

Algae Monitoring Update Greenbrier River

December 4, 2019



CHRIS SMITH

ENVIRONMENTAL RESOURCES ANALYST, WATER QUALITY STANDARDS

CHRIS.B.SMITH@WV.GOV

TITLE 47
LEGISLATIVE RULE
DEPARTMENT OF ENVIRONMENTAL PROTECTION
WATER RESOURCES
SERIES 2
REQUIREMENTS GOVERNING WATER QUALITY STANDARDS

§47-2-3. Conditions Not Allowable In State Waters

3.2.g. Algae blooms or concentrations of bacteria which may impair or interfere with the designated uses of the affected waters;

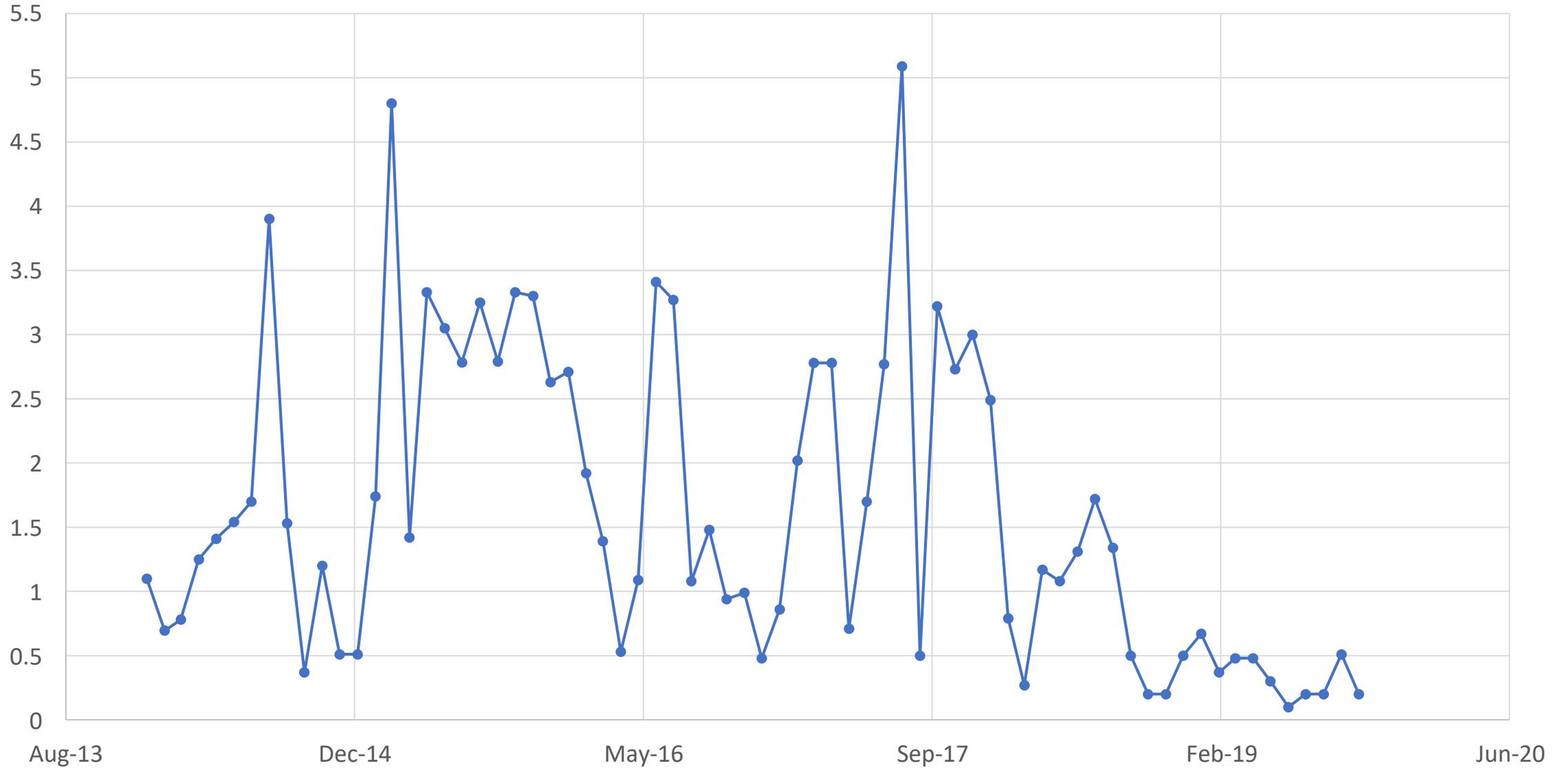
§47-2-6. Water Use Categories.

6.1. These rules establish general Water Use Categories and Water Quality Standards for the waters of the State. Unless otherwise designated by these rules, at a minimum all waters of the State are designated for the Propagation and Maintenance of Fish and Other Aquatic Life (Category B) and for Water Contact Recreation (Category C) consistent with Federal Act goals. Incidental utilization for whatever purpose may or may not constitute a justification for assignment of a water use category to a particular stream segment.

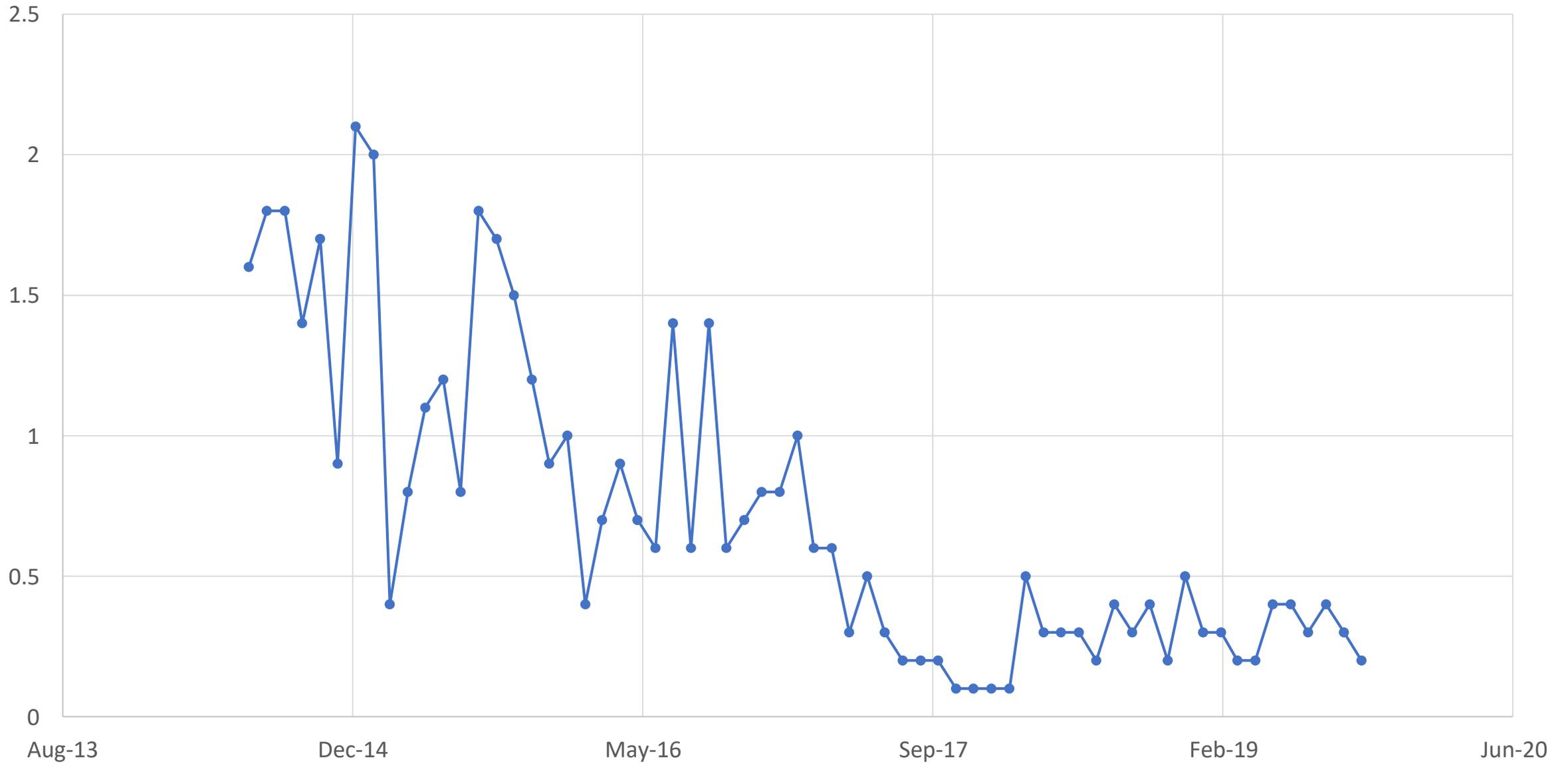
Greenbrier River

- 2008 DEP report *Assessment of Filamentous Algae on the Greenbrier River and Other West Virginia Streams*
- 2009 DEP placed phosphorus limits in the NPDES permits of contributing facilities
- 2010 DEP report *Nutrient Levels and Filamentous Algae Growth in the Greenbrier River*
- 2010 sections listed on the 303(d) list of impaired waters
- 2013 *Greenbrier River Restoration Plan* implemented
- 2019 Wastewater Treatment Plant upgrades fully online

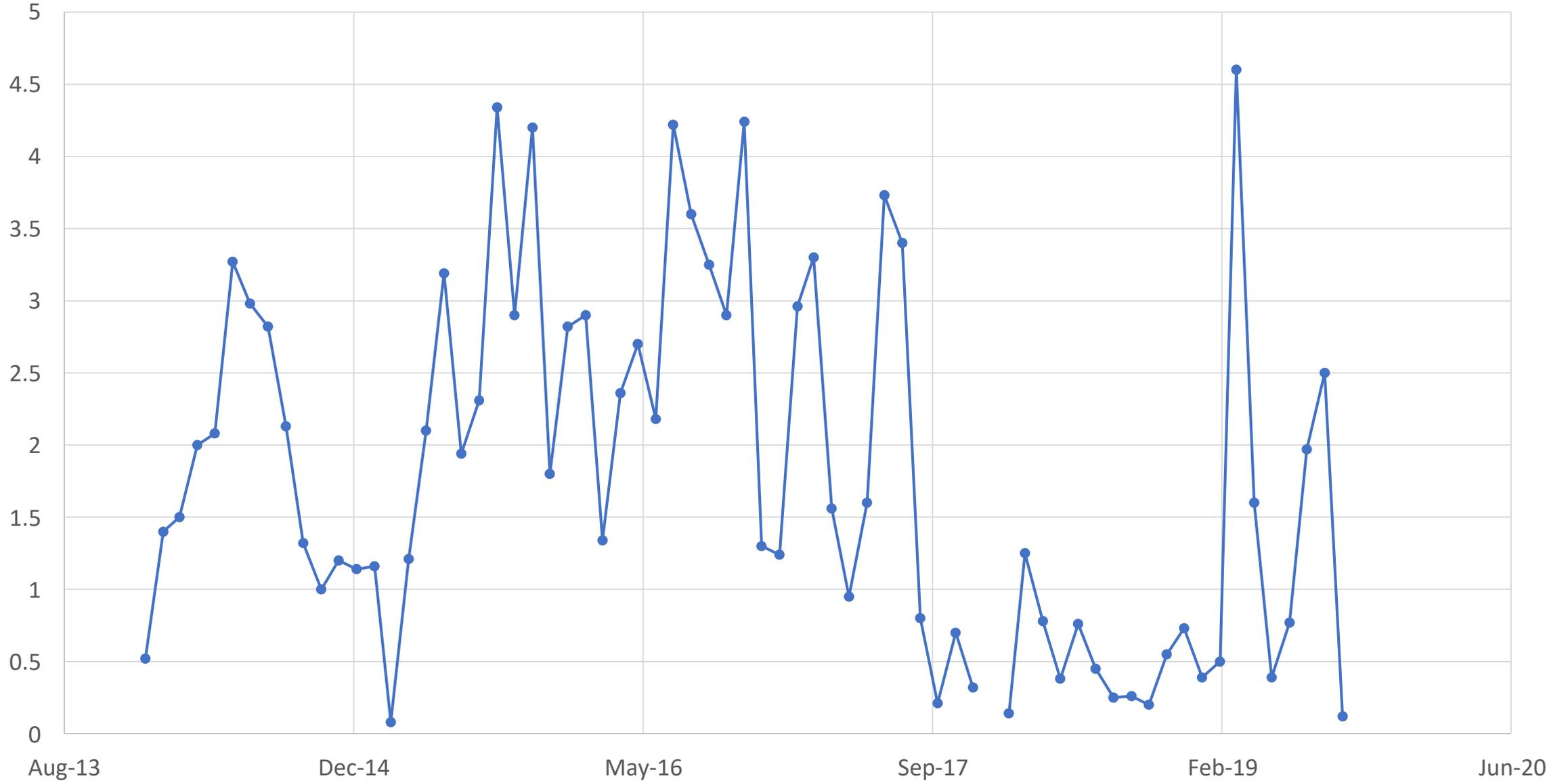
Ronceverte Total Phosphorus Monthly Average (mg/l)



White Sulphur Springs Total Phosphorus Monthly Average (mg/l)



Alderson Total Phosphorus Monthly Average (mg/l)



Phosphorus Load Reductions

	Pre-upgrade	Post-upgrade	% Reduction
White Sulphur Springs	17.6	2.9	84
Howard Creek (mouth)	15.3	2.8	81
Ronceverte	16.8	3.1	81
Avg. Daily TP load increase (Ronceverte to Rockland)	11.0	2.6	76

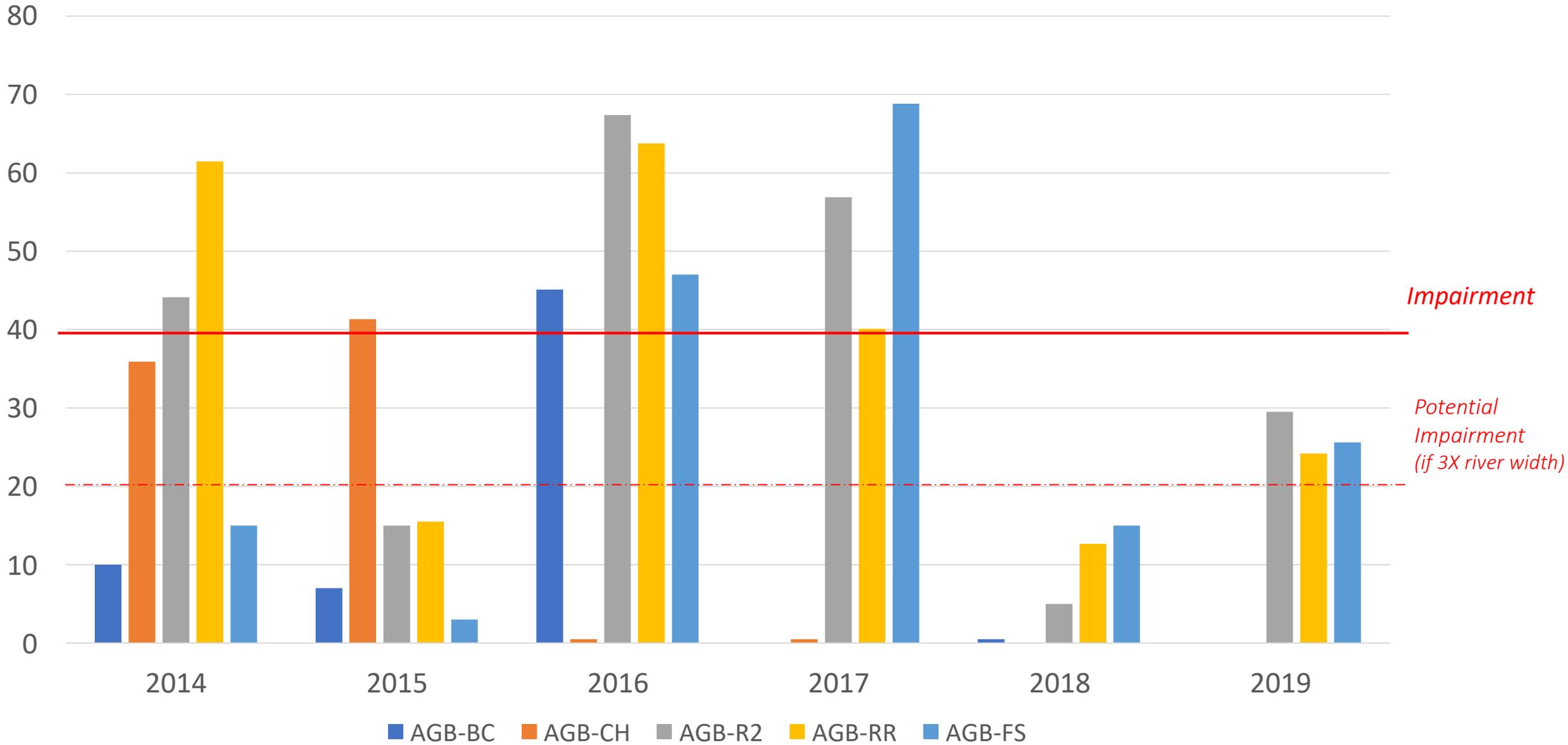
Greenbrier River

Peak Observed Algae Coverage Past 5 Years

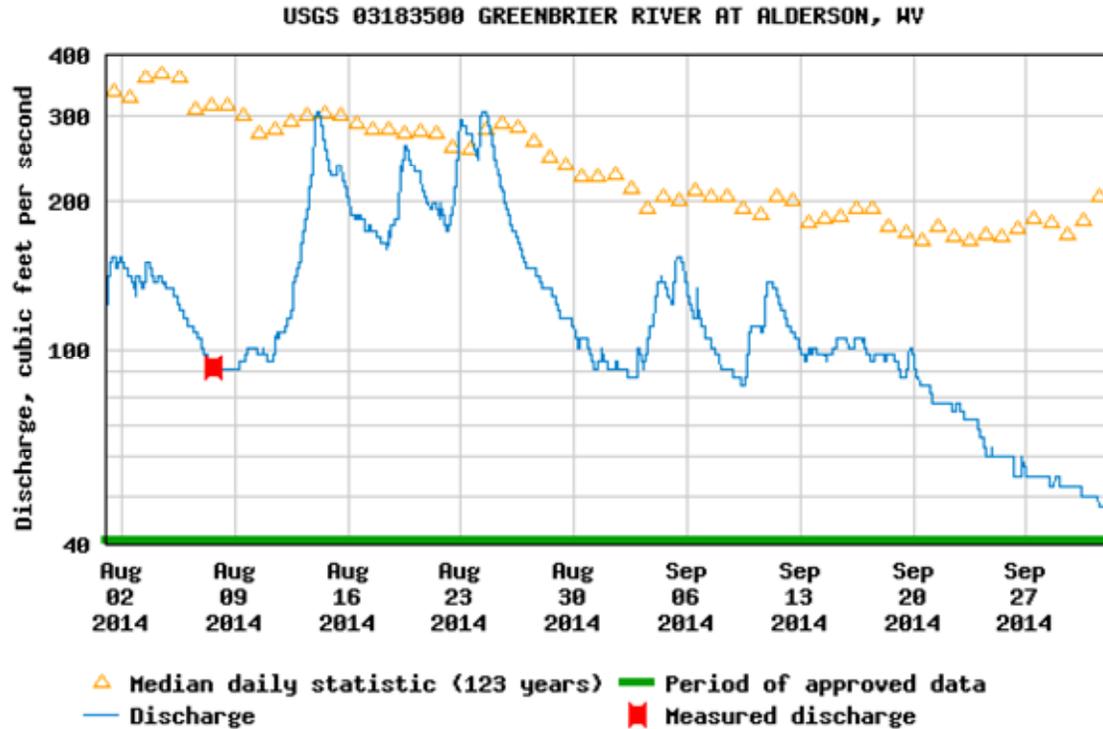
Site ID	2014	2015	2016	2017	2018	2019
AGB-M00 (109.1)	<1	<1	0	<1	0	0
AGB-BC-1-A (101.8)	10	7	45.11	0	<1	0
AGB-SEE (98.2)	-	10	-	<1	-	-
AGB-D2 (90.0)	3	21.08*	8	15	<5	10
AGB-64 (50.1)	0	<1	0	0	<5	0
AGB-CH (46.1)	35.9	41.35	<1	<1	0	0
AGB-R00 (43.8)	8	<1	0	<1	<1	<1
AGB-R2 (43.1)	44.13	15	67.37	56.9	<5	29.5*
AGB-RR (40.6)	61.47	15.52	63.75	40.09	12.67	24.2*
AGB-FS (35.8)	15	3	47.01	68.8	15	25.7*
AGB-GRC (33.9)	4	0	-	3	<1	< 1
AGB-A00 (28.8)	2	<1	<1	<1	<5	< 1
AGB-A2 (26.0)	10	10	10	5	10	< 5
AGB-LBR (18.5)	4	8	5	5	<5	<1
AGB-TAL (16.8)	<1	25*	1	5	15	10

* Not 3 times width

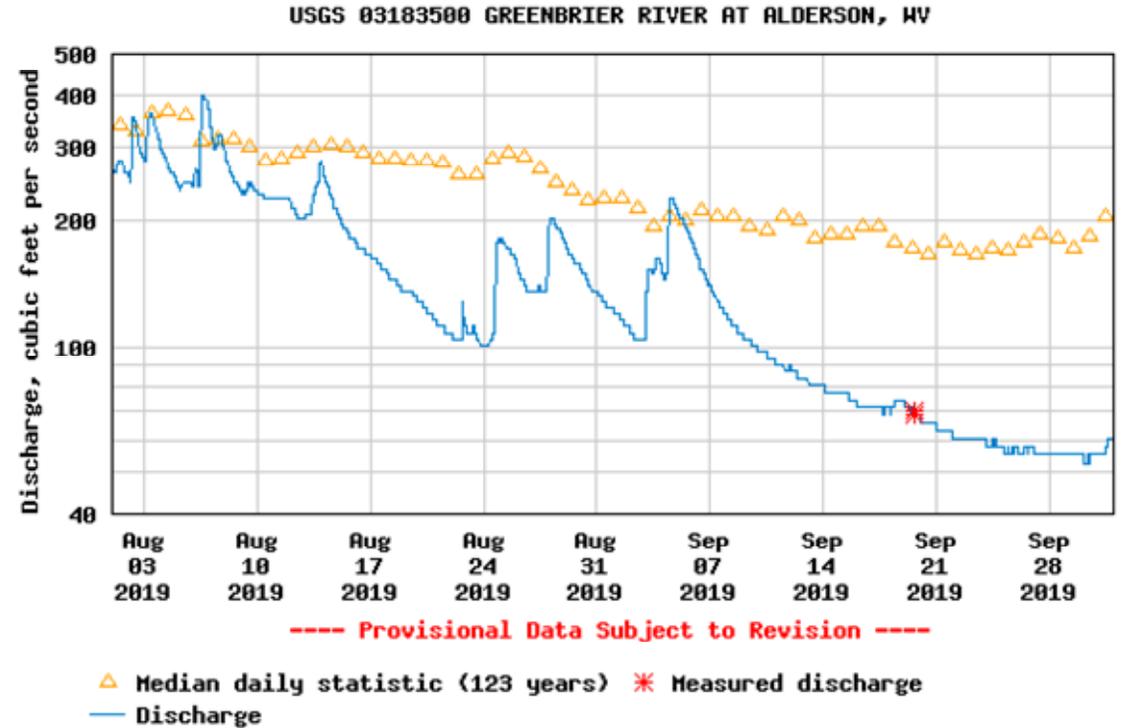
Peak Observed Percentage Algae Coverage By Year



2014

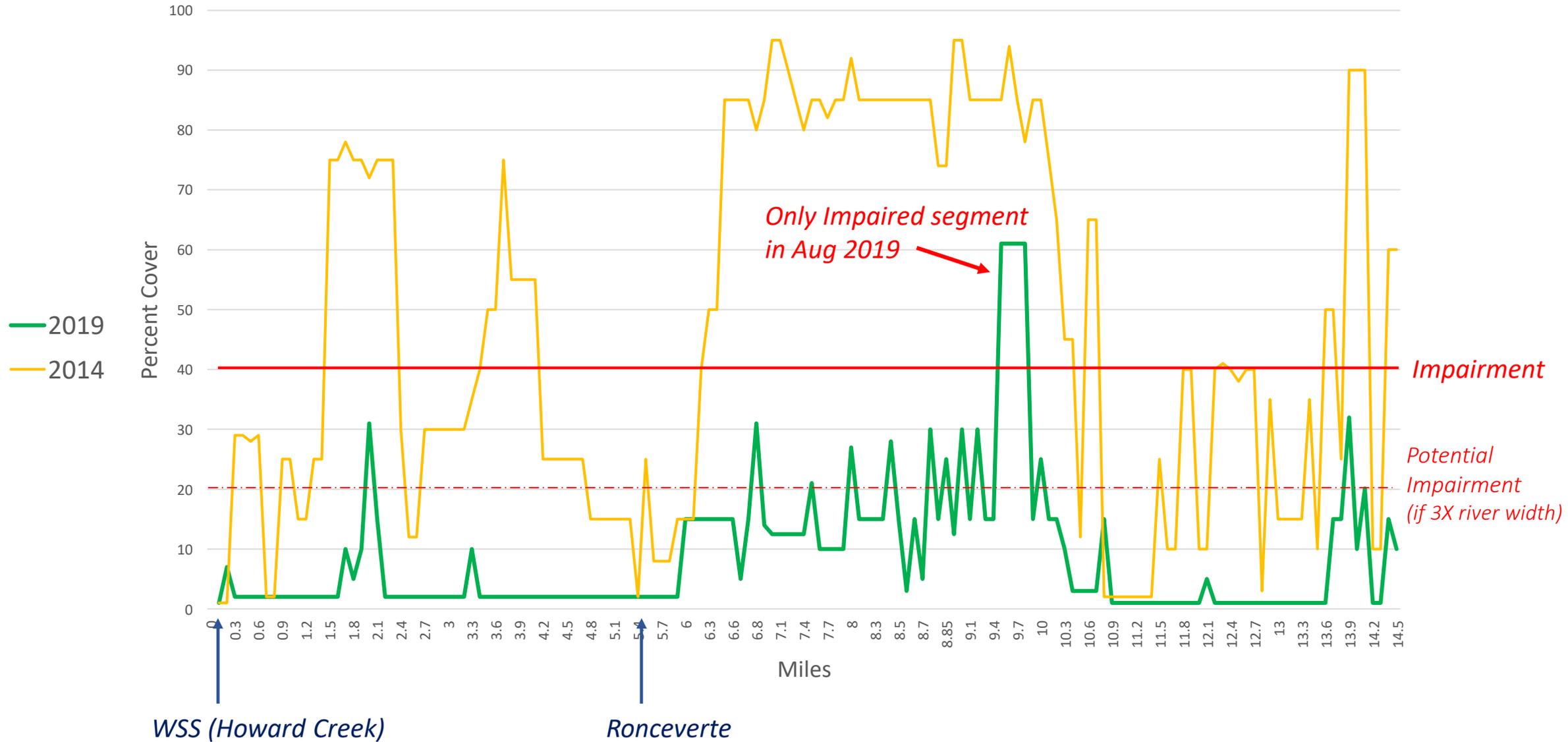


2019



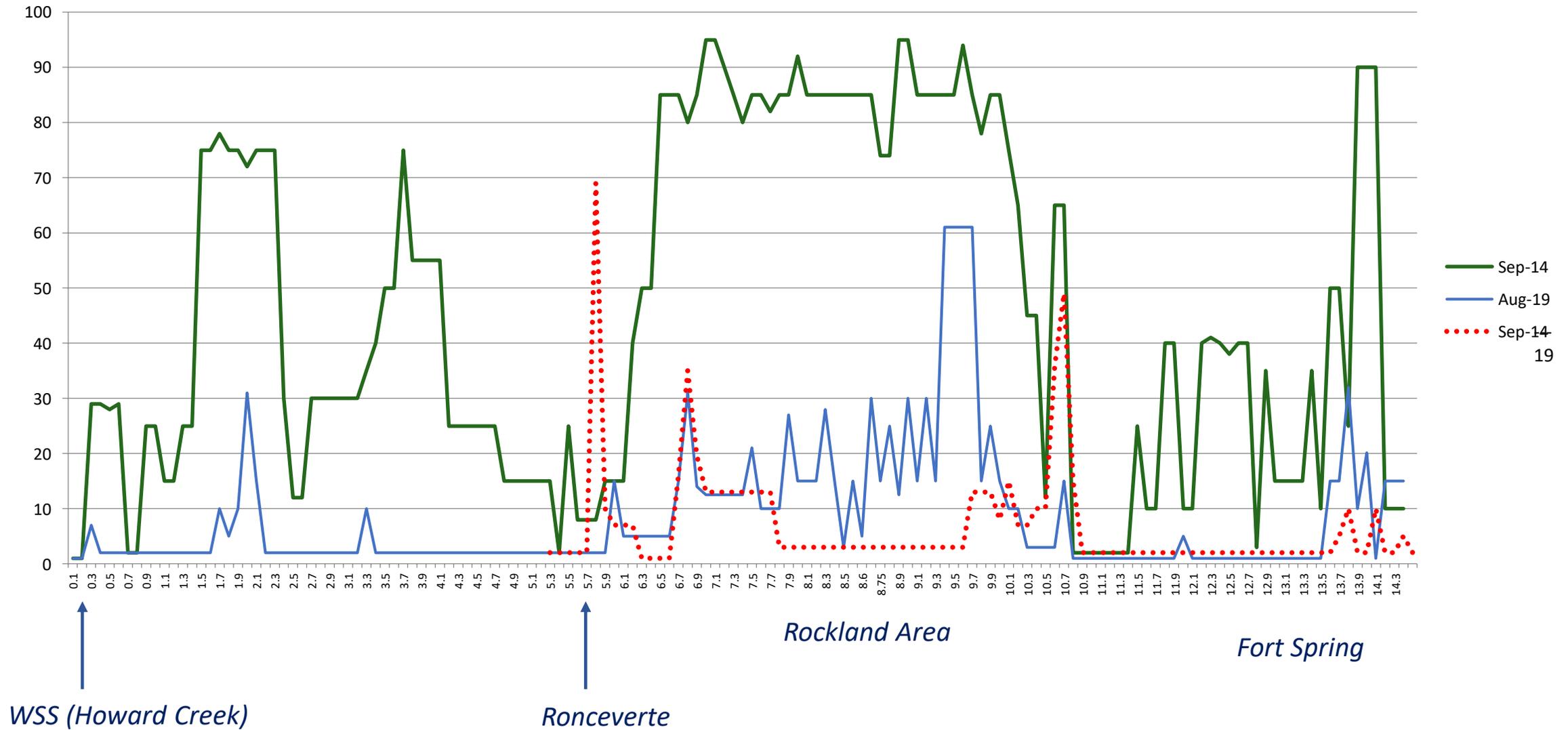
Algae Coverage Comparison 2019 & 2014

Greenbrier River Caldwell to Fort Spring



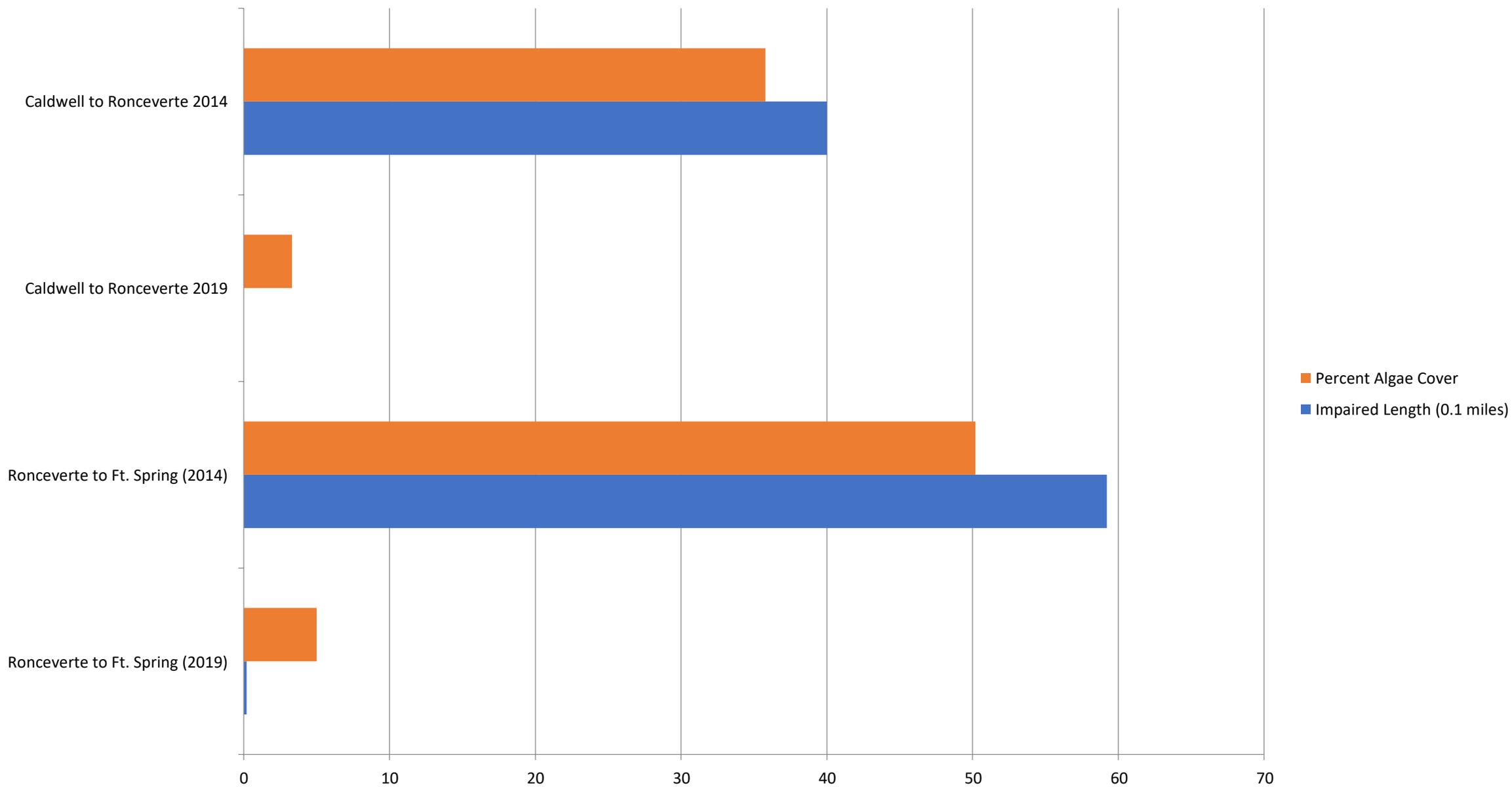
Algae Coverage Comparison 2019 & 2014

Greenbrier River Caldwell to Fort Spring

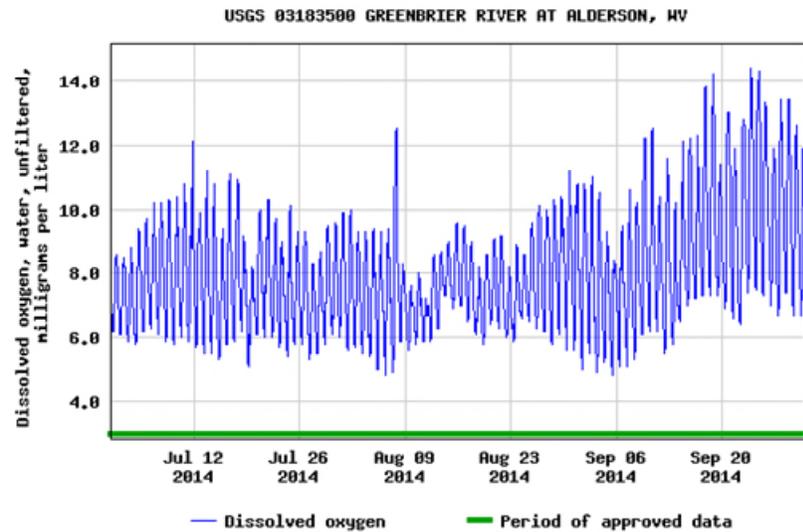
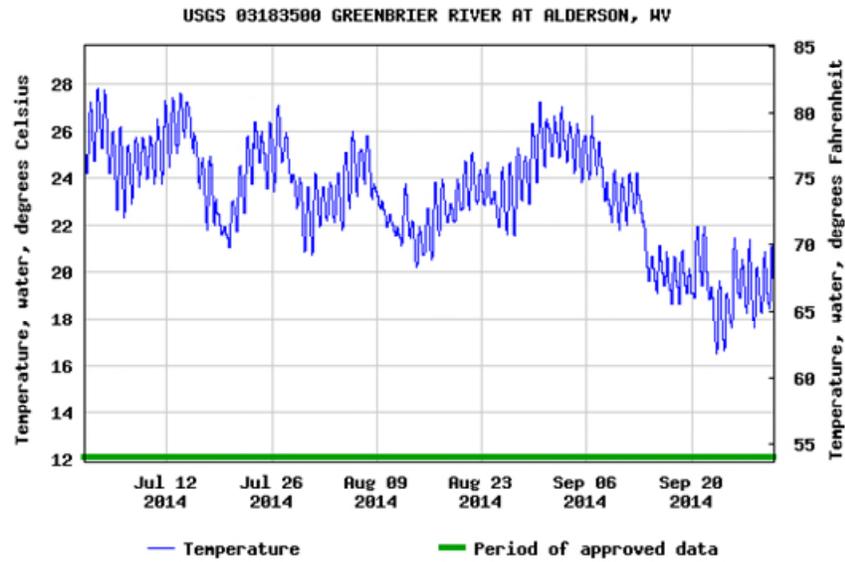


Algae Improvements (Caldwell to Fort Spring)

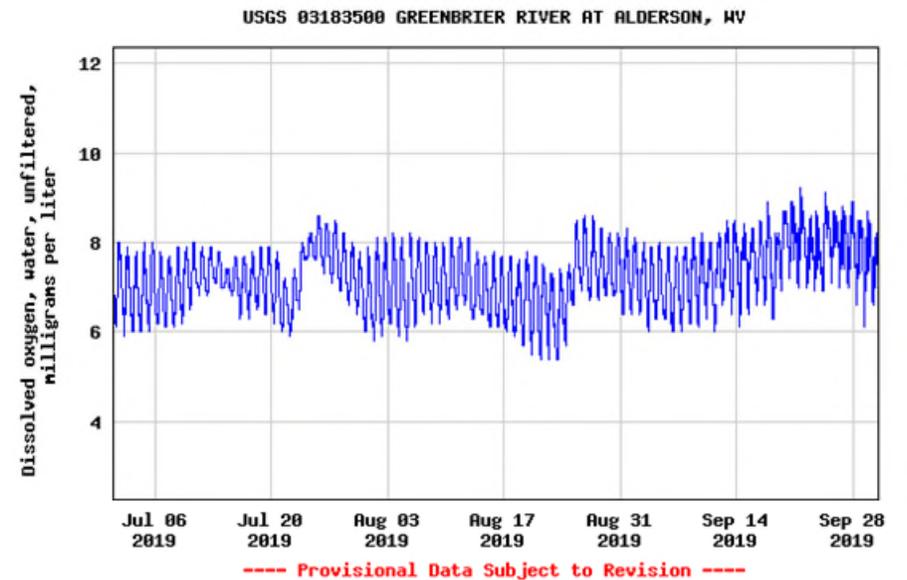
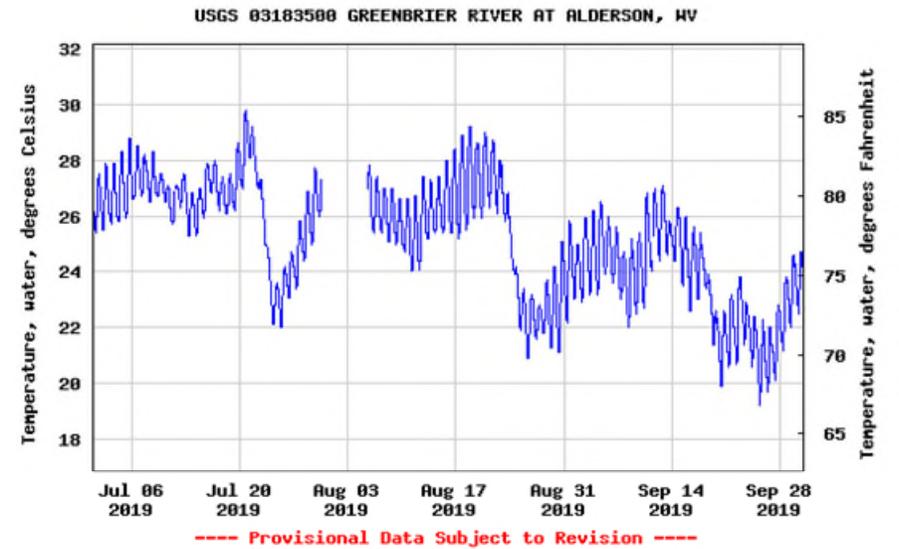
	2014 (Sep)	2019 (Aug Sep)		% Reduction (Aug Sep)
Average Percent Cover	46.9	8.8	7.8	81 - 83
Surface acres of algae	140.1	23.9	13.8	83 - 90
Stream miles impaired	9.9	0.41	0.02	96 - 99.8
Stream miles >40% coverage	6.52	0.41	0.02	93.7 - 99.7



2014



2019



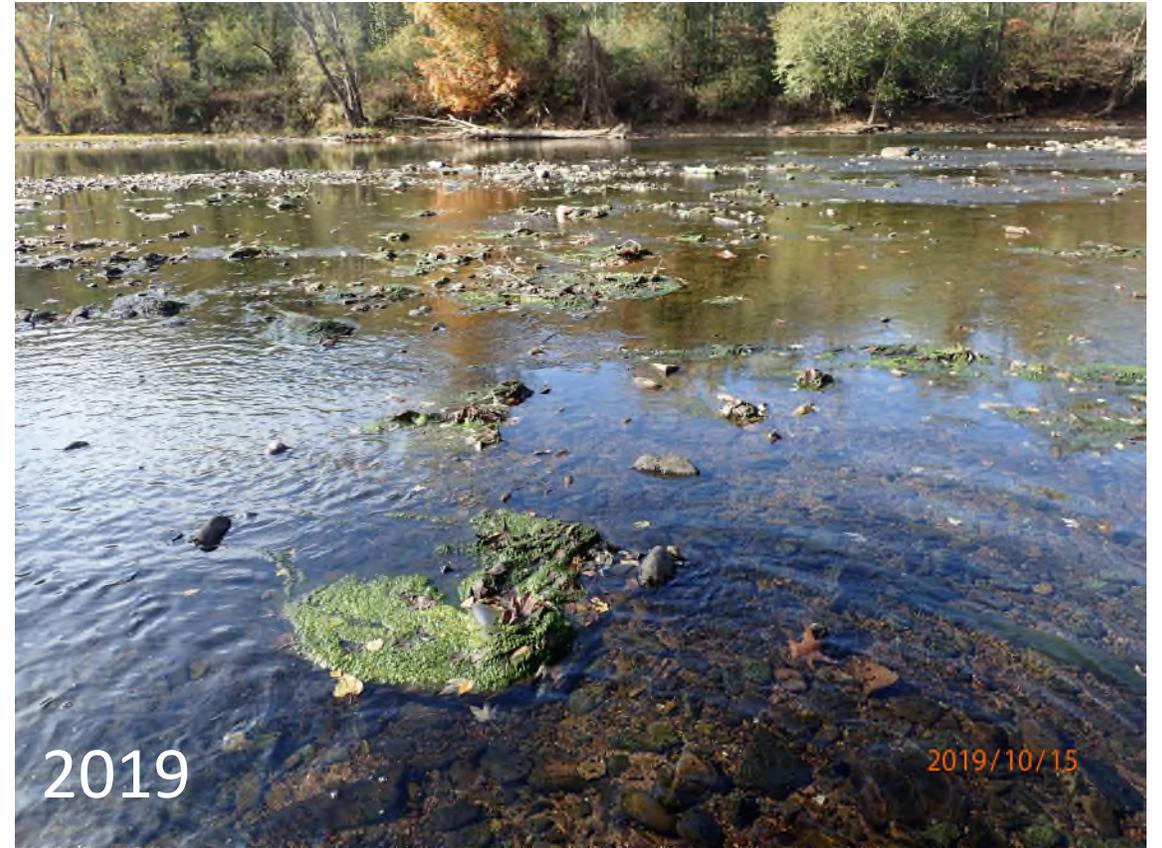
AGB-R2 (first site below Ronceverte WWTP)



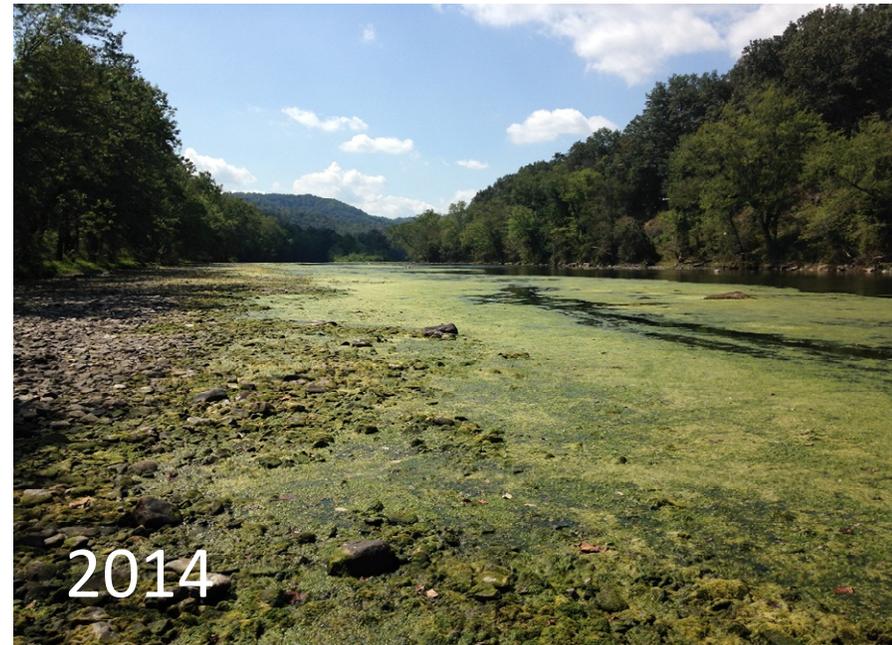
AGB-R2



AGB-R2



AGB-R2 previous years



AGB-RR (Rockland Road)



2019

2019/07/29

AGB-RR



AGB-RR



2019

2019/09/17

AGB-RR



AGB-RR previous years



AGB-FS (Fort Spring)



AGB-FS



AGB-FS previous years



Greenbrier River Moving Forward

- Continue to monitor algae development and growth
- Continue monitoring WWTP nutrient data
- Delist if no further impairment occurs

Tygart Valley River

- Elkins to Norton: Average coverage = 38%, with 48.7 surface acres of algae
- Updating nutrient monitoring from POTWs and instream (through 2020)
- Working with Elkins and WVU on possible alternative treatment solutions



New River

- Elevated levels were noted downstream of the VA line in late summer
- Only time significant amount observed at long term monitoring station
- Will continue monitoring in future and respond accordingly.

Buckhannon River and Elk River

- NOT listed as impaired
- Buckhannon hasn't shown levels of concern since 2015
- Elk had elevated levels above Clay, only in 2017



South Branch Potomac River

- LISTED as impaired (Moorefield to Romney area)
- Hasn't exceeded listing threshold since 2014
- Expect to DE-LIST recreational algae impairment in 2020



Bluestone River





Chris Smith
Phone: 304-926-0499 ext. 1341
Email: Chris.B.Smith@wv.gov

