

Dunkard Creek Watershed Water Quality / Golden Algae Update

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Watershed Assessment Branch
August 25, 2011



Watershed Assessment Section

WVDEP

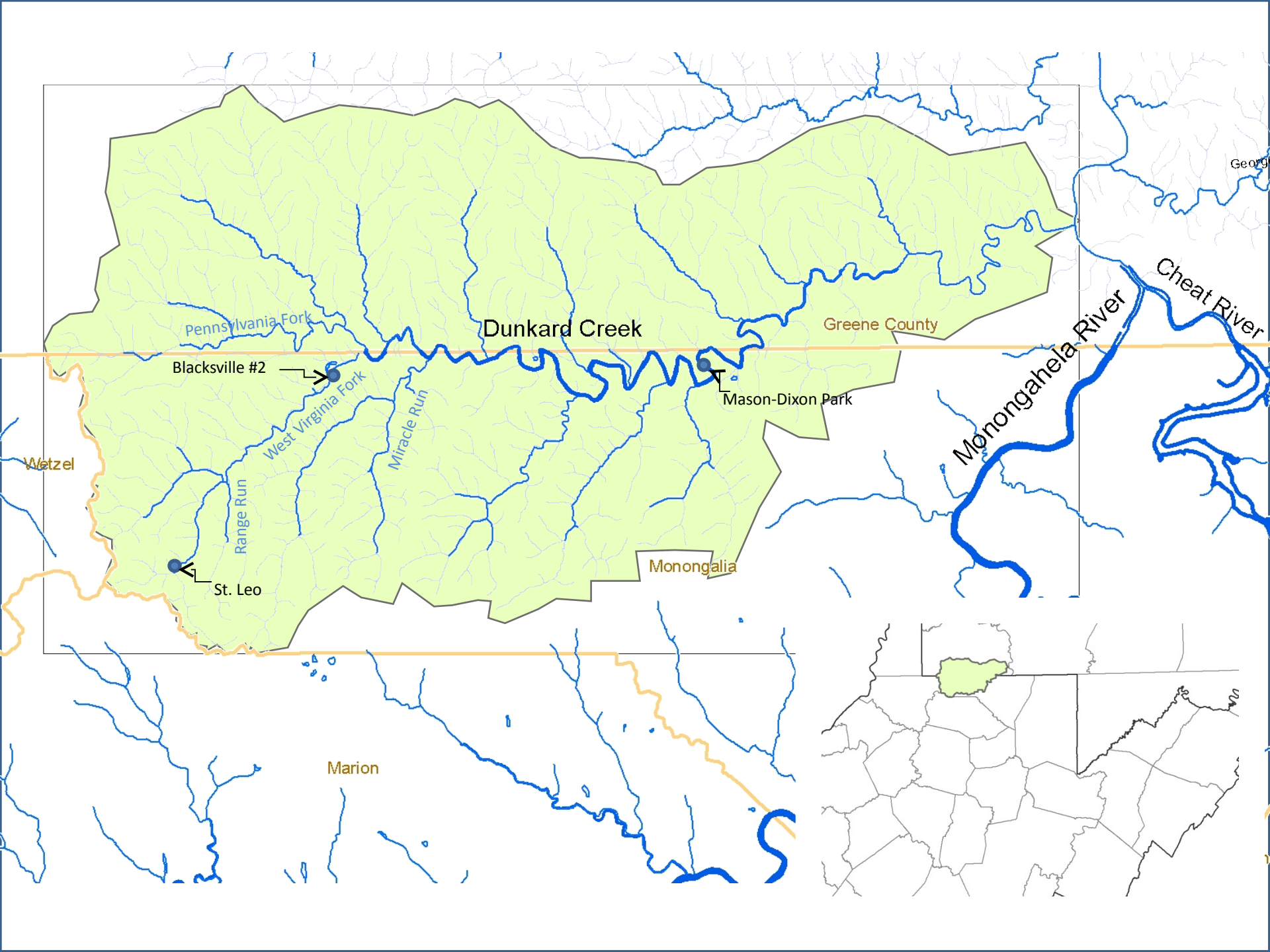
Division of Water and Waste Management Watershed Assessment Section

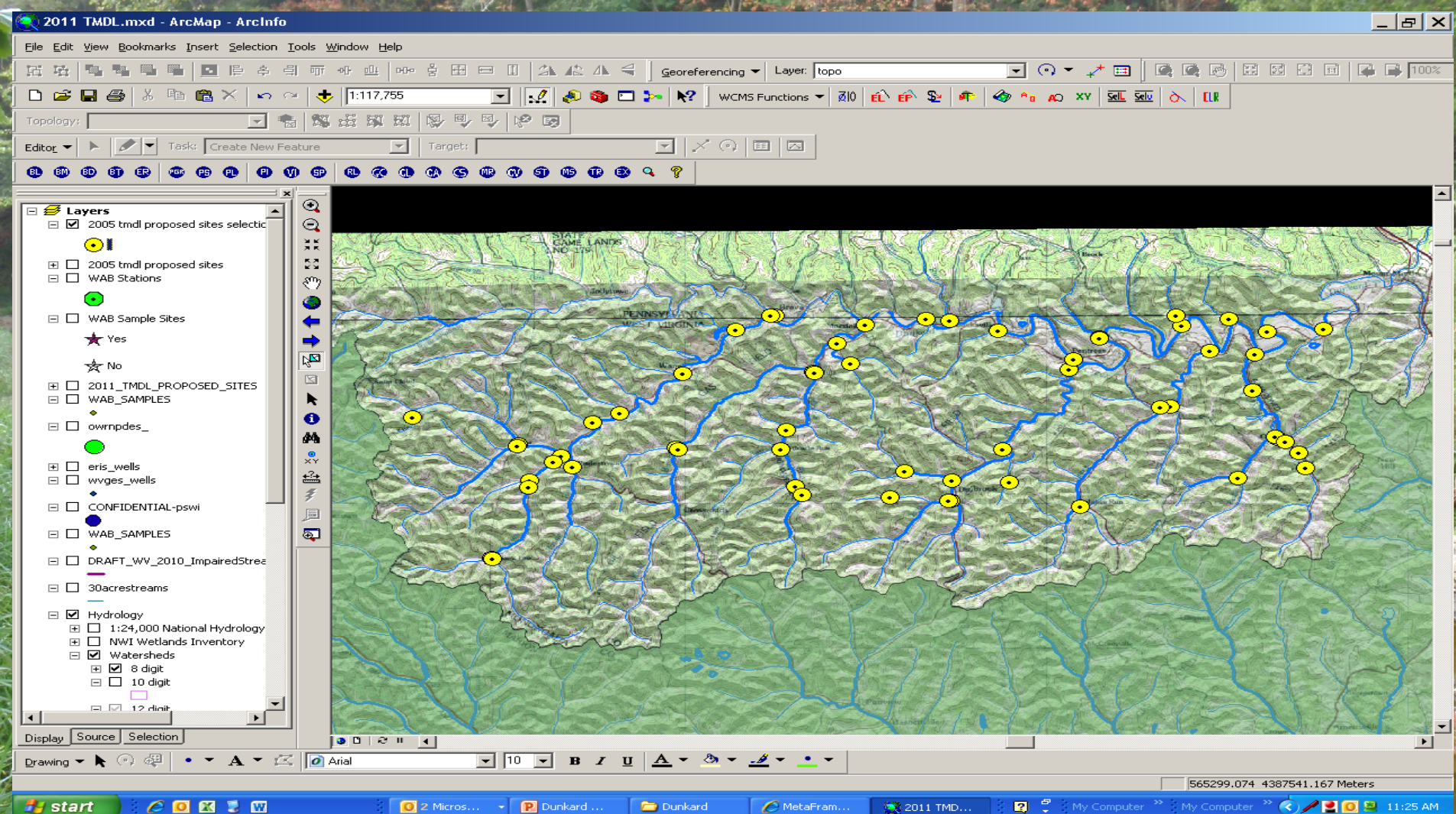
- Pre-TMDL Development Monitoring
- Ambient Network Monitoring – Mason Dixon Park
- OSM / WVDEP “Trend Stations”
- Deployables
- Benthic Macroinvertebrate Monitoring
- Golden Algae Monitoring



Watershed Assessment Section



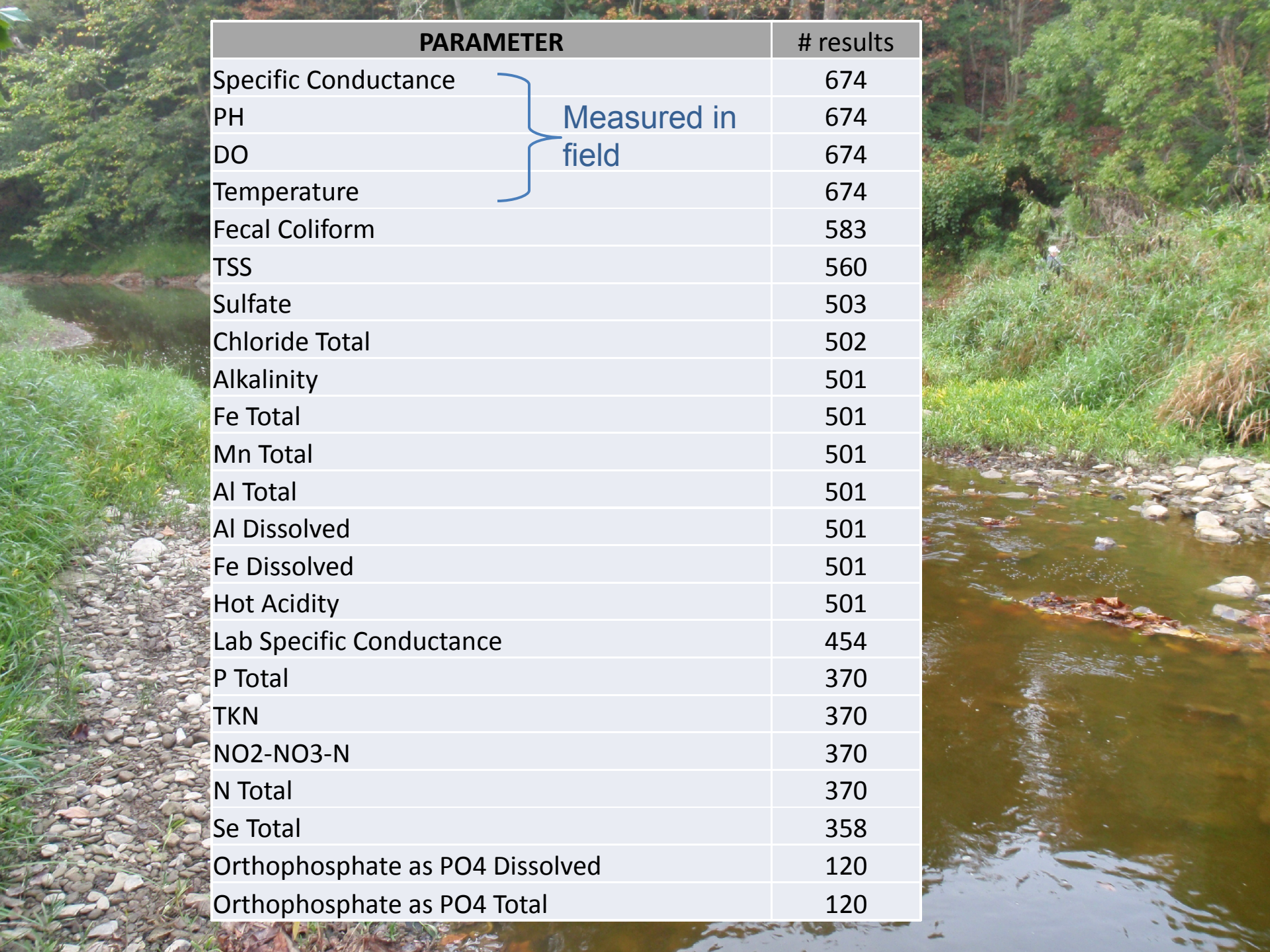




60 Sites sampled monthly for:

PARAMETER	# results
Specific Conductance	674
PH	674
DO	674
Temperature	674
Fecal Coliform	583
TSS	560
Sulfate	503
Chloride Total	502
Alkalinity	501
Fe Total	501
Mn Total	501
Al Total	501
Al Dissolved	501
Fe Dissolved	501
Hot Acidity	501
Lab Specific Conductance	454
P Total	370
TKN	370
NO2-NO3-N	370
N Total	370
Se Total	358
Orthophosphate as PO4 Dissolved	120
Orthophosphate as PO4 Total	120

Measured in field



Water Quality data from Ambient Site at Mason Dixon Park



ty Data - since 2008

10

8

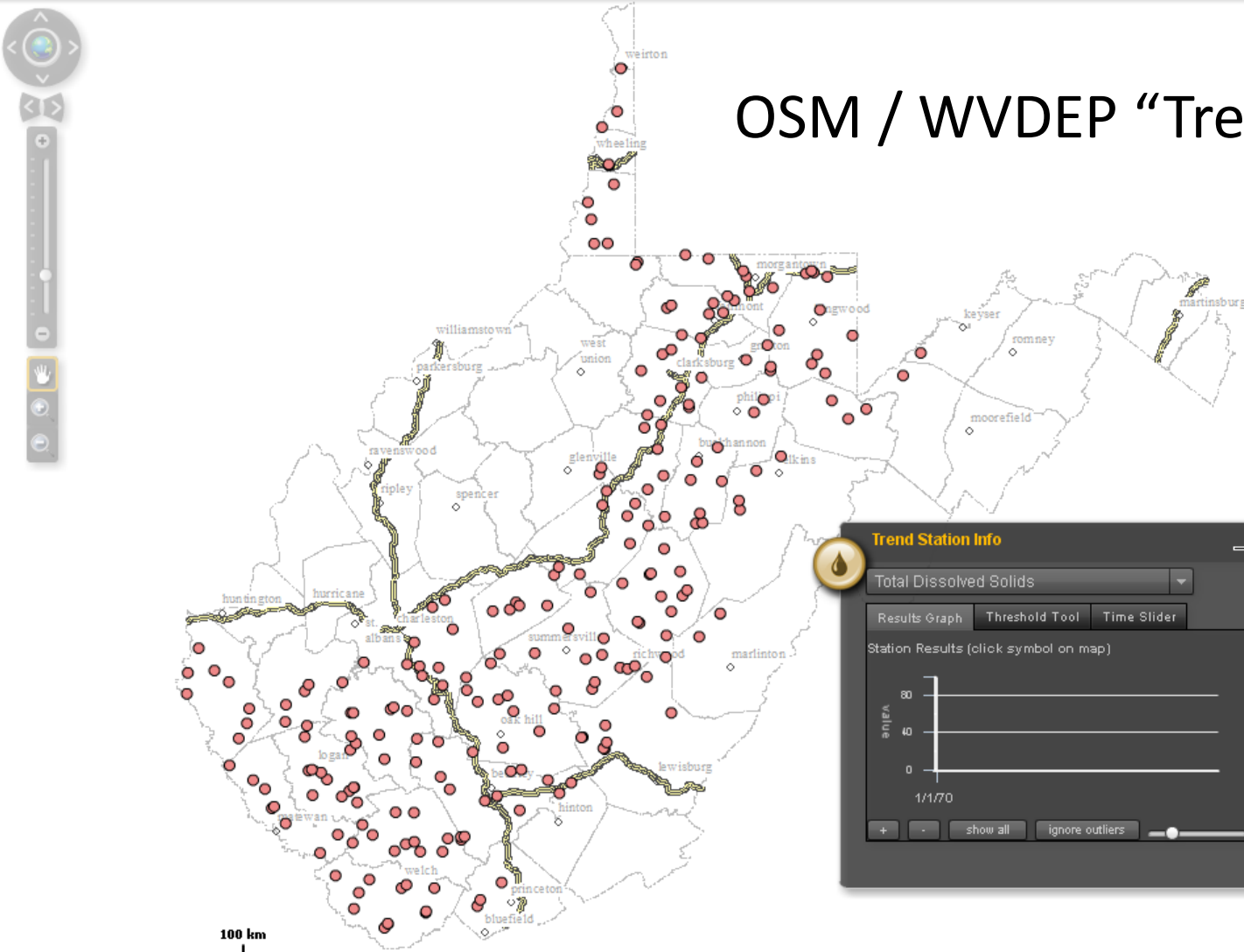
6

4

2

0

OSM / WVDEP "Trend Stations"



Trend Station Info

Total Dissolved Solids

Results Graph | Threshold Tool | Time Slider

Station Results (click symbol on map)

value

80

40

0

1/1/70

+ - show all ignore outliers

-77.48208 38.74794 NAD83
805,741E 4,294,685N UTM17



Trend Station Info

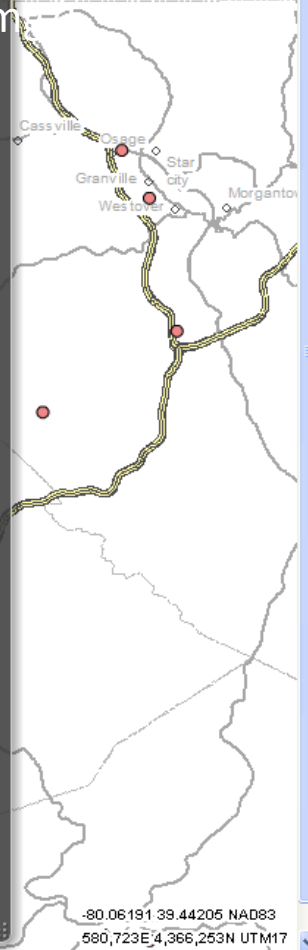
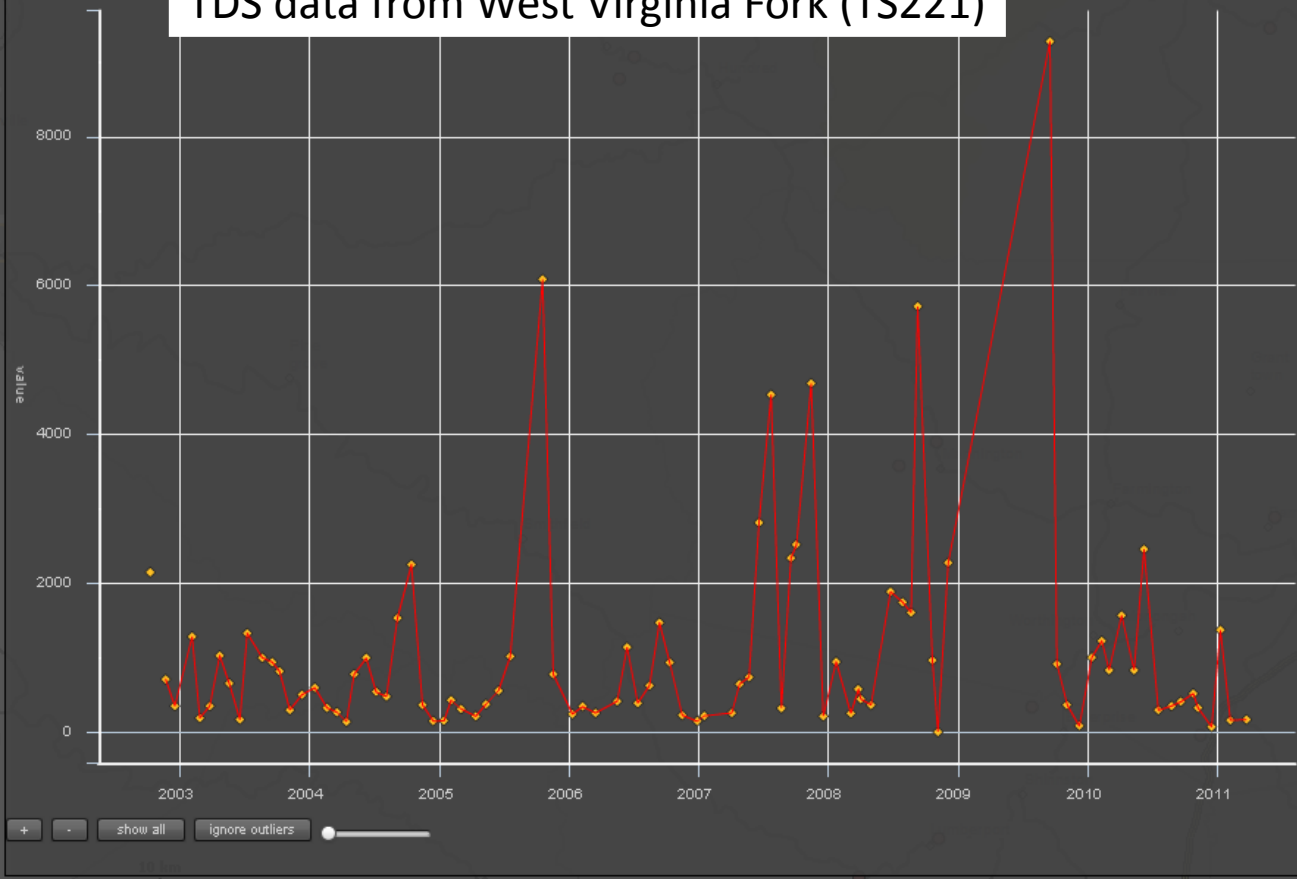
Total Dissolved Solids

Results Graph Threshold Tool Time Slider

Total Dissolved Solids

TDS data from West Virginia Fork (TS221)

9/17/20
9282 m



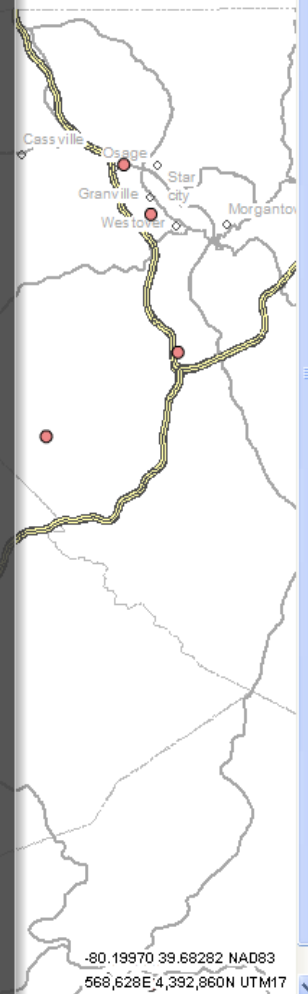
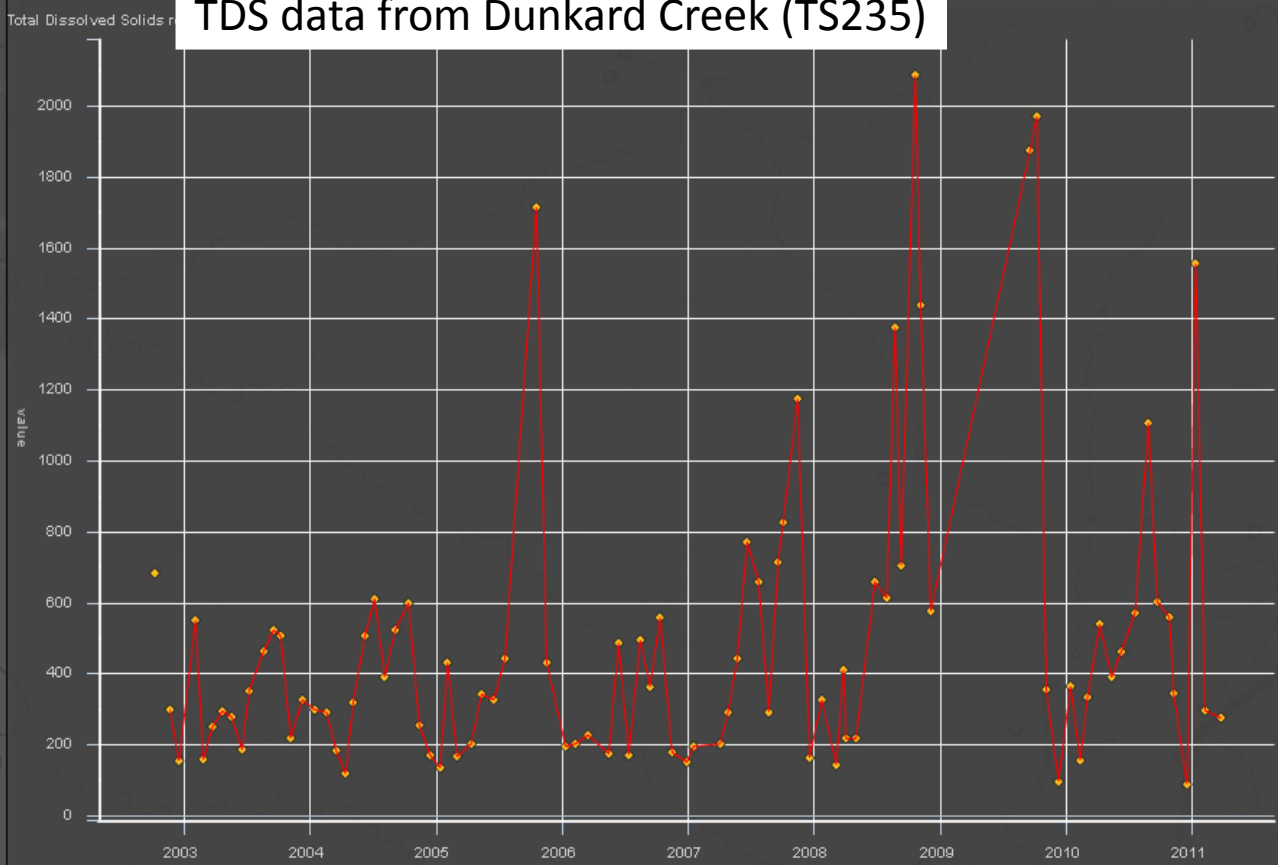


Trend Station Info

Total Dissolved Solids

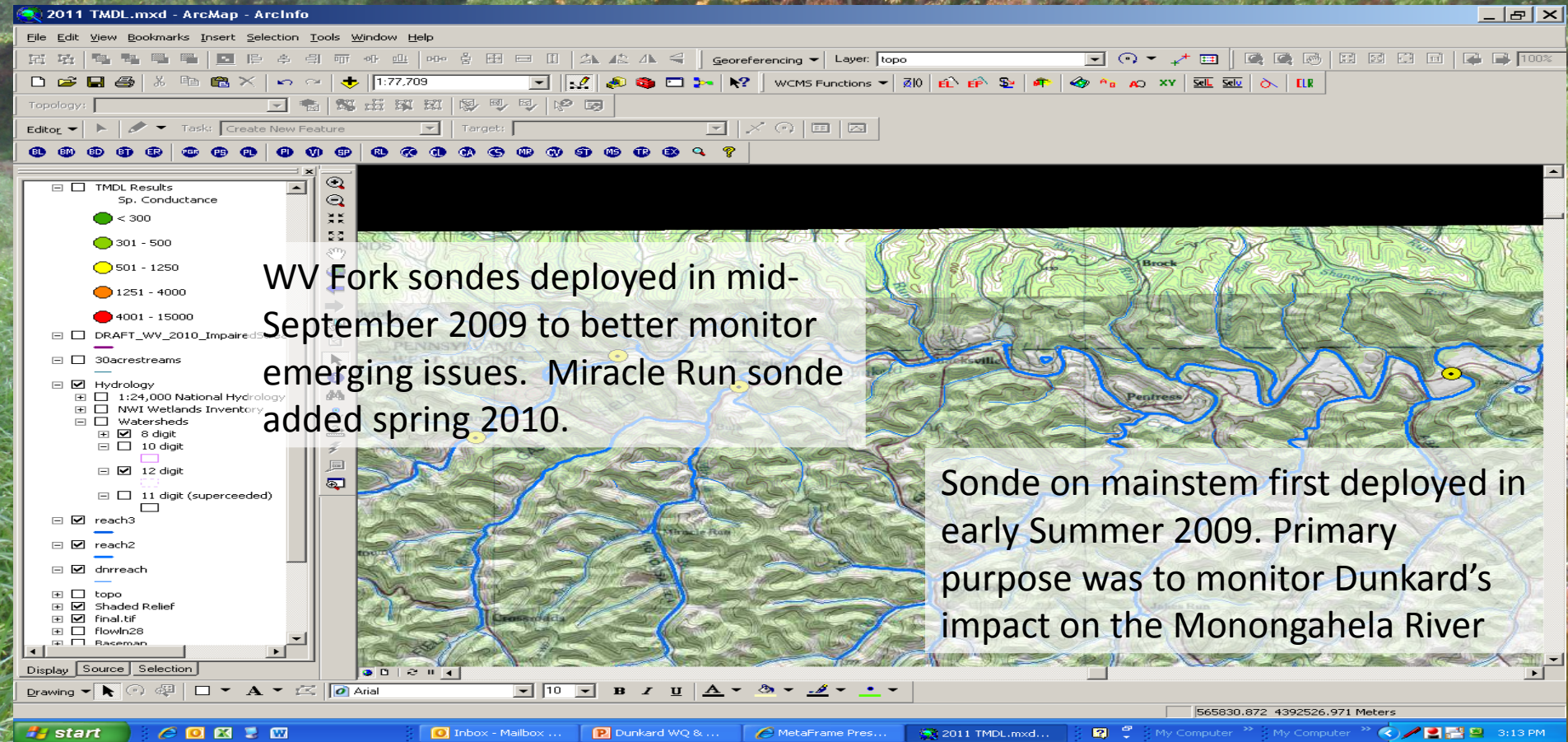
Results Graph

TDS data from Dunkard Creek (TS235)



-80.19970 39.68282 NAD83
568,628E 4,392,860N UTM17

Continuous Water Quality data from deployed sondes



Sp. Conductance (uS/cm)

Temp.

Dunkard Creek at Mason-Dixon Park

4

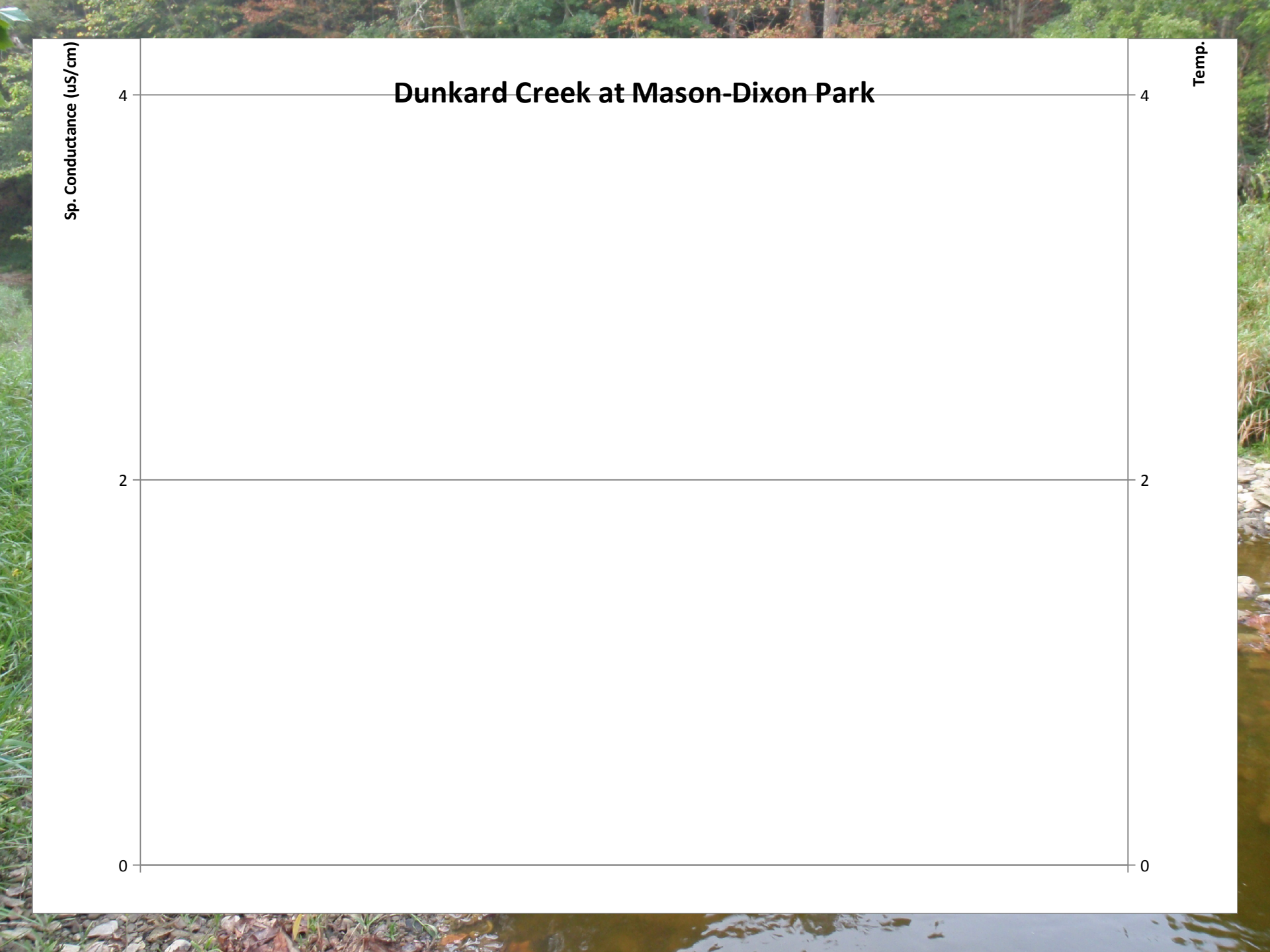
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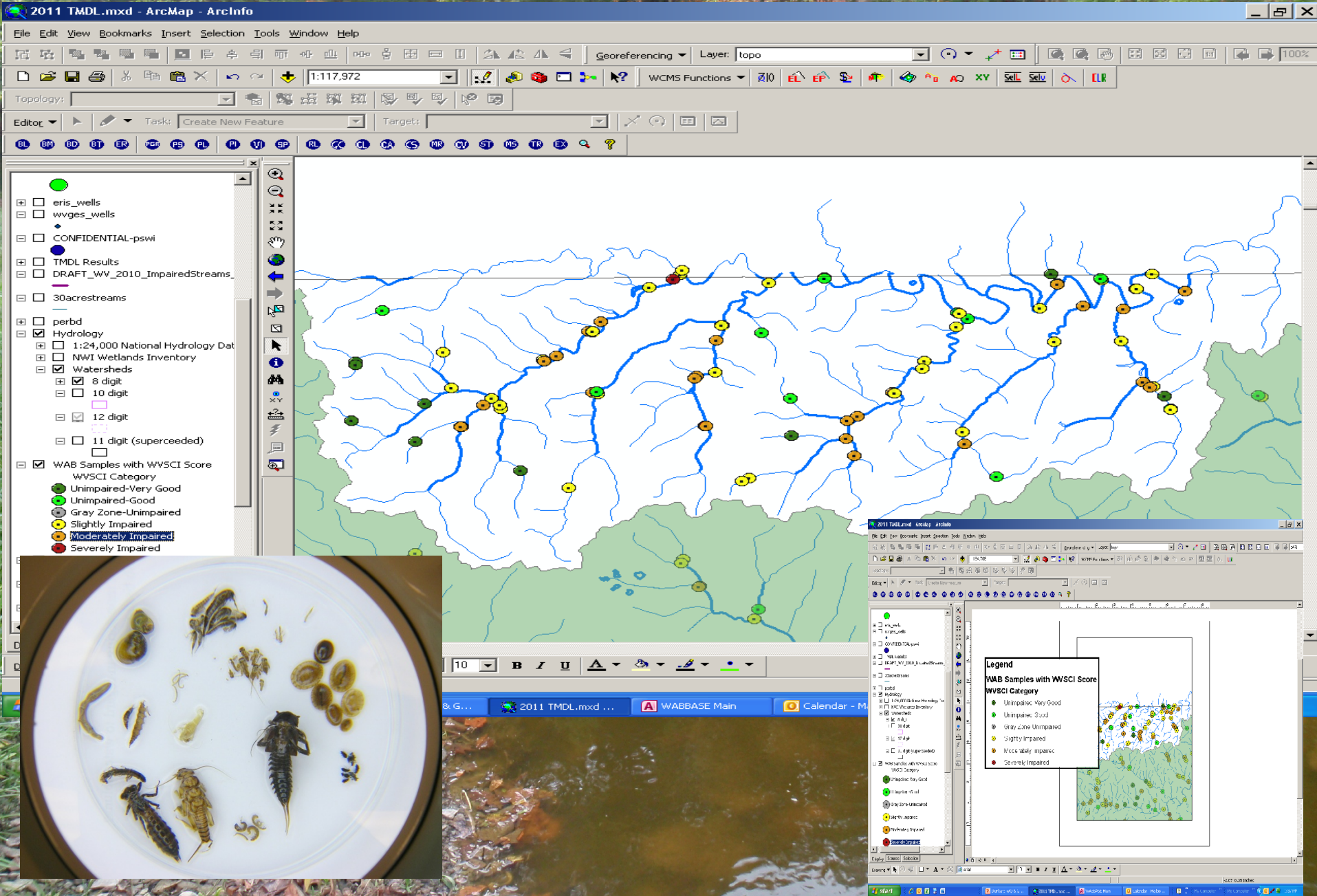
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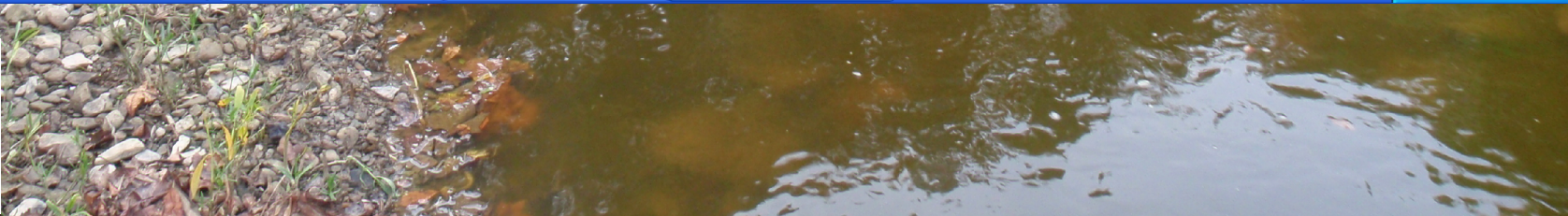
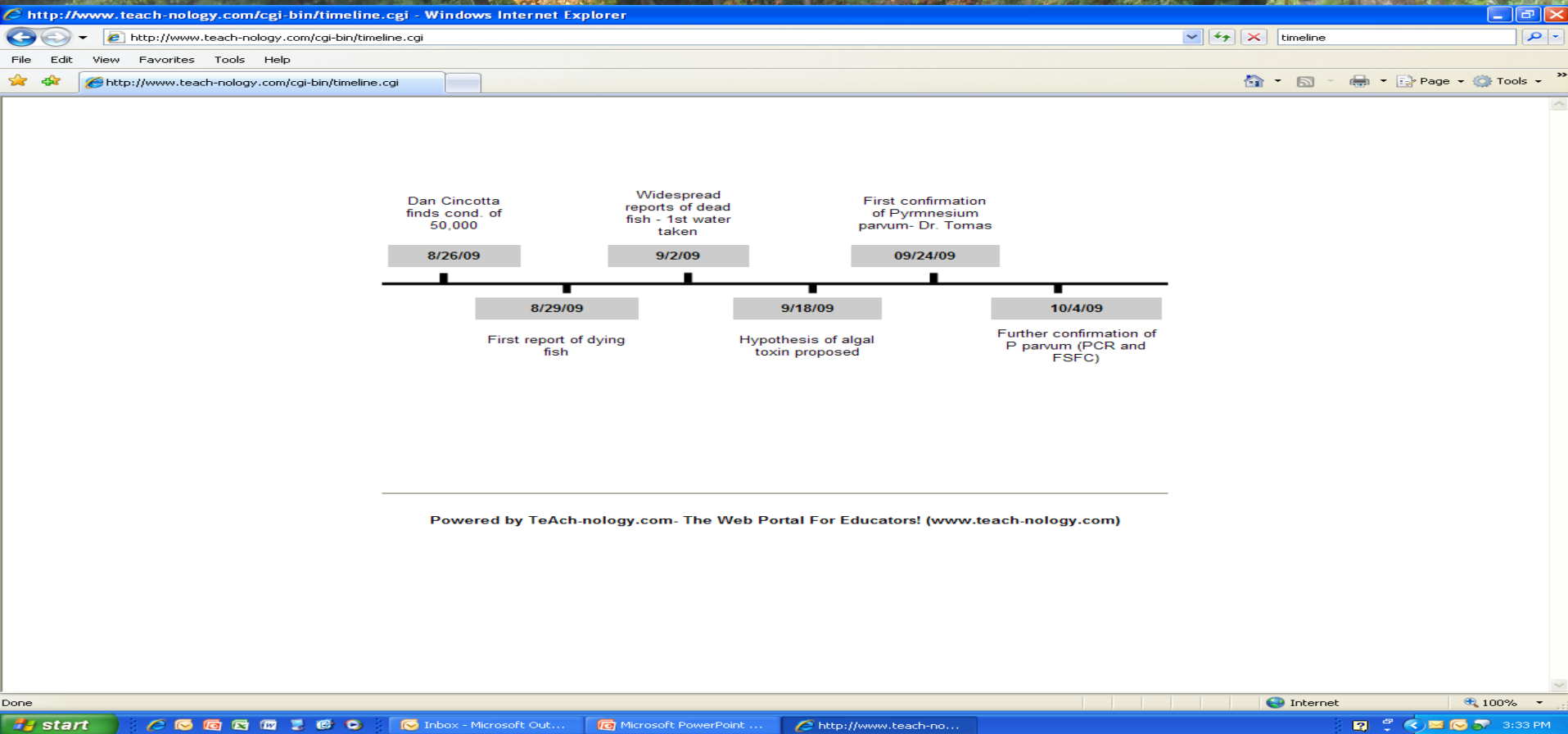
Dunkard Creek Benthic Macroinvertebrate Samples



Long Term Monitoring Sites - LTMS

STREAM_NAME	ANCODE	MILE_POINT	SAMPLE_DATE	WVSCI	PCT_2_DOMINANT_SCORE_WVSCI	PCT_CHIRONOMIDAE_SCORE_WVSCI	PCT_EPT_SCORE_WVSCI	HBI_SCORE_WVSCI	EPT_TAXA_SCORE_WVSCI	TOTAL_TAXA_SCORE_WVSCI
Dunkard Creek	WVM-1	20.6	13-Jul-05	59.5	48	38	26	65	85	95
Dunkard Creek	WVM-1	20.6	28-Aug-07	53.5	51	92	19	67	38	55
Dunkard Creek	WVM-1	20.6	13-Aug-08	73.3	98	84	43	72	69	73
Dunkard Creek	WVM-1	20.6	11-Aug-09	55.3	60	82	17	70	38	64
Dunkard Creek	WVM-1	20.6	22-Sep-09	54.1	32	100	46	74	23	50
Dunkard Creek	WVM-1	20.6	01-Sep-10	52.7	42	60	48	66	46	55
South Fork/West Virginia Fork/Dunkard Creek	WVM-1-F-7	1	29-Aug-07	28	29	28	6	56	8	41
South Fork/West Virginia Fork/Dunkard Creek	WVM-1-F-7	1	12-Aug-09	40.9	46	51	25	58	15	50

Timeline of Dunkard Creek Aquatic Life Kill Investigation



Golden Algae, *Prymnesium parvum*

- Normally associated w/ estuarine or marine water
- Also found in inland waters - high salinity/mineral content (Texas / Oklahoma border)
- Nutrients, salinity, and hydrology are key components
- Produces Ichthyotoxins
- Kills by making gills impermeable



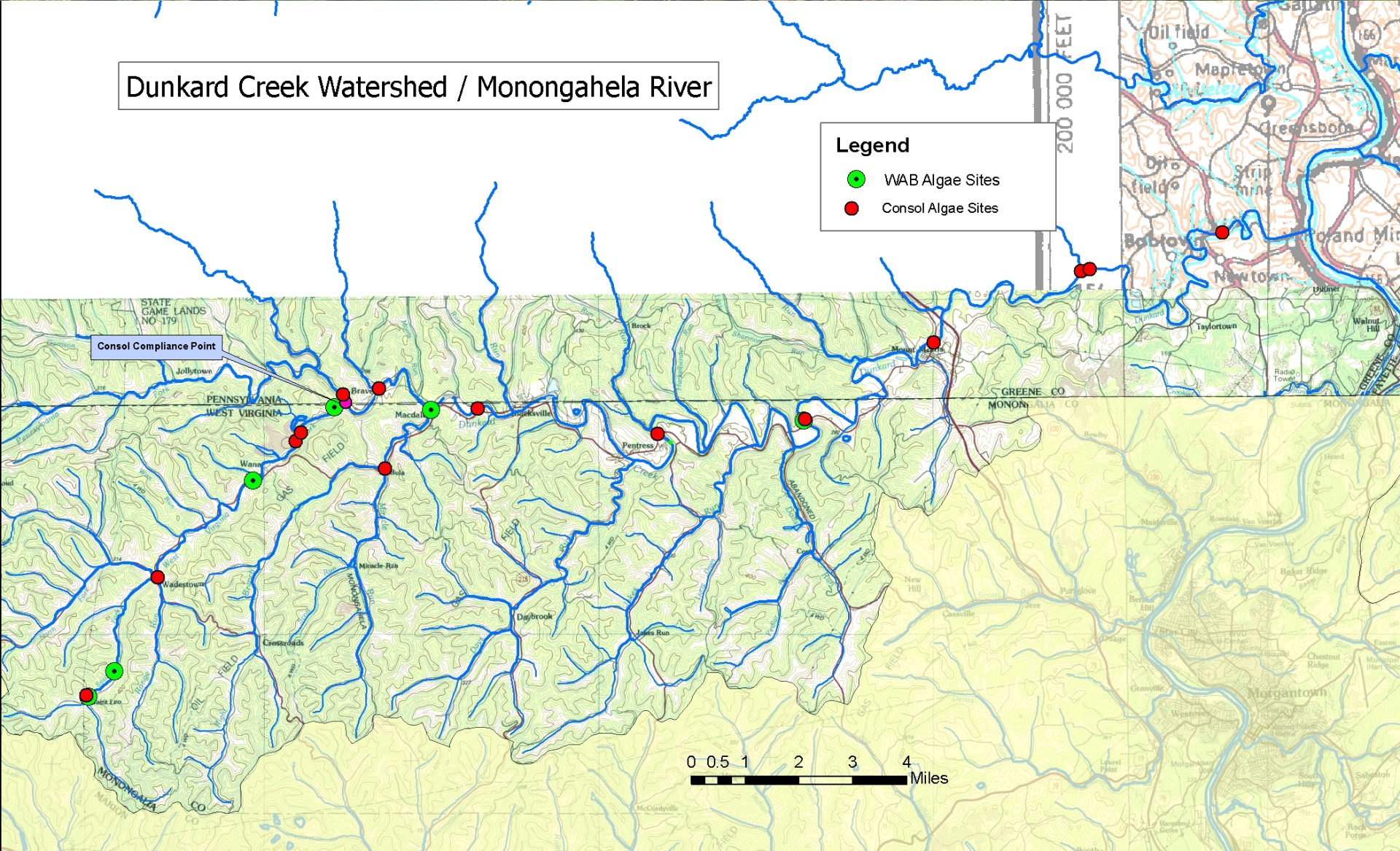
Golden Algae Monitoring

- **Consol**
 - Weekly monitoring - Dunkard Creek, Paw Paw, & Buffalo (less frequent)
 - Sept 2009 – present
- **WVDEP**
 - Algae monitoring – Dunkard and beyond

Dunkard Creek Watershed / Monongahela River

Legend

- WAB Algae Sites
- Consol Algae Sites



Consol Compliance Point

0 0.5 1 2 3 4 Miles

200 000 FEET

- Watershed Map
- Water Quality Monitoring
- Benthic and Fish Information
- Water Quality and Impaired Streams
- Total Maximum Daily Loads (TMDL)
- Reports
- Special Studies
- Nonpoint Source Program
- Water Quality Standards

DEP Offices | News | Outlook Web Access | Text size A A A
 Home > Water and Waste Management > Watershed Management > Water Quality Monitoring > Dunkard Creek 2009 Fish Kill Information

Dunkard Creek 2009 Fish Kill Information

The West Virginia Department of Environmental Protection is working with the West Virginia Division of Natural Resources, the Pennsylvania Department of Environmental Protection and the Environmental Protection Agency in the investigation of the Dunkard Creek fish kill.

The West Virginia DEP and other investigators have been assembling available scientific information on golden algae and the toxins it produces. Scientific literature states both the golden algae and the toxins it produces are influenced by environmental factors including the water's pH, temperature, salinity and nutrients.

The tables below provide information, data, and links regarding golden algae and Dunkard Creek.

Sampling Information for Pymnesium Parvum (Golden Algae) - PDF files - Dunkard Creek
 (Data is provided by Consolidated Coal Co.)

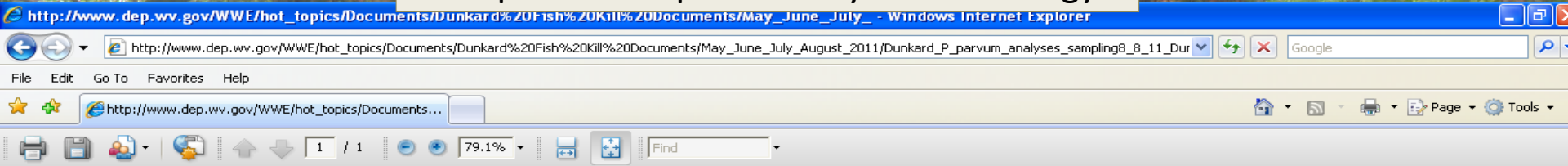
		August 18, 2011	August 15, 2011
August 11, 2011	August 8, 2011	August 11, 2011	August 4, 2011
August 1, 2011	July 28, 2011	July 25, 2011	July 21, 2011
July 18, 2011			
June 30, 2011			
June 1, 2011	May 23, 2011	May 16, 2011	May 11, 2011
May 3, 2011	April 25, 2011	April 18, 2011	April 11, 2011
March 7, 2011	February 21, 2011	January 24, 2011	January 10, 2011
January 4, 2011	December 27, 2010	December 13, 2010	December 6, 2010
November 29, 2010	November 22, 2010	November 15, 2010	November 8, 2010
November 2, 2010	November 1, 2010	October 25, 2010	October 11, 2010
October 5, 2010	September 27, 2010	September 20, 2010	September 13, 2010
	September 7, 2010	September 2, 2010	August 30, 2010
August 19, 2010	August 18, 2010	August 9, 2010	August 3, 2010
July 13, 2010	July 8, 2010	June 22, 2010	June 8, 2010
May 27, 2010	May 19, 2010	May 5, 2010	April 8, 2010

Data provided to WVDEP and others ASAP

Website includes:

- Monitoring results
- Press releases
- Orders
- Links to related information

Example of data provided by Consol Energy.

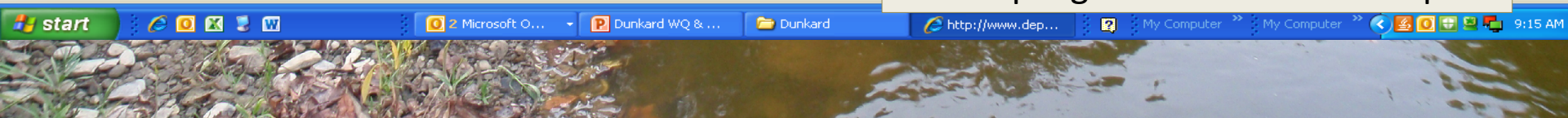


Algae screening samples from WV/PA
Clemson University
Project Number: 0101-09-0408-005
Contact Person: Beth Burdette

Sample Name	Sampling Date	Samples Received	<i>Prymnesium parvum</i> Detected	Estimated Cells/mL*	Comments
Miracle Run @ Bula WV	8/8/11	8/9/11	NO		Sample not received; no flow during sampling
Loveridge Compliance Pt	8/8/11	8/9/11	NO		
DS Beaver Dam Pond	8/8/11	8/9/11	NO		
WV fork @ Wadestown WV	8/8/11	8/9/11	NO		
WV fork US Outlet 003	8/8/11	8/9/11	NO		
WV Fork @ Outlet 003					
BV #2 Compliance Pt.	8/8/11	8/9/11	NO		
PA Fork @ Shamrock PA	8/8/11	8/9/11	NO		
Dunkard @ Brave PA Dam	8/8/11	8/9/11	NO		
Dunkard Behind CBHS	8/8/11	8/9/11	NO		
Dunkard @ Pentress WV	8/8/11	8/9/11	NO		
Dunkard Below Mason-Dixon	8/8/11	8/9/11	NO		
Dunkard @ Mount Morris	8/8/11	8/9/11	NO		
Dunkard US Dana Mining	8/8/11	8/9/11	NO		
Dunkard DS Dana Mining	8/8/11	8/9/11	NO		
Dunkard @ Beal Rd.	8/8/11	8/9/11	NO		

*Estimate based on concentrated samples (50:1)

16 sites in Dunkard Creek Watershed
89 sampling events = ~ 1424 samples



Golden Algae Monitoring - Outside Dunkard Creek Watershed Provided by Consol / data posted on DEP's website

Dunkard Creek 2009 Fish Kill Information - Windows Internet Explorer

http://www.dep.wv.gov/WWE/watershed/wqmonitoring/Pages/DunkardCreekFishKillInformation.aspx

Dunkard Creek 2009 Fish Kill Information

February 23, 2010	February 16, 2010	February 9, 2010	February 2, 2010
January 29, 2010	January 22, 2010	January 15, 2010	January 8, 2010
December 30, 2009	December 28, 2009	December 18, 2009	December 16, 2009
November 12, 2009	November 10, 2009	November 6, 2009	November 3, 2009
October 27, 2009	October 23, 2009	October 20, 2009	October 16, 2009
October 13, 2009	October 6, 2009	September 29, 2009	

Sampling Information for Golden Algae (Prymnesium Parvum) for Paw Paw and Buffalo Creek sampling location -PDF files

	August 10, 2011	July 26, 2011	July 20, 2011
June 22, 2011	June 10, 2011	May 24, 2011	May 10, 2011
May 4, 2011	April 26, 2011	April 19, 2011	April 8, 2011
March 24, 2011	March 8, 2011	February 23, 2011	January 26, 2011
January 11, 2011	December 28, 2010	December 14, 2010	December 7, 2010
November 9, 2010	November 1, 2010	September 28, 2010	September 21, 2010
August 31, 2010	August 24, 2010	August 2, 2010	July 26, 2010
July 12, 2010	July 6, 2010	June 28, 2010	June 24, 2010
June 17 and 18, 2010	June 7, 2010	May 24, 2010	May 17, 2010
May 3, 2010	April 28 and 29, 2010	April 12, 2010	April 5, 2010

DEP Golden Algae (Prymnesium Parvum) samples

		September 2010
August 20, 2010	July 2010	January 2010
December 2009		

Dunkard Creek Fish Kill (2009) Additional Information

ORDERS / PRESS RELEASES / GENERAL INFORMATION

[Link to Consent decree with CONSOL](#)

 [Golden Algae Growth Rate Final Report](#)

start Microsoft O... Dunkard WQ & ... Dunkard Dunkard Creek ... My Computer My Computer 9:16 AM

Example of data provided by Consolidated Coal, Inc.

Algae screening samples from WV/PA
Clemson University
Project Number: 0101-09-0408 (104)
Contact Person: Beth Burdette

Sample Name	Sampling Date	Samples Received	<i>Prynnesium parvum</i> Detected	Estimated Cells/mL*	Comments
Buf 1	8/10/11	8/11/11	NO		
Buf 2	8/10/11	8/11/11	NO		
Buf 3	8/10/11	8/11/11	NO		
Buf 4	8/10/11	8/11/11	NO		
Buf 5	8/10/11	8/11/11	NO		
Paw 1	8/10/11	8/11/11	NO		
Paw 2	8/10/11	8/11/11	NO		
Paw 3	8/10/11	8/11/11	NO		
Paw 4	8/10/11	8/11/11	NO		
Paw 5	8/10/11	8/11/11	NO		

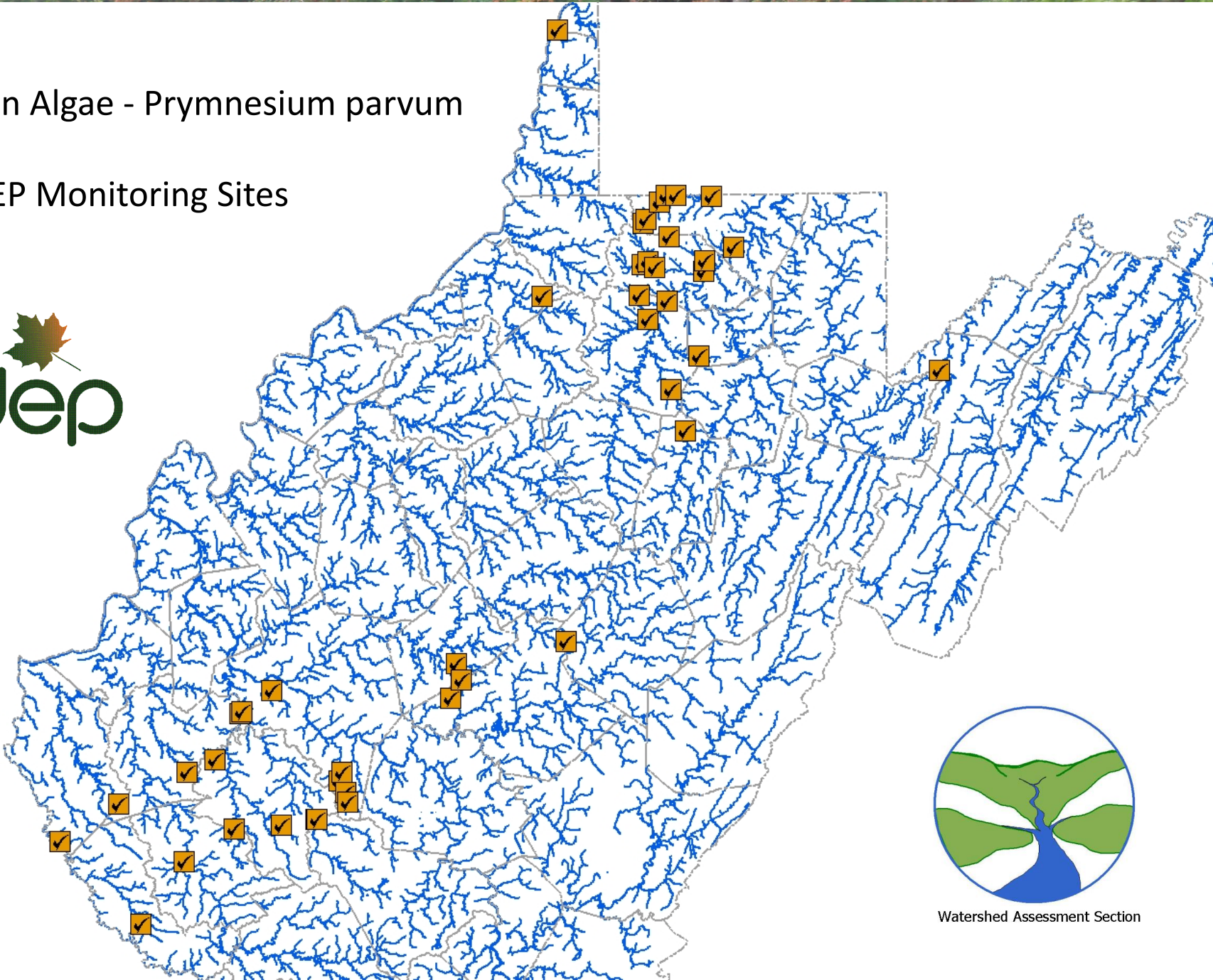
*Estimate based on concentrated samples (50:1)

10 Additional sites outside Dunkard Ck
~40 sampling events = 400 samples

November 12, 2009 – last date where multiple sites had detectable GA
December 30, 2009 – last date with any reported GA from Consol routine monitoring*
Nearly 1500 samples examined since last detection

Golden Algae - *Prymnesium parvum*

WVDEP Monitoring Sites



Watershed Assessment Section

Algae in Other WV waters

- 39 Locations sampled in October 2009
 - Purposefully chose higher Specific Conductance waters
 - Mon Drainage detections in Dunkard, Tenmile, Simpson and Elk Creeks (West Fork)
 - Short Creek – Northern Panhandle
 - Cabin Creek – Near Charleston (137,306 cells/ml) Follow-up sampling completed – several events
- Continued targeted sampling in 2010 and 2011.

Summary

- Monthly WQ data collected at Mason-Dixon Park – ongoing
- Hourly data (temp, pH, and conductivity) from 4 sites ongoing
- Ionic Stress Pre-TMDL Data collection ongoing
 - Will continue thru June 2012
 - Conductivity loggers will be deployed in next month.
- Essentially no golden algae since “Dunkard Kill”



Detected in Dunkard thru end of 2009



WVDEP Information:

<http://>

www.dep.wv.gov/WWE/watershed/wqmonitoring/Pages/DunkardC

Or search:

“WVDEP Dunkard Creek 2009 Fish Kill Information”

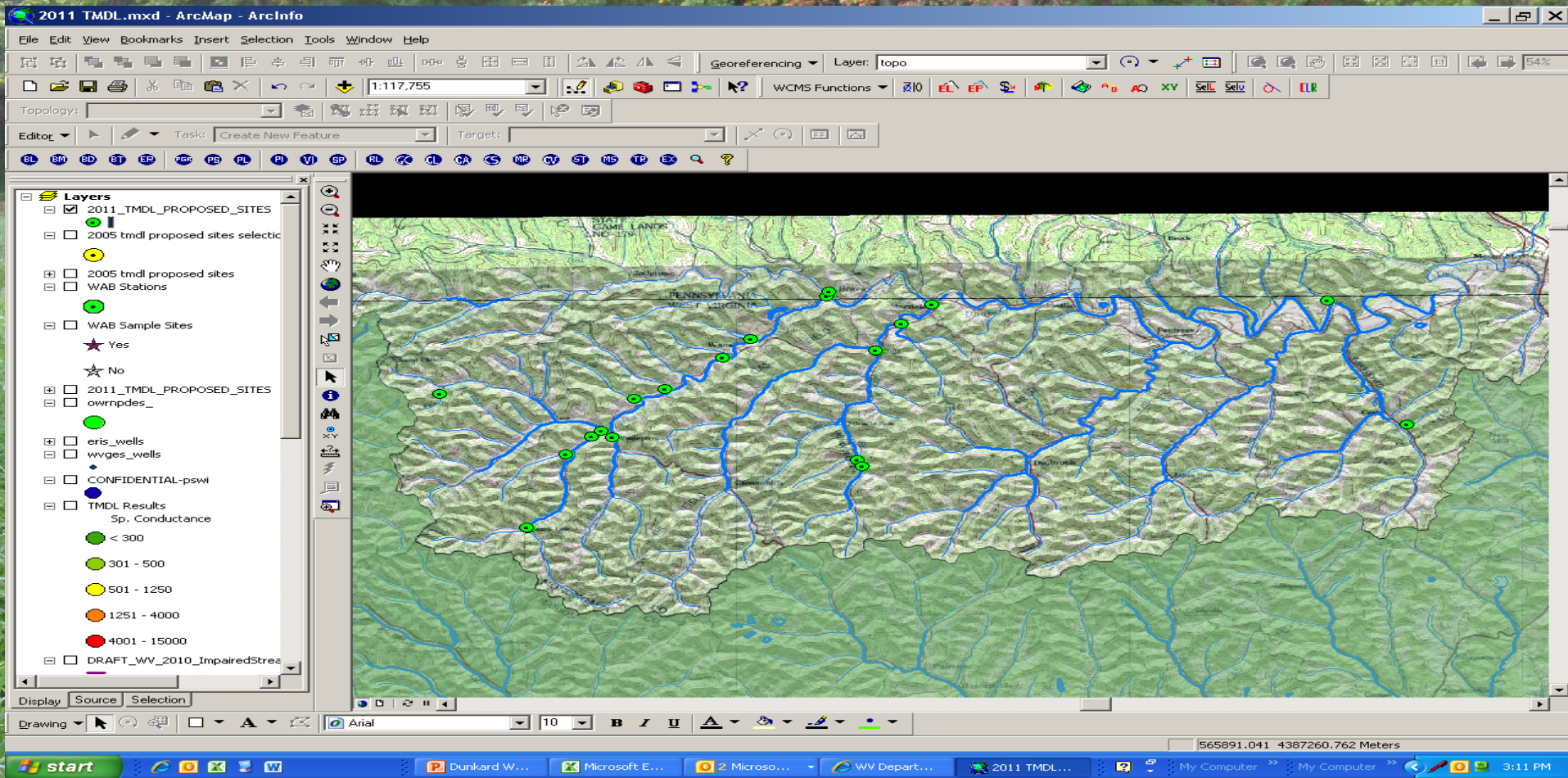
For other Water Quality data:

Data Query tool <http://apps.dep.wv.gov/dwwm/wqdata/>

Ambient Data Graphs

<http://apps.dep.wv.gov/dwwm/wqdataac/>

Current Dunkard Creek Pre-TMDL Monitoring Sites



Several sites will have conductivity loggers deployed