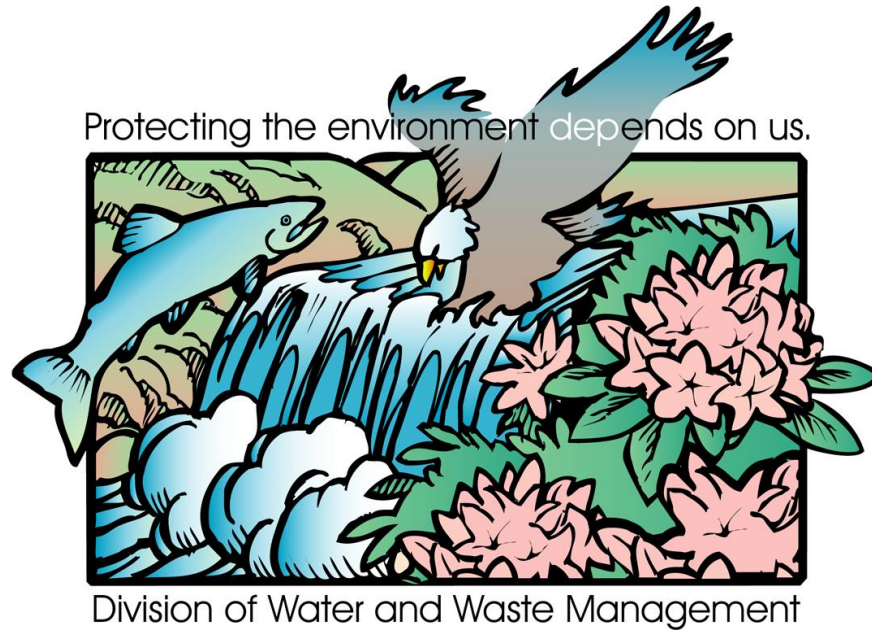


Dunkard Creek Aquatic Life Kills

September, 2009

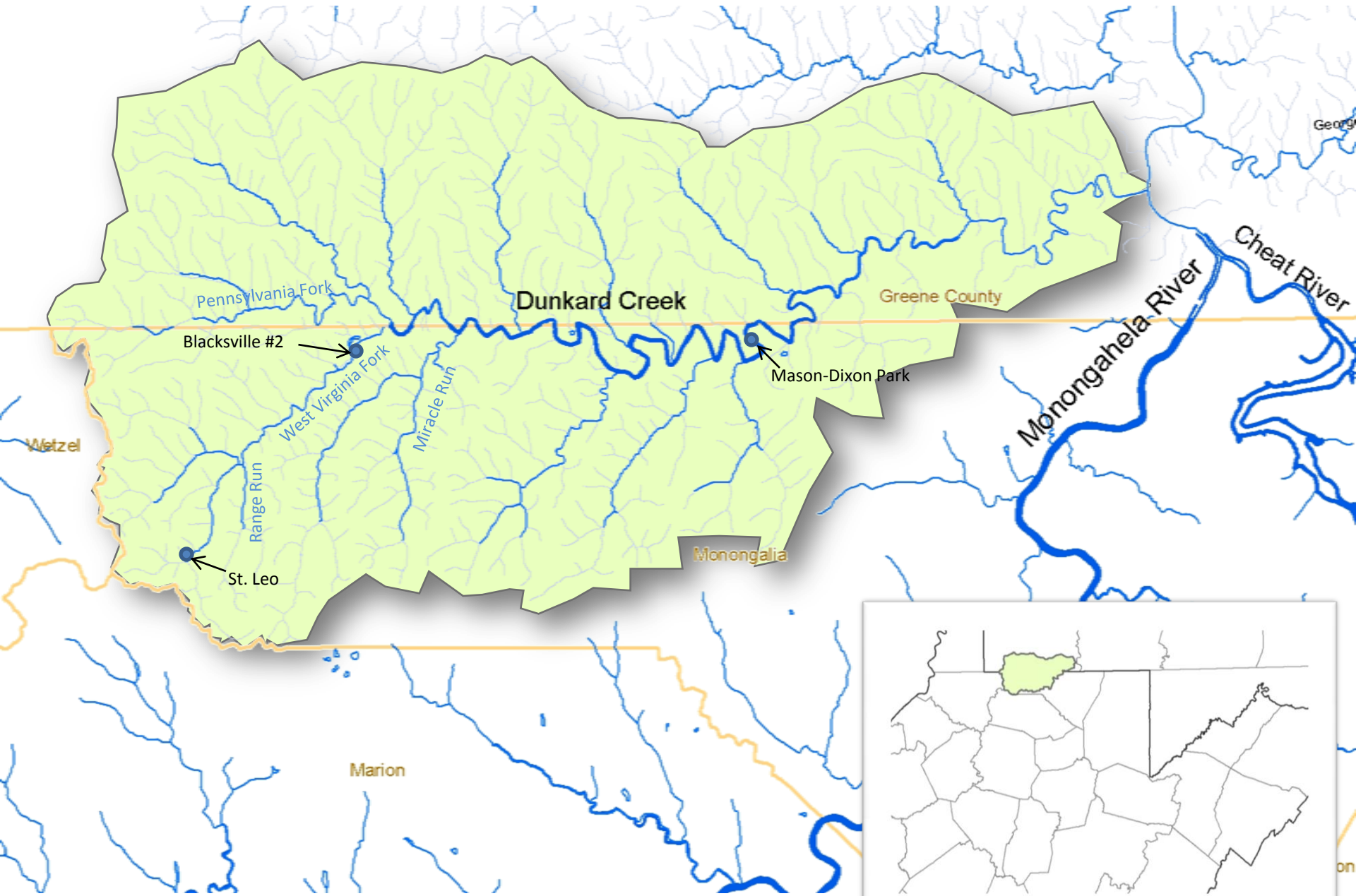


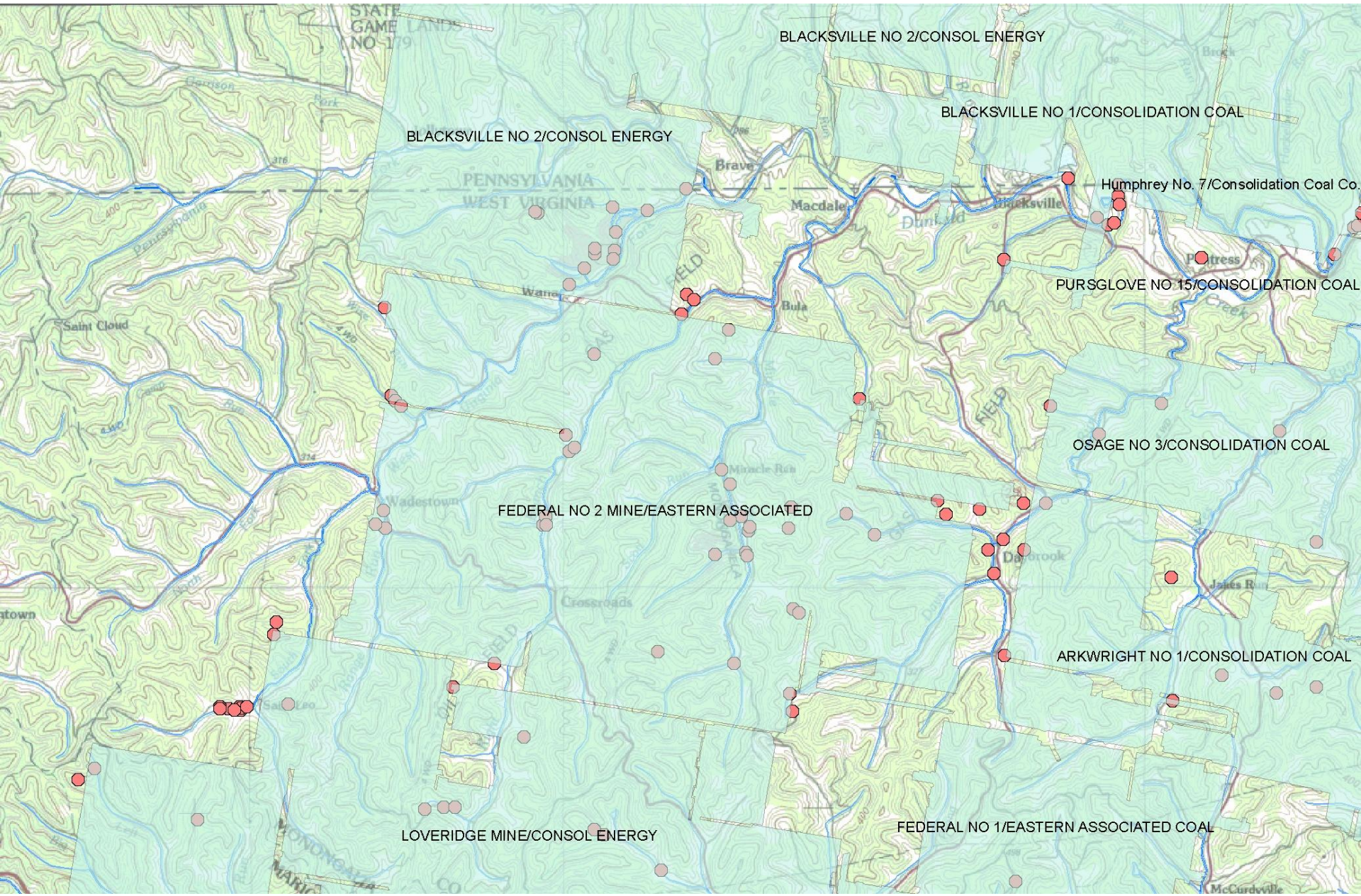
Patrick Campbell, DEP-DWWM

October 09, 2009

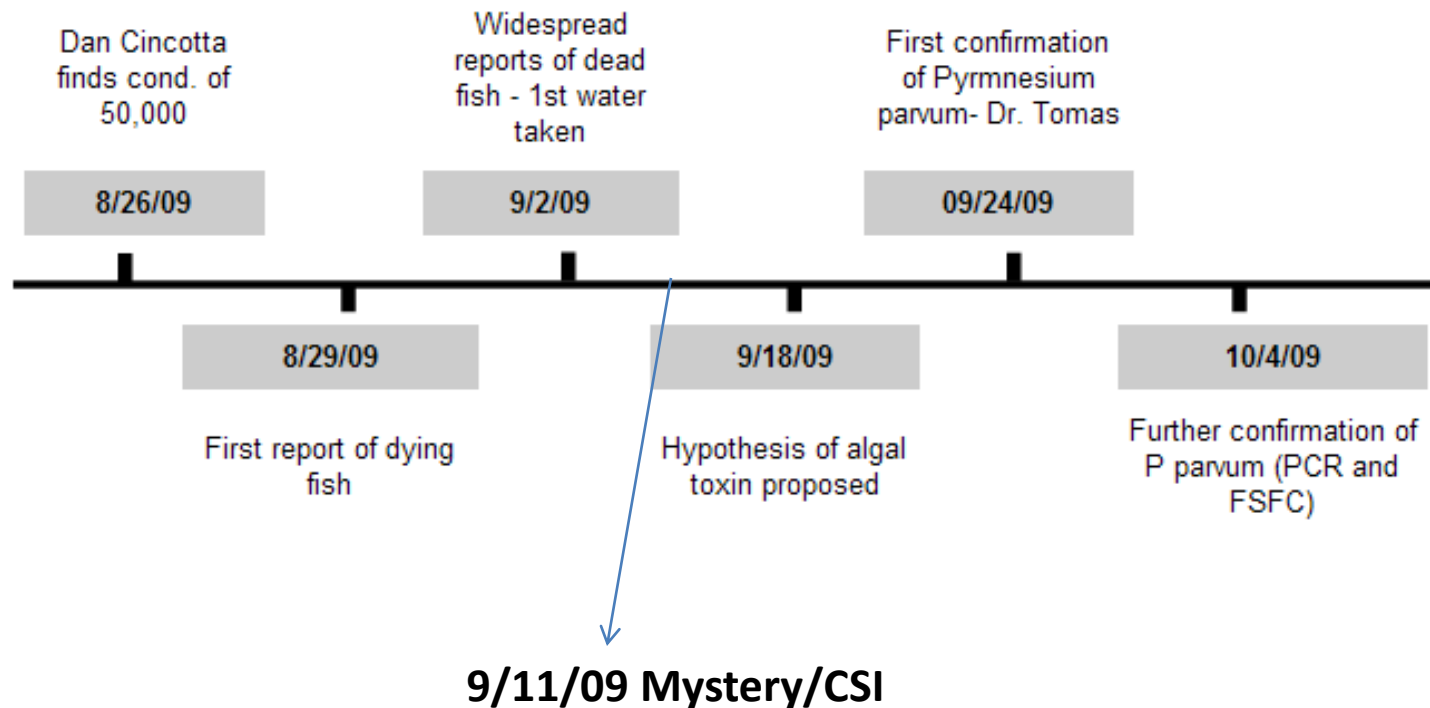
Progression

- **Quick Watershed Orientation**
- **Data Sources and Data**
- **Golden Algae Information**





Draft Timeline of Dunkard Creek Fish Kill Investigation



Data Sources

- **WVDEP**
 - **Division of Mining and Reclamation**
 - **Division of Water and Waste Management**
 - **Environmental Enforcement**
 - **Watershed Assessment**
- **WVDNR**
- **PA Fish and Boat Commission**
- **PADEP**
- **USEPA**
- **Dischargers**
 - **NPDES Requirements**
 - **Special Studies**
- **WVU, RAIN, USGS, Watershed Associations, Interest Groups, others?**

Data

- **Great Deal Collected**
- **Not all results in/entered/qc'd...**
- **Many, many pollutants analyzed for...**
- **Most Investigators Analyzing pH, Conductivity, Sulfate, Chloride, TDS, nutrients and metals**
- **Organics have also been analyzed**

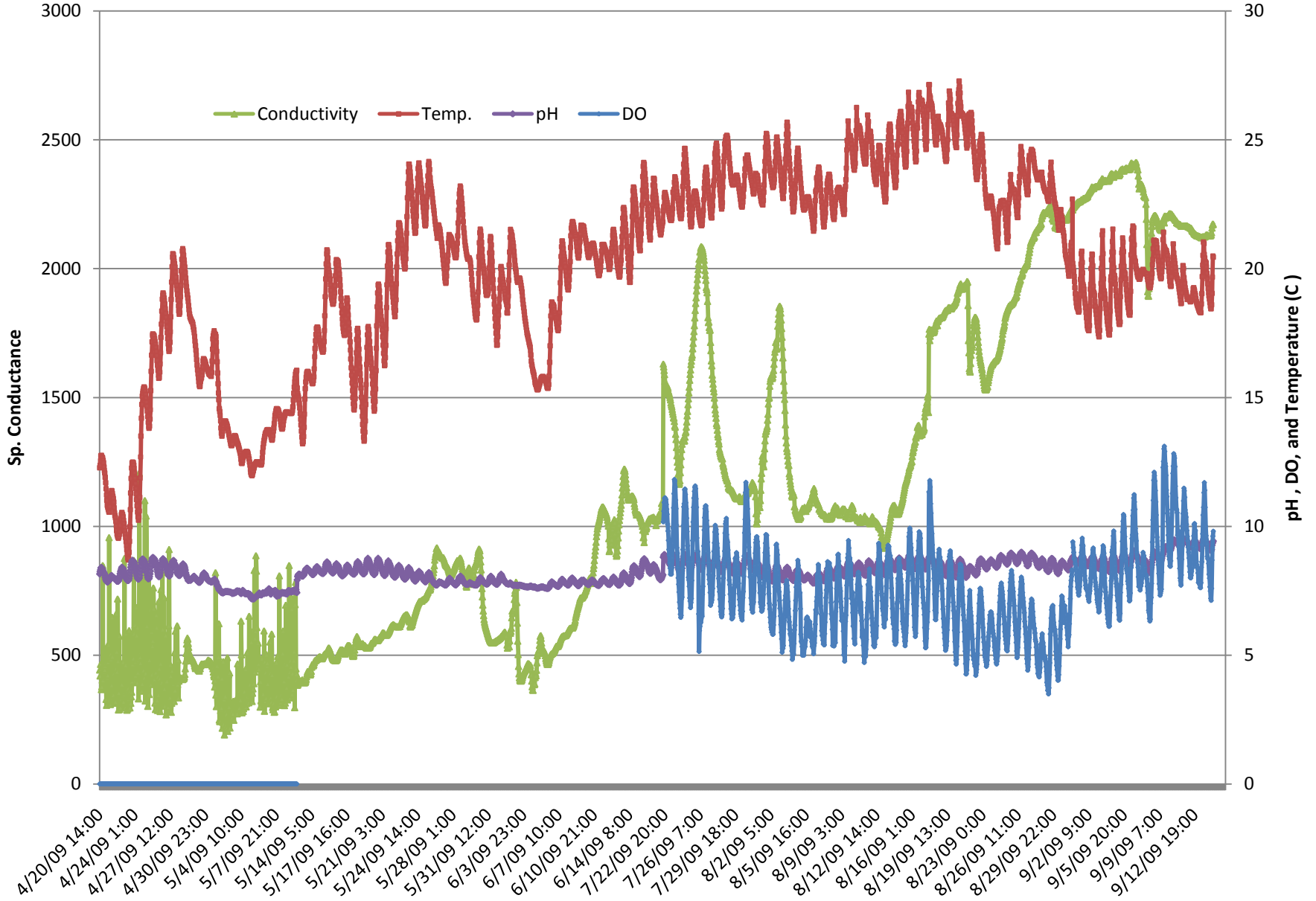
- **This is a developing topic, cooperators seeing things for the 1st time; much more coordination required**

**WVDEP Pre-TMDL Development Monitoring – July 2005 thru June 2006 v.
Recent Data WV & PA DEP data - DRAFT**

Location	pH			Conductivity			Sulfate			Chloride		
	Avg	Max	recent	Avg	Max	recent	Avg	Max	recent	Avg	Max	recent
South Fork/West Virginia Fork	7.98	8.78	9.03	4,815	12,776	9,400 - 10,370	1,766	5,066	3,510	405	1,082	1,300
West Virginia Fork/Dunkard Creek @ mp 2.7 (Wana)	7.74	8.42	8.38	1,900	6,805	3,700 - 4,590	611	2,483	1,110	143	545	408
West Virginia Fork/Dunkard Creek @ mp 0.1	7.77	8.51	8.56	1,904	6,495	5690*-33,800	600	2,192	1,180 - 8,300	165	660	740*-4500
Pennsylvania Fork/Dunkard Creek near mouth	7.59	8.09	7.6-8.1	243	352	332-672	33	40	32.5 - 42.7	6	12	6 to 16
Miracle Run near mouth	7.65	7.95	7.8 - 8.2	1,729	3,387	3660-4120	645	1,340	1,854	78	163	239
Dunkard Creek @ Mason Dixon Park	7.86	8.35	8.88	640	1,584	1900 - 2558	163	475	754	43	127	226

Uncorrected data

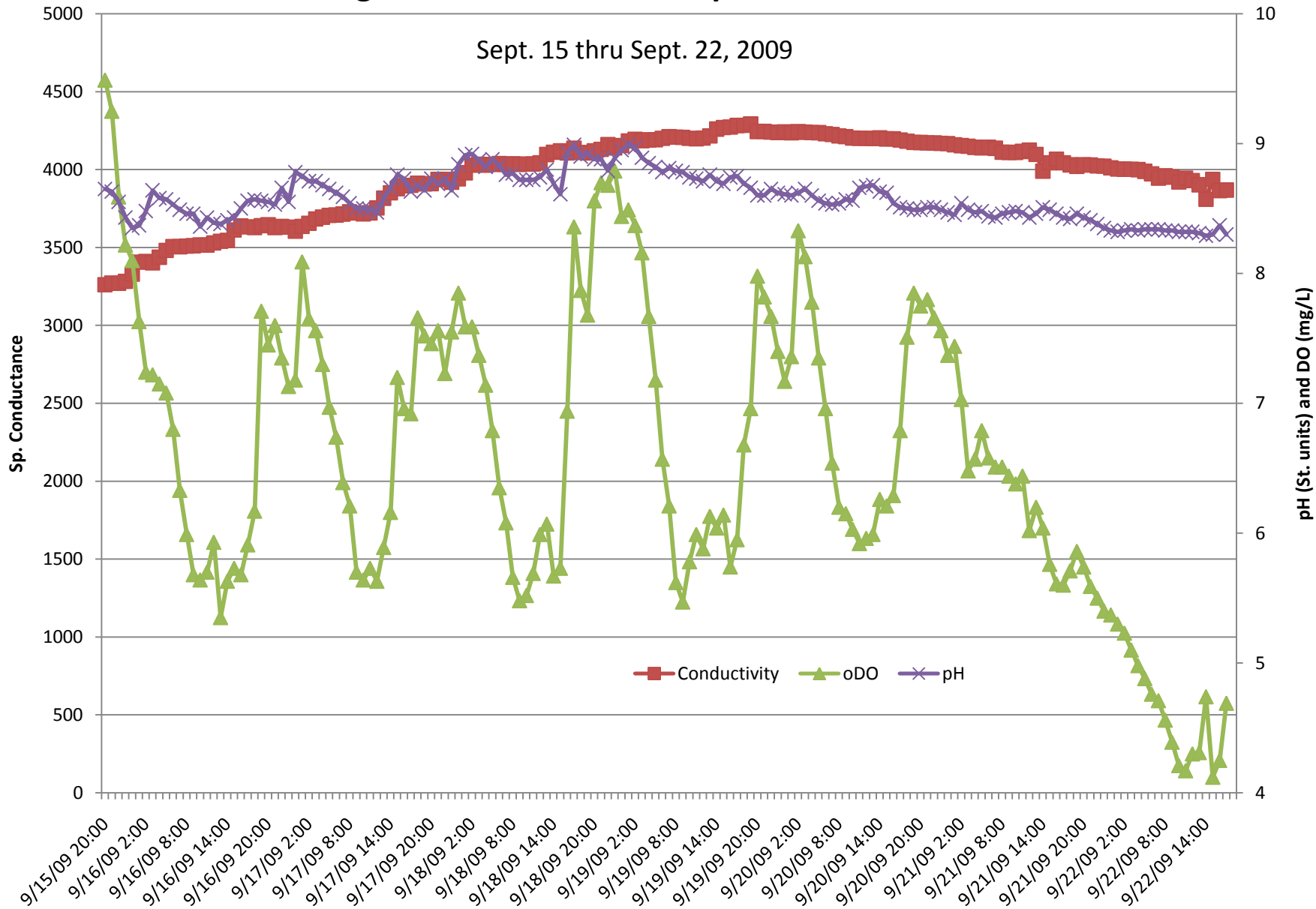
Dunkard Creek at State Line - April 20 thru Sept 14 2009



Uncorrected data

West Virginia Fork / Dunkard - Upstream of Blacksville #2

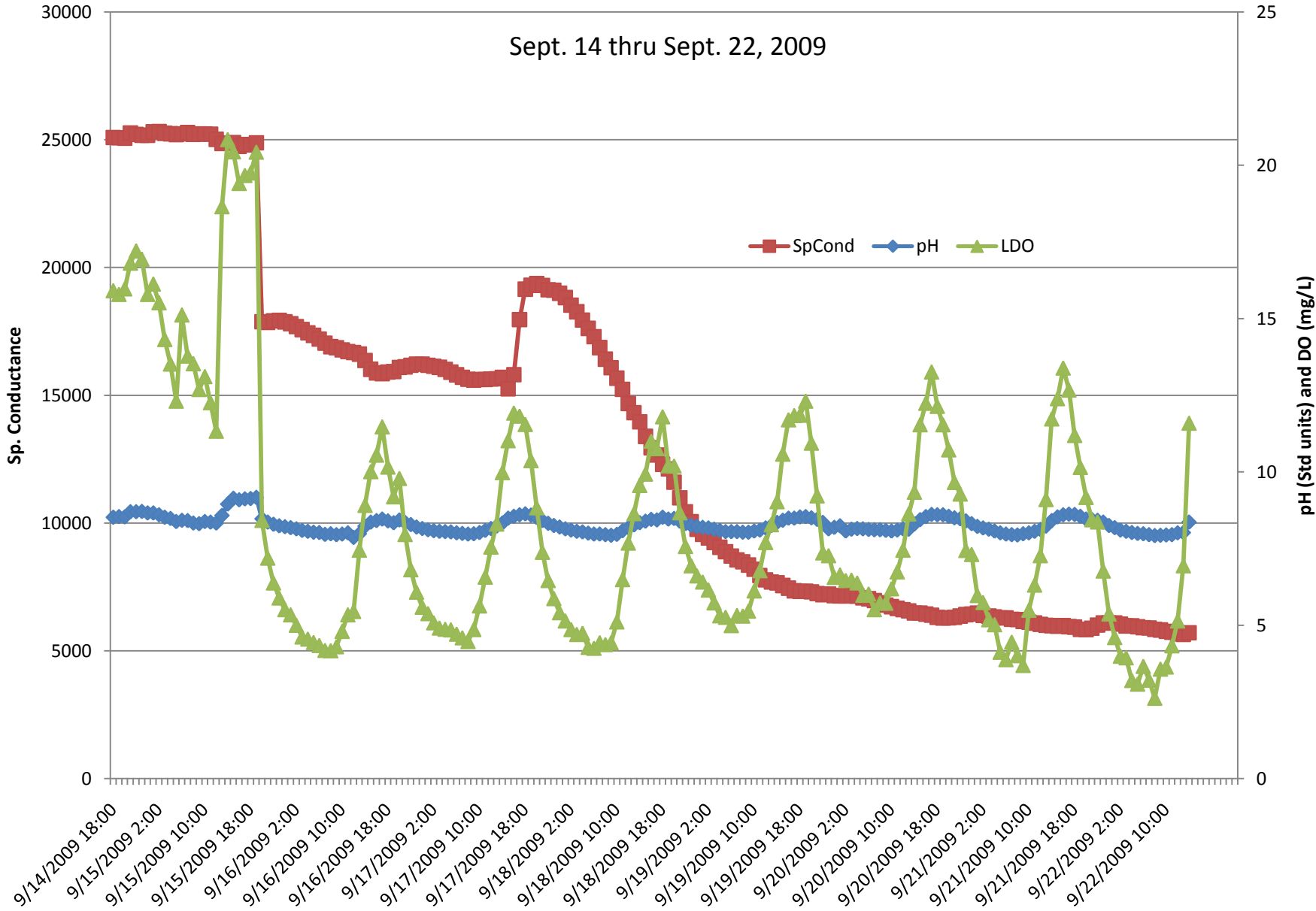
Sept. 15 thru Sept. 22, 2009



Uncorrected data

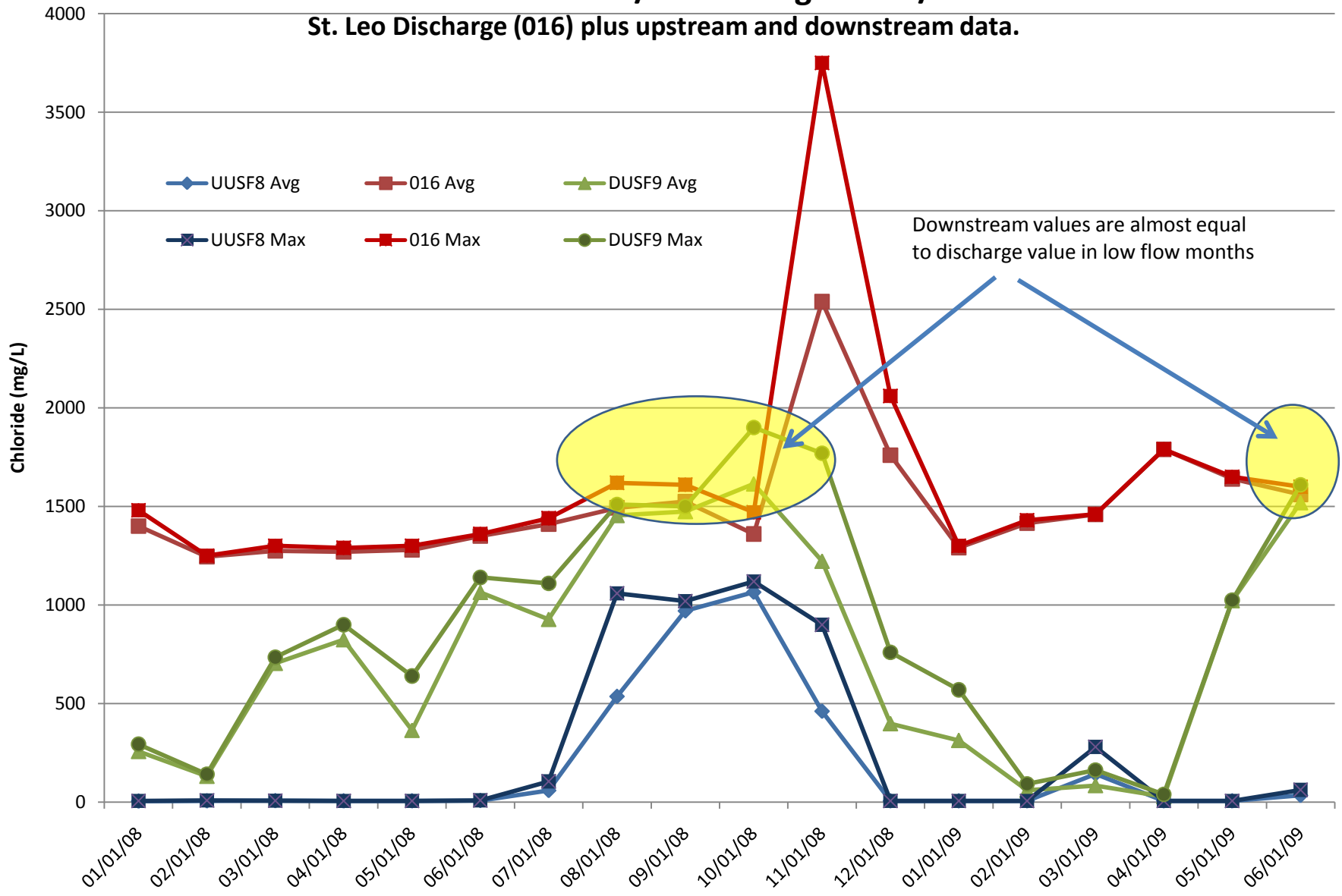
West Virginia Fork of Dunkard - Downstream of Blacksville #2

Sept. 14 thru Sept. 22, 2009

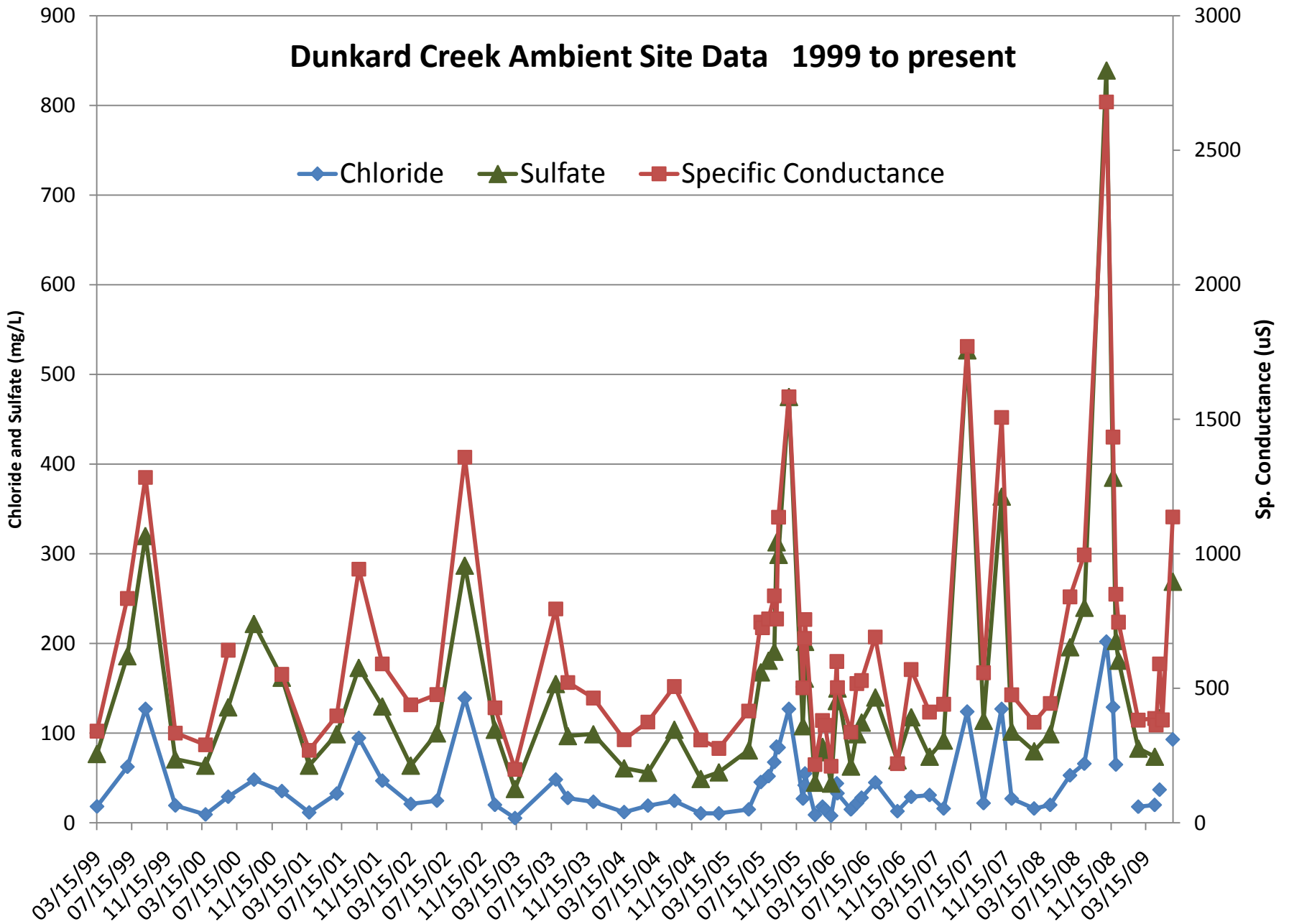


Chlorides from South Fk / West Virginia Fk / Dunkard

St. Leo Discharge (016) plus upstream and downstream data.

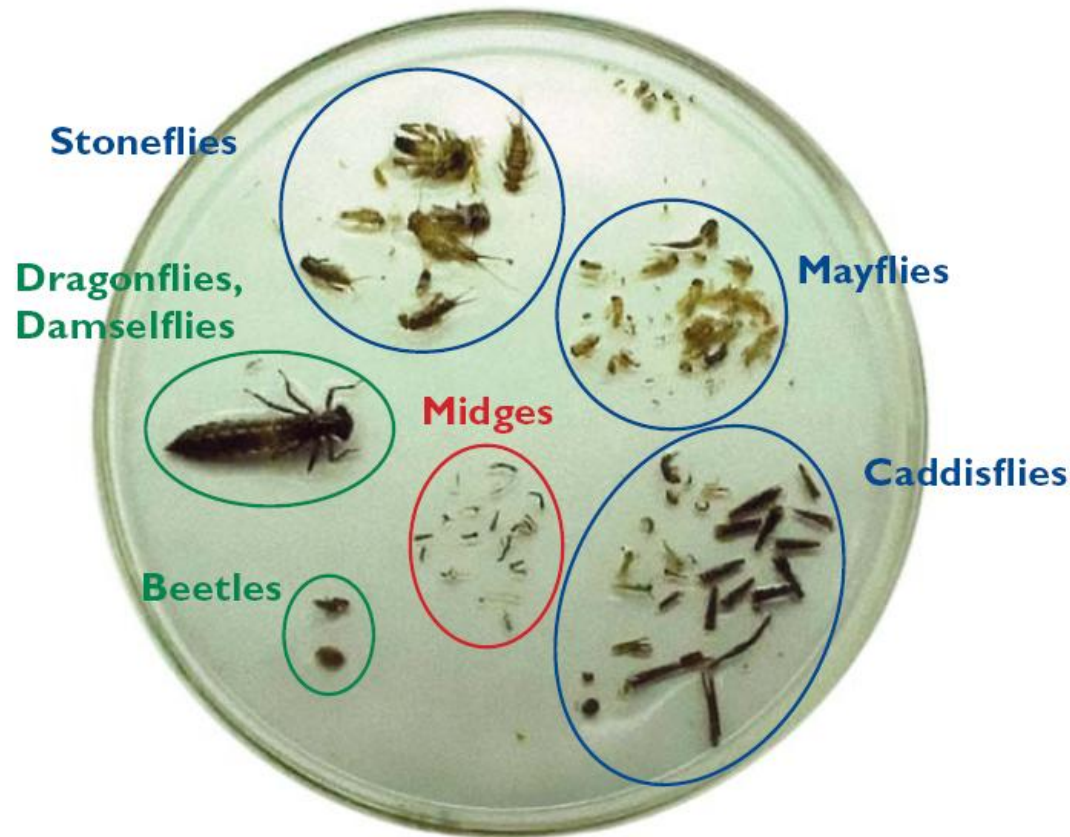


Dunkard Creek Ambient Site Data 1999 to present

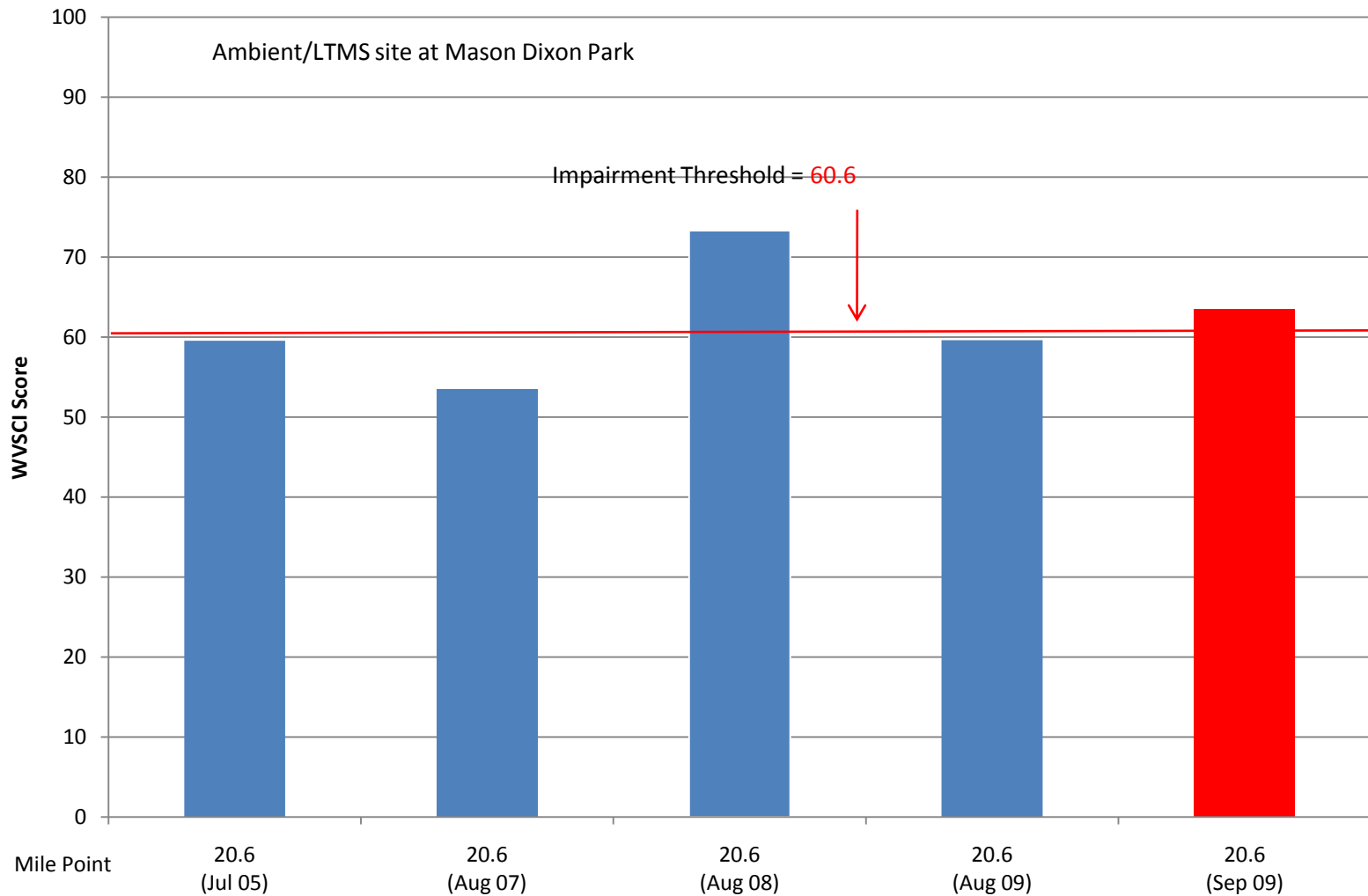


Benthic Macroinvertebrate Sampling

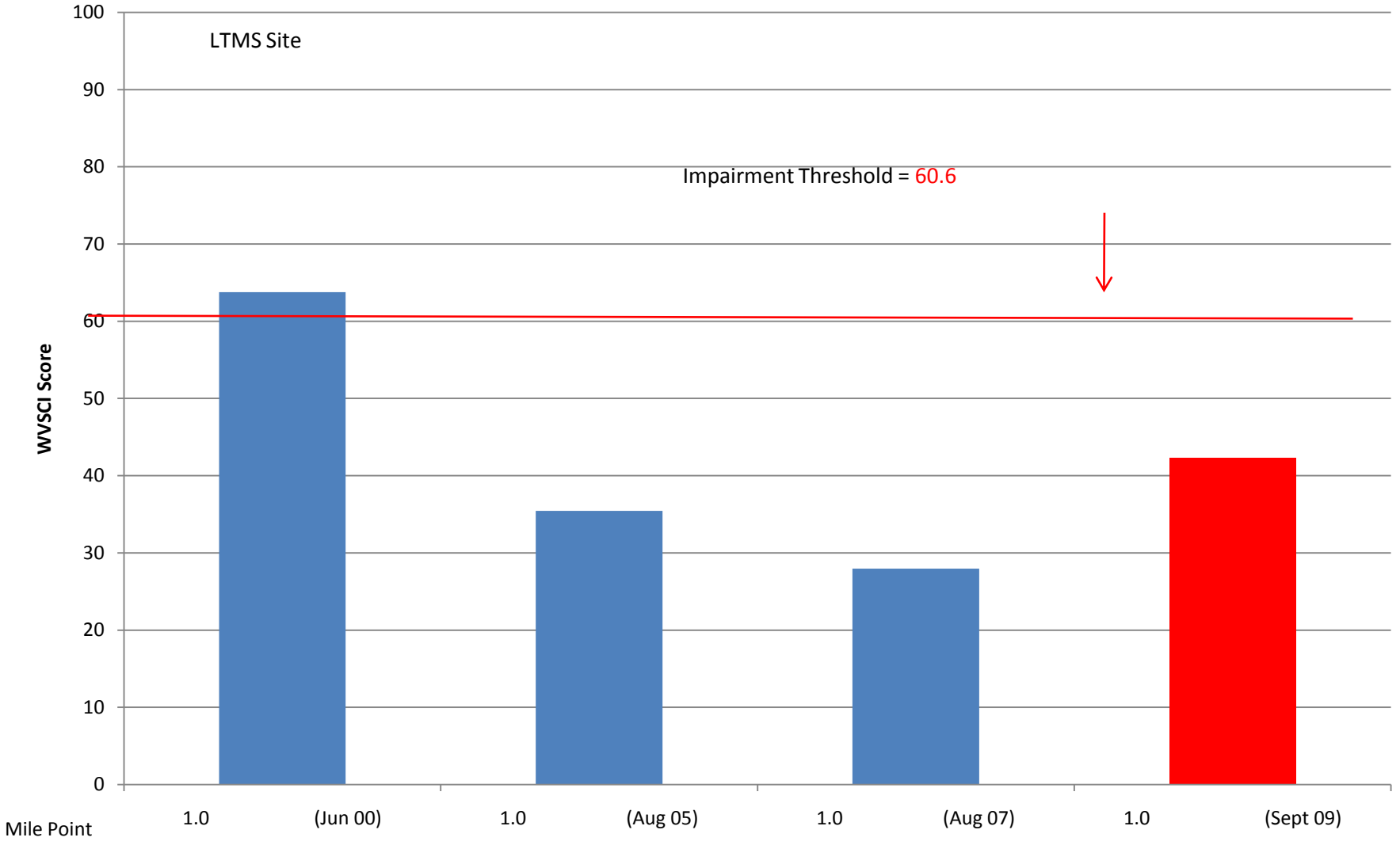
Algae affected???



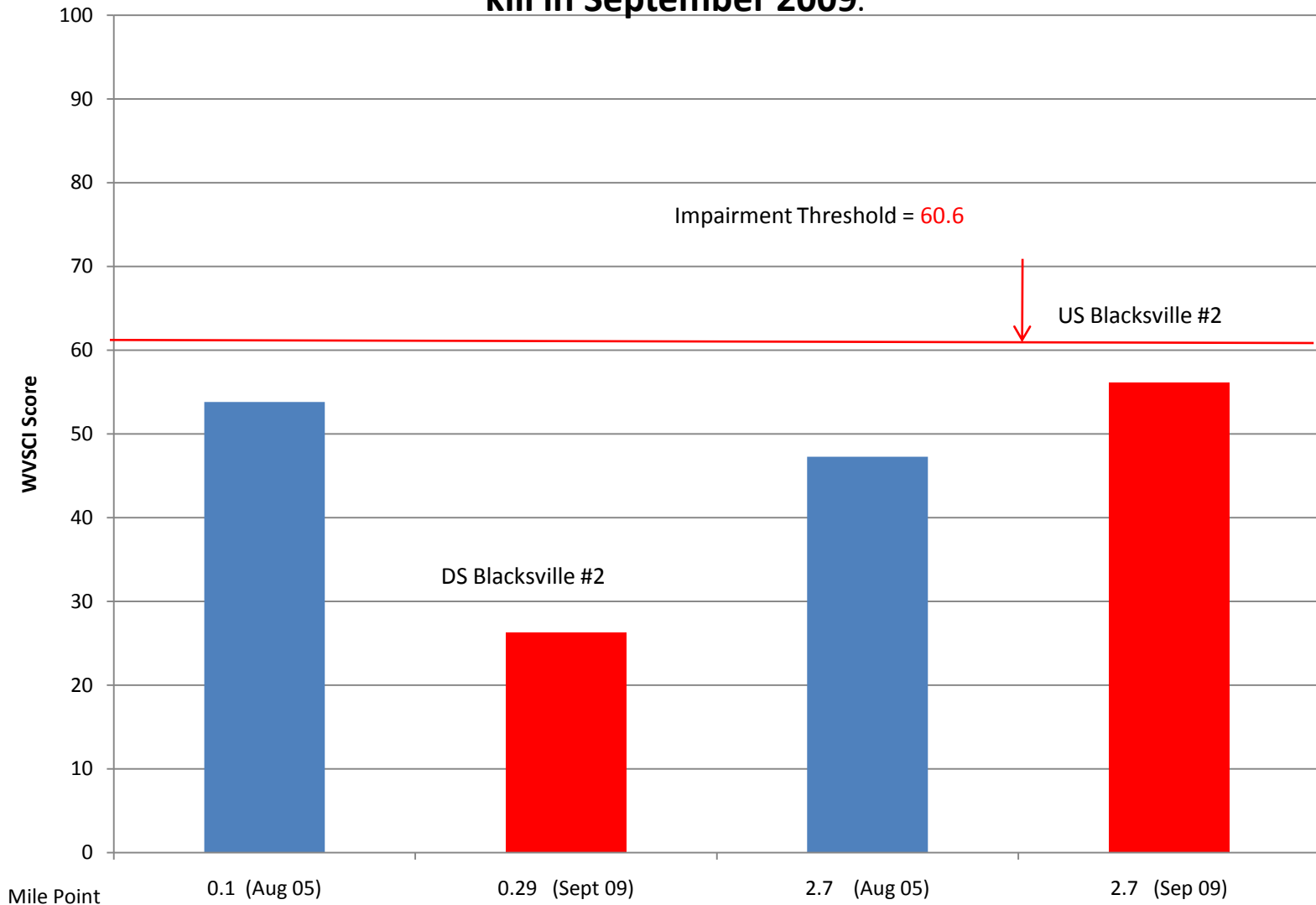
WVSCI scores for Dunkard Creek mainstem. Red bars represent benthic samples collected during significant aquatic life kill in September 2009.



WVSCI scores for South Fork/West Virginia Fork/Dunkard Creek . **Red bars** represent benthic samples collected during significant aquatic life kill in September 2009.



WVSCI scores for West Virginia Fork/Dunkard Creek. Red bars represent benthic samples collected during significant aquatic life kill in September 2009.



Golden Algae



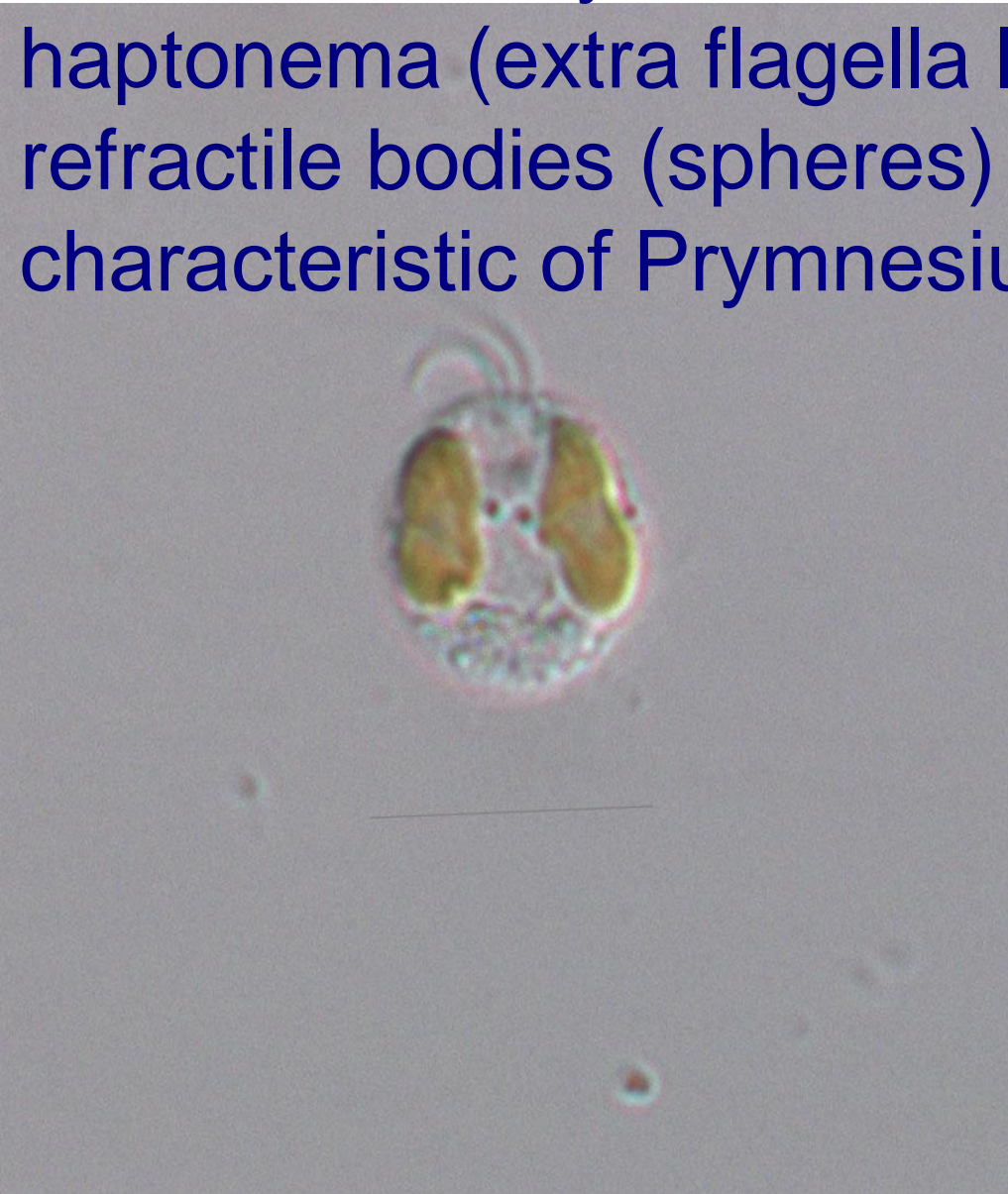
Photo's courtesy of WVDEP's Mike Carico/Brad Swiger





Photo – WVDEP Jeff Bailey DOH Garage 9/18/0

“You can clearly see the two flagella, haptonema (extra flagella like structure) and refractile bodies (spheres) within cells. All characteristic of *Prymnesium parvum*”



Dr. Carmello Tomas, UNC-Wilmington

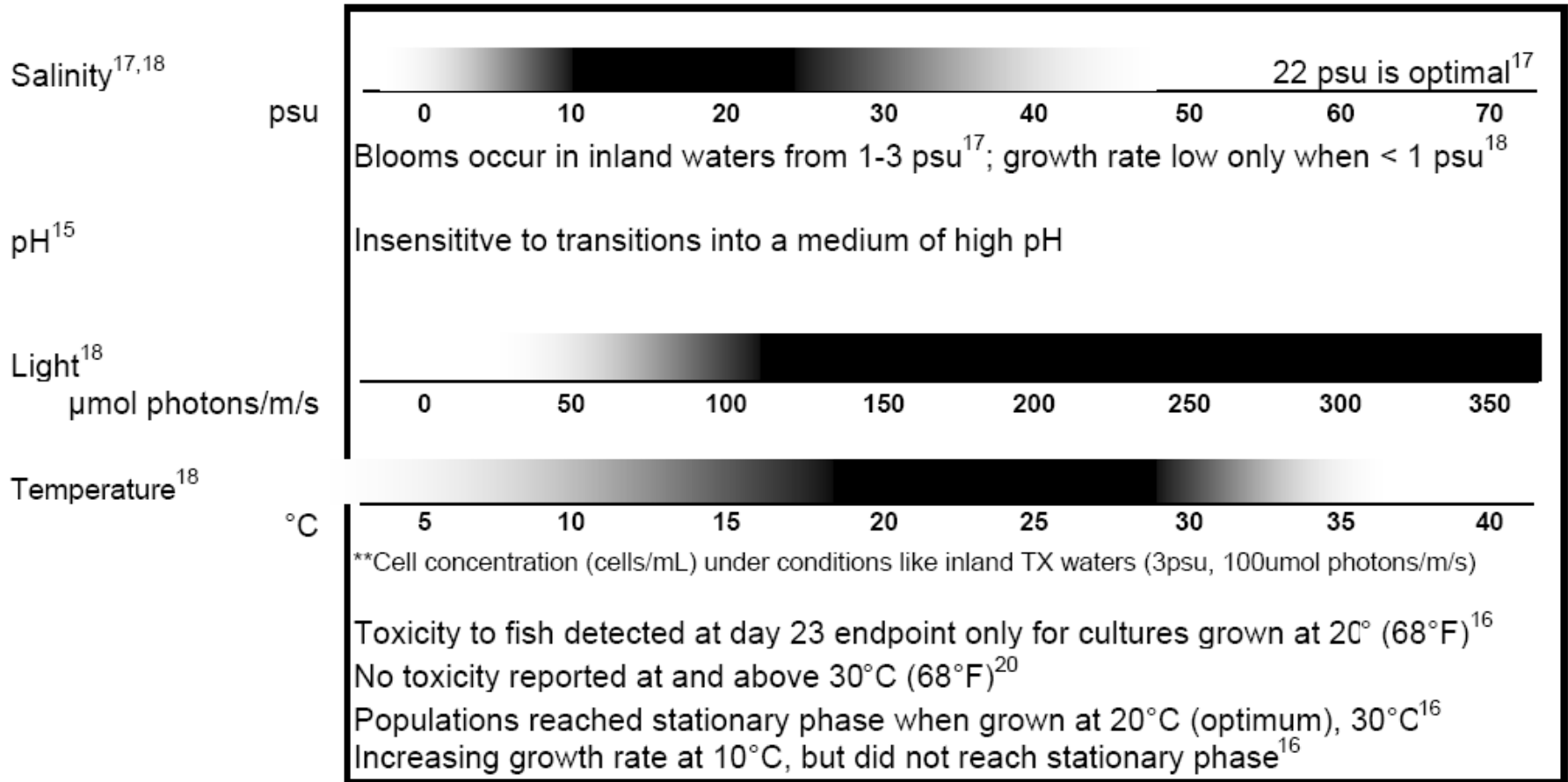


Prymnesium parvum is a [haptophyte](#), belonging to [Haptophyta](#) (=Prymnesiophyta). The species is of concern because of its ability to produce a toxin. It is a flagellated alga that is normally found suspended in the water column. It was first identified in [North America](#) in 1985 and it is not known if it was introduced artificially (e.g., an invasive species or missed in previous surveys). Toxin production mainly kills fish and appears to have little effect on cattle or humans. This distinguishes it from [red tide](#), which are algal bloom whose toxins lead to harmful effects in people. Although no harmful effects are known, it is recommended not to consume dead or dying fish exposed to a *P. parvum*

Wisconsin Information – *Prymnesium parvum*

Tolerance

**increasingly dark color indicates increasingly optimal range



Prymnesium Parvum Cells/mL

WANA 345,320

MDP 242,300

WTL 304,600

UMR 102,200

DBP 94.600

Oklahoma – kills 50k+

UBD 460

Thinking ahead – other waters of concern

Conductivity >1500 $\mu\text{mos/cm}$

North Branch Potomac River	PNB-00001	WVPNB	105.59
Mud River	OGL-00009	WVOGM	79.00
Little Coal River	KC-00004	WVKC-10	32.00
Buffalo Creek	MU-00041	WVM-23	30.20
Elk Creek	MW-00081	WVMW-21	29.00
Twentymile Creek	KG-00151	WVKG-5	27.06
Stony River	PNB-00033	WVPNB-17	24.50
Cabin Creek	KU-00078	WVK-61	21.14
Spruce Laurel Fork	KC-00037	WVKC-10-T-11	18.73
Dunkard Creek	ML-00001	WVM-1	18.50
West Fork/Pond Fork	KC-00104	WVKC-10-U-7	16.90
Bingamon Creek	MW-00174	WVMW-7	14.80
Paw Paw Creek	MU-00034	WVM-22	14.40
Big Horse Creek	KC-00010	WVKC-10-I	14.30
Lilly Fork	KE-00104	WVKE-50-B	13.11
Kiah Creek	OT-00060	WVO-2-Q-18	13.10
Leatherwood Creek	KE-00099	WVKE-46	11.21
Pyles Fork	MU-00055	WVM-23-O	11.00
Short Creek	OUS-00089	WVO-90	10.30
Indian Creek	MU-00021	WVM-17	9.40
Dents Run	MU-00072	WVM-7	9.20

Thanks to countless people!

- Upper Mon folks
- WVDNR – Clayton, Cincotta, Hedrick, Jernejcic, Wellman, Keplinger, others
- WVDEP – Carico, Foster, Swiger, Roddy, Henry, Powroznik, Vukovich
- PADEP
- PA Fish and Boat Commission
- EPA
- WVU
- **All the helpful *P. parvum* researchers**
- Many, many more