Sxʷuytn-Kaniksu Connections Trail Project:

Aquatics

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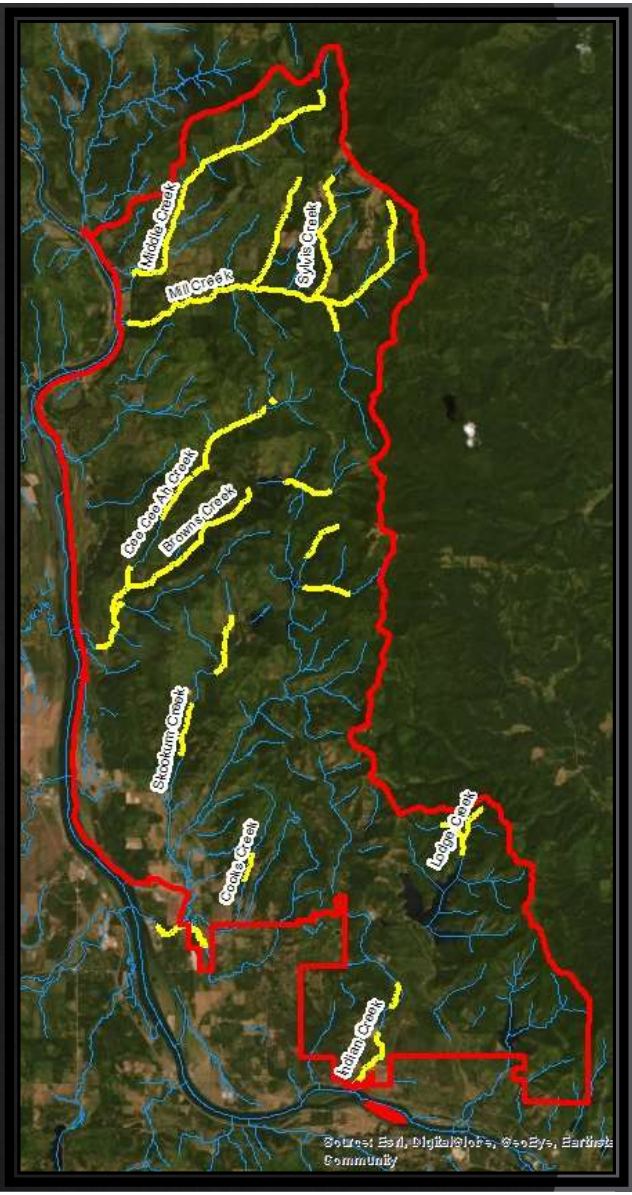
Kalispel Tribe Natural Resources Department

Data Collection

- June to September 2019
- Selected larger, fish bearing streams
- Surveyed mouth to headwaters when possible
- Completed 50 miles in 16 streams
- Road analysis completed using GRAIP lite and GIS programs



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Data Analysis

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Attributes		Reaches											
		1	2	3	4	5	6	7	8	9	10	11	12
Landowners (decreasing order)		WA, PVT	WA	WA, PR	PR	PR	PR	PR	PR	WA	WA	FS, PR	FS
Temperature (°C)		12.8	10.1	10.3	10.4	12.4	11.1	11.9	13.4	11.8	12.4	12	11.5
Flow (cfs)		~3.8	~3.4	~3	~2.5	~2.2	~2	~1.6	~1	<1	<1	<1	<1
Rosgen Channel Type		B4a	A4	B4	B4	B4	B4a	B4	B4	A4	B4	A4a+	E4
Montgomery-Buffington Classification		Cascade	Cascade	Plane-Bed	Plane-Bed	Plane-Bed	Step-Pool	Plane-Bed	Step-Pool	Step-Pool	Plane-Bed	Cascade	Pool-Riffle
Channel Confinement		Confined	Confined	Unconfined	Unconfined	Unconfined	Confined	Unconfined	Confined	Confined	Unconfined	Confined	Unconfined
Slope (%)		8.96	9.84	2.13	3.00	3.02	4.94	3.53	3.52	7.79	3.03	14.64	7.45
Elevation Gain (ft.)		226	279	95	161	144	200	243	144	259	128	472	26
Sinuosity		1.310	1.634	1.702	1.131	1.437	1.538	1.462	1.378	1.348	1.512	1.169	0.178
Stream Length	Map (mi.)	0.44	0.36	0.52	0.93	0.66	0.52	0.95	0.57	0.49	0.55	0.53	0.42
	Map (ft.)	2318.20	1903.94	2727.15	4936.03	3502.25	2755.90	5041.05	3012.03	2585.18	2921.60	2820.67	2206.90
	Measured (mi)	0.48	0.54	0.85	1.02	0.90	0.77	1.30	0.78	0.63	0.80	0.61	0.07
	Measured (ft.)	2526.25	2835.30	4471.79	5366.14	4774.28	4048.56	6872.29	4095.47	3326.77	4220.80	3226.71	352.36
Channel and Floodplain Characteristics	Wetted Width (ft.)	11.45	10.73	11.99	10.36	9.91	9.66	8.36	8.28	7.92	7.06	5.49	4.38
	Bankfull Width (ft.)	16.60	14.96	16.17	12.87	12.79	11.23	12.79	12.46	9.56	8.04	6.48	-
	Flood Prone (ft.)	32.67	19.94	51.36	8.33	14.97	15.66	19.02	15.51	14.96	11.81	10.41	-
	Max Bankfull Depth (ft)	1.94	2.73	1.48	1.60	1.03	0.89	0.92	0.66	1.18	0.69	0.85	-
	Bankfull depth (ft)	1.34	2.35	1.12	1.18	0.76	0.72	0.59	0.44	0.84	0.49	0.59	-
	Bankfull Flow (cfs)	74.66	155.66	43.00	49.75	19.25	13.50	11.66	7.33	17.33	5.33	6.25	-
	Bed Stability	0.37	0.44	0.70	0.67	0.77	0.94	1.29	1.90	1.04	1.54	1.37	-
	Meander Belt Width (ft)	184	184	179	169	163	160	149	132	125	102	77	66
Width to Depth Ratio		13.02	6.68	15.37	12.50	16.89	16.15	21.71	28.28	11.36	16.61	10.95	-
Pools	Per Mile	8.36	42.83	15.35	12.79	15.48	20.87	26.12	16.76	20.63	27.52	45.82	119.88
	Residual Depth (ft.)	1.46	1.33	1.52	1.52	1.57	1.36	1.42	1.30	1.50	1.44	1.15	1.39
	>3 (ft.)	0	0	0	1	2	0	0	0	0	0	0	0
Pool : Riffle		19:33	47:45	27:29	37:46	36:46	46:46	37:48	46:46	40:44	41:38	47:45	57:38
Side Channel Availability (ft.)	Dry	0.00	0.00	134.48	0.00	0.00	0.00	82.00	0.00	0.00	0.00	0.00	0.00
	Pool	0.00	0.00	78.72	39.36	0.00	0.00	108.24	0.00	0.00	406.72	0.00	0.00
	Riffle	606.80	32.80	543.28	72.16	95.12	140.38	391.96	78.72	160.72	350.96	62.32	0.00
% of Pools formed by BV		0	0	8	0	0	0	0	0	0	0	0	0
% of Pools Formed by Wood		25	35	77	92	64	44	76	54	31	77	32	25
Jams		52.00	61.00	90.00	116.00	70.00	39.00	95.00	41.00	39.00	76.00	53.00	0.00
Substrate (mm)	Sediment < 6mm (%)	39.60	23.99	61.03	54.68	57.55	53.76	48.93	33.3	43.3	45.23	38.73	-
	D16	1.25	1.51	1.79	1.28	1.30	1.27	1.81	1.67	1.47	2.02	2.12	-
	D50	2.033	6.93	5.13	4.50	4.25	5.73	14.60	11.50	9.63	6.43	8.33	-
	D84	95	32.00	12.00	13.00	23.00	46.67	24.66	40	57.3	16	32.25	-
LWM per mile (LM:S)		33:59	39:37	52:64	50:92	17:87	21:42	38:97	32:83	62:106	40:108	36:100	0:0
LWD Volume per mile (ft^3)		1450.93	1849.43	2304.14	2073.98	1042.47	800.02	1845.08	1395.95	2500.79	2004.81	1380.87	0.00
Average Tree Height within Meander Belt Width (ft)		47.2	27.8	25.9	30.8	50.5	49.8	44.9	38.5	57.3	45.4	61.4	25.4
Riparian Vegetation	Riparian Dominant	GF	GF	GF	GF	GF	SS	GF	GF	GF	GF	ST	GF
	Riparian Subdominant	ST	SS	LT	FT	NV	NV	SS	LT	LT	SS	LT	SP
	Large Woody Recruits	CC/CA	CC/CF	CC/CH/CS	CC/CF	CC/CF	CC/CF	CC/CF	CC/CH	CC/CF/CH	CC/CH/CS	CC/CH	CS/CH

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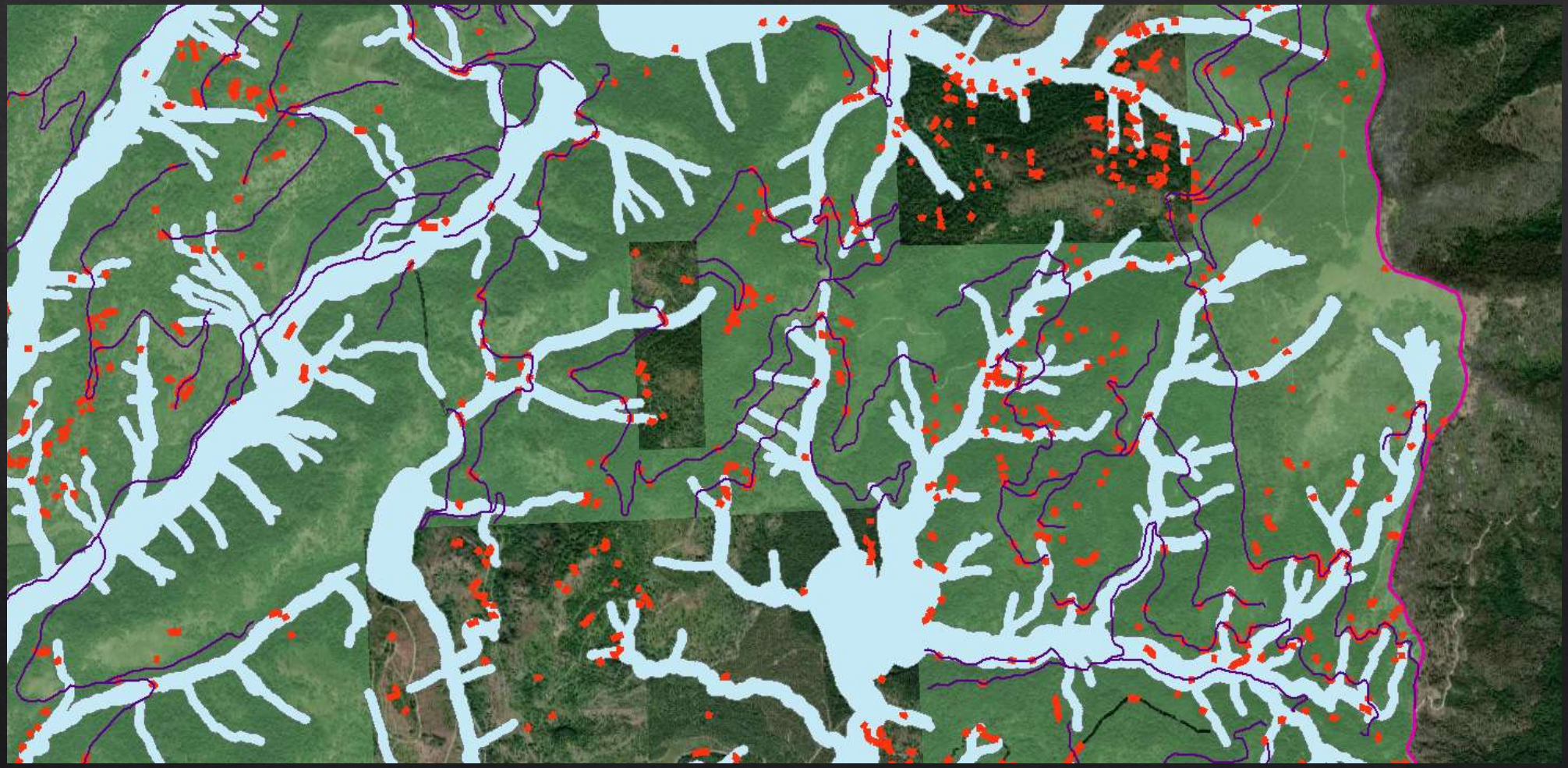

Sediment Yield From Roads (Tons)

Watershed	
Middle	3,015
Cusick	1,142
CeeCeeAh	1,417
Skookum	4,310
Exposure	1,525

Roads in RMA (300ft from stream)

Watershed	%
Middle	47
Cusick	31
CeeCeeAh	48
Skookum	51
Exposure	38

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		Middle		Cusick		CeeCeeAh		Skookum		Exposure	
		Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action
Water Quality	TMDL-Impaired Waters	2		1		3		3		2	
	Sedimentation	3		3		3		3		3	
Water Quantity	Flow Characteristics	1		1		1		1		1	
Aquatic Habitat	Fragmentation	1		1		2		2		1	
	Large Wood	2		1		1		1		1	
	Channel Shape/Function	3		1		3		3		3	
Road/Trail Condition	Open Road Density	3		3		3		3		3	
	Road Maintenance	3		3		3		3		3	
	Proximity to Water	3		3		3		3		3	
	Mass Wasting	2		1		2		1		1	

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Proposed Actions

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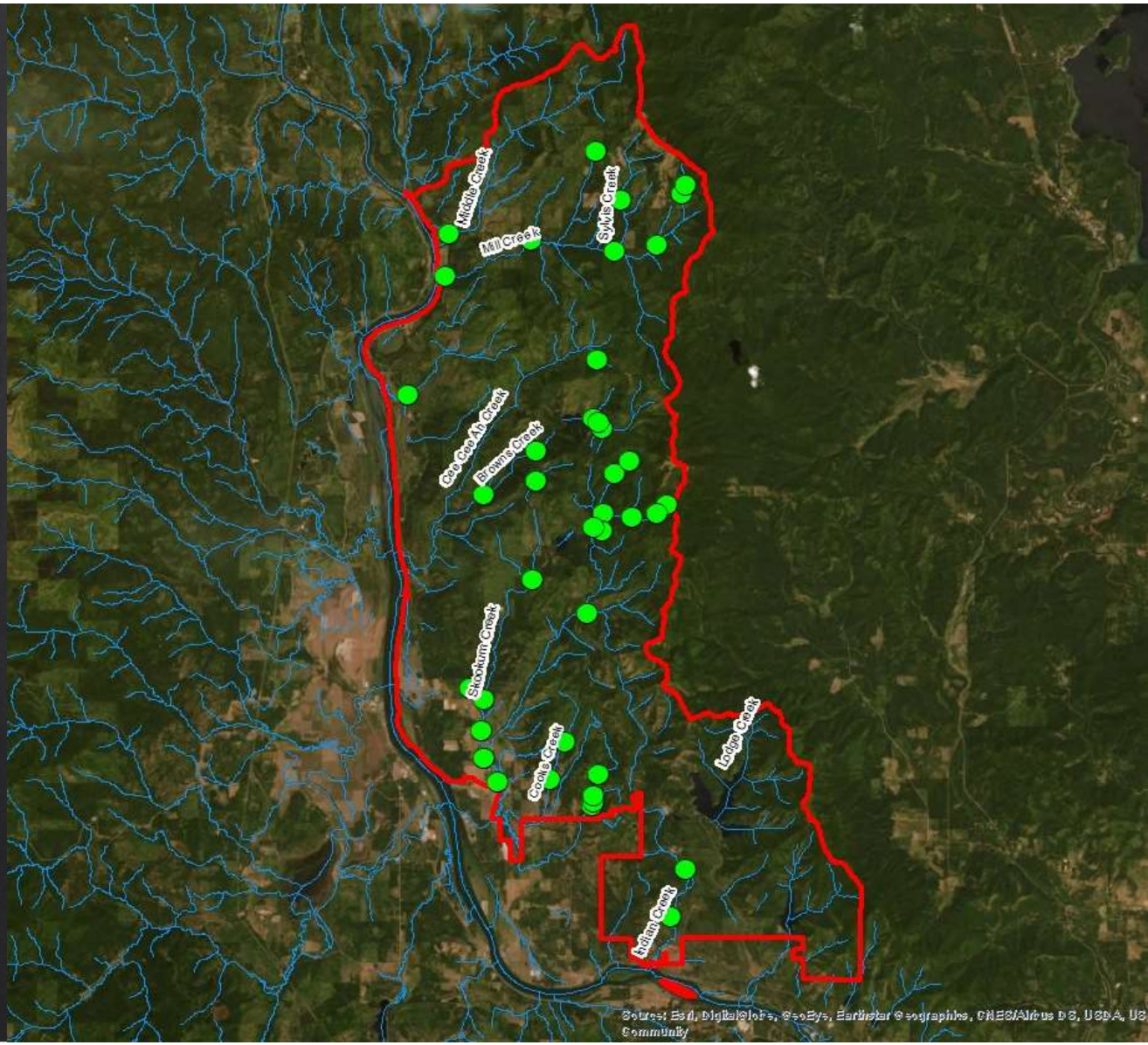
Culvert Replacement

- 40+ identified for replacement
  - Undersized
  - Hanging



Culvert Replacement

Additional Large Woody Debris

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RMA Road Density Reduction

	Middle		Cusick		CeeCeeAh		Skookum		Exposure	
	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action
Road Density (mi./mi.^{2})	6.8	3.7	8.8	4.8	11.4	5.6	12.5	6	5.7	3

Overall ≈ 50% reduction in road density near streams

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Sediment Yield Reduction

	Middle		Cusick		CeeCeeAh		Skookum		Exposure	
	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action
Sediment Tonnage	3,015	2,708	1,142	991	1,417	1,155	4,310	3,686	1,525	1,306

Reduction of ≈ 150 to 600 tons per year per watershed

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		Middle		Cusick		CeeCeeAh		Skookum		Exposure	
		Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action	Existing	Proposed Action
Water Quality	TMDL-Impaired Waters	2	2	1	1	3	3	3	3	2	2
	Sedimentation	3	3	3	3	3	3	3	3	3	3
Water Quantity	Flow Characteristics	1	1	1	1	1	1	1	1	1	1
Aquatic Habitat	Fragmentation	1	1	1	1	2	1	2	1	1	1
	Large Wood	2	1	1	1	1	1	1	1	1	1
	Channel Shape/Function	3	1	1	1	3	1	3	1	3	1
Road/Trail Condition	Open Road Density	3	3	3	3	3	3	3	3	3	3
	Road Maintenance	3	1	3	1	3	1	3	1	3	1
	Proximity to Water	3	3	3	3	3	3	3	3	3	3
	Mass Wasting	2	2	1	1	2	2	1	2	1	2

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Thank You

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