

# Water Resource Management Plan

## Annual Progress Report to the WV Joint Legislative Oversight Commission on State Water Resources

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



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Water Use Section Manager  
January 7, 2013



# Contents of Today's Report

- Water Resource Management Plan Accomplishments
- Large Quantity User Survey and bottled water
- Meetings with stakeholders update
- Water Withdrawal Guidance Tool and USGS Gauge Study
- Groundwater Study and Mine Pool Atlas
- Drought, Flood and Climate Change
- Commerce and WV Water Resources
- Updated WMP Data Page for Legislative Review
- New Web Tool Developed
- O&G WMP Accomplishments
- Less Fortunate Outcomes

# WRMP Accomplishments

- Built a strong Water Use Section team with a Professional Geologist, Research Analyst, a GIS and Remote Sensing Coordinator and 2 Environmental Scientist.
- Built strong working relationships with other agencies ACoE, USGS, ICPRB, IJDC, WVCA, ....
- Fully updated the Water Withdrawal Tool
- Completed the WV Mine Pool Atlas
- Improved the system to complete LQU survey

# WRMP Accomplishments, cont.

- Completed the WV Water Resources Management Plan Map Atlas
- Continued DEP Funding for USGS Gauges
- Completed Geophysical Logging of the USGS GW Monitoring Wells
- Completed all watershed outreach meetings
- Raising the technological bar by making the heart of the WRMP a web based GIS system containing a vast amount of information
- Reviewed surrounding state plans and learned from their experience

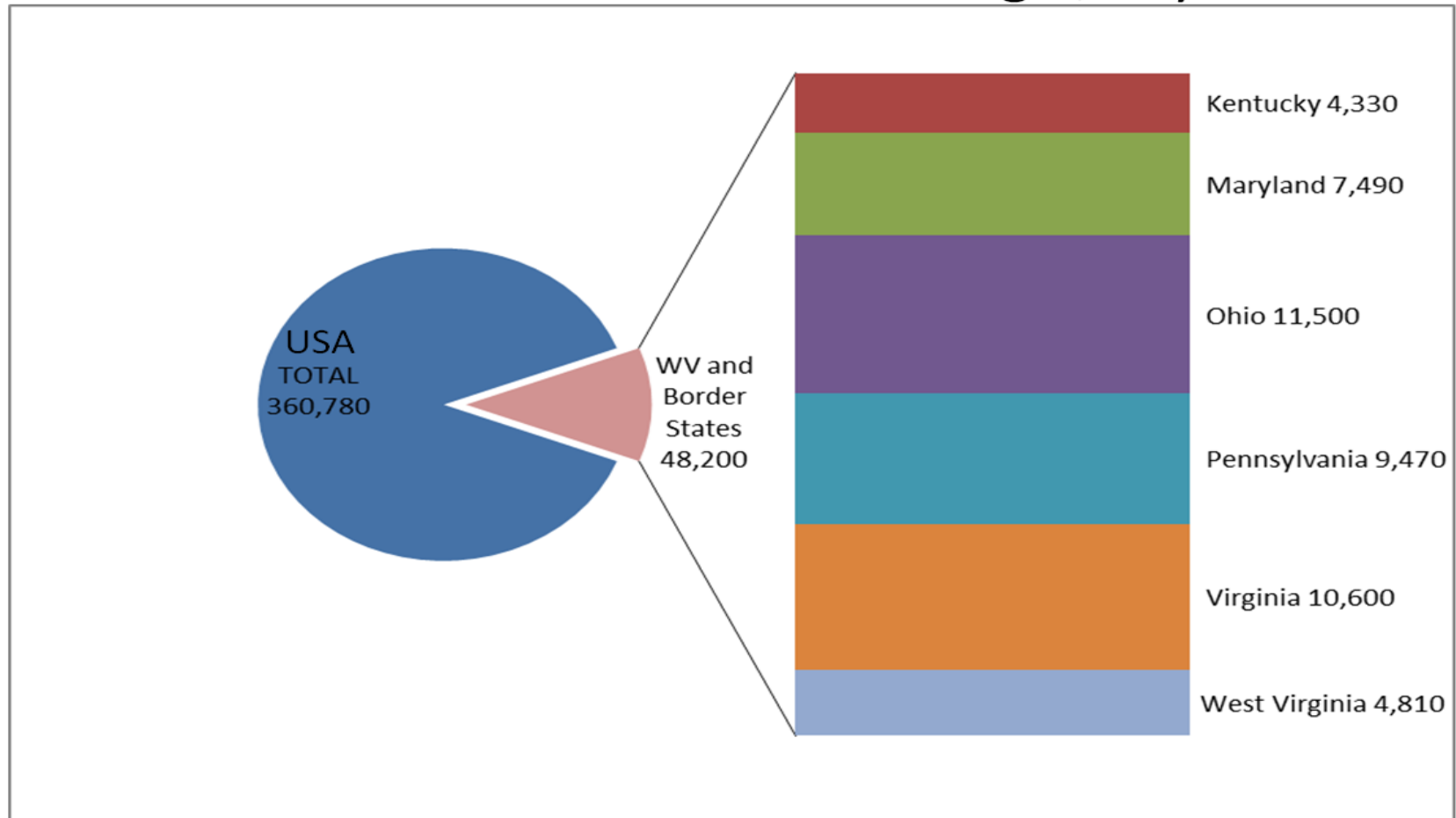


# 2011 Large Quantity User Survey

- We have received 100% of the 2011 surveys
- Full Compliance = No NOV's needed
- Finished Database Entry
- Currently Analyzing the Data

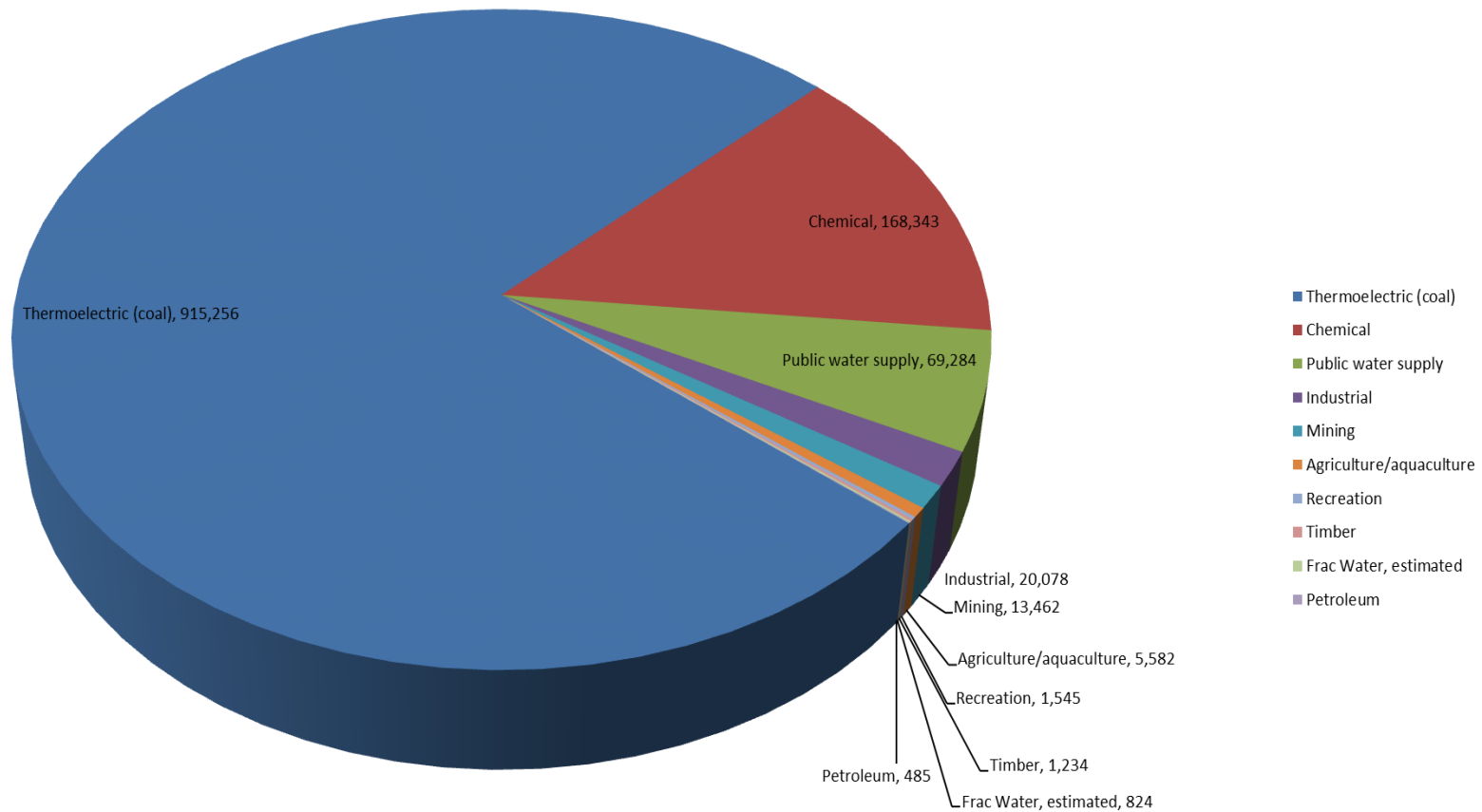
# USA Water Use vs. Local Water Use

West Virginia and Border States' Contribution to the USGS Estimates of Total Water Withdrawals in the United States in 2005 in Mgal/day



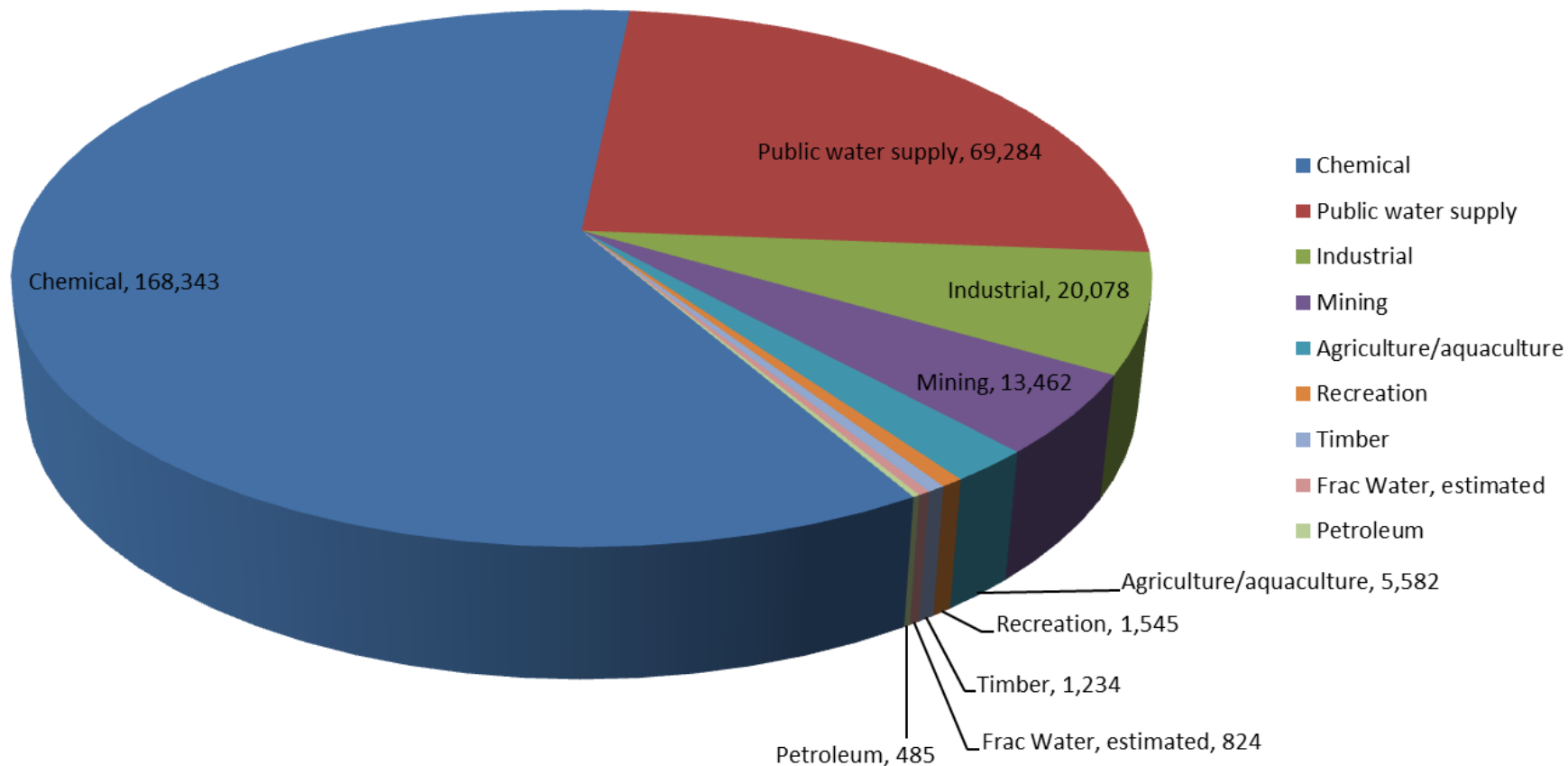
# 3 year average Water Use Including Thermoelectric (excluding Hydro)

3 Year Average Water Use in 2011 by SIC Group (millions of gallons)  
(excluding Hydroelectric facilities)



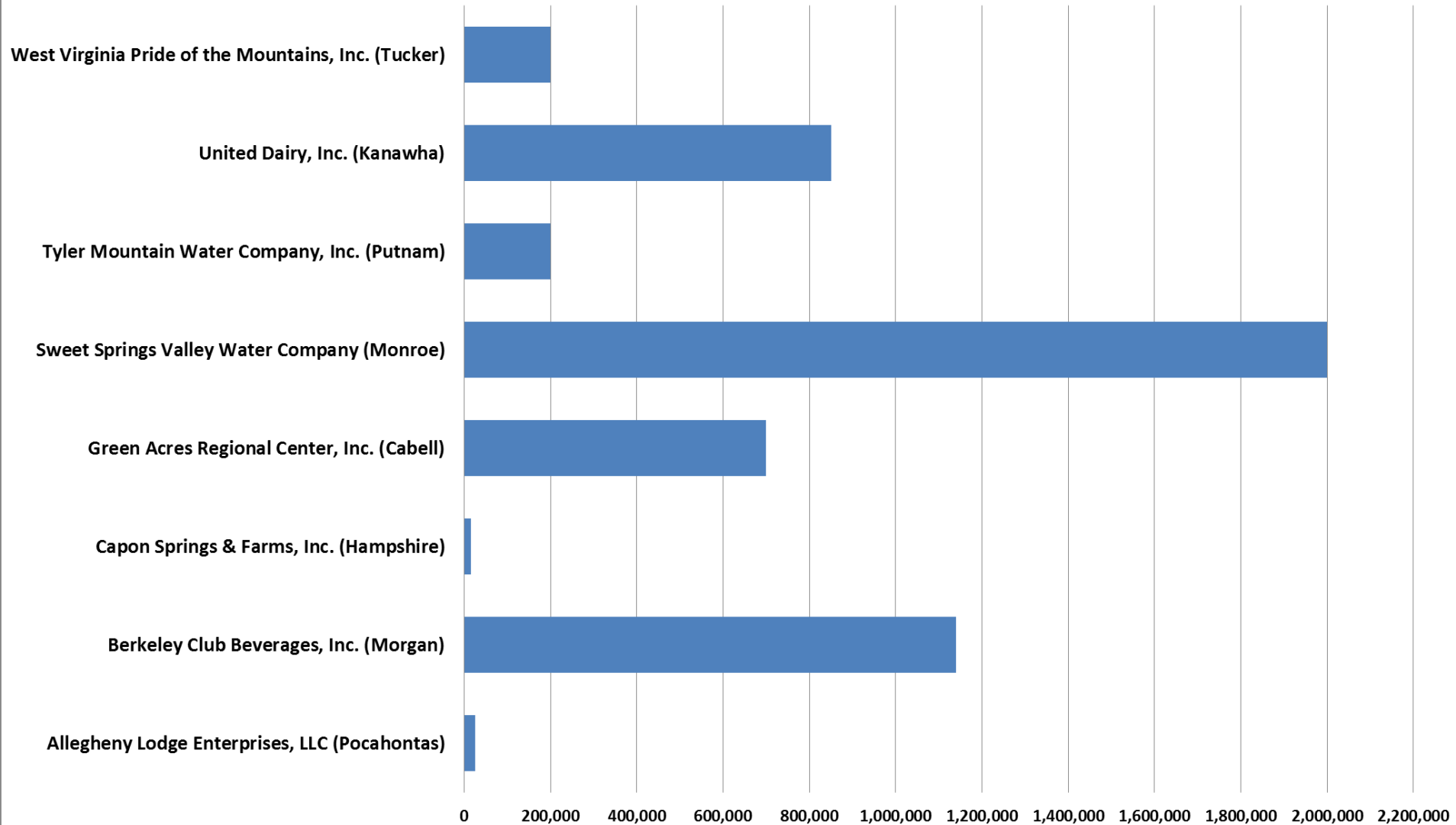
# 3 Year Average Water Use (excluding Thermo and Hydro)

**3 Year Average Water Use in 2011 by SIC Group (millions of gallons)  
(excluding Hydroelectric and Thermoelectric Facilities)**



# Total Bottled Water in 2012 (5,130,829 Gallons)

Total Bottled Water Per Company in 2012 (Gallons)

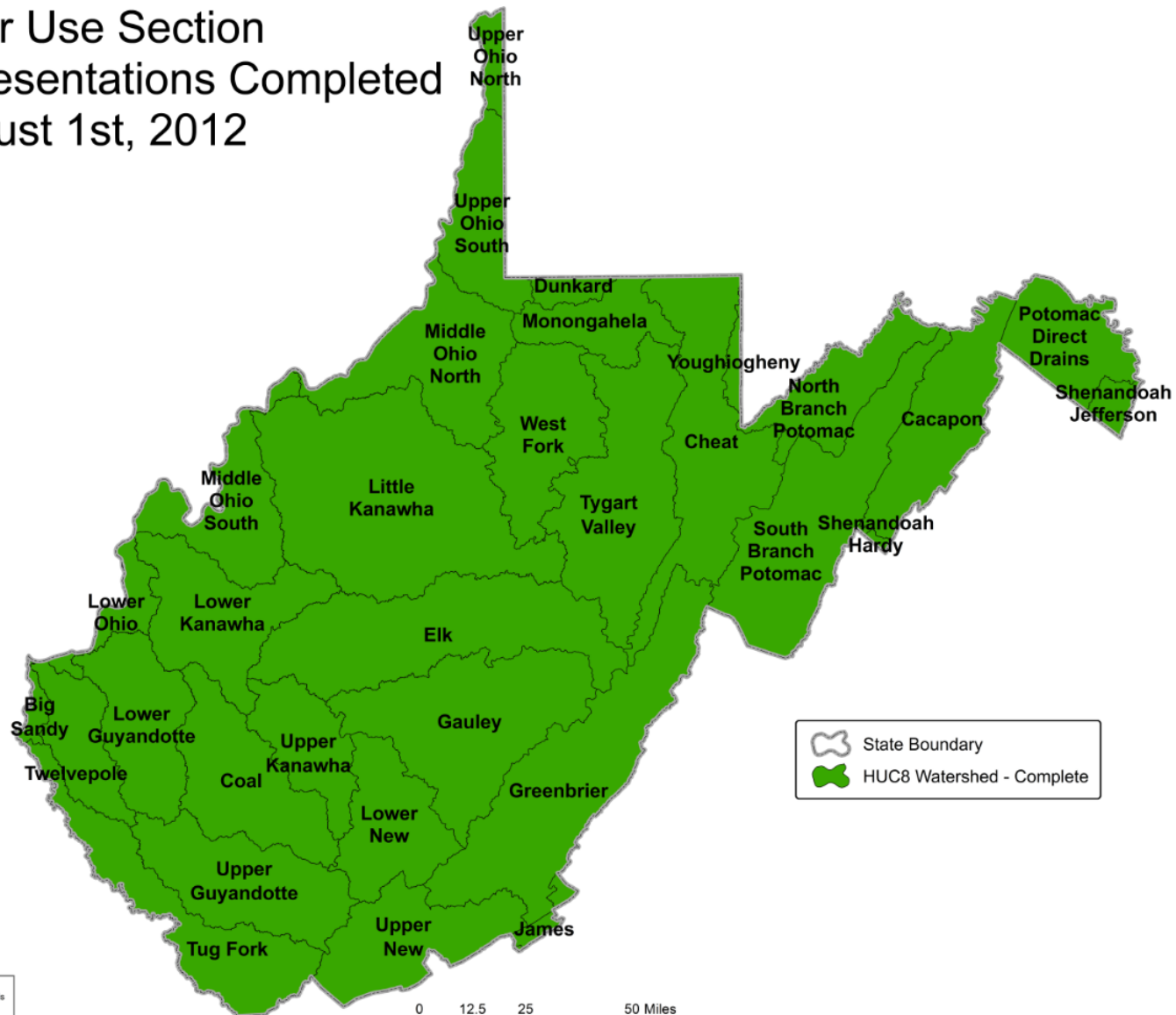




# Watershed Stakeholder Meetings



Water Use Section  
Watershed Presentations Completed  
August 1st, 2012

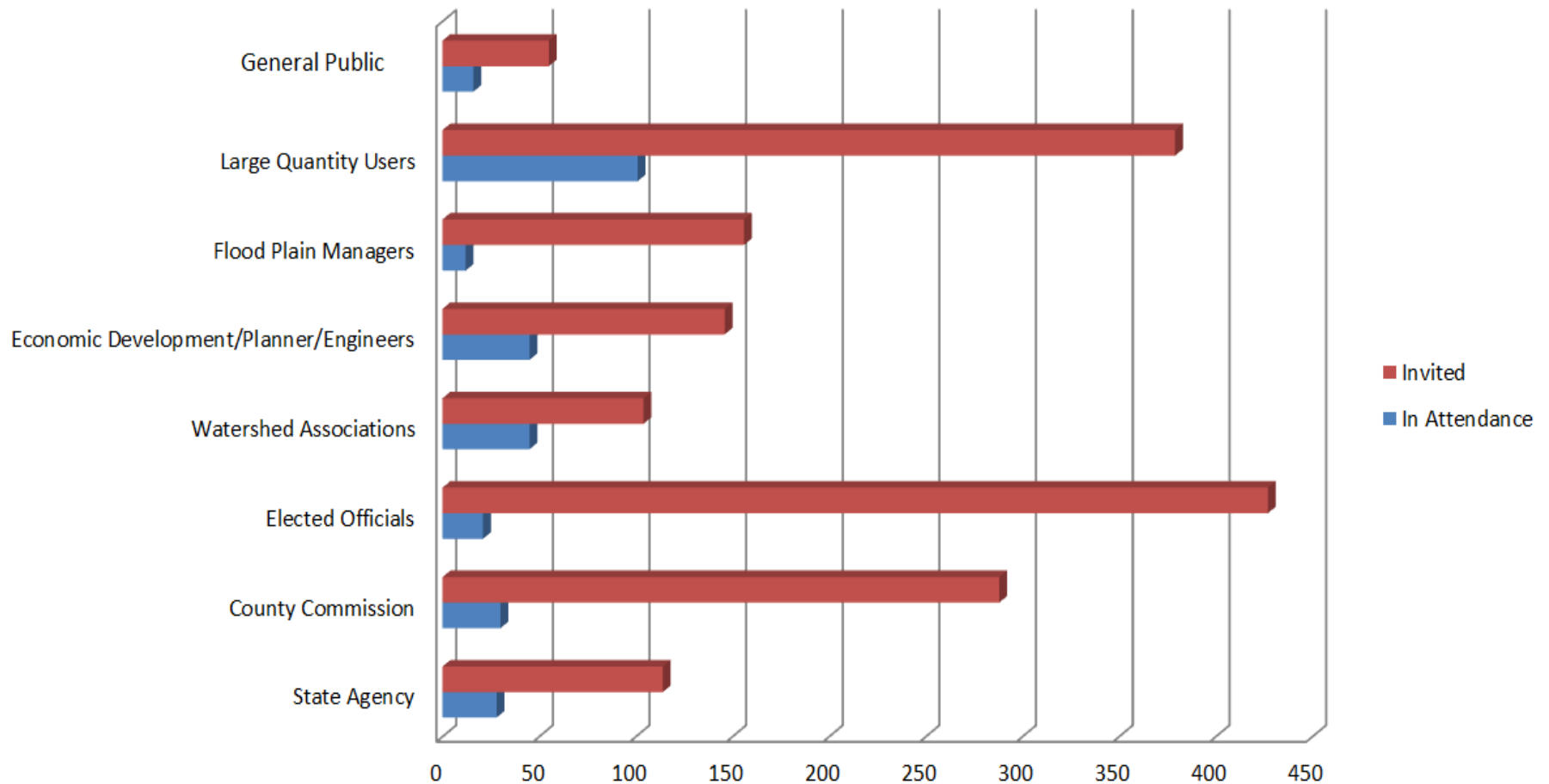


Source Data: Natural Resource Conservation Service 12-Digit Watersheds; 30 Jan 2009.

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the appropriate usage of the information.

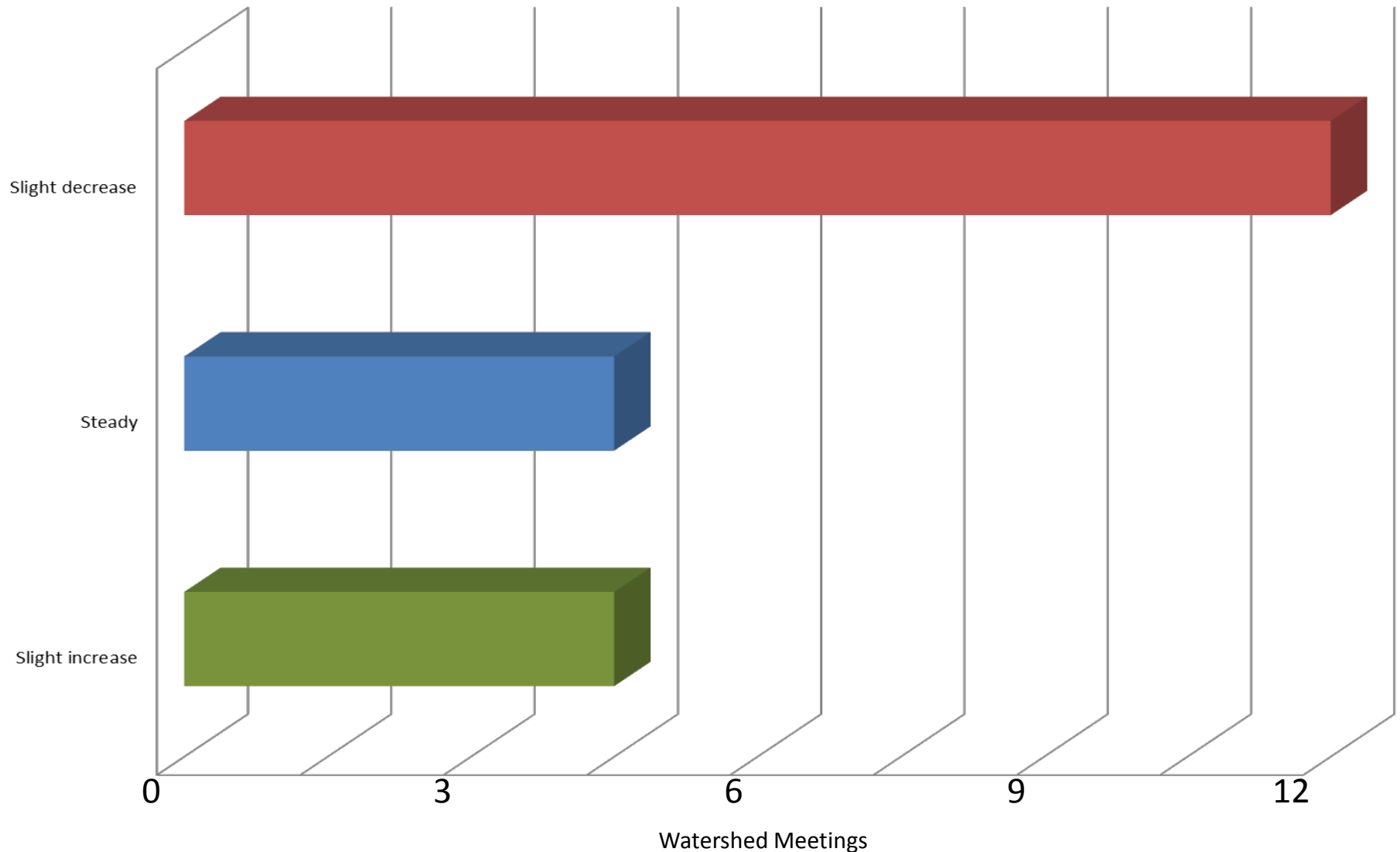
# Watershed Stakeholder Meetings

Total Attendance in 28 watershed meetings



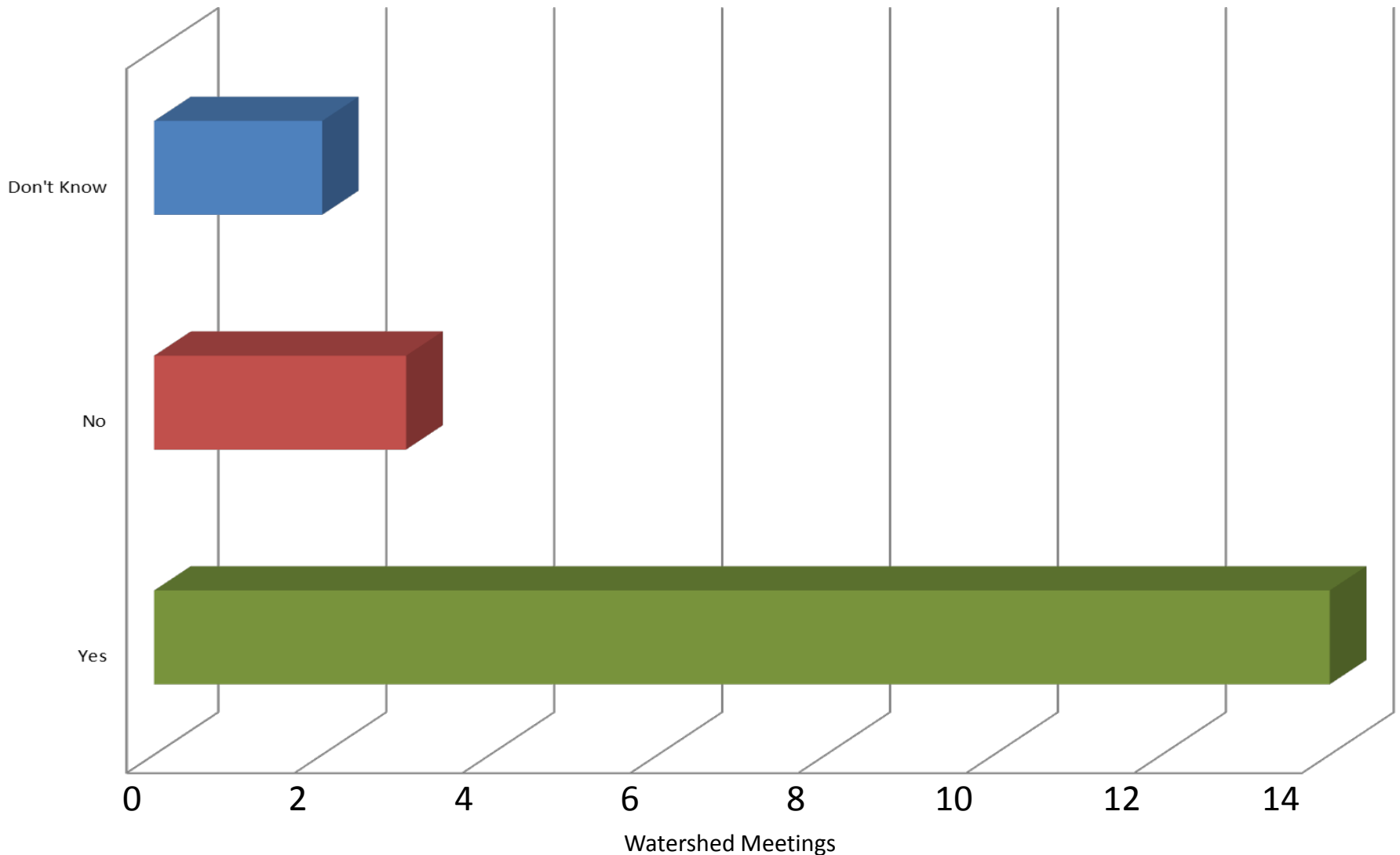
# Watershed Stakeholder Meetings

How do you expect the local population to change in the next 10 years



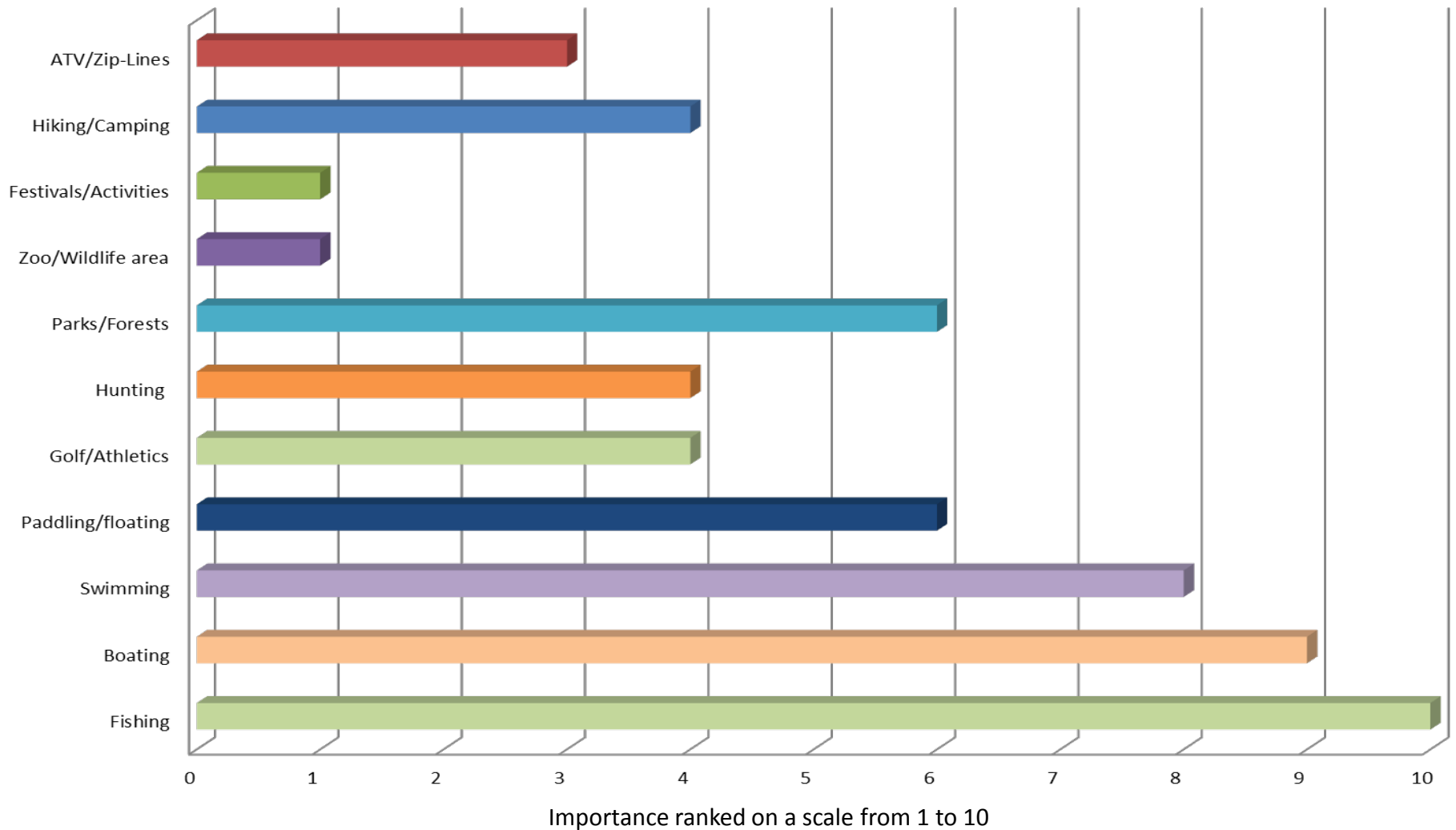
# Watershed Stakeholder Meetings

Are there new sub-divisions or commercial developments planned?



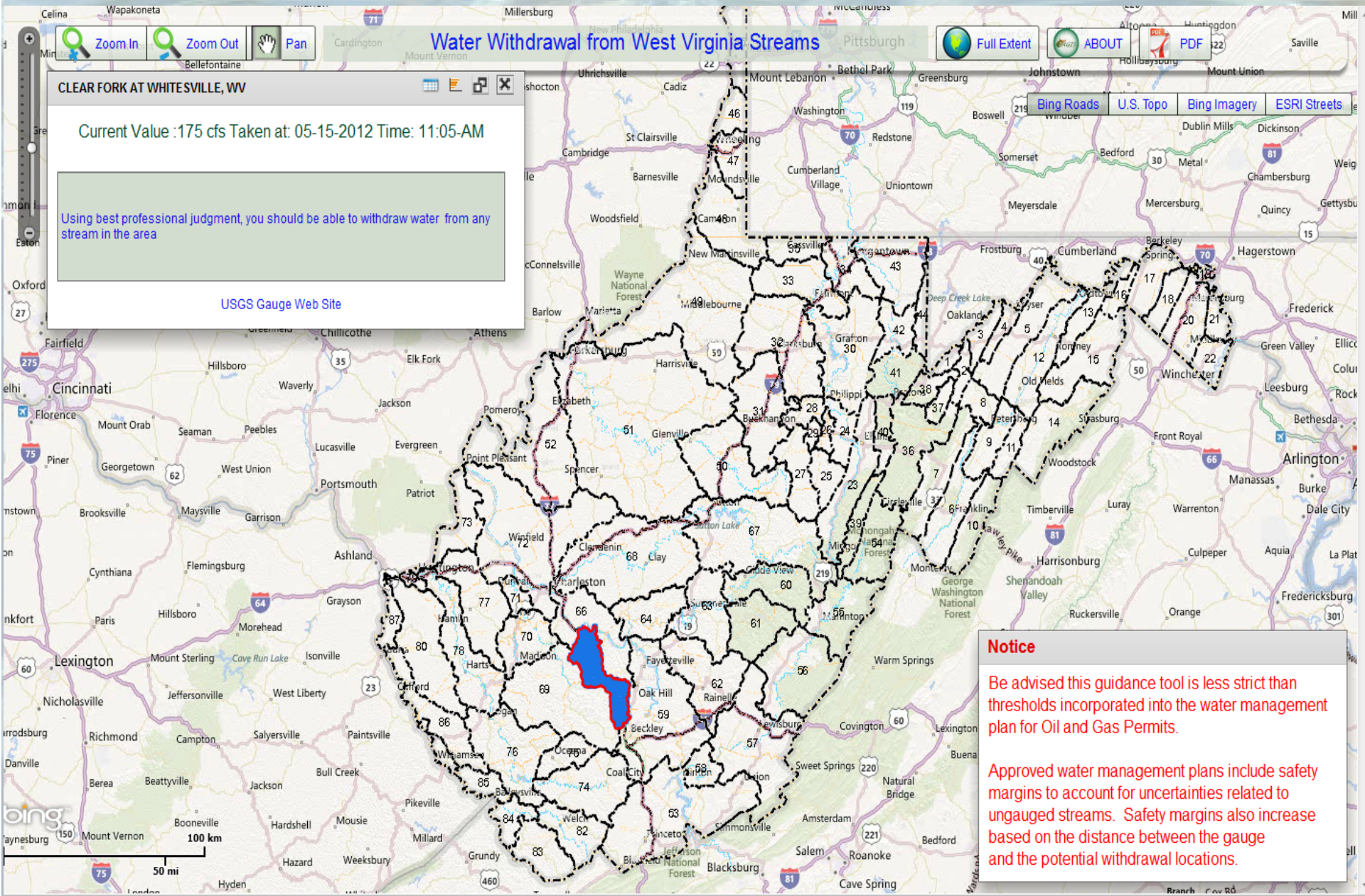
# Watershed Stakeholder Meetings

What are the important recreational uses in the area that are dependent on water?





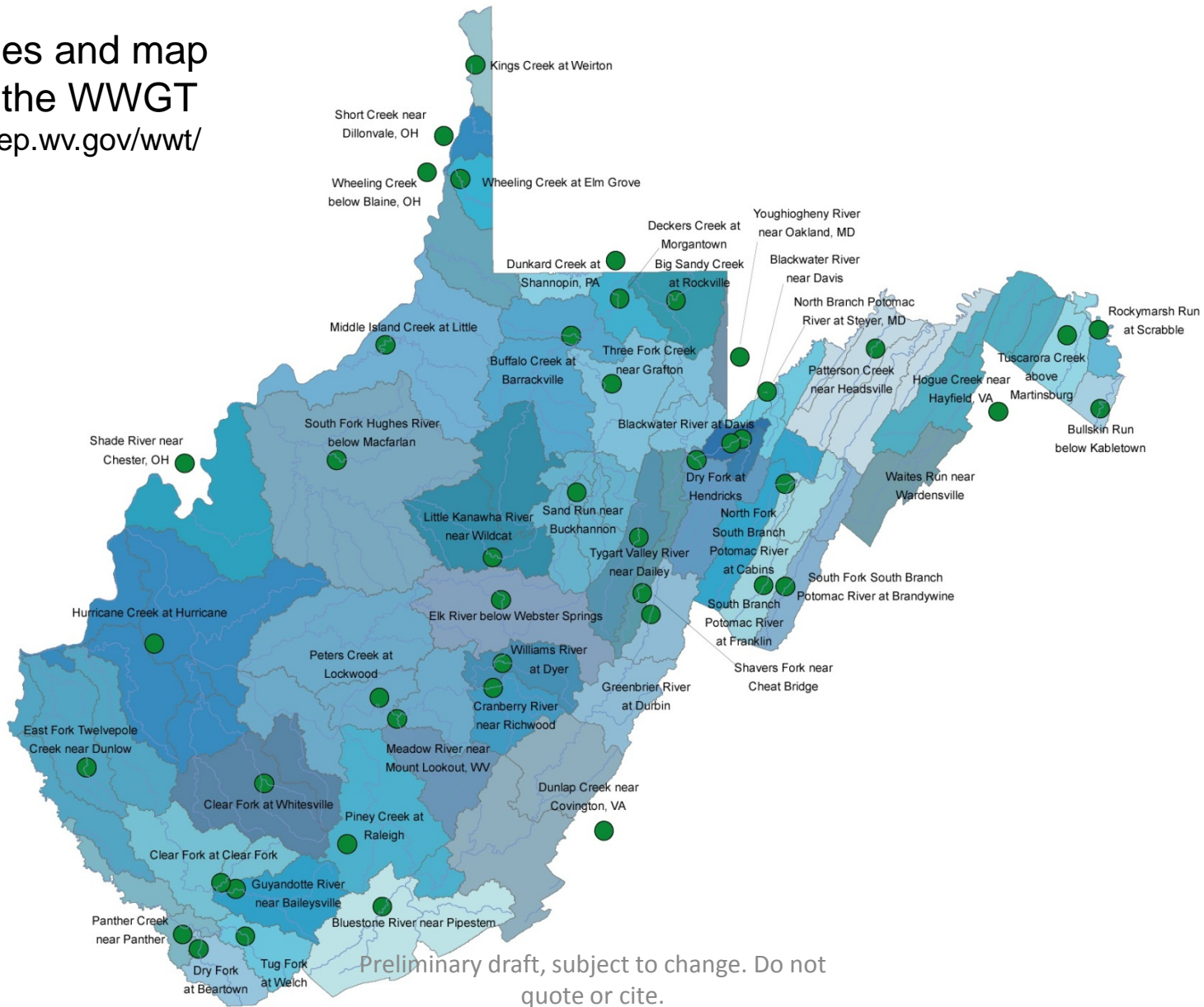
# Water Withdrawal Tool Updates





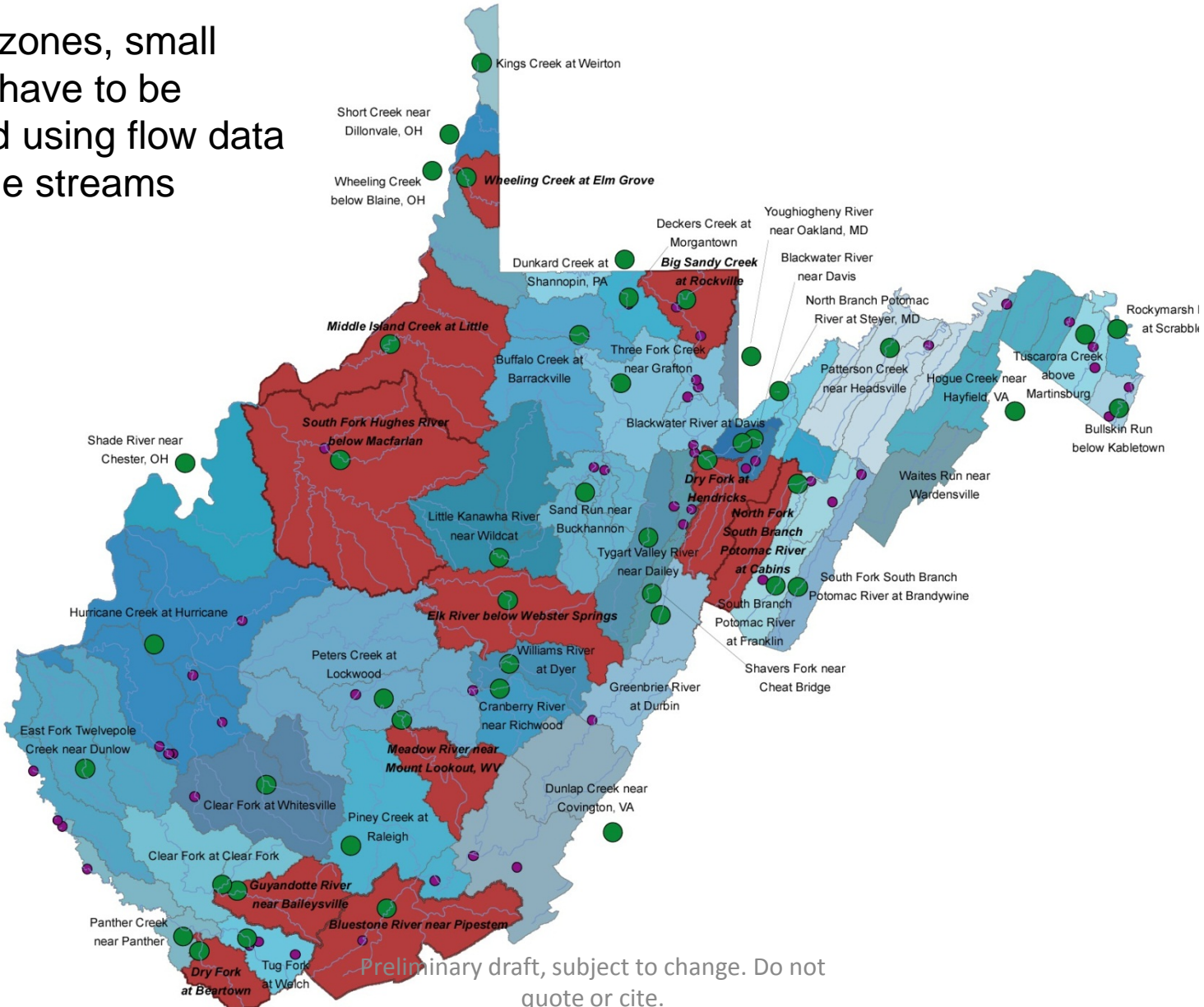
# USGS Water Gauge Study

Index gages and map zones for the WWGT  
<http://tagis.dep.wv.gov/wwt/>



# USGS Water Gauge Study

In many zones, small streams have to be managed using flow data from large streams



Preliminary draft, subject to change. Do not quote or cite.





# USGS Water Gauge Study

	Potomac										West Fork-Tygart										Cheat										Upper Ohio										Greenbrier-New										Gauley-Elk										Lower Kanawha										Guyandotte-Big Sandy																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
	patterson	franklin	cabins	petersburg	brandywine	moorefield	springfield	coopers	openison	millville	slakey	andra	land run	hall	grafton	barrackville	hendrix	at.davis	cheat bridge	shavers.blw.bowden	pansons	rowlesburg	rockwell	wheeling,ok	welch	pipetown	durbin	buckeye	johnson	midvale	dyer	cranberry	cragsville	mt.lebanon	lockwood	webster	whitesville	ahlford	tomardo	hurricane	barrackville	cheer fork	dunlow	welch	beartown	panther	williamson	at.kernit																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
Potomac	0.7873777	0.8921	0.9341	0.8826	0.8734	0.6782	0.4776	0.6864	0.7043	0.6569	0.5642	0.6167	0.5583	0.5856	0.7164	0.6398	0.7139	0.7008	0.7008	0.7075	0.6705	0.5444	0.5784	0.5903	0.838	0.9011	0.8642	0.8626	0.801	0.8022	0.80304	0.8212	0.6314	0.7411	0.5518	0.5416	0.5396	0.5468	0.5405	0.5448	0.4885	0.2965	0.3079	0.3175	0.4031	0.4381	0.4661	0.4781	0.4881	0.4943	0.5009	0.5008	0.4847	0.534	0.4801	0.2602	0.3807	0.4069	0.4178	0.4383	0.4531	0.4611	0.4683	0.4745	0.4805	0.4865	0.4925	0.4985	0.5045	0.5105	0.5165	0.5225	0.5285	0.5345	0.5405	0.5465	0.5525	0.5585	0.5645	0.5705	0.5765	0.5825	0.5885	0.5945	0.6005	0.6065	0.6125	0.6185	0.6245	0.6305	0.6365	0.6425	0.6485	0.6545	0.6605	0.6665	0.6725	0.6785	0.6845	0.6905	0.6965	0.7025	0.7085	0.7145	0.7205	0.7265	0.7325	0.7385	0.7445	0.7505	0.7565	0.7625	0.7685	0.7745	0.7805	0.7865	0.7925	0.7985	0.8045	0.8105	0.8165	0.8225	0.8285	0.8345	0.8405	0.8465	0.8525	0.8585	0.8645	0.8705	0.8765	0.8825	0.8885	0.8945	0.9005	0.9065	0.9125	0.9185	0.9245	0.9305	0.9365	0.9425	0.9485	0.9545	0.9605	0.9665	0.9725	0.9785	0.9845	0.9905	0.9965	1.0025	1.0085	1.0145	1.0205	1.0265	1.0325	1.0385	1.0445	1.0505	1.0565	1.0625	1.0685	1.0745	1.0805	1.0865	1.0925	1.0985	1.1045	1.1105	1.1165	1.1225	1.1285	1.1345	1.1405	1.1465	1.1525	1.1585	1.1645	1.1705	1.1765	1.1825	1.1885	1.1945	1.2005	1.2065	1.2125	1.2185	1.2245	1.2305	1.2365	1.2425	1.2485	1.2545	1.2605	1.2665	1.2725	1.2785	1.2845	1.2905	1.2965	1.3025	1.3085	1.3145	1.3205	1.3265	1.3325	1.3385	1.3445	1.3505	1.3565	1.3625	1.3685	1.3745	1.3805	1.3865	1.3925	1.3985	1.4045	1.4105	1.4165	1.4225	1.4285	1.4345	1.4405	1.4465	1.4525	1.4585	1.4645	1.4705	1.4765	1.4825	1.4885	1.4945	1.5005	1.5065	1.5125	1.5185	1.5245	1.5305	1.5365	1.5425	1.5485	1.5545	1.5605	1.5665	1.5725	1.5785	1.5845	1.5905	1.5965	1.6025	1.6085	1.6145	1.6205	1.6265	1.6325	1.6385	1.6445	1.6505	1.6565	1.6625	1.6685	1.6745	1.6805	1.6865	1.6925	1.6985	1.7045	1.7105	1.7165	1.7225	1.7285	1.7345	1.7405	1.7465	1.7525	1.7585	1.7645	1.7705	1.7765	1.7825	1.7885	1.7945	1.8005	1.8065	1.8125	1.8185	1.8245	1.8305	1.8365	1.8425	1.8485	1.8545	1.8605	1.8665	1.8725	1.8785	1.8845	1.8905	1.8965	1.9025	1.9085	1.9145	1.9205	1.9265	1.9325	1.9385	1.9445	1.9505	1.9565	1.9625	1.9685	1.9745	1.9805	1.9865	1.9925	1.9985	2.0045	2.0105	2.0165	2.0225	2.0285	2.0345	2.0405	2.0465	2.0525	2.0585	2.0645	2.0705	2.0765	2.0825	2.0885	2.0945	2.1005	2.1065	2.1125	2.1185	2.1245	2.1305	2.1365	2.1425	2.1485	2.1545	2.1605	2.1665	2.1725	2.1785	2.1845	2.1905	2.1965	2.2025	2.2085	2.2145	2.2205	2.2265	2.2325	2.2385	2.2445	2.2505	2.2565	2.2625	2.2685	2.2745	2.2805	2.2865	2.2925	2.2985	3.0045	3.0105	3.0165	3.0225	3.0285	3.0345	3.0405	3.0465	3.0525	3.0585	3.0645	3.0705	3.0765	3.0825	3.0885	3.0945	3.1005	3.1065	3.1125	3.1185	3.1245	3.1305	3.1365	3.1425	3.1485	3.1545	3.1605	3.1665	3.1725	3.1785	3.1845	3.1905	3.1965	3.2025	3.2085	3.2145	3.2205	3.2265	3.2325	3.2385	3.2445	3.2505	3.2565	3.2625	3.2685	3.2745	3.2805	3.2865	3.2925	3.2985	3.3045	3.3105	3.3165	3.3225	3.3285	3.3345	3.3405	3.3465	3.3525	3.3585	3.3645	3.3705	3.3765	3.3825	3.3885	3.3945	3.4005	3.4065	3.4125	3.4185	3.4245	3.4305	3.4365	3.4425	3.4485	3.4545	3.4605	3.4665	3.4725	3.4785	3.4845	3.4905	3.4965	3.5025	3.5085	3.5145	3.5205	3.5265	3.5325	3.5385	3.5445	3.5505	3.5565	3.5625	3.5685	3.5745	3.5805	3.5865	3.5925	3.5985	3.6045	3.6105	3.6165	3.6225	3.6285	3.6345	3.6405	3.6465	3.6525	3.6585	3.6645	3.6705	3.6765	3.6825	3.6885	3.6945	3.7005	3.7065	3.7125	3.7185	3.7245	3.7305	3.7365	3.7425	3.7485	3.7545	3.7605	3.7665	3.7725	3.7785	3.7845	3.7905	3.7965	3.8025	3.8085	3.8145	3.8205	3.8265	3.8325	3.8385	3.8445	3.8505	3.8565	3.8625	3.8685	3.8745	3.8805	3.8865	3.8925	3.8985	3.9045	3.9105	3.9165	3.9225	3.9285	3.9345	3.9405	3.9465	3.9525	3.9585	3.9645	3.9705	3.9765	3.9825	3.9885	3.9945	4.0005	4.0065	4.0125	4.0185	4.0245	4.0305	4.0365	4.0425	4.0485	4.0545	4.0605	4.0665	4.0725	4.0785	4.0845	4.0905	4.0965	4.1025	4.1085	4.1145	4.1205	4.1265	4.1325	4.1385	4.1445	4.1505	4.1565	4.1625	4.1685	4.1745	4.1805	4.1865	4.1925	4.1985	4.2045	4.2105	4.2165	4.2225	4.2285	4.2345	4.2405	4.2465	4.2525	4.2585	4.2645	4.2705	4.2765	4.2825	4.2885	4.2945	4.3005	4.3065	4.3125	4.3185	4.3245	4.3305	4.3365	4.3425	4.3485	4.3545	4.3605	4.3665	4.3725	4.3785	4.3845	4.3905	4.3965	4.4025	4.4085	4.4145	4.4205	4.4265	4.4325	4.4385	4.4445	4.4505	4.4565	4.4625	4.4685	4.4745	4.4805	4.4865	4.4925	4.4985	4.5045	4.5105	4.5165	4.5225	4.5285	4.5345	4.5405	4.5465	4.5525	4.5585	4.5645	4.5705	4.5765	4.5825	4.5885	4.5945	4.6005	4.6065	4.6125	4.6185	4.6245	4.6305	4.6365	4.6425	4.6485	4.6545	4.6605	4.6665	4.6725	4.6785	4.6845	4.6905	4.6965	4.7025	4.7085	4.7145	4.7205	4.7265	4.7325	4.7385	4.7445	4.7505	4.7565	4.7625	4.7685	4.7745	4.7805	4.7865	4.7925	4.7985	4.8045	4.8105	4.8165	4.8225	4.8285	4.8345	4.8405	4.8465	4.8525	4.8585	4.8645	4.8705	4.8765	4.8825	4.8885	4.8945	4.9005	4.9065	4.9125	4.9185	4.9245	4.9305	4.9365	4.9425	4.9485	4.9545	4.9605	4.9665	4.9725	4.9785	4.9845	4.9905	4.9965	5.0025	5.0085	5.0145	5.0205	5.0265	5.0325	5.0385	5.0445	5.0505	5.0565	5.0625	5.0685	5.0745	5.0805	5.0865	5.0925	5.0985	5.1045	5.1105	5.1165	5.1225	5.1285	5.1345	5.1405	5.1465	5.1525	5.1585	5.1645	5.1705	5.1765	5.1825	5.1885	5.1945	5.2005	5.2065	5.2125	5.2185	5.2245	5.2305	5.2365	5.2425	5.2485	5.2545	5.2605	5.2665	5.2725	5.2785	5.2845	5.2905	5.2965	5.3025	5.3085	5.3145	5.3205	5.3265	5.3325	5.3385	5.3445	5.3505	5.3565	5.3625	5.3685	5.3745	5.3805	5.3865	5.3925	5.3985	5.4045	5.4105	5.4165	5.4225	5.4285	5.4345	5.4405	5.4465	5.4525	5.4585	5.4645	5.4705	5.4765	5.4825	5.4885	5.4945	5.5005	5.5065	5.5125	5.5185	5.5245	5.5305	5.5365	5.5425	5.5485	5.5545	5.5605	5.5665	5.5725	5.5785	5.5845	5.5905	5.5965	5.6025	5.6085	5.6145	5.6205	5.6265	5.6325	5.6385	5.6445	5.6505	5.6565	5.6625	5.6685	5.6745	5.6805	5.6865	5.6925	5.6985	5.7045	5.7105	5.7165	5.7225	5.7285	5.7345	5.7405	5.7465	5.7525	5.7585	5.7645	5.7705	5.7765	5.7825	5.7885	5.7945	5.8005	5.8065	5.8125	5.8185	5.8245	5.8305	5.8365	5.8425	5.8485	5.8545	5.8605	5.8665	5.8725	5.8785	5.8845	5.8905	5.8965	5.9025	5.9085	5.9145	5.9205	5.9265	5.9325	5.9385	5.9445	5.9505	5.9565	5.9625	5.9685	5.9745	5.9805	5.9865	5.9925	5.9985	6.0045	6.0105	6.0165	6.0225	6.0285	6.0345	6.0405	6.0465	6.0525	6.0585	6.0645	6.0705	6.0765	6.0825	6.0885	6.0945	6.1005	6.1065	6.1125	6.1185	6.1245	6.1305	6.1365	6.1425	6.1485	6.1545	6.1605	6.1665	6.1725	6.1785	6.1845	6.1905	6.1965	6.2025	6.2085	6.2145	6.2205	6.2265	6.2325	6.2385	6.2445	6.2505	6.2565	6.2625	6.2685	6.2745	6.2805	6.2865	6.2925	6.2985	6.3045	6.3105	6.3165	6.3225	6.3285	6.3345	6.3405	6.3465	6.3525	6.3585	6.3645	6.3705	6.3765	6.3825	6.3885	6.3945	6.4005	6.4065	6.4125	6.4185	6.4245	6.4305	6.4365	6.4425	6.4485	6.4545	6.4605	6.4665	6.4725	6.4785	6.4845	6.4905	6.4965	6.5025	6.5085	6.5145	6.5205	6.5265	6.5325	6.5385	6.5445	6.5505	6.5565	6.5625	6.5685	6.5745	6.5805	6.5865	6.5925	6.5985	6.6045	6.6105	6.6165	6.6225	6.6285	6.6345	6.6405	6.6465	6.6525	6.6585	6.6645	6.6705	6.6765	6.6825	6.6885	6.6945	6.7005	6.7065	6.7125	6.7185	6.7245	6.7305	6.7365	6.7425	6.7485	6.7545	6.7605	6.7665	6.7725	6.7785	6.7845	6.7905	6.7965	6.8025	6.8085	6.8145	6.8205	6.8265	6.8325	6.8385	6.8445	6.8505	6.8565	6.8625	6.8685	6.8745	6.8805	6.8865	6.8925	6.8985	6.9045	6.9105	6.9165	6.9225	6.9285	6.9345	6.9405	6.9465	6.9525	6.9585	6.9645	6.9705	6.9765	6.9825	6.9885	6.9945	7.0005	7.0065	7.0125	7.0185	7.0245	7.0305	7.0365	7.0425	7.0485	7.0545	7.0605	7.0665	7.0725	7.0785	7.0845	7.0905	7.0965	7.1025	7.1085	7.1145	7.1205	7.1265	7.1325	7.1385	7.1445	7.1505	7.1565	7.1625	7.1685	7.1745	7.1805	7.1865	7.1925	7.1985	7.2045	7.2105	7.2

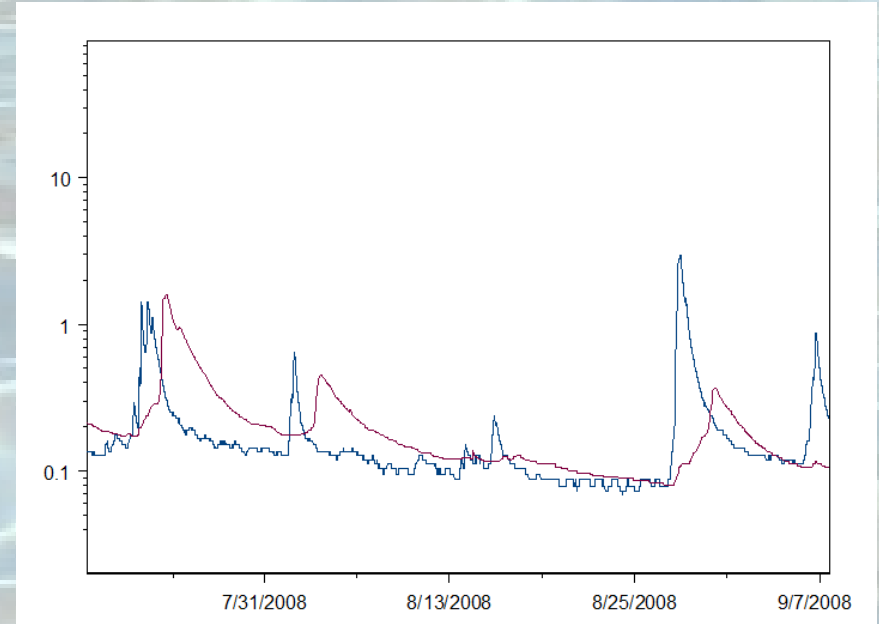


# USGS Water Gauge Study

	Potomac										West Fork-Tygart										Cheat										Upper Ohio										Greenbrier-New										Gauley-Elk										Lower Kanawha										Guyandotte-Big Sandy									
	patterson	franklin	cabins	petersburg	brandywine	moorefield	springfield	casopin	opeton	millville	dailey	audra	land run	hall	graffton	barrackville	hendrix	at davis	cheat bridge	shavers.blw.bowden	parsons	rowlesburg	rockwell	whiting ck	wilcox	pipetern	durbin	badgley	johnson	hillsdale	dyer	cranberry	cragsville	mt.kokout	lockwood	webster	whitesville	shilford	tomado	hurricane.ck	baileysville	clear fork	welch	beartown	panther	williams	at summit																																	
Potomac	1.000	0.723	0.749	0.822	0.581	0.683	0.822	0.824	0.728	0.781	0.401	0.258	0.164	0.300	0.553	0.499	0.606	0.624	0.431	0.468	0.565	0.567	0.720	0.550	0.350	0.476	0.602	0.583	0.638	0.630	0.279	0.305	0.377	0.466	0.224	0.305	0.332	0.331	0.388	0.445	0.473	0.338	0.211	0.283	0.261	0.406	0.386	0.361																																
West Fork-Tygart	0.723	1.000	0.791	0.863	0.792	0.746	0.773	0.646	0.581	0.797	0.532	0.310	0.143	0.319	0.247	0.221	0.530	0.476	0.588	0.513	0.526	0.507	0.481	0.306	0.392	0.560	0.712	0.790	0.709	0.718	0.445	0.393	0.293	0.713	0.718	0.323	0.521	0.391	0.482	0.468	0.246	0.339	0.172	0.194	0.253	0.176	0.368	0.185	0.187	0.148	0.401	0.338	0.345	0.326																										
Cheat	0.749	0.791	1.000	0.962	0.741	0.862	0.884	0.721	0.500	0.729	0.678	0.463	0.246	0.483	0.422	0.428	0.803	0.789	0.643	0.679	0.789	0.780	0.636	0.301	0.466	0.446	0.603	0.623	0.713	0.718	0.323	0.521	0.391	0.482	0.468	0.246	0.339	0.172	0.194	0.253	0.176	0.368	0.185	0.187	0.148	0.401	0.338	0.345	0.326																															
Upper Ohio	0.822	0.863	0.962	1.000	0.790	0.864	0.884	0.721	0.500	0.729	0.596	0.350	0.143	0.388	0.422	0.368	0.724	0.678	0.624	0.656	0.706	0.696	0.622	0.311	0.432	0.521	0.709	0.817	0.788	0.776	0.471	0.521	0.544	0.576	0.215	0.509	0.198	0.215	0.283	0.162	0.462	0.290	0.082	0.244	0.239	0.339	0.359	0.326																																
Greenbrier-New	0.581	0.792	0.743	0.759	1.000	0.877	0.755	0.563	0.402	0.667	0.504	0.278	0.143	0.277	0.195	0.165	0.330	0.429	0.632	0.522	0.525	0.504	0.486	0.130	0.340	0.566	0.720	0.824	0.736	0.705	0.613	0.597	0.641	0.503	0.293	0.548	0.132	0.182	0.244	0.234	0.347	0.260	0.081	0.362	0.390	0.354	0.366	0.324																																
Gauley-Elk	0.683	0.746	0.862	0.854	0.877	1.000	0.891	0.747	0.504	0.718	0.545	0.297	0.105	0.335	0.264	0.260	0.660	0.549	0.579	0.591	0.628	0.613	0.599	0.259	0.337	0.467	0.765	0.739	0.747	0.717	0.485	0.520	0.552	0.501	0.185	0.508	0.060	0.157	0.214	0.184	0.333	0.242	-0.027	0.208	0.222	0.274	0.306	0.245																																
Lower Kanawha	0.772	0.894	0.894	0.702	0.891	1.000	0.842	0.609	0.637	0.568	0.335	0.144	0.411	0.466	0.414	0.706	0.655	0.573	0.607	0.680	0.686	0.641	0.373	0.408	0.465	0.751	0.779	0.782	0.779	0.463	0.593	0.513	0.528	0.189	0.498	0.130	0.186	0.266	0.212	0.368	0.238	0.057	0.239	0.232	0.311	0.311	0.263																																	
Guyandotte-Big Sandy	0.646	0.727	0.772	0.563	0.747	0.884	0.721	0.500	0.729	0.377	0.222	0.109	0.264	0.512	0.486	0.550	0.541	0.399	0.447	0.516	0.529	0.434	0.503	0.256	0.436	0.545	0.555	0.592	0.577	0.196	0.277	0.292	0.392	0.099	0.278	0.060	0.207	0.352	0.278	0.375	0.286	0.096	0.219	0.197	0.315	0.354	0.312																																	
	0.729	0.772	0.772	0.563	0.747	0.884	0.721	0.500	0.729	0.396	0.160	0.035	0.247	0.356	0.234	0.495	0.474	0.439	0.396	0.473	0.494	0.529	0.296	0.344	0.493	0.613	0.687	0.787	0.801	0.352	0.440	0.413	0.531	0.231	0.303	0.223	0.239	0.291	0.123	0.404	0.187	0.207	0.388	0.368	0.369	0.395	0.369																																	
	0.601	0.532	0.626	0.596	0.604	0.568	0.377	0.237	0.396	1.000	0.778	0.525	0.807	0.503	0.439	0.764	0.671	0.827	0.917	0.841	0.824	0.824	0.724	0.751	0.286	0.745	0.691	0.434	0.402	0.650	0.691	0.655	0.484	0.355	0.814	0.081	0.141	0.236	0.407	0.177	0.172	0.218	0.123	0.153	0.133	0.196	0.184																																	
	0.258	0.310	0.453	0.350	0.278	0.297	0.335	0.222	0.087	0.160	0.778	1.000	0.791	0.941	0.369	0.444	0.724	0.578	0.671	0.794	0.772	0.786	0.300	0.514	0.843	0.315	0.564	0.499	0.225	0.204	0.641	0.608	0.576	0.373	0.434	0.679	0.081	0.215	0.273	0.480	0.199	0.235	0.309	0.139	0.217	0.152	0.256	0.299																																
	0.164	0.143	0.210	0.143	0.143	0.105	0.144	0.108	0.000	0.005	0.525	0.791	0.800	0.737	0.327	0.399	0.517	0.438	0.506	0.569	0.555	0.521	0.443	0.186	0.688	0.253	0.348	0.321	0.024	0.007	0.399	0.436	0.415	0.204	0.485	0.450	0.108	0.214	0.261	0.465	0.169	0.226	0.404	0.211	0.261	0.224	0.261	0.318																																
	0.309	0.319	0.493	0.388	0.277	0.335	0.411	0.304	0.145	0.247	0.927	0.941	0.737	1.000	0.454	0.502	0.741	0.638	0.676	0.802	0.802	0.810	0.371	0.215	0.868	0.313	0.558	0.538	0.286	0.265	0.557	0.632	0.602	0.434	0.444	0.701	0.094	0.231	0.304	0.473	0.191	0.206	0.314	0.125	0.211	0.164	0.264	0.298																																
	0.553	0.347	0.452	0.422	0.195	0.364	0.466	0.512	0.516	0.356	0.503	0.369	0.327	0.454	0.100	0.732	0.624	0.716	0.435	0.546	0.645	0.666	0.810	0.669	0.403	0.149	0.396	0.293	0.255	0.252	0.242	0.309	0.280	0.294	0.209	0.431	0.249	0.268	0.316	0.243	0.193	0.198	0.148	0.072	0.047	0.257	0.241	0.151																																
	0.499	0.221	0.405	0.368	0.105	0.282	0.416	0.480	0.439	0.234	0.439	0.444	0.398	0.502	0.732	1.000	0.565	0.615	0.336	0.495	0.583	0.568	0.699	0.734	0.435	0.202	0.300	0.228	0.144	0.128	0.168	0.214	0.223	0.196	0.209	0.356	0.131	0.323	0.398	0.233	0.193	0.208	0.153	0.102	0.096	0.212	0.210	0.151																																
	0.606	0.530	0.820	0.724	0.530	0.660	0.706	0.560	0.403	0.495	0.764	0.721	0.517	0.741	0.624	0.565	1.000	0.879	0.752	0.884	0.971	0.915	0.660	0.352	0.699	0.370	0.811	0.687	0.525	0.513	0.561	0.611	0.607	0.488	0.308	0.644	0.094	0.151	0.219	0.412	0.341	0.264	0.075	0.146	0.170	0.266	0.338	0.282																																
	0.628	0.476	0.789	0.676	0.423	0.549	0.655	0.541	0.405	0.474	0.613	0.578	0.438	0.638	0.796	0.655	0.879	0.881	0.667	0.750	0.817	0.857	0.421	0.616	0.313	0.658	0.555	0.430	0.424	0.463	0.483	0.481	0.411	0.290	0.558	0.148	0.148	0.216	0.367	0.309	0.217	0.085	0.174	0.186	0.329	0.342	0.285																																	
	0.411	0.588	0.683	0.624	0.632	0.579	0.573	0.559	0.267	0.403	0.824	0.671	0.506	0.678	0.435	0.336	0.752	0.667	0.140	0.677	0.405	0.753	0.665	0.729	0.372	0.840	0.788	0.556	0.519	0.648	0.818	0.788	0.558	0.470	0.776	0.322	0.306	0.242	0.251	0.255	0.307	0.354	0.317																																					
	0.468	0.513	0.747	0.656	0.522	0.591	0.607	0.447	0.281	0.396	0.917	0.794	0.569	0.800	0.546	0.495	0.884	0.750	0.877	1.000	0.925	0.883	0.538	0.289	0.75	0.308	0.828	0.720	0.473	0.438	0.682	0.707	0.698	0.515	0.360	0.807	0.114	0.176	0.263	0.430	0.269	0.271	0.175	0.094	0.123	0.194	0.259	0.223																																
	0.565	0.526	0.799	0.706	0.525	0.628	0.680	0.516	0.362	0.473	0.841	0.772	0.555	0.808	0.645	0.583	0.917	0.901	0.805	0.925	1.000	0.989	0.640	0.341	0.759	0.359	0.876	0.703	0.507	0.488	0.614	0.653	0.648	0.504	0.358	0.735	0.116	0.174	0.257	0.432	0.313	0.256	0.139	0.161	0.201	0.276	0.342	0.293																																
	0.566	0.507	0.790	0.698	0.504	0.613	0.686	0.529	0.381	0.494	0.833	0.766	0.521	0.819	0.666	0.546	0.935	0.877	0.751	0.883	0.969	1.000	0.644	0.343	0.739	0.350	0.841	0.691	0.519	0.504	0.580	0.632	0.621	0.506	0.330	0.779	0.108	0.185	0.273	0.402	0.291	0.238	0.146	0.165	0.212	0.254	0.330	0.294																																
	0.778	0.481	0.618	0.623	0.485	0.599	0.646	0.624	0.611	0.524	0.478	0.306	0.241	0.371	0.393	0.691	0.660	0.656	0.645	0.640	0.646	0.646	0.306	0.385	0.348	0.521	0.486	0.462	0.462	0.312	0.381	0.429	0.434	0.315	0.462	0.325	0.361	0.439	0.264	0.359	0.316	0.175	0.088	0.186	0.348	0.341	0.279																																	
	0.350	0.392	0.484	0.432	0.340	0.337	0.406	0.256	0.215	0.344	0.751	0.841	0.688	0.848	0.403	0.433	0.693	0.616	0.729	0.753	0.759	0.336	0.388	0.217	1.000	0.411	0.595	0.580	0.396	0.378	0.641	0.727	0.695	0.560	0.644	0.688	0.299	0.344	0.390	0.567	0.345	0.333	0.481	0.267	0.340	0.342	0.412	0.434																																
	0.476	0.560	0.446	0.521	0.566	0.467	0.465	0.436	0.420	0.493	0.286	0.315	0.253	0.313	0.149	0.202	0.370	0.313	0.372	0.308	0.359	0.350	0.348	0.218	0.411	1.000	0.349	0.510	0.376	0.359	0.411	0.514	0.557	0.																																														

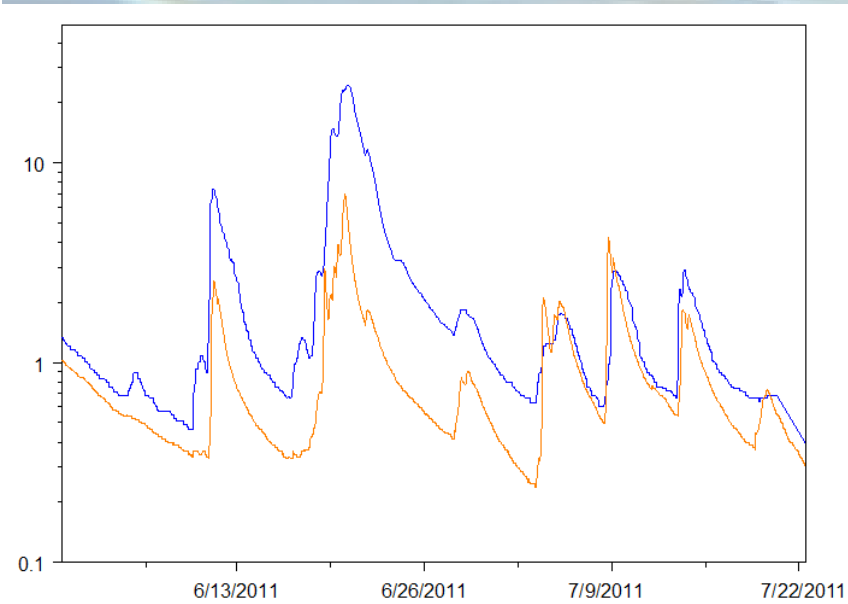
# USGS Water Gauge Study

Differences in timing  
are related to basin  
size and shape



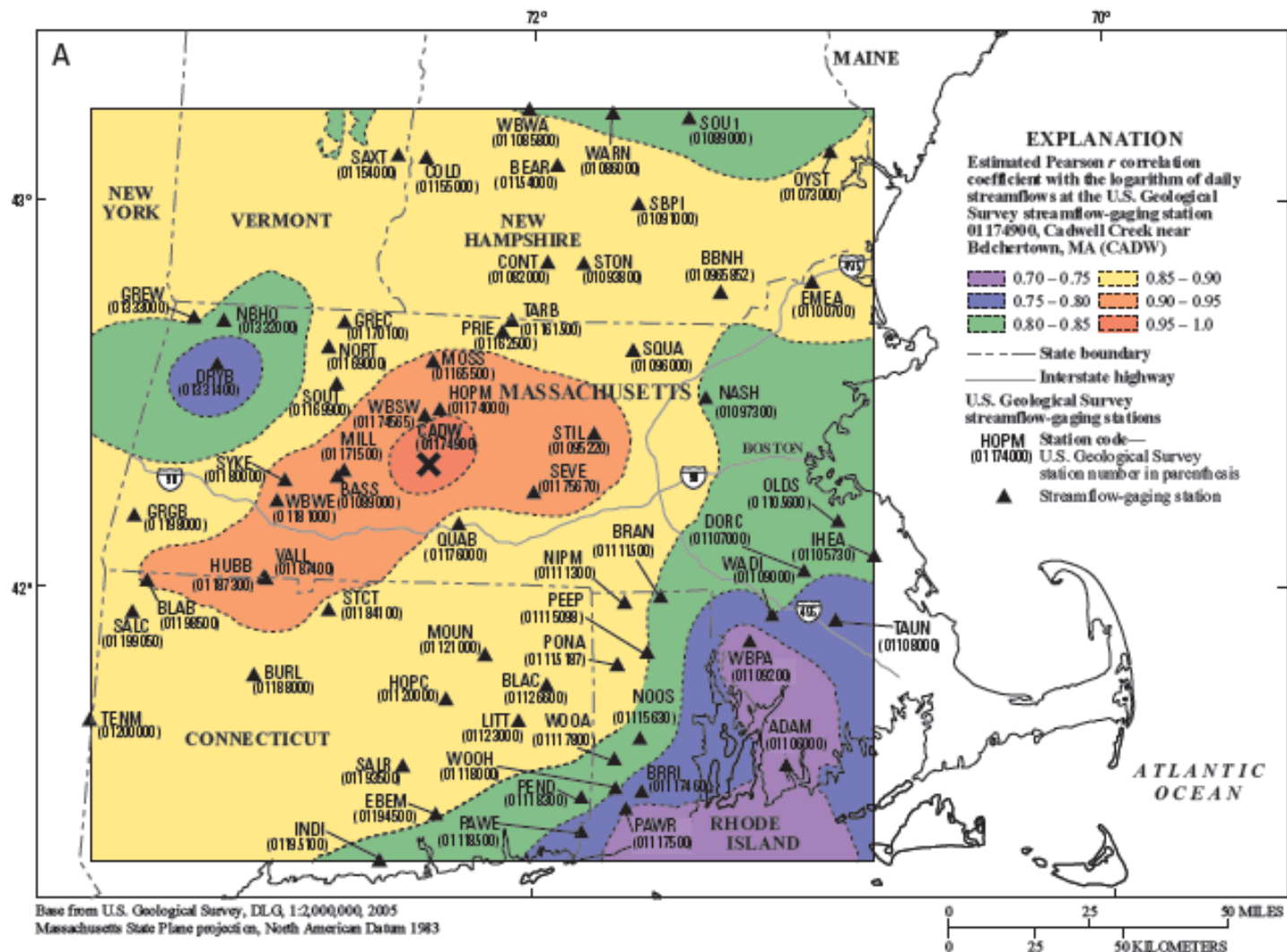
Waites Run	12.6 mi <sup>2</sup>
Great Cacapon	675 mi <sup>2</sup>

Preliminary draft, subject to change. Do not quote or cite.



Blackwater River	85.9 mi <sup>2</sup>
Dry Fork	349 mi <sup>2</sup>

# Example map from Archfield and others, 2009, showing estimated correlations determined by Kriging.

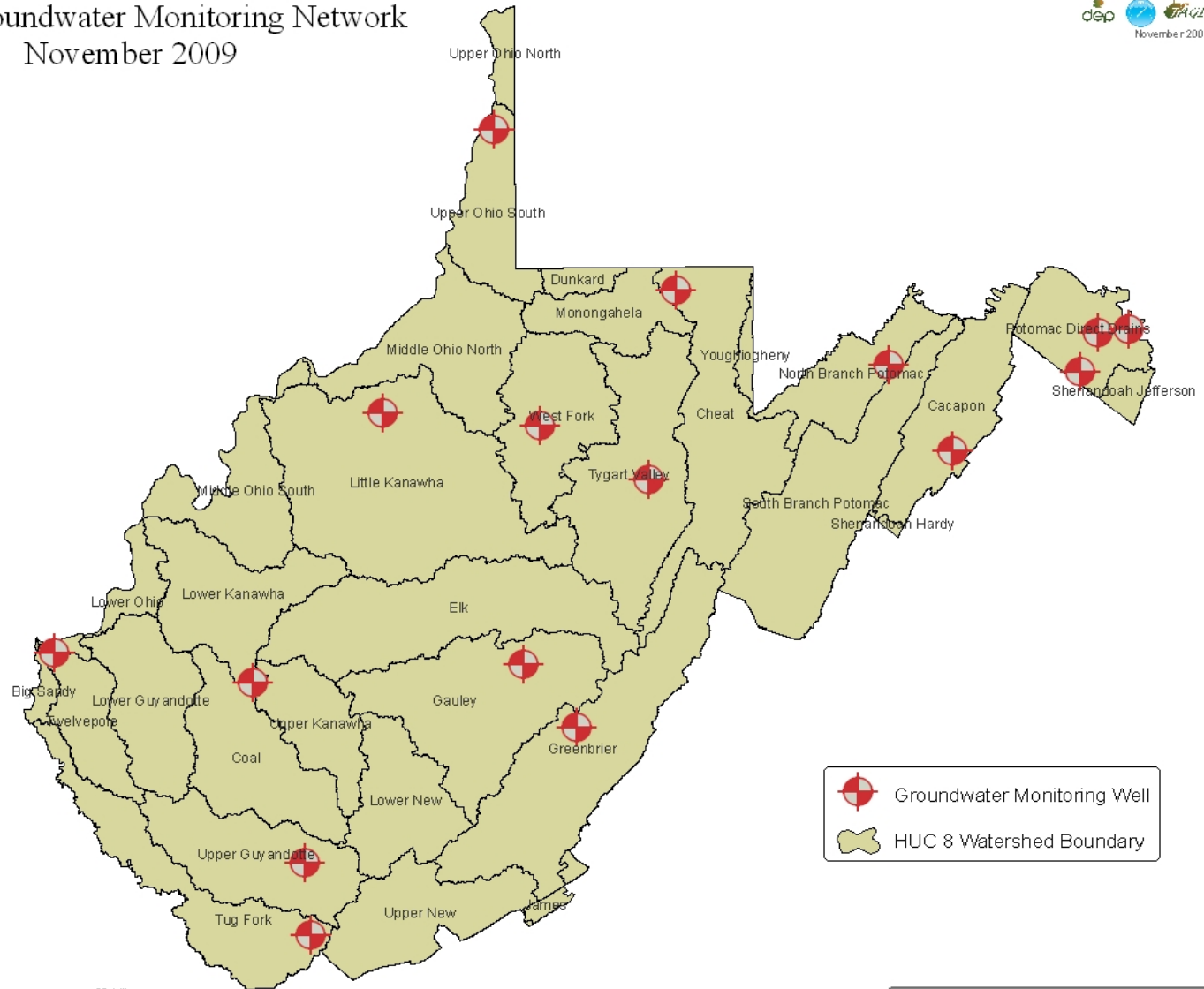


Preliminary draft, subject to change. Do not quote or cite.

Figure 4. Estimated Pearson  $r$  correlations with the logarithm of daily streamflows at the U.S. Geological Survey streamgages (A) 01174900, Cadwell Creek near Belchertown, MA (CADW), and (B) 01095220, Stillwater River near Sterling, MA (STIL).

# Groundwater Monitoring

Current Groundwater Monitoring Network  
November 2009







West Virginia Mine Pool Atlas

# Mine Pool Atlas

## SUMMARY OF POTENTIAL TOTALLY FLOODED UNDERGROUND MINING BY COAL SEAM\*

Group/Formation	Coal Seam	No. of Mines	Mean coal thickness (feet)	Min. footprint area (acres)	Max. footprint area (acres)	Mean footprint area (acres)	Median footprint area (acres)	Total footprint area (acres)	Estimated void volume (acre feet)	Max. potential storage (million gallons)
DUNKARD GROUP	Washington	0								
	Waynesburg A	0								
MONONGAHELA GROUP	Waynesburg	0								
	Uniontown	0								
	<b>Sewickley</b>	10	5.73	0.01	494.35	109.84	9.40	1,098.45	3,223.36	1,050.49
	<b>Redstone</b>	5	3.57	5.13	486.29	212.93	86.26	1,064.63	1,777.56	579.31
	<b>Pittsburgh</b>	46	6.38	0.92	20,204.27	3,933.91	641.06	180,959.81	625,388.68	203,814.17
CONEMAUGH GROUP	Elk Lick	0								
	Harlem	0								
	Bakerstown	0								
	Brush Creek	0								
	Mahoning	0								
ALLEGHENY FORMATION	<b>Upper Freeport</b>	3	5.27	17.38	1,592.89	582.25	136.47	1,746.75	3,621.87	1,180.37
	Lower Freeport	0								
	Upper Kittanning	1		402.06	402.06	402.06	402.06	402.06		
	<b>Middle Kittanning</b>	5	5.39	81.75	4,755.03	1,879.00	172.19	9,395.02	24,387.17	7,947.78
	Lower Kittanning	0								
	Number 6 Block	0								
	Upper Number 5 Block	0								
	Number 5 Block	0								
<b>TOTAL</b>	<b>21 seams/14 with mines &gt; 500 acres</b>	<b>194</b>	<b>71.07</b>	<b>1,775.17</b>	<b>101,914.86</b>	<b>28,595.98</b>	<b>16,911.24</b>	<b>393,811.87</b>	<b>1,106,549.98</b>	<b>360,624.64</b>



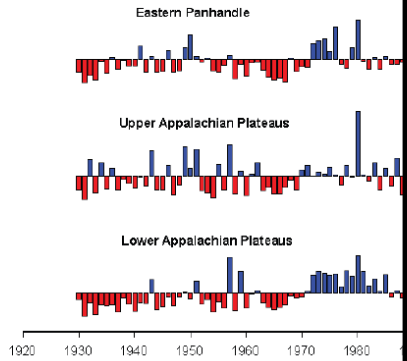
\*Includes above, near, and below drainage underground mines — seams containing below drainage underground mines > 500 acres in area are highlighted and major seams are in boldface



In cooperation with the West Virginia Department of Environmental Protection,  
Division of Water and Waste Management

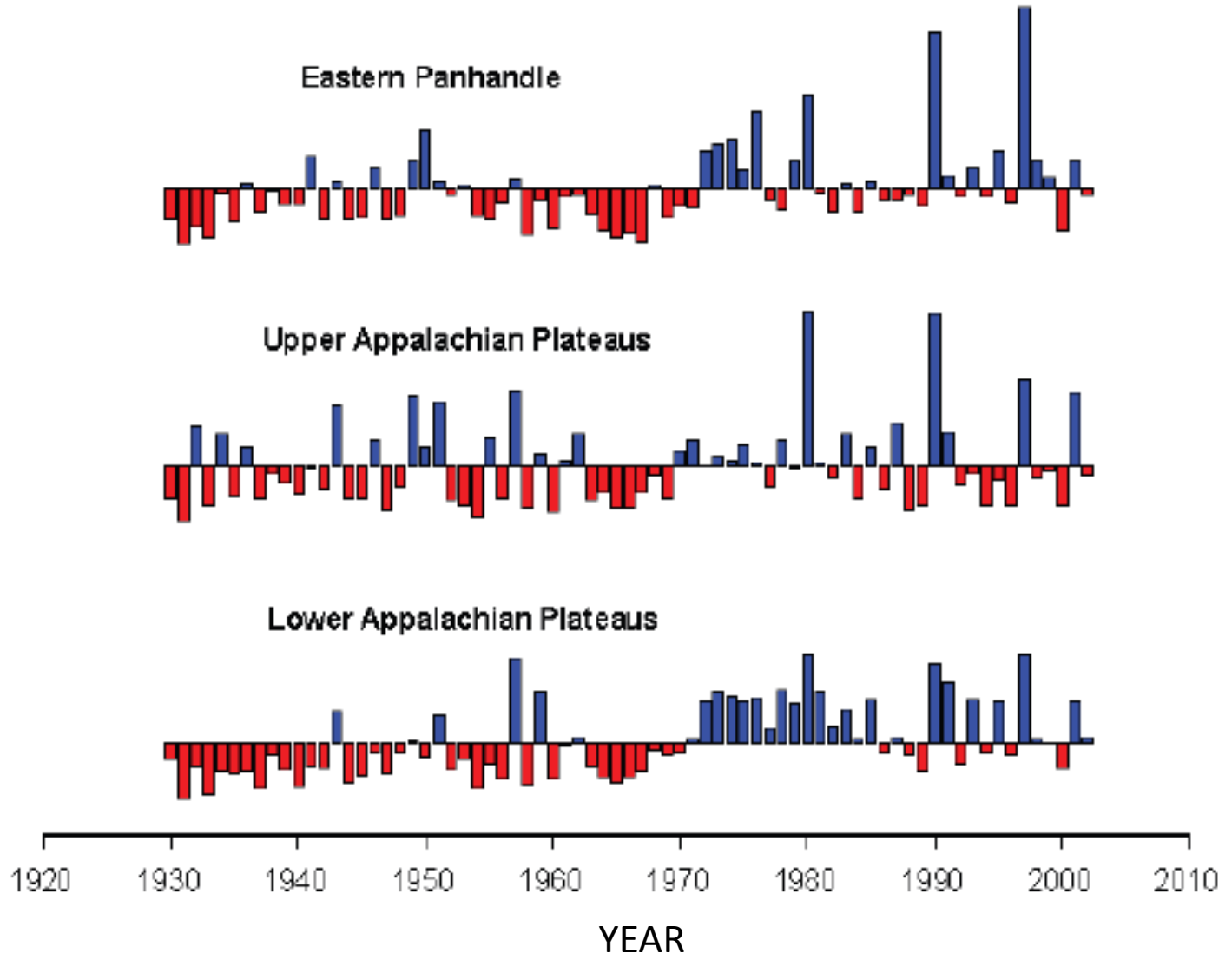
**Low-Flow Analysis and Selected Flow Statistics  
Representative of 1930–2002 for Streamflow-Gaging  
Stations In or Near West Virginia**

Climate Change equals Change in the  
intensity and/or frequency of Floods  
and droughts.

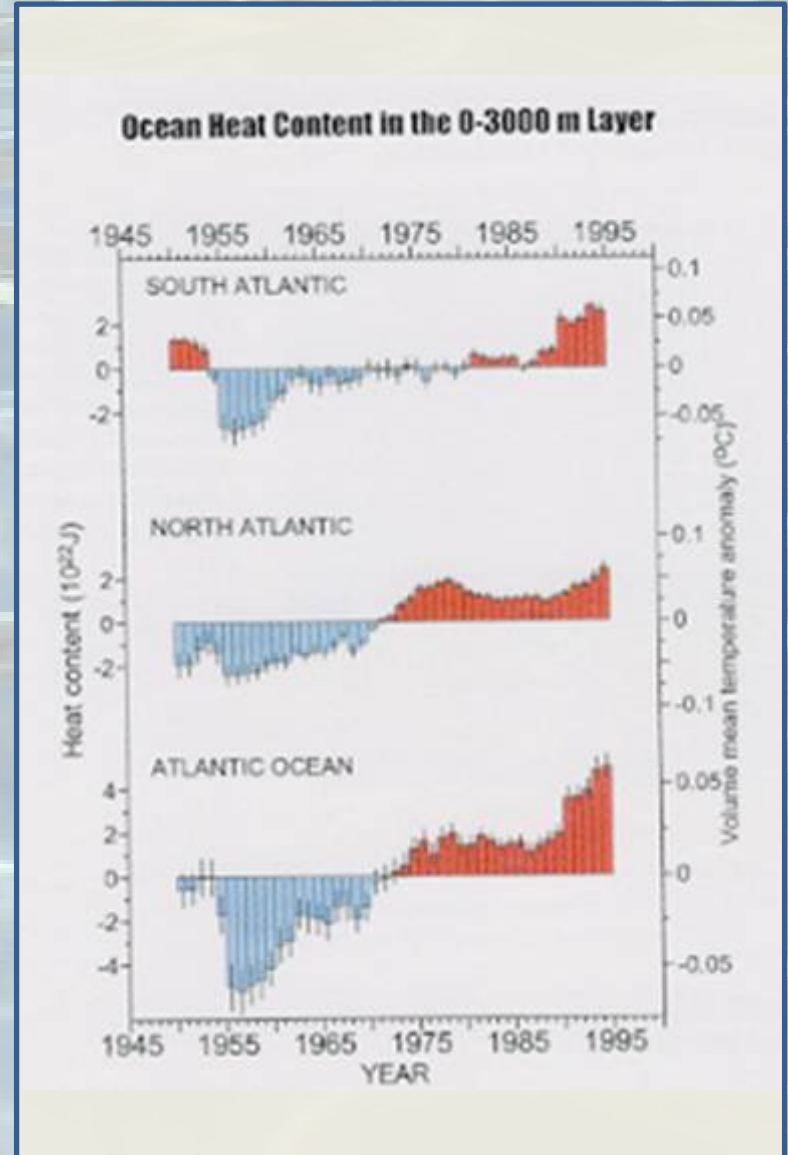
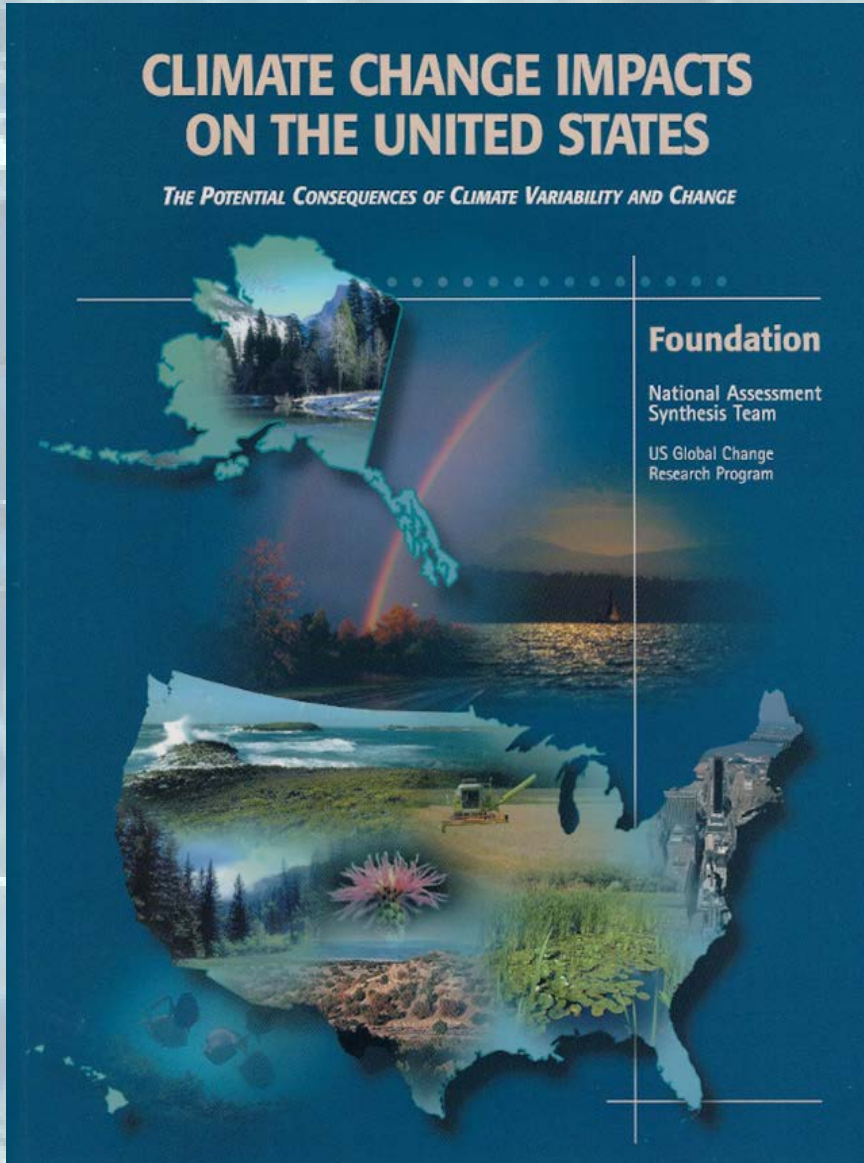


Scientific Investigations Report 2006–500

U.S. Department of the Interior  
U.S. Geological Survey



# Rising Ocean Temperature Could Result in Increased Precipitation



WV Conservation Agency and the Army Corps of Engineers created a task force who produced the WV Flood Protection Plan in 2003



## WEST VIRGINIA FLOOD PROTECTION PLAN

### 1. Introduction

**a. Authority for the Study.** West Virginia has endured years of uncoordinated efforts to reduce flood damages by numerous Federal and State agencies. In 1991, the West Virginia Conservation Agency (previously known as the West Virginia Soil Conservation Agency) was directed to prepare a Flood Damage Assessment and Mitigation Plan for West Virginia in an attempt to understand and control flood damages.

Chapter 19-21A of the State Code establishes the State Conservation Committee and Conservation Districts. The Conservation Agency, as an agent of the State Committee, is charged to conserve natural resources, control floods, prevent impairment of dams and reservoirs, assist in maintaining the navigability of rivers and harbors, conserve wildlife, protect the tax base, protect public lands, and protect and promote the health, safety, and general welfare of the people. The Conservation Agency coordinates these activities with the State's Conservation Districts.

All State and Federal agencies having responsibilities related to floodplain management and flood mitigation activities in the State were invited to participate. An interim draft of this plan

entitled "West Virginia Statewide Flood Damage Assessment and Mitigation Plan" was prepared in 1993. A final version of the plan was never produced.

In 1998, Senator Robert C. Byrd obtained funding for the Corps of Engineers (USACE) to formulate a comprehensive strategy for reducing economic, property, and personal losses due to flooding in West Virginia. Those funds were provided to match State funds and in-kind resources to complete the 1993 Plan. Due to the time lapse since completion of the interim draft plan in 1993, portions of the current Plan would be updated with new chapters added.

The West Virginia Conservation Agency and the Corps of Engineers have developed a partnership with numerous Federal and State agencies to formulate a comprehensive strategic plan for reducing flood damages in the State. The first step in that process was the creation of a Task Force composed of Federal, State, and quasi-public organizations that have participated in

# Current WV Drought Response Plan

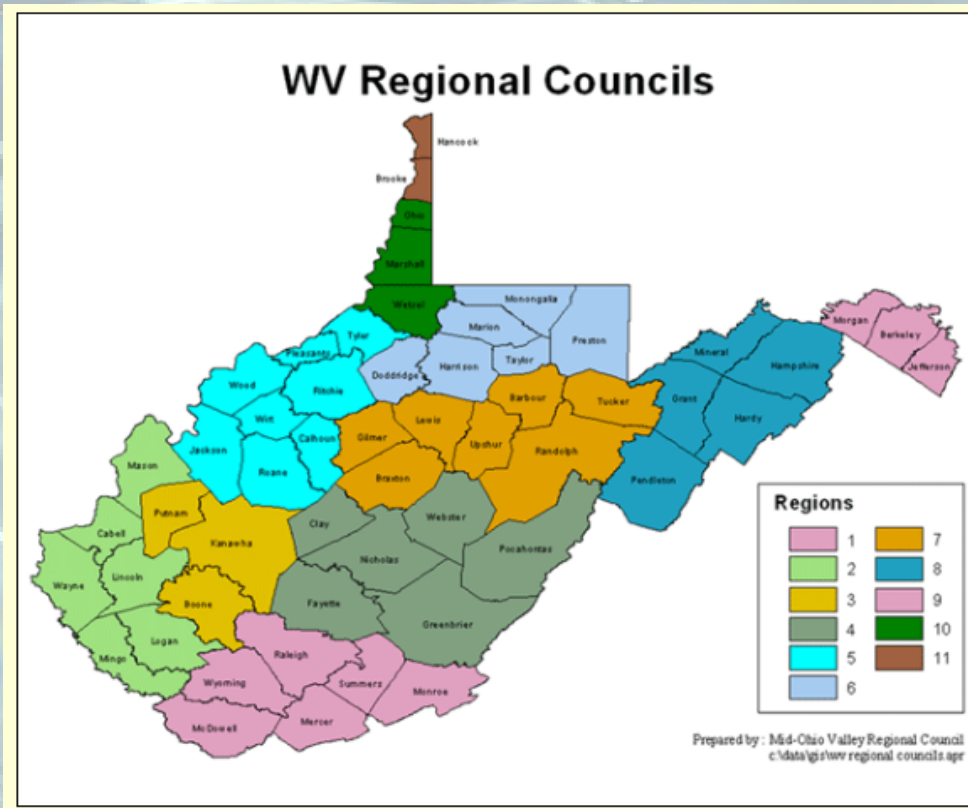
## Annex U – Drought

- Enacted around 2008
- Is the go to document for drought emergency according to DHSEM
- Lead agency is WV Department of Agriculture
- The Lead contact is WVDHSEM Duty Officer , based on the Annex U - Checklist
- A reaction based plan triggered by agricultural losses



# Commerce of our State's Water Resources

- Regional Planning and Development Councils – good initial contact
- Regional Comprehensive Economic Development Strategy Annual Reports are published every year and posted on line.
  - “Because natural resources such as clean water and air, land and mineral deposits are limited, and the use of these resources affects everyone.”



**Region I PDC 2011  
CEDS Annual Report**

**Region I PDC**  
1439 E. Main Street, Suite 5  
Princeton, WV 24740  
(304) 431-7225  
[www.regiononepdc.org](http://www.regiononepdc.org)

*"Serving the people of McDowell, Mercer, Monroe, Raleigh, Summers & Wyoming Counties"*

<https://apps.dep.wv.gov/DWWM/WaterUse/index.cfm>

Username: *To Be Provided*

Password: *To Be Provided*

The screenshot shows a web browser window with the address bar displaying <https://apps.dep.wv.gov/DWWM/WaterUse/index.cfm>. The browser's address bar also shows the page title "WMP-Data". The browser's toolbar includes icons for OSW Hydroacoustics, Free Hotmail, Suggested Sites, and Web Slice Gallery. The main content area of the browser displays the West Virginia Department of Environmental Protection logo, which consists of a green leaf icon and the text "dep west virginia department of environmental protection". Below the logo is a horizontal orange line. Underneath the line, the text "WMP-Data" is displayed. The login form contains two input fields: "User Name" and "Password", each followed by a text input box. Below the input boxes is a "Submit" button. At the bottom of the page, there is a footer with the text "Privacy, Security and Accessibility | [WV.gov](#) | [USA.gov](#) | © 2012 State of West Virginia".



## WMP-Data

Last date modified: 11/26/12

[WMP - Executive Summary](#)

[WMP - Statewide](#)

[WVGES Mine Pool Atlas](#)

[Marcellus Map](#)

[LiDAR Slides](#)

[Eastern Panhandle HUC8 Watershed Maps](#)

[North Branch Potomac HUC8 Watershed Maps](#)

[South Branch Potomac HUC8 Watershed Maps](#)



### USGS Stream Gauge Links

<http://waterwatch.usgs.gov/?m=real&r=wv>

<http://waterdata.usgs.gov/wv/nwis/current/?type=flow>


Send comments to [Brian.A.Carr@wv.gov](mailto:Brian.A.Carr@wv.gov)

# Water Use Web Site


OSW Hydroacoustics M Free Hotmail Suggested Sites Web Slice Gallery

marshall.edu


OSW Hydroacoustics M Free Hotmail Suggested Sites Web Slice Gallery Page Safety Tools



west virginia department of environmental protection



WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION  
WATER USE SECTION



Center for Environmental, Geotechnical and Applied Sciences

**GIS Water Use Section Web Mapping Tool**

**WV DEP Water Use**

**Helpful Links**

**Definitions**

**Contact Us**

## Welcome to the WVDEP Water Use Section Public Information Portal

This website was developed by the Center of Environmental, Geotechnical, and Applied Sciences (**CEGAS**) at Marshall University. It serves as a public information portal for data related to water use in West Virginia. **The Water Use Section** of the WV DEP was developed as a result of the **Water Resources Protection and Management Act of 2008**. On this site, you have access to reports from the Large Quantity User and Marcellus Shale Frac Water databases. Other datasets are displayed on the GIS Water Use Section web mapping tool.



# Water Use Web Site

## Instructions

WV Water Use Mapping Tool

This document includes instructions on using the WV Water Use Mapping Tool.

9/14/2012

### I. Map Viewer Overview

The layout of the map viewer is shown below.



Map Viewer Overview

### II. Navigation

This section describes how to navigate. Below is a picture of the navigation widget. It is found on the left side of the map viewer. It becomes transparent when the cursor is not hovering over a navigation control.



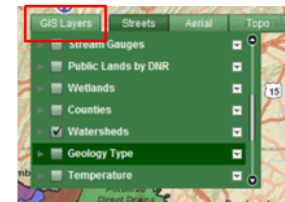
In addition to using the "Zoom slider" on the navigation widget, you can also roll the mouse wheel forward or backwards to zoom in or out respectively.

### III. View GIS Layers

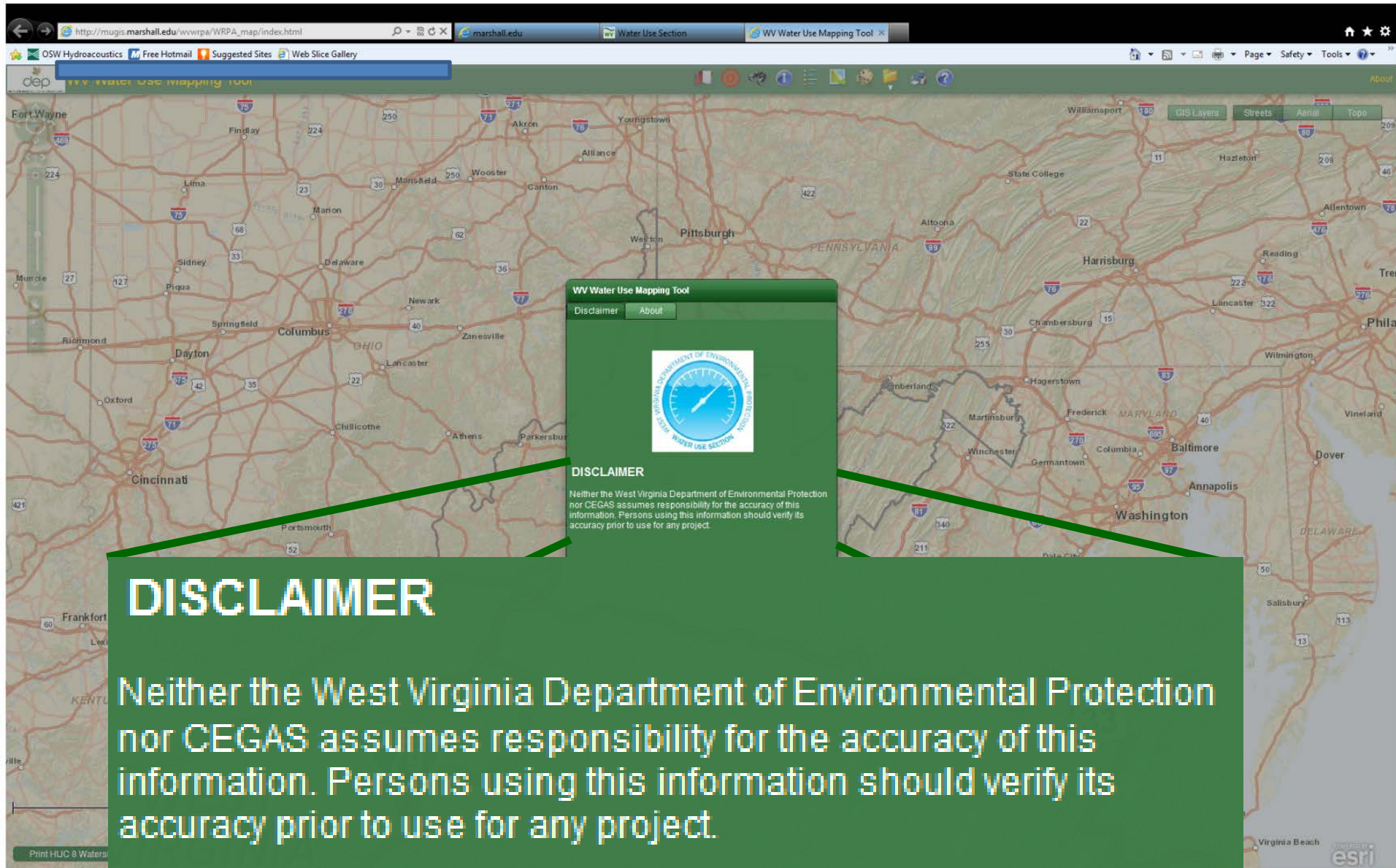
Switch between base layers by selecting one of the buttons labeled "Streets", "Aerial" or "Topo". Base layers are used in the viewer to display background imagery and street data.



Additional layers can be displayed in the viewer by selecting the "GIS Layers" button and then selecting the checkbox beside the layer to display. Note: not all layers will be displayed at all scales/zoom levels.




# Water Use Web Site - Disclaimer



The image shows a screenshot of a web browser displaying a map of the West Virginia Water Use Mapping Tool. The browser's address bar shows the URL [http://mugis.marshall.edu/wvwrpa/wrpa\\_map/index.html](http://mugis.marshall.edu/wvwrpa/wrpa_map/index.html). The browser's title bar indicates the page is titled "WV Water Use Mapping Tool". The map displays a geographical area covering parts of West Virginia, Ohio, Pennsylvania, and Maryland, with various cities and roads labeled. A green callout box is overlaid on the map, containing the following text:

**WV Water Use Mapping Tool**  
Disclaimer About

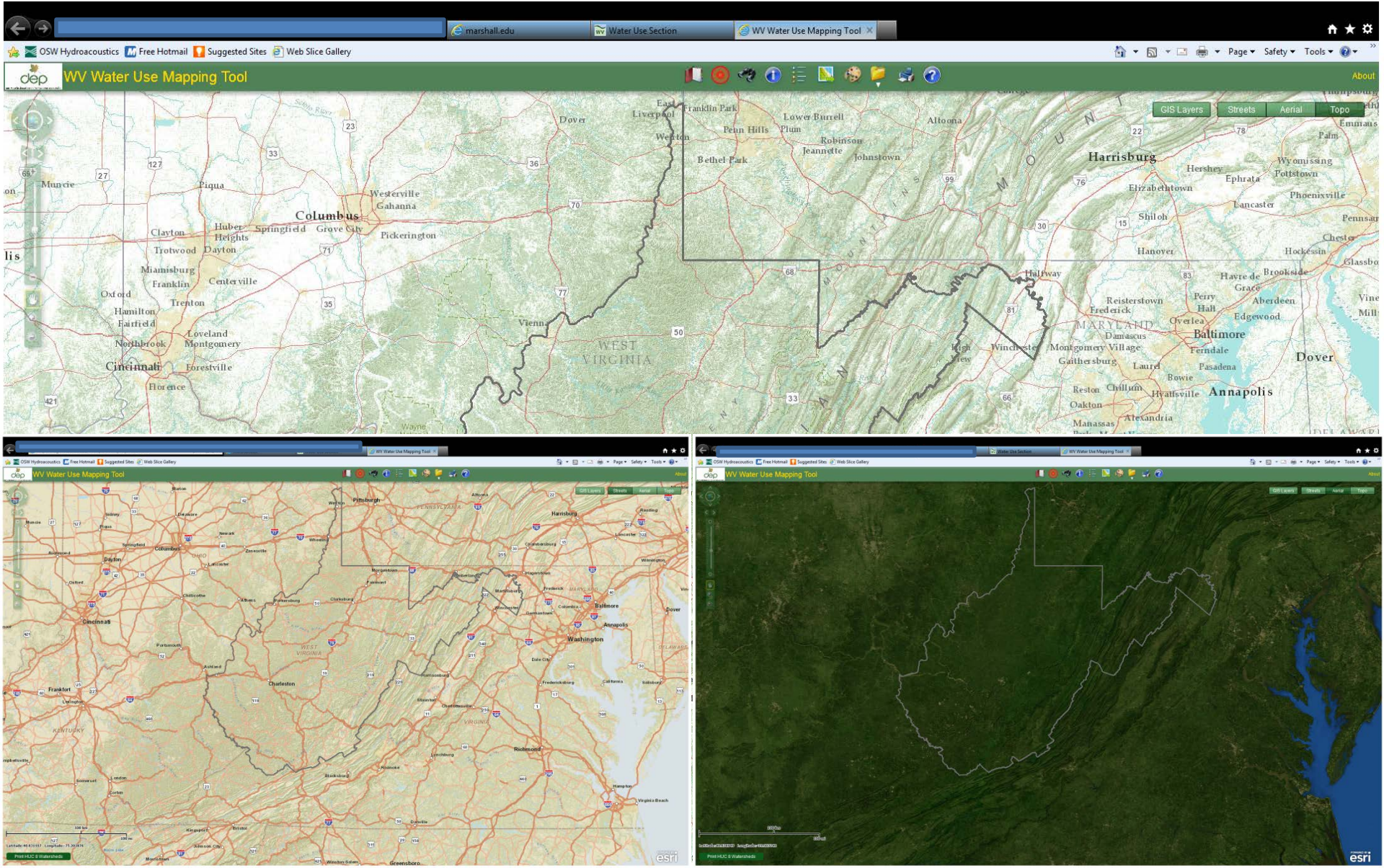


**DISCLAIMER**  
Neither the West Virginia Department of Environmental Protection nor CEGAS assumes responsibility for the accuracy of this information. Persons using this information should verify its accuracy prior to use for any project.

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# Water Use Web Site – Base Maps





# Water Use Web Site – Locate

The image displays two screenshots of the WV Water Use Mapping Tool web application. The top screenshot shows the search interface where the address "601 57th street se charleston wv" has been entered. The bottom screenshot shows the search results for the same address, listing five potential locations with their scores.

**Search Interface (Top Screenshot):**

Find an address  
Enter the address  
601 57th street se charleston wv  
Locate Clear

**Search Results (Bottom Screenshot):**

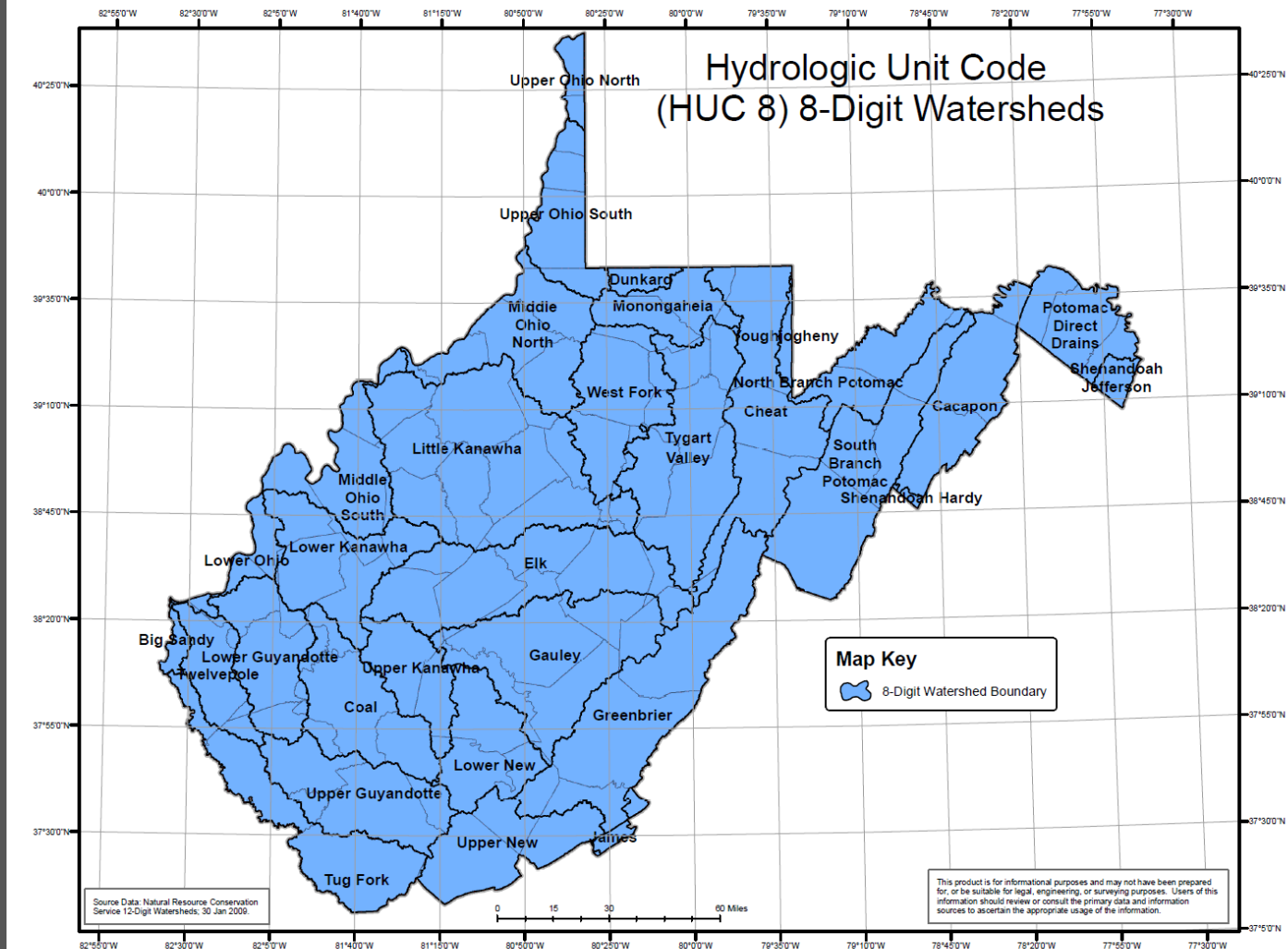
Locations found: 5

- 601 57th St SE, Charleston, WV, 25304  
Score: 100
- 602 57th St SE, Charleston, WV, 25304  
Score: 79
- 57th St SE, Charleston, WV, 25304  
Score: 100
- Charleston, WV  
Score: 100
- South Charleston, WV  
Score: 95.5

Latitude: 38.325617 Longitude: -81.413413  
Print HUC 8 Watersheds

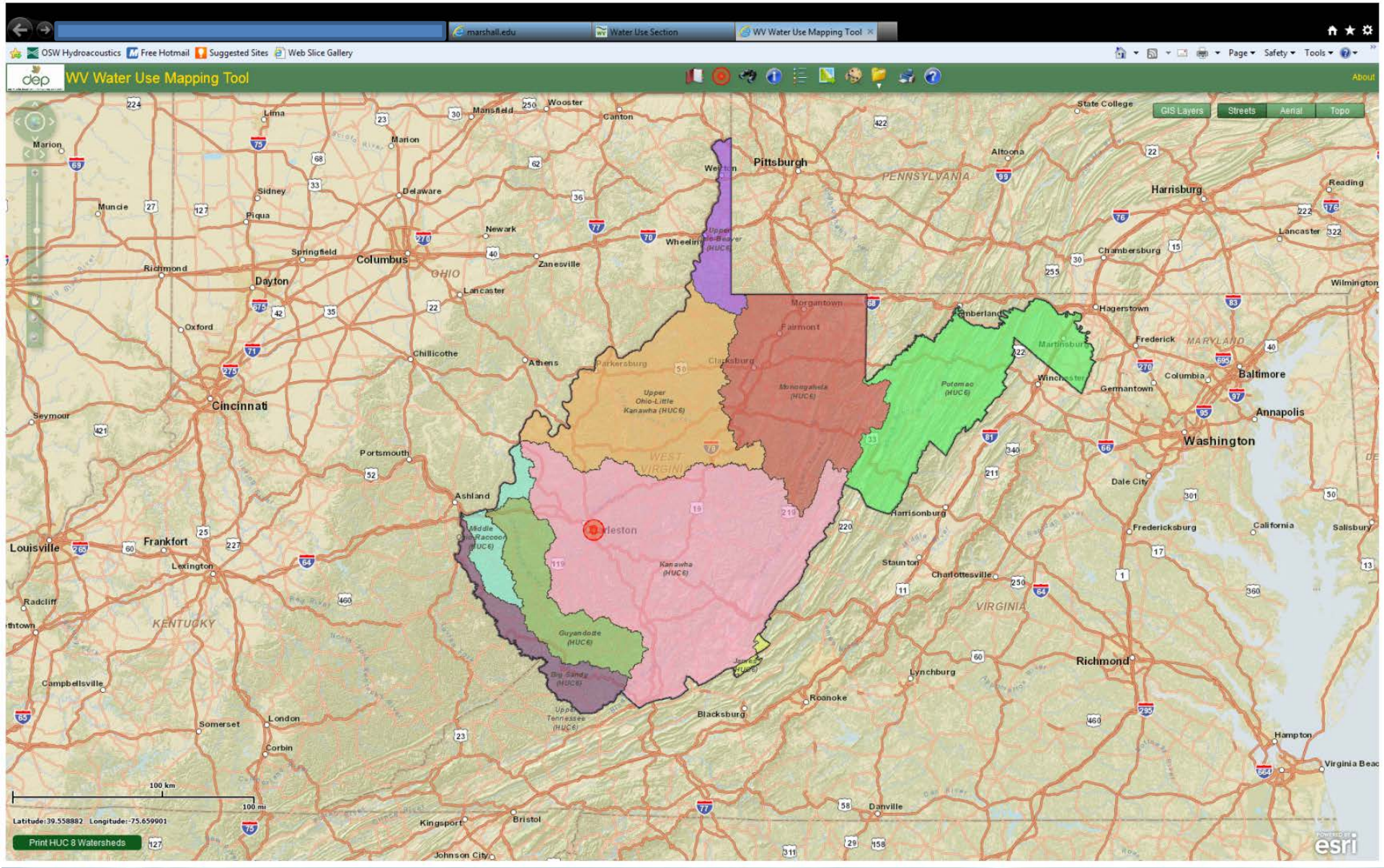
Latitude: 38.312655 Longitude: -81.559211  
Print HUC 8 Watersheds

# HUC 8 Watershed Map



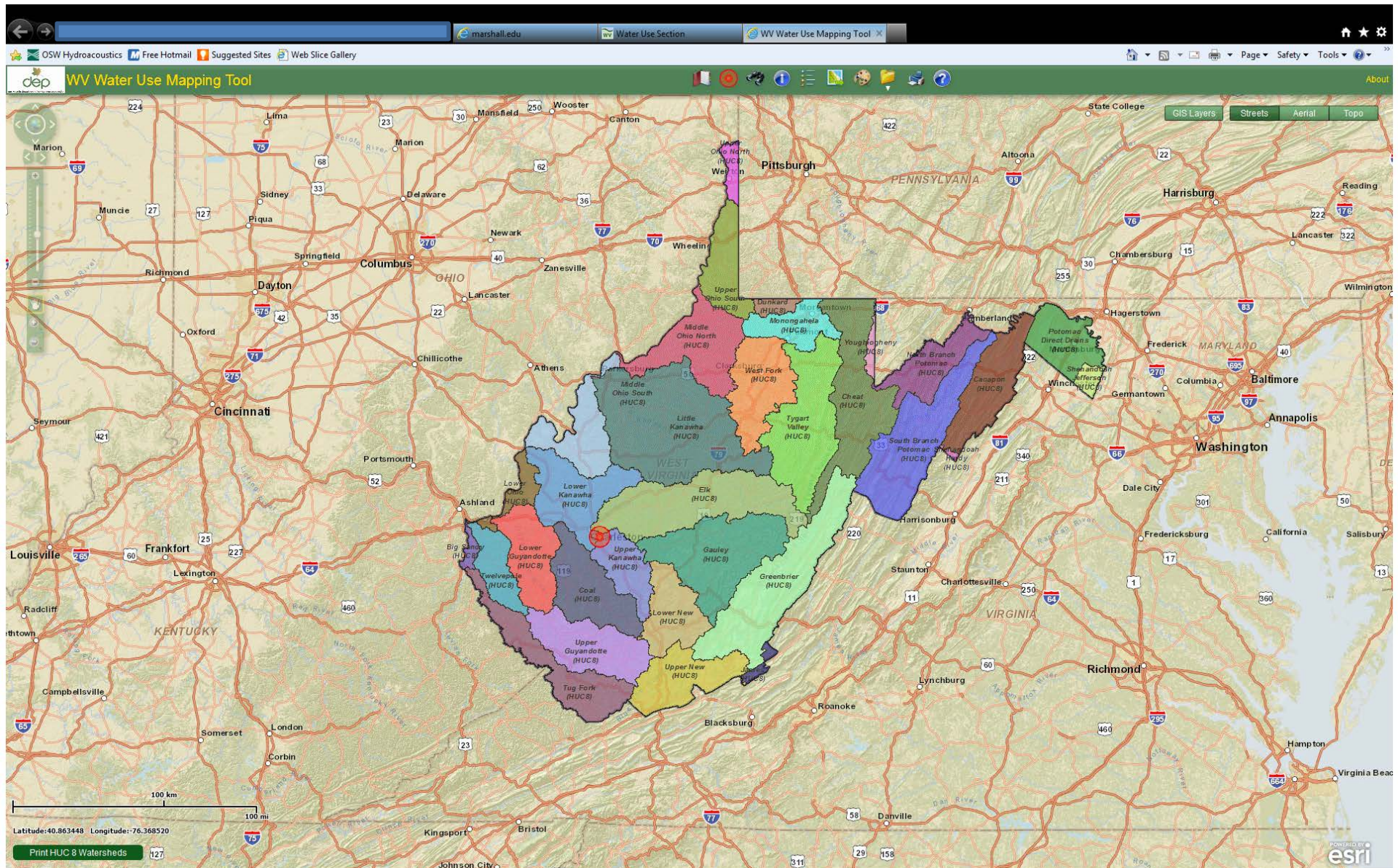


# Water Use Web Site – GIS Layers



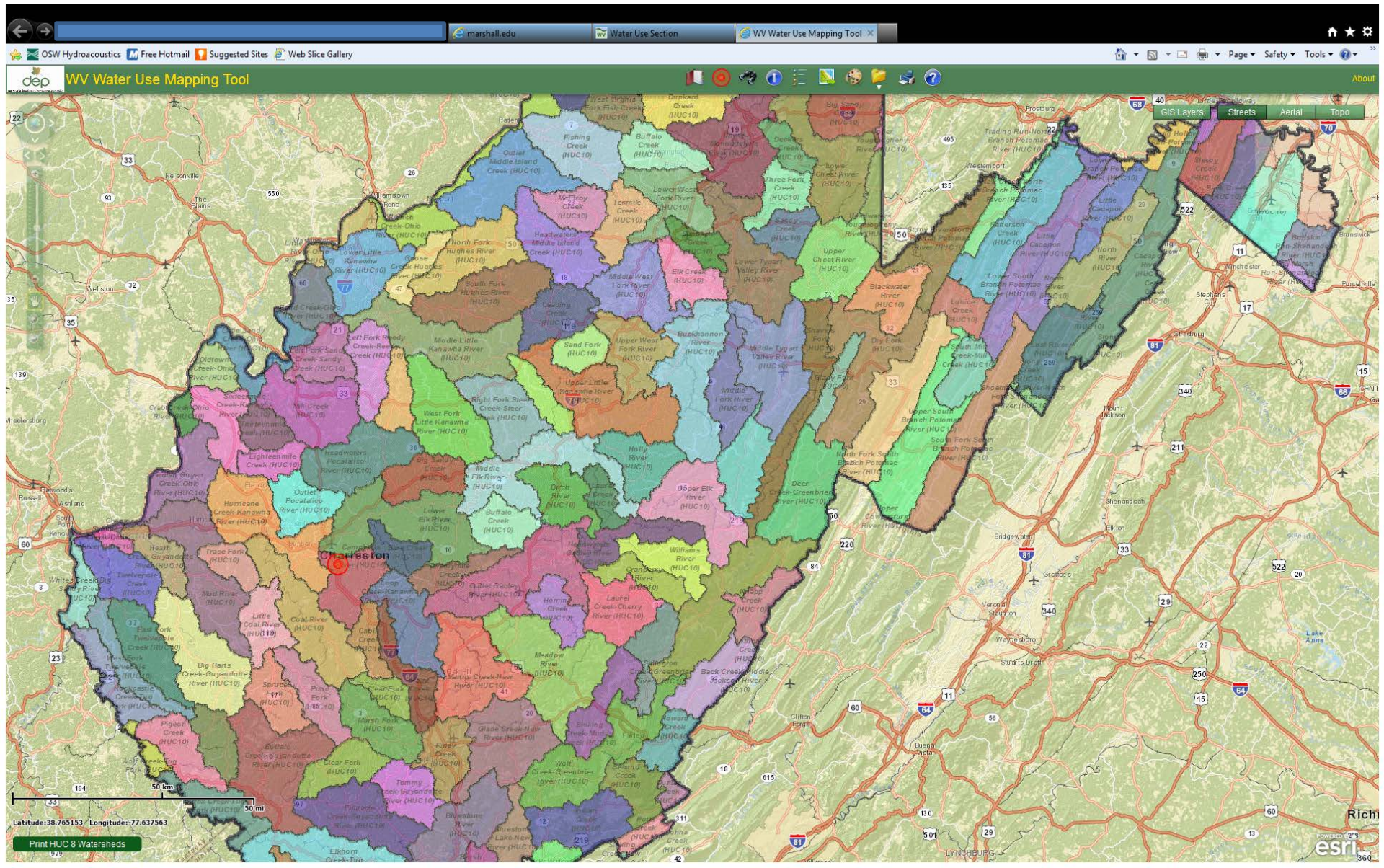


# Water Use Web Site – GIS Layers



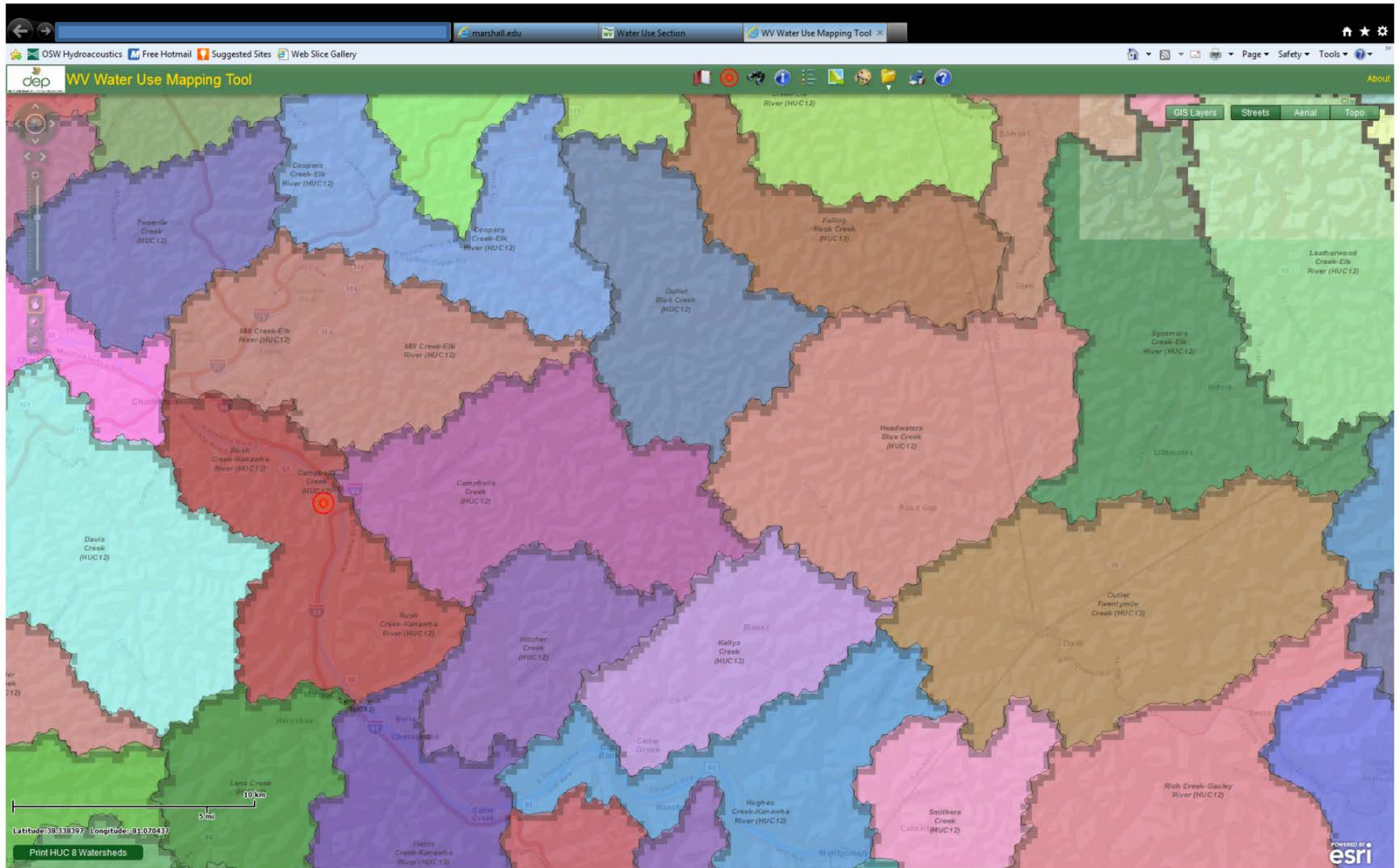


# Water Use Web Site – GIS Layers



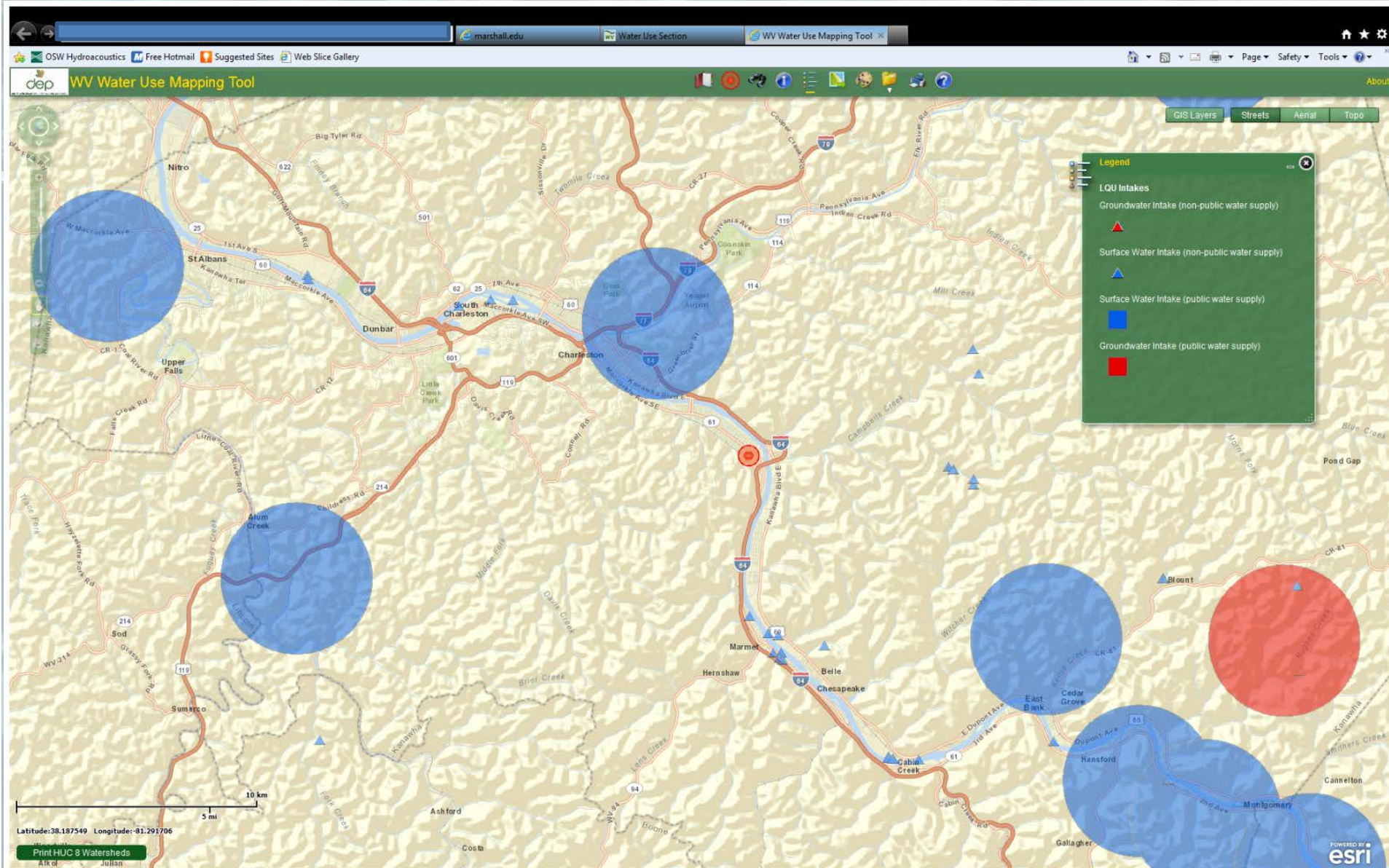


# Water Use Web Site – GIS Layers





# Water Use Web Site – LQU Locations





# Water Use Web Site - LQU Search Widget

The screenshot displays the WV Water Use Mapping Tool web application. The browser address bar shows the URL [marshall.edu](http://marshall.edu) and the page title "WV Water Use Mapping Tool". The application header includes the DEP logo and the title "WV Water Use Mapping Tool".

The main map area shows a topographic map of West Virginia with various watersheds highlighted in red and blue. A search widget is overlaid on the map, titled "Search: LQU Intake Locations". The search parameters are:

- Search Layer: Surface Water Intake (non-public water supply)
- County: Marion
- Watersheds: All watersheds listed below (checked), Monongahela, Tygart Valley
- Water Uses: All water uses

A "Search" button is located at the bottom of the search widget. The map also includes a scale bar (0 to 20 km) and coordinates (Latitude: 39.859830, Longitude: -80.530245).

On the right side, there are two panels displaying details for selected features:

**Search: LQU Intake Locations**  
Features Selected: 6  
Zoom Clear

**Consol Energy - Loveridge**  
Facility ID: 77  
Facility Address: PO Box 40  
Facility City: Fairview  
Facility County: Marion  
Facility State: WV  
Facility Zipcode: 26570  
Facility Phone: 3046621214  
Facility PWSID:  
Facility Closure Year: 0  
County: Marion  
Water Use: Mining  
HUC-8 Code: 5020003  
Watershed Name(HUC-8): Monongahela  
Water Source Name: Paw Paw Creek at Sugar Run

**Consol Energy - Loveridge**  
Facility ID: 78  
Facility Address: PO Box 40  
Facility City: Fairview  
Facility County: Marion  
Facility State: WV  
Facility Zipcode: 26570  
Facility Phone: 3046621214  
Facility PWSID:  
Facility Closure Year: 0  
County: Marion  
Water Use: Mining  
HUC-8 Code: 5020005  
Watershed Name(HUC-8): Dunkard  
Water Source Name: Miracle Run Freshwater

**Consol Energy - Loveridge**  
Facility ID: 79  
Facility Address: PO Box 40  
Facility City: Fairview  
Facility County: Marion  
Facility State: WV  
Facility Zipcode: 26570  
Facility Phone: 3046621214  
Facility PWSID:  
Facility Closure Year: 0  
County: Marion  
Water Use: Mining  
HUC-8 Code: 5020003  
Watershed Name(HUC-8): Monongahela  
Water Source Name: Hibbs Run Pump

The bottom right corner of the application features the ESRI logo.



# Water Use Web Site – Identify Widget

The screenshot displays the WV Water Use Mapping Tool web application. The browser's address bar shows the URL [marshall.edu](http://marshall.edu) and the page title is "WV Water Use Mapping Tool". The application interface includes a top navigation bar with "OSW Hydroacoustics", "Free Hotmail", "Suggested Sites", and "Web Slice Gallery". The main map area shows a topographic map of West Virginia with various water intake locations marked by colored circles and triangles. Two "Identify" pop-up windows are open, providing detailed information for selected features.

**Identify Window 1 (Left):**

- Surface Water Intake (public water supply)
- F\_ID: 1193
- Facility Name: West Virginia American Water - Kanawha Valley
- Facility Address: PO Box 1906
- Facility City: Charleston
- Facility State: WV
- Facility Zip: 25327
- Facility Phone: 3043402040
- Facility PWSID: 3302016
- Facility Closure Year: 0
- SW\_INPT\_ID:
- Intake County: Kanawha
- Intake HUC8 Name: Elk
- Intake HUC8 Number: 5050007
- Water Use: Public water supply
- Water Source: Sulton Dam
- Surface Water Intake (public water supply)

**Identify Window 2 (Center):**

- Surface Water Intake (public water supply)
- F\_ID: 1193
- Facility Name: West Virginia American Water - Kanawha Valley
- Facility Address: PO Box 1906
- Facility City: Charleston
- Facility State: WV
- Facility Zip: 25327
- Facility Phone: 3043402040
- Facility PWSID: 3302016
- Facility Closure Year: 0
- SW\_INPT\_ID:
- Intake County: Kanawha
- Intake HUC8 Name: Elk
- Intake HUC8 Number: 5050007

**Legend (Right):**

- LQU Intakes
- Groundwater Intake (non-public water supply)
- Surface Water Intake (non-public water supply)
- Surface Water Intake (public water supply)
- Groundwater Intake (public water supply)

The map includes a scale bar (0 to 10 km), a coordinate display (Latitude: 38.429730, Longitude: -81.263553), and a "Print HUC 8 Watersheds" button. The bottom right corner features the "POWERED BY esri" logo.



# Water Use Web Site – GIS Layers

The screenshot displays the WV Water Use Mapping Tool web application. The browser address bar shows the URL [marshall.edu](http://marshall.edu) and the page title "Water Use Section". The application header includes the DEP logo and the title "WV Water Use Mapping Tool". The map shows a topographic view of a region in West Virginia, with a dam highlighted in red. Two data popups are visible: an "Identify" popup on the left and a "Dams" popup on the right. The "Dams" popup contains the following information:

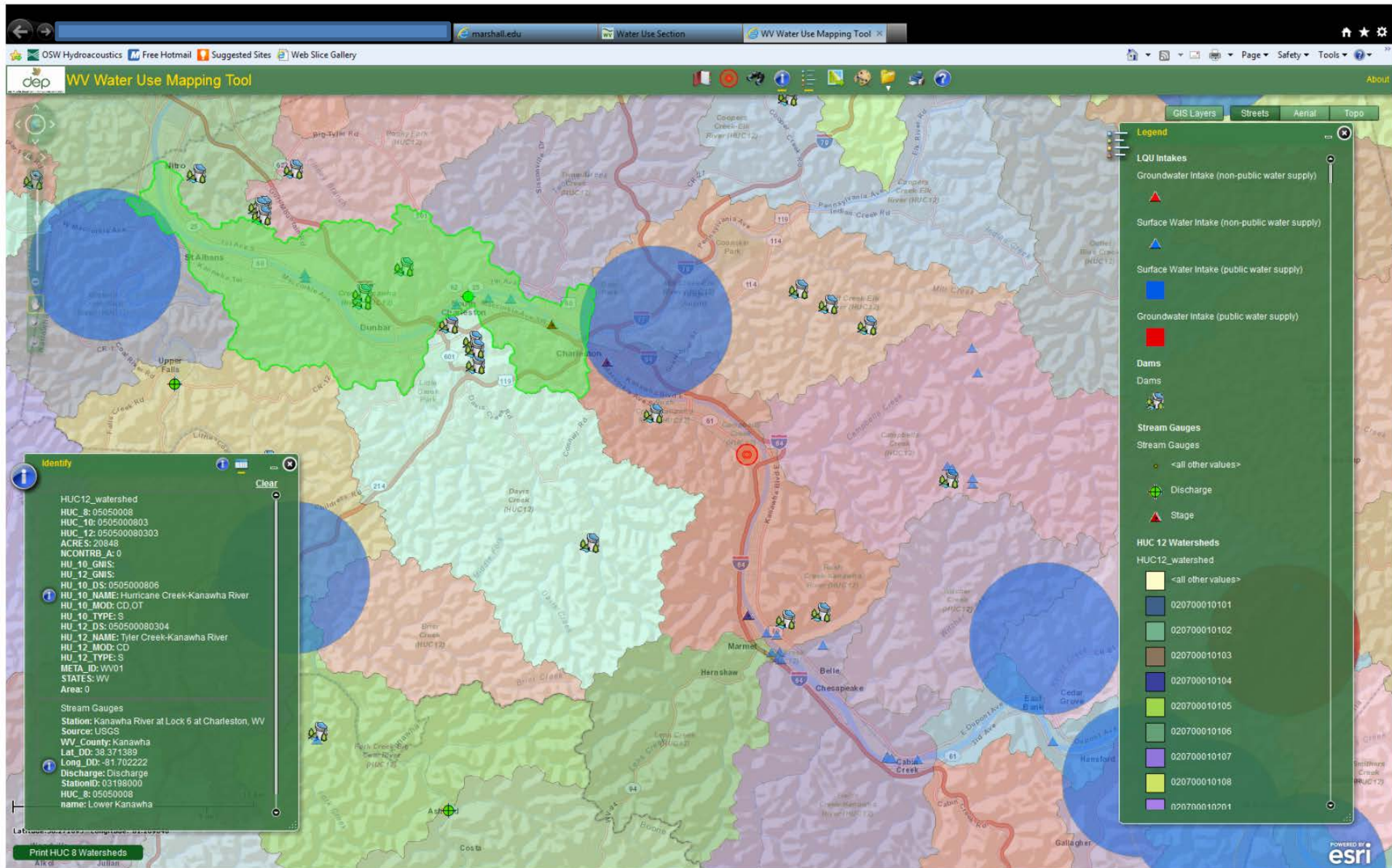
**Dams**

DamID: 283  
Dam: 03928  
NAME: GRAFFLANE SW DAM  
OTHR\_NM:  
STATE\_ID: 03928  
NTNL\_ID: WV03928  
LAT\_DD: 38.327778  
LONG\_DD: -81.614722  
COUNTY: KANAWHA  
RIVER:  
NRST\_CTY: KANAWHA CITY  
DIST\_CTY: 0  
OWNR\_NME: BOWLES RICE MCDAVID  
GRAFF & LOVE  
OWNR\_TYP: P

The map also shows various geographical features, including roads (e.g., I-77, I-64, I-78), rivers (e.g., Kanawha River, Cheat River), and towns (e.g., Marmet, Belle, Chesapeake). A scale bar at the bottom left indicates 5 miles and 10 kilometers. The coordinates are Latitude: 38.432150 and Longitude: -81.375477. The application footer includes a "Print HUC 8 Watersheds" button and the Esri logo.

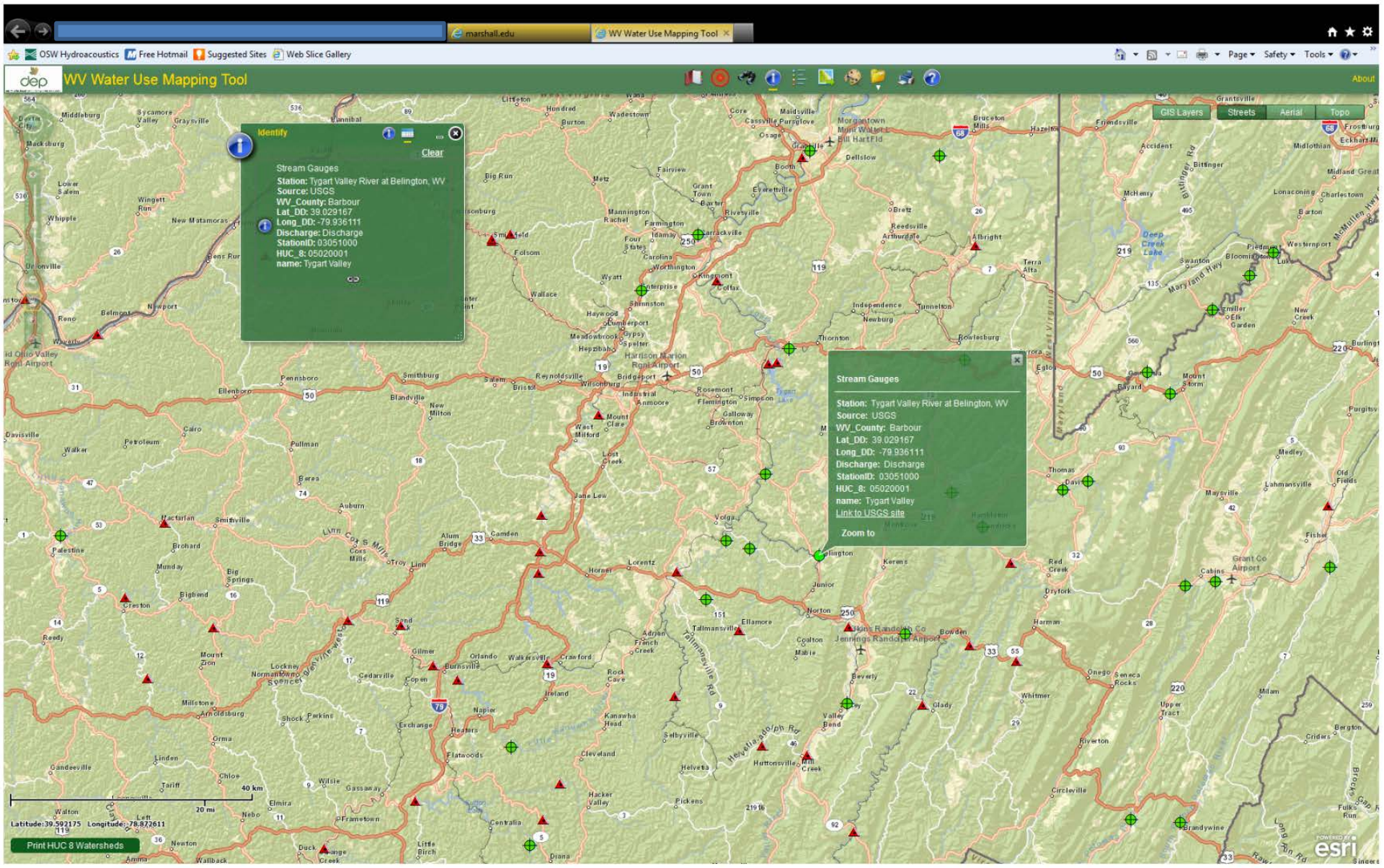


# Water Use Web Site – GIS Layers





# Water Use Web Site – GIS Layers



# Water Use Web Site – USGS Gauge Link

OSW Hydroacoustics | Free Hotmail | Suggested Sites | Web Slice Gallery

USGS Water Resources (Cooperator Access)

News - updated September 2012

Data Category: Surface Water | Geographic Area: United States | GO

## USGS 03051000 TYGART VALLEY RIVER AT BELINGTON, WV PROVISIONAL DATA SUBJECT TO REVISION

Available data for this site | Time-series: Daily data | GO

**LOCATION.**--Lat 39°01'45", long 79°56'10", referenced to North American Datum of 1927, Barbour County, WV, Hydrologic Unit 05020001, on left bank opposite mouth of Mill Creek, 0.2 mi downstream from highway bridge at Belington, and at mile 62.4.

**DRAINAGE AREA.**--406 mi<sup>2</sup>, excluding that of Mill Creek.

**PERIOD OF RECORD.**--June 1907 to current year (daily discharge and peaks). Prior to October 1960, published as Tygart River at Belington.

**REVISED RECORDS.**--WSP 953: 1933(M), 1941(M). WSP 1335: 1912, 1914-15, 1916(M), 1921-22(M), 1925(M), 1928, 1933. WSP 1385: 1909(M), 1913-15(M), 1917-18, 1924(M), 1928(M), 1932, 1934, 1936, 1938-39, 1948-49. WDR WV-97-1: Drainage area. WDR-US-2009: 1926(M).

**GAGE.**--Water-stage recorder with satellite telemeter. Datum of gage is 1,679.62 ft above NAVD 88 (1,680.35 ft above NGVD 29, 1,679.49 ft above COE 12). Prior to Apr. 25, 1939, nonrecording gage at site 0.2 mi upstream at same datum.

**EXTREMES OUTSIDE PERIOD OF RECORD.**--Flood of July 1888, reached a stage of 21.7 ft, from floodmarks at former site, discharge, 21,200 ft<sup>3</sup>/s.

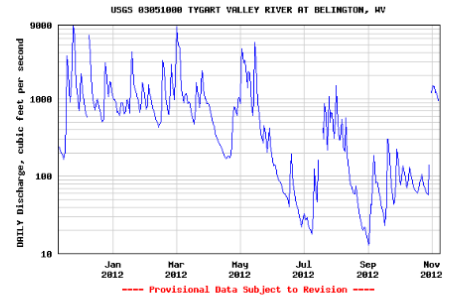
This gaging station is maintained in cooperation with:  
*U.S. Army Corps of Engineers, Pittsburgh District  
State of West Virginia*

This station managed by the Charleston Field Office.

Available Parameters	Period of Record	Output format	Days (365)
<input type="checkbox"/> All 1 Available Parameters for this site	1907-06-05 2012-11-07	<input checked="" type="radio"/> Graph	-- or --
<input checked="" type="checkbox"/> 00060 Discharge(Mean)		<input type="radio"/> Graph w/ stats	Begin date
		<input type="radio"/> Graph w/ meas	2011-11-08
		<input type="radio"/> Table	End date
		<input type="radio"/> Tab-separated	2012-11-07

[Summary of all available data for this site](#)  
[Instantaneous-data availability statement](#)

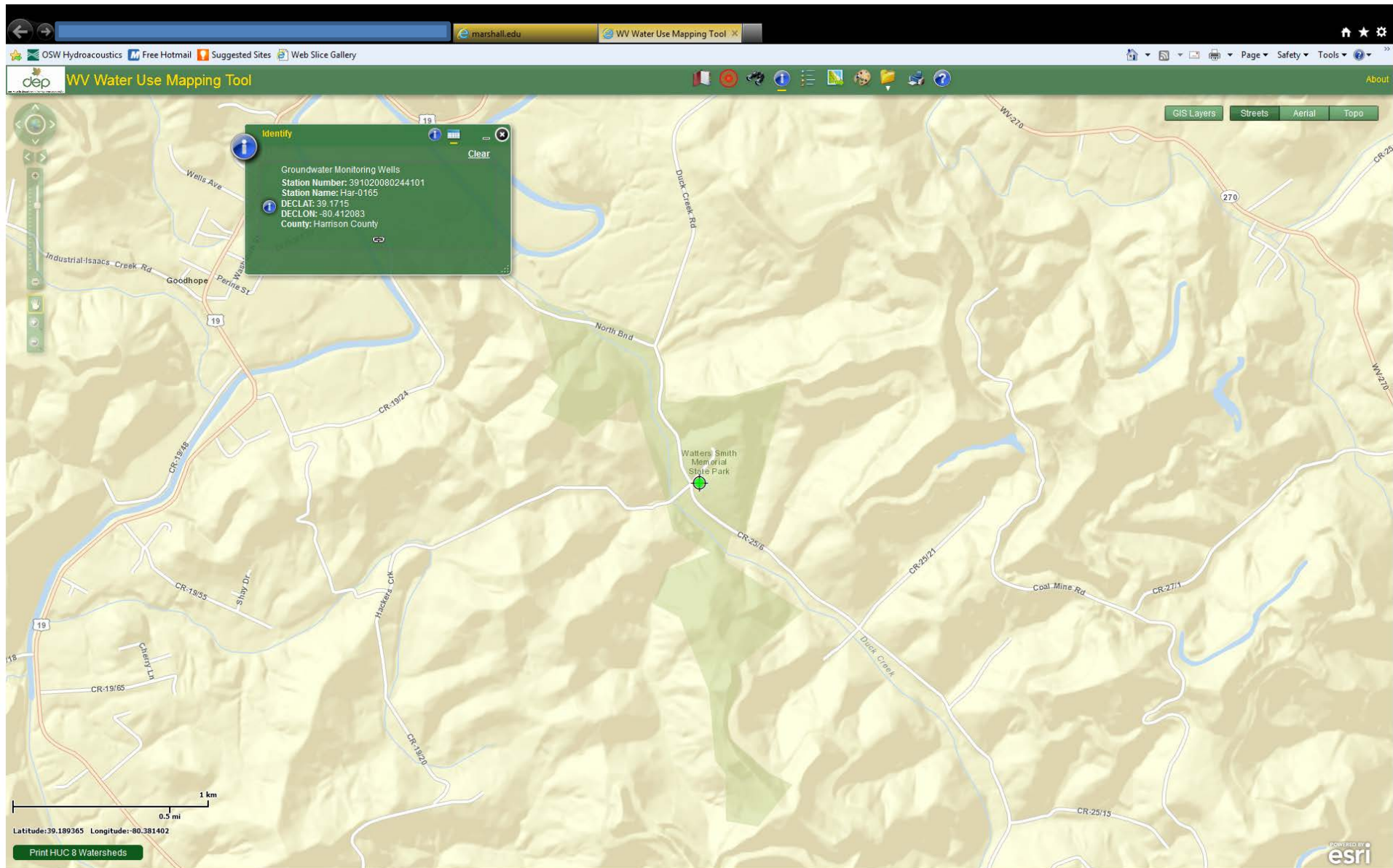
### Discharge, cubic feet per second



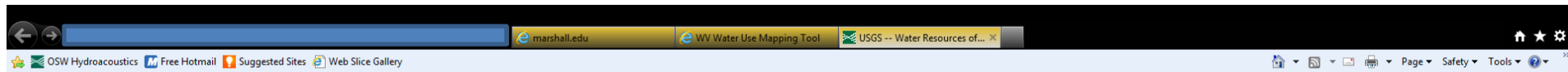
Create [presentation-quality](#) graph. P00060 0001



# Water Use Web Site – GW Layer



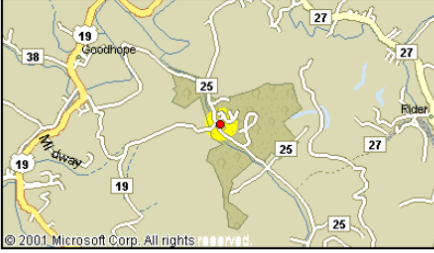
# Water Use Web Site – USGS GW Well Link



**Groundwater Watch**

**Latest News...**

Site Number: 391020080244101 - Har-0165



**DESCRIPTION:**  
 Latitude 39°10'17.4", Longitude 80°24'43.5" NAD83  
 Harrison County, West Virginia, Hydrologic Unit 05020002  
 Well depth: 218. feet  
 Hole depth: 218. feet  
 Land surface altitude: 1,048.42feet above NAVD88.  
 Well completed in "Pennsylvanian aquifers" (N300PNSLVN) national aquifer.  
 Well completed in "Conemaugh Formation" (321CNMG) local aquifer

**AVAILABLE DATA FROM NWISWeb:**

	2008	2012
Current / Historical Observations	-10-	-07-
	07	22

**Daily Data**  
 Field groundwater-level measurements  
 Field/Lab water-quality samples

Additional Data Sources	Begin Date	End Date	Count
<a href="#">Annual Water-Data Report (pdf)</a> **offsite**	2009	2010	2
<a href="#">Groundwater Watch</a> **offsite**	2008	2012	1281

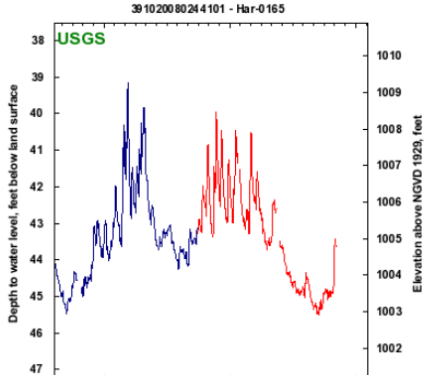
**OPERATION:**  
 Record for this site is maintained by the USGS West Virginia Water Science Center  
 Email questions about this site to [West Virginia Water Science Center Water-Data Inquiries](#)

## Daily Groundwater Data

Most recent **Provisional** daily data value: **43.65** on **11/07/12**

Summary for Period of Continuous Record  
 Depth to water level, feet below land surface  
 Approved Daily Values Data Used in Analysis

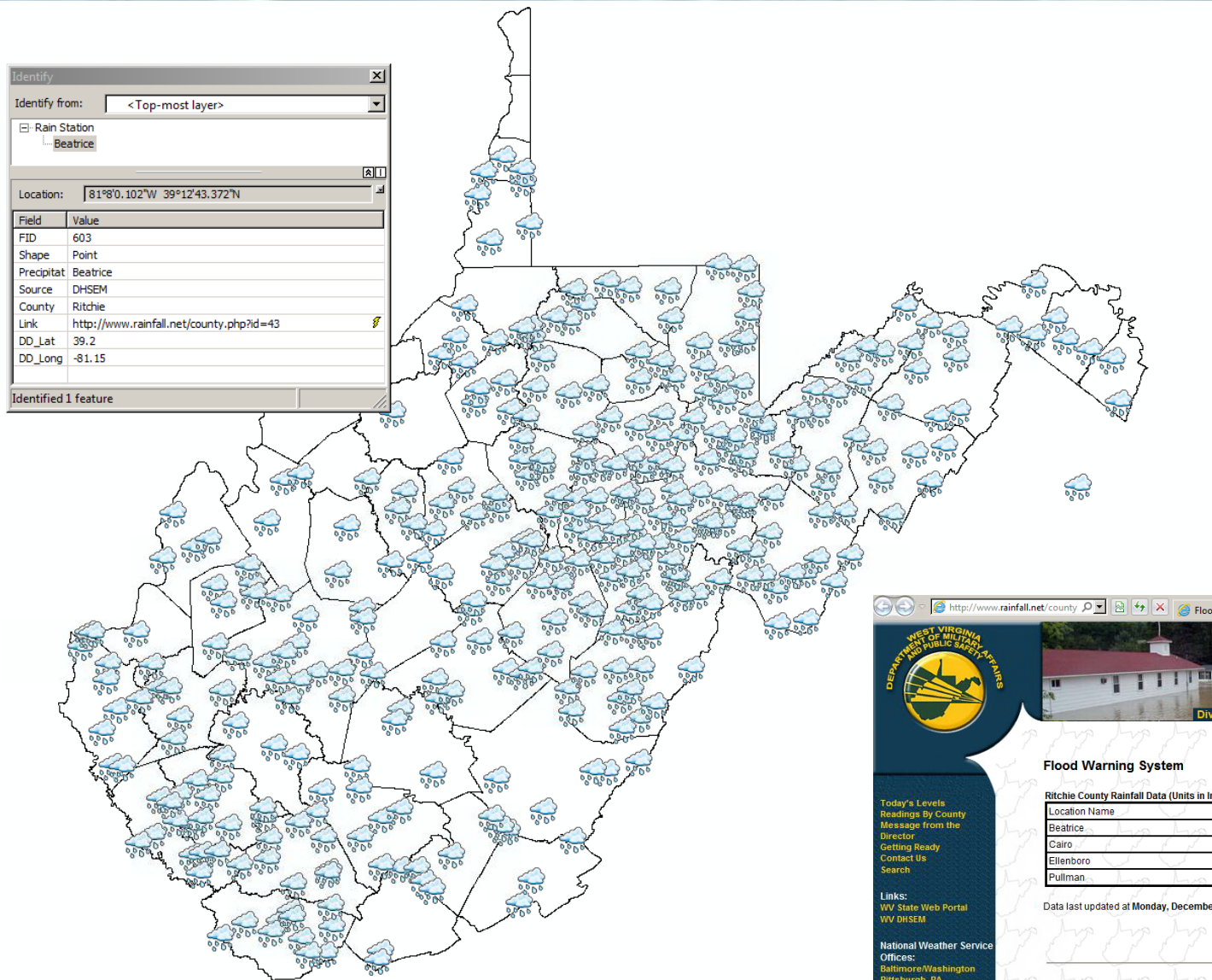
Begin Date	End Date	Days	% Complete
10/07/08	09/30/11	986	90



- Daily Data Options**
- [View latest data from NWISWeb](#)
  - [View data in calendar format](#)
  - [Download data in text format](#)
  - [View daily medians](#)



# Water Use Web Site – Precipitation Sites



http://www.rainfall.net/county... Flood Warning System x Internet Explorer 9 - Microsof...

**Flood Warning System**

Ritchie County Rainfall Data (Units in Inches)

Location Name	15 Min.	30 Min.	1 Hr.	3 Hr.	6 Hr.	12 Hr.	24 Hr.
Beatrice	0.00	0.00	0.00	0.00	0.04	0.08	0.09
Gairo	0.00	0.00	0.00	0.00	0.00	0.12	0.12
Ellenboro	0.00	0.00	0.00	0.00	0.04	0.12	0.12
Pullman	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Data last updated at Monday, December 17, 2012 at 11:45 am EST.

[Printable Version](#)

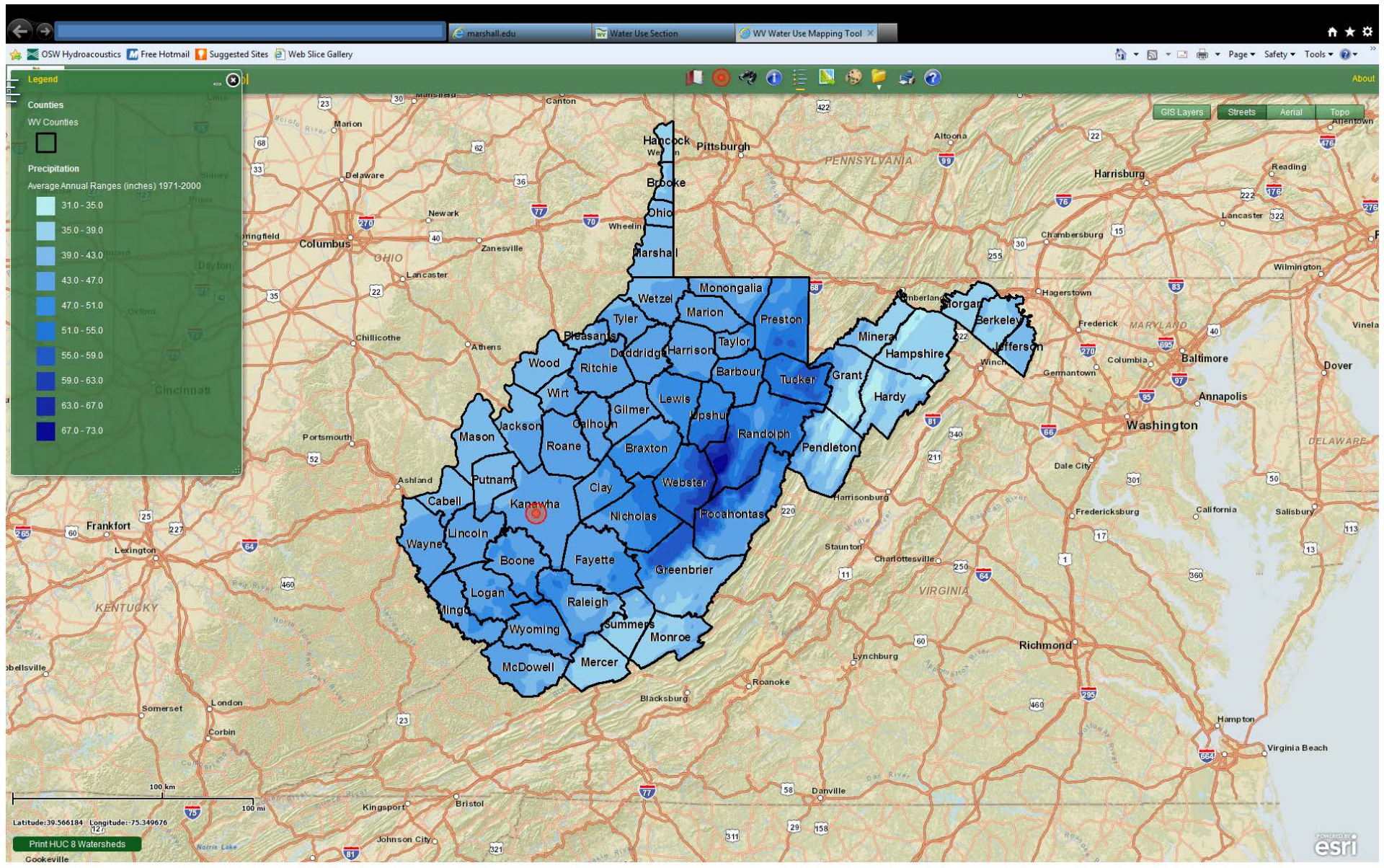
Today's Levels  
 Readings By County  
 Message from the Director  
 Getting Ready  
 Contact Us  
 Search

Links:  
 WV State Web Portal  
 WV DHSEM

National Weather Service  
 Offices:  
 Baltimore/Washington  
 Pittsburgh, PA  
 Blacksburg, VA  
 Charleston, WV

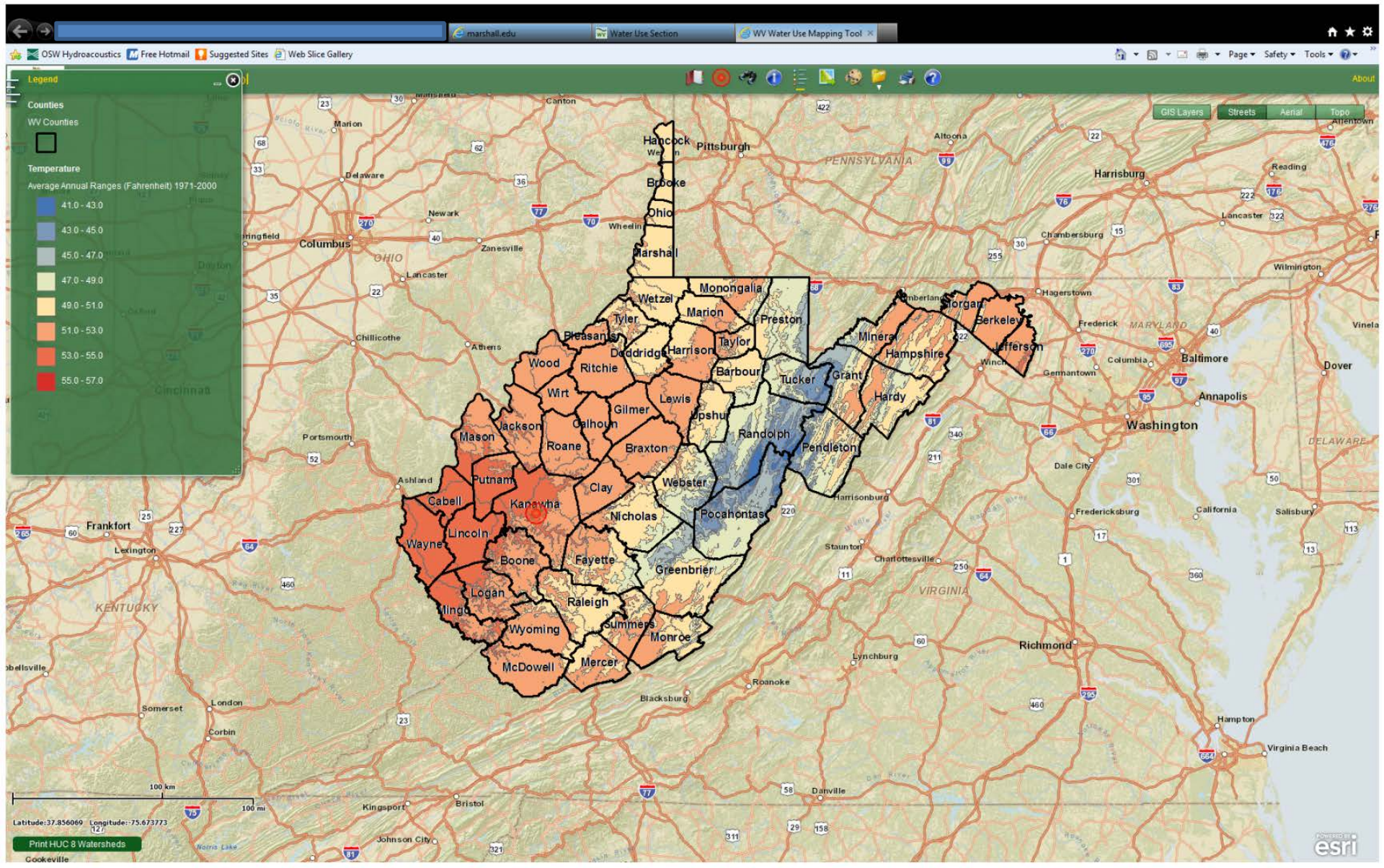


# Water Use Web Site – GIS Layers



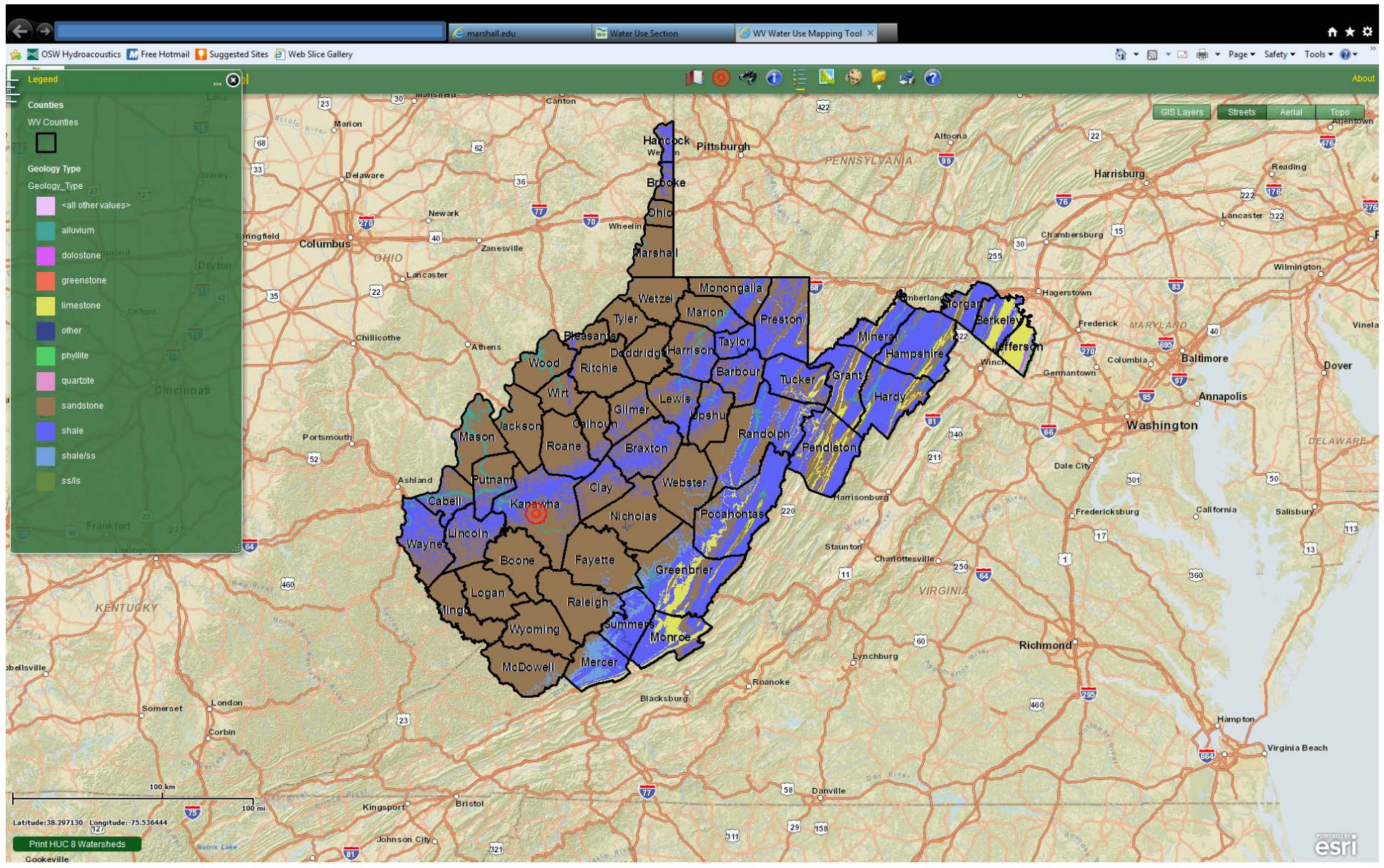


# Water Use Web Site – GIS Layers



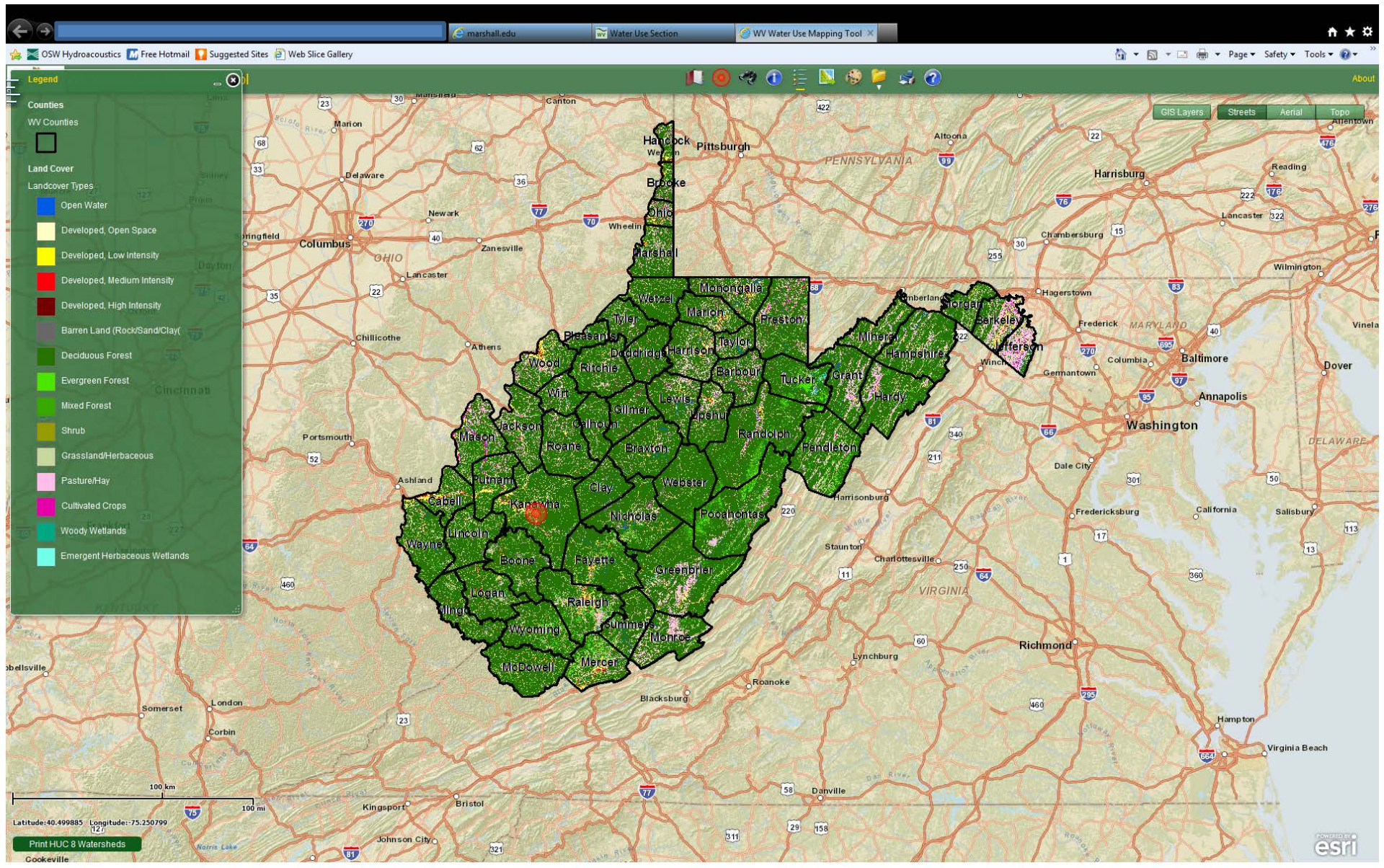


# Water Use Web Site – GIS Layers





# Water Use Web Site – GIS Layers





# Water Use Web Site - Pie Chart Reports

Firefox | http://mugis.marshall.edu/wwwpa/ | WV Water Use Mapping Tool

mugis.marshall.edu/wwwpa/WRPA\_map/index.html

dep WV Water Use Mapping Tool

GIS Layers | Streets | Aerial | Topo

County: Pocahontas

Deciduous Forest: 74% (1802900700)

Deciduous Forest (1802900700)

Development/Plant Space

Pasture/Hay

Mixed Forest

Evergreen Forest

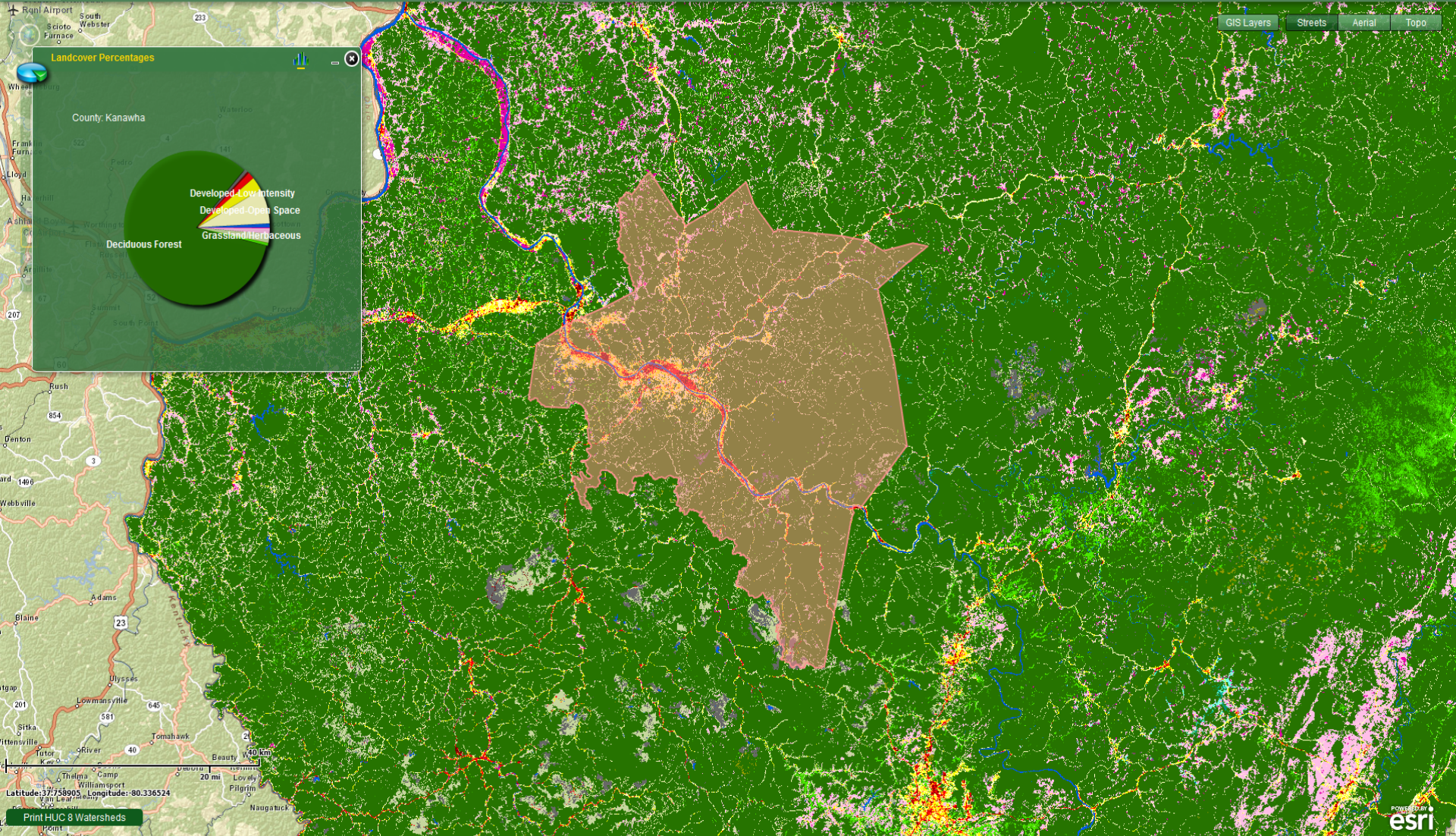
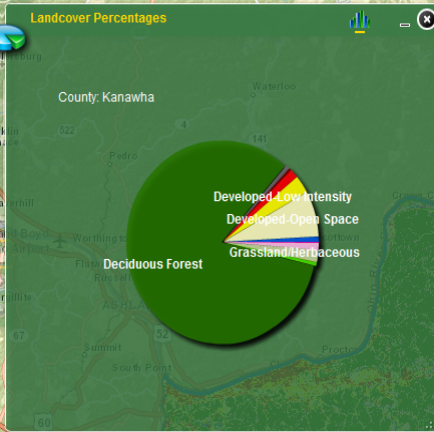
Latitude: 38.398005 Longitude: 80.338523

Print HUC & Watersheds

esri

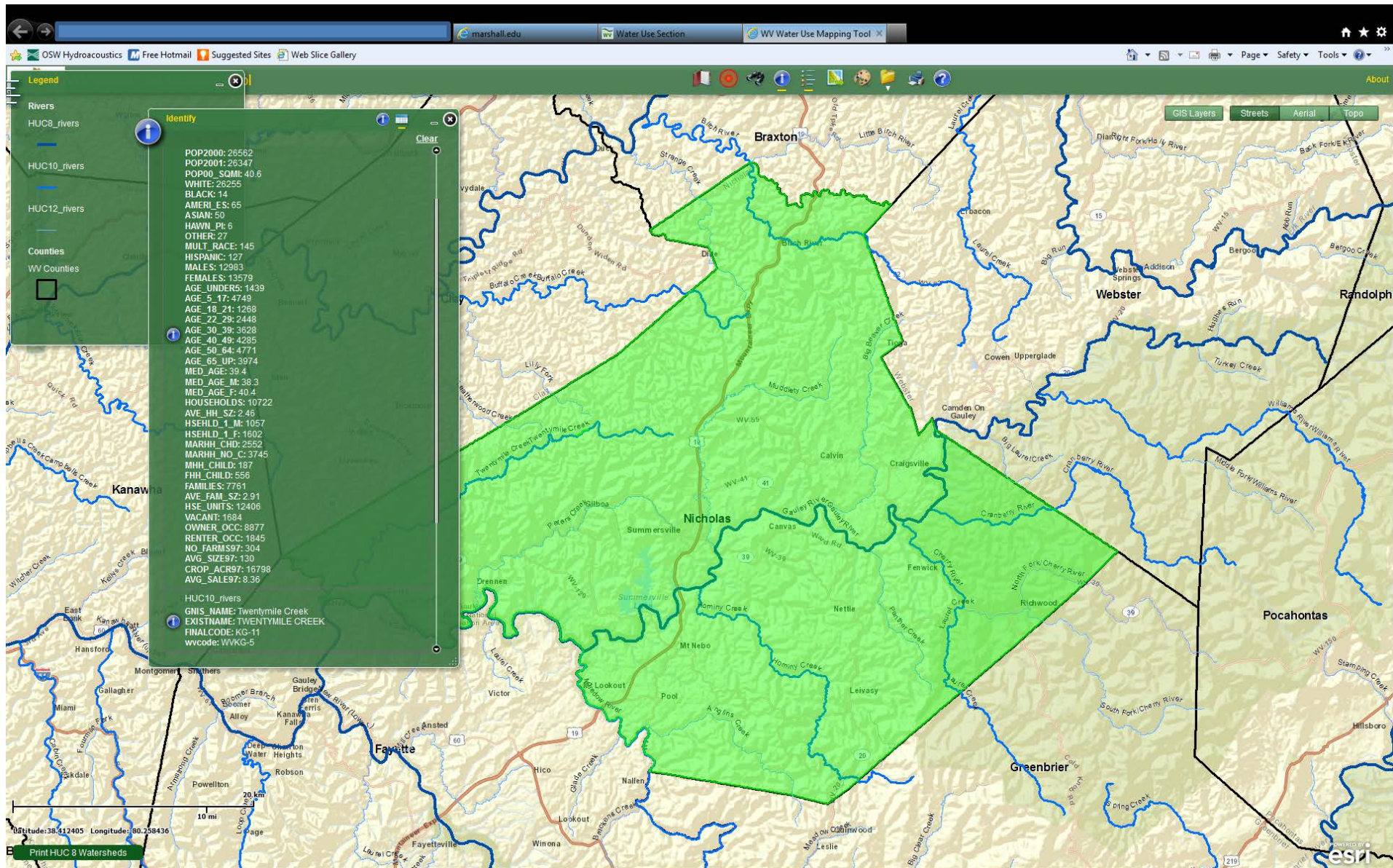


# Water Use Web Site - Pie Chart Reports





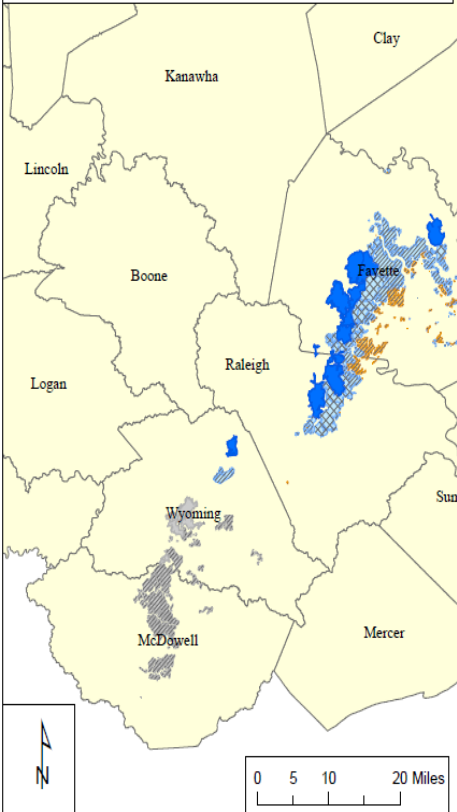
# Water Use Web Site – GIS Layers



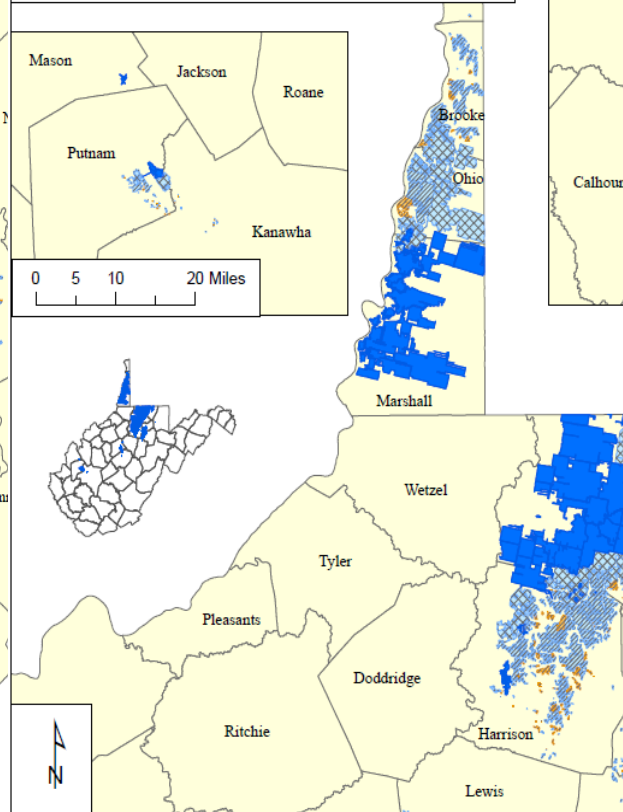


# Water Use Web Site – Mine Pool

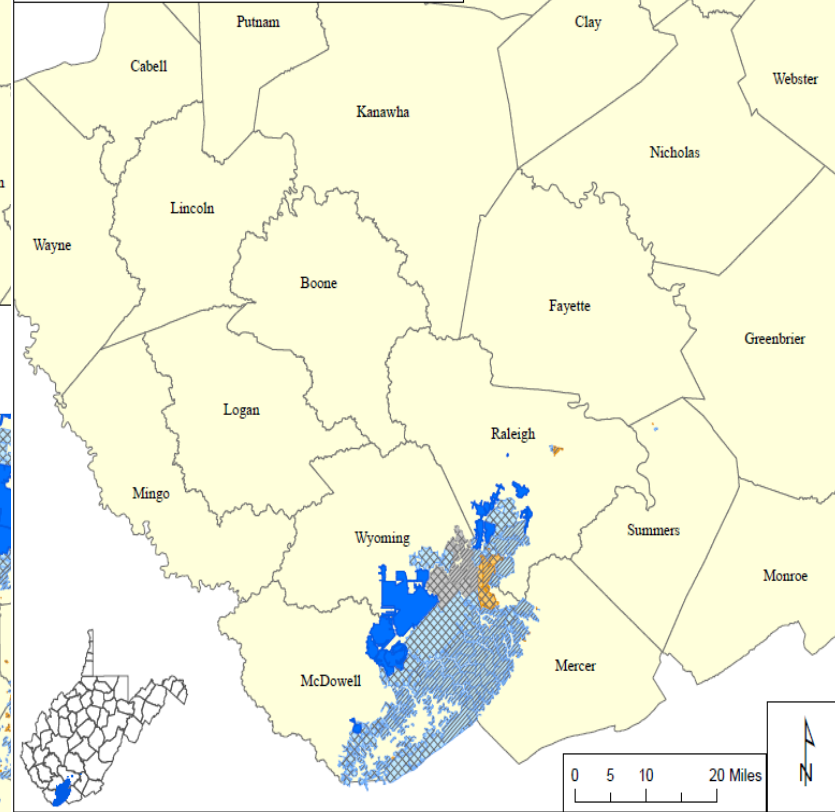
## Sewell Mine Pools Seam Overview



## Pittsburgh Mine Pools Seam Overview



## Pocahontas No. 3 Mine Pools Seam Overview



### Legend

- Position**
- Above Drainage
  - Near Drainage
  - Below Drainage
- Potential Extent of Flooding**
- Undetermined
  - Flooded areas unlikely
  - Partially flooded
  - Totally flooded

### Sewell M

No. of Mines	19
Mean coal thickness (feet)	3.63
Min. foot print area (acres)	1.00
Max. foot print area (acres)	7,469.50
Mean foot print area (acres)	990.66
Median foot print area (acres)	174.18
Total foot print area (acres)	18,822.60
Estimated void volume (acre feet)	37,037.88
Max. potential storage (million gallons)	12,070.64

### Legend

- Position**
- Above Drainage
  - Near Drainage
  - Below Drainage
- Potential Extent of Flooding**
- Undetermined
  - Flooded areas unlikely
  - Partially flooded
  - Totally flooded

### Pittsburgh Mine P

No. of Mines	0
Mean coal thickness (feet)	0.00
Min. foot print area (acres)	0.00
Max. foot print area (acres)	0.00
Mean foot print area (acres)	0.00
Median foot print area (acres)	0.00
Total foot print area (acres)	0.00
Estimated void volume (acre feet)	0.00
Max. potential storage (million gallons)	0.00

### Legend

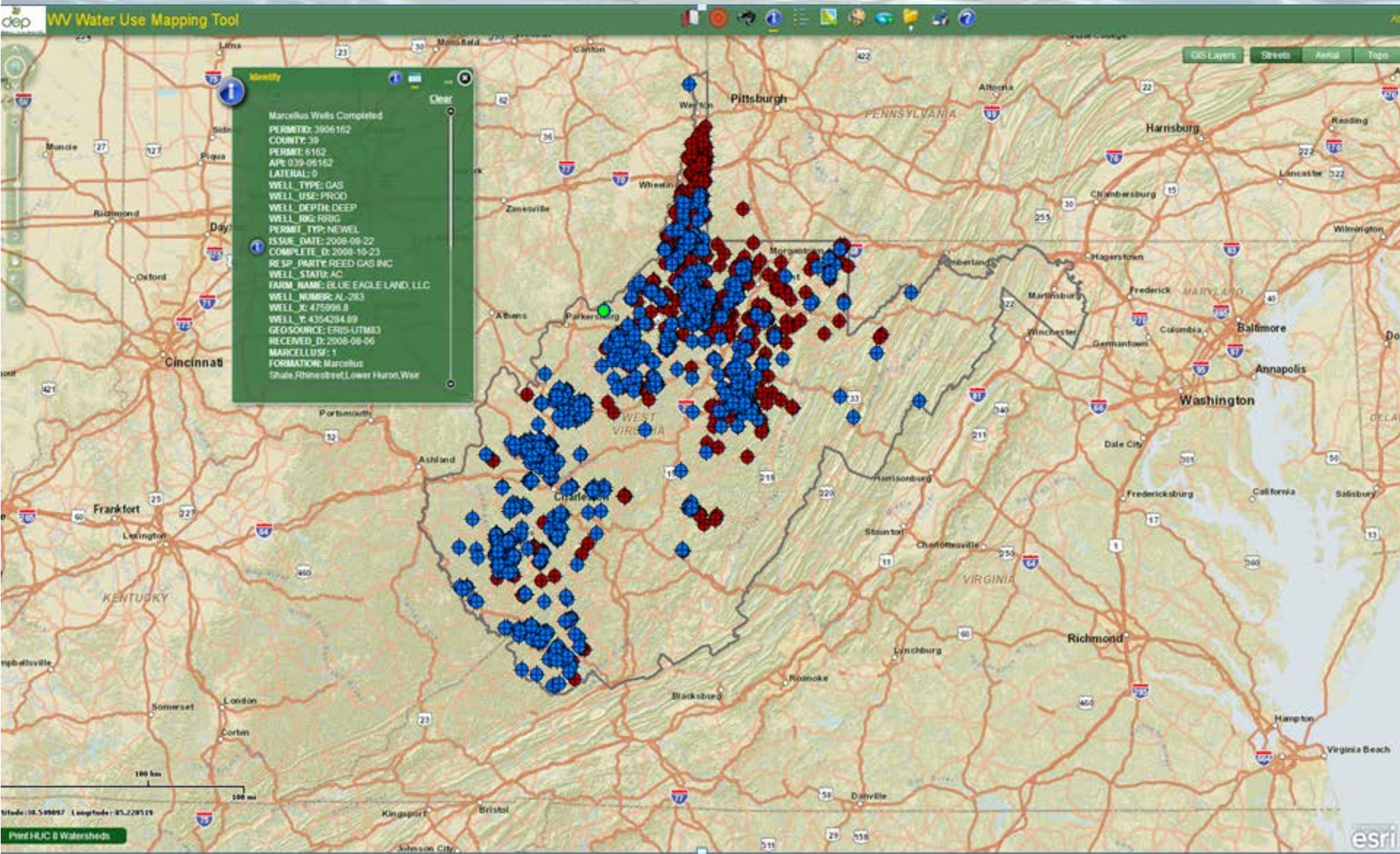
- Position**
- Above Drainage
  - Near Drainage
  - Below Drainage
- Potential Extent of Flooding**
- Undetermined
  - Flooded areas unlikely
  - Partially flooded
  - Totally flooded

### Pocahontas No. 3 Mine Pool Statistics

	Undetermined	Potentially flooded areas unlikely	Potentially partially flooded	Potentially totally flooded
No. of Mines	19	56	211	13
Mean coal thickness (feet)	3.63	4.27	4.72	4.10
Min. foot print area (acres)	1.00	0.02	0.03	23.38
Max. foot print area (acres)	7,469.50	4,312.28	24,666.84	21,361.85
Mean foot print area (acres)	990.66	142.19	771.26	3,350.77
Median foot print area (acres)	174.18	0.73	168.10	1,247.45
Total foot print area (acres)	18,822.60	7,962.37	162,736.63	43,560.05
Estimated void volume (acre feet)	37,037.88	13,978.94	396,114.19	98,167.56
Max. potential storage (million gallons)	12,070.64	4,555.74	129,093.61	31,992.81



# Water Use Web Site – Marcellus Wells





# WVGES Oil & Gas Well Pipeline



Select County: (103) Wetzel    Select datatypes:  (Check All)

Enter Permit #: 2439

Location     Production     Plugging  
 Owner/Completion     Stratigraphy     Sample  
 Pay/ShowWater     Logs     Btm Hole Loc

- [Table Descriptions](#)
- [County Code Translations](#)
- [Permit-Numbering Series](#)
- [Usage Notes](#)
- [Contact Information](#)
- [Disclaimer](#)
- [WVGES Main](#)
- ["Pipeline-Plus" New](#)

WV Geological & Economic Survey.

**Well: County = 103 Permit = 2439**

Report Time: Friday, December 07, 2012 10:33:42 AM

Location Information: [View Map](#)

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4710302439	Wetzel	2439	Proctor	Wileyville	Littleton	39.70032	-80.647649	530207.7	4394555.9

Bottom Hole Location Information:

API	EP_FLAG	UTME	UTMN	LON_DD	LAT_DD
4710302439	1	As Proposed	531364	4394403	-80.634169

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR	PROP_VD	PROP_TRGT_FM
4710302439	3/10/2010	Dvtd Orgnl Loc	Completed	Chesapeake Appalachia LLC	10H	627258	Brogan	26759/26451/1245772/1243544/1243545	Chesapeake Appalachia LLC	Chesapeake Appalachia, LLC	7200	Marcellus Sh

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	G_BEF	G_AFT	O_BEF	O_AFT	P_BEF	TL_BEF	P_AFT	TL_AFT
4710302439	3/10/2010	4/4/2009	1379	Ground Level	Kausooth	Marcellus Sh	Marcellus Sh	Development Well	Development Well	Gas	Rotary Acid-Frac	5860	11707	11707	2790								4727

Pay/ShowWater Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4710302439	3/10/2010	Water	Fresh Water	Vertical			358	Pennsylvanian System					
4710302439	3/10/2010	Pay	Gas	Deviated	8029	Marcellus Sh	8191	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	8269	Marcellus Sh	8431	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	8509	Marcellus Sh	8684	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	8749	Marcellus Sh	9071	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	9149	Marcellus Sh	9471	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	9549	Marcellus Sh	9871	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	9949	Marcellus Sh	10271	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	10349	Marcellus Sh	10671	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	10749	Marcellus Sh	11071	Marcellus Sh					
4710302439	3/10/2010	Pay	Gas	Deviated	11149	Marcellus Sh	11471	Marcellus Sh					

Production Gas Information:

API	OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4710302439	Chesapeake Appalachia, LLC	2010	273014	0	0	31251	34433	46092	39814	49362	52771	0	0	0	19291
4710302439	Chesapeake Appalachia, LLC	2011	804558	83892	64628	66892	69614	57331	32047	87064	73224	74156	71974	50829	72907

Production Oil Information:

API	OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4710302439	Chesapeake Appalachia, LLC	2010	694	0	0	112	7	40	6	134	102	0	288	0	5
4710302439	Chesapeake Appalachia, LLC	2011	3744	254	311	412	502	339	93	436	326	315	256	203	297

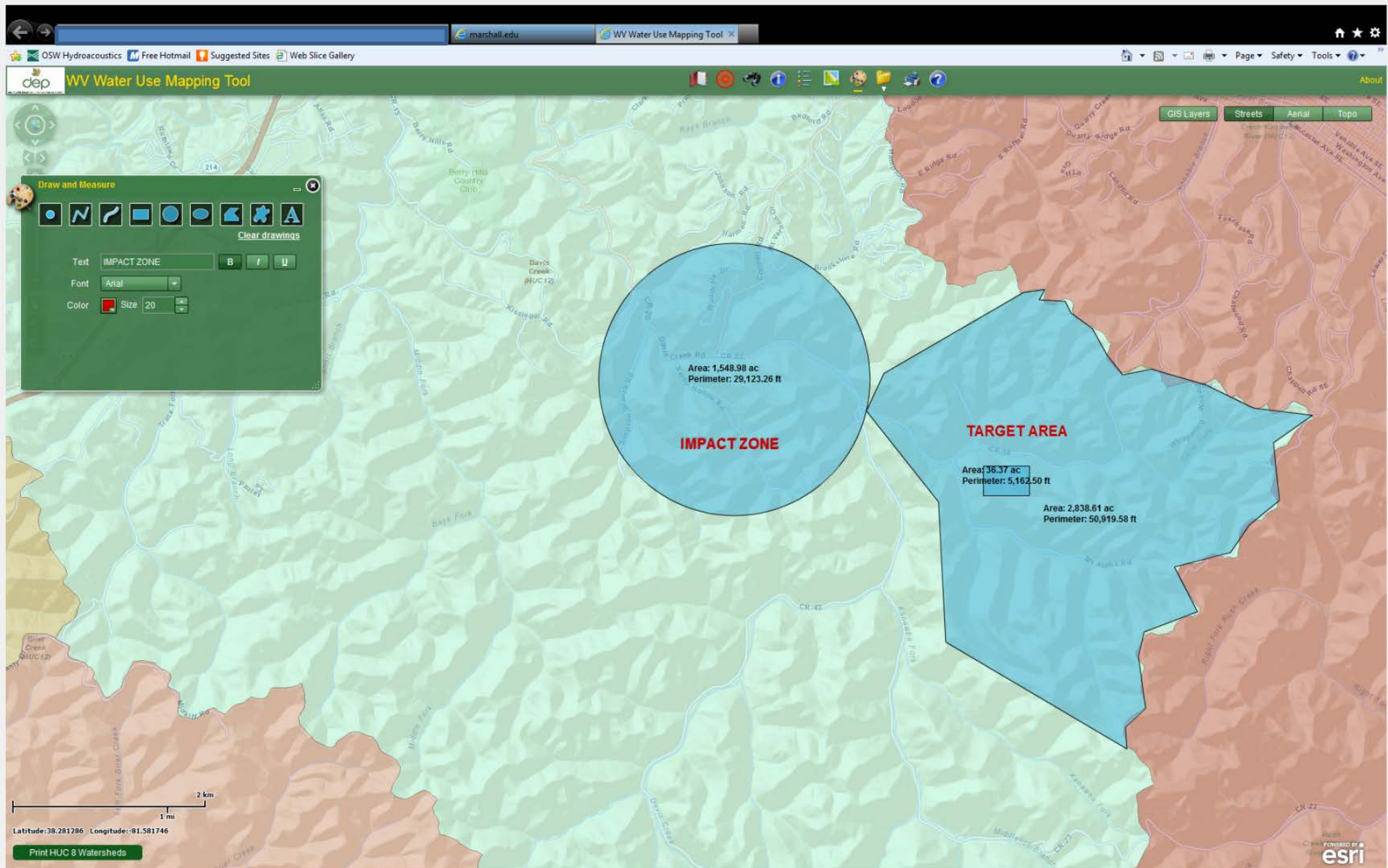
Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4710302439	Dvtd Orgnl Loc	Maxton	Well Record	2200	Reasonable	50	Reasonable	1379	Ground Level
4710302439	Dvtd Orgnl Loc	Big Lime	Well Record	2259	Reasonable	16	Reasonable	1379	Ground Level
4710302439	Dvtd Orgnl Loc	Big Injun (undiff)	Well Record	2275	Reasonable	225	Reasonable	1379	Ground Level
4710302439	Dvtd Orgnl Loc	Tully Ls	Well Record	7096	Reasonable	24	Reasonable	1379	Ground Level
4710302439	Dvtd Orgnl Loc	Hamilton	Well Record	7120	Reasonable	89	Reasonable	1379	Ground Level
4710302439	Dvtd Orgnl Loc	Marcellus Sh	Well Record	7209	Reasonable			1379	Ground Level

There is no Wireline (E-Log) data for this well

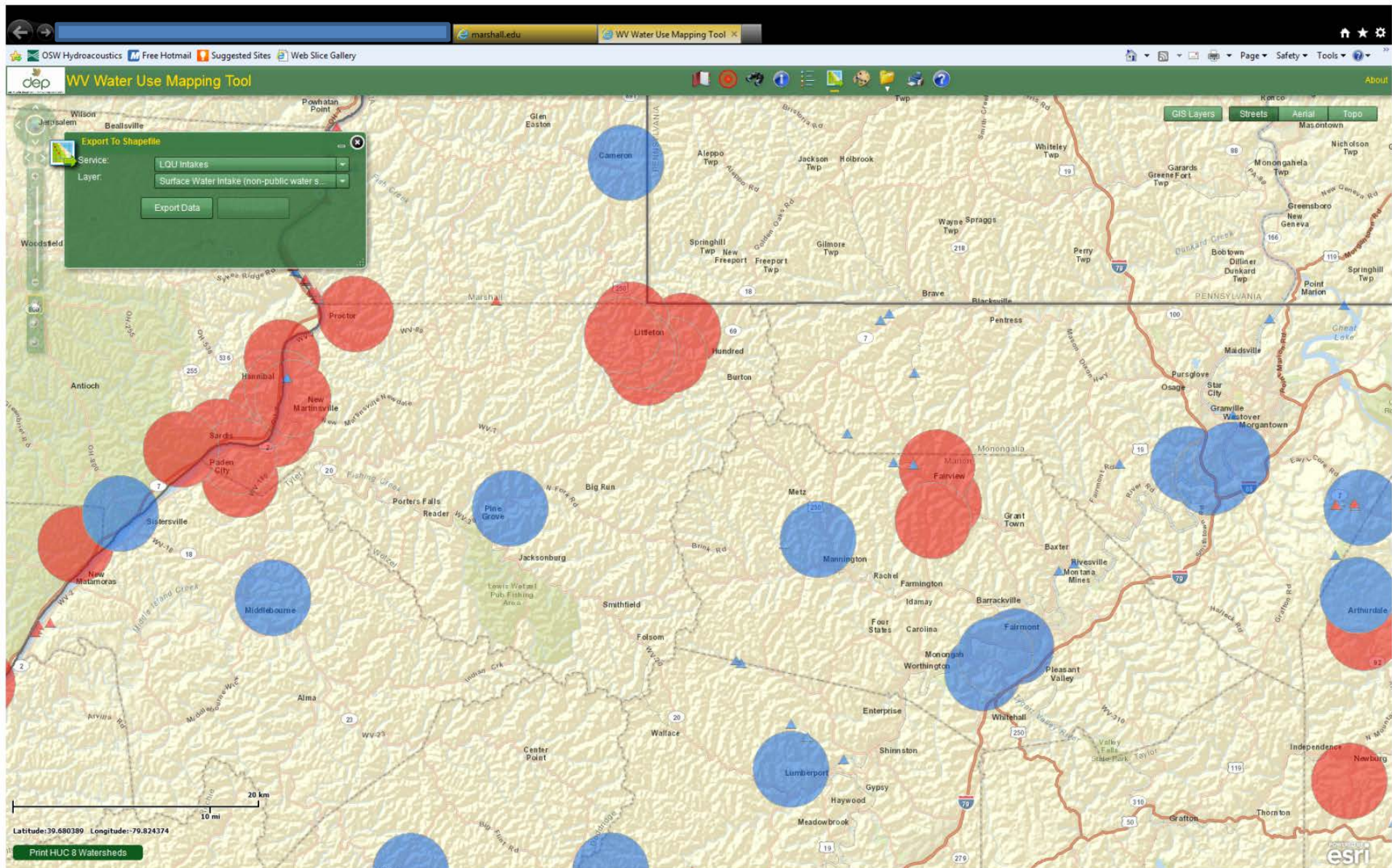
There is no Plugging data for this well

# Water Use Web Site - Draw





# Water Use Web Site – Export/Print





# Water Use Web Site Links - WVDEP

west virginia State Agency Directory | Online Services Search WV DEP

dep west virginia department of environmental protection  
- Promoting a Healthy Environment

DEP Offices | Agency History | News | Outlook Web Access | Text size A A A

**Air**  
Division of Air Quality Home  
Air Quality Index  
Open Burning Regulations  
Air Monitoring Data  
Permit Application Forms  
Policies  
[See More](#)

**Land**  
REAP  
Abandoned Mine Lands and Reclamation  
Division of Mining and Reclamation  
Office of Oil and Gas  
Special Reclamation of Industrial Lands  
[See More](#)

**Water and Waste**  
Water and Waste Home  
2012 Draft 303(d) List  
Water Withdrawal Guidance Tool  
Permitting  
Water Use  
Special Studies  
[See More](#)

**Inside DEP**  
Environmental Advocate  
Contact the Executive Office  
Environmental Enforcement  
Youth Environmental Program  
Public Information Office  
Agency Budget  
[See More](#)

**Permitting**  
Narrative Water Quality Permitting Guidance  
e-Permitting/eDMR  
[See More](#)

**How Do I...?**  
Find a job with DEP  
File a FOIA Request  
Find a Public Notice  
Report a Spill  
Volunteer  
[See More](#)

**Agency Geospatial Technologies**  
GIS and ITO's TAGIS Unit  
[See More](#)

**Events**  
Special Reclamation Fund Advisory Council (SRFAC) ...  
11/07/2012  
WVDEP regulations for manufacturers seminar  
11/08/2012  
Public meeting on water quality standards  
11/08/2012  
[See More](#)

**IMPORTANT NOTICE: Upcoming vacancy announcements for Oil and Gas Inspectors**  
Due to recent legislative changes to the Oil and Gas statute, DEP has created class specifications for Oil and Gas Inspector, Oil and Gas Inspector Specialist, and Oil and Gas Inspector Supervisor. These class specifications have been approved by the State Personnel Board and are available on the Division of Personnel's (DOP) website.

**Spotlight**  
October  
West Virginia Department of Environmental Protection





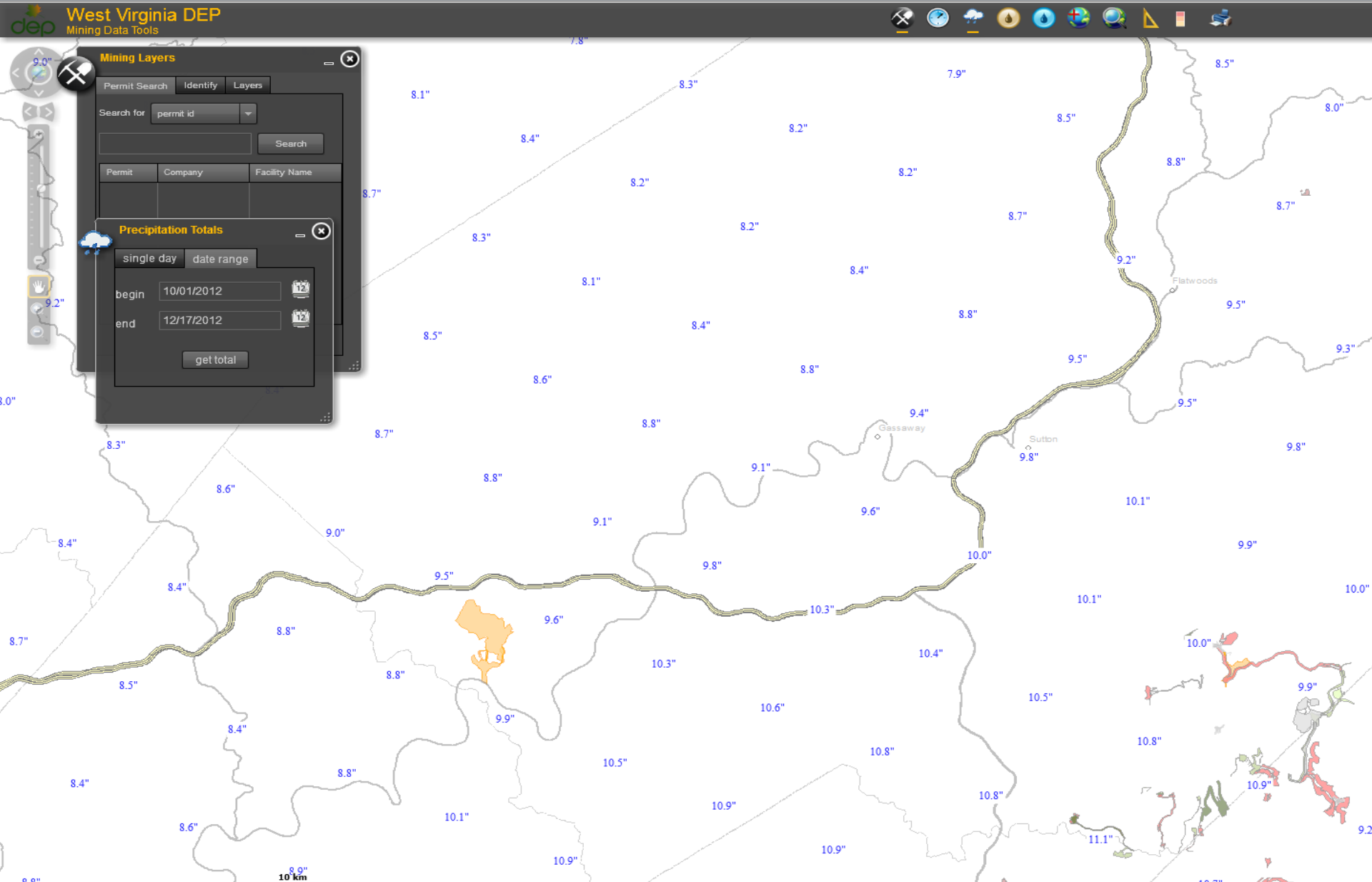
## MAPPING APPS

the following geospatial applications allow access to WVDEP environmental data using only an Internet connection and a web browser

Applications are organized along the ribbon based on frequency of use. The applications are developed using ESRI's Flex and Javascript API's running on the Agency's ArcGIS Server cluster.

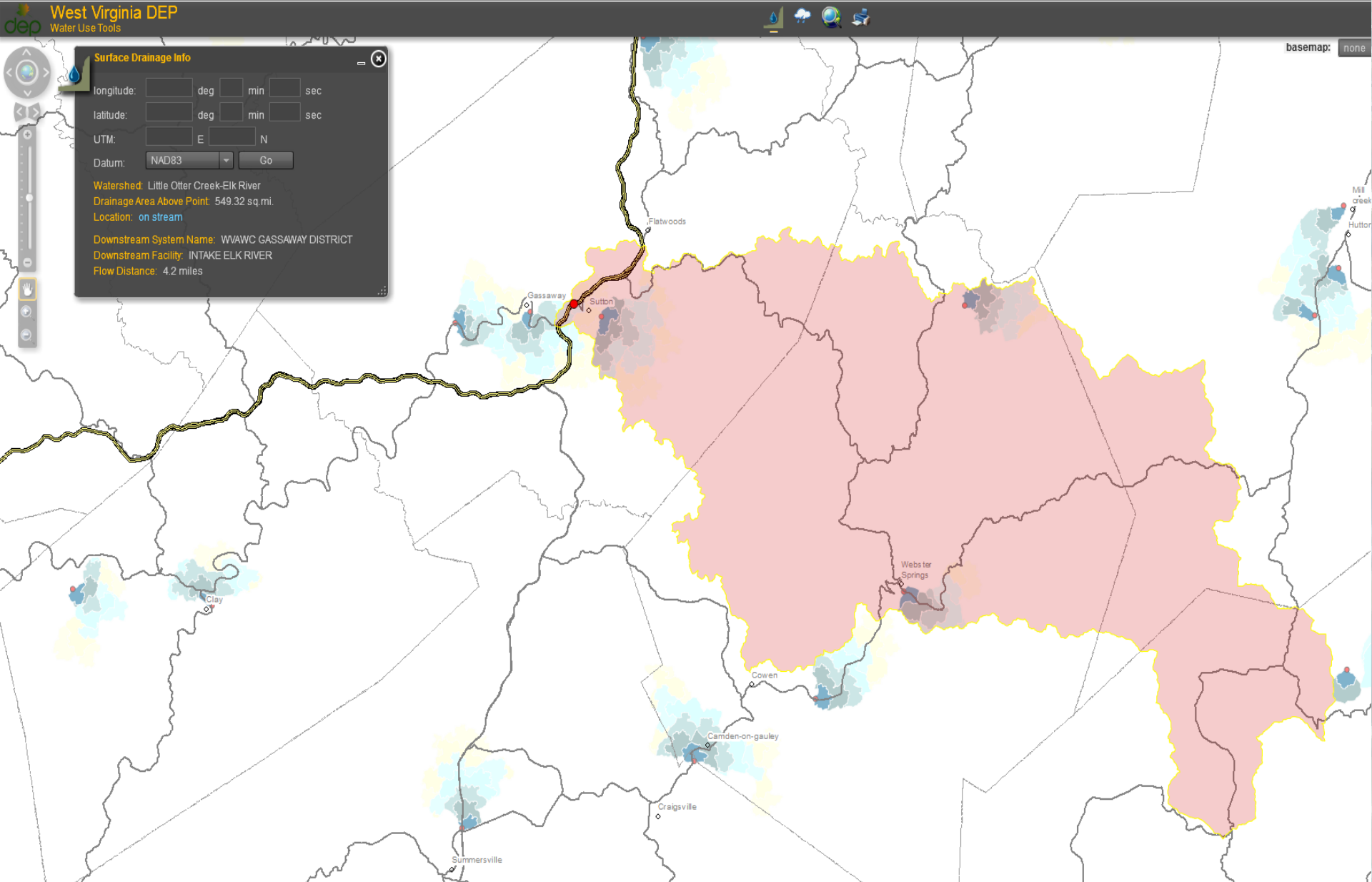


# Tagis Precipitation Total Over Date Range

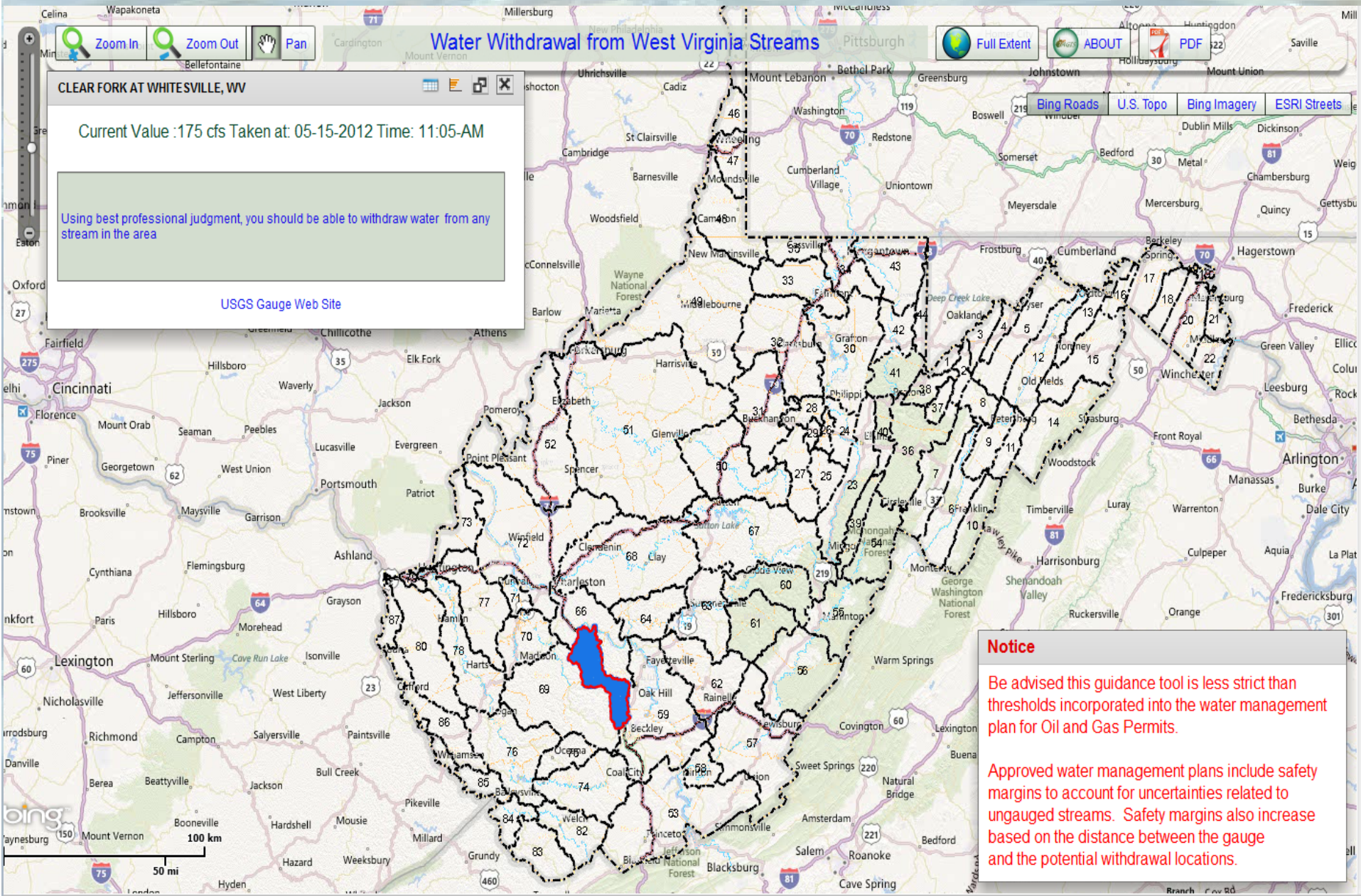




# Tagis Basin Size Widget



# WVDEP Water Withdrawal Tool









# WV Water Gauging Council Web Site

## Welcome to the West Virginia Switching Station Database for Water-Monitoring Gages

This link will give you access to State and Federal Agencies web-pages for gages they are monitoring. This database link gives multiple links to each gage from different agencies. This allows for access to a gage even if one agency's webpage is down.

Click on Link Below

[Switching Station Database for  
Water-Monitoring Gages](#)

### West Virginia Water-Monitoring Gages

Streams and Rivers	Source	WV County	World-Wide-Web Address	Latitude	Longitude
<b>POTOMAC RIVER BASIN</b>					
North Branch Potomac River at Steyer, MD	USGS	Grant	<a href="http://waterdata.usgs.gov/md/nwsluv/701595000">http://waterdata.usgs.gov/md/nwsluv/701595000</a>	391807	791825
North Branch Potomac River at Kitzmiller, MD	USGS	Mineral	<a href="http://waterdata.usgs.gov/md/nwsluv/701595500">http://waterdata.usgs.gov/md/nwsluv/701595500</a>	392338	791054
North Branch Potomac River at Bamum, WV	BCOE	Mineral	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>		
Stony River near Mount Storm, WV	USGS	Mineral	<a href="http://waterdata.usgs.gov/wv/nwsluv/701595800">http://waterdata.usgs.gov/wv/nwsluv/701595800</a>	392642	760639
North Branch Potomac River at Luke, MD	USGS	Grant	<a href="http://waterdata.usgs.gov/wv/nwsluv/701595500">http://waterdata.usgs.gov/wv/nwsluv/701595500</a>	391610	791545
North Branch Potomac River at Pisto, MD	USGS	Mineral	<a href="http://waterdata.usgs.gov/wv/nwsluv/701595500">http://waterdata.usgs.gov/wv/nwsluv/701595500</a>	392845	793354
North Branch Potomac River near Cumberland, MD	USGS	Mineral	<a href="http://waterdata.usgs.gov/md/nwsluv/701600000">http://waterdata.usgs.gov/md/nwsluv/701600000</a>	393400	785022
Patterson Creek near Headsville, WV	BCOE	Mineral	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>	393718	784624
South Branch Potomac River at Franklin, WV	USGS	Mineral	<a href="http://waterdata.usgs.gov/wv/nwsluv/701604500">http://waterdata.usgs.gov/wv/nwsluv/701604500</a>	392635	784920
North Fork South Branch Potomac River at Cabins, WV	USGS	Pendleton	<a href="http://www.afws.net/data/wv/Pendleton.htm">http://www.afws.net/data/wv/Pendleton.htm</a>	383808	792017
South Branch Potomac River near Petersburg, WV	AFWS	Pendleton	<a href="http://www.rainfall.net/country.php?id=36">http://www.rainfall.net/country.php?id=36</a>		
South Branch Potomac River near Petersburg, WV	DHSEM	Pendleton	<a href="http://www.rainfall.net/country.php?id=36">http://www.rainfall.net/country.php?id=36</a>		
South Fork South Branch Potomac River at Brandywine, WV	USGS	Grant	<a href="http://waterdata.usgs.gov/wv/nwsluv/701606000">http://waterdata.usgs.gov/wv/nwsluv/701606000</a>	385904	791402
South Fork South Branch Potomac River near Moorefield, WV	AFWS	Grant	<a href="http://www.afws.net/data/wv/Grant.htm">http://www.afws.net/data/wv/Grant.htm</a>		
South Fork South Branch Potomac River near Moorefield, WV	DHSEM	Grant	<a href="http://www.rainfall.net/country.php?id=12">http://www.rainfall.net/country.php?id=12</a>		
South Fork South Branch Potomac River near Moorefield, WV	USGS	Grant	<a href="http://waterdata.usgs.gov/wv/nwsluv/701606500">http://waterdata.usgs.gov/wv/nwsluv/701606500</a>	385928	791034
South Fork South Branch Potomac River near Moorefield, WV	AFWS	Grant	<a href="http://www.afws.net/data/wv/Grant.htm">http://www.afws.net/data/wv/Grant.htm</a>		
South Fork South Branch Potomac River near Moorefield, WV	DHSEM	Grant	<a href="http://www.rainfall.net/country.php?id=12">http://www.rainfall.net/country.php?id=12</a>		
South Fork South Branch Potomac River near Moorefield, WV	RWIN	Grant	<a href="http://rwin.nws.noaa.gov/wv/nwsluv/hydro.html">http://rwin.nws.noaa.gov/wv/nwsluv/hydro.html</a>		
South Fork South Branch Potomac River at Brandywine, WV	BCOE	Grant	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>		
South Fork South Branch Potomac River at Brandywine, WV	USGS	Pendleton	<a href="http://waterdata.usgs.gov/wv/nwsluv/701607500">http://waterdata.usgs.gov/wv/nwsluv/701607500</a>	383753	791438
South Fork South Branch Potomac River near Moorefield, WV	AFWS	Pendleton	<a href="http://www.afws.net/data/wv/Pendleton.htm">http://www.afws.net/data/wv/Pendleton.htm</a>		
South Fork South Branch Potomac River near Moorefield, WV	DHSEM	Pendleton	<a href="http://www.rainfall.net/country.php?id=36">http://www.rainfall.net/country.php?id=36</a>		
South Branch Potomac River near Moorefield, WV	USGS	Hardy	<a href="http://waterdata.usgs.gov/wv/nwsluv/701608000">http://waterdata.usgs.gov/wv/nwsluv/701608000</a>	390044	785723
South Branch Potomac River near Moorefield, WV	AFWS	Hardy	<a href="http://www.afws.net/data/wv/Hardy.htm">http://www.afws.net/data/wv/Hardy.htm</a>		
South Branch Potomac River near Moorefield, WV	DHSEM	Hardy	<a href="http://www.rainfall.net/country.php?id=16">http://www.rainfall.net/country.php?id=16</a>		
South Branch Potomac River near Moorefield, WV	BCOE	Hardy	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>		
South Branch Potomac River near Moorefield, WV	AFWS	Hardy	<a href="http://www.afws.net/data/wv/Hardy.htm">http://www.afws.net/data/wv/Hardy.htm</a>	390614	785737
South Branch Potomac River near Springfield, WV	DHSEM	Hardy	<a href="http://www.rainfall.net/country.php?id=16">http://www.rainfall.net/country.php?id=16</a>		
Potomac River at Paw Paw, WV	USGS	Hampshire	<a href="http://waterdata.usgs.gov/wv/nwsluv/701608500">http://waterdata.usgs.gov/wv/nwsluv/701608500</a>	392649	783916
Potomac River at Paw Paw, WV	BCOE	Hampshire	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>		
Potomac River at Paw Paw, WV	USGS	Morgan	<a href="http://waterdata.usgs.gov/md/nwsluv/701610000">http://waterdata.usgs.gov/md/nwsluv/701610000</a>	393220	782723
Potomac River at Paw Paw, WV	BCOE	Morgan	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>		
Warm Springs Run near Berkeley Springs, WV	USGS	Morgan	<a href="http://waterdata.usgs.gov/wv/nwsluv/791610000">http://waterdata.usgs.gov/wv/nwsluv/791610000</a>	393826	781308
Waites Run near Wardensville, WV	USGS	Hardy	<a href="http://waterdata.usgs.gov/wv/nwsluv/701610400">http://waterdata.usgs.gov/wv/nwsluv/701610400</a>	393821	783556
Cacapon River near Great Cacapon, WV	USGS	Morgan	<a href="http://waterdata.usgs.gov/wv/nwsluv/701611500">http://waterdata.usgs.gov/wv/nwsluv/701611500</a>	393821	781836
Potomac River at Hancock, MD	USGS	Morgan	<a href="http://waterdata.usgs.gov/md/nwsluv/701613000">http://waterdata.usgs.gov/md/nwsluv/701613000</a>	393821	781040
Potomac River at Hancock, MD	BCOE	Morgan	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>		
Back Creek near Jones Springs, WV	USGS	Berkeley	<a href="http://waterdata.usgs.gov/wv/nwsluv/791614000">http://waterdata.usgs.gov/wv/nwsluv/791614000</a>	393043	780215
Openjuno Creek near Martinsburg, WV	USGS	Berkeley	<a href="http://waterdata.usgs.gov/wv/nwsluv/701615500">http://waterdata.usgs.gov/wv/nwsluv/701615500</a>	392525	775620
Tuscarora Creek above Martinsburg, WV	USGS	Berkeley	<a href="http://waterdata.usgs.gov/wv/nwsluv/791616000">http://waterdata.usgs.gov/wv/nwsluv/791616000</a>	392910	775618
Shenandoah River at Millville, WV	USGS	Jefferson	<a href="http://waterdata.usgs.gov/wv/nwsluv/701636500">http://waterdata.usgs.gov/wv/nwsluv/701636500</a>	391655	774722
Mill Creek @ Bunker Hill, WV	BCOE	Jefferson	<a href="http://www.nab-wc.usace.army.mil/mapsrver/">http://www.nab-wc.usace.army.mil/mapsrver/</a>		
Mill Creek @ Bunker Hill, WV	USGS	Berkeley	<a href="http://waterdata.usgs.gov/wv/nwsluv/791616400">http://waterdata.usgs.gov/wv/nwsluv/791616400</a>	392005	780312
<b>OHIO RIVER BASIN</b>					
Ohio River at Dashields Lock & Dam, PA	PCOE	Hancock	<a href="http://www2.myl.usace.army.mil/watercontrol/stationinfo2.cfm?st=DSH1&amp;ID=DSH116&amp;S">http://www2.myl.usace.army.mil/watercontrol/stationinfo2.cfm?st=DSH1&amp;ID=DSH116&amp;S</a>	403200	801100
Ohio River above Montgomery Dam & Locks at Ohioview, PA	USGS	Jefferson	<a href="http://waterdata.usgs.gov/wv/nwsluv/791616500">http://waterdata.usgs.gov/wv/nwsluv/791616500</a>	393821	781836
Ohio River at New Cumberland Lock & Dam, OH (Upper)	USGS	Jefferson	<a href="http://waterdata.usgs.gov/wv/nwsluv/791616500">http://waterdata.usgs.gov/wv/nwsluv/791616500</a>	393821	781836
Ohio River at New Cumberland Lock & Dam, OH (Lower)	USGS	Jefferson	<a href="http://waterdata.usgs.gov/wv/nwsluv/791616500">http://waterdata.usgs.gov/wv/nwsluv/791616500</a>	393821	781836
Ohio River at New Cumberland Lock & Dam, OH (Lower)	NWS	Jefferson	<a href="http://www.srh.noaa.gov/data/RD/RV/ARLX">http://www.srh.noaa.gov/data/RD/RV/ARLX</a>	403141	803733



map.gov


OSW Hydroacoustics Free Hotmail Suggested Sites Web Slice Gallery

Home Getting Started FAQ User Manual

# New and Improved Version

## WV Flood Tool

Remember: When In Doubt, It's not Out!



**Launch Tool**

### Agency Information

- Department of Homeland Security, FEMA
- West Virginia Division of Homeland Security and Emergency Management
- West Virginia GIS Technology Center

Overview Features Contacts **Data Layers** Resources Glossary

### Data Layers

Data layers are divided into three major categories: (1) base map or background layers, (2) overlay reference layers, and (3) the flood hazard or risk layers. Many of the layers are scale-dependent and only display at certain map scales.

#### Base Map (Background) Layers

The WV Flood Tool provides access to 12 base map layers from commercial and governmental web services. Road base map layers are useful for viewing the named features of roads, streams, and other points of interest. Topographic base layers are helpful for viewing the terrain. Photographic or satellite imagery base layers are useful for viewing structures and high resolution pictures of the earth's surface. The best leaf-off imagery layer includes high resolution imagery combined with the 2003 SAIID imagery.

#### Reference Layers

Overlay reference layers consist of vector framework layers such as transportation, hydrography, elevation contours, geographic names, boundaries, and addresses. Reference layers are generalized and more detailed at zoomed-out and zoomed-in scales, respectively, with all layers displayed at the largest zoom in scale of 1:1,128.

#### Flood Layers

Flood layers encompass information about flood hazards and mitigating flood risks. The flood layers include the best available digital flood data from the FEMA Map Service Center. Certain flood layers (water surface elevation, water depth, x-sections, FEMA panel index, floodways, etc.) are only viewable in the Expert or Risk Map Views. See the User Guide in the Resources Tab for more information.

Supported Browsers: Internet Explorer 7.8.9, Firefox 3+, Chrome, Safari. Please contact [support](#) with questions or comments re

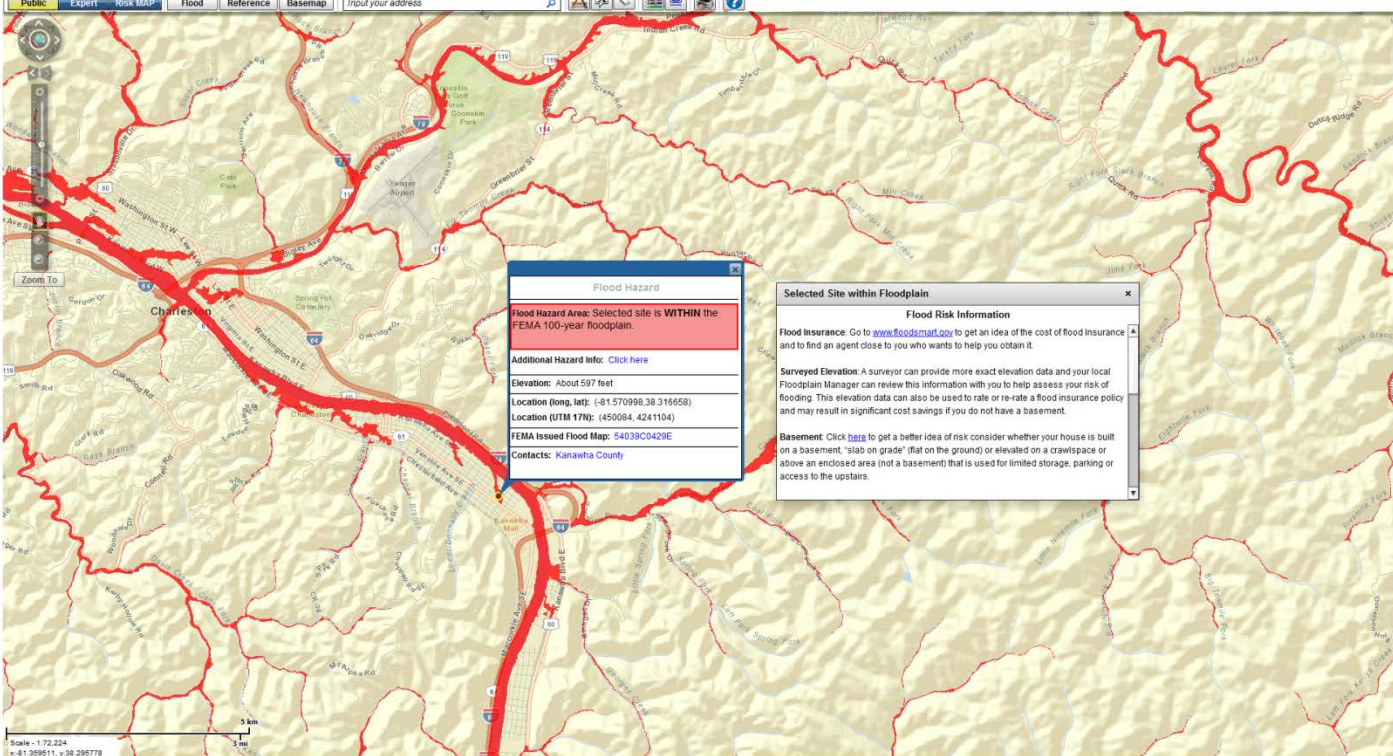
map.gov

OSW Hydroacoustics Free Hotmail Suggested Sites Web Slice Gallery

# WV FLOOD TOOL

View Layers Search Tools

Public Expert Risk MAP Flood Reference Basemap Input your address



#### Flood Hazard

**Flood Hazard Area: Selected site is WITHIN the FEMA 100-year floodplain**

Additional Hazard Info: [Click here](#)

Elevation: About 597 feet

Location (long, lat): (-81.570998, 38.316658)

Location (UTM 17N): (450084, 4241104)

FEMA Issued Flood Map: 54039C0429E

Contacts: Kanawha County

#### Selected Site within Floodplain

##### Flood Risk Information

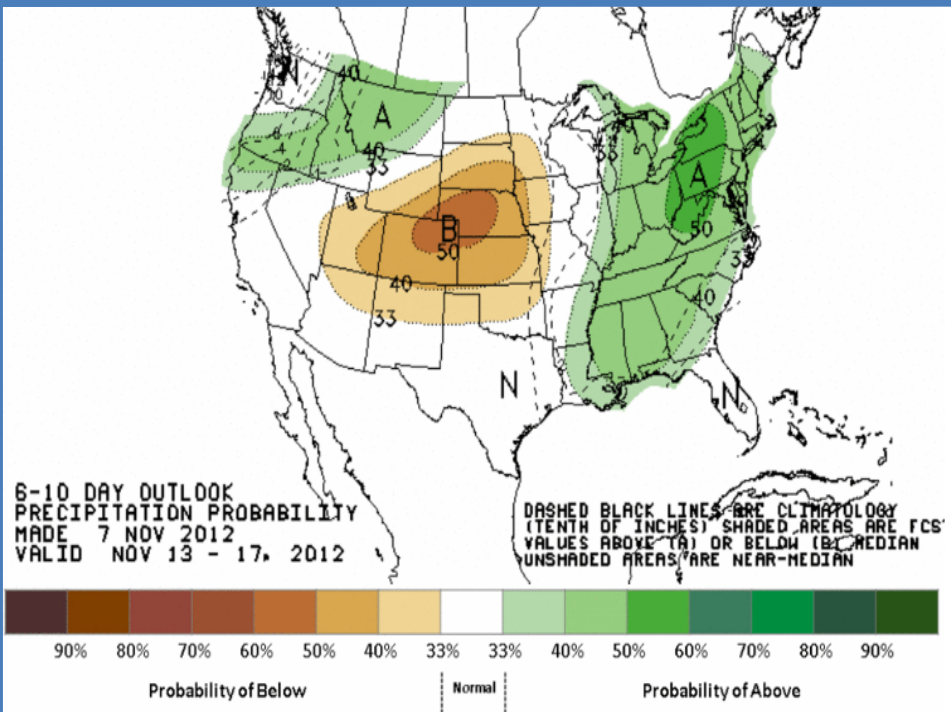
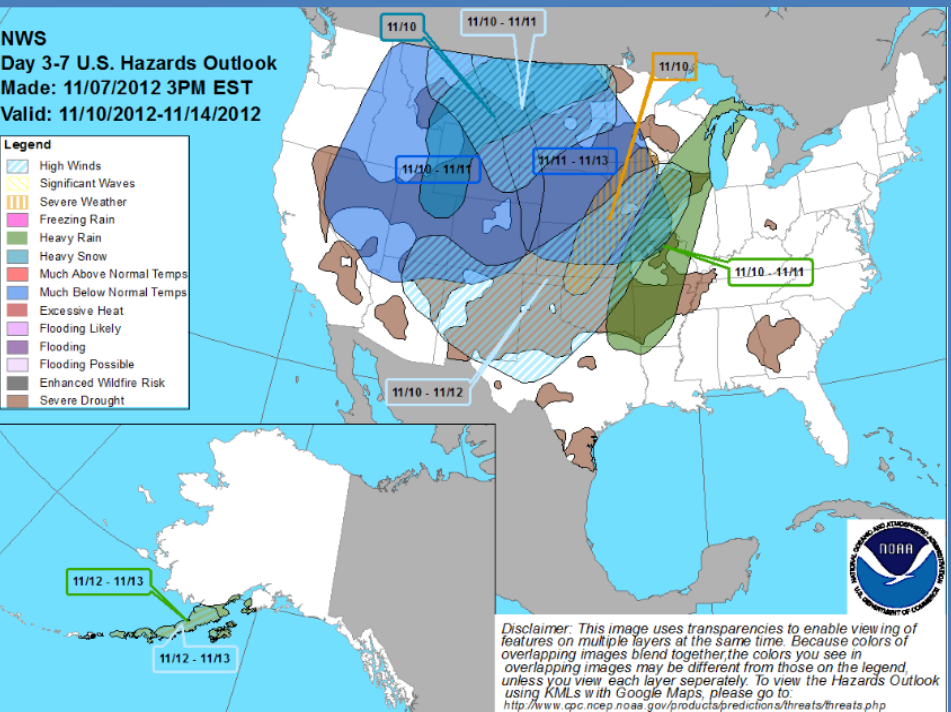
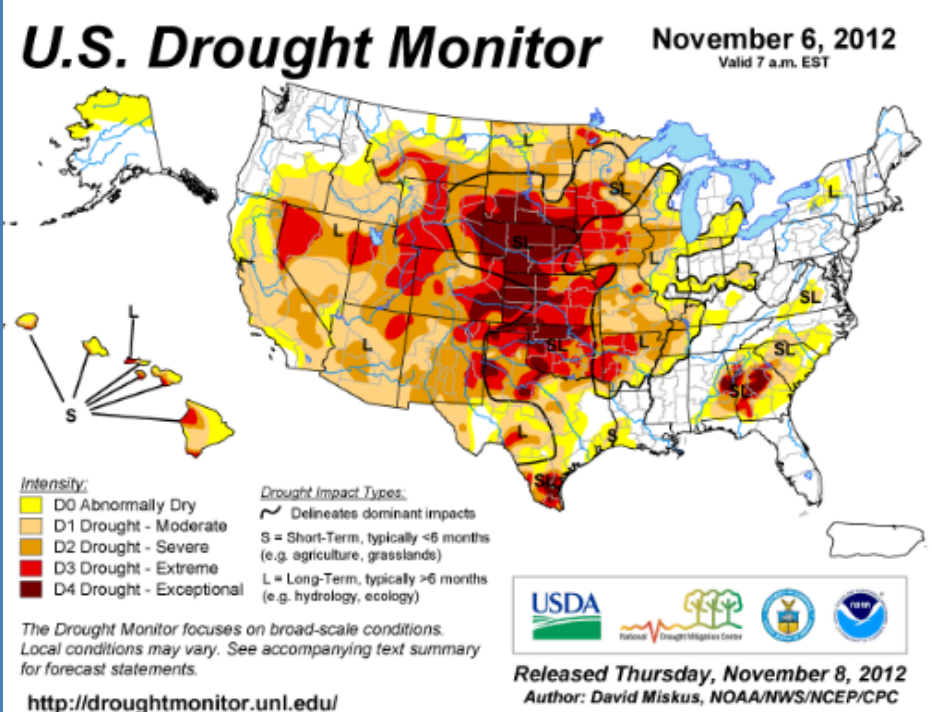
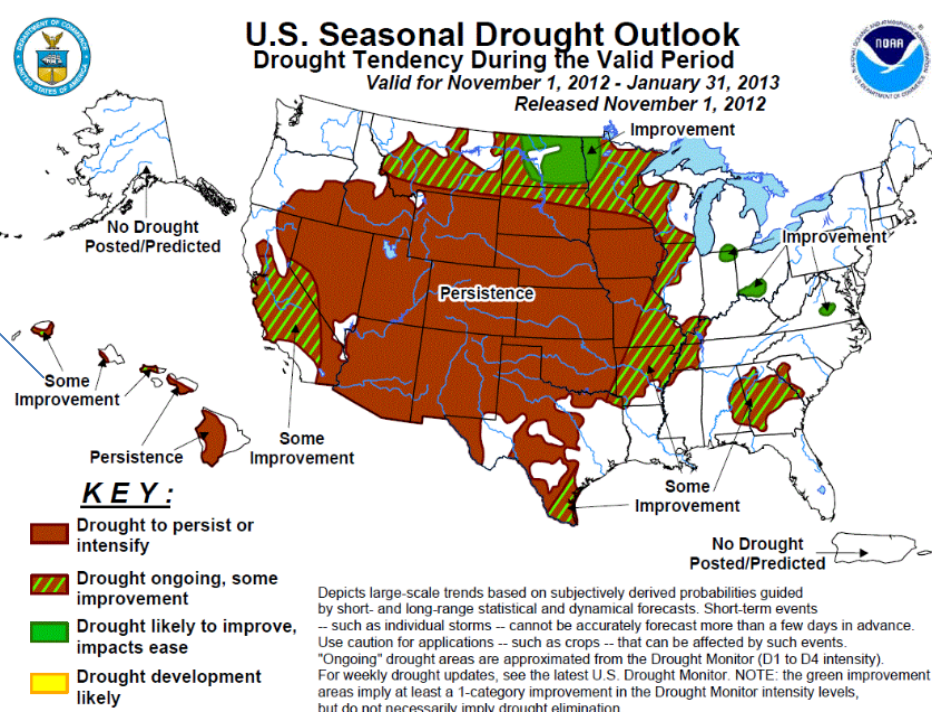
**Flood Insurance:** Go to [www.floodsmart.gov](http://www.floodsmart.gov) to get an idea of the cost of flood insurance and to find an agent close to you who wants to help you obtain it.

**Surveyed Elevation:** A surveyor can provide more exact elevation data and your local Floodplain Manager can review this information with you to help assess your risk of flooding. This elevation data can also be used to rate or re-rate a flood insurance policy and may result in significant cost savings if you do not have a basement.

**Basement:** Click [here](#) to get a better idea of risk consider whether your house is built on a basement, "slab on grade" (flat on the ground) or elevated on a crawlspace or above an enclosed area (not a basement) that is used for limited storage, parking or access to the upstairs.

Scale: 1:72,224  
x: -81.369511, y: 38.295778







# Other Web Tools Envisioned

- A WV Water Law Section
- Stream Flow Estimator
- Spring and Groundwater Well Information Portal
- Who's Who Water Resources Contact List
- Seasonal Average Precipitation Rate Demographics
- Horizontal Drilling WMP Look Up Tool
- Also, Routine Updates and Improvements

# WMP Accomplishments

- Designed and implemented a WMP program for horizontal drilling which our section received an Agency Recognition Award
  - Effectively reduced the number of public water withdrawal complaints
- Reviewed and approved more than 800 O&G Water Management Plans this year
- Negotiated minimum flow thresholds for regulated rivers with ACoE
- Initiated a Base Flow study approximating the flow threshold that is safe for aquatic life (USGS SIR 2012 5121)
- We are continuing to track hydro frac water usage
- Created 6 Partial record stations to determine small stream flow rates



# WMP Accomplishments, cont.

- Enabled 3 Gas Companies to fund new stream gauges
- Created forms to simplify WMP submittal for the gas industry
- Redesigned WMP process effectively reducing the number of Modifications
- Searchable, transparent and consistent
- Created a system simplifying process for enforcement by inspectors
- Presented numerous times to industry, inspectors and environmental groups

# Less Fortunate Outcomes

## ICPRB Workshop Topics and Presentations:

- Basic concepts in water science
  - [Basic Hydrology – Part 1 \(water cycle video\)](#)
  - [Basic Hydrology – Part 2](#)
- Water resource planning
  - [Overview of Water Resource Management](#)
  - [Developing a Water Resource Plan](#)
  - [Planning Summary](#)
- Water demand and availability forecasting
  - [Water Demand Forecasting](#)
  - [Resource Assessment](#)
- Water resource issues
  - [Source Water Protection](#)
  - [Emergency Response Planning for Drought and Floods](#)
  - [Stormwater Management](#)
  - [Marcellus Shale Drilling \(drilling and hydrofracking video\)](#)
  - [Environmental Issues](#)
- [Inexpensive Mapping and Data Management tools \(GoogleEarth watershed tour\)](#)
- [Practical Exercises](#)
  - Hydrology
  - Issue and Problem Identification
  - Collaborative Water Resource Planning



# County Plans

- We have not seen the expected interest in Submission of Local Watershed Plans
- Only Pocahontas County has approached us to include their County Plan in the State Water Resource Protection and Management Plan.
- As a result we have been working with the Pocahontas Task Force and their consultants to insure there plan is as consistent with the state plan as possible.

# Questions?



Thank you.

