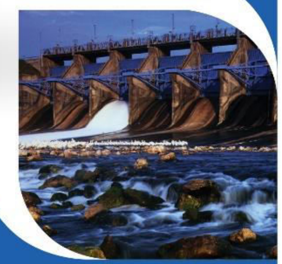
Village Creek-Lake Arlington Watershed Protection

Aaron Hoff

Trinity River Authority

May 18, 2017



Village Creek Lake Arlington WATERSHED PROTECTION

Trinity River Authority of Texas

Enriching the Trinity basin as a resource for Texans

Recap from Last Meeting

- Discussed NRCS Conservation Programs available to ag/rural landowners
  - *Michael Brooks, District Conservationist – USDA Natural Resource Conservation Service*
- Discussed projects funded through the Water Quality Management Plan Program
  - *Mitch Conine, Project Management Coordinator – Texas State Soil & Water Conservation Board*
- Provided a water quality monitoring update on approved data from June-October 2016
  - *Angela Kilpatrick, Senior Environmental Scientist - Trinity River Authority*
- Overview of an Example WPP
- Check the website for last meeting's presentations
  - http://www.trinityra.org/lakearlingtonvillagecreek

Meeting Overview

- WPP Discussion – Chapters 1-3
  - *Aaron Hoff, Watershed Coordinator - Trinity River Authority*
- Water Quality Monitoring Update
  - *Angela Kilpatrick, Senior Environmental Scientist - Trinity River Authority*
- Live Demonstration – WikiWatershed's "Model My Watershed" Tool
- Upcoming Events and Path Forward
  - *Aaron Hoff, Watershed Coordinator - Trinity River Authority*
- Open Discussion and Closing Comments

Ground Rules for Discussion Periods

- Please save questions until after each presentation has been given (unless speaker says otherwise)
- Any additional questions may be answered during the open discussion period at the end
- Please be respectful of others' time and points of view

http://www.trinityra.org/lakearlingtonvillagecreek

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Basin Planning

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Village Creek-Lake Arlington Watershed Protecton

In the News

Next Public Stakeholder Meeting - 2/11/2016

Our next public meeting for the Village Creek-Lake Arlington Watershed Protection Partnership will take place on Thursday, February 11, at 6:30pm. The meeting will be held at the Everman City Hall Annex. We will be nominating members for the Steering Committee to be voted on at our March meeting, so if you have someone in mind that would be an asset to this decision-making group, you can nominate them at the meeting or through our Stakeholder Survey.

February 11, 2016
6:30pm - 8:30pm
Everman City Hall Annex
213 North Race St
Everman, TX 76140
See Map

See you there!

Stakeholder Survey

Want to get involved in the watershed? Pl re to take the Stakeholder Survey to let us know how you'd like to help out, or if y involved.

Take the Stakeholder Survey

https://www.surveymonkey.com/r/KQ3PGHY

Watershed Protection Plan Kickoi

Thanks to everyone who joined us in Burles e kickoff meeting on Thursday, December 10th. Presentations are now posted to the Me page for your reference.

At the meeting, the Watershed Protection group voted for an official logo. Here's the final design:

Basin Planning

- History of Water Quality
- Clean Rivers Program
- Reports
- Region C Water Planning
- Village Creek-Lake Arlington
  - About
  - Meetings
  - Maps & Data

Point of Interest

The Texas legislature established the Texas Clean Rivers Program in 1991 to provide a systematic, coordinated effort to evaluate and protect Texas' water resources.

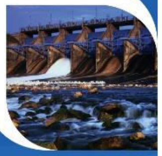
Funding Source

ARLINGTON
THE AMERICAN DREAM CITY

EPA United States Environmental Protection Agency

Texas Commission on Environmental Quality

Funding provided by the Texas Commission on Environmental Quality through a Clean Water Act Section 319(h) grant from the U.S. Environmental Protection Agency, with match funding from the City of Arlington and in-kind contributions from TRA.



Let’s get started!

http://www.trinityra.org/lakearlingtonvillagecreek

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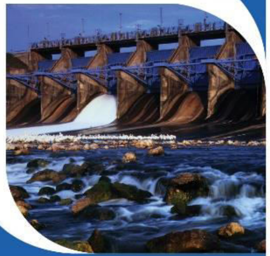
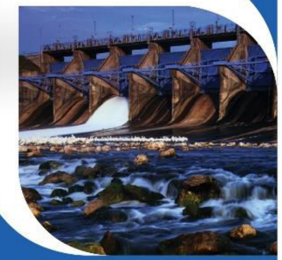


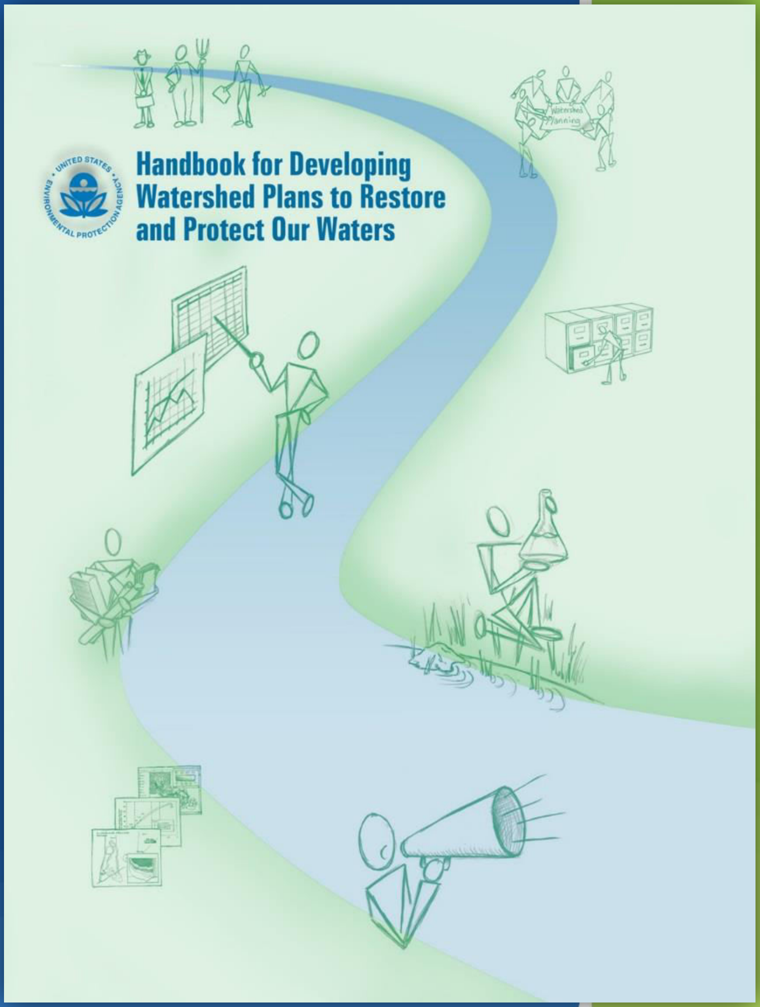
WPP Discussion: Chapters 1-3

Aaron Hoff
Trinity River Authority
May 18, 2017



Review – What's a WPP?

- Voluntary plan developed through local stakeholder coordination
- Watershed scale, multi-jurisdictional approach to watershed management and water quality protection
- Follows EPA's Nine Element Plan Handbook
  - *Handbook for Developing Watershed Plans to Restore and Protect our Waters*, March 2008

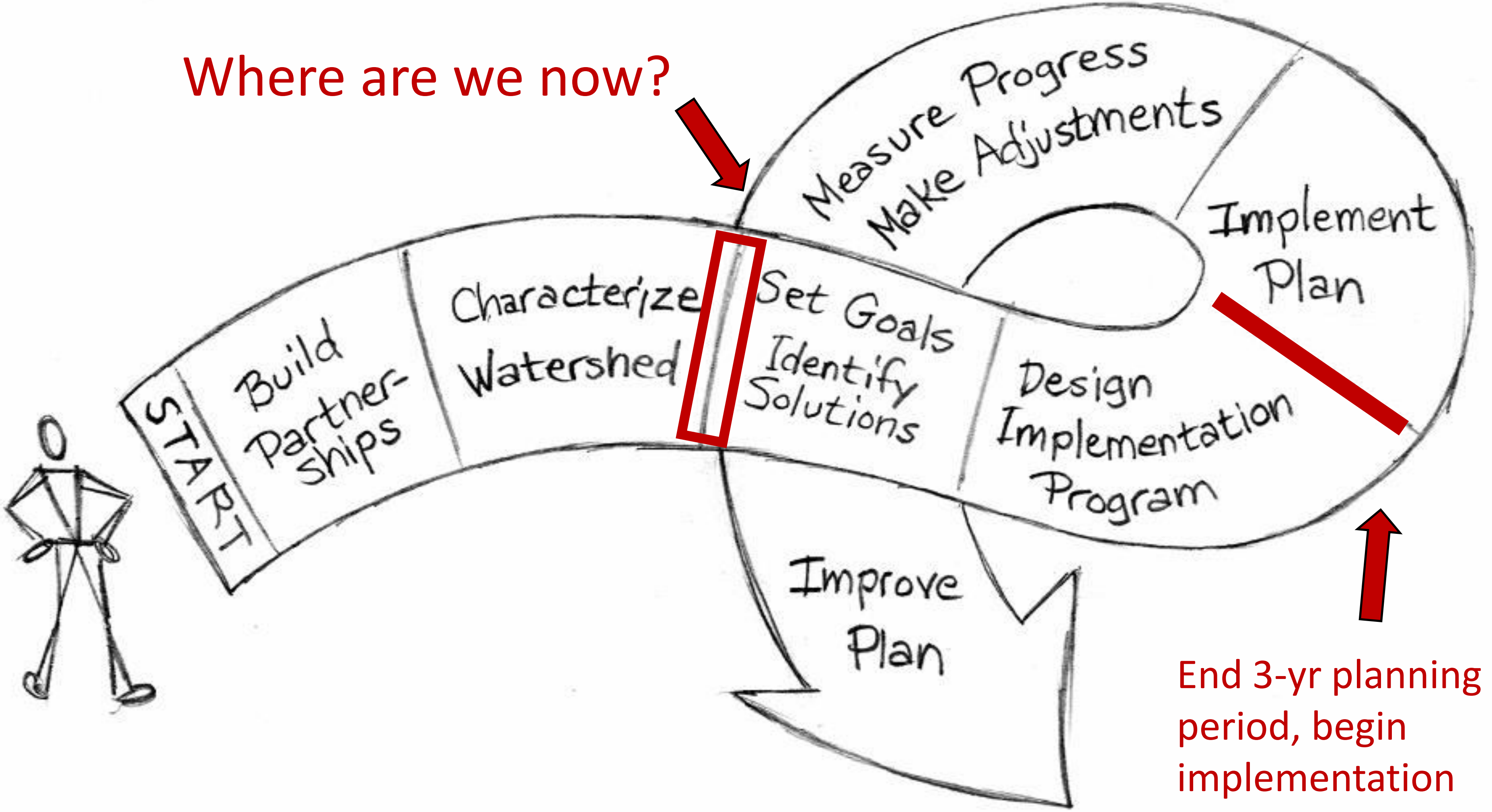


Nine Elements that Must be Included

1) Identify causes & sources of pollution
2) Estimate load reductions expected
3) Describe mgmt measures & targeted critical areas
4) Estimate technical and financial assistance needed
5) Develop education/outreach components
6) Develop schedule for implementation
7) Describe interim, measurable milestones
8) Identify indicators to measure progress
9) Develop a monitoring component

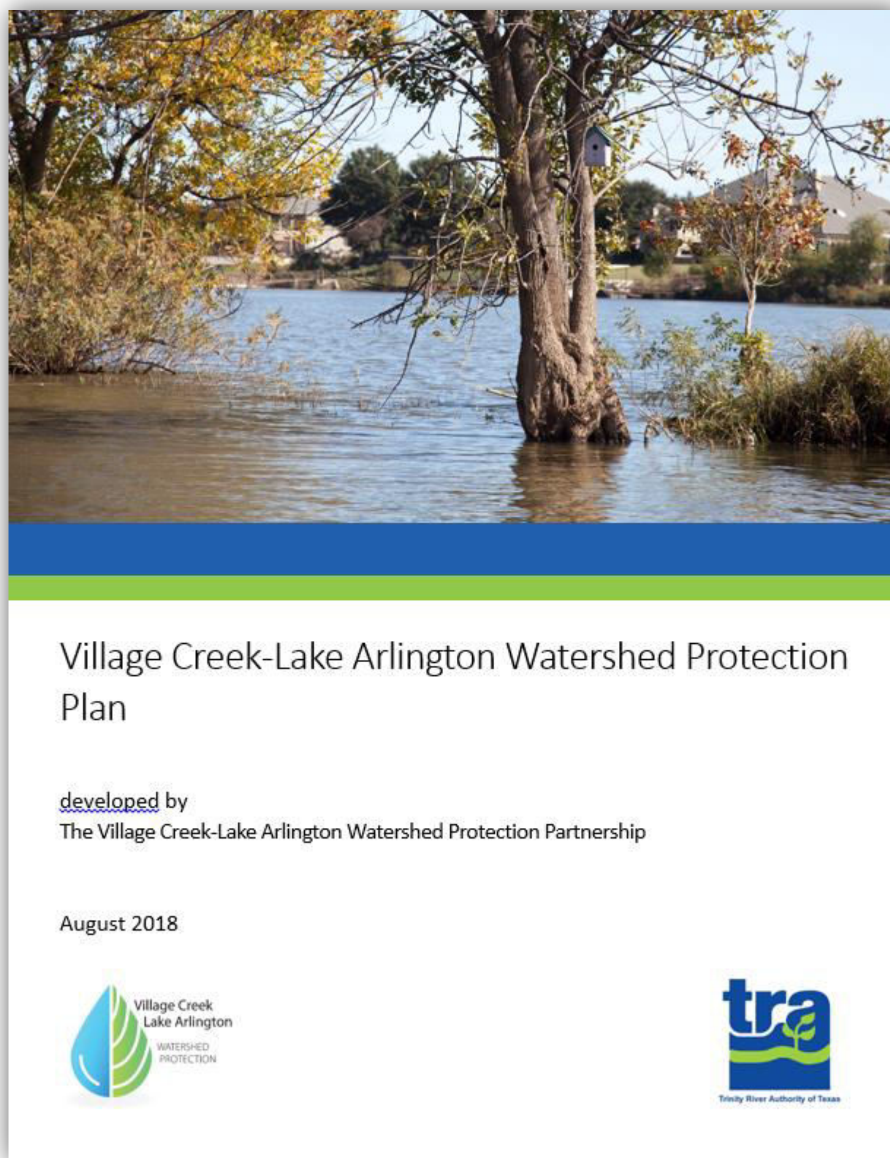
Chapter 2 *(kinda-sorta)*

Six Steps in Watershed Planning



Chapter Review

Here we go...



Village Creek-Lake Arlington Watershed Protection Plan

developed by
The Village Creek-Lake Arlington Watershed Protection Partnership

August 2018

Comments to be Addressed

- Incorporate NCTCOG's future land use projections
  - Covered in SELECT analysis
- Incorporate components of previous studies
  - Several introduced in Ch. 2
  - Revisited in later chapters for BMP and restoration strategy recommendations
- Investigate Arlington ammunition plant and army barracks
- Lake/pond turnover and seasonal nutrient availability

Questions?

http://www.trinityra.org/lakearlingtonvillagecreek

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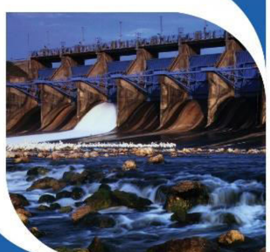
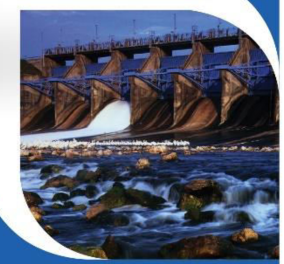


Water Quality Monitoring Results

Angela Kilpatrick

Trinity River Authority

May 18, 2017



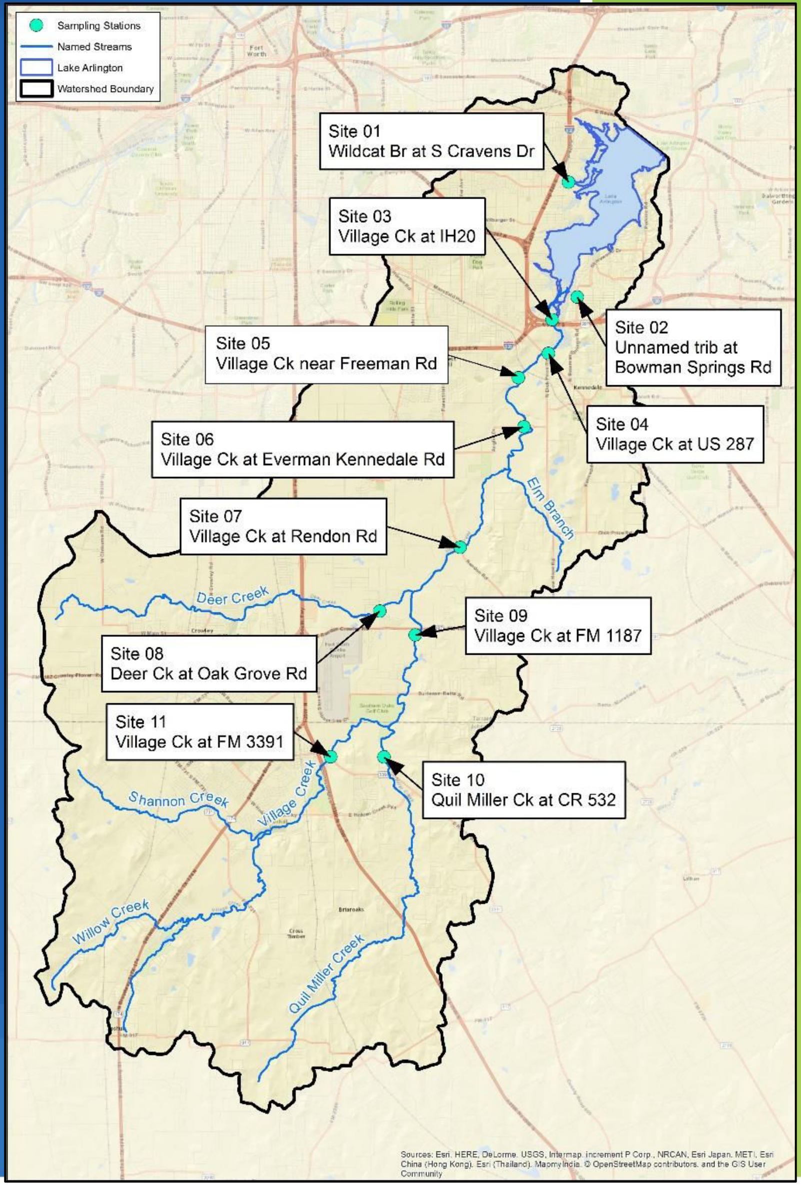
Village Creek Lake Arlington WATERSHED PROTECTION

Trinity River Authority of Texas

Enriching the Trinity basin as a resource for Texans

Monitoring Plan and Lab Analysis

- Samples collected by PES staff are dropped off at CRWS lab for analysis of:
  - *E. coli*
  - Nitrate, Nitrite, Total Kjeldahl Nitrogen
  - Total Phosphorus, Orthophosphate
  - Chlorophyll a
  - TDS, TSS, VSS
- QC-approved data for June to November 2016 submitted to TCEQ
- Preliminary data presented for December 2016 to April 2017



Evaluation Criteria

Analytical results were compared to TCEQ's water quality standards and screening levels to determine if values exceeded criteria

Site-specific Water Quality Criteria for the Village Creek-Lake Arlington Watershed (TCEQ)

Parameter	Segment ID 0828	Segment ID 0828A
Cl-1 (mg/L)	100	100
SO4-2 (mg/L)	100	-
TDS (mg/L)	300	300
DO (mg/L) grab minimum	3.0	2.0
DO (mg/L) 24 hour average	5.0	3.0
DO (mg/L) 24 hour minimum	3.0	2.0
pH range	6.5-9.0	6.5-9.0
E. coli #/100ml	126	126
Temperature (°F; °C)	95; 35	95; 35

Texas Nutrient Screening Levels and EPA Nutrient Reference Criteria

Parameter		TCEQ Screening Levels		EPA Reference Criteria				Other Sources
		Lake/Reservoir	Stream	Lake/Reservoir		Stream		
TKN	(mg/L)	-	-	0.38[a]	0.41[b]	0.3[a]	0.4[b]	
NO_2	(mg/L)	-	-	-	-	-	-	0.02[c]
NO_3	(mg/L)	0.37	1.95	-	-	-	-	
NO_2+NO_3	(mg/L)	-	-	0.017[a]	0.01[b]	0.125[a]	0.078[b]	
TP	(mg/L)	0.20	0.69	0.02[a]	0.019[b]	0.037[a]	0.038[b]	
OP	(mg/L)	0.05	0.37	-	-	-	-	
Chl-a[d]	(µg/L)	26.7	14.1	5.18[a]	2.875[b]	0.93[a]	1.238[b]	

[a] Reference conditions for aggregate Ecoregion IX waterbodies, upper 25th percentile of data from all seasons, 1990-1999.

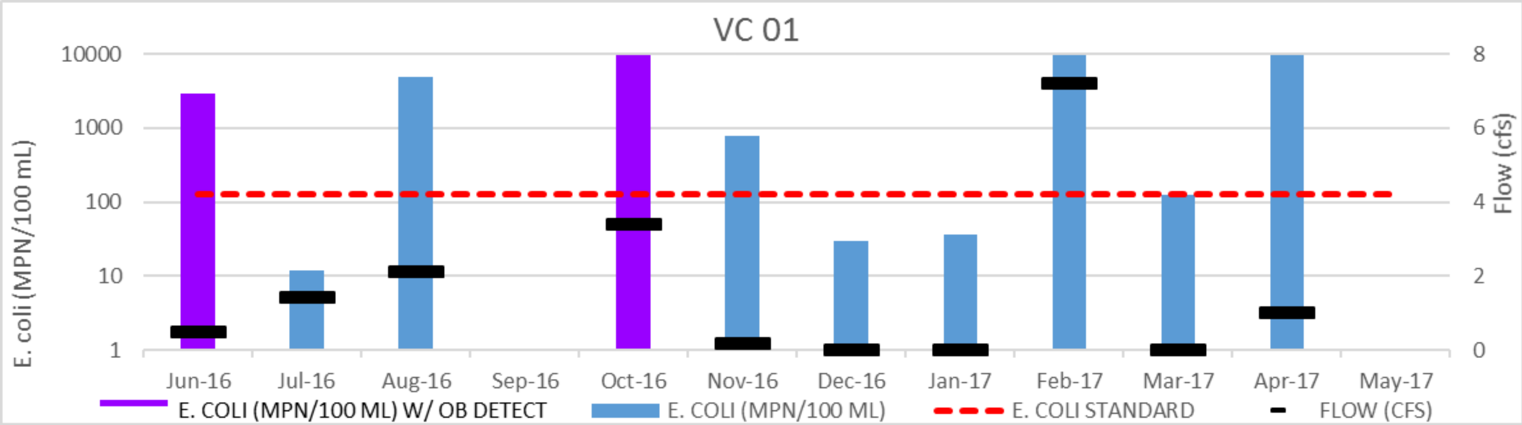
[b] Reference conditions for level III Ecoregion 29 waterbodies, upper 25th percentile of data from all seasons.

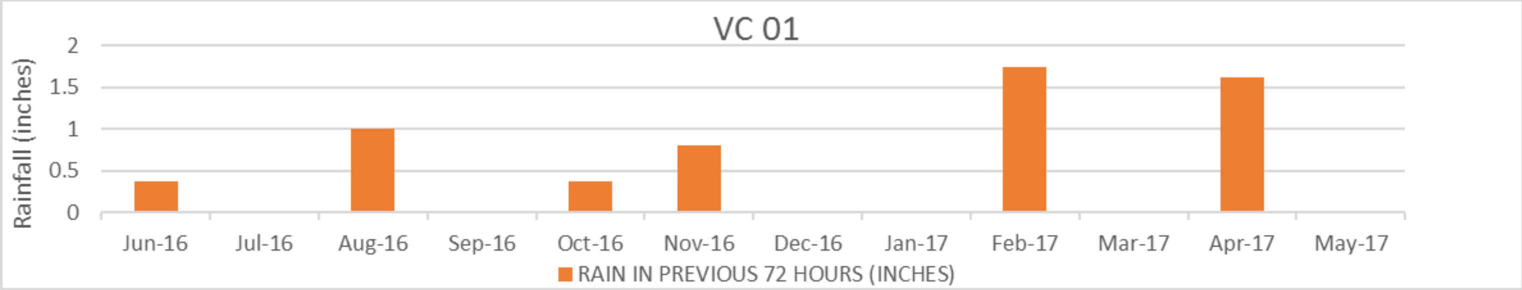
[c] For nitrite, concentrations above 0.02 mg/L (ppm) usually indicate polluted waters (Mesner, N., J. Geiger. 2010. Understanding Your Watershed: Nitrogen. Utah State University, Water Quality Extension.

[d] Chlorophyll a, as measured by Spectrophotometric method with acid correction.

Site 1 – Wildcat Branch at Cravens

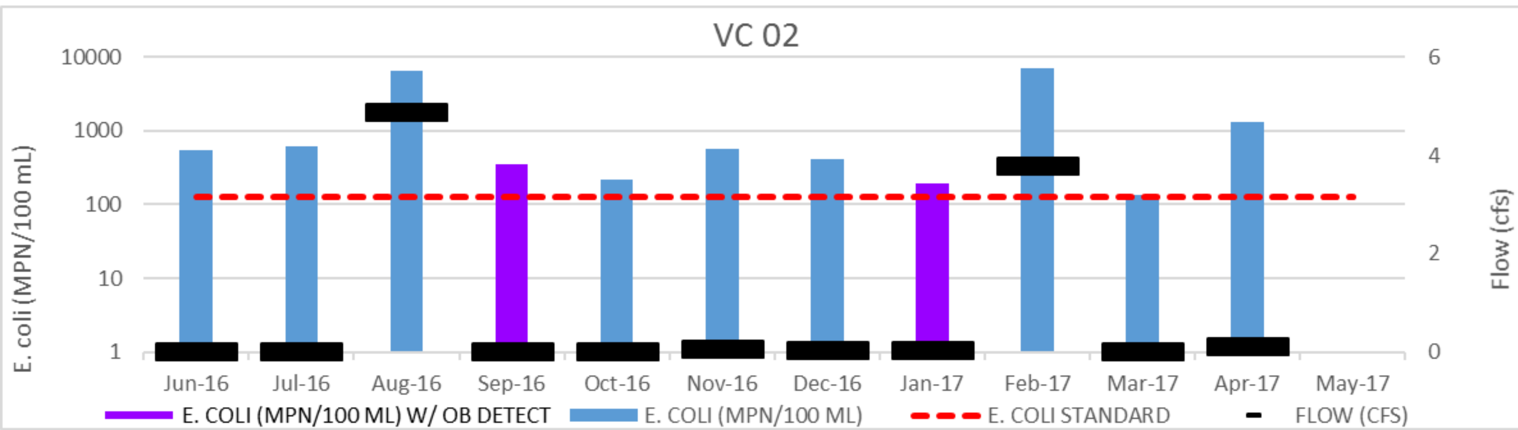
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/29/2016	17	2909	0.25	<0.05	1.08	0.04	0.14	164	10	<3	1	0.375	0.375	0.476
7/19/2016	17	12	<0.05	<0.05	0.65	<0.02	0.04	244	7	3	0	0	0	1.413
8/15/2016	4	>4839	0.33	<0.05	0.82	0.03	0.09	187	12	<8	0	0.63	1	2.125
10/20/2016	<3	>9678	0.41	<0.05	1.35	0.08	0.22	144	58	10	1	0.375	0.375	3.41
11/9/2016	3	771	0.12	< 0.05	0.55	0.03	0.06	194	3	< 2	0	0.055	0.805	0.16
12/14/2016	< 3	30	< 0.05	< 0.05	0.37	< 0.02	0.05	367	4	< 2	0	0	0	0.01
1/10/2017	< 3	37	< 0.05	< 0.05	0.6	0.04	0.09	339	6	< 3	0	0	0	0
2/14/2017	< 3	9678	0.57	< 0.05	0.85	0.25	0.34	130	26	< 4		1.75	1.75	7.2
3/28/2017	31	125	< 0.05	< 0.05	1.17	< 0.02	0.09	238	8	4		0	0	0
4/3/2017	5	9678	0.19	< 0.05	0.8	0.05	0.19	123	38	< 6		1.25	1.625	1.012

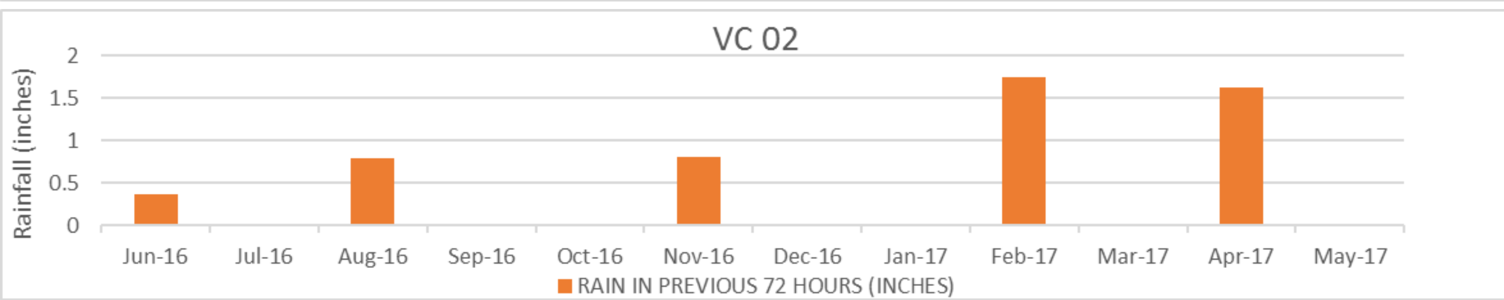




Site 2 – Unnamed trib at Bowman Springs Rd

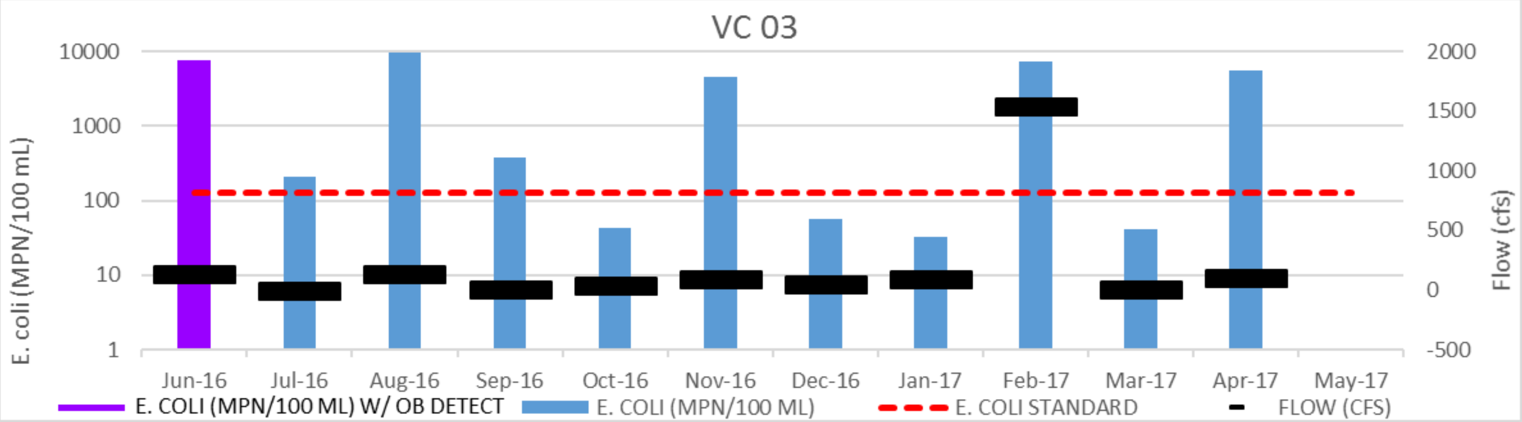
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/28/2016	11	534	0.2	<0.05	0.38	<0.02	0.02	1304	<2	<2	0	0.375	0.375	0.03
7/20/2016	<3	612	<0.05	<0.05	0.36	<0.02	0.02	1573	4	<2	0	0	0	0.017
8/17/2016	3	6510	0.4	<0.05	0.68	<0.02	0.06	240	19	<15	0	0	0.8	4.87
9/13/2016	<3	344	0.06	<0.05	0.22	<0.02	0.02	815	<3	<3	1	0	0	0.01
10/11/2016	6	213	<0.05	<0.05	0.26	<0.02	0.03	1093	8	<2	0	0	0	0.02
11/9/2016	< 3	556	0.18	< 0.05	0.47	< 0.02	0.04	535	3	< 2	0	0.055	0.805	0.07
12/13/2016	< 3	413	0.09	< 0.05	0.47	< 0.02	0.03	1142	< 2	< 2	0	0	0	0.05
1/10/2017	< 3	192	0.1	< 0.05	< 0.2	< 0.02	0.02	1219	3	< 2	1	0	0	0.05
2/14/2017	< 3	6932	0.78	< 0.05	1.03	0.27	0.37	207	24	4		1.75	1.75	3.79
3/28/2017	12	137	< 0.05	< 0.05	0.81	< 0.02	0.04	1095	5	2		0	0	0.03
4/3/2017	7	1302	0.21	< 0.05	0.65	< 0.02	0.08	509	6	< 2		1.25	1.625	0.13

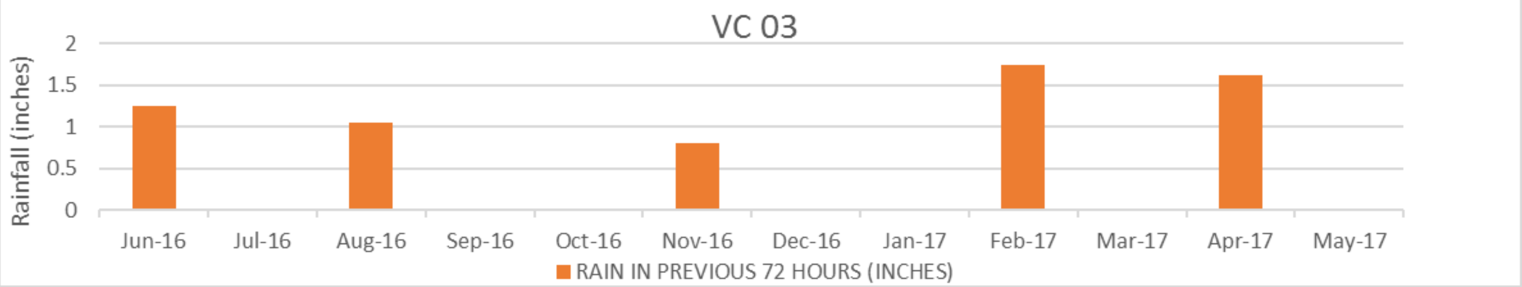




Site 3 – Village Creek at IH-20

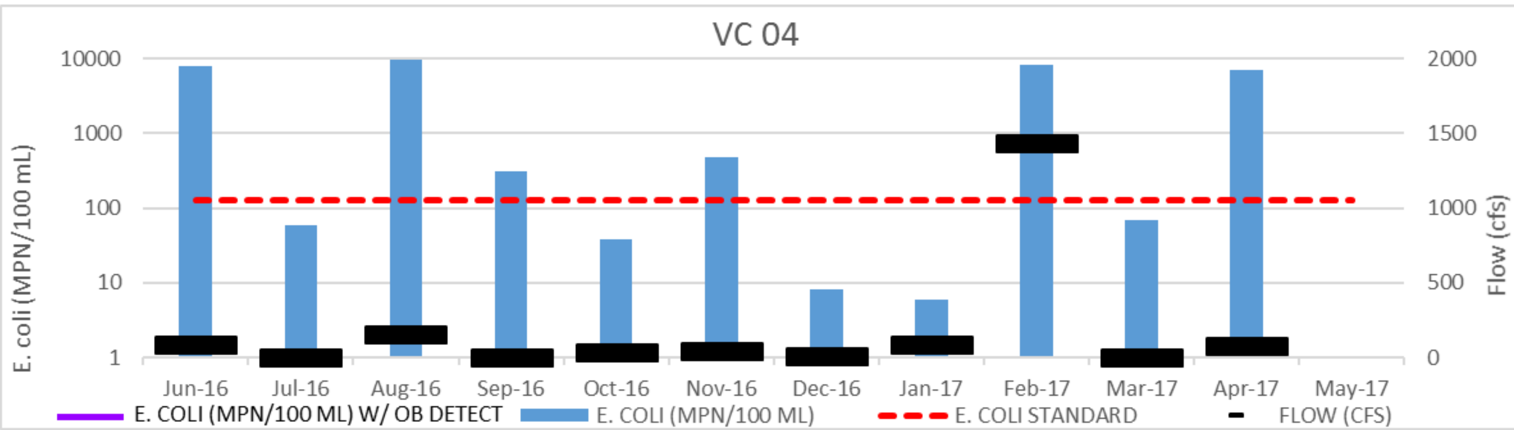
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/29/2016	9	7701	0.62	<0.05	0.96	0.11	0.35	233	116	<14	1	0.375	1.25	133.222
7/20/2016	12	212	0.14	<0.05	0.59	<0.02	0.05	238	20	3	0	0	0	-2.757
8/15/2016	6	>9678	0.23	<0.05	0.9	0.02	0.28	192	128	12	0	0.88	1.05	131.714
9/13/2016	8	384	0.63	<0.05	0.27	0.02	0.06	154	26	<3	0	0	0	0.378
10/11/2016	5	43	0.71	<0.05	0.56	0.03	0.06	171	13	2	0	0	0	34.09
11/9/2016	6	4611	0.25	< 0.05	0.38	0.03	0.08	156	21	< 6	0	0.055	0.805	86
12/14/2016	4	56	0.29	< 0.05	0.46	< 0.02	0.04	164	8	< 2	0	0	0	46.829
1/10/2017	9	32	0.33	< 0.05	0.22	< 0.02	0.04	173	8	< 2	0	0	0	91
2/14/2017	22	7270	0.71	< 0.05	1.39	0.14	0.54	203	426	35		1.75	1.75	1545
3/28/2017	18	42	< 0.05	< 0.05	0.69	< 0.02	0.05	335	14	< 3		0	0	0
4/3/2017	< 3	5654	0.8	< 0.05	0.92	0.1	0.24	272	68	9		1.25	1.625	101.072

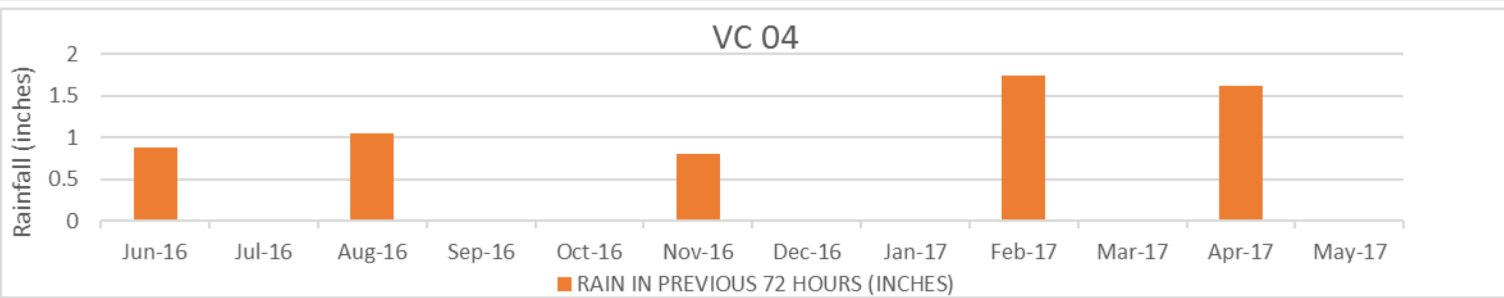




Site 4 – Village Creek at US-287 BUS

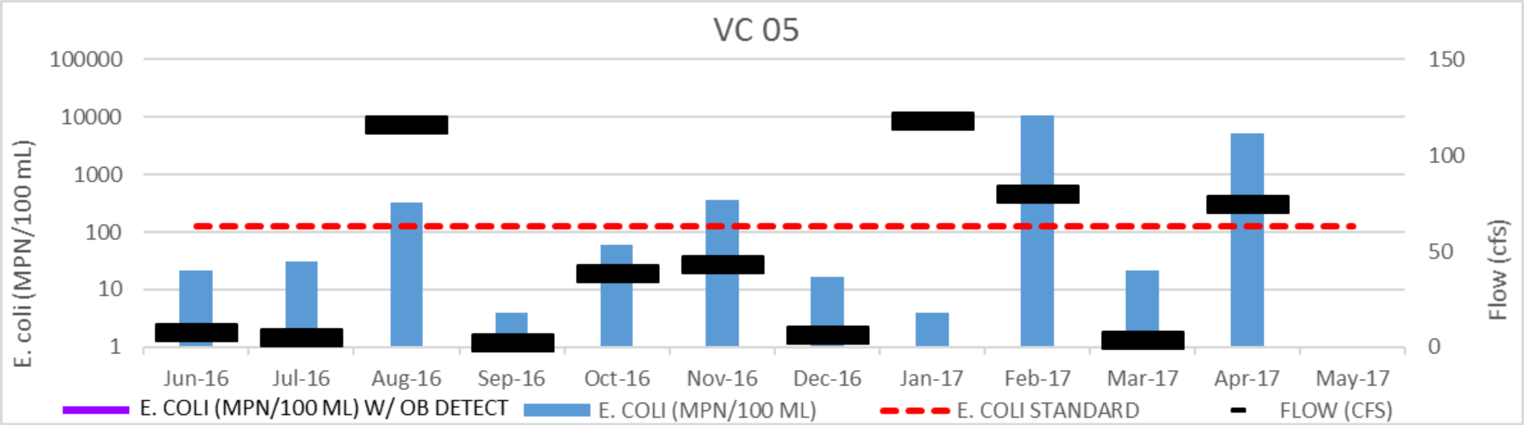
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/28/2016	11	7945	0.37	<0.05	0.61	<0.02	0.12	304	54	<6	0	0.875	0.875	82.731
7/20/2016	5	59	0.2	<0.05	0.42	<0.02	0.04	167	9	<2	0	0	0	3.281
8/15/2016	8	>9678	0.28	<0.05	0.88	0.04	0.33	179	152	<16	0	0.88	1.05	154.395
9/13/2016	4	314	0.56	<0.05	0.45	0.03	0.04	157	12	<3	0	0	0	3.31
10/11/2016	6	38	0.72	<0.05	0.53	0.03	0.05	161	8	<2	0	0	0	34.88
11/9/2016	7	488	0.25	< 0.05	0.45	0.03	0.07	145	12	< 4	0	0.055	0.805	46
12/13/2016	4	8	0.31	< 0.05	0.51	0.02	0.04	151	3	< 2	0	0	0	7.889
1/10/2017	9	6	0.33	< 0.05	< 0.2	< 0.02	0.04	168	8	< 2	0	0	0	87
2/14/2017	14	8164	0.73	< 0.05	1.26	0.13	0.65	220	470	40		1.75	1.75	1432
3/28/2017	8	70	< 0.05	< 0.05	0.46	< 0.02	0.04	418	15	< 2		0	0	0.04
4/3/2017	12	6932	1.06	< 0.05	0.95	0.13	0.26	273	64	< 7		1.25	1.625	79.827

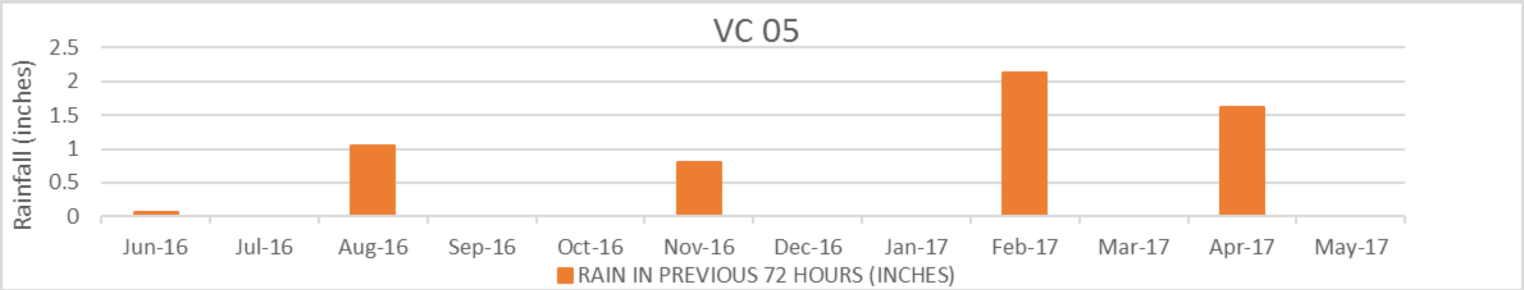




Site 5 – Village Creek near Freeman Dr

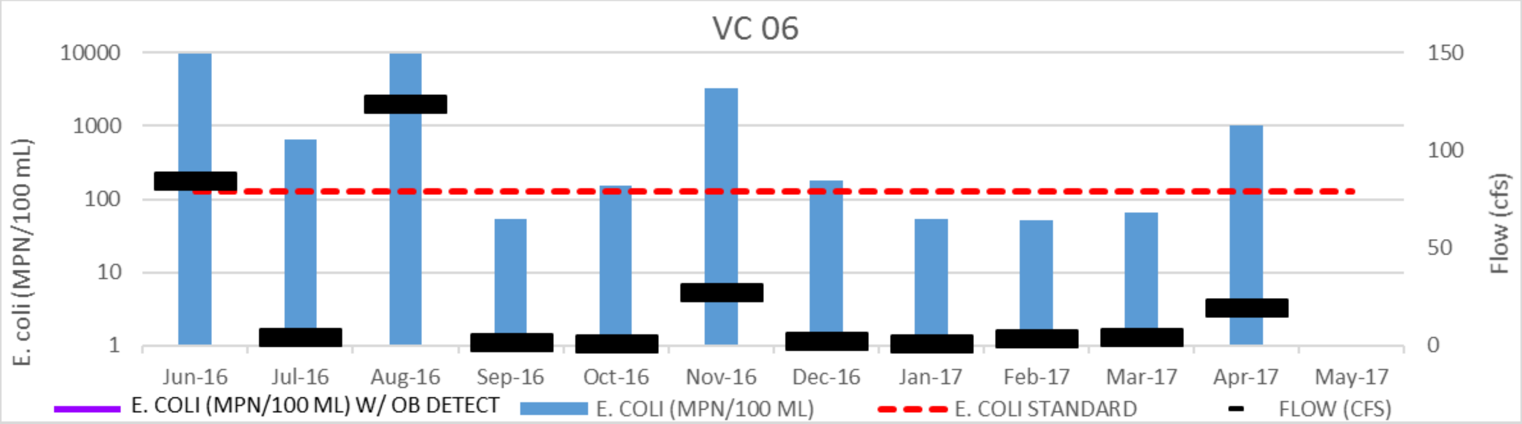
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
7/12/2016	6	21	0.17	<0.05	0.47	0.02	0.04	152	8	<2	0	0	0.055	8.1811
7/20/2016	<3	30	0.23	<0.05	0.42	<0.02	0.03	191	5	<2	0	0	0	5.046
8/17/2016	9	323	0.33	<0.05	0.45	<0.02	0.05	146	21	<9	0	0	1.05	115.7915
9/13/2016	<3	4	0.67	<0.05	0.48	0.03	0.04	172	4	<2	0	0	0	2.65
10/11/2016	8	61	0.74	<0.05	0.44	0.03	0.06	159	14	3	0	0	0	38.95
11/9/2016	6	369	0.26	< 0.05	0.51	0.03	0.07	132	15	< 4	0	0.055	0.805	43.11
12/13/2016	< 3	17	0.32	< 0.05	0.44	0.02	0.04	149	2	< 2	0	0	0	6.54
1/10/2017	11	4	0.35	< 0.05	< 0.2	< 0.02	0.04	162	8	< 2	0	0	0	118.41
2/15/2017	7	10462	0.93	< 0.1	0.99	0.16	0.29	271	59	< 7		0.375	2.125	80.2
3/28/2017	< 3	22	< 0.05	< 0.05	0.44	< 0.02	0.03	408	8	< 2		0	0	4.13
4/3/2017	8	5199	0.93	< 0.05	0.77	0.12	0.24	278	72	9		1.25	1.625	74.52

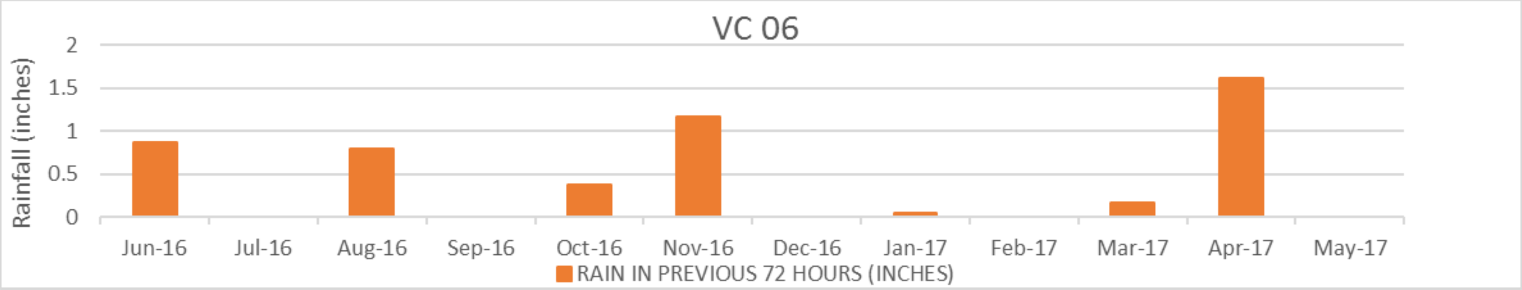




Site 6 – Village Creek at Everman-Kennedale Rd

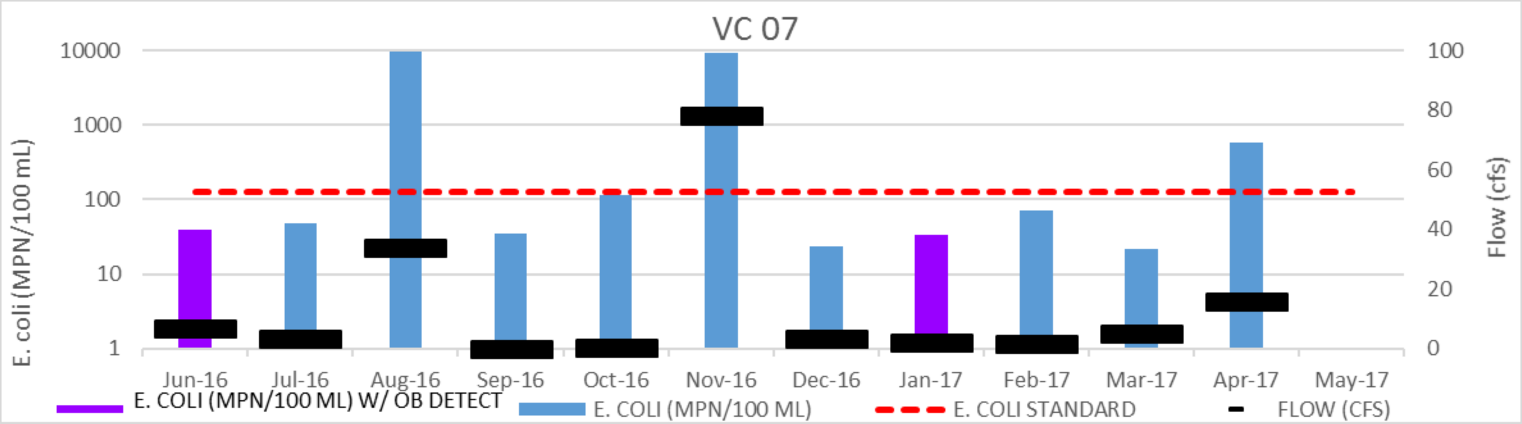
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/28/2016	7	>9678	0.44	<0.05	0.72	<0.02	0.17	276	87	<11	0	0.875	0.875	84.47
7/20/2016	3	643	<0.05	<0.05	0.21	<0.02	<0.02	481	5	<2	0	0	0	4.19
8/15/2016	8	>9678	0.35	<0.05	0.88	0.06	0.4	190	196	<20	0	0.63	0.8	123.674
9/13/2016	4	53	<0.05	<0.05	<0.2	<0.02	0.03	355	14	<2	0	0	0	1.6
10/10/2016	3	154	0.26	<0.05	0.44	0.04	0.09	216	22	<4	0	0	0.375	0.99
11/9/2016	3	3255	0.36	< 0.05	0.53	0.06	0.14	211	42	< 7	0	0.175	1.175	27.14
12/13/2016	< 3	177	< 0.05	< 0.05	0.32	< 0.02	0.04	312	5	< 2	0	0	0	2.8
1/9/2017	< 3	54	0.84	< 0.05	< 0.2	0.07	0.09	341	6	< 2	0	0	0.055	0.98
2/13/2017	4	52	0.67	< 0.05	0.48	< 0.02	0.03	416	11	< 2		0	0	4.1
3/27/2017	4	65	< 0.05	< 0.05	0.46	< 0.02	0.04	467	15	< 2		0	0.175	4.52
4/4/2017	< 3	1031	0.63	< 0.05	0.71	0.07	0.16	285	35	5		0	1.625	19.38

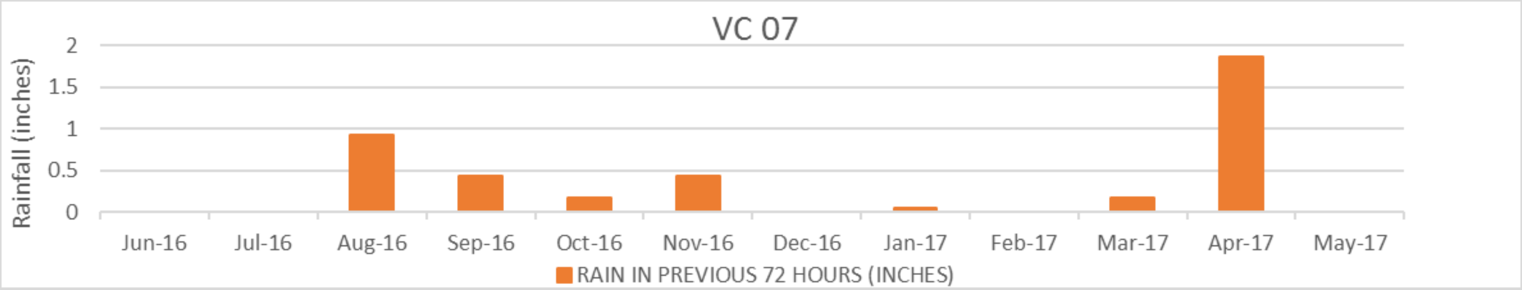




Site 7 – Village Creek at Rendon Rd

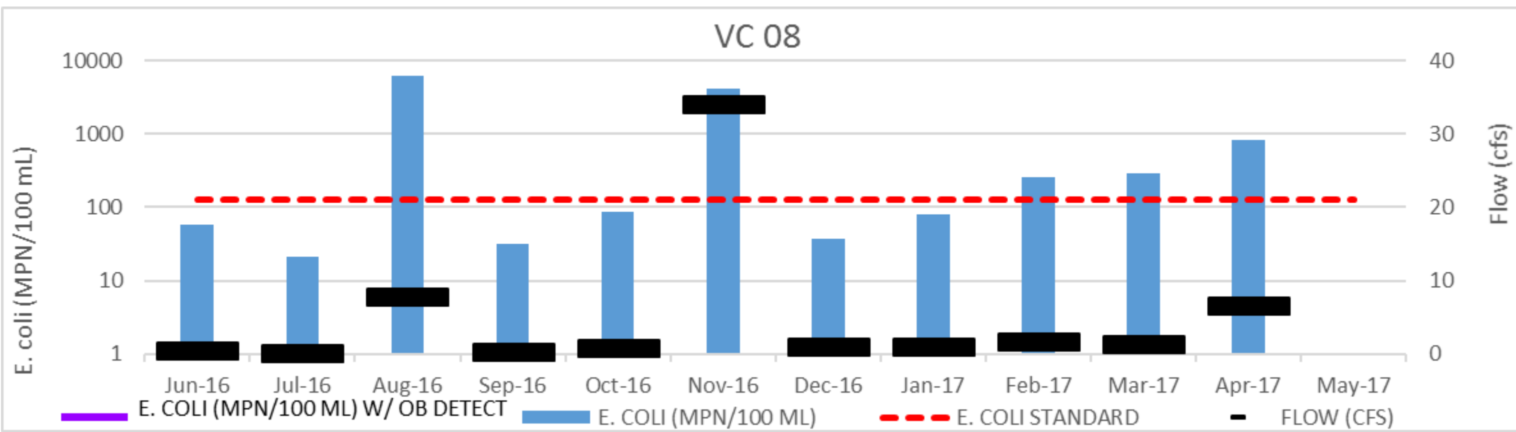
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/27/2016	<3	39	0.14	<0.05	0.45	<0.02	0.02	509	5	<2	1	0	0	7
7/20/2016	4	48	<0.05	<0.05	0.37	<0.02	<0.02	461	4	<2	0	0	0	3.2
8/15/2016	4	>9678	0.33	<0.05	0.81	0.07	0.25	202	58	<19	0	0.88	0.93	34
9/12/2016	<3	35	<0.05	<0.05	0.29	<0.02	0.03	304	5	<2	0	0	0.43	0.08
10/10/2016	<3	113	0.08	<0.05	0.38	0.03	0.05	223	3	<2	0	0	0.175	0.17
11/8/2016	4	9208	0.42	< 0.05	0.59	0.08	0.16	209	34	< 9	0	0.375	0.43	78
12/12/2016	< 3	24	< 0.05	< 0.05	0.36	< 0.02	0.03	318	2	< 2	0	0	0	3.2
1/9/2017	< 3	34	0.19	< 0.05	< 0.2	0.08	0.11	328	< 2	< 2	1	0	0.055	2.1
2/13/2017	< 3	70	0.78	< 0.05	0.53	< 0.02	0.03	408	< 2	< 2		0	0	1.5
3/27/2017	< 3	22	< 0.05	< 0.05	0.43	< 0.02	0.03	430	2	< 2		0	0.175	5.3
4/4/2017	< 3	573	0.64	< 0.05	0.62	0.09	0.14	299	12	< 2		0	1.875	16

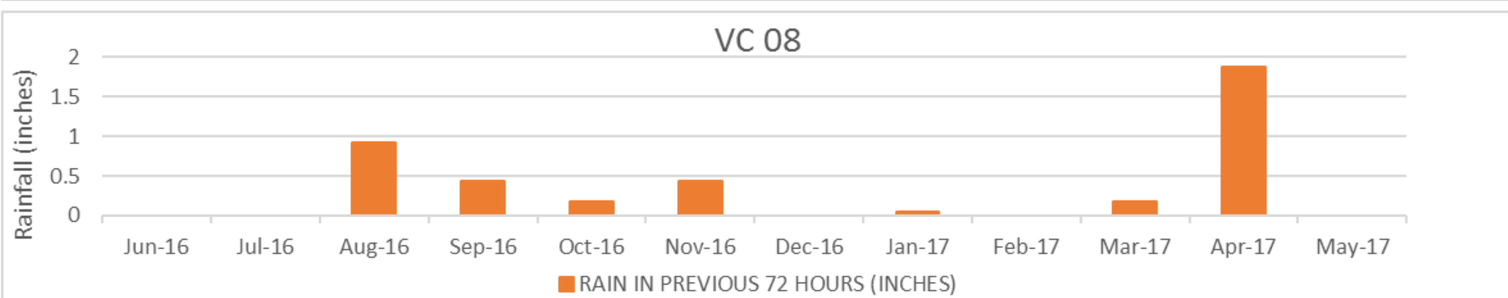




Site 8 – Deer Creek at Oak Grove Rd

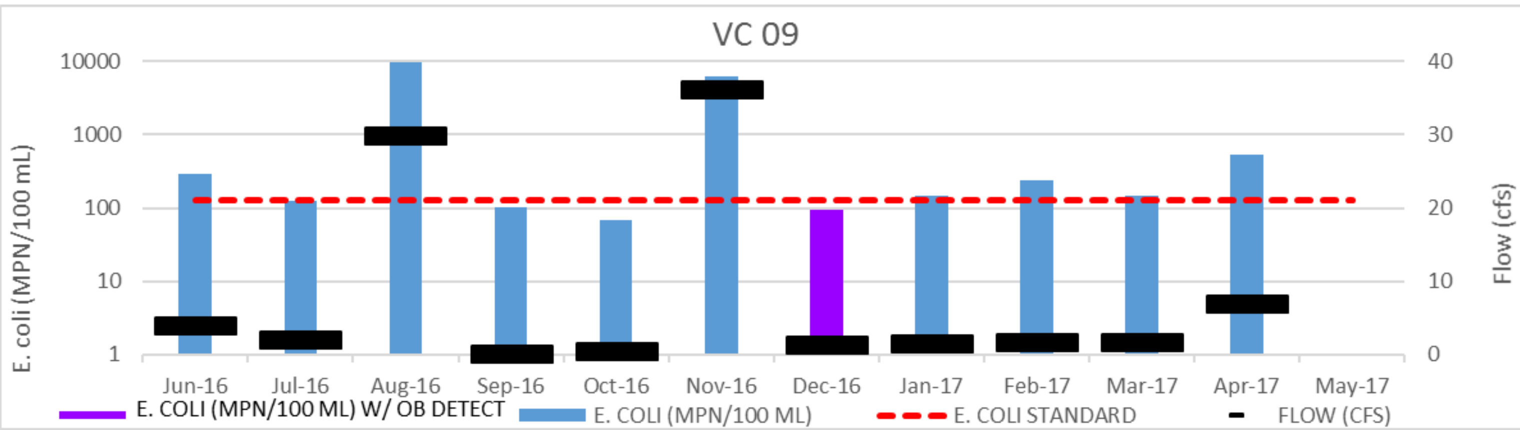
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/27/2016	4	58	0.54	<0.05	0.49	<0.02	<0.02	350	4	<2	0	0	0	0.5
7/19/2016	4	21	0.15	<0.05	0.45	<0.02	<0.02	309	5	<2	0	0	0	0.214
8/15/2016	8	6212	0.39	<0.05	0.71	0.04	0.26	212	137	<14	0	0.88	0.93	7.92
9/12/2016	4	32	<0.05	<0.05	0.31	<0.02	0.03	268	7	<2	0	0	0.43	0.32
10/10/2016	5	86	0.1	<0.05	0.42	<0.02	0.04	253	10	2	0	0	0.175	0.8
11/8/2016	< 3	4106	0.35	< 0.05	0.59	0.03	0.09	216	38	< 8	0	0.375	0.43	34.05
12/12/2016	< 3	37	0.3	< 0.05	0.24	< 0.02	< 0.02	300	2	< 2	0	0	0	1.02
1/9/2017	< 3	80	0.25	< 0.05	< 0.2	< 0.02	0.02	286	< 2	< 2	0	0	0.055	0.95
2/13/2017	< 3	255	0.15	< 0.05	0.49	< 0.02	0.03	324	4	< 2		0	0	1.71
3/27/2017	< 3	288	0.08	< 0.05	0.44	< 0.02	0.02	345	5	< 2		0	0.175	1.45
4/4/2017	3	820	0.69	< 0.05	0.56	0.03	0.08	297	21	< 2		0	1.875	6.69

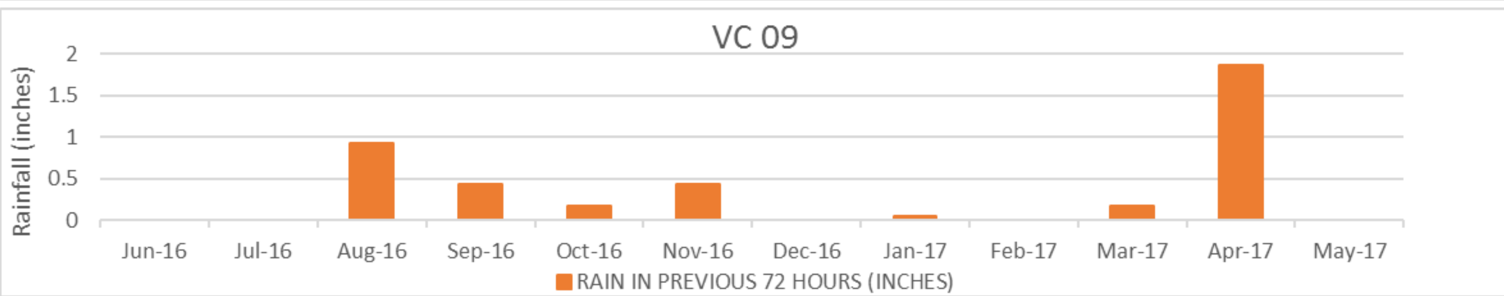




Site 9 – Village Creek at FM 1187

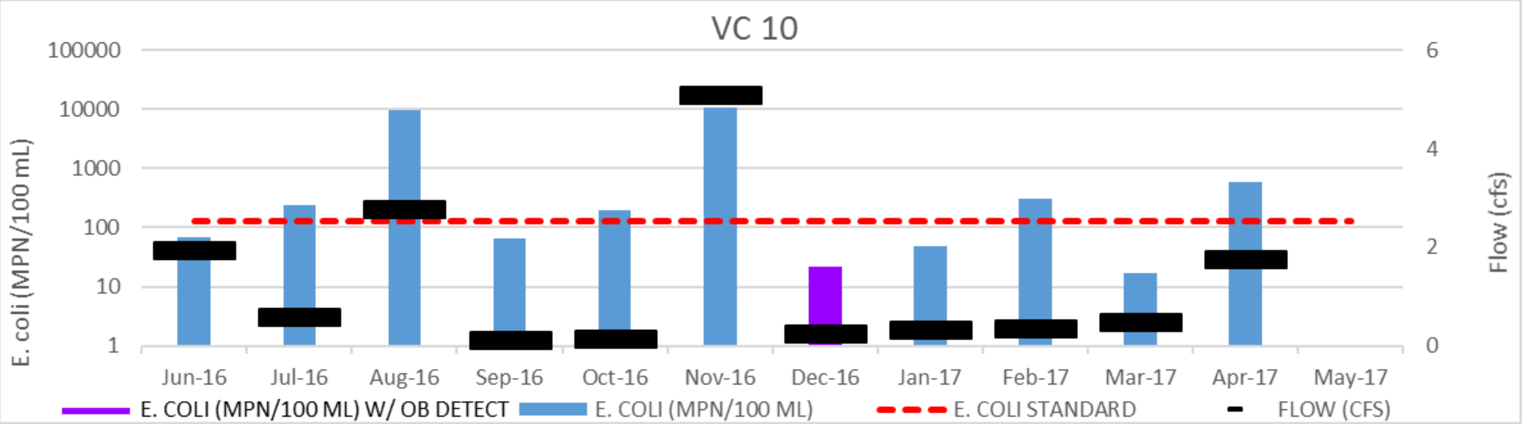
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/27/2016	5	289	0.31	<0.05	0.42	<0.02	0.03	558	8	<2	0	0	0	4.033
7/19/2016	<3	127	0.4	<0.05	0.5	<0.02	0.02	501	4	<2	0	0	0	2.09
8/15/2016	8	>9678	0.37	<0.05	0.83	0.08	0.28	204	54	<17	0	0.88	0.93	29.93
9/12/2016	4	102	1.17	<0.05	0.29	0.03	0.07	402	16	<3	0	0	0.43	0.2
10/10/2016	<3	67	0.96	<0.05	0.36	0.1	0.13	246	2	<2	0	0	0.175	0.59
11/8/2016	4	6131	0.45	< 0.05	0.54	0.12	0.19	180	24	< 7	0	0.375	0.43	36.11
12/12/2016	< 3	96	0.41	< 0.05	0.31	0.12	0.15	408	2	< 2	1	0	0	1.38
1/9/2017	< 3	144	0.26	< 0.05	0.24	0.16	0.18	412	< 2	< 2	0	0	0.055	1.5
2/13/2017	11	234	2.02	0.08	0.81	0.04	0.09	514	7	< 2		0	0	1.76
3/27/2017	15	148	0.19	< 0.05	0.61	0.07	0.14	535	47	10		0	0.175	1.77
4/4/2017	< 3	537	0.78	< 0.05	0.61	0.18	0.25	312	16	< 2		0	1.875	6.98

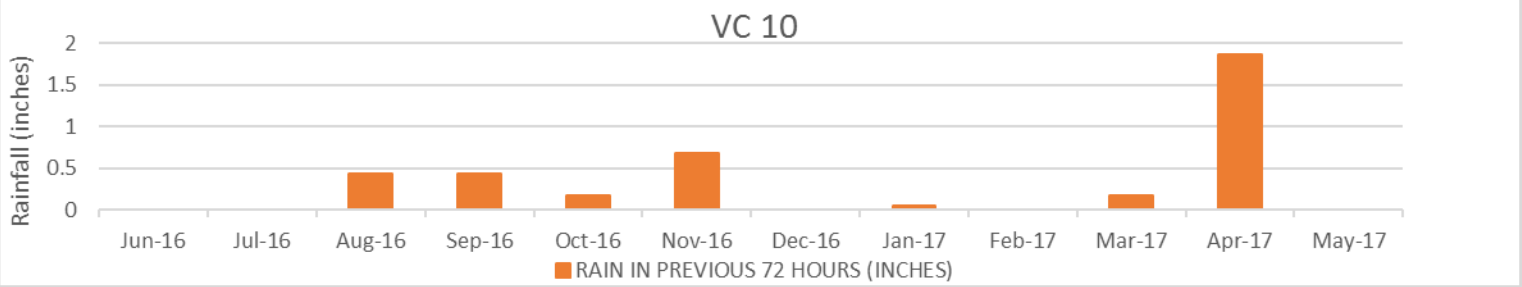




Site 10 – Quil Miller Creek at CR 532

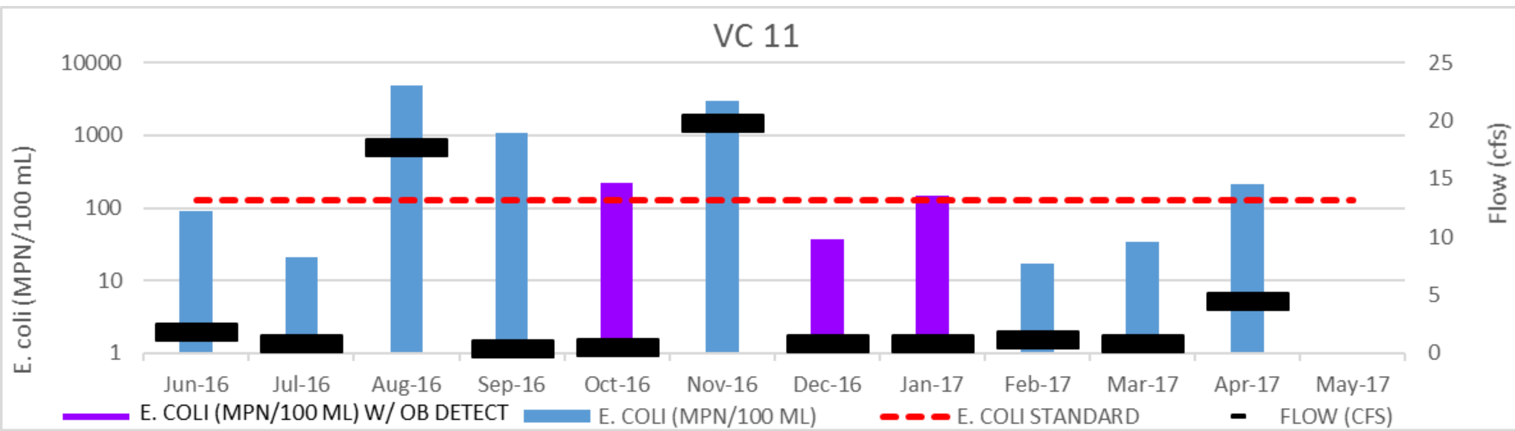
DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/27/2016	<3	68	0.29	<0.05	0.39	0.07	0.05	676	3	<2	0	0	0	1.932
7/19/2016	<3	245	0.12	<0.05	0.26	0.04	0.05	613	4	<2	0	0	0	0.598
8/15/2016	<3	>9678	0.43	<0.05	0.99	0.17	0.38	234	54	<14	0	0.38	0.43	2.77
9/12/2016	<3	64	<0.05	<0.05	0.21	0.05	0.06	528	32	<3	0	0	0.43	0.13
10/10/2016	<3	200	<0.05	<0.05	0.22	0.05	0.06	410	7	<2	0	0	0.175	0.16
11/8/2016	< 3	10462	0.39	< 0.05	0.79	0.19	0.31	237	35	< 9	0	0.625	0.68	5.1
12/12/2016	< 3	22	< 0.05	< 0.05	< 0.2	0.04	0.06	556	2	< 2	1	0	0	0.25
1/9/2017	< 3	49	< 0.05	< 0.05	< 0.2	0.03	0.04	672	< 2	< 2	0	0	0.055	0.33
2/13/2017	6	311	< 0.05	< 0.05	0.41	0.02	0.04	604	3	< 2		0	0	0.36
3/27/2017	< 3	17	< 0.05	< 0.05	0.26	0.02	0.04	662	13	4		0	0.175	0.49
4/4/2017	5	602	0.29	< 0.05	0.58	0.1	0.2	384	26	< 3		0	1.875	1.75

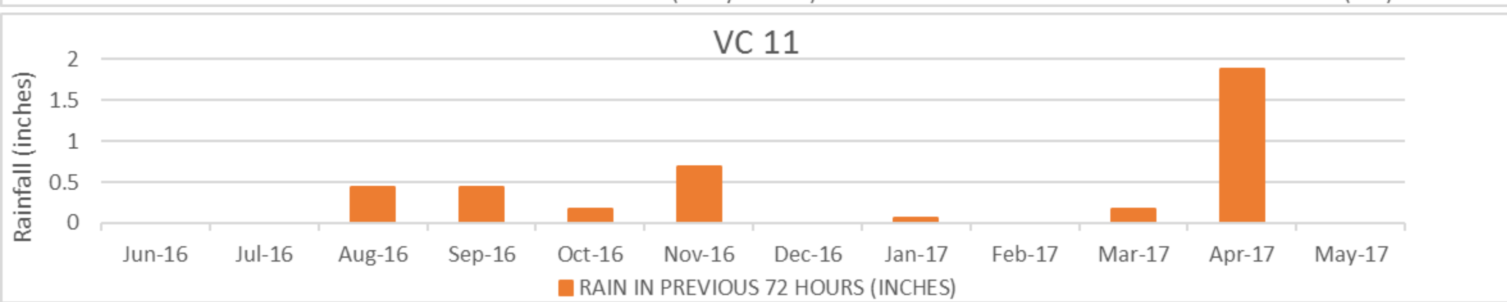




Site 11 – Village Creek at FM 3391

DATE	CHLOROPHYLL-A (UG/L)	E. COLI (MPN/100 ML)	NITRATE (MG/L)	NITRITE (MG/L)	TKN (MG/L)	OP (MG/L)	TP (MG/L)	TDS (MG/L)	TSS (MG/L)	VSS (MG/L)	OBs DETECTED (1=YES, 0=NO)	24 HR RAIN (INCHES)	72 HR RAIN (INCHES)	FLOW (CFS)
6/27/2016	<3	92	2.45	0.07	0.67	0.1	0.14	553	8	<2	0	0	0	1.814
7/19/2016	<3	21	<0.05	<0.05	0.41	0.18	0.2	515	8	<2	0	0	0	0.881
8/15/2016	6	>4839	0.34	<0.05	0.72	0.13	0.22	158	40	<8	0	0.38	0.43	17.78
9/12/2016	<3	1095	<0.05	<0.05	0.48	0.23	0.25	370	7	<3	0	0	0.43	0.39
10/10/2016	<3	220	2.14	0.06	0.58	0.52	0.56	303	8	<2	1	0	0.175	0.59
11/8/2016	4	2987	1.03	< 0.05	0.63	0.28	0.34	232	28	< 6	0	0.625	0.68	19.84
12/12/2016	< 3	37	4.65	< 0.05	0.89	1.16	1.24	453	< 2	< 2	1	0	0	0.85
1/9/2017	< 3	146	4.52	< 0.05	0.48	1.75	1.8	455	< 2	< 2	1	0	0.055	0.91
2/13/2017	12	17	4.87	0.16	0.84	0.99	0.97	527	3	< 2		0	0	1.2
3/27/2017	4	34	2.93	< 0.1	0.66	0.88	0.89	529	3	< 2		0	0.175	0.9
4/4/2017	6	216	1.2	< 0.05	0.51	0.37	0.38	353	8	< 2		0	1.875	4.55

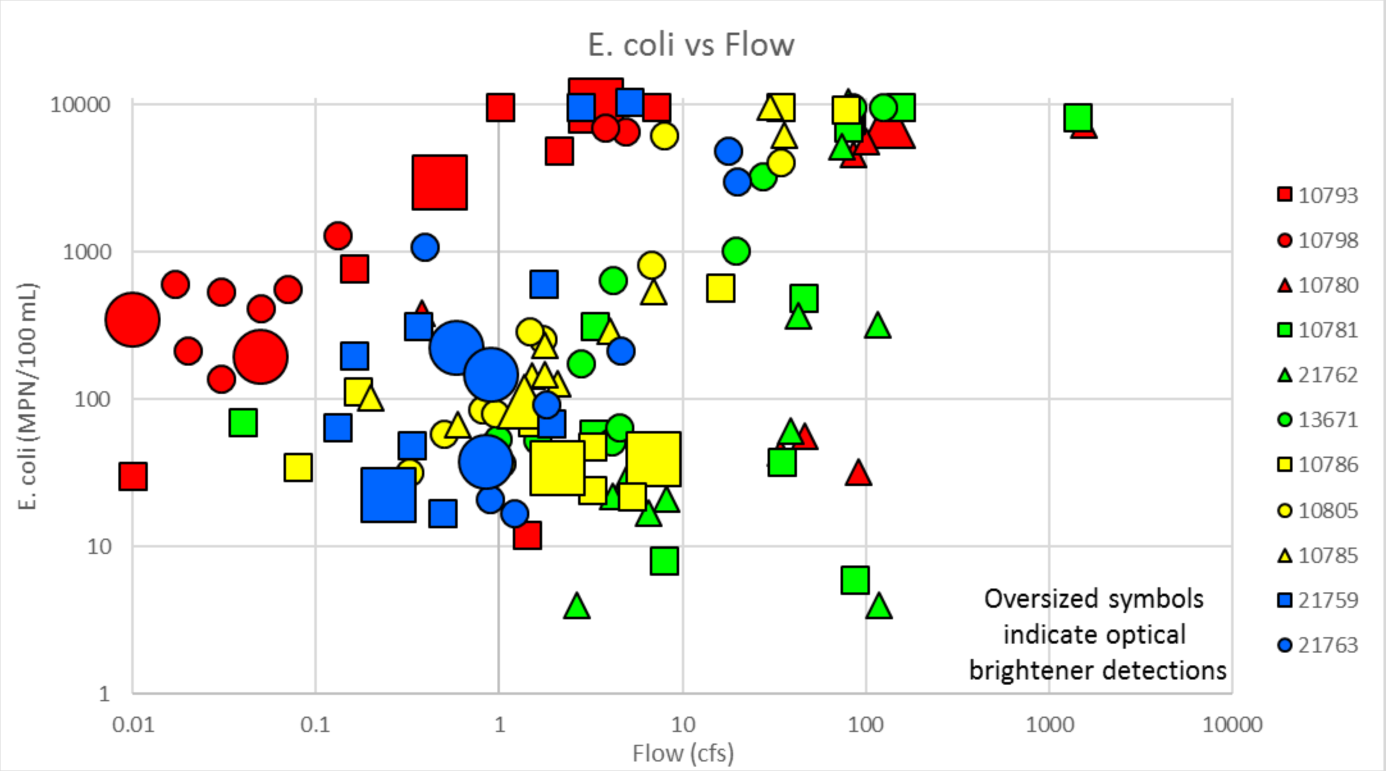




Optical Brighteners

Results for data collected:
Jun 2016 – April 2017

(*E. coli* and Flow plotted on log scale)



Potential Sources with positive OB hits

- High *E. coli*, low flow: malfunctioning septic systems or wastewater infrastructure, greywater
- High *E. coli,* high flow: large wastewater pipeline break, sanitary sewer overflow
- Low *E. coli* , varying flows: various chemicals, pesticides, dyes, car washes

OB testing is not intended to provide definite results, but instead provide us with another means of identifying possible sources.

Correlation Analysis

Results for data collected at all sites:
Jun 2016 – April 2017

	Secchi	Turbidity	Days Since Precip	24 hr rain	72 hr rain	Flow	NO2	TKN	TSS	VSS
Days Since Precip	0.5132									
24 hr rain	-0.6459	0.5358								
72 hr rain	-0.6220									
Flow		0.7655		0.5116						
TKN	-0.5677			0.6408	0.5401					
OP							0.8831			
TP							0.8276			
TSS	-0.5207	0.8069		0.6525		0.9077		0.5684		
VSS		0.8184		0.6385		0.9013		0.6024		
E. coli	-0.7549		-0.5021	0.7753	0.5866			0.6637	0.5540	0.5420

** Each of the coefficients in the table below has a p-value of 0.0000000044 or less; the correlations between each set of parameters is actual and significant.*
***Arbitrary cutoff of +/- 0.5 was defined to indicate those correlations which may be significant.*

Significant correlations

- TSS, VSS ▶ Rainfall
- TKN ▶ TSS, VSS, Recent rainfall
- *E. coli* ▶ Recent rainfall, TKN, TSS, VSS

Based on this dataset, the correlation coefficients above seem to indicate that constituents such as E. coli, nutrients, and solids are being introduced to the watershed primarily through non-point source runoff, and is most likely a non-point source issue.

Moving Forward

- Will submit additional data in Spring 2017
- Continue to analyze water quality samples at TRA-CRWS through May 2017
- TRA will run statistical and load duration curve analysis using CRWS data
- Data will be used to guide development of the Village Creek-Lake Arlington WPP

Questions?

http://www.trinityra.org/lakearlingtonvillagecreek

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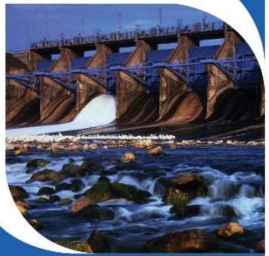
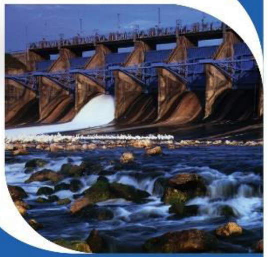


Live Demonstration: “Model My Watershed” Tool

Aaron Hoff
Trinity River Authority
May 18, 2017



Trinity River Authority of Texas
Enriching the Trinity basin as a resource for Texans

Wiki Watershed – 3 Programs

"A Web toolkit to support citizens, conservation practitioners, municipal decision-makers, researchers, educators, and students to collaboratively advancing knowledge and stewardship of fresh water."

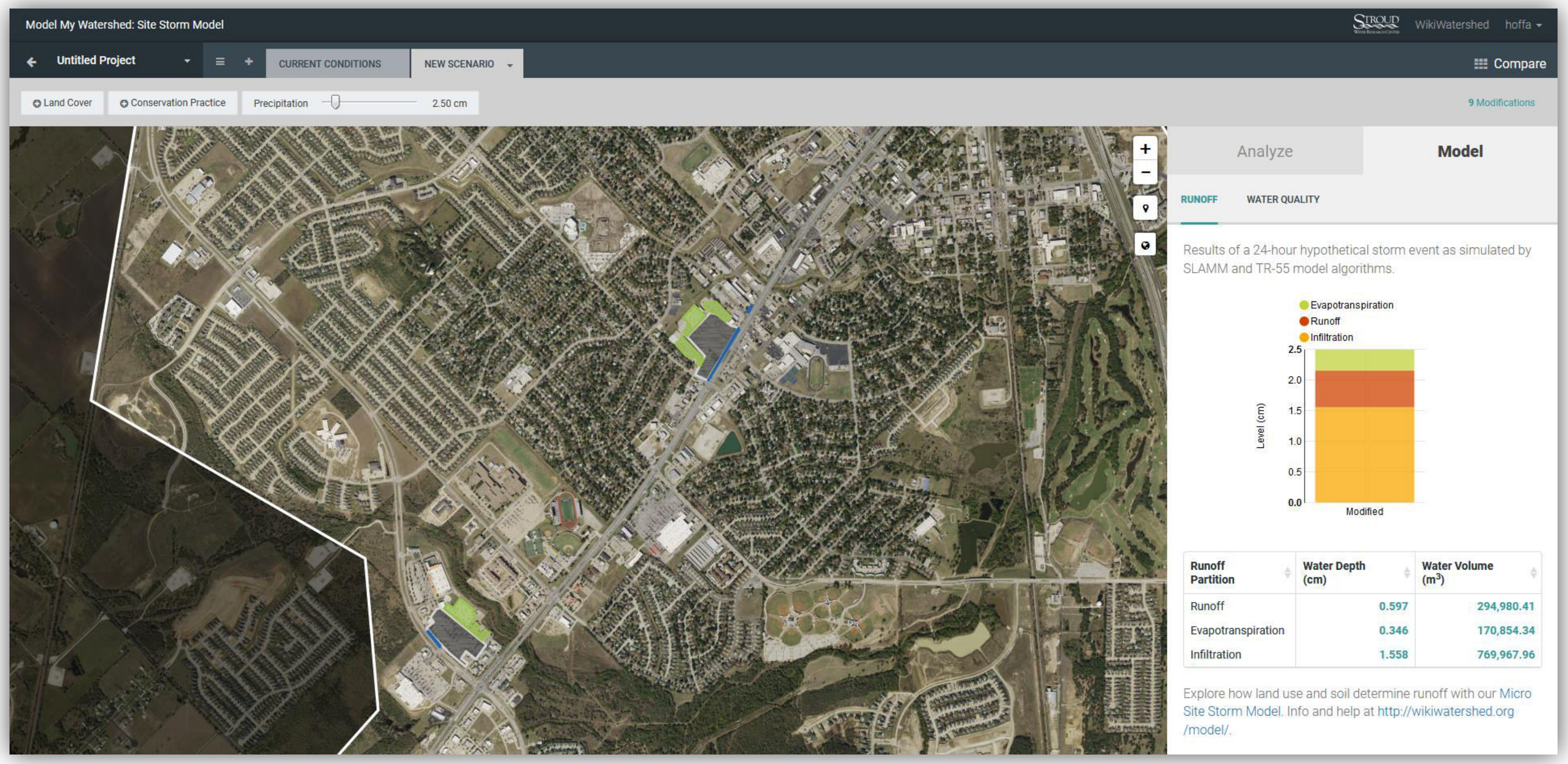
- Model My Watershed®
  - Use existing spatial datasets to compare BMP management scenarios & changes to water balance and water quality
- Monitor My Watershed® *(late 2017)*
  - Focus on assisting citizens with monitoring efforts
- Manage My Watershed® *(conceptual)*
  - Social networking app that connects citizens to policy-makers

Wiki Watershed

Model My Watershed®

- Analyze real land cover, soil and other geospatial data
- Model storm water runoff and water quality
- Compare conservation or development scenarios in your watershed

https://app.wikiwatershed.org/

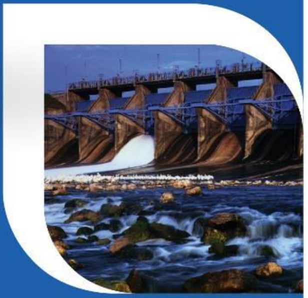


Upcoming Events and Path Forward

Aaron Hoff

Trinity River Authority

May 18, 2017



Trinity River Authority of Texas

Enriching the Trinity basin as a resource for Texans

EPA's Office of Research and Development and Office of Water invite you to a **free webinar**

EPA

Water Systems Partnerships

A certificate for one continuing education contact hour will be offered for this webinar

Tuesday, May 30, 2017
2:00 to 3:00 pm EST*

***Optional Q&A session from 3:00 to 3:30 pm EST**

Partnerships and their Benefits to Small Systems

Small systems face unique challenges in providing affordable drinking water that meets federal and state regulations. These challenges include aging infrastructure, increasing costs and declining rate bases, and limited technical and managerial capabilities. Water systems can overcome these challenges by developing partnerships with other systems. Partnerships provide opportunities to collaborate on compliance solutions and operations and maintenance activities and to share costs with other nearby systems This increases capacity and enables systems to provide safe and affordable water to their communities. This presentation will provide an introduction to the various types of water system partnerships and how these can benefit small water systems.

Presented by Ellen Tarquinio – *EPA's Office of Water (OW)*. Ellen is an environmental protection specialist with the Office of Ground Water and Drinking Water's Drinking Water Protection Division within EPA's Office of Water where she focuses on water system partnerships for drinking water systems. Ellen started at the EPA in 2004, developing and leading the National Rivers and Streams Assessment and the National Lakes Survey. After a year working for the EPA Administrator, she served as the Deputy Director for Water Policy at the White House. Previously, Ellen worked as a fisheries biologist and GIS specialist for New York State.

California Consolidation Case Study

On June 24, 2015, California's governor signed Senate Bill 88 authorizing CalEPA's State Water Board to require systems that consistently fail to meet standards to consolidate with, or obtain service from, a public water system. Senate Bill 88 is crafted to expedite permanent solutions for failing water systems and those that have run out of water due to the drought. Consolidating public water systems and extending service from existing public water systems to communities nd areas that currently rely on under-performing or failing small water systems, as well as private wells, reduces costs and improves reliability. This presentation focuses on small water system challenges, the advantages of consolidation, the California SB-88 process and two consolidation case studies.

Presented by Chad Fisher – *California EPA (CalEPA)*. Chad is an engineer with California EPA's (CalEPA) Division of Drinking Water. He has been with CalEPA for nine years, the last three of which Chad has led a work team focused on small water systems in California's Central Valley. The work area is primarily composed of disadvantaged communities with a variety of water quality challenges. Chad received a B.S. in Chemical Engineering from the University of California, Berkeley and is a registered Professional Engineer in the State of California.

Registration: https://attendee.gotowebinar.com/register/8508858086518235395

Who should attend?

State primacy agencies, tribes, community planners, technical assistance providers, academia, and water systems interested in issues facing community water systems and solutions to help solve them.

Looking for more webinars?

This webinar is part of EPA's monthly series: *Challenges and Treatment Solutions for Small Drinking Water Systems*. A webinar will be held each month in 2017.

epa.gov/water-research/small-systems-monthly-webinar-series

Register online:

https://attendee.gotowebinar.com/register/8508858086518235395

EPA United States Environmental Protection Agency

EPA's Office of Research and Development (ORD) invites you to a free webinar

Safe and Sustainable Water Resources Research Program

A monthly webinar series focused on EPA water research

EPA's Global Change Explorer Web Tools Collection

Wednesday, May 31, 2017 2:00 to 3:00 pm EDT

Register online: https://attendee.gotowebinar.com/register/1208629743139931394

EPA's Global Change Explorer is a collection of three web tools that allow visualization, comparison, and access to spatial data that describe potential future environmental change. These data can serve as a starting point to assess the vulnerability of air, water, ecosystems, and human health to climate change, land use change, and other large-scale environmental stressors. The data and tools in the Global Change Explorer are relevant across multiple scientific disciplines and environmental media, providing a foundation for integrated assessments of global change. The three web tools will be presented:

1. Land Use Tool - *Presented by Phil Morefield*

EPA's Integrated Climate and Land Use Scenarios (ICLUS) project developed scenarios of future human population, housing density, and impervious surface for the contiguous United States. These scenarios are broadly consistent with peer-reviewed storylines of population growth and economic development, now widely used by the climate change impacts community. The ICLUS project produced high-resolution spatial data for vulnerability and impacts assessments that integrate both climate and land use changes.

2. Watersheds Tool - *Presented by Dr. Thomas Johnson*

EPA's 20 Watersheds project has developed model simulations of how streamflow and water quality (nitrogen, phosphorus and sediment) respond to a range of potential mid-21st century climate change and urban development scenarios in 20 large, U.S. drainage basins. The watersheds used in the study represent a range of geographic, hydrologic, and climatic conditions across the nation. The Global Change Explorer provides online tools for visualization and comparison of simulation results.

3. Deposition Tool - *Presented by Dr. Christopher M. Clark*

Loads Mapper Tool enables decision makers, researchers, and the public to easily access information on atmospheric deposition of nitrogen and sulfur, critical loads, and their exceedances to better understand local and regional vulnerability to atmospheric pollution. This interactive mapping tool displays nitrogen and sulfur deposition levels through time for several air quality models, critical load levels for terrestrial and aquatic ecosystems in the National Critical Loads Database, and the exceedance of deposition over the critical loads as an estimate of vulnerability to air pollution.

Phil Morefield is a geographer in ORD-National Center for Environmental Assessment (NCEA). His research projects focus on the development of models and tools that help us understand the potential impacts of global change, especially the interactions of demographic, land use, and climate change.

Dr. Thomas Johnson is a hydrologist in ORD-NCEA. His technical interests include the interaction of hydrologic and ecological systems, and watershed management including climate and land use change effects on water and watershed systems.

Dr. Christopher Clark is a terrestrial ecologist in ORD-NCEA. His technical training and interests include biogeochemical cycling, statistics, community and ecosystem ecology, impacts from climate change and atmospheric deposition of nitrogen and sulfur on ecosystems, hydraulic fracturing, and the sustainability of biofuel production and supply chains.

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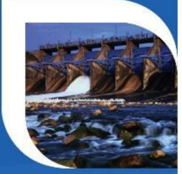
Future Events and Meetings

- Next Steering Committee Meeting
  - Tentative for 3rd week of August
  - Approve content for WPP Chapters 1-3
    - Watershed Overview
    - Watershed Management
    - Partnership Structure
  - Discuss load duration curve (LDC) results and SELECT inputs
- Next Partnership Meeting
  - Tentative for September 21, 2017
    - Alternate dates: 9/14, 9/28
  - Present draft LDC results
  - Present and discuss proposed parameters for several SELECT modules



Open Comment Period

If you have additional concerns or comments, please send them to:

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http://www.trinityra.org/lakearlingtonvillagecreek