

2019 Annual Water Resources Report

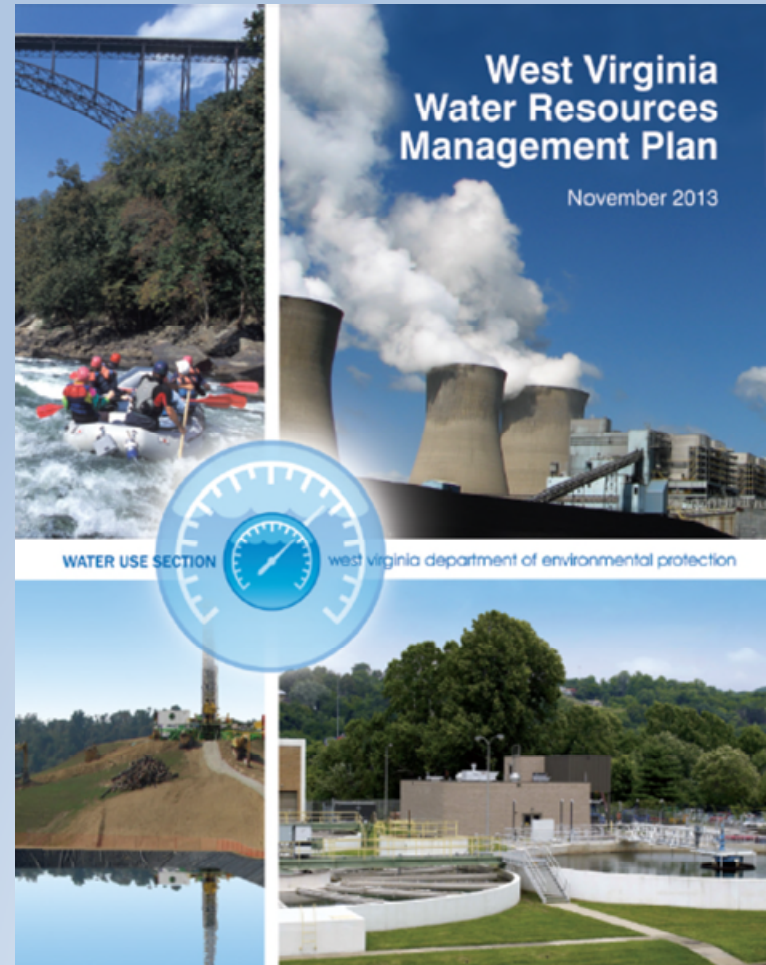
Joint Legislative Oversight Commission on State Water Resources



West Virginia Department of Environmental Protection
Division of Water and Waste Management
Water Use Section

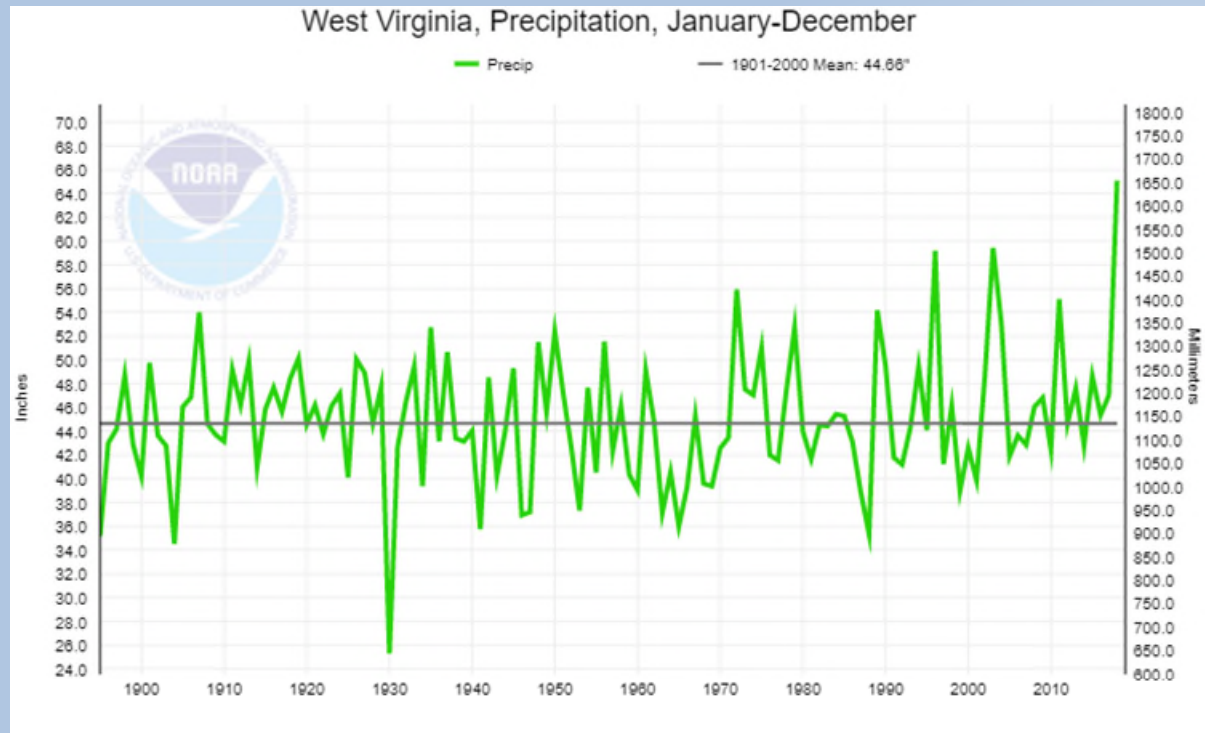
Water Resources Management Overview

- WV Code 22-26 originally passed in 2004.
- Senate Bill 641 renamed it the Water Resources Protection and Management Act in 2008.
- The WVDEP Water Use Section was created to accomplish the Act's requirements.
- The WV Water Resources Management Plan was submitted on November 22, 2013.
- The Plan was adopted as part of Senate Bill 373 in 2014.



2018-2019 Water Resources Availability

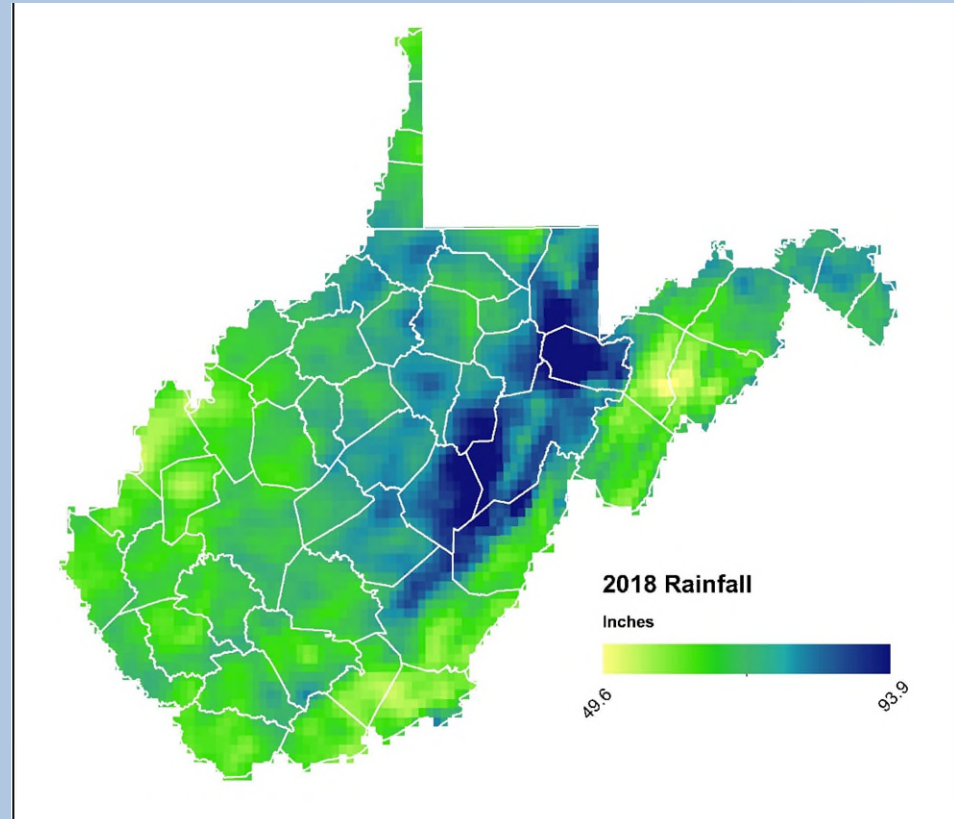
- **2018 - record rainfall**
- **2019 - average rainfall with dry periods March-April and August-October**



West Virginia's annual precipitation from 1895 – 2018. Note 2018 record (NOAA)

2018-2019 Water Resources Availability

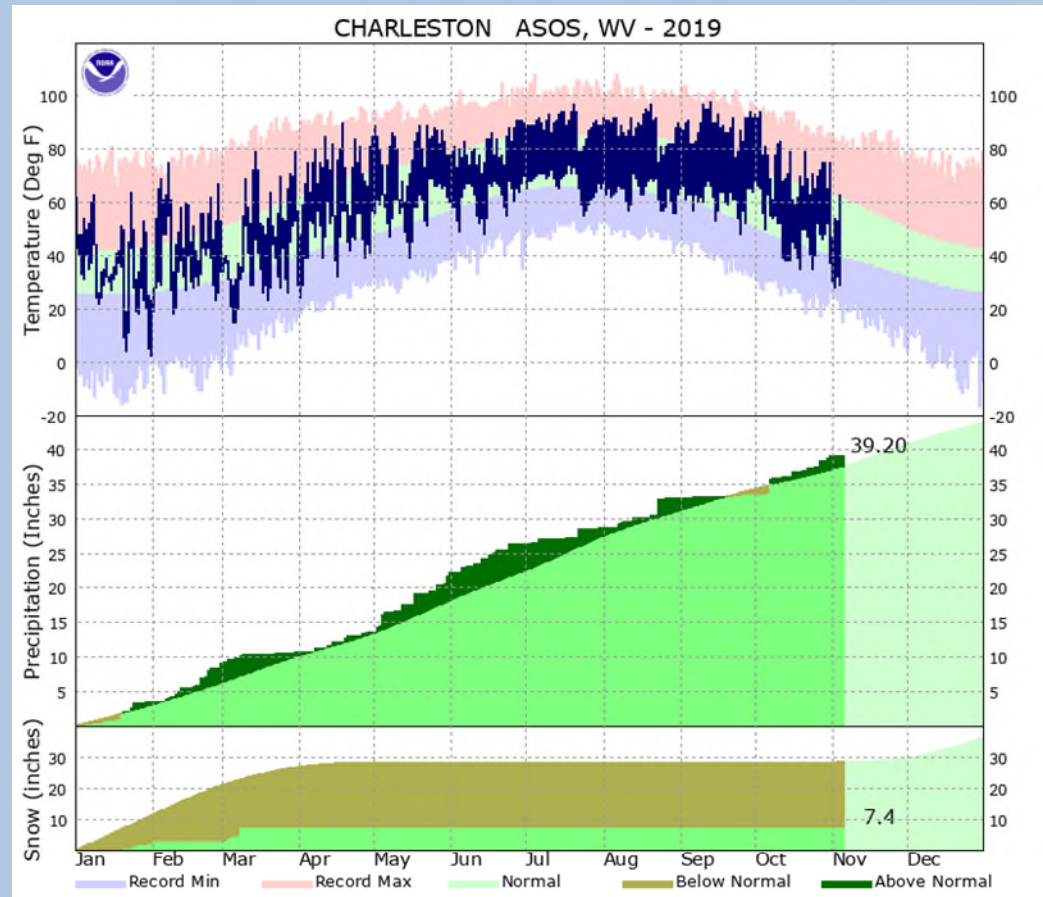
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West Virginia's 2018 annual precipitation totals (OSU PRISM)

2018-2019 Water Resources Availability

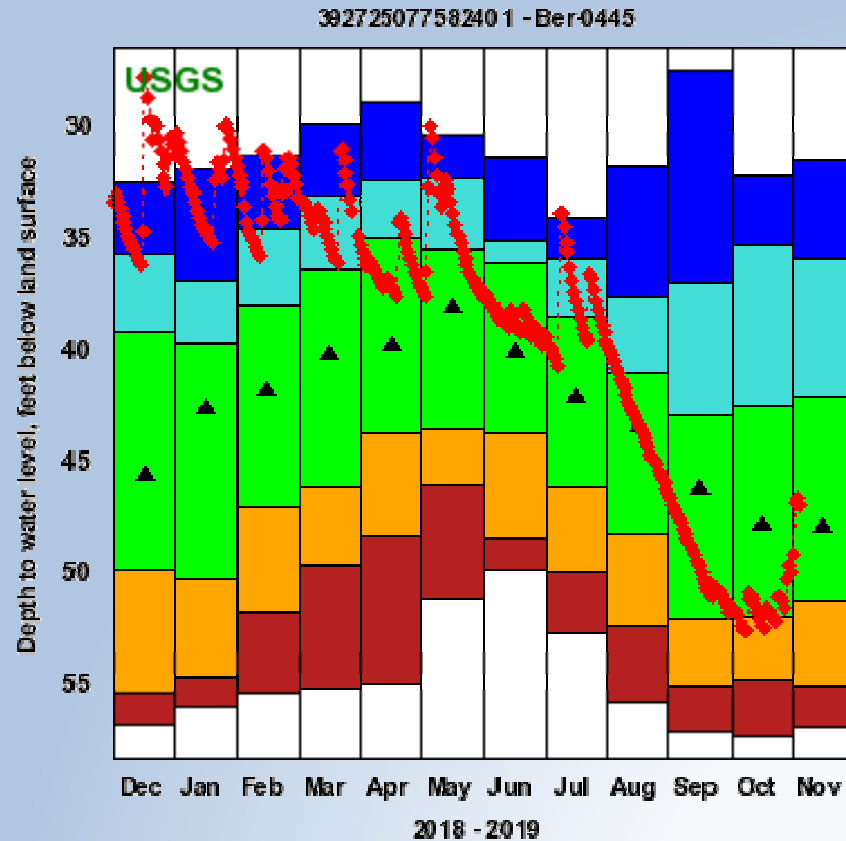
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Climate data for Charleston, WV from January – November 2019 (NOAA)

2018-2019 Water Resources Availability

- 2018 - record rainfall
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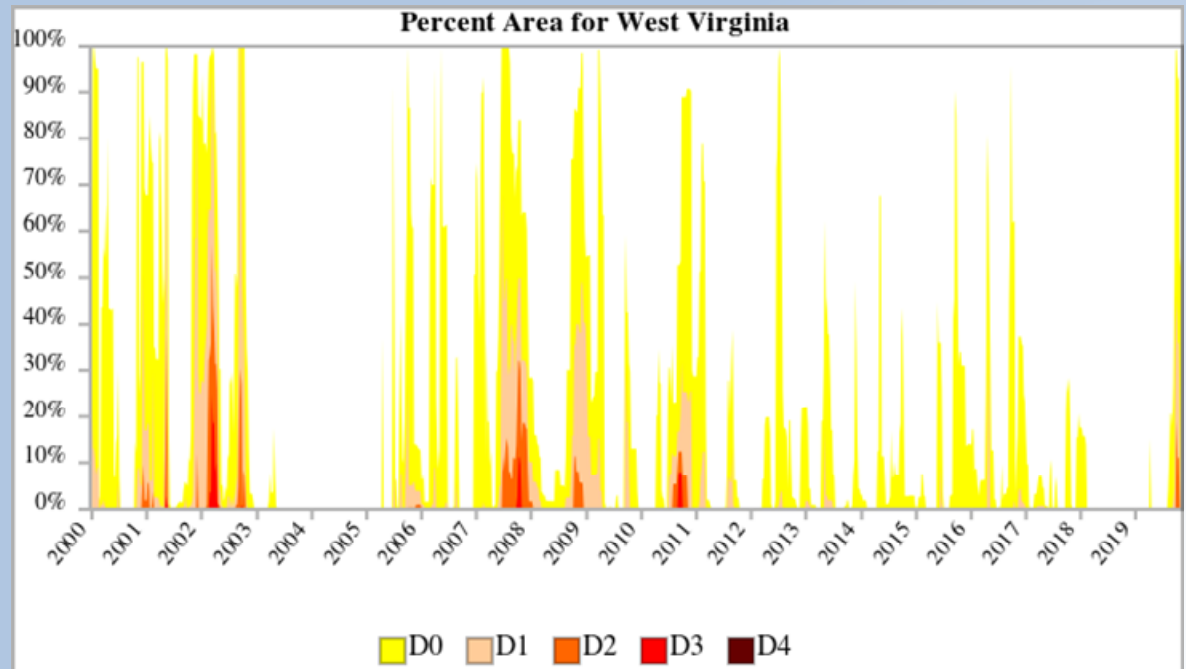


Plot created 11/04/19 20:22

Groundwater levels December 2018 – November 2019 in Martinsburg, WV. Note record levels in late 2018 (USGS)

2018-2019 Water Resources Availability

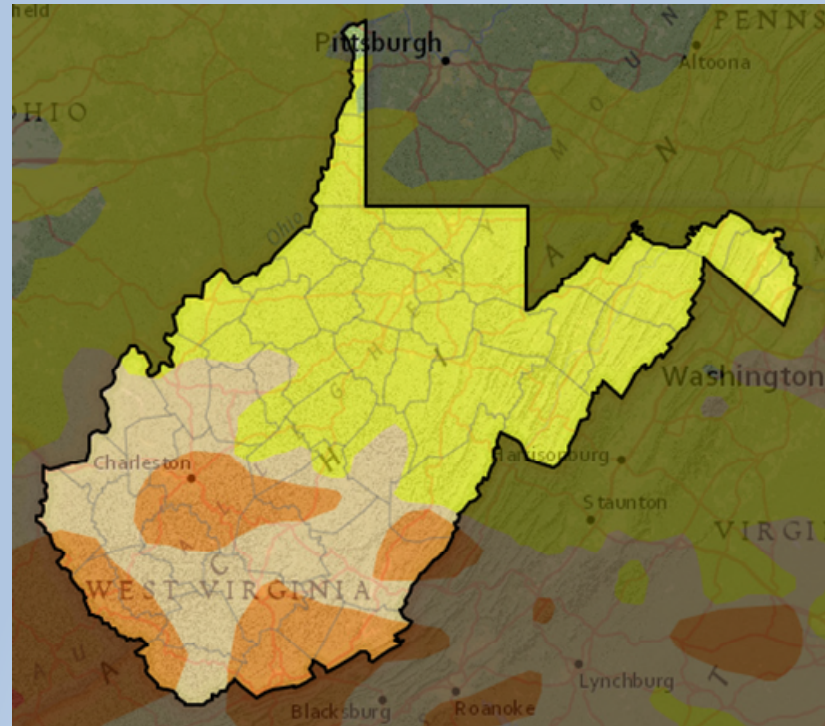
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Drought conditions in West Virginia since 2000 (Drought.gov)

2018-2019 Water Resources Availability

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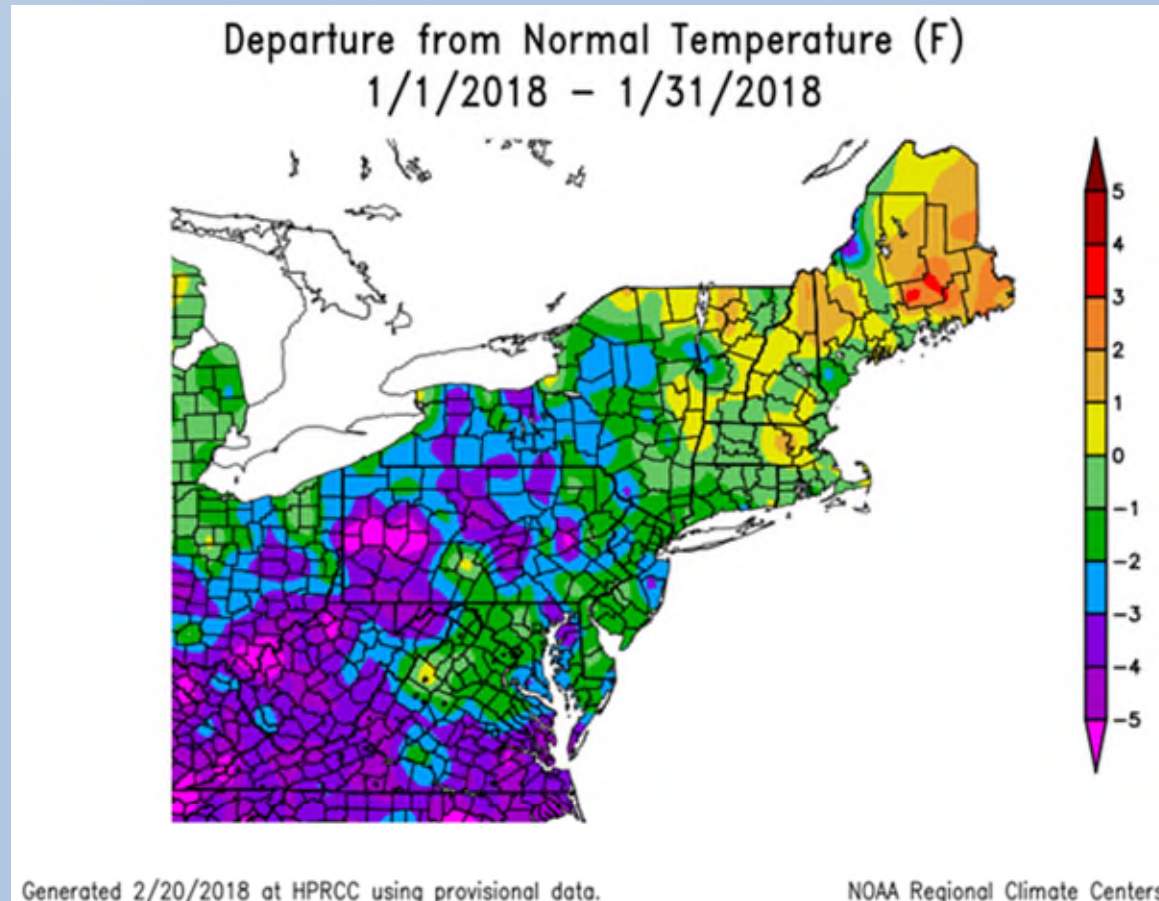
Drought conditions in West Virginia, October 2019 (Drought.gov)

Large Quantity User Withdrawals

Water Use Sector	LQUs	Total Gallons WD	% of Total WD	% Change from 2017
Agriculture/Aquaculture	13	7,342,326,962	1.18%	16.40%
Chemical	13	134,058,672,936	21.47%	-1.77%
Industrial	21	14,795,031,981	2.37%	2.33%
Mining	71	14,755,098,334	2.36%	-2.81%
Oil & Gas	15	4,321,192,565	0.69%	32.41%
Petroleum	1	303,734,621	0.05%	8.60%
Public Water Supply	209	67,903,655,278	10.87%	11.68%
Recreation	21	1,264,305,547	0.20%	-1.39%
Thermoelectric	9	378,664,719,354	60.63%	-12.89%
Timber	3	1,120,874,025	0.18%	-1.44%
TOTAL		624,529,611,603	100.00%	-7.32%
Hydroelectric	11	234,743,229,993,045		0.32%

Total 2018 water withdrawals (WD) from the LQU database (WVDEP)

Large Quantity User Withdrawals



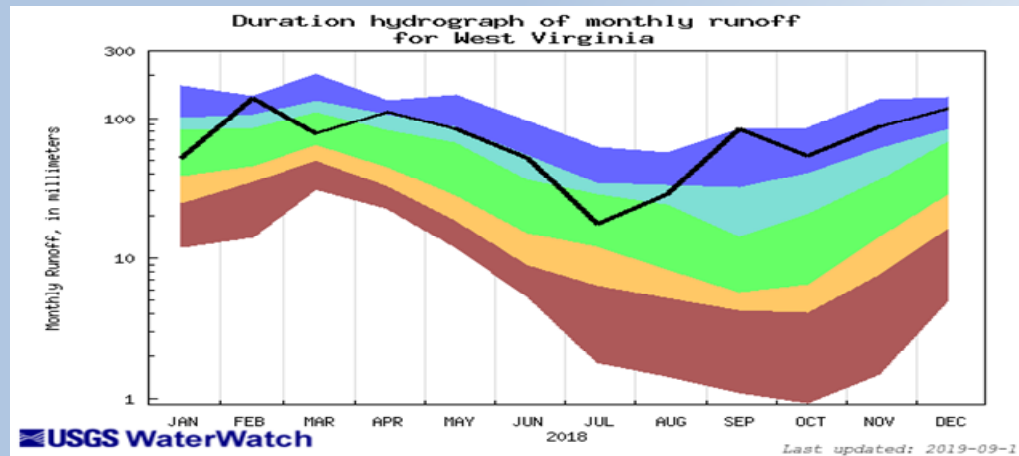
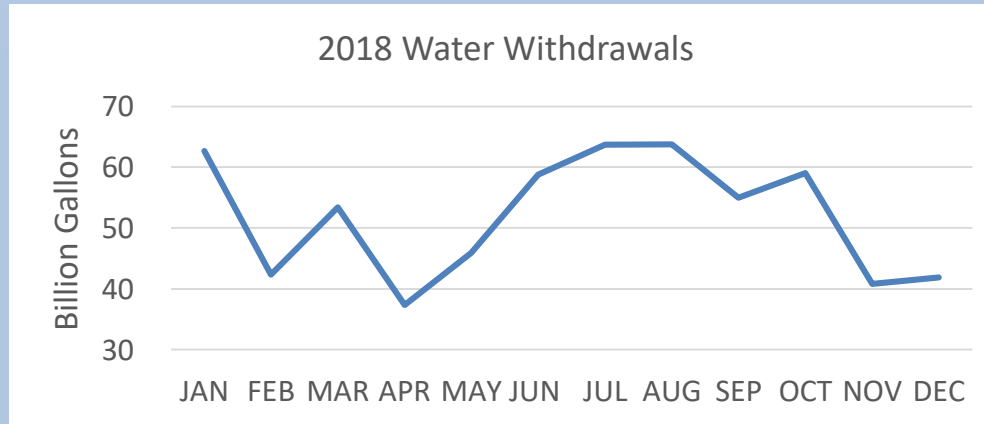
Abnormally low temperatures in West Virginia during January 2018 (NOAA)

Large Quantity User Withdrawals

Water Use Sector	Surface WD	% of SW WD	Groundwater WD	% of GW WD
Agriculture/Aquaculture	7,105,060,562	1.20%	237,266,400	0.77%
Chemical	124,745,574,481	21.01%	9,313,098,455	30.14%
Industrial	13,951,636,745	2.35%	843,395,236	2.73%
Mining	8,677,784,916	1.46%	6,077,313,418	19.67%
Oil & Gas	4,253,799,127	0.72%	67,393,438	0.22%
Petroleum	57,162	0.00%	303,677,459	0.98%
Public Water Supply	54,538,588,243	9.19%	13,365,067,035	43.26%
Recreation	933,896,714	0.16%	330,408,833	1.07%
Thermoelectric	378,313,760,704	63.73%	350,958,650	1.14%
Timber	1,112,465,297	0.19%	8,408,728	0.03%
TOTAL	593,632,623,951	95.05%	30,896,987,652	4.95%
Hydroelectric	234,743,229,993,045		-	

Breakdown of Surface Water (SW) and Groundwater (GW) withdrawals from the 2018 LQU database (WVDEP)

Seasonal Withdrawal Trends



Top: 2018's monthly trends in total withdrawal from the LQU Database (WVDEP)
Bottom: West Virginia 2018 monthly hydrograph. Note logarithmic scale (USGS)

Oil & Gas Water Management Plans

- WV Code 22-6A-7 and 35CSR8
- Reviewed 556 individual water management plans
- 75 new plans, 94 modifications
- Volumes reported to LQU program



Water Resources Research

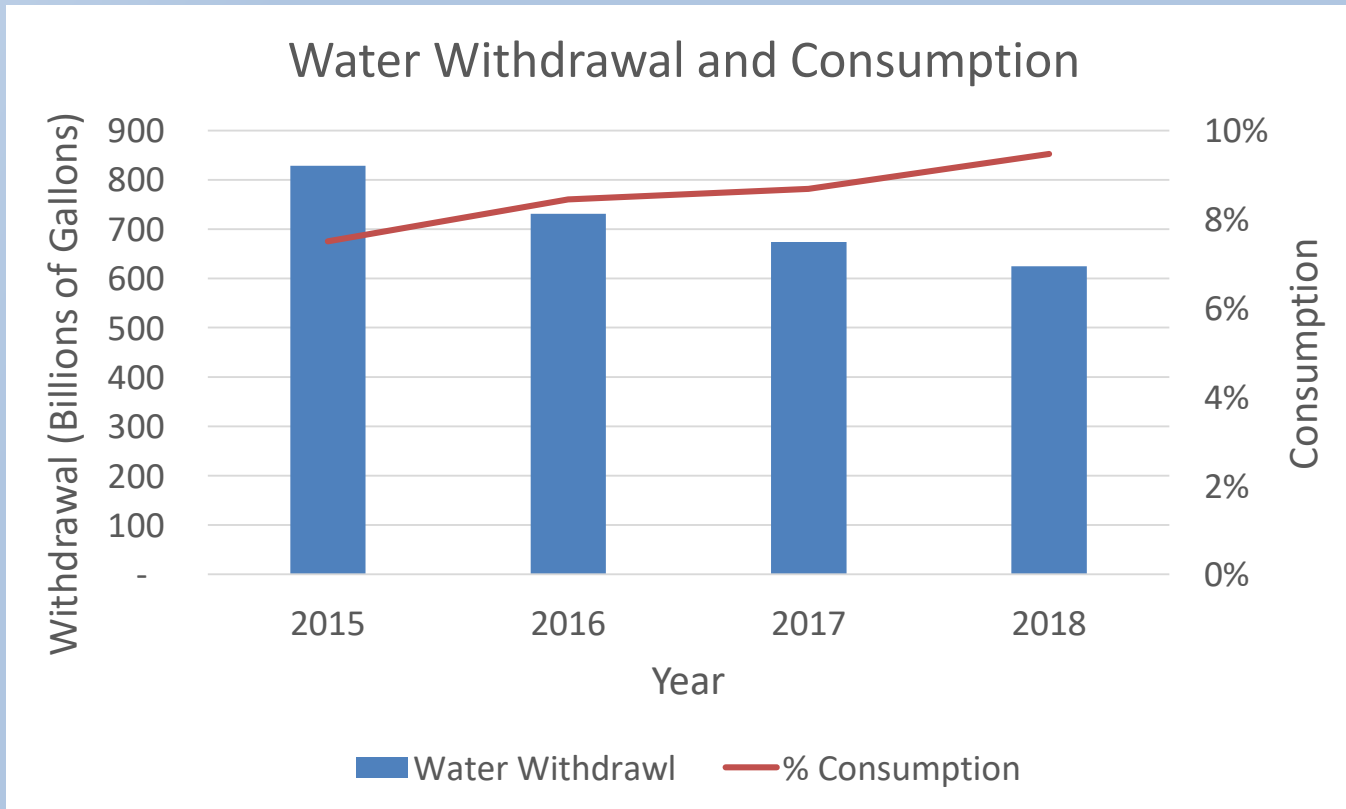
- Water Use and Consumption
- Geophysical Groundwater Well Logging
- Abandoned Underground Coal Mine Aquifers
- Water Stress and Critical Planning Areas

Consumptive Use

Water Use Sector	Total Gallons WD	Cons. Coeff.	Gallons Cons.	% of Cons.
Agriculture/Aquaculture	7,342,326,962	0.12	881,079,235	1.49%
Chemical	134,058,672,936	0.2	26,811,734,587	45.34%
Industrial	14,795,031,981	0.13	1,923,354,158	3.25%
Mining	14,755,098,334	0.17	2,508,366,717	4.24%
Oil & Gas	4,321,192,565	1	4,321,192,565	7.31%
Petroleum	303,734,621	0.27	82,008,348	0.14%
Public Water Supply	67,903,655,278	0.18	12,222,657,950	20.67%
Recreation	1,264,305,547	0.5	632,152,774	1.07%
Thermoelectric	378,664,719,354	0.025	9,466,617,984	16.01%
Timber	1,120,874,025	0.25	280,218,506	0.47%
TOTAL	624,529,611,603		59,129,382,823	9.47%
Hydroelectric	234,743,229,993,045	0	-	

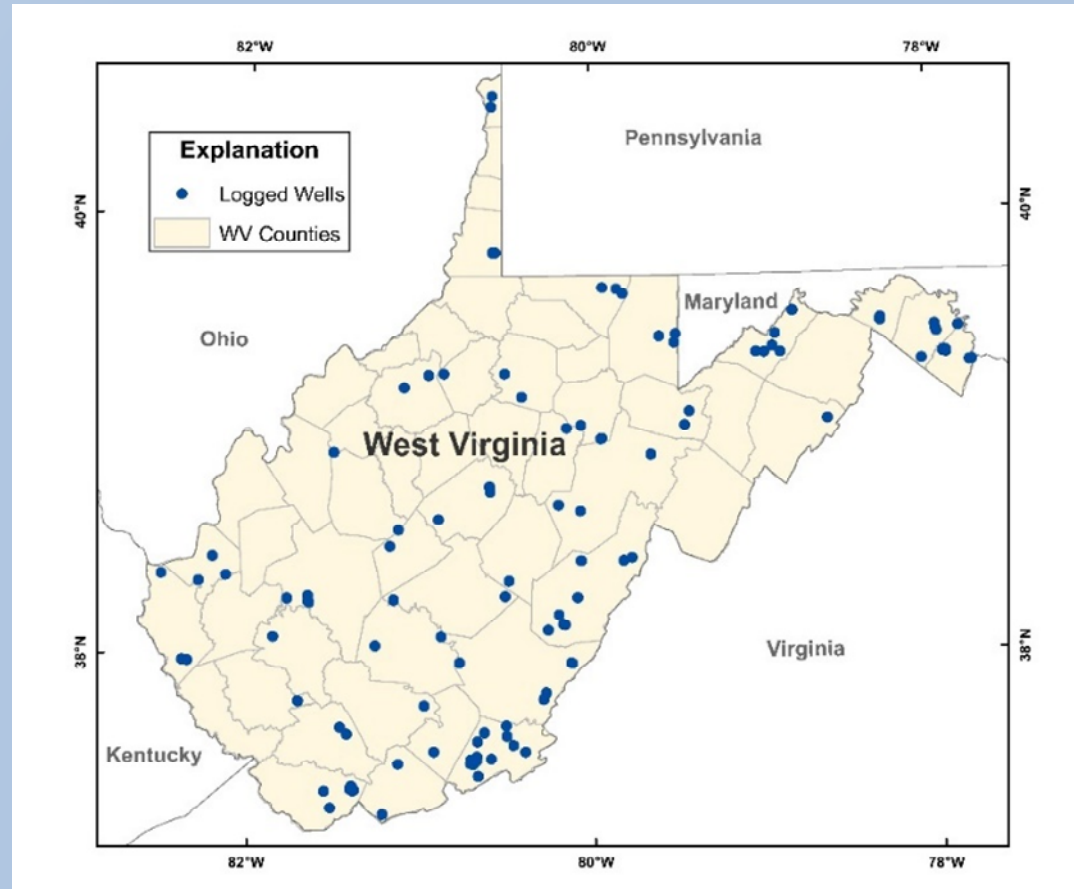
Current consumption coefficients applied to 2018 withdrawal data (WVDEP)

Consumptive Use



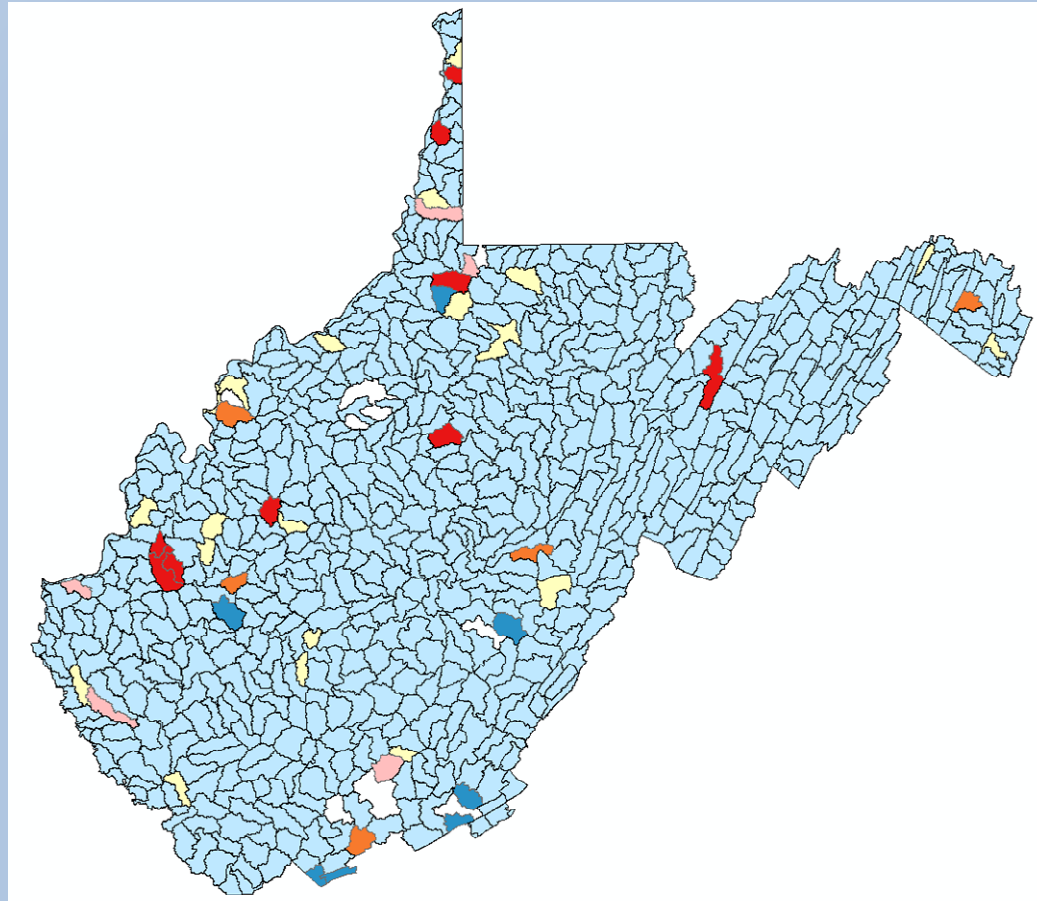
An increase in water consumption estimates contrasts with the decline in total LQU water withdrawal. Note different axis scales (WVDEP)

Geophysical Groundwater Well Logging



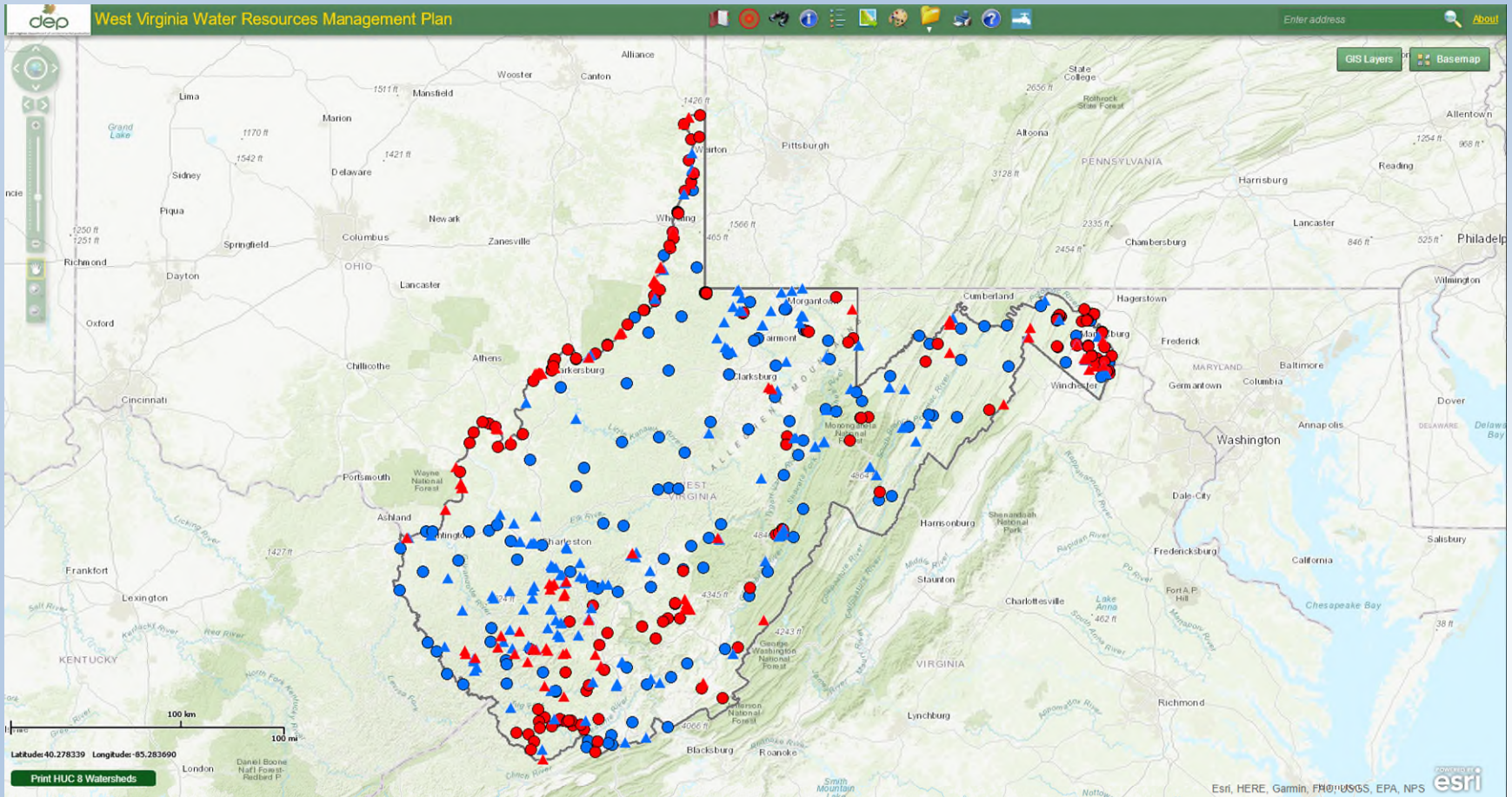
Location of USGS-WVDEP borehole geophysics well logs 2015-2019 (USGS)

Water Stress and Critical Planning Areas



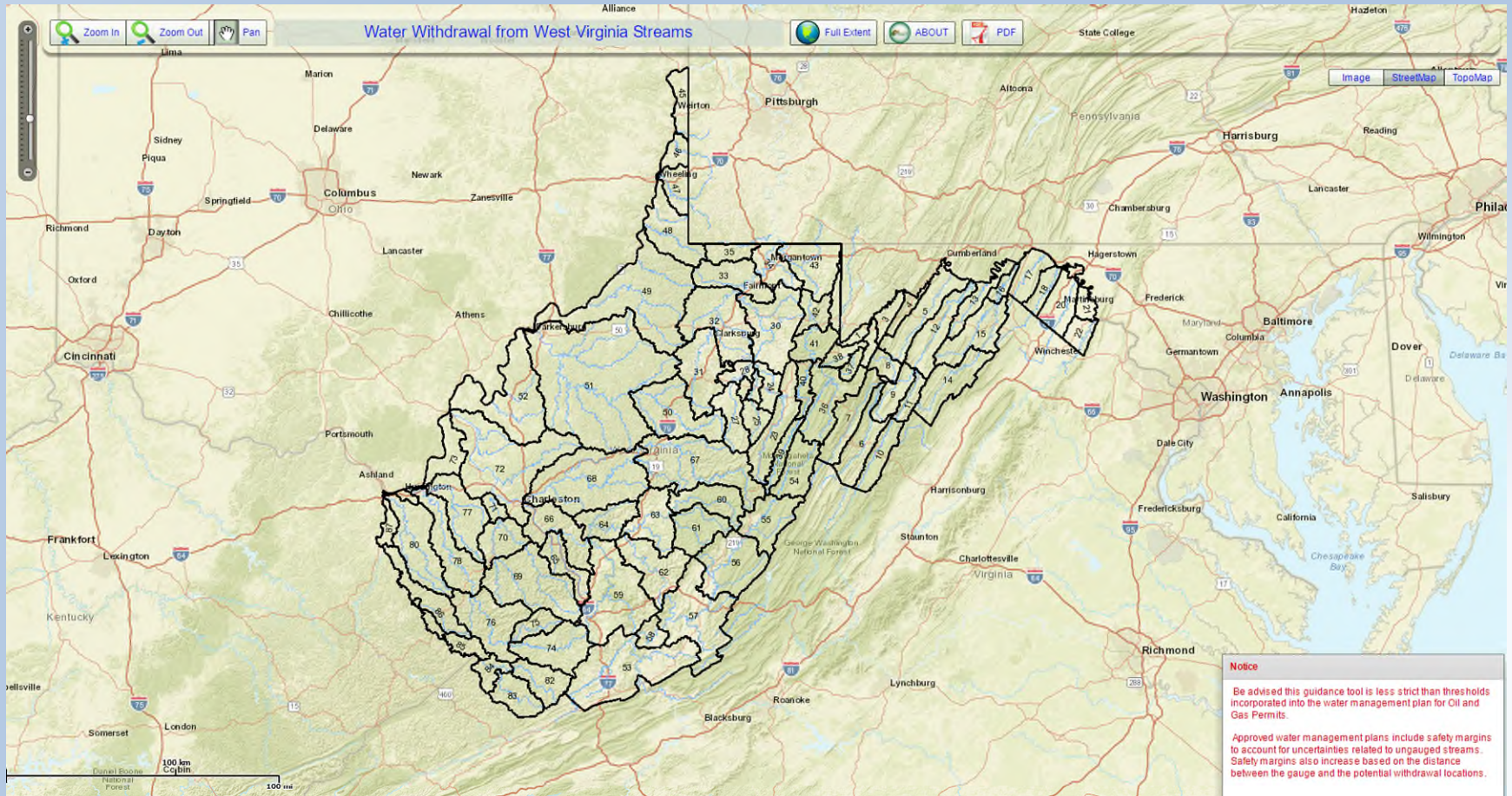
Preliminary water supply stress index analysis (WVU)

Water Resources Management Mapping Tool



Large Quantity Users from the Water Resources Mapping Tool. Blue – surface water; red – groundwater (WVDEP)

Water Withdrawal Guidance Tool



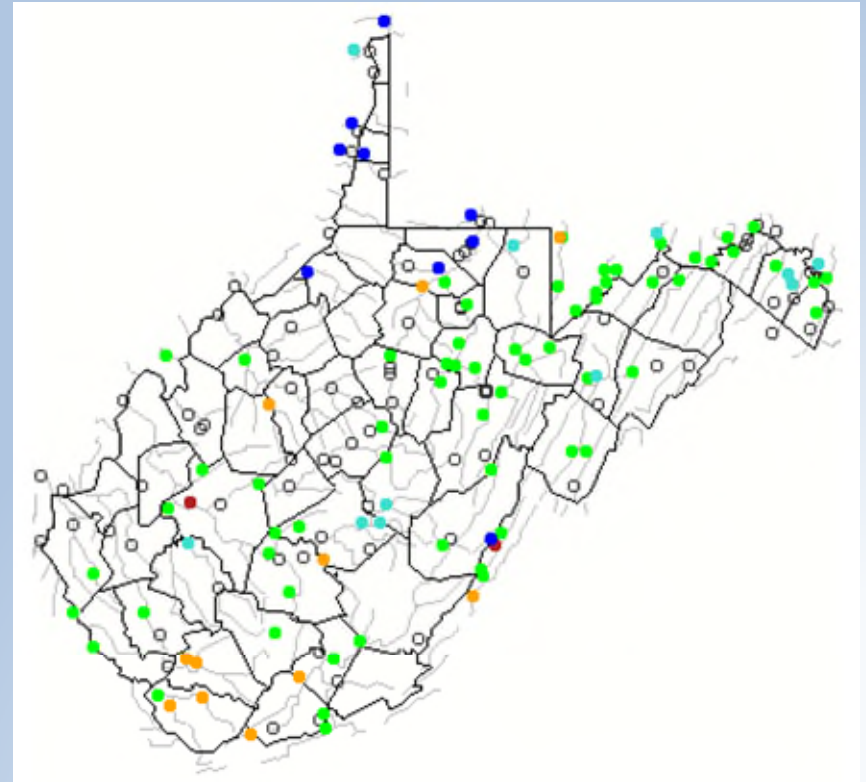
The 86 hydrologic zones of the Water Withdrawal Guidance Tool (WVDEP)

Water Resources: Plans and Priorities

- Update Water Withdrawal Guidance Tool
- Detailed Public Water Supply Information
- Upgrade Data Entry and Management

Program Needs

- **The USGS stream gage and groundwater level network are the most important assets to DEP water resource management.**
- Our models and online tools are dependent on data from USGS
- Thank you for supporting stream gauge funding



The stream gauge network in West Virginia (USGS)

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