

Musselshell Watershed Coalition

Salinity Meter End of Season Assessment: November 2020

Assessment and tables prepared by Brian Hauschild; Narrative by Adam Sigler; November 2020

In the first 2 weeks of November 2020, all 5 meters were assessed at the same time for reading agreement. This was conducted at the USDA NRCS Field Office in Winnett, MT by Brian Hauschild. Meter readings were recorded in 1413 solution before and after cleaning the meter electrodes. The relative percent differences (RPD) between pre and post cleaning was less than 2% for all meters. The ProPlus meter produced readings 18% higher than the 1413 solution, which is the largest divergence from calibration standards since monitoring began in 2014. This meter was used for measurements at the Musselshell Bridge, Above Melstone Canal, and Below Melstone Canal sites. It is not possible to know whether this inaccuracy in meter readings applies for all readings for the season, or if the issue developed at some time during the season. For this reason, the two readings from May for the above and below Melstone Canal sites that were above the irrigation salinity threshold should be interpreted with caution.

		LMCD 1			LMCD 2			LMCD 3			LMCD 4			ProPlus		
		Time (min)	SC (uS/cm)	Temp (C)	Time (min)	SC (uS/cm)	Temp (C)	Time (min)	SC (uS/cm)	Temp (C)	Time (min)	SC (uS/cm)	Temp (C)	Time (min)	SC (uS/cm)	Temp (C)
2019	Pre-cleaning	0	1431	21.4	0	1458	21.3	0	1439	21.4	0	1454		0	1692	21.6
		2	1428	21.5	2	1454	21.3	2	1442	21.4	2	1455		2	1694	21.6
		4	1428	21.6	4	1453	21.3	4	1442	21.5	4	1455		4	1696	21.6
	Post-cleaning	0	1422	21.2	0	1468	21.3	0	1433	21.5	0	1439		0	1671	21.7
		2	1424	21.2	2	1460	21.4	2	1435	21.5	2	1437		2	1673	21.7
		4	1425	21.2	4	1457	21.5	4	1436	21.5	4	1437		4	1673	21.7
		6	1425	21.2												
		RPD (pre vs post clean)		0.2%			-0.3%			0.4%			1.3%			1.4%
		RPD (post clean reading vs 1413 solution)		0.8%			3.1%			1.6%			1.7%			18.4%

All five meters were then placed in the same tub of water and readings were recorded simultaneously while slugs of salt water were added in accordance with the SOPs, to assess agreement among the meters over the range of salinities observed during the monitoring season. Meters 1 through 4 produced values within a tight range of one another, while the pro-plus produced values approximately 15% higher than the other meters. The ProPlus meter producing higher values than the other meters is consistent with the calibration assessment summarized above.

Time (min)	LMCD 1		LMCD 2		LMCD 3		LMCD 4		ProPlus		Avg.	Notes
	SC (uS/cm)	RPD	SC (uS/cm)	RPD	SC (uS/cm)	RPD	SC (uS/cm)	RPD	SC (uS/cm)	RPD		
0	1725	-3.64%	1741	-2.75%	1747	-2.41%	1753	-2.08%	1985	10.88%	1790.2	Placed probes in tub of Winnett NRCS field office tap water.
1	1727	-3.57%	1740	-2.85%	1744	-2.62%	1755	-2.01%	1989	11.06%	1791.0	
5	1726	-3.73%	1742	-2.83%	1744	-2.72%	1753	-2.22%	1999	11.50%	1792.8	
8	1725	-3.70%	1739	-2.91%	1741	-2.80%	1749	-2.36%	2002	11.77%	1791.2	
10	3509	-2.47%	3547	-1.42%	3529	-1.92%	3569	-0.81%	3836	6.61%	3598.0	Added salt water to the tub of tap water/probes, mixed in the salt water.
12	3506	-2.50%	3546	-1.39%	3534	-1.72%	3569	-0.75%	3825	6.37%	3596.0	
15	3506	-2.46%	3546	-1.35%	3538	-1.57%	3568	-0.73%	3814	6.11%	3594.4	
17	3503	-2.50%	3545	-1.34%	3538	-1.53%	3568	-0.70%	3811	6.07%	3593.0	
19	3503	-2.49%	3544	-1.35%	3538	-1.51%	3567	-0.71%	3810	6.06%	3592.4	Added salt water to the tub of tap water/probes, mixed in the salt water.
21	4118	-2.38%	4157	-1.46%	4170	-1.15%	4206	-0.29%	4441	5.28%	4218.4	
23	4118	-2.36%	4160	-1.36%	4176	-0.98%	4203	-0.34%	4430	5.04%	4217.4	
25	4120	-2.30%	4163	-1.28%	4177	-0.95%	4200	-0.40%	4425	4.93%	4217.0	
28	5218	-2.02%	5302	-0.45%	5296	-0.56%	5318	-0.15%	5495	3.18%	5325.8	Added salt water to the tub of tap water/probes, mixed in the salt water
30	5216	-2.01%	5300	-0.43%	5295	-0.52%	5318	-0.09%	5485	3.05%	5322.8	
35	5215	-1.96%	5291	-0.53%	5292	-0.51%	5317	-0.04%	5480	3.03%	5319.0	

In summary, the difference among meters at the end of the season was less than 20% for all meters, and less than 4% for meters excluding the ProPlus. The higher readings for the ProPlus indicate that the salinities for the Musselshell Bridge, Above Melstone Canal, and Below Melstone Canal sites may be reported as higher than the actual values. The ProPlus meter has consistently produced some of the larger measurement errors and an assessment of this meter's performance during the monitoring off-season would be advisable.