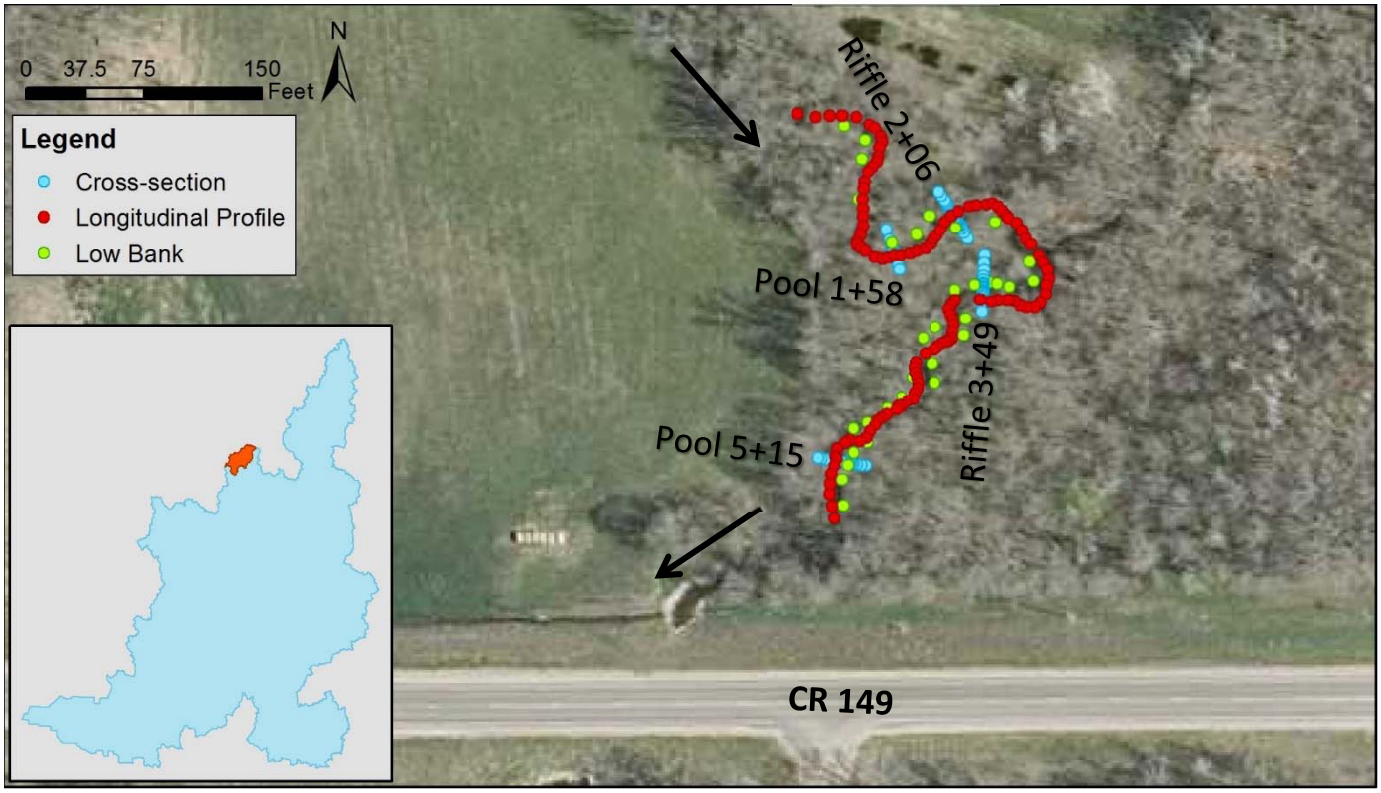
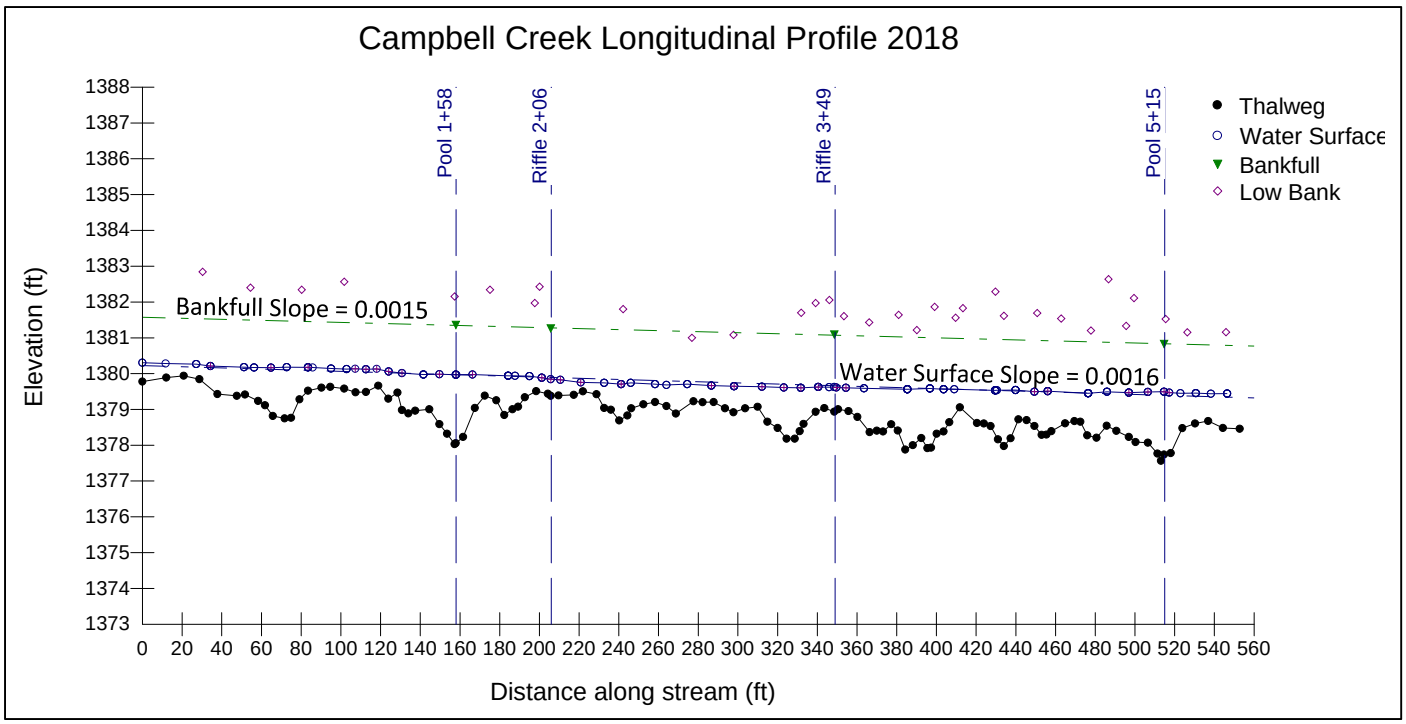
Stream Name	Campbell Creek
Nearest Road	County Road 149
Nearby MPCA Biological Site	None
Drainage Area	12.6 square miles
Stream Type - Existing	E5
Stream Type - Potential	E4
Valley Type	Unconfined Glacial (U-GL-TP)
Entrenchment Ratio	2.53
Width-to-Depth Ratio	7.67
Sinuosity	1.3
Slope	0.0015
Particle Size (D50)	SAND (2 mm)

Campbell Creek originates near Richwood. It is considered an altered, public watercourse at 260TH Street and transitions to a public watercourse at 230th Street. It flows into Mud Lake north of Detroit Lakes. Campbell Creek was assessed upstream of CR 149. The channel flows through outwash glacial deposits (unsorted sand and gravel) and a stagnation moraine. The soil types within the riparian zone are silty clay loams (Soil Survey Staff NRCS, 2018).

The channel was narrow and deep, with a width-to-depth ratio of 7.67, and the substrate was predominantly sand-sized particles (E5 stream type). The total Pfankuch score was 101, which is unstable for E4 and E5 stream types. The channel was incised and did not have access to its adjacent floodplain during minor flood events. The bank-height ratio was 1.3. At two times the maximum depth of the riffle, the flood-prone width was approximately 25 feet wide.



Campbell Creek, upstream of County Road 149

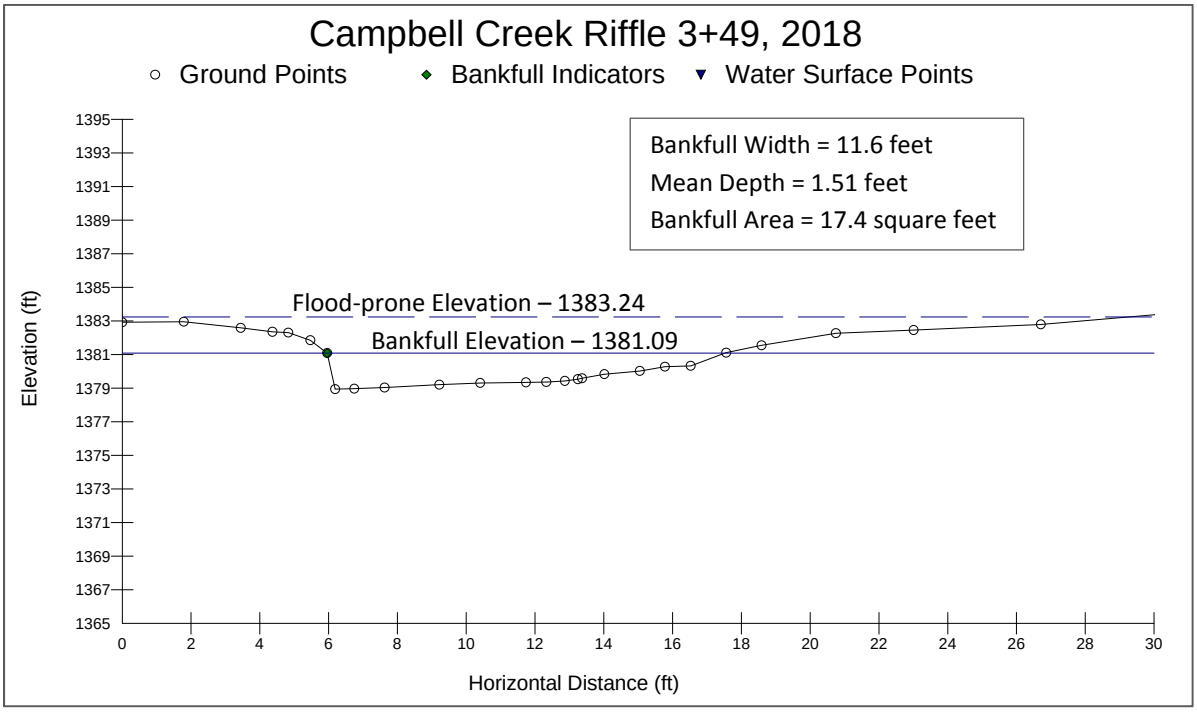


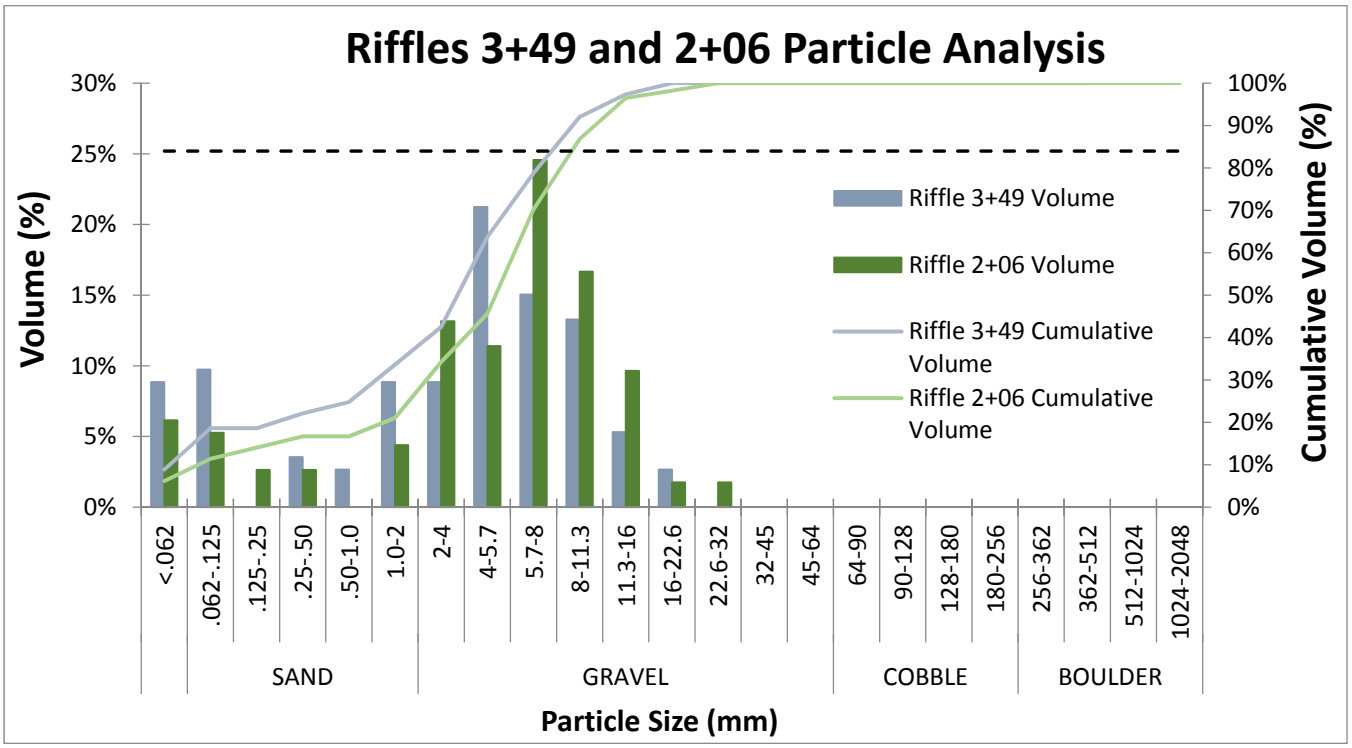
PFANKUCH	9/21/18
Upper Bank	
Landform Slope	Poor (8)
Mass Wasting	Fair (8)
Debris Jam Potential	Good (4)
Vegetative Protection	Fair (7)
Lower Bank	
Channel Capacity	Poor (4)
Bank Rock Content	Poor (8)
Obstructions to Flow	Good (4)
Cutting	Fair (12)
Deposition	Good (6)
Channel Bottom	
Rock Angularity	Fair (3)
Brightness	Good (2)
Consolidation of Particles	Fair (5)
Bottom Size Distribution	Fair (12)
Scouring and Deposition	Fair (14)
Aquatic Vegetation	Poor (4)
Total Score	**Unstable (101)**

Campbell Creek was in an unstable condition at this site. The channel was incised, but it did have access to its adjacent floodplain during larger flood events. The channel bottom was inundated with excessive fine sediment, likely coming from the streambanks. It would be beneficial to correct the observed incision, reduce the loading of fine sediments to the stream, and evaluate any impacts that stream crossings are having on channel stability.

Campbell Creek, upstream of County Road 149

Channel Dimensions	Mean	Max		Mean	Max
Riffle Width (ft.)	12.1	12.6	Pool Width (ft.)	10.1	10.9
Mean Riffle Depth (ft.)	1.46	1.51	Mean Pool Depth (ft.)	2.31	2.35
Maximum Riffle Depth (ft.)	2	2.2	Maximum Pool Depth (ft.)	3.2	3.3
Riffle Cross-Sectional Area (sq. ft.)	17.5	17.6	Pool Cross-Sectional Area (sq. ft.)	23.3	24.6
Width of Flood-Prone Area (ft.)	25.5	29.3	Pool Width to Riffle Width	0.84	0.9
Riffle Width/Depth Ratio	8.3	9	Mean Pool Depth to Mean Riffle Depth	1.6	1.6
Entrenchment Ratio	2.1	2.5	Pool Area to Riffle Area	1.3	1.4





Campbell Creek, upstream of County Road 149