

Water Resources Protection and Management Act Annual Report to the WV Joint Legislative Oversight Commission on State Water Resources

West Virginia Department of Environmental Protection

Water Use Section

November 14, 2011

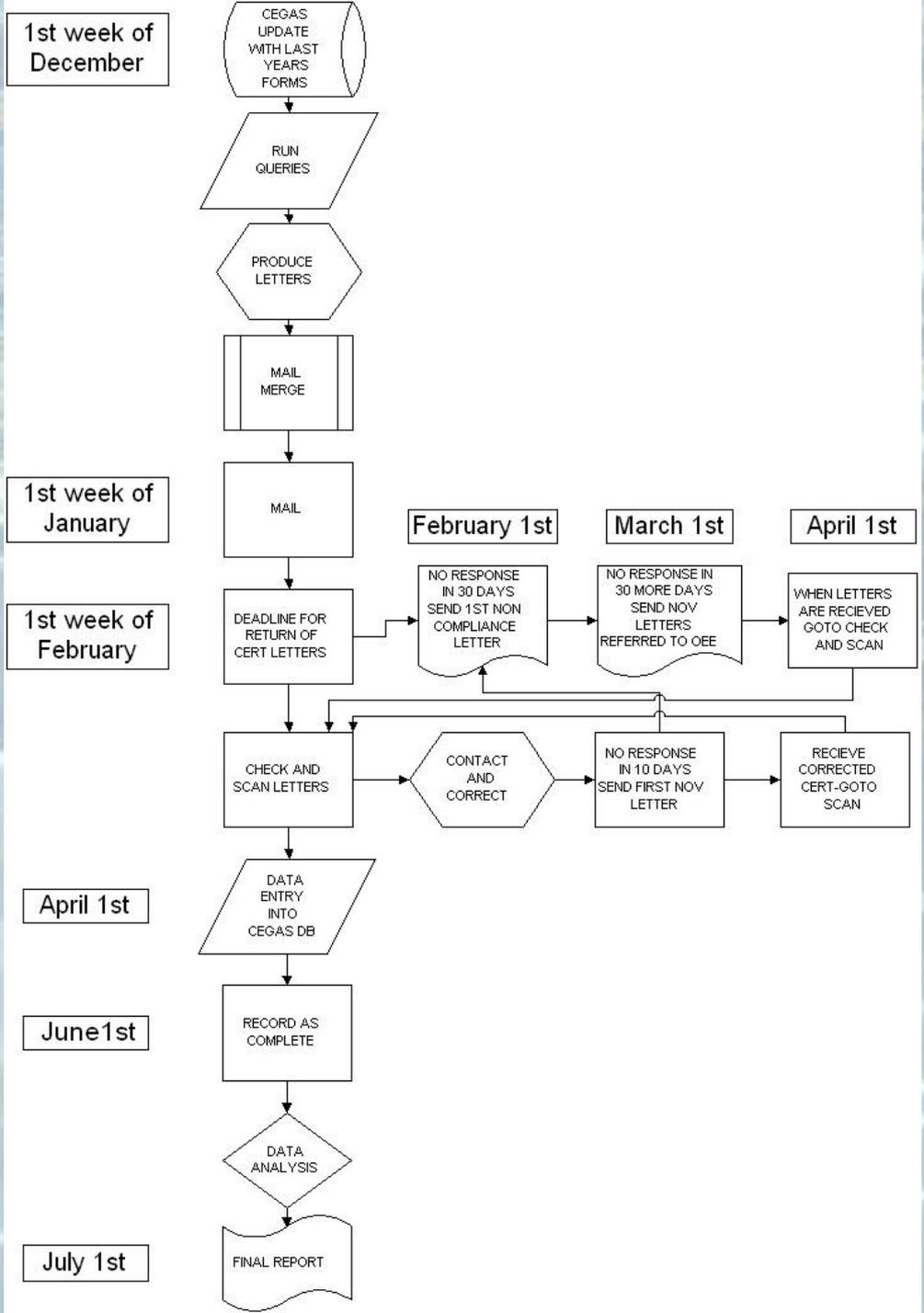


Contents of Today's Report

- Large quantity user registration/certification
- Meetings with stakeholders update
- Biological In-stream Flow Study results
- Groundwater Study and Mine Pool Atlas
- Water Withdrawal Guidance Tool update
- Small Stream Withdrawal Study
- Marcellus frac water tracking
- Oil and Gas Executive Order WMP
- 3 new stream gauges
- Growing pains of the Water Use Section
- 2011-2013 Timeline

Large Quantity User Registration / Certification

- We have Completed the 2010 certification/registration
- Made upgrades to the database
- Better reports
- Search engine
- Annual percent change in water use to date
 - (based on 7 years of data)





LQU - Summary by Use-Type



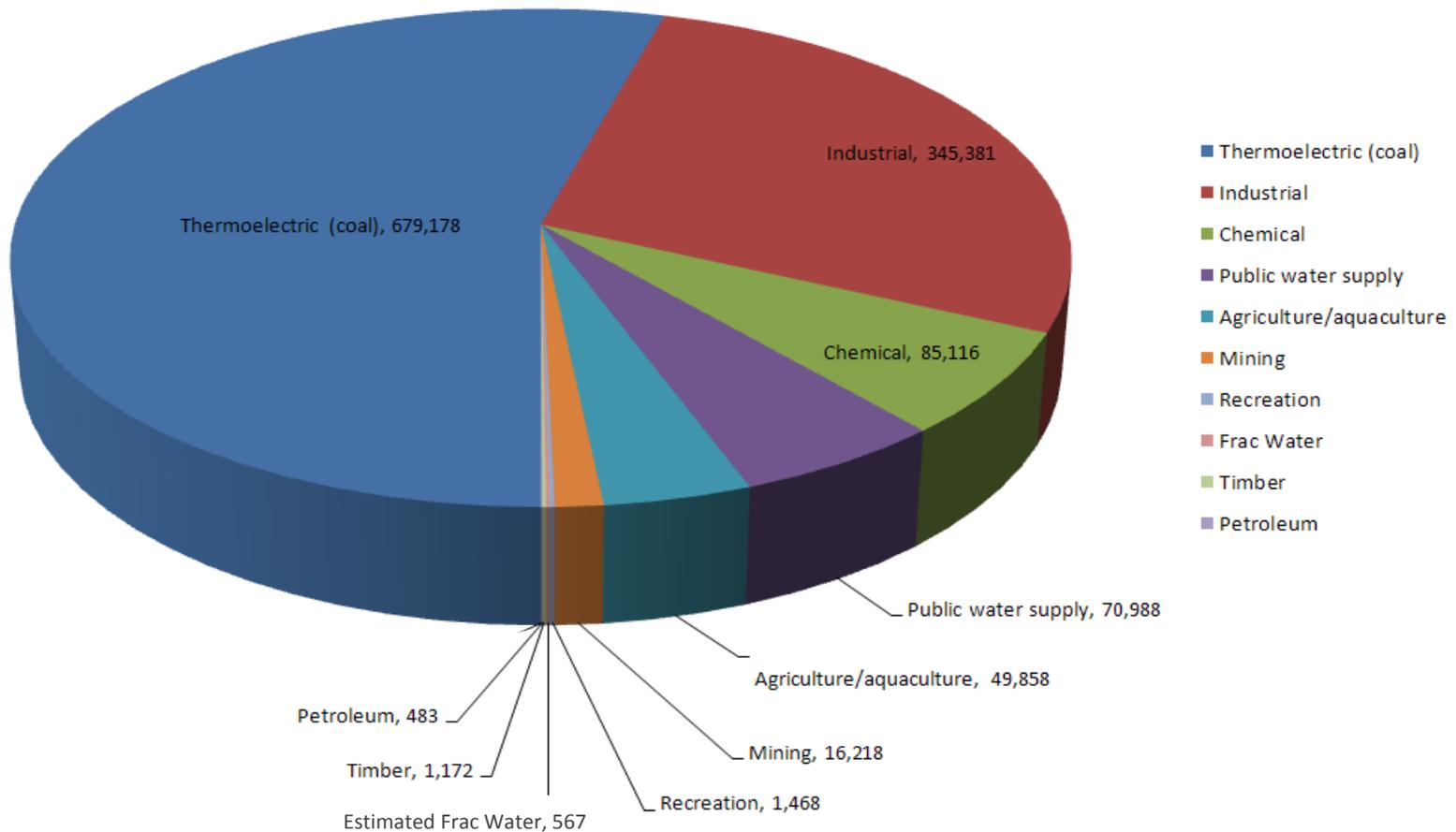
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Water Use Category	2010 Water Volume (gal)
Agriculture/aquaculture	49,857,602,940
Chemical	85,116,330,531
Frac Water	567,000,000
Hydroelectric	126,510,096,924,535
Industrial	345,381,183,819
Mining	16,217,749,925
Petroleum	483,475,044
Public water supply	70,987,570,924
Recreation	1,468,357,700
Thermoelectric (coal)	679,177,907,464
Timber	1,172,317,796
Total Annual Statewide Water Use:	127,760,001,077,076

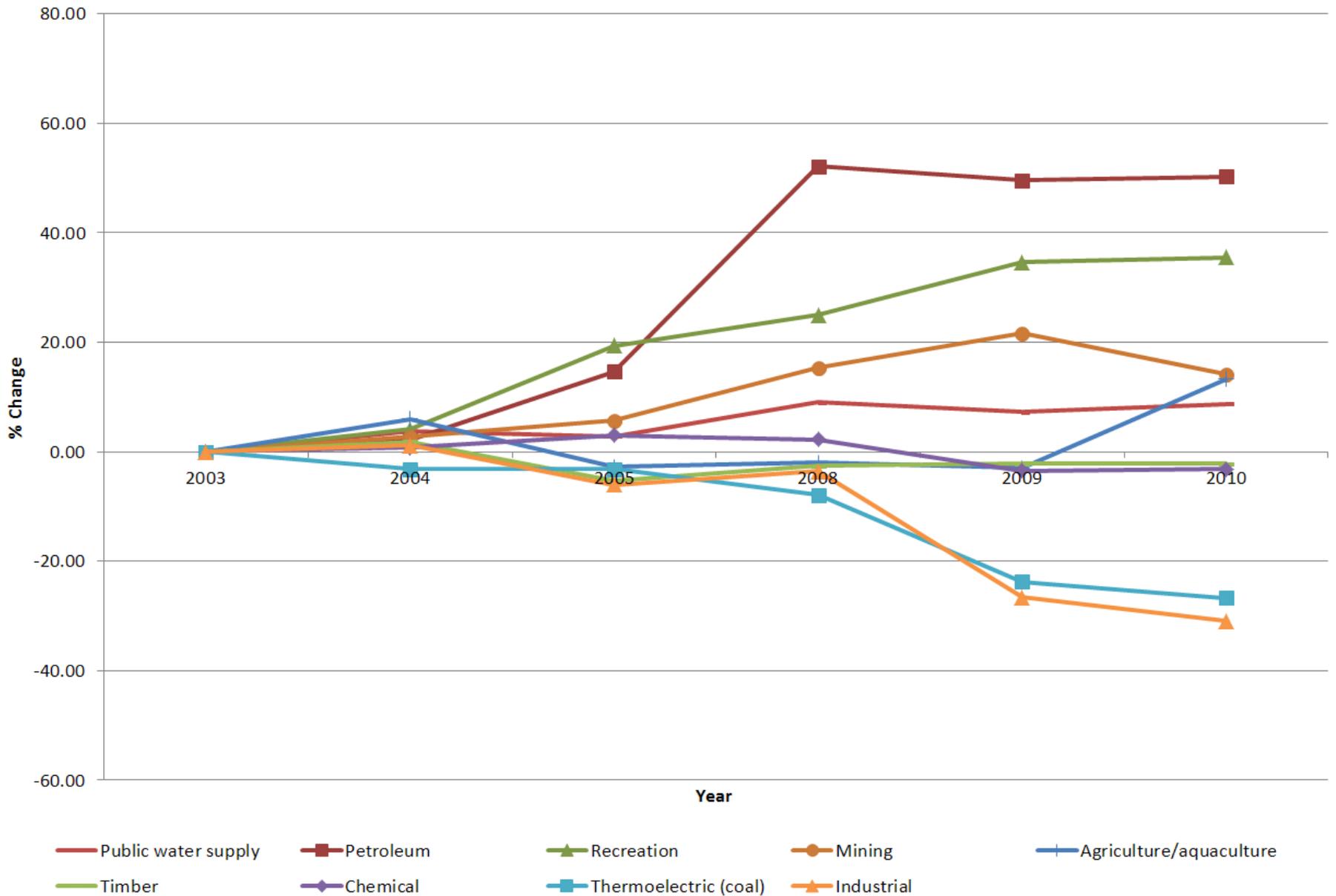


2010 Water Usage + Thermal-electric

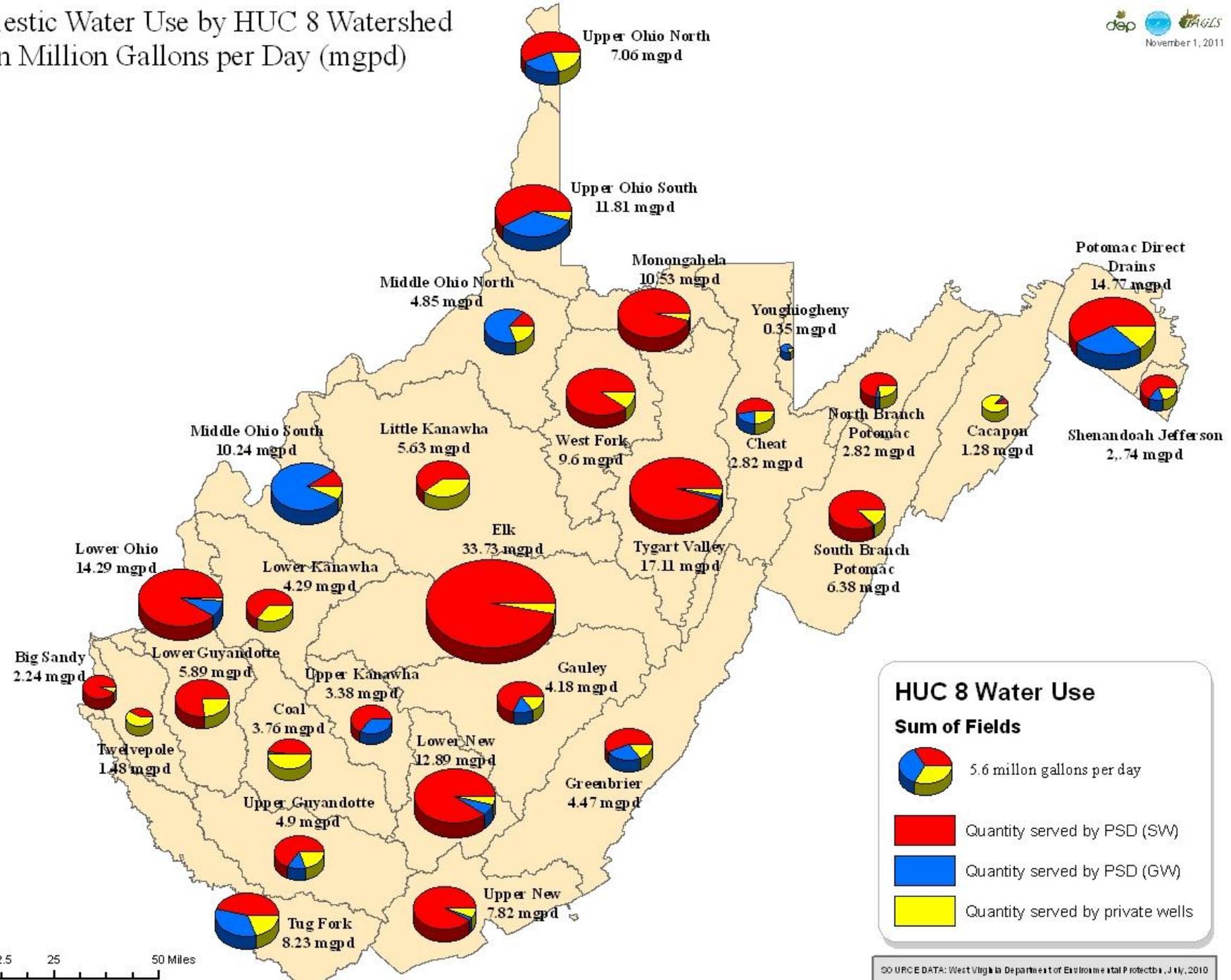
**2010 Water Use by SIC Group (millions of gallons)
(excluding Hydroelectric Facilities)**



Annual % Change in Reported Water Use since 2003 by Type



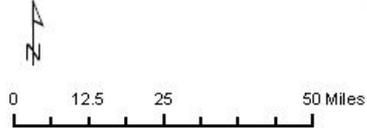
Domestic Water Use by HUC 8 Watershed in Million Gallons per Day (mgpd)



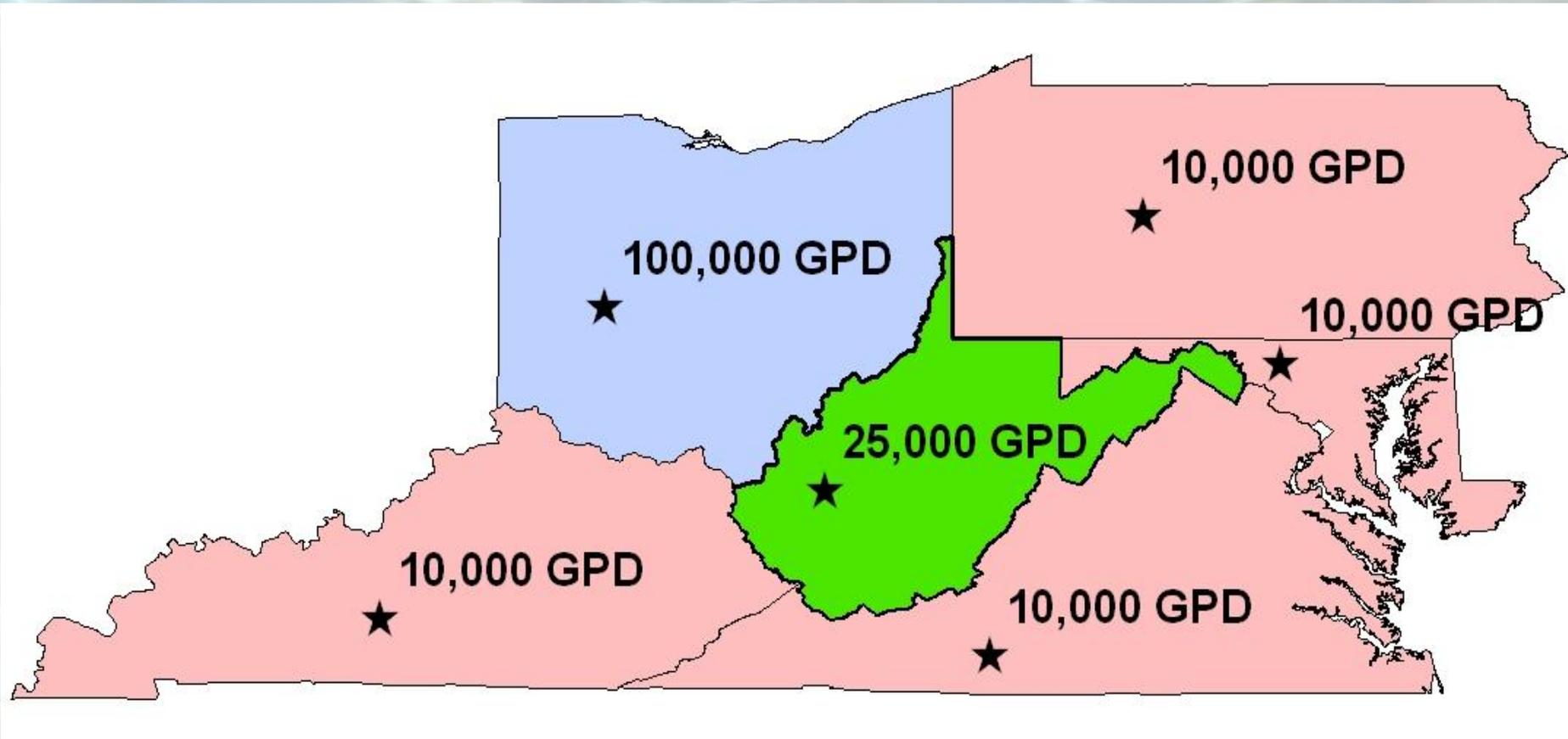
HUC 8 Water Use

Sum of Fields

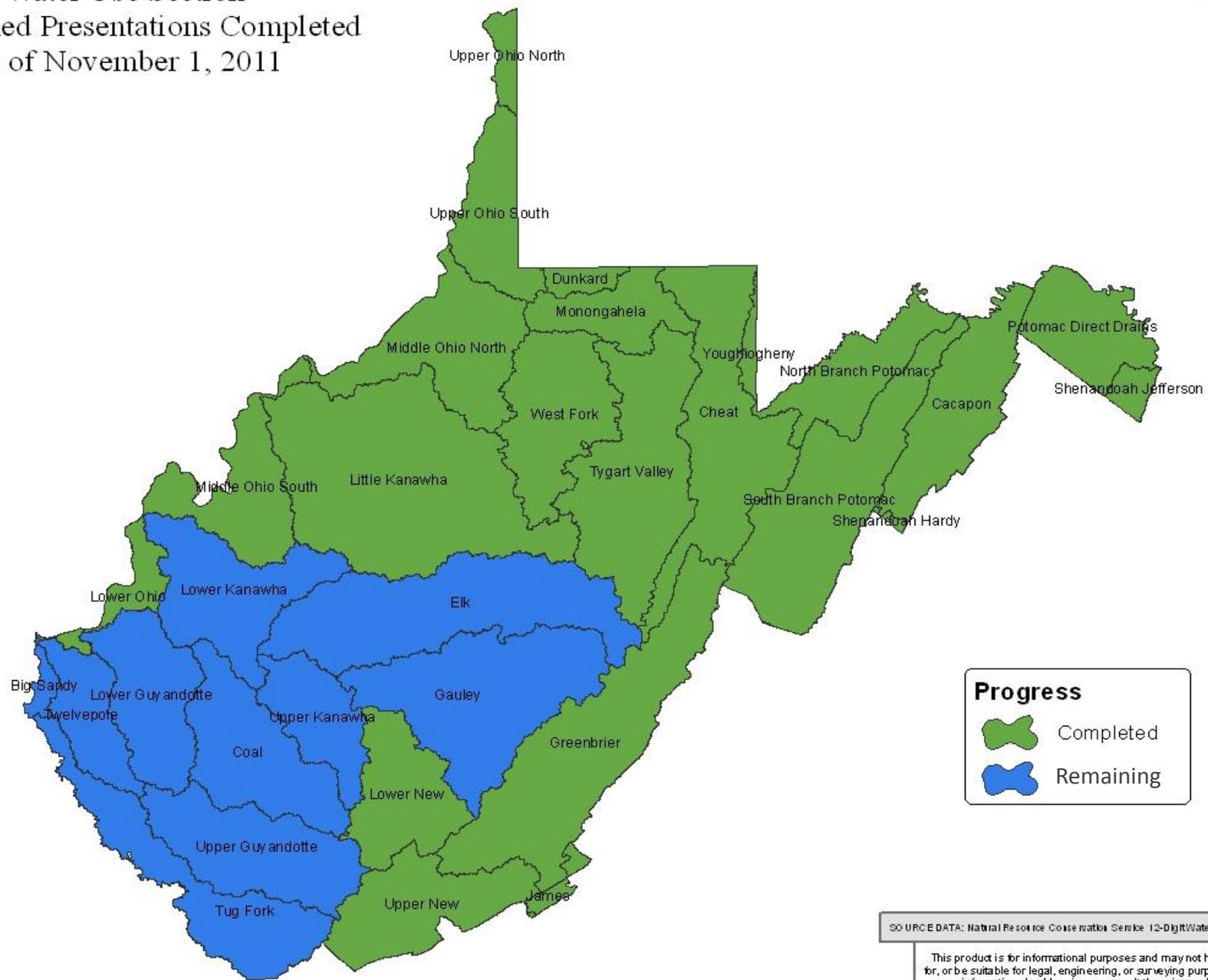
-  5.6 million gallons per day
-  Quantity served by PSD (SW)
-  Quantity served by PSD (GW)
-  Quantity served by private wells



Should we lower the limit?

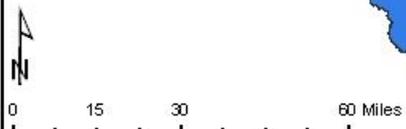


Water Use Section Watershed Presentations Completed as of November 1, 2011



Progress

-  Completed
-  Remaining



SOURCE DATA: National 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.

We have made updates to the Marcellus Frac Water Database

- De-Bugging
- Better reports
- Better search engine
- Improved instruction manual
- Beginning analysis of the data



frac water search utility

By date range

Start Date 

End Date

Detail Report

Summary Report

By permit number

API Number:

API Only

Well Site



By operator

Operator Name

Detail Report

Detail by Date Range

Summary Report

Summary by Date Range

Frac Water Disposal

Summary

Data last updated October 26, 2011



Summary Frac Water Use Report



Start Date: 1/1/2011 End Date: 11/4/2011

Report generated: Tuesday, November 08, 2011 2:58:40 PM

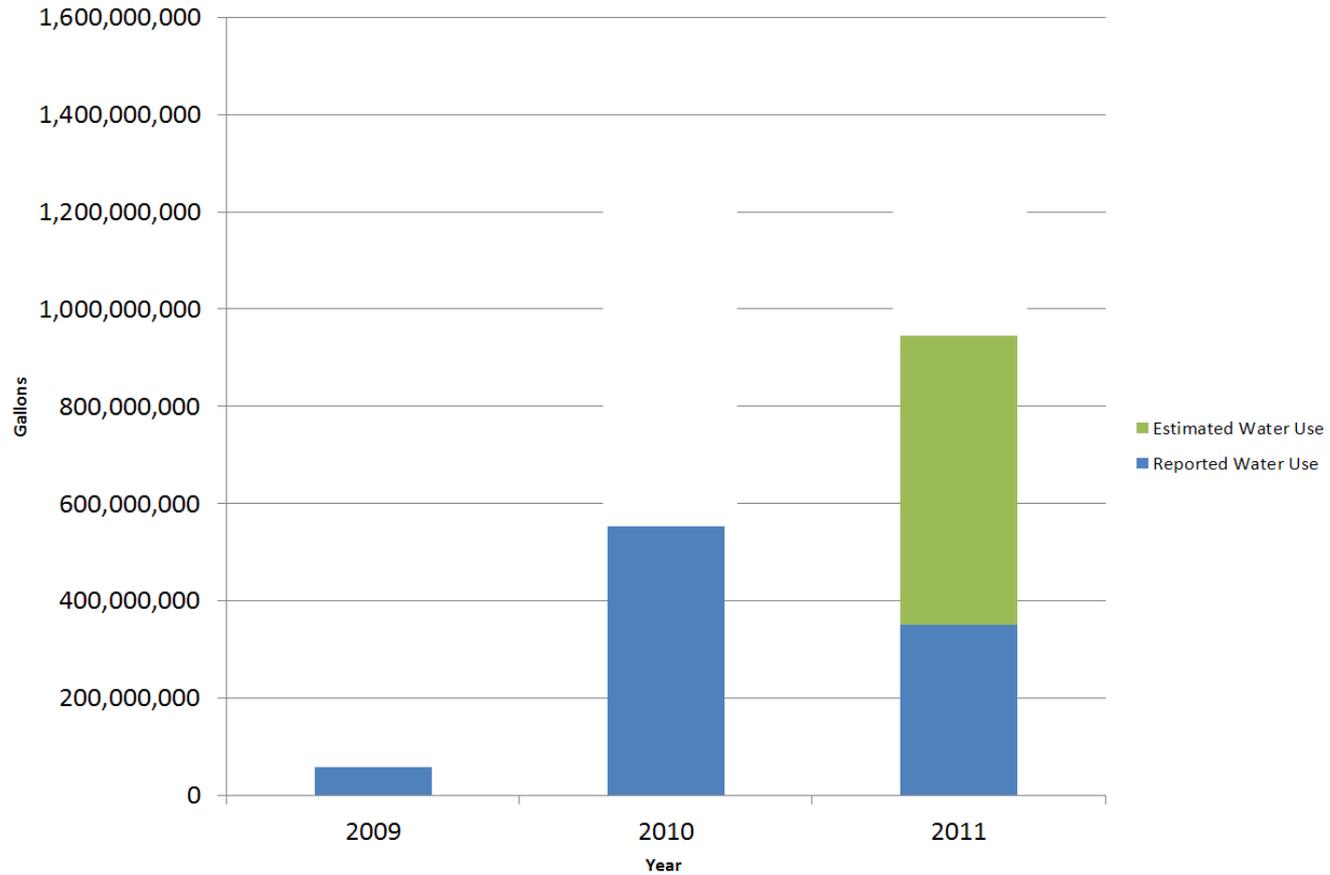
Water Use Volumes by Operator

Operator:	ActiveWell Sites*	Amount Withdrawn: (gal)	Amount Injected: (gal)	Amount Recovered: (gal)	Percent Recovered:	Amount Disposed: (gal)
Antero Resources	7	58,904,367	81,695,954	11,144,617	13.64%	10,175,856
Chesapeake Appalachia	10	83,599,376	106,786,008	4,535,242	4.25%	4,535,244
EQT Production Company	23	108,815,784	111,190,506	2,723,405	2.45%	2,915,955
Gastar Exploration USA Inc.	1	15,388,632	12,868,632	602,537	4.68%	602,537
Grenadier Energy Partners LLC	4	13,406,232	13,406,232	3,990,294	29.76%	964,053
Hunt Marcellus Operating Company	2	11,287,920	11,287,920	797,076	7.06%	524,902
Jay Bee Oil and Gas Inc	1	5,180,168	4,788,000	210,000	4.39%	210,000
Mark Adams Company	2	0	0	0	#Div/0!	0
Range Resources Appalachia LLC	3	37,983,456	38,551,212	2,110,686	5.48%	2,110,686
TRANS ENERGY INC.	3	18,101,454	18,101,454	1,719,102	9.50%	1,718,652
Triana Energy LLC	1	7,666,134	3,858,134	424,242	11.00%	479,514
WV Department of Environmental Protection	1	6,000,000	5,000,000	400,000	8.00%	400,000
XTO Energy Inc	6	25,335,399	25,213,524	1,764,462	7.00%	1,570,506

Statewide Totals:	ActiveWell Sites*	Total Withdrawn: (gal)	Total Injected: (gal)	Total Recovered: (gal)	Percent Recovered:	Total Disposed: (gal)
	64	391,668,922	432,747,576	30,421,663	7.03%	26,207,905

* Active well sites may contain more than one individual well; contact the DEP's Water Use Section for any questions regarding individual wells or the data contained herein (304) 926-0499 ext. 1271

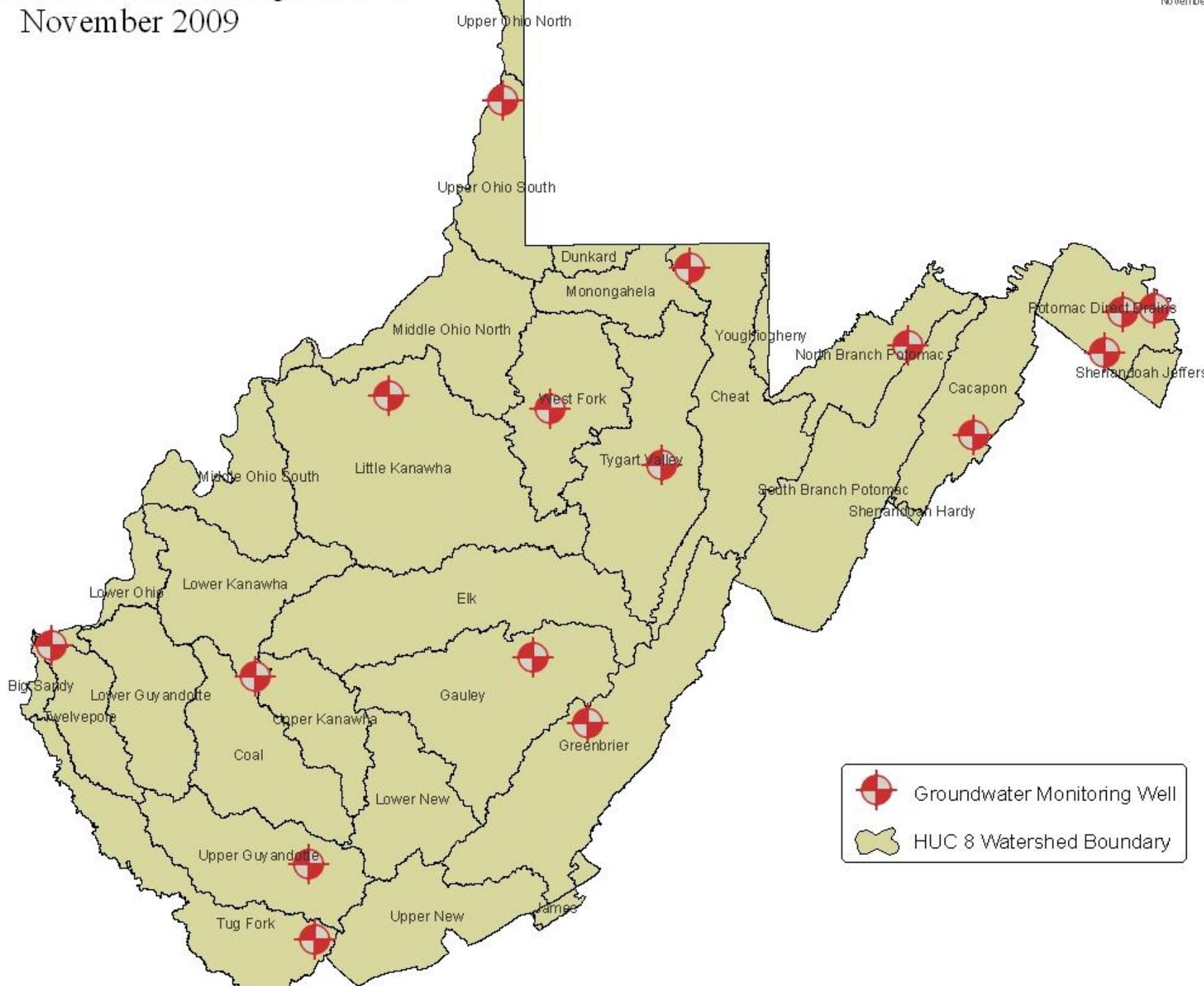
Marcellus Shale Water Demand

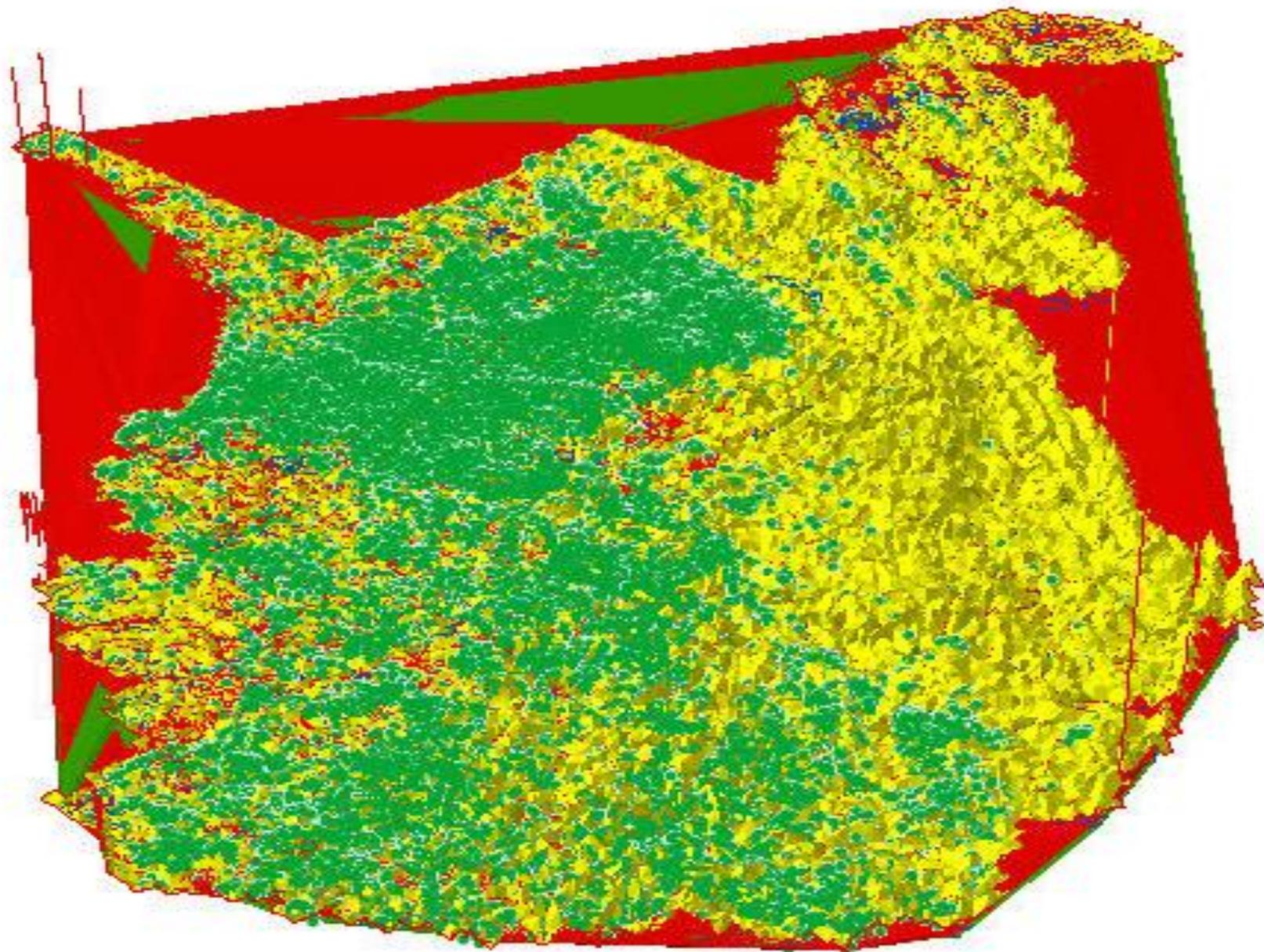


	2009	2010	2011 (to date)
Reported wells	4	103	80
Total reported vol.	57,000,000 gal	567,000,000 gal	391,668,922 gal
Volume per well	14,200,000 gal	5,500,000 gal	4,895,861 gal
Est. wells drilled	--	86	181
Est. water use	--	567,000,000 gal	905,000,000 gal

Water Withdrawal Tool

- In need of another Upgrade
 - Biological in-stream flow project (inconclusive)
 - Lessons learned during preparation to review Marcellus Water Management Plans
 - USGS small stream project





Mine Pool Atlas



Water Management Plans In Accordance With 35CSR8



west virginia department of environmental protection

2010/07/06

Water Management Plans

- ✓ Location
- ✓ Volume
- ✓ Months
- ✓ Disposal
- ✓ Additives

05/31/2011

Goals

- **Easy for companies to submit plans**
- **Searchable, transparent and consistent**
- **Easy for enforcement**
- **Minimize truck traffic while protecting our waters**

Underlying Theme

- **At this location we believe there will be this much available water. At x pump rate, you can have Y water, and protect AQL.**



west virginia department of environmental protection
 601 57th Street SE
 Charleston, WV 25304

**WATER MANAGEMENT PLAN/
 WATER ADDENDUM**
For Horizontal Oil and Gas Well Permits
 Office of Oil and Gas
 Phone: (304) 926-0499

DEP Office Use only	
Date Received by Oil & Gas:	
Administratively Complete – Oil & Gas: <input type="checkbox"/> Yes <input type="checkbox"/> No:	
Date Received by Water Use:	
Complete – Water Use: <input type="checkbox"/> Yes <input type="checkbox"/> No	

Section I - Operator Information

API: 47 - _____ **-** _____ Modification?
County Permit

Operator Name:	
Operator ID:	*Registered in the Frac Water Reporting Website? Yes <input type="checkbox"/> No <input type="checkbox"/>
Mailing Address:	Contact Name/Title (Water Resources Manager):
Contact Phone:	Contact Email:

*If no, the operator will be required to register with the WVDEP Water Use Section, contact dep.water.us@wv.gov

Section II - Well Overview

Operator's Well Number:			
Anticipated Frac Date:	Location (decimal degrees, NAD 83)		
	Latitude:	Longitude:	County:

Section III – Source Water Overview (check all that apply)

Streams/Rivers <input type="checkbox"/>	Lakes/Reservoirs <input type="checkbox"/>	Ground Water <input type="checkbox"/>	Purchased Water (PSD) <input type="checkbox"/>
Purchased Water (Private) <input type="checkbox"/>	Recycled Frac Water <input type="checkbox"/>	Multi-Site Impoundment <input type="checkbox"/>	
Other (describe):			
Total anticipated water volume to be used (gal):			

Water Management Plan Data-Entry Interface

API Number

Well/Operator Information

API_Number
Well Name:
Operator_ID
Operator ID (OG):
Well Latitude:
Well Longitude:
County
Frac Date:
Total water (gal):

Contact Information

Contact Name
Contact Phone
Contact Email
Contact Address 1
Contact Address 2
Contact City
Contact State
Contact ZipCode

Administrative Detail

Date Received (OG)
Date Received (WUS)
Date of Completion

Water Source Information

API_Number
Source Name:
Source Type:
Source Lat:
Source Long:
County
HUC-8 Watershed:

Owner Permission Obtained

Owner_name
Owner_address1
Owner_address2
Owner_City
Owner_State
Owner_Zip
Owner_Phone

Activity Detail

Start Date:
End Date:
Pump rate (gpm):
Total volume (gal)
Active

Surface Water Source Additional Information

Basin Area (sq. mi.)
Stream final code:
 Endangered_Species? Mussel Stream?
 Trout Stream? Tier 3?
 Gauged Stream?
 Regulated Stream?

 Proximate PSD?

If using pump trucks

Number of pumping trucks:
Pump rate of trucks:
Max. simultaneous trucks at site:

Reference Gauge Information

Reference Gauge
Known Demand on Stream(cfs) [from GIS]:
Required Gauge Reading (cfs) [from Water Profile]:
Req.Passby flow at location (cfs) [from Water Profile]

WMP_Promising?

Purchased Water Source Additional Information

Supplier type:
Max. Daily Purchase (gal):
 Supplier is registered LQU?

Ground Water Source Additional Information

Permit Number:
 New Well? Drill date
Aquifer (if known):

Reservoir Water Source Additional Information

Minimum release (cfs):

Reused Frac Water Source Additional Information

Source API:

Multi-site impoundments

MSI Name:
MSI_Owner
 MSI is registered LQU? Permanent Withdrawal?
MSI Latitude:
MSI Long:

Record: 1 of 1

- Data entry interface:
- Well Information
 - Water Source Information



Water Management Plan Data-Entry Interface

API Number

Well/Operator Information

API_Number
 Well Name:
 Operator_ID
 Operator ID (OG):
 Well Latitude:
 Well Longitude:
 County
 Frac Date:
 Total water (gal):

Contact Information

Contact Name
 Contact Phone
 Contact Email
 Contact Address 1
 Contact Address 2
 Contact City
 Contact State
 Contact ZipCode

Administrative Detail

Date Received (OG)
 Date Received (WUS)
 Date of Completion

Water Source Information

API_Number
 Source Name:
 Source Type:
 Source Lat:
 Source Long:
 County
 HUC-8 Watershed:

Owner Permission Obtained

Owner_name
 Owner_address1
 Owner_address2
 Owner_City
 Owner_State
 Owner_Zip
 Owner_Phone

Activity Detail

Start Date:
 End Date:
 Pump rate (gpm):
 Total volume (gal)
 Active Yes

Surface Water Source Additional Information

Basin Area (sq. mi.)
 Stream final code:
 Endangered_Species? Mussel Stream?
 Trout Stream? Tier 3?
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 Regulated Stream?

 Proximate PSD?

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Number of pumping trucks:
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Reference Gauge
 Known Demand on Stream(cfs) [from GIS]:
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WMP_Promising?

Purchased Water Source Additional Information

Supplier type:
 Max. Daily Purchase (gal):
 Supplier is registered LQU?

Ground Water Source Additional Information

Permit Number:
 New Well? Drill date
 Aquifer (if known):

Reservoir Water Source Additional Information

Minimum release (cfs):

Reused Frac Water Source Additional Information

Source API:

Multi-site impoundments

MSI Name:
 MSI_Owner
 MSI is registered LQU? Permanent Withdrawal?
 MSI Latitude:
 MSI Long:

Record: 1 of 1

Record: 1 of 1

Report Generator



Water Management Plan - Surface Water Availability Profile



API Number:

Operator:

Important:

For each proposed surface water intake location identified in your water management plan (and summarized here in), DEP has made an evaluation concerning water availability over the specified date range. DEP's assessment is based on the following considerations:

- Statistical analysis of historical USGS stream gauge data (transferred to un-gauged locations as necessary),
- Identification of sensitive aquatic life (endangered species, mussels, etc.),
- Quantification of known existing demands on the water supply (Large Quantity Users),
- Minimum flows required by the Army Corps of Engineers, and
- Designated stream uses

Based on these factors, DEP has provided, for each intake location, a reference gauge location and discharge flow reading which must be surpassed prior to withdrawals. Additionally, DEP has established a minimum passby flow at the withdrawal location which must also be surpassed prior to withdrawals. These thresholds are considered terms of the permit and are enforceable as such.

Note that the determinations made here in are based on the best available data, but it is impossible to predict water availability in the future. While the DEP has carefully established these minimum withdrawal thresholds, it remains the operator's responsibility to protect aquatic life at all times.

Intake Summary

Intake Point	Start Date	End Date	Volume (gal)	Ref. Gauge ID:	Ref. Gauge Name
Tygart River #1	12/1/2011	1/31/2012	1,000,000	3057000	TYGART VALLEY RIVER AT COLFAX, WV
Max. Pump rate (gpm):	954	Min. Gauge Reading (cfs):	628.26	Min. Passby (cfs):	592.8
Intake Point	Start Date	End Date	Volume (gal)	Ref. Gauge ID:	Ref. Gauge Name
West Fork #1	12/1/2011	1/31/2012	1,000,000	3061000	WEST FORK RIVER AT ENTERPRISE, WV
Max. Pump rate (gpm):	954	Min. Gauge Reading (cfs):	254.34	Min. Passby (cfs):	67.7
Intake Point	Start Date	End Date	Volume (gal)	Ref. Gauge ID:	Ref. Gauge Name
Middle Island Creek #1	12/1/2011	1/31/2012	1,000,000	3114500	MIDDLE ISLAND CREEK AT LITTLE, WV
Max. Pump rate (gpm):	954	Min. Gauge Reading (cfs):	51.83	Min. Passby (cfs):	12.48

Cover letter to the applicant

- Limitations of the Water Availability Profile
- Summary of intake flow requirements
 - Max. Pump rate
 - Min. Gauge reading
 - Min. Pass by flow at location

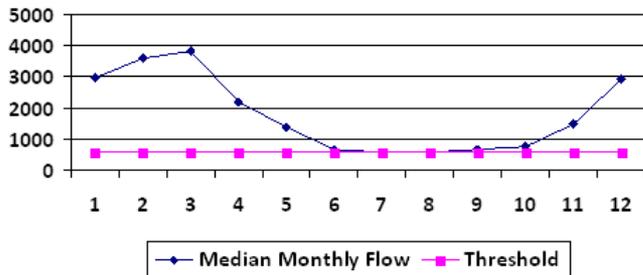
Intake Detail

API Number: Operator:

Source ID: Source Name: Source Latitude:
HUC_8_Code: County: Source Longitude:
Drainage Area (sq. mi.): Anticipated withdrawal start date:
Anticipated withdrawal end date:
Total Volume from Source (gal):
Max. Pump rate (gpm):
 Endangered Species? Mussel Stream?
 Trout Stream? Tier_3?
 Regulated Stream?
 Proximate PSD?
 Gauged Stream?
Reference Gauge:
Drainage Area (sq. mi.): Gauge Threshold (cfs):

Month	Median monthly flow (cfs)	Threshold	Estimated Available water (cfs)
<input type="text"/>	<input type="text"/>	#Type!	#Type!

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs) #Type!
Demand on Stream (cfs):
Pump rate (cfs):
Headwater Safety (cfs):
Ungauged Stream Safety (cfs):
Final Threshold (cfs) #Type!
Min. Gauge Reading (cfs) #Type!
Passby at Location: #Type!

General intake information

- Flags for sensitive aquatic life
- Location details
 - Basin area
- Reference Gauge Information
 - Basin area
 - Statistically-based threshold (point where withdraws must stop)

Water Availability Information

- Estimated median monthly flow
- Known water demands
 - LQU
 - Marcellus
- Safety factors (where appropriate)

Minimum required flow @ Gauge
Minimum pass-by flow @ location

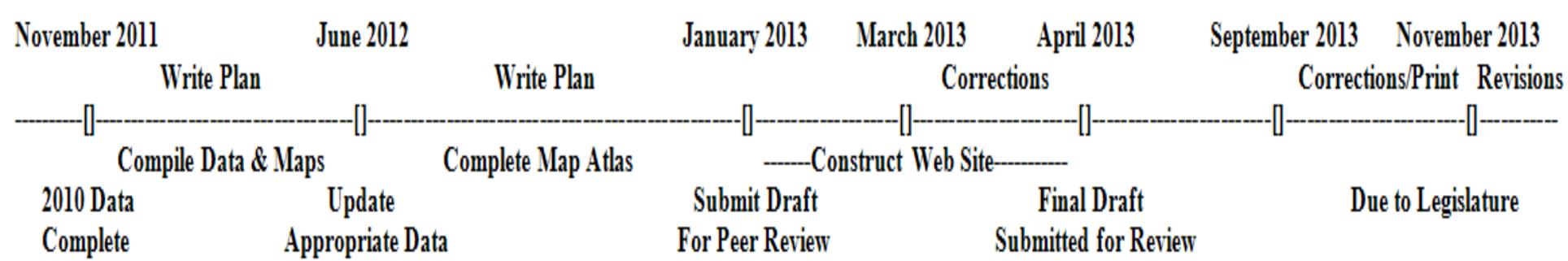
Talk about companies funding gages



Growing Pains

- Last November Update We Were Fully Staffed with a Program Manager, Geologist, GIS & Database
- Dec. 2010 – Database Tech **Retired (-1)**
- Dec. 2010 – Hired new Database Tech (Full)
- April 2011 – GIS Tech **Resigned (-1)**
- May 2011 – Program Manager **Retired (-2)**
- June 2011 – Hired new GIS Tech **(-1)**
- Sept. 2011 – Program Manager replaced from with in the section **(-1)**
- Today we are still down 1 FTE and our workload has increased significantly due to the Executive Order.

Water Management Plan Time Line



Questions?



Thank you.

