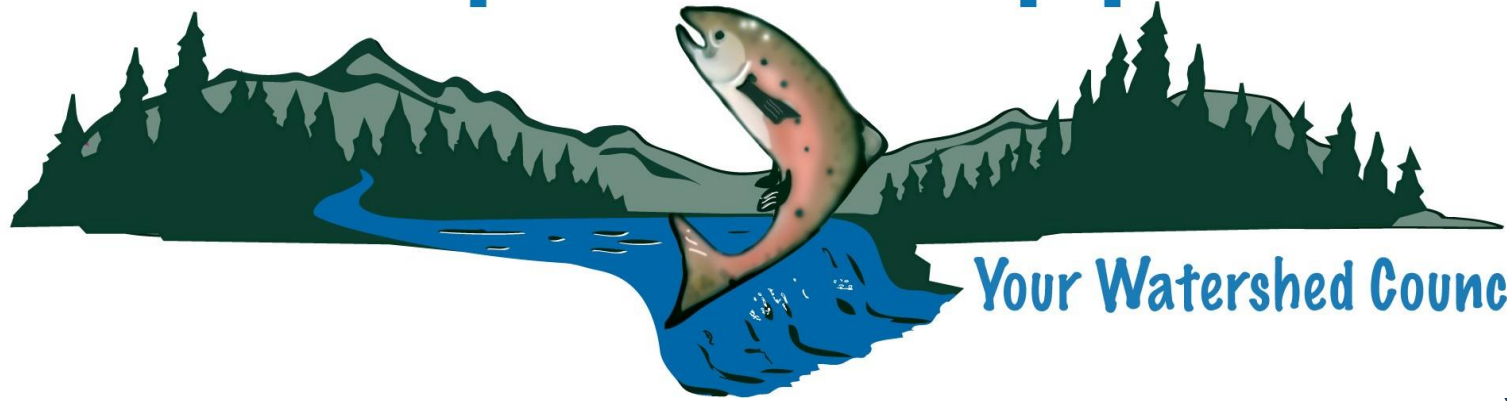


Partnership for the Umpqua Rivers



Your Watershed Council

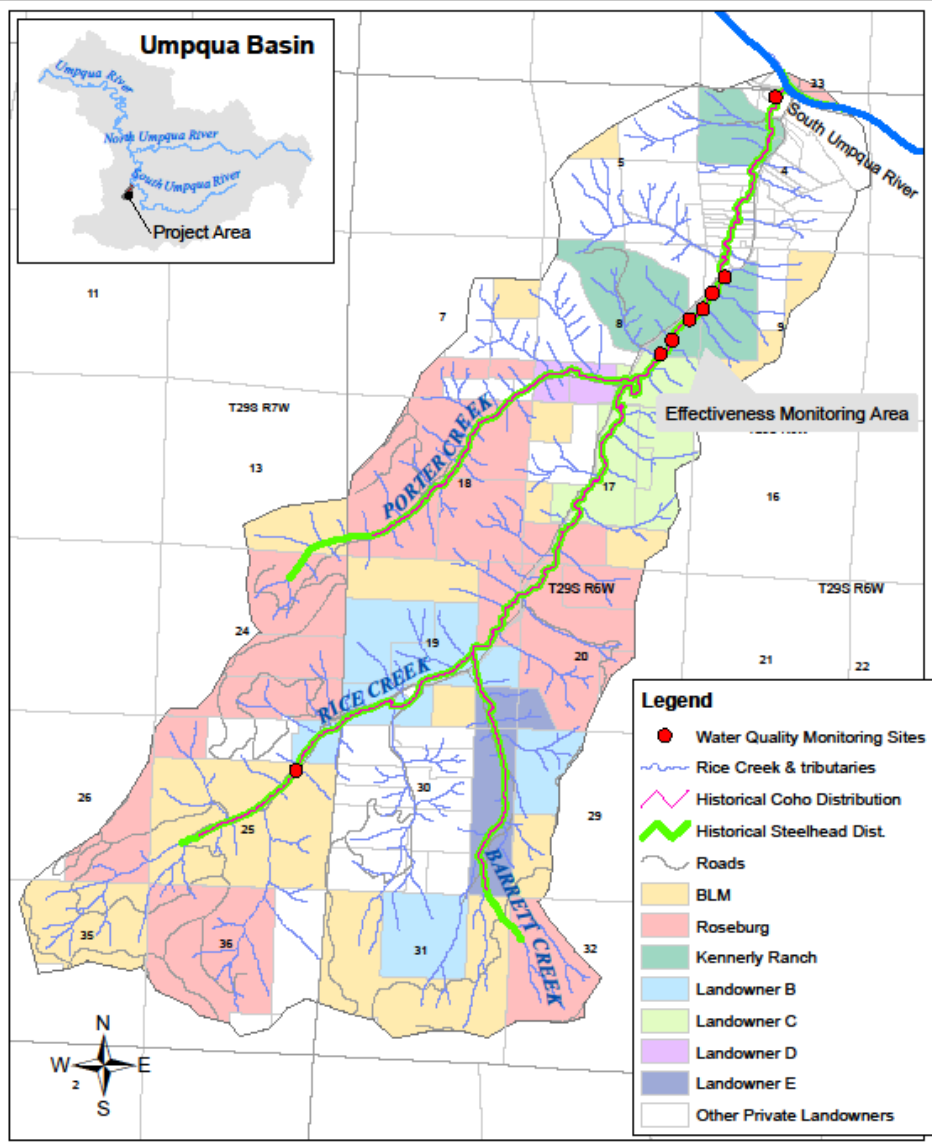


**Rice Creek Effectiveness Monitoring Project
Progress Report
Presented to the Hydrologists' Breakfast
10/1/2020**

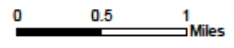
The background of the slide is a solid dark blue. In the bottom right corner, there are several overlapping, wavy, light blue lines that create a sense of movement and depth, resembling a stylized representation of water or a landscape feature.

Agenda

- Background
- Reaches
- Timeline
- Photo Points
- Sinuosity
- Wet/Dry Mapping
- Habitat Surveys
- Cross Sections & Pebble Counts
- Macro Invertebrate Sampling
- Continuous Temperature
- Summary



Rice Creek 7th Field



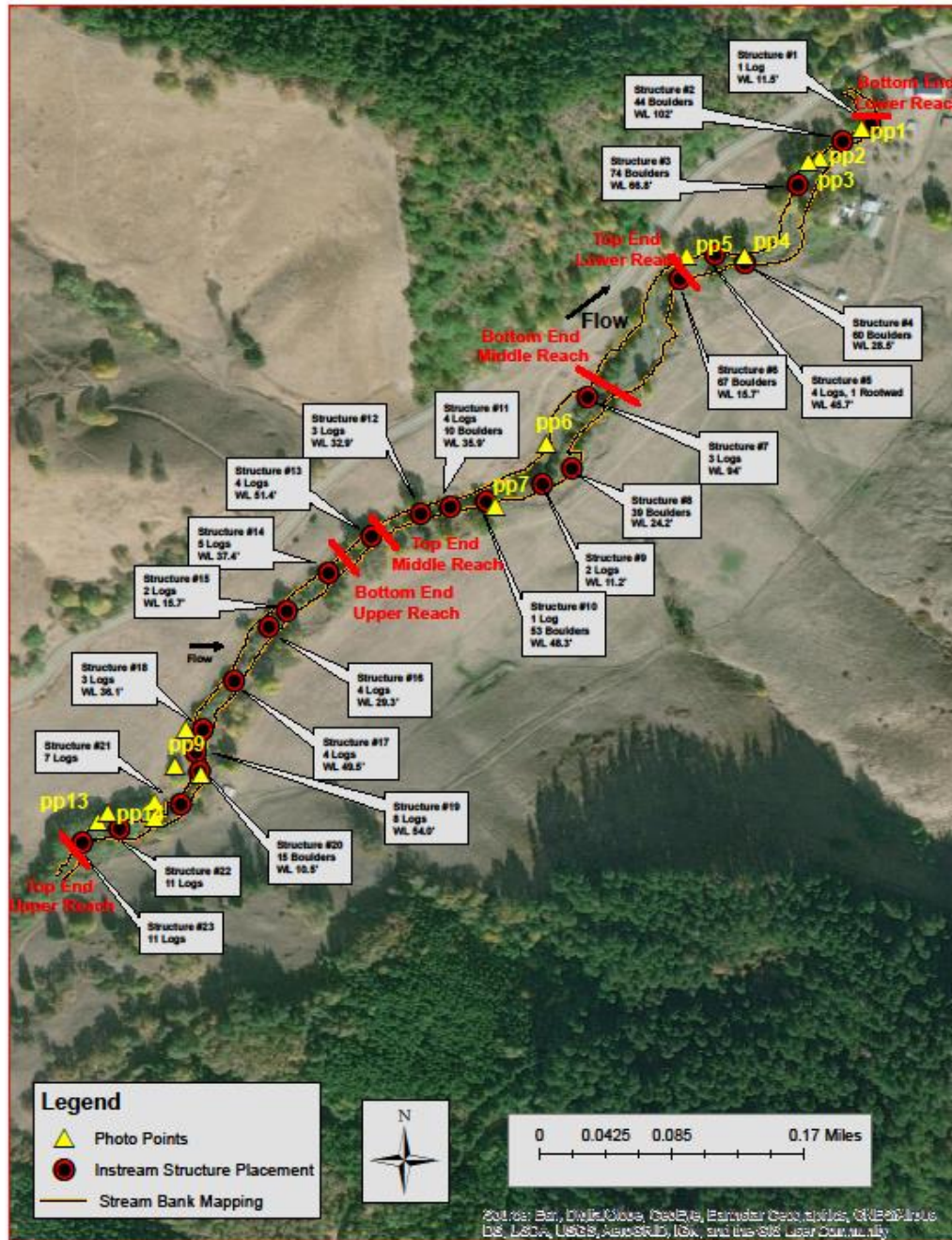


Rice Creek Pre Project Kennerly Ranch, Dillard

- Brush clearing April-May 2015
- Bridge Placement Aug. 2016
- Instream Log and Boulder Weirs Sept. 2017
- Livestock Exclusion Nov. 2018
- Riparian Planting April 2019



Rice Creek Stream Bank, Photo Point and Instream Structure Locations



➤ Photo Points

- 13 Photo point locations were established in 2016
- High and low flows pictures were taken each year.
- For 4 years, two pre structure and two post structure placement (this is three sets of pre photos and four sets of post photos)
- Example from each reach to follow

Rice Creek Photo Points 2016 - 2019



May 5, 2016
Looking Upstream Below
Bottom End Lower Reach



June 6, 2017
Looking Upstream Below
Bottom End Lower Reach



October 18, 2017
Looking Upstream Below
Bottom End Lower Reach



November 15, 2018
Looking Upstream Below
Bottom End Lower Reach



November 15, 2018 Looking Upstream Below
Bottom End Lower Reach



May 5, 2016
Looking Downstream at
Bottom End Middle Reach



December 15, 2016
Looking Downstream
at Bottom End Middle
Reach



June 28, 2017
Looking Downstream at
Bottom End Middle Reach



November 15, 2018
Looking Downstream at
Bottom End Middle Reach



February 17, 2019

Looking Downstream at Bottom End Middle Reach



May 5, 2016
Looking Upstream Toward
Top End of Upper Reach



June 28, 2017
Looking Upstream Toward
Top End of Upper Reach



November 15, 2018
Looking Upstream Toward
Top End of Upper Reach

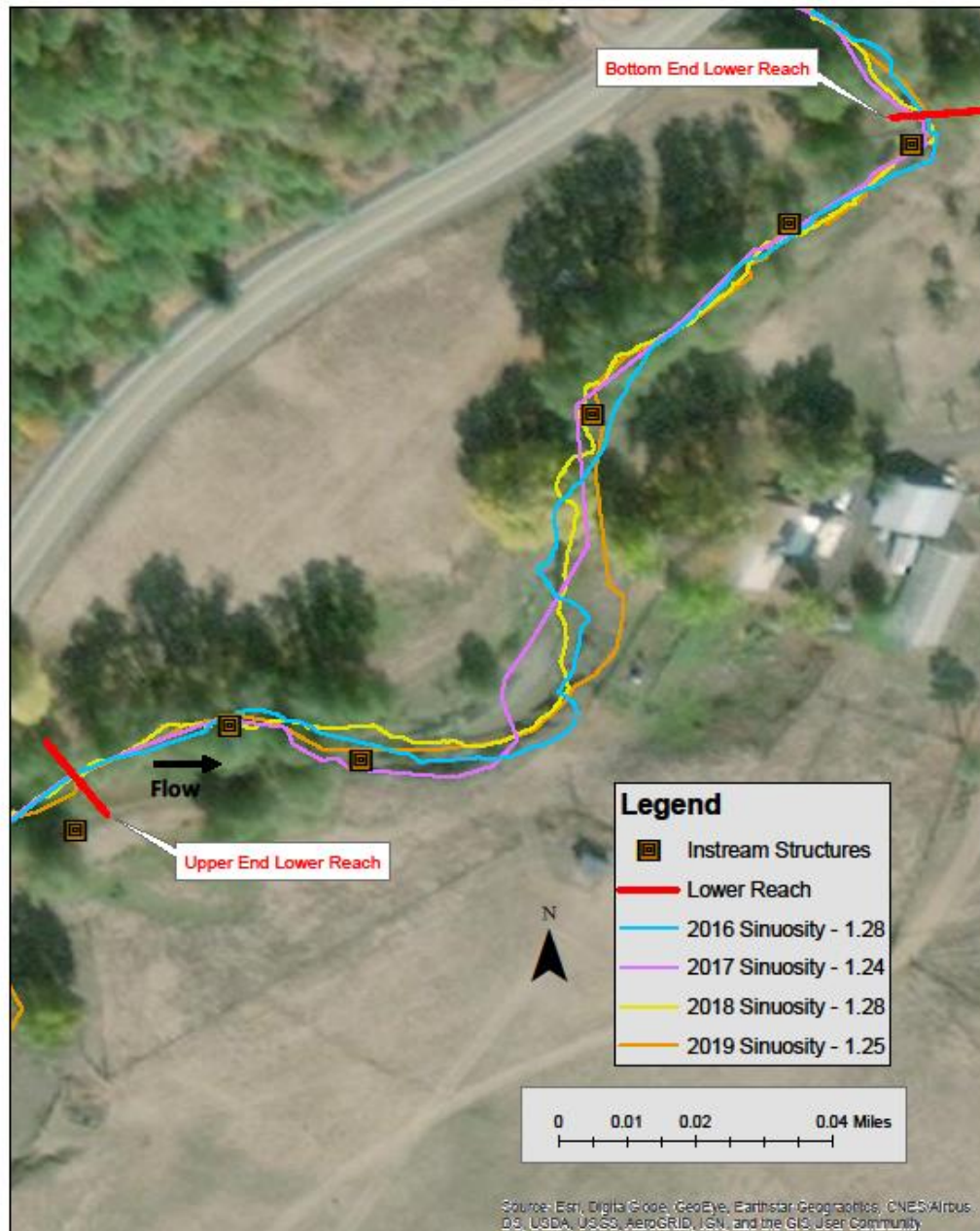


February 17, 2019
Looking Upstream Toward
Top End of Upper Reach

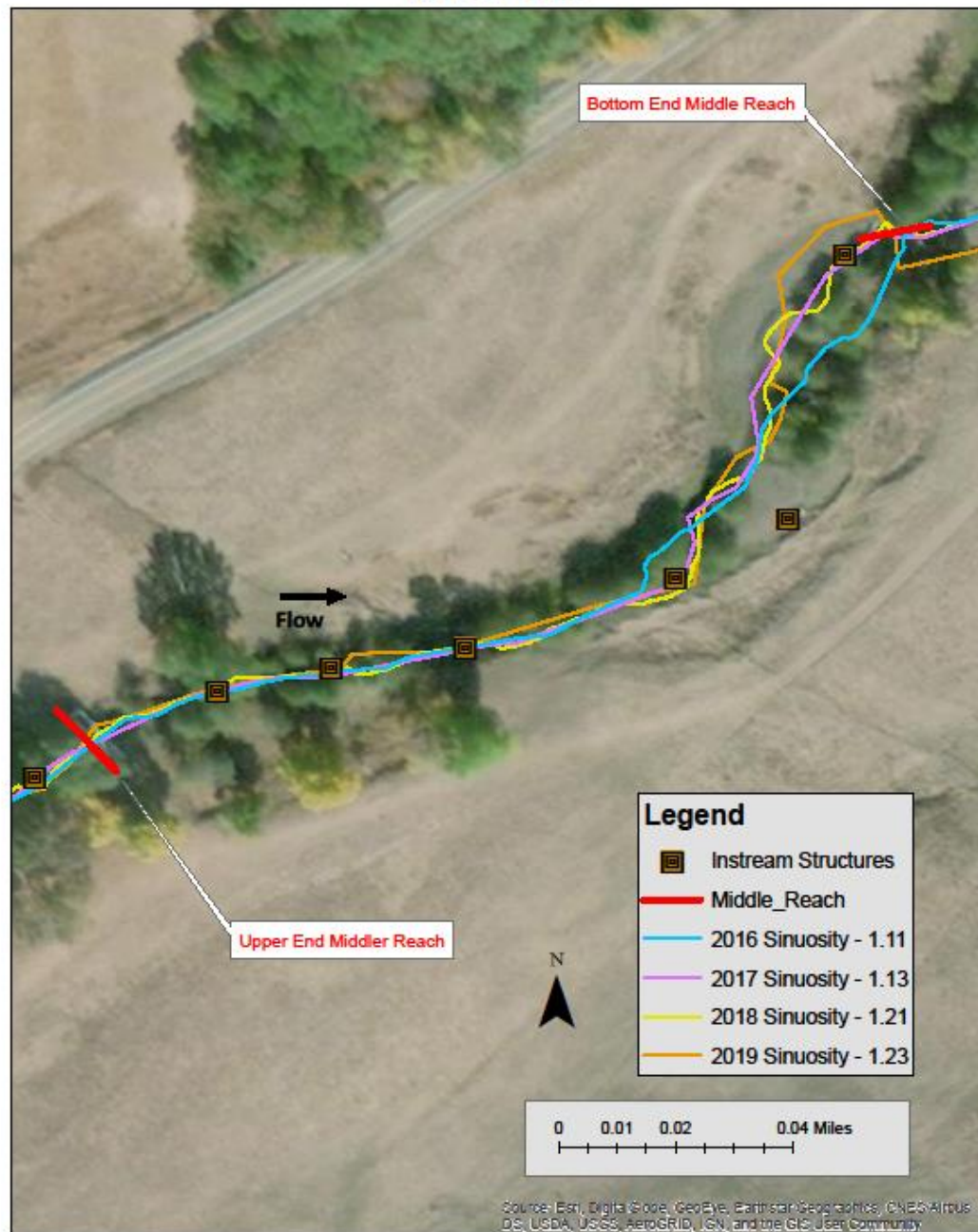
➤ Sinuosity

- Once per year, after winter flows, data is collected to show how much the stream has changed.
- This information has been collected 4 years, two pre structure and two post structure placement.

Sinuosity Mapping Lower Reach Rice Creek 2016-2019



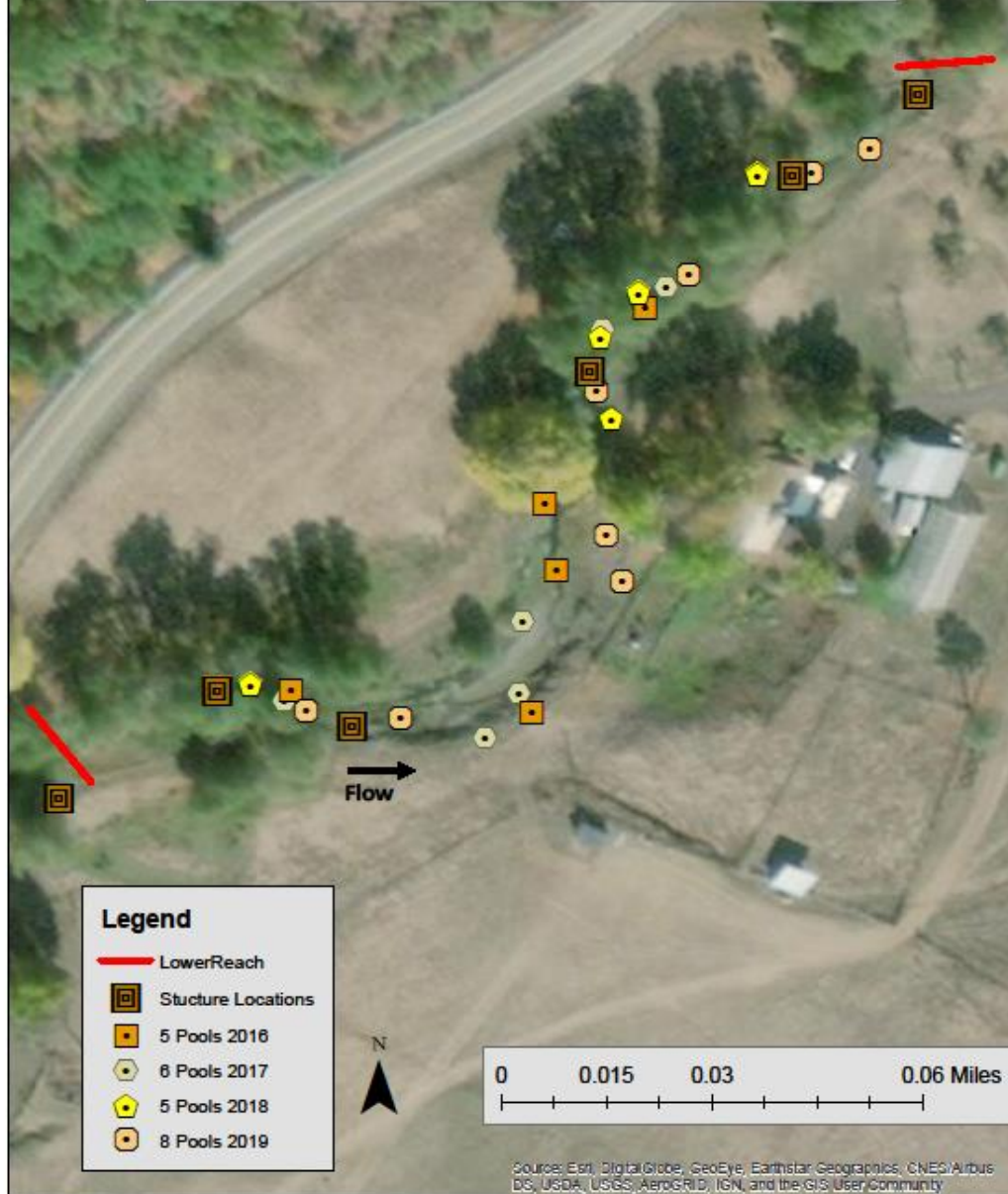
Sinuosity Mapping Middle Reach Rice Creek 2016-2019



➤ Wet/Dry Mapping & Pool Counts

- In mid-September each year the areas of disconnected channel have been mapped.
- In conjunction with this survey the number, location and size of pools that are greater or equal to .8' are mapped. This information has been collected 4 years, two pre structure and two post structure placement.

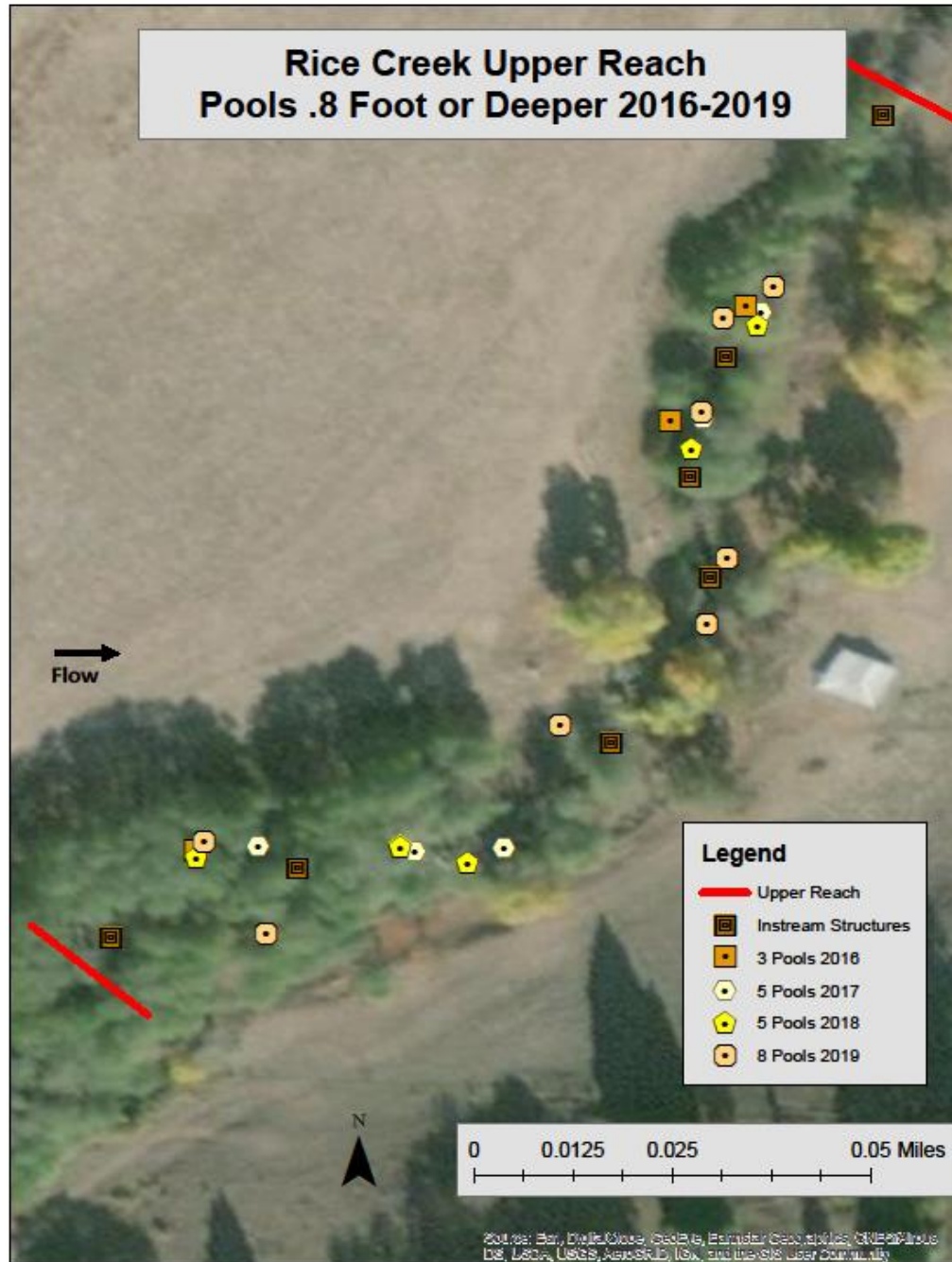
Rice Creek Lower Reach Pools .8 Foot or Deeper 2016-2019



Rice Creek Middle Reach Pools .8 Foot or Deeper 2016-2019



Rice Creek Upper Reach Pools .8 Foot or Deeper 2016-2019



Source: Bar, Dwight/Globe / GeoBIS, Esri/Mapbox, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

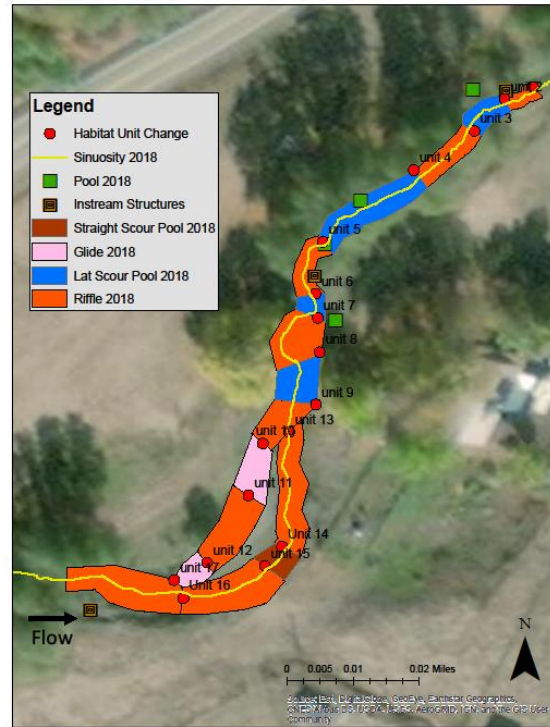
➤ Habitat Surveys ODFW Modified

- Once per year near early summer, physical stream characteristics are collected, three ODFW Habitat Surveys have been conducted, two pre structure and one post.

2017 Lower Reach Habitat Units, Sinuosity and Pools



2018 Lower Reach Habitat Units, Sinuosity and Pools



➤ Cross Sections and Pebble Counts

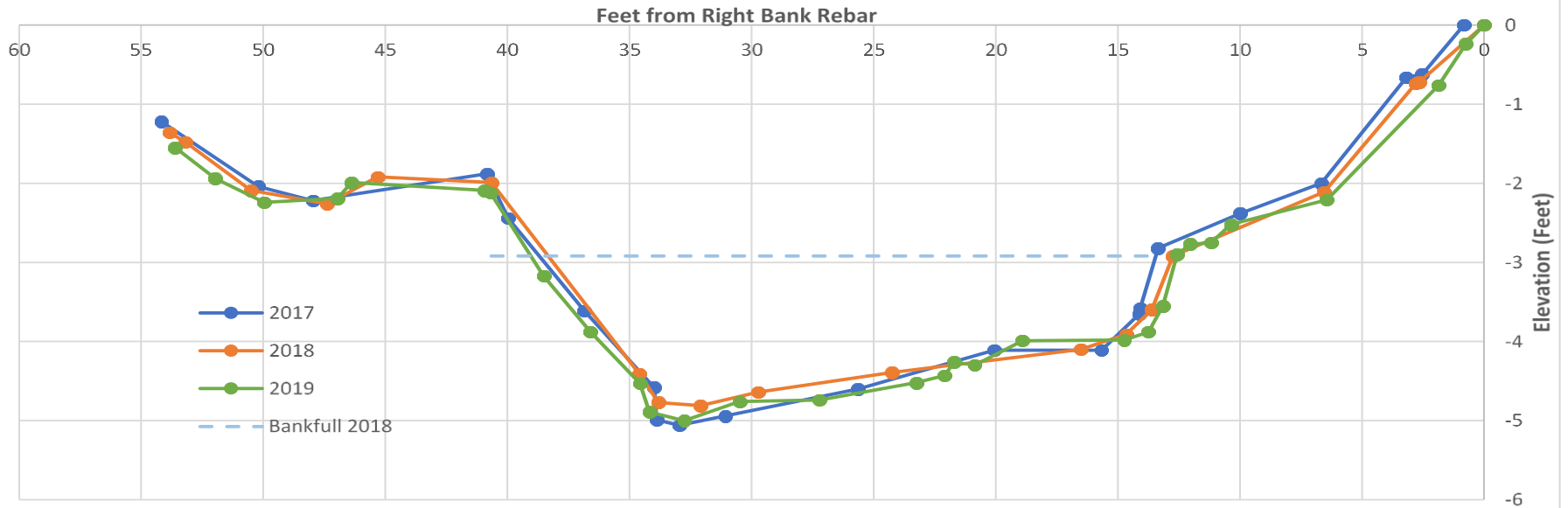
- Cross sections were established in 2017 placing three cross sections at each structure were setup, two structures per reach for a total of 18 cross sections around 6 structures. During low flows after each year's winter rain events the cross sections are repeated to profile changes in the stream. Cross sections have been conducted 3 time one pre and two post.
- Pebble counts are collected each year in conjunction with the cross-section profile



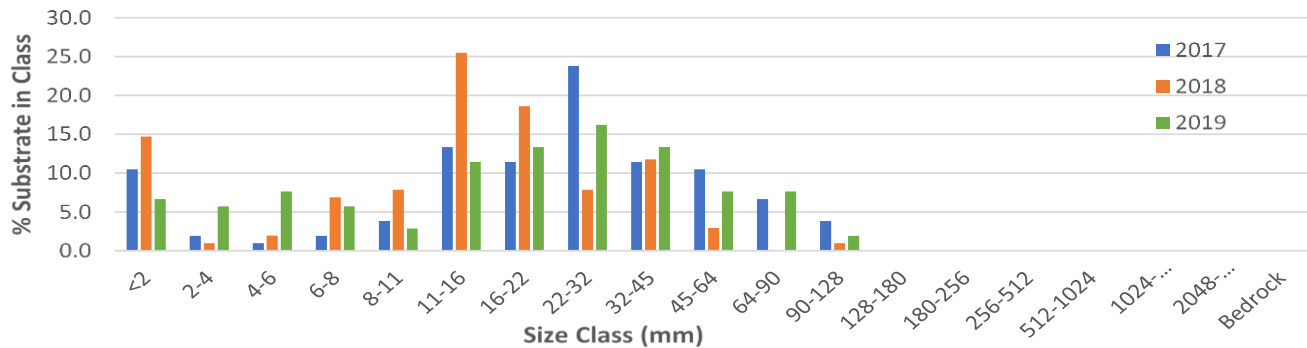
Rice Creek Lower Reach Cross Section Locations



**Rice Creek Cross Section 3 - 1 Year Pre (2017), 1 Year Post (2018) and 2 Years Post (2019)
40 Feet Upstream of Structure 2**



**Pebble Counts Cross Section 3 – 1 Year Pre (2017), 1 Year Post (2018) and 2 Years Post (2019)
40 Feet Upstream of Structure 2**



Pebble Counts

2017 D50 = 22-32 mm

2018 D50 = 11-16 mm

2019 D50 = 16-22 mm



9/27/17

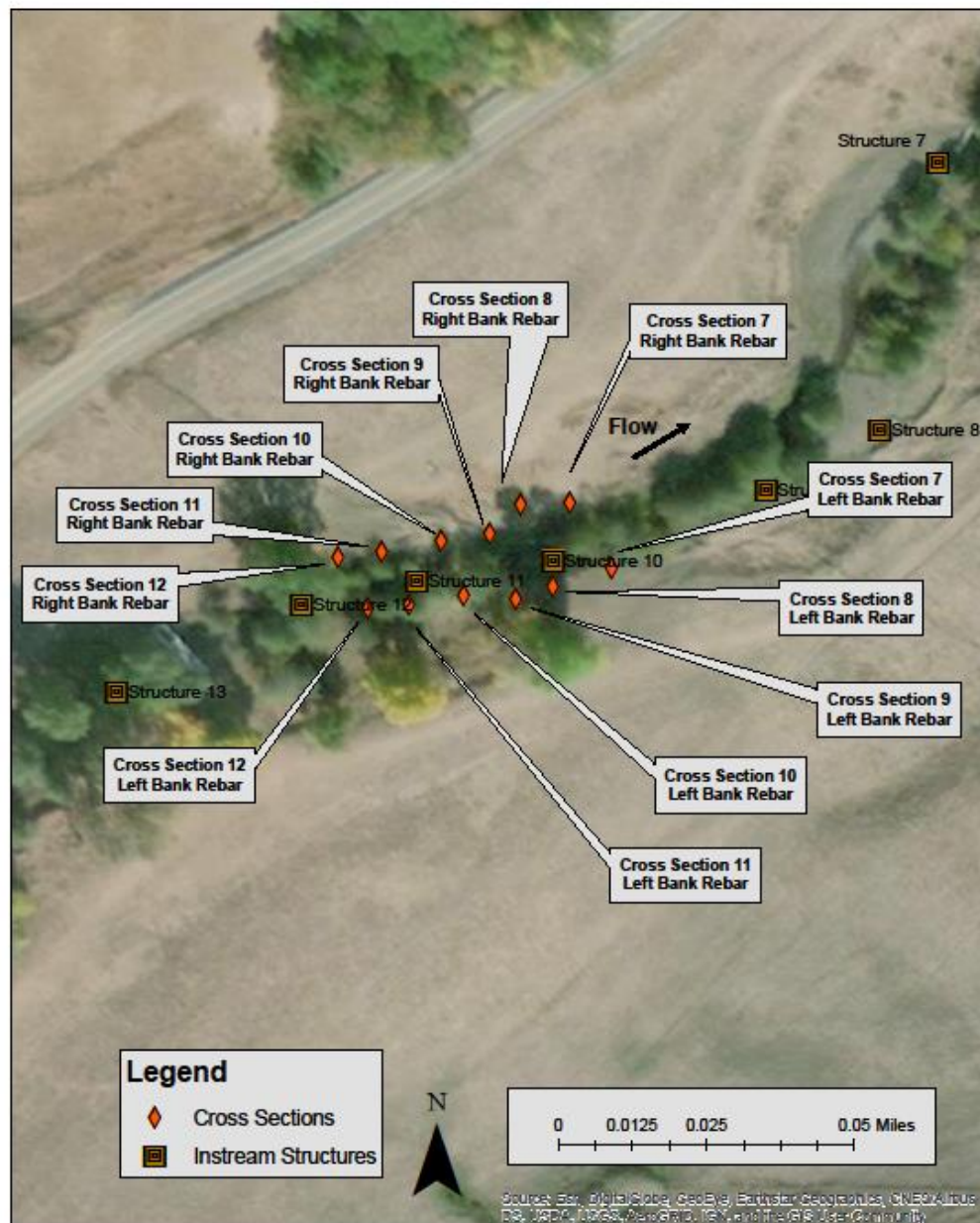
Looking Downstream at Cross Section



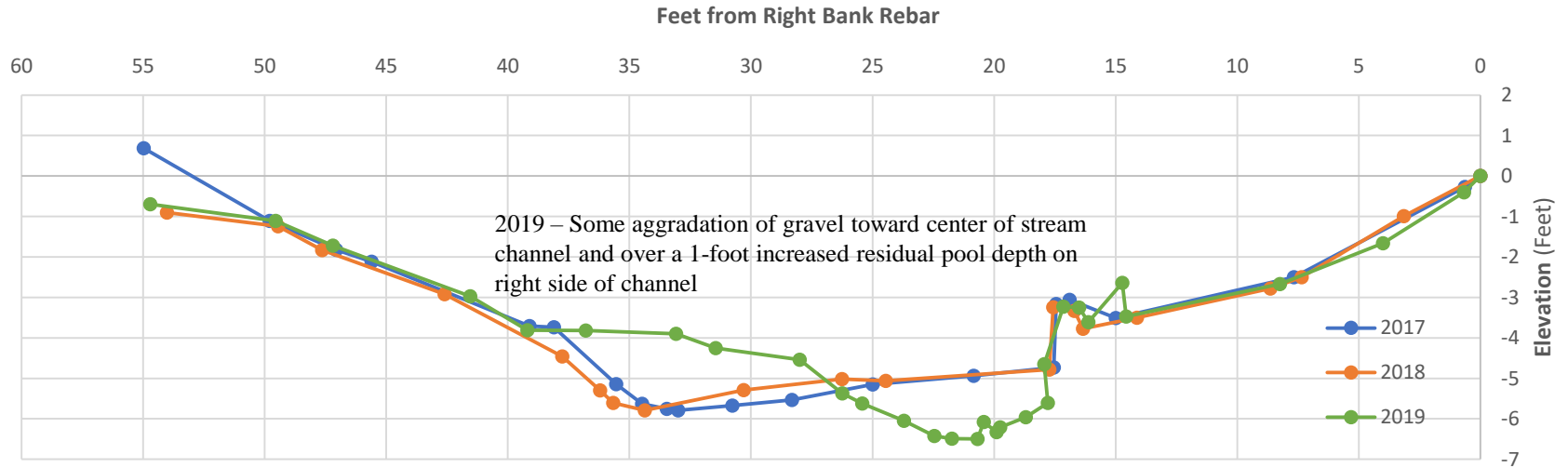
6/17/19

Downstream

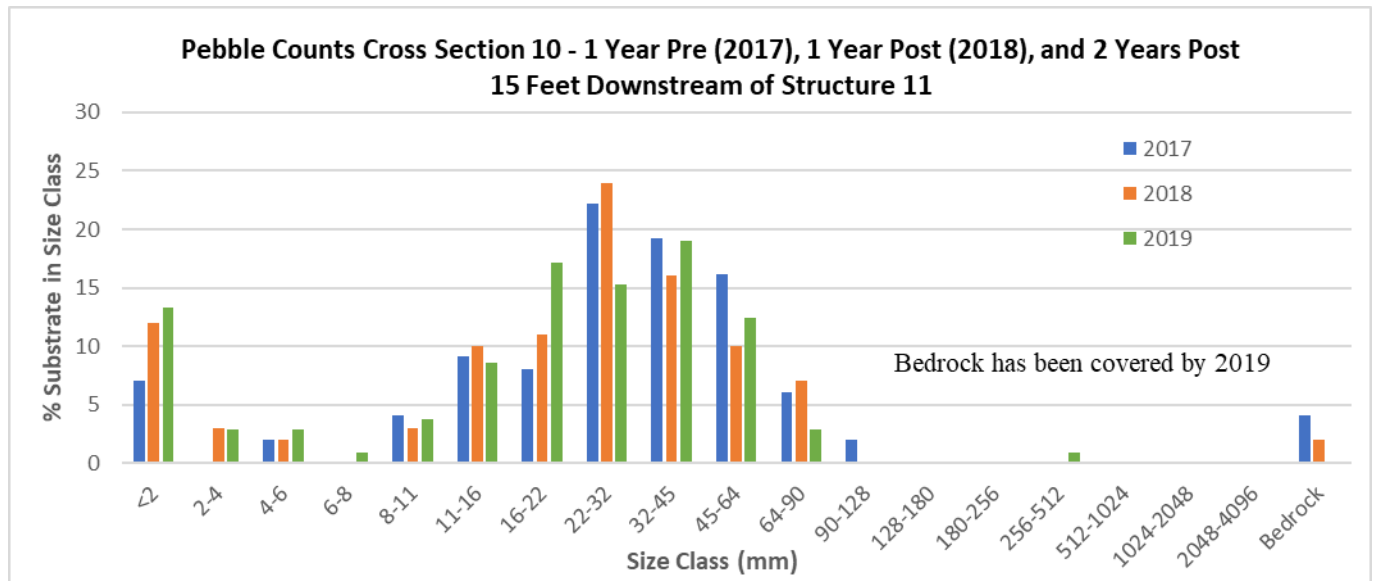
Rice Creek Middle Reach Cross Section Locations



**Rice Creek Cross Section 10 - 1 Year Pre (2017), 1 Year Post (2018) and 2 Years Post (2019)
15 Feet Downstream of Structure 11**



Pebble Counts
 2017 D50 = 22-32 mm
 2018 D50 = 22-32 mm
 2019 D50 = 8-11 mm



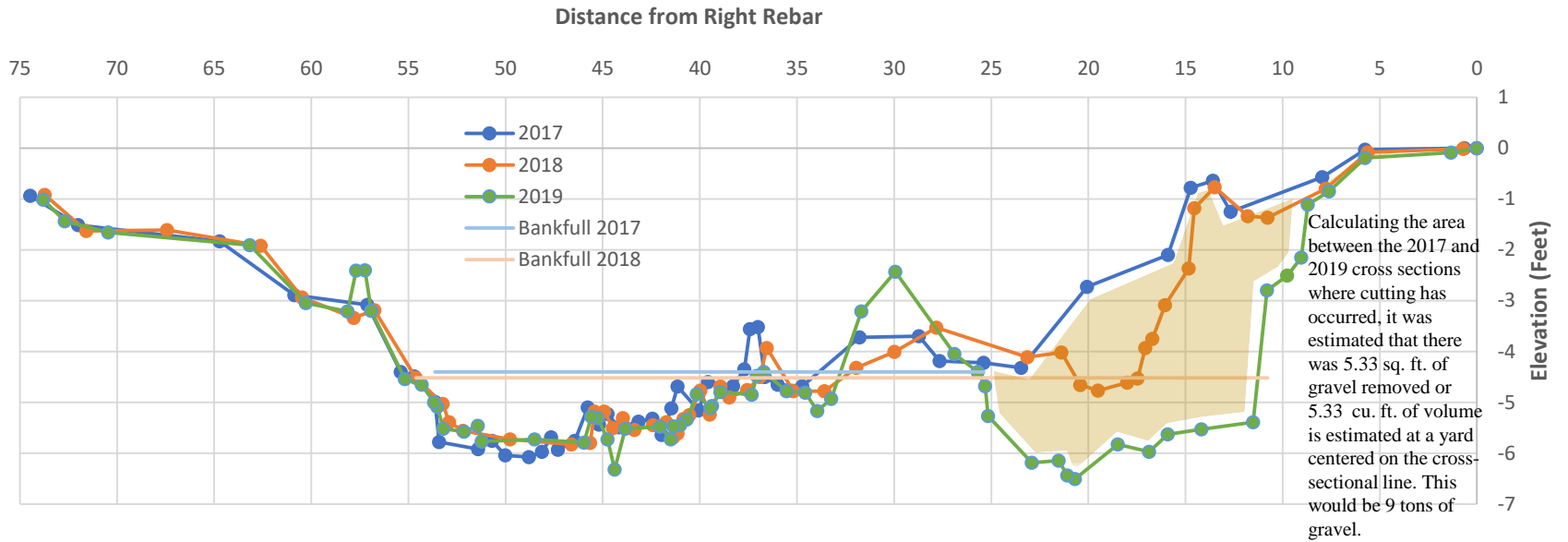


11/13/2018
Looking Upstream at Cross Section



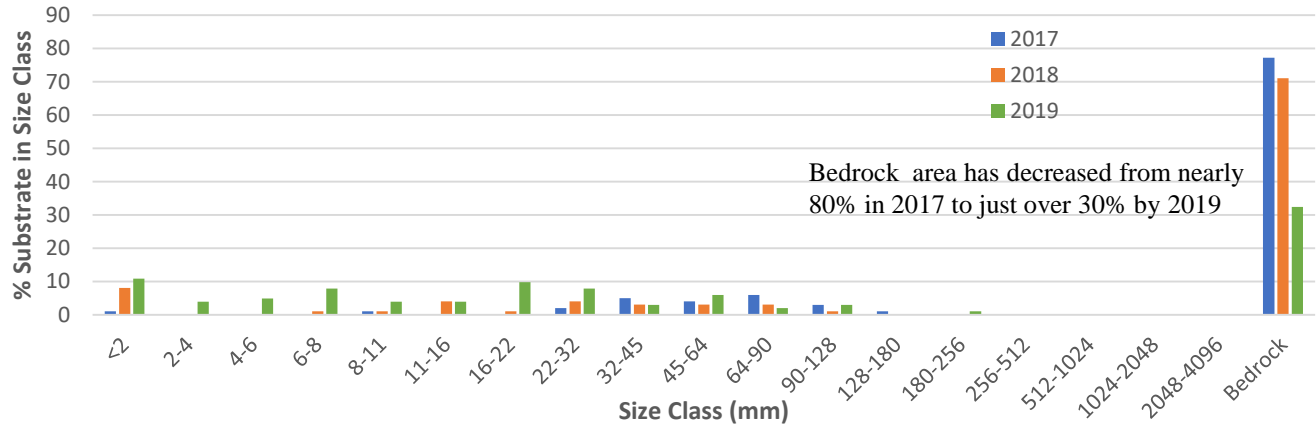
7/24/2019
Looking Upstream at Cross Section

Rice Creek Cross Section 13 - 15 Feet Downstream of Structure Year Zero (2017), Year One (2018) and Year Two (2019)



Pebble Counts Cross Section 13 - 1 Year Pre (2017), 1 Year Post (2018) and 2 Years Post (2019) 15 Feet Downstream of Structure 18

Pebble Counts
 2017 D50 = Bedrock
 2018 D50 = Bedrock
 2019 D50 = 16-22 mm





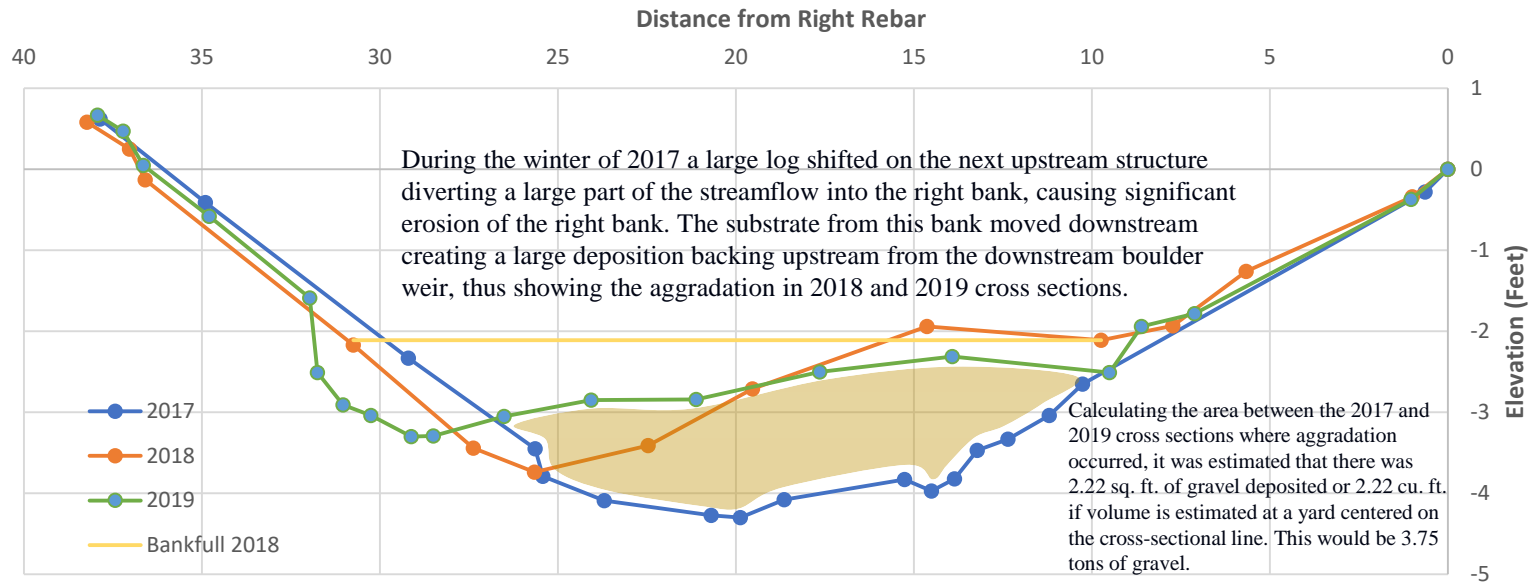
11/13/2018

In this photo you can just see the erosion starting off the end of the logs pointing to the right bank.

8/5/2019 Looking Downstream Toward Cross Section

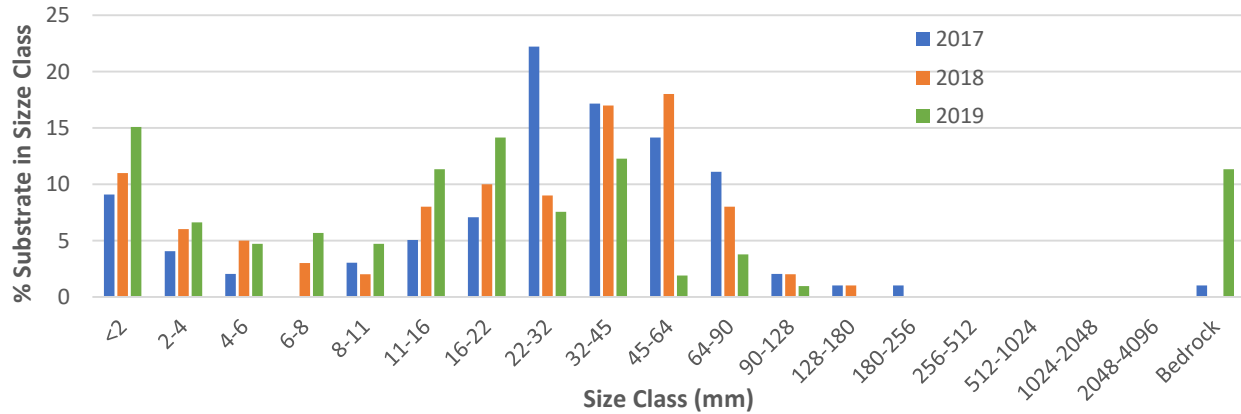


Rice Creek Cross Section 17 - 15 Feet Upstream of Structure 20 1 Year Pre (2017), 1 Year Post (2018) and 2 Years Post (2019)



Pebble Counts Cross Section 17 - 1 Year Pre (2017), 1 Year Post (2018) and 2 Years Post (2019)

Pebble Counts
 2017 D50 = 22-32 mm
 2018 D50 = 22-32 mm
 2019 D50 = 16-22 mm





10/25/2017
Looking Downstream at Cross Section



8/6/2019
Looking Downstream at Cross Section

2017



2018

➤ Macroinvertebrate Sample Collections

- Each year in late May a composite kick samples have been collected in each reach.
- These samples have been collected for 5 years (three pre structure and two post structure placement)
- All samples have been analyzed by Cole Ecological, Inc.



2015-2017 Rice Creek Macroinvertebrates								
Sum of Count					CE_Lab_Sam_ID	Field_Samp_ID		
Phylum	Class	Order	Family	Final ID	18-105-01	18-105-02	18-105-03	18-105-04
					RCL05-21-15	RCM05-21-15	RCU05-21-15	RCL05-25-16
☑ Annelida	☑ Clitellata	☑ Haplotaxida	☑	Enchytraeidae			1	
				Lumbricidae	1		2	1
			☑ Naididae	Naidinae	1	1	33	2
				Tubificinae	13			14
		☑ Lumbriculida	☑	Lumbriculidae	17	1		9
☑ Arthropoda	☑ Arachnida	☑ Trombidiforme	☑	Trombidiformes	1	1	1	1
			☑ Lebertiidae	Lebertia	1			1
			☑ Sperchontidae	Sperchon		1	4	
				Sperchonopsis				1
			☑ Hygrobatidae	Atractides				1
				Hygrobates			2	
			☑ Torrenticolidae	Torrenticola				
			☑ Limnesiidae	Limnesia				
	☑ Insecta	☑ Coleoptera	☑ Elmidae	Heterolimnius corpulentus			1	
				Narpus				
				Narpus angustus				1
				Optioservus	2		2	3
				Ordobrevia nubifera				1
				Zaitzevia	2	4	8	
			☑ Psephenidae	Psephenus falli		1	3	
		☑ Diptera	☑ Ceratopogonidae	Ceratopogonidae				
				Ceratopogoninae	1	1	8	1
			☑ Chironomidae	Brillia	1	16	26	
				Corynoneura	1	1	1	
				Cricotopus	1	1	9	1
				Cricotopus bicinctus group	1		2	
				Cricotopus trifascia group				
				Demicryptochironomus				
				Eukiefferiella	2	3	6	4
				Eukiefferiella brehmi group	6	2	7	2
				Eukiefferiella claripennis group	7	21	26	
				Eukiefferiella devonica group				
				Heterotrissocladius marcidus group				
				Larsia				
				Micropsectra	70	61	38	4
				Orthocladius				
				Orthocladius (Euorthocladius) rivicola group		1	2	
				Orthocladius (Mesorthocladius)				
				Orthocladius Complex	6	2		
				Pagastia	1	1		
				Parakiefferiella				
				Parametriochnemus	11	6	4	7
				Pentaneura	1			2
				Polypedilum	120	55	12	3
				Rheocricotopus			1	
				Rheotanytarsus	1		1	1
				Thienemanniella	1		6	
				Thienemannimyia group	7			
				Tvetenia			2	1
				Tvetenia bavarica group	17	20	15	
			☑ Empididae	Clinocera	1			
				Empididae			1	
				Neoplasta			1	
			☑ Simuliidae	Simulium	40	154	48	91
			☑ Tipulidae	Cryptolabis				
				Dicranota			2	
				Hexatoma			1	

O/E benchmarks for describing biological condition for predictive PREDATOR model

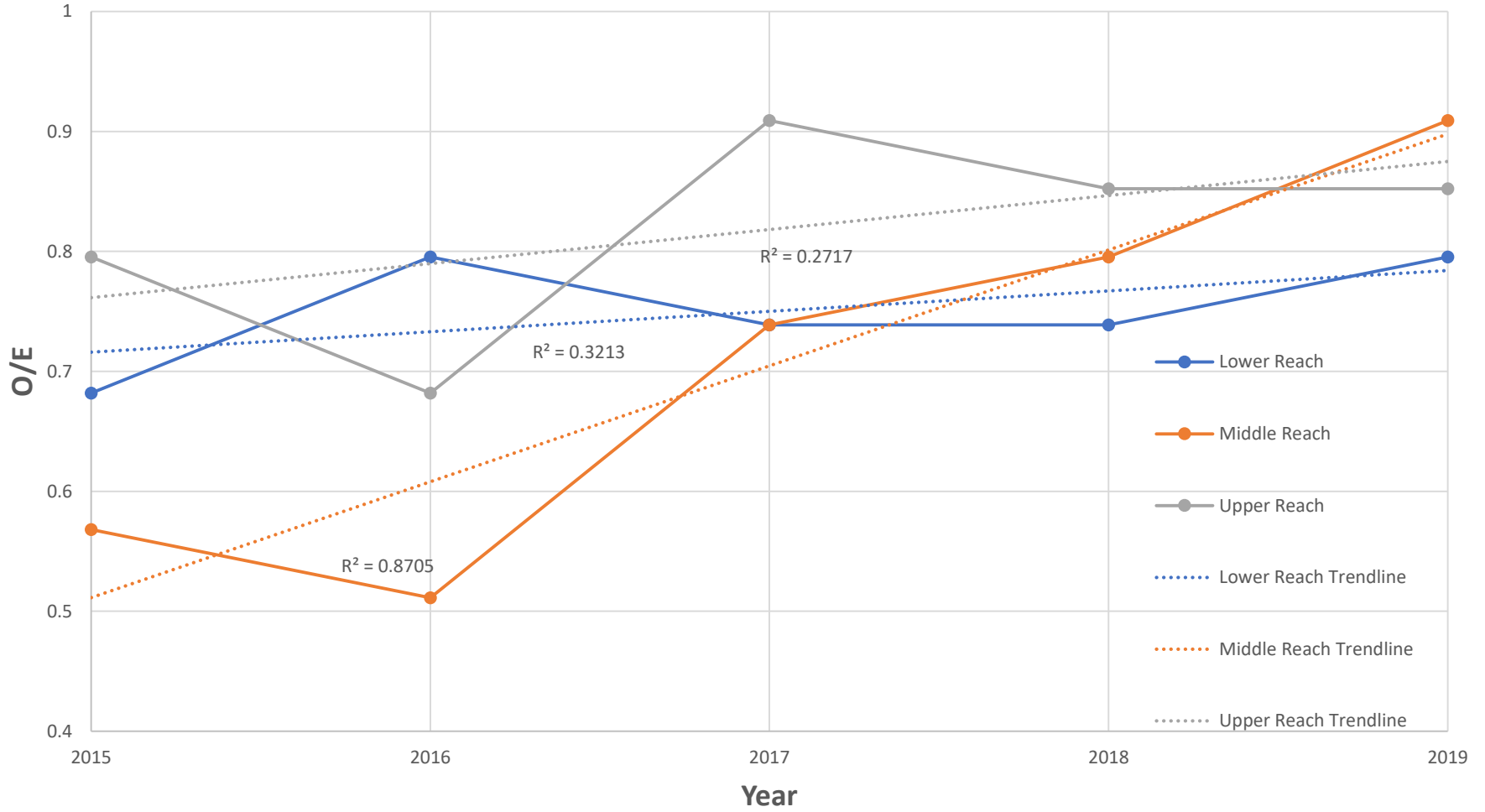
Biological Condition Class	Reference percentile	WC+CP= Western Cordillera + Columbia Plateau	
		O/E	% Common Taxa Loss/Gain
Most disturbed		≤ 0.78	$\geq 22\%$ loss
Moderately disturbed	> 10th to 25th	0.79 – 0.92	8 – 21% loss
Least disturbed	> 25th to 95th	0.93 – 1.23	0 - 7% loss 0 - 23% gain
Enriched	> 95th	> 1.23	> 23% gain



Summary 2015-2019 Macroinvertebrates

O/E Results for Rice Creek Study 2015-2019				
Year	Lower Reach	Middle Reach	Upper Reach	
2015	0.6818			Three years pre
2016	0.7954			Two years pre
2017	0.7386			Pre on year of structure placement
2018	0.7386			First year post structure placements
2018	0.6818			Duplicate 2018, Difference O/E Duplicates = 0.0566817
2019	0.7954			Second year post structure placements
2015		0.5682		Three years pre
2016		0.5114		Two years pre
2017		0.7386		Pre on year of structure placement
2018		0.7954		First year post structure placements
2019		0.9091		Second year post structure placements
2015			0.7954	Three years pre
2016			0.6818	Two years pre
2017			0.9091	Pre on year of structure placement
2018			0.8523	First year post structure placements
2019			0.8523	Second year post structure placements

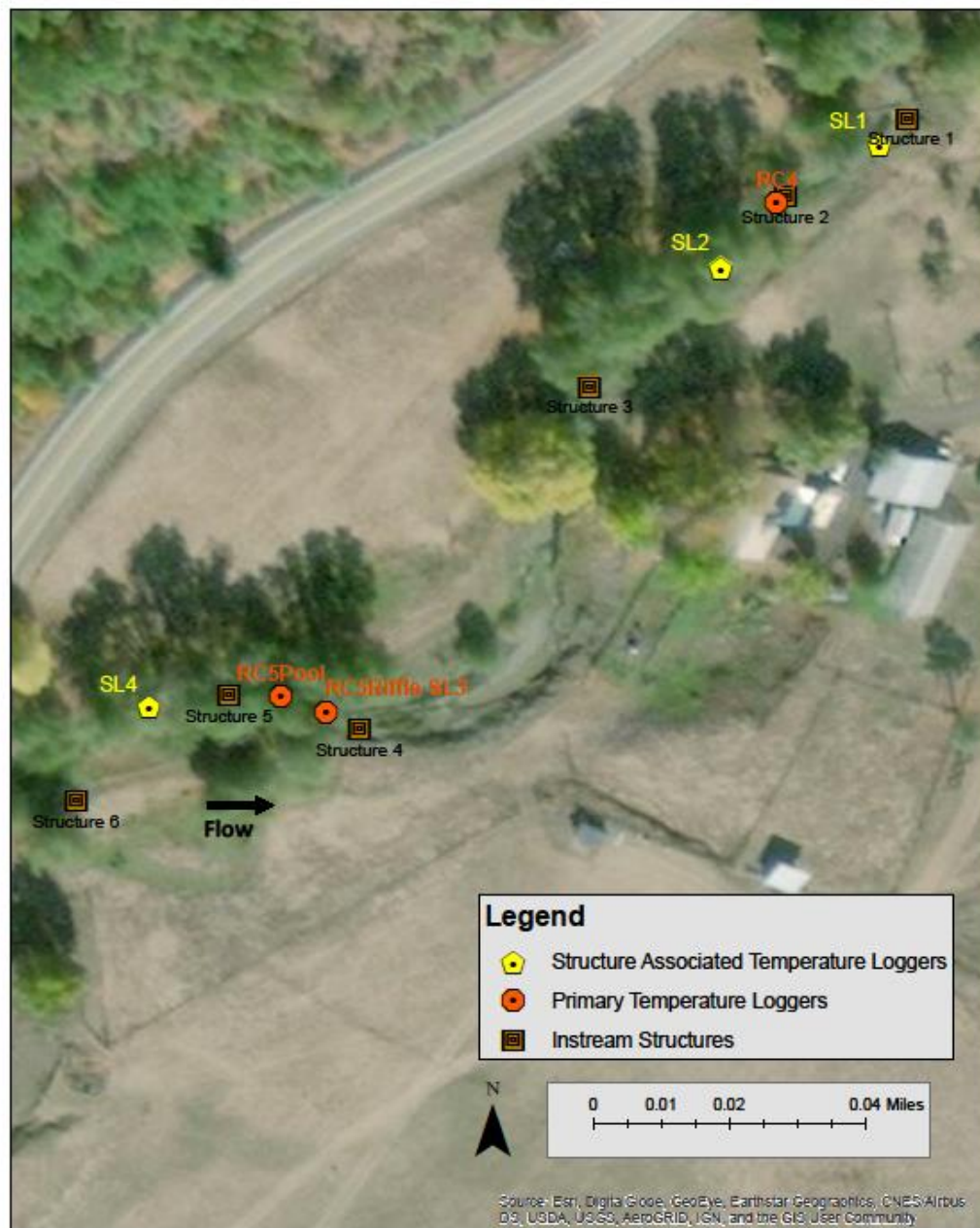
Macroinvertebrate Observed/Expected (O/E)



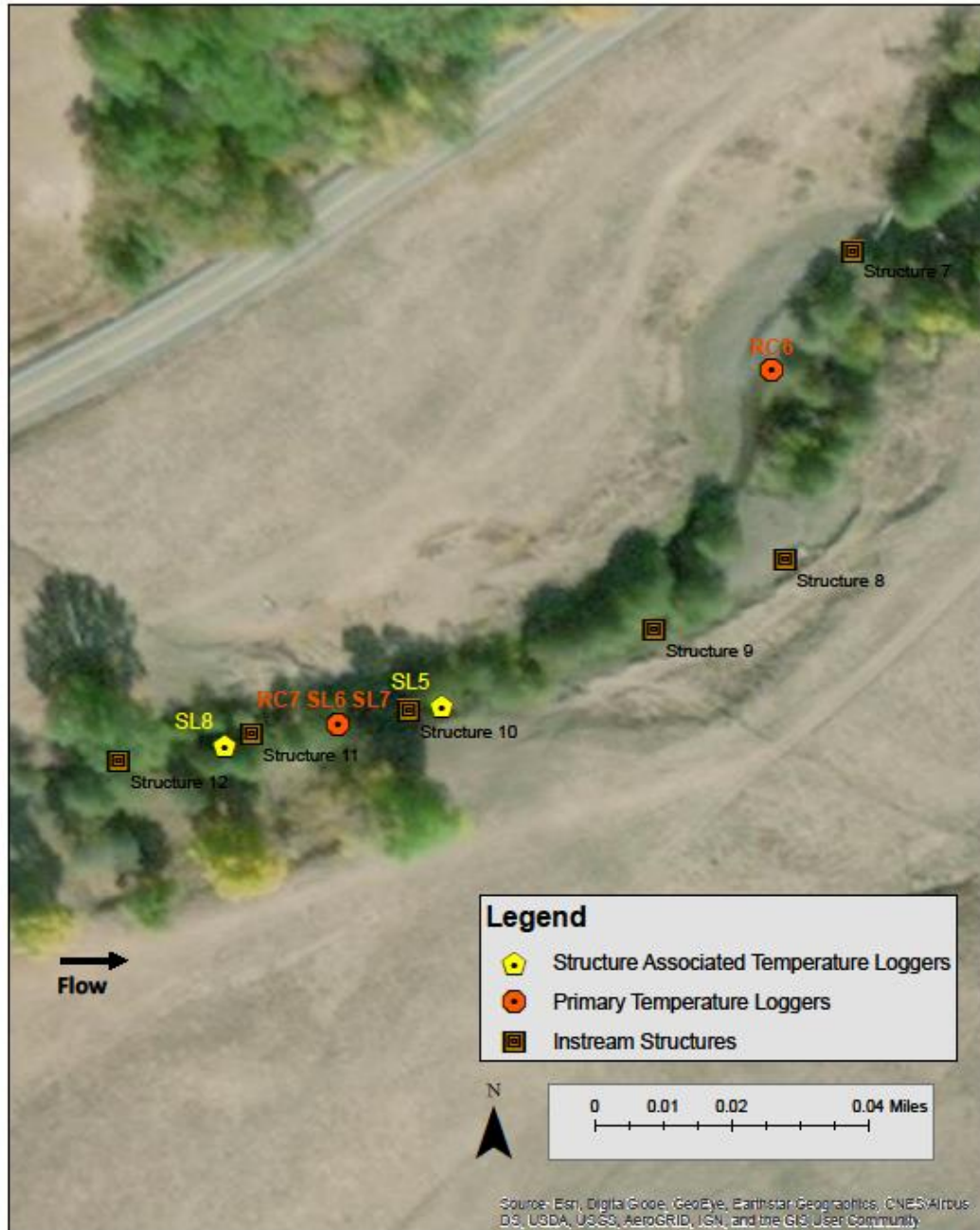
➤ Continuous Temperature Loggers

- Deployed continuous temperature loggers recording every 30' each summer period for approximately 5 months.
 - ✓ Pre structure placement 9 temperature logger were deployed
 - ✓ Post structure placement 17 temperature loggers were deployed to help further study the structures effects.

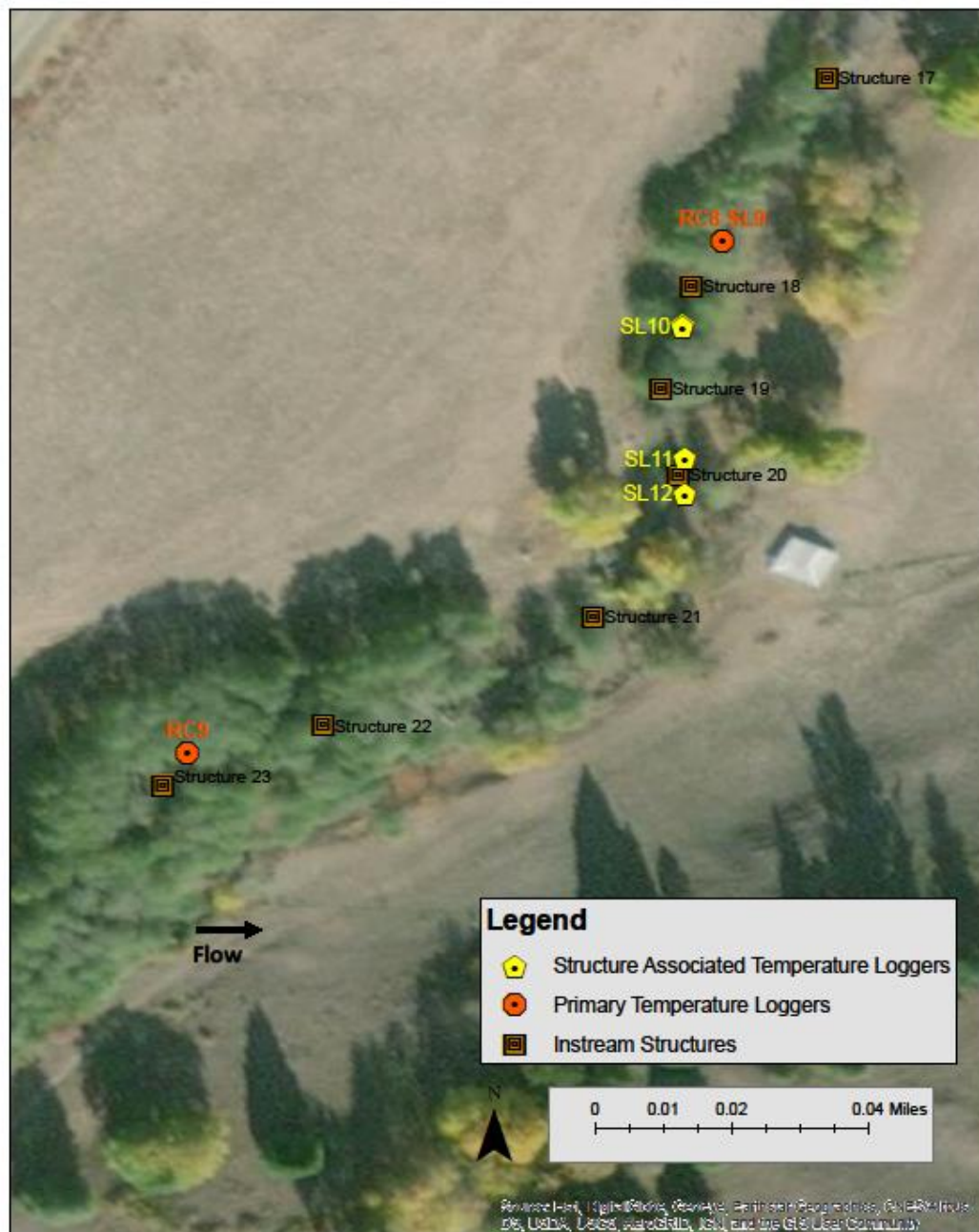
Temperature Logger Locations Lower Reach Rice Creek



Temperature Logger Locations Middle Reach Rice Creek



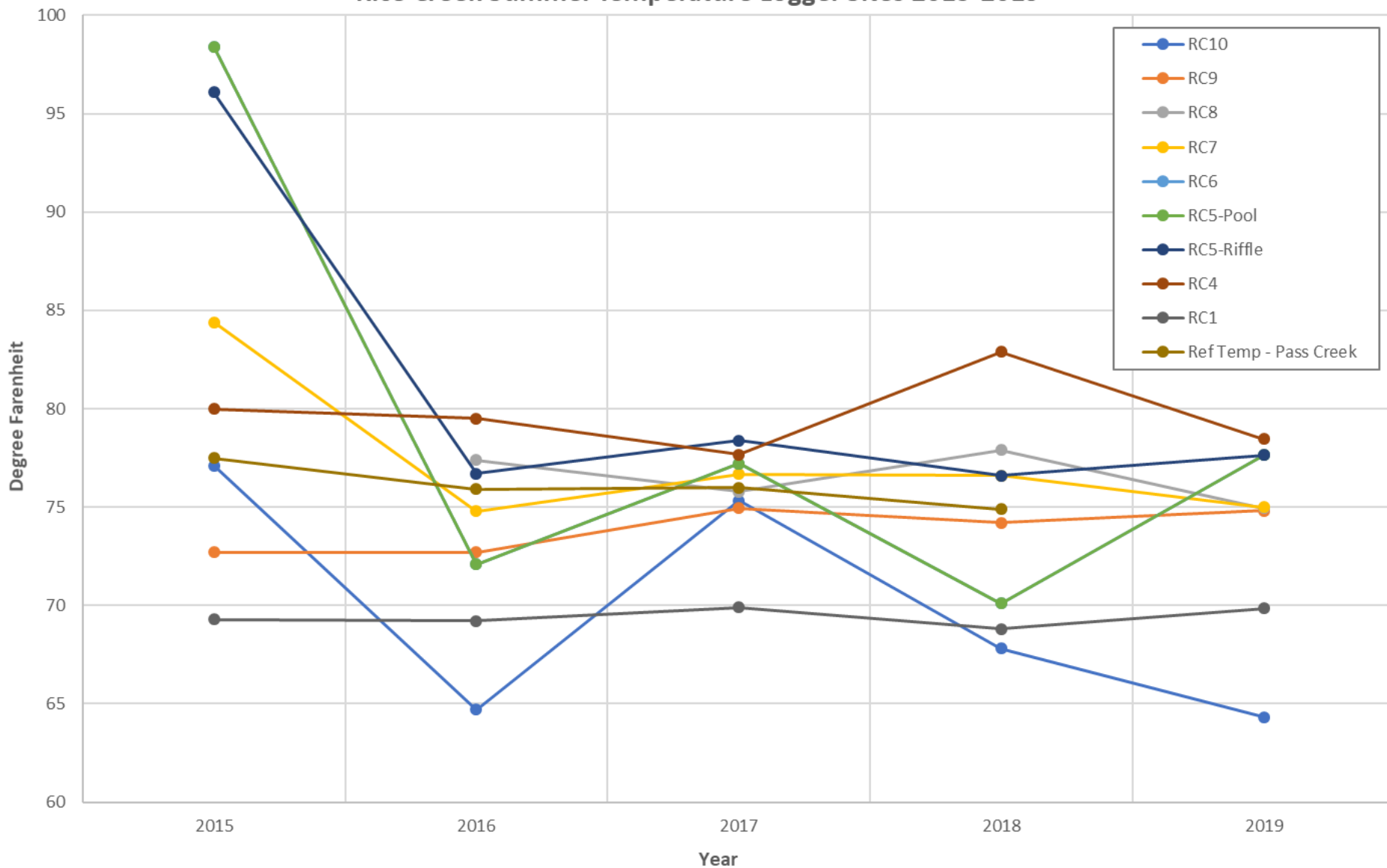
Temperature Logger Locations Upper Reach Rice Creek



2019 Continuous Temperature Data Upstream to Downstream

Site Description	Site ID	Seasonal Maximum		Seasonal Minimum		7-Day averages			Days >	Days >	
		Date	Value	Date	Value	Date	Maximum	Minimum	Δ T	64 F	70 F
Lower End BLM Land	RC10	07/13/19	64.6	05/02/19	46.1	08/13/19	63.1	59.3	3.8	2	0
Upper Reach Top End	RC9	08/03/19	74.8	05/02/19	45.8	08/03/19	73.4	63.7	9.7	110	60
Upper Reach Bottom End Above Upper Structure	SL12	08/04/19	73.5	05/02/19	45.9	08/03/19	71.8	64.0	7.8	106	37
Upper Reach Bottom End Below Upper Structure	SL11	08/04/19	73.0	05/02/19	46.0	06/15/19	71.5	59.9	11.6	106	33
Upper Reach Bottom End Above Lower Structure	SL10	08/04/19	75.9	05/02/19	45.9	08/03/19	73.9	63.7	10.2	109	54
Upper Reach Bottom End - Below Lower Structure	RC8 SL9	08/04/19	74.9	05/02/19	46.0	08/03/19	73.3	63.8	9.5	109	52
Middle Reach Top End Above Upper Structure	SL8	08/04/19	75.3	05/02/19	45.9	08/03/19	73.8	63.0	10.8	111	57
Middle Reach Top End - Above Lower Structure, Below Upper Structure	RC7 SL6 SL7	08/03/19	75.0	05/02/19	46.0	08/03/19	73.0	63.1	9.9	111	58
Middle Reach Top End Below Lower Structure	SL5	08/04/19	75.6	05/02/19	45.9	08/03/19	74.0	63.3	10.8	111	58
Middle Reach Bottom End	RC6	08/04/19	76.9	05/02/19	46.0	08/03/19	75.1	64.6	10.6	112	65
Lower Reach Top End Above Structure	SL4	08/04/19	79.1	05/02/19	46.3	08/03/19	78.1	66.5	11.6	124	87
Lower Reach Upper End	RC5 Pool	08/04/19	76.9	05/02/19	46.3	08/04/19	76.0	67.3	8.7	122	84
Lower Reach Top End Riffle Downstream of Structure	RC5 Riffle SL3	08/04/19	77.6	05/02/19	46.4	08/03/19	76.8	66.5	10.3	126	87
Lower Reach Bottom End Above Structure	SL2	08/04/19	96.4	05/02/19	46.4	08/03/19	89.2	60.6	28.6	128	88
Lower Reach Bottom End	RC4	08/04/19	78.5	05/02/19	46.5	08/03/19	77.1	66.4	10.7	126	87
Lower Reach Bottom End Below Structure	SL1	08/04/19	79.7	05/02/19	47.2	08/03/19	78.3	66.9	11.4	121	84
Rice Creek Near Mouth	RC1	06/12/19	69.9	05/02/19	48.1	06/15/19	69.2	61.9	7.2	104	0

7-Day Average Maximum Temperature Rice Creek Summer Temperature Logger Sites 2015-2019



*Pass Creek data courtesy of Denise Dammann Umpqua Temperature Study 2018.

2018 Continuous Temperature Data Above and Below Structures

Site ID	Site Description	Seasonal Maximum		Seasonal Minimum		Seasonal Max-Min Δ		7-Day averages			Days > 70 F	
		Date	Value	Date	Value	Date	Value	Date	Maximum	Minimum		Δ T
Structure 18 - 3 Logs - Weir Length 36.1 Feet												
SL10	Upper Reach Bottom End Above Lower Structure	07/26/18	89.5	06/01/18	49.9	08/01/18	27.1	07/27/18	83.5	61.7	21.8	68
RC8 SL9	Upper Reach Bottom End - Below Lower Structure	07/26/18	79.6	06/01/18	49.6	07/28/18	17.4	07/27/18	77.9	62.4	15.5	59
Structure 11 - 4 Logs, 10 Boulders - Weir Length 35.9 Feet												
SL8	Middle Reach Top End Above Upper Structure	07/16/18	77.2	06/01/18	49.4	06/12/18	15.8	07/15/18	75.0	64.1	10.9	45
RC7 SL6 SL7	Middle Reach Top End - Below Upper Structure	07/16/18	78.6	06/01/18	49.3	06/24/18	16.1	07/15/18	76.6	63.5	13.1	56
Structure 10 - 1 Log, 53 Boulders - Weir Length 48.3'												
RC7 SL6 SL7	Middle Reach Top End - Above Lower Structure	07/16/18	78.6	06/01/18	49.3	06/24/18	16.1	07/15/18	76.6	63.5	13.1	56
SL5	Middle Reach Top End Below Lower Structure	07/16/18	79.3	06/01/18	49.3	06/24/18	17.1	07/15/18	77.3	63.7	13.7	70
Structure 5 - 4 Logs, 1 Rootwad - 45.7'												
SL4	Lower Reach Top End Above Structure	08/01/18	84.5	05/02/18	47.3	08/01/18	19.9	07/29/18	82.6	65.7	16.9	86
RC5 Riffle SL3	Lower Reach Top End Riffle Downstream of Structure	07/16/18	78.9	05/02/18	47.4	06/12/18	16.0	07/15/18	76.6	66.6	10.0	82

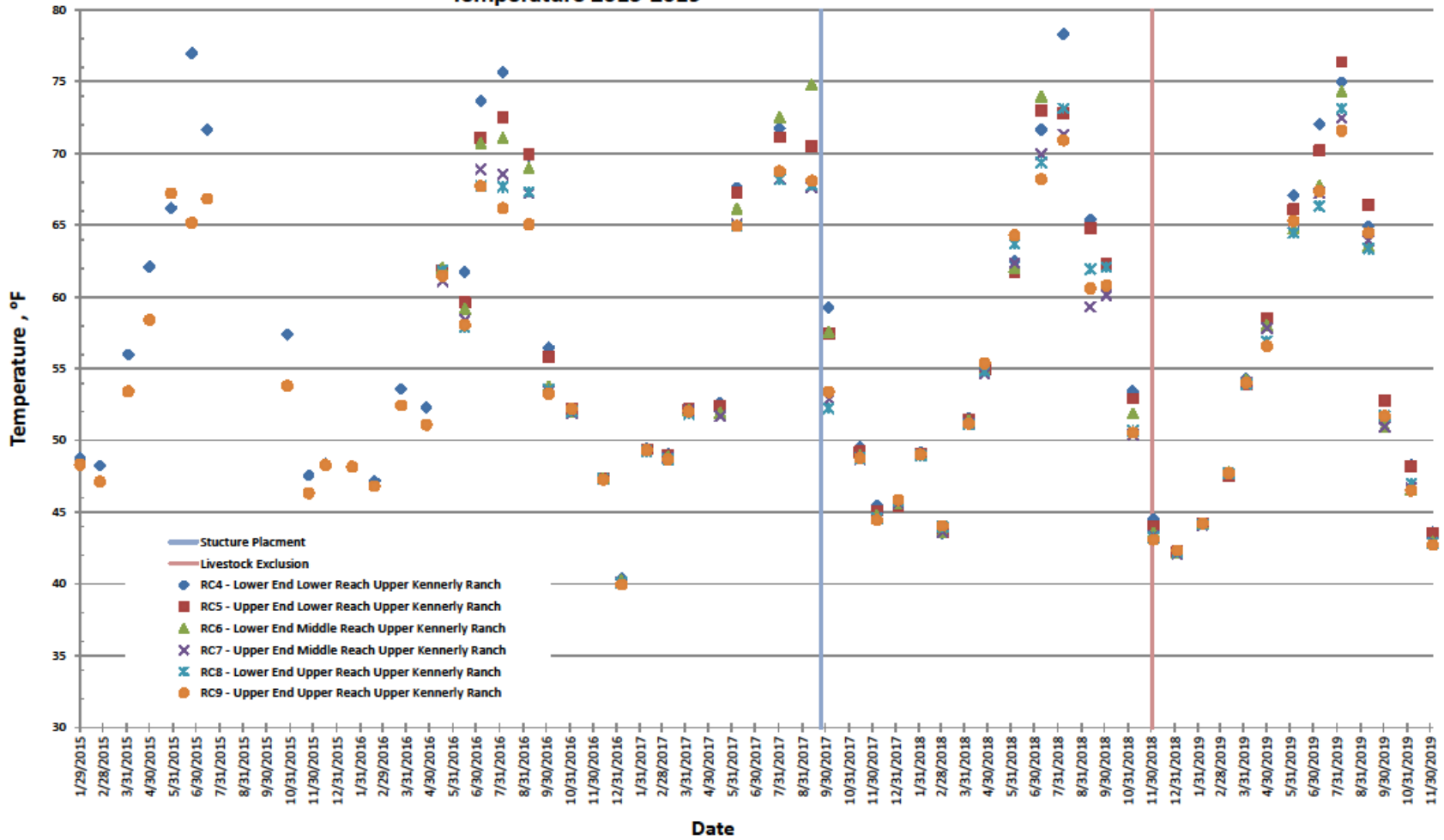
2019 Continuous Temperature Data Above and Below Structures

Site ID	Site Description	Seasonal Maximum		Seasonal Minimum		Seasonal Max Δ T		7-Day averages			Days > 70 F	
		Date	Value	Date	Value	Date	Value	Date	Maximum	Minimum		Δ T
Structure 18 - 3 Logs - Weir Length 36.1 Feet												
SL10	Upper Reach Bottom End Above Lower Structure	08/04/19	75.9	05/02/19	45.9	06/11/19	13.8	08/03/19	73.9	63.7	10.2	54
RC8 SL9	Upper Reach Bottom End - Below Lower Structure	08/04/19	74.9	05/02/19	46.0	06/11/19	13.7	08/03/19	73.3	63.8	9.5	52
Structure 11 - 4 Logs, 10 Boulders - Weir Length 35.9 Feet												
SL8	Middle Reach Top End Above Upper Structure	08/04/19	75.3	05/02/19	45.9	06/11/19	14.7	08/03/19	73.8	63.0	10.8	57
RC7 SL6 SL7	Middle Reach Top End - Below Upper Structure	08/03/19	75.0	05/02/19	46.0	06/11/19	14.7	08/03/19	73.0	63.1	9.9	58
Structure 10 - 1 Log, 53 Boulders - Weir Length 48.3'												
RC7 SL6 SL7	Middle Reach Top End - Above Lower Structure	08/03/19	75.0	05/02/19	46.0	06/11/19	14.7	08/03/19	73.0	63.1	9.9	58
SL5	Middle Reach Top End Below Lower Structure	08/04/19	75.6	05/02/19	45.9	06/11/19	14.8	08/03/19	74.0	63.3	10.8	58
Structure 5 - 4 Logs, 1 Rootwad - 45.7'												
SL4	Lower Reach Top End Above Structure	08/04/19	79.1	05/02/19	46.3	06/11/19	15.1	08/03/19	78.1	66.5	11.6	87
RC5 Riffle SL3	Lower Reach Top End Riffle Downstream of Structure	08/04/19	77.6	05/02/19	46.4	06/11/19	15.3	08/03/19	76.8	66.5	10.3	87

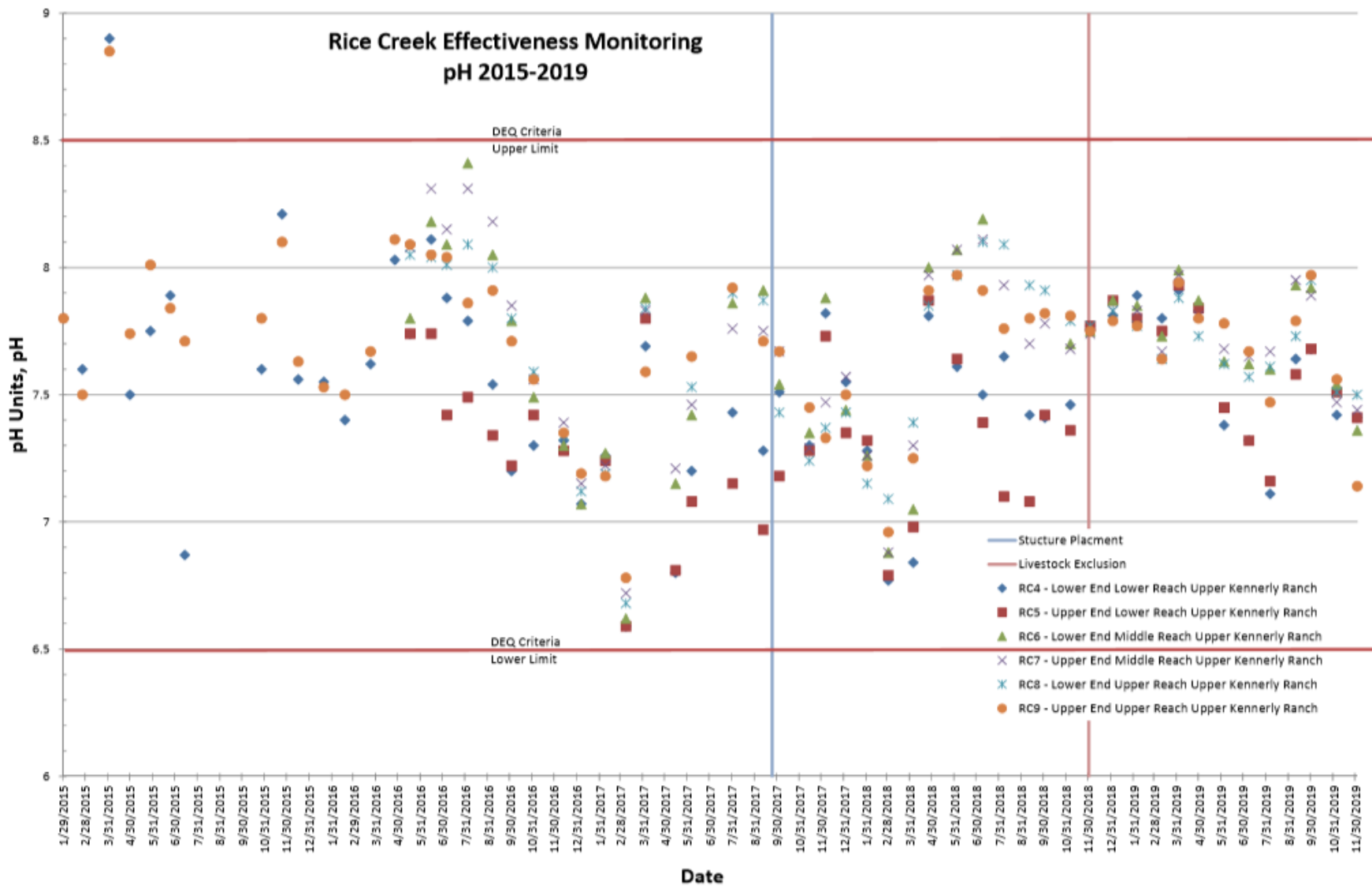
➤ Water Quality Monitoring

- Conducted 58 sampling events collecting grab samples (collecting 2226 individual data), of 6 parameters:
 - ✓ Temperature
 - ✓ pH
 - ✓ Conductivity
 - ✓ Dissolved Oxygen
 - ✓ Turbidity
 - ✓ E. coli

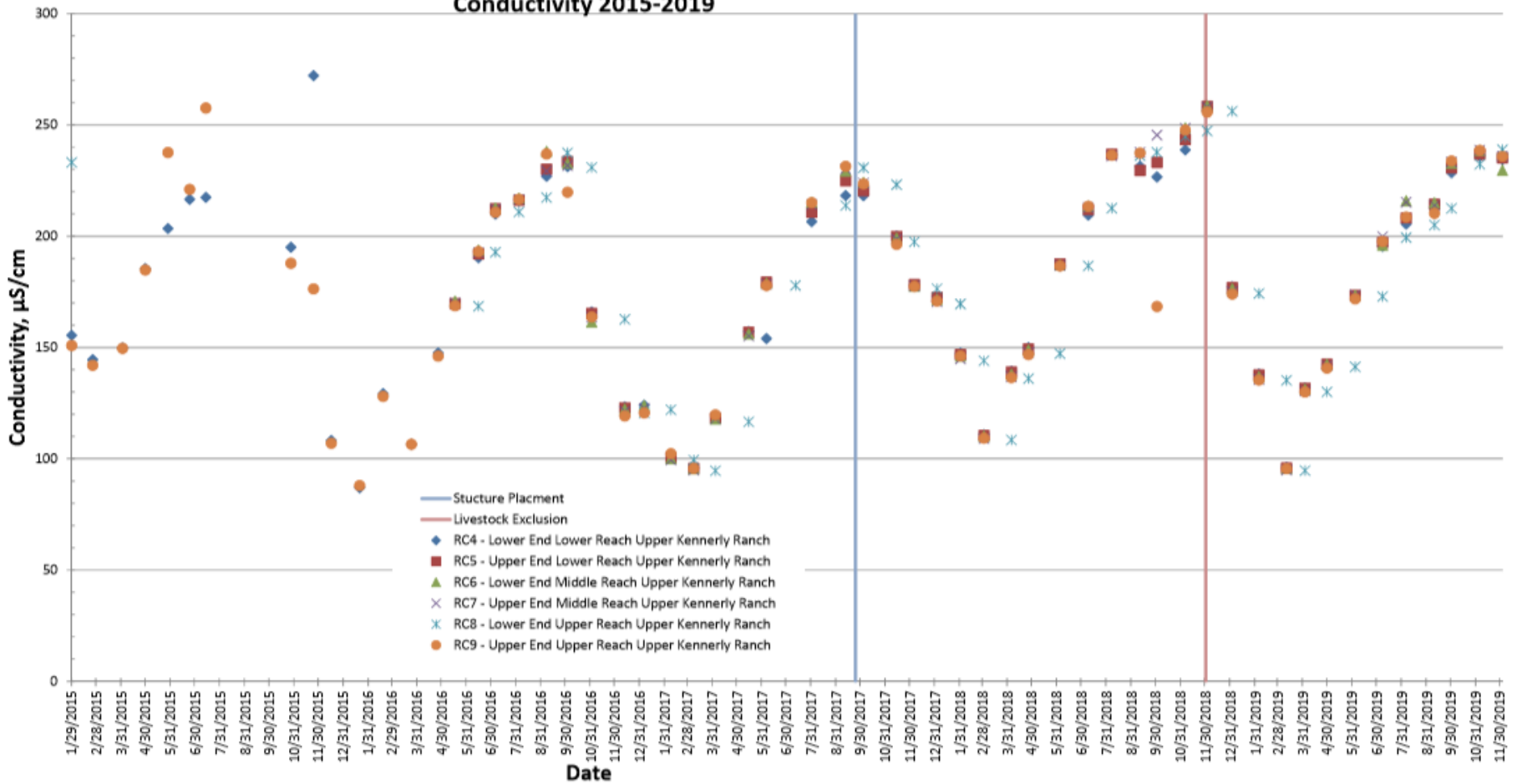
Rice Creek Effectiveness Monitoring Temperature 2015-2019



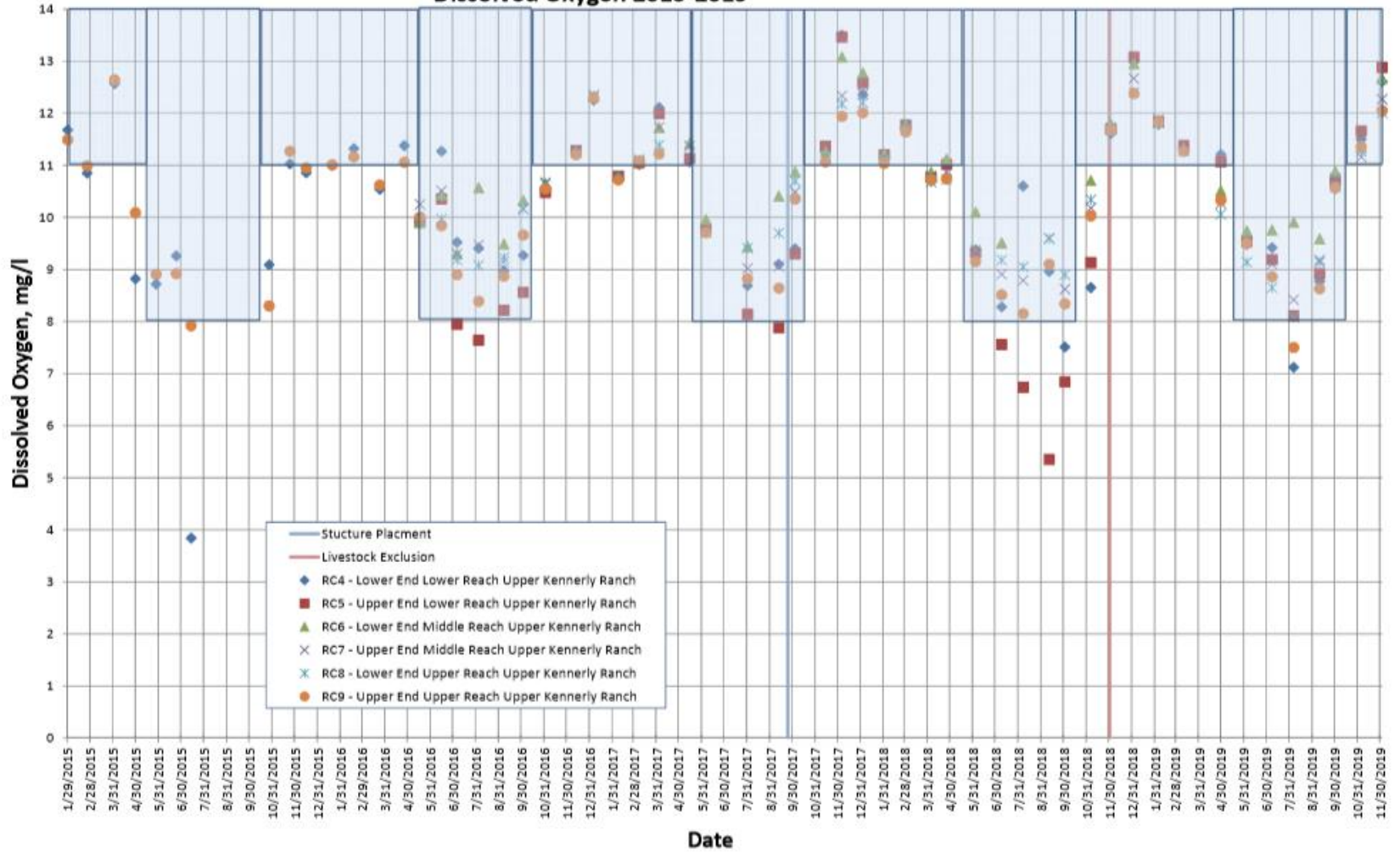
Rice Creek Effectiveness Monitoring pH 2015-2019



Rice Creek Effectiveness Monitoring Conductivity 2015-2019

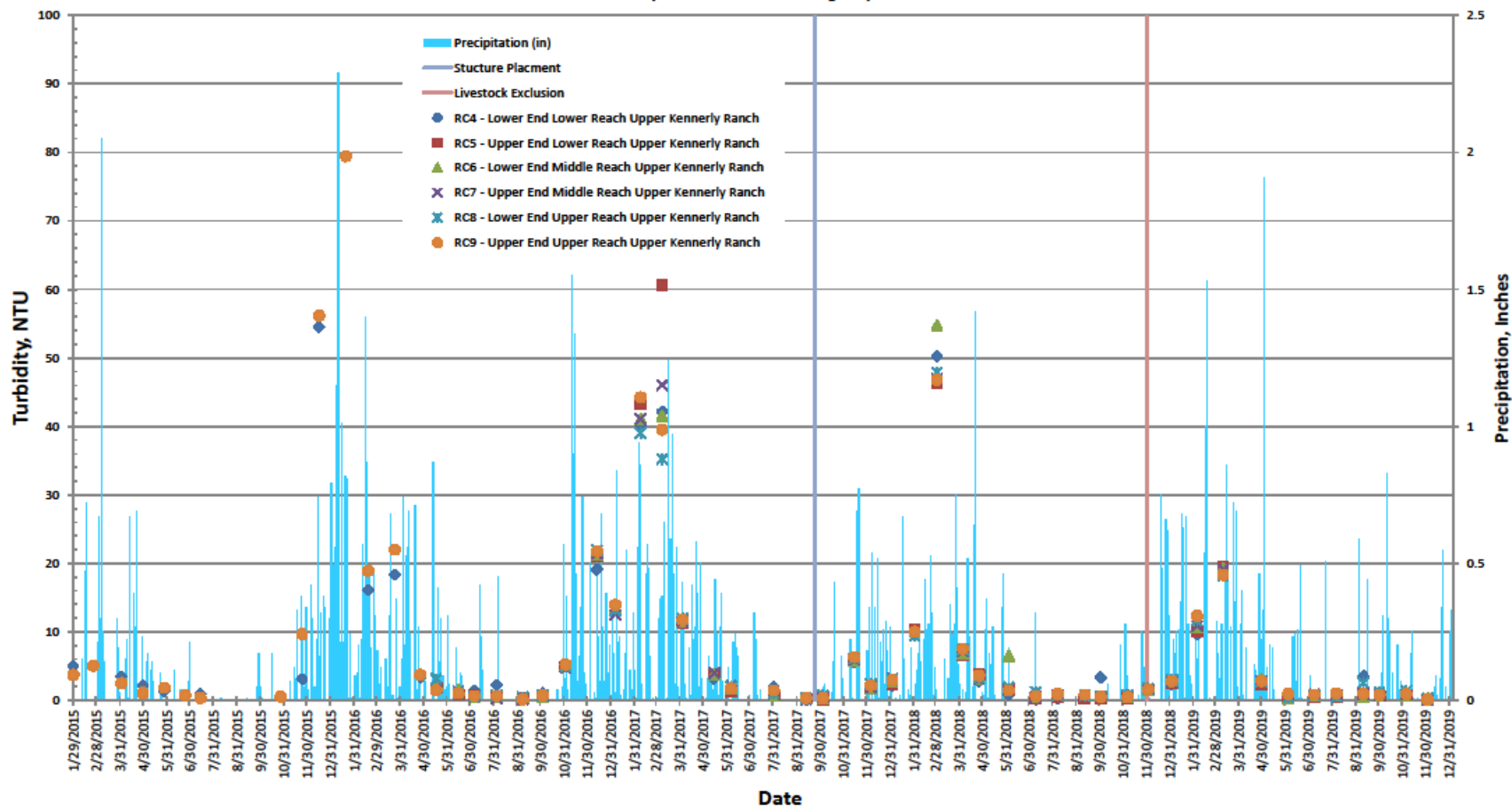


Rice Creek Effectiveness Monitoring Dissolved Oxygen 2015-2019



Rice Creek Effectiveness Monitoring Turbidity & Daily Precipitation 2015-2019

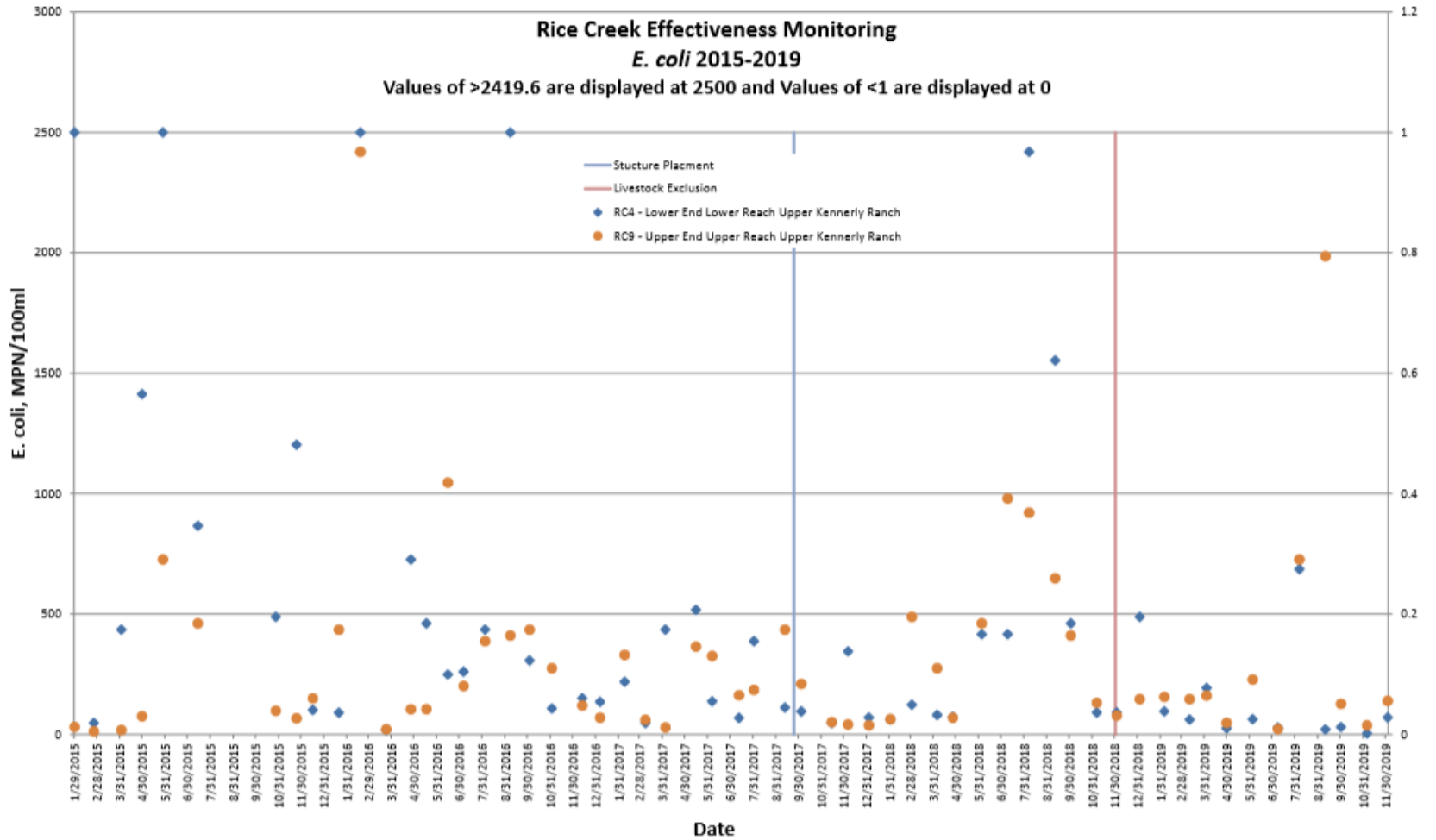
**Precipitaion from Roseburg Airport



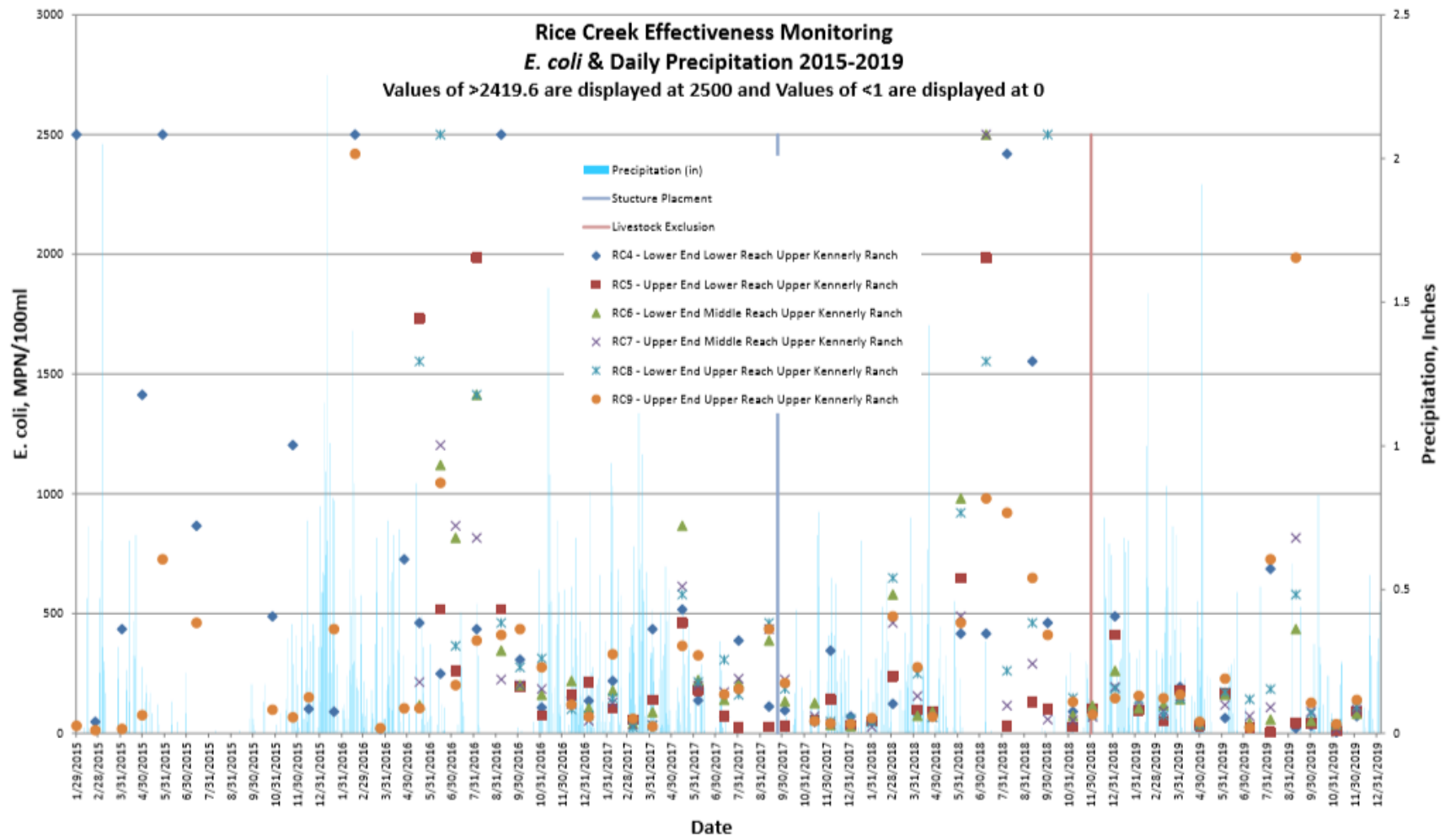
Rice Creek Effectiveness Monitoring

E. coli 2015-2019

Values of >2419.6 are displayed at 2500 and Values of <1 are displayed at 0



**Rice Creek Effectiveness Monitoring
E. coli & Daily Precipitation 2015-2019**
 Values of >2419.6 are displayed at 2500 and Values of <1 are displayed at 0



Summary

- Cross Sections
 - Numerous cross sections have gravel accumulation and erosion to create pool
- Macros
 - Positive trend of taxa diversity in middle reach
- Habitat Surveys
 - Indicating increasing channel complexity and diversity
- Pools
 - Increased number and size of pools
- Sinuosity
 - Overall increased sinuosity in the project area, added side channels
- E.coli
 - Since livestock exclusion *E. coli* levels have been reduced
- pH
 - Range of detected levels has narrowed and stabilized
- Turbidity
 - Lower turbidity levels have been seen since restoration, and cattle exclusion

3/26/19
Lower Reach

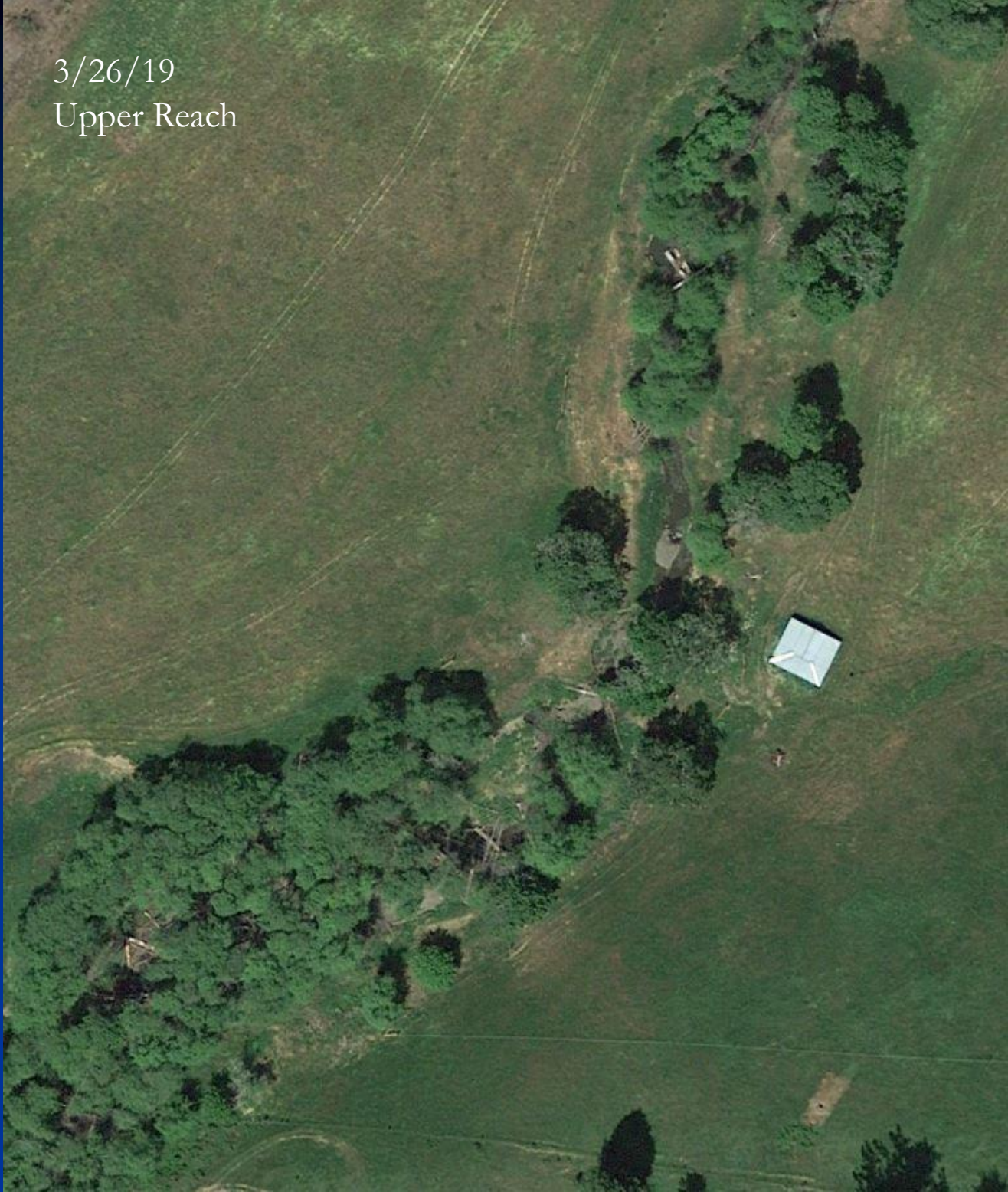


Rice Creek Rd

3/26/19
Middle Reach



3/26/19
Upper Reach



Future Plans

- 2 more years of monitoring out of the next 3 years (one year no data will be collected)
- This data will be used to create presentations to help acquire new landowners for restoration projects
- All data collected will be used to inform restoration project designers to learn how different types of structures functioned in Rice Creek to inform restoration practices into the future

Questions?

Rice Creek 2/5/2020

