

Musselshell Watershed Coalition

Salinity Meter End of Season Assessment: April 2024

In March of 2024, a drift test was conducted on all five conductivity sensors to assess meter agreement over a range of salinities. This test was conducted by Bridget Warrenfeltz at Marsh Lab in Bozeman, MT. All five meters were placed in a single bucket of tap water, and slugs of salt water were added to the bucket as stated in the SOP. After each addition of salt water, specific conductivity was measured periodically to assess meter agreement over the range of salinities observed during the monitoring season. The relative percent difference (RPD) for all meters fell within the acceptable range of 0 to 5 percent.

Time (min)	LMCD 1		LMCD 2		LMCD 3		LMCD 4		ProPlus		Avg.	Notes	
	SC (uS/cm)	RPD											
0	221.6	-4.75%	236.6	1.70%	233.2	0.24%	230.2	-1.05%	241.6	3.85%	232.6	Placed probes in bucket of Marsh Labs tap water.	
1	221.7	-4.46%	236.3	1.83%	231.9	-0.07%	230.1	-0.84%	240.3	3.55%	232.1		
5	220.7	-3.01%	233.4	2.57%	226.9	-0.29%	219.3	-3.63%	237.5	4.37%	227.6		
8	220.3	-2.24%	229.6	1.89%	220.6	-2.10%	219.6	-2.55%	236.6	5.00%	225.3		
10	909	-0.83%	913	-0.39%	911	-0.61%	928	1.24%	922	0.59%	916.6	Added salt water to the tub of tap water/probes, mixed in the salt water.	
13	919	0.33%	919	0.33%	917	0.11%	913	-0.33%	912	-0.44%	916.0		
15	918	0.22%	920	0.44%	917	0.11%	913	-0.33%	912	-0.44%	916.0		
17	918	0.22%	920	0.44%	916	0.00%	913	-0.33%	913	-0.33%	916.0		
19	1443	0.17%	1448	0.51%	1445	0.31%	1434	-0.46%	1433	-0.53%	1440.6	Added salt water to the tub of tap water/probes, mixed in the salt water.	
21	1442	0.11%	1449	0.60%	1444	0.25%	1433	-0.51%	1434	-0.44%	1440.4		
23	1442	0.15%	1449	0.64%	1442	0.15%	1431	-0.61%	1435	-0.33%	1439.8		
25	1441	0.11%	1449	0.67%	1440	0.04%	1431	-0.58%	1436	-0.24%	1439.4		
28	2228	-0.13%	2237	0.28%	2233	0.10%	2229	-0.08%	2227	-0.17%	2230.8	Added salt water to the tub of tap water/probes, mixed in the salt water.	
30	2230	-0.05%	2237	0.26%	2232	0.04%	2229	-0.10%	2228	-0.14%	2231.2		
32	2230	-0.02%	2238	0.34%	2229	-0.06%	2227	-0.15%	2228	-0.11%	2230.4		
35	2228	-0.08%	2238	0.37%	2229	-0.04%	2226	-0.17%	2228	-0.08%	2229.8		

Then, in early April, each conductivity sensor was placed in a 1413 μ S conductivity standard to test reading accuracy before and after cleaning the meter electrodes. All RPDs between pre- and post-cleaning were less than 3% for all meters, and all meters except LMCD1 read less than the 1413 μ S conductivity standard. LMCD 1's pre-cleaning readings were relatively high compared to the other meters, so a second pre-cleaning check was performed. The second round of testing resulted in a final reading of 1382 μ S/cm. All meters read within 3% of the calibration solution after cleaning.

	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)
Pre-cleaning	0	1442	21.1	0	1384	21.5	0	1399	21.6	0	1380	21.8	0	1378	21.5
	2	1426	21.8	2	1389	22.0	2	1387	22.1	2	1376	22.3	2	1395	21.7
	4	1426	21.9	4	1393	22.0	4	1390	22.3	4	1377	22.4	4	1400	21.7
	6	1426	22.0	6	1397	22.1	6	1392	22.3	6	1379	22.5	6	1402	21.7
				8	1402	22.2	8	1394	22.4	8	1380	22.6	8	1402	21.7
Post-cleaning	0	1406	22.8	0	1384	23.0	0	1393	22.4	0	1384	22.9	0	1397	22.0
	2	1396	23.3	2	1395	23.1	2	1396	22.9	2	1384	23	2	1403	21.9
	4	1395	23.3	4	1399	23.1	4	1400	23.0	4	1386	23.1	4	1400	22.0
	6	1395	23.3	6	1402	23.2	6	1402	23.0	6	1389	23.2	6	1401	22.0
	8	1395	23.3	8	1403	23.2	8	1405	23.1	8	1390	23.2	8	1402	22.0
	RPD (pre vs post clean)	2.2%			-0.1%			-0.8%			-0.7%			0.0%	
	RPD (post clean reading vs 1413 solution)	-1.3%			-0.7%			-0.6%			-1.6%			-0.8%	

In summary, the meters likely produced reliable data throughout the field season. The difference among meters at the end of the season was less than 5% across salinity levels and the difference from the calibration solution was less than 3%.