Update on City/County Watershed Study

Board of Supervisors – Jan. 10, 2023

Jamison Crosby, PBES





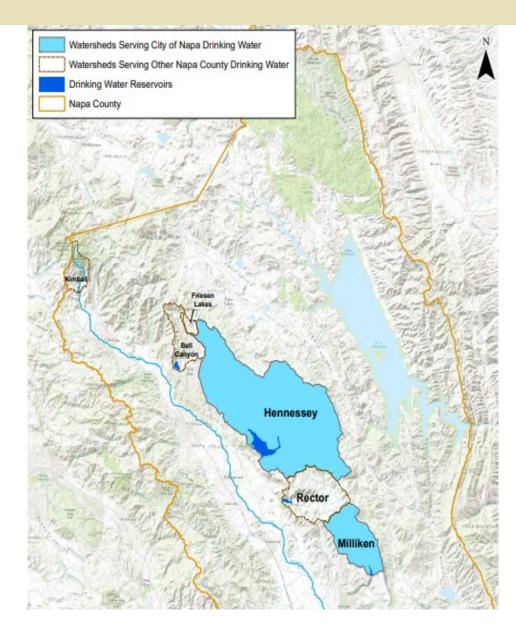
• Hennessey and Millken Reservoirs



- 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





City of Napa Municipal Reservoirs

Watershed Sampling and Analysis





31,000 AF storage 32,800 acres watershed (50 mi²)

Milliken Reservoir

1,400 AF storage 6,100 acres watershed (10 mi²)



Additional Supply from State Water Project



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



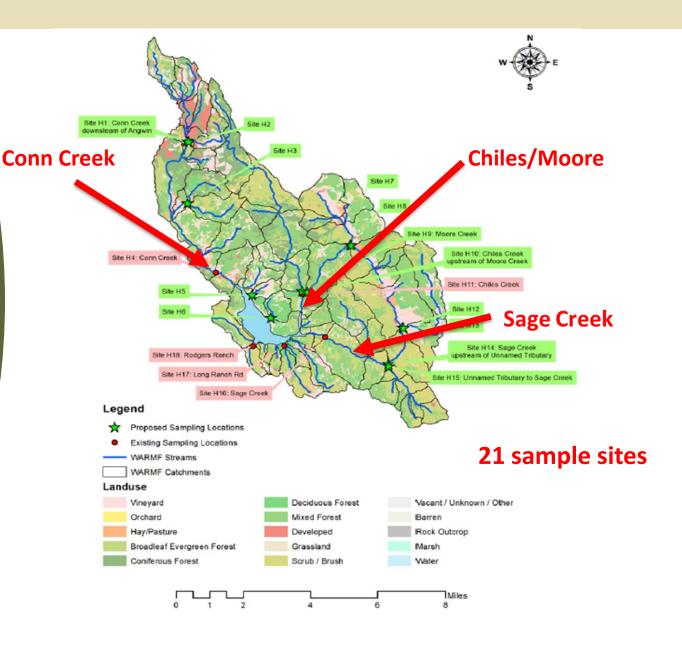




- Collect samples throughout rainy season
 - First flush
 - Large runoff events
 - Average runoff events
- Consistent, accessible sample locations
- Establish baseline water quality data
- Calibrate the WARMF Model

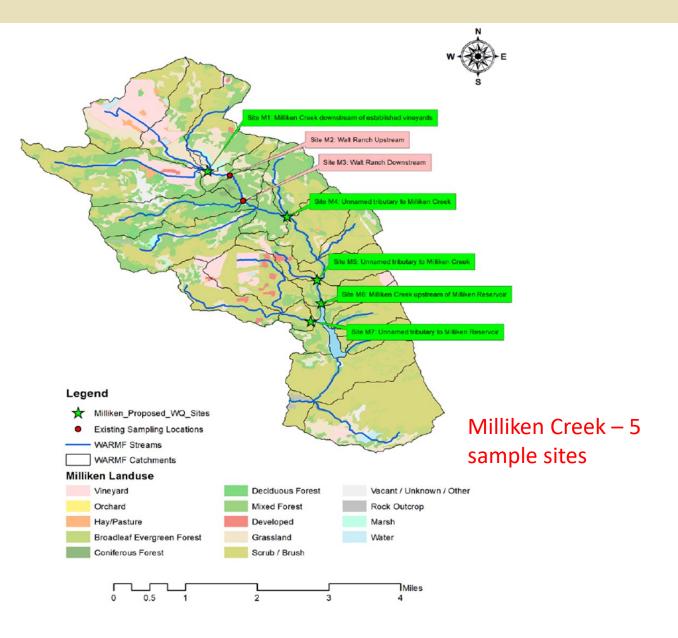
Lake Hennessey Reservoir & Watershed





Milliken Reservoir & Watershed







A Tradition of Stewardship A Commitment to Service 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



A Tradition of Stewardship A Commitment to Service

	GE	NERAL N	INERAL	<mark>, PHYSI</mark>	CAL AND	INORG	ANIC AN	IALYSIS
DADAMETER	Caltest	Caltest	Caltest	Caltest	Caltest	Caltest	Caltest	Caltest
PARAMETER	10/27/21	11/30/21	12/22/21	01/19/22	02/23/22 03/30/22 0	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



A Tradition of Stewardship A Commitment to Service

PARAMETER	Caltest	Caltest	Caltest	
PARAPIETER	10/27/21	12/22/21	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





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



A Tradition of Stewardship A Commitment to Service • Questions?