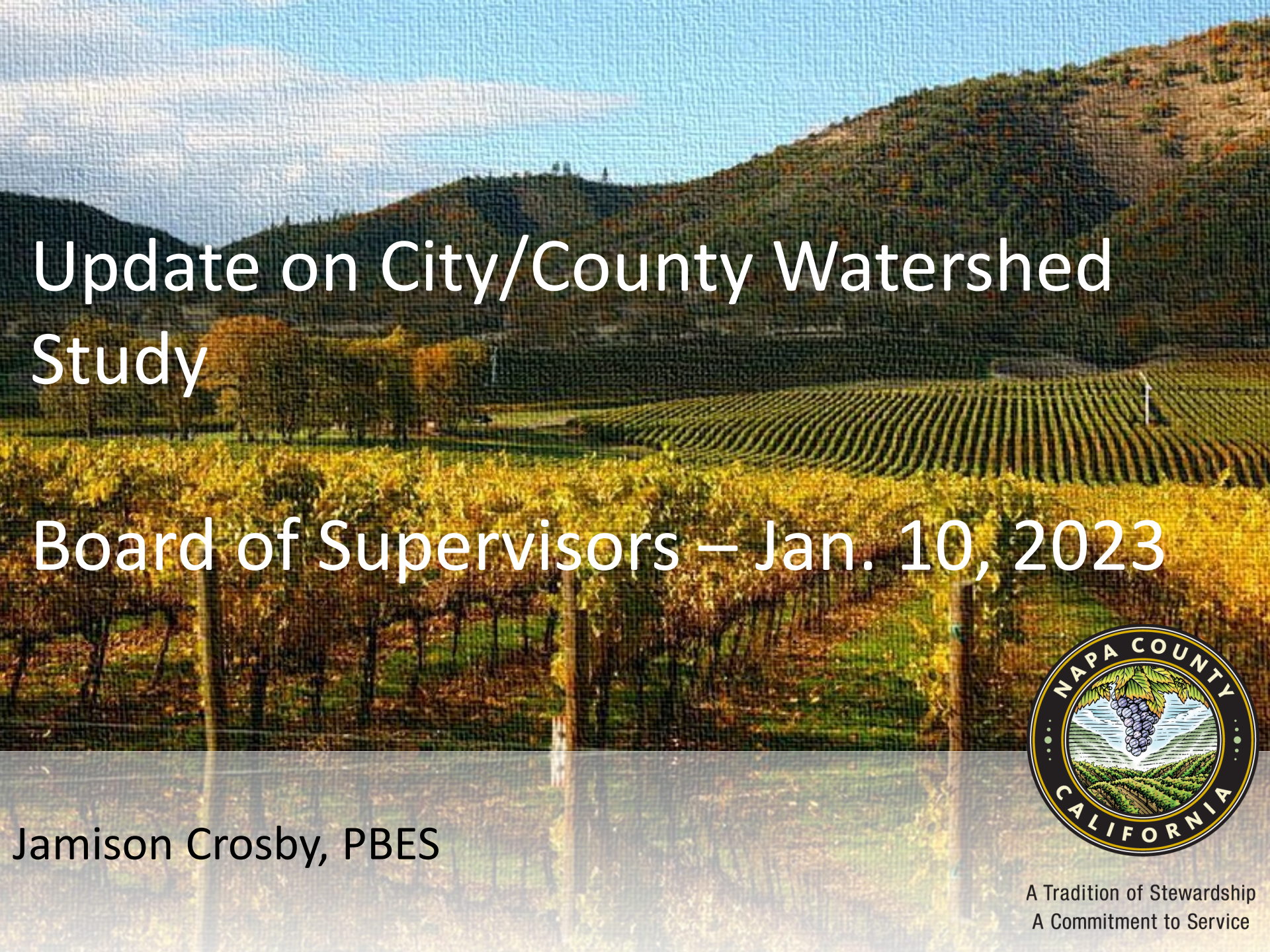

Update on City/County Watershed Study

Board of Supervisors – Jan. 10, 2023

Jamison Crosby, PBES

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City/County Joint Watershed Study

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- Shared interest in water quality
  - Hennessey and Millken Reservoirs
- Watershed Analysis and Risk Management Framework (WARMF) Model – 2017
- Sampling and Analysis Plan - 2019
- MOU between City and County – 2019
  - Sample collection starting fall
  - Amended on November 22, 2022
- 50/50 Cost share

Napa County Drinking Water Supply Watersheds

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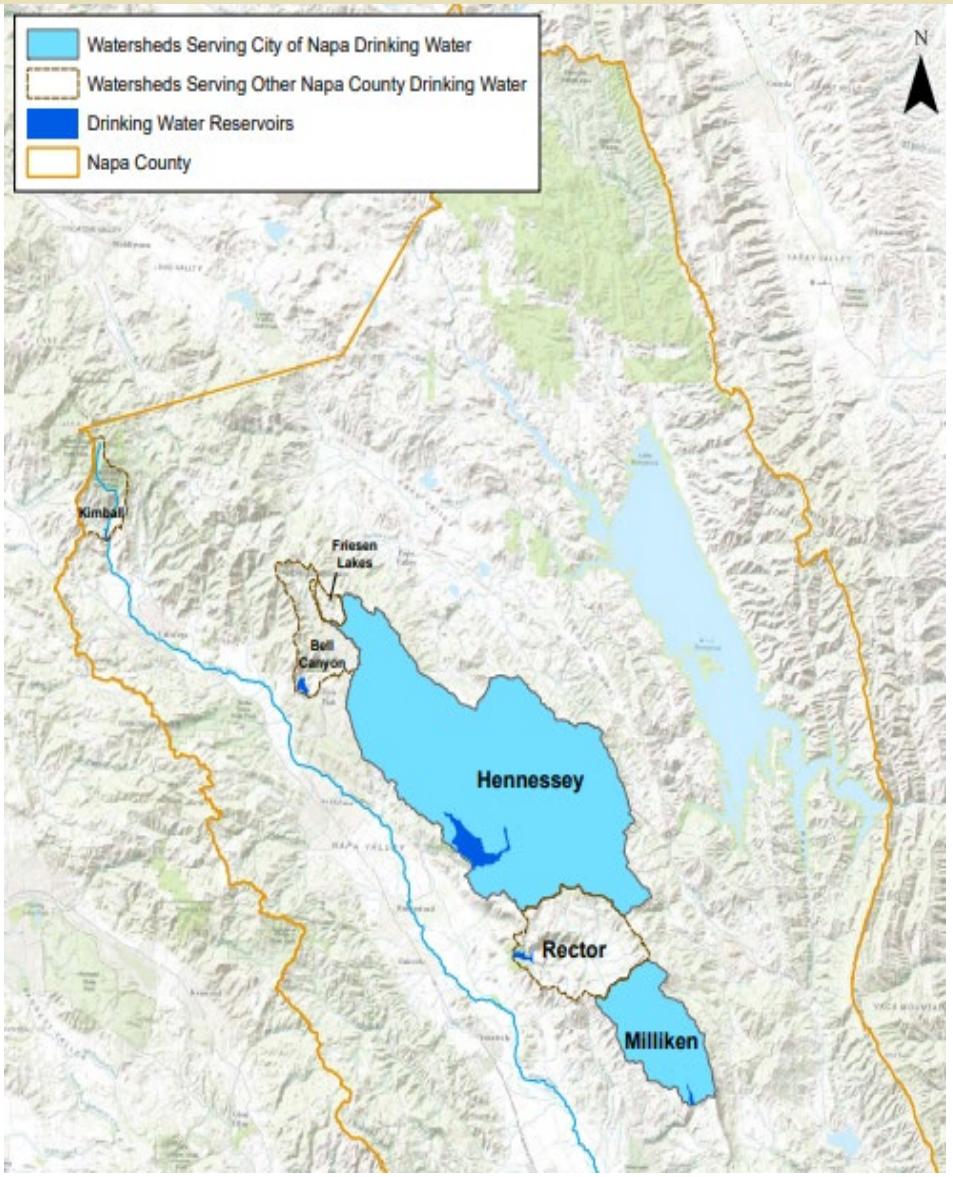

City of Napa Municipal Reservoirs

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Watershed Sampling and Analysis

Lake Hennessey

31,000 AF storage
32,800 acres watershed (50 mi^2)

Milliken Reservoir

1,400 AF storage
6,100 acres watershed (10 mi^2)

Additional Supply from State Water Project

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TEAM EFFORT

Teams of 2 cover a route:
2 RCD/2 City/2 County

- Training
- Sample bottles
- PPE (gloves, boots)
- COCs (Chain of Custody)
- Coolers of ice

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- Collect samples throughout rainy season
  - First flush
  - Large runoff events
  - Average runoff events
- Consistent, accessible sample locations
- Establish baseline water quality data
- Calibrate the WARMF Model

Lake Hennessey Reservoir & Watershed

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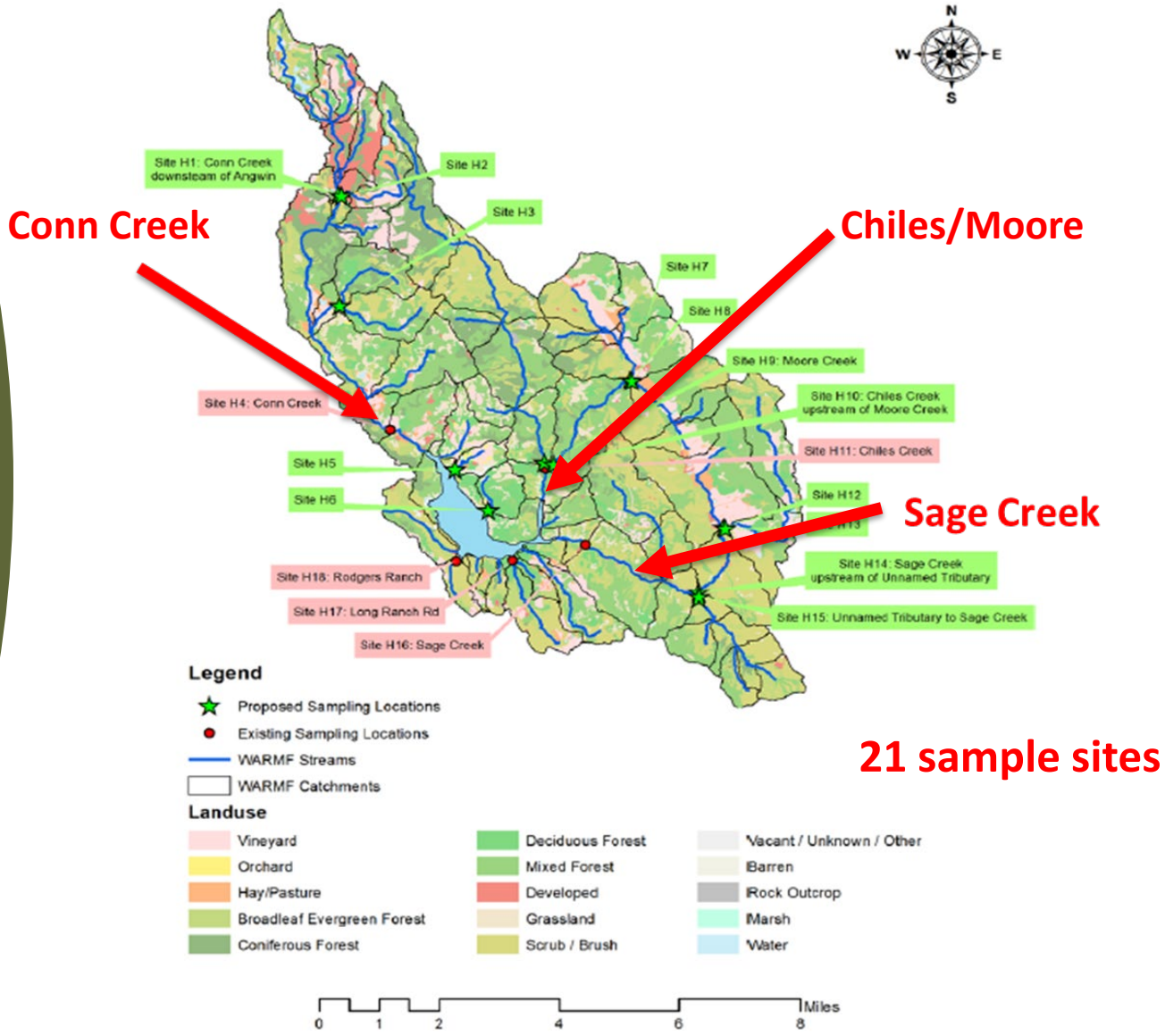

Milliken Reservoir & Watershed

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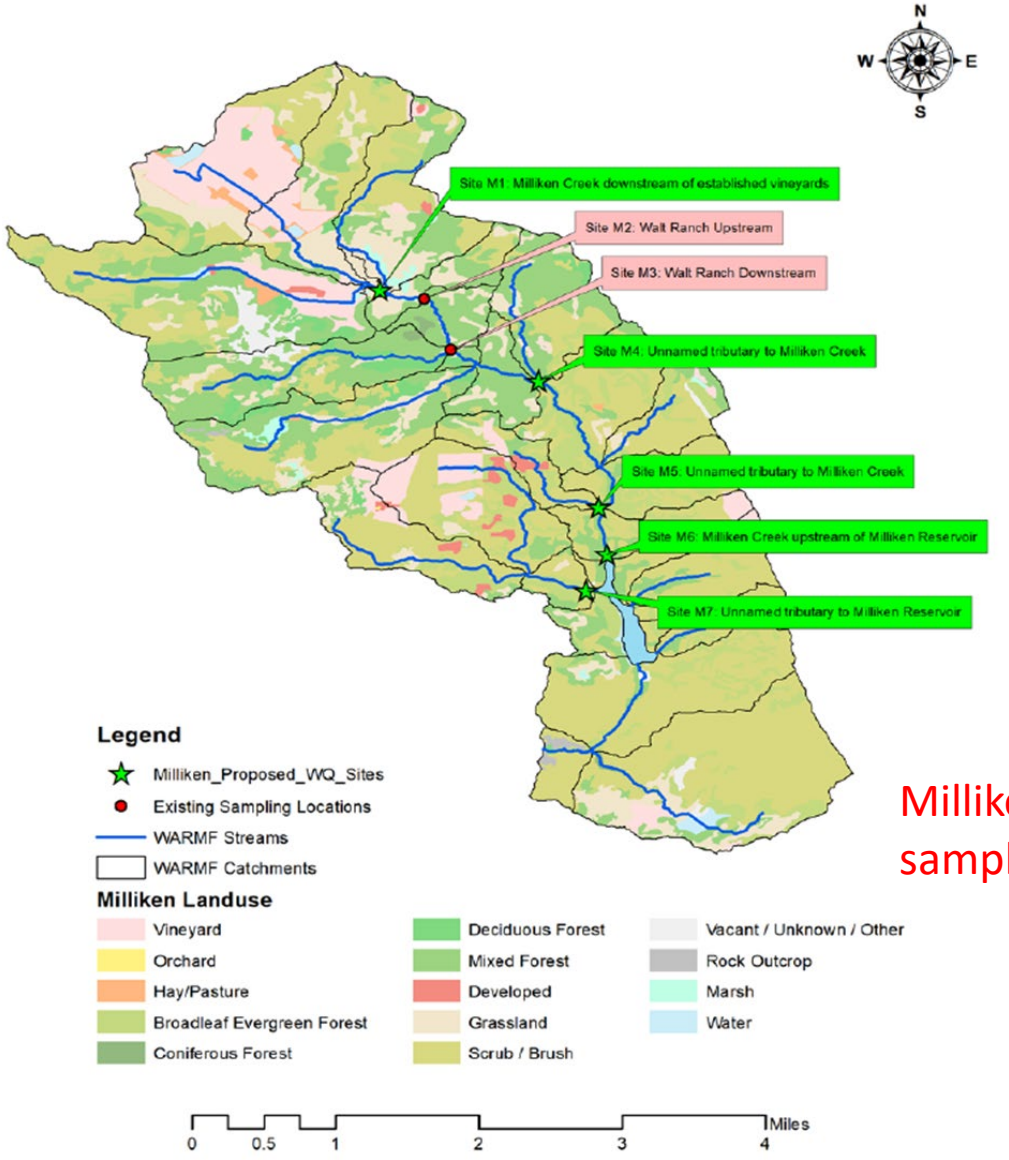

Milliken Creek – 5 sample sites

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First 3 years of sampling data:

- 2019/20 & prior – max 4 sample events
  - Scouted and established new sites
  - Most sites only had 2 sample events (Jan – Feb)
- 2020/21 – max 4 sample events
  - Extremely dry year
  - Sufficient flow for Jan – April only
- 2021/22 – max 8 sample events
  - First full year of sampling

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GENERAL MINERAL, PHYSICAL AND INORGANIC ANALYSIS								
PARAMETER	Caltest	Caltest	Caltest	Caltest	Caltest	Caltest	Caltest	Caltest
	10/27/21	11/30/21	12/22/21	01/19/22	02/23/22	03/30/22	04/27/22	05/25/22
Hardness, total	52	44	44	50	42	44	50	42
Calcium	13	11	10	11	12	11	11	10
Alkalinity, Total (as CaCO3)	47	63	47	53	56	59	59	59
Hydroxide (as CaCO3)	ND	ND	ND	ND	ND	ND	ND	ND
Carbonate (as CaCO3)	ND	ND	ND	ND	ND	ND	ND	ND
Bicarbonate (as CaCO3)	47	63	47	53	56	59	59	59
Sulfate	12.0	6.9	8.9	12.0	10.0	9.5	7.7	4.6
Chloride	13	10.0	9.8	9.8	8.1	7.5	8.1	7.3
pH (field)	7.34	7.10	7.40	7.15	8.20	7.08	7.30	7.55
Specific Conductance	200	190	170	190	170	170	170	160
TDS	170	150	140	180	150	180	160	180
TSS	ND	3.0	ND	ND	ND	ND	24.0	3.5
VSS	ND	3.0	ND	ND	ND	ND	5.3	ND
CBOD	ND	ND	ND	ND	ND	ND	ND	ND
Turbidity	11	3.5	27	18	19	14	18	6.1
Ammonium	0.17	0.096	0.055	0.150	ND	0.076	0.150	ND
Dissolved Oxygen (field)	6.80	6.95	8.21	7.76	7.80	7.48	8.00	5.97
Water Temperature (field)	14.2	11.3	8.9	10.1	6.2	10.8	10.6	16.8
Air Temperature (field)	16.1	11.8	7.0	7.7	7.6	12.7	15.2	27.1
ortho Phosphate as PO4	ND	0.12	ND	ND	ND	0.11	0.12	0.12
Nitrate + Nitrite as N	3.40	0.7	1.70	1.10	0.70	0.36	0.38	0.280
Total Kjeldahl Nitrogen	0.83	0.33	0.85	0.17	ND	0.47	0.44	0.14
Soluble Kjeldahl Nitrogen	0.66	0.14	0.61	0.17	ND	0.41	0.19	ND
Ammonia	0.17	ND	ND	0.15	ND	ND	0.15	ND
DOC (Dissolved Organic Carbon)	5.6	2.3	5.0	2.1	2.5	2.8	2.8	2.5
TOC (Total Organic Carbon)	5.8	2.1	4.8	2.0	3.0	2.7	2.6	2.6
Total Phosphorus as P	0.11	0.13	0.12	0.10	0.12	0.13	0.17	0.15
Dissolved Phosphorus as P	ND	0.11	ND	ND	ND	0.10	0.11	0.13

Conn H101

City/County Joint Watershed Study

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PARAMETER	Caltest 10/27/21	Caltest 12/22/21	Caltest 01/19/22
Hardness, total	120	64	78
Calcium	25	12	13
Alkalinity, Total (as CaCO3)	94	54	84
Hydroxide (as CaCO3)	ND	ND	ND
Carbonate (as CaCO3)	ND	ND	ND
Bicarbonate (as CaCO3)	94	54	84
Sulfate	37.0	12.0	16.0
Chloride	13.0	5.4	9.5
pH (field)	7.57	7.45	7.55
Specific Conductance	330	170	240
TDS	220	140	180
TSS	ND	ND	ND
VSS	ND	ND	ND
CBOD	ND	ND	ND
Turbidity	4.9	35	4.8
Ammonium	0.20	0.17	0.13
Dissolved Oxygen (field)	6.48	8.85	8.72
Water Temperature (field)	16.2	8.4	8.9
Air Temperature (field)	18.8	6.2	11.8
ortho Phosphate as PO4	ND	ND	ND
Nitrate + Nitrite as N	1.80	0.36	0.57
Total Kjeldahl Nitrogen	0.96	1.10	0.17
Soluble Kjeldahl Nitrogen	1.00	0.74	0.14
Ammonia	0.20	0.17	0.13
DOC (Dissolved Organic Carbon)	14.0	13.0	2.9
TOC (Total Organic Carbon)	14.0	13.0	2.7
Total Phosphorus as P	0.12	0.11	ND
Dissolved Phosphorus as P	0.11	ND	ND

Conn H105

Next Steps

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- Continue sampling and analysis
- Refine WARMF model
- Train City and County staff on model
- Over time – determine water quality trends

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- Questions?