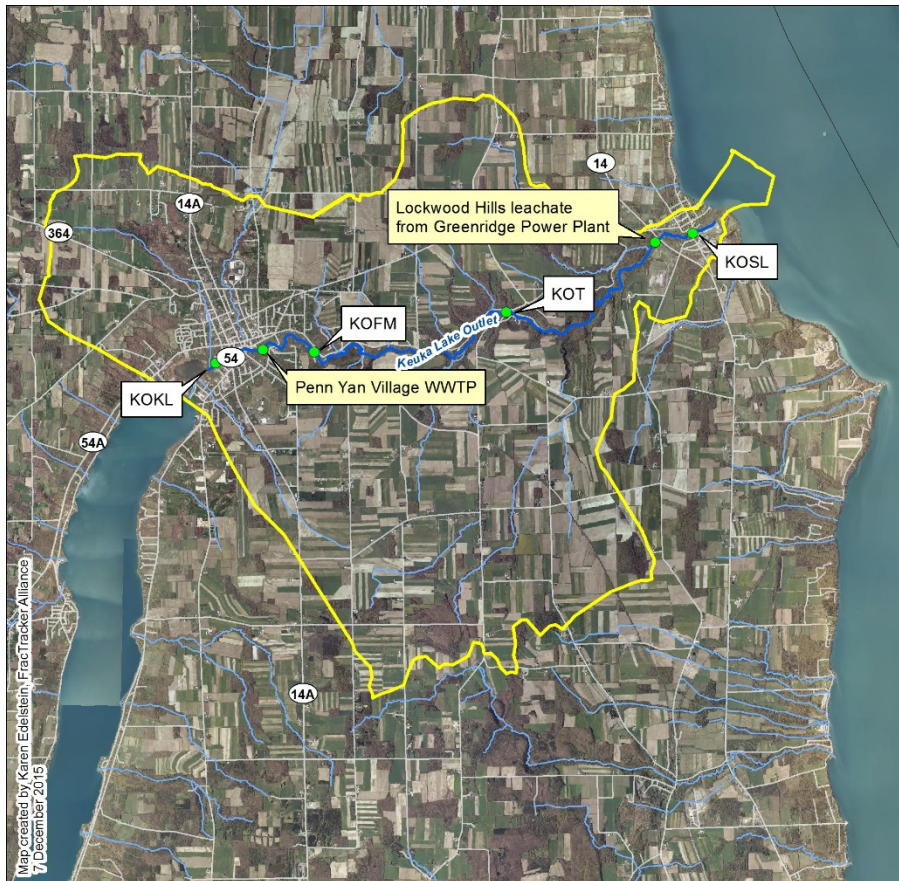


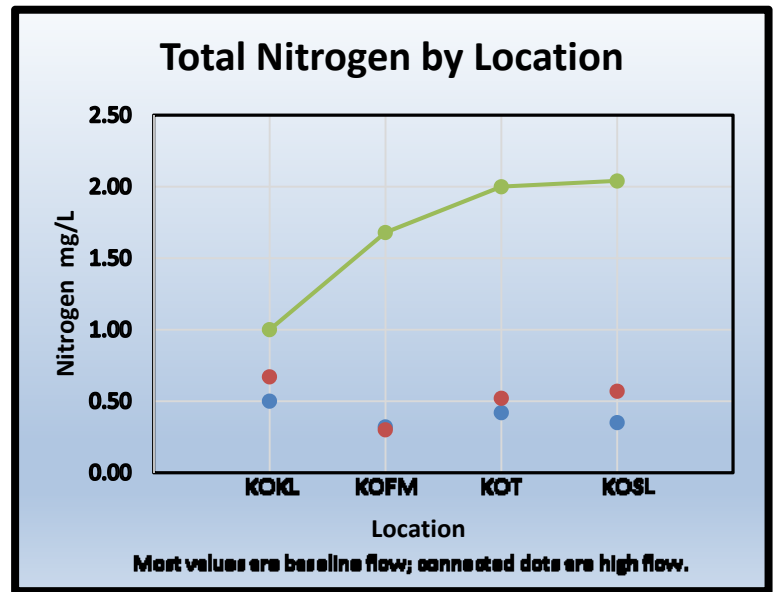
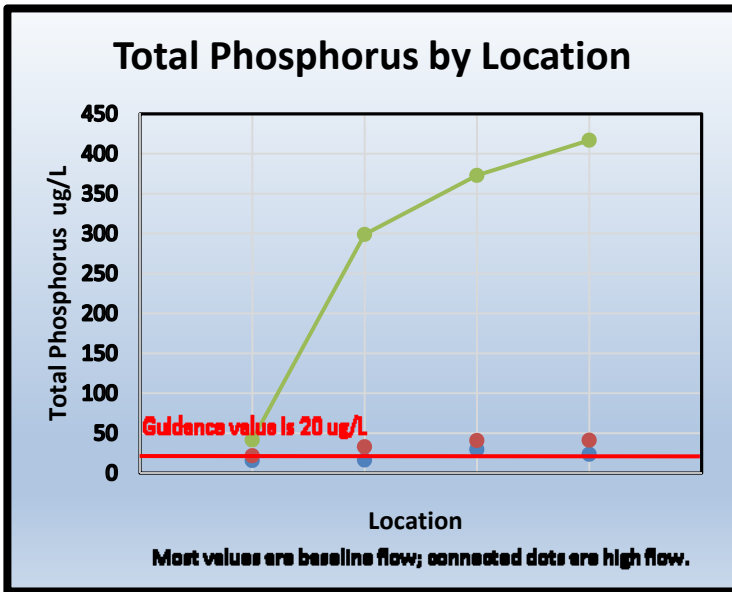
## Keuka Outlet Fact Sheet

Keuka Outlet is the largest tributary to Seneca Lake, its watershed area representing 35% of total. It is the sole outlet of Keuka Lake, and flows northeast from Penn Yan to Dresden, mid-way on the western shore of Seneca Lake. The flow from Keuka Lake is controlled by gates in a dam at Penn Yan. The drainage area is largely made up of agriculture and forested land, though the outlet does receive effluent from the Penn Yan WWTP. The stream has a long history of mills and industry on its shores, and historically provided water for a canal connecting the two lakes. The Keuka Outlet stream is a DEC Class C fishing stream. The maps shows the sampling locations on the outlet stream, though the watershed encompasses all that flows into Keuka Lake.



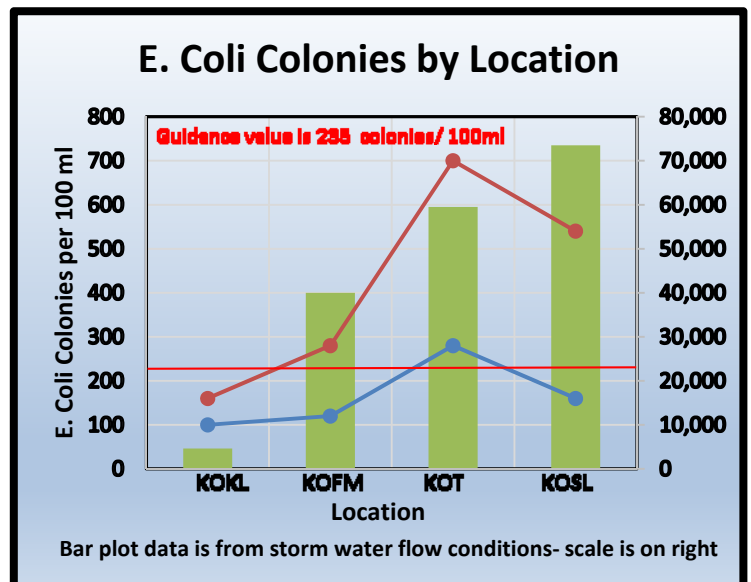
SLPWA (and its partner CSI) has sampled and tested the outlet throughout 2015 at the four locations shown on the map (KOKL, KOFM, KOT, KOSL). Results for phosphorus and nitrogen (nutrients that encourage plant and algae growth), and E. coli bacteria (indicator of human and animal wastes) are the most concerning of the attributes tested.

## Results



The graph showing phosphorus levels, at the locations sampled, shows that at normal stream flow conditions the levels are reasonable at the 1-2X the DEC guidance level of 20ug/l. During the one storm event tested the phosphorus levels increased dramatically to ~20X the guidance level. The graph for nitrogen is similar, with normal flow conditions showing levels at or below the guidance level. Again the high flow of the storm event showed nitrogen levels 4X the guidance level. High flow levels combined with high levels of nutrients results in much added nutrients flowing into Seneca Lake, adding to the issue of weed and algae growth. 2015 saw Seneca Lakes first confirmed toxic blue-green algae blooms.

The graph to the right shows the levels of E.coli during normal flow and the one high flow event captured. At normal flow, the E.coli levels increase as the stream flows from Keuka to Seneca Lake, starting below the guidance level and ending at or above that level, The real concern is the dramatically high levels seen during the high flow event, with levels increasing from 20X to 310X . E. coli is not regulated in Class C streams. The very high levels that are seen in the highest of flow conditions pollute Seneca Lake (a "Class A" drinking water supply) with this dangerous bacteria. Investigative sampling will be required to determine if the Penn Yan waste water treatment facility is a significant contributor to the high bacteria levels.



Actions to address these issues can occur at the community and state level. Upgrades or replacement of the WWTP can address the high phosphorus output. Improvement and controls on agricultural practices can have impact on the dramatic run-off effects seen for both phosphorus and E.coli levels

### Keuka Outlet Data

Location Code	GPS Coordinates	Site Name	Team Contact	Sampling Date	Type of Event	Water Temperature (degrees C)	pH	Dissolved Oxygen mg/L	Chloride mg/L	Soluble Reactive Phosphorus ug/L	Total Phosphorus (ug/L)	Nitrate-Nitrite Nitrogen (mg/L)	Kjeldahl Total Nitrogen (mg/L)	Specific Conduct (Ms/cm)	Coliform (Col/100 ml)	E.coli (Col/100 ml)	Turbidity (NTU)	Hardness Mg/L as CaCo3	Total Suspended Solids (ml/L)
Guidance Values							6.5-8.5 (Classes A- C) 6.0-9.0 (Class D)		50.0		20.0	1.00		150-500	2400	235			
KOKL 42.6574 -77.0589	Penn Yan Boat Launch	Fred Geyer	7/13/2015	BF	23.5	8.00	7.8	35.2	15.10	15.8	0.08	0.50	315.0	4000	100	1.71	117.0	0.63	
			8/17/2015	BF	25.2	8.25	6.8	37.5	17.20	21.8	0.08	0.67	305.0	9000	60	3.89	110.0	0.63	
			9/30/2015	SW	21.5	7.25	5.1	31.7	23.20	41.7	0.07	1.00	287.0	20000	4620	80.00	141.0	53.00	
KOFM 42.6596 -77.0371	Fox Mills Rd.	Fred Geyer	7/13/2015	BF	23.5	8.25	7.6	35.9	9.14	16.3	0.09	0.32	323.0	7000	120	2.62	118.0	2.25	
			8/17/2015	BF	24.8	8.25	7.4	38.6	20.00	32.9	0.05	0.30	331.0	5500	160	4.59	130.0	12.50	
			9/30/2015	SW	-	8.00	7.7	33.0	175.00	299.0	2.16	1.68	384.0	100000	40000	80.00	141.0	53.00	
KOT 42.6669 -76.9947	KO Tributary near Ridge Rd.	Larry Martin	7/13/2015	BF	23.5	8.25	7.9	37.3	16.40	29.6	0.30	0.42	333.0	5000	280	4.82	122.0	15.30	
			8/17/2015	BF	23.2	8.25	---	42.6	32.50	40.8	0.72	0.52	366.0	12500	420	1.86	132.0	1.25	
			9/30/2015	SW	17.0	8.25	8.0	38.6	204.00	373.0	4.80	2.00	454.0	100000	59500	95.00	177.0	65.00	
KOSL 42.6805 -76.9538	Charles St. Bridge, Dresden	Larry Martin	7/13/2015	BF	23.2	8.00	7.8	39.3	12.60	23.5	0.27	0.35	339.0	20000	160	1.05	119.0	7.00	
			8/17/2015	BF	22.7	8.25	7.4	47.1	30.10	41.3	1.04	0.57	402.0	11000	380	2.79	138.0	0.63	
			9/30/2015	SW	16.8	8.00	8.0	31.3	215.00	417.0	4.25	2.04	401.0	100000	73500	150.00	161.0	102.00	

BF= Base Flow; SW= Storm Water