to Spillimacheen (Took out at Cedared creek)							
Time	GPS Wypt	GPS Lat	GPS Long	Avenza Pt	Side or River (ri	Photo	Snag Class	Observed Wildl	Access Note	Beaver Activity	Other (Stand Si	Other (Stand Si	Other (Stand Si	Other (Stand Si	Other (Stand Si	Other (Stand Size, Circumference)
2021-08-19T16:2	253	50.833216	-116.29205	spilli-brisco-place	RL	Y	1	N/A	mod river access	beaver cut prese	189	170	140	56	64	81
2021-08-19T17:1	259	50.833439	-116.28931	spilli-brisco-place	RL	Y	2	Cavities, Eastern	mod river access	beaver food on b	245	120	115	159	beaver nibble on a 145	
2021-08-19T17:4	260	50.838941	-116.28725	spilli-brisco-place	RL	Y	2/3	Cavities	poor river access	beaver feeding s	~ 10 stand size					
2021-08-19T17:5	264	50.850649	-116.30111	spilli-brisco-place	RL	Y	2	Cavities	poor river access	baver feeding spots						
2021-08-19T18:4	270	50.867666	-116.3269	spilli-brisco-place	RL	Y	2/3	Nest	poor river access	Lodge	~ 5 stand size					
2021-08-19T19:0	272	50.874611	-116.33904	spilli-brisco-place	RL	Y	2/3	BAEA perch + N	poor river access	feeding sites						
2021-08-19T19:0	273	50.878483	-116.33943	spilli-brisco-place	Both	Y	2/3	Cavities	poor river access	feeding sites	~20 tree stand size					
2021-08-19T19:2	275	50.884672	-116.35301	spilli-brisco-place	RL	Y	2 (many 1-3)	large cavity	poor river access	feeding sites	2 individuals					
2021-08-19T19:2	277	50.887207	-116.359	spilli-brisco-place	RL	Y	1-2	various	good-road	lodge + food	100+ stand size					
2021-08-19T19:3	278	50.886327	-116.36031	spilli-brisco-place	RL	Y	1/2	AUEA pair	poor river access	feeding sites	~ 5+ stand size					
2021-08-19T19:5	279	50.892975	-116.36882	spilli-brisco-place	RR	Y	1/2	various	mod river access	N/A	20+ stand size, many individuals spaced out					
2021-08-19T20:2	282	50.910937	-116.37304	harrogate-placer	RL	Y	1	cavities	mod river access	n/a	30+ stand size					
2021-08-19T20:5	283	50.908082	-116.38329	harrogate-placer	RL	Y	1/2	various, mix of tr	poor/mod	old cut	100+ stand size	190	110	170	150	190
2021-08-19T21:2	284	50.918498	-116.38271	harrogate-placer	RR	Y	1	cavities	mod/river or roac	feeding sites	100 + stand size					
2021-08-19T21:5	287	50.928598	-116.38884	harrogate-placer	RL	Y	2	cavities + BAEA	mod river access	n/a	50+ stand size					

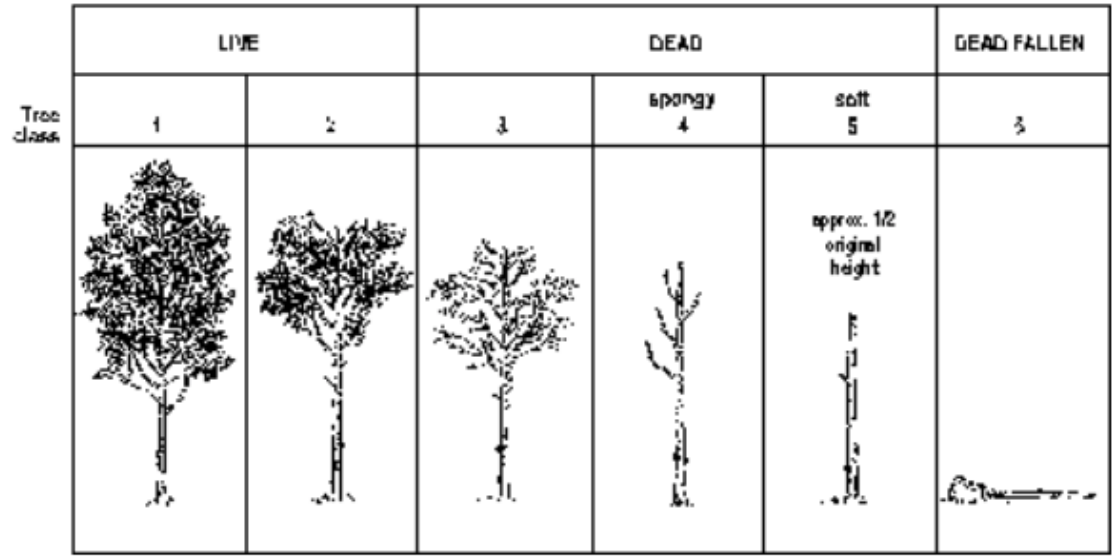
Date	Aug 20th, 2021			Crew	KP, TP, SB	Area	Nicholson to Golden				
Time	GPS Wypt	GPS Lat	GPS Long	Avenza Pt	Side or River (ri	Photo	Snag Class	Observed Wildl	Access Note	Beaver Activity	Other (Stand Size, Circumference)
2021-08-20T18:3	289	51.2448	-116.91217		L	Y	1-2	cavities + perche	Good	n/a	>100, 292 end point
2021-08-20T18:4	293	51.253145	-116.92205		L	Y	1-3	cavities	pooor	lodge	50-100
2021-08-20T18:5	294	51.256752	-116.92453		R	Y	1-3	Great Blue Hero	good	n/a	> 100, good regeneration
2021-08-20T18:5	295	51.255186	-116.92858		R	Y	1-3	unconfirmed big	poor	n/a	25, Nest + eagle/ perched.
2021-08-20T19:1	297	51.262604	-116.92754		L	Y	1-2	cavities	poor	n/a	~10-15 stand size, thinner strips with conifers nearby.
2021-08-20T19:2	298	51.273177	-116.93904			Y					sparse
2021-08-20T19:3	300	51.277615	-116.94931		L	Y			poor		spares on L, none on R
2021-08-20T19:4	301	51.279663	-116.95837		both	Y	1-3	cavities, nest	poor	n/a	nest on right, stand > 100 both sides
2021-08-20T19:5	302	51.280725	-116.9711		L	Y	1-3	cavities	good	n/a	west side of valley. Stand > 50. Old piers on L.

Date	Aug 20th, 2021			Crew	KP and TP	Area	Botts Channel, Feldmans to Spilli				
Time	GPS Wypt	GPS Lat	GPS Long	Avenza Pt	Side or River (ri	Photo	Snag Class	Observed Wildl	Access Note	Beaver Activity	Other (Stand Size, Circumference)
2021-08-20T23:0	303	50.860648	-116.34399		L	Y	1	n/a	great	n/a	2
2021-08-20T23:1	305	50.864351	-116.34605		L	Y	1-2	cavities	good	n/a	10
2021-08-20T23:3	311	50.880747	-116.35284		L	Y	1-3	too far to see	poor	n/a	really far, 1-200 m away past river, west along bugaboo river
2021-08-20T23:3	313	50.883125	-116.35733		L	Y	1	n/a	mod	n/a	sinle line of ~20 trees, 100m west.

Date	Aug 21st, 2021			Crew	KP and TP	Area	Invermere to Radium				
Time	GPS Wypt	GPS Lat	GPS Long	Avenza Pt	Side or River (ri	Photo	Snag Class	Observed Wildl	Access Note	Beaver Activity	Other (Stand Size, Circumference)
2021-08-21T14:5	315	50.523016	-116.02302	4	R	Y				n/a	nest confier
2021-08-21T15:1	316	50.529	-116.03194	5	L	Y	1-3		poor	n/a	toby creek alluvial fan, >100
2021-08-21T15:2	318	50.542088	-116.04452	6	L	Y	1	n/a	poor	n/a	50ish thin line
2021-08-21T16:1	323	50.577074	-116.05916	7	L	Y	1-2	n/a	poor	n/a	horse thief creek outflow. Mixed forest
2021-08-21T16:2	326	50.588587	-116.0654	8	R	Y	1	n/a	mod	n/a	~ 25 stand size
2021-08-21T16:5	327	50.593646	-116.06648	9	L	Y	1-3	cavities	poor	n/a	>50
2021-08-21T16:5	328	50.598346	-116.07065	10	L	Y	1-3	cavities, nest,	poor	feeding sight	>100, big nest,
2021-08-21T17:0	331	50.605977	-116.07213	11	L	Y	2-3	lots of cavities	poor	n/a	20-30 stand size
2021-08-21T17:2	333	50.613514	-116.08716	12	Both	Y	1-3	perching, cavitie	mod on RR, poo	feeding sight	>100
2021-08-21T17:3	335	50.617512	-116.09165	13	Both	Y	1-3	cavities	mod on RR, poo	feeding sight	>100
2021-08-21T17:4	336	50.61894	-116.0968	14	Both	Y	1-3	cavities	Good RR, poor f	n/a	>100

Survey Crew	Date	GPS Unit	General Survey area	Wypt #	Latitude	Longitude	Elevation	Time	Circumference (m)	Notes
YCC + LLC	Nov 8, 2021	1	Suzanne's property-BDA	485	50.8166	-116.28288	792.407593	2021-11-08T20:46:2	1.58	Cavity, old beaver cut in proximity
YYC + LLC	Nov 8, 2021	1	Suzanne's property-BDA	486	50.816528	-116.28285	797.815674	2021-11-08T20:47:0	2.85	big branch hanging, danger tree
YYC + LLC	Nov 8, 2021	1	Suzanne's property-BDA	487	50.816613	-116.28288	798.219666	2021-11-08T20:53:1	1.89	tree fallen on it, danger tree
YYC + LLC	Nov 8, 2021	1	Suzanne's property-BDA	488	50.816678	-116.28298	802.390747	2021-11-08T21:11:5	2.55	lots of small trees around the base
YYC + LLC	Nov 8, 2021	1	Suzanne's property-BDA	489	50.81689	-116.28345	792.843018	2021-11-08T21:46:4	1.7	completely girdled by beaver
YYC + LLC	Nov 8, 2021	1	Suzanne's property-BDA	490	50.816795	-116.28329	789.103271	2021-11-08T21:47:5	2.25	partially chewed on bottom
YYC + LLC	Nov 8, 2021	1	Suzanne's property-BDA	491	50.816673	-116.28305	786.024902	2021-11-08T22:03:0	1.9	partially chewed less than the last one
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	3	50.833247	-116.29209	804.919495	2021-11-09T17:42:5	1.7	Old beaver activity close, neighbouring tree chewed
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	4	50.833191	-116.29202	804.102173	2021-11-09T17:44:2	2.2	same as previous
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	1	50.833318	-116.2924	805.375366	2021-11-09T17:40:1	1.7	unremarkable
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	2	50.833282	-116.29245	805.392883	2021-11-09T17:41:3	1.5	nesting box present + bird nest
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	5	50.833342	-116.29258	802.870911	2021-11-09T17:47:4	1.9	snake grass around base
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	6	50.833322	-116.29275	801.353271	2021-11-09T17:52:2	1.7	unremarkable
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	KP Phone-CWSP tree wire #1					2.5	largest tree in area, lots of old beaver activity around
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	KP Phone-CWSP tree wire #2					1.5	nice younger tree, lots of beaver activity around
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	24	50.833148	-116.29324	794.166748	2021-11-09T18:57:2	1.3	beaver activity close by
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	25	50.833346	-116.29326	795.342834	2021-11-09T19:01:3	1.1	
YYC + LLC	Nov 9, 2021	2	2nd Brisco Bridge	26	50.833187	-116.29311	795.870789	2021-11-09T19:04:4	1.6	
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	27	50.903958	-116.37217	797.269226	2021-11-09T20:38:4	1.5	maybe all the same tree next to old cabin
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	11	50.833731	-116.29228	796.723389	2021-11-09T18:16:2	1.5	maybe all the same tree next to old cabin
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	28	50.904245	-116.37214	797.665833	2021-11-09T21:11:3	1.6	maybe all the same tree next to old cabin
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	29	50.904375	-116.37186	796.70459	2021-11-09T21:38:2	2	some wildlife cavities
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	30	50.90461	-116.372	793.144958	2021-11-09T21:50:4	1.65	
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	30	50.90461	-116.372	793.144958	2021-11-09T21:50:4	1.9	cavities in top
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	31	50.904264	-116.37188	790.492859	2021-11-09T22:26:3	1.92	
YYC + LLC	Nov 9, 2021	2	Spillimacheen bridge 2	31	50.904264	-116.37188	790.492859	2021-11-09T22:26:3	1.45	
YYC + LLC	Nov 10, 2021	2	Radium	32	50.619691	-116.09588	790.222839	2021-11-10T16:29:0	1.76	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	36					1.55	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	38	50.619554	-116.09581	790.291687	2021-11-10T16:43:0	1.3	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	39	50.619702	-116.09577	791.457275	2021-11-10T16:45:5	1.15	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	40	50.619684	-116.09567	791.993164	2021-11-10T16:52:0	1.2	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	41	50.619555	-116.09563	792.135864	2021-11-10T16:56:3	1	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	42	50.619676	-116.0956	791.159485	2021-11-10T16:59:0	1.15	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	43	50.619403	-116.09578	793.418823	2021-11-10T17:15:5	1.4	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	44	50.619467	-116.09579	793.726135	2021-11-10T17:17:1	1.3	Old beaver cuts nearby
YYC + LLC	Nov 10, 2021	2	Radium	45	50.618457	-116.09622	793.089661	2021-11-10T17:49:5	1.5	
YYC + LLC	Nov 10, 2021	2	Radium	46	50.61841	-116.09618	794.545349	2021-11-10T17:58:0	1.6	by camp spot
YYC + LLC	Nov 10, 2021	2	Radium	47	50.617541	-116.09671	795.409424	2021-11-10T18:21:0	1.5	
YYC + LLC	Nov 10, 2021	2	Radium	48	50.617159	-116.09625	796.707214	2021-11-10T18:30:0	1.8	
YYC + LLC	Nov 10, 2021	2	Radium	49	50.617244	-116.09558	796.647644	2021-11-10T18:43:5	1.9	
YYC + LLC	Nov 10, 2021	2	Radium	50	50.617374	-116.09536	799.497437	2021-11-10T18:54:4	2.1	
YYC + LLC	Nov 10, 2021	2	Radium	51	50.617467	-116.0955	800.550232	2021-11-10T19:02:2	1.7	

Appendix B. BC's wildlife tree classification system-native broad leaved deciduous trees



British Columbia's wildlife tree classification system (native broad-leaved deciduous)

Available from: https://www2.gov.bc.ca/assets/gov/environment/plants-animals-and-ecosystems/conservation-habitat-management/wildlife-conservation/wildlife-tree-committee/2008-qp-dta-course-trainer-booklet.pdf

Appendix C. Photos during cottonwood field surveys

Photo 1- Living Lakes Canada team member Georgia Peck completing cottonwood stand surveys on the Columbia River

Photo 2- CWSP President Suzanne Bayley and volunteer Tomba Paagman documenting a cottonwood stand on the Columbia River.

Photo 3- a small yet complex Cottonwood stand on the banks of the Columbia River.

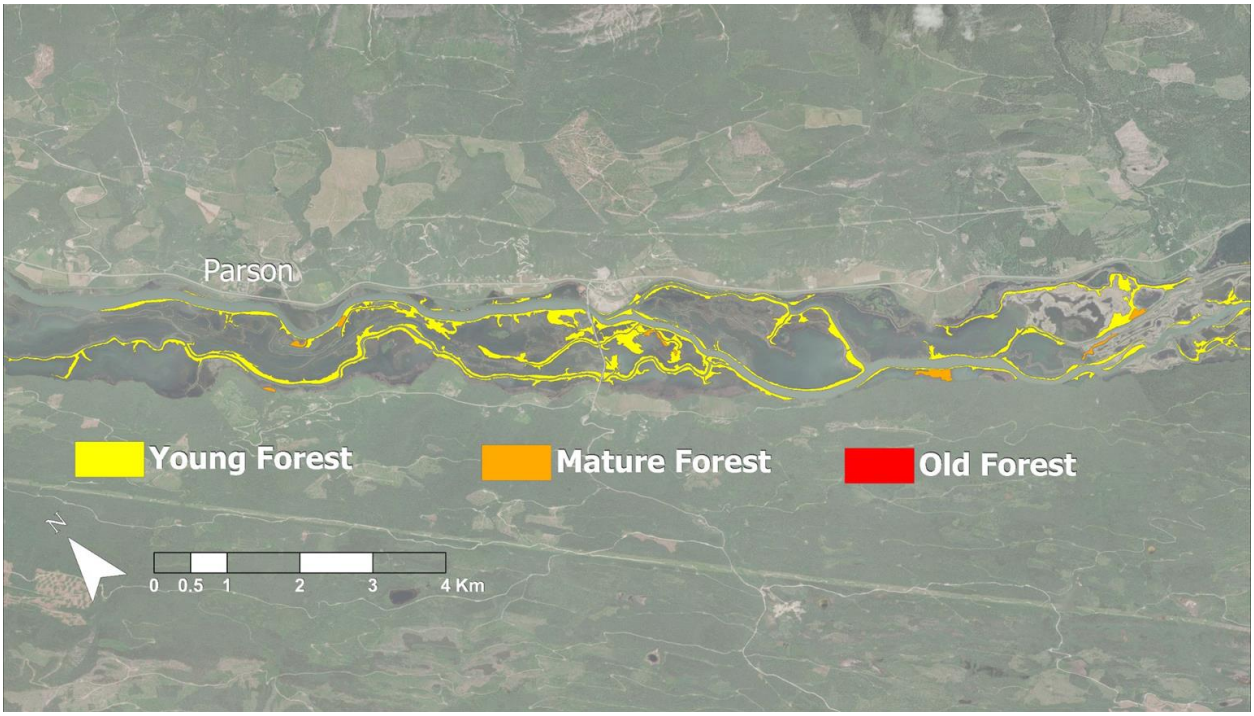
Photo 4- observed beaver activity on a small stand of cottonwoods near the Columbia River

Photo 5-Wildsight's Youth Climate Corps applying a wire guard around a high value cottonwood tree

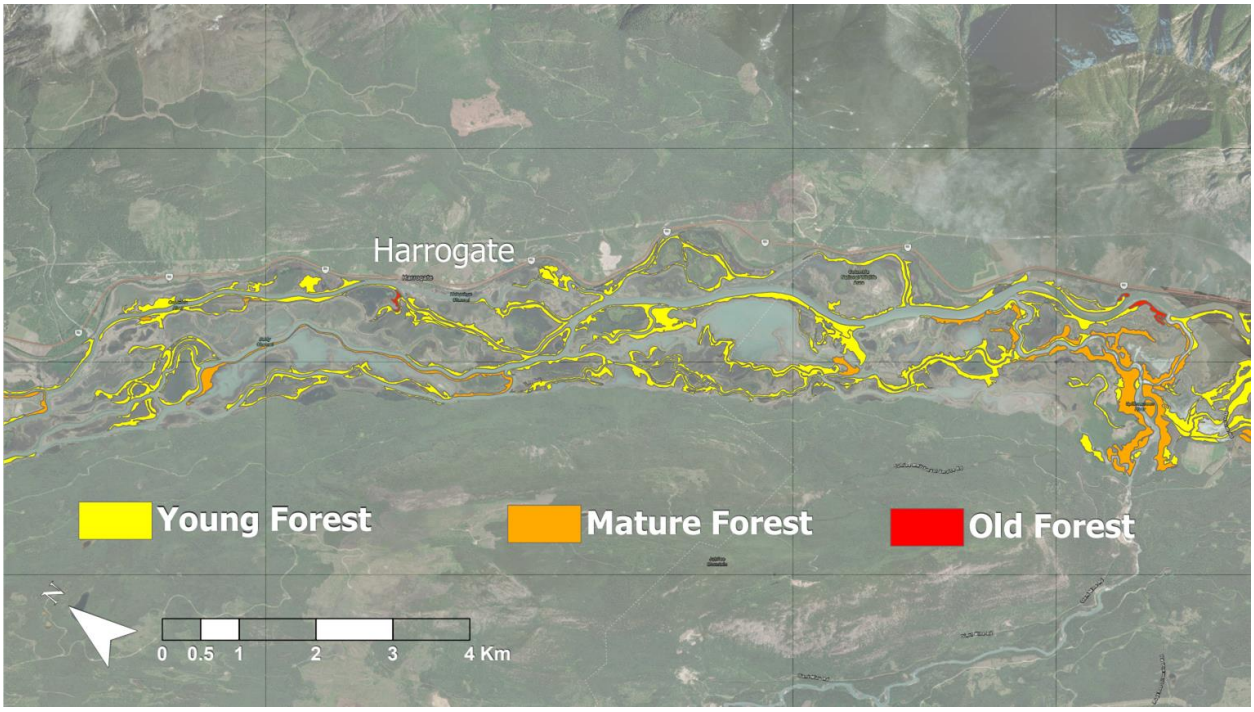
Photo 6- completed wire guard installation around a high value cottonwood tree.

Photo 7- Living Lakes Canada, and Wildsight YCC team members posing for group photo during wire guard installation field days

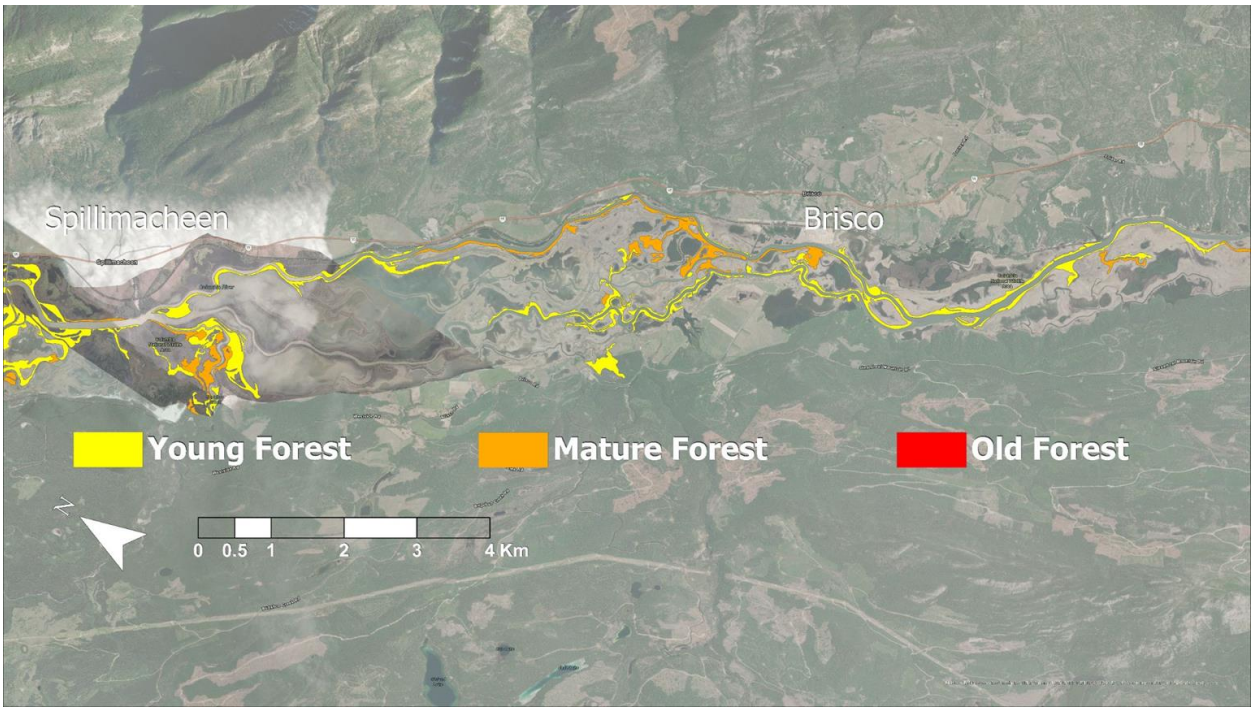
Appendix D. Maps



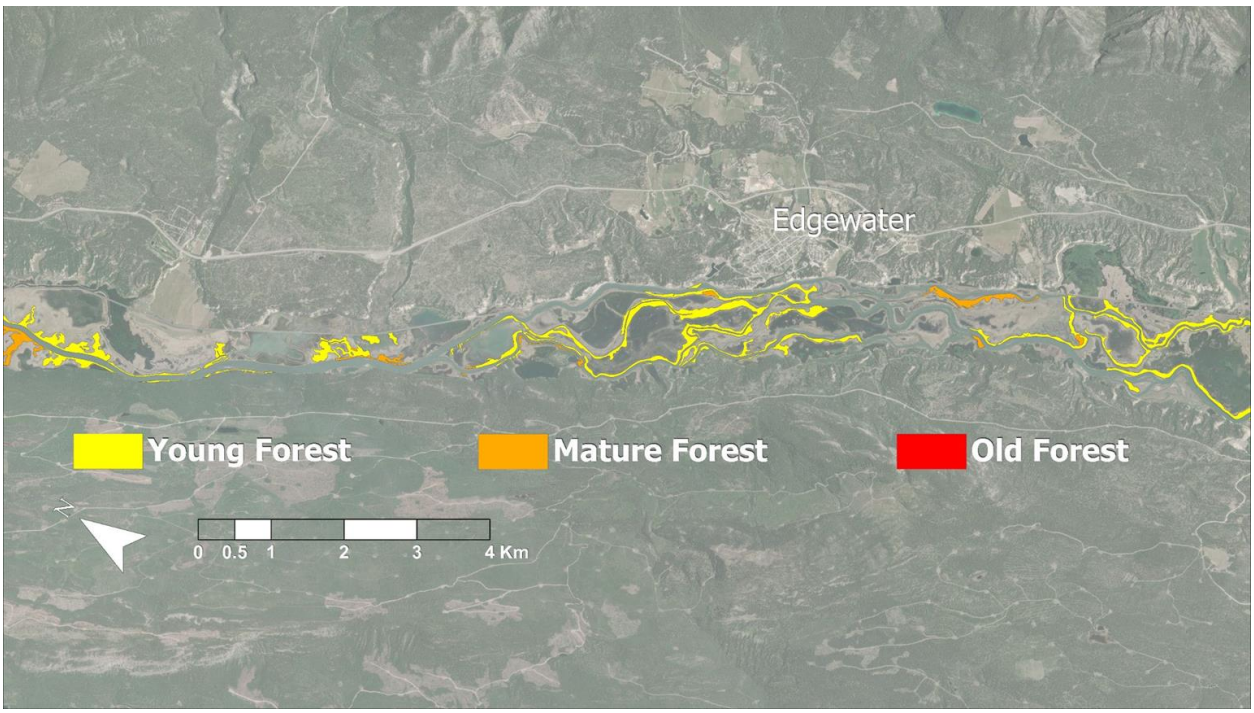
Map 1- Cottonwood stands near Parson, BC.



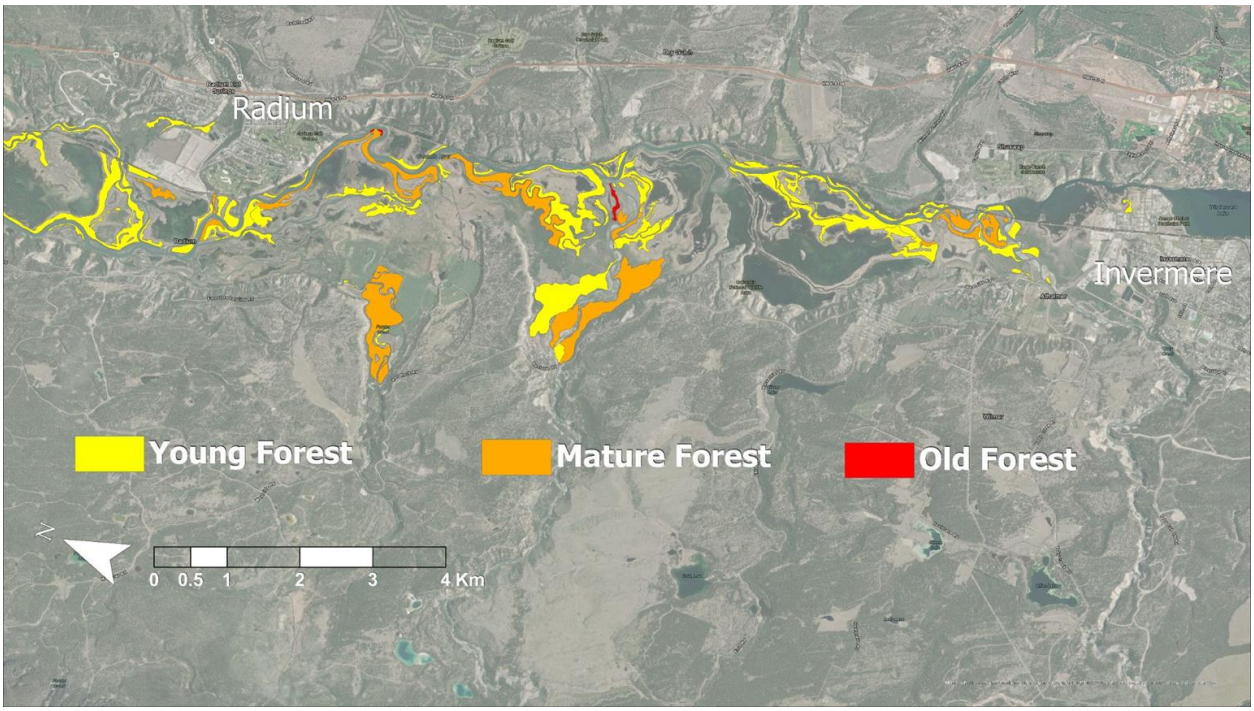
Map 2- Cottonwood stands near Harrogate, BC.



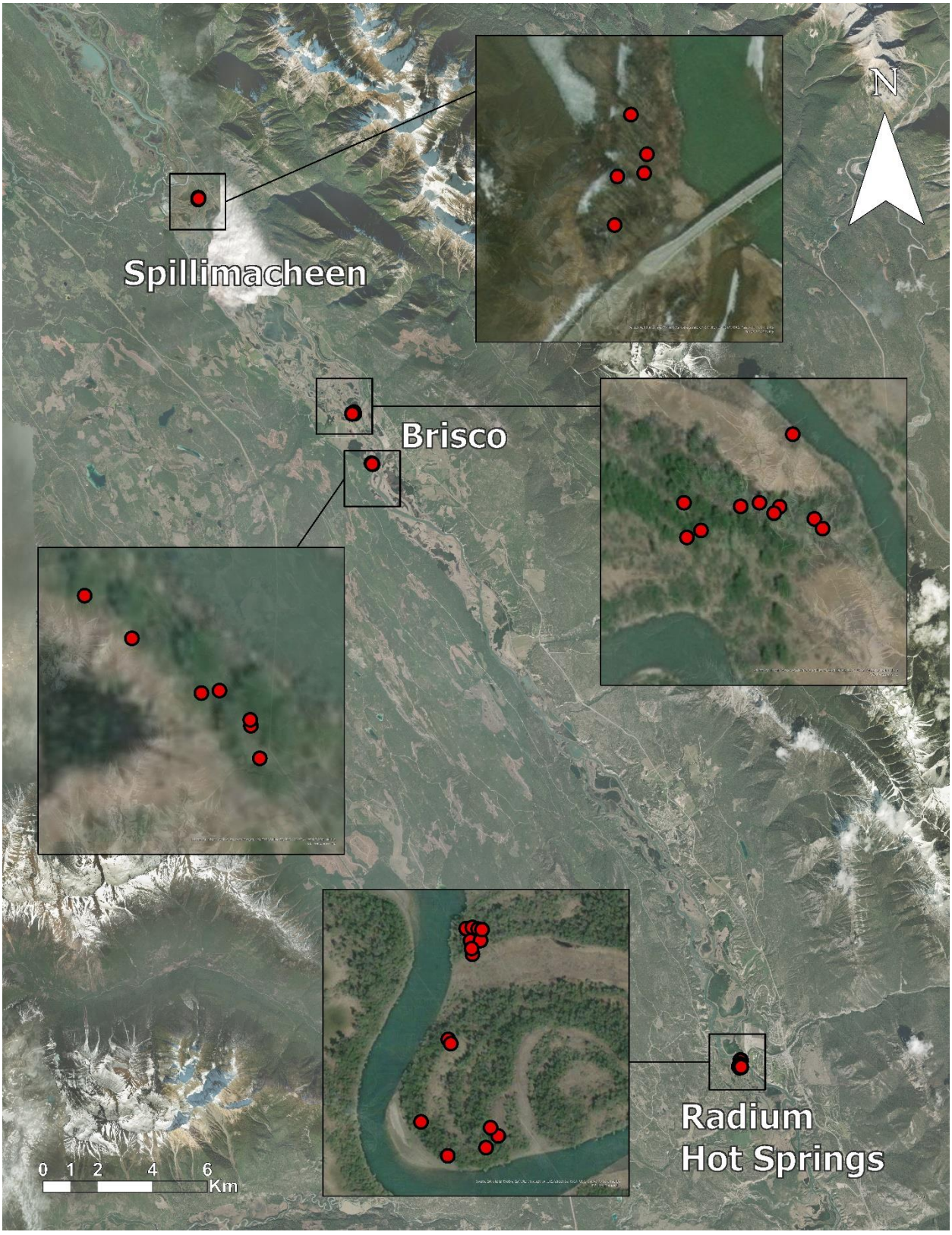
Map 3- Cottonwood stands near Spillimacheen and Brisco, BC.



Map 4- Cottonwood stands near Edgewater, BC.



Map 5- Cottonwood stands near Radium and Invermere, BC.



Map 6- Cottonwood wiring locations in the Columbia Wetlands.