

# Algae Impairment Monitoring Update

August 22, 2019



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**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.



# Filamentous Green Algae





# Algae: How much is too much?

- DEP Guidelines for Listing Document

Based on:

- Study conducted in 2012 by Responsive Management
- 1,001 completed interviews
- Participants were asked:

Questions regarding their recreational uses of the waters

Questions regarding their opinions of algae

What levels of coverage would prevent them from using the water for recreational activities



# Favorable conditions allowing for algae growth

- Low flow
- Warm water temperature and sunlight
- Low turbidity
- Nutrients (nitrogen and phosphorus)
- Hardness (typically below 150 mg/l)
- Alkalinity (typically above 35 mg/l)

# Rivers where we have seen algae blooms

- Greenbrier
- Tygart
- Buckhannon
- Elk
- Bluestone
- Cacapon
- South Branch Potomac



# 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



# WWTP upgrades now online

- Alderson
- Ronceverte
- White Sulphur Springs



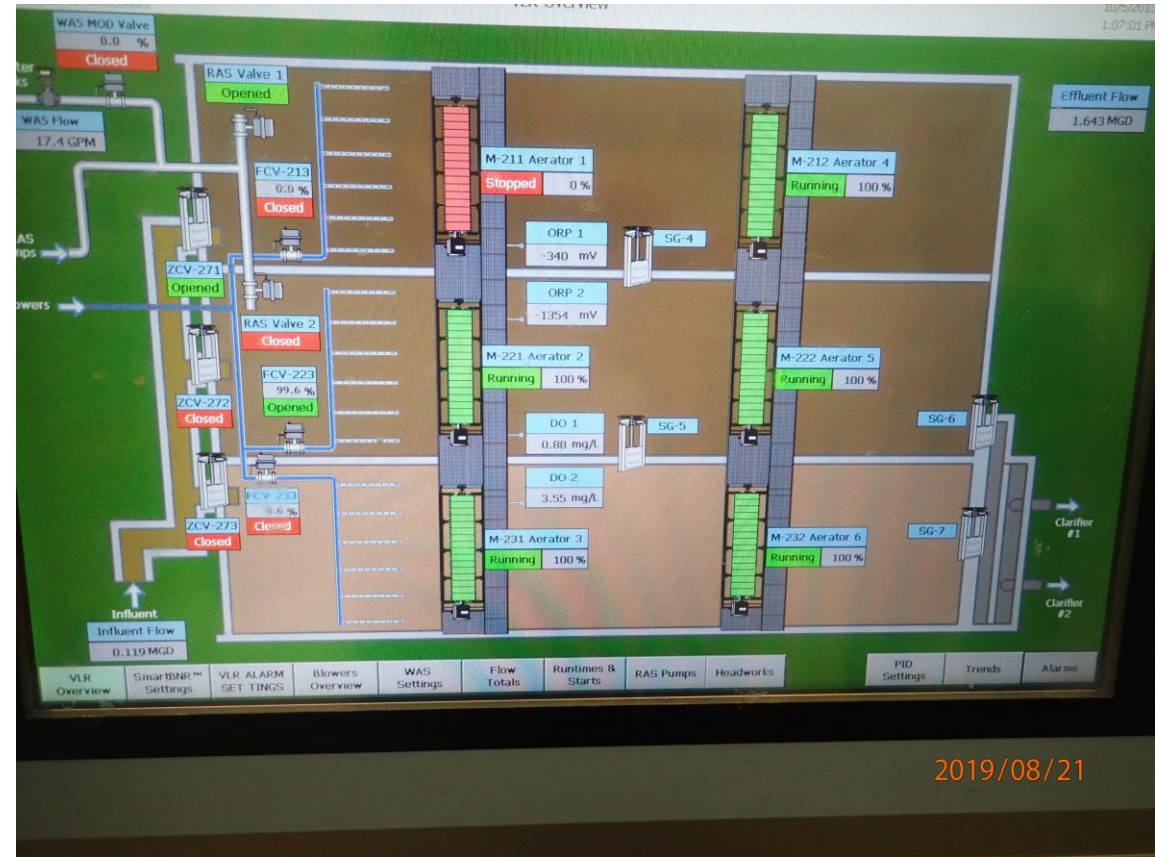


# Ronceverte Wastewater Treatment Plant





# Control Room





# VLRs and Clarifiers

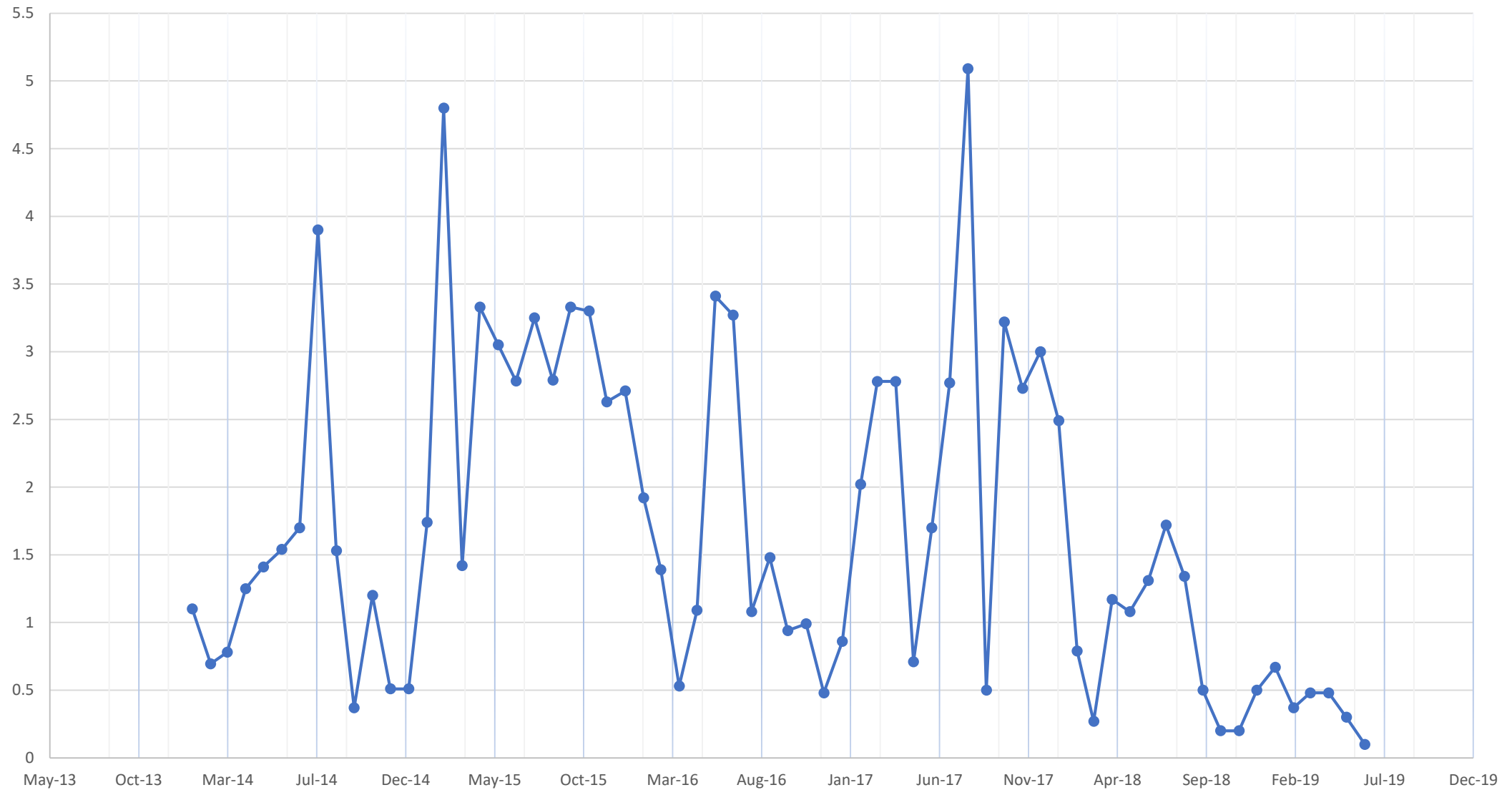




# Tertiary Filters and Digester

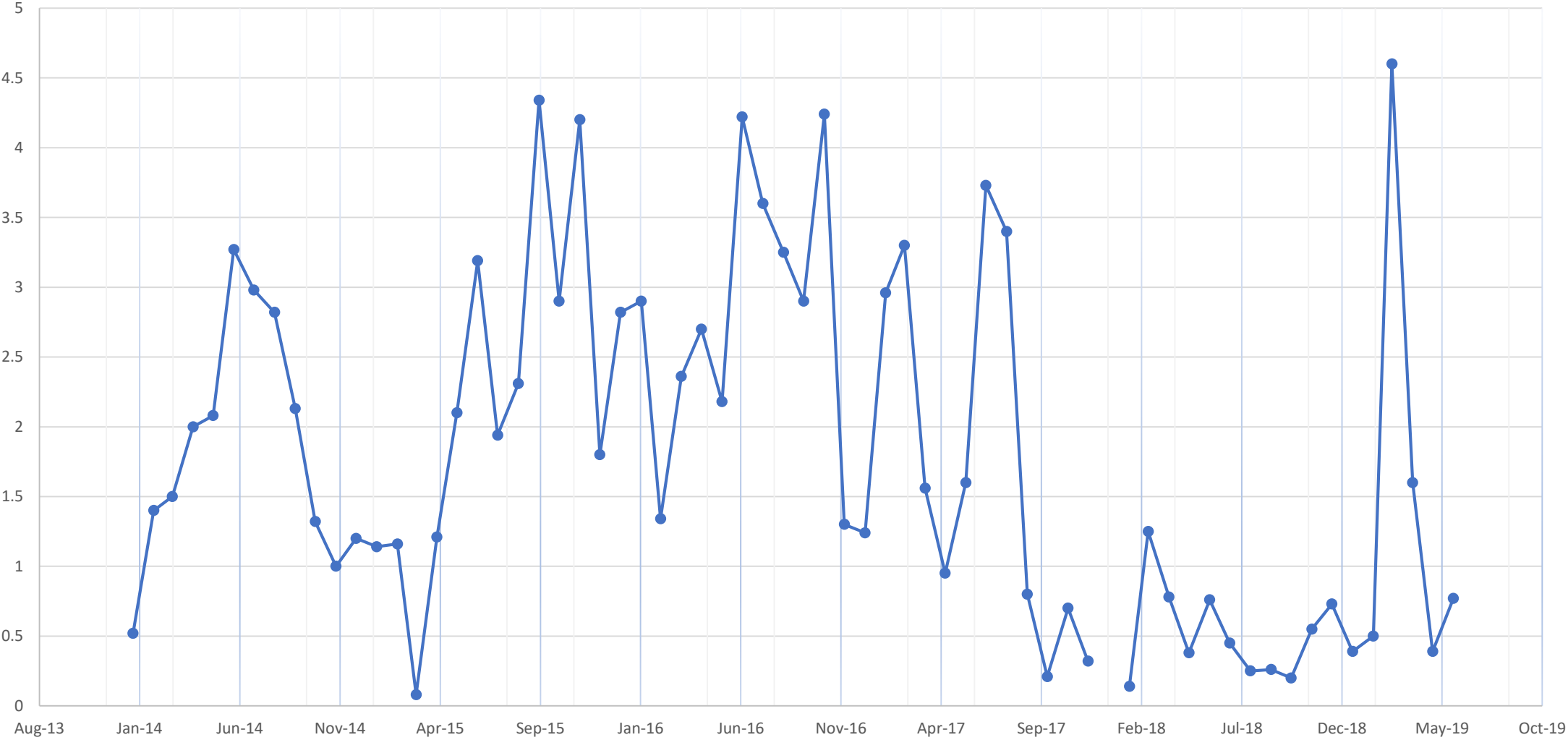


Ronceverte Total Phosphorus Monthly Average (mg/l)

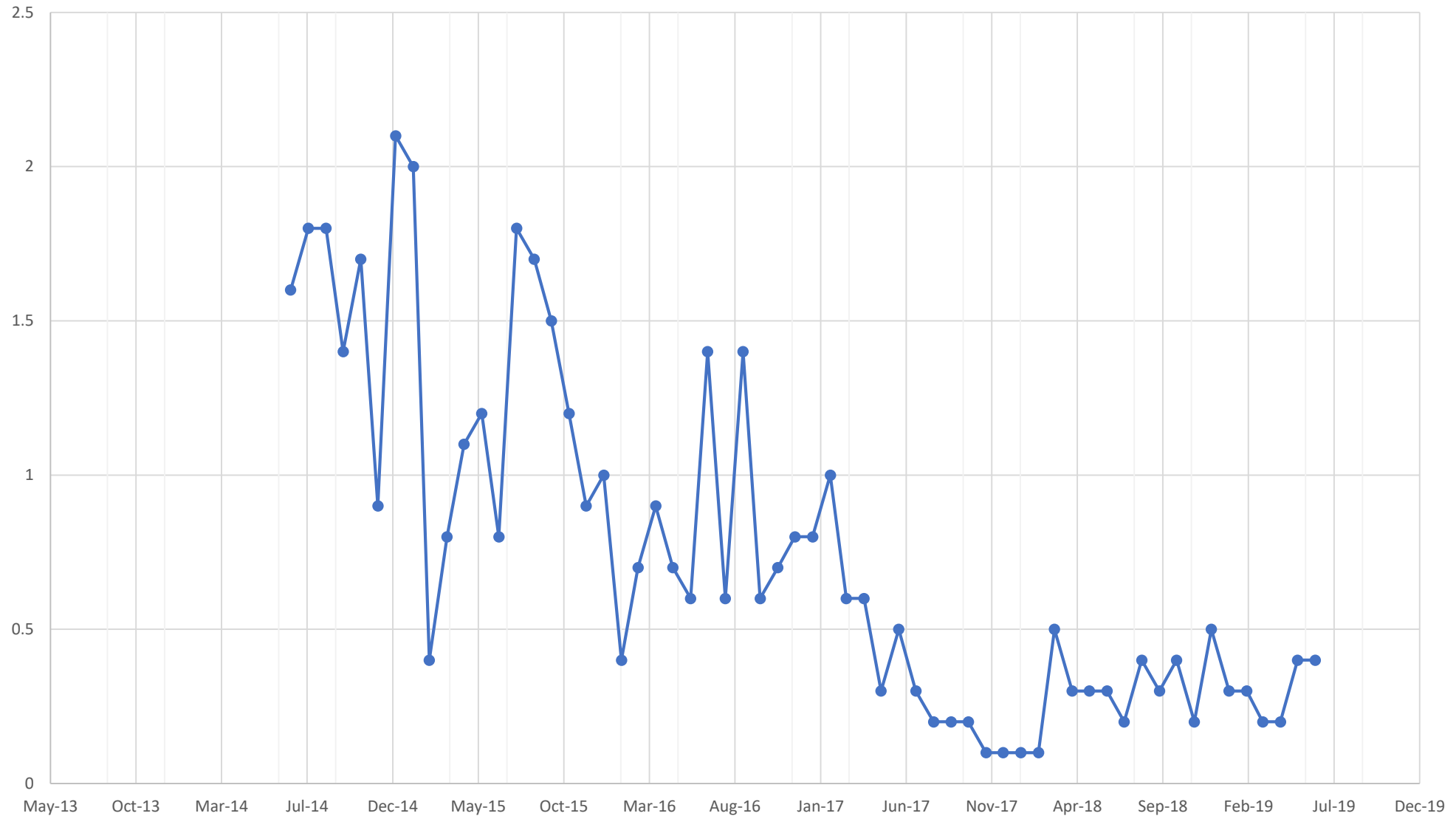




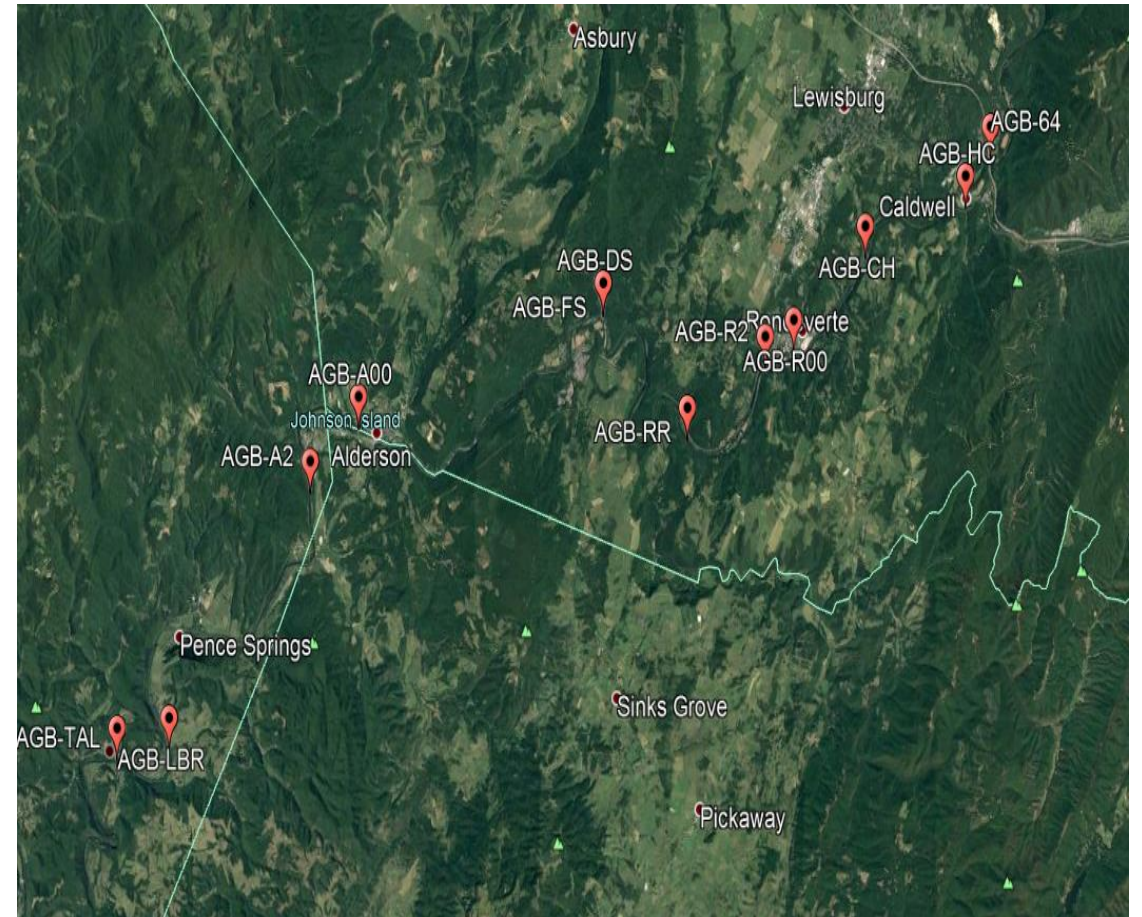
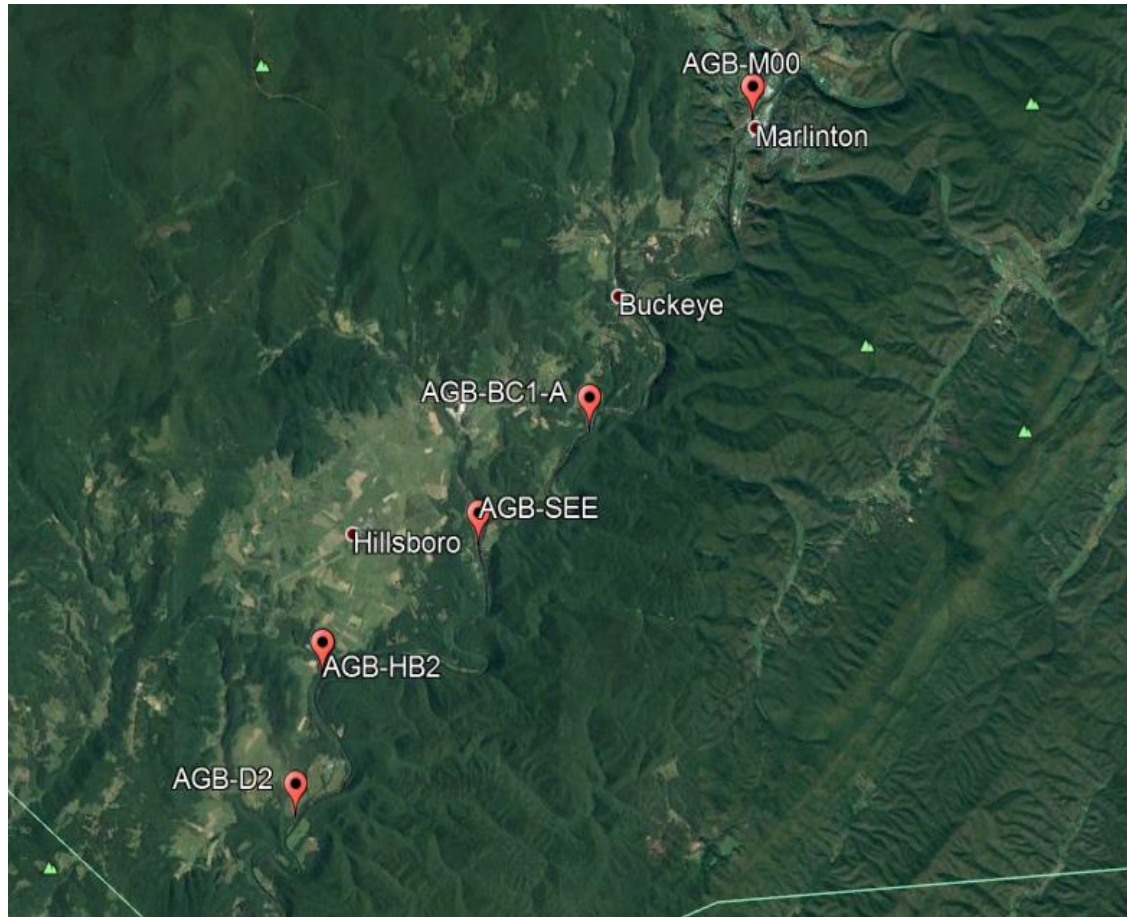
Alderson Total Phosphorus Monthly Average (mg/l)



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



# Greenbrier River sampling and observation sites





# 2018 – A year of record precipitation

## Record rainfall was the story of 2018 weather in West Virginia

SHARE ARTICLE

By **Jake Flatley** in **News** | January 01, 2019 at 4:30PM



Like 34

Tweet

Share 12

**CHARLESTON, W.Va.** — Fans of rain certainly enjoyed 2018 in West Virginia.

Record-breaking rainfall was the story of the year in the state weather wise.

“This year has been unusually wet,” Andy Chilian, WSAZ Meteorologist, said. “For example for Charleston, this is the wettest year on record. And the records go back in the late 1890s.”

Chilian said Charleston broke its 2003 record of 61 inches of rain by more than five inches. Yeager Airport in the capital city measured 66.56 inches of rain on the final day of the calendar year.

2018 broke the yearly record for rainfall for a lot of places in the state while one month broke the monthly record.

“September in Charleston was the wettest on record by far with 11 inches of rain,” Chilian said.



Governor Jim Justice @WVGovernor

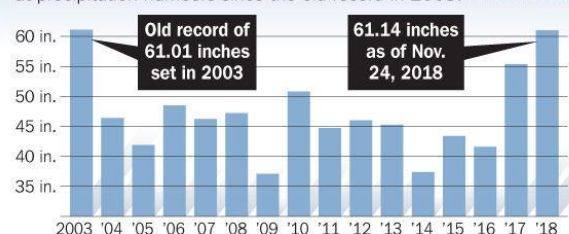
Early this morning I declared a State of Emergency for all 55 counties, after heavy rain triggered flooding in multiple locations and was expected to continue throughout the weekend. Our @guard\_wv, and the Emergency Operations Center at @WVDHSEM are on standby to help. #wvgov

42 9:17 AM - Feb 17, 2018

49 people are talking about this

### Wettest year on record

With five weeks remaining, 2018 is already Charleston's wettest year on record. Here is a look at precipitation numbers since the old record in 2003:



Source: National Weather Service in Charleston

Gazette-M

Greenbrier County

## Heavy Rainfall Fills Greenbrier River in Flash Flood Watch

By: Regina Gonzalez

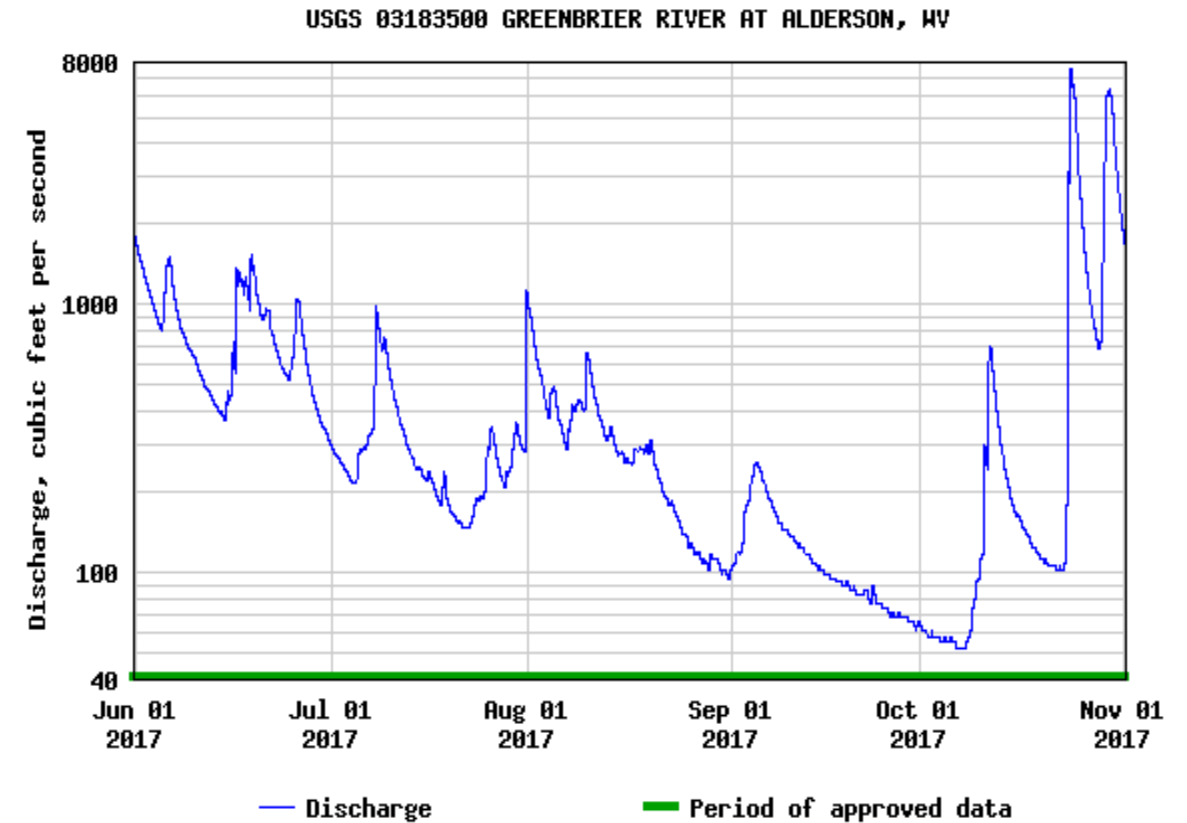
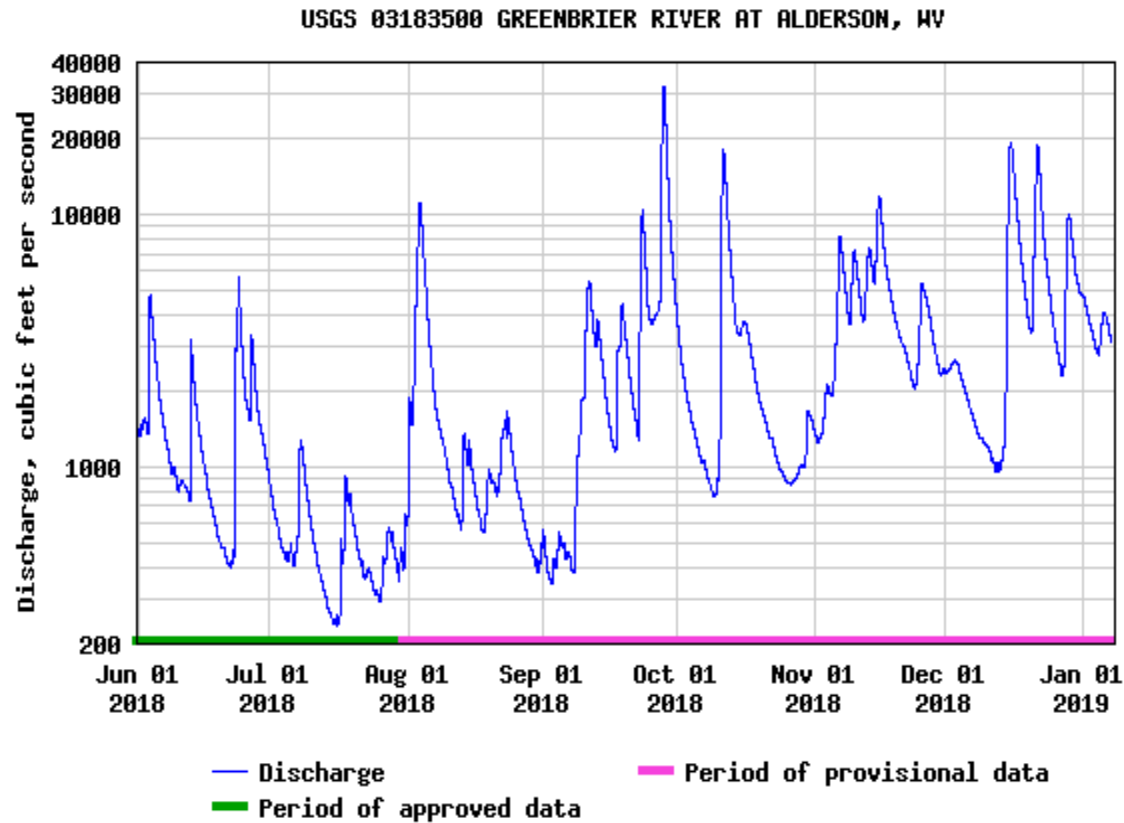
Posted: Aug 03, 2018 06:51 PM EDT

Updated: Aug 03, 2018 06:51 PM EDT



RONCEVERTE, WV (WVNS) - Day after day of endless rain was enough to keep the Greenbrier River moving rough through Ronceverte. It was one of many flowing through areas under flash flood watch.

# 2018 vs. 2017 flows lower Greenbrier





# Greenbrier River

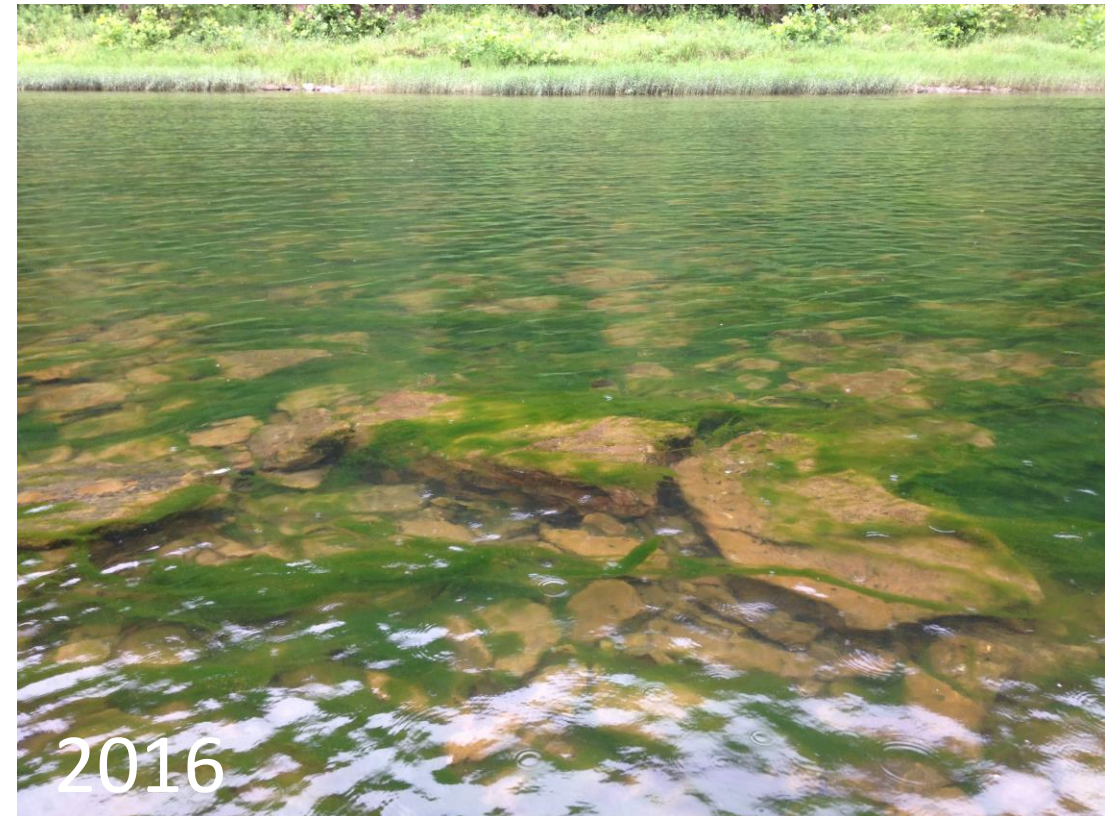
## Peak Observed Algae Coverage Past 5 Years

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	0
AGB-R2 (43.1)	44.13	15	67.37	56.9	<5	< 1
AGB-RR (40.6)	61.47	15.52	63.75	40.09	12.67	24.17*
AGB-FS (35.8)	15	3	47.01	68.8	15	25.6*
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

# AGB-BC-1-A (Below Beaver Creek)

	2014	2015	2016	2017	2018	2019
AGB-BC-1-A (101.8)	10	7	45.11	0	<1	0





# AGB-CH (Coffman Hill)

	2014	2015	2016	2017	2018	2019
AGB-CH (46.1)	34.47	41.35	<1	<1	0	0





# AGB-R2 (first site below Ronceverte WWTP)

	2014	2015	2016	2017	2018	2019
AGB-R2 (43.1)	40.21	15	67.37	56.9	<5	< 1





# AGB-R2

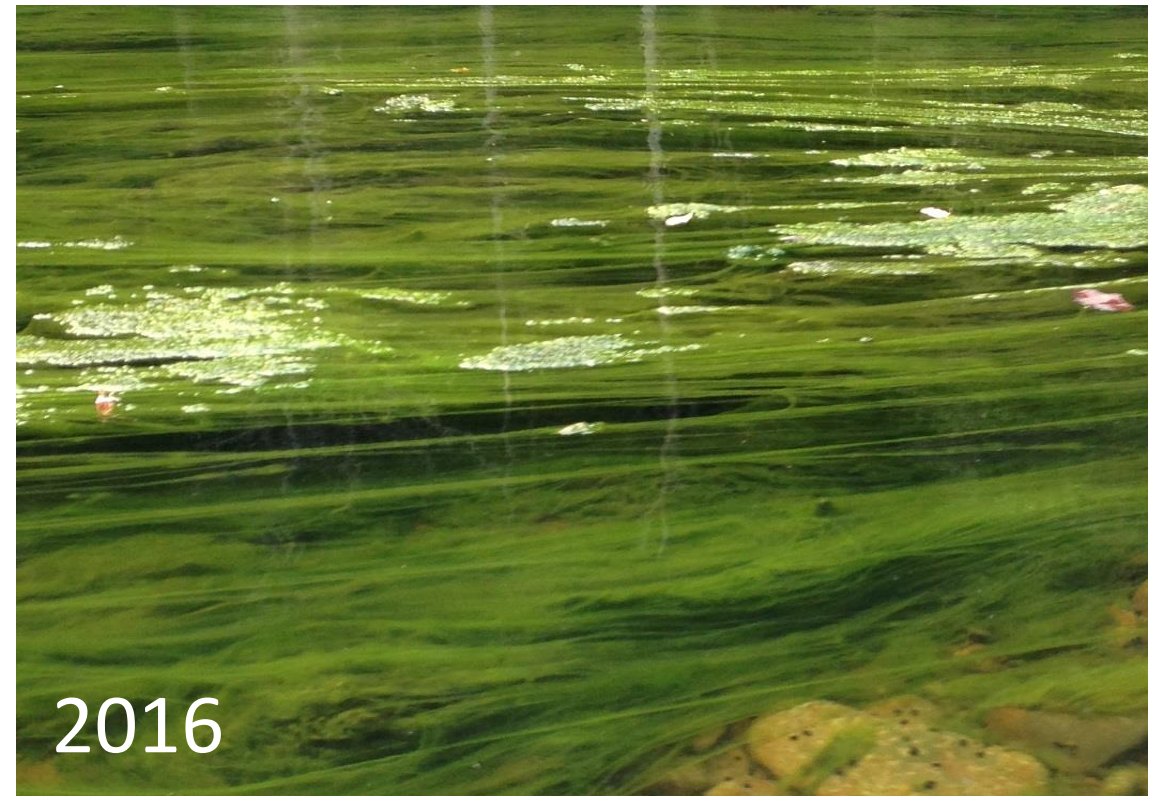
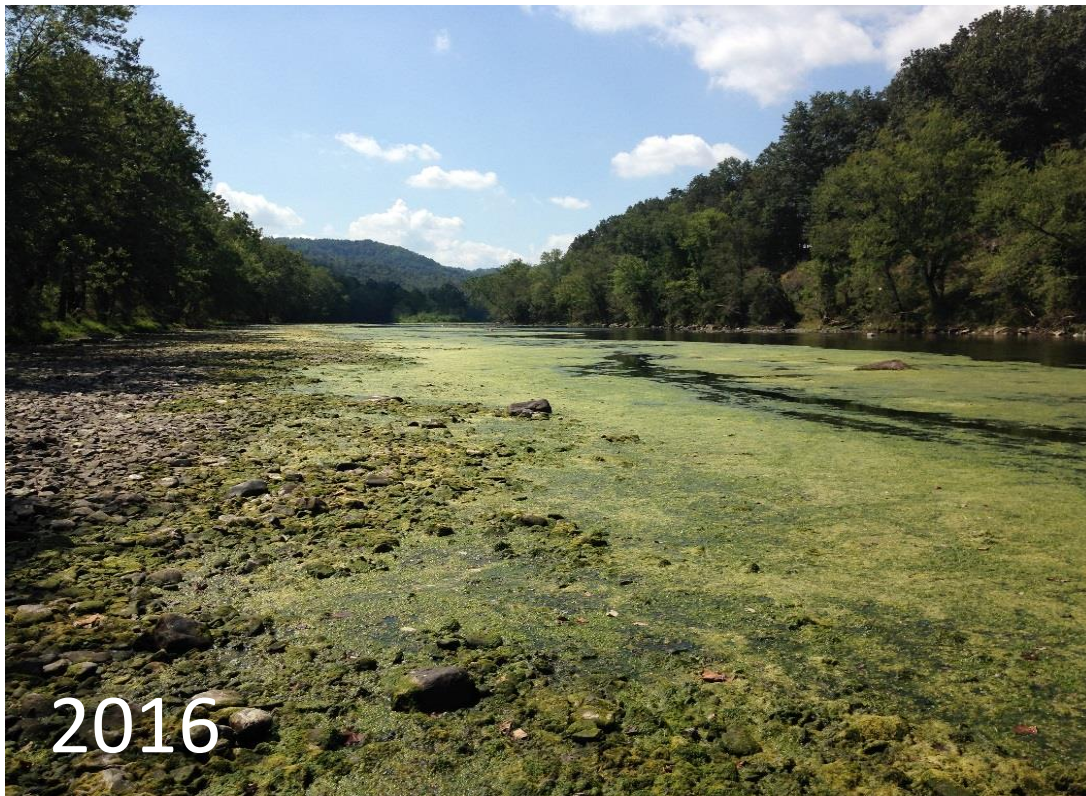
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	2014	2015	2016	2017	2018	2019
AGB-R2 (43.1)	40.21	15	67.37	56.9	<5	< 1



2014



# AGB-RR (Rockland Road)

	2014	2015	2016	2017	2018	2019
AGB-RR (40.6)	61.47	15	63.75	40.09	12.67	24.17





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	2014	2015	2016	2017	2018	2019
AGB-RR (40.6)	61.47	15	63.75	40.09	12.67	24.17





# AGB-RR

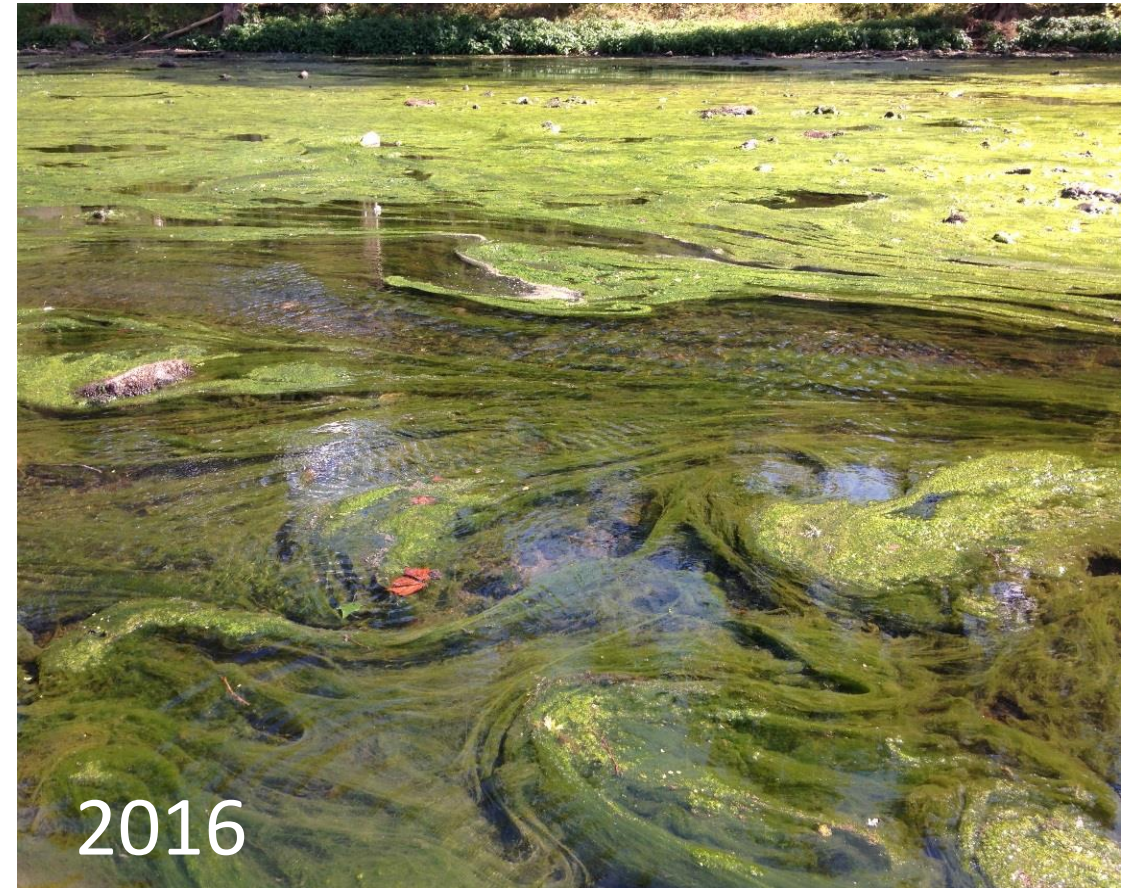
	2014	2015	2016	2017	2018	2019
AGB-RR (40.6)	61.47	15	63.75	40.09	12.67	24.17





# AGB-RR

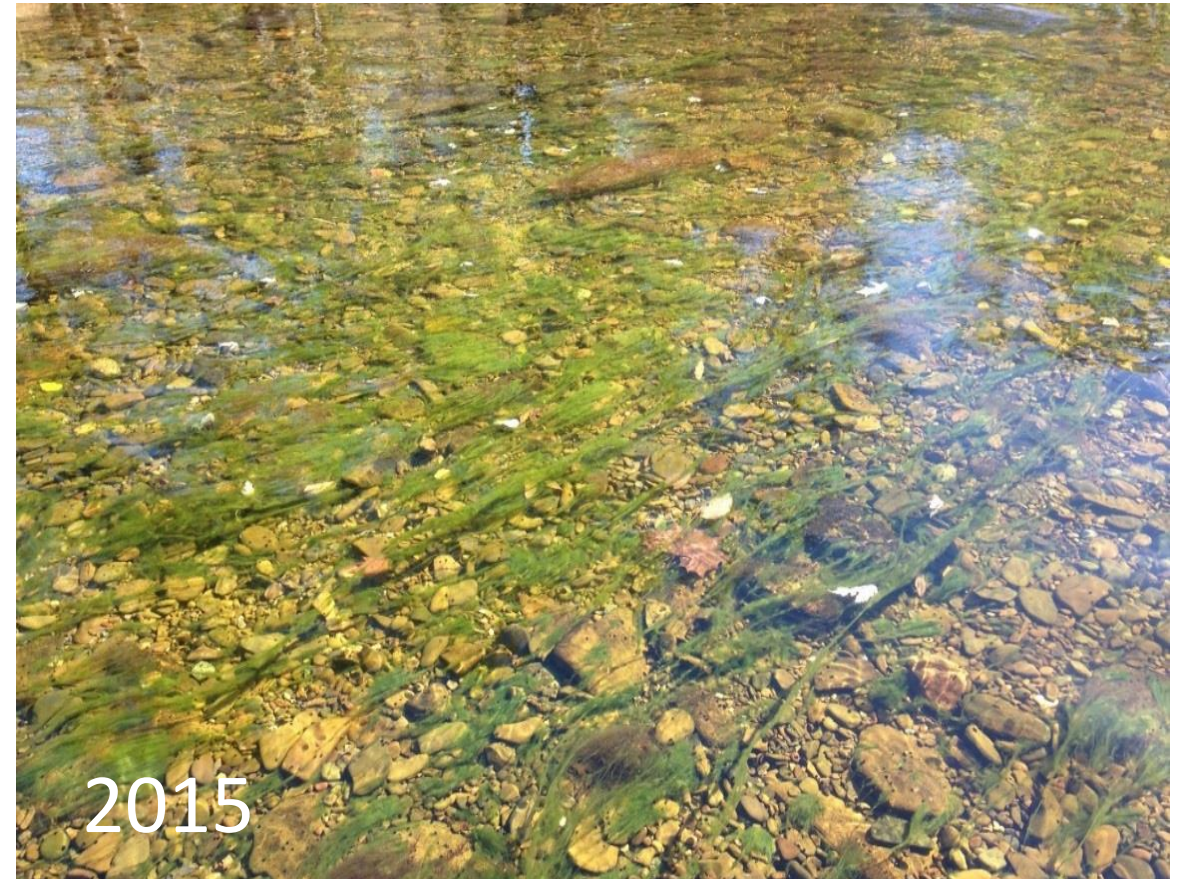
	2014	2015	2016	2017	2018	2019
AGB-RR (40.6)	61.47	15	63.75	40.09	12.67	24.17





# AGB-RR

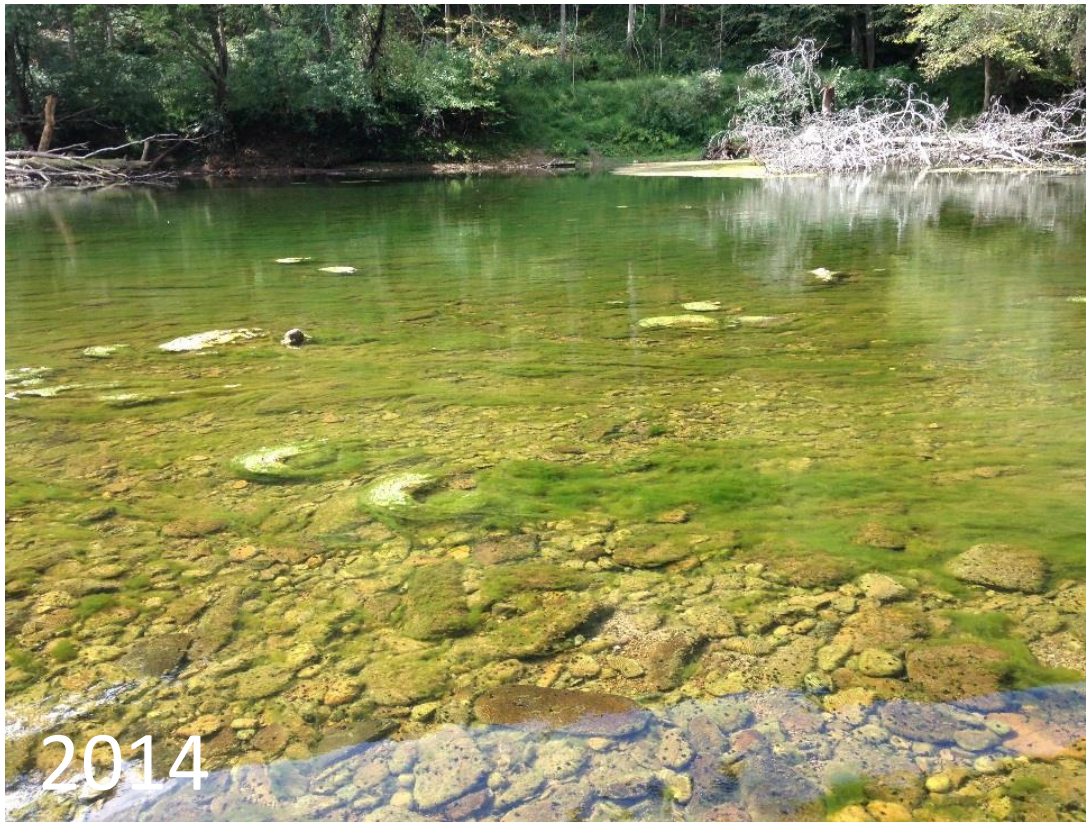
	2014	2015	2016	2017	2018	2019
AGB-RR (40.6)	61.47	15	63.75	40.09	12.67	24.17





# AGB-RR

	2014	2015	2016	2017	2018	2019
AGB-RR (40.6)	61.47	15	63.75	40.09	12.67	14.6





# AGB-FS (Fort Spring)

	2014	2015	2016	2017	2018	2019
AGB-FS (35.8)	15	3	47.01	68.8	15	25.6





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	2014	2015	2016	2017	2018	2019
AGB-FS (35.8)	15	3	47.01	68.8	15	25.6





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# Greenbrier River Moving Forward

- Continue to monitor algae growth
- Continue sampling
- Continue monitoring WWTP data
- Delist if impairment ceases



# Tygart Valley River

- One round of sampling this year (12 stations Huttonsville to Norton)  
Results pending
- Levels of algae exceeding impairment threshold observed in Elkins area
- Significant SAV below Beverly, but no filamentous algae
- Two more rounds of sampling planned Aug-Sept.
- DEP is working toward a restoration plan
- Discussions with Elkins WWTP about phosphorus reduction



# Buckhannon River

- One round of sampling (4 stations Hall to Tennerton)  
Results pending
- Two more rounds of sampling planned Aug-Sept.
- No appreciable filamentous algae observed (unimpaired)  
No impaired levels observed since 2015





# South Branch of Potomac

- Observations (longitudinal Aug 2019)
  - No impairment observed
- Potential delisting in 2020



# Elk River

- Impairment observed in 2017
- Continuing to sample and monitor





# Bluestone River







Thank you!

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