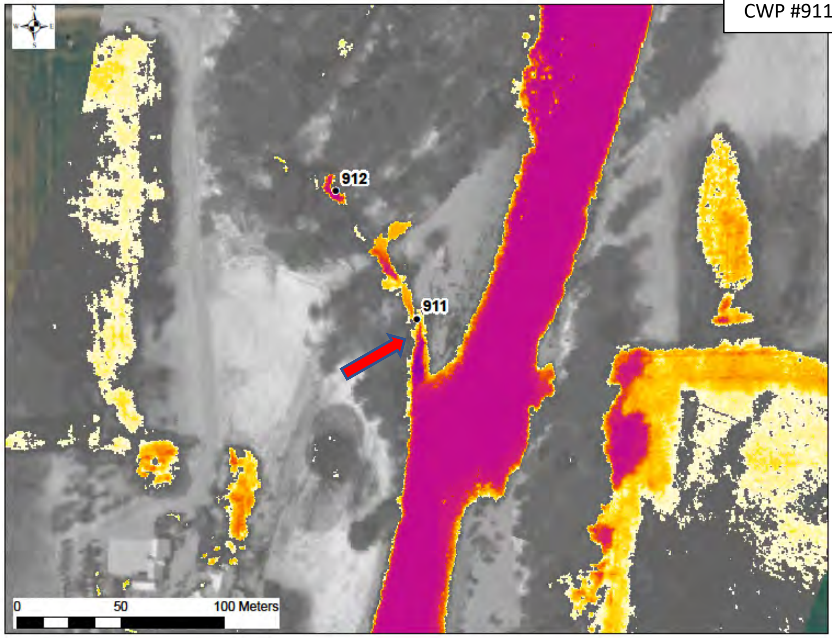
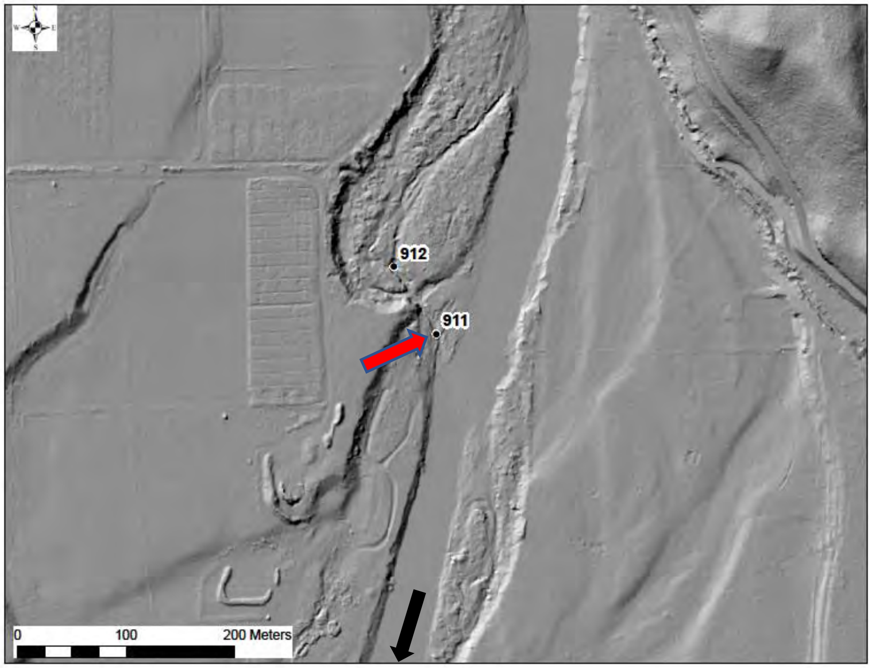
Appendix A. Cold-water patch descriptions and data, Methow River subbasin.

Assessment Unit	CWP ID#	Pages
Methow – Thompson	911, 912, 10, 48, 75, 143, 98, 160	A 2- 22
Methow – Fawn	32, 42, 56, 13, 901, 902, 26, 24, 76, 99, 907, 43, 44, 45, 70, 50, 92, 71, 27, 65, 66, 86, 93, 100, 67, 908, 57, 17, 25, 176, 2,5, 6, 3, 53, 7, 83, 87, 51, 909, 101, 35, 102, 16, 108	A 23 - 156
Methow - Rattlesnake	131, 146, 68, 38, 1, 46, 47, 36, 152, 156, 116, 910, 88, 18, 154	A 157 – 194
Chewuch – Pearrygin	90, 913, 168, 150	A 195 - 206
Chewuch – Doe	914, 140, 61, 113, 135, 915, 96, 916, 917, 136, 50, 153, 31	A 207 - 246
Chewuch – Thirtymile	73, 80, 159, 9, 8, 23, 37, 137	A 247 - 272
Chewuch – Kay	105, 114	A 273 - 277
Twisp – Lower	175, 58, 109, 28, 39, 84, 78, 79, 72, 110, 103, 89	A 278 - 312
Twisp – Middle	163, 162, 94, 905, 906, 60, 904, 63, 95, 22, 29, 903, 112	A 313 - 351
Twisp - Upper	112, 14, 903, 64, 54	A 352 - 359

CWP ID#	911	**CWP Channel Length (m)**	60
Stream	Methow	**CWP Channel Avg Width (m)**	4
Assessment Unit	Methow - Thompson	**CWP Channel Area (m^2)**	240
Survey Date	2/10/22	**Max CWP Channel Depth (cm)**	130
Survey Time	1511	**Average CWP Channel Depth (cm)**	1
River km	77.75	**Min Plume Temp (℃)**	6.2
Latitude	48.43682	**Avg Plume Temp (℃)**	6.4
Longitude	-120.155	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	20
CWP Source	Alcove	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Backwater	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	3.5
Mainstem Temp (℃)	5.1	**Plume Length 1℃ Differential (m)**	9
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	31.5
Min CWP Temp (℃)	6.2	**Fish Presence**	None observed
Average CWP Temp (℃)	6.4	**Fish Species**	
Max Main/CWP Diff (℃)	1.1 (warmer)	**Fish Count**	
Avg Main/CWP Diff (℃)	1.3 (warmer)		
CWP Description	Emerald Pool. Top lobe was warmest >8C. Channel connected ds end. Colder water in summer via on-going monitoring.		
Plume Description	Low flow into mainstem backwater.		
Restoration Notes	3R project site, “Emerald Pool”		

CWP #911_AL_Methow - Thompson





Downstream view of alcove channel to mainstem, Winter 2022.

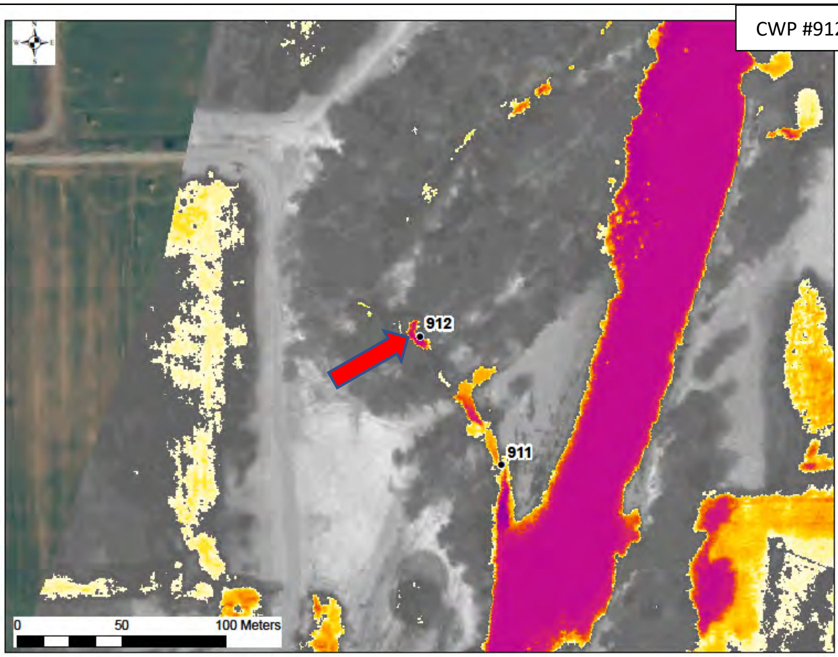
Upstream view of alcove pool.

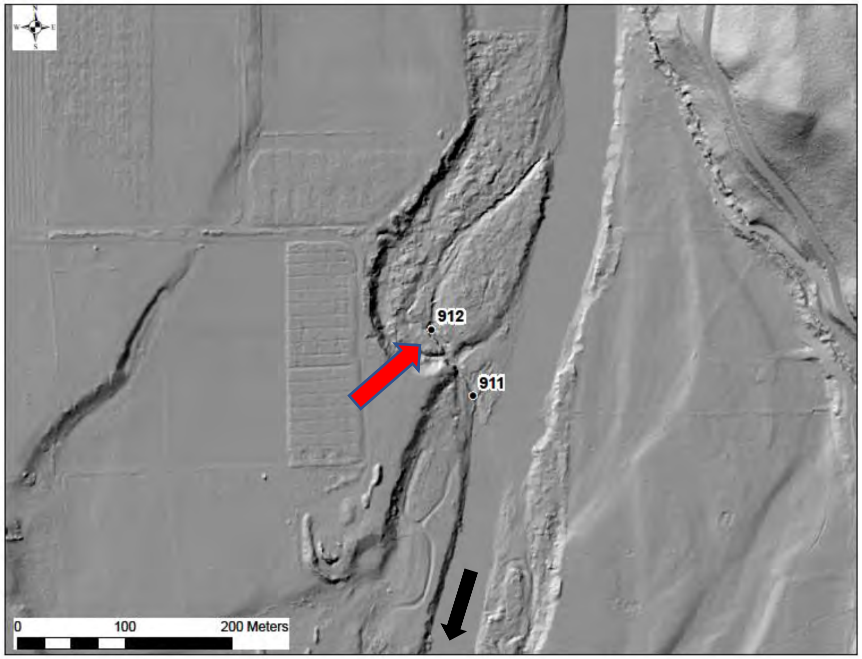
Upstream view of channel from upper pool.

Lateral view across alcove pool.

CWP ID#	912	**CWP Channel Length (m)**	34
Stream	Methow	**CWP Channel Avg Width (m)**	2.5
Assessment Unit	Methow - Thompson	**CWP Channel Area (m²)**	85
Survey Date	2/10/22	**Max CWP Channel Depth (cm)**	1
Survey Time	1525	**Average CWP Channel Depth (cm)**	10
River km	77.75	**Min Plume Temp (℃)**	
Latitude	48.43682	**Avg Plume Temp (℃)**	
Longitude	-120.154877	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	5.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.1	**Fish Presence**	Yes
Average CWP Temp (℃)	8.2	**Fish Species**	Coho or Chinook
Max Main/CWP Diff (℃)	3.0 (warmer)	**Fish Count**	10
Avg Main/CWP Diff (℃)	2.9 (warmer)		
CWP Description	Refrigerator pool and channel. Connected to Emerald at ds end. Source pool max 120cm avg 50cm. Colder water in summer.		
Plume Description	No plume flows into ds pool at 7.3deg with pool temp similar.		
Restoration Notes	3R project site, “Refrigerator Pool”		

CWP #912_AL_Methow - Thompson





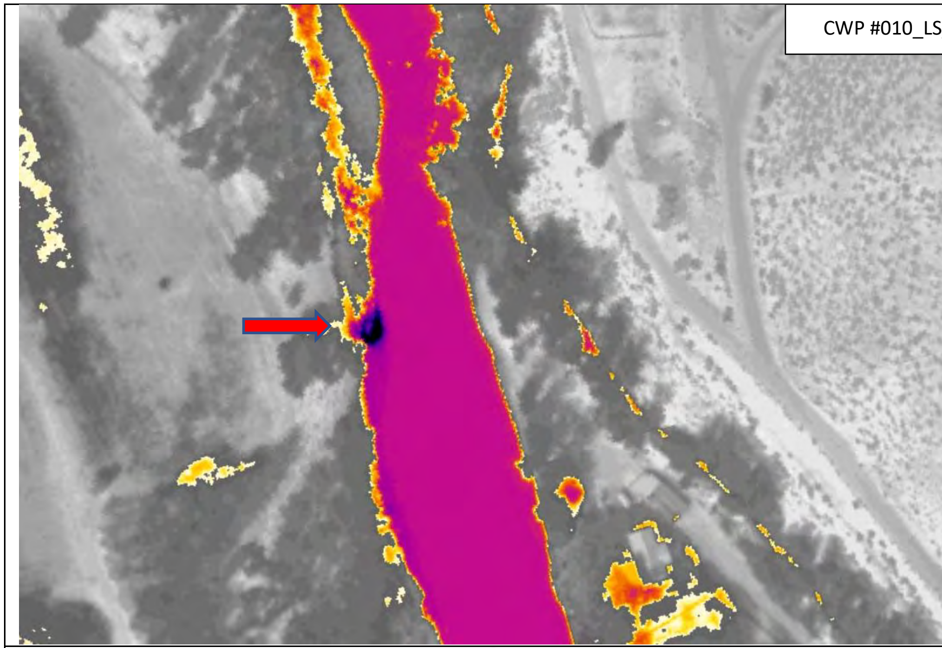
Downstream view of alcove channel to mainstem, Winter 2022.

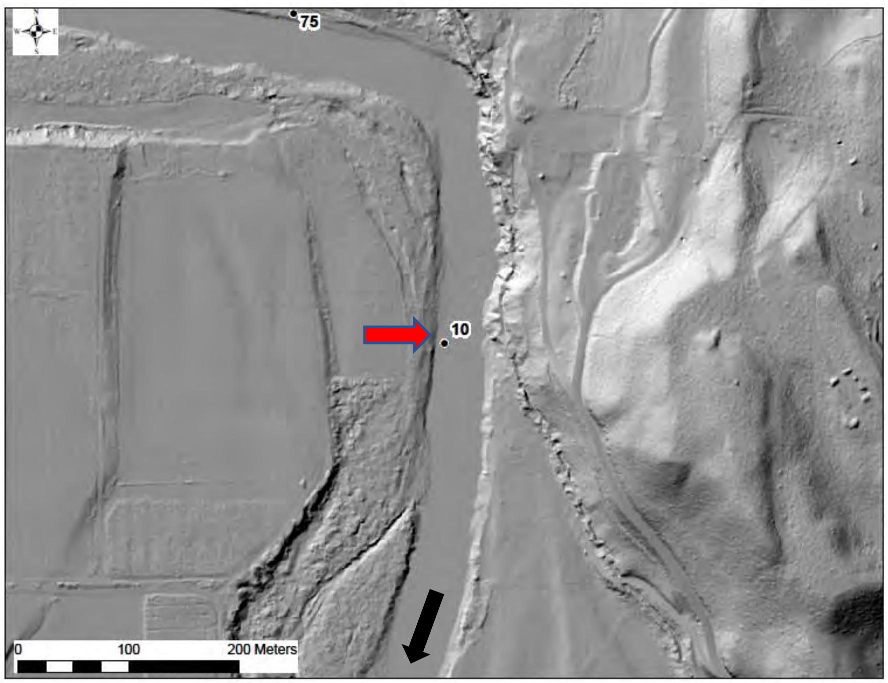
Upstream view of alcove pool.

Lateral view across alcove pool into secondary channel.

Methow Cold Water Patch Assessment			
CWP ID#	10	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Survey Date	7/28/21	**CWP Channel Area (m²)**	
Survey Time	1402	**Max CWP Channel Depth (cm)**	
River km	77.95	**Average CWP Channel Depth (cm)**	
Latitude	48.43795	**Min Plume Temp (℃)**	7.8
Longitude	-120.1556	**Avg Plume Temp (℃)**	11.0
River Bank	Right	**Min Plume Depth (cm)**	4
CWP Source	Lateral Seep	**Max Plume Depth (cm)**	29
Tributary Name		**Avg Plume Depth (cm)**	15
Habitat Type	Pool	**Plume Width 2℃ Differential (m)**	4
Dominant Substrate	Cobble	**Plume Length 2℃ Differential (m)**	7
Dominant Cover	Rock	**Plume Area 2℃ Differential (m²)**	28
Mainstem Temp (℃)	15.3	**Plume Width 1℃ Differential (m)**	6
Tributary Temp (℃)		**Plume Length 1℃ Differential (m)**	18
Min CWP Temp (℃)	7.8	**Plume Area 1℃ Differential (m²)**	108
Average CWP Temp (℃)	11.0	**Fish Presence**	None observed
Max Main/CWP Diff (℃)	7.5	**Fish Species**	
Avg Main/CWP Diff (℃)	5.3	**Fish Count**	
CWP Description	Downstream of point bar across mainstem from Barkley pump beach. No overhead cover, likely low volume.		
Plume Description	Low velocity, deeper than nearshore areas ds		
Restoration Notes	Cover, depth enhancement		

CWP #010_LS_Methow - Thompson

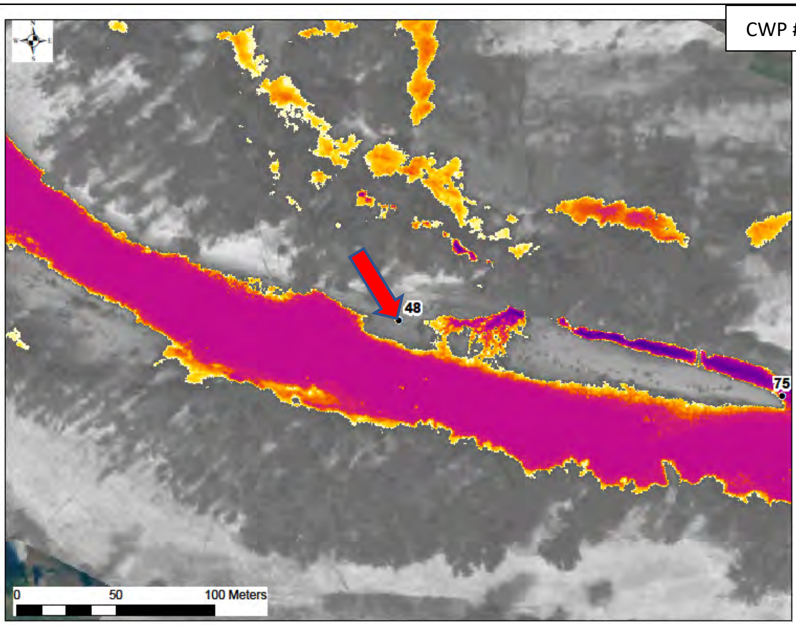


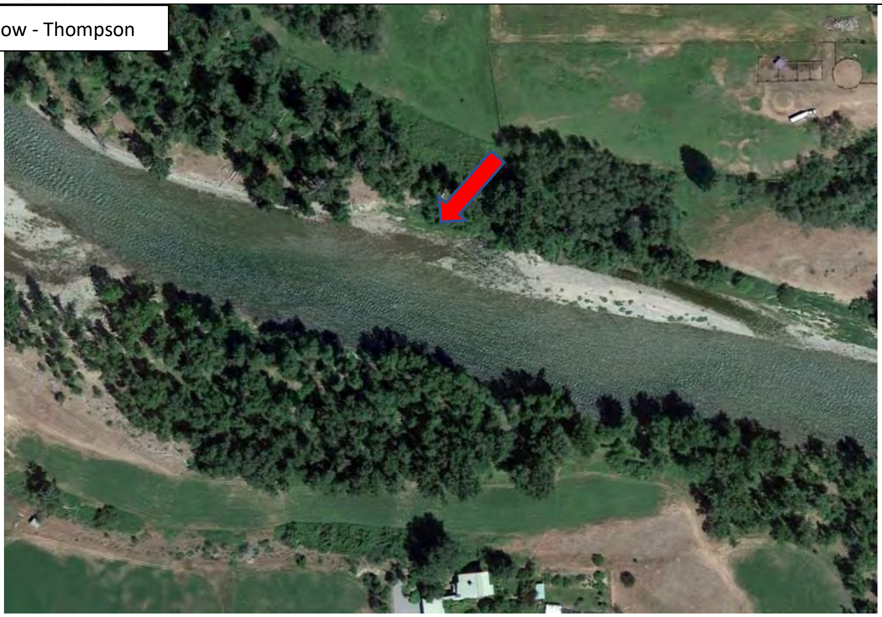


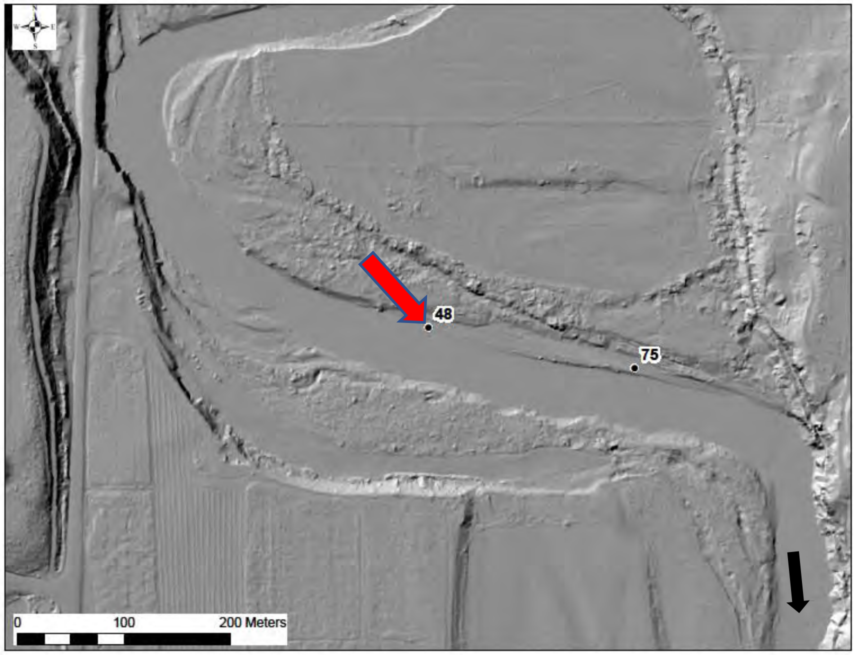
Downstream view of seep and plume area.

Methow Cold Water Patch Assessment			
CWP ID#	048	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Thompson	**CWP Channel Area (m²)**	
Survey Date	7/28/21	**Max CWP Channel Depth (cm)**	
Survey Time	1343	**Average CWP Channel Depth (cm)**	
River km	78.39	**Min Plume Temp (℃)**	10.5
Latitude	48.44062	**Avg Plume Temp (℃)**	
Longitude	-120.15752	**Min Plume Depth (cm)**	3
River Bank	Left	**Max Plume Depth (cm)**	10
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	40
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	22
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	880
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	51
Mainstem Temp (℃)	15.3	**Plume Length 1℃ Differential (m)**	27
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	1377
Min CWP Temp (℃)	10.5	**Fish Presence**	Not observed
Average CWP Temp (℃)	11.0	**Fish Species**	
Max Main/CWP Diff (℃)	4.8	**Fish Count**	
Avg Main/CWP Diff (℃)	4.3		
CWP Description	Shallow fan coming out of bank seep onto cobble bar. Small pool at upstream end 11C. Winter 2022 visit mainstem = 4.9C, seep = 7.6C, average = 9.1C.		
Plume Description	Tight to left bank of mainstem.		
Restoration Notes	Cover, depth, connectivity. Planned 3R site.		

CWP #048_LS_Methow - Thompson







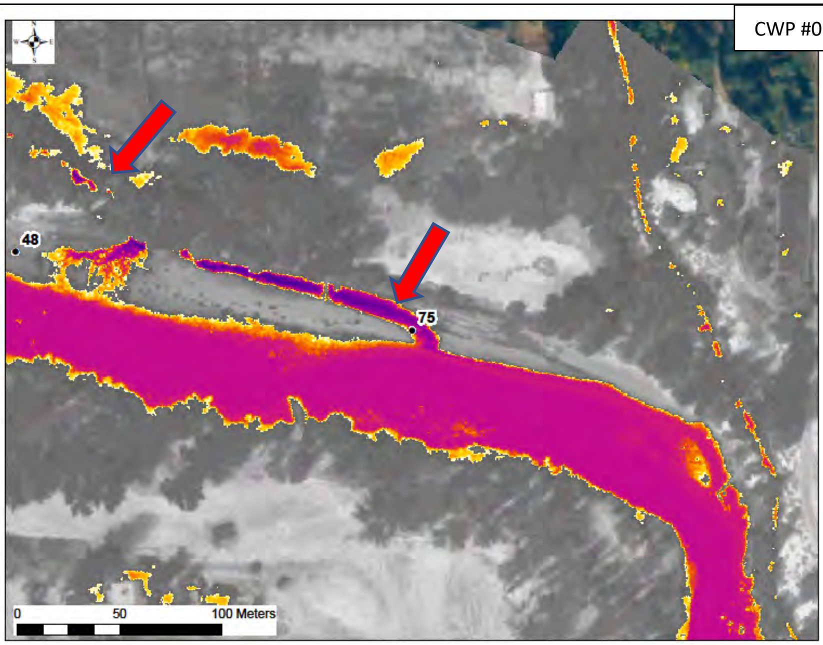
Upstream view towards seep source and pool.

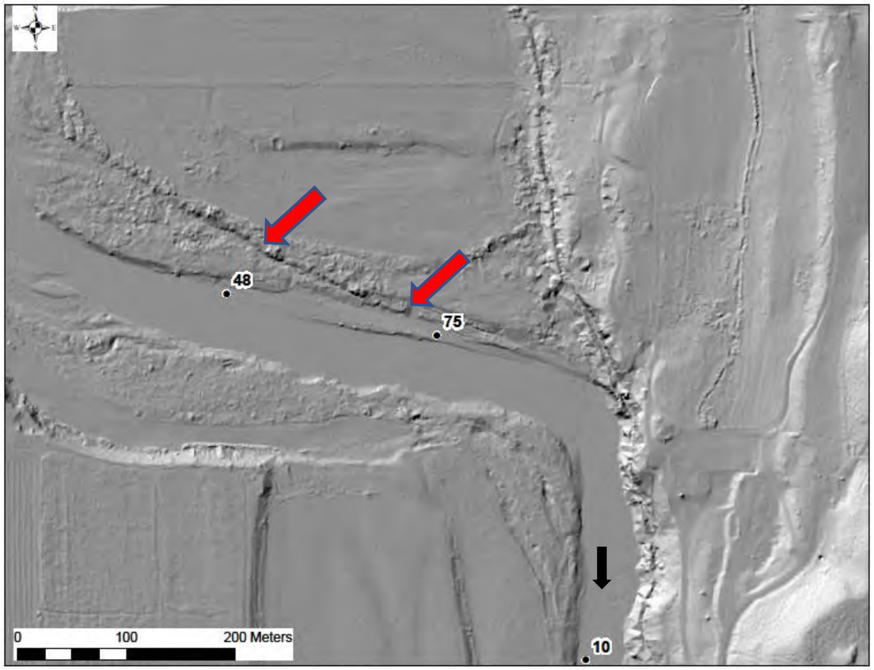
Downstream view from source towards mainstem, winter 2022.

Upstream view to source, winter 2022.

CWP ID#	075	**CWP Channel Length (m)**	350
Stream	Methow	**CWP Channel Avg Width (m)**	2
Assessment Unit	Methow - Thompson	**CWP Channel Area (m²)**	700
Survey Date	9/12/2022	**Max CWP Channel Depth (cm)**	20
Survey Time	1435	**Average CWP Channel Depth (cm)**	8
River km	78.39	**Min Plume Temp (℃)**	11.5
Latitude	48.44062	**Avg Plume Temp (℃)**	12.3
Longitude	-120.160027	**Min Plume Depth (cm)**	2
River Bank	Left	**Max Plume Depth (cm)**	10
CWP Source	Springbrook	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	5
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	160
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	800
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	12.6	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	11.7	**Fish Presence**	None observed
Average CWP Temp (℃)	12.0	**Fish Species**	
Max Main/CWP Diff (℃)	0.9	**Fish Count**	
Avg Main/CWP Diff (℃)	0.6		
CWP Description	Gilbertson channel from spring. Long and shallow. Little cover or depth in the perched channel. Steep drop to mainstem. 7/28/21 = 15.3 mainstem, 10.5 CWP. 2/10/22 = 4.9C mainstem, 7.2C seep, 8.1C average seep		
Plume Description	Plume at confluence <1meter wide, wider upstream along cobble bar. No 1C diff in 2022.		
Restoration Notes	Cover, depth, access. Potential 3R site.		

CWP #075_SB_Methow - Thompson





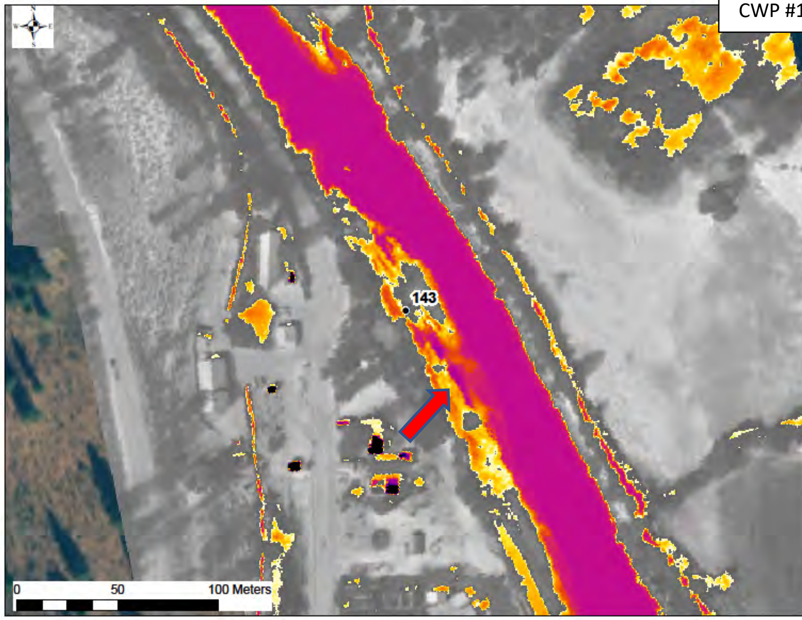
Downstream view in perched spring channel, Winter 2022.

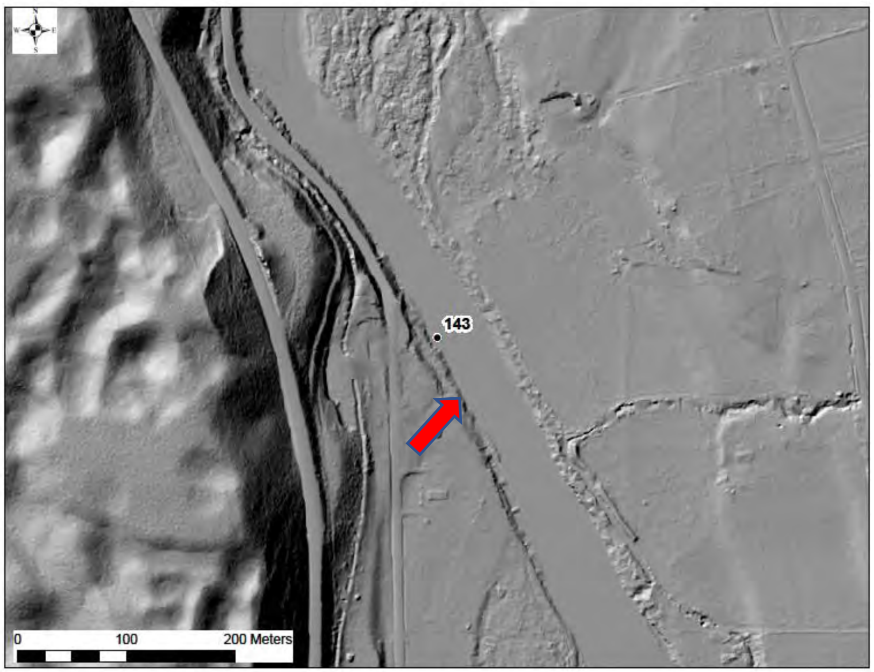
Upstream view of perched spring channel.

Upstream view of spring channel drop into mainstem, Winter 2022.

CWP ID#	143	**CWP Channel Length (m)**	40 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	3 (est)
Assessment Unit	Methow - Thompson	**CWP Channel Area (m²)**	120
Survey Date	7/28/21	**Max CWP Channel Depth (cm)**	81
Survey Time	1243	**Average CWP Channel Depth (cm)**	55
River km	79.94	**Min Plume Temp (℃)**	
Latitude	48.44934	**Avg Plume Temp (℃)**	
Longitude	-120.16249	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	3.5
Mainstem Temp (℃)	14.6	**Plume Length 1℃ Differential (m)**	11
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	38.5
Min CWP Temp (℃)	13.4	**Fish Presence**	Yes
Average CWP Temp (℃)		**Fish Species**	Chinook, other
Max Main/CWP Diff (℃)	1.2	**Fish Count**	35
Avg Main/CWP Diff (℃)			
CWP Description	Across from Bear Creek. Deep pocket upstream end is cold. Rest is warmer than mainstem. TIR <2 ℃ site.		
Plume Description	No plume detected, outflow warmer than mainstem.		
Restoration Notes	Cover. Across from Barkley Bear restoration project. Landowner may not be supportive of actions at this location.		

CWP #143_AL_Methow - Thompson

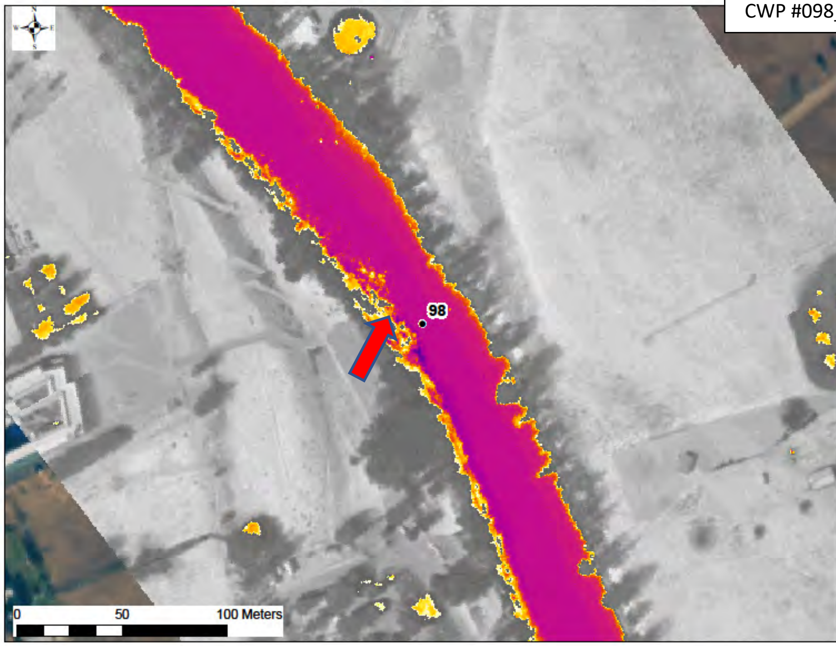




Upstream view of alcove channel.

CWP ID#	098	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Thompson	**CWP Channel Area (m^2)**	
Survey Date	7/28/21	**Max CWP Channel Depth (cm)**	
Survey Time	1119	**Average CWP Channel Depth (cm)**	
River km	82.07	**Min Plume Temp (℃)**	11.0
Latitude	48.4656	**Avg Plume Temp (℃)**	
Longitude	-120.17088	**Min Plume Depth (cm)**	5
River Bank	Right	**Max Plume Depth (cm)**	20
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	14
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	28
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	14.0	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	
Min CWP Temp (℃)	11.0	**Fish Presence**	None observed
Average CWP Temp (℃)		**Fish Species**	
Max Main/CWP Diff (℃)	3.0	**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Isolated seep from bank cobble. Adjacent to KOA campground.		
Plume Description	Narrow tight to bank. Shallow.		
Restoration Notes	Good access. Cover and depth		

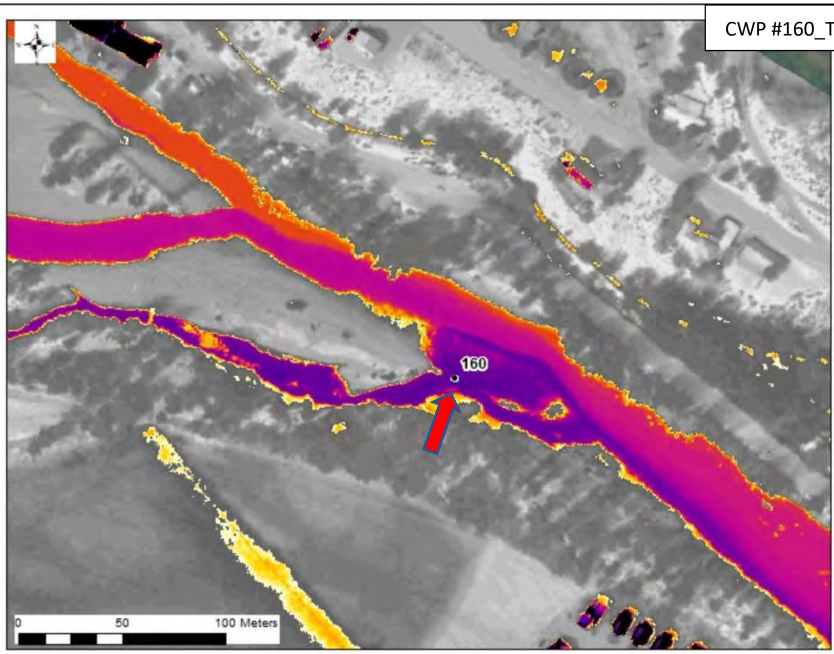
CWP #098_LS_Methow - Thompson

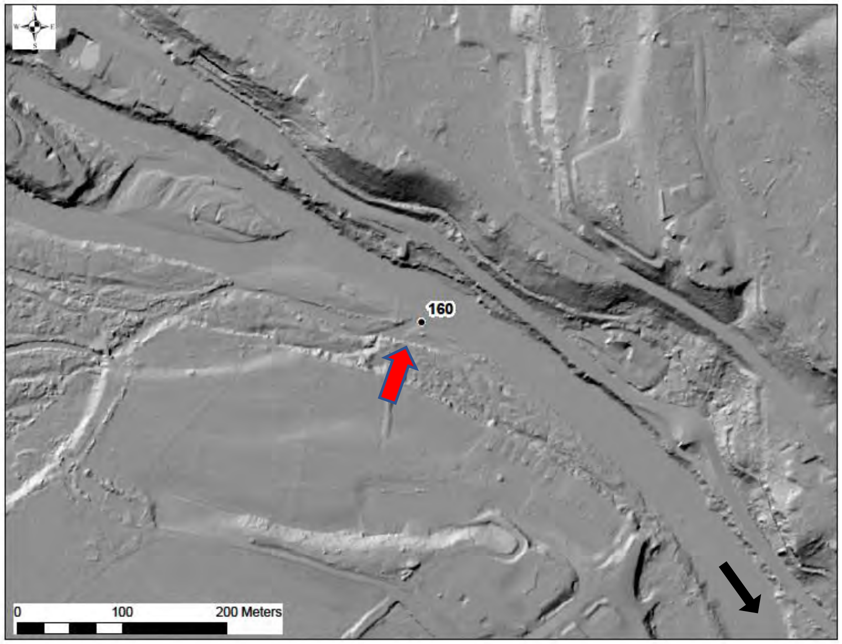



Upstream view of seep area and mainstem.

CWP ID#	160	**CWP Channel Length (m)**	600 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	3 (est)
Assessment Unit	Methow – Thompson	**CWP Channel Area (m²)**	1,800
Survey Date	7/28/2021	**Max CWP Channel Depth (cm)**	
Survey Time	1531	**Average CWP Channel Depth (cm)**	
River km	83.39	**Min Plume Temp (℃)**	11.7
Latitude	48.47513	**Avg Plume Temp (℃)**	12.0
Longitude	-120.180777	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	50
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	30
Tributary Name	Spring Creek	**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	5.2
Mainstem Temp (℃)	13.6	**Plume Length 1℃ Differential (m)**	87
Tributary Temp (℃)	11.2	**Plume Area 1℃ Differential (m²)**	452.4
Min CWP Temp (℃)	11.2	**Fish Presence**	Yes
Average CWP Temp (℃)	12.0	**Fish Species**	Unknown
Max Main/CWP Diff (℃)	2.4	**Fish Count**	
Avg Main/CWP Diff (℃)	1.6		
CWP Description	Spring Creek inflow from hatchery complex. Managed water sources.		
Plume Description	Narrows on ds end. No 2C plume detected.		
Restoration Notes	Complexity and depth. Good public viewing area.		

CWP #160_TC_Methow - Thompson



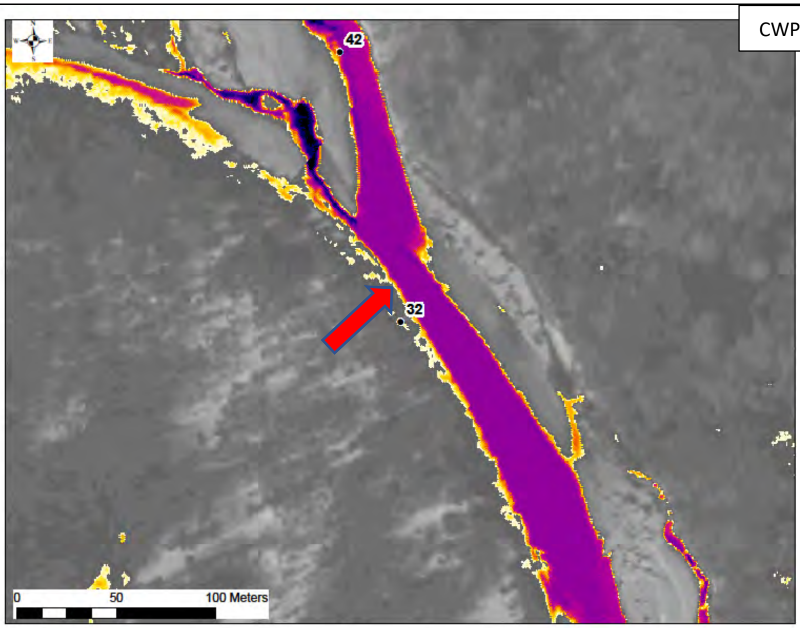


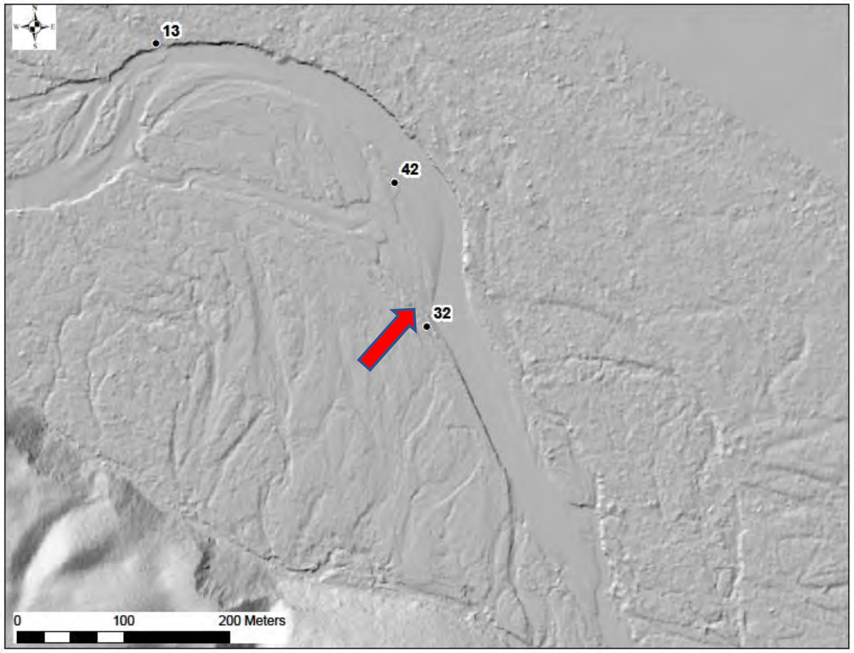
Downstream view of spring flow into mainstem plume.

Upstream view of spring flow into mainstem.

Methow Cold Water Patch Assessment			
CWP ID#	032	**CWP Channel Length (m)**	63
Stream	Methow	**CWP Channel Avg Width (m)**	1
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	63
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	43
Survey Time	1520	**Average CWP Channel Depth (cm)**	5
River km	94.28	**Min Plume Temp (℃)**	10.0
Latitude	48.51721	**Avg Plume Temp (℃)**	12.0
Longitude	-120.29014	**Min Plume Depth (cm)**	10
River Bank	Right	**Max Plume Depth (cm)**	46
CWP Source	Springbrook	**Avg Plume Depth (cm)**	39
Tributary Name		**Plume Width 2℃ Differential (m)**	3.5
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	8
Dominant Substrate	Sand	**Plume Area 2℃ Differential (m²)**	28
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	3.5
Mainstem Temp (℃)	13.7	**Plume Length 1℃ Differential (m)**	1
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	3.5
Min CWP Temp (℃)	9.4	**Fish Presence**	None detected
Average CWP Temp (℃)	9.6	**Fish Species**	
Max Main/CWP Diff (℃)	4.3	**Fish Count**	
Avg Main/CWP Diff (℃)	4.1		
CWP Description	Skinny, shallow, low flow channel originated in marshy area and runs along bar.		
Plume Description	Spring channel comes in as side channel along bar, riffle flows in on a diagonal and quickly overtakes thermal benefit. Plume deep, but mostly standing water, no flow.		
Restoration Notes	Deflection to create larger plume. Spring channel is pretty shallow, so may not provide much habitat if it could be accessed.		

CWP #032_SB_Methow - Fawn



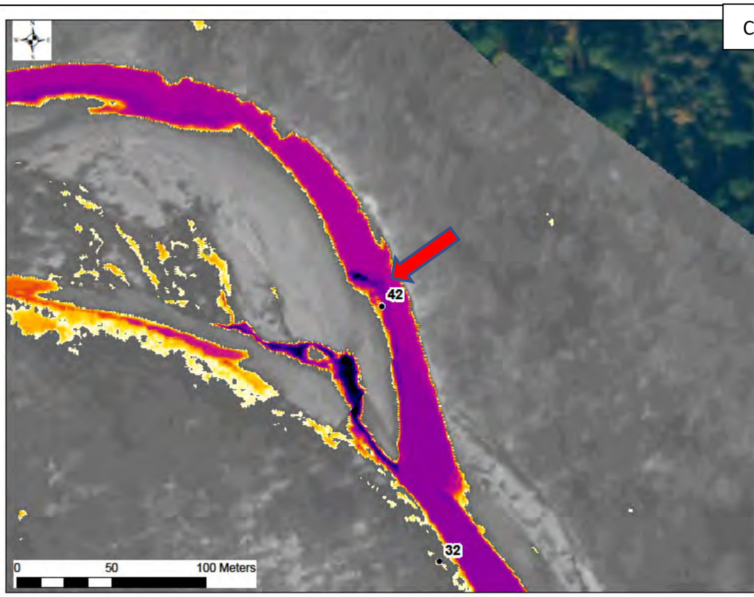


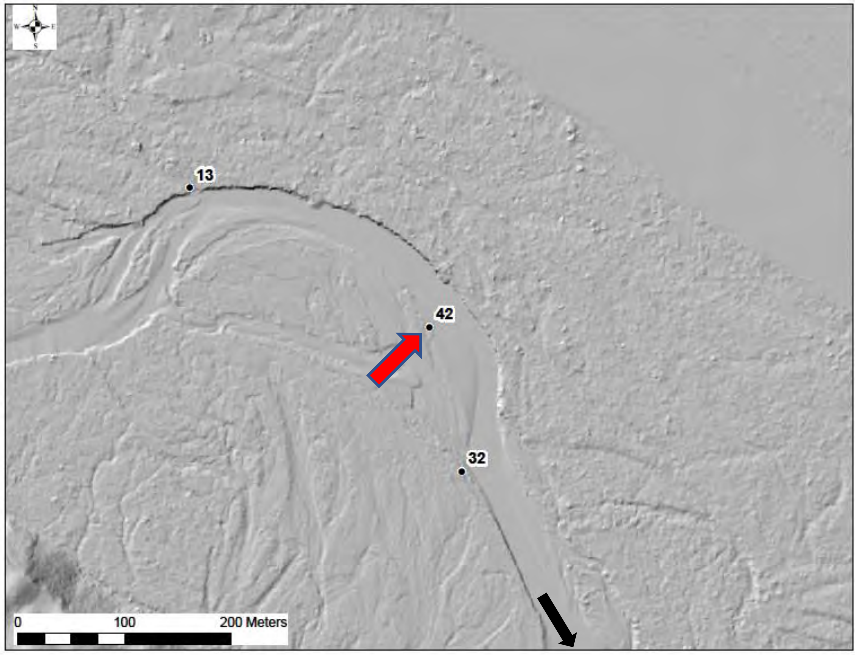
Upstream view into channel adjacent to mainstem.

Downstream view in channel towards plume. 	Upstream view at source seepage. 

Methow Cold Water Patch Assessment			
CWP ID#	042	**CWP Channel Length (m)**	1.5
Stream	Methow	**CWP Channel Avg Width (m)**	1
Assessment Unit	Methow – Fawn	**CWP Channel Area (m²)**	1.5
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	36
Survey Time	1506	**Average CWP Channel Depth (cm)**	22
River km	94.36	**Min Plume Temp (℃)**	
Latitude	48.51843	**Avg Plume Temp (℃)**	
Longitude	-120.29054	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.7	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	10.1	**Fish Presence**	None observed
Average CWP Temp (℃)	11.9	**Fish Species**	
Max Main/CWP Diff (℃)	3.6	**Fish Count**	
Avg Main/CWP Diff (℃)	1.8		
CWP Description	Lateral seep creates small pool around wood jam on cobble bar, dribbles into mainstem, but < 2C differential and warmer than mainstem in places. No plume into mainstem. Very small patch.		
Plume Description	None. Pool dribbles into mainstem, flowing over bar, but that's already warmer than mainstem temp.		
Restoration Notes	Depth and cover. Really small influence.		

CWP #042_LS_Methow -Fawn





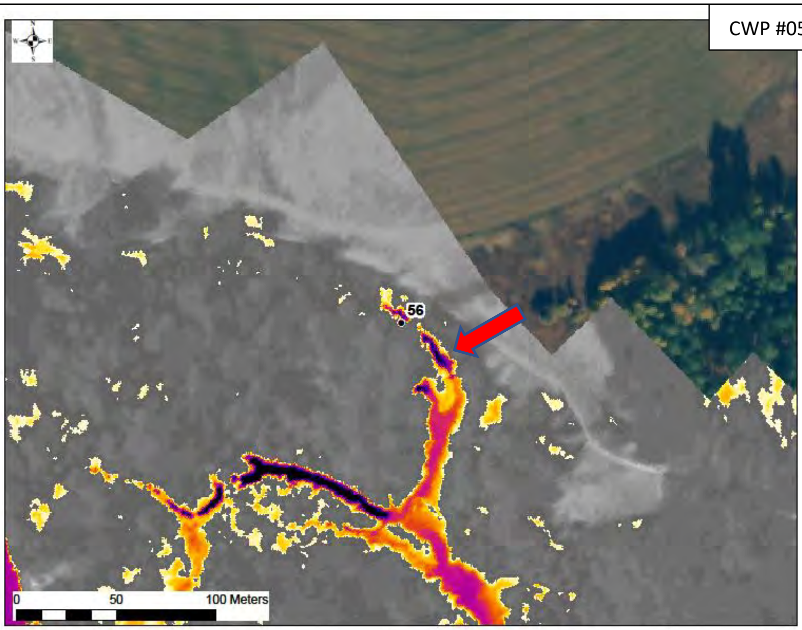
Lateral view to seep source.

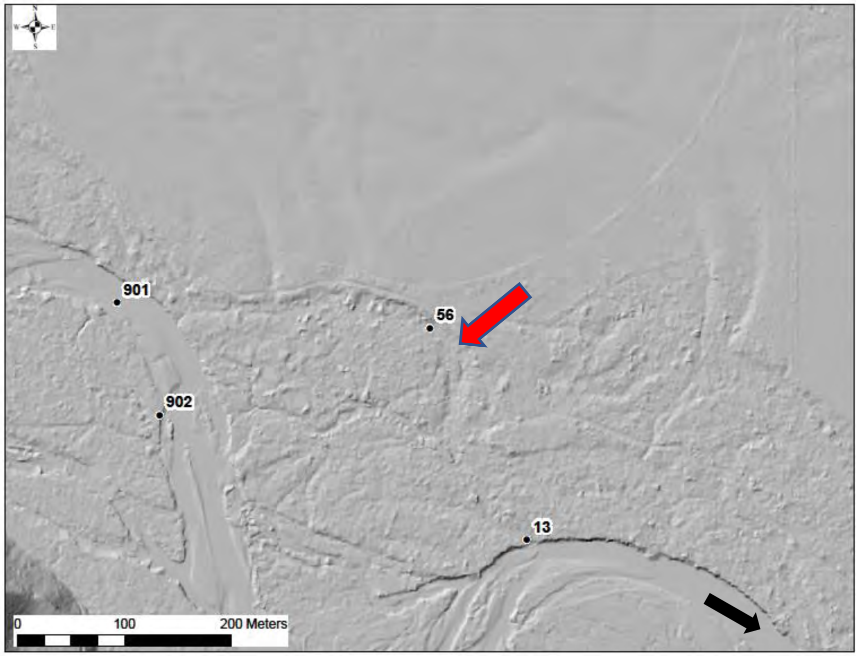

Upstream view at seep source.


Lateral view of flow into mainstem.

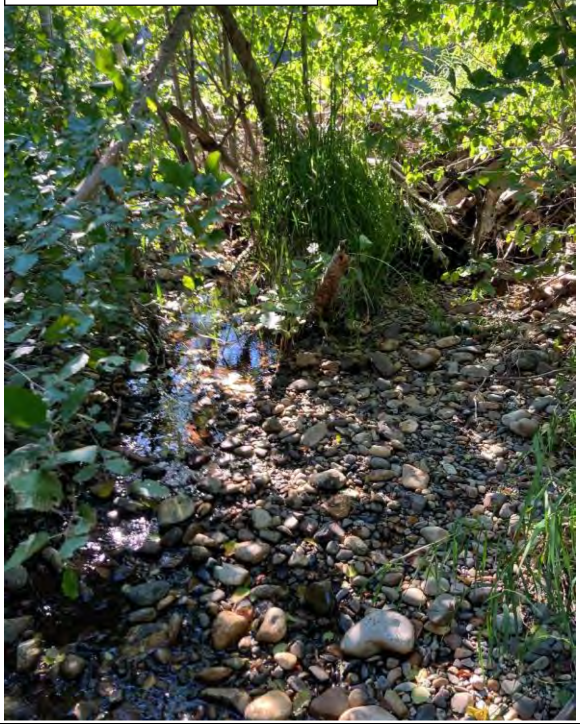
Methow Cold Water Patch Assessment			
CWP ID#	056	**CWP Channel Length (m)**	441
Stream	Methow	**CWP Channel Avg Width (m)**	2.5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	1102.5
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	102
Survey Time	1355	**Average CWP Channel Depth (cm)**	15
River km	94.81	**Min Plume Temp (℃)**	10.4
Latitude	48.52141	**Avg Plume Temp (℃)**	11.0
Longitude	-120.29478	**Min Plume Depth (cm)**	10
River Bank	Left	**Max Plume Depth (cm)**	35
CWP Source	Springbrook	**Avg Plume Depth (cm)**	18
Tributary Name		**Plume Width 2℃ Differential (m)**	1.5
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	71
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	106.5
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	13.8	**Plume Length 1℃ Differential (m)**	73
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	146
Min CWP Temp (℃)	8.4	**Fish Presence**	Yes
Average CWP Temp (℃)	9.8	**Fish Species**	Coho, brook, other
Max Main/CWP Diff (℃)	5.4	**Fish Count**	
Avg Main/CWP Diff (℃)	4.0		
CWP Description	Two branches that start small, cobble spring, 1m wide at 9C, becomes wider, deeper, slower 10C, into beaver channel (no dam). Coho, brook, others. Coho spawning perhaps. Good cover.		
Plume Description	Flows into cold side channel, then 20m down to mainstem, long plume along LB, 3m down to 0.5m width, glide, cobble, good depth. Mixes with CWP #013.		
Restoration Notes	Wood structure for cover, deflection. Access into spring channel a little low and steep right now.		

CWP #056_SB_Methow - Fawn



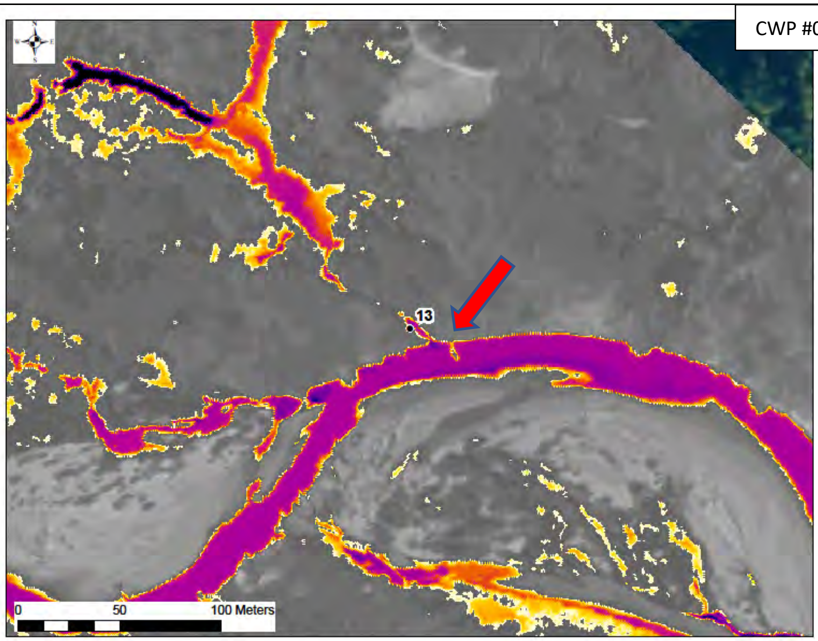


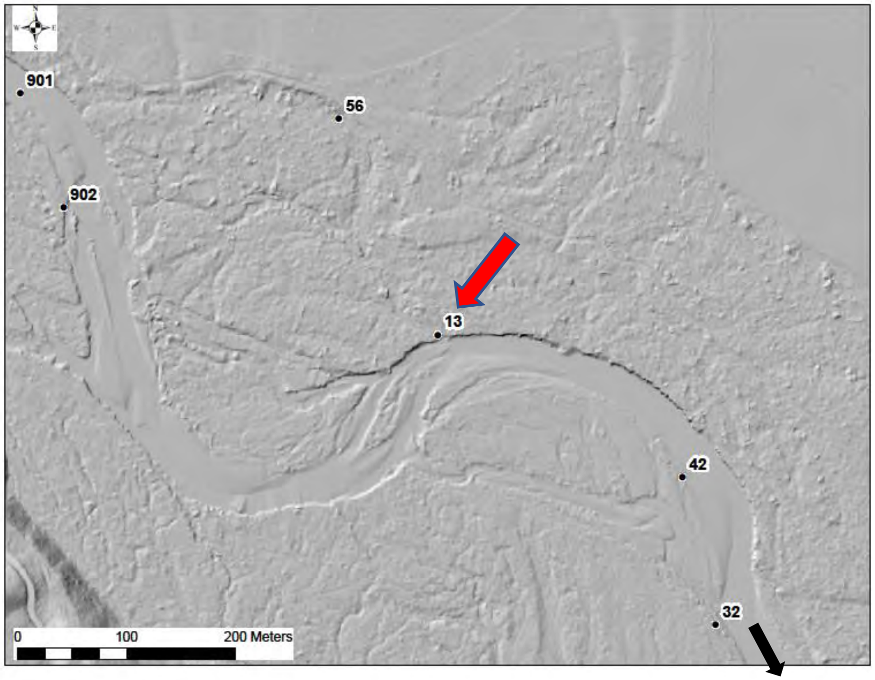
Downstream view towards mainstem

Downstream view of spring channel. 	Downstream view from seep source. 

Methow Cold Water Patch Assessment			
CWP ID#	013	**CWP Channel Length (m)**	336
Stream	Methow	**CWP Channel Avg Width (m)**	2.5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	840
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	96
Survey Time	1604	**Average CWP Channel Depth (cm)**	20
River km	94.84	**Min Plume Temp (℃)**	
Latitude	48.51962	**Avg Plume Temp (℃)**	
Longitude	-120.29357	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.7	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.1	**Fish Presence**	Yes
Average CWP Temp (℃)	11.2	**Fish Species**	*O.mykiss*
Max Main/CWP Diff (℃)	5.6	**Fish Count**	
Avg Main/CWP Diff (℃)	2.5		
CWP Description	Starts at forest edge of cobble bar, spring flow in riparian channel with series of small pools connected by short riffles, into larger, slower pools as an open channel along bar at confluences with #056 32m upstream from confluence with Methow.		
Plume Description	Same as #056 plume, #013 (10.5C) comes into pool with #056 (9C), flows together to Methow.		
Restoration Notes	Depth, connectivity.		

CWP #013_SB_Methow_Fawn





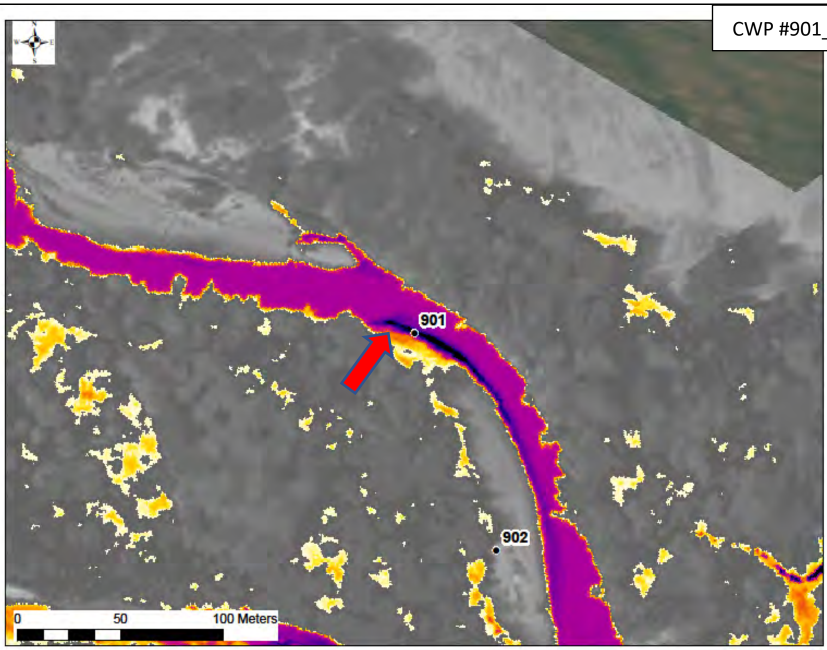
Confluence with CWP #056.

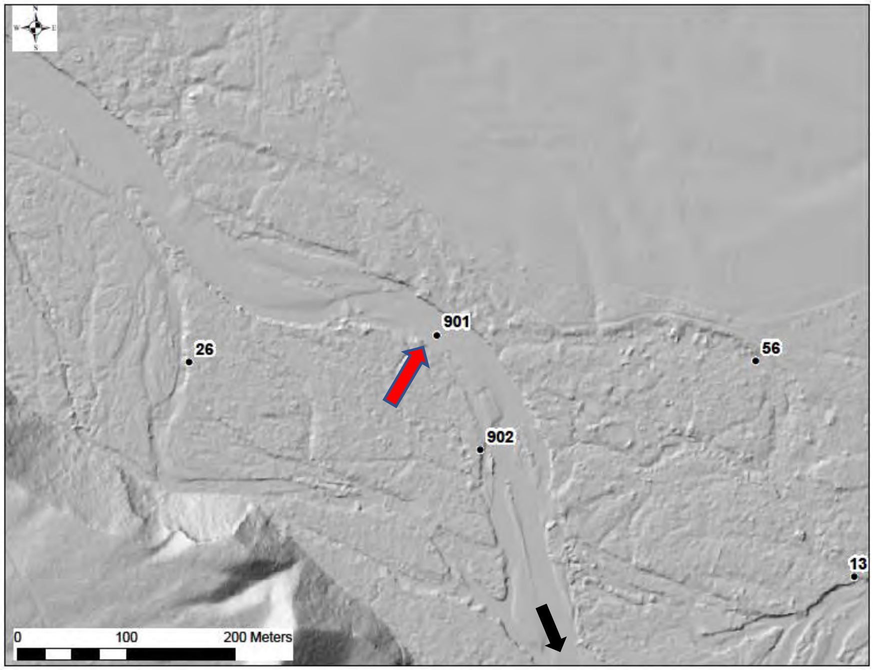

Downstream view of glide in channel.


Downstream view of pool habitat.

CWP ID#	901	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	
Survey Date	8/19/21	**Max CWP Channel Depth (cm)**	
Survey Time	1632	**Average CWP Channel Depth (cm)**	
River km	95.25	**Min Plume Temp (℃)**	11.5
Latitude	48.52164	**Avg Plume Temp (℃)**	12.5
Longitude	-120.29874	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	12
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	6
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	30
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	30
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	1.5
Mainstem Temp (℃)	14	**Plume Length 1℃ Differential (m)**	47
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	70.5
Min CWP Temp (℃)	11.5	**Fish Presence**	None observed
Average CWP Temp (℃)	12.5	**Fish Species**	
Max Main/CWP Diff (℃)	2.5	**Fish Count**	
Avg Main/CWP Diff (℃)	1.5		
CWP Description	Lateral seep located. Was not identified by TIR report.		
Plume Description	Long, shallow, and narrow. Pulsing cold water. Along inside bend of cobble bar.		
Restoration Notes	Complexity and depth.		

CWP #901_LS_Methow Fawn



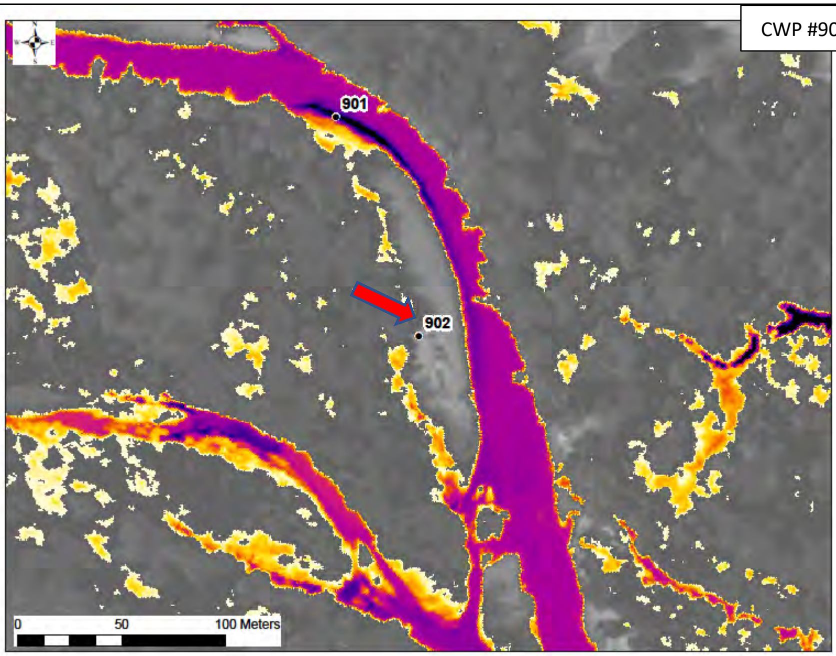


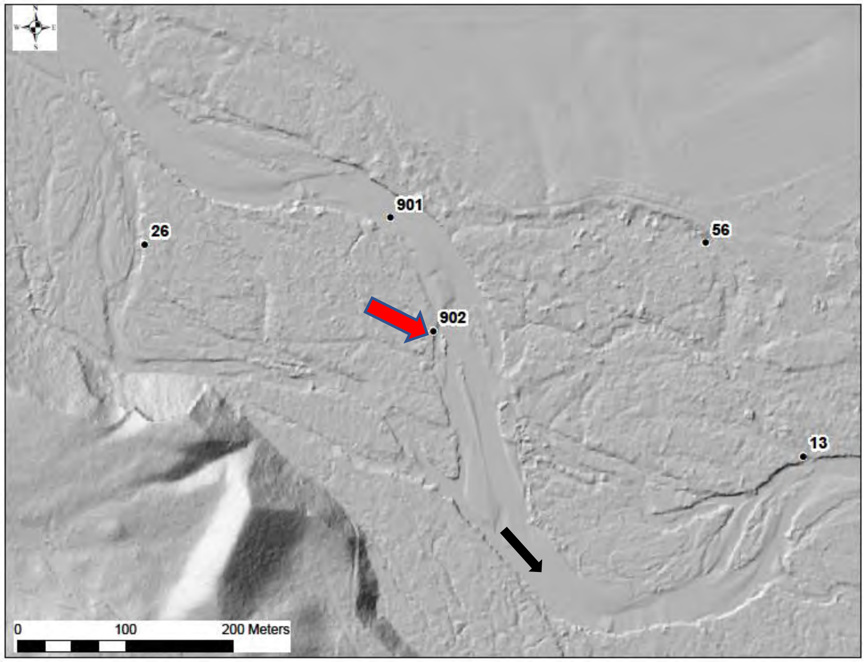
Lateral view from seep across mainstem.

Downstream view of seep area into mainstem.

CWP ID#	902	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	8/19/21	**Max CWP Channel Depth (cm)**	
Survey Time	1646	**Average CWP Channel Depth (cm)**	
River km	95.25	**Min Plume Temp (℃)**	9.7
Latitude	48.52069	**Avg Plume Temp (℃)**	12.0
Longitude	-120.29821	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	20
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	1.5
Habitat Type	Backwater	**Plume Length 2℃ Differential (m)**	4
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	6
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	14.0	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	9.7	**Fish Presence**	None observed
Average CWP Temp (℃)	12.0	**Fish Species**	
Max Main/CWP Diff (℃)	4.3	**Fish Count**	
Avg Main/CWP Diff (℃)	2.0		
CWP Description	Seep from cobble bank. Just random probe into this spot, not ID site.		
Plume Description	Small backwater pool connected to main flow above and below. Ds of big pool. Abundant wood nearby.		
Restoration Notes	Complexity and depth.		

CWP #902_LS_Methow Fawn



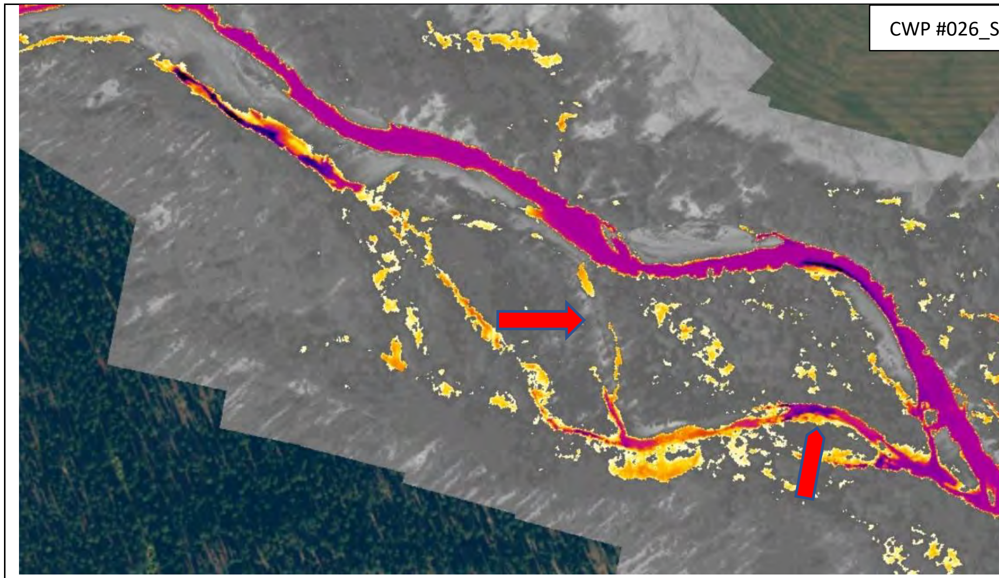


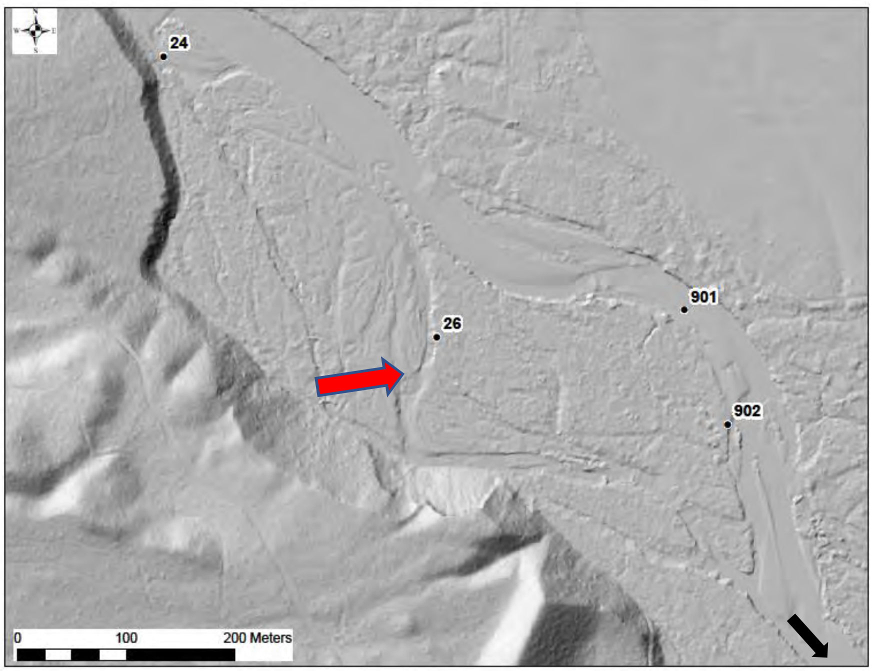
Downstream view of alcove and mainstem.

Lateral view of seep area.

Methow Cold Water Patch Assessment			
CWP ID#	026	**CWP Channel Length (m)**	600 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	6
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	3,600
Survey Date	8/26/21	**Max CWP Channel Depth (cm)**	30
Survey Time	1718	**Average CWP Channel Depth (cm)**	15
River km	95.4	**Min Plume Temp (℃)**	
Latitude	48.52143	**Avg Plume Temp (℃)**	
Longitude	-120.30183	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	14.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.6	**Fish Presence**	None observed
Average CWP Temp (℃)	12.5	**Fish Species**	
Max Main/CWP Diff (℃)	5.5	**Fish Count**	
Avg Main/CWP Diff (℃)	1.6		
CWP Description	Long side channel. Connected at bottom with top blocked by natural cobble levee and wood. Cool patch near bottom 11.5C. Some areas warmer than ambient including near top. Wide and deep in places.		
Plume Description	Channel flows into backwater off mainstem. Not very cold at that location, no discernable plume.		
Restoration Notes	Connection at top. Complexity.		

CWP #026_SB_Methow - Fawn





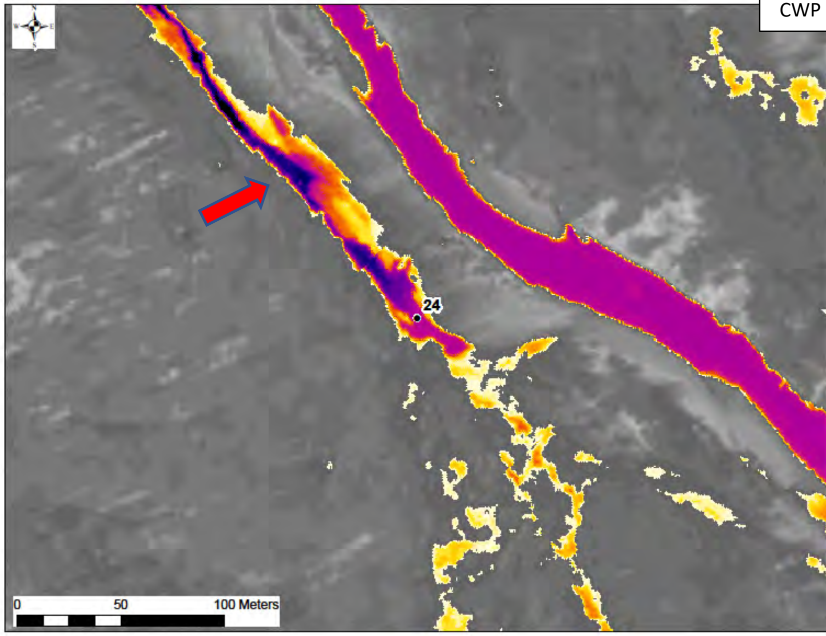
Downstream from mainstem at top wood jam of side channel.

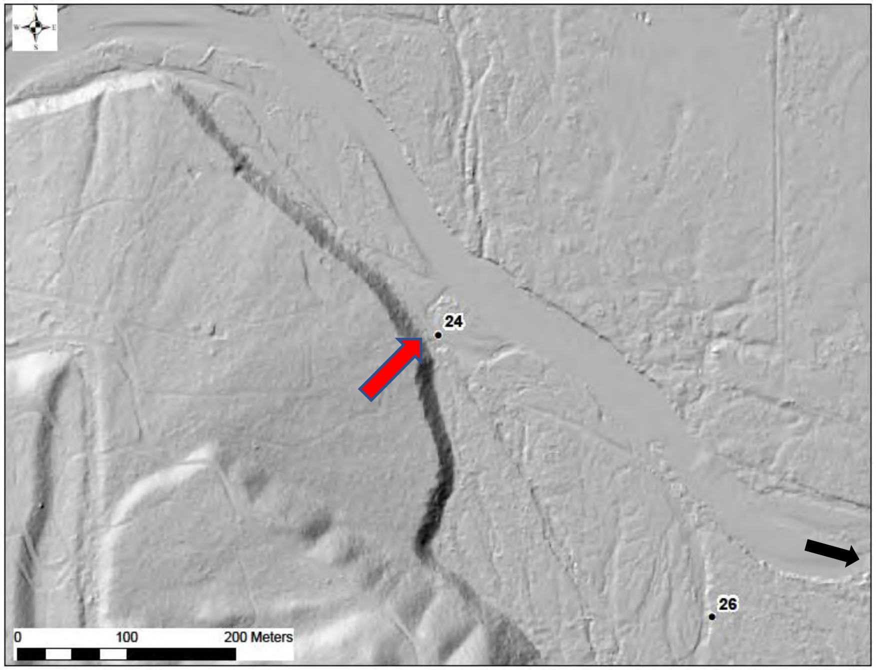

Upstream view at source ds of wood jam.


Downstream view in channel.

Methow Cold Water Patch Assessment			
CWP ID#	024	**CWP Channel Length (m)**	190 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	6
Assessment Unit	Methow – Fawn	**CWP Channel Area (m²)**	1,140
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	95
Survey Time	1403	**Average CWP Channel Depth (cm)**	25
River km	96.12	**Min Plume Temp (℃)**	
Latitude	48.52377	**Avg Plume Temp (℃)**	
Longitude	-120.30521	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	14.2	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.6	**Fish Presence**	Not observed
Average CWP Temp (℃)	12.0	**Fish Species**	
Max Main/CWP Diff (℃)	5.6	**Fish Count**	
Avg Main/CWP Diff (℃)	2.2		
CWP Description	A series of isolated pools in a high flow channel. At downstream end connects into CWP #026 channel. Not all pools cold some 13-14C. Coldest two were most upstream with distinct source from cobbles.		
Plume Description	No plume. No connection to mainstem.		
Restoration Notes	Connectivity at upstream end. Complexity maybe.		

CWP #024_SB_Methow - Fawn





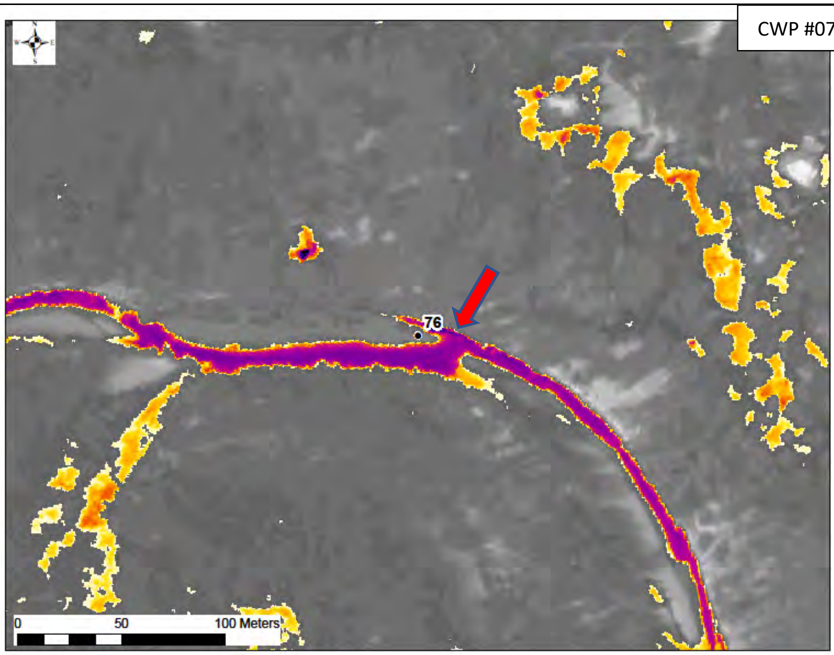
Downstream view along spring channel from near source.

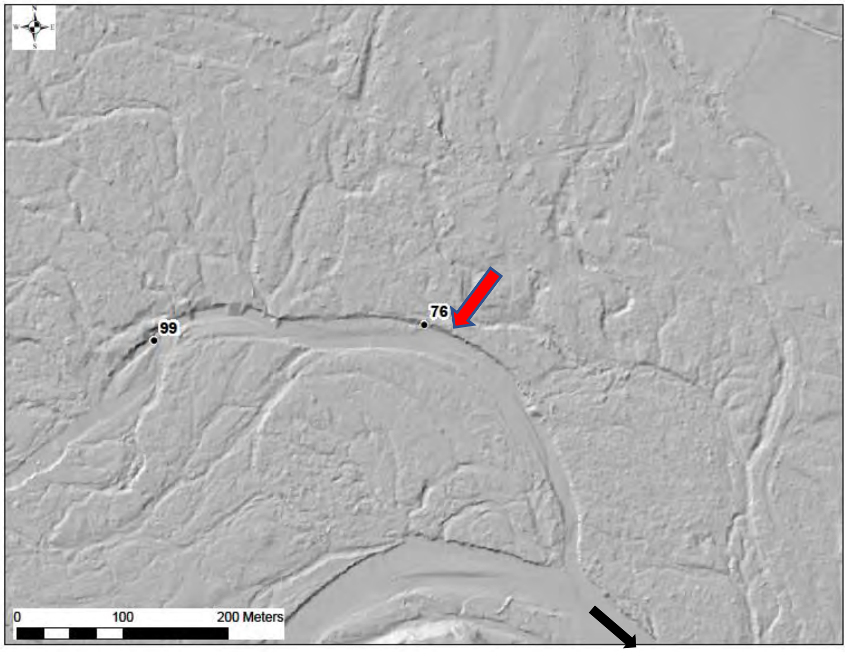

Downstream view in channel.


Upstream view in channel.

CWP ID#	076	**CWP Channel Length (m)**	35
Stream	Methow	**CWP Channel Avg Width (m)**	3
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	105
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	15
Survey Time	1442	**Average CWP Channel Depth (cm)**	8
River km	96.39	**Min Plume Temp (℃)**	9
Latitude	48.52848	**Avg Plume Temp (℃)**	11.5
Longitude	-120.30907	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	20
CWP Source	Springbrook	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	28
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	28
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	13.0	**Plume Length 1℃ Differential (m)**	54
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	108
Min CWP Temp (℃)	8.6	**Fish Presence**	None observed
Average CWP Temp (℃)	9.2	**Fish Species**	
Max Main/CWP Diff (℃)	4.4	**Fish Count**	
Avg Main/CWP Diff (℃)	3.8		
CWP Description	Low volume. Good riparian shade. Residence nearby to north.		
Plume Description	Cold. Tight to left bank of side channel. SC may pick up hyporheic at 11.8C just ds.		
Restoration Notes	Depth and complexity in side channel.		

CWP #076_SB_Methow - Fawn

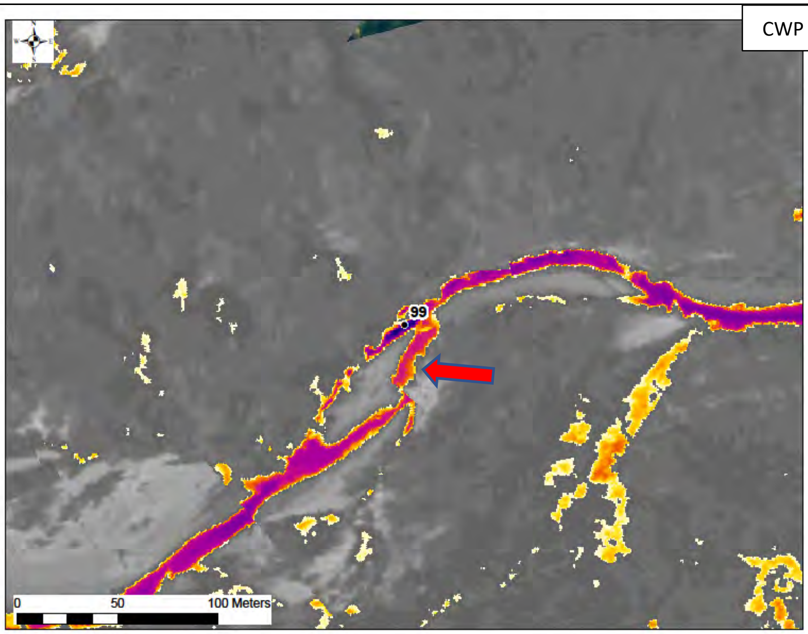




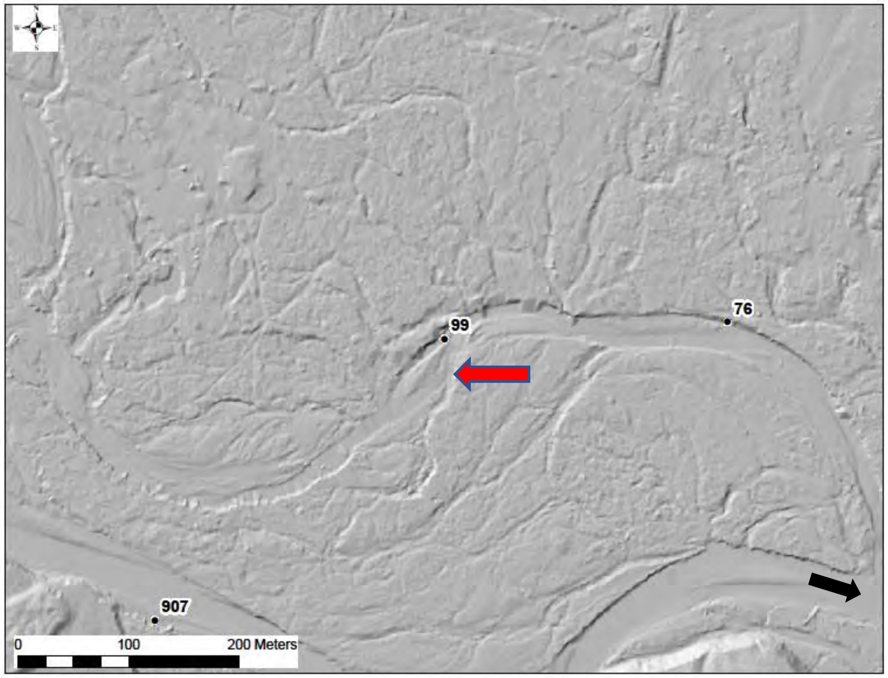
Downstream view from spring channel into side channel.

Upstream view of side channel adjacent to spring channel.

CWP ID#	099	**CWP Channel Length (m)**	80
Stream	Methow	**CWP Channel Avg Width (m)**	5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	400
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	45
Survey Time	1511	**Average CWP Channel Depth (cm)**	8
River km	96.48	**Min Plume Temp (℃)**	
Latitude	48.52836	**Avg Plume Temp (℃)**	
Longitude	-120.31254	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	9.8	**Fish Presence**	Yes
Average CWP Temp (℃)	10.5	**Fish Species**	Chinook
Max Main/CWP Diff (℃)	3.3	**Fish Count**	5
Avg Main/CWP Diff (℃)	2.6		
CWP Description	Wooded channel at source flows into cobble pool prior to joining more northerly channel then join and flow down to CWP076. Imagery shows colder channel was north one.		
Plume Description	No plume. Warms to 13C in riffle at confluence. Several cold seeps right bank ds.		
Restoration Notes	Uncertain. Chinook were in cobble pool. YOY.		



CWP #099_SB_Methow - Fawn



Downstream view of spring channel confluence.

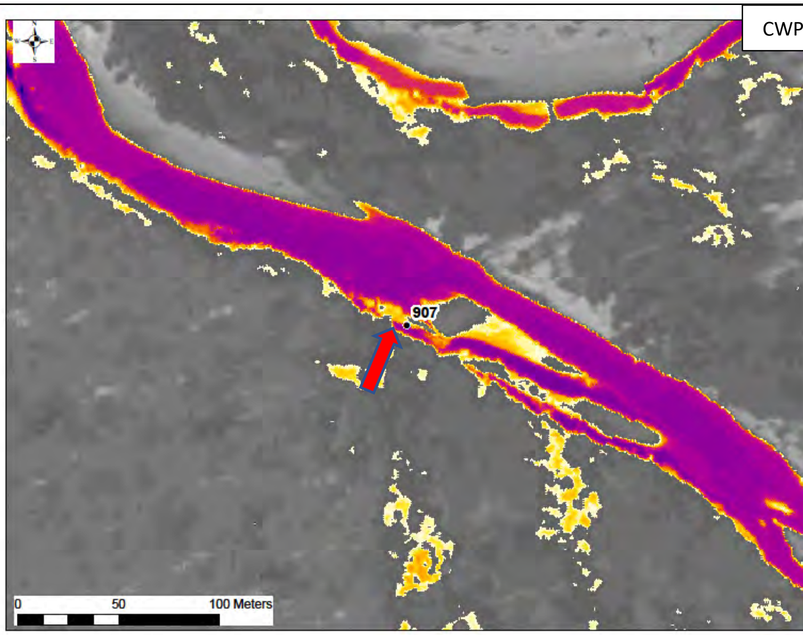
Downstream view of spring channel.

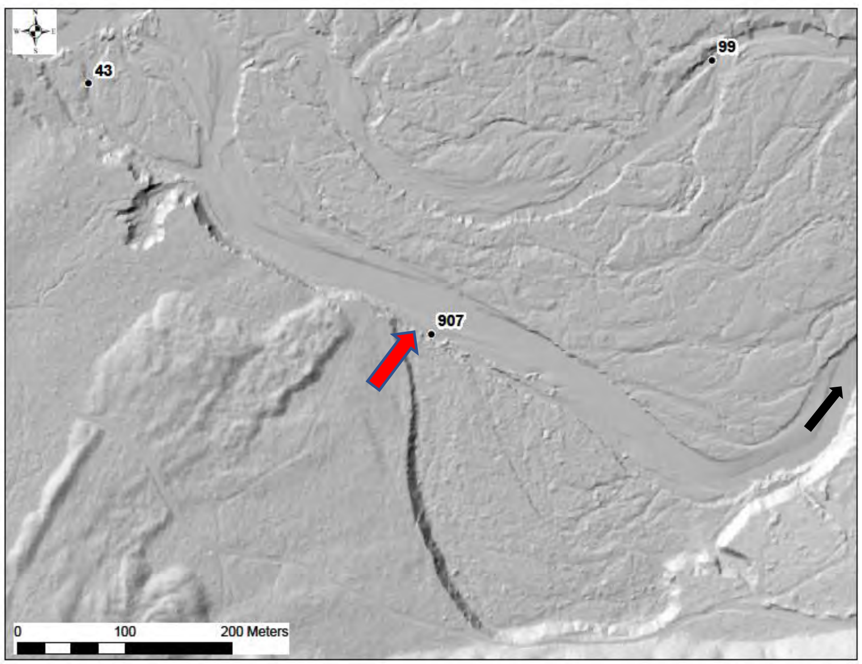
Upstream view of spring channel source.

Upstream view of spring channel.

CWP ID#	907	**CWP Channel Length (m)**	50
Stream	Methow	**CWP Channel Avg Width (m)**	5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	250
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	70
Survey Time	1707	**Average CWP Channel Depth (cm)**	12
River km	96.85	**Min Plume Temp (℃)**	
Latitude	48.526083	**Avg Plume Temp (℃)**	
Longitude	-120.36111	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	14.0	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	7.8	**Fish Presence**	None observed
Average CWP Temp (℃)	9.5	**Fish Species**	
Max Main/CWP Diff (℃)	6.2	**Fish Count**	
Avg Main/CWP Diff (℃)	4.5		
CWP Description	Perched pools that flow into cobble bar right side of mainstem. Deep and cold with two main pools.		
Plume Description	No plume. Not connected to mainstem.		
Restoration Notes	Connectivity.		

CWP #907_AL_Methow - Fawn



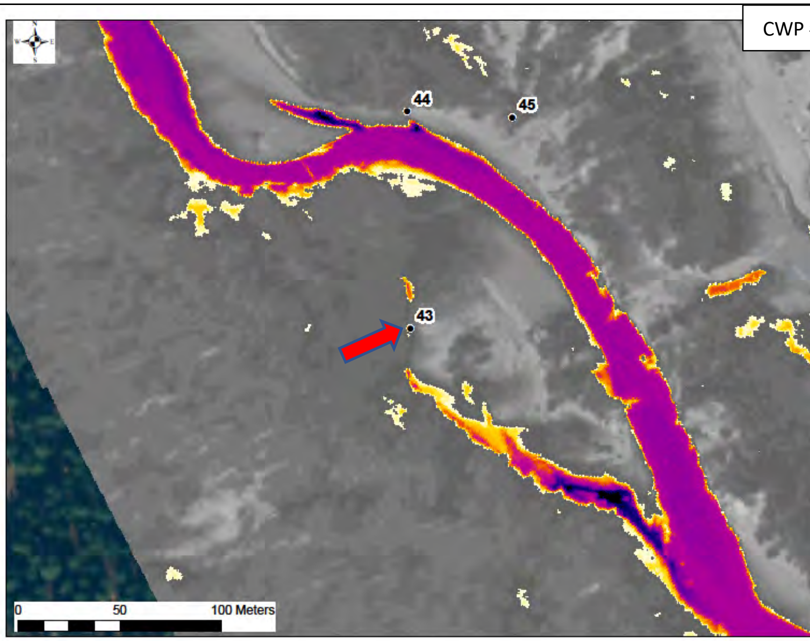


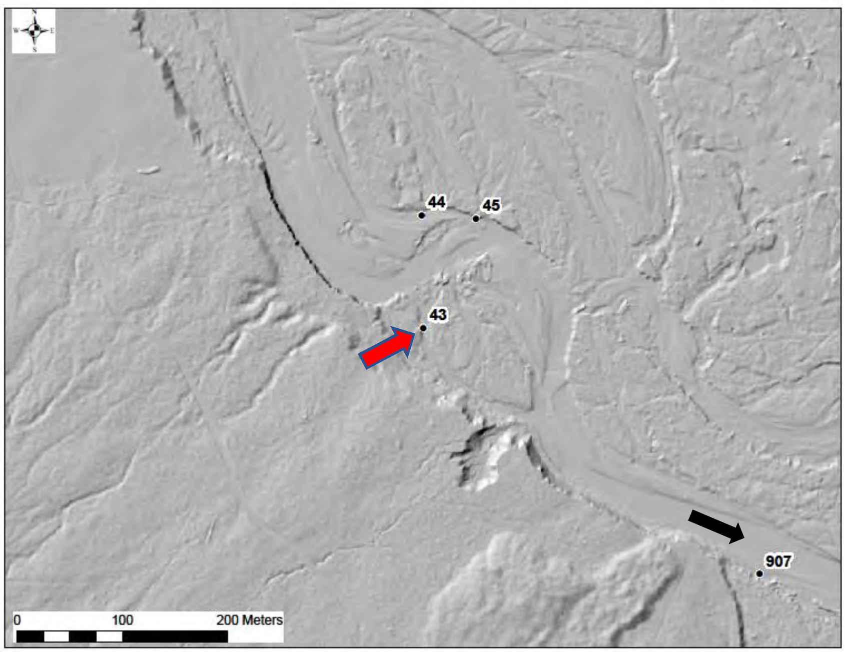
Downstream view of isolated pool from source.

Upstream view of isolated pool.

Methow Cold Water Patch Assessment			
CWP ID#	043	**CWP Channel Length (m)**	29
Stream	Methow	**CWP Channel Avg Width (m)**	1.5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	43.5
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	35
Survey Time	1610	**Average CWP Channel Depth (cm)**	8
River km	97.15	**Min Plume Temp (℃)**	11.7
Latitude	48.5282	**Avg Plume Temp (℃)**	11.7
Longitude	-120.32042	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	30
CWP Source	Alcove	**Avg Plume Depth (cm)**	15
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	4.5
Mainstem Temp (℃)	13.6	**Plume Length 1℃ Differential (m)**	6
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	27
Min CWP Temp (℃)	11.5	**Fish Presence**	None observed
Average CWP Temp (℃)	11.8	**Fish Species**	
Max Main/CWP Diff (℃)	2.1	**Fish Count**	
Avg Main/CWP Diff (℃)	1.8		
CWP Description	Short run low volume alcove flows into mainstem side channel. Not deep except for confluence pool. Tight to right bank of side channel on active surface.		
Plume Description	Confluence pool. Side channel flow swamps it quickly. No 2C plume.		
Restoration Notes	Complexity.		

CWP #043_AL_Methow -Fawn





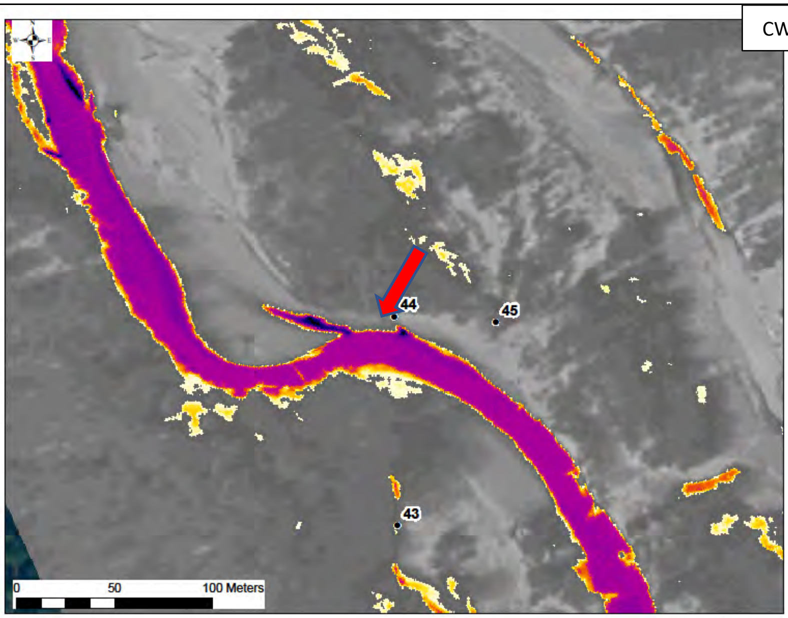
Downstream view towards plume pool.

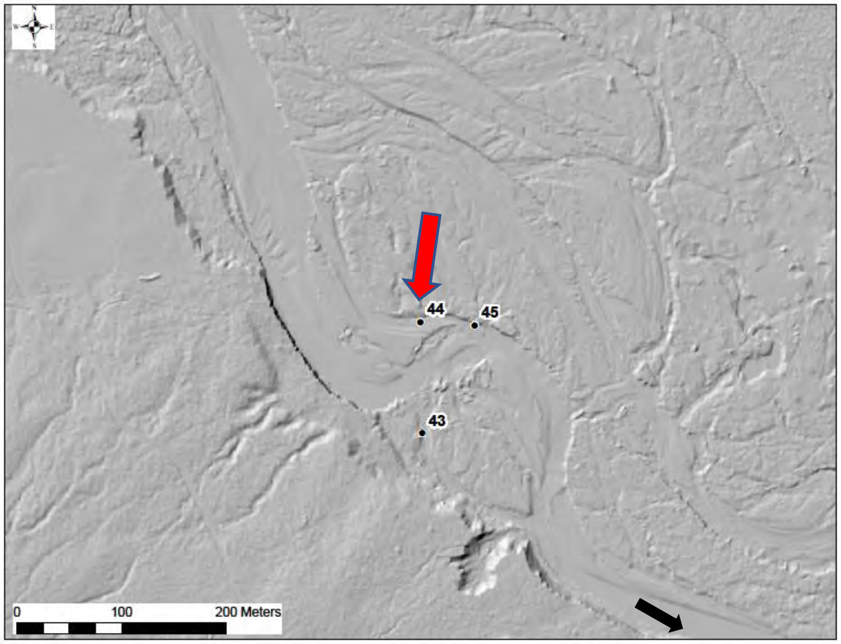
Upstream view at alcove source on left.

Lateral view of alcove flow from side channel.

Methow Cold Water Patch Assessment			
CWP ID#	044	**CWP Channel Length (m)**	65
Stream	Methow	**CWP Channel Avg Width (m)**	2
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	130
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	37
Survey Time	1642	**Average CWP Channel Depth (cm)**	8
River km	97.43	**Min Plume Temp (℃)**	
Latitude	48.52916	**Avg Plume Temp (℃)**	
Longitude	-120.32043	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.9	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	11.7	**Fish Presence**	None observed
Average CWP Temp (℃)	12.5	**Fish Species**	
Max Main/CWP Diff (℃)	2.2	**Fish Count**	
Avg Main/CWP Diff (℃)	1.4		
CWP Description	Small low volume seep in active channel. Disconnected. Mainstem at this location may have moved since 2009.		
Plume Description	No plume. Disconnected.		
Restoration Notes	Complexity, connectivity.		

CWP #044_AL_Methow - Fawn





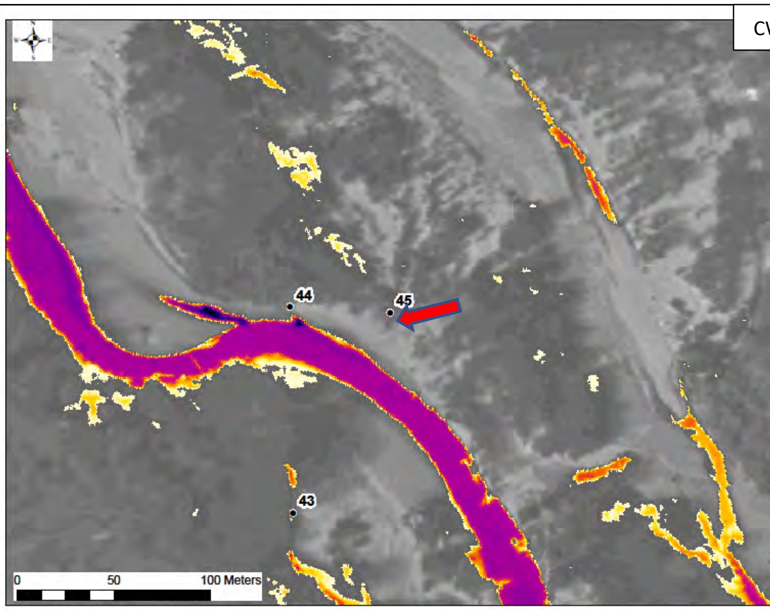
Downstream view towards #045 and mainstem.

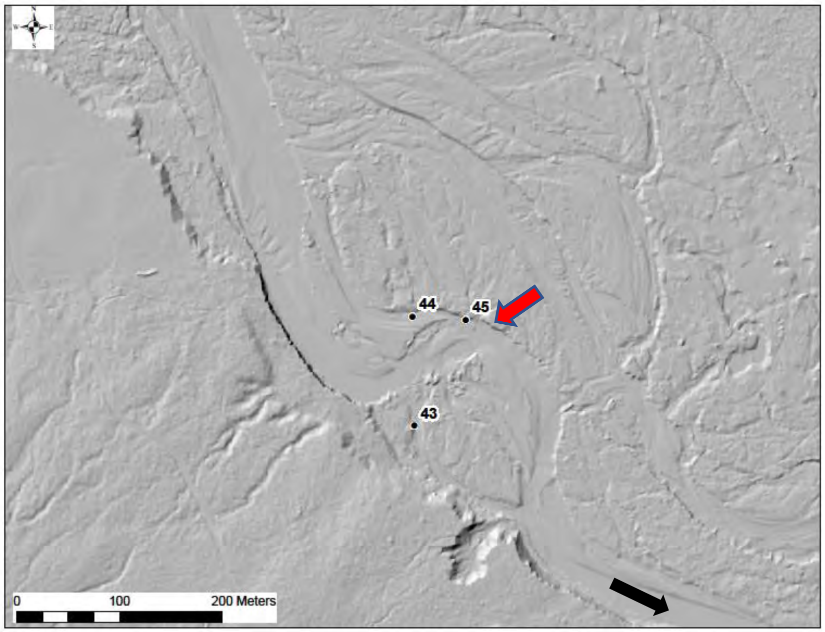

Lateral view of alcove source.


Upstream view at alcove source on right, mainstem on left.

Methow Cold Water Patch Assessment			
CWP ID#	045	**CWP Channel Length (m)**	1
Stream	Methow	**CWP Channel Avg Width (m)**	0.8
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	0.8
Survey Date	8/30/21	**Max CWP Channel Depth (cm)**	4
Survey Time	1650	**Average CWP Channel Depth (cm)**	2
River km	97.43	**Min Plume Temp (℃)**	
Latitude	48.52913	**Avg Plume Temp (℃)**	
Longitude	-120.31973	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.9	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	12.5	**Fish Presence**	None observed
Average CWP Temp (℃)	12.8	**Fish Species**	
Max Main/CWP Diff (℃)	1.4	**Fish Count**	
Avg Main/CWP Diff (℃)	1.1		
CWP Description	Small lateral seep. Low volume.		
Plume Description	No plume detected. Seep flow into mainstem backwater at 13.3C. Mainstem channel shift may have impacted this location.		
Restoration Notes	Complexity, but site not cold.		

CWP #045_LS_Methow - Fawn



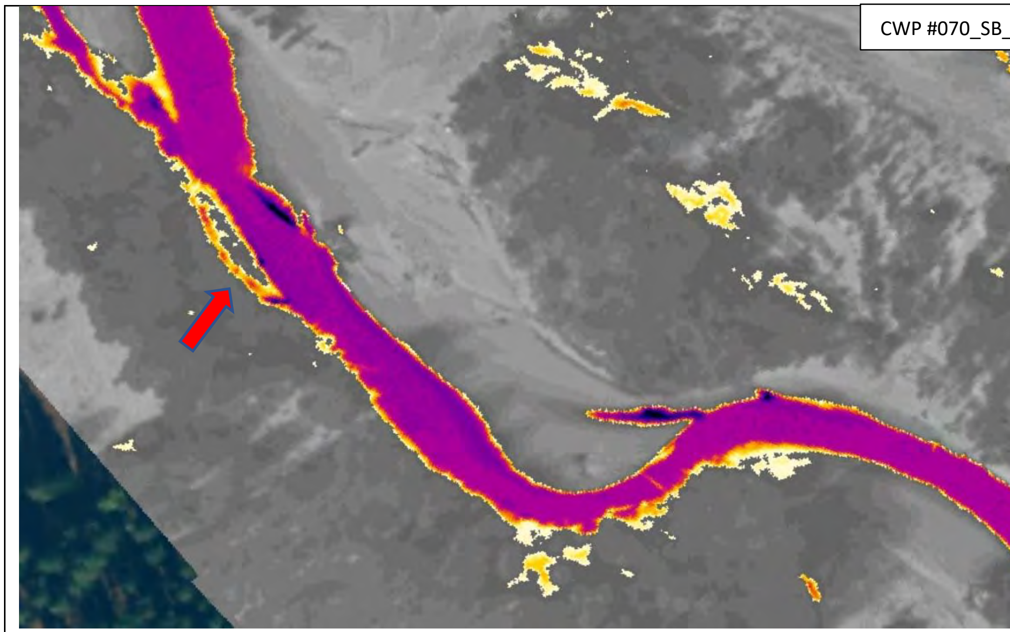


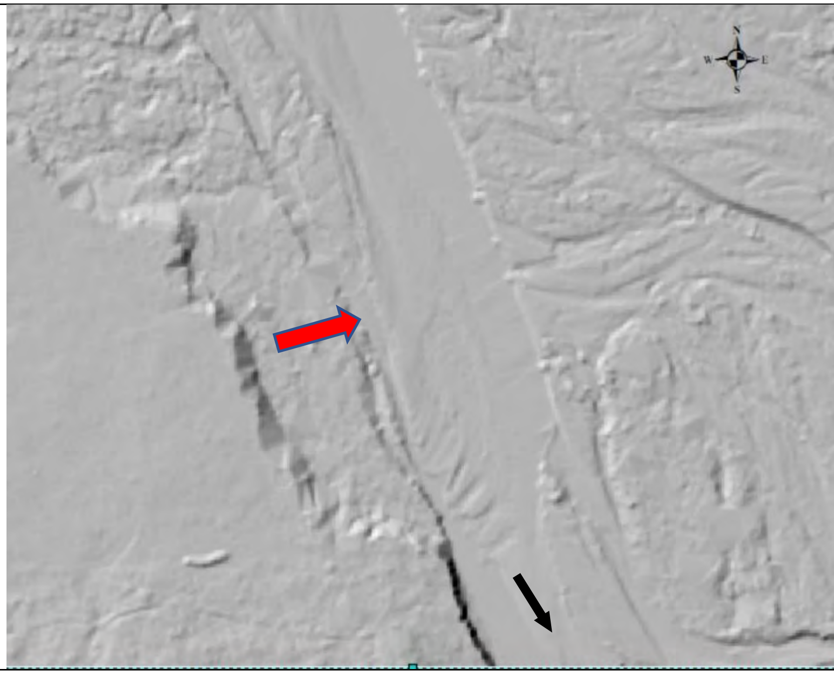
Downstream view towards mainstem.


Lateral view of seep source.

CWP ID#	070	**CWP Channel Length (m)**	75
Stream	Methow	**CWP Channel Avg Width (m)**	3
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	225
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	28
Survey Time	1233	**Average CWP Channel Depth (cm)**	8
River km	97.49	**Min Plume Temp (℃)**	
Latitude	48.58993	**Avg Plume Temp (℃)**	
Longitude	-120.32267	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	10.6	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.5	**Fish Presence**	Yes
Average CWP Temp (℃)	9.3	**Fish Species**	*O. mykiss*
Max Main/CWP Diff (℃)	2.1	**Fish Count**	4
Avg Main/CWP Diff (℃)	1.3		
CWP Description	Short run medium volume spring channel. Dense vegetation esp at us end. Complex with wood and veg. Just to west of another larger cold channel. Just us of Hancock Creek side channel which is the more east of these two.		
Plume Description	Spring channel flows into another small cold channel prior to flowing into mainstem. Pool habitat was 10C so no plume into mainstem. Channel 8.6C joins 9.7C in another small channel.		
Restoration Notes	Reach based approach needed.		

CWP #070_SB_Methow - Fawn





Downstream view along spring channel.

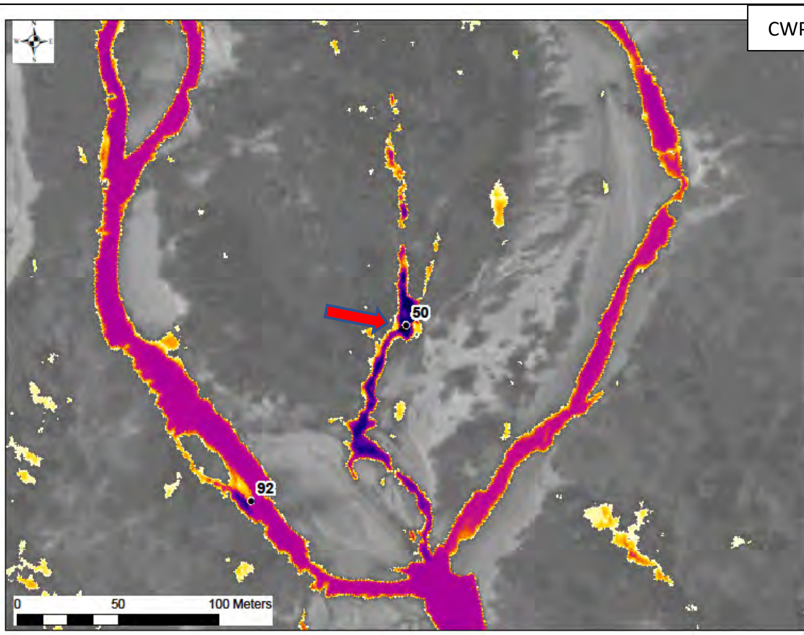
Lateral view of source seepage into mainstem.

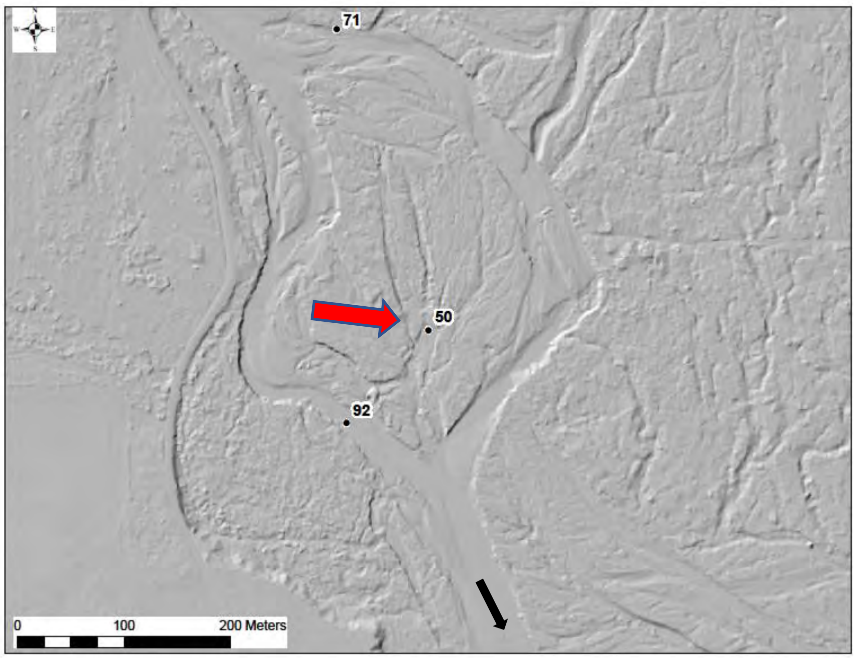
Upstream view of spring channel entering side channel.

Upstream view of side channel ds of spring channel.

Methow Cold Water Patch Assessment			
CWP ID#	050	**CWP Channel Length (m)**	185 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	6.5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	1072
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	65
Survey Time	1332	**Average CWP Channel Depth (cm)**	15
River km	97.96	**Min Plume Temp (℃)**	
Latitude	48.53344	**Avg Plume Temp (℃)**	
Longitude	-120.32341	**Min Plume Depth (cm)**	
River Bank	Center	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	11.4	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.3	**Fish Presence**	Yes
Average CWP Temp (℃)	9.2	**Fish Species**	Chinook
Max Main/CWP Diff (℃)	3.1	**Fish Count**	20
Avg Main/CWP Diff (℃)	2.2		
CWP Description	Middle Fender Mill spring channel. Connected to mainstem at ds end and at us end during high flows. Recent beaver activity and dams. Complex riparian habitat.		
Plume Description	No plume. Warmer than mainstem. Beaver ponds just upstream warming waters.		
Restoration Notes	Upstream hydrology to naturalize activation. Reach-based approach.		

CWP #050_SB_Methow - Fawn





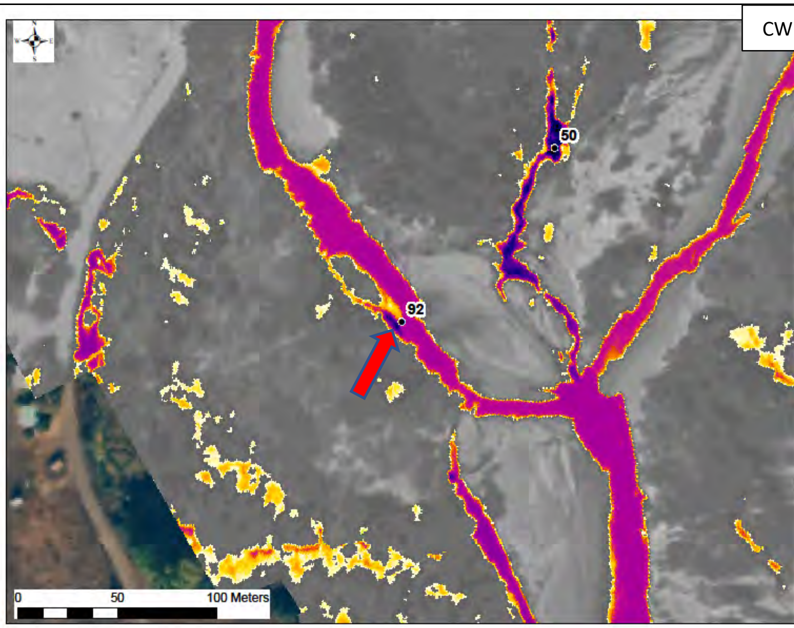
Downstream view from beaver pond and dam.

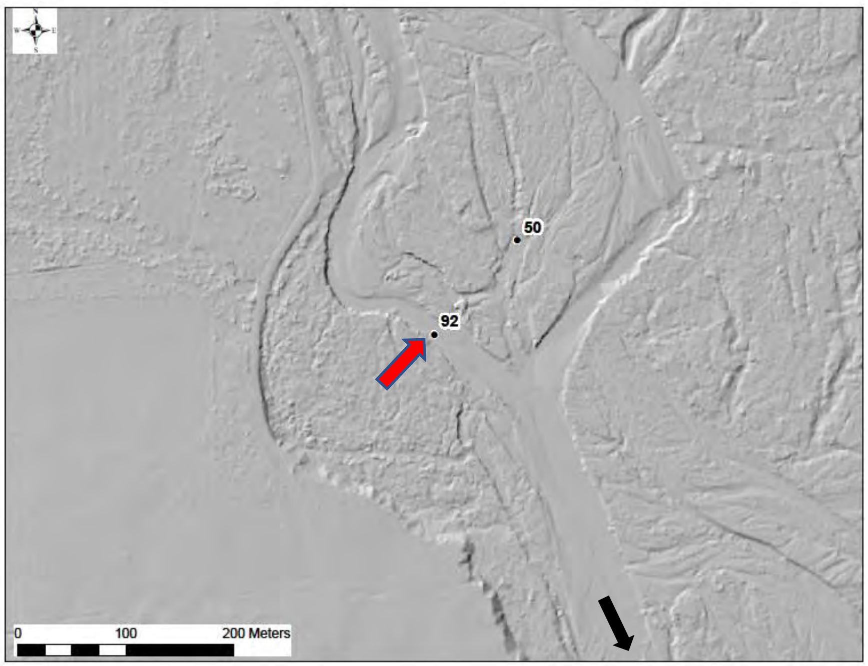
Downstream view from source.

Upstream view into channel above beaver pond.

CWP ID#	092	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	
Survey Time	1318	**Average CWP Channel Depth (cm)**	
River km	97.98	**Min Plume Temp (℃)**	10.5
Latitude	48.53266	**Avg Plume Temp (℃)**	10.8
Longitude	-120.32446	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	15
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	11.4	**Plume Length 1℃ Differential (m)**	11
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	11
Min CWP Temp (℃)	10.5	**Fish Presence**	None observed
Average CWP Temp (℃)	10.8	**Fish Species**	
Max Main/CWP Diff (℃)	0.9	**Fish Count**	
Avg Main/CWP Diff (℃)	0.6		
CWP Description	Likely low volume seep into pooltail glide. Mainstem in more west location flows along seep now.		
Plume Description	Narrow along bank, not especially cold. No 2C plume area.		
Restoration Notes	Complexity.		

CWP #092_LS_Methow - Fawn



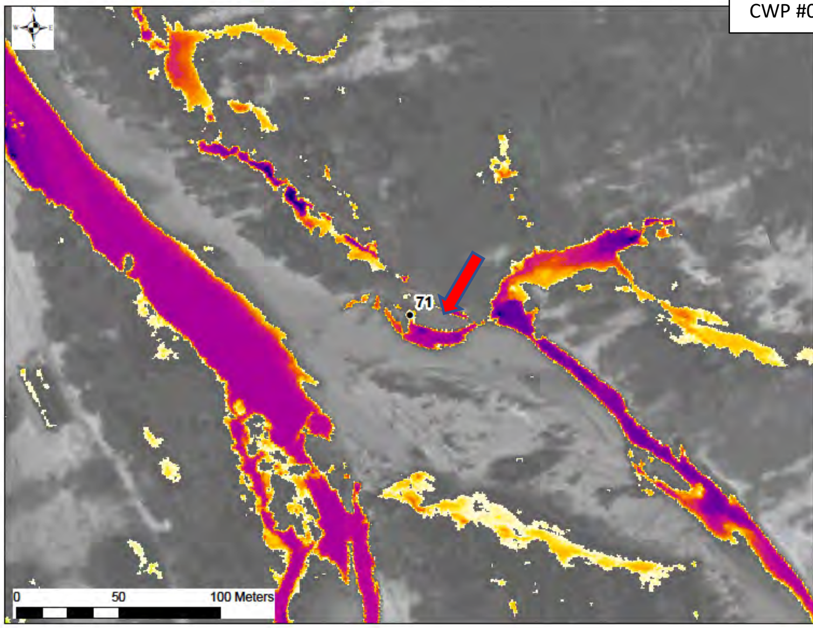


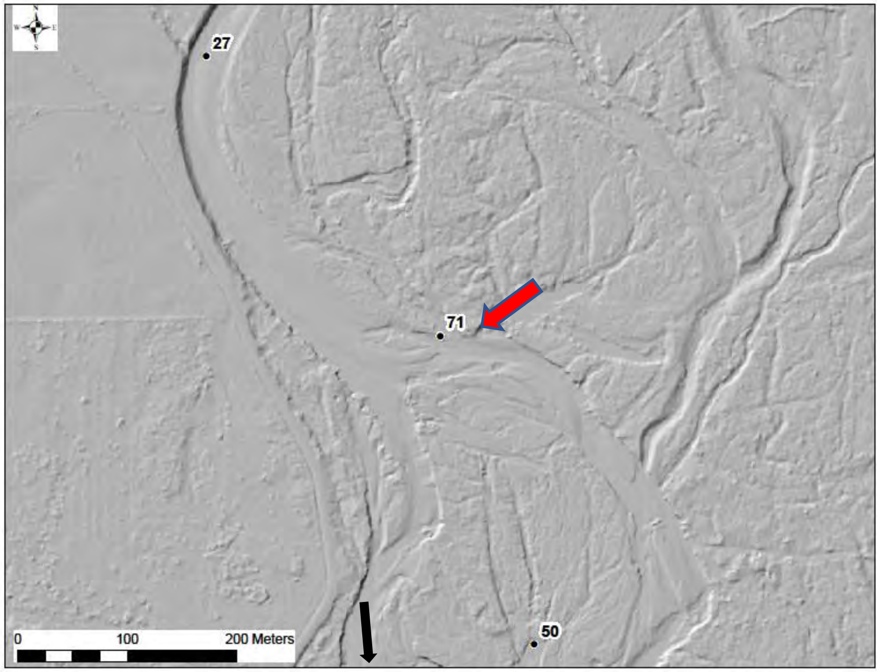
Downstream view of seep into mainstem.

Upstream view of seep bank and mainstem.

CWP ID#	071	**CWP Channel Length (m)**	415 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	5.5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	2,282
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	60
Survey Time	1357	**Average CWP Channel Depth (cm)**	20
River km	98.46	**Min Plume Temp (℃)**	
Latitude	48.53598	**Avg Plume Temp (℃)**	
Longitude	-120.32455	**Min Plume Depth (cm)**	
River Bank	Center	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	11.4	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	9.0	**Fish Presence**	None observed
Average CWP Temp (℃)	9.6	**Fish Species**	
Max Main/CWP Diff (℃)	2.4	**Fish Count**	
Avg Main/CWP Diff (℃)	1.8		
CWP Description	Extends us to nearly the mainstem ds of bridge. Picks up cooler flows along the channel >12C upper end in spots. Complex riparian thru floodplain surface. Some ponds maybe flood debris dams. Did not reach upper end.		
Plume Description	Flows into Stansbury SC. No discernible plume.		
Restoration Notes	Functional floodplain channel. High flow activated.		

CWP #071_SB_Methow - Fawn





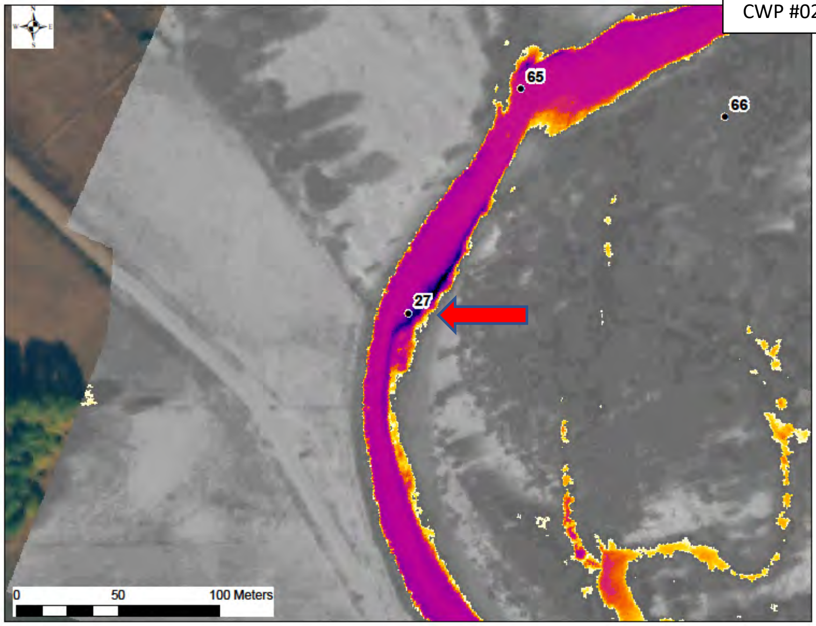
Downstream view in side channel at confluence.

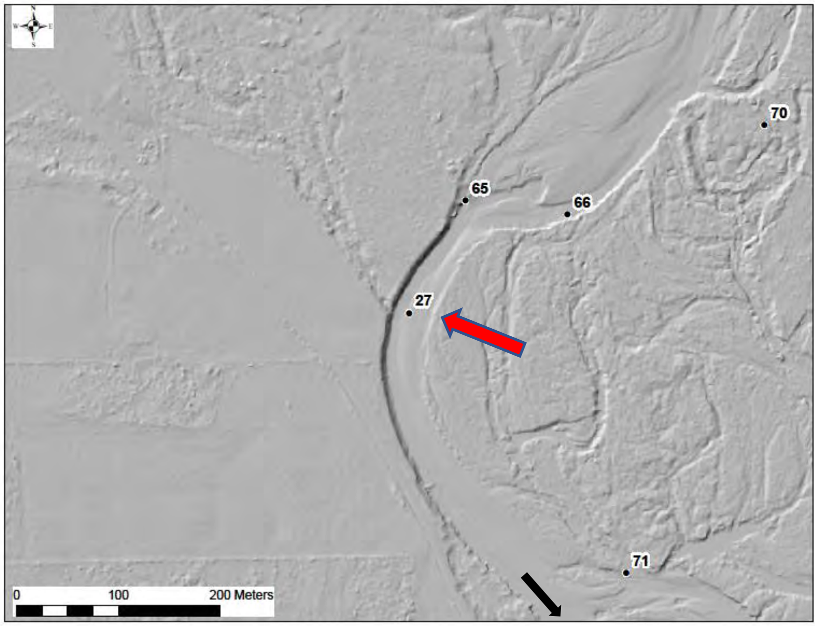
Downstream view of pool habitat in channel.

Upstream view of downstream channel confluence.

Methow Cold Water Patch Assessment			
CWP ID#	027	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	
Survey Time	1436	**Average CWP Channel Depth (cm)**	
River km	98.61	**Min Plume Temp (℃)**	8.7
Latitude	48.53829	**Avg Plume Temp (℃)**	11.5
Longitude	-120.32742	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	15
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	0.6
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	23
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	13.8
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	13.3	**Plume Length 1℃ Differential (m)**	30
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	60
Min CWP Temp (℃)	8.7	**Fish Presence**	None observed
Average CWP Temp (℃)	11.5	**Fish Species**	
Max Main/CWP Diff (℃)	4.6	**Fish Count**	
Avg Main/CWP Diff (℃)	1.8		
CWP Description	Seep left mainstem cobble bar.		
Plume Description	Shallow. Low volume.		
Restoration Notes	Complexity and depth.		

CWP #027_LS_Methow - Fawn



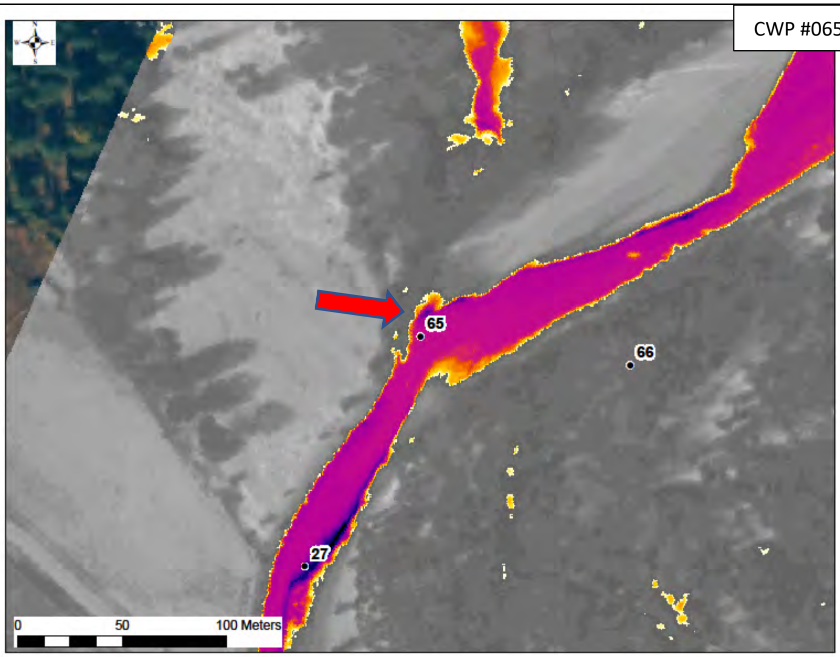


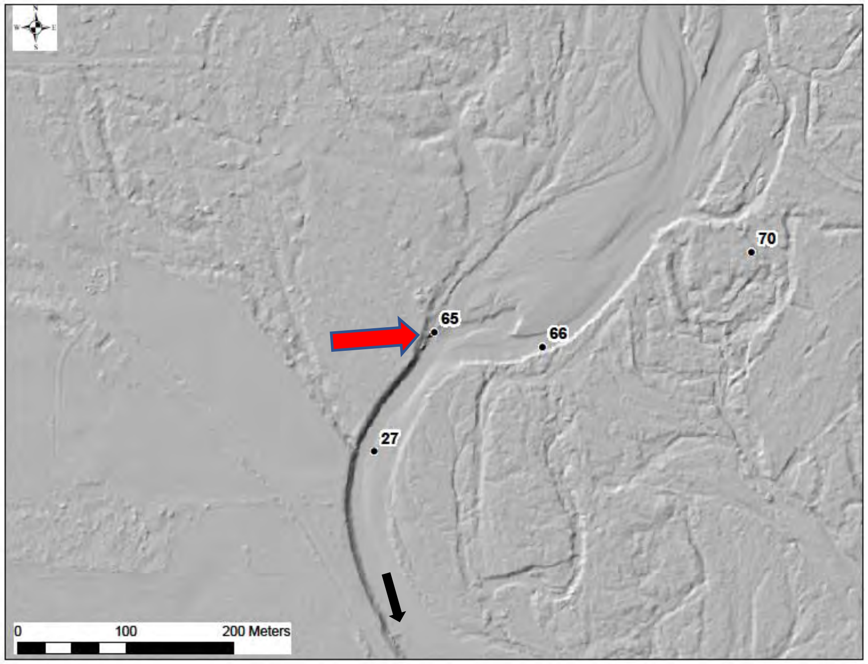
Downstream view along seep adjacent to mainstem.

Upstream view along seep from cobble.

CWP ID#	065	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	
Survey Time	1451	**Average CWP Channel Depth (cm)**	
River km	98.97	**Min Plume Temp (℃)**	11.5
Latitude	48.53928	**Avg Plume Temp (℃)**	9.5
Longitude	-120.32666	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	50
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	25
Tributary Name		**Plume Width 2℃ Differential (m)**	3.5
Habitat Type	Backwater	**Plume Length 2℃ Differential (m)**	13
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	45.5
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	6
Mainstem Temp (℃)	14.5	**Plume Length 1℃ Differential (m)**	18
Tributary Temp (℃)	11.5	**Plume Area 1℃ Differential (m^2)**	108
Min CWP Temp (℃)	8.8	**Fish Presence**	None observed
Average CWP Temp (℃)	10.5	**Fish Species**	
Max Main/CWP Diff (℃)	5.7	**Fish Count**	
Avg Main/CWP Diff (℃)	4.0		
CWP Description	Spring flow out of sandy elevated cobble bar. Does not seem high volume. Some flow tight to west high bank. East flow through sandy fan. Possible trib or SC or ditch was 11.5C.		
Plume Description	Plume is a backwater off mainstem bend. Stratified with cooler water below. 12C or warmer at surface. Cold tributary (ditch flow?) is adding high volume to backwater.		
Restoration Notes	Complexity. Wood structure.		

CWP #065_LS_Methow - Fawn





Downstream view of alcove pool and mainstem.

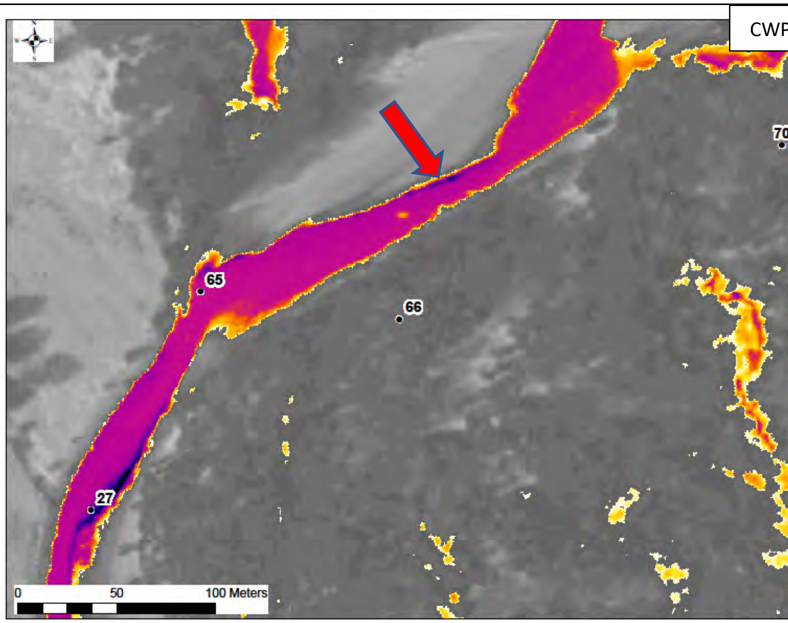
Upstream view of alcove and source seep.

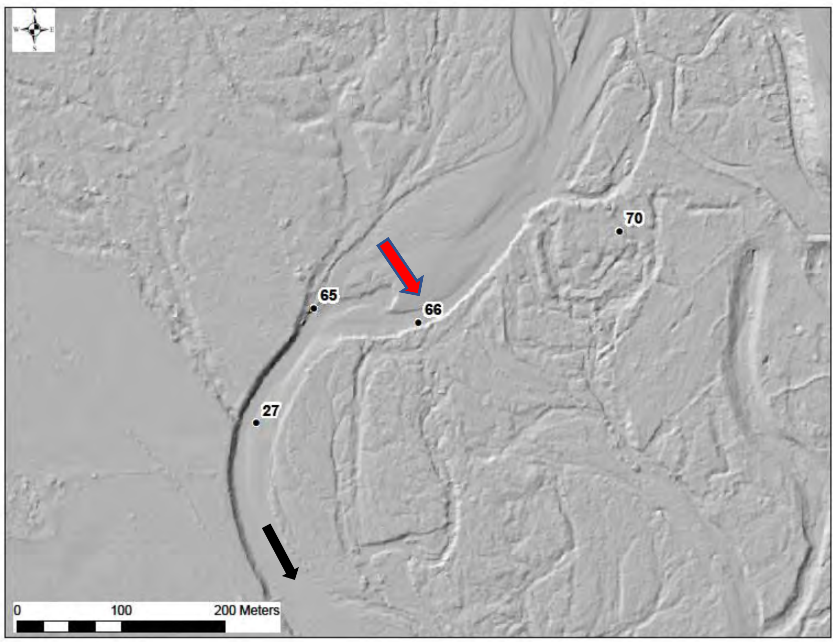
Upstream view of source seepage.

Upstream view of seepage and mainstem mixing.

CWP ID#	066	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	
Survey Time	1519	**Average CWP Channel Depth (cm)**	
River km	99.01	**Min Plume Temp (℃)**	11.1
Latitude	48.53915	**Avg Plume Temp (℃)**	12.0
Longitude	-120.3253	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	25
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	12
Tributary Name		**Plume Width 2℃ Differential (m)**	0.4
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	15
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	6
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	14.5	**Plume Length 1℃ Differential (m)**	19
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	19
Min CWP Temp (℃)	11.1	**Fish Presence**	None observed
Average CWP Temp (℃)	12.0	**Fish Species**	
Max Main/CWP Diff (℃)	3.4	**Fish Count**	
Avg Main/CWP Diff (℃)	2.5		
CWP Description	Similar to CWP #027 just ds. Low volume seepage out of cobble bar. Mainstem probably migrating to east along this bend at us end of Fender Mill floodplain.		
Plume Description	Not really a large plume and quite shallow compared to adj pool habitat.		
Restoration Notes	Reach based approach. Depth and complexity.		

CWP #066_LS_Methow - Fawn



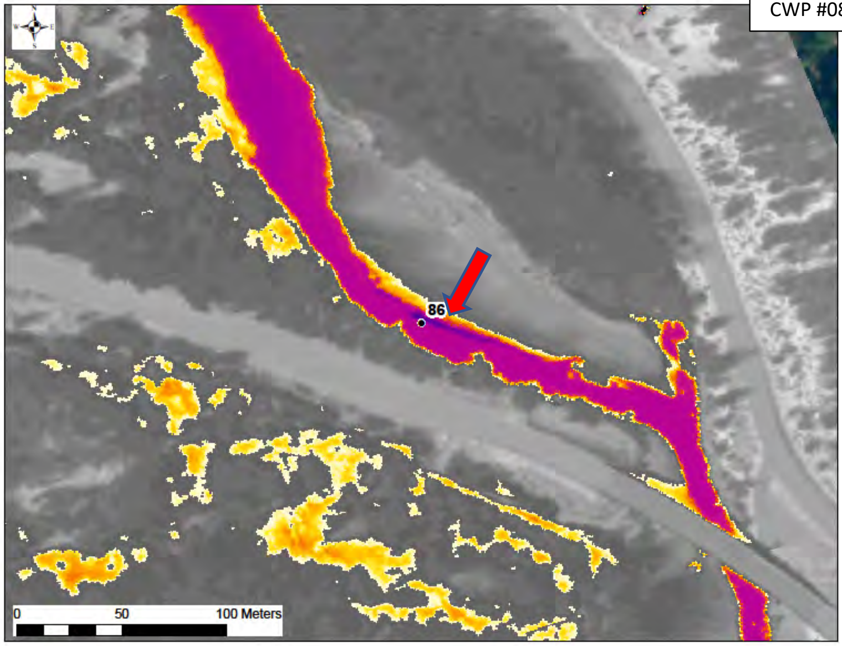


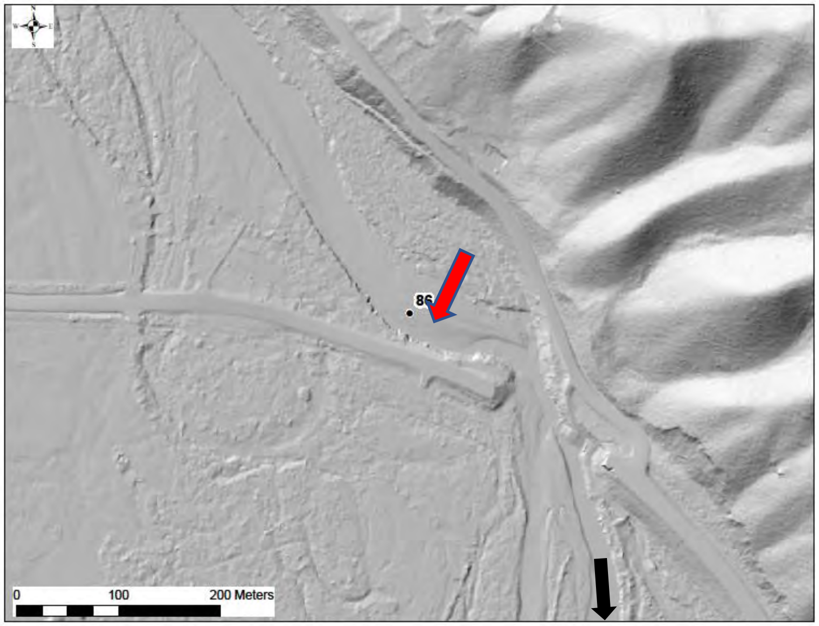
Downstream view along seep and mainstem.

Upstream view of seep area and mainstem.

CWP ID#	086	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/1/21	**Max CWP Channel Depth (cm)**	
Survey Time	1549	**Average CWP Channel Depth (cm)**	
River km	99.77	**Min Plume Temp (℃)**	11.3
Latitude	48.54506	**Avg Plume Temp (℃)**	12.5
Longitude	-120.32529	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	18
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	10
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	3
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	14.1	**Plume Length 1℃ Differential (m)**	16
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	16
Min CWP Temp (℃)	11.3	**Fish Presence**	None observed
Average CWP Temp (℃)	12.5	**Fish Species**	
Max Main/CWP Diff (℃)	2.8	**Fish Count**	
Avg Main/CWP Diff (℃)	1.6		
CWP Description	Similar to cobble bar seeps ds of Weeman bridge. Likely hyporheic flow thru cobbles. Low volume.		
Plume Description	Narrow along bank		
Restoration Notes	Reach based. Depth and complexity.		

CWP #086_LS_Methow - Fawn



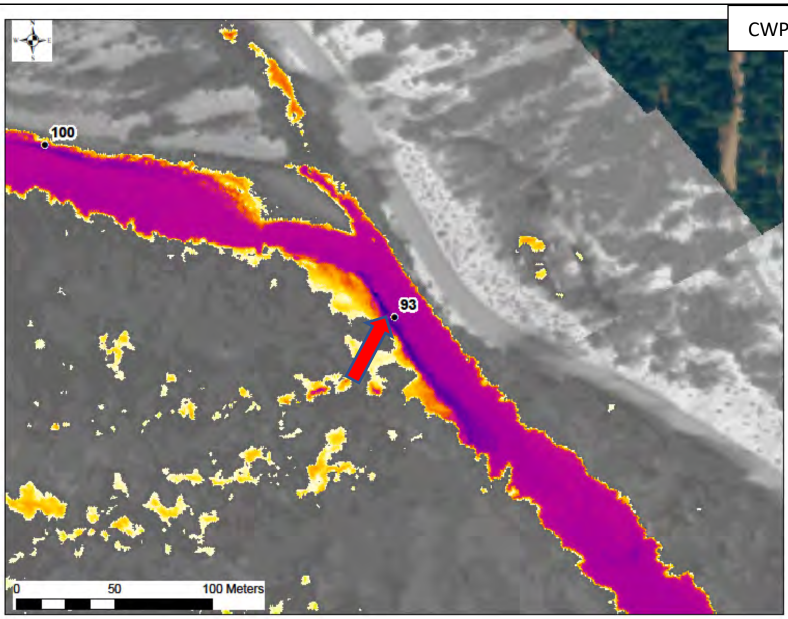


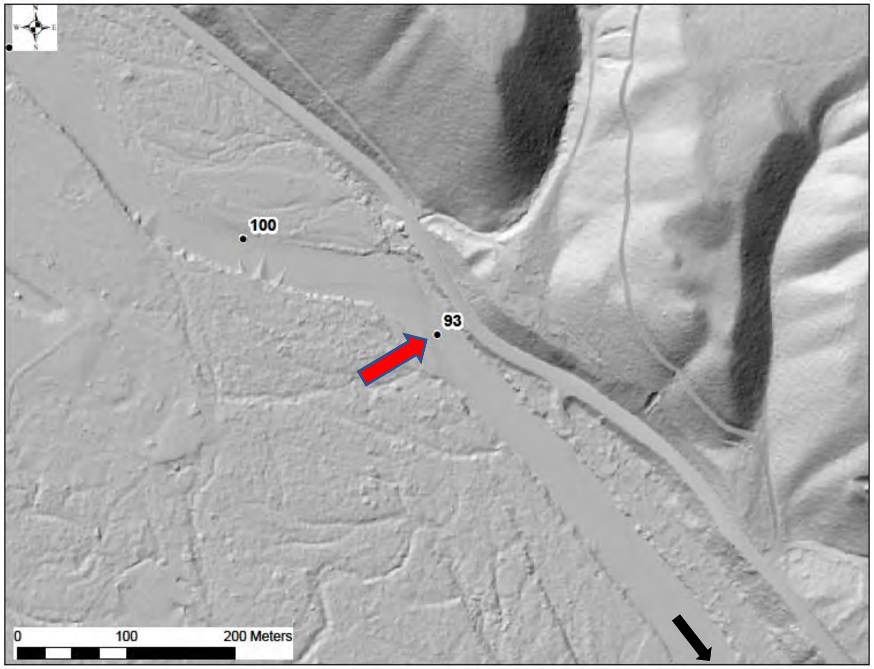
Upstream view of seep and mainstem.

Downstream view along seep and mainstem.

CWP ID#	093	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	
Survey Date	9/2/21	**Max CWP Channel Depth (cm)**	
Survey Time	1322	**Average CWP Channel Depth (cm)**	
River km	100.4	**Min Plume Temp (℃)**	11.1
Latitude	48.54984	**Avg Plume Temp (℃)**	12.0
Longitude	-120.33067	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	12
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.5
Mainstem Temp (℃)	12.6	**Plume Length 1℃ Differential (m)**	17
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	8.5
Min CWP Temp (℃)	11.1	**Fish Presence**	None observed
Average CWP Temp (℃)	12.0	**Fish Species**	
Max Main/CWP Diff (℃)	1.5	**Fish Count**	
Avg Main/CWP Diff (℃)	0.6		
CWP Description	From cobble bar right bank.		
Plume Description	Low volume not especially cold. Localized.		
Restoration Notes	Reach based complexity. Wood. Depth.		

CWP #093_LS_Methow - Fawn



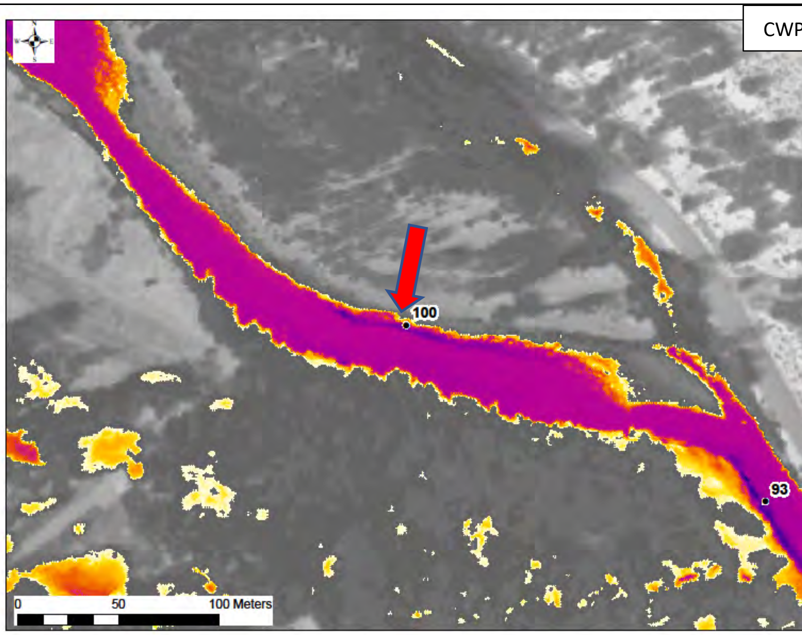


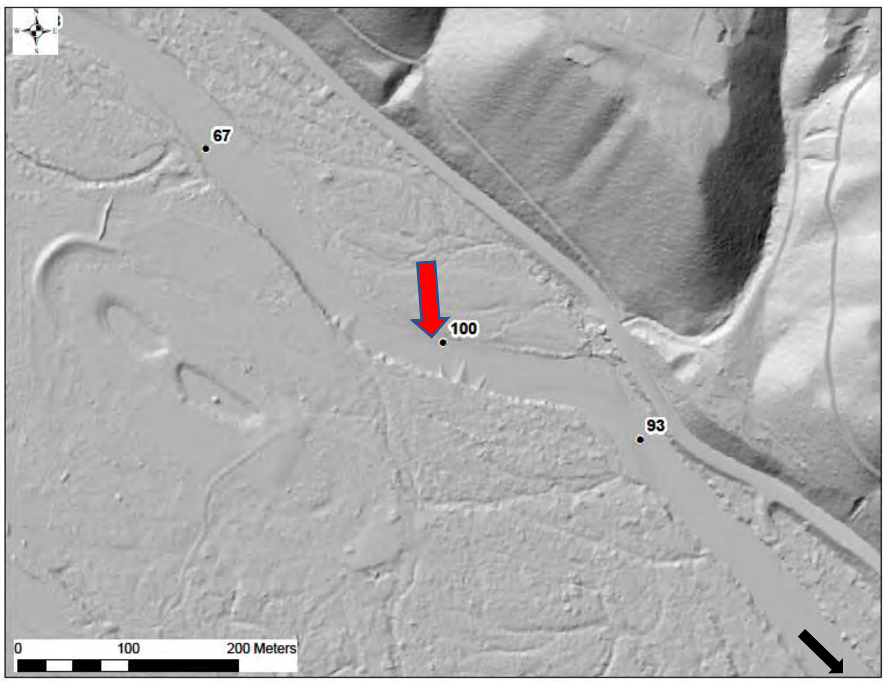
Downstream view of seep into mainstem.

Upstream view of seep bank and mainstem.

CWP ID#	100	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/2/21	**Max CWP Channel Depth (cm)**	
Survey Time	1342	**Average CWP Channel Depth (cm)**	
River km	100.6	**Min Plume Temp (℃)**	11.1
Latitude	48.55064	**Avg Plume Temp (℃)**	12.8
Longitude	-120.33308	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	8
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	3
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.2
Mainstem Temp (℃)	12.7	**Plume Length 1℃ Differential (m)**	22
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	4.4
Min CWP Temp (℃)	11.1	**Fish Presence**	Yes
Average CWP Temp (℃)	12.8	**Fish Species**	*O.mykiss*
Max Main/CWP Diff (℃)	1.6	**Fish Count**	1
Avg Main/CWP Diff (℃)	0.1 (warmer)		
CWP Description	Seep river left from cobble bar. Erratic cold water detection pulsing. Likely low volume.		
Plume Description	Really has little effect on main flow, does not reach it and warms up to 15C prior. Similar to other seeps in this reach.		
Restoration Notes	Reach based complexity.		

CWP #100_LS_Methow - Fawn



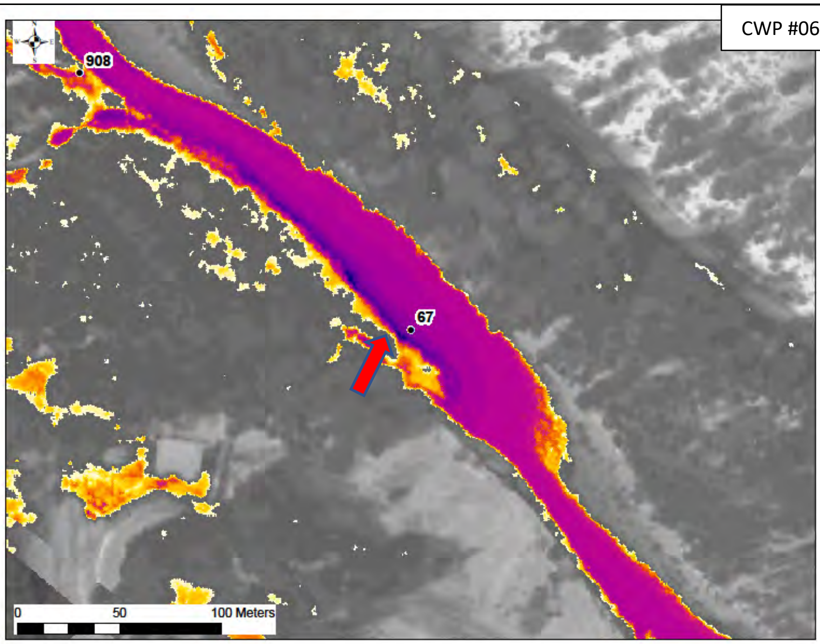


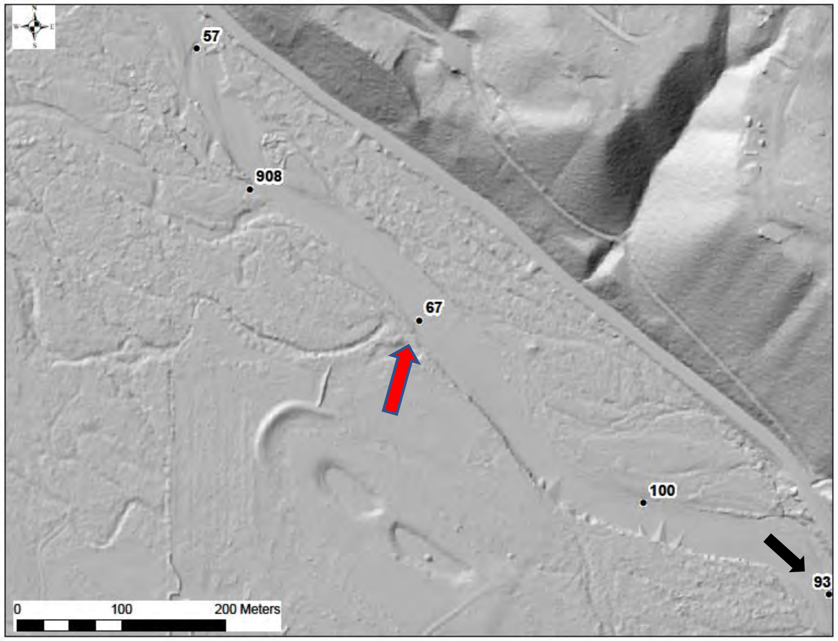
Downstream view of seep area and mainstem.

Upstream view of seep area and mainstem.

CWP ID#	067	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/2/21	**Max CWP Channel Depth (cm)**	
Survey Time	1403	**Average CWP Channel Depth (cm)**	
River km	101	**Min Plume Temp (℃)**	9.6
Latitude	48.55223	**Avg Plume Temp (℃)**	11.8
Longitude	-120.33598	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	30
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	7
Tributary Name		**Plume Width 2℃ Differential (m)**	1.2
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	150
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	180
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	3
Mainstem Temp (℃)	13.4	**Plume Length 1℃ Differential (m)**	170
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	510
Min CWP Temp (℃)	9.6	**Fish Presence**	None observed
Average CWP Temp (℃)	11.8	**Fish Species**	
Max Main/CWP Diff (℃)	3.8	**Fish Count**	
Avg Main/CWP Diff (℃)	1.6		
CWP Description	Long lateral seep right bank from narrow cobble strip.		
Plume Description	Long plume that extends ds from two side channel flows upstream. Cobble only cover. Mainstem cooling in this glide warmer us of next us riffle at tributary mouths.		
Restoration Notes	Reach based complexity. Wood. Depth.		

CWP #067_LS_Methow - Fawn





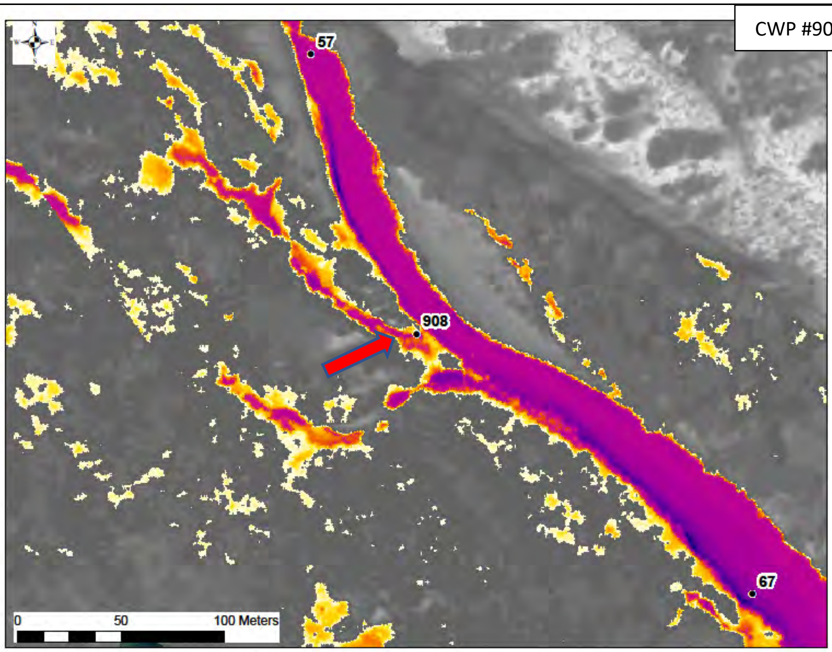
Downstream view along seep and mainstem.

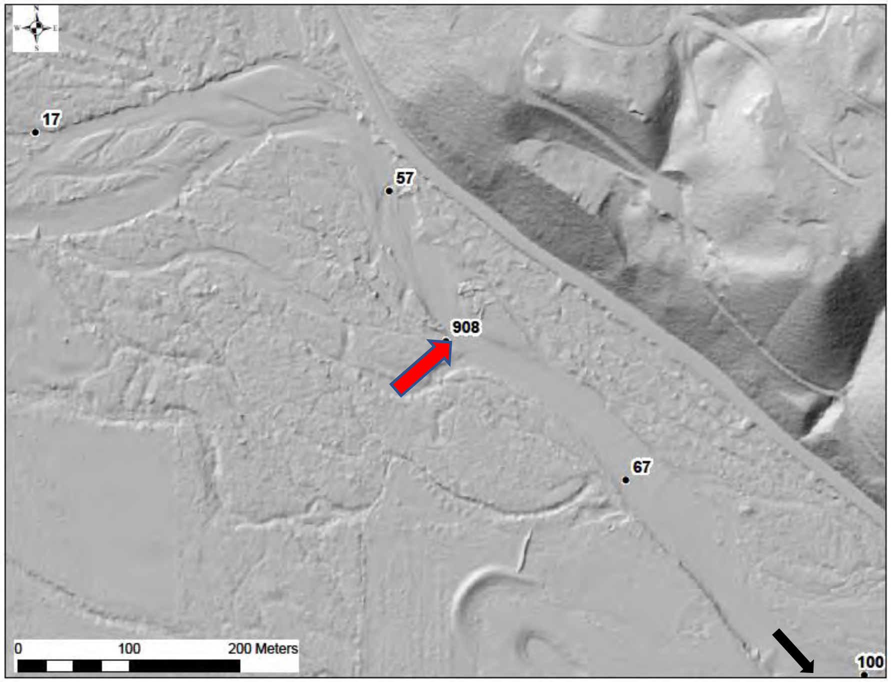
Upstream view of seep area and mainstem.

Lateral view of source seepage.

CWP ID#	908	**CWP Channel Length (m)**	200 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	6
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	1,200
Survey Date	9/2/21	**Max CWP Channel Depth (cm)**	45
Survey Time	1440	**Average CWP Channel Depth (cm)**	12
River km	101.1	**Min Plume Temp (℃)**	
Latitude	48.55337	**Avg Plume Temp (℃)**	
Longitude	-120.33817	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	14.6	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	10.0	**Fish Presence**	None observed
Average CWP Temp (℃)	11.5	**Fish Species**	
Max Main/CWP Diff (℃)	4.6	**Fish Count**	
Avg Main/CWP Diff (℃)	3.1		
CWP Description	High volume spring channel. Cold. Mainstem connectivity at high flows. Split channel at upstream end. Play dam at mouth could have prevented juvenile entry. Lovely channel.		
Plume Description	Channel flows into mainstem and commingled with plume described for CWP#093.		
Restoration Notes	Reach based. Good complexity in channel area. Likely high flow side channel.		

CWP #908_SB_Methow - Fawn





Downstream view of confluence with mainstem.

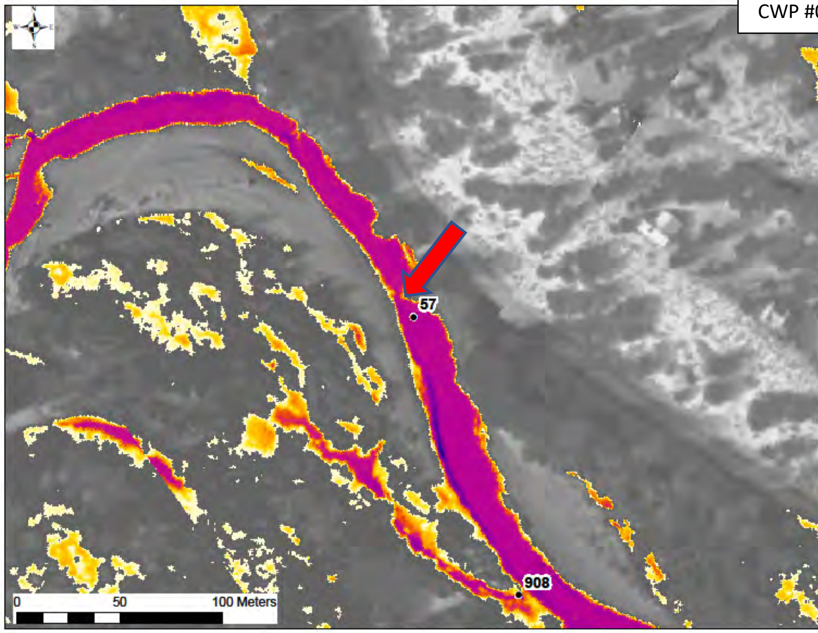

Upstream view in spring channel.

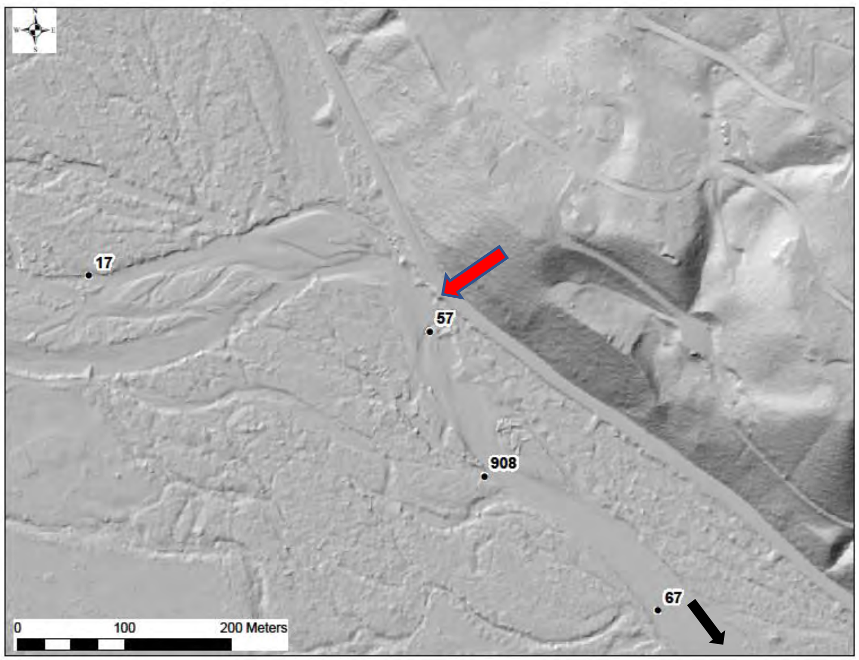

Upstream view of spring source area.


Upstream view of channel confluence with mainstem.

Methow Cold Water Patch Assessment			
CWP ID#	057	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/2/21	**Max CWP Channel Depth (cm)**	
Survey Time	1455	**Average CWP Channel Depth (cm)**	
River km	101.2	**Min Plume Temp (℃)**	10.5
Latitude	48.55459	**Avg Plume Temp (℃)**	12.9
Longitude	-120.33885	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	40
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	14
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	20
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	6
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	15.1	**Plume Length 1℃ Differential (m)**	25
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	25
Min CWP Temp (℃)	10.5	**Fish Presence**	None observed
Average CWP Temp (℃)	12.9	**Fish Species**	
Max Main/CWP Diff (℃)	4.6	**Fish Count**	
Avg Main/CWP Diff (℃)	2.2		
CWP Description	Lateral seep on right bank off cobble bar. Large cottonwood fell on it. Huge rootwad and deep scour pool. Cold water mixes with warmer us water in pool. Isolated pool 25m west was 11.5-12.8C. Same cobble bar. This site has changed since 2009 with tree addition.		
Plume Description	In pool to 40 cm deep. Along bank not wide or overly deep.		
Restoration Notes	Good analog site.		

CWP #057_LS_Methow - Fawn





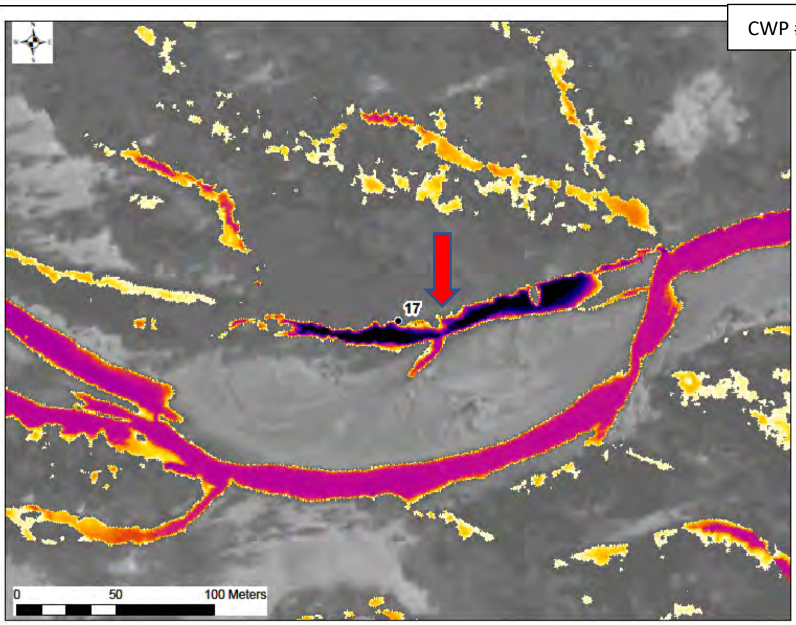
Downstream view of pool and rootwad.

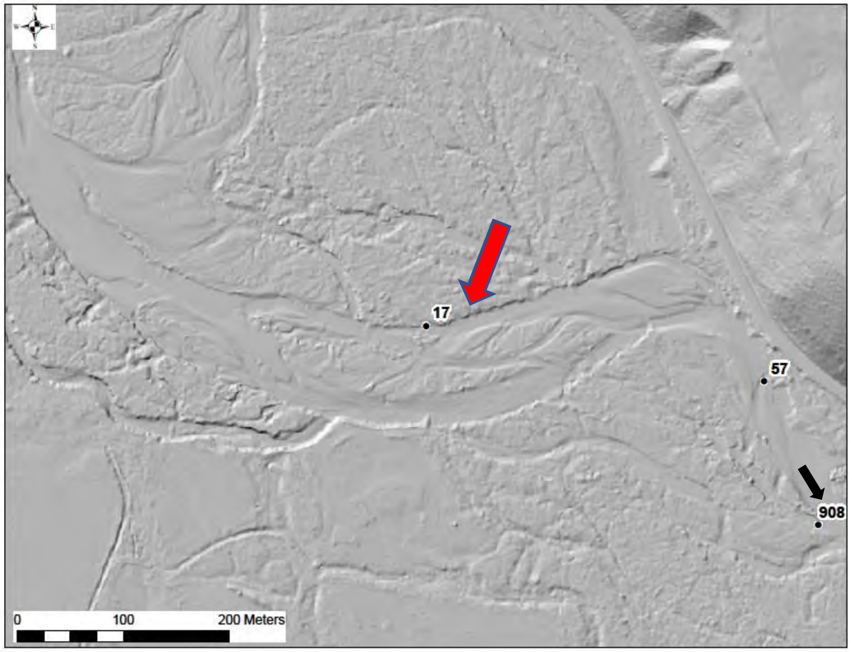
Upstream view of tree and mainstem.

Downstream view of isolated pool.

Methow Cold Water Patch Assessment			
CWP ID#	017	**CWP Channel Length (m)**	20
Stream	Methow	**CWP Channel Avg Width (m)**	5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	100
Survey Date	9/2/21	**Max CWP Channel Depth (cm)**	45
Survey Time	1549	**Average CWP Channel Depth (cm)**	15
River km	101.4	**Min Plume Temp (℃)**	
Latitude	48.55498	**Avg Plume Temp (℃)**	
Longitude	-120.34317	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	15.3	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	11.3	**Fish Presence**	Yes
Average CWP Temp (℃)	11.8	**Fish Species**	Coho
Max Main/CWP Diff (℃)	4.0	**Fish Count**	8
Avg Main/CWP Diff (℃)	3.5		
CWP Description	Mainstem occupies most of CWP #017 at ds end. Isolated pool now. Channel has moved since imagery.		
Plume Description	No plume influence. Nearly fully isolated.		
Restoration Notes	Complex area currently. Reach based approach.		

CWP #017_AL_Methow - Fawn





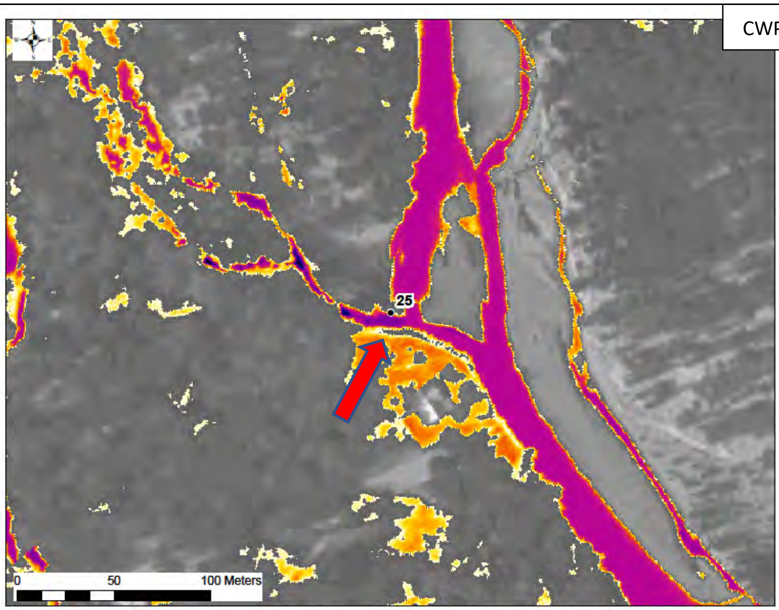
Downstream view along mainstem bar.

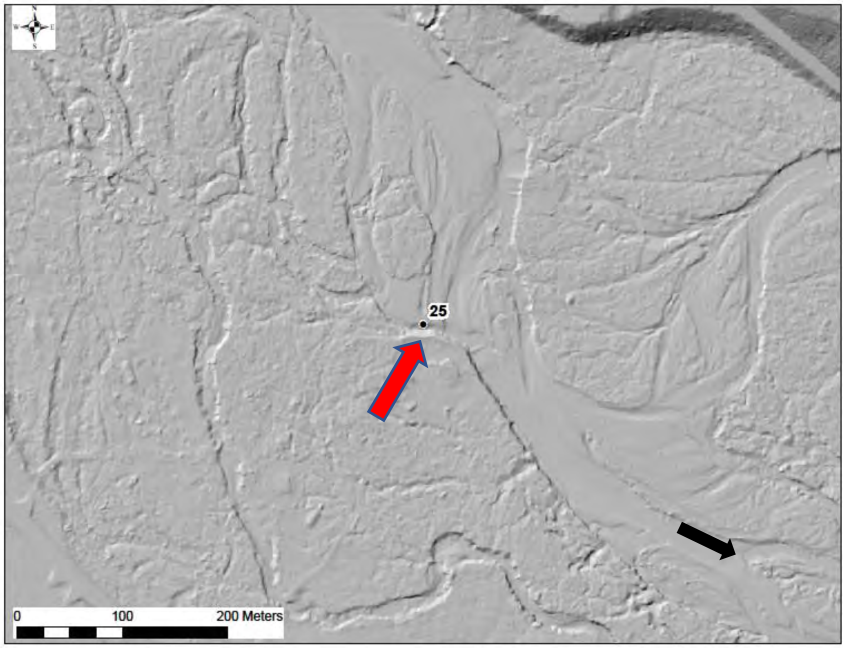
Upstream view towards source pool within wood jam.

Source pool – downstream view.

Methow Cold Water Patch Assessment			
CWP ID#	025	**CWP Channel Length (m)**	450 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	3 (est)
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	1350
Survey Date	9/2/21	**Max CWP Channel Depth (cm)**	
Survey Time	1619	**Average CWP Channel Depth (cm)**	
River km	102.2	**Min Plume Temp (℃)**	
Latitude	48.55722	**Avg Plume Temp (℃)**	
Longitude	-120.34962	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	15.2	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	11.2	**Fish Presence**	Yes
Average CWP Temp (℃)	12.0	**Fish Species**	Unknown
Max Main/CWP Diff (℃)	4.0	**Fish Count**	
Avg Main/CWP Diff (℃)	3.2		
CWP Description	Did not walk whole channel complex - dense mature riparian thrashing. Mostly dry near mouth us to split into multiple paths. East channel heads back to mainstem. West channel into several warm beaver ponds at 15.5C.		
Plume Description	Scant flow into large deep riprap bend pool. No plume detected.		
Restoration Notes	Connectivity, mainstem complexity		

CWP #025_SB_Methow - Fawn



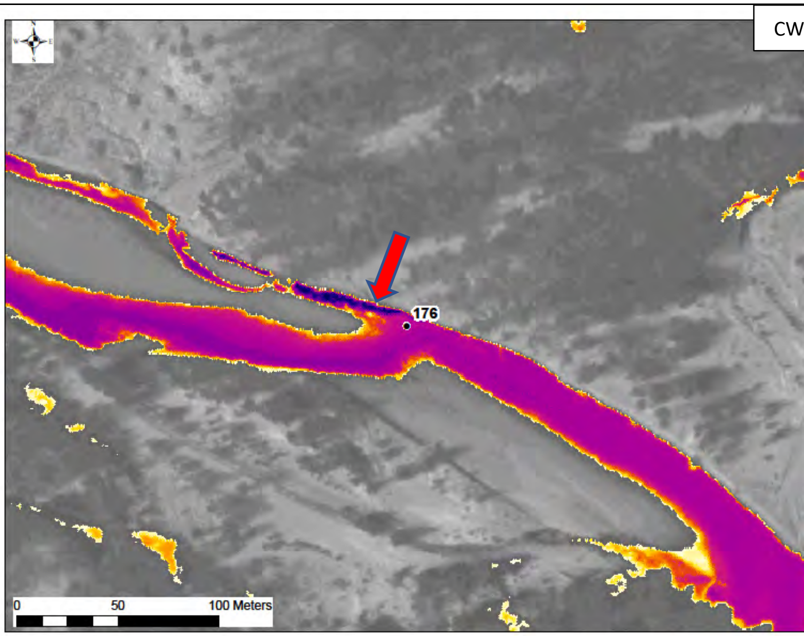


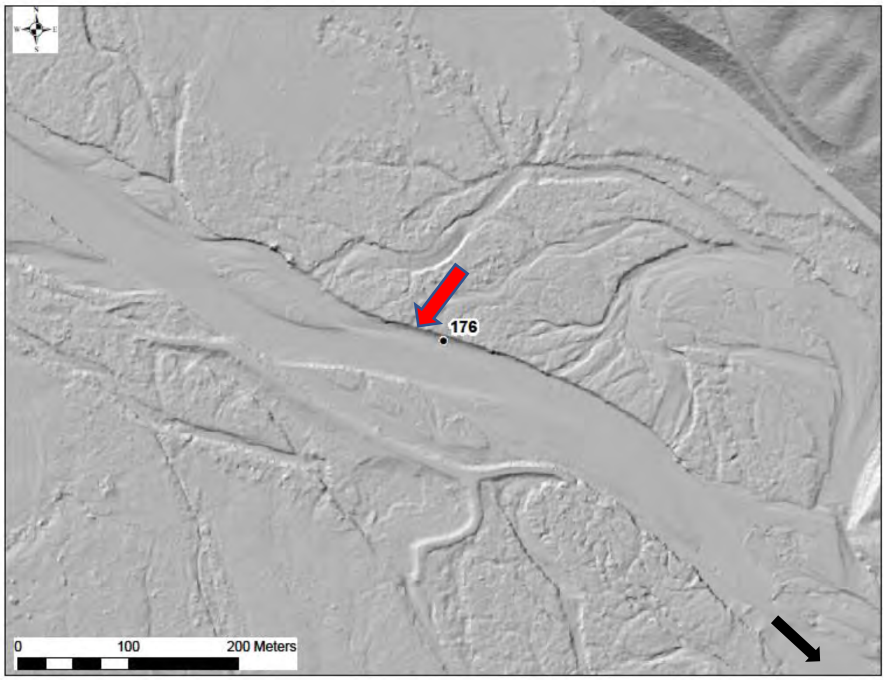
Downstream view of channel near confluence with mainstem.

Interior pond. 	

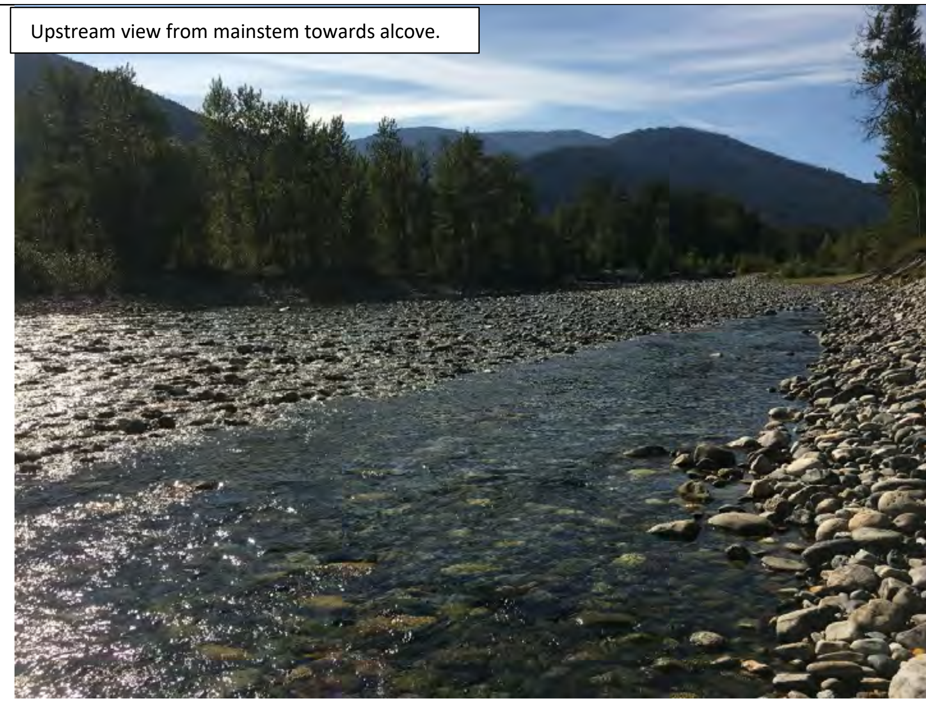
CWP ID#	176	**CWP Channel Length (m)**	90
Stream	Methow	**CWP Channel Avg Width (m)**	1
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	90
Survey Date	9/13/21	**Max CWP Channel Depth (cm)**	12
Survey Time	1513	**Average CWP Channel Depth (cm)**	6
River km	103.2	**Min Plume Temp (℃)**	7.9
Latitude	48.56246	**Avg Plume Temp (℃)**	11.0
Longitude	-120.35519	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	25
CWP Source	Alcove	**Avg Plume Depth (cm)**	7
Tributary Name		**Plume Width 2℃ Differential (m)**	0.6
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	45
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	27
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.5
Mainstem Temp (℃)	14	**Plume Length 1℃ Differential (m)**	50
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	75
Min CWP Temp (℃)	8.6	**Fish Presence**	Yes
Average CWP Temp (℃)	11	**Fish Species**	Chinook
Max Main/CWP Diff (℃)	5.4	**Fish Count**	
Avg Main/CWP Diff (℃)	3.0		
CWP Description	Spring flow from side channel cobble flows into mainstem. Not deep. Isolated pool 20m us has 8.6C inflow and handful of stranded Chinook. Pool is 8m x 4m. Not too deep. 20cm max.		
Plume Description	Spring channel flows into mainstem riffle at slight bend. Cold seepage off left cobble bank.		
Restoration Notes	Reach based complexity. Connectivity. Depth and complexity.		

CWP #176_AL_Methow Fawn





Upstream view from mainstem towards alcove.

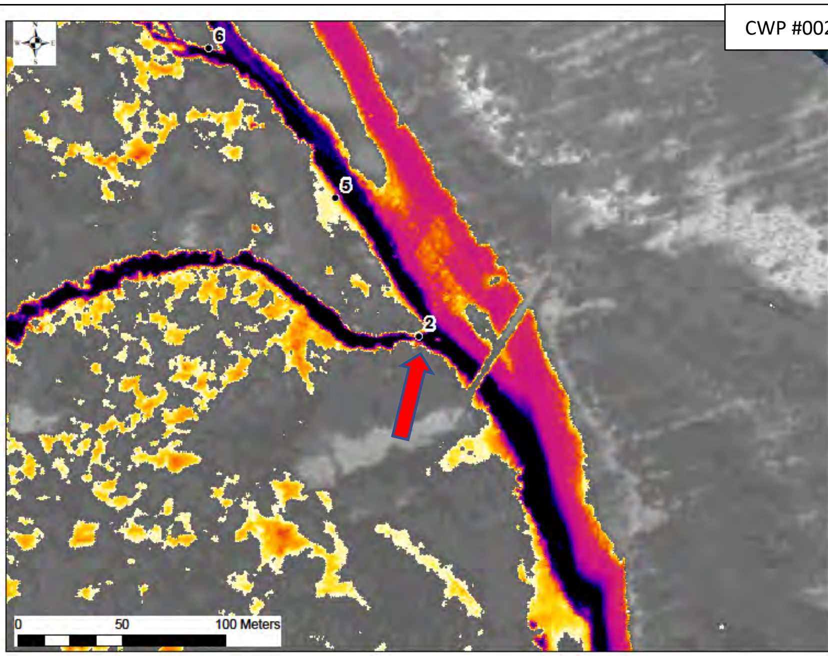


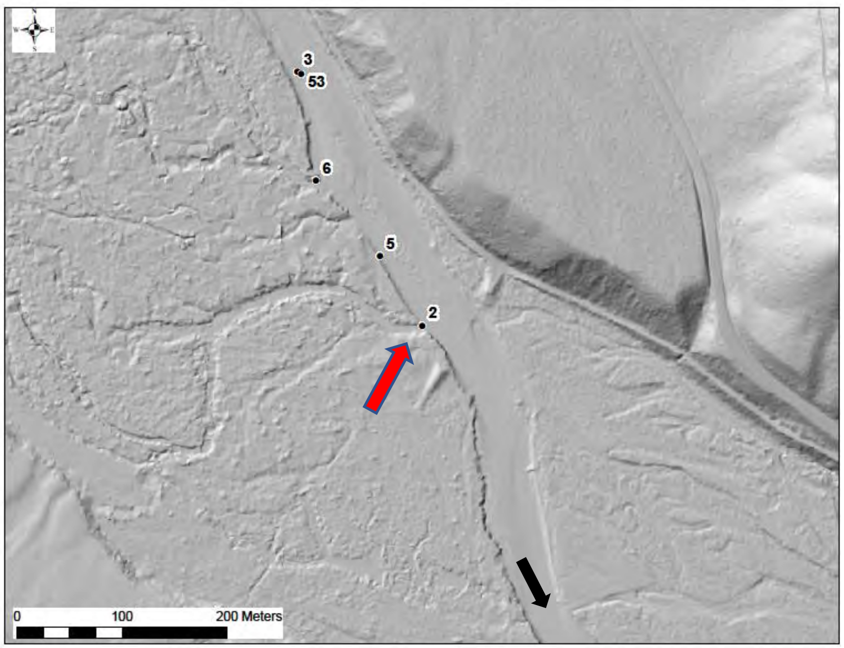
Downstream view of channel to mainstem.

Upstream view of alcove source.

Methow Cold Water Patch Assessment			
CWP ID#	002	**CWP Channel Length (m)**	450 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	3 (est)
Assessment Unit	Methow-Fawn	**CWP Channel Area (m^2)**	1350
Survey Date	9/13/21	**Max CWP Channel Depth (cm)**	50
Survey Time	1617	**Average CWP Channel Depth (cm)**	15
River km	104.6	**Min Plume Temp (℃)**	9.0
Latitude	48.57098	**Avg Plume Temp (℃)**	
Longitude	-120.36944	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	
Tributary Name	Suspension Creek	**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	18.5	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)	9.5	**Plume Area 1℃ Differential (m^2)**	
Min CWP Temp (℃)	9.5	**Fish Presence**	Yes
Average CWP Temp (℃)	9.0	**Fish Species**	Chinook, redds
Max Main/CWP Diff (℃)	9.0	**Fish Count**	
Avg Main/CWP Diff (℃)	9.5		
CWP Description	Spring Creek - long channel through intact riparian. Did not survey full length.		
Plume Description	Plume extends far downstream and is mixed with other cold water flows so difficult to discern plume so not measured. Mainstem at mouth <9C, spring channel 9.5C.		
Restoration Notes	Mainstem only. Reach based complexity. YN complexity project site in 2022.		

CWP #002_TC_Methow_Fawn



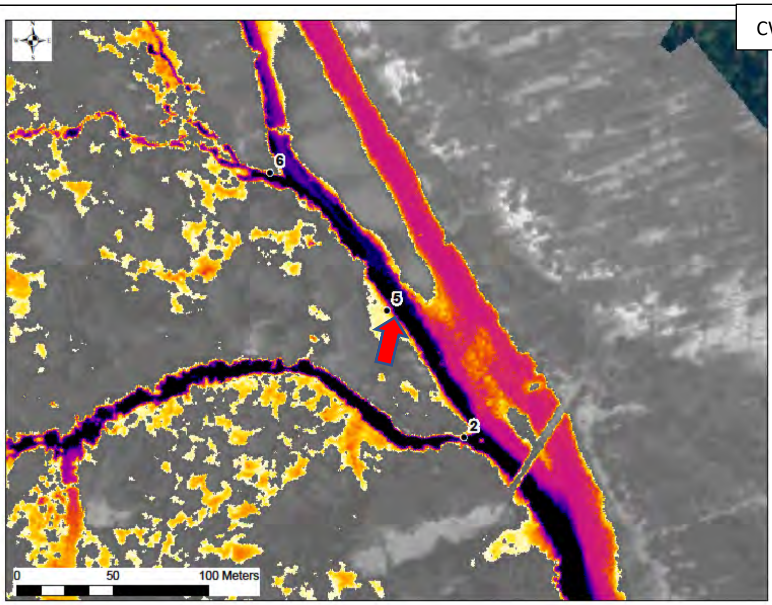


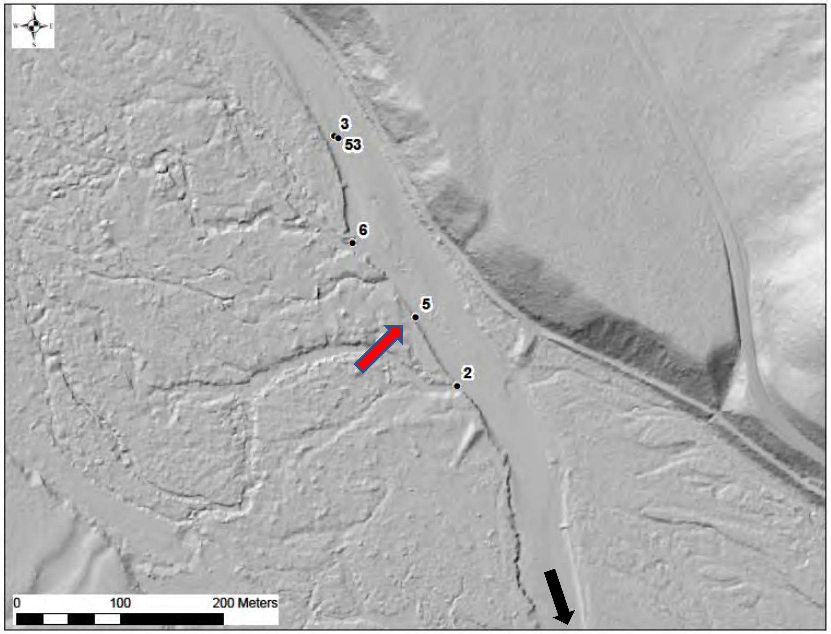
Downstream view at confluence with Methow R.

Upstream view of Suspension Creek channel.

Methow Cold Water Patch Assessment			
CWP ID#	005	**CWP Channel Length (m)**	33
Stream	Methow	**CWP Channel Avg Width (m)**	0.5
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	16.5
Survey Date	9/13/21	**Max CWP Channel Depth (cm)**	10
Survey Time	1630	**Average CWP Channel Depth (cm)**	4
River km	104.9	**Min Plume Temp (℃)**	
Latitude	48.57158	**Avg Plume Temp (℃)**	
Longitude	-120.36998	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	8.8	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.6	**Fish Presence**	None observed
Average CWP Temp (℃)	8.8	**Fish Species**	
Max Main/CWP Diff (℃)	0.2	**Fish Count**	
Avg Main/CWP Diff (℃)	0		
CWP Description	Lateral seep off cobble sloped bank. Large pine fallen on top upper end. Low/medium volume. Mainstem slightly colder in spots.		
Plume Description	Hard to define, not measured. Lots of cold water and mixing in mainstem. Mainstem channel 6m wide – all flow from upstream springs.		
Restoration Notes	Reach based complexity. YN complexity project site in 2022.		

CWP #005_LS_Methow_Fawn





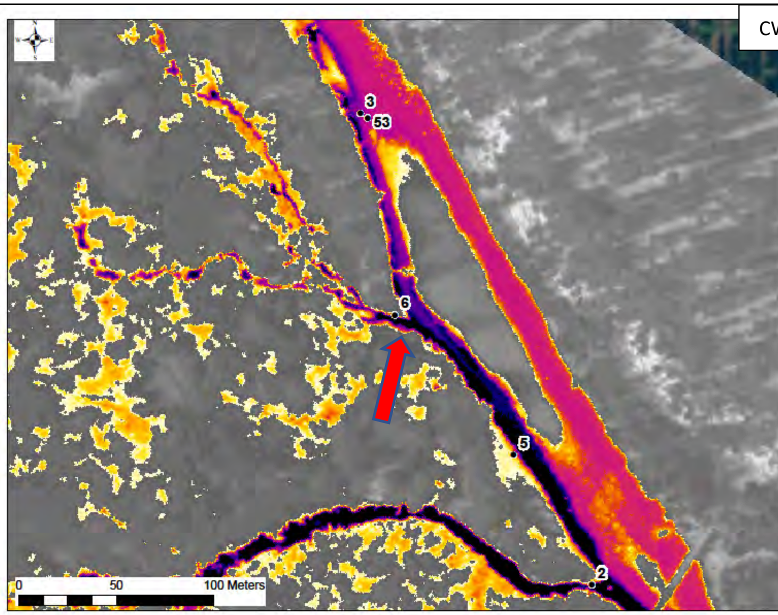
Downstream view from seep source.

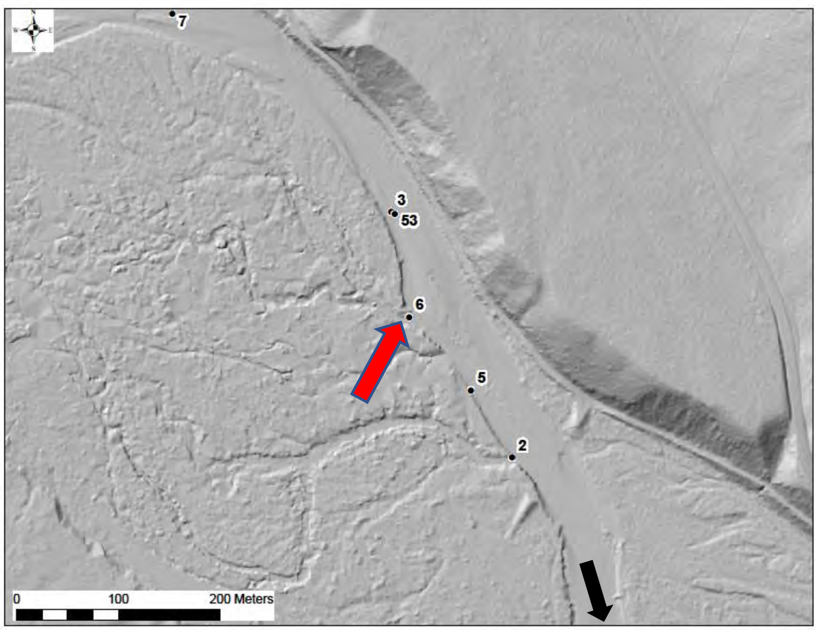

Downstream view along seep wall.


Upstream view along seep.

Methow Cold Water Patch Assessment			
CWP ID#	006	**CWP Channel Length (m)**	300 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	3 (est)
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	900
Survey Date	9/13/21	**Max CWP Channel Depth (cm)**	60
Survey Time	1638	**Average CWP Channel Depth (cm)**	14
River km	104.8	**Min Plume Temp (℃)**	8.5
Latitude	48.57223	**Avg Plume Temp (℃)**	8.8
Longitude	-120.3708	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	30
CWP Source	Springbrook	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.3	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.6	**Fish Presence**	Yes
Average CWP Temp (℃)	9.2	**Fish Species**	Chinook
Max Main/CWP Diff (℃)	4.7	**Fish Count**	10 parr
Avg Main/CWP Diff (℃)	4.1		
CWP Description	Springbrook through intact riparian. Chinook redd near mouth. Upstream passage beyond looks tough. Juvenile chinook in uppermost pool.		
Plume Description	Spring channel is majority of flow so no distinct plume. Upstream water is seepage from CWP 003. Plume is primarily spring channel flow at 9.3C.		
Restoration Notes	Reach based complexity. YN complexity project site in 2022.		

CWP #006_SB_Methow_Fawn



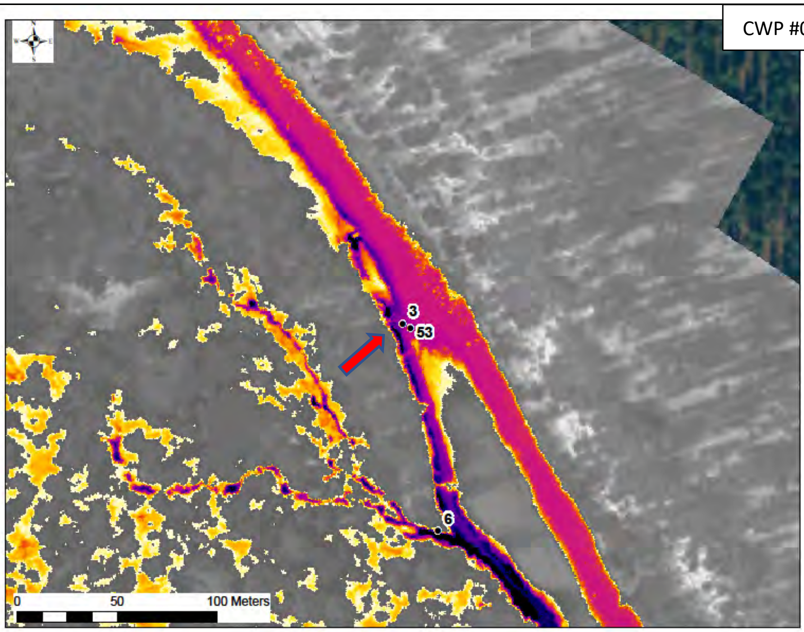


Downstream view from seep source.

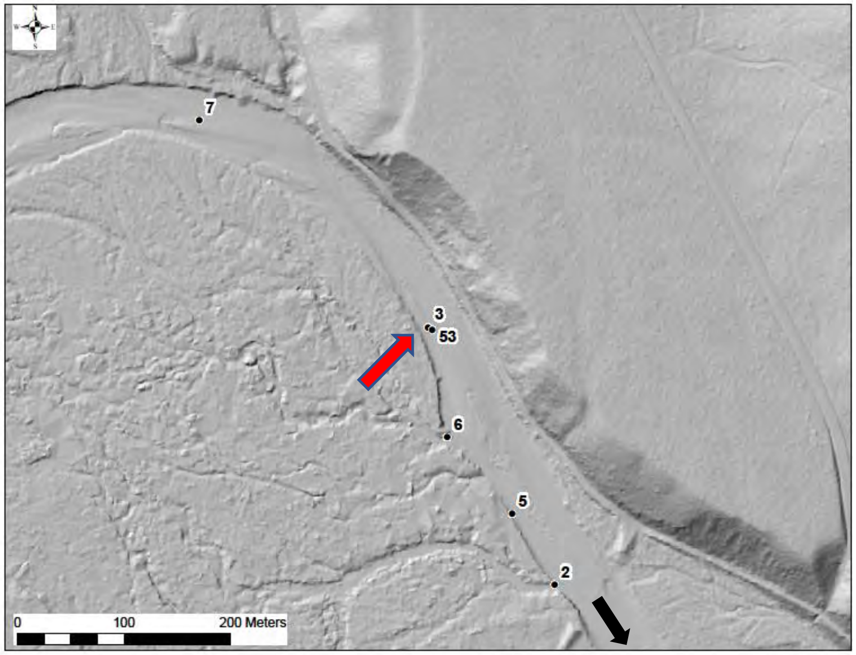
Downstream view in channel towards mouth.

Downstream view of pool in channel.

Methow Cold Water Patch Assessment			
CWP ID#	003	**CWP Channel Length (m)**	100
Stream	Methow	**CWP Channel Avg Width (m)**	3
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	300
Survey Date	9/13/21	**Max CWP Channel Depth (cm)**	15
Survey Time	1708	**Average CWP Channel Depth (cm)**	6
River km	104.9	**Min Plume Temp (℃)**	
Latitude	48.57316	**Avg Plume Temp (℃)**	
Longitude	-120.37103	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.3	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	
Min CWP Temp (℃)	9.0	**Fish Presence**	None observed
Average CWP Temp (℃)	9.8	**Fish Species**	
Max Main/CWP Diff (℃)	4.3	**Fish Count**	
Avg Main/CWP Diff (℃)	3.5		
CWP Description	Seep from within dry mainstem cobble bed. Flows into channel of CWP #006. Suspension Creek area.		
Plume Description	No plume, no mainstem connection.		
Restoration Notes	Reach based complexity. YN complexity project site in 2022.		



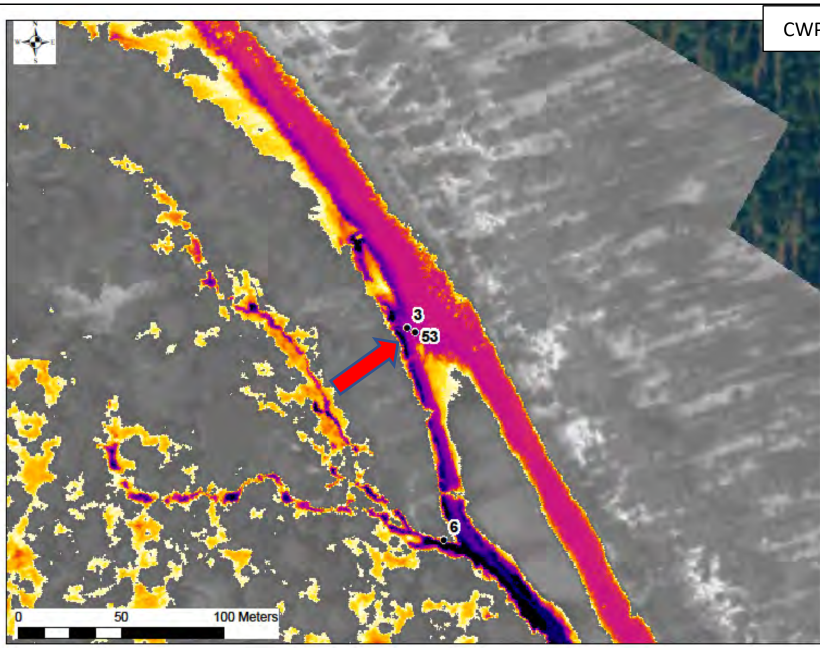
CWP #003_LS_Methow_Fawn

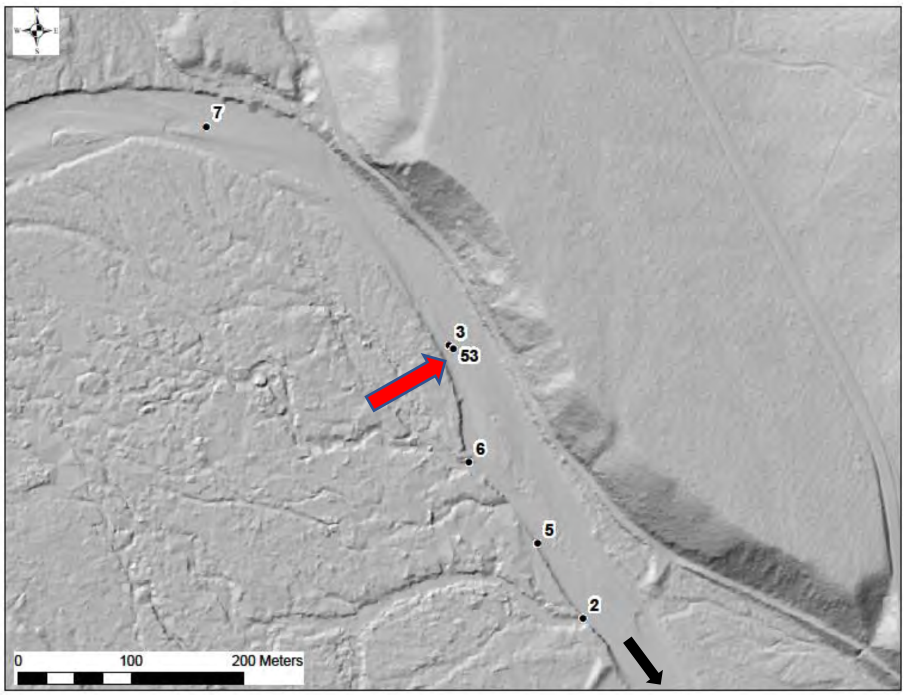


Downstream view from seep source.

Methow Cold Water Patch Assessment			
CWP ID#	053	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/14/21	**Max CWP Channel Depth (cm)**	
Survey Time	1432	**Average CWP Channel Depth (cm)**	
River km	104.9	**Min Plume Temp (℃)**	8.9
Latitude	48.57314	**Avg Plume Temp (℃)**	10.0
Longitude	-120.37098	**Min Plume Depth (cm)**	1
River Bank	Center	**Max Plume Depth (cm)**	15
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	9
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	46
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	46
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	3
Mainstem Temp (℃)	11.8	**Plume Length 1℃ Differential (m)**	46
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	138
Min CWP Temp (℃)	8.5	**Fish Presence**	None observed
Average CWP Temp (℃)	10	**Fish Species**	
Max Main/CWP Diff (℃)	3.3	**Fish Count**	
Avg Main/CWP Diff (℃)	1.8		
CWP Description	Seep from mainstem right dry cobble. Just us of CWP #003. Not large volume. Source appears to be around one large boulder right of center in mainstem. Seepage downstream of that point.		
Plume Description	Mixes with mainstem flow through cobbles. Slow moving and shallow.		
Restoration Notes	Cover and depth, complexity		

CWP #053_LS_Methow - Fawn

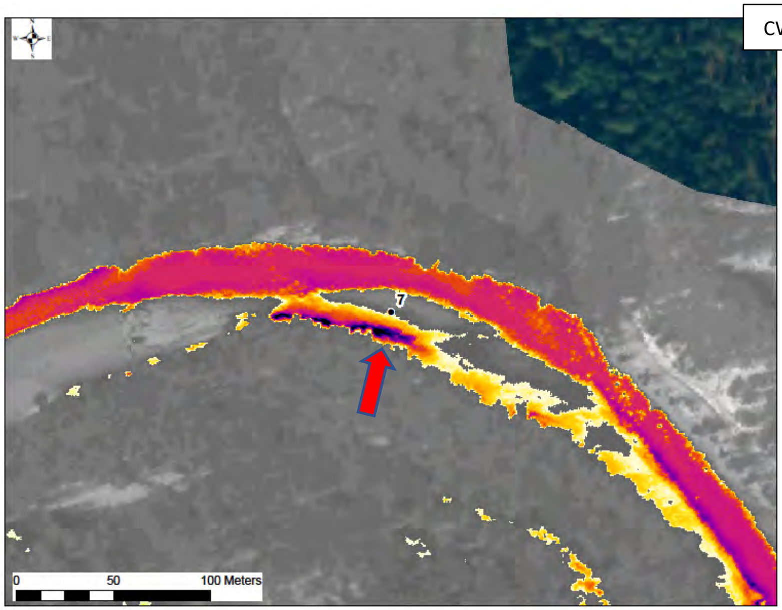




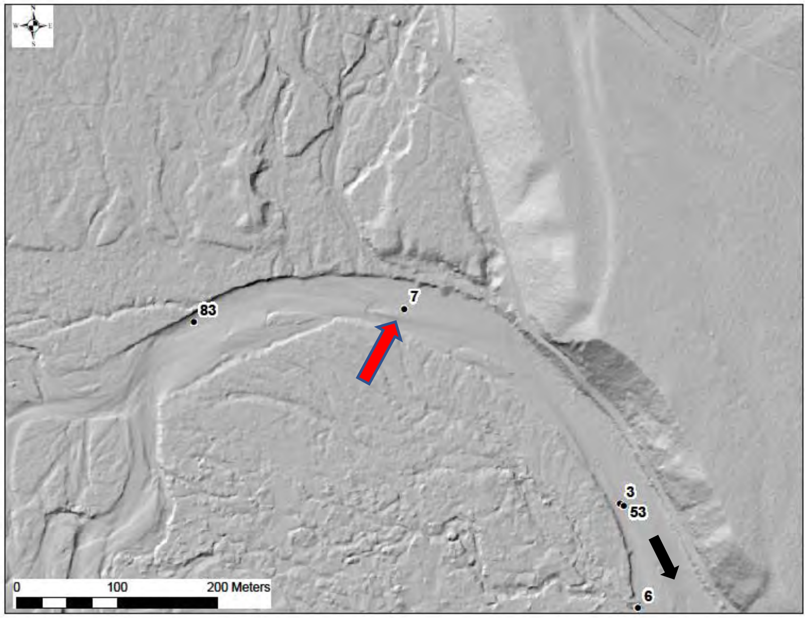
Downstream view from upstream.

Upstream view towards source and mainstem.

Methow Cold Water Patch Assessment			
CWP ID#	007	**CWP Channel Length (m)**	46
Stream	Methow	**CWP Channel Avg Width (m)**	4
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	184
Survey Date	9/14/21	**Max CWP Channel Depth (cm)**	90
Survey Time	1449	**Average CWP Channel Depth (cm)**	9
River km	105.1	**Min Plume Temp (℃)**	
Latitude	48.57492	**Avg Plume Temp (℃)**	
Longitude	-120.37393	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	11.0	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	11.1	**Fish Presence**	None observed
Average CWP Temp (℃)	13.5	**Fish Species**	
Max Main/CWP Diff (℃)	-0.1	**Fish Count**	
Avg Main/CWP Diff (℃)	-2.5		
CWP Description	Seepage into dry mainstem cobble bed. Warm relative to mainstem flow which is minimal at this location and dry upstream a short distance. Top pool area is coldest with tree and large rootwad creating scour.		
Plume Description	No plume, no mainstem connection.		
Restoration Notes	Large rootwad analog site. Repeat treatment elsewhere.		



CWP #007_LS_Methow_Fawn



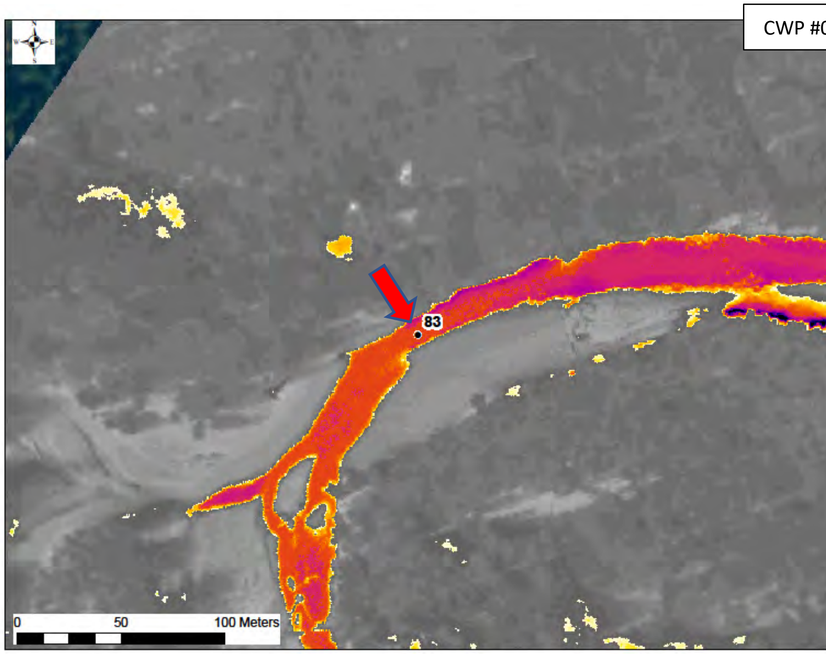
Downstream view from seep source.

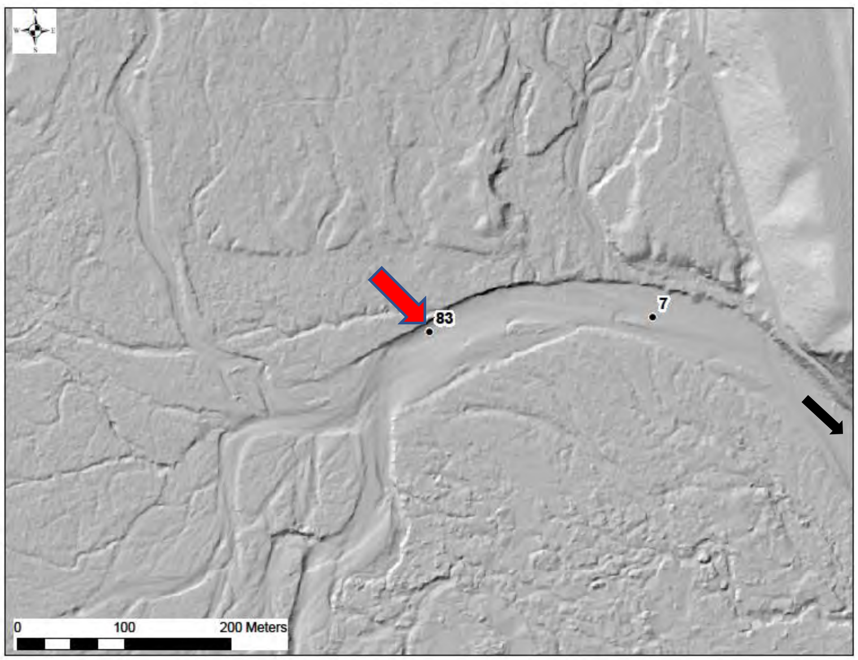

Downstream view of pool at rootwad.


Upstream view of CWP 007 and wood.

CWP ID#	083	**CWP Channel Length (m)**	95
Stream	Methow	**CWP Channel Avg Width (m)**	4
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	380
Survey Date	9/14/21	**Max CWP Channel Depth (cm)**	35
Survey Time	1506	**Average CWP Channel Depth (cm)**	15
River km	105.4	**Min Plume Temp (℃)**	
Latitude	48.57481	**Avg Plume Temp (℃)**	
Longitude	-120.37677	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	Dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.3	**Fish Presence**	None observed
Average CWP Temp (℃)	9.5	**Fish Species**	
Max Main/CWP Diff (℃)	3.2	**Fish Count**	
Avg Main/CWP Diff (℃)	2.0		
CWP Description	Seepage from high left boulder bank. Origin of mainstem flow. Dry us. Mainstem temp from ds. Mainstem ds was 11.5C		
Plume Description	No true plume as seepage. flow is mainstem. Dry channel us.		
Restoration Notes			

CWP #083_LS_Methow - Fawn





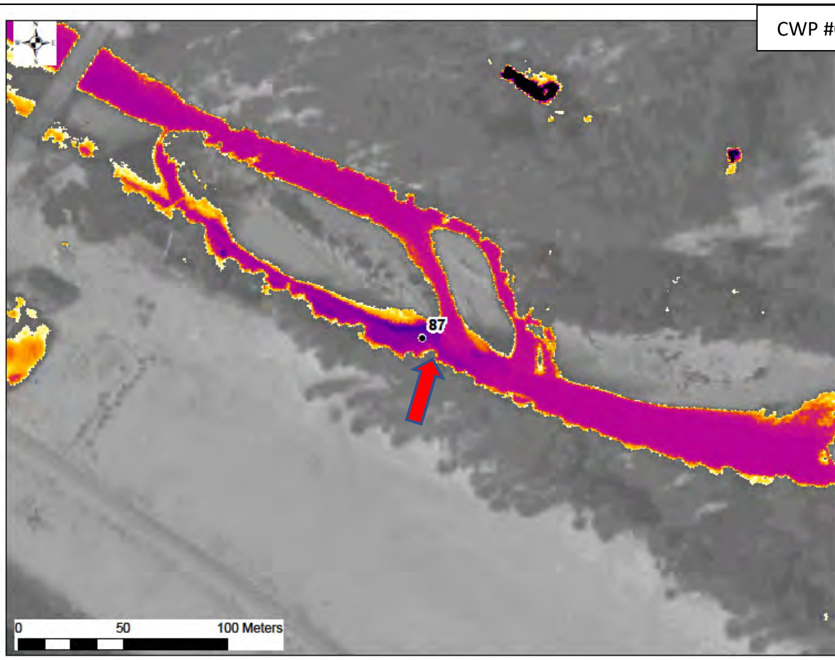
Lateral view of bank seepage.

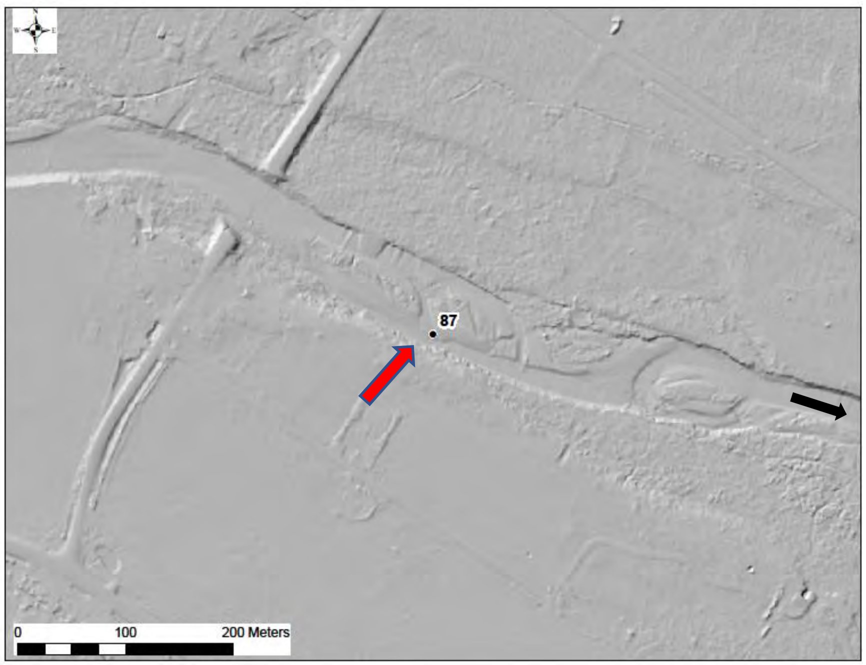
Downstream view of seepage into mainstem.

Upstream view of seep and upstream dry mainstem.

CWP ID#	087	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	
Survey Date	9/7/21	**Max CWP Channel Depth (cm)**	
Survey Time	1313	**Average CWP Channel Depth (cm)**	
River km	109.1	**Min Plume Temp (℃)**	9.2
Latitude	48.58913	**Avg Plume Temp (℃)**	11.8
Longitude	-120.40474	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	20
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	0.2
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	20
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	4
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.5
Mainstem Temp (℃)	13.0	**Plume Length 1℃ Differential (m)**	35
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	17.5
Min CWP Temp (℃)	9.2	**Fish Presence**	None observed
Average CWP Temp (℃)	11.8	**Fish Species**	
Max Main/CWP Diff (℃)	3.8	**Fish Count**	
Avg Main/CWP Diff (℃)	1.2		
CWP Description	Lateral seep from eroding high right bank. At conf of two channels ds of Mazama bridge.		
Plume Description	Tight to right bank. Could be other hyporheic flow thru cobble bars just upstream.		
Restoration Notes	Complexity and depth. Good location and access for bank wood.		

CWP #087_LS_Methow - Fawn





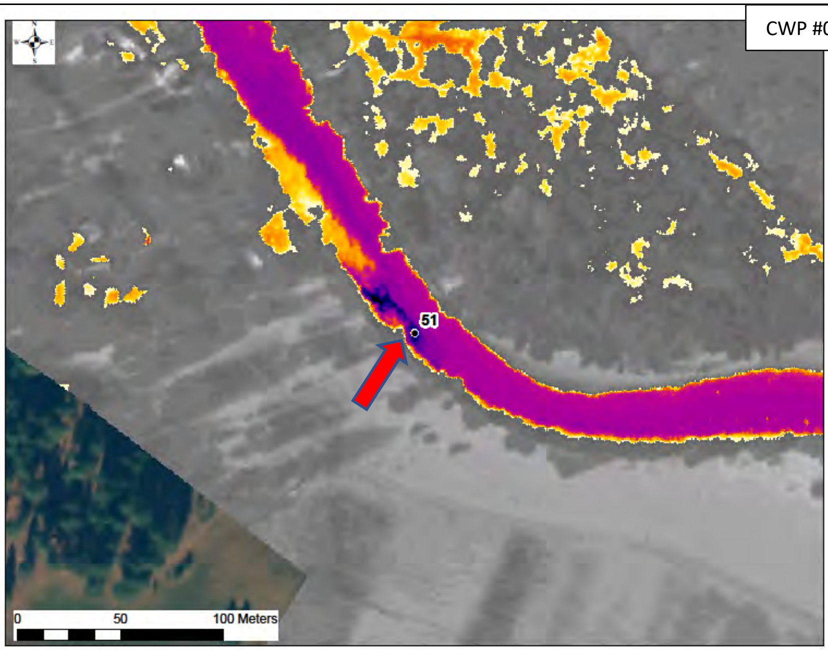
Downstream view of seep into mainstem.

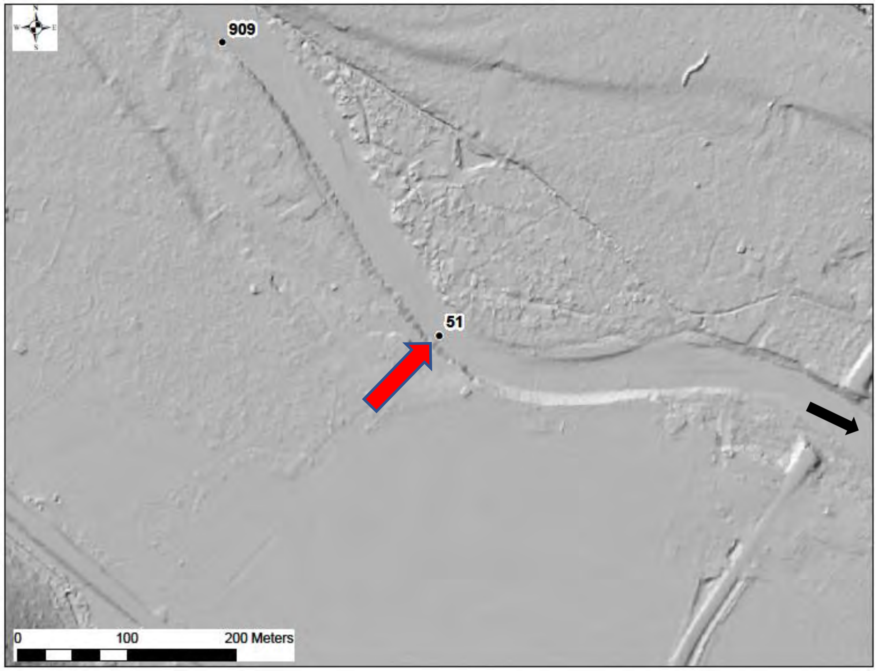
Upstream view of seep bank and mainstem.

Lateral view of bank seep zone.

Methow Cold Water Patch Assessment			
CWP ID#	051	**CWP Channel Length (m)**	20 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	2 (est)
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	60
Survey Date	9/7/21	**Max CWP Channel Depth (cm)**	
Survey Time	1344	**Average CWP Channel Depth (cm)**	
River km	109.6	**Min Plume Temp (℃)**	9.9
Latitude	48.59095	**Avg Plume Temp (℃)**	11.5
Longitude	-120.4119	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	25
CWP Source	Alcove	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	14
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	4.2
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.5
Mainstem Temp (℃)	13.6	**Plume Length 1℃ Differential (m)**	38
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	19
Min CWP Temp (℃)	9.9	**Fish Presence**	None observed
Average CWP Temp (℃)	11.5	**Fish Species**	
Max Main/CWP Diff (℃)	3.7	**Fish Count**	
Avg Main/CWP Diff (℃)	2.1		
CWP Description	Seep from long cobble bar and also from right bank. Similar to CWP #087. High eroding bank. Boulders along bank.		
Plume Description	Seepage flow from bank and bar.		
Restoration Notes	Complexity and depth. Wood along bank.		

CWP #051_AL_Methow - Fawn





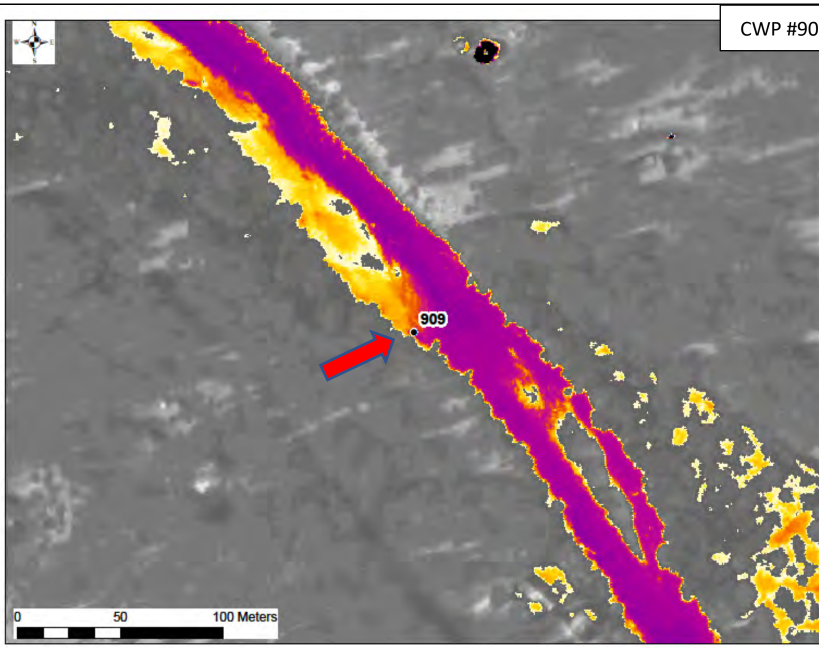
Downstream view from source.

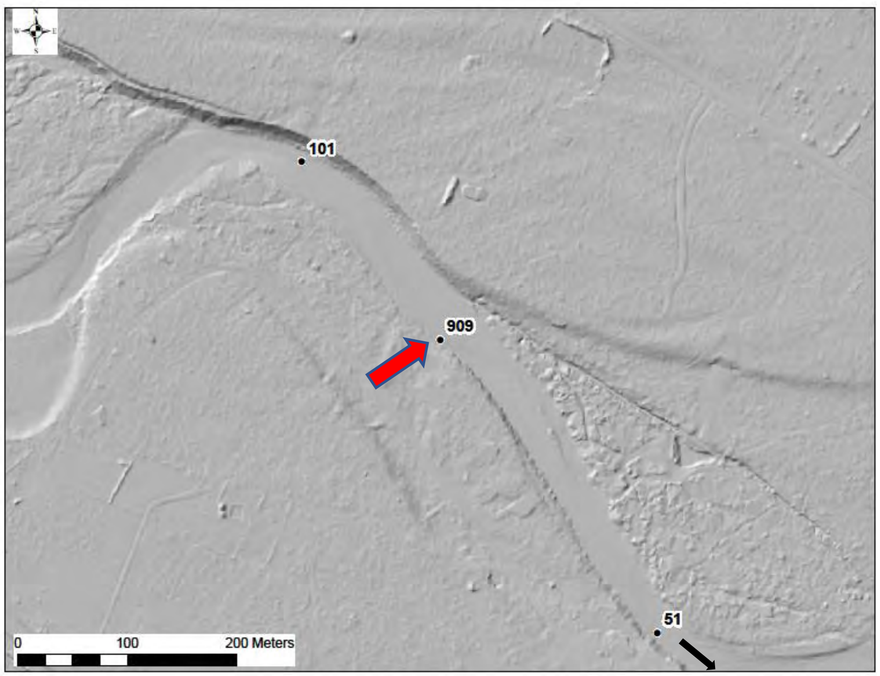

Downstream view from source.


Upstream view towards source and mainstem.

CWP ID#	909	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/7/21	**Max CWP Channel Depth (cm)**	
Survey Time	1411	**Average CWP Channel Depth (cm)**	
River km	109.9	**Min Plume Temp (℃)**	11.3
Latitude	48.59337	**Avg Plume Temp (℃)**	12.2
Longitude	-120.41457	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	25
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	0.2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	7
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	1.4
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	14.1	**Plume Length 1℃ Differential (m)**	19
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	19
Min CWP Temp (℃)	11.3	**Fish Presence**	None observed
Average CWP Temp (℃)	12.2	**Fish Species**	
Max Main/CWP Diff (℃)	2.8	**Fish Count**	
Avg Main/CWP Diff (℃)	1.9		
CWP Description	Seep from ds end of cobble bar and bank.		
Plume Description	Short shallow run over cobble into small backwater on bend in mainstem.		
Restoration Notes	Depth and complexity.		

CWP #909_LS_Methow - Fawn





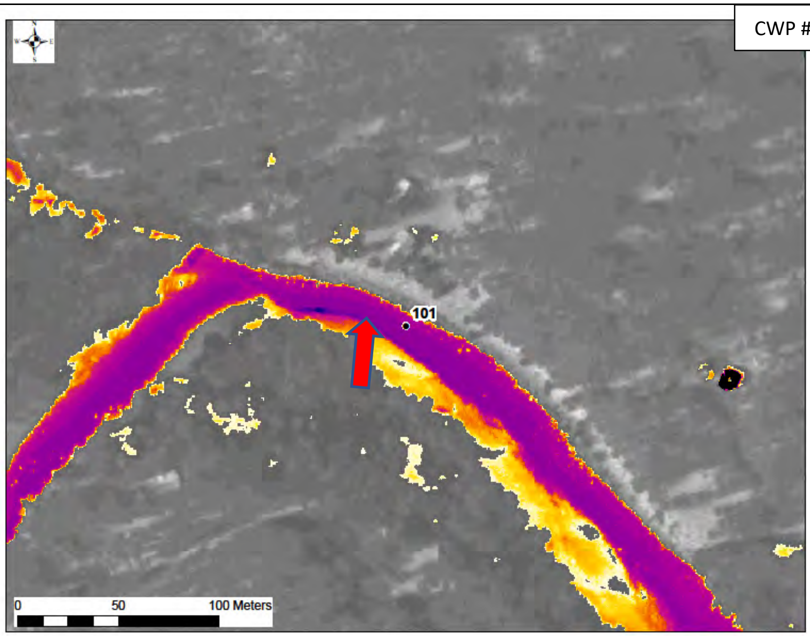
Downstream view of seep area and mainstem.

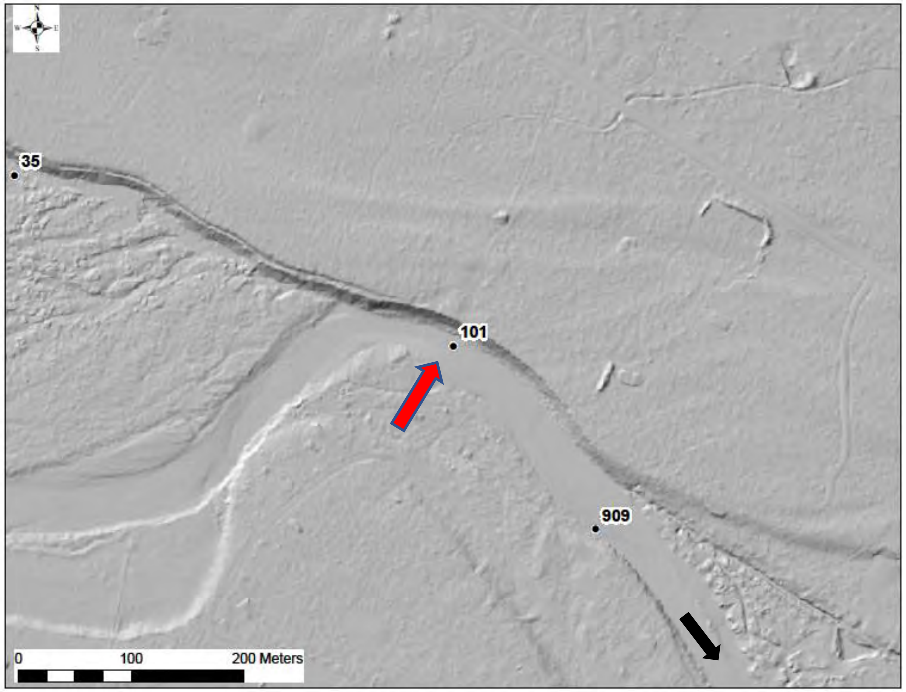
Lateral view towards alcove source.

Upstream view of seep area and upstream cobble bar.

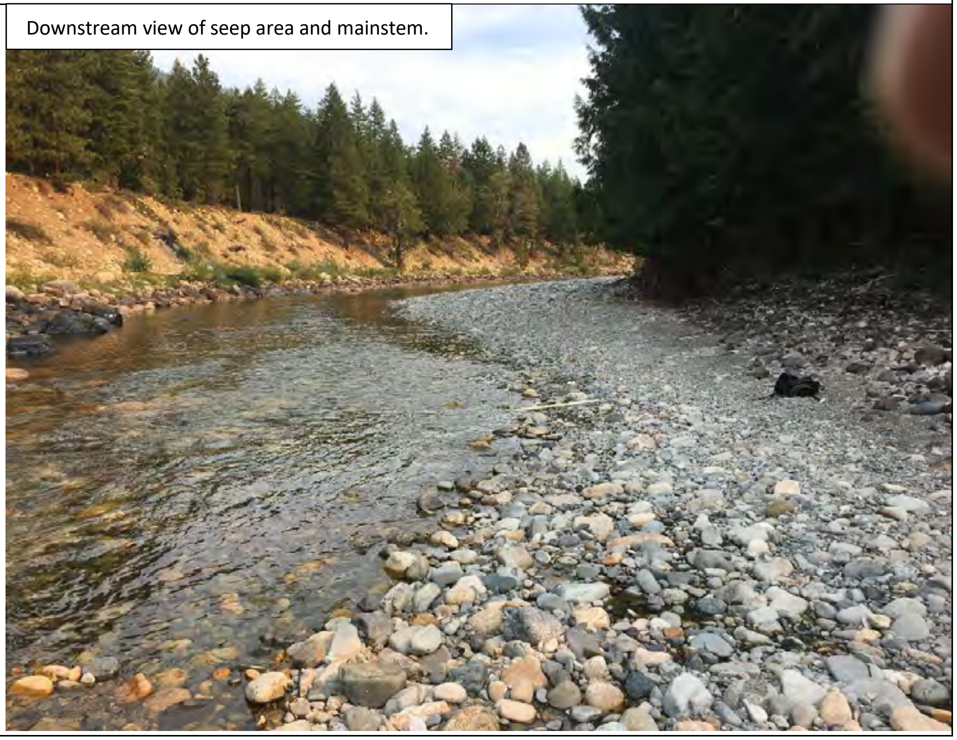
CWP ID#	101	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/7/21	**Max CWP Channel Depth (cm)**	
Survey Time	1427	**Average CWP Channel Depth (cm)**	
River km	110.2	**Min Plume Temp (℃)**	10.0
Latitude	48.59484	**Avg Plume Temp (℃)**	11.8
Longitude	-120.41627	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	20
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	7
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	46
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	13.8
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	14.3	**Plume Length 1℃ Differential (m)**	62
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	62
Min CWP Temp (℃)	10.0	**Fish Presence**	None observed
Average CWP Temp (℃)	11.8	**Fish Species**	
Max Main/CWP Diff (℃)	4.3	**Fish Count**	
Avg Main/CWP Diff (℃)	2.5		
CWP Description	Lateral seep along ds end of cobble bar in bend in mainstem. Narrow band along bank.		
Plume Description	Similar to others off cobble bars. Good depth profile in adjacent glide.		
Restoration Notes	Reach based complexity. High bank on left with houses.		

CWP #101_LS_Methow - Fawn





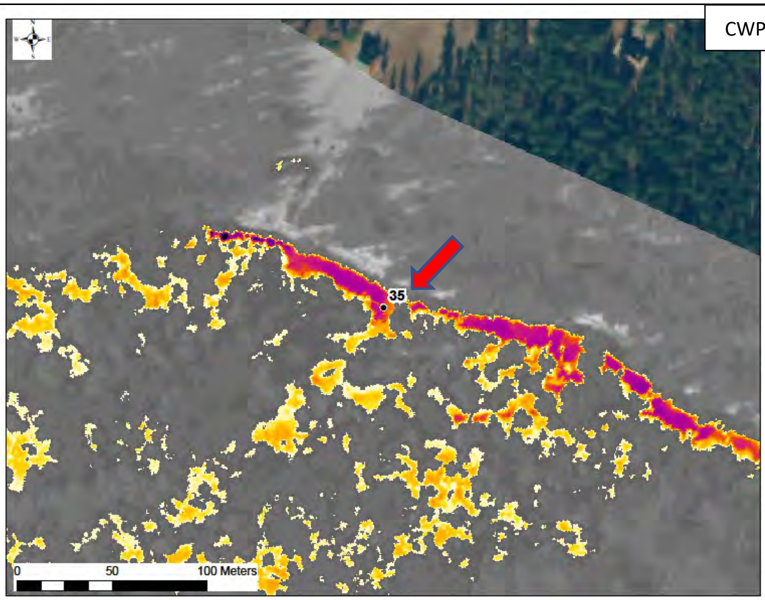
Downstream view of seep area and mainstem.

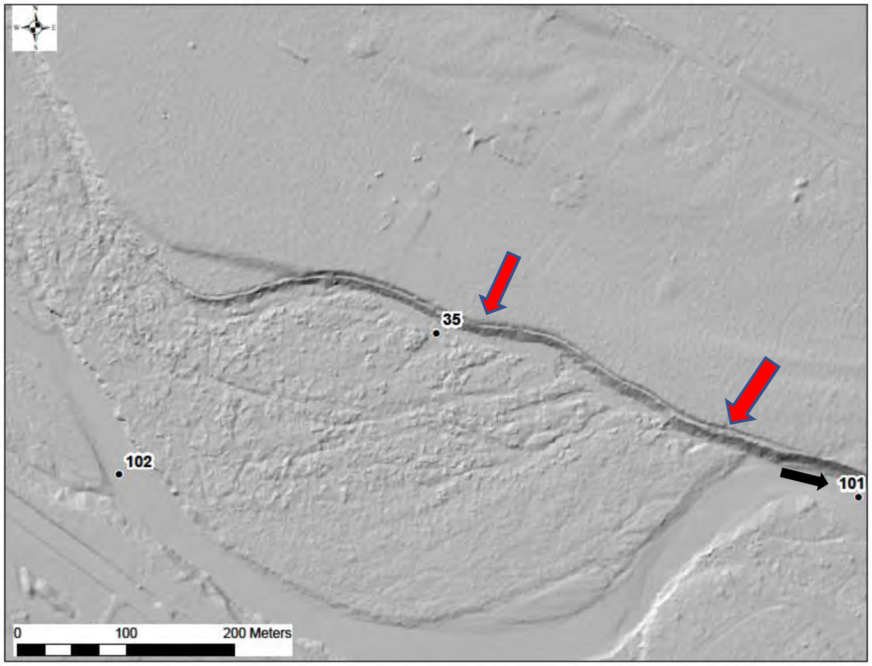


Upstream view of seep area and mainstem.

Methow Cold Water Patch Assessment			
CWP ID#	035	**CWP Channel Length (m)**	420 (est)
Stream	Methow	**CWP Channel Avg Width (m)**	3 (est)
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	1260
Survey Date	9/7/21	**Max CWP Channel Depth (cm)**	
Survey Time	1449	**Average CWP Channel Depth (cm)**	
River km	111	**Min Plume Temp (℃)**	10.3
Latitude	48.596053	**Avg Plume Temp (℃)**	12.0
Longitude	-120.420388	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	35
CWP Source	Springbrook	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	3
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	5
Dominant Substrate		**Plume Area 2℃ Differential (m²)**	15
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	3.5
Mainstem Temp (℃)	14.4	**Plume Length 1℃ Differential (m)**	8
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	28
Min CWP Temp (℃)	10.3	**Fish Presence**	None observed
Average CWP Temp (℃)	12.0	**Fish Species**	
Max Main/CWP Diff (℃)	3.9	**Fish Count**	
Avg Main/CWP Diff (℃)	2.4		
CWP Description	Spring channel, not able to access full length.		
Plume Description	Spring channel flows into river left backwater off mainstem. Spring flow 13.3C. Seepage to 10.3C.		
Restoration Notes	Further investigate source, landowner support needed.		

CWP #035_SB_Methow - Fawn



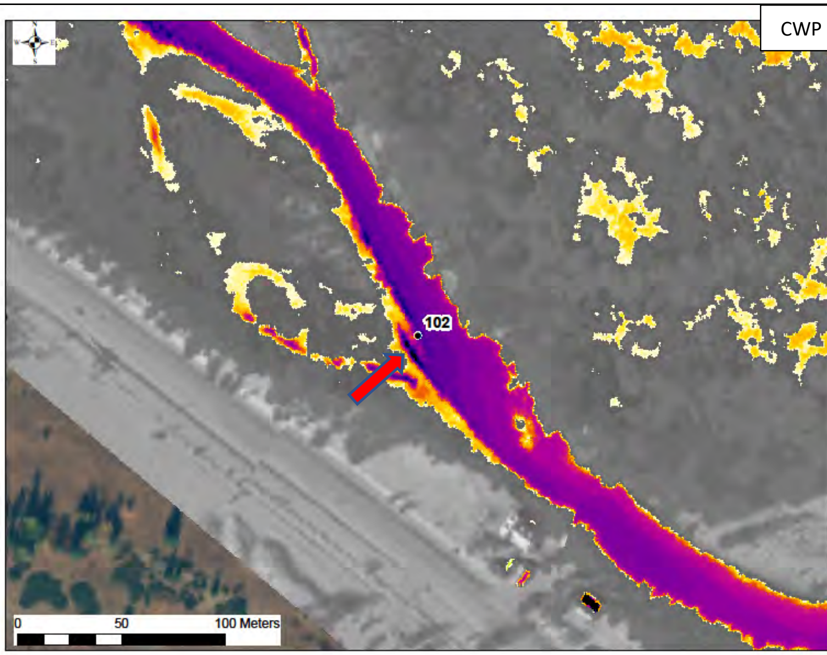


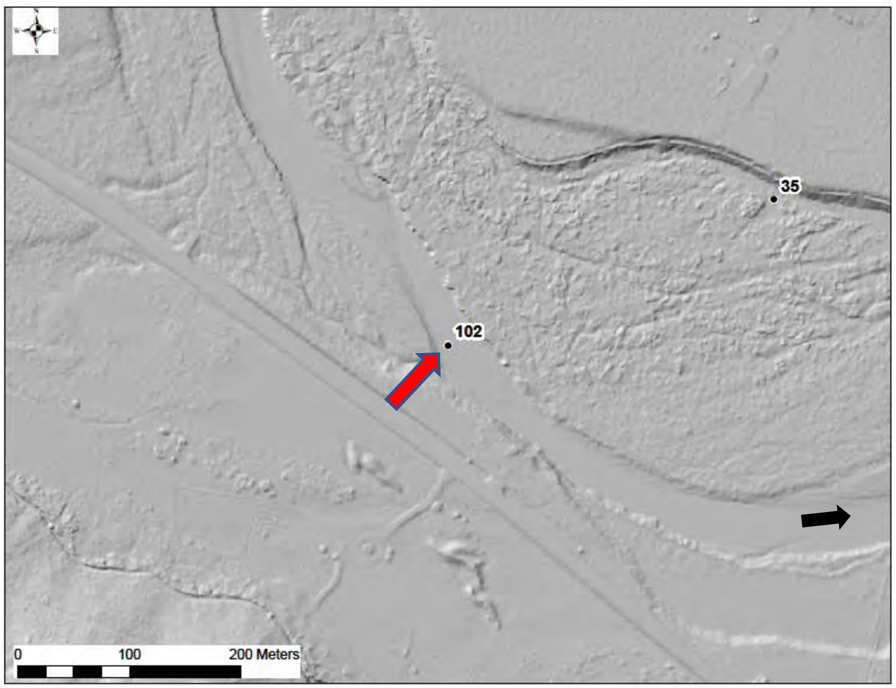
Downstream view into plume pool at confluence with mainstem.

Upstream view from mainstem towards plume pool. 	

CWP ID#	102	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/7/21	**Max CWP Channel Depth (cm)**	
Survey Time	1520	**Average CWP Channel Depth (cm)**	
River km	111	**Min Plume Temp (℃)**	9.3
Latitude	48.59506	**Avg Plume Temp (℃)**	11.7
Longitude	-120.42551	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	12
CWP Source	Alcove	**Avg Plume Depth (cm)**	6
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	6
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	6
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	13
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	26
Min CWP Temp (℃)	9.3	**Fish Presence**	None observed
Average CWP Temp (℃)	11.7	**Fish Species**	
Max Main/CWP Diff (℃)	3.8	**Fish Count**	
Avg Main/CWP Diff (℃)	1.4		
CWP Description	Hyporheic seep ds end of cobble bar. Side channel/upper alcove mouth is dry. Low volume seep with little mainstem influence. Side channel has isolated pools at 13.3C.		
Plume Description	Small slackwater, not deep.		
Restoration Notes	Reach based complexity. Side channel connectivity. Little wood in reach.		

CWP #102_AL_Methow - Fawn



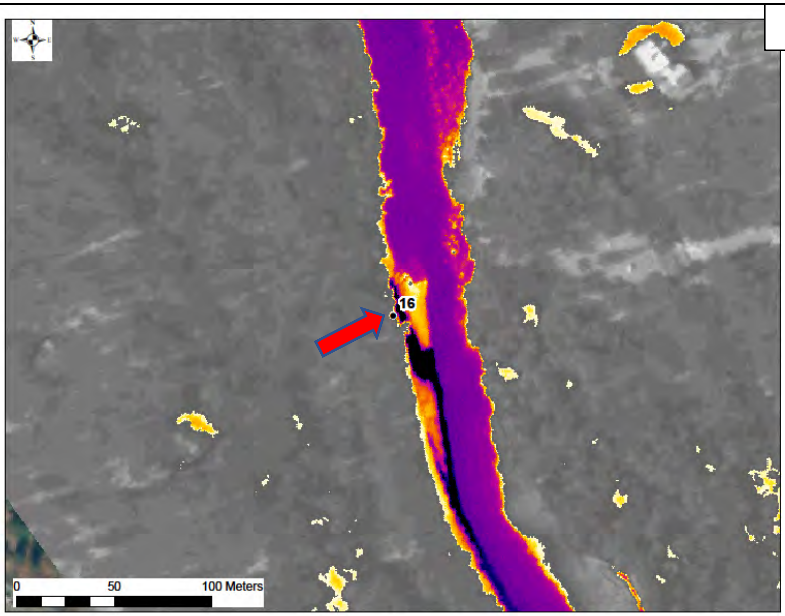


Downstream view of alcove area and mainstem.

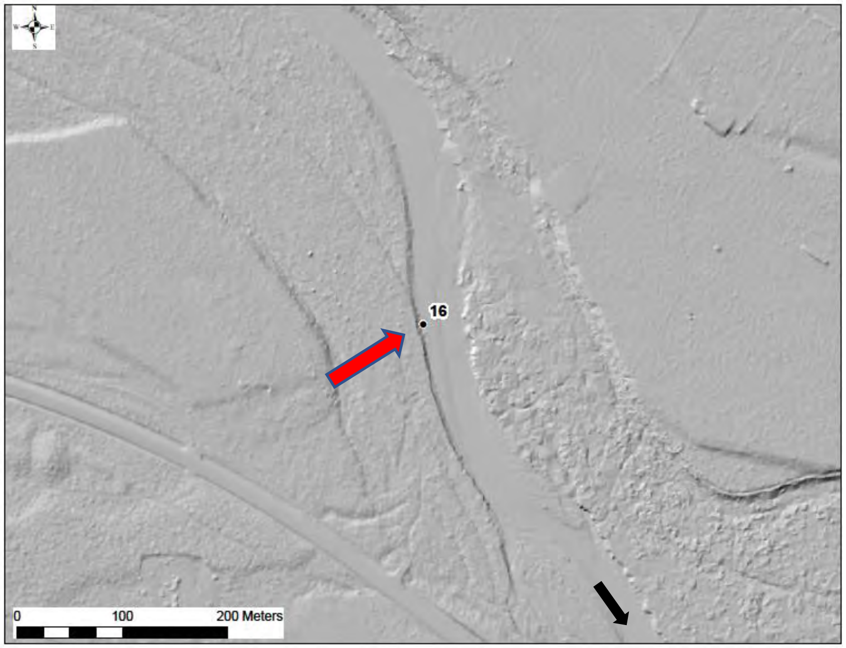
Upstream view of alcove area and mainstem.

Upstream view of high flow channel.

Methow Cold Water Patch Assessment			
CWP ID#	016	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m^2)**	
Survey Date	9/7/21	**Max CWP Channel Depth (cm)**	
Survey Time	1552	**Average CWP Channel Depth (cm)**	
River km	111.4	**Min Plume Temp (℃)**	7.9
Latitude	48.59799	**Avg Plume Temp (℃)**	11.8
Longitude	-120.42836	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	24
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	0.5
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	60
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	30
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	165
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	330
Min CWP Temp (℃)	7.9	**Fish Presence**	None observed
Average CWP Temp (℃)	11.8	**Fish Species**	
Max Main/CWP Diff (℃)	5.2	**Fish Count**	
Avg Main/CWP Diff (℃)	1.3		
CWP Description	Cold spring flow from under cedar tree. Recreational property on bank. Starts as pool that flows across cobble bar to mainstem. Plume along right bank of mainstem. Spring pool connected with us mainstem flow at 13.1C. Play dam above spring.		
Plume Description	Wide and cold. Long. Not deep along mainstem.		
Restoration Notes	Reach based complexity. Wood.		



CWP #016_LS_Methow - Fawn

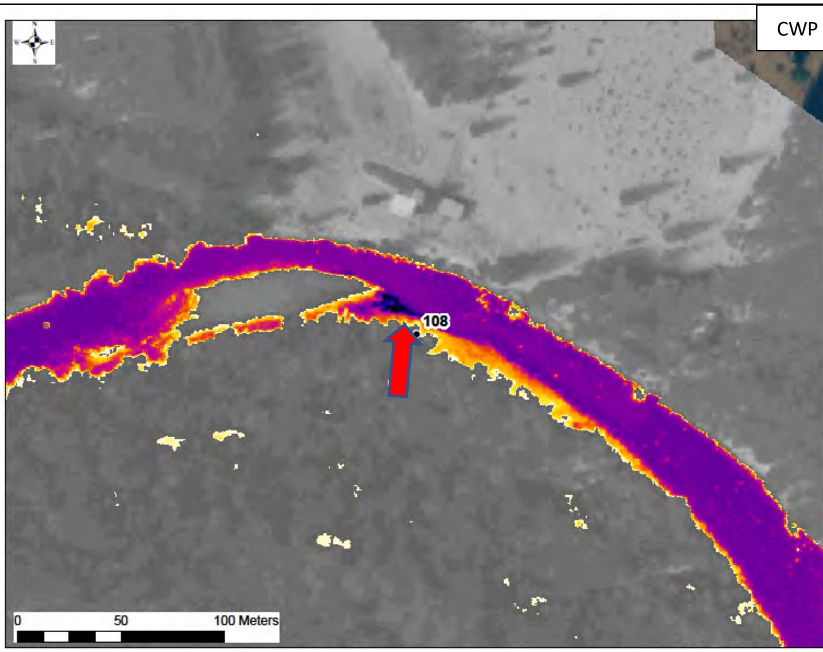


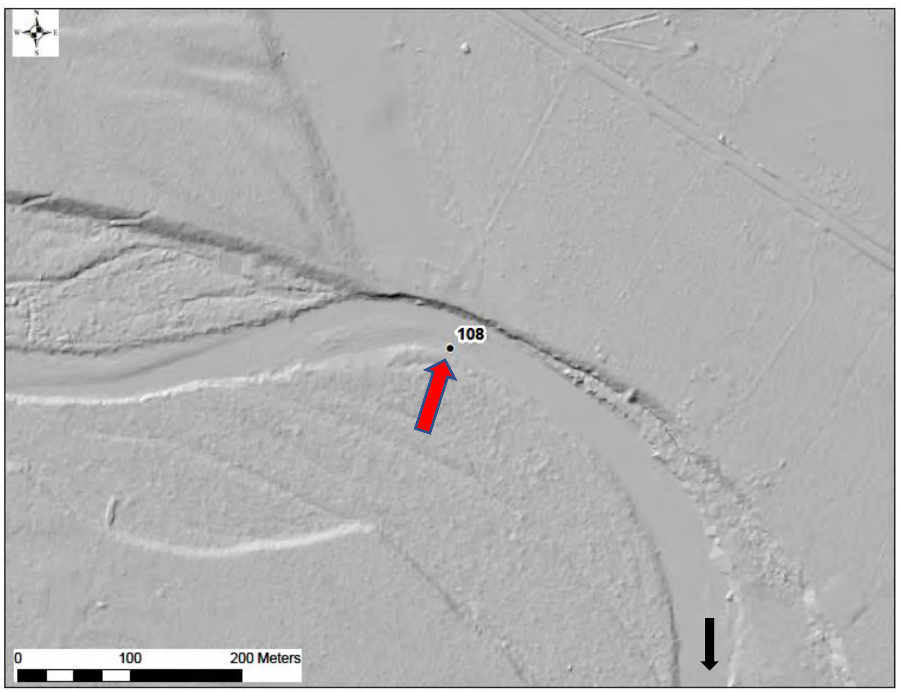
View to source along right bank.

 Downstream view from source seep from under tree.	

CWP ID#	108	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Fawn	**CWP Channel Area (m²)**	
Survey Date	9/8/21	**Max CWP Channel Depth (cm)**	
Survey Time	1426	**Average CWP Channel Depth (cm)**	
River km	111.9	**Min Plume Temp (℃)**	10.1
Latitude	48.60117	**Avg Plume Temp (℃)**	11.9
Longitude	-120.43124	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	20
CWP Source	Alcove	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	9
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	2.7
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.2
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	15
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	18
Min CWP Temp (℃)	10.1	**Fish Presence**	Not observed
Average CWP Temp (℃)	11.9	**Fish Species**	
Max Main/CWP Diff (℃)	3.0	**Fish Count**	
Avg Main/CWP Diff (℃)	1.2		
CWP Description	Seep into alcove ds end of cobble bar. Could be side channel at some flows.		
Plume Description	Isolated right bank seep. Warmer mainstem water entering from us thru cobble bar.		
Restoration Notes	Reach based complexity. Depth.		

CWP #108_AL_Methow - Fawn



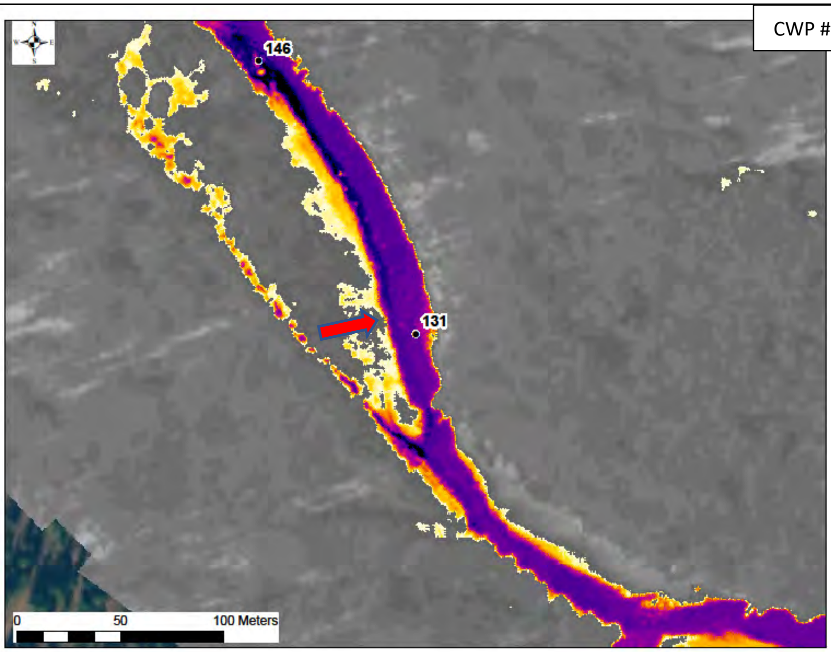


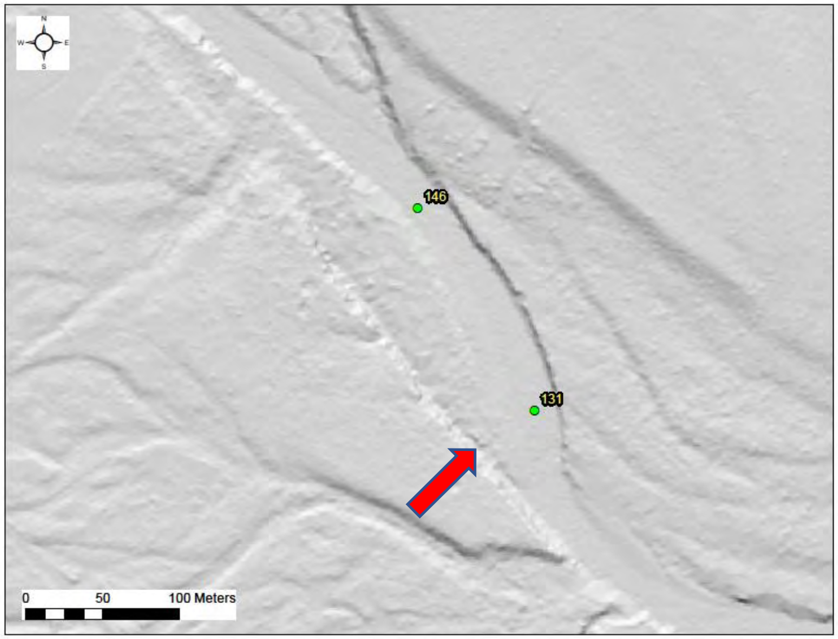
Downstream view of alcove area and mainstem.

Upstream view of alcove area and mainstem.

CWP ID#	131	**CWP Channel Length (m)**	165
Stream	Methow	**CWP Channel Avg Width (m)**	2
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	330
Survey Date	9/8/21	**Max CWP Channel Depth (cm)**	25
Survey Time	1500	**Average CWP Channel Depth (cm)**	7
River km	112.7	**Min Plume Temp (℃)**	10.0
Latitude	48.6027	**Avg Plume Temp (℃)**	11.0
Longitude	-120.44051	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	28
CWP Source	Springbrook	**Avg Plume Depth (cm)**	12
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	6
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	1.8
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	12.3	**Plume Length 1℃ Differential (m)**	10
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	10
Min CWP Temp (℃)	9.0	**Fish Presence**	Yes
Average CWP Temp (℃)	9.8	**Fish Species**	Unknown
Max Main/CWP Diff (℃)	3.3	**Fish Count**	3
Avg Main/CWP Diff (℃)	2.5		
CWP Description	Spring flow in high flow side channel. Dense vegetation in channel. Warms to 12C at top. 9C flow lower down to 9.8C at mouth.		
Plume Description	Right bank flow off short shelf into mainstem at bend. Boulders along high bank.		
Restoration Notes	Upstream connectivity.		

CWP #131_SB_Methow - Rattlesnake



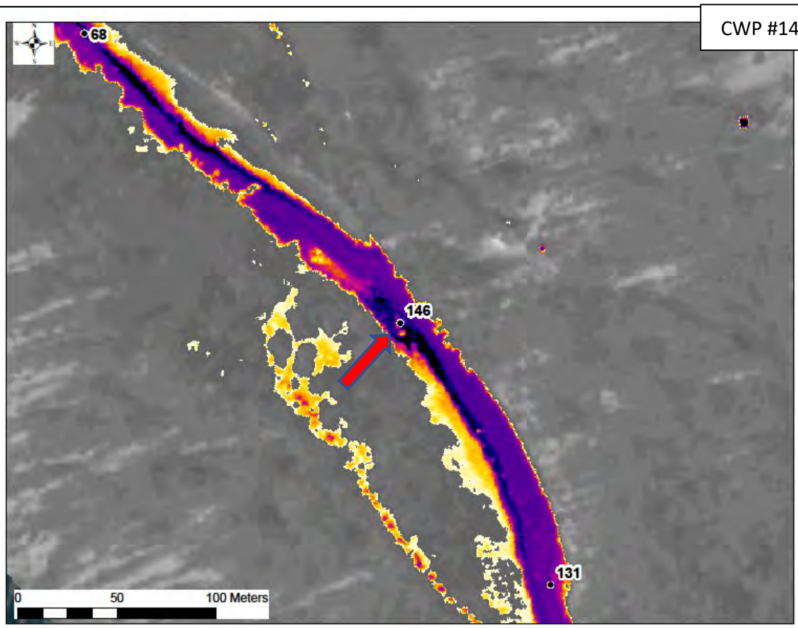


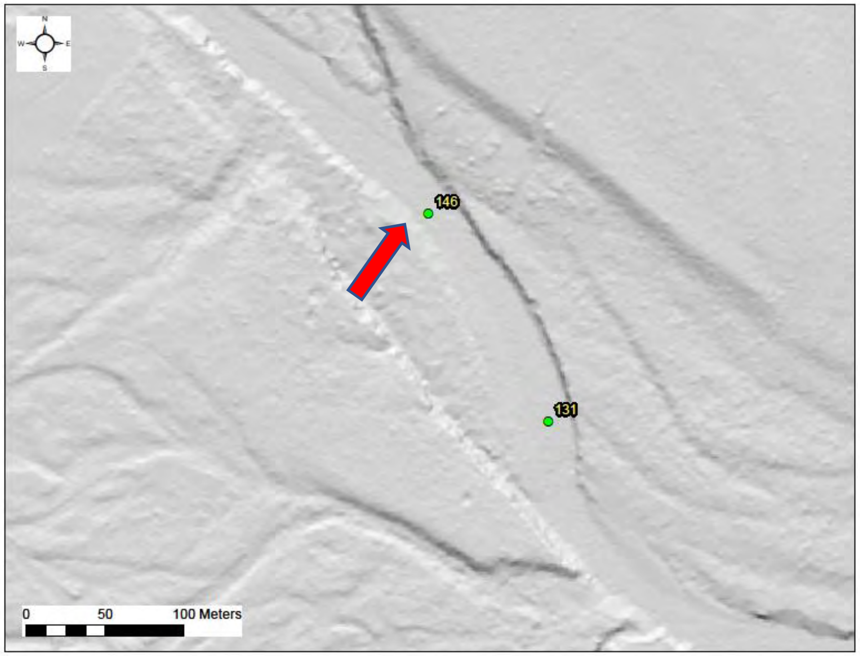
Upstream view in spring channel.

Upstream view of channel confluence with mainstem.

CWP ID#	146	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	
Survey Date	9/8/21	**Max CWP Channel Depth (cm)**	
Survey Time	1539	**Average CWP Channel Depth (cm)**	
River km	113	**Min Plume Temp (℃)**	9.3
Latitude	48.60389	**Avg Plume Temp (℃)**	10.6
Longitude	-120.44153	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	40
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	20
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	12.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	7.6	**Fish Presence**	None detected
Average CWP Temp (℃)	10.6	**Fish Species**	
Max Main/CWP Diff (℃)	4.5	**Fish Count**	
Avg Main/CWP Diff (℃)	1.5		
CWP Description	Significant hyporheic flow thru cobble bar and from mainstem channel cobble. Coldest water from isolated spring pool along right bank.		
Plume Description	Varied flows - could not well define plume. Significant cooling across mainstem channel 10m wide. Good depth in plume.		
Restoration Notes	Reach based complexity. Depth and cover.		

CWP #146_LS_Methow - Rattlesnake





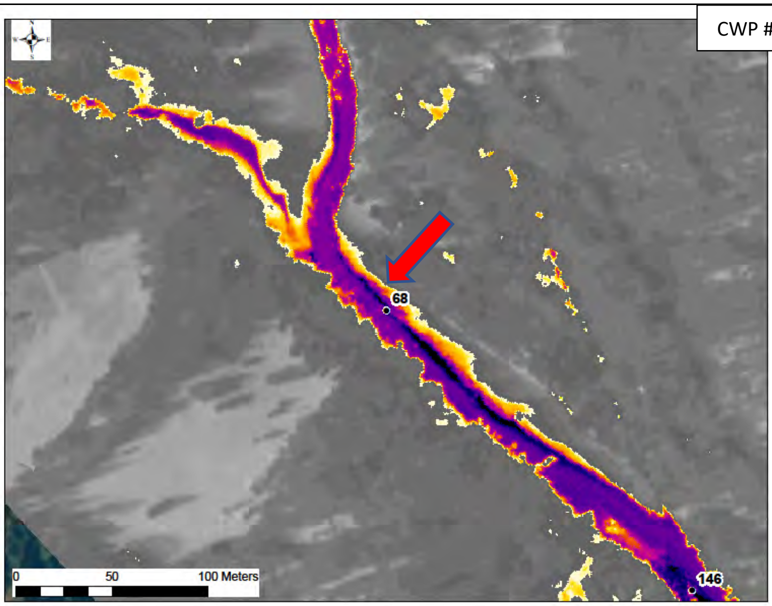
Downstream view of seepage and mainstem.

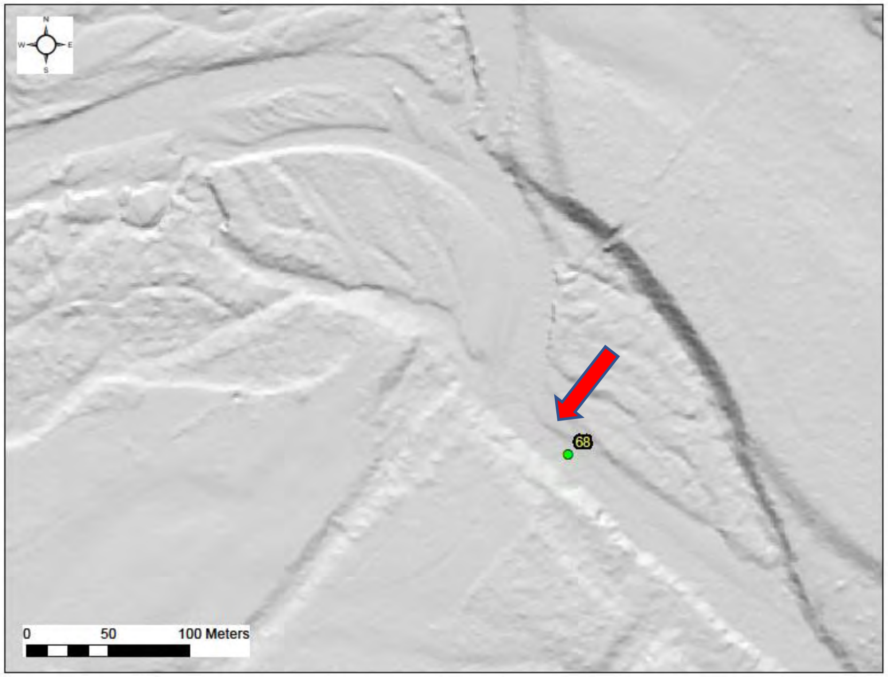

Downstream view of primary seep source.


Downstream view of seep area.

CWP ID#	068	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	
Survey Date	9/8/21	**Max CWP Channel Depth (cm)**	
Survey Time	1606	**Average CWP Channel Depth (cm)**	
River km	113.2	**Min Plume Temp (℃)**	8.7
Latitude	48.60521	**Avg Plume Temp (℃)**	7.3
Longitude	-120.44368	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	25
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	2
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	130
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m²)**	260
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	12.3	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	7.3	**Fish Presence**	None observed
Average CWP Temp (℃)	8.7	**Fish Species**	
Max Main/CWP Diff (℃)	5.0	**Fish Count**	
Avg Main/CWP Diff (℃)	3.6		
CWP Description	Hyporheic seep along left bank mainstem boulder bar. Appears to be elevation drop from us at bend. Not very much mainstem flow.		
Plume Description	Boulders left bank seepage. Significant cooling of mainstem but little non rock cover. Hard to describe plume with all the cooling.		
Restoration Notes	Reach based complexity. Right bank is high with veg and wood.		

CWP #068_LS_Methow - Rattlesnake

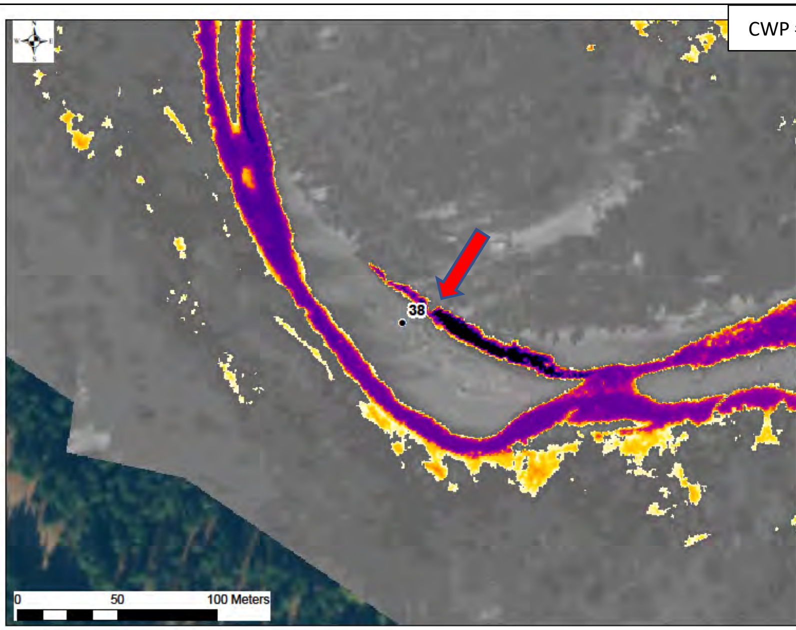


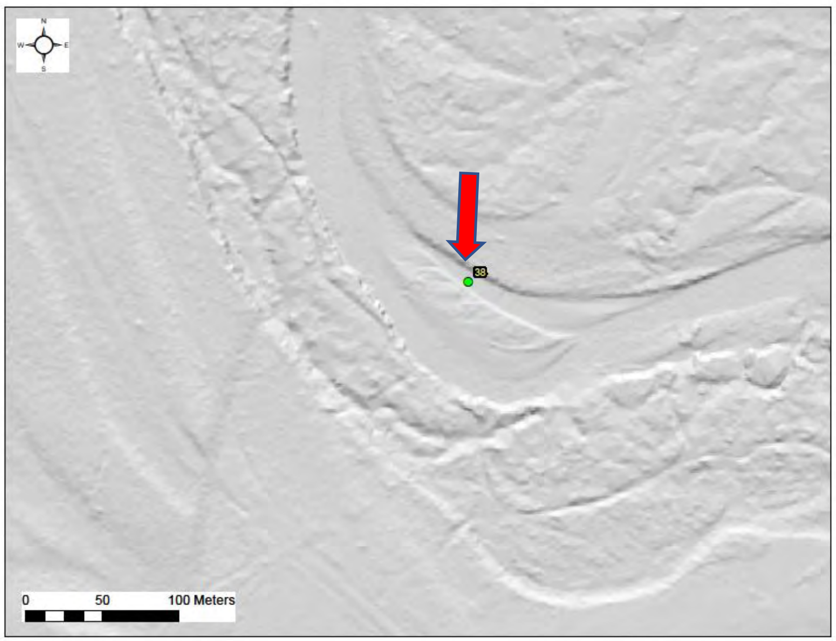


Downstream view along seep and mainstem.

Methow Cold Water Patch Assessment			
CWP ID#	038	**CWP Channel Length (m)**	33
Stream	Methow	**CWP Channel Avg Width (m)**	5
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	165
Survey Date	9/8/21	**Max CWP Channel Depth (cm)**	18
Survey Time	1634	**Average CWP Channel Depth (cm)**	6
River km	113.6	**Min Plume Temp (℃)**	
Latitude	48.6071	**Avg Plume Temp (℃)**	
Longitude	-120.44986	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	Dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	7.6	**Fish Presence**	None observed
Average CWP Temp (℃)	8.9	**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Hyporheic spring seep under leaning fir tree. Left bank in isolated pool. Us flow is warmer coming out of cobble bar. Mainstem channel dry.		
Plume Description	No plume. No connection.		
Restoration Notes	Reach based complexity. Connectivity.		

CWP #038_AL_Methow -Rattlesnake



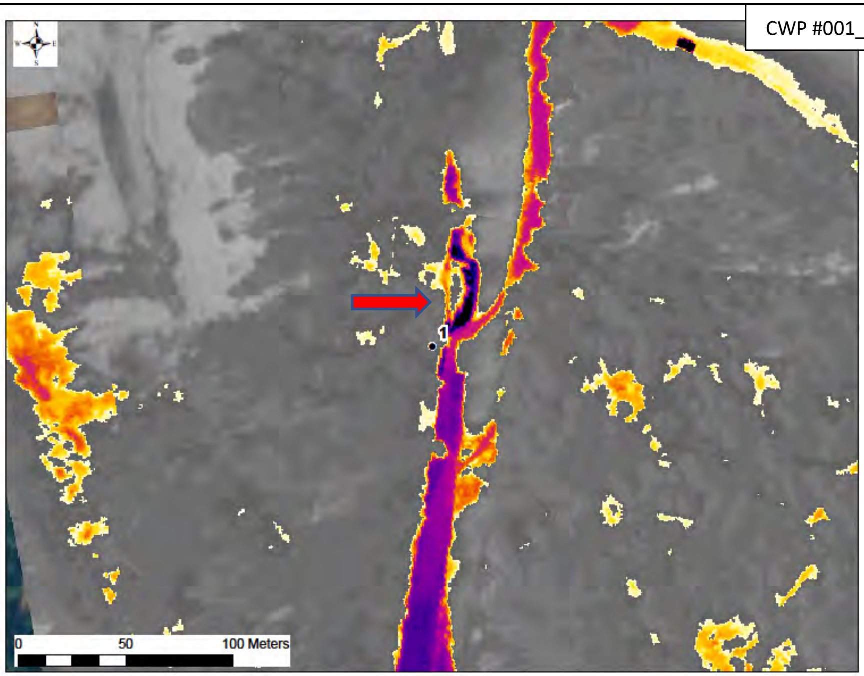


Downstream view at from alcove source.

Upstream view towards source and upstream seepage from cobble bar.

Methow Cold Water Patch Assessment			
CWP ID#	001	**CWP Channel Length (m)**	105
Stream	Methow	**CWP Channel Avg Width (m)**	4
Assessment Unit	Methow-Rattlesnake	**CWP Channel Area (m²)**	420
Survey Date	9/8/21	**Max CWP Channel Depth (cm)**	75
Survey Time	1652	**Average CWP Channel Depth (cm)**	12
River km	114.3	**Min Plume Temp (℃)**	
Latitude	48.61019	**Avg Plume Temp (℃)**	
Longitude	-120.45098	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	6.7	**Fish Presence**	Not observed
Average CWP Temp (℃)	8.6	**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Several hyporheic seeps into dry mainstem channel. Coldest is in largest pool to 6.7C. Upper seep from right bank cobble warmer at 7.7C. Another isolated pool at 8.6C.		
Plume Description	No plume. No connection.		
Restoration Notes	Reach based complexity. Cover.		

CWP #001_LS_Methow -Rattlesnake



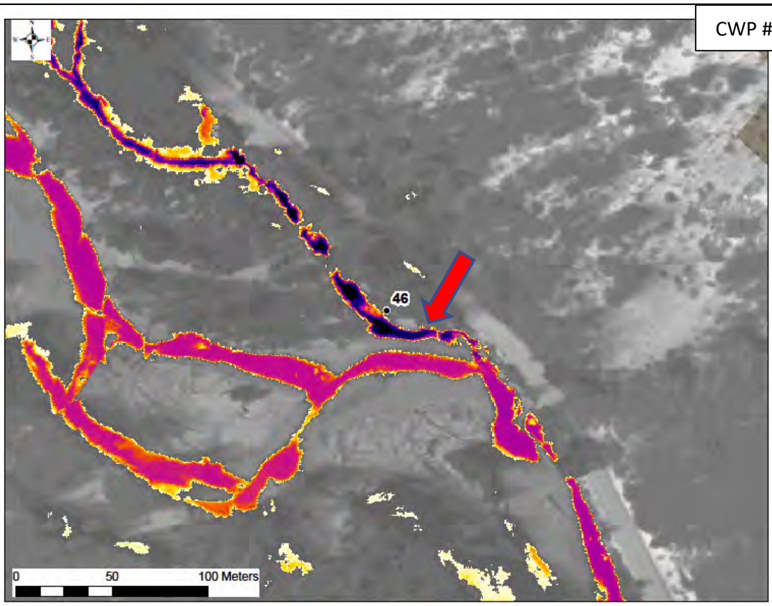
Downstream view along right bank, primary seep

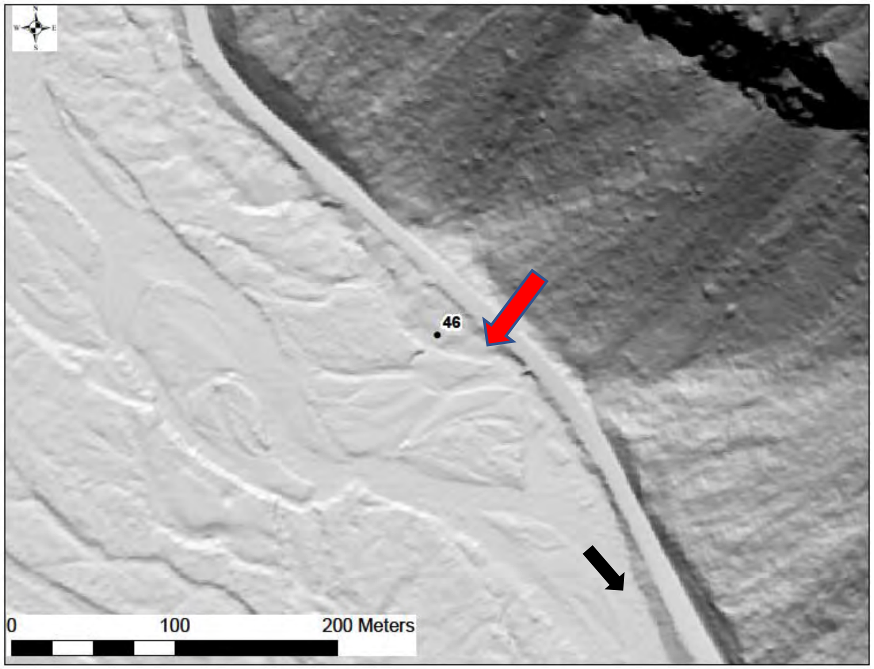

Downstream view along right bank, smaller upstream seep


Upstream view along right bank, primary seep

Methow Cold Water Patch Assessment			
CWP ID#	046	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	
Survey Time	1308	**Average CWP Channel Depth (cm)**	
River km	116.3	**Min Plume Temp (℃)**	
Latitude	48.627	**Avg Plume Temp (℃)**	
Longitude	-120.46111	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	Dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)		**Fish Presence**	None observed
Average CWP Temp (℃)		**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Side channel and spring flow dry. Mainstem dry. Appears high quality side channel habitat. High flow debris observed.		
Plume Description	No connection, no plume. No water.		
Restoration Notes			

CWP #046_SB_Methow - Rattlesnake



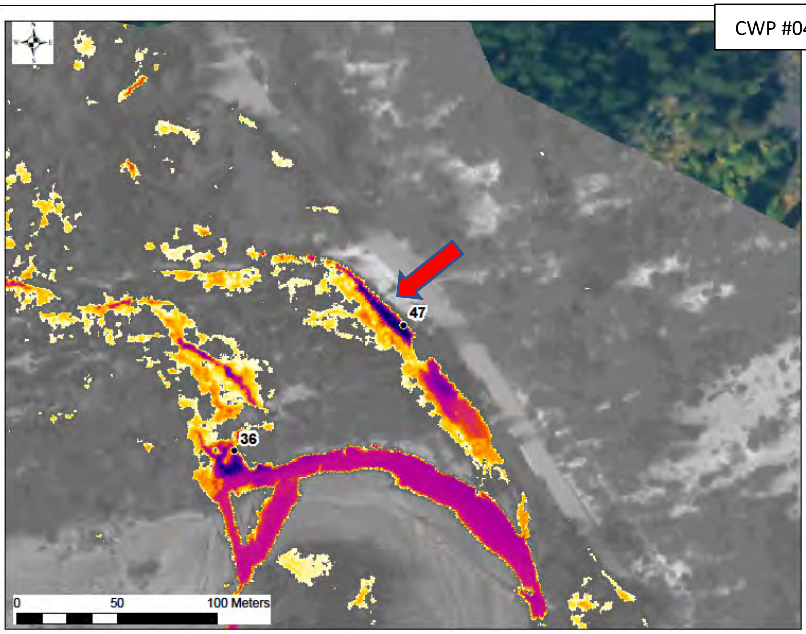


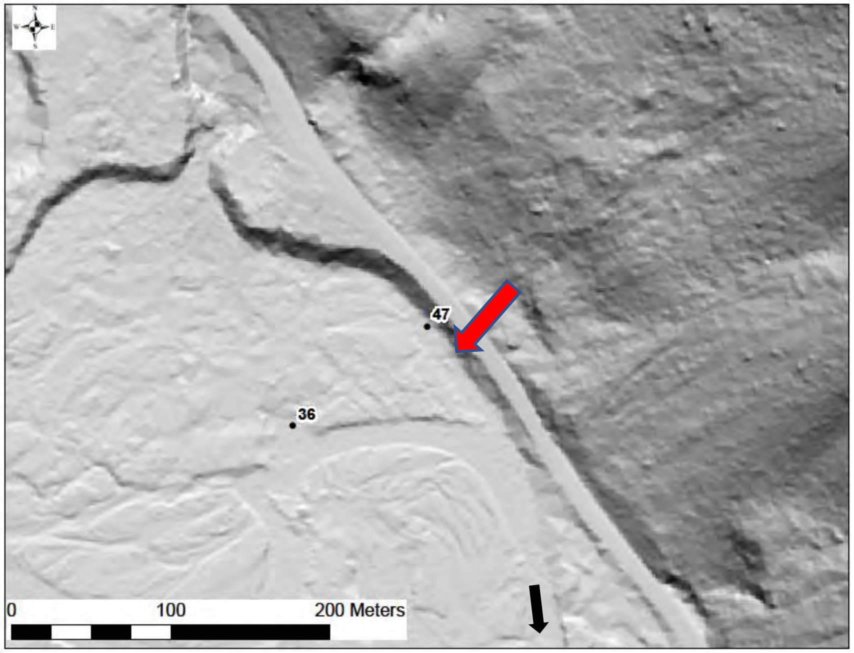
Downstream view in channel towards mainstem.

Upstream view in side channel.

Methow Cold Water Patch Assessment			
CWP ID#	047	**CWP Channel Length (m)**	44
Stream	Methow	**CWP Channel Avg Width (m)**	9
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	396
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	125
Survey Time	1330	**Average CWP Channel Depth (cm)**	30
River km	117	**Min Plume Temp (℃)**	
Latitude	48.63114	**Avg Plume Temp (℃)**	
Longitude	-120.46565	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name	Gate Creek	**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	Dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	9.3	**Fish Presence**	Yes
Average CWP Temp (℃)	10.4	**Fish Species**	Chinook
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Side spring channel dry. Isolated pool at mouth along left bank mainstem. Adult and juvenile chinook in pool. Small seep just us in cobble bar >13C. Need to determine Gate Creek flow fate.		
Plume Description	No connection. No plume.		
Restoration Notes	Reach based complexity. Side channel connectivity. Dry beaver dam in SC.		

CWP #047_AL_Methow - Rattlesnake





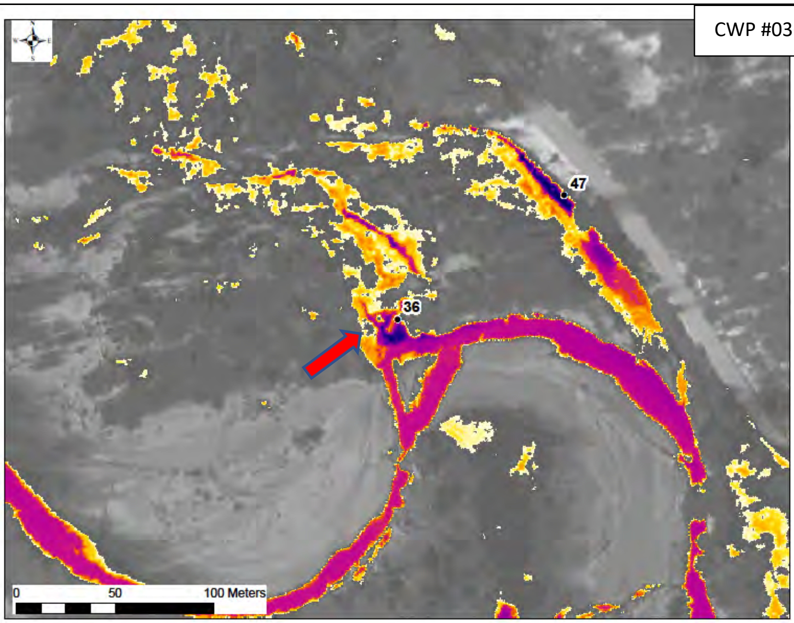
Downstream view in channel towards mainstem dry channel and isolated pool.

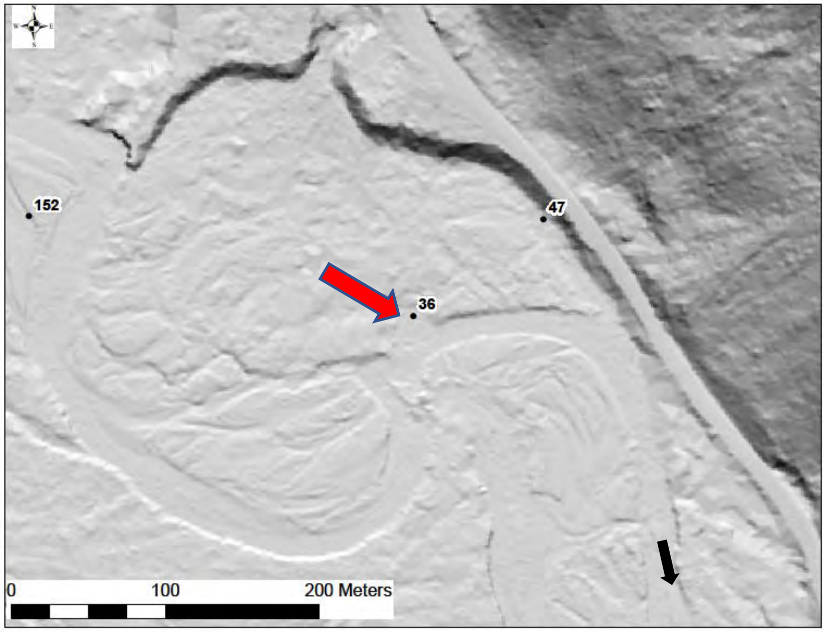

Downstream view in side channel.


Upstream view in side channel.

Methow Cold Water Patch Assessment			
CWP ID#	036	**CWP Channel Length (m)**	10
Stream	Methow	**CWP Channel Avg Width (m)**	5
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m^2)**	50
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	30
Survey Time	1353	**Average CWP Channel Depth (cm)**	8
River km	117.1	**Min Plume Temp (℃)**	
Latitude	48.63058	**Avg Plume Temp (℃)**	
Longitude	-120.4668	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	Dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	
Min CWP Temp (℃)	14.6	**Fish Presence**	Yes
Average CWP Temp (℃)	15.4	**Fish Species**	*O. mykiss*
Max Main/CWP Diff (℃)		**Fish Count**	6
Avg Main/CWP Diff (℃)			
CWP Description	Isolated pool - warm. Mouth of high flow side channel which is dry. Another tiny pool at 20C with many fry and a snake.		
Plume Description	No connection. Photo 4 is of another larger isolated pool along left bank mainstem just upstream. Low was 13.6C to 15C. Many dead fish chinook/mykiss/Saco. Merganser family present and maybe otters. Carnage.		
Restoration Notes	Complexity, connectivity.		

CWP #036_AL_Methow - Rattlesnake





Upstream view into isolated pool in mainstem active channel.

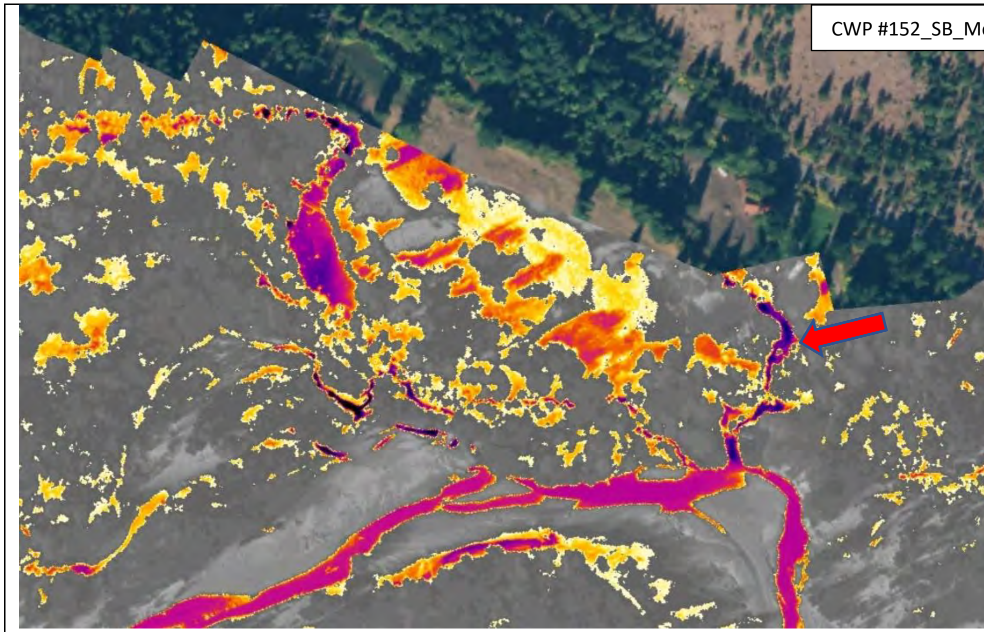
Upstream view at isolated poo at mouth of side channel.

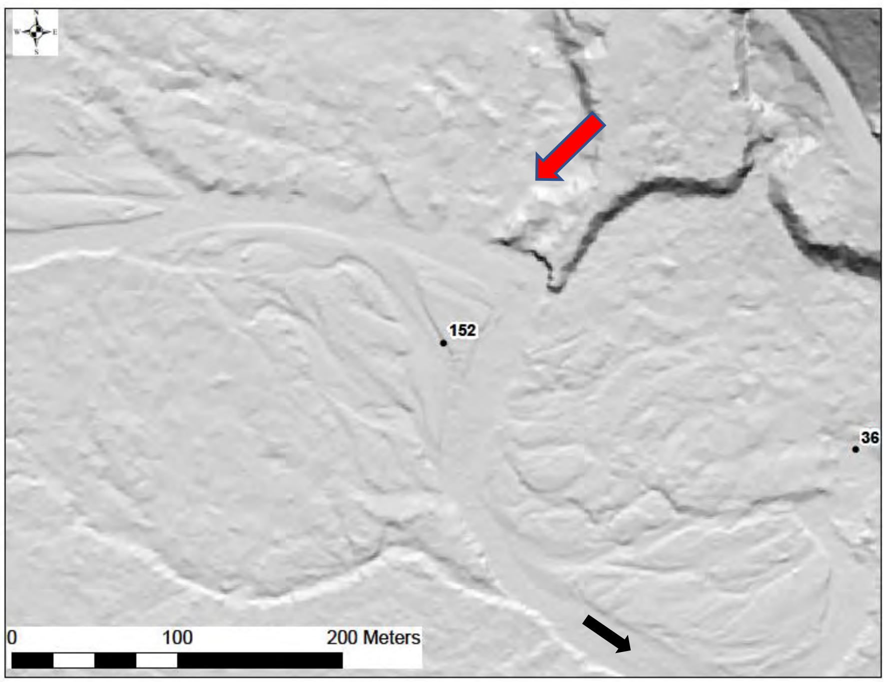
Upstream view at seepage pool.

Downstream view of upper isolated pool.

CWP ID#	152	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m^2)**	
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	
Survey Time	1416	**Average CWP Channel Depth (cm)**	
River km	117.6	**Min Plume Temp (℃)**	
Latitude	48.63117	**Avg Plume Temp (℃)**	
Longitude	-120.47018	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type		**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	Dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	
Min CWP Temp (℃)		**Fish Presence**	None detected
Average CWP Temp (℃)		**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Dry side spring flow channel and dry mainstem.		
Plume Description	No plume no connection.		
Restoration Notes	Needs further evaluation of off channel habitat conditions. Gate Creek water needs investigation.		

CWP #152_SB_Methow - Rattlesnake

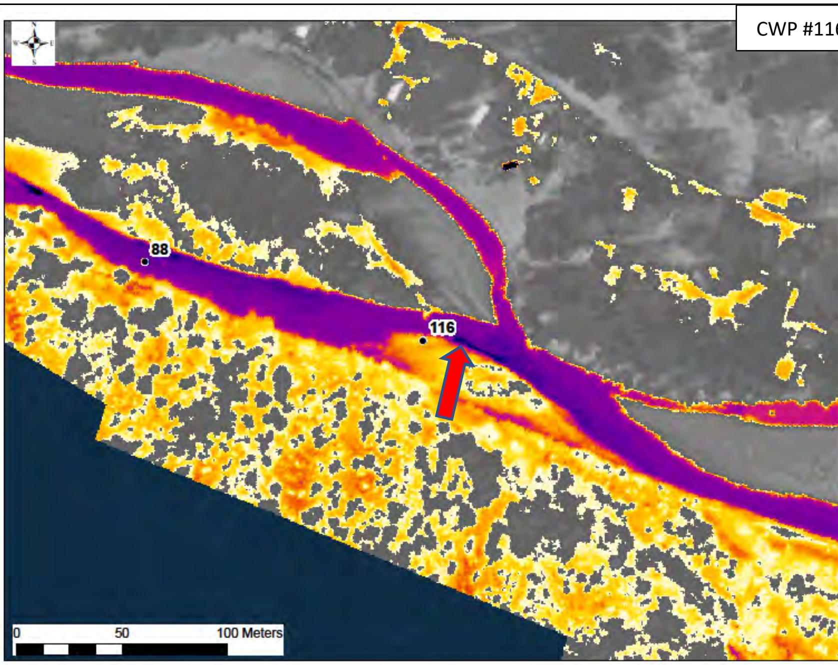


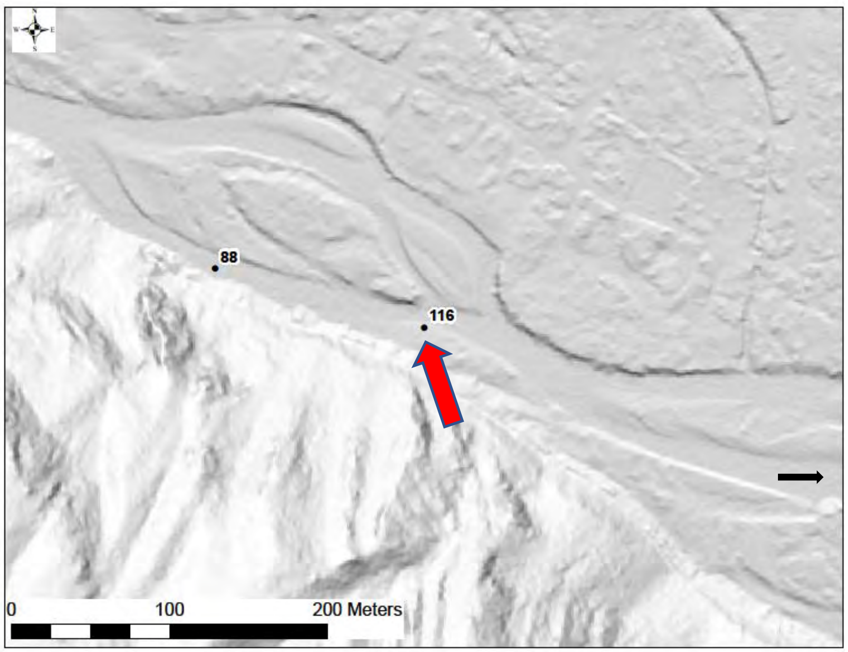


Upstream view into spring channel from dry mainstem.

CWP ID#	116	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m^2)**	
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	
Survey Time	1630	**Average CWP Channel Depth (cm)**	
River km	121	**Min Plume Temp (℃)**	8.7
Latitude	48.64375	**Avg Plume Temp (℃)**	10.2
Longitude	-120.50562	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	40
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	15
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	50
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	50
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.5
Mainstem Temp (℃)	12.7	**Plume Length 1℃ Differential (m)**	60
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	90
Min CWP Temp (℃)	8.7	**Fish Presence**	None observed
Average CWP Temp (℃)	10.2	**Fish Species**	
Max Main/CWP Diff (℃)	4.0	**Fish Count**	
Avg Main/CWP Diff (℃)	2.5		
CWP Description	Lateral seep along cobble bar. Riffle drop to glide in mainstem.		
Plume Description	Cold and wide in places.		
Restoration Notes	Cover. Depth.		

CWP #116_LS_Methow - Rattlesnake

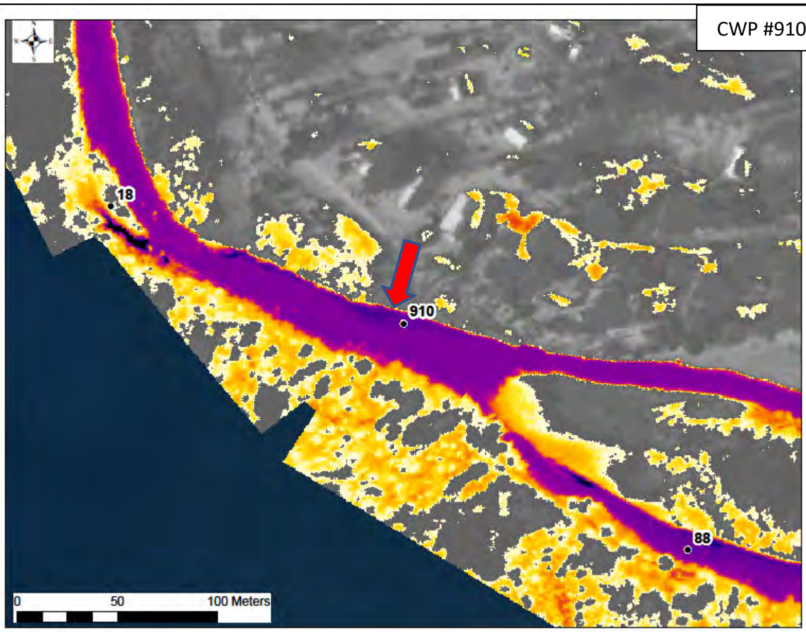




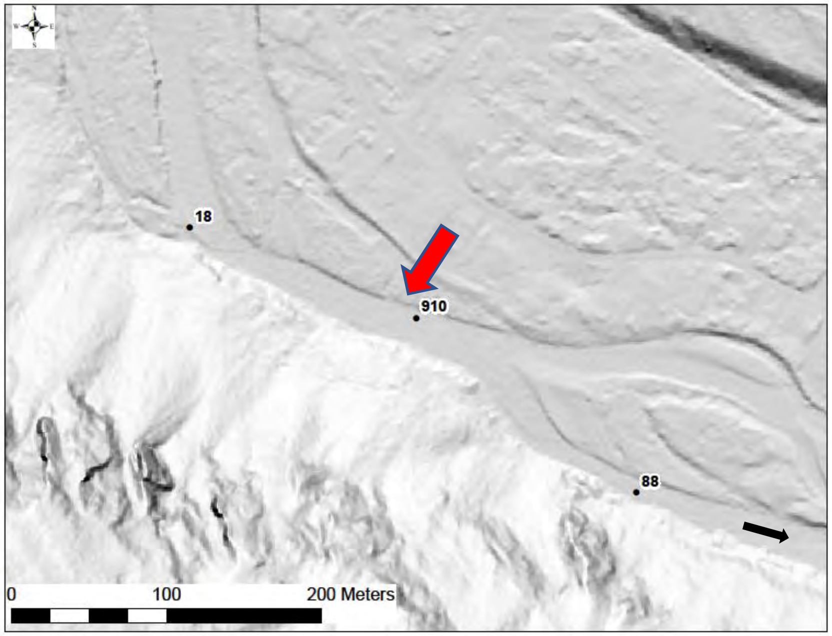
Downstream view of seep area and mainstem.

Upstream view of seep area and mainstem.

CWP ID#	910	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	
Survey Time	1600	**Average CWP Channel Depth (cm)**	
River km	121	**Min Plume Temp (℃)**	10.6
Latitude	48.64511	**Avg Plume Temp (℃)**	11.4
Longitude	-120.50933	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	40
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	20
Tributary Name		**Plume Width 2℃ Differential (m)**	0.5
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	60
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	30
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.3
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	75
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	97.5
Min CWP Temp (℃)	10.6	**Fish Presence**	None observed
Average CWP Temp (℃)	11.4	**Fish Species**	
Max Main/CWP Diff (℃)	2.5	**Fish Count**	
Avg Main/CWP Diff (℃)	1.7		
CWP Description	Seep along vegetated cobble bank. Possibly associated with CWP #088.		
Plume Description	Decent depth off bank. Low complexity and cover.		
Restoration Notes	Houses along bank. Complexity.		



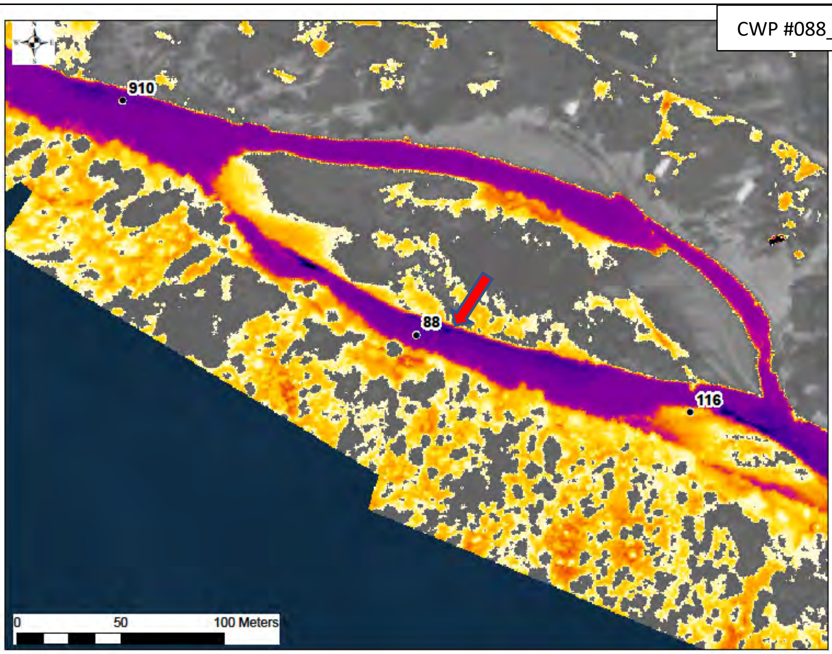
CWP #910_LS_Methow - Rattlesnake

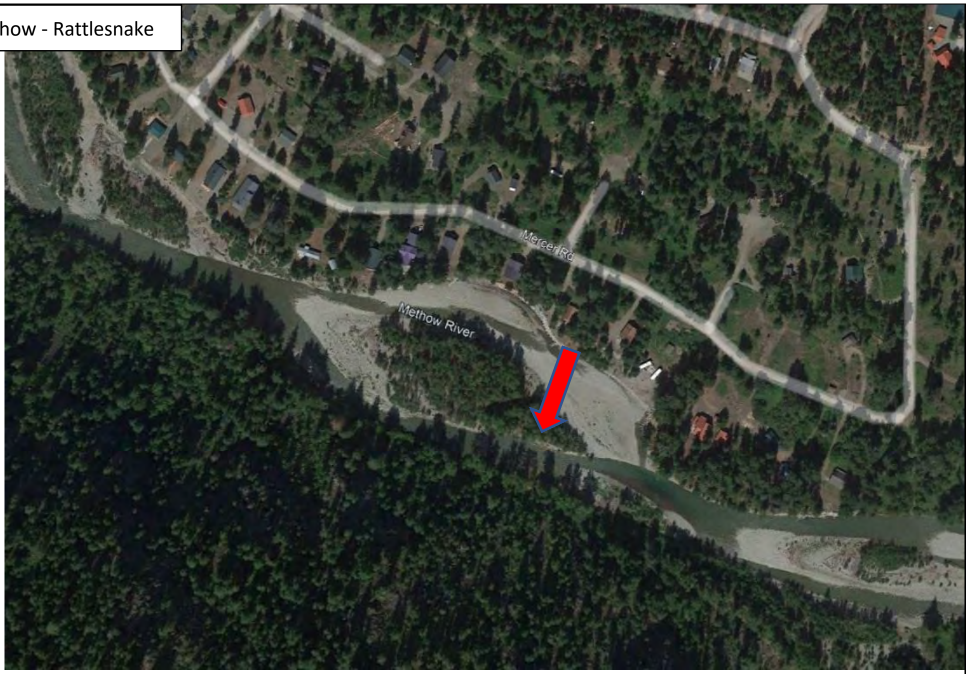


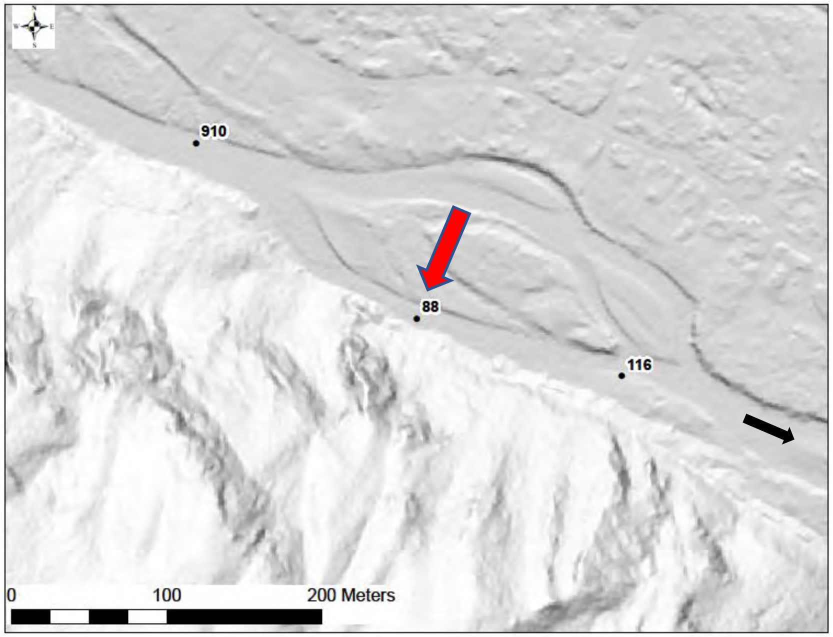
Upstream view of seep area along mainstem.

CWP ID#	088	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	
Survey Time	1613	**Average CWP Channel Depth (cm)**	
River km	121.1	**Min Plume Temp (℃)**	9.6
Latitude	48.64409	**Avg Plume Temp (℃)**	11.0
Longitude	-120.50741	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	40
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	15
Tributary Name		**Plume Width 2℃ Differential (m)**	0.4
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	46
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	18.4
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.3
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	80
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	104
Min CWP Temp (℃)	9.6	**Fish Presence**	Yes
Average CWP Temp (℃)	11.0	**Fish Species**	Chinook
Max Main/CWP Diff (℃)	3.5	**Fish Count**	1
Avg Main/CWP Diff (℃)	2.1		
CWP Description	CWP #088 not specifically located. This site is just ds along left bank mainstem after bend. Seeps from cobble boulder island.		
Plume Description	Tight to left bank mainstem. Cobble and boulder glide.		
Restoration Notes	Complexity. Lost River Airport area access.		

CWP #088_LS_Methow - Rattlesnake





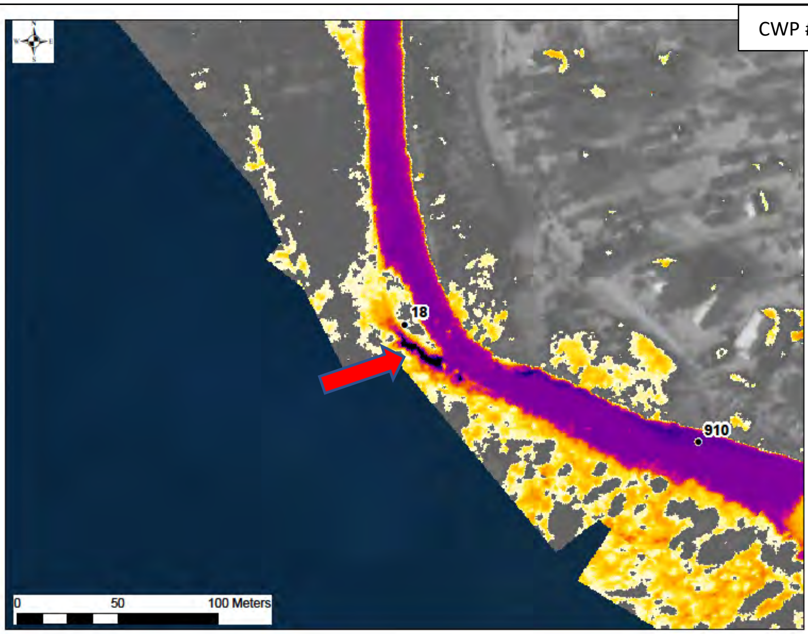


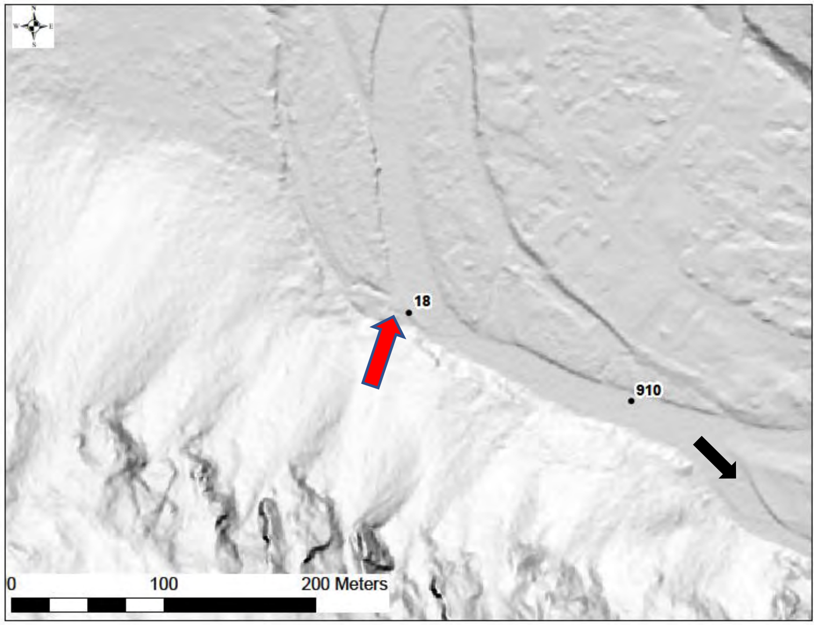
Upstream view of seep into mainstem.

Downstream view along cobble seep and mainstem.

Methow Cold Water Patch Assessment			
CWP ID#	018	**CWP Channel Length (m)**	31
Stream	Methow	**CWP Channel Avg Width (m)**	1.3
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	40.3
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	20
Survey Time	1542	**Average CWP Channel Depth (cm)**	7
River km	121.3	**Min Plume Temp (℃)**	8.8.
Latitude	48.64564	**Avg Plume Temp (℃)**	9.2
Longitude	-120.51131	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	90
CWP Source	Alcove	**Avg Plume Depth (cm)**	25
Tributary Name		**Plume Width 2℃ Differential (m)**	5
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	14
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	70
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.3	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	8.6	**Fish Presence**	None observed
Average CWP Temp (℃)	9.0	**Fish Species**	
Max Main/CWP Diff (℃)	4.7	**Fish Count**	
Avg Main/CWP Diff (℃)	4.3		
CWP Description	Seeps along steep bank ds end of right mainstem cobble bar. Some flow from bar.		
Plume Description	Backwater pool on mainstem bend. Deep and cold. Boulders. No 1C plume measurement.		
Restoration Notes	Cover. Likely high flow energy location. Lost River Airport area.		

CWP #018_AL_Methow - Rattlesnake



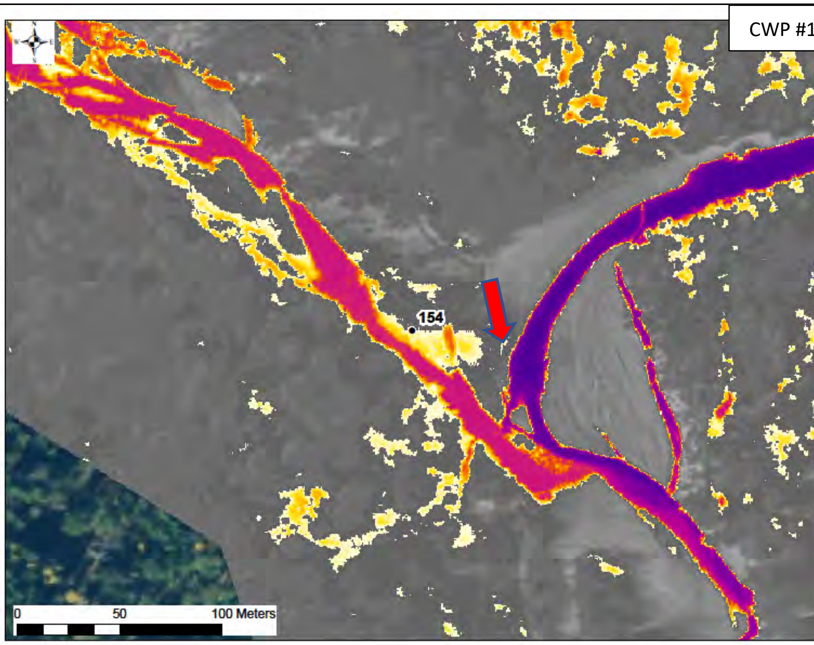


Downstream view along mainstem bar from source.

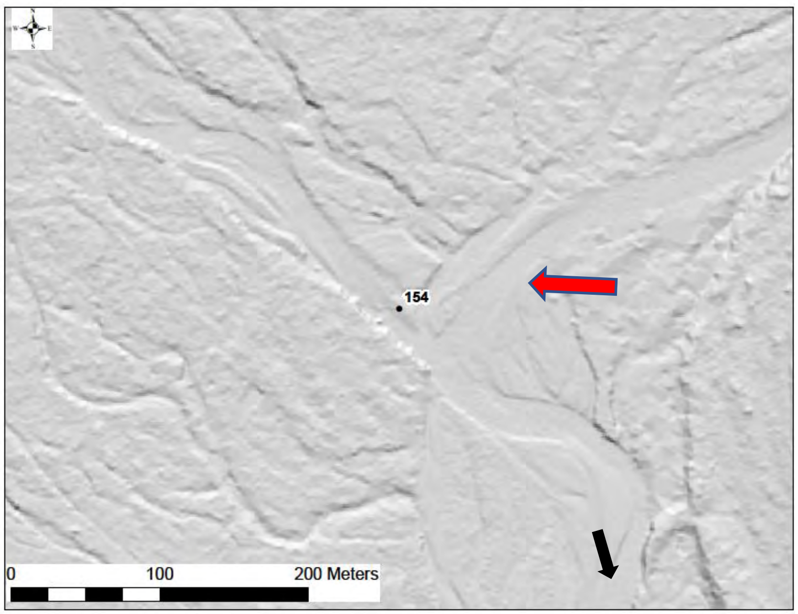

Downstream view towards plume in backwater.


Upstream view to plume pool and channel.

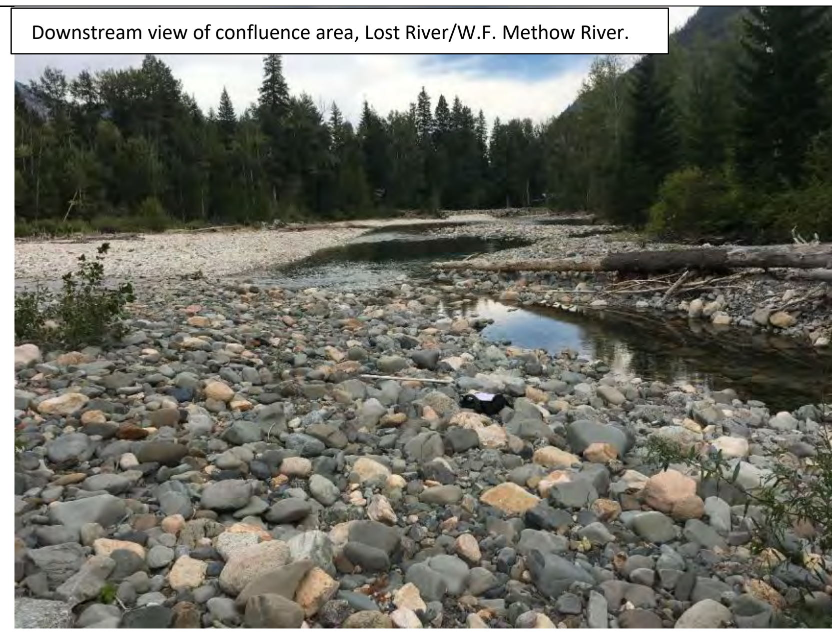
CWP ID#	154	**CWP Channel Length (m)**	
Stream	Methow	**CWP Channel Avg Width (m)**	
Assessment Unit	Methow - Rattlesnake	**CWP Channel Area (m²)**	
Survey Date	9/9/21	**Max CWP Channel Depth (cm)**	
Survey Time	1527	**Average CWP Channel Depth (cm)**	
River km	122	**Min Plume Temp (℃)**	
Latitude	48.65041	**Avg Plume Temp (℃)**	
Longitude	-120.51262	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	
Tributary Name	Lost River	**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	Dry	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)	13	**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	13	**Fish Presence**	None detected
Average CWP Temp (℃)	13	**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Methow us of Lost River is dry.		
Plume Description	No plume. Lost River is only flow.		
Restoration Notes	Complexity. Likely high energy location.		



CWP #154_TC_Methow - Rattlesnake

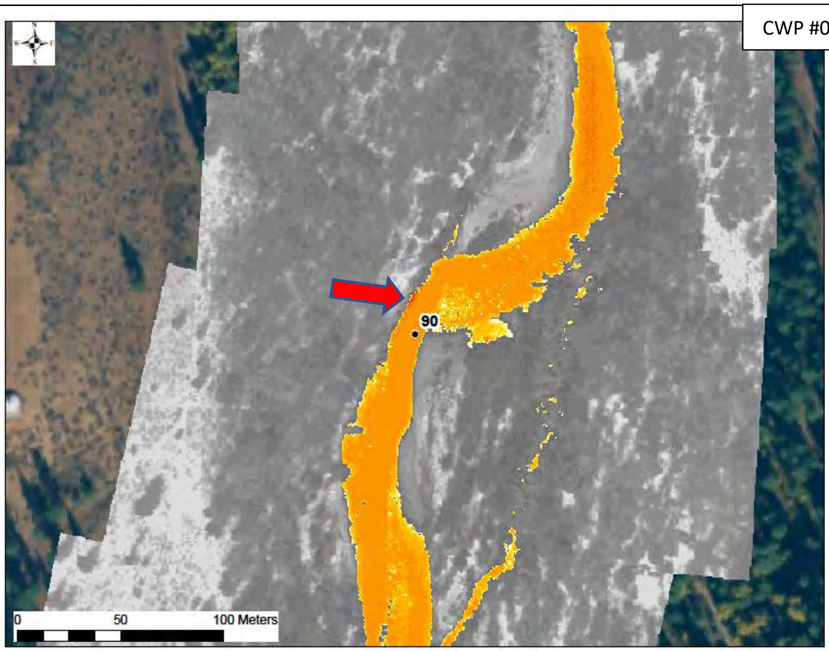


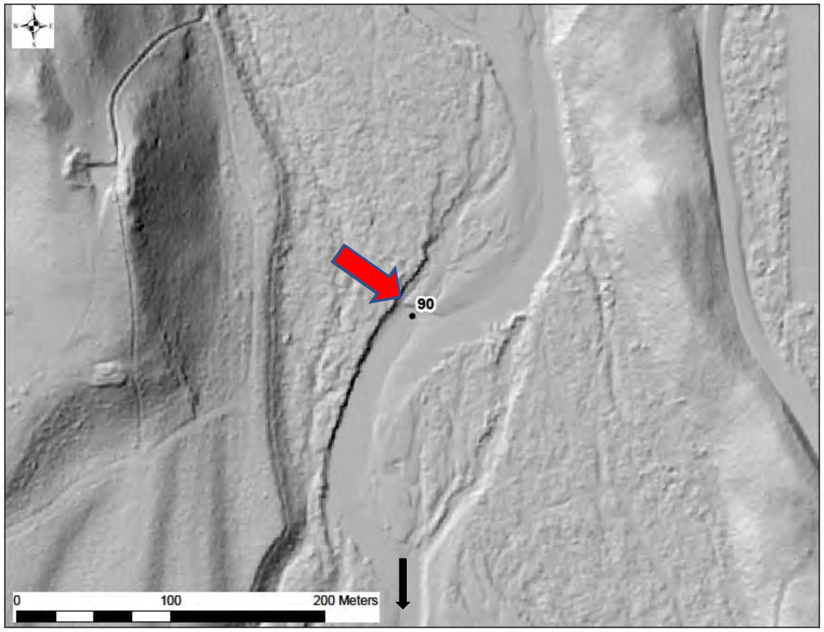
Downstream view of confluence area, Lost River/W.F. Methow River.



CWP ID#	90	**CWP Channel Length (m)**	21
Stream	Chewuch	**CWP Channel Avg Width (m)**	4.5
Assessment Unit	Chewuch - Pearrygin	**CWP Channel Area (m²)**	94.5
Survey Date	8/19/22	**Max CWP Channel Depth (cm)**	49
Survey Time	1444	**Average CWP Channel Depth (cm)**	10
River km	10.8	**Min Plume Temp (℃)**	13.6
Latitude	48.54124	**Avg Plume Temp (℃)**	14.5
Longitude	-120.18497	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	12
CWP Source	Alcove	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	4
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	8
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	3
Mainstem Temp (℃)	16.3	**Plume Length 1℃ Differential (m)**	5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	15
Min CWP Temp (℃)	8.6	**Fish Presence**	None observed
Average CWP Temp (℃)	11.1	**Fish Species**	
Max Main/CWP Diff (℃)	7.7	**Fish Count**	
Avg Main/CWP Diff (℃)	5.2		
CWP Description	Ds end of dry high flow channel. Alcove pool.		
Plume Description	Small backwater area off mainstem riffle		
Restoration Notes	Depth and complexity.		

CWP #090_AL_Chewuch - Pearrygin



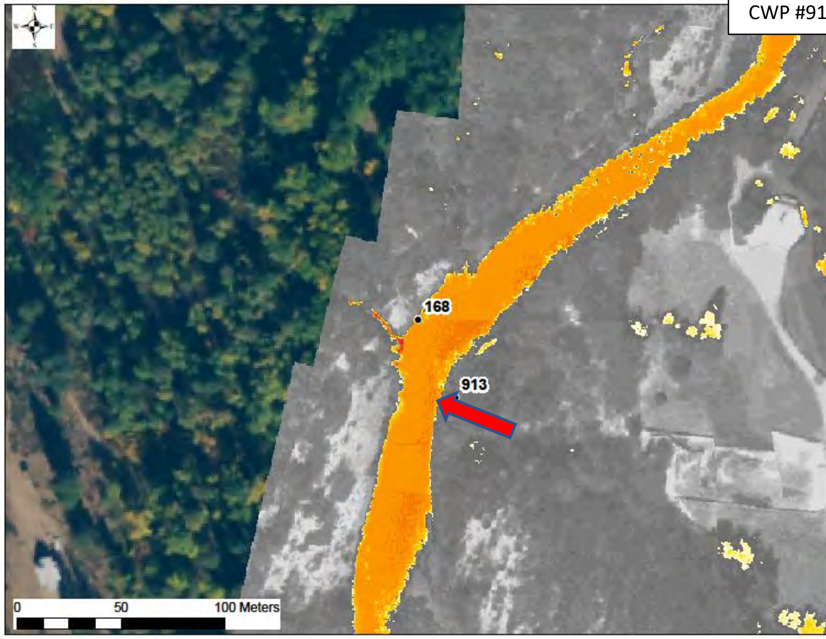


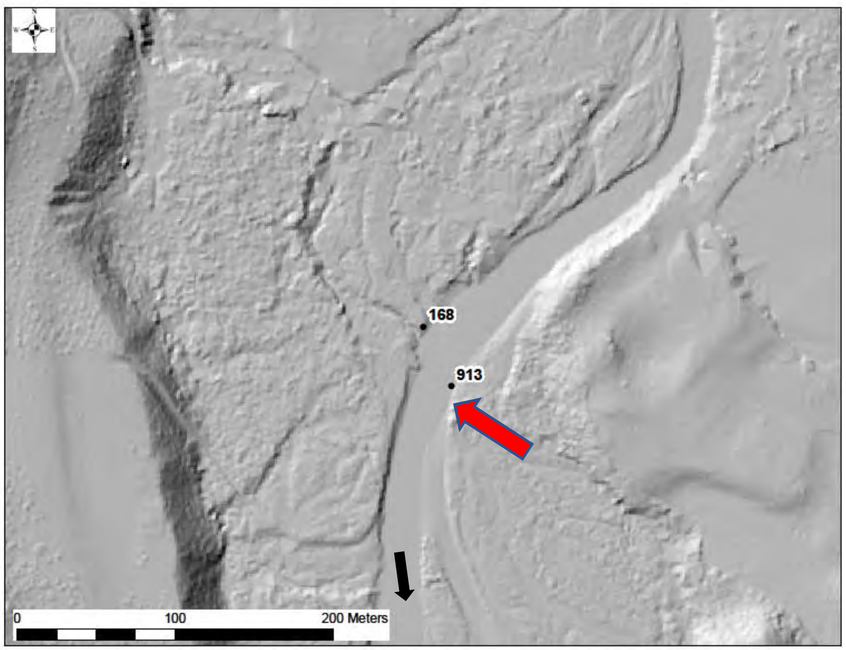
Downstream view of alcove and channel.


Upstream towards alcove and plume area.

CWP ID#	913	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Pearrygin	**CWP Channel Area (m²)**	
Survey Date	8/19/22	**Max CWP Channel Depth (cm)**	
Survey Time	1524	**Average CWP Channel Depth (cm)**	
River km	11.6	**Min Plume Temp (℃)**	11.1
Latitude	48.54721	**Avg Plume Temp (℃)**	14.0
Longitude	-120.18557	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	13
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	7
Tributary Name		**Plume Width 2℃ Differential (m)**	0.2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	34
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	6.8
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.4
Mainstem Temp (℃)	16.4	**Plume Length 1℃ Differential (m)**	39
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	15.6
Min CWP Temp (℃)	11.1	**Fish Presence**	None observed
Average CWP Temp (℃)	14.0	**Fish Species**	
Max Main/CWP Diff (℃)	5.3	**Fish Count**	
Avg Main/CWP Diff (℃)	2.4		
CWP Description	Low volume seepage through sandy bank. Powerline overhead.		
Plume Description	Narrow. Flows from sand and ds cobble bar.		
Restoration Notes	Depth and complexity		

CWP #913_LS_Chewuch - Pearrygin



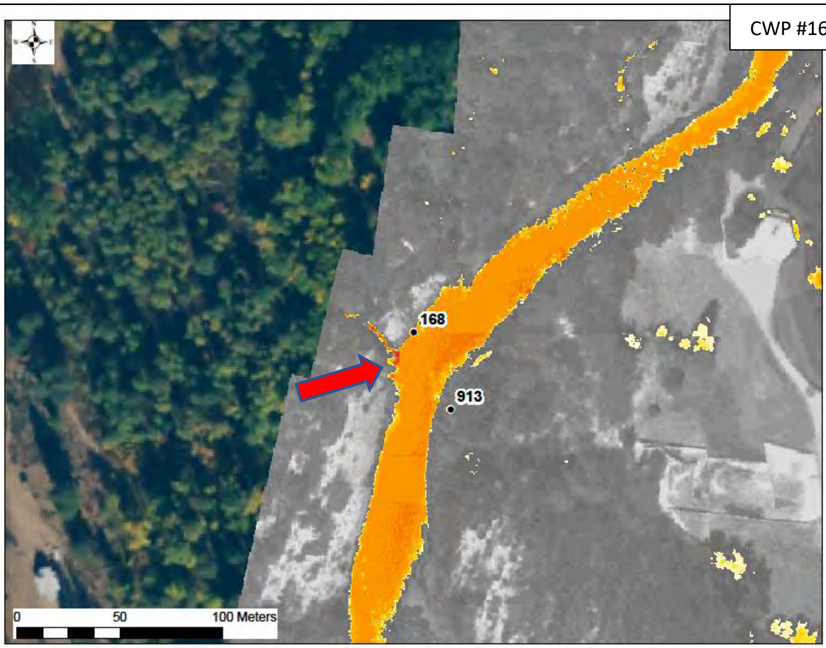


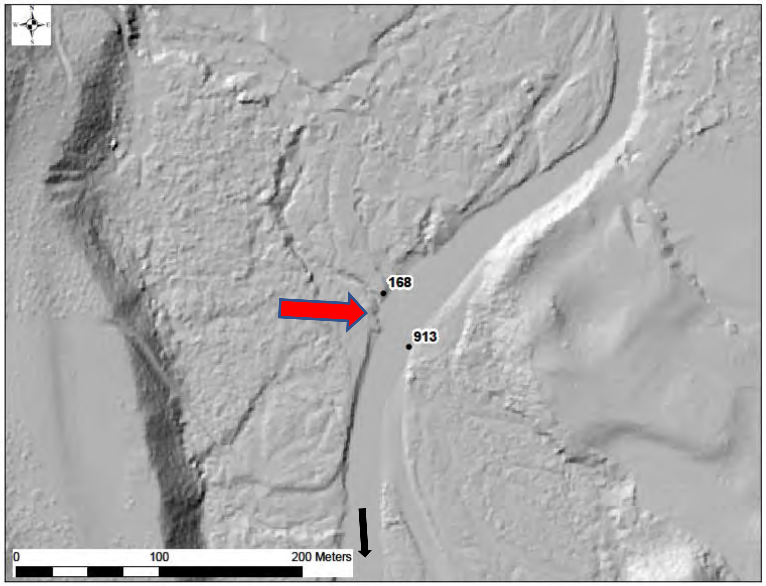
Downstream view along seep area.

Upstream view along seep area. 	

CWP ID#	168	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Pearrygin	**CWP Channel Area (m²)**	
Survey Date	8/19/22	**Max CWP Channel Depth (cm)**	
Survey Time	1540	**Average CWP Channel Depth (cm)**	
River km	11.7	**Min Plume Temp (℃)**	8.9
Latitude	48.54755	**Avg Plume Temp (℃)**	14.5
Longitude	-120.18581	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	40
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	9
Tributary Name	Cub Creek	**Plume Width 2℃ Differential (m)**	1.5
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	10
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	15
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	3
Mainstem Temp (℃)	16.7	**Plume Length 1℃ Differential (m)**	12
Tributary Temp (℃)	14.5	**Plume Area 1℃ Differential (m²)**	36
Min CWP Temp (℃)	14.5	**Fish Presence**	None observed
Average CWP Temp (℃)	14.5	**Fish Species**	
Max Main/CWP Diff (℃)	2.2	**Fish Count**	
Avg Main/CWP Diff (℃)	2.2		
CWP Description	Cub Creek inflow.		
Plume Description	Observed cold seepage thru cobbles at confluence at 12.5C so colder than Cub Creek by appx 2C.		
Restoration Notes	Complexity		

CWP #168_TC_Chewuch - Pearrygin





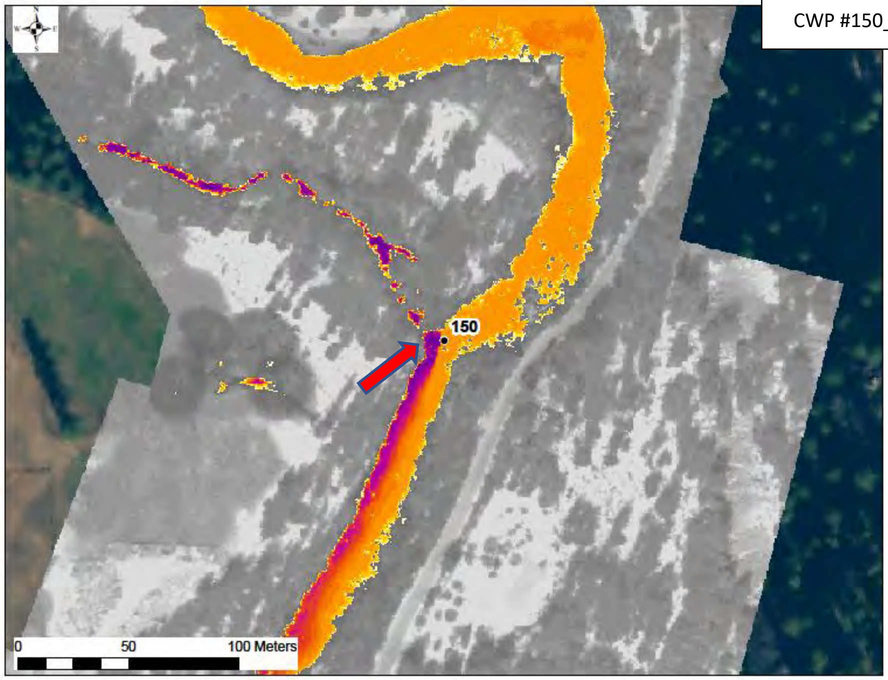
Cub Creek channel.

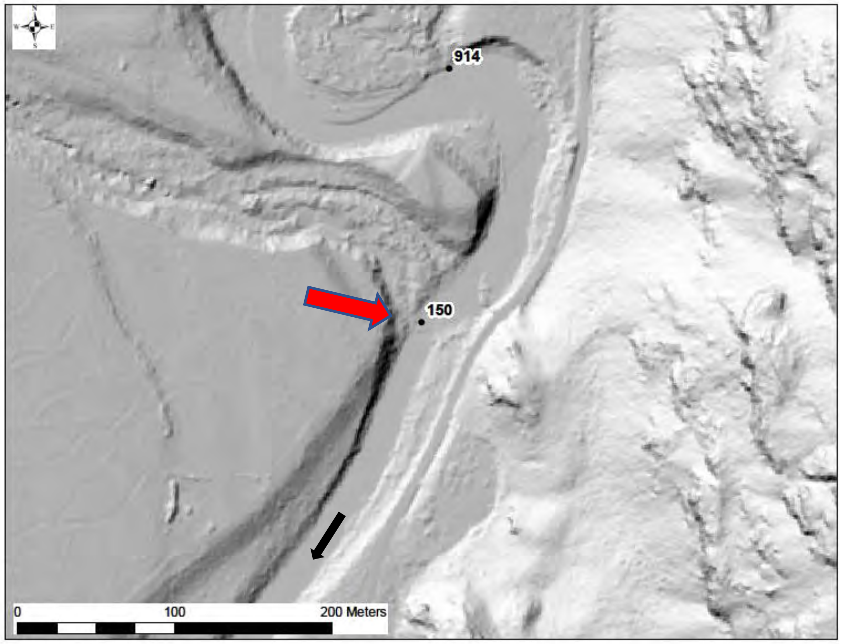
Downstream view from confluence.

Side view of Cub Creek confluence.

CWP ID#	150	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Pearrygin	**CWP Channel Area (m²)**	
Survey Date	8/18/22	**Max CWP Channel Depth (cm)**	
Survey Time	1618	**Average CWP Channel Depth (cm)**	
River km	19.2	**Min Plume Temp (℃)**	11.1
Latitude	48.60327	**Avg Plume Temp (℃)**	14.0
Longitude	-120.16327	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	90
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	40
Tributary Name	Eightmile Creek	**Plume Width 2℃ Differential (m)**	8
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	200
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m²)**	1600
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	11
Mainstem Temp (℃)	18.3	**Plume Length 1℃ Differential (m)**	300
Tributary Temp (℃)	11.1	**Plume Area 1℃ Differential (m²)**	3300
Min CWP Temp (℃)	11.1	**Fish Presence**	None observed
Average CWP Temp (℃)	14.0	**Fish Species**	
Max Main/CWP Diff (℃)	7.2	**Fish Count**	
Avg Main/CWP Diff (℃)	4.3		
CWP Description	High volume and cold tributary.		
Plume Description	Small backwater area off mainstem riffle.		
Restoration Notes	Depth and complexity		

CWP #150_TC_ Chewuch - Pearrygin





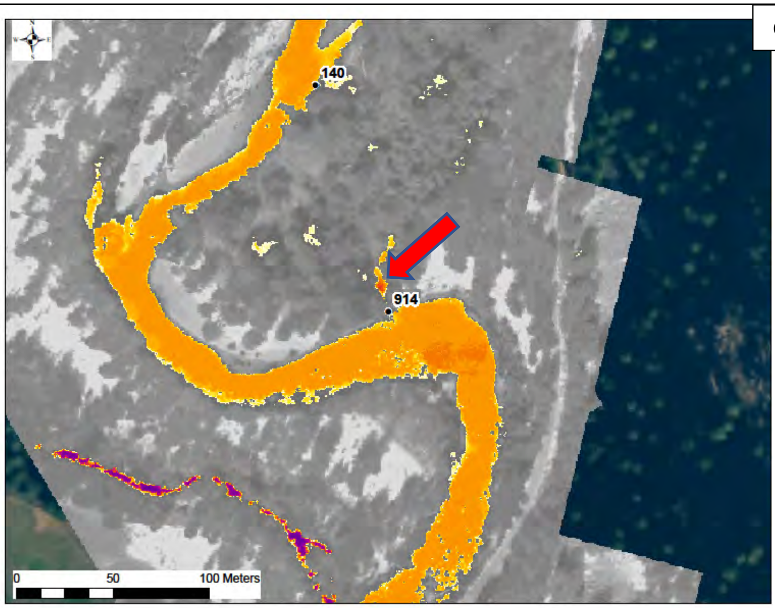
Eightmile Creek confluence.

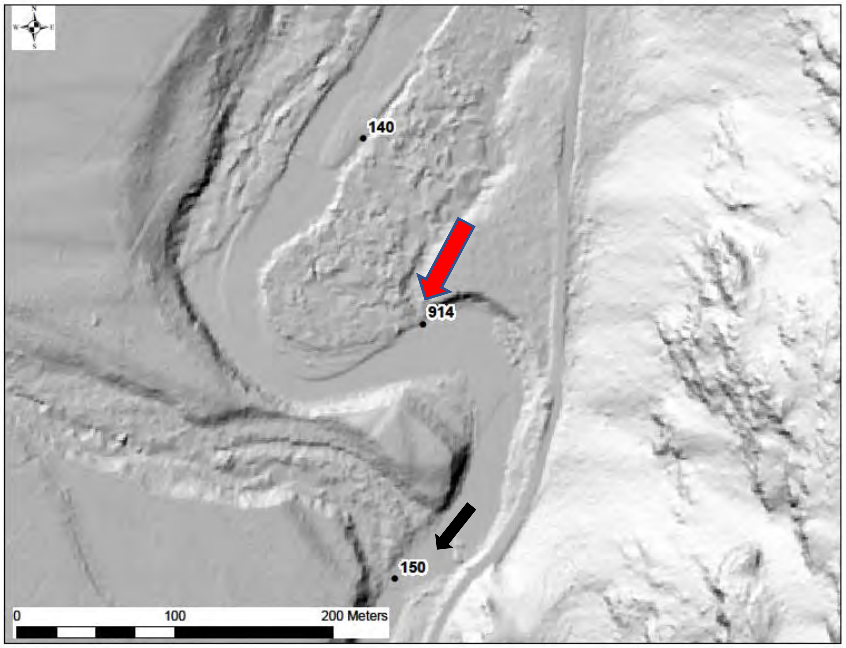

Downstream from confluence along mainstem.


Downstream view of Chewuch mainstem.

CWP ID#	914	**CWP Channel Length (m)**	38
Stream	Chewuch	**CWP Channel Avg Width (m)**	5
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	190
Survey Date	8/22/2022	**Max CWP Channel Depth (cm)**	110
Survey Time	1457	**Average CWP Channel Depth (cm)**	60
River km	19.8	**Min Plume Temp (℃)**	17.1
Latitude	48.60472	**Avg Plume Temp (℃)**	17.5
Longitude	-120.16301	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	4
CWP Source	Alcove	**Avg Plume Depth (cm)**	2
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Sand	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	0.5
Mainstem Temp (℃)	18.8	**Plume Length 1℃ Differential (m)**	0.3
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	0.15
Min CWP Temp (℃)	10.2	**Fish Presence**	None observed
Average CWP Temp (℃)	12.8	**Fish Species**	
Max Main/CWP Diff (℃)	8.6	**Fish Count**	
Avg Main/CWP Diff (℃)	6.0		
CWP Description	Long deep alcove channel. Previous restoration wood installed. Additional wood in adjacent mainstem pool. May have been excavated to obtain observed depth.		
Plume Description	No 2C differential. Very small flows into large pool. Some cold seepage across channel.		
Restoration Notes	Connectivity improvement. Cover. Additional wood placements. YN RM 11-13 project site.		

CWP #914_AL_Chewuch - Doe





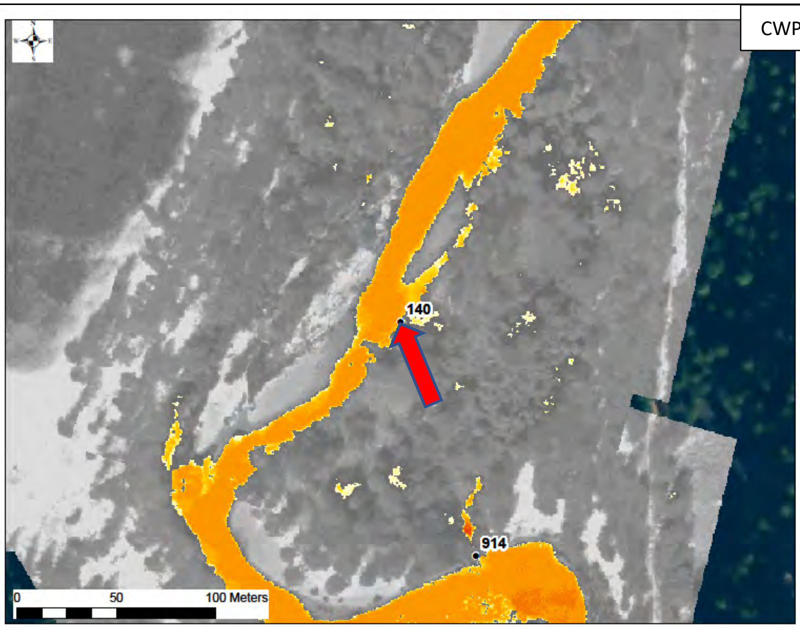
Downstream view in spring channel from upstream end.

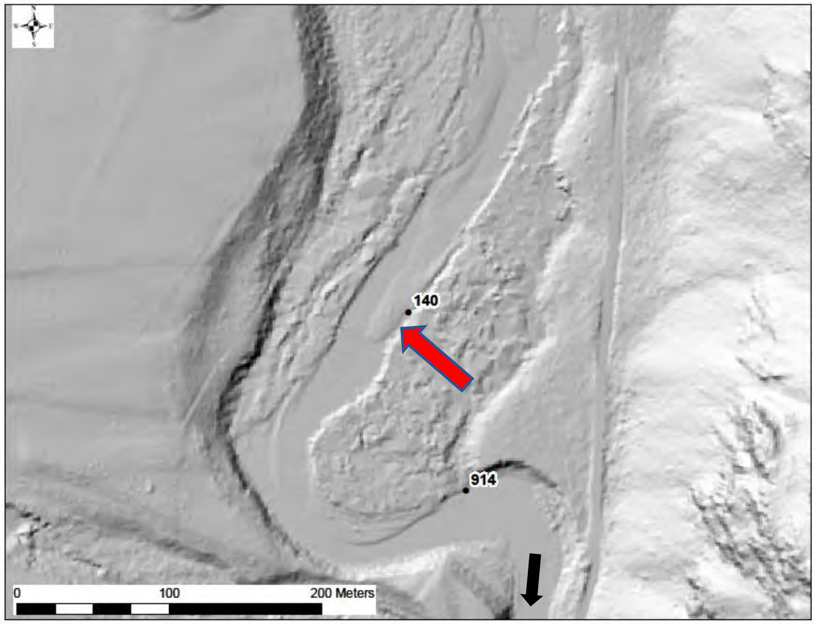
Upstream view from downstream end of channel.

Side view of spring channel confluence with mainstem.

CWP ID#	140	**CWP Channel Length (m)**	30
Stream	Chewuch	**CWP Channel Avg Width (m)**	3.5
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	105
Survey Date	8/22/2022	**Max CWP Channel Depth (cm)**	30
Survey Time	1524	**Average CWP Channel Depth (cm)**	15
River km	19.9	**Min Plume Temp (℃)**	17.8
Latitude	48.60578	**Avg Plume Temp (℃)**	18.2
Longitude	-120.16351	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	25
CWP Source	Alcove	**Avg Plume Depth (cm)**	12
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	4
Mainstem Temp (℃)	19.0	**Plume Length 1℃ Differential (m)**	4
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	16
Min CWP Temp (℃)	11.9	**Fish Presence**	None observed
Average CWP Temp (℃)	14.0	**Fish Species**	
Max Main/CWP Diff (℃)	7.1	**Fish Count**	
Avg Main/CWP Diff (℃)	5.0		
CWP Description	Hyporheic flow into backwater. Well vegetated bank.		
Plume Description	Flow into slow eddy off short riffle. Deposition of post fire fines. No 2C plume.		
Restoration Notes	Complexity.		

CWP #140_AL_Chewuch - Doe





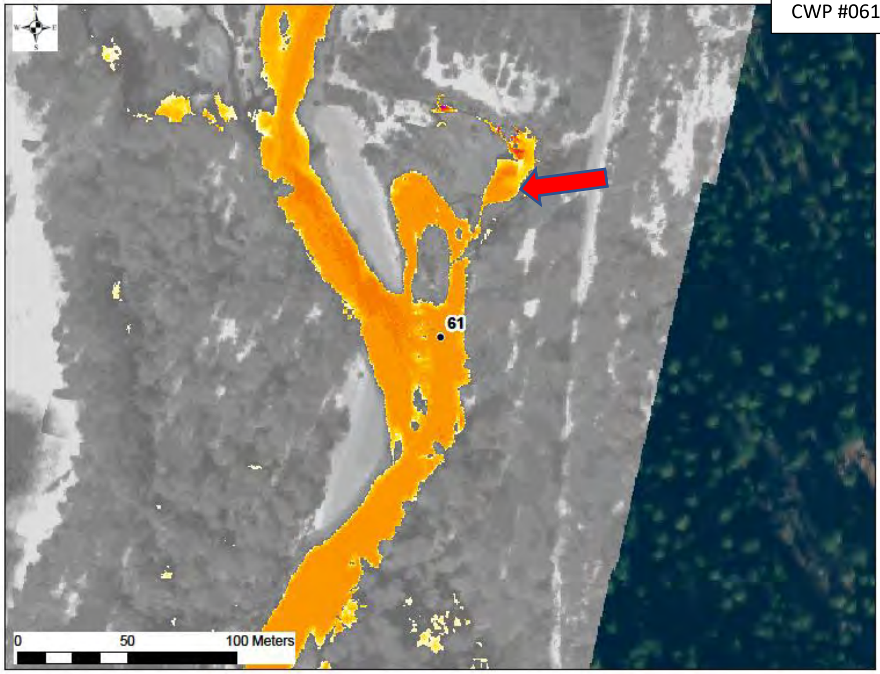
Downstream view in towards mainstem.

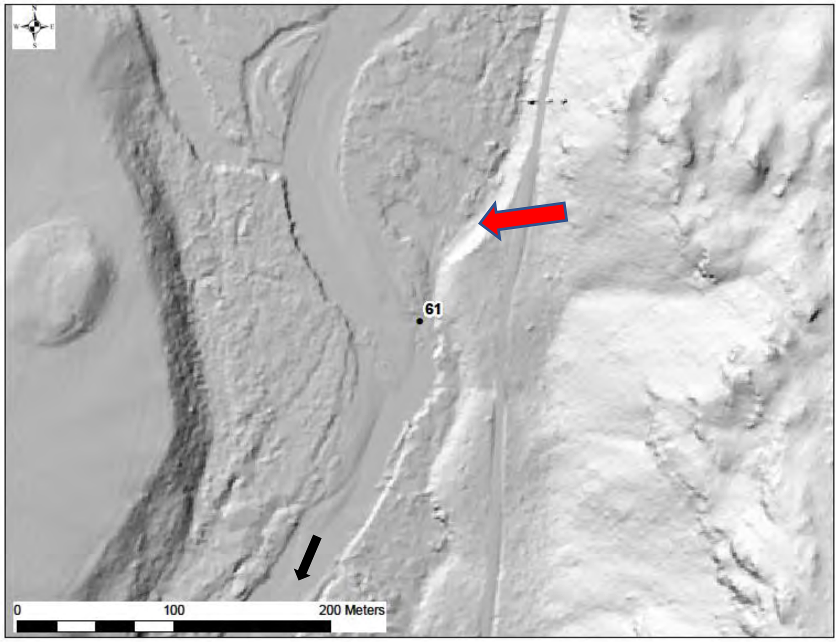
Downstream view of spring channel from top of alcove.

Upstream view along alcove channel and cobble bar.

CWP ID#	61	**CWP Channel Length (m)**	120
Stream	Chewuch	**CWP Channel Avg Width (m)**	5
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	600
Survey Date	8/22/2022	**Max CWP Channel Depth (cm)**	40
Survey Time	1542	**Average CWP Channel Depth (cm)**	25
River km	20.2	**Min Plume Temp (℃)**	17
Latitude	48.60764	**Avg Plume Temp (℃)**	18.3
Longitude	-120.16228	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	12
CWP Source	Springbrook	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	0.2
Dominant Substrate	Sand	**Plume Area 2℃ Differential (m²)**	0.06
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	0.5
Mainstem Temp (℃)	19.1	**Plume Length 1℃ Differential (m)**	0.3
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	0.15
Min CWP Temp (℃)	7.8	**Fish Presence**	Yes
Average CWP Temp (℃)	12.0	**Fish Species**	Coho
Max Main/CWP Diff (℃)	11.3	**Fish Count**	1 parr
Avg Main/CWP Diff (℃)	7.1		
CWP Description	Seeps from wetland area flows down channel to mainstem. Isolated pond near us end is 20C. Lots of 11-12C area within restoration wood placements.		
Plume Description	Very small cold flow into deep mainstem back eddy.		
Restoration Notes	Increased cover. Improved connectivity to mainstem. YN RM 11 -13 project site.		

CWP #061_SB_Chewuch - Doe





Upstream view at mainstem confluence.

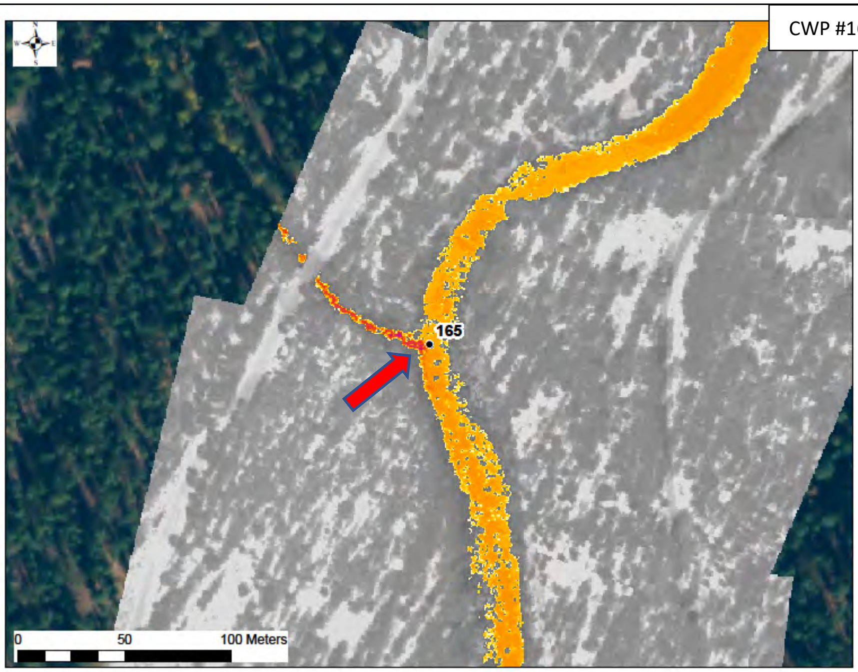
Downstream view at top of channel.

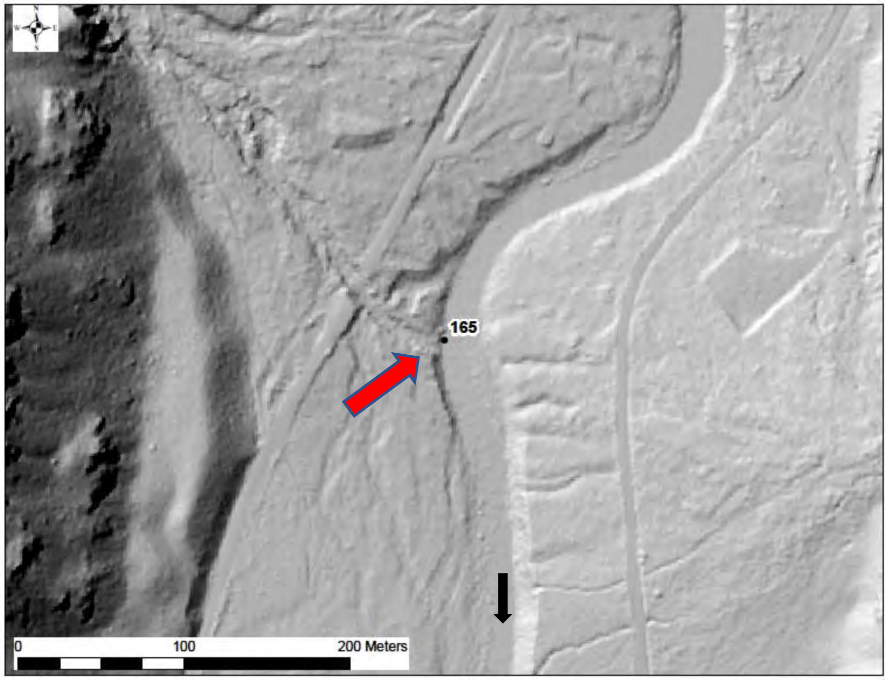
Upstream view into spring channel at confluence with mainstem.

Upstream towards top of channel with restoration wood.

CWP ID#	165	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	
Survey Date	8/22/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1626	**Average CWP Channel Depth (cm)**	
River km	23.5	**Min Plume Temp (℃)**	18.7
Latitude	48.63365	**Avg Plume Temp (℃)**	18.7
Longitude	-120.15667	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	60
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	10
Tributary Name	Falls Creek	**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	19.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)	18.6	**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	18.6	**Fish Presence**	None observed
Average CWP Temp (℃)	18.7	**Fish Species**	
Max Main/CWP Diff (℃)	0.5	**Fish Count**	
Avg Main/CWP Diff (℃)	0.4		
CWP Description	Falls Creek. No 1C colder flow detected.		
Plume Description	Boulder and sand strewn alluvial fan. High energy location. High gradient ds from confluence. No plume more than 0.4C detected.		
Restoration Notes	Complexity and cover. Wood.		

CWP #165_TC_Chewuch - Doe



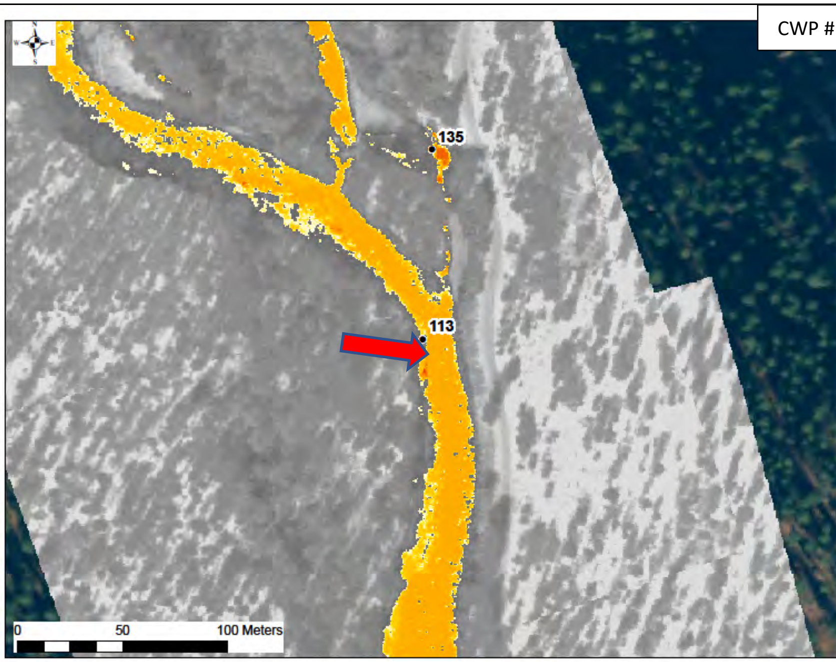


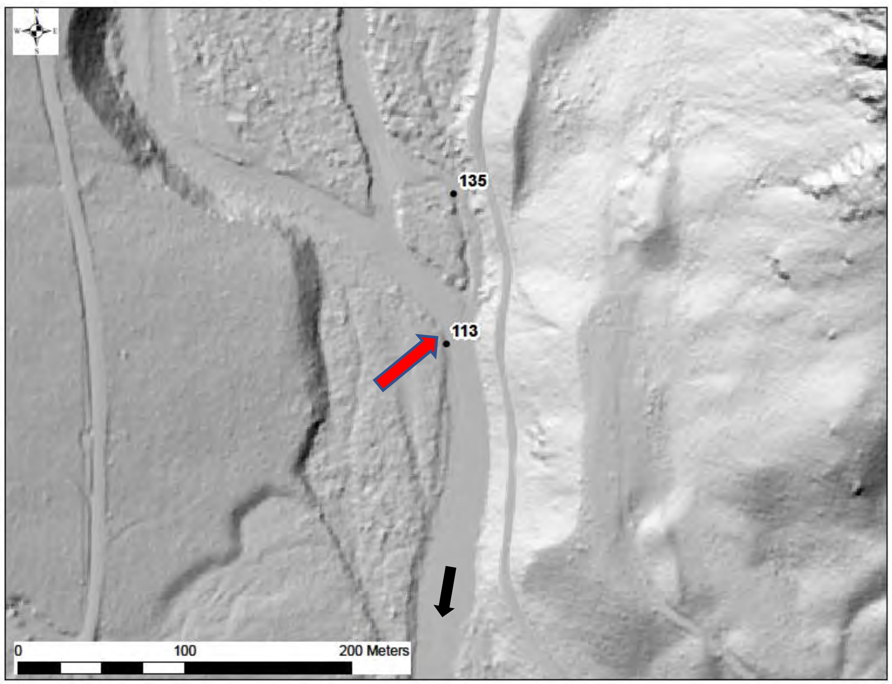
Side view into Falls Creek channel.


Upstream view from plume area.

CWP ID#	113	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1343	**Average CWP Channel Depth (cm)**	
River km	29.9	**Min Plume Temp (℃)**	14.1
Latitude	48.68165	**Avg Plume Temp (℃)**	15.0
Longitude	-120.12979	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	8
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	4
Tributary Name		**Plume Width 2℃ Differential (m)**	0.1
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	0.1
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	0.01
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	16.7	**Plume Length 1℃ Differential (m)**	0.1
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	0.1
Min CWP Temp (℃)	14.1	**Fish Presence**	None observed
Average CWP Temp (℃)	15.0	**Fish Species**	
Max Main/CWP Diff (℃)	2.6	**Fish Count**	
Avg Main/CWP Diff (℃)	1.7		
CWP Description	Very low volume lateral seep. Barely detectable and isolated. Flow from cobble gravel point bar.		
Plume Description	Very small		
Restoration Notes	Depth and complexity. Good pool habitat adjacent.		

CWP #113_LS_Chewuch - Doe



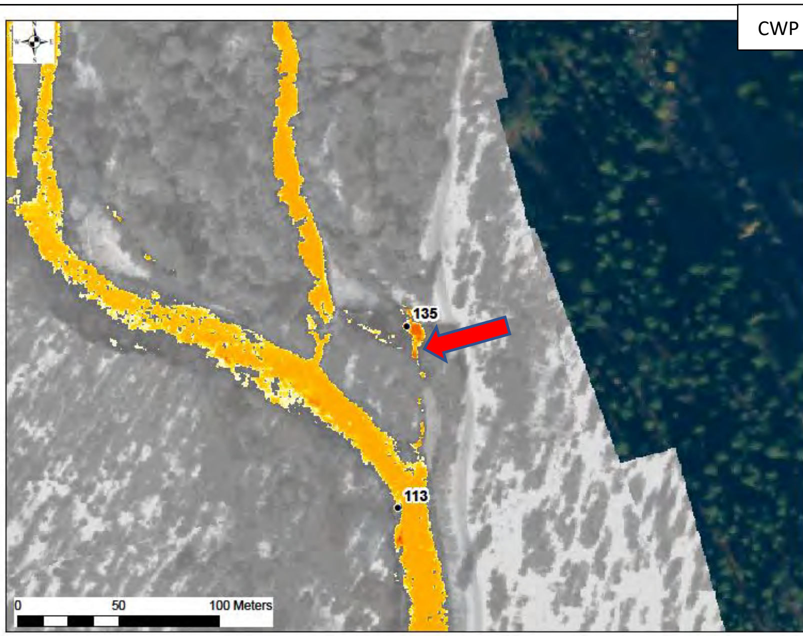


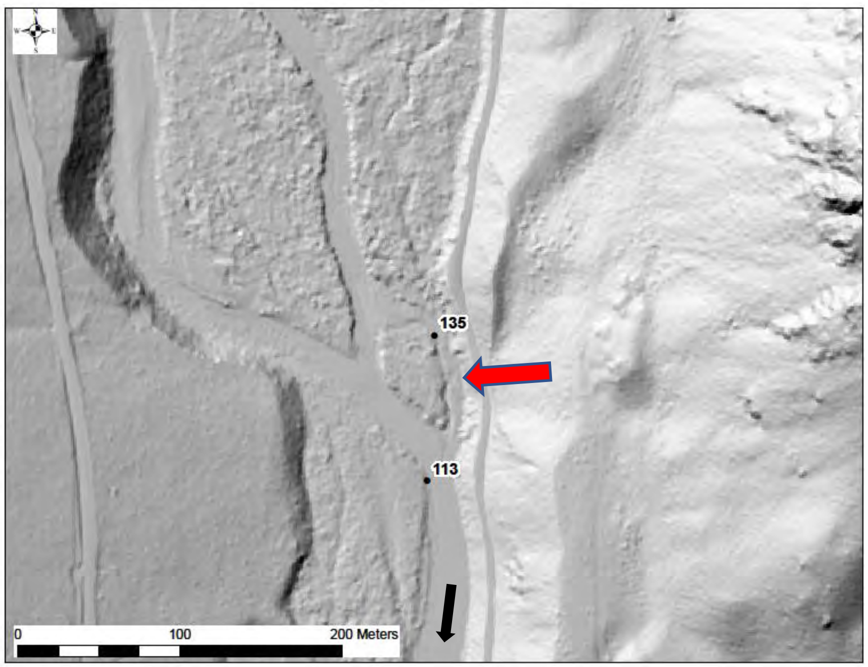
Downstream view along seep.

 Upstream view along seep. CWP #135 channel is at top right.	

CWP ID#	135	**CWP Channel Length (m)**	12
Stream	Chewuch	**CWP Channel Avg Width (m)**	2
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	24
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	42
Survey Time	1354	**Average CWP Channel Depth (cm)**	10
River km	29.9	**Min Plume Temp (℃)**	
Latitude	48.68246	**Avg Plume Temp (℃)**	
Longitude	-120.12972	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	16.7	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	9.4	**Fish Presence**	Yes
Average CWP Temp (℃)	11.8	**Fish Species**	Coho
Max Main/CWP Diff (℃)	7.4	**Fish Count**	10 parr
Avg Main/CWP Diff (℃)	4.9		
CWP Description	Seep from steep bank with riprap. In side channel but mostly dry downstream. Few small isolated pools. Would be springbrook with more flow.		
Plume Description	No plume or flow at side channel confluence.		
Restoration Notes	Likely PWI restoration project large wood longitudinal along riprap. Connectivity.		

CWP #135_AL_Chewuch - Doe





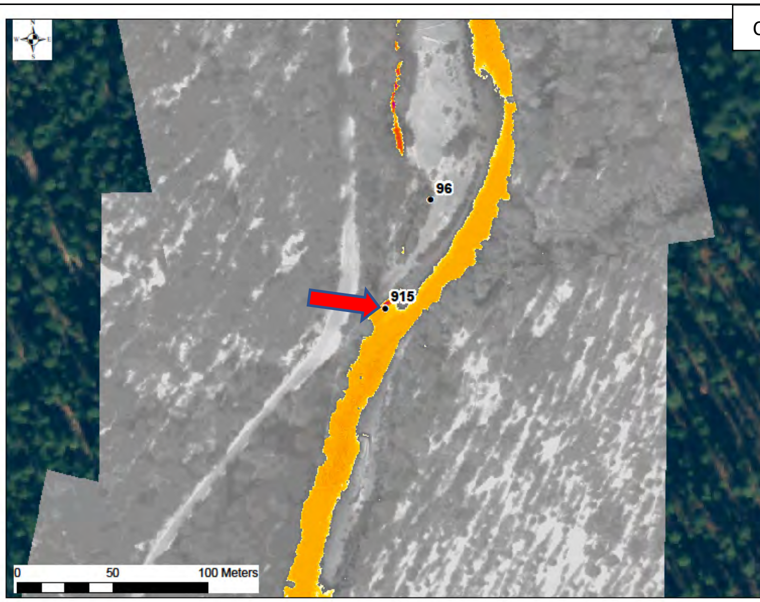
Upstream view into side channel.

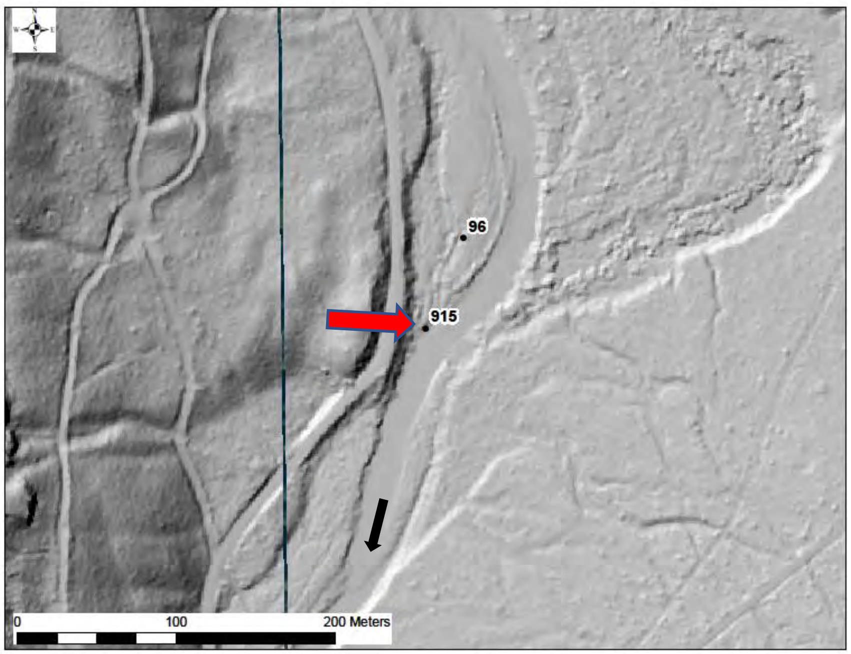

Downstream view of restoration logs.


Upstream view of seepage source.

CWP ID#	915	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1444	**Average CWP Channel Depth (cm)**	
River km	33.1	**Min Plume Temp (℃)**	10.8
Latitude	48.70704	**Avg Plume Temp (℃)**	14.5
Longitude	-120.12378	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	7
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	3
Tributary Name		**Plume Width 2℃ Differential (m)**	0.1
Habitat Type	Backwater	**Plume Length 2℃ Differential (m)**	8
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	0.8
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	0.3
Mainstem Temp (℃)	17.5	**Plume Length 1℃ Differential (m)**	10
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	3
Min CWP Temp (℃)	10.8	**Fish Presence**	None observed
Average CWP Temp (℃)	12.0	**Fish Species**	
Max Main/CWP Diff (℃)	6.7	**Fish Count**	
Avg Main/CWP Diff (℃)	5.5		
CWP Description	Lateral seep into backwater.		
Plume Description	Seepage from ds end of #096 springbrook channel. Likely same source water.		
Restoration Notes	Complexity and depth.		

CWP #915_LS_Chewuch - Doe



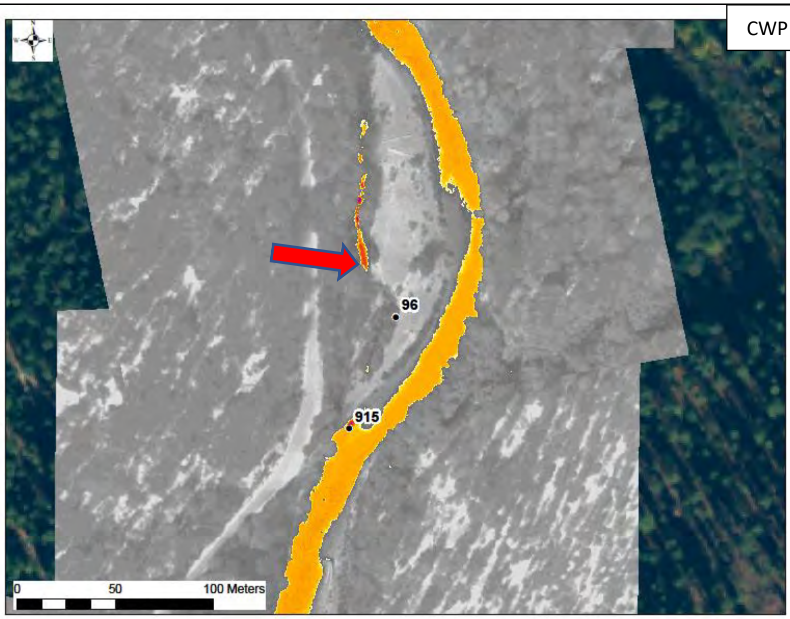


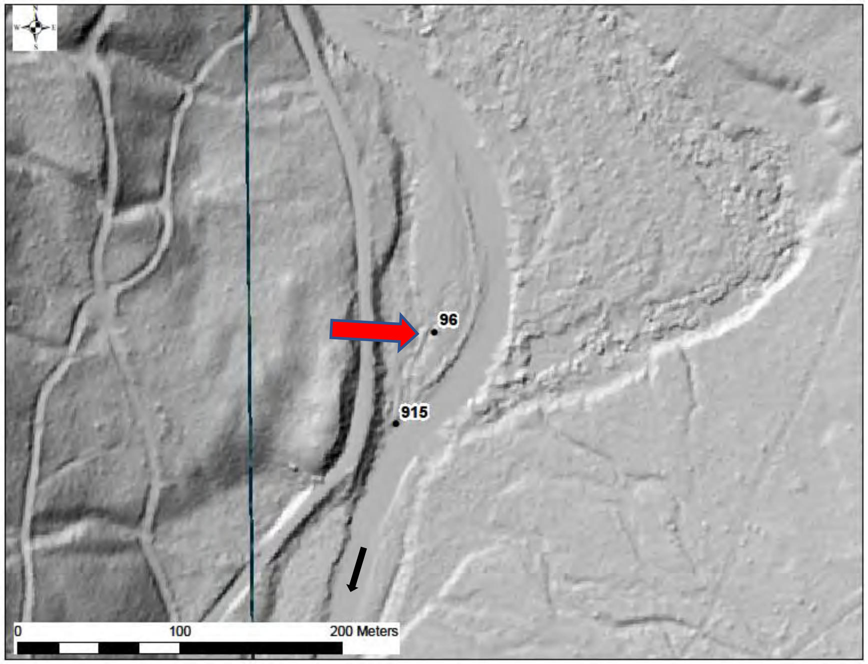
Downstream view of seeps into backwater.

Upstream view along seeps from plume area.

CWP ID#	096	**CWP Channel Length (m)**	80
Stream	Chewuch	**CWP Channel Avg Width (m)**	3
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	240
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	40
Survey Time	1459	**Average CWP Channel Depth (cm)**	15
River km	33.2	**Min Plume Temp (℃)**	
Latitude	48.70755	**Avg Plume Temp (℃)**	
Longitude	-120.12345	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	17.5	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	6.8	**Fish Presence**	None observed
Average CWP Temp (℃)	11	**Fish Species**	
Max Main/CWP Diff (℃)	10.7	**Fish Count**	
Avg Main/CWP Diff (℃)	6.5		
CWP Description	High flow channel seepage into several isolated pools. Upstream pool is largest coldest most volume. Very cold.		
Plume Description	Plume into mainstem CWP#915, so no plume measured. Likely these are similar groundwater inputs.		
Restoration Notes	Connectivity.		

CWP #096_SB_Chewuch - Doe



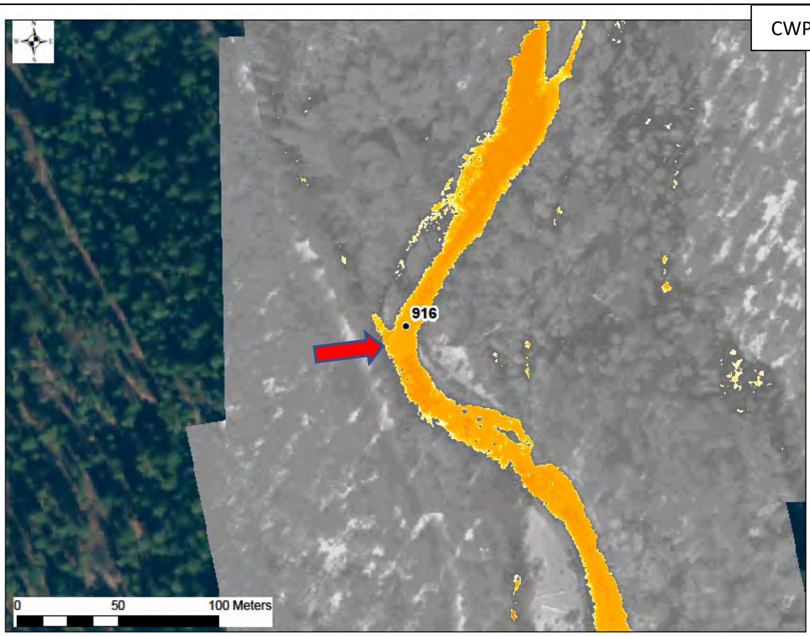


Downstream view in spring channel towards mainstem.

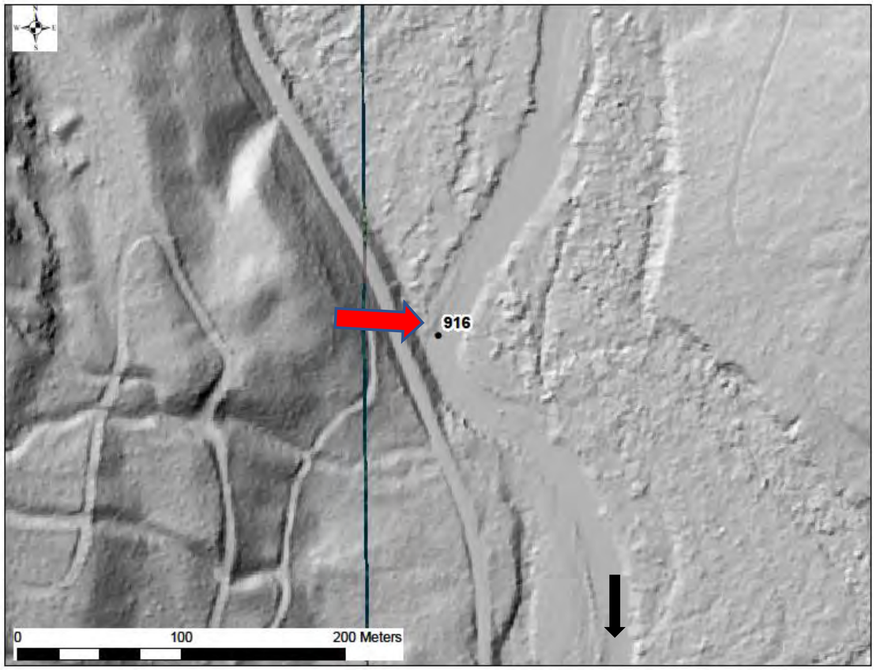
Downstream view of spring channel from top source area.

Upstream view from in spring channel.

CWP ID#	916	**CWP Channel Length (m)**	12
Stream	Chewuch	**CWP Channel Avg Width (m)**	2
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	24
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	10
Survey Time	1528	**Average CWP Channel Depth (cm)**	4
River km	33.5	**Min Plume Temp (℃)**	14.5
Latitude	48.70957	**Avg Plume Temp (℃)**	16.0
Longitude	-120.12439	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	10
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	3
Tributary Name		**Plume Width 2℃ Differential (m)**	0.2
Habitat Type	Backwater	**Plume Length 2℃ Differential (m)**	3
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	0.6
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.3
Mainstem Temp (℃)	18.0	**Plume Length 1℃ Differential (m)**	8
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	2.4
Min CWP Temp (℃)	12.2	**Fish Presence**	None observed
Average CWP Temp (℃)	15.0	**Fish Species**	
Max Main/CWP Diff (℃)	5.8	**Fish Count**	
Avg Main/CWP Diff (℃)	3.0		
CWP Description	Lateral seep into mainstem riffle and backwater. Low volume.		
Plume Description	Shallow and not large. Mostly seepage.		
Restoration Notes	Depth and complexity.		



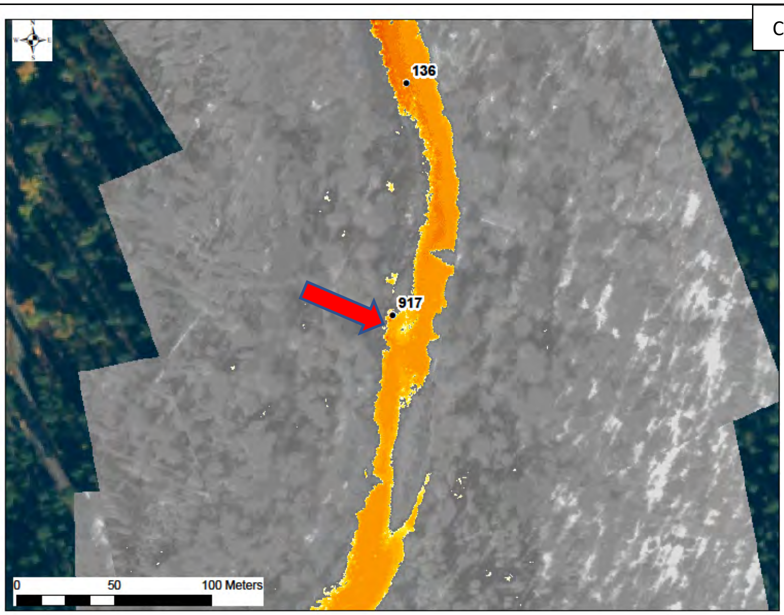
CWP #916_LS_Chewuch - Doe



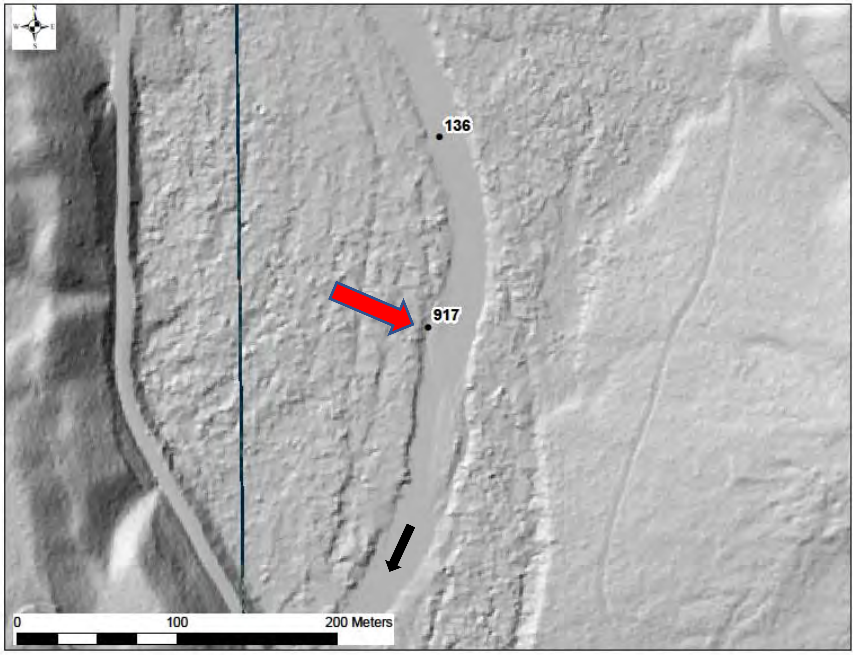
Downstream view along seeps.

Upstream view from plume area in mainstem backwater.

CWP ID#	917	**CWP Channel Length (m)**	24
Stream	Chewuch	**CWP Channel Avg Width (m)**	2
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	48
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	11
Survey Time	1548	**Average CWP Channel Depth (cm)**	5
River km	33.7	**Min Plume Temp (°C)**	10.2
Latitude	48.71167	**Avg Plume Temp (°C)**	13.0
Longitude	-120.1234	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	10
CWP Source	Alcove	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2°C Differential (m)**	0.2
Habitat Type	Riffle	**Plume Length 2°C Differential (m)**	8
Dominant Substrate	Cobble	**Plume Area 2°C Differential (m²)**	1.6
Dominant Cover	Vegetation	**Plume Width 1°C Differential (m)**	0.3
Mainstem Temp (°C)	17.5	**Plume Length 1°C Differential (m)**	10
Tributary Temp (°C)		**Plume Area 1°C Differential (m²)**	3
Min CWP Temp (°C)	10.6	**Fish Presence**	Yes
Average CWP Temp (°C)	12.5	**Fish Species**	Coho
Max Main/CWP Diff (°C)	6.9	**Fish Count**	
Avg Main/CWP Diff (°C)	5.0		
CWP Description	Seepage along bank ds of point bar. Small alcove channel flows to mainstem riffle.		
Plume Description	Narrow. Low volume. Seepage extends down along cobble bank.		
Restoration Notes	Complexity		

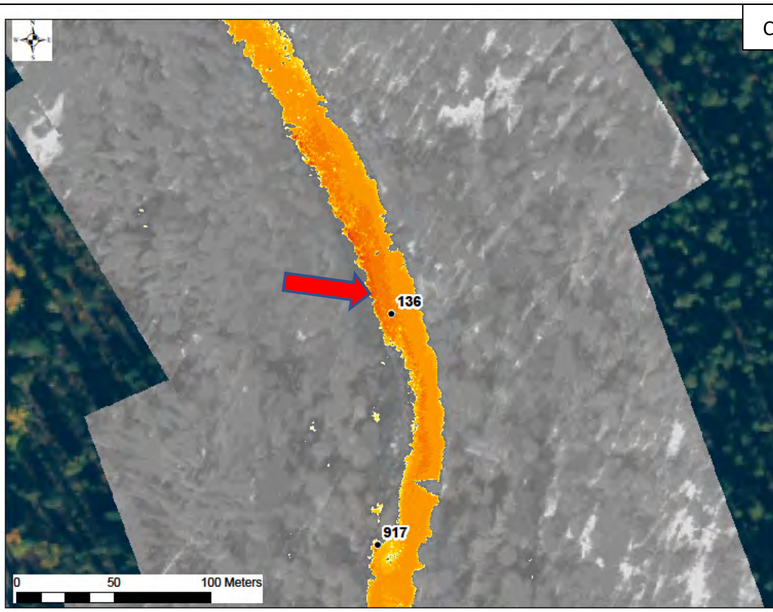


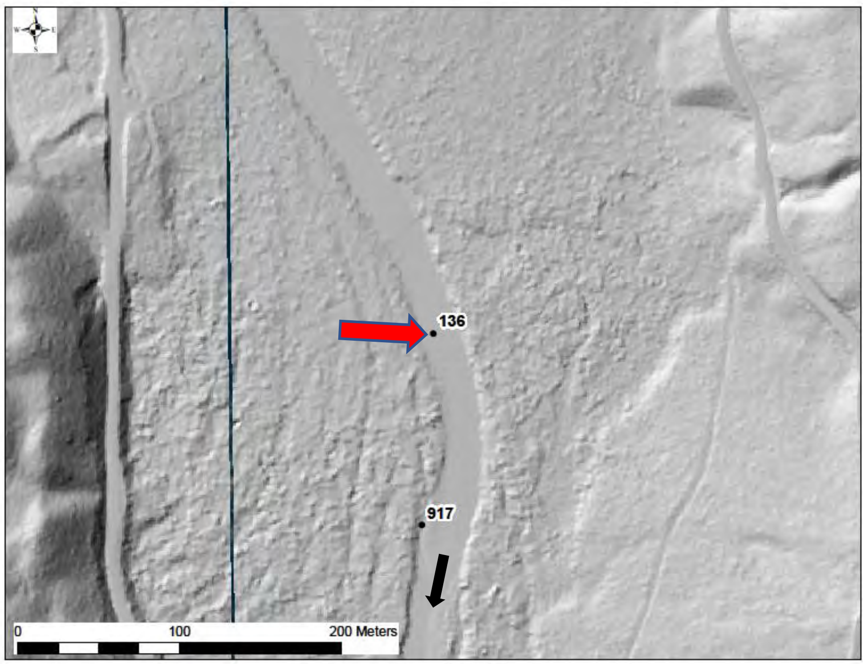
CWP #917_AL_Chewuch - Doe



CWP ID#	136	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1607	**Average CWP Channel Depth (cm)**	
River km	33.9	**Min Plume Temp (℃)**	12.2
Latitude	48.71274	**Avg Plume Temp (℃)**	15.0
Longitude	-120.12329	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	12
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	0.2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	80
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	16
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.6
Mainstem Temp (℃)	17.5	**Plume Length 1℃ Differential (m)**	110
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	66
Min CWP Temp (℃)	11.1	**Fish Presence**	None observed
Average CWP Temp (℃)	15.0	**Fish Species**	
Max Main/CWP Diff (℃)	6.4	**Fish Count**	
Avg Main/CWP Diff (℃)	2.5		
CWP Description	Long lateral seep from cobble.		
Plume Description	Narrow band along right shore.		
Restoration Notes	Depth and complexity.		

CWP #136_LS_Chewuch - Doe

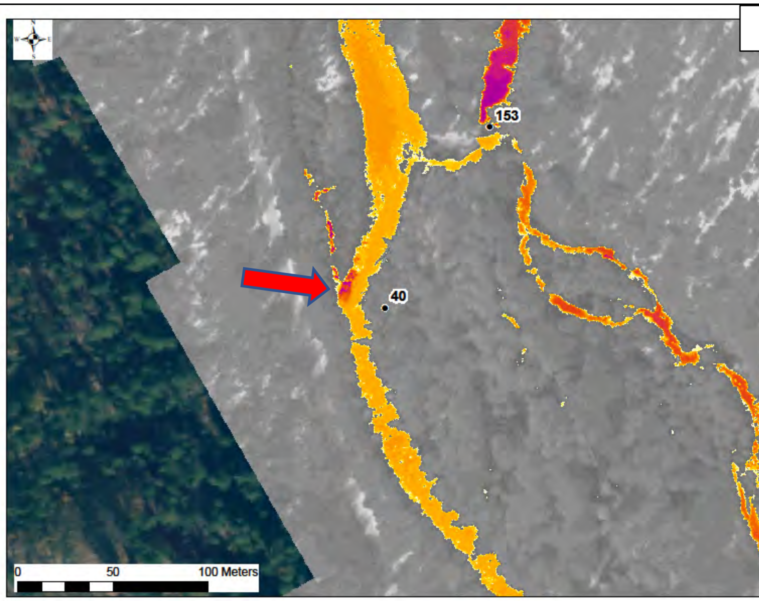


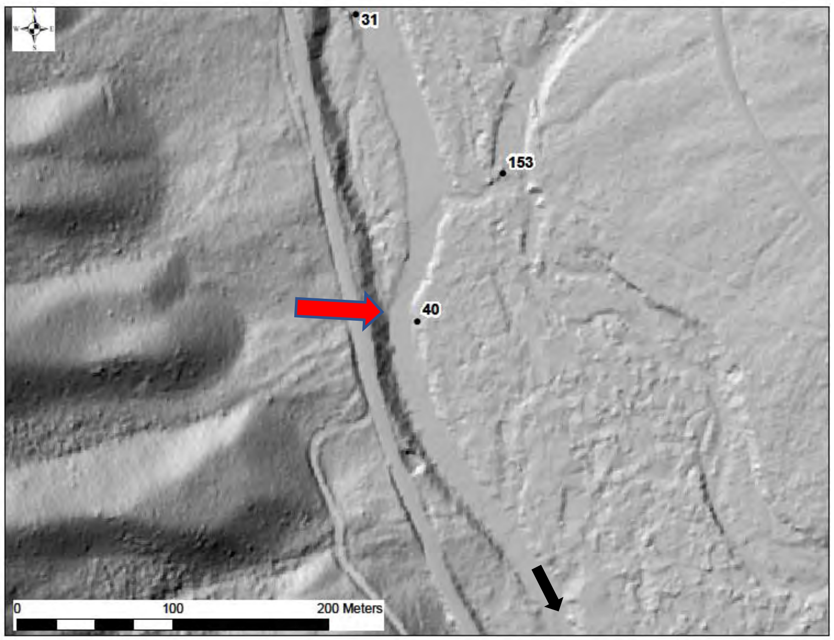


Downstream view along seepage area.

CWP ID#	040	**CWP Channel Length (m)**	100
Stream	Chewuch	**CWP Channel Avg Width (m)**	3
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	300
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	35
Survey Time	1723	**Average CWP Channel Depth (cm)**	15
River km	35.9	**Min Plume Temp (℃)**	8.5
Latitude	48.72728	**Avg Plume Temp (℃)**	16
Longitude	-120.13585	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	45
CWP Source	Springbrook	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	8
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	8
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	18.7	**Plume Length 1℃ Differential (m)**	16
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	32
Min CWP Temp (℃)	7.0	**Fish Presence**	None observed
Average CWP Temp (℃)	8.0	**Fish Species**	
Max Main/CWP Diff (℃)	11.7	**Fish Count**	
Avg Main/CWP Diff (℃)	10.7		
CWP Description	Perched spring channel with consistent cold temps. High volume. Complex.		
Plume Description	Flow into small backwater with high volume. Some seepage us of channel confluence thru cobbles.		
Restoration Notes	Complexity. Connectivity upstream.		

CWP #040_SB_Cheuwch - Doe





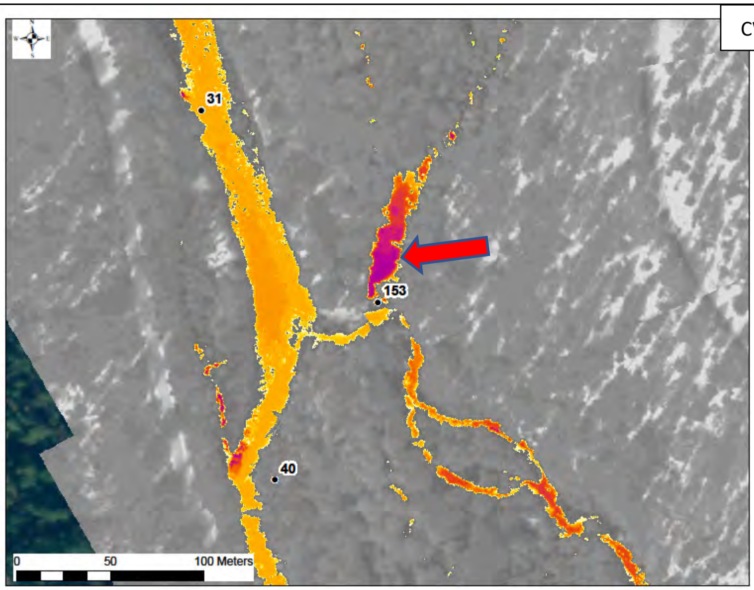
Downstream view along seeps towards mainstem.

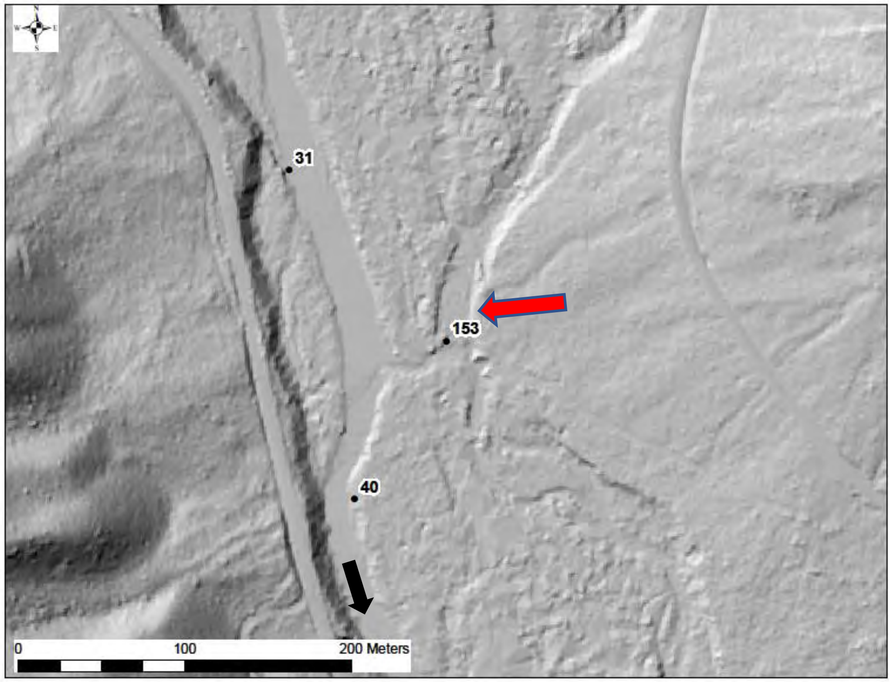

Side view of seeps.


Upstream view of spring channel from plume area.

CWP ID#	153	**CWP Channel Length (m)**	250
Stream	Chewuch	**CWP Channel Avg Width (m)**	10
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	2500
Survey Date	8/25/2022	**Max CWP Channel Depth (cm)**	60
Survey Time	1306	**Average CWP Channel Depth (cm)**	15
River km	35.9	**Min Plume Temp (℃)**	
Latitude	48.72813	**Avg Plume Temp (℃)**	
Longitude	-120.13509	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	
Tributary Name	No Snake Creek	**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	17.7	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)	11.8	**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	10.8	**Fish Presence**	None observed
Average CWP Temp (℃)	11.0	**Fish Species**	
Max Main/CWP Diff (℃)	6.9	**Fish Count**	
Avg Main/CWP Diff (℃)	6.7		
CWP Description	High volume spring creek complex. Pools and flowing channels lead us to source in dense forest.		
Plume Description	Flows into almost disconnected side channel. Difficult to determine plume as side channel cold and variable 8-12C.		
Restoration Notes	Connectivity. Fairly complex habitat exists. Reach based within this cold reach.		

CWP #153_TC_Chewuch - Doe





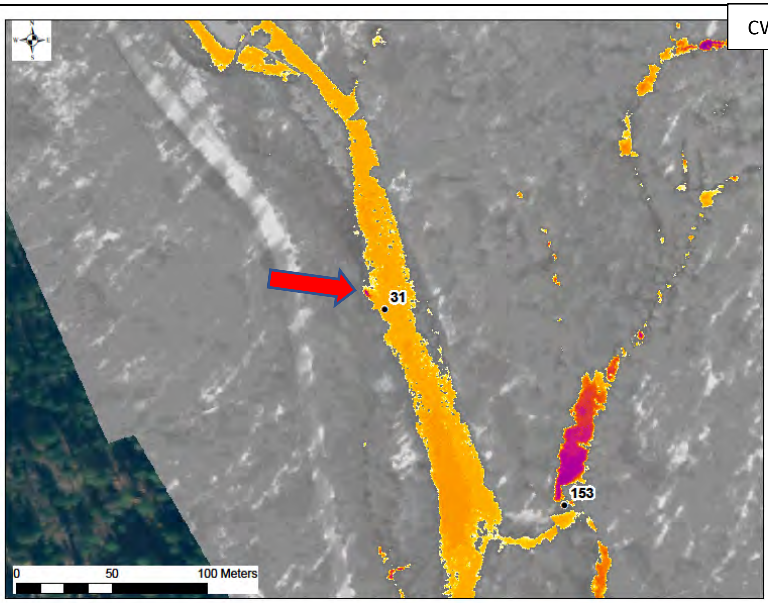
Side view into spring channel at confluence.

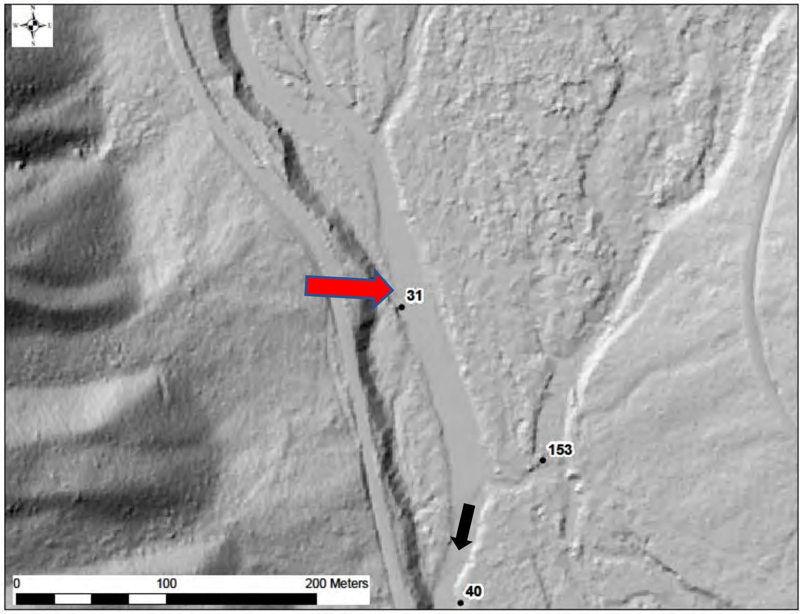
Downstream view in upper spring channel.

Downstream view of spring channel pool near confluence.

CWP ID#	31	**CWP Channel Length (m)**	4
Stream	Chewuch	**CWP Channel Avg Width (m)**	1
Assessment Unit	Chewuch - Doe	**CWP Channel Area (m²)**	4
Survey Date	8/24/2022	**Max CWP Channel Depth (cm)**	9
Survey Time	1702	**Average CWP Channel Depth (cm)**	5
River km	36	**Min Plume Temp (℃)**	14.2
Latitude	48.72906	**Avg Plume Temp (℃)**	16.0
Longitude	-120.13636	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	9
CWP Source	Alcove	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	0.2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	3
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	0.6
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.5
Mainstem Temp (℃)	18.6	**Plume Length 1℃ Differential (m)**	5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	2.5
Min CWP Temp (℃)	6.6	**Fish Presence**	None observed
Average CWP Temp (℃)	8.5	**Fish Species**	
Max Main/CWP Diff (℃)	12.0	**Fish Count**	
Avg Main/CWP Diff (℃)	10.1		
CWP Description	Short alcove channel downstream end of small high flow channel. Low volume. Cold.		
Plume Description	Minimal flow into small mainstem backwater		
Restoration Notes	Depth and complexity.		

CWP #031_AL_Chewuch - Doe



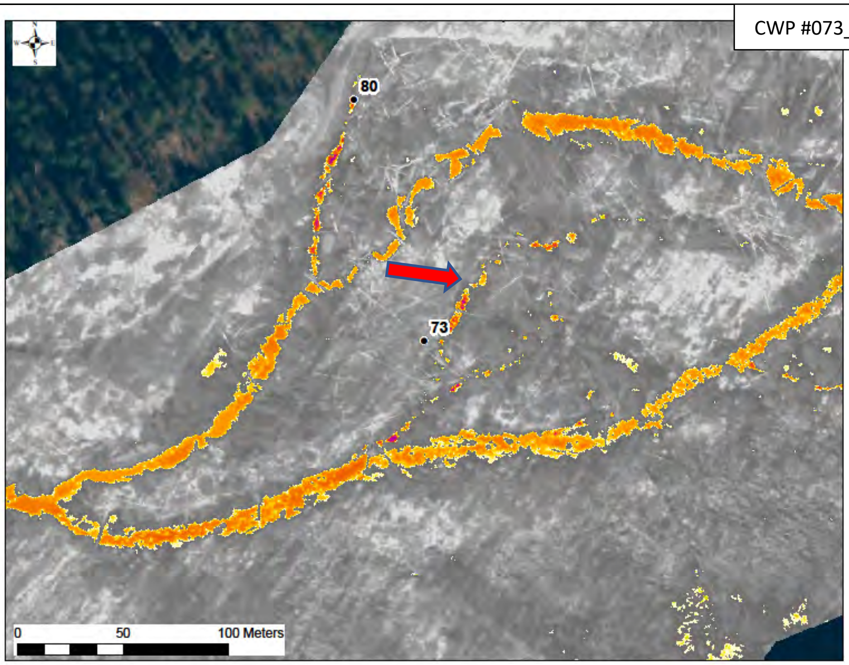


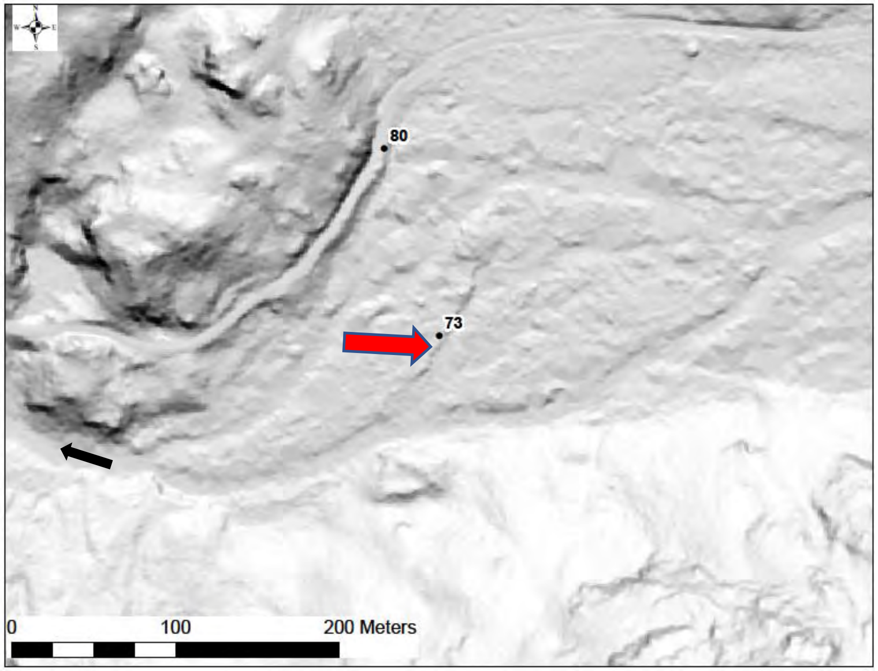
Downstream view in alcove channel towards mainstem.

Upstream view from plume area into alcove channel.

CWP ID#	073	**CWP Channel Length (m)**	250
Stream	Chewuch	**CWP Channel Avg Width (m)**	5
Assessment Unit	Chewuch - Thirtymile	**CWP Channel Area (m²)**	1250
Survey Date	8/25/2022	**Max CWP Channel Depth (cm)**	30
Survey Time	1452	**Average CWP Channel Depth (cm)**	8
River km	43.8	**Min Plume Temp (℃)**	13.1
Latitude	48.78328	**Avg Plume Temp (℃)**	15.0
Longitude	-120.10087	**Min Plume Depth (cm)**	1
River Bank	Center	**Max Plume Depth (cm)**	32
CWP Source	Springbrook	**Avg Plume Depth (cm)**	12
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	18
Dominant Substrate	Sand	**Plume Area 2℃ Differential (m²)**	5.4
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	17.1	**Plume Length 1℃ Differential (m)**	33
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	33
Min CWP Temp (℃)	8.3	**Fish Presence**	None observed
Average CWP Temp (℃)	10.2	**Fish Species**	
Max Main/CWP Diff (℃)	8.8	**Fish Count**	
Avg Main/CWP Diff (℃)	6.9		
CWP Description	Heavily vegetated and woody. Flows into mainstem. To east of #080 side channel.		
Plume Description	Spring channel flows into cobble mainstem. Tight to right bank. Good volume.		
Restoration Notes	Connectivity. Well wooded and vegetated spring channel presently.		

CWP #073_SB_Chewuch - Thirtymile



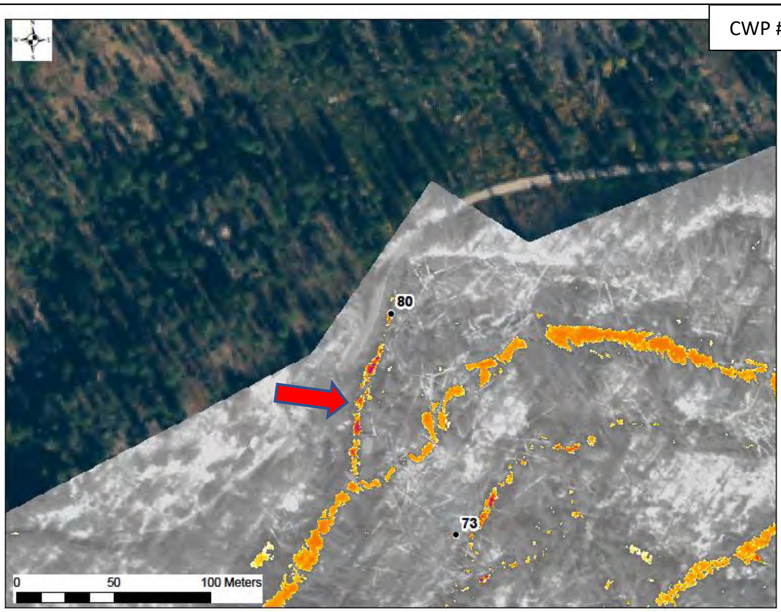


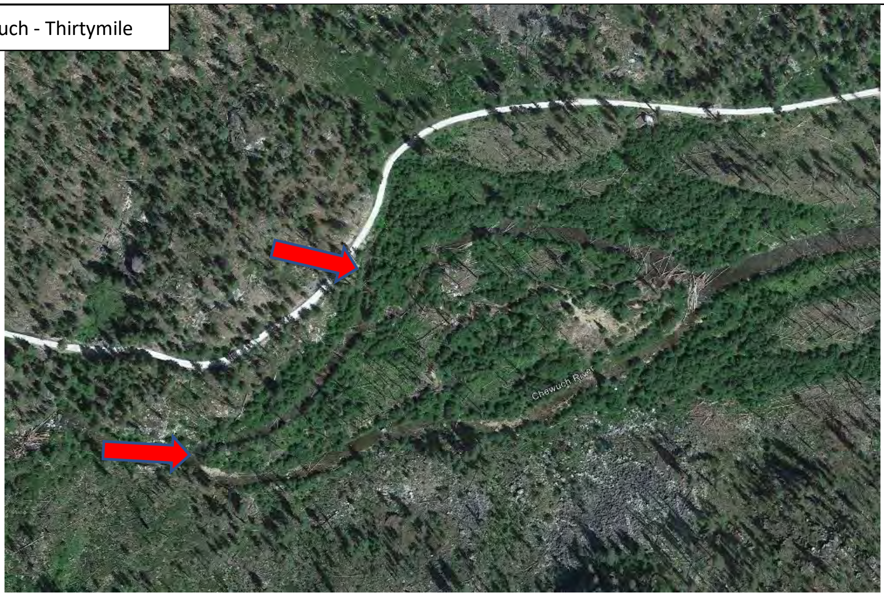
Upstream view of mainstem from plume area.

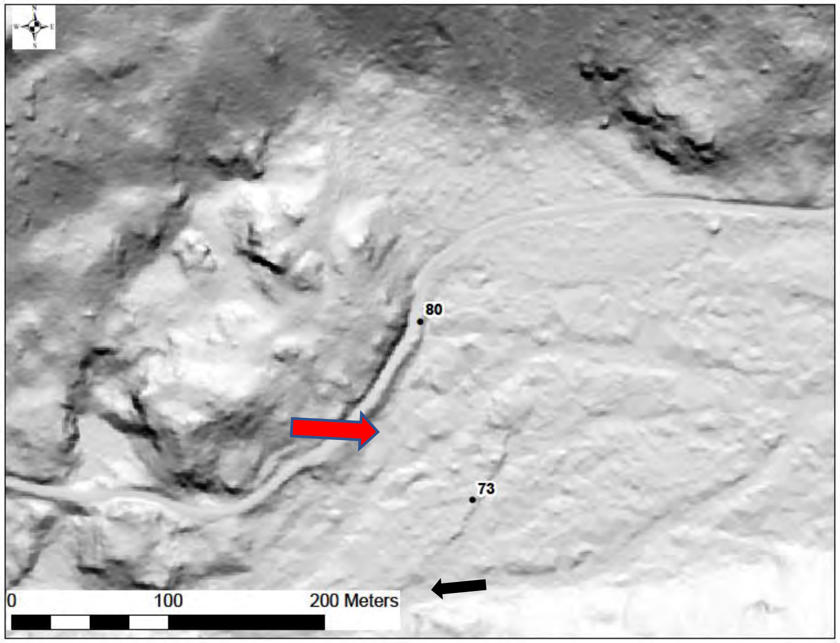
Downstream view in spring channel.

CWP ID#	080	**CWP Channel Length (m)**	200
Stream	Chewuch	**CWP Channel Avg Width (m)**	6
Assessment Unit	Chewuch - Thirtymile	**CWP Channel Area (m^2)**	1200
Survey Date	8/25/2022	**Max CWP Channel Depth (cm)**	30
Survey Time	1423	**Average CWP Channel Depth (cm)**	15
River km	43.8	**Min Plume Temp (℃)**	14.5
Latitude	48.78431	**Avg Plume Temp (℃)**	16.2
Longitude	-120.10131	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	45
CWP Source	Springbrook	**Avg Plume Depth (cm)**	15
Tributary Name		**Plume Width 2℃ Differential (m)**	1.5
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	2
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m^2)**	3
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	17.2	**Plume Length 1℃ Differential (m)**	5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	10
Min CWP Temp (℃)	8.6	**Fish Presence**	None observed
Average CWP Temp (℃)	10.5	**Fish Species**	
Max Main/CWP Diff (℃)	8.6	**Fish Count**	
Avg Main/CWP Diff (℃)	6.7		
CWP Description	Heavily vegetated springbrook. Several old beaver dams ponding. Few ponds with connecting channels. Cold. West of CWP #073.		
Plume Description	Flows into side channel pool. Small plume.		
Restoration Notes	Connectivity.		

CWP #080_SB_Chewuch - Thirtymile







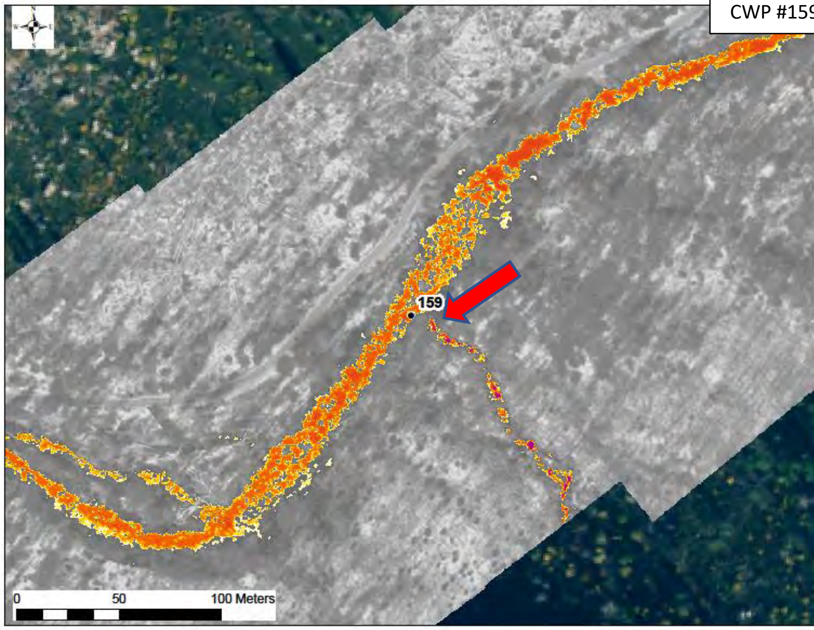
Downstream view in spring channel.

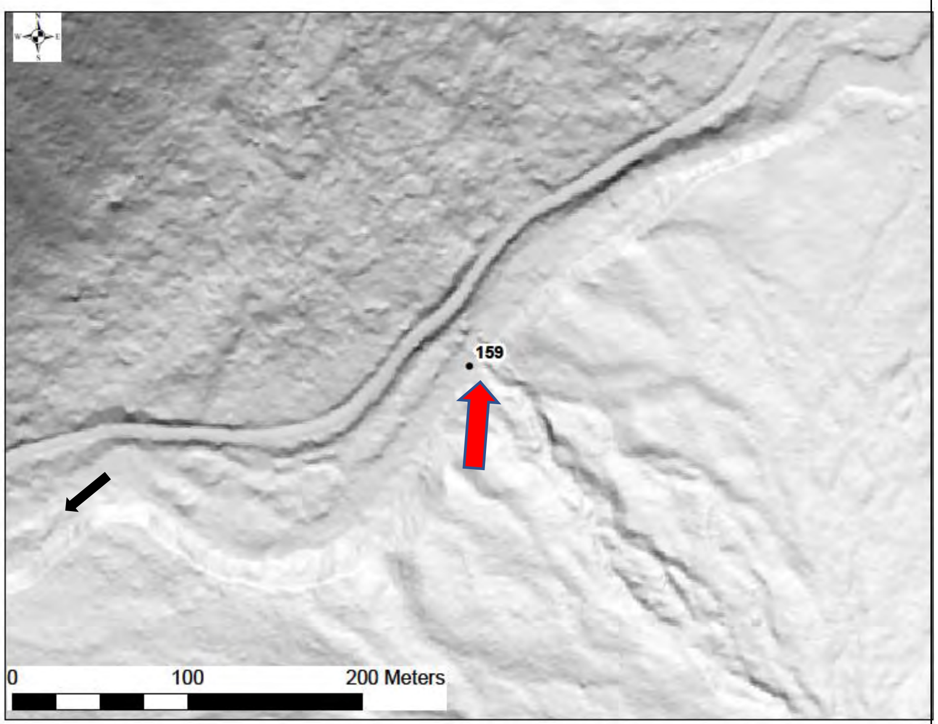
Downstream view of spring channel.

Upstream view of spring channel from plume area.

CWP ID#	159	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch - Thirtymile	**CWP Channel Area (m²)**	
Survey Date	8/25/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1555	**Average CWP Channel Depth (cm)**	
River km	46.3	**Min Plume Temp (℃)**	11.8
Latitude	48.78992	**Avg Plume Temp (℃)**	15.5
Longitude	-120.07323	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	40
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	20
Tributary Name	Sheep Creek	**Plume Width 2℃ Differential (m)**	2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	5
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m²)**	10
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2.5
Mainstem Temp (℃)	17.1	**Plume Length 1℃ Differential (m)**	20
Tributary Temp (℃)	11.7	**Plume Area 1℃ Differential (m²)**	50
Min CWP Temp (℃)	11.7	**Fish Presence**	None observed
Average CWP Temp (℃)	15.5	**Fish Species**	
Max Main/CWP Diff (℃)	5.4	**Fish Count**	
Avg Main/CWP Diff (℃)	1.6		
CWP Description	High gradient creek channel.		
Plume Description	Good cold creek volume into mainstem boulder garden.		
Restoration Notes	High energy mainstem reach. Good existing pocket water.		

CWP #159_TC_Chewuch - Thirtymile



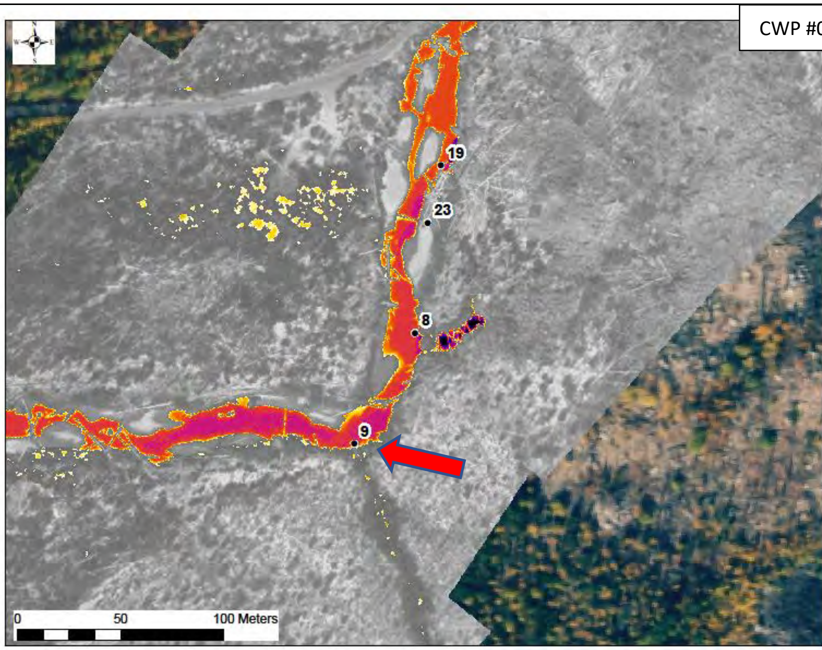


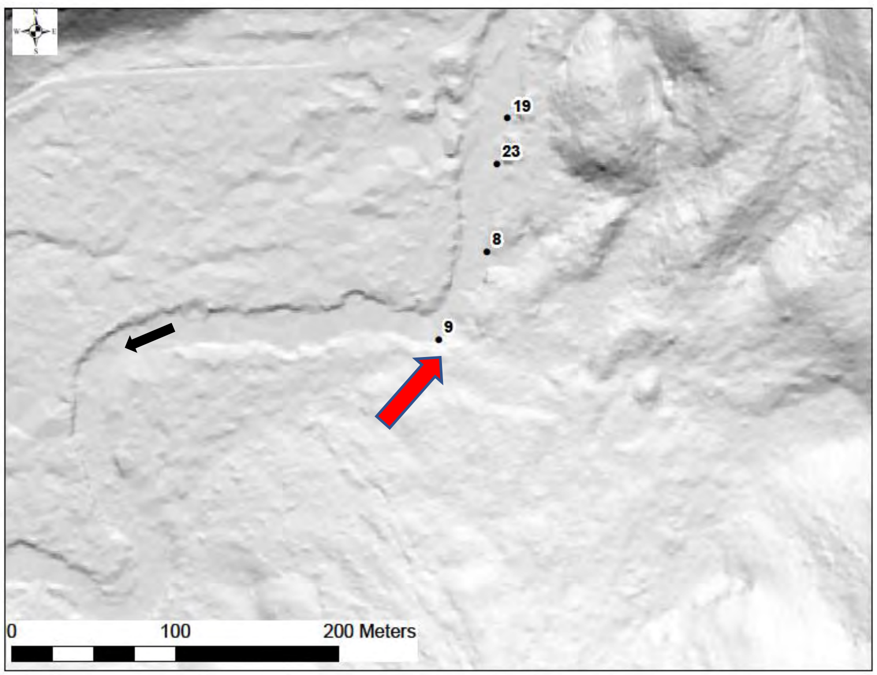
Upstream view from plume area.

Side view of confluence area.

CWP ID#	009	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	0.5
Assessment Unit	Chewuch - Thirtymile	**CWP Channel Area (m²)**	
Survey Date	9/7/2022	**Max CWP Channel Depth (cm)**	15
Survey Time	1320	**Average CWP Channel Depth (cm)**	6
River km	49.2	**Min Plume Temp (℃)**	10.3
Latitude	48.79657	**Avg Plume Temp (℃)**	11.5
Longitude	-120.04702	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	15
CWP Source	Springbrook	**Avg Plume Depth (cm)**	4
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Sand	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	0.2
Mainstem Temp (℃)	13.0	**Plume Length 1℃ Differential (m)**	3.5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	0.7
Min CWP Temp (℃)	9.5	**Fish Presence**	None observed
Average CWP Temp (℃)	9.6	**Fish Species**	
Max Main/CWP Diff (℃)	3.5	**Fish Count**	
Avg Main/CWP Diff (℃)	3.4		
CWP Description	Small spring channel flows down slope into large pool in mainstem. Insanely dense vegetation so did not reach source.		
Plume Description	Deep pool little overall effect from spring inflow. No 2C differential. Mainstem cooled by upstream inputs of cold water from #008, #019, #023.		
Restoration Notes	Complexity.		

CWP #009_SB_Chewuch - Thirtymile





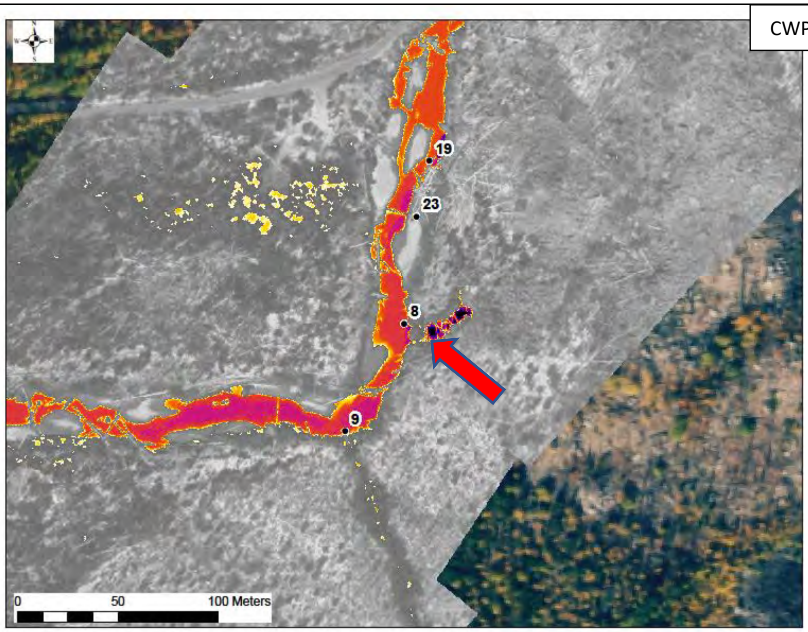
Spring channel confluence mouth.

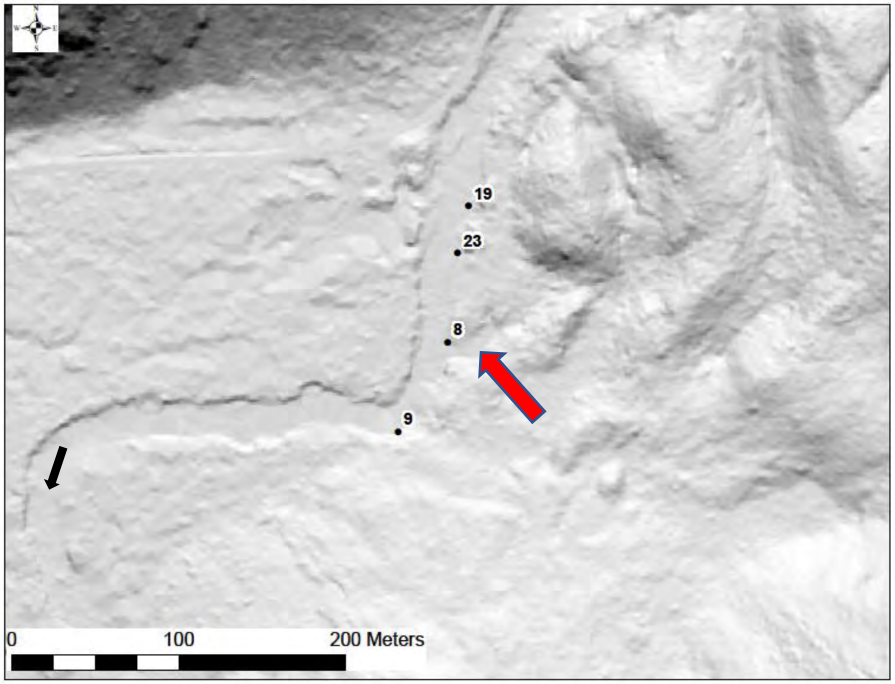
Side view of confluence and plume area.

Downstream view of plume area mainstem pool.

CWP ID#	008	**CWP Channel Length (m)**	37
Stream	Chewuch	**CWP Channel Avg Width (m)**	9
Assessment Unit	Chewuch - Thirtymile	**CWP Channel Area (m^2)**	333
Survey Date	9/7/2022	**Max CWP Channel Depth (cm)**	80
Survey Time	1314	**Average CWP Channel Depth (cm)**	30
River km	49.3	**Min Plume Temp (℃)**	7.5
Latitude	48.79705	**Avg Plume Temp (℃)**	11.0
Longitude	-120.04661	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	65
CWP Source	Alcove	**Avg Plume Depth (cm)**	30
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	12
Dominant Substrate	Sand	**Plume Area 2℃ Differential (m^2)**	12
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	1.5
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	16
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	24
Min CWP Temp (℃)	6.4	**Fish Presence**	None observed
Average CWP Temp (℃)	7.2	**Fish Species**	
Max Main/CWP Diff (℃)	6.7	**Fish Count**	
Avg Main/CWP Diff (℃)	5.9		
CWP Description	Large alcove pool. Cold. Recent beaver activity.		
Plume Description	Two channels flow from pond into mainstem. Plume coldest between the two channels.		
Restoration Notes	Complexity and connectivity to pond.		

CWP #008_AL_Chewuch - Thirtymile





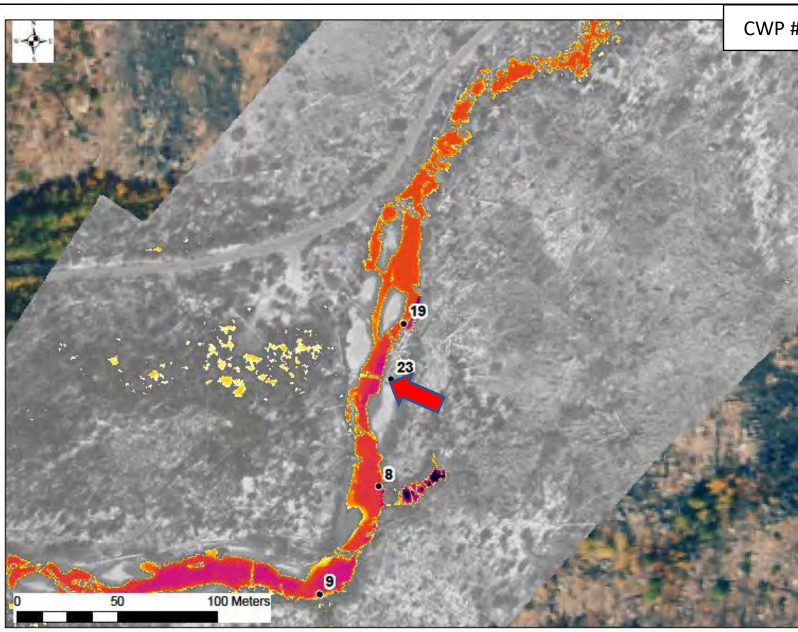
Downstream view in alcove pool.

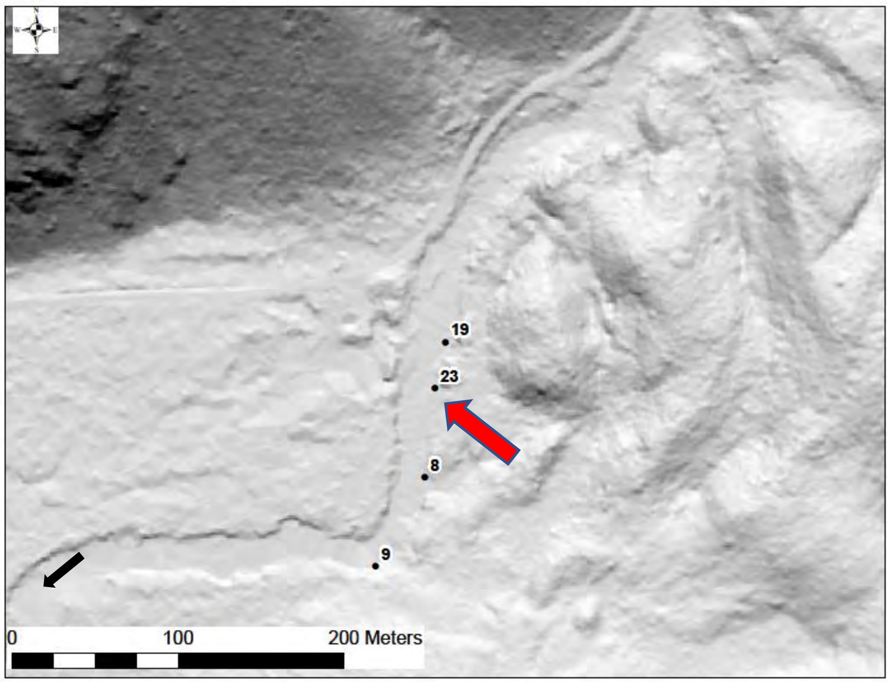

Side view from mainstem to alcove confluence.


Upstream view of alcove pool.

CWP ID#	023	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch – Thirtymile	**CWP Channel Area (m^2)**	
Survey Date	9/7/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1346	**Average CWP Channel Depth (cm)**	
River km	49.3	**Min Plume Temp (℃)**	11.5
Latitude	48.79753	**Avg Plume Temp (℃)**	12.1
Longitude	-120.04652	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	48
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	18
Tributary Name		**Plume Width 2℃ Differential (m)**	1.2
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	12
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m^2)**	14.4
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	13.5	**Plume Length 1℃ Differential (m)**	22
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	22
Min CWP Temp (℃)	9.6	**Fish Presence**	Yes
Average CWP Temp (℃)	11.2	**Fish Species**	Unknown
Max Main/CWP Diff (℃)	3.9	**Fish Count**	
Avg Main/CWP Diff (℃)	2.3		
CWP Description	Seep from vegetated bank into wood jam in mainstem.		
Plume Description	Flows along sandy bank and gravel channel.		
Restoration Notes	Complexity and depth.		

CWP #023_LS_Chewuch - Thirtymile



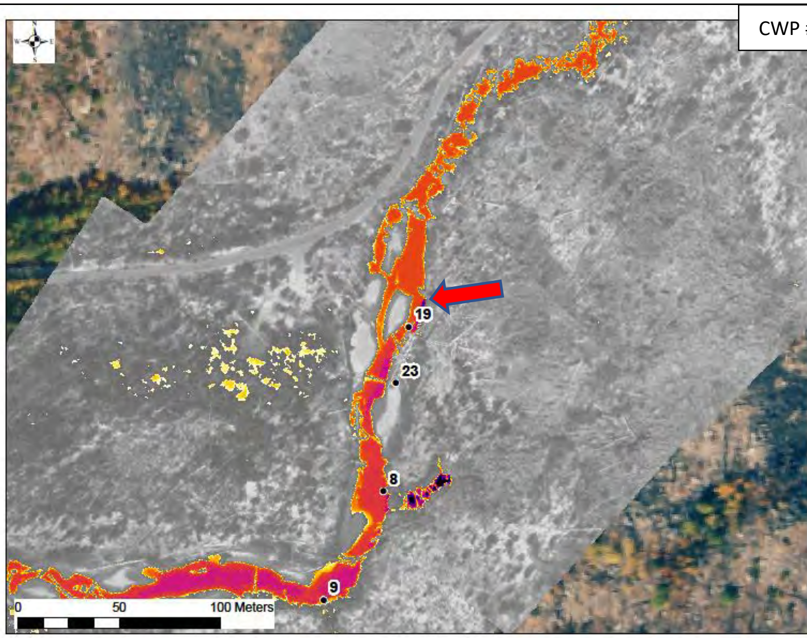


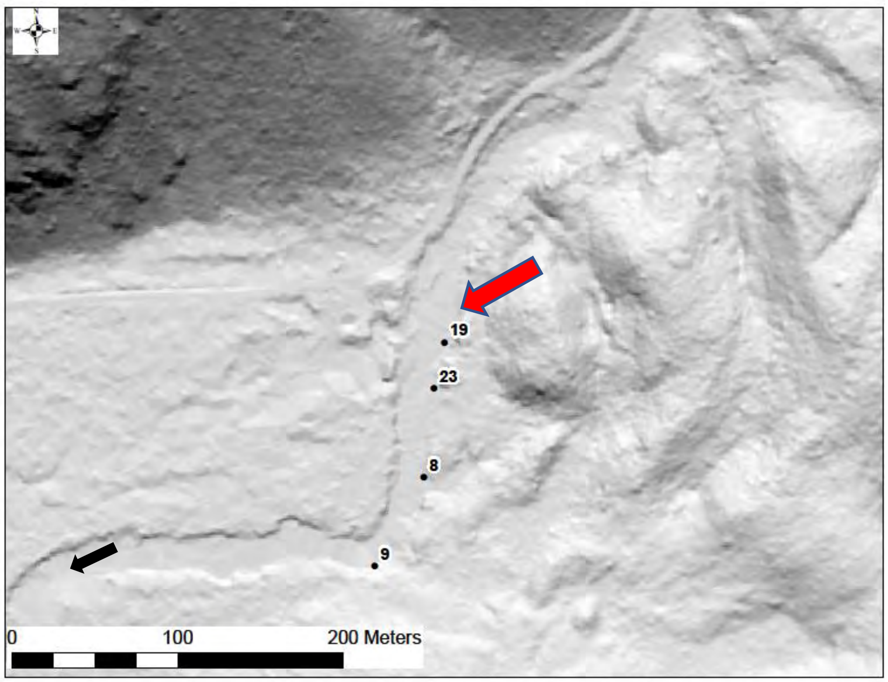
Downstream view along seep.

Upstream view from plume area along seep.

CWP ID#	019	**CWP Channel Length (m)**	25
Stream	Chewuch	**CWP Channel Avg Width (m)**	1
Assessment Unit	Chewuch – Thirtymile	**CWP Channel Area (m²)**	25
Survey Date	9/7/2022	**Max CWP Channel Depth (cm)**	22
Survey Time	1357	**Average CWP Channel Depth (cm)**	5
River km	49.3	**Min Plume Temp (℃)**	6.2
Latitude	48.79778	**Avg Plume Temp (℃)**	10.5
Longitude	-120.04643	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	55
CWP Source	Alcove	**Avg Plume Depth (cm)**	35
Tributary Name		**Plume Width 2℃ Differential (m)**	2.5
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	15
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	37.5
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	3
Mainstem Temp (℃)	16.2	**Plume Length 1℃ Differential (m)**	15
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	45
Min CWP Temp (℃)	5.8	**Fish Presence**	None observed
Average CWP Temp (℃)	5.8	**Fish Species**	
Max Main/CWP Diff (℃)	10.4	**Fish Count**	
Avg Main/CWP Diff (℃)	10.4		
CWP Description	Multiple springs flow onto sandbar channel and flow to mainstem glide. Just us of CWP #023. Wood on bar. Cold. Significant source.		
Plume Description	Flows into CWP #023. Fairly deep and woody. Spring has large ds cooling effect.		
Restoration Notes	Depth and complexity.		

CWP #019_AL_Chewuch - Thirtymile



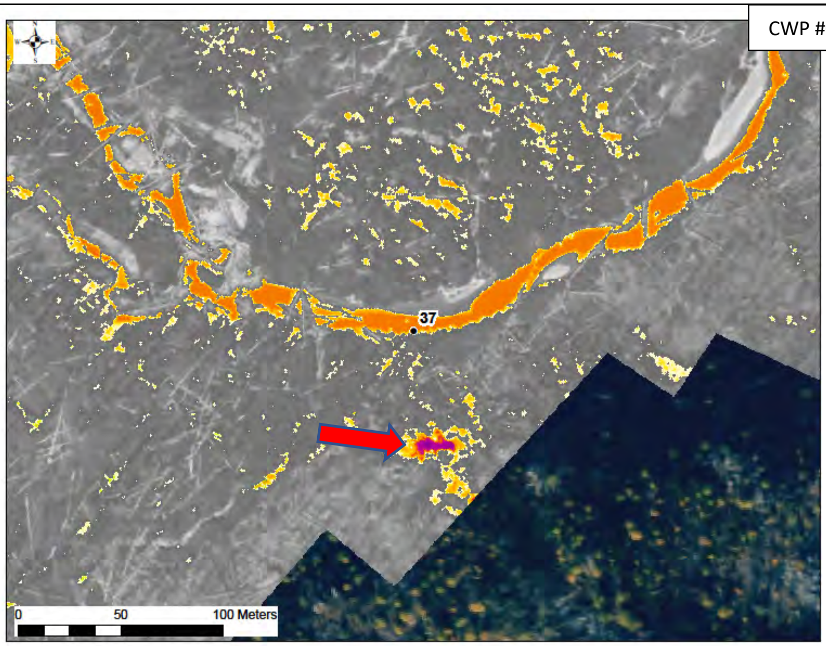


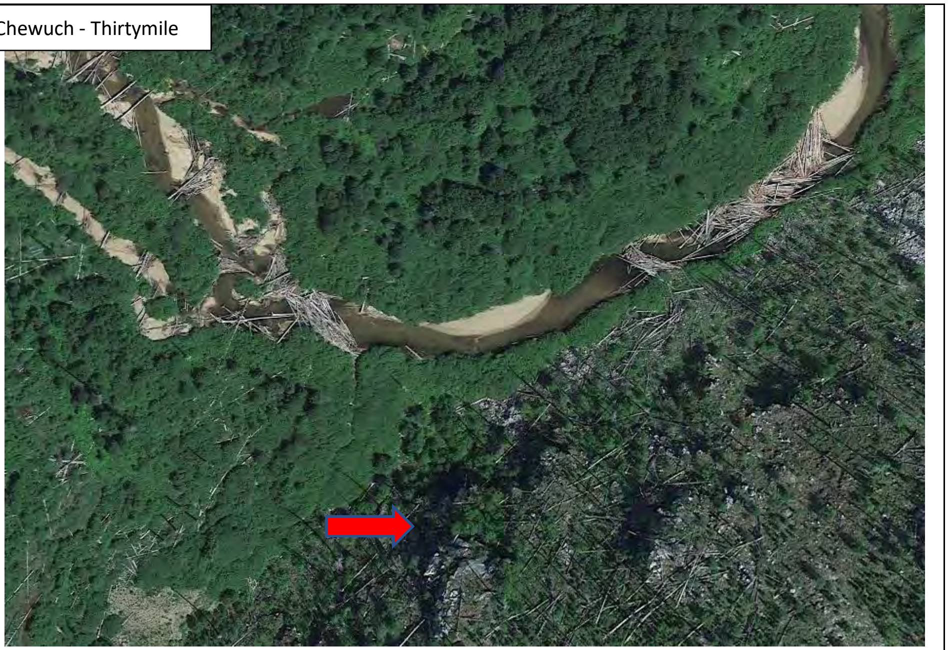
Downstream view of spring channel from top source area.

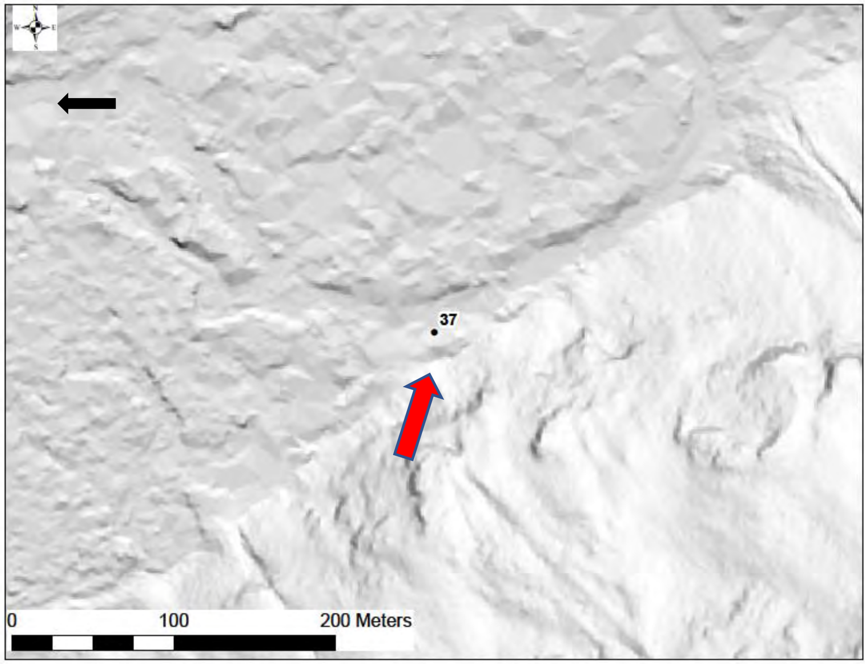

Upstream towards alcove confluence on right.

CWP ID#	037	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch – Thirtymile	**CWP Channel Area (m²)**	
Survey Date	9/7/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1525	**Average CWP Channel Depth (cm)**	
River km	51.2	**Min Plume Temp (℃)**	
Latitude	48.80584	**Avg Plume Temp (℃)**	
Longitude	-120.02891	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Wall Seep	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	14.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)		**Fish Presence**	None observed
Average CWP Temp (℃)		**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Dense riparian. Unable to access source.		
Plume Description	No plume. No connection.		
Restoration Notes	Unlikely for fish use or access.		

CWP #037_WS_Chewuch - Thirtymile



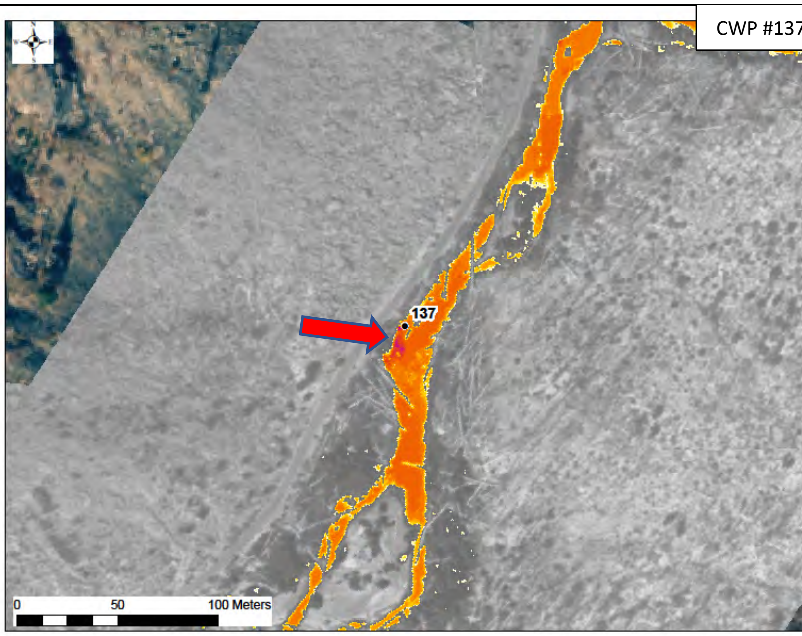


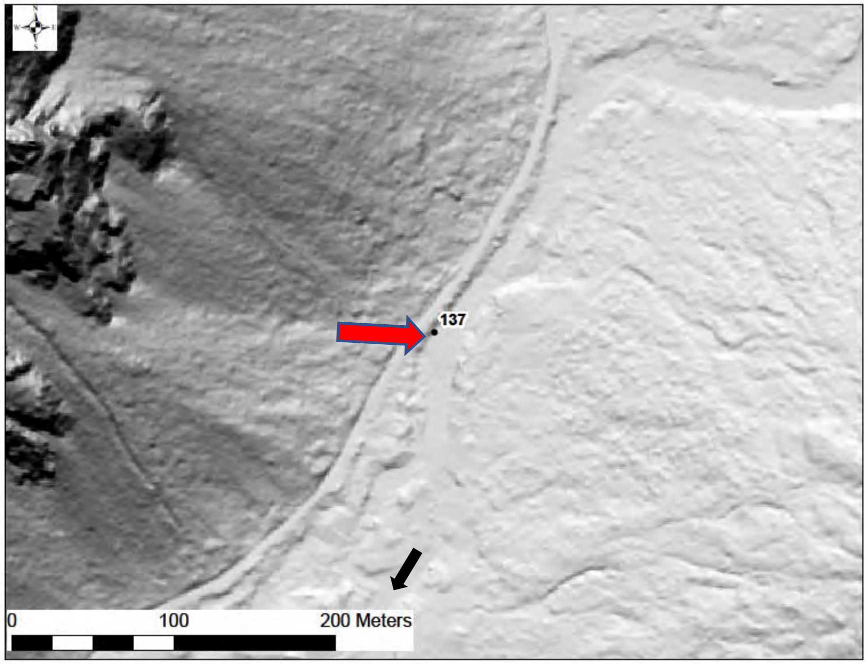


Seepage from rock wall.

CWP ID#	137	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch – Thirtymile	**CWP Channel Area (m^2)**	
Survey Date	9/7/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1441	**Average CWP Channel Depth (cm)**	
River km	52.3	**Min Plume Temp (℃)**	5.2
Latitude	48.81238	**Avg Plume Temp (℃)**	14.1
Longitude	-120.02283	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	40
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	1.5
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	5
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	7.5
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	15.5	**Plume Length 1℃ Differential (m)**	22
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	44
Min CWP Temp (℃)	5.0	**Fish Presence**	Yes
Average CWP Temp (℃)	5.2	**Fish Species**	Unknown
Max Main/CWP Diff (℃)	10.5	**Fish Count**	1
Avg Main/CWP Diff (℃)	10.3		
CWP Description	Lateral seep from boulder field above road. High volume for small source.		
Plume Description	Low velocity edge flows into ds riffle and dissipates.		
Restoration Notes	Cover.		

CWP #137_LS_Chewuch - Thirtymile



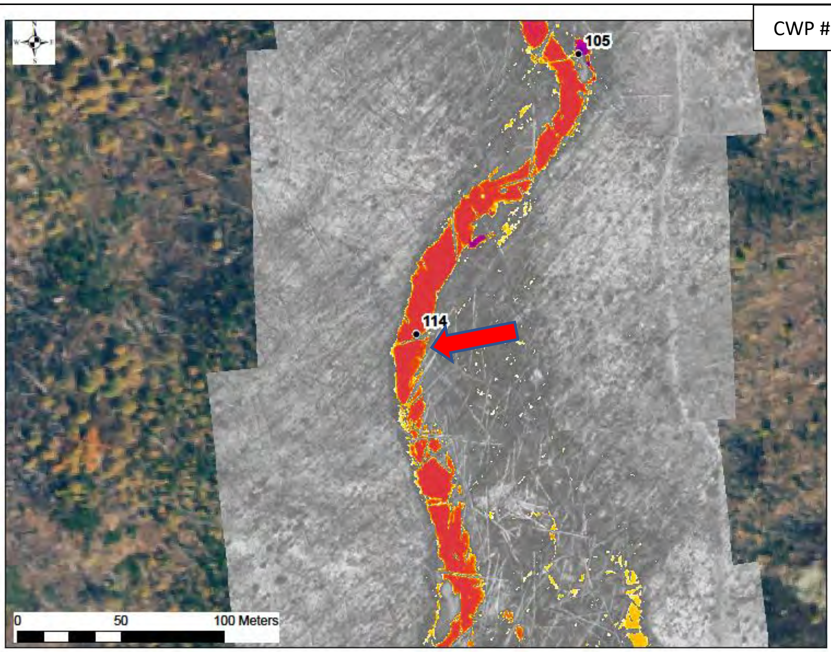


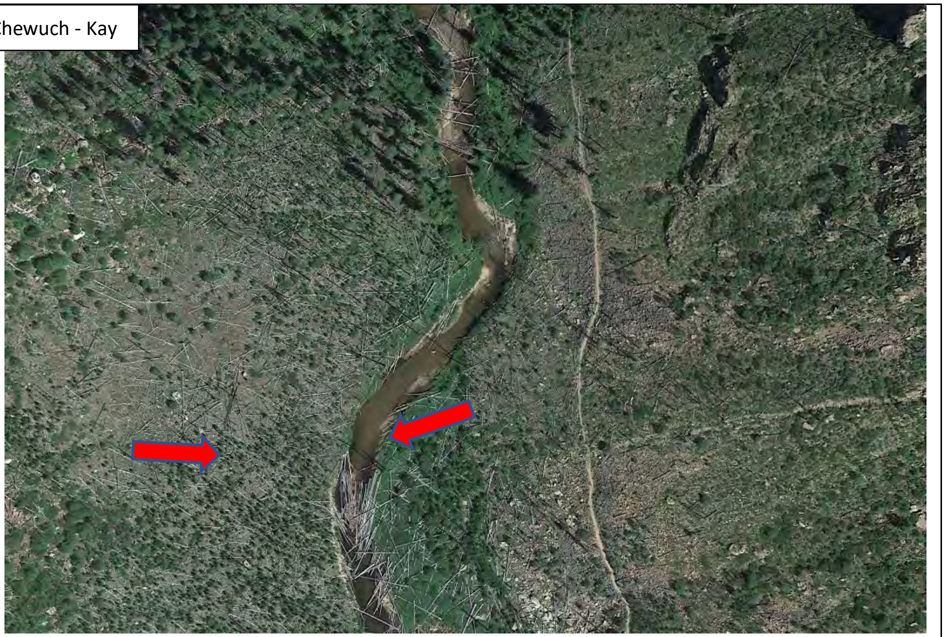
Side view at seep source.


Upstream view from plume area.

CWP ID#	114	**CWP Channel Length (m)**	3.5
Stream	Chewuch	**CWP Channel Avg Width (m)**	1
Assessment Unit	Chewuch – Kay	**CWP Channel Area (m²)**	3.5
Survey Date	9/8/2022	**Max CWP Channel Depth (cm)**	8
Survey Time	1437	**Average CWP Channel Depth (cm)**	3
River km	56.9	**Min Plume Temp (℃)**	
Latitude	48.84275	**Avg Plume Temp (℃)**	
Longitude	-120.02422	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.0	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	6.4	**Fish Presence**	None observed
Average CWP Temp (℃)	7.8	**Fish Species**	
Max Main/CWP Diff (℃)	6.6	**Fish Count**	
Avg Main/CWP Diff (℃)	5.2		
CWP Description	Seepage from ds end of sand gravel bar. Minimal flow.		
Plume Description	No discernible plume. Areas in shallows up to 16C.		
Restoration Notes	Depth.		

CWP #114_AL_Chewuch - Kay



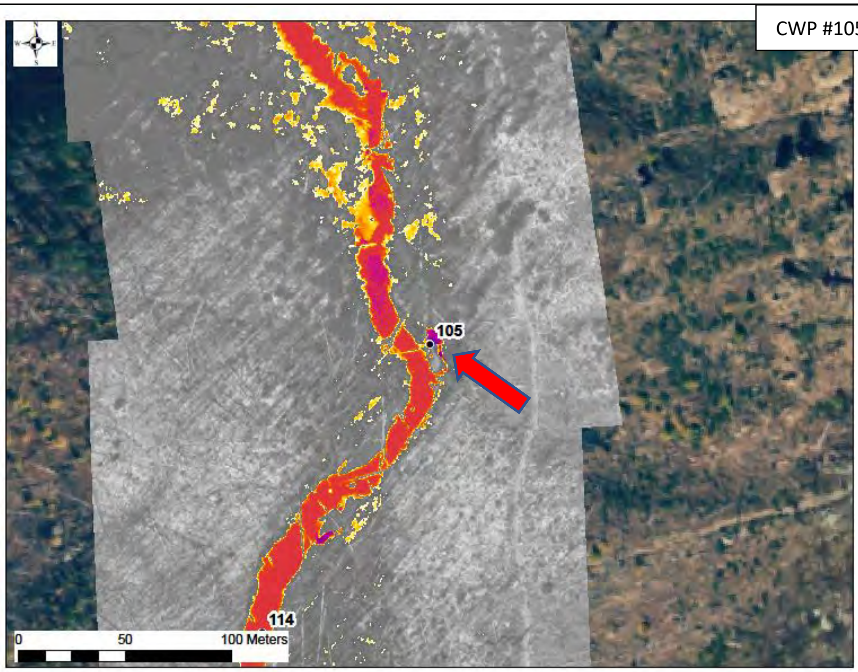


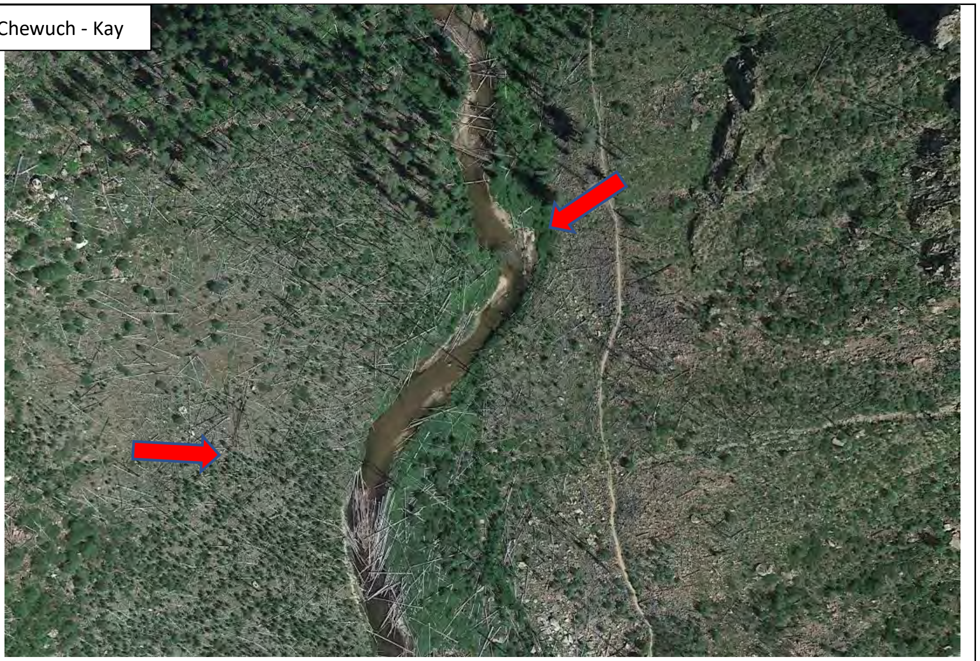
Upstream view from plume area.

Downstream view in from alcove source.

CWP ID#	105	**CWP Channel Length (m)**	
Stream	Chewuch	**CWP Channel Avg Width (m)**	
Assessment Unit	Chewuch – Kay	**CWP Channel Area (m²)**	
Survey Date	9/8/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1424	**Average CWP Channel Depth (cm)**	
River km	56.9	**Min Plume Temp (℃)**	
Latitude	48.84396	**Avg Plume Temp (℃)**	
Longitude	-120.02313	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)		**Fish Presence**	None observed
Average CWP Temp (℃)		**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	No CWP located. Off channel present and moist but no flow. Dense riparian. Flows into small mainstem backwater.		
Plume Description	11.7C in backwater.		
Restoration Notes	Restoration unlikely at this location. Complex habitat exists.		

CWP #105_AL_Chewuch - Kay



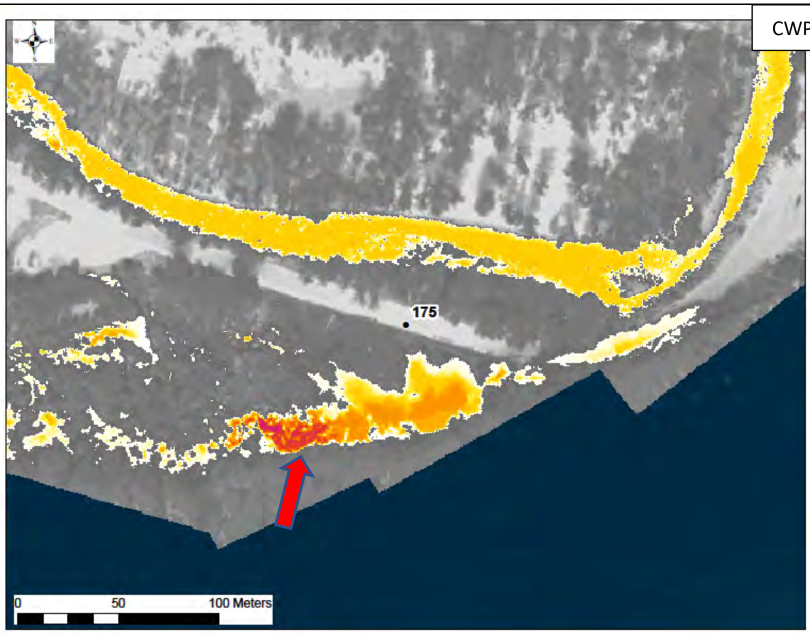


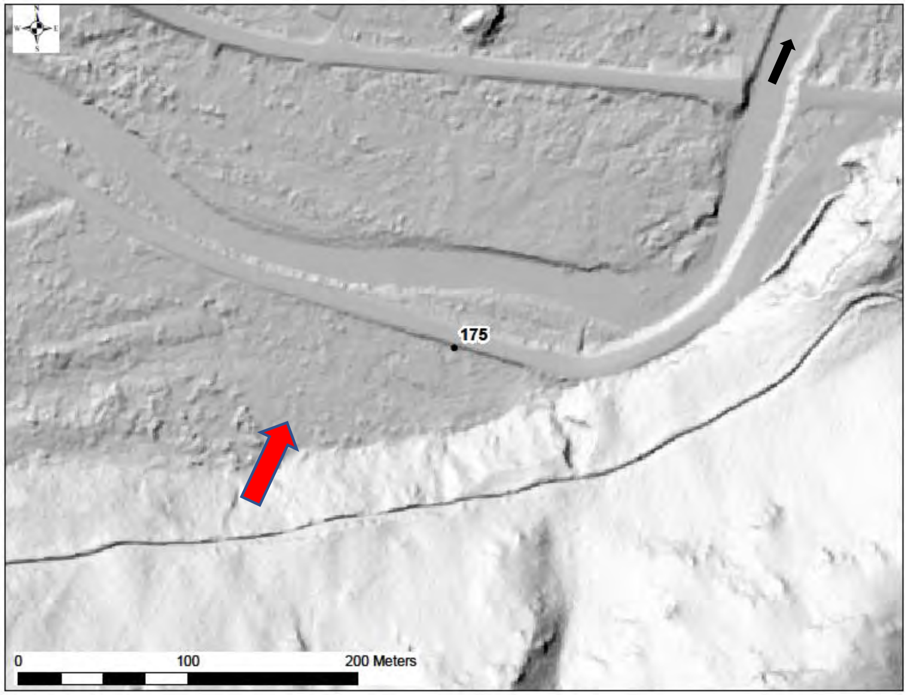
Upstream view from mainstem into dry alcove area.

Downstream view from dry alcove area into mainstem.

CWP ID#	175	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Lower	**CWP Channel Area (m^2)**	
Survey Date	8/27/21	**Max CWP Channel Depth (cm)**	
Survey Time	1633	**Average CWP Channel Depth (cm)**	
River km	3.21	**Min Plume Temp (℃)**	
Latitude	48.36843	**Avg Plume Temp (℃)**	
Longitude	-120.15114	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Alcove	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type		**Plume Length 2℃ Differential (m)**	
Dominant Substrate		**Plume Area 2℃ Differential (m^2)**	
Dominant Cover		**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	16.4	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	
Min CWP Temp (℃)		**Fish Presence**	None detected
Average CWP Temp (℃)		**Fish Species**	
Max Main/CWP Diff (℃)		**Fish Count**	
Avg Main/CWP Diff (℃)			
CWP Description	Wetland pond dry. No water found.		
Plume Description	No plume, no connectivity with mainstem.		
Restoration Notes	Unlikely, was supported by ditch flow that has been shut off.		

CWP #175_AL_ Twisp Lower

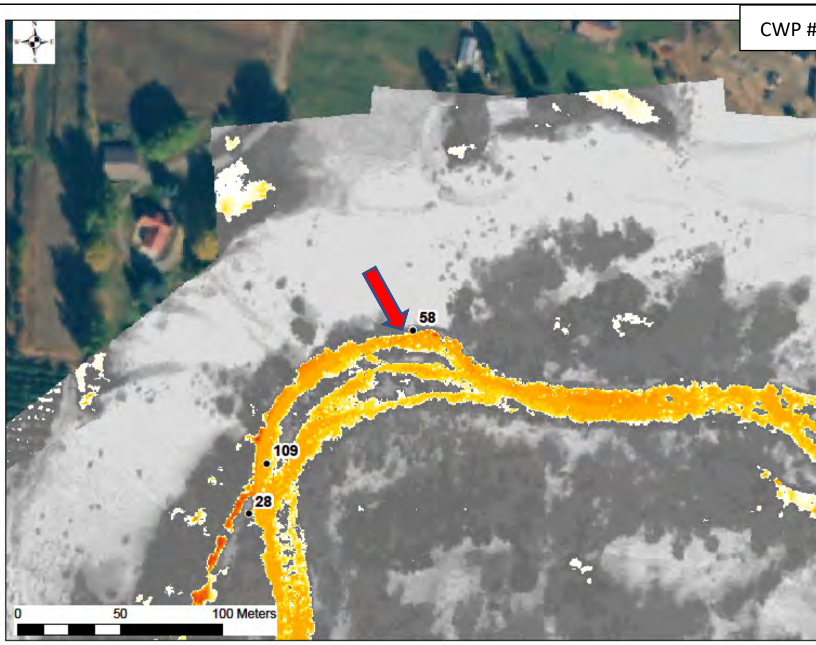


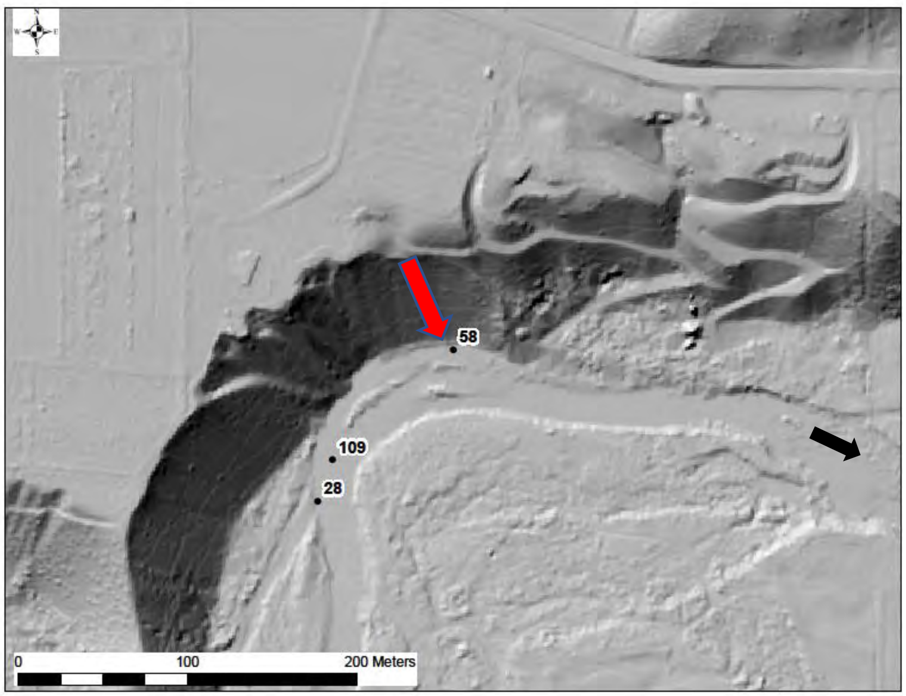


Upstream view from pond wetland

CWP ID#	058	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	
Survey Date	8/18/21	**Max CWP Channel Depth (cm)**	
Survey Time	1609	**Average CWP Channel Depth (cm)**	
River km	4.56	**Min Plume Temp (℃)**	
Latitude	48.37194	**Avg Plume Temp (℃)**	
Longitude	-120.16939	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	27
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	20
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	20
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	17.0	**Plume Length 1℃ Differential (m)**	19
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	19
Min CWP Temp (℃)	10.3	**Fish Presence**	None detected
Average CWP Temp (℃)	11.3	**Fish Species**	
Max Main/CWP Diff (℃)	6.7	**Fish Count**	
Avg Main/CWP Diff (℃)	5.7		
CWP Description	Flowing from multiple places along the bank below a steep hillslope. Reed canary grass along bank, open slope above. Landowners mention ties to irrigation ditch operations.		
Plume Description	Long, narrow plume through a riffle in the side channel.		
Restoration Notes	Increase depth, provide cover, protect plume to extend influence.		

CWP #058_LS_Twisp - Lower





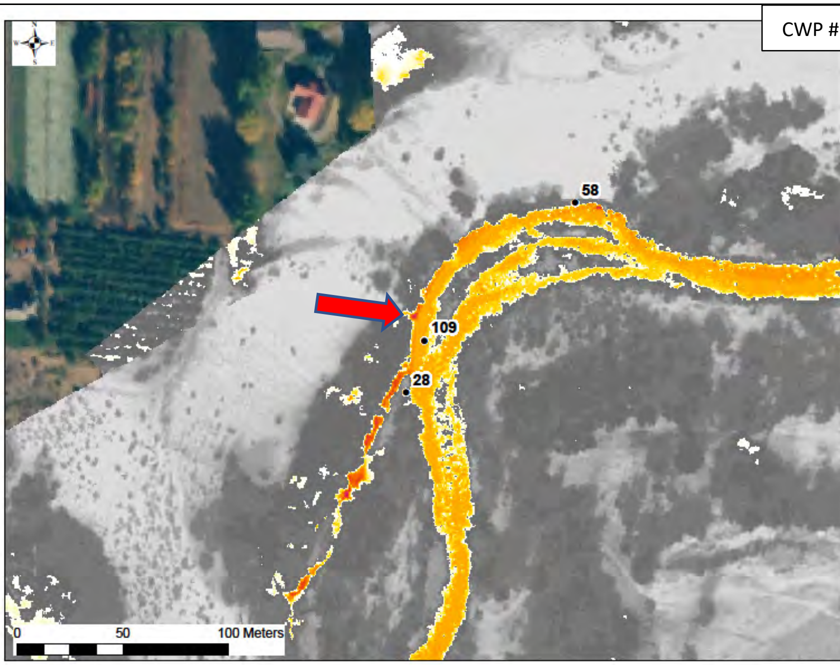
Upstream view towards seeps along bank.

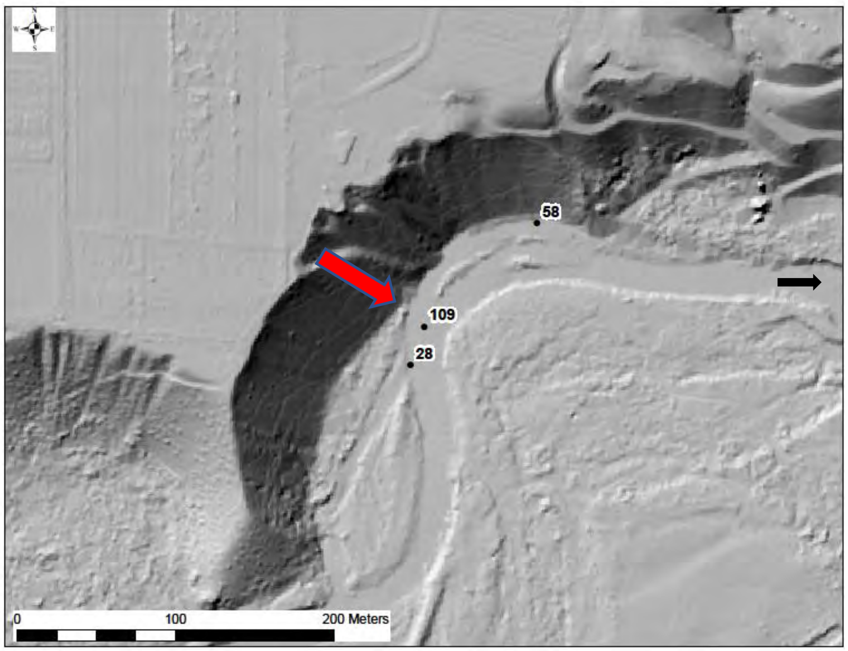
Downstream view along seeps and plume.

Lateral view of seep area.

CWP ID#	109	**CWP Channel Length (m)**	45
Stream	Twisp	**CWP Channel Avg Width (m)**	2
Assessment Unit	Twisp Lower	**CWP Channel Area (m^2)**	90
Survey Date	9/12/2022	**Max CWP Channel Depth (cm)**	22
Survey Time	1622	**Average CWP Channel Depth (cm)**	16
River km	4.61	**Min Plume Temp (℃)**	12.3
Latitude	48.37122	**Avg Plume Temp (℃)**	11.5
Longitude	-120.17034	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	33
CWP Source	Springbrook	**Avg Plume Depth (cm)**	15
Tributary Name		**Plume Width 2℃ Differential (m)**	1.7
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	17
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	28.9
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.7
Mainstem Temp (℃)	13.6	**Plume Length 1℃ Differential (m)**	18
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	30.6
Min CWP Temp (℃)	11.2	**Fish Presence**	Not detected
Average CWP Temp (℃)	11.4	**Fish Species**	
Max Main/CWP Diff (℃)	2.4	**Fish Count**	
Avg Main/CWP Diff (℃)	2.2		
CWP Description	Flow from spring channel enters side channel just ds of split. High volume. Spring channel which extends a way up along slope toe. Visit on 8/18/21 had 17.7C mainstem, 10.3C CWP, 7.4C differential.		
Plume Description	Tight to bank.		
Restoration Notes	Depth and complexity.		

CWP #109_SB_Twisp - Lower





Downstream view towards plume along side channel bank.

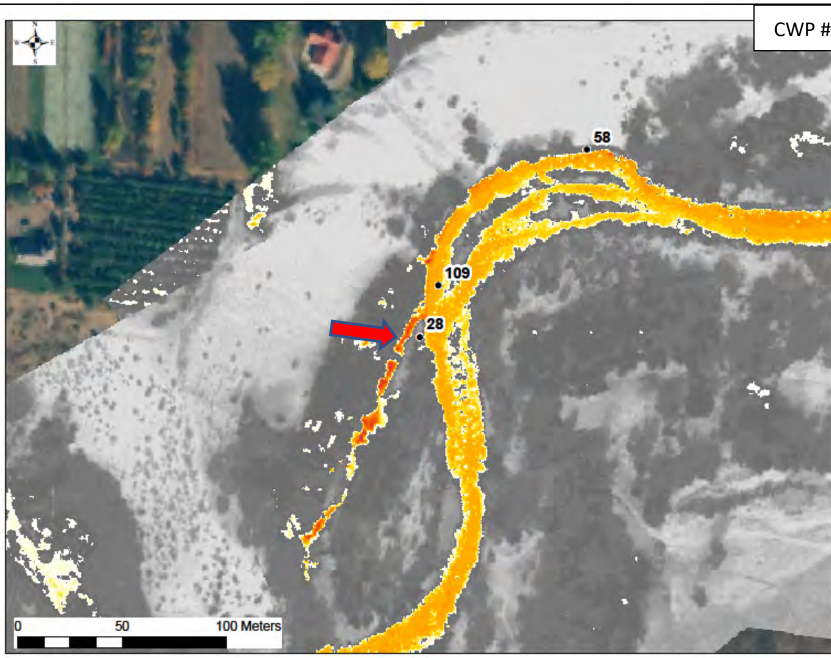
Lateral view of channel

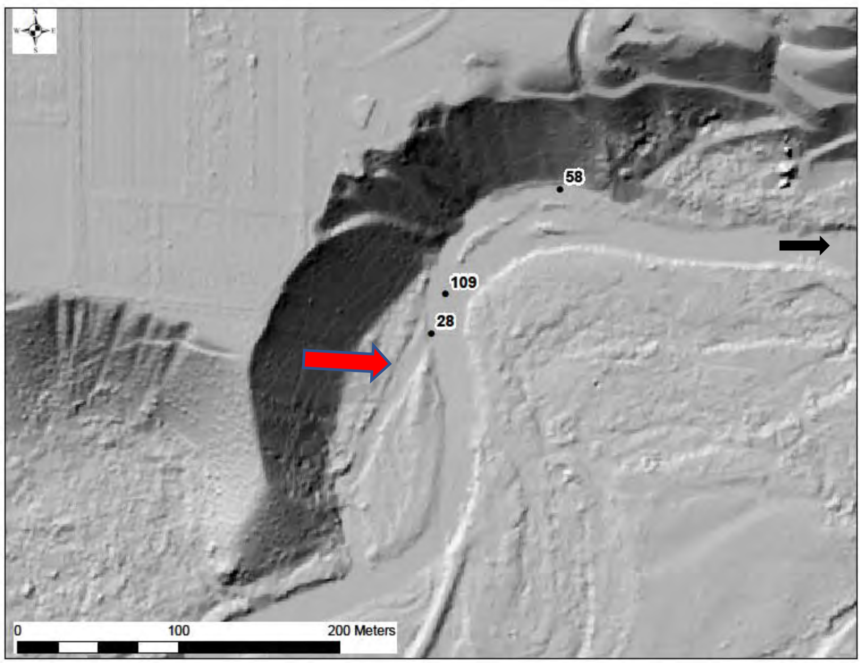
Upstream view from plume area.

Upstream view of spring source.

CWP ID#	28	**CWP Channel Length (m)**	106
Stream	Twisp	**CWP Channel Avg Width (m)**	6
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	636
Survey Date	9/12/2022	**Max CWP Channel Depth (cm)**	36
Survey Time	1641	**Average CWP Channel Depth (cm)**	12
River km	4.67	**Min Plume Temp (℃)**	12.1
Latitude	48.3711	**Avg Plume Temp (℃)**	12.5
Longitude	-120.17045	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	18
CWP Source	Springbrook	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	24
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	24
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	13.6	**Plume Length 1℃ Differential (m)**	25
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	25
Min CWP Temp (℃)	11.7	**Fish Presence**	Yes
Average CWP Temp (℃)	12.1	**Fish Species**	*O. mykiss*
Max Main/CWP Diff (℃)	1.9	**Fish Count**	
Avg Main/CWP Diff (℃)	1.5		
CWP Description	Multiple seeps coming off hillslope into side channel, cold water extends down entirety of wetted side channel (dry above seeps). Visit on 8/18/21 had 18.2C mainstem, 12.3C CWP, 5.9C differential.		
Plume Description	Plume long, narrow, margin.		
Restoration Notes	Depth, cover, protection to increase width. Across channel from YN project site.		

CWP #028_SB_Twisp - Lower





Downstream view in spring channel.

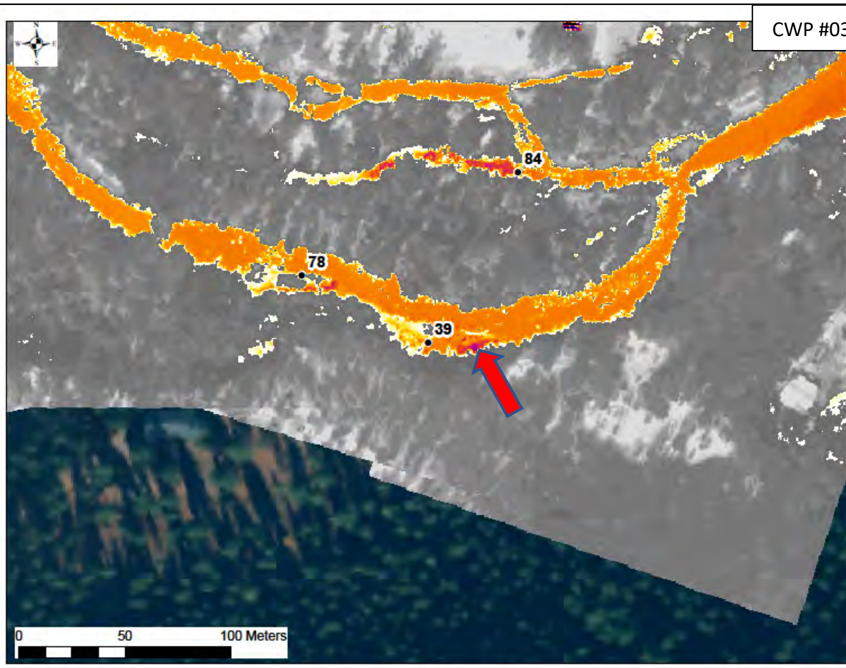
Upstream view from plume area.

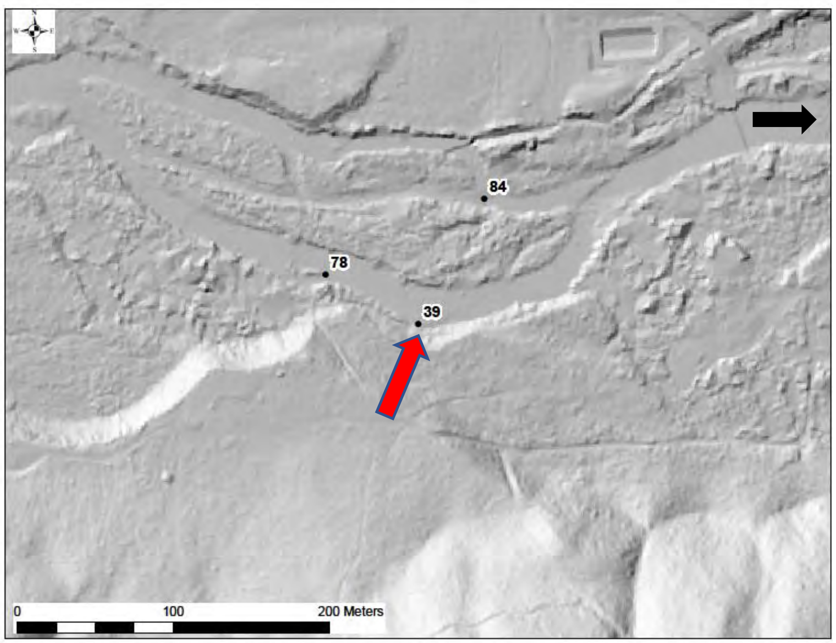
Downstream view of spring channel from top source pool.

Downstream towards mainstem confluence.

CWP ID#	039	**CWP Channel Length (m)**	37
Stream	Twisp	**CWP Channel Avg Width (m)**	0.5
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	18.5
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	20
Survey Time	1604	**Average CWP Channel Depth (cm)**	9
River km	11.6	**Min Plume Temp (℃)**	11.8
Latitude	48.37901	**Avg Plume Temp (℃)**	13.2
Longitude	-120.24587	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	25
CWP Source	Alcove	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	3
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	0.9
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	14.5	**Plume Length 1℃ Differential (m)**	11
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	11
Min CWP Temp (℃)	8.7	**Fish Presence**	Yes
Average CWP Temp (℃)	9.2	**Fish Species**	*O. mykiss*
Max Main/CWP Diff (℃)	5.8	**Fish Count**	8
Avg Main/CWP Diff (℃)	6.3		
CWP Description	Small spring channel perched on cobble bar. Tight to bank flows along channel to meet river. Fairly shallow. Mostly 9-10C. Visit on 8/17/21 had 16.1C mainstem, 8.8 CWP, 7.3C differential.		
Plume Description	Backwater area minimal current.		
Restoration Notes	Complexity and connectivity. Good reach-based area.		

CWP #039_AL_Twisp - Lower





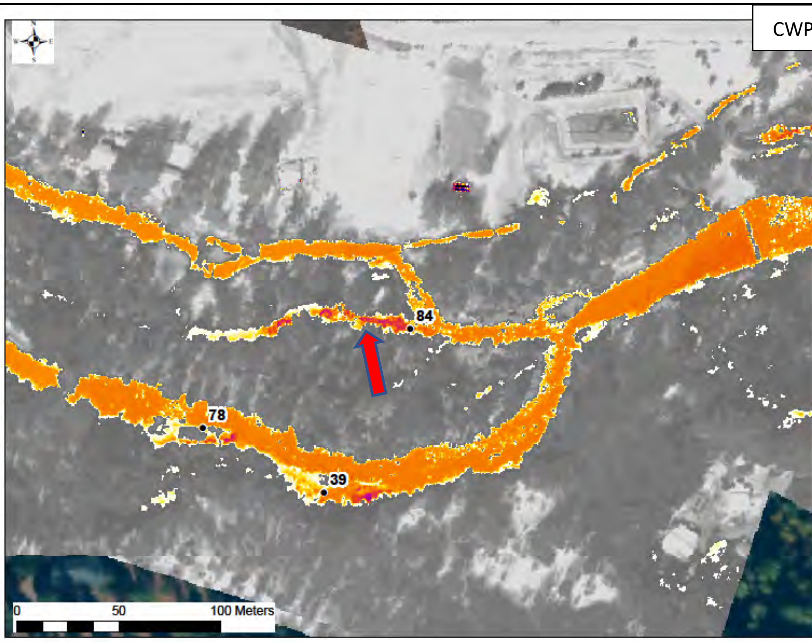
Upstream view of alcove channel.

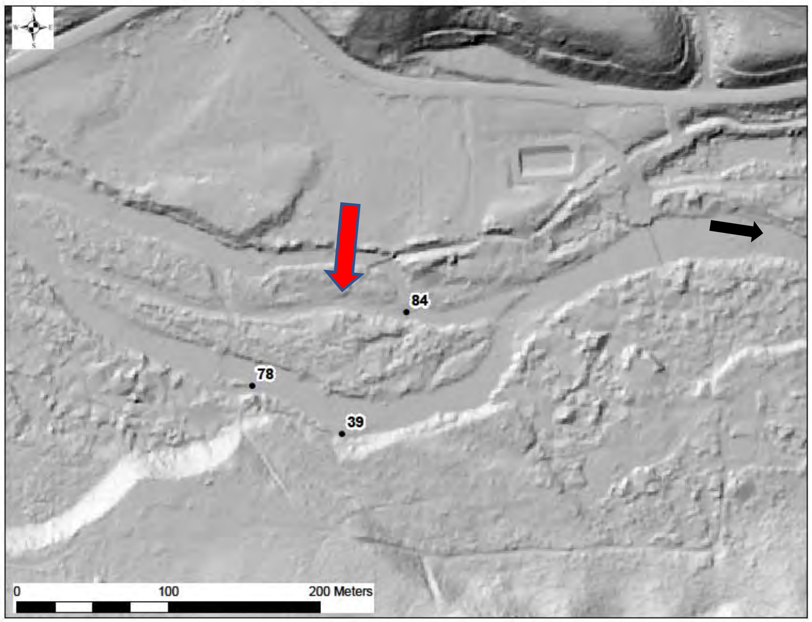
Downstream view of alcove channel and mainstem.

Lateral view of alcove source and channel .

CWP ID#	084	**CWP Channel Length (m)**	23
Stream	Twisp	**CWP Channel Avg Width (m)**	3
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	69
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	20
Survey Time	1550	**Average CWP Channel Depth (cm)**	10
River km	11.6	**Min Plume Temp (℃)**	12.8
Latitude	48.3795	**Avg Plume Temp (℃)**	13.0
Longitude	-120.24667	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	10
CWP Source	Springbrook	**Avg Plume Depth (cm)**	4
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.1
Mainstem Temp (℃)	14.5	**Plume Length 1℃ Differential (m)**	4
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	0.4
Min CWP Temp (℃)	9.6	**Fish Presence**	Yes
Average CWP Temp (℃)	10.5	**Fish Species**	*O.mykiss*
Max Main/CWP Diff (℃)	4.9	**Fish Count**	8 parr
Avg Main/CWP Diff (℃)	4.9		
CWP Description	Very localized cold water. Connected to mainstem through cobble bar. Visit on 8/17/21 had 16.1C mainstem, 10.1C CWP, 6.0C differential.		
Plume Description	Mixes with side channel flow coming from acclimation pond infrastructure.		
Restoration Notes	Depth and complexity. Cover at confluence with side channel. Reach-based.		

CWP #084_SB_Twisp - Lower





Downstream view of channel confluence with mainstem.

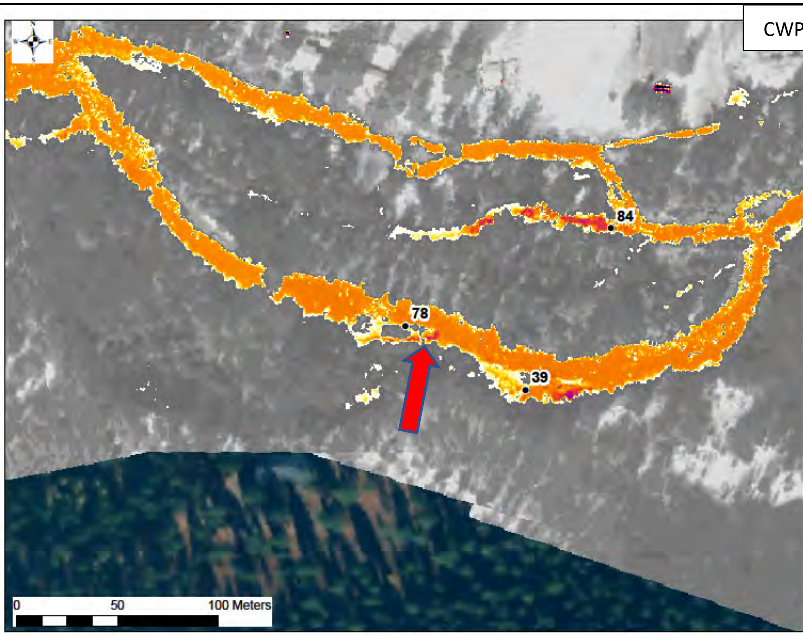

Downstream view of spring channel from top.

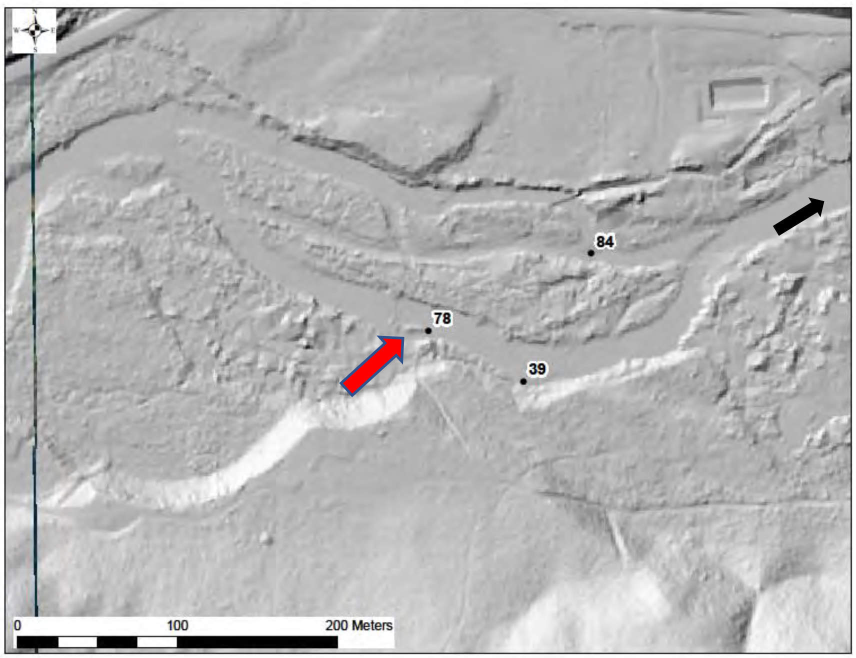

Upstream view of channel.


Downstream view along spring channel.

CWP ID#	078	**CWP Channel Length (m)**	65
Stream	Twisp	**CWP Channel Avg Width (m)**	3.5
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	227.5
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	30
Survey Time	1535	**Average CWP Channel Depth (cm)**	12
River km	11.7	**Min Plume Temp (℃)**	12.0
Latitude	48.37949	**Avg Plume Temp (℃)**	13.5
Longitude	-120.24529	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	45
CWP Source	Springbrook	**Avg Plume Depth (cm)**	20
Tributary Name		**Plume Width 2℃ Differential (m)**	0.4
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	2
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	0.8
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.6
Mainstem Temp (℃)	15.0	**Plume Length 1℃ Differential (m)**	5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	3
Min CWP Temp (℃)	10.5	**Fish Presence**	Not observed
Average CWP Temp (℃)	11.0	**Fish Species**	
Max Main/CWP Diff (℃)	4.5	**Fish Count**	
Avg Main/CWP Diff (℃)	4.0		
CWP Description	Similar to #039. Isolated spring channel on cobble bar. Mainstem flow enters at top but stops. Spring flow starts just below wood jam near top of channel. Good riparian overhead. Not deep. Visit on 8/17/21 had 16.1C mainstem, 10C CWP, 6.1C differential.		
Plume Description	Spring channel flow into mainstem side channel. Backwater pool.		
Restoration Notes	Connectivity and complexity. Reach-based.		

CWP #078_SB_Twisp - Lower





Downstream view of alcove channel and mainstem.

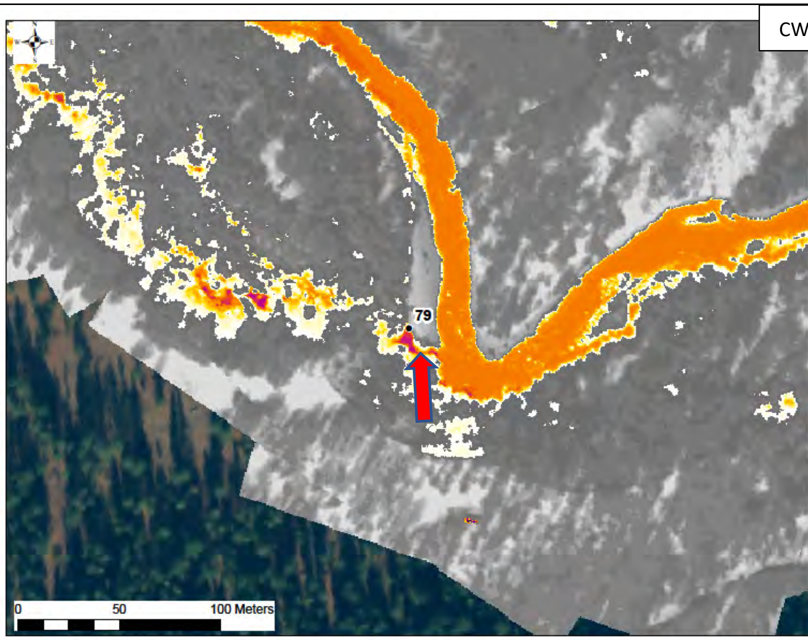
Lateral view across mainstem towards alcove channel.

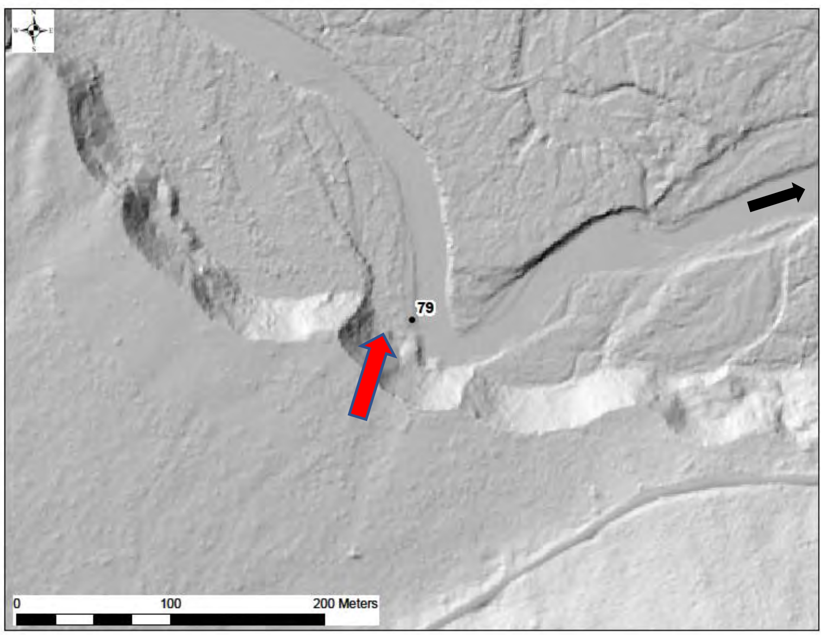
Downstream view from mainstem into top of channel.

Upstream view of alcove source and channel.

CWP ID#	079	**CWP Channel Length (m)**	50
Stream	Twisp	**CWP Channel Avg Width (m)**	3
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	150
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	80
Survey Time	1457	**Average CWP Channel Depth (cm)**	40
River km	18.7	**Min Plume Temp (℃)**	10.0
Latitude	48.36508	**Avg Plume Temp (℃)**	12.0
Longitude	-120.31917	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	16
CWP Source	Springbrook	**Avg Plume Depth (cm)**	7
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	3
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	0.9
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.3
Mainstem Temp (℃)	14.5	**Plume Length 1℃ Differential (m)**	5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	1.5
Min CWP Temp (℃)	9.0	**Fish Presence**	Yes
Average CWP Temp (℃)	9.4	**Fish Species**	Chinook parr
Max Main/CWP Diff (℃)	5.5	**Fish Count**	
Avg Main/CWP Diff (℃)	5.1		
CWP Description	High volume (less than 1 cfs) flow from a beaver dam about 6m up from river. Beaver pond and canals present. Dense riparian. Temps 9-11C in beaver zone. Fully connected with mainstem. Visit on 8/18/21 had 15.7C mainstem, 8.6C CWP, 7.1C differential.		
Plume Description	Channel flows into narrow plume through riffle out toward pool.		
Restoration Notes	Depth and complexity. Tie into ds pool habitat. Connectivity to spring channel. Protect cold outflow. Wood restoration structures just upstream 2022 YN project.		

CWP #079_SB_Twisp - Lower





Upstream view from plume area into channel.

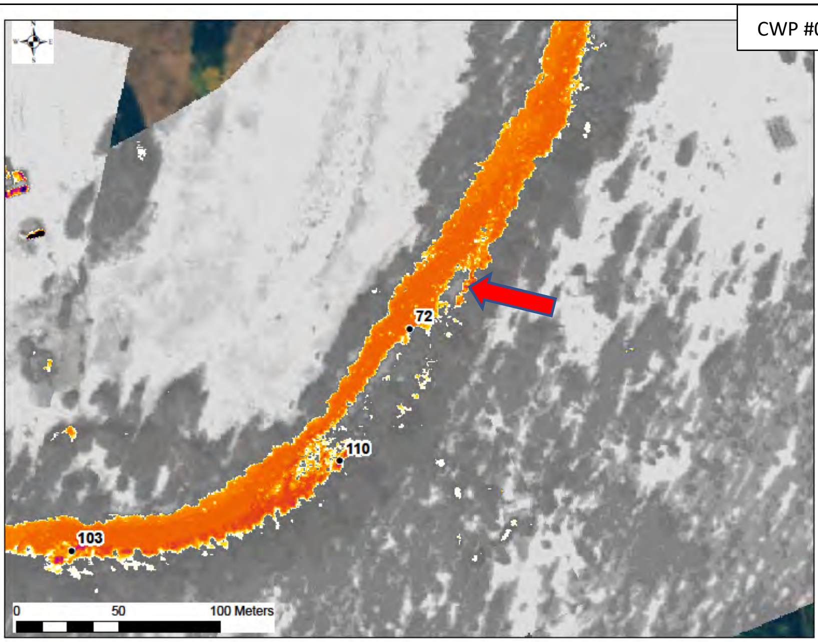
Downstream view in channel to plume area.

Downstream view towards plume area.

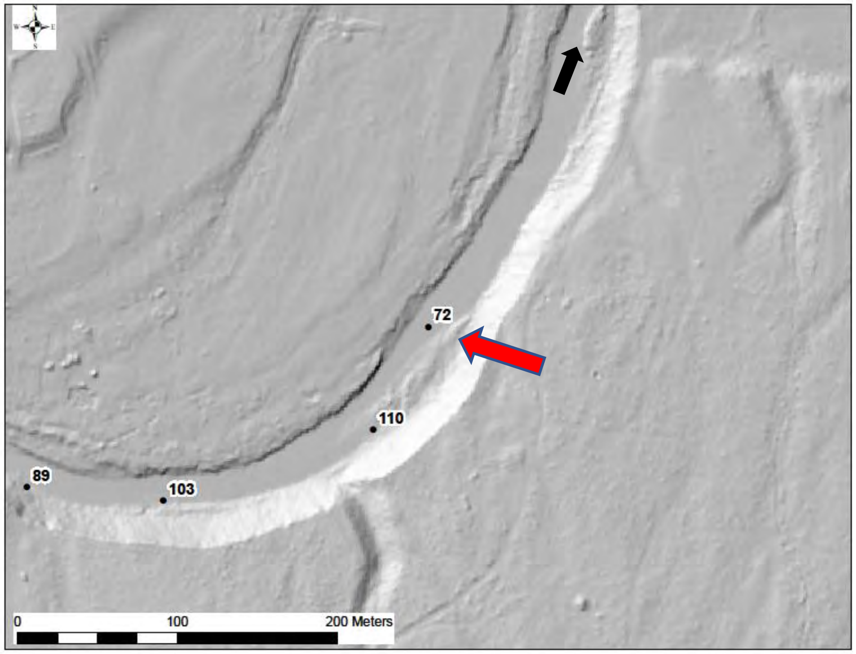
Upstream view in channel to beaver pond.

Upstream view from plume area.

CWP ID#	072	**CWP Channel Length (m)**	20
Stream	Twisp	**CWP Channel Avg Width (m)**	0.3
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	6
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1320	**Average CWP Channel Depth (cm)**	1
River km	20.5	**Min Plume Temp (℃)**	8.7
Latitude	48.3657	**Avg Plume Temp (℃)**	11.2
Longitude	-120.32861	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	30
CWP Source	Alcove	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	0.1
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	12
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	1.2
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.3
Mainstem Temp (℃)	12.3	**Plume Length 1℃ Differential (m)**	12
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	3.6
Min CWP Temp (℃)	8.1	**Fish Presence**	None observed
Average CWP Temp (℃)	9.2	**Fish Species**	
Max Main/CWP Diff (℃)	4.2	**Fish Count**	
Avg Main/CWP Diff (℃)	3.2		
CWP Description	Spring flow off right bank. Shallow, narrow. Several spring sources, broken up by high points of bar. Good connectivity with mainstem. Visit on 8/18/21 had 12.3C mainstem, 7.5C CWP, 4.8C differential.		
Plume Description	Tight to right bank. Small backwater into mainstem riffle.		
Restoration Notes	Depth and complexity. Play dam present, landowner outreach.		



CWP #072_AL_Twisp - Lower



Downstream view of channel confluence with

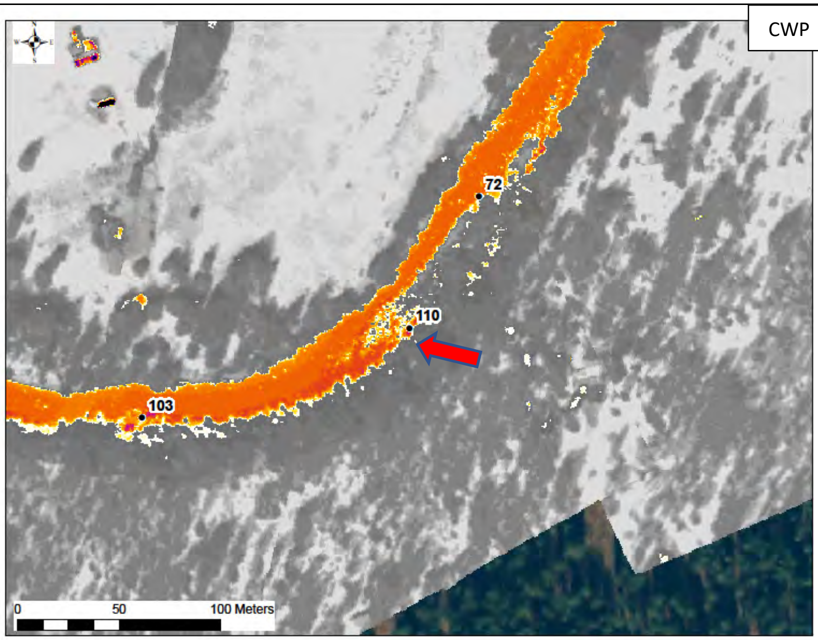

Downstream view of plume area.

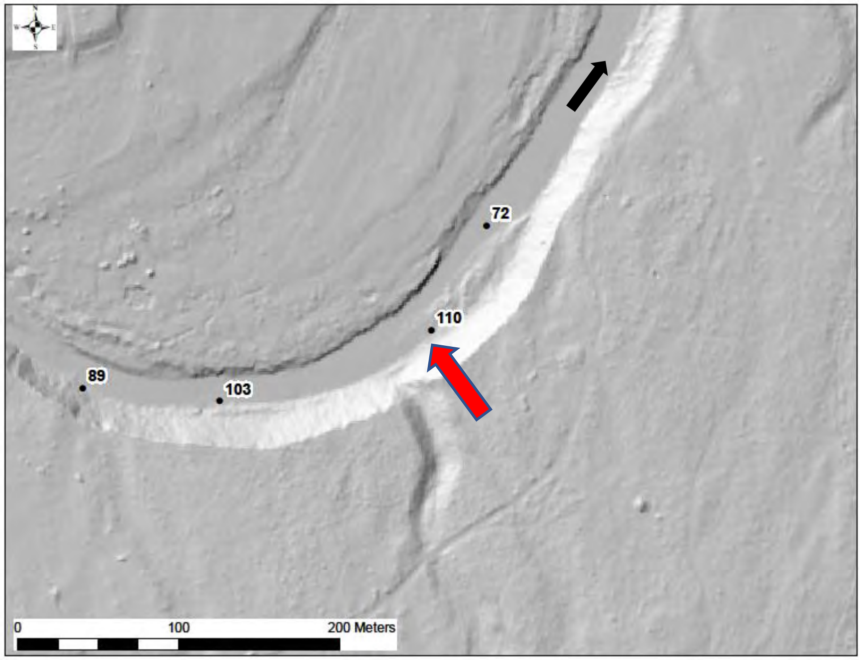

Upstream view of channel at source.


Upstream view from plume into seeps.

CWP ID#	110	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Lower	**CWP Channel Area (m^2)**	
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1343	**Average CWP Channel Depth (cm)**	
River km	20.6	**Min Plume Temp (℃)**	9.7
Latitude	48.36513	**Avg Plume Temp (℃)**	10.3
Longitude	-120.32908	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	30
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	12
Tributary Name		**Plume Width 2℃ Differential (m)**	0.4
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	18
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	7.2
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.6
Mainstem Temp (℃)	12.3	**Plume Length 1℃ Differential (m)**	20
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	12
Min CWP Temp (℃)	9.0	**Fish Presence**	None observed
Average CWP Temp (℃)	10.3	**Fish Species**	
Max Main/CWP Diff (℃)	3.3	**Fish Count**	
Avg Main/CWP Diff (℃)	2.0		
CWP Description	Perched site. Very localized cold water. Connected to mainstem through cobble bar. Spring seep with no visible surface flow. Visit on 8/18/21 had 12.3C mainstem, 9.2 CWP, 3.1C differential.		
Plume Description	Filters into high cobble bar flows across and into mainstem riffle.		
Restoration Notes	Split flow. Complexity.		

CWP #110_LS_Twisp - Lower





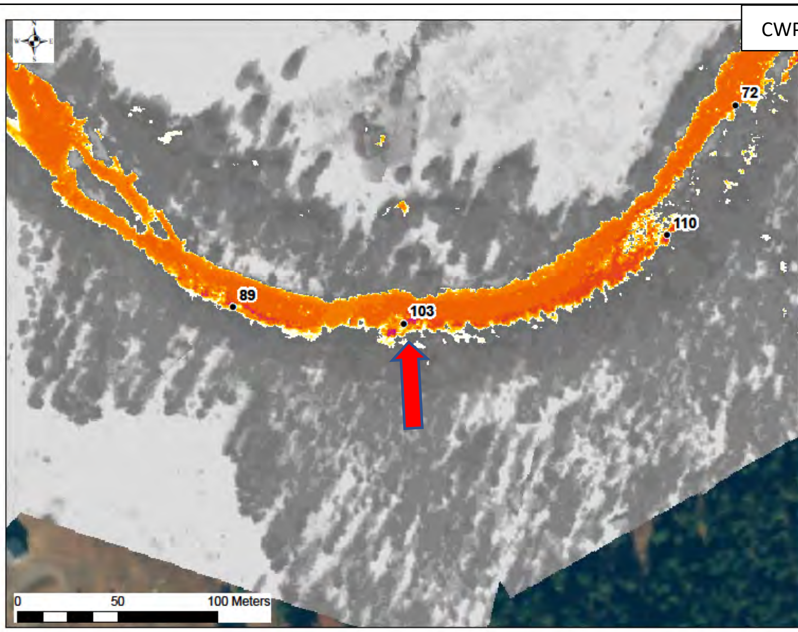
Upstream view of seep source.

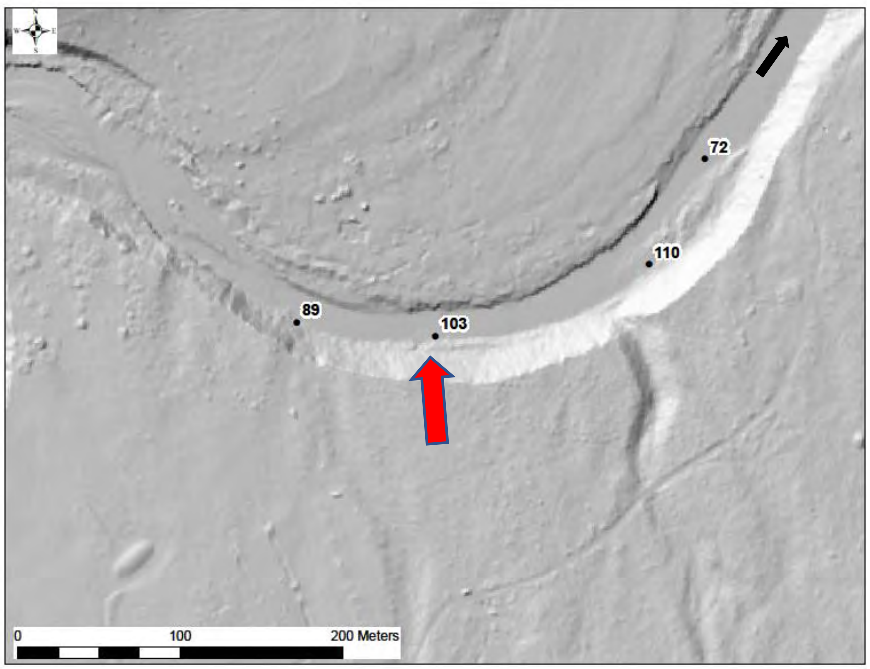
Lateral view of seep area.

Upstream view from plume into seep.

CWP ID#	103	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Lower	**CWP Channel Area (m²)**	
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1359	**Average CWP Channel Depth (cm)**	
River km	20.7	**Min Plume Temp (℃)**	10.1
Latitude	48.36486	**Avg Plume Temp (℃)**	11.5
Longitude	-120.33086	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	35
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	1.2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	12
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	14.4
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	13.3	**Plume Length 1℃ Differential (m)**	12
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	24
Min CWP Temp (℃)	7.4	**Fish Presence**	None observed
Average CWP Temp (℃)	8.8	**Fish Species**	
Max Main/CWP Diff (℃)	5.9	**Fish Count**	
Avg Main/CWP Diff (℃)	4.5		
CWP Description	Seep of steep bank that extends down to CWP #110 and #072. Deeper pocket at downstream end where it fully meets mainstem. Top of seep flows into boulder bar. Connected to main flow but shallow. Visit on 8/18/21 had 14.1C mainstem, 7.2C CWP, 6.9C differential.		
Plume Description	Narrow off bar. Flows into nice pool feature ds.		
Restoration Notes	Depth and complexity. Enhance pool area.		

CWP #103_LS_Twisp - Lower





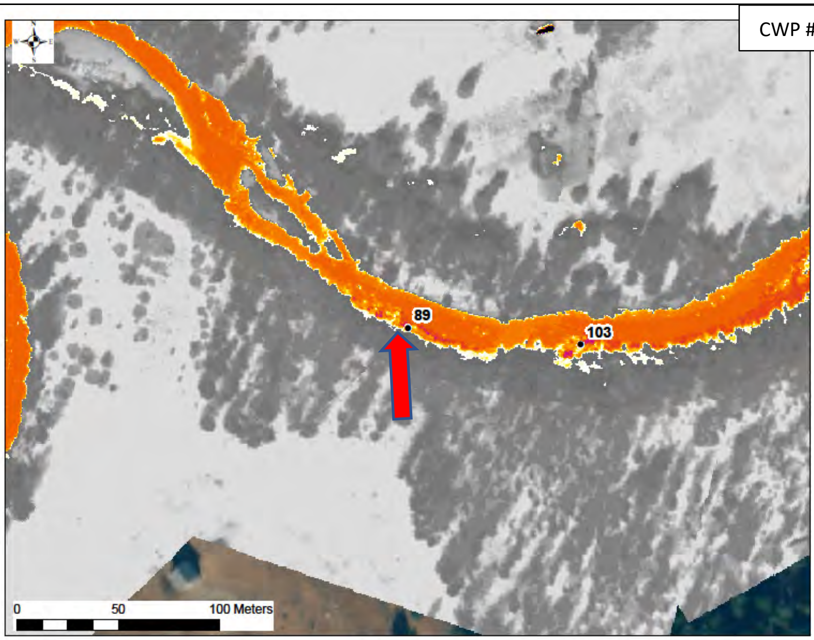
Downstream view of plume area in mainstem.

Downstream view of channel at source.

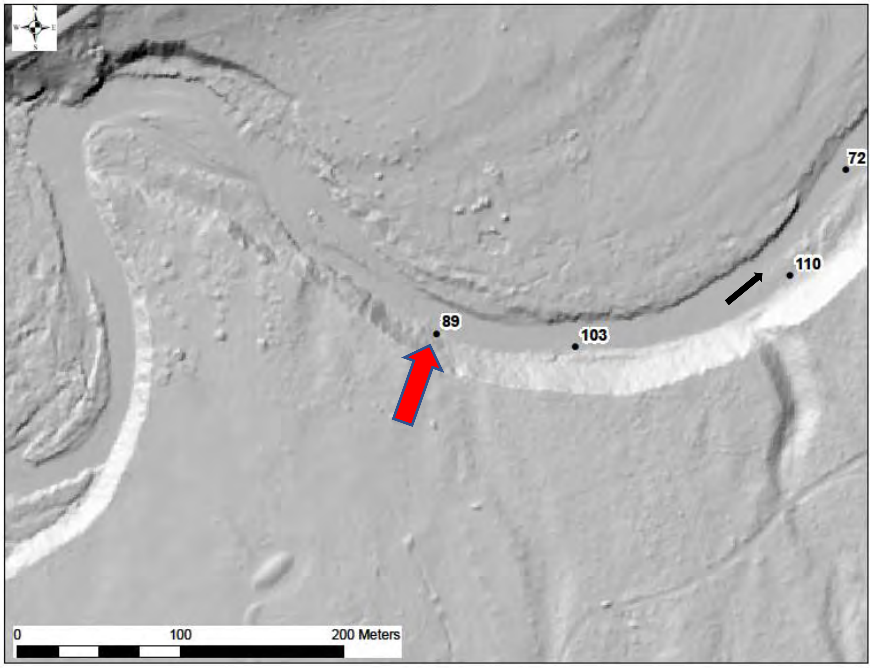
Lateral view of seep area.

Upstream view from plume into seep.

CWP ID#	089	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Lower	**CWP Channel Area (m^2)**	
Survey Date	9/6/2022	**Max CWP Channel Depth (cm)**	
Survey Time	1419	**Average CWP Channel Depth (cm)**	
River km	20.8	**Min Plume Temp (℃)**	10.8
Latitude	48.36504	**Avg Plume Temp (℃)**	11.8
Longitude	-120.33201	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	40
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	14
Tributary Name		**Plume Width 2℃ Differential (m)**	0.1
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	47
Dominant Substrate	Boulder	**Plume Area 2℃ Differential (m^2)**	4.7
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	0.3
Mainstem Temp (℃)	14.1	**Plume Length 1℃ Differential (m)**	53
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	15.9
Min CWP Temp (℃)	7.6	**Fish Presence**	Not observed
Average CWP Temp (℃)	9.5	**Fish Species**	
Max Main/CWP Diff (℃)	6.5	**Fish Count**	
Avg Main/CWP Diff (℃)	4.6		
CWP Description	Seep from steep bank - same as CWP #103. Visible surface flow into deep sandy pocket on edge of pool. Boulders line bank. Vegetated island just upstream. Cold water stratified below warmer mainstem. Visit on 8/18/21 had had 14.7C mainstem, 7.9C CWP, 6.8C differential.		
Plume Description	Cold water stratified below warmer mainstem.		
Restoration Notes	Complexity and deflection/isolation. Good restoration potential.		



CWP #089_LS_Twisp - Lower



Downstream view of plume area in mainstem.

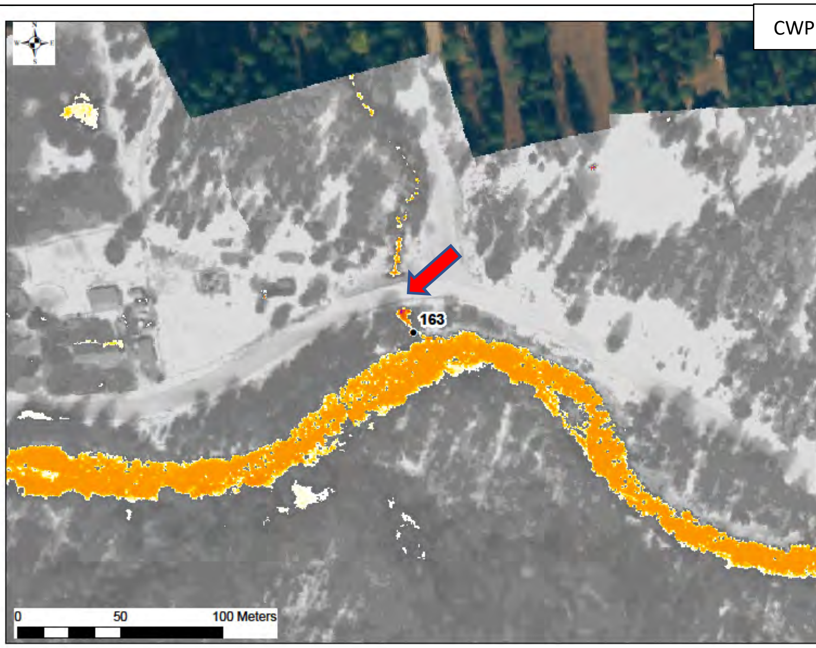

Lateral view of seep area.

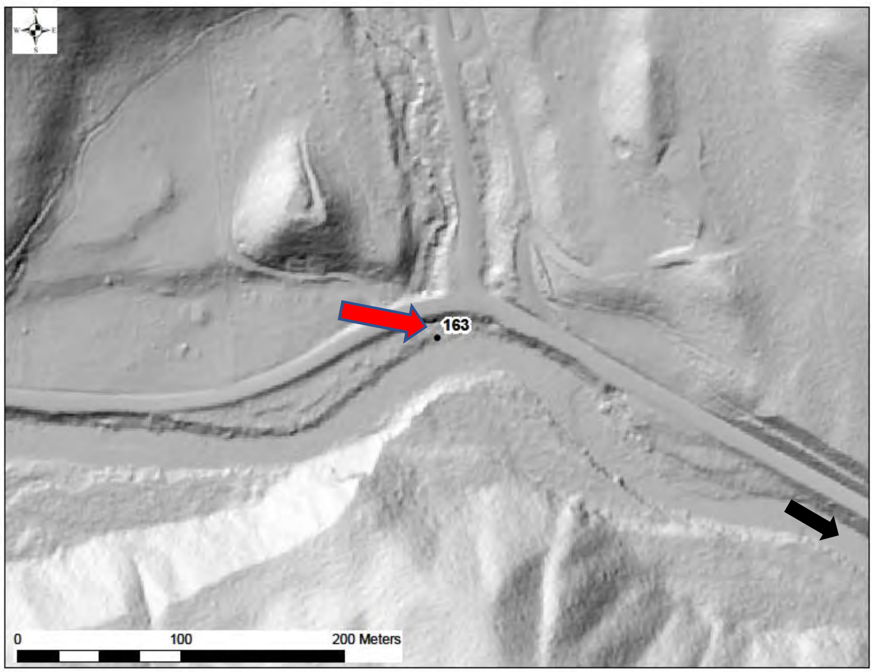

Upstream view of plume area.


Upstream view from plume into seep.

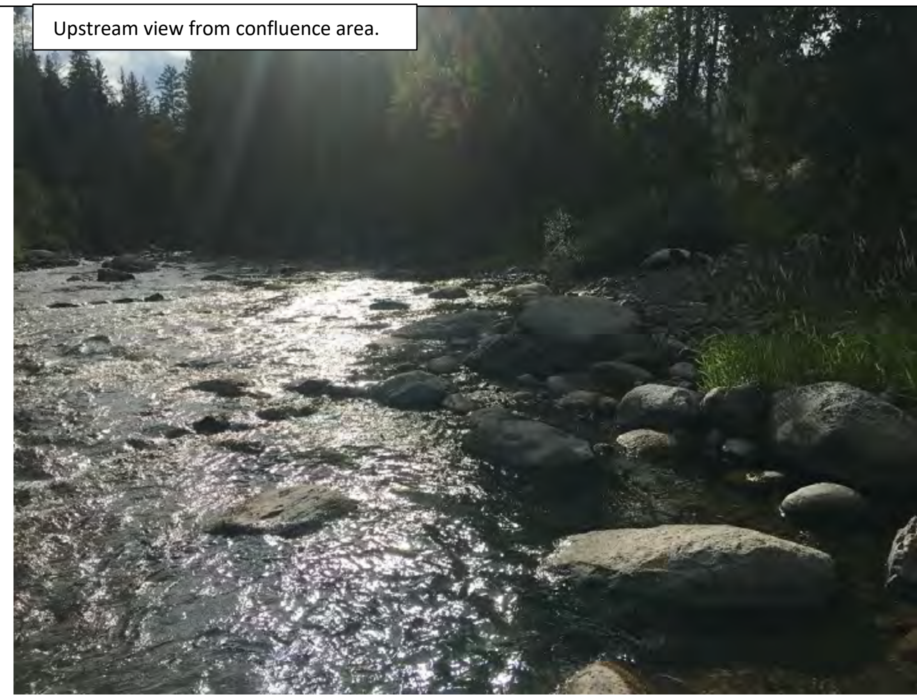
CWP ID#	163	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	
Survey Date	8/26/21	**Max CWP Channel Depth (cm)**	
Survey Time	1652	**Average CWP Channel Depth (cm)**	
River km	15.4	**Min Plume Temp (℃)**	12.8
Latitude	48.37904	**Avg Plume Temp (℃)**	14
Longitude	-120.28619	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	28
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	15
Tributary Name	Little Bridge Creek	**Plume Width 2℃ Differential (m)**	1.3
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	12
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	15.6
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	16.2	**Plume Length 1℃ Differential (m)**	24
Tributary Temp (℃)	12.7	**Plume Area 1℃ Differential (m²)**	48
Min CWP Temp (℃)	12.7	**Fish Presence**	None detected
Average CWP Temp (℃)	14	**Fish Species**	
Max Main/CWP Diff (℃)	3.5	**Fish Count**	
Avg Main/CWP Diff (℃)	2.2		
CWP Description	Fish passable but shallow rocky entrance to creek. Culvert just upstream.		
Plume Description	Flow from creek into cobble and boulders. No overhead cover at low flow.		
Restoration Notes	Depth and complexity.		

CWP #163_TC_ Twisp Middle





Upstream view from confluence area.

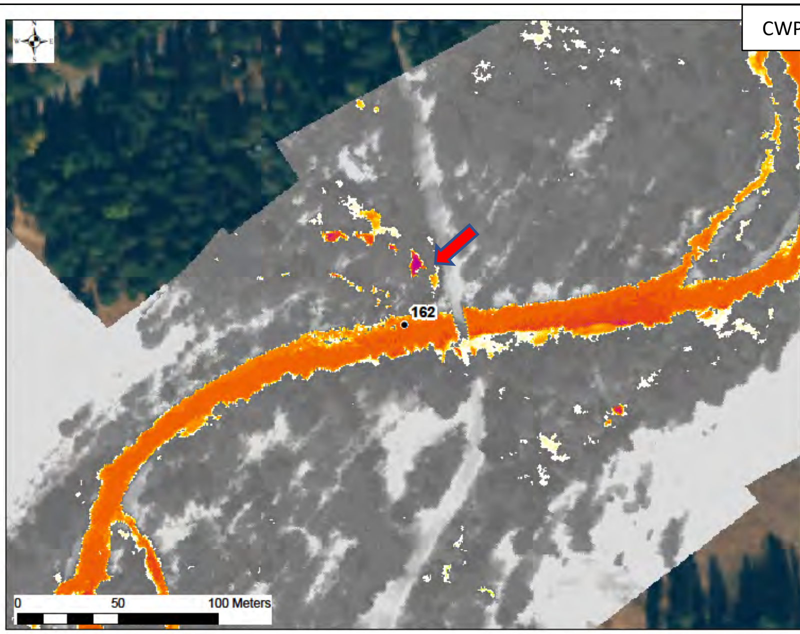


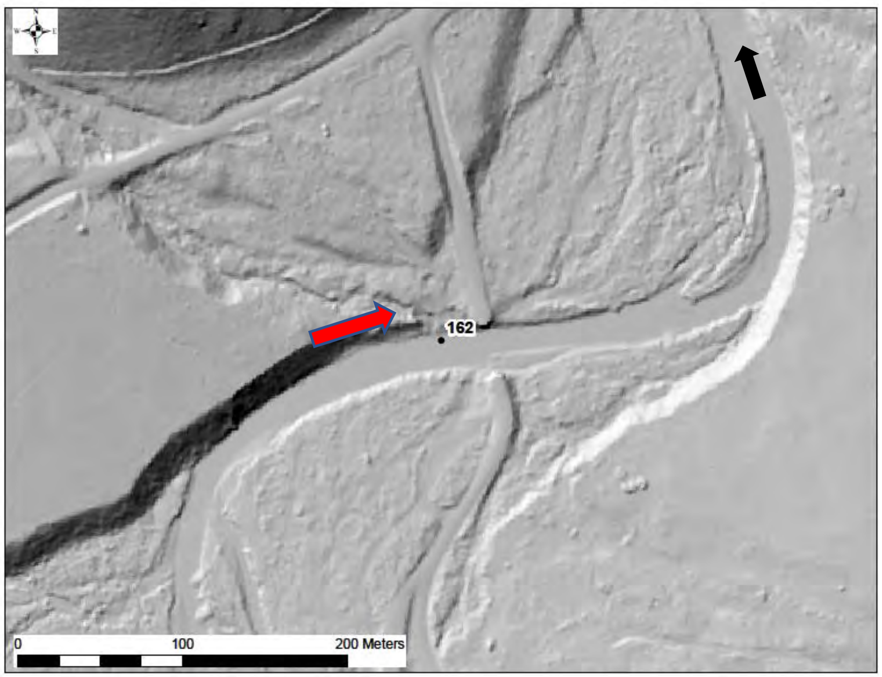
Downstream view of confluence and mainstem.

Lateral view of Little Bridge Creek confluence.

CWP ID#	162	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	
Survey Date	8/26/21	**Max CWP Channel Depth (cm)**	
Survey Time	1623	**Average CWP Channel Depth (cm)**	
River km	21.5	**Min Plume Temp (℃)**	11.7
Latitude	48.36394	**Avg Plume Temp (℃)**	13
Longitude	-120.33741	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	25
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	10
Tributary Name	Canyon Creek	**Plume Width 2℃ Differential (m)**	1
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	10
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	10
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.5
Mainstem Temp (℃)	14.5	**Plume Length 1℃ Differential (m)**	28
Tributary Temp (℃)	11.7	**Plume Area 1℃ Differential (m²)**	42
Min CWP Temp (℃)	11.7	**Fish Presence**	Yes
Average CWP Temp (℃)	13	**Fish Species**	Unknown
Max Main/CWP Diff (℃)	2.8	**Fish Count**	
Avg Main/CWP Diff (℃)	1.5		
CWP Description	Canyon Creek has two outlet channels about 12m apart. Both 11.7C. Upper has more flow perhaps. A cfs or so from each. Access into creek not great. Looks like creek is diverted and ponded just upstream on private land.		
Plume Description	Shallow cobble. Two cold inputs that flow into one another and ds to bridge. Little Instream cover.		
Restoration Notes	Complexity and depth.		

CWP #162_TC_ Twisp Middle





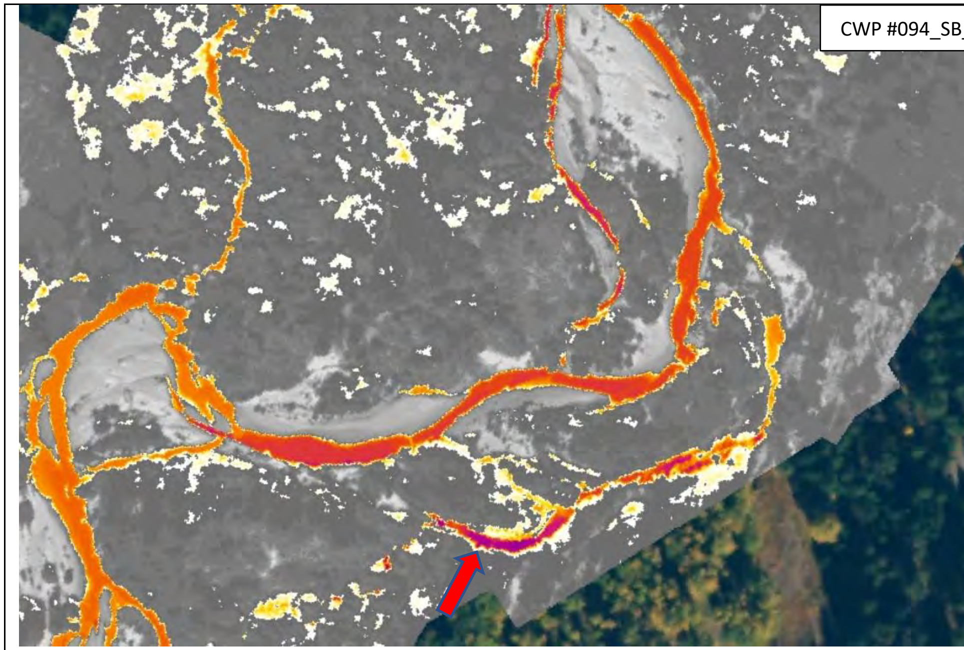
Downstream view of confluence area.

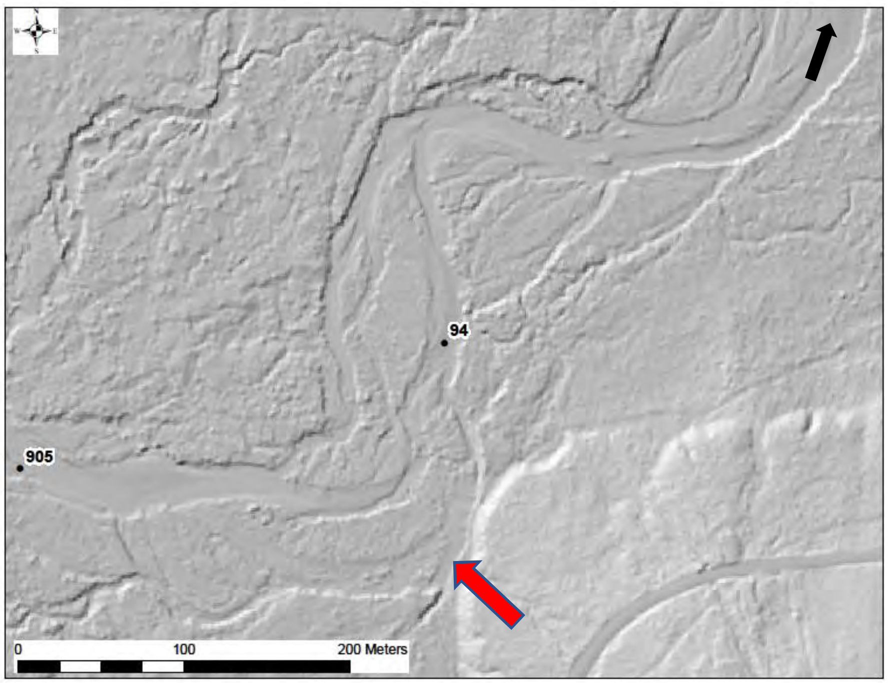
Downstream view of plume area and mainstem.

Lateral view of confluence area.

CWP ID#	094	**CWP Channel Length (m)**	360 (est)
Stream	Twisp	**CWP Channel Avg Width (m)**	2 (est)
Assessment Unit	Twisp Middle	**CWP Channel Area (m^2)**	720 (est)
Survey Date	8/27/21	**Max CWP Channel Depth (cm)**	
Survey Time	1449	**Average CWP Channel Depth (cm)**	15
River km	23.3	**Min Plume Temp (℃)**	
Latitude	48.35729	**Avg Plume Temp (℃)**	
Longitude	-120.34595	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Side Channel	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	15.5	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	
Min CWP Temp (℃)	8.7	**Fish Presence**	Yes
Average CWP Temp (℃)	10.5	**Fish Species**	*O. mykiss*
Max Main/CWP Diff (℃)	6.8	**Fish Count**	
Avg Main/CWP Diff (℃)	4.9		
CWP Description	Several seeps begin channels that flow into 2009 mainstem path. #094 is most south and is now beaver ponds and 18C where that channel meets the other channel of 11.5C. Ds of that 13-14C. Fish in colder channel near top. Complex reach.		
Plume Description	No plume. Mainstem swamps the side channel flow of 14.5C.		
Restoration Notes	Split flow into channel.		

CWP #094_SB_ Twisp Middle





Downstream view of spring channel.

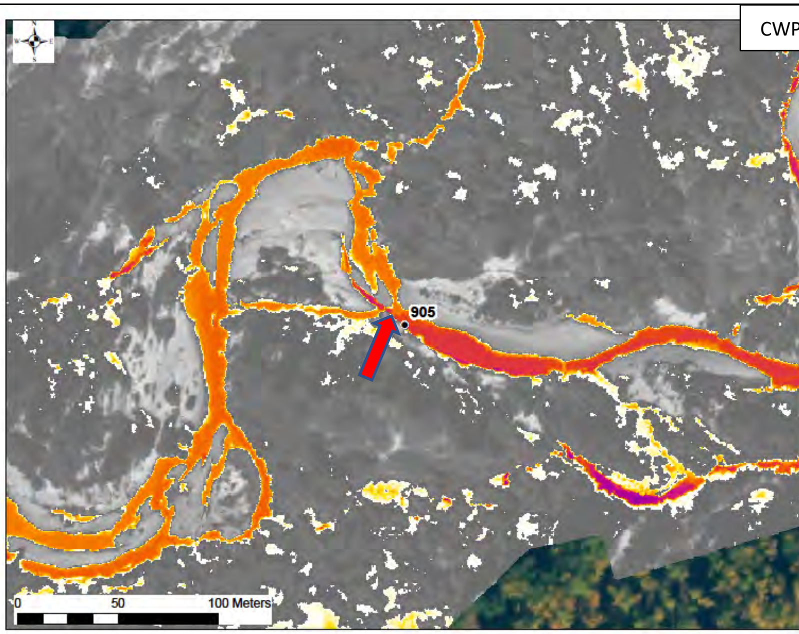
Downstream view or pool complexity.

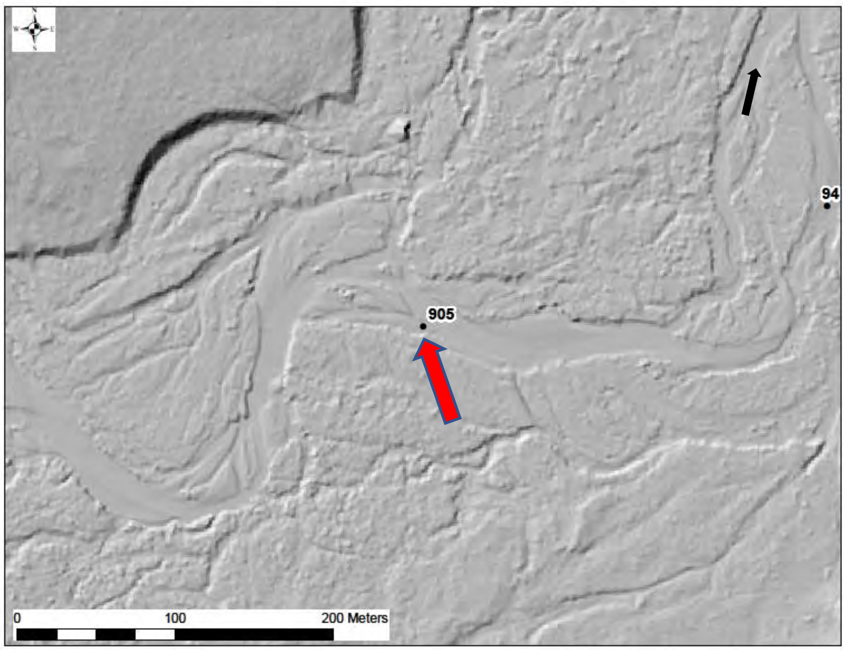
Upstream view of spring channel.

Upstream view of seep source and mainstem.

CWP ID#	905	**CWP Channel Length (m)**	45
Stream	Twisp	**CWP Channel Avg Width (m)**	1.5
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	67.5
Survey Date	8/27/21	**Max CWP Channel Depth (cm)**	20
Survey Time	1513	**Average CWP Channel Depth (cm)**	8
River km	23.4	**Min Plume Temp (℃)**	9.7
Latitude	48.35662	**Avg Plume Temp (℃)**	14.0
Longitude	-120.34941	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	20
CWP Source	Alcove	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	0.6
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	9
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	5.4
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	15.3	**Plume Length 1℃ Differential (m)**	12
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	12
Min CWP Temp (℃)	8.8	**Fish Presence**	Yes
Average CWP Temp (℃)	10.0	**Fish Species**	Chinook, *O.mykiss*
Max Main/CWP Diff (℃)	6.5	**Fish Count**	
Avg Main/CWP Diff (℃)	5.3		
CWP Description	In a side channel. Shallow. YOY O. mykiss. Adult chinook at plume.		
Plume Description	Spring flow into mainstem riffle bend hole. Narrow. Shallow except in pool bit.		
Restoration Notes	Connectivity. Depth.		

CWP #905_AL_ Twisp Middle



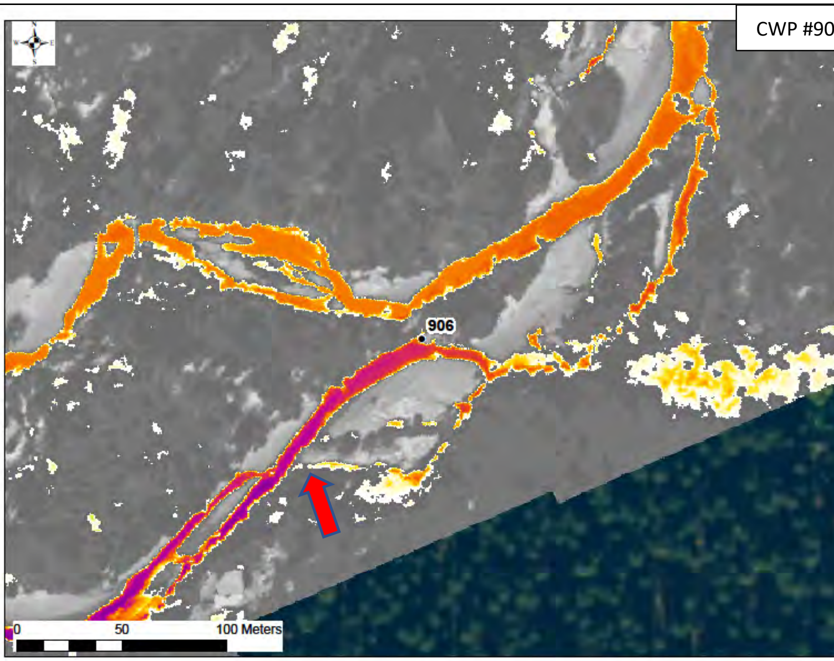


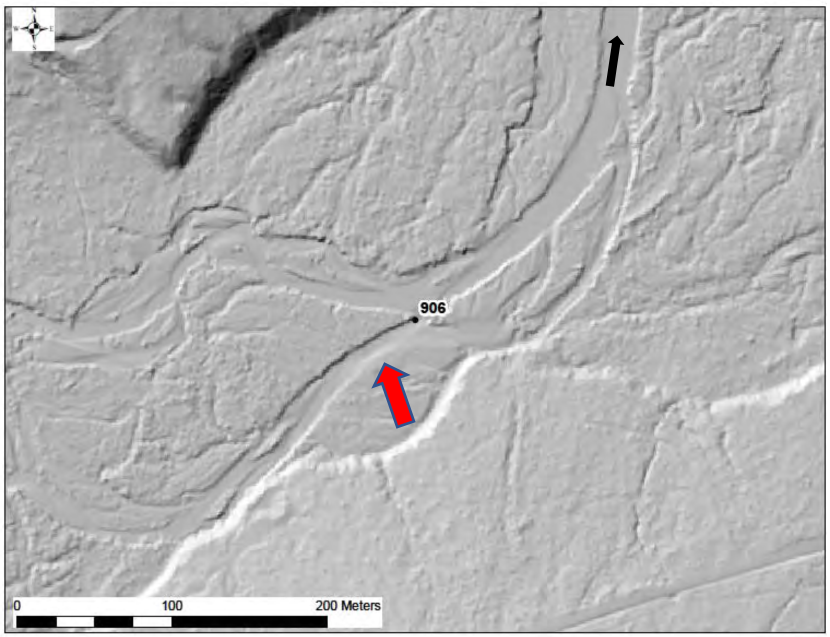
Upstream view of alcove from mainstem.

Upstream view of alcove source.

CWP ID#	906	**CWP Channel Length (m)**	575 (est)
Stream	Twisp	**CWP Channel Avg Width (m)**	6
Assessment Unit	Twisp Middle	**CWP Channel Area (m^2)**	3,450
Survey Date	8/27/21	**Max CWP Channel Depth (cm)**	40
Survey Time	1547	**Average CWP Channel Depth (cm)**	15
River km	24.9	**Min Plume Temp (℃)**	13.8
Latitude	48.35375	**Avg Plume Temp (℃)**	14.3
Longitude	-120.35835	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	60
CWP Source	Springbrook	**Avg Plume Depth (cm)**	35
Tributary Name		**Plume Width 2℃ Differential (m)**	1.5
Habitat Type	Pool	**Plume Length 2℃ Differential (m)**	2
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	3
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	15.3	**Plume Length 1℃ Differential (m)**	5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	10
Min CWP Temp (℃)	8.6	**Fish Presence**	Yes
Average CWP Temp (℃)	11.5	**Fish Species**	*O.mykiss*, Chinook
Max Main/CWP Diff (℃)	6.7	**Fish Count**	
Avg Main/CWP Diff (℃)	3.8		
CWP Description	Long channel. Did not see source. Vegetated. Lots of fish. Beaver dam and pond. High quality habitat. More complex upstream from house. Dense riparian		
Plume Description	Spring flow into mainstem riffle bend deep hole with cover. Log. Maybe small adult chinook holding.		
Restoration Notes	Connectivity. Complexity.		

CWP #906_SB_ Twisp Middle





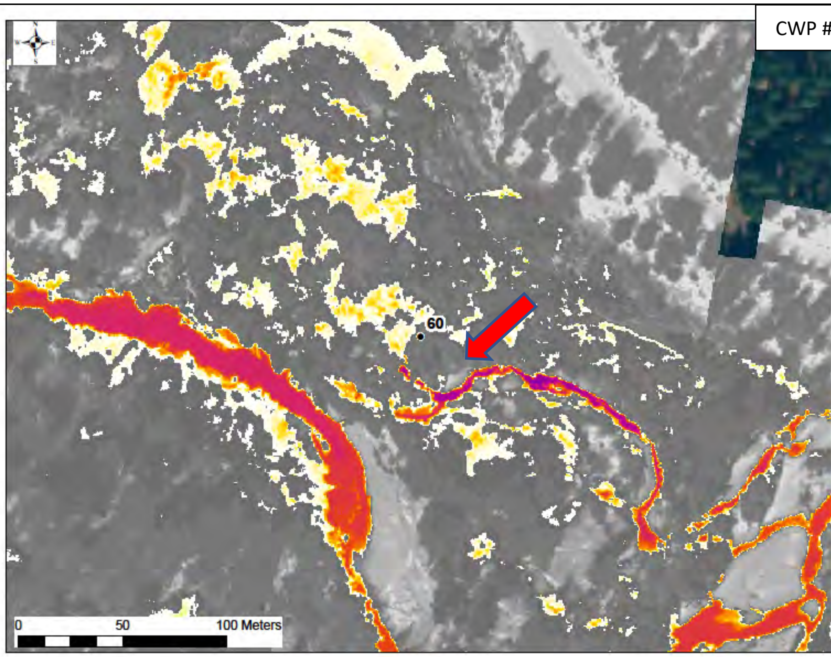
Downstream view of channel confluence with mainstem.

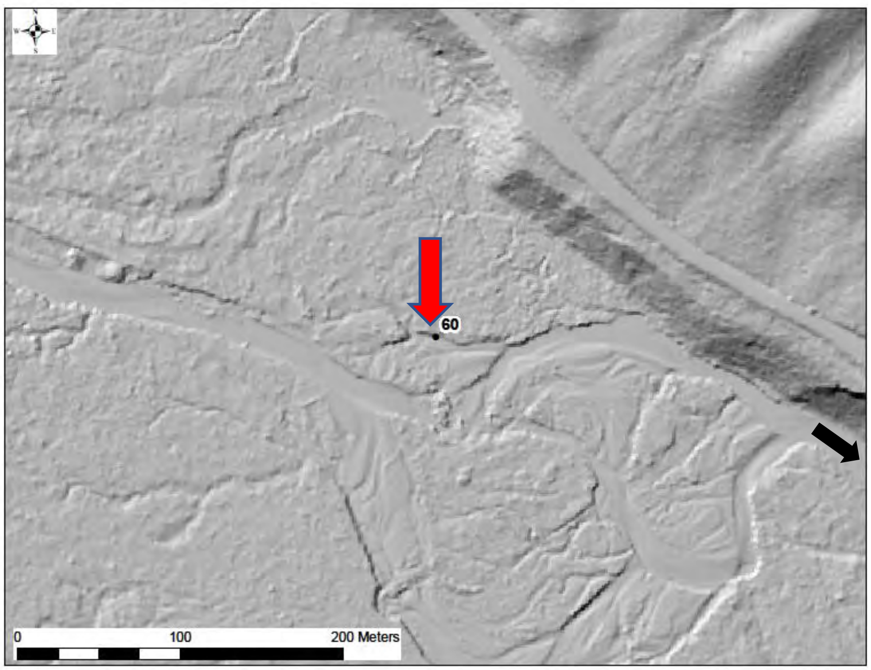

Downstream view of spring channel.


Upstream view of beaver dam and pool.

Methow Cold Water Patch Assessment			
CWP ID#	060	**CWP Channel Length (m)**	1
Stream	Twisp	**CWP Channel Avg Width (m)**	35
Assessment Unit	Middle Twisp	**CWP Channel Area (m²)**	25
Survey Date	8/27/21	**Max CWP Channel Depth (cm)**	10
Survey Time	1307	**Average CWP Channel Depth (cm)**	1
River km	27	**Min Plume Temp (℃)**	
Latitude	48.35807	**Avg Plume Temp (℃)**	
Longitude	-120.38547	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Glide	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	9.9	**Fish Presence**	None observed
Average CWP Temp (℃)	11.5	**Fish Species**	
Max Main/CWP Diff (℃)	3.2	**Fish Count**	
Avg Main/CWP Diff (℃)	1.6		
CWP Description	Spring seeps in side channel are within active channel. Low volume. No connection to mainstem. Several small isolated pools. Only one was <11C. Mainstem has moved left since 2009. Bushwhacked into beaver ponds to north. High temps in the water I could find.		
Plume Description	No plume. No connection. Mainstem may be where CWP was in 2009.		
Restoration Notes	Connectivity.		

CWP #060_SB_Middle Twisp





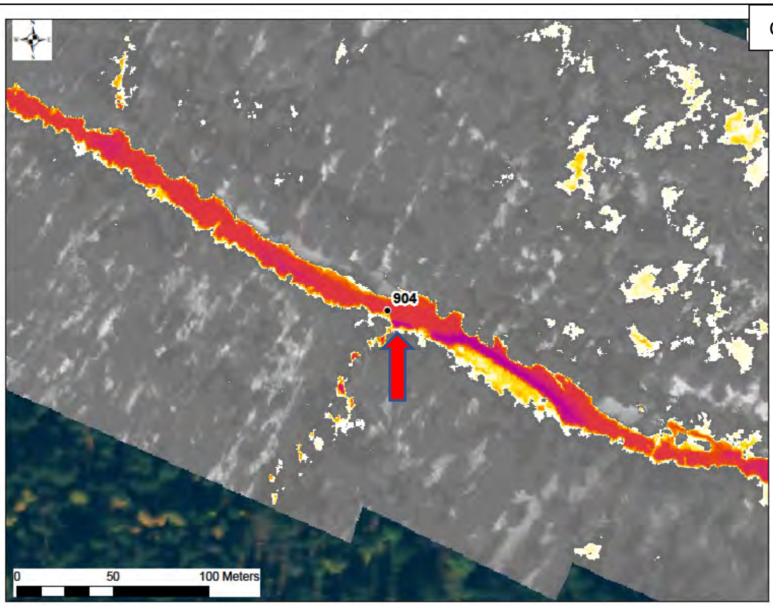
Downstream view of seeps along active channel surface.

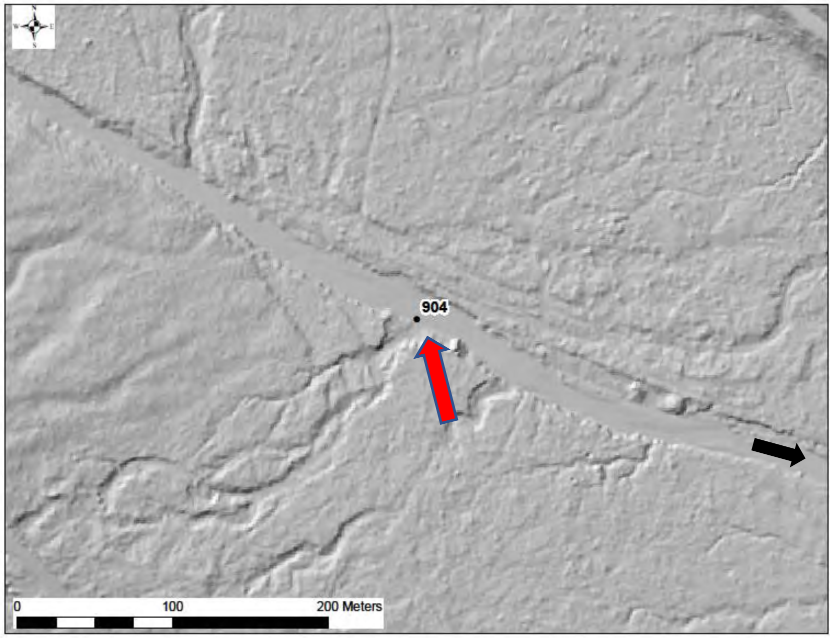

Downstream view of isolated seep.


Upstream view of seep and high flow channel.

CWP ID#	904	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	
Survey Date	8/27/21	**Max CWP Channel Depth (cm)**	
Survey Time	1335	**Average CWP Channel Depth (cm)**	
River km	27.2	**Min Plume Temp (℃)**	11.9
Latitude	48.35894	**Avg Plume Temp (℃)**	12.5
Longitude	-120.39037	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	22
CWP Source	Tributary Confluence	**Avg Plume Depth (cm)**	14
Tributary Name	Eagle Creek	**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1.6
Mainstem Temp (℃)	13.5	**Plume Length 1℃ Differential (m)**	15
Tributary Temp (℃)	11.7	**Plume Area 1℃ Differential (m²)**	24
Min CWP Temp (℃)	11.7	**Fish Presence**	None observed
Average CWP Temp (℃)	12.5	**Fish Species**	
Max Main/CWP Diff (℃)	1.8	**Fish Count**	
Avg Main/CWP Diff (℃)	1.0		
CWP Description	Eagle Creek confluence.		
Plume Description	Flows out from creek at 2m wide then tapers quickly.		
Restoration Notes	Complexity and depth. YN restoration area 2022.		

CWP #904_TC_ Twisp Middle



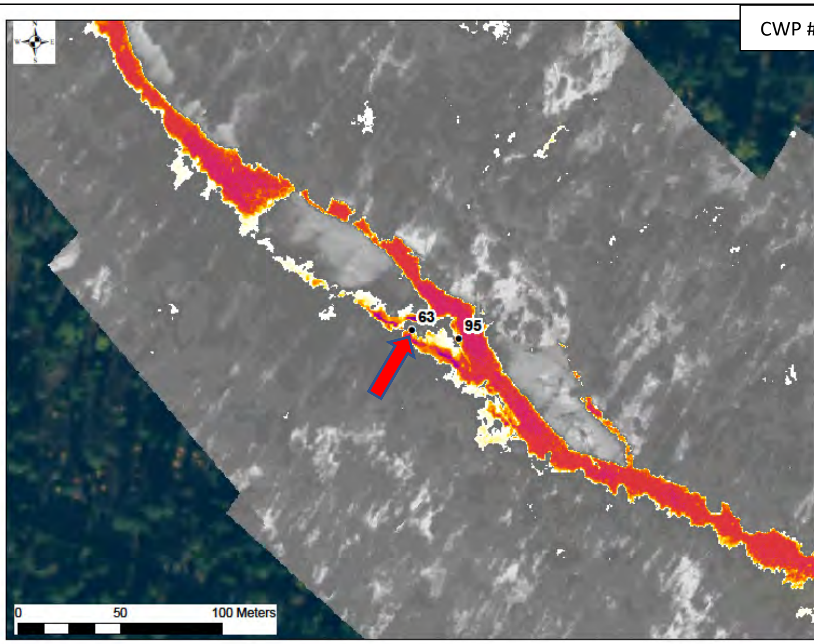


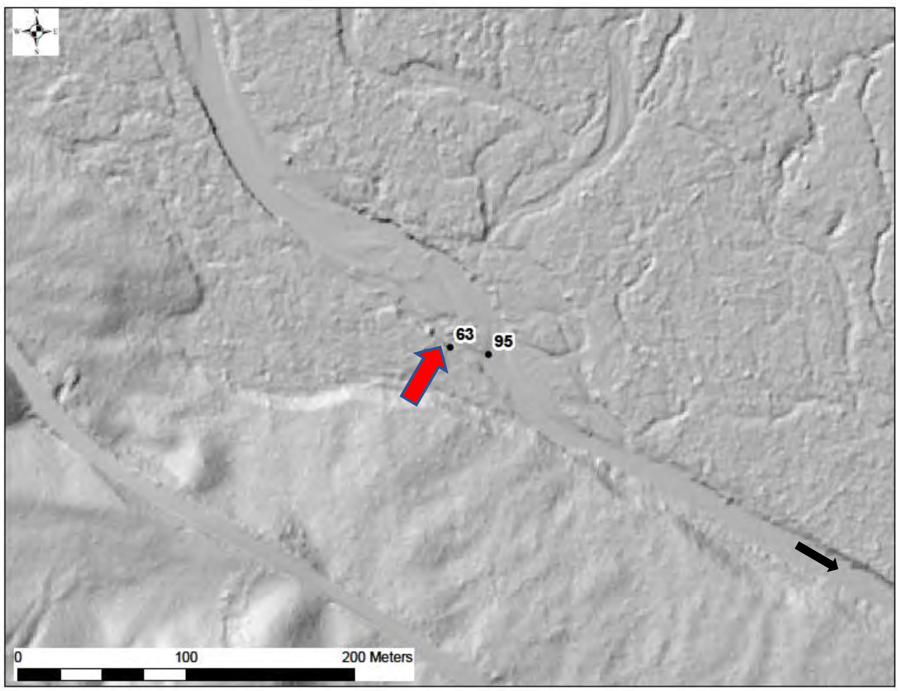
Downstream view of plume area and mainstem.

Lateral view of Eagle Creek confluence. 	

Methow Cold Water Patch Assessment			
CWP ID#	063	**CWP Channel Length (m)**	60
Stream	Twisp	**CWP Channel Avg Width (m)**	3.5
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	210
Survey Date	8/26/21	**Max CWP Channel Depth (cm)**	35
Survey Time	1514	**Average CWP Channel Depth (cm)**	14
River km	27.9	**Min Plume Temp (℃)**	12.5
Latitude	48.36145	**Avg Plume Temp (℃)**	13.0
Longitude	-120.39682	**Min Plume Depth (cm)**	
River Bank	Right	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	12.6	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	11.7	**Fish Presence**	None observed
Average CWP Temp (℃)	12.3	**Fish Species**	
Max Main/CWP Diff (℃)	0.9	**Fish Count**	
Avg Main/CWP Diff (℃)	0.3		
CWP Description	No >2C cold seeps found in channel. Max was 1C cooler than mainstem. Some >13C observed. Scant flow at ds connection with mainstem. Flows into gravel bar.		
Plume Description	No cold plume. Spring channel warmer than mainstem at confluence.		
Restoration Notes	Connectivity, depth. Active restoration area in 2022 via YN large wood.		

CWP #063_SB_Twisp Middle





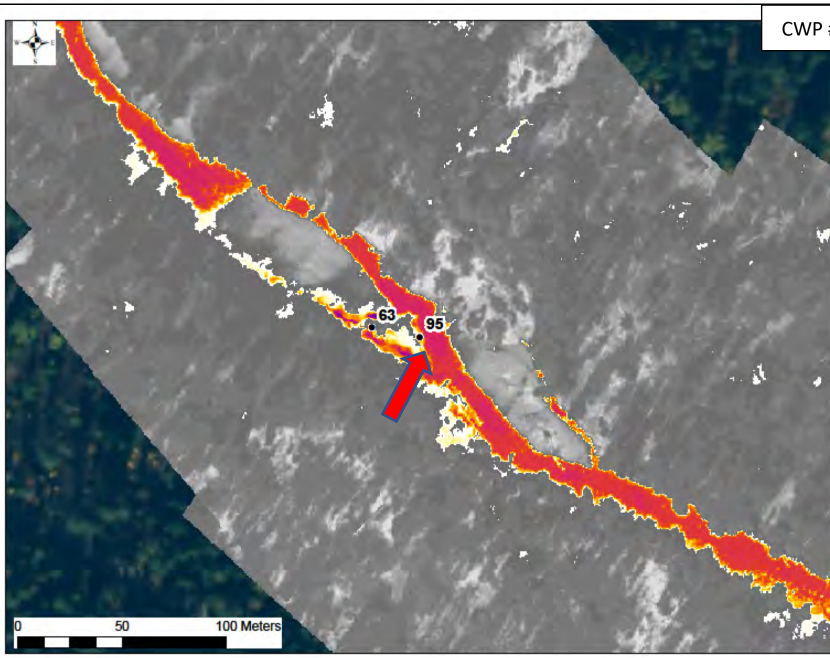
Downstream view of spring channel towards mainstem.

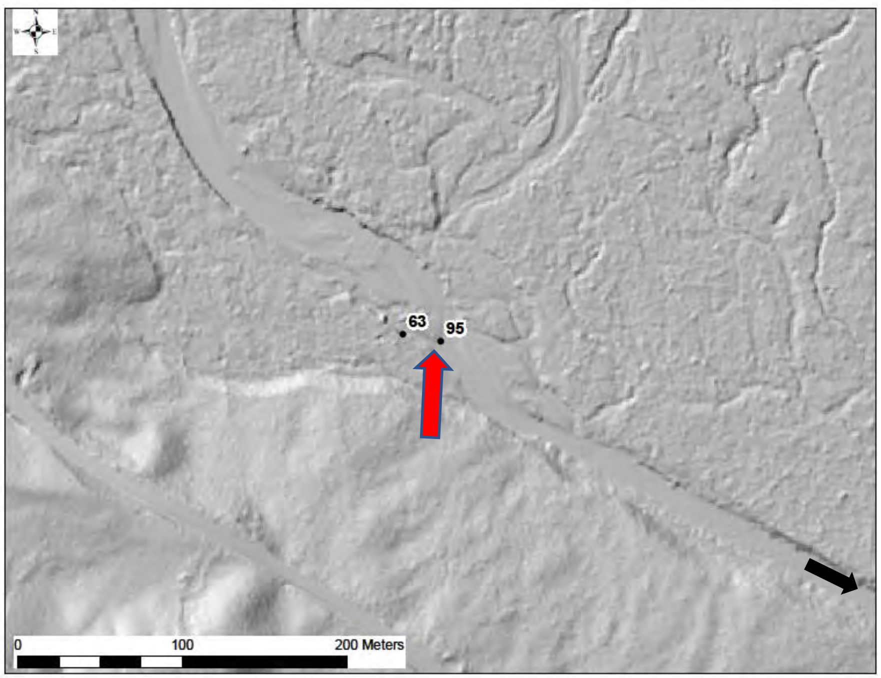
Upstream view in channel.

Upstream view from mainstem into channel.

CWP ID#	095	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	
Survey Date	8/26/21	**Max CWP Channel Depth (cm)**	
Survey Time	1535	**Average CWP Channel Depth (cm)**	
River km	27.9	**Min Plume Temp (℃)**	8.5
Latitude	48.36141	**Avg Plume Temp (℃)**	11.0
Longitude	-120.39651	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	22
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	12
Tributary Name		**Plume Width 2℃ Differential (m)**	0.3
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	5
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	1.5
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	0.4
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	13
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	5.2
Min CWP Temp (℃)	8.5	**Fish Presence**	None observed
Average CWP Temp (℃)	11.0	**Fish Species**	
Max Main/CWP Diff (℃)	4.6	**Fish Count**	
Avg Main/CWP Diff (℃)	2.1		
CWP Description	Localized seepage from right cobble bank. Plume flows into channel from CWP #063. Connected to mainstem 13m ds.		
Plume Description	Localized tight to right bank within active channel. Cools water from that channel.		
Restoration Notes	Complexity. Consider island upstream. YN wood area 2022.		

CWP #095_LS_Middle Twisp





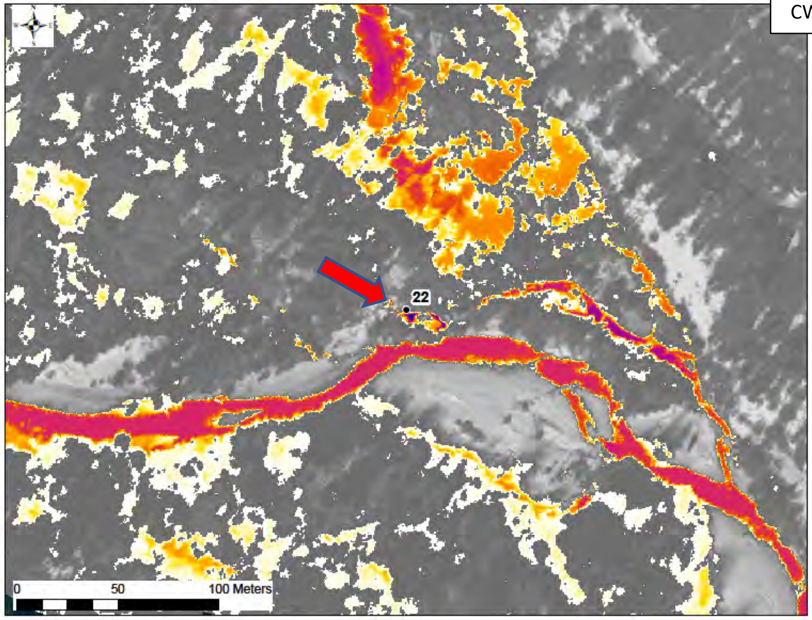
Downstream view of seep and mainstem.

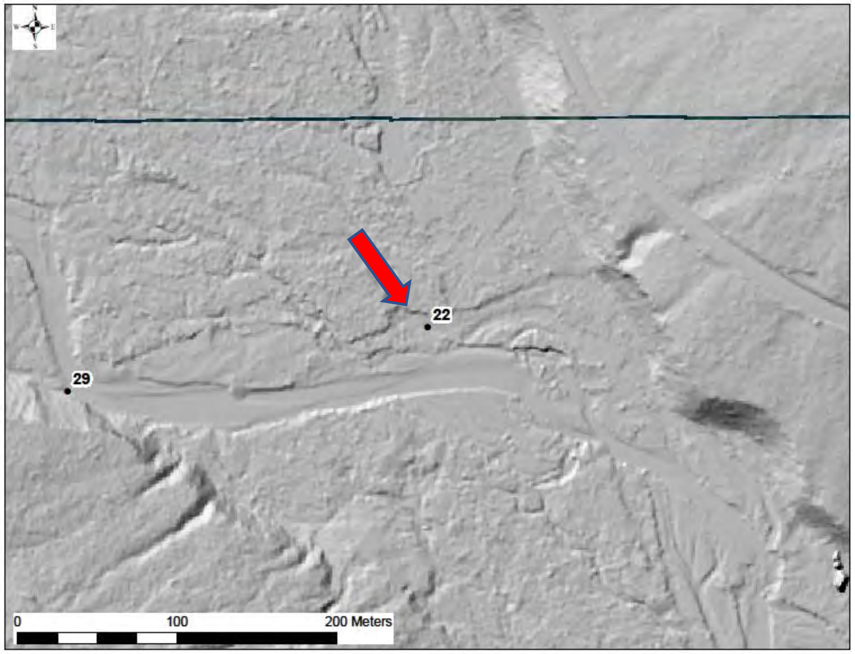
Upstream view of seep and mainstem on left.

Lateral view of seep source from bank.

Methow Cold Water Patch Assessment			
CWP ID#	022	**CWP Channel Length (m)**	100
Stream	Twisp	**CWP Channel Avg Width (m)**	6
Assessment Unit	Middle Twisp	**CWP Channel Area (m²)**	600
Survey Date	8/26/21	**Max CWP Channel Depth (cm)**	54
Survey Time	1353	**Average CWP Channel Depth (cm)**	20
River km	30	**Min Plume Temp (℃)**	
Latitude	48.37384	**Avg Plume Temp (℃)**	
Longitude	-120.41383	**Min Plume Depth (cm)**	
River Bank	Left	**Max Plume Depth (cm)**	
CWP Source	Springbrook	**Avg Plume Depth (cm)**	
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	
Mainstem Temp (℃)	11.6	**Plume Length 1℃ Differential (m)**	
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	
Min CWP Temp (℃)	7.6	**Fish Presence**	Yes
Average CWP Temp (℃)	8.5	**Fish Species**	*O.mykiss*
Max Main/CWP Diff (℃)	4.0	**Fish Count**	>15
Avg Main/CWP Diff (℃)	3.1		
CWP Description	Wide alcove spring pond that narrows as it hits main floodplain then flows in small channel along cobble bar ds to mainstem. Old beaver dam near active main channel likely creates ponding. Deep fines in ponds. Large spring complex to north was mostly dry.		
Plume Description	No substantial plume as channel meets mainstem. 9.2C in last channel pool prior to drop into cobble bar on river. Long spring channel runs along left side of active channel. Lots of 25mm mykiss.		
Restoration Notes	Spilt flow above spring channel. Small complexity in spring channel along active channel. Connectivity to upper flows out of active flow areas.		

CWP #022_SB_Middle Twisp





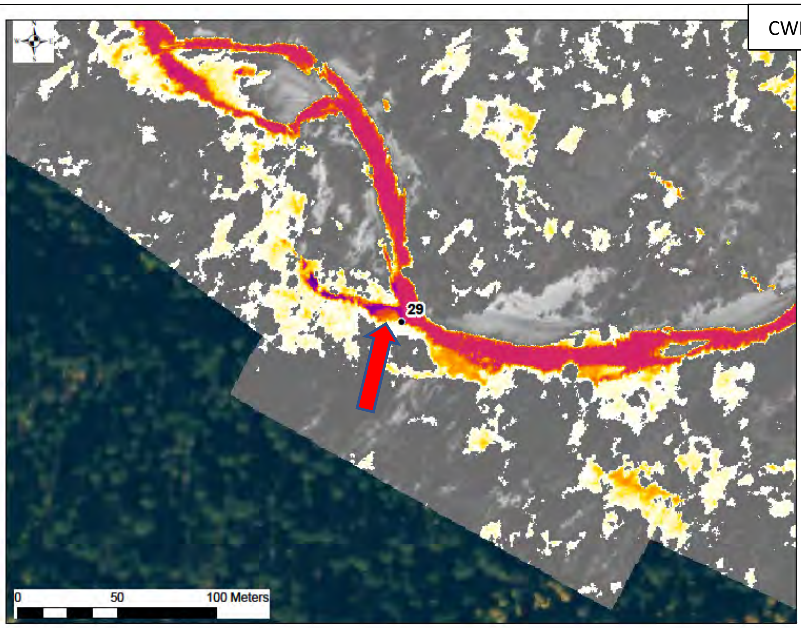
Downstream view along spring channel on mainstem bar.

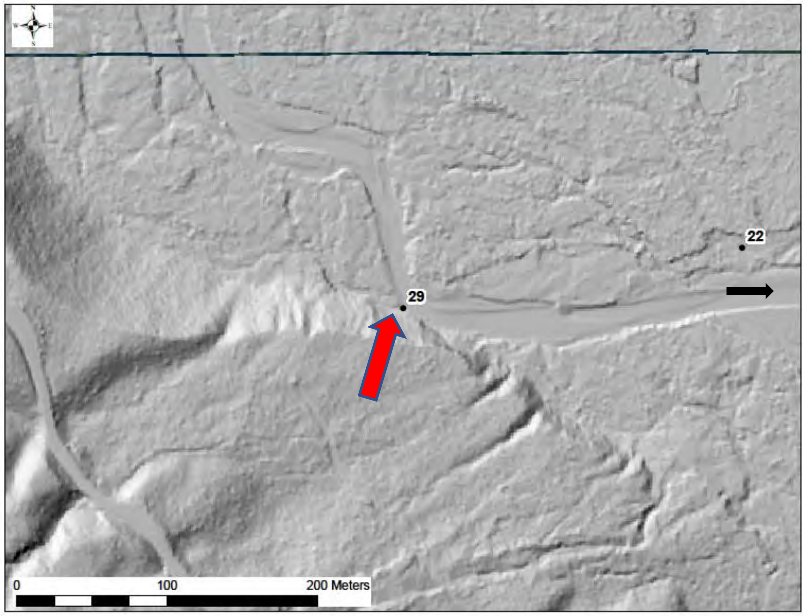
Downstream view from spring source.

Upstream view to channel at confluence with Twisp River.

Methow Cold Water Patch Assessment			
CWP ID#	029	**CWP Channel Length (m)**	90
Stream	Twisp	**CWP Channel Avg Width (m)**	4
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	360
Survey Date	8/26/21	**Max CWP Channel Depth (cm)**	46
Survey Time	1314	**Average CWP Channel Depth (cm)**	18
River km	30.4	**Min Plume Temp (℃)**	8.6
Latitude	48.37349	**Avg Plume Temp (℃)**	9.5
Longitude	-120.41688	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	10
CWP Source	Springbrook	**Avg Plume Depth (cm)**	5
Tributary Name		**Plume Width 2℃ Differential (m)**	0.2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	0.5
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	0.1
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	1.2
Mainstem Temp (℃)	11.2	**Plume Length 1℃ Differential (m)**	3
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	3.6
Min CWP Temp (℃)	7.3	**Fish Presence**	Not observed
Average CWP Temp (℃)	8.3	**Fish Species**	
Max Main/CWP Diff (℃)	3.9	**Fish Count**	
Avg Main/CWP Diff (℃)	2.9		
CWP Description	Springbrook channel with dense riparian. Old beaver dam and small pond. 15m of elevated dry channel near mouth. Flows subsurface into river plume. Source is at toe of steep slope.		
Plume Description	Very small. Just a trickle coming in. Cobble. At bend in mainstem. Detected 8.5-9C flow upstream along cobble bar in mainstem. Quickly absorbed by warmer main flow.		
Restoration Notes	Connectivity. Mainstem right complexity.		

CWP #029_SB_Twisp Middle





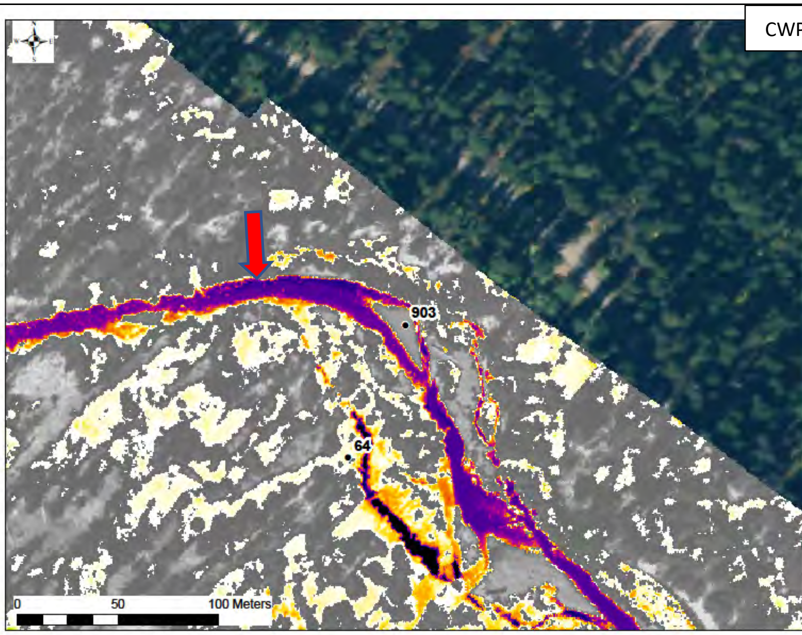
Downstream view along seep adjacent to mainstem.

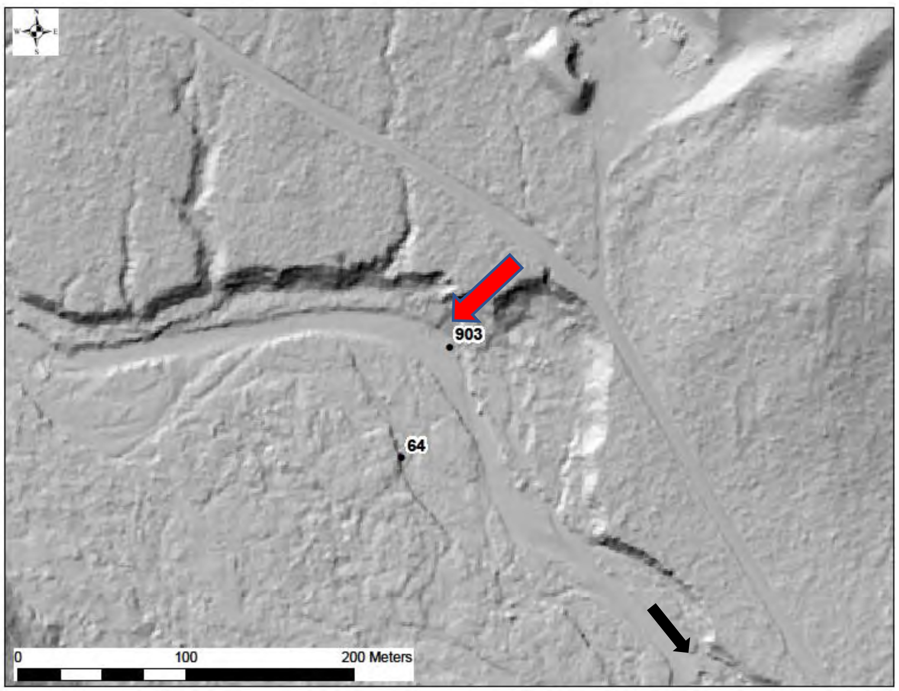

Interior channel pool.


Upstream view at source seepage.

CWP ID#	903	**CWP Channel Length (m)**	17
Stream	Twisp	**CWP Channel Avg Width (m)**	3.5
Assessment Unit	Twisp Middle	**CWP Channel Area (m^2)**	59.5
Survey Date	8/20/21	**Max CWP Channel Depth (cm)**	50
Survey Time	1551	**Average CWP Channel Depth (cm)**	20
River km	38.6	**Min Plume Temp (℃)**	7.0
Latitude	48.41339	**Avg Plume Temp (℃)**	8.1
Longitude	-120.48653	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	12
CWP Source	Alcove	**Avg Plume Depth (cm)**	8
Tributary Name		**Plume Width 2℃ Differential (m)**	1
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	2
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	2
Dominant Cover	Wood	**Plume Width 1℃ Differential (m)**	1.5
Mainstem Temp (℃)	10.1	**Plume Length 1℃ Differential (m)**	4
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	6
Min CWP Temp (℃)	6.7	**Fish Presence**	None observed
Average CWP Temp (℃)	7.0	**Fish Species**	
Max Main/CWP Diff (℃)	3.4	**Fish Count**	
Avg Main/CWP Diff (℃)	3.1		
CWP Description	Seep of left bank into backwater pool. Not a large feature. Mainstem cooling throughout this reach. Hyporheic likely.		
Plume Description	Small and through cobble.		
Restoration Notes	Connected at present for juveniles. Lots of wood present. Downstream complexity. CTCR project area 2022.		

CWP #903_AL_Middle Twisp





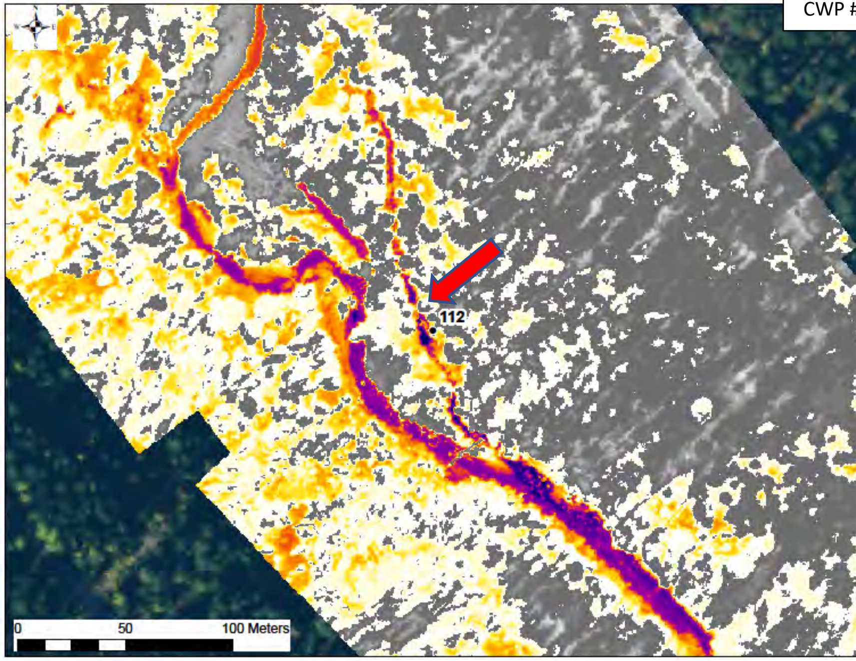
Upstream view of alcove and mainstem.

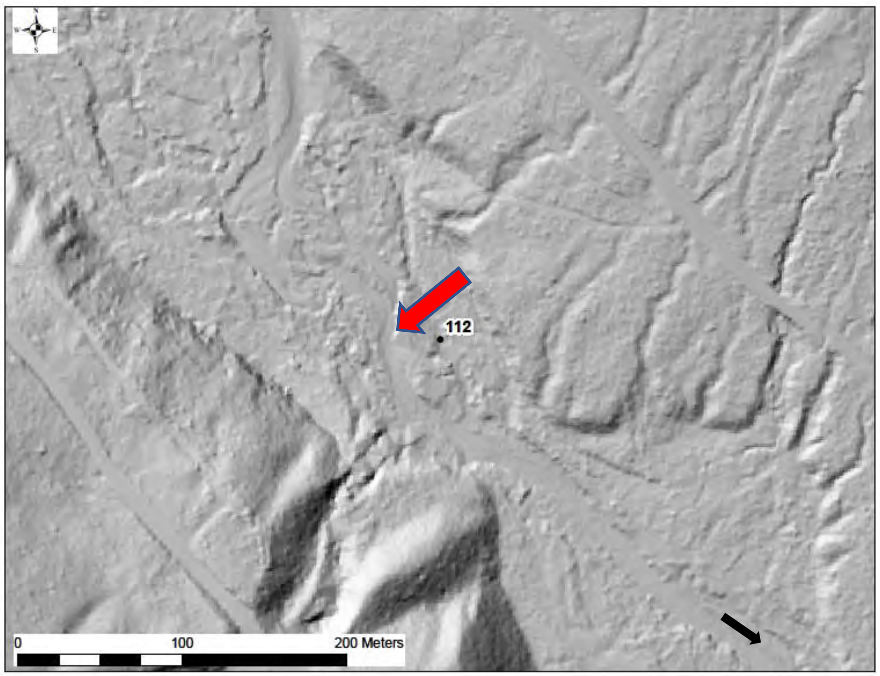

Upstream view of alcove source.


Downstream view of alcove area.

CWP ID#	112	**CWP Channel Length (m)**	110 (est)
Stream	Twisp	**CWP Channel Avg Width (m)**	3.5
Assessment Unit	Twisp Middle	**CWP Channel Area (m²)**	385
Survey Date	8/20/21	**Max CWP Channel Depth (cm)**	55
Survey Time	1403	**Average CWP Channel Depth (cm)**	12
River km	39	**Min Plume Temp (℃)**	10.8
Latitude	48.41575	**Avg Plume Temp (℃)**	9.7
Longitude	-120.49342	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	20
CWP Source	Springbrook	**Avg Plume Depth (cm)**	15
Tributary Name		**Plume Width 2℃ Differential (m)**	2
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	53
Dominant Substrate	Gravel	**Plume Area 2℃ Differential (m²)**	106
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	4
Mainstem Temp (℃)	13.1	**Plume Length 1℃ Differential (m)**	600
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	2400
Min CWP Temp (℃)	7.2	**Fish Presence**	None observed
Average CWP Temp (℃)	9.0	**Fish Species**	
Max Main/CWP Diff (℃)	5.9	**Fish Count**	
Avg Main/CWP Diff (℃)	4.1		
CWP Description	Flow begins from channel drop in rootwad. Picks up volume as it moves ds. High volume into cobble bar along mainstem. Significant cooling of mainstem. Connectivity with main channel present for juveniles. Mainstem was 12.3 at mouth cooler by 1deg from us		
Plume Description	Cobble bar high volume into mainstem influence several meters out for a ways. Cools the mainstem by 1C downstream. Significant cooling.		
Restoration Notes	Connectivity and cover.		

CWP #112_SB_ Twisp Middle





Upstream view of spring channel confluence with mainstem.

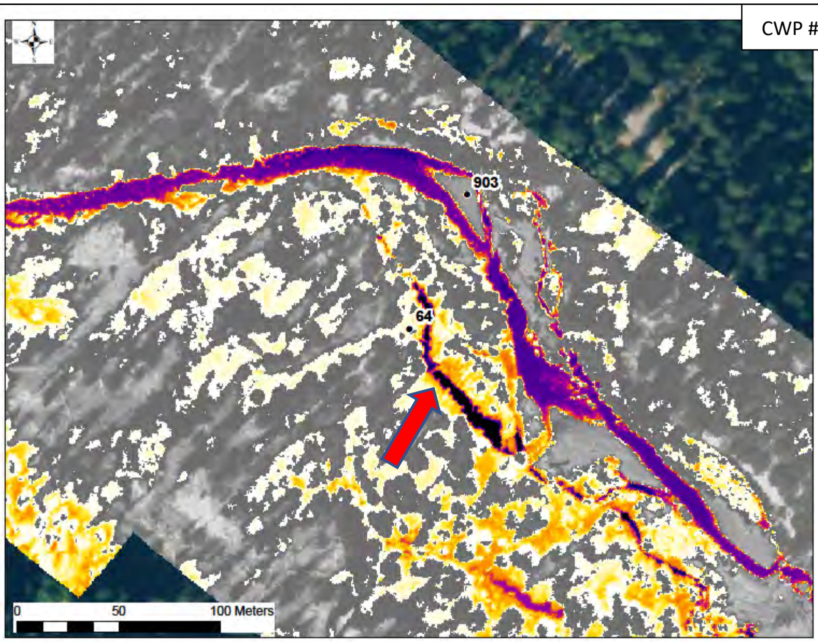
Downstream view of spring channel.

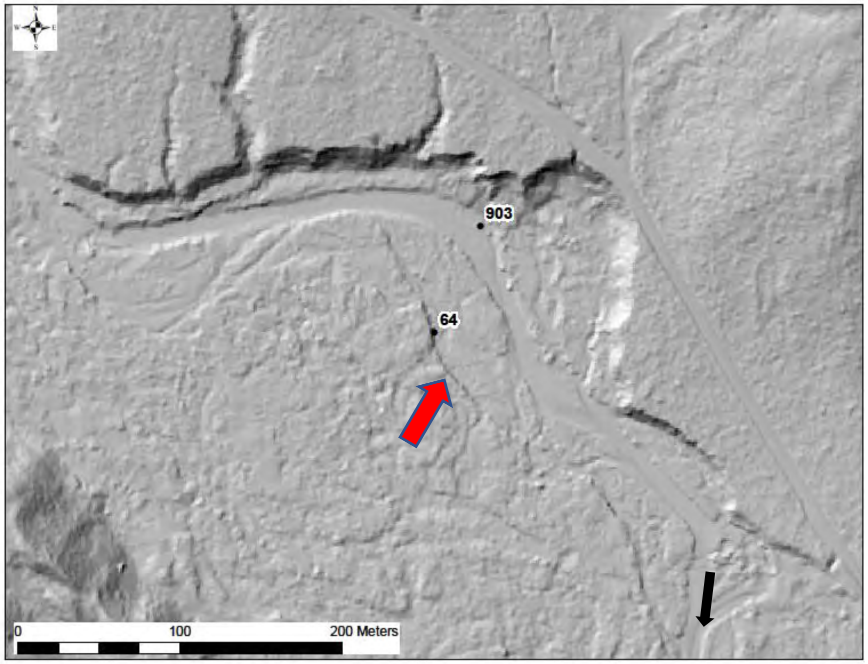
Upstream view of spring channel.

Downstream view of spring channel at source.

Methow Cold Water Patch Assessment			
CWP ID#	064	**CWP Channel Length (m)**	260 (est)
Stream	Twisp	**CWP Channel Avg Width (m)**	4
Assessment Unit	Twisp Upper	**CWP Channel Area (m^2)**	1,040
Survey Date	8/20/21	**Max CWP Channel Depth (cm)**	55
Survey Time	1513	**Average CWP Channel Depth (cm)**	15
River km	38.2	**Min Plume Temp (℃)**	8
Latitude	48.4128	**Avg Plume Temp (℃)**	7.8
Longitude	-120.48692	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	35
CWP Source	Springbrook	**Avg Plume Depth (cm)**	20
Tributary Name		**Plume Width 2℃ Differential (m)**	
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m^2)**	
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	2
Mainstem Temp (℃)	11.4	**Plume Length 1℃ Differential (m)**	1.5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m^2)**	3
Min CWP Temp (℃)	6.4	**Fish Presence**	Yes
Average CWP Temp (℃)	7.3	**Fish Species**	Likely *O. mykiss*
Max Main/CWP Diff (℃)	5.0	**Fish Count**	
Avg Main/CWP Diff (℃)	4.1		
CWP Description	Long springbrook channel. Several inactive beaver dams. Fish observed below most downstream dam. Flows into cobble bar for short ways prior to entering mainstem.		
Plume Description	Spring channel flow swamped by mainstem flow at confluence. Plume very small and not more than 1.4C lower.		
Restoration Notes	Complexity at confluence, enhanced channel connectivity. CTCR restoration area in 2022.		

CWP #064_SB_Twisp Upper





Downstream view of spring channel near mouth.

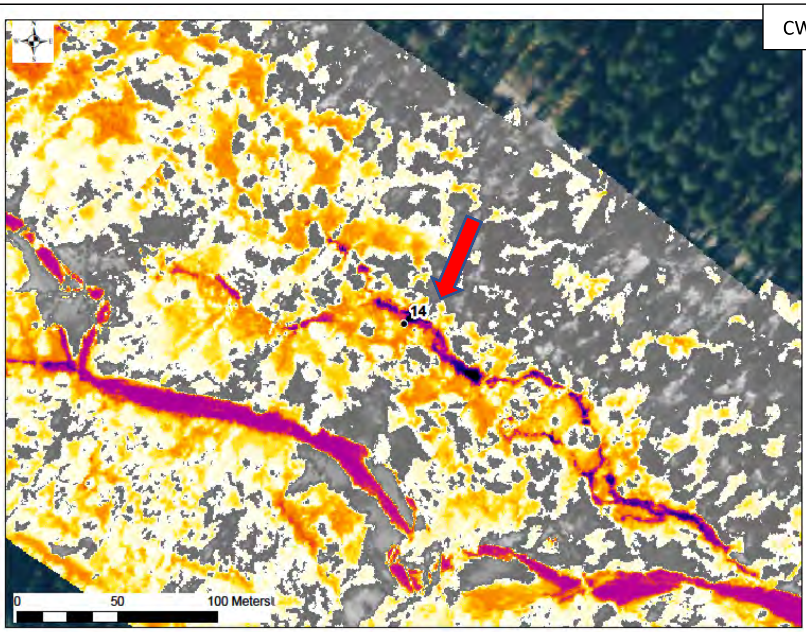
Downstream view of spring channel at confluence with mainstem.

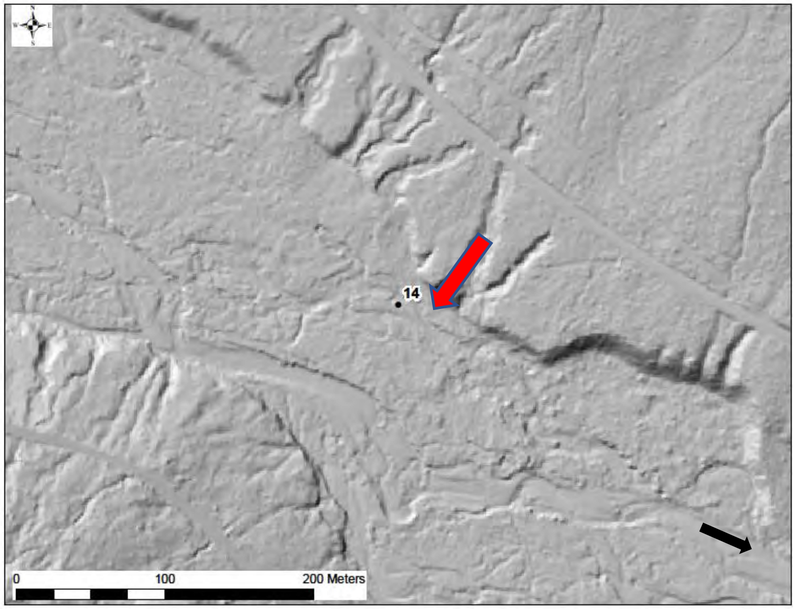
Upstream view in channel near source.

Upstream view of beaver dam and pond.

Methow Cold Water Patch Assessment			
CWP ID#	014	**CWP Channel Length (m)**	265
Stream	Twisp	**CWP Channel Avg Width (m)**	3
Assessment Unit	Twisp - Upper	**CWP Channel Area (m²)**	795
Survey Date	8/20/21	**Max CWP Channel Depth (cm)**	55
Survey Time	1306	**Average CWP Channel Depth (cm)**	10
River km	40.2	**Min Plume Temp (℃)**	11.1
Latitude	48.42339	**Avg Plume Temp (℃)**	12
Longitude	-120.50486	**Min Plume Depth (cm)**	1
River Bank	Left	**Max Plume Depth (cm)**	19
CWP Source	Springbrook	**Avg Plume Depth (cm)**	10
Tributary Name		**Plume Width 2℃ Differential (m)**	0.4
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	2.5
Dominant Substrate	Fines	**Plume Area 2℃ Differential (m²)**	1
Dominant Cover	Vegetation	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	13.3	**Plume Length 1℃ Differential (m)**	3.5
Tributary Temp (℃)		**Plume Area 1℃ Differential (m²)**	3.5
Min CWP Temp (℃)	6.6	**Fish Presence**	None observed
Average CWP Temp (℃)	8.0	**Fish Species**	
Max Main/CWP Diff (℃)	6.7	**Fish Count**	
Avg Main/CWP Diff (℃)	5.3		
CWP Description	Source from below cobble reef in off channel. Ponds in places with one larger beaver pond. Long channel. Scant flow at mouth. Dense riparian.		
Plume Description	Small. Little bit of drop to mainstem. Channel likely a bit perched higher than mainstem.		
Restoration Notes	Connectivity.		

CWP #014_SB_ Twisp Upper





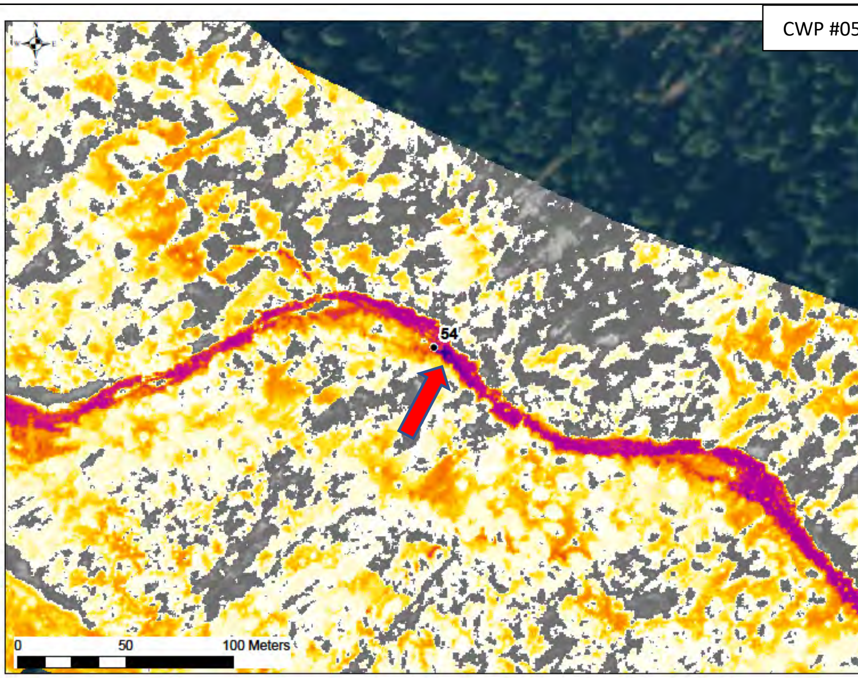
Downstream view of beaver pond in channel.

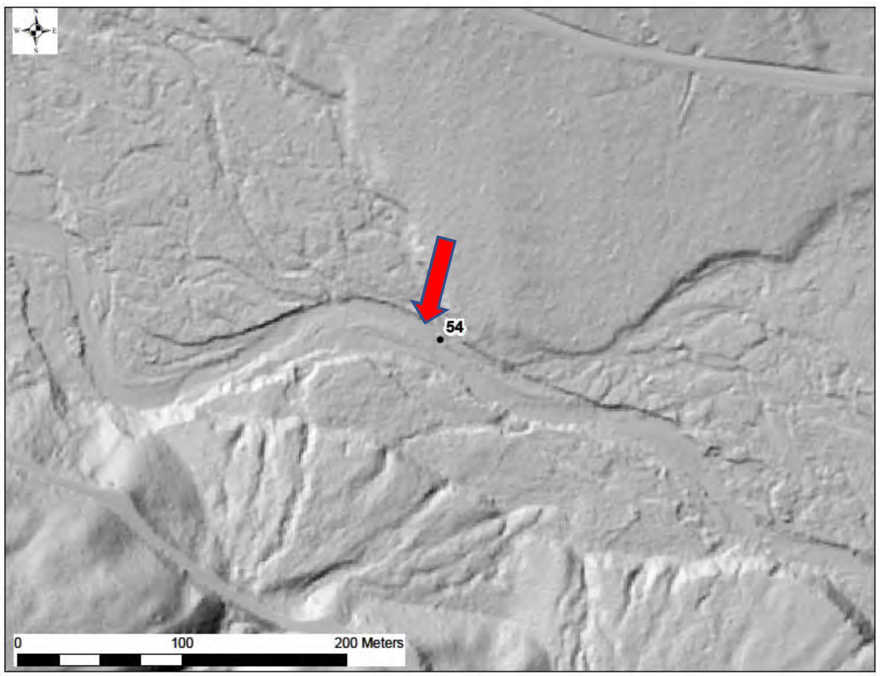
Downstream view at source.

Channel along mainstem bar – upstream view.

Methow Cold Water Patch Assessment			
CWP ID#	054	**CWP Channel Length (m)**	
Stream	Twisp	**CWP Channel Avg Width (m)**	
Assessment Unit	Upper Twisp	**CWP Channel Area (m²)**	
Survey Date	8/20/21	**Max CWP Channel Depth (cm)**	
Survey Time	1217	**Average CWP Channel Depth (cm)**	
River km	41.4	**Min Plume Temp (℃)**	9.5
Latitude	48.42885	**Avg Plume Temp (℃)**	11
Longitude	-120.51622	**Min Plume Depth (cm)**	1
River Bank	Right	**Max Plume Depth (cm)**	15
CWP Source	Lateral Seep	**Avg Plume Depth (cm)**	6
Tributary Name		**Plume Width 2℃ Differential (m)**	0.6
Habitat Type	Riffle	**Plume Length 2℃ Differential (m)**	20
Dominant Substrate	Cobble	**Plume Area 2℃ Differential (m²)**	12
Dominant Cover	Rock	**Plume Width 1℃ Differential (m)**	1
Mainstem Temp (℃)	12.7	**Plume Length 1℃ Differential (m)**	30
Tributary Temp (℃)	13.1	**Plume Area 1℃ Differential (m²)**	30
Min CWP Temp (℃)	9.5	**Fish Presence**	None observed
Average CWP Temp (℃)	11	**Fish Species**	
Max Main/CWP Diff (℃)	3.6	**Fish Count**	
Avg Main/CWP Diff (℃)	2.1		
CWP Description	Seep visible in a few localized spots. Small tributary just ds was 13.1C.		
Plume Description	Lateral seep of cut bank. Burned area. Not wide plume.		
Restoration Notes	Depth and complexity		

CWP #054_LS_Twisp Upper



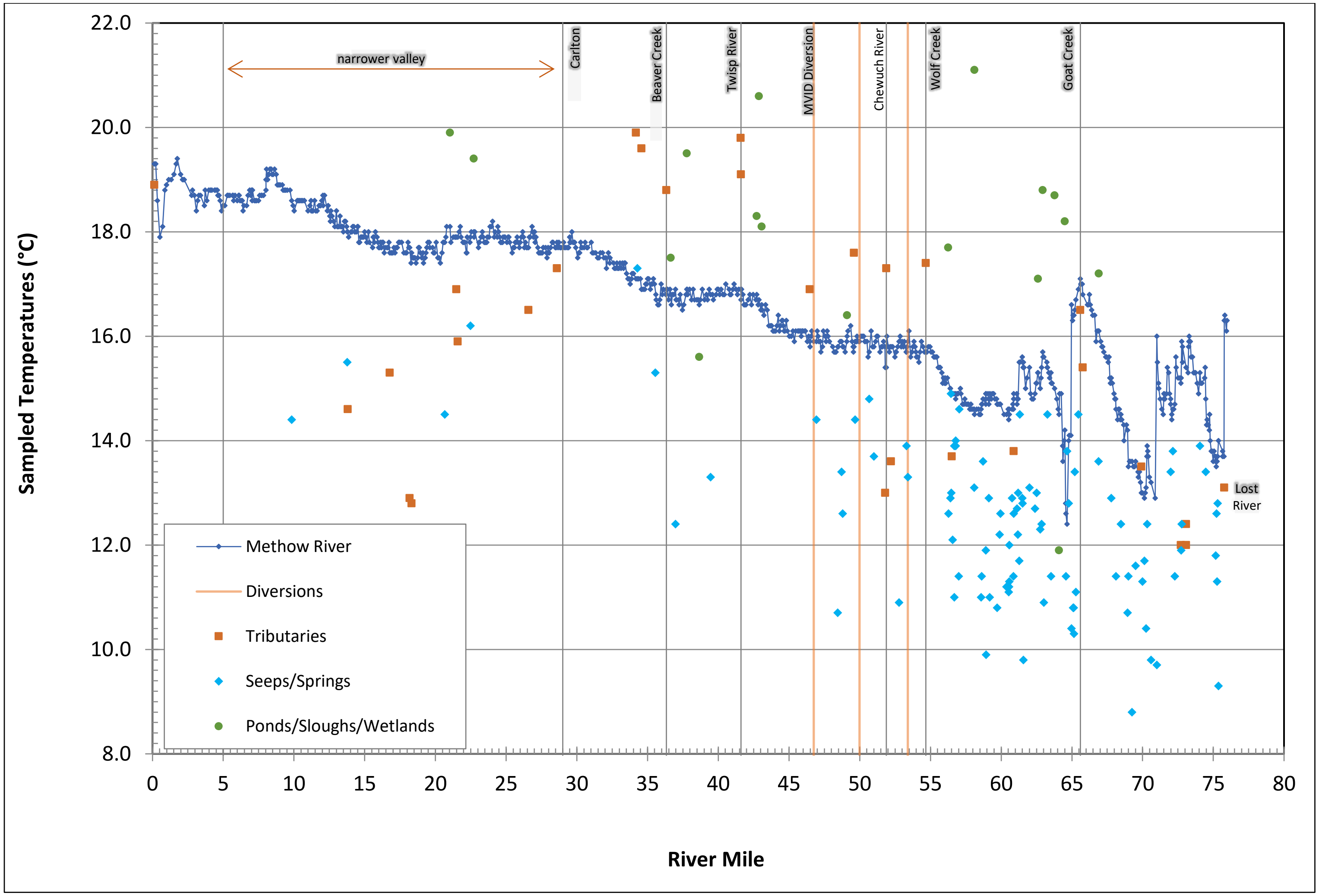


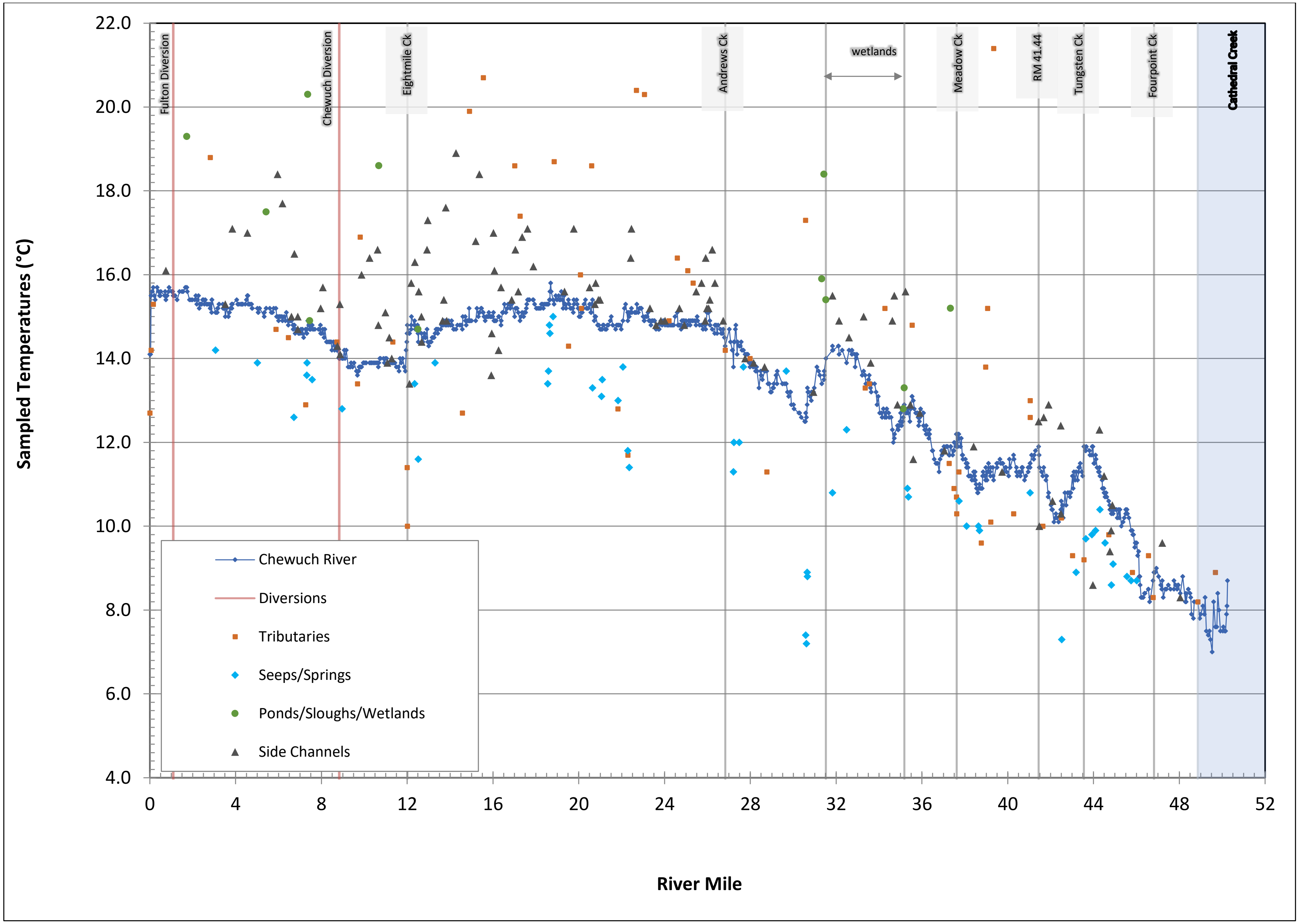
Downstream view from source seep.

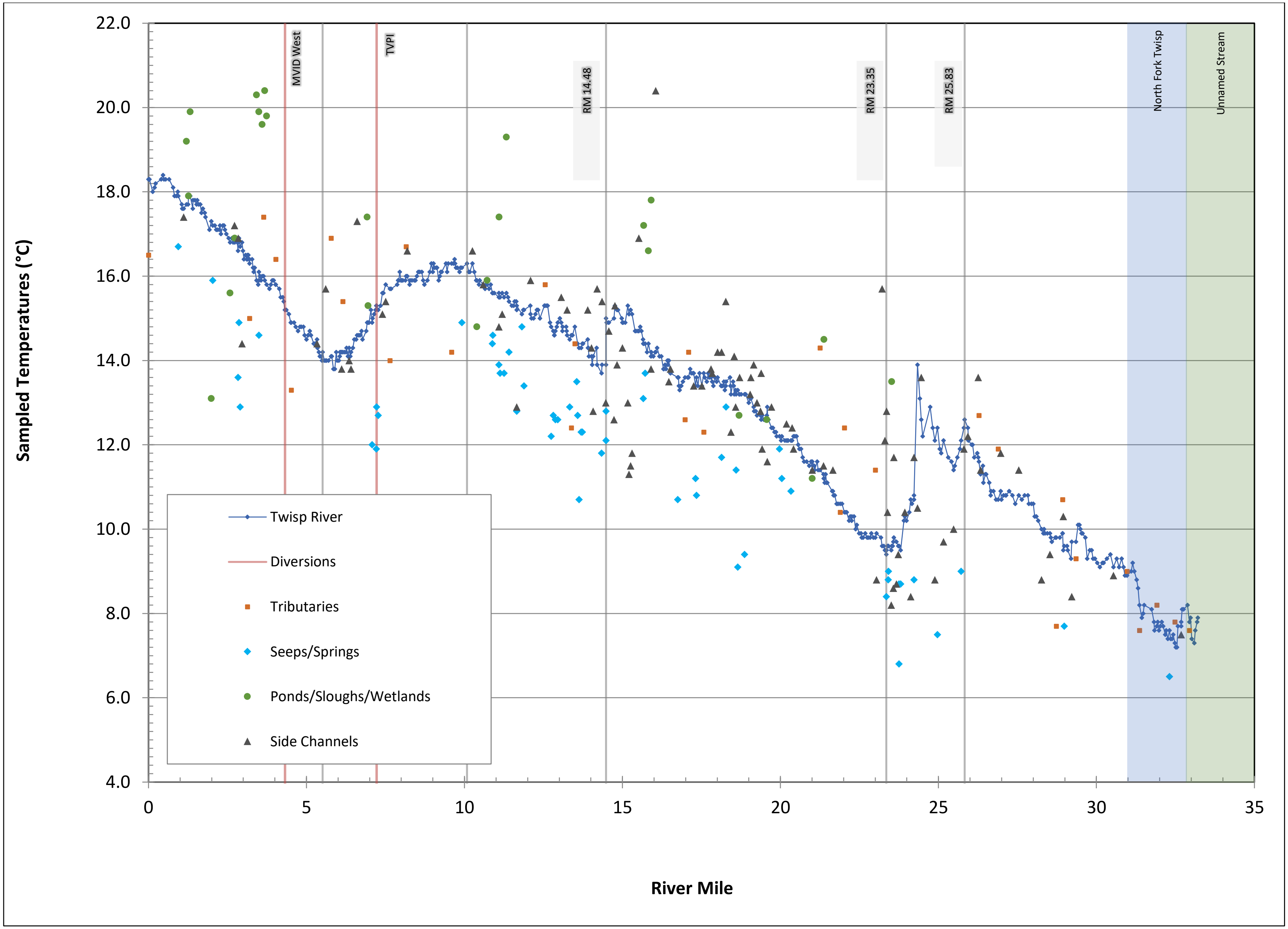
Upstream view from seeps.

Downstream view towards seeps on right bank.

Appendix B. Longitudinal profiles of the Methow, Chewuch, and Twisp Rivers, 2009 TIR data collection, figures from Watershed Sciences (2009).




Sampled Temperatures (°C)
River Mile
Fulton Diversion
Chewuch Diversion
Eightmile Ck
Andrews Ck
wetlands
Meadow Ck
RM 41.44
Tungsten Ck
Fourpoint Ck
Cathedral Creek
Chewuch River
Diversions
Tributaries
Seeps/Springs
Ponds/Sloughs/Wetlands
Side Channels
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
0
4
8
12
16
20
24
28
32
36
40
44
48
52



Sampled Temperatures (°C)
River Mile
MVID West
TVPI
RM 14.48
RM 23.35
RM 25.83
North Fork Twisp
Unnamed Stream
Twisp River
Diversions
Tributaries
Seeps/Springs
Ponds/Sloughs/Wetlands
Side Channels
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
0
5
10
15
20
25
30
35

Appendix C. 3R Water Temperature and Cold-Water Patch Primer

John Crandall, 14 February 2022

This report provides a brief summary of water temperature monitoring data that have been collected at the River Rock Reach (3R) project area since 2009. The report purpose is to assist the development of future habitat restoration actions aimed at enhancing water quality resources thereby supporting ESA fish recovery in the 3R reach.

Background

The 3R project was initiated in 2014 to increase off-channel and mainstem habitat connectivity and complexity to benefit the productivity of ESA-listed salmonids in the Methow River. Primary project elements included the installation of three mainstem engineered wood structures and the enhancement of hydrologic connectivity between several side channel flow paths and the active channel of the mainstem in the area around the “Emerald Pool” which is located at the downstream terminus of the 3R side channel. Large wood installation in the lower portion of the side channel was focused on increasing habitat complexity and fish cover. Adaptive measures to the project area were carried out in the spring of 2018 including the adjustment of a large tree (that fell into the upstream end of the Emerald Pool side channel) to facilitate flushing flows through the Emerald Pool. This log was responsible for large accumulations of sand in the Emerald Pool and decreasing flows from the 3R side channel “Refrigerator Pool”.

Since 2012, water temperature monitoring has been on-going at the 3R site with five temperature loggers active for the majority of this time (Figure 1). Three of the loggers (Emerald Pool, Refrigerator Pool, and Black Lagoon Pool) were deployed in the 3R side channel complex with the fourth logger located along the left bank of the mainstem Methow River directly across from the side channel. The fifth logger was installed in the Bedrock Springs channel upstream of the 2014 project area. Data collection at this site ceased in 2018. Monitoring goals included tracking the status and trends of water temperature over time and assessing the effectiveness of the project to enhance and protect cold water resources.

Recently, an effort to re-assess thermal infrared (TIR) imagery data collected in 2009 has been underway throughout the Methow watershed. This includes site visits to identified cold water patches (>2℃ difference from ambient) to verify their continued existence, describe flow sources, and to measure temperatures and patch dimensions. In the 3R area, five cold water patches were identified within three separate areas (Figure 2). Two patches are located along the left bank of the Methow River along the Gilbertsen property (Bedrock Springs and Bedrock Seep), a single alcove site (Beach Alcove) is located at the downstream end of a cobble point bar downstream of Bedrock Springs, along river right, and the other two sites are the Emerald Pool and Refrigerator Pool associated with the 3R side channel.

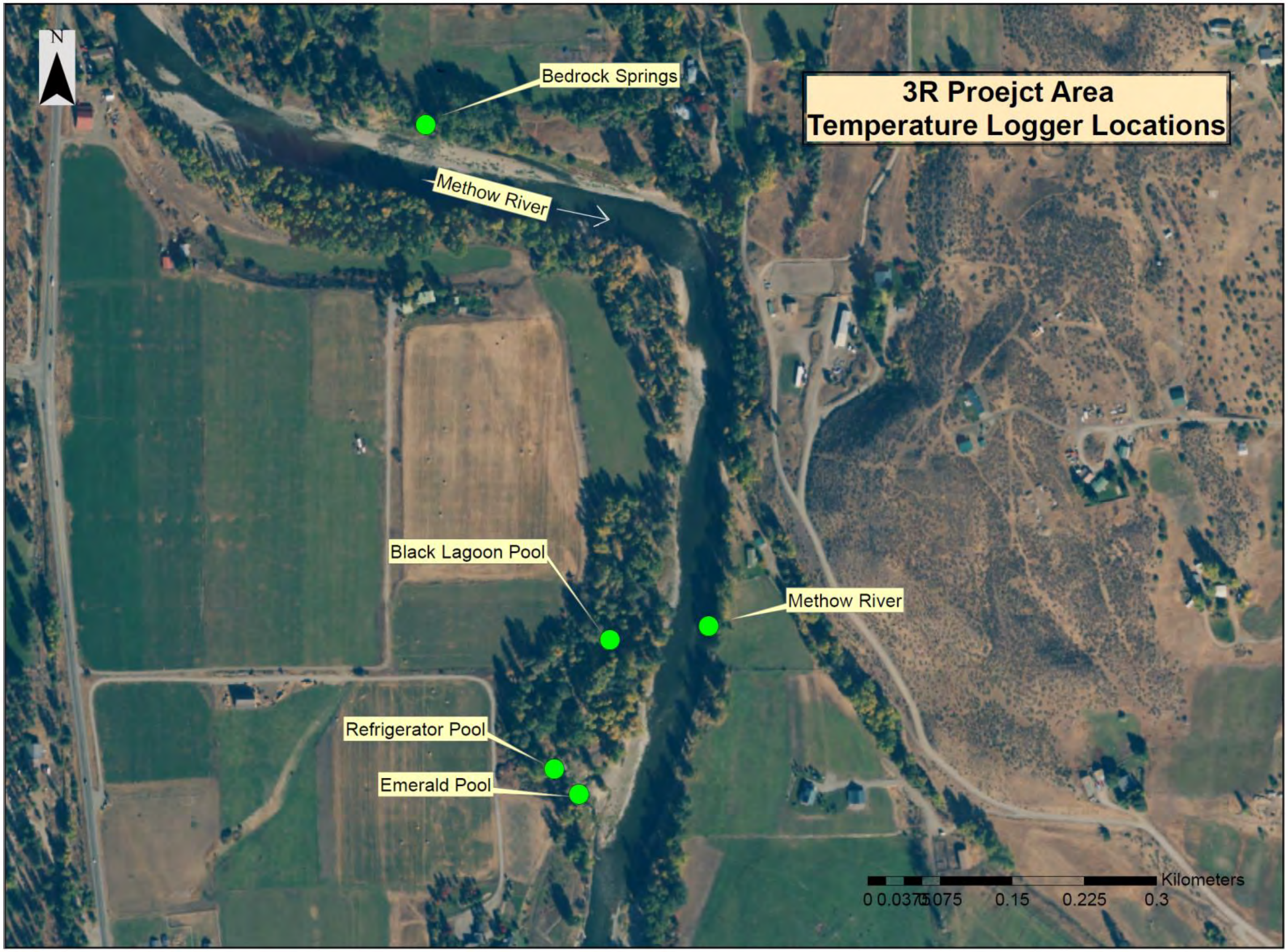


Figure 1. Water temperature logger locations, 3R project area.

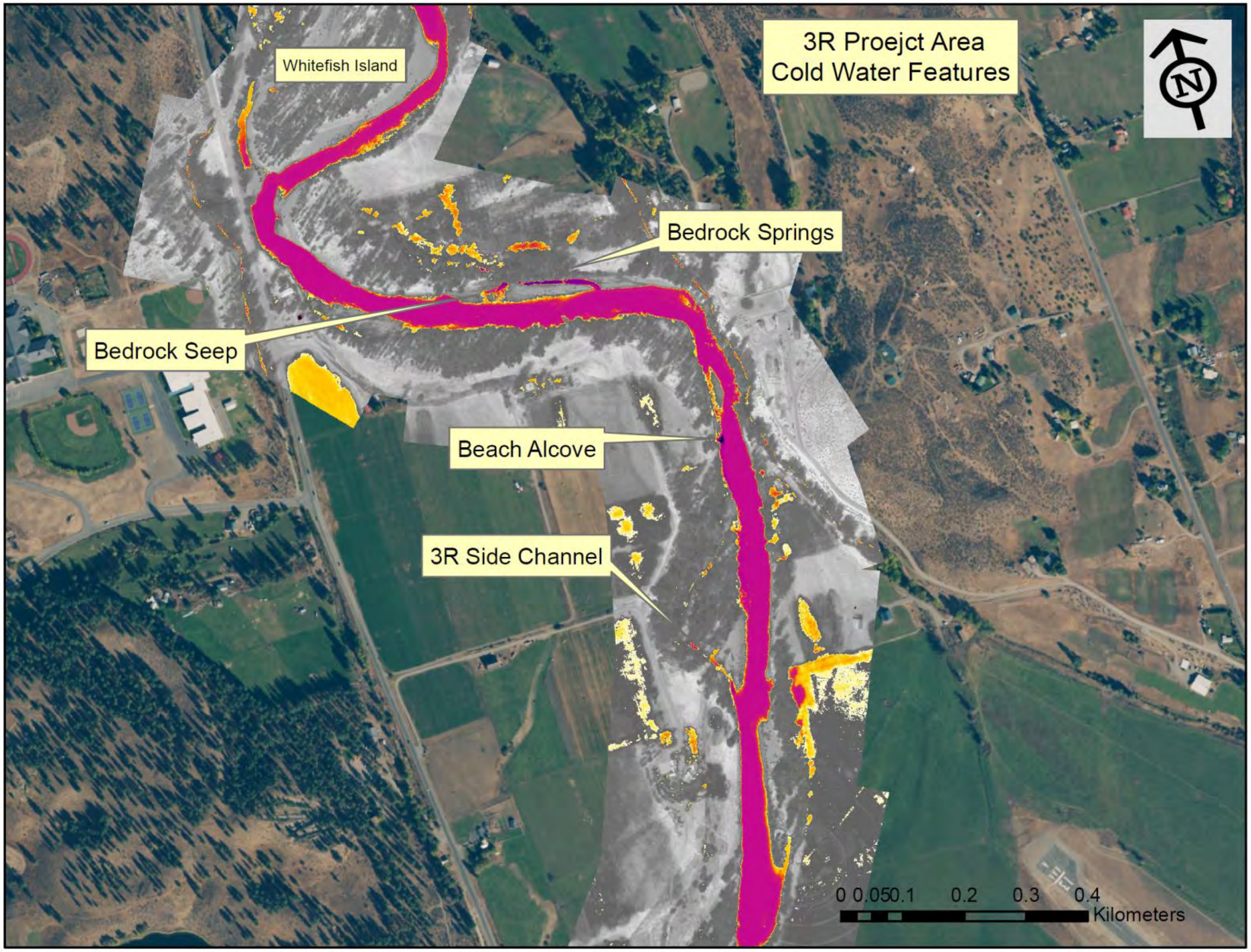


Figure 2. Cold water patch locations, 3R project area.

Site Temperature Comparison
Daily water temperature data have been collected at four locations within the 3R project site continuously since 2012 and between 2012-2018 at the Bedrock Springs site upstream from the 3R side channel. Exceptions include the Refrigerator Pool in 2014 when the logger was removed for restoration and Methow River in 2020 when a logger was lost after a data collection run.

Over this period, water temperatures have fluctuated seasonally each year with observed seasonal highs for all sites in July-August and seasonal lows in December-January (Figures 3-5).

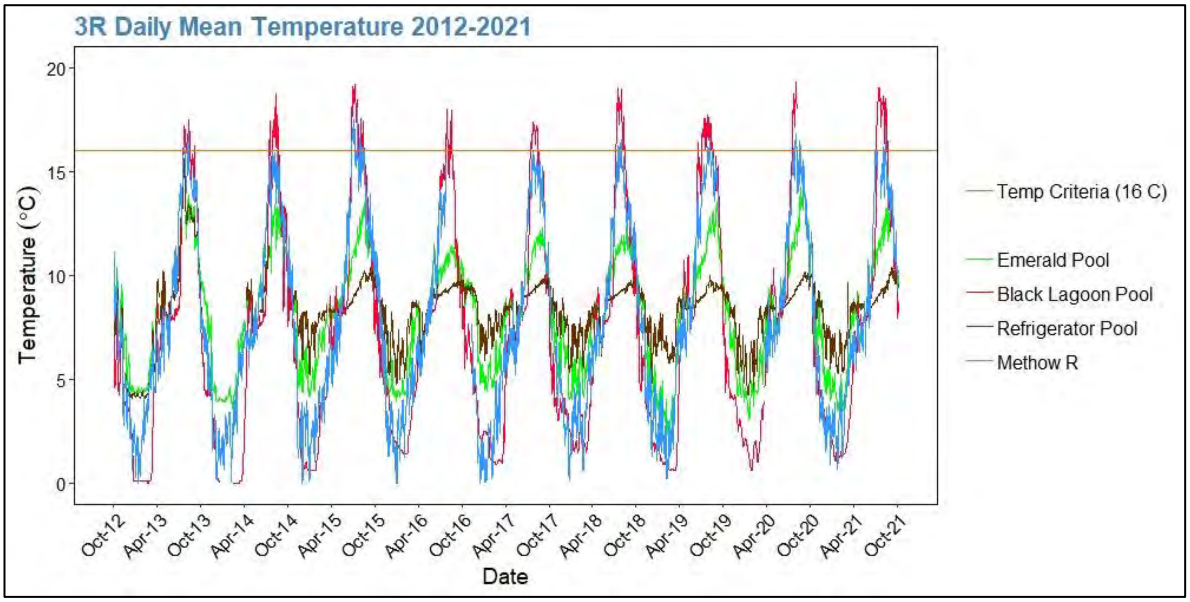


Figure 3. Daily mean temperature, 3R project area, 2012-2021.

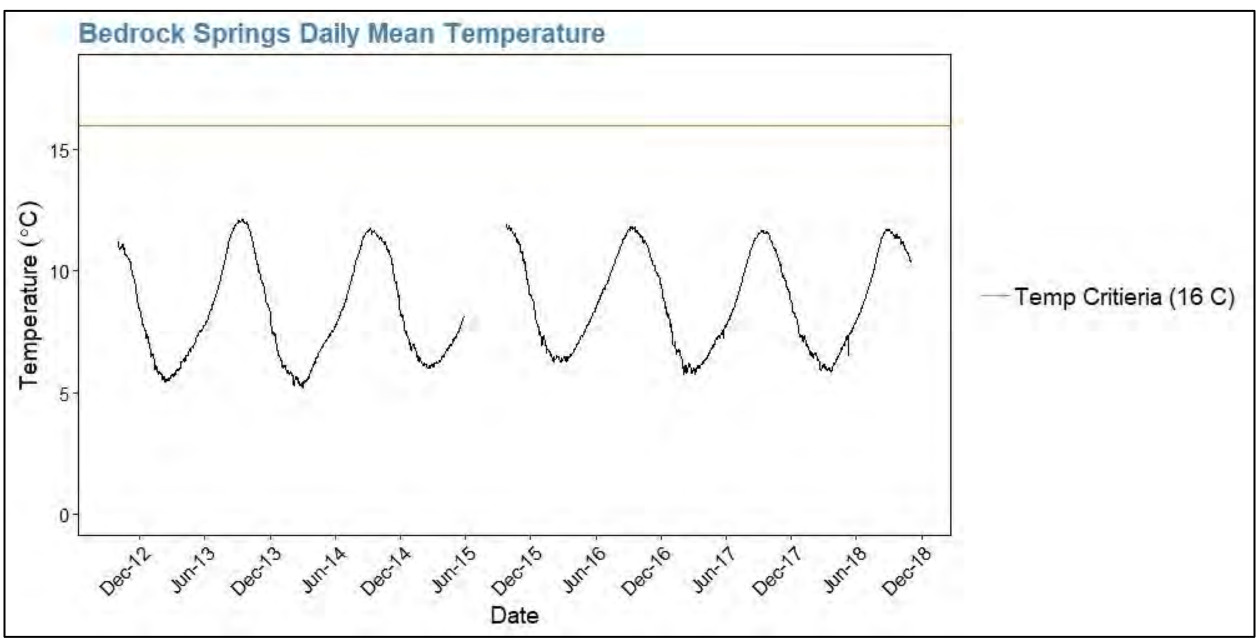


Figure 4. Daily mean temperature, Bedrock Springs, 2012-2018.

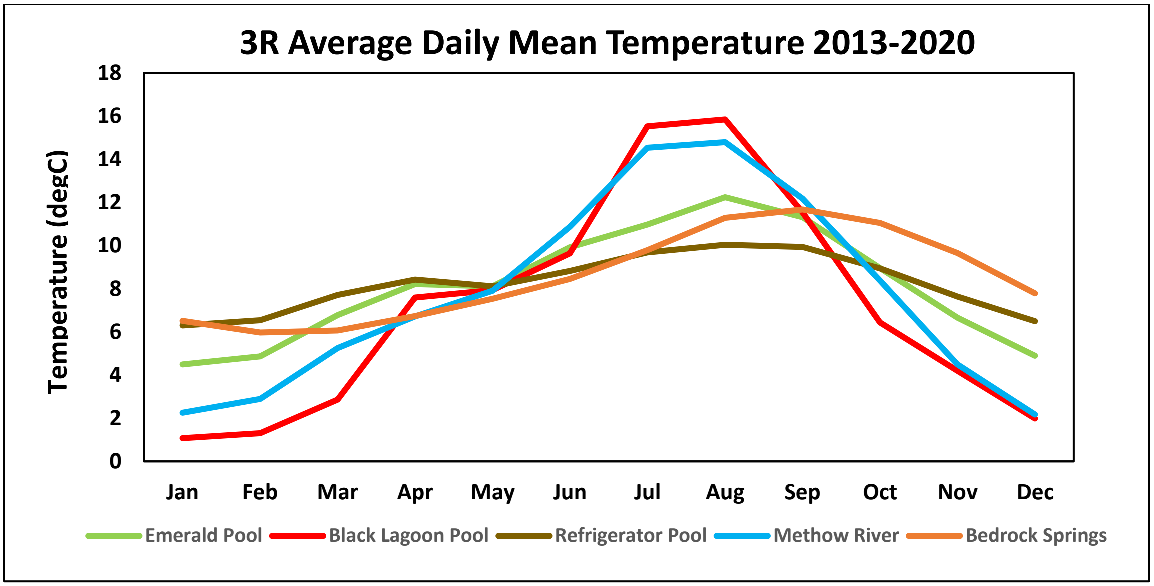


Figure 5. Average monthly daily mean temperature, 3R project area, 2013-2021.

Sites differed both in their average daily high and low temperatures as well as in the degree of daily and monthly variation (Figures 3 and 5). Two sites, Methow River and Black Lagoon Pool, were both the warmest and coldest sites each year, although they expressed similar temperatures with the other three sites during spring (April-June) and again in fall (September-October). These two periods correspond to when water temperatures across the Methow watershed transition from annual lows to annual high (and vice-versa) and is driven largely by the seasonal changes in ambient air temperatures as well as by changes in mainstem discharge. During periods of high flow (i.e. spring freshet), all sites are inundated by high volumes of mainstem flow and would be expected to be of similar temperature during these events. Compared to the other sites, the Bedrock Springs site is likely the highest in elevation and would be less affected by high flow inundation.

The other three sites, Emerald Pool, Refrigerator Pool, and Bedrock Springs all expressed less annual variation (and did not reach the extremes observed) compared to the nearby Methow River and Black Lagoon Pool sites (Figure 5). The least amount of annual variation was observed in Refrigerator Pool and Bedrock Springs which only varied between 3.7-5.3℃ across the year, while Black Lagoon Pool and Methow River fluctuated by as much as 12.5-14.4℃. The Emerald Pool site was intermediate to these two groups with an annual variation of approximately 7.7℃.

There was not a significant amount variation across years for all sites when examining monthly average maximum temperatures for August (warmest month) and January (coldest month), although temperatures appear to have fluctuated more over the years during January compared to August (Figures 6 and 7). All of the sites may experience icing during the winter, so it is possible some of this variation could be explained through loggers becoming affected by ice.

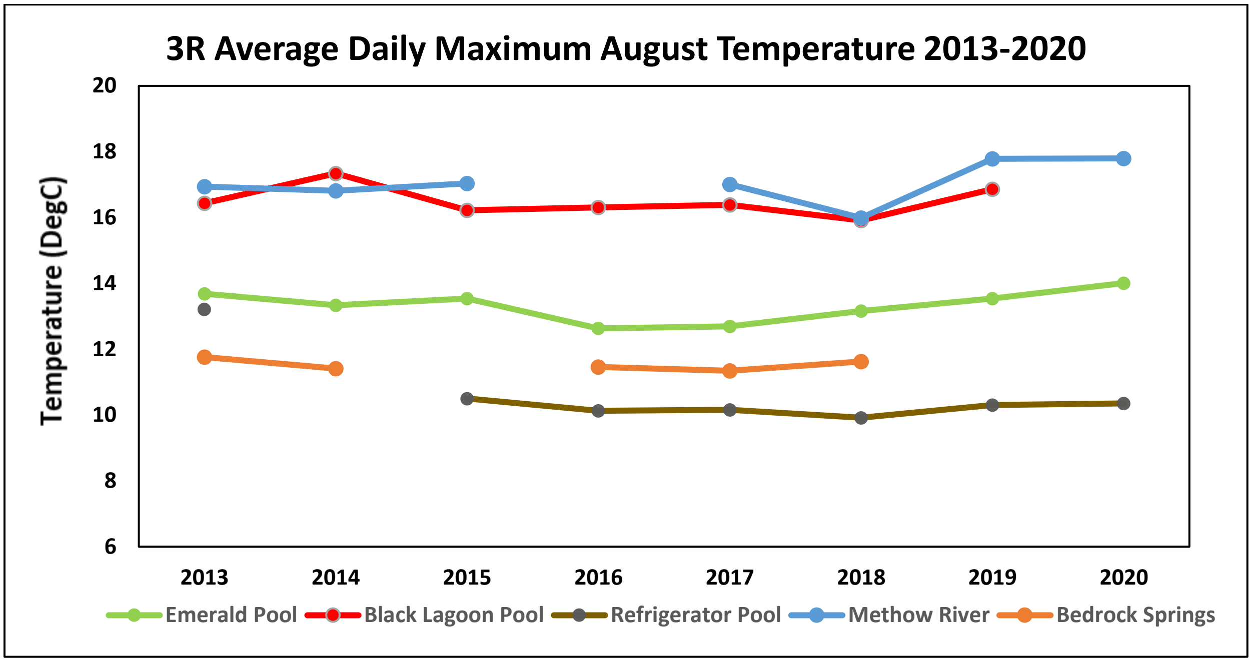


Figure 6. August average daily maximum temperature, 3R project area, 2013-2020.

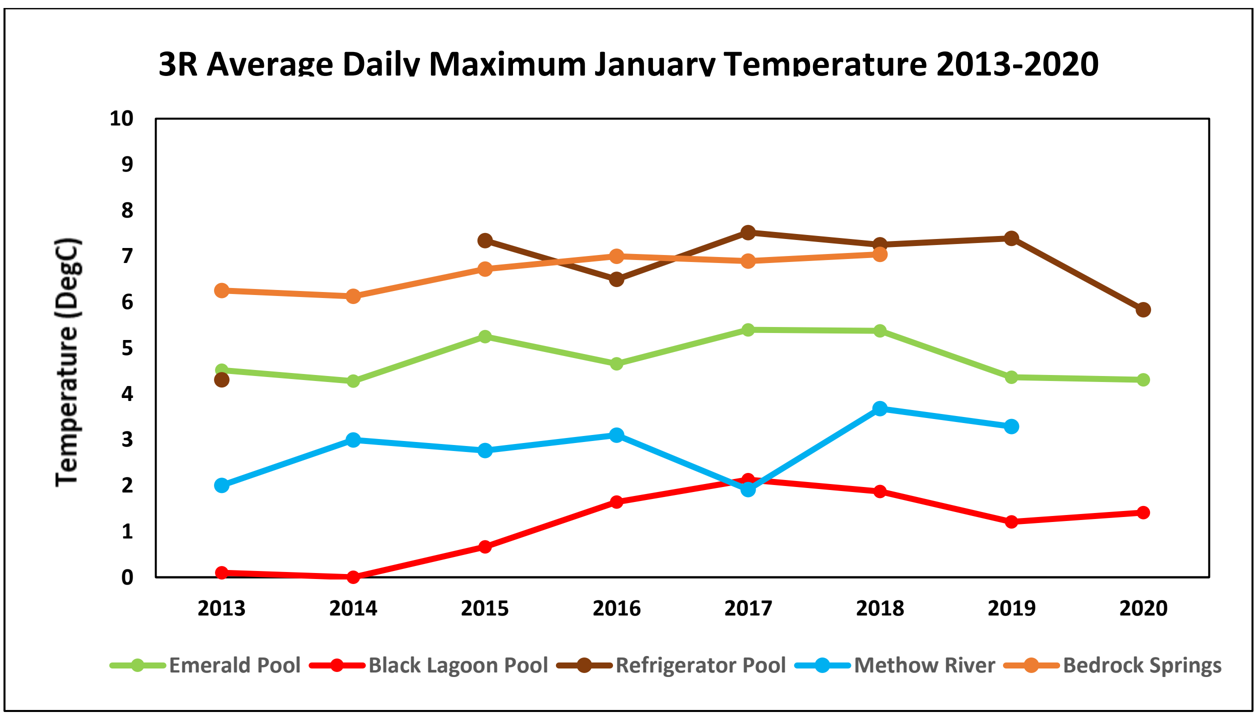


Figure 7. January average daily maximum temperature, 3R project area, 2013-2020.

Additionally, logger placement within the water column can influence specific readings, and while attention was paid to redeploying loggers in the same location after each data download event, it is possible deployment location also had some influence on observed temperatures at all times of year, but perhaps especially when discharge was low (i.e. late July-September).

Overall, observed water temperature data from the 3R project area strongly support the likelihood that groundwater/hyporheic flow is driving observed patterns of water temperatures at the Emerald Pool, Refrigerator Pool, and Bedrock Springs sites. Although it is a perennial pool and isolated from mainstem flows from approximately July-April, the Black Lagoon Pool does not appear to be (cold) groundwater supported. The Black Lagoon Pool is relatively similar in overall temperature regime to the Methow River site and may be the result of a short run of surface water dominated hyporheic flow into the upper end of the side channel.

While August temperatures did not shift markedly in the Black Lagoon Pool following the 2014 restoration, January temperatures did exhibit an approximately 2℃ increase. It is not fully known what the cause of this increase was, it is suspected to be related to logger placement as the Black Lagoon is heavily influenced by icing which has required shifts in logger placement to deeper water to avoid the logger becoming iced in.

Interestingly, the Refrigerator Pool site exhibited a shift in temperature regime likely as a result of the 2014 restoration project. The average maximum temperatures for August decreased by approximately 3℃ after 2014, while the January maximum temperatures increased by approximately >2℃. These changes may have been a response to the enhanced groundwater derived flow out of the pool and downstream connectivity with the Emerald Pool.

Thermal Imagery Summary

The TIR imagery data for the 3R project area were collected on 24 August 2009 and revealed several cold water patches within and adjacent to the mainstem Methow River including Bedrock Springs and Bedrock Seep, the Beach Alcove, and the lower 3R side channel containing the Refrigerator and Emerald Pools (Figures 8-10, see also Appendix A for photos). It should be noted that TIR imagery captures only the temperature at the waters surface so it is possible that cooler temperatures were present at some locations, such as the Refrigerator Pool, but were not detected by the TIR imagery due to temperature stratification or other influences.

The Bedrock Springs complex (spring channel and seep) occurs on river left on the Gilbertsen property where spring channel flow originates in a small channel (1-3 meters wide) a short distance up (~100 meters) from the active channel and flows onto a perched cobble bar. It flows for a short distance downstream along the bar before it drops into the mainstem. The seep originates from the bank upstream of the spring channel and quickly spreads out on the cobble bar and flows into the mainstem, and also mixing into the flow coming out from of the spring channel. There is one small pool at this location which appears to contain some of the coldest water in the seep area. Water depths in the complex range from 1-45 cm with average of 10-15 cm.

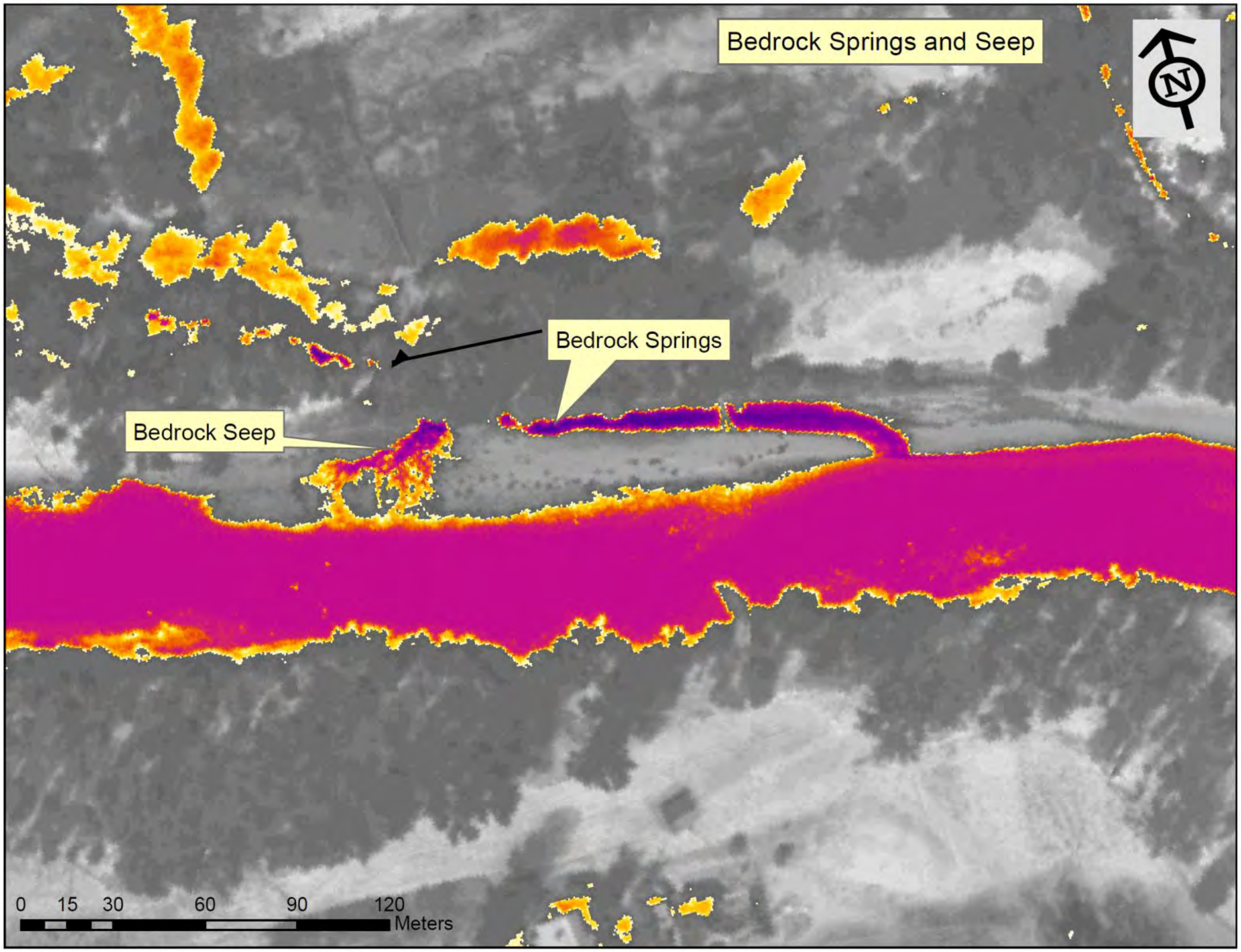


Figure 8. TIR imagery of Bedrock Springs complex, 24 August 2009.

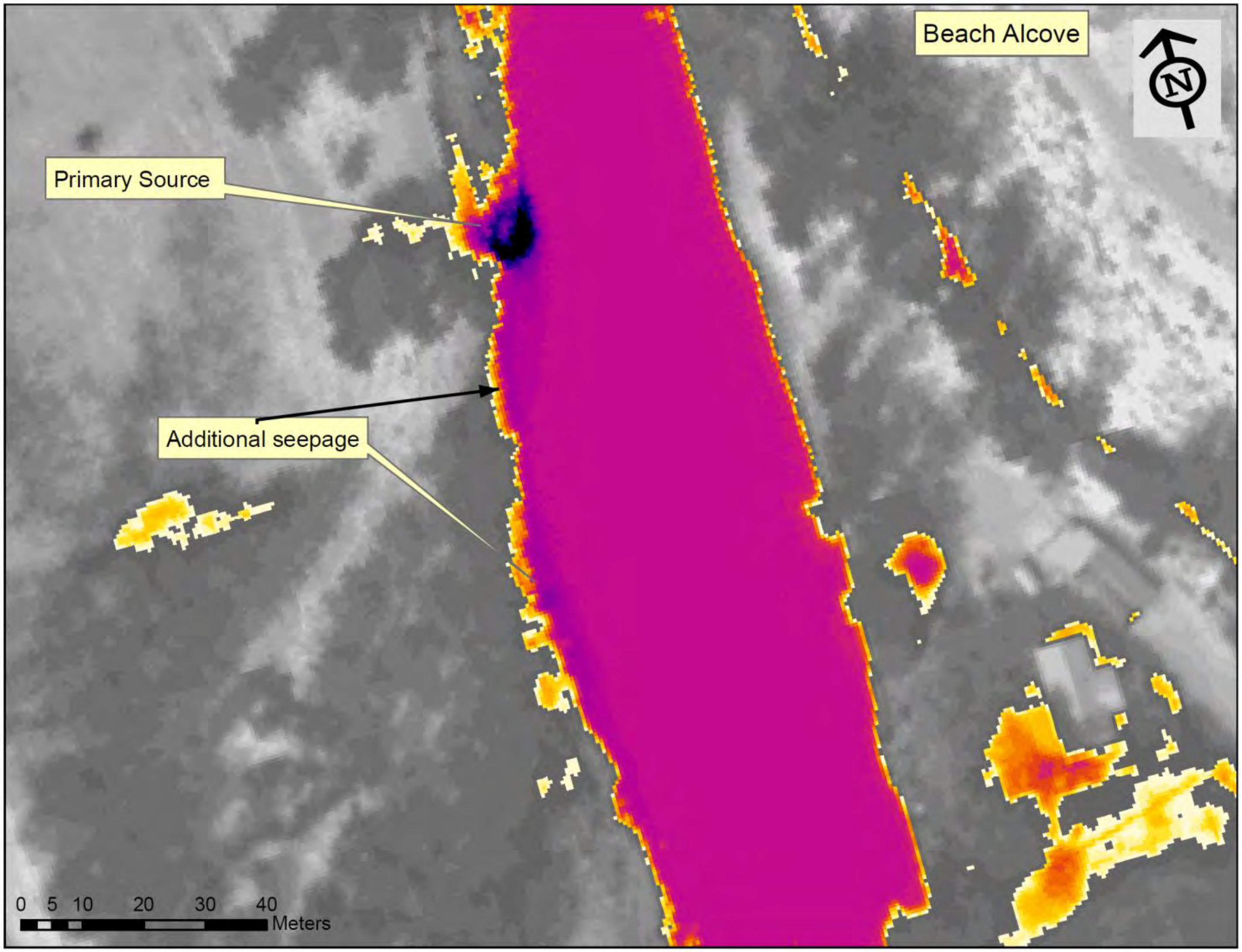


Figure 8. TIR imagery of Beach Alcove, 24 August 2009.

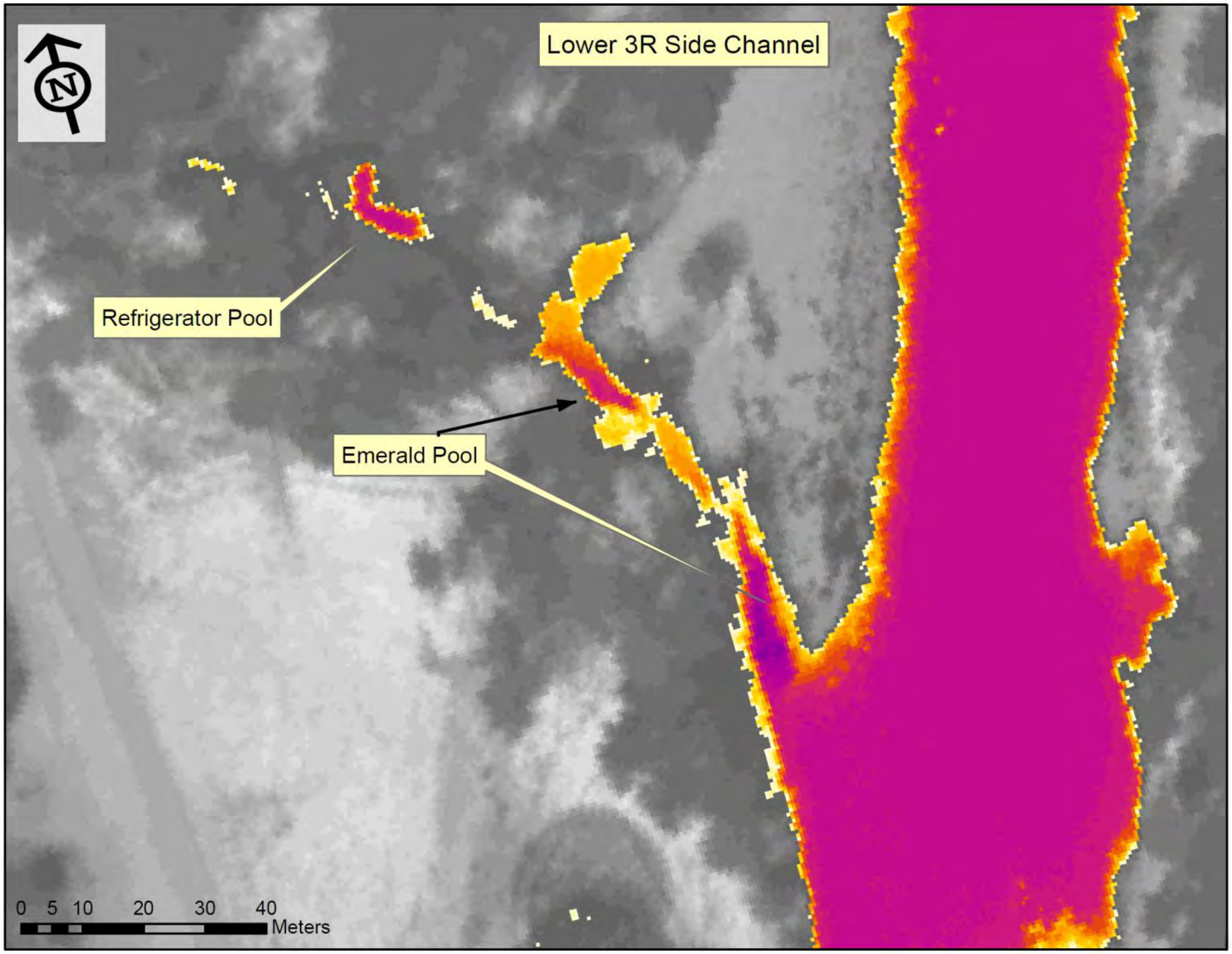


Figure 10. TIR imagery of lower 3R side channel, 24 August 2009.

The Beach Alcove originates at the downstream end of a cobble point bar on river right around the next downstream bend in the mainstem from Bedrock Springs. It expresses as lateral seep upwelling feature that is largely void of any overhead fish cover. Substrate is cobble dominated and depths range from 1-40 cm with the majority 5-15 cm deep. Additional areas of cold water seepage can be seen in the TIR imagery along the bank downstream of the primary plume, but volumes appear to be fairly low in those locations. Of the five cold water sites, the Beach Alcove may have the most significant influence on water temperatures in the mainstem channel.

The Refrigerator Pool and Emerald Pool are associated with the 3R side channel area with only the Emerald Pool expressing relatively cold water in the TIR imagery. The Refrigerator Pool, located fully in the 3R side channel, was possibly excavated in the past which was responsible for the deep pool profile (>100 cm) at this location. The Emerald Pool, which is >100 cm deep in the upstream portions, may contain several discreet locations of cold water inputs with a noticeable input originating downstream of the bedrock cliff. Both areas are hydrologically connected to one another and the Methow River at low flows.

TIR data from 2009 (pre-restoration) indicate that the 3R cold water patches were cooler than the adjacent mainstem by several degrees, except for the Refrigerator Pool which was similar in temperature to the mainstem (Table 1).

Table 1. Approximate temperature values for 3R project area sites, 8/24/2009.

Site	Approximate temp range on 8/24/2009	Approximate degrees ***cooler*** than mainstem
Mainstem Methow River	15.8 – 16.1	n/a
Bedrock Springs	12.8 – 13.4	3
Bedrock Seep	12.9 – 14.0	2-3
Beach Alcove	10.5 – 12.0	4-5.5
Refrigerator Pool	15.8-16.0	0
Emerald Pool	14.0-15.0	1-2

The 3R cold water patches were visited on 7/29/2021 to determine if they still existed and to collect water temperature and ancillary site information (e.g. depth, substrate, fish cover). This monitoring revealed that all four locations identified in 2009 still contained cold water characteristics 12 years later (Table 2). The post-restoration Refrigerator Pool condition would now qualify it as a cold water patch (2℃ difference from mainstem). All sites were between 3-5℃ cooler than the adjacent mainstem.

Table 2. Approximate temperature values for 3R project area sites, 7/28/2021.

Site	Approximate temp range on 7/28/2021	Approximate degrees ***cooler*** than mainstem
Mainstem Methow River	15.3	n/a
Bedrock Springs	11.6	4
Bedrock Seep	10.5	5
Beach Alcove	10.5*	5
Refrigerator Pool	10.4	5
Emerald Pool	12.5	3

*Patch data for this site were lost thru the data portal. This value is derived from memory.

Additionally, all sites were visited on 2/10/2022 to examine winter time temperature profiles (Table 3). All five sites were between 2-4℃ warmer than the adjacent mainstem which was at 5℃.

Table 3. Approximate temperature values for 3R project area sites, 2/10/2022.

Site	Approximate temp range on 2/10/2022	Approximate degrees ***warmer*** than mainstem
Mainstem Methow River	5	n/a
Bedrock Springs	7-8	2-3
Bedrock Seep	7-9	2-4
Beach Alcove	7-8	2-3
Refrigerator Pool	7-8	2-3
Emerald Pool	8	3

Combined, these data support the findings of continuous temperature logger data indicating that all five cold water patch locations at 3R are likely supported by inputs of cold groundwater/hyporheic flow. All sites are cooler than the mainstem during summer high temperature periods and warmer than the mainstem during winter cold periods. Temperature probing in both the Refrigerator Pool and Emerald Pool, as well as some areas within the Beach Alcove, during the 2/10/2022 data collection indicated that both pools, and the deeper portions of the Beach Alcove, were well mixed (i.e. not stratified) from a temperature standpoint. The Bedrock Springs complex has few deep portions and all areas within these sites also appeared well mixed.

Data also indicate that temperatures in the Refrigerator Pool have shifted to a more groundwater dominated state as a result of the 2014 restoration actions. This may be a result of the enhancement of downstream connectivity from the side channel to the Emerald Pool which has resulted in a surface flowing channel between the two areas driving the replacement of cool groundwater contained within the Refrigerator Pool.