

# West Virginia Department of Environmental Protection



June 2018

Draft Report

## **Total Maximum Daily Loads for the Monongahela River Watershed, West Virginia**

*Prepared for*  
West Virginia Department of Environmental Protection  
Division of Water and Waste Management  
Watershed Assessment Branch, TMDL Section

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## Draft TMDLs for Monongahela River Watershed

June 7, 2018

# Agenda

- Project Timeline/History
- TMDL/Water quality standards recap
- Overview of TMDL effort
- Explanation/demonstration of electronic documents, spreadsheets, tools
- Questions and answers

# WVDEP TMDL Process (4 yrs)

- Stream Selection - (2/2014)
- Pre-TMDL monitoring, source identification and characterization - (7/2014 – 6/2015)
- Contract to model water quality and hydrology – (7/2016)
- Determine baseline condition and allocate pollutant loads
- Draft Report comment period – **(5/24 – 6/25)**
- **Draft TMDL Public Meeting – 6/7**
- Finalization and EPA approval

# What's a TMDL?

- “Total Maximum Daily Load”
  - (1) How much pollutant a stream can receive and remain healthy
  - (2) Pollution Budget - prescribes reductions (where needed) of pollutants that result in the restoration of an impaired stream
- TMDL development required by Clean Water Act for streams impaired by a pollutant



$$\text{TMDL} = \Sigma \text{WLA} + \Sigma \text{LA} + \text{MOS}$$

- $\Sigma$  = "sum of"
- WLA = "wasteload allocations"
- LA = "load allocations"
- MOS = "margin of safety"
- WLAs - pollutant loads from "point sources"
  - Discharge from point
  - Need NPDES permit
- LAs - pollutant loads from "nonpoint sources" and background
  - Precipitation/runoff driven
  - No permit required

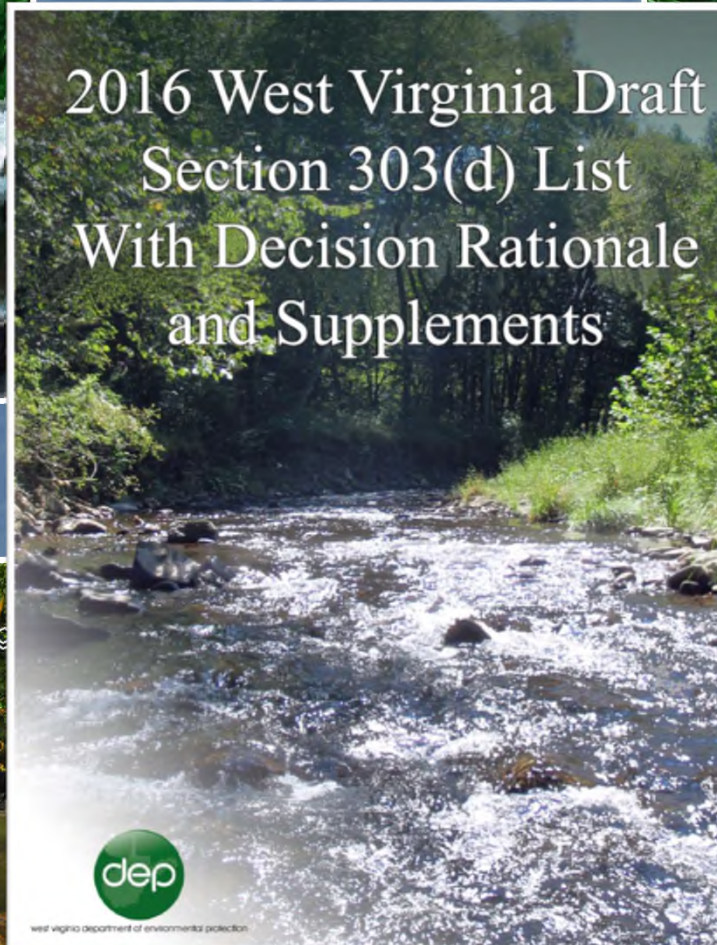
# What's an impaired stream?

- Stream that doesn't meet ***water quality standards***
- West Virginia Water Quality Standards are codified in 47 CSR 2
  - <http://apps.sos.wv.gov/adlaw/csr/readfile.aspx?DocId=27572&Format=PDF>
- Standards include "Designated Uses" for WV waters and "water quality criteria" to protect those uses
- Criteria can be numeric or narrative
- Impaired streams are enumerated on the 303(d) list



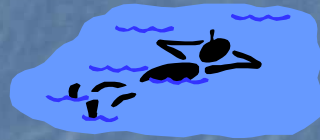


# West Virginia Section 303(d) List / Integrated Report



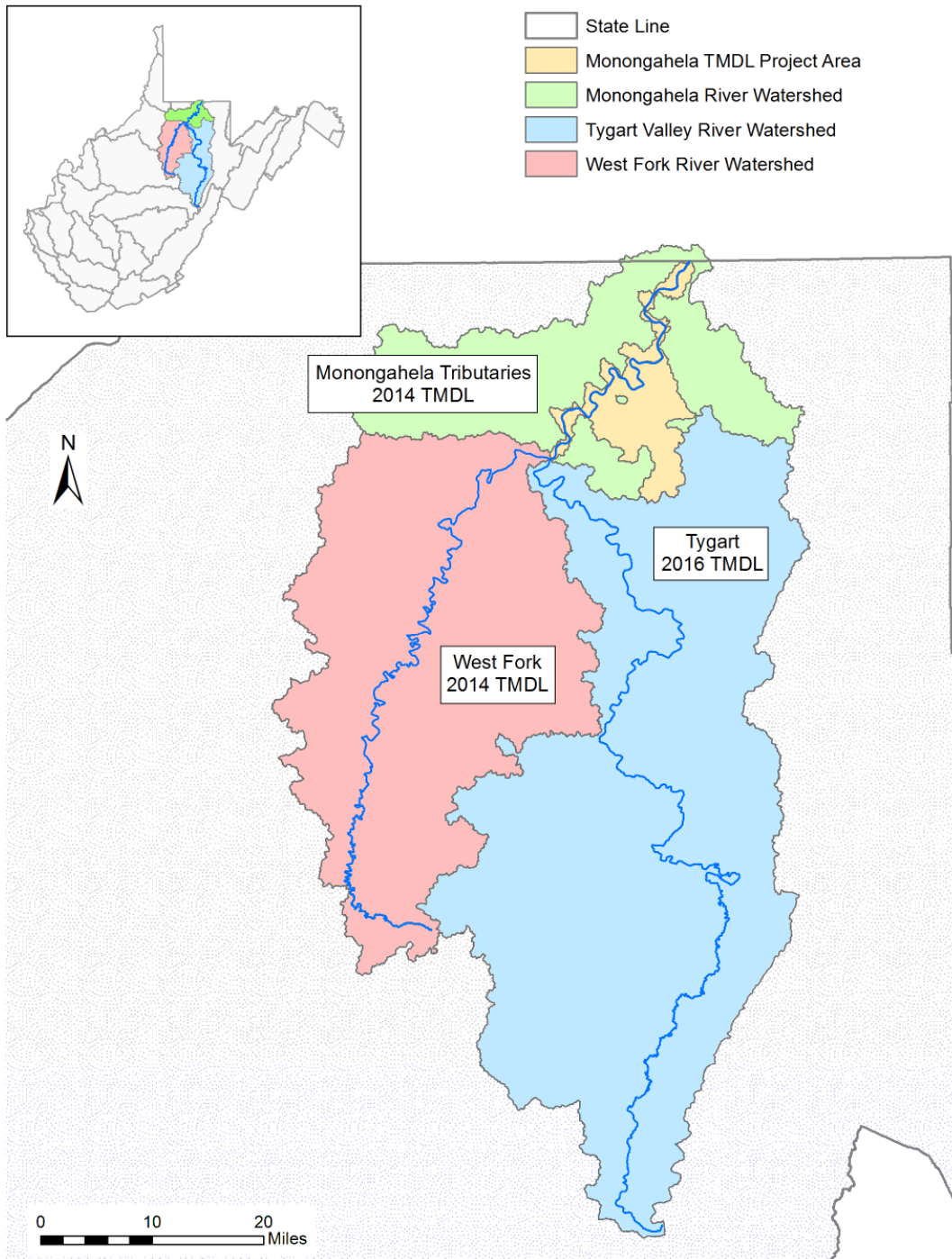
# Numeric Criteria of Concern

## ➤ Fecal Coliform



- Water Contact Recreation/Public Water Supply
- Shall not exceed 200 counts/100ml as a monthly geometric mean (5 samples/month)
- Nor to exceed 400 counts/100 ml in more than 10% of samples in a month





# Mainstem Monongahela River – Project Area

The 2014 Monongahela tributary, 2014 West Fork, and 2016 Tygart Valley allocations are included in this effort

# MDAS Model

- Watershed Model
- Runs dynamically on a 1-hour time step
- Represents land use (hydrologic processes) and river processes
- Recognizes exposure duration and exceedance frequency components of criteria
- Can include nonpoint and point sources

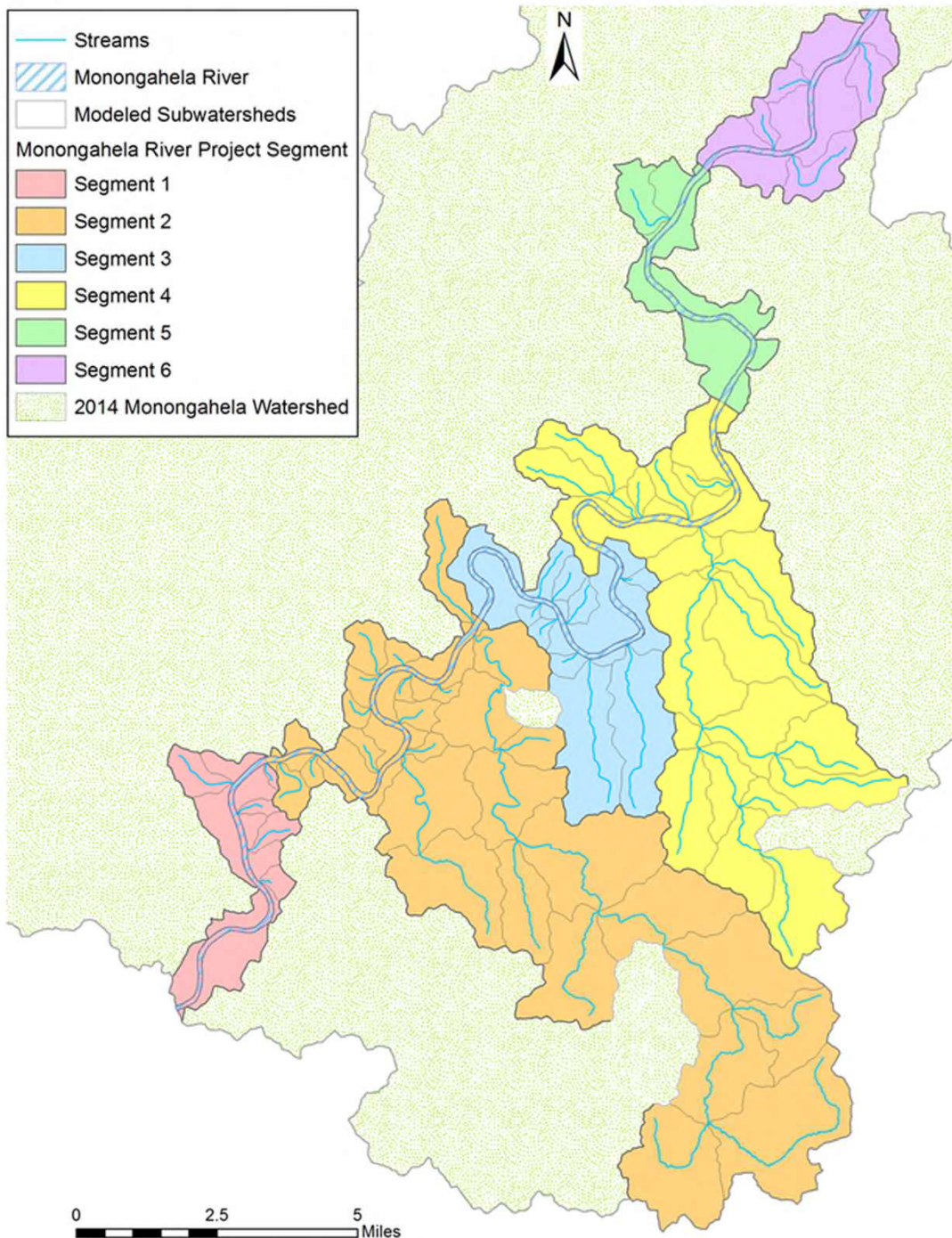
# Modeling Approach

- Segment watershed
  - Tributaries not in 2014 Mon River TMDL for fecal coliform
  - Land area draining directly to Mon with no NHD channel
- Configure model to represent all sources
- Use the historic TMDL model setup and calibration for 2014 Mon tribs, Tygart and West Fork
- Use output from MDAS as inputs to EFDC
- Run MDAS for Baseline conditions (existing)
- Run MDAS for TMDL scenario(s)



# Impaired Waters

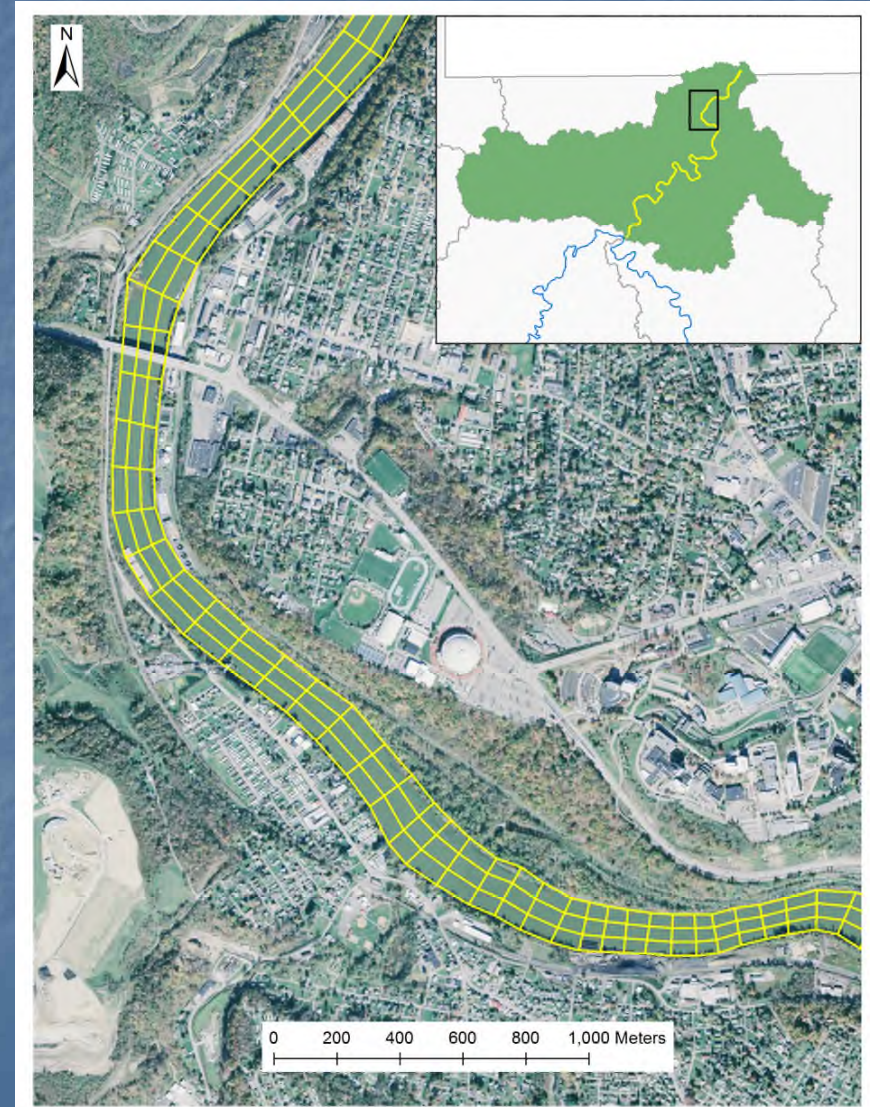
116 subwatersheds  
flowing into six  
mainstem project  
segments (Fig. 3-2)





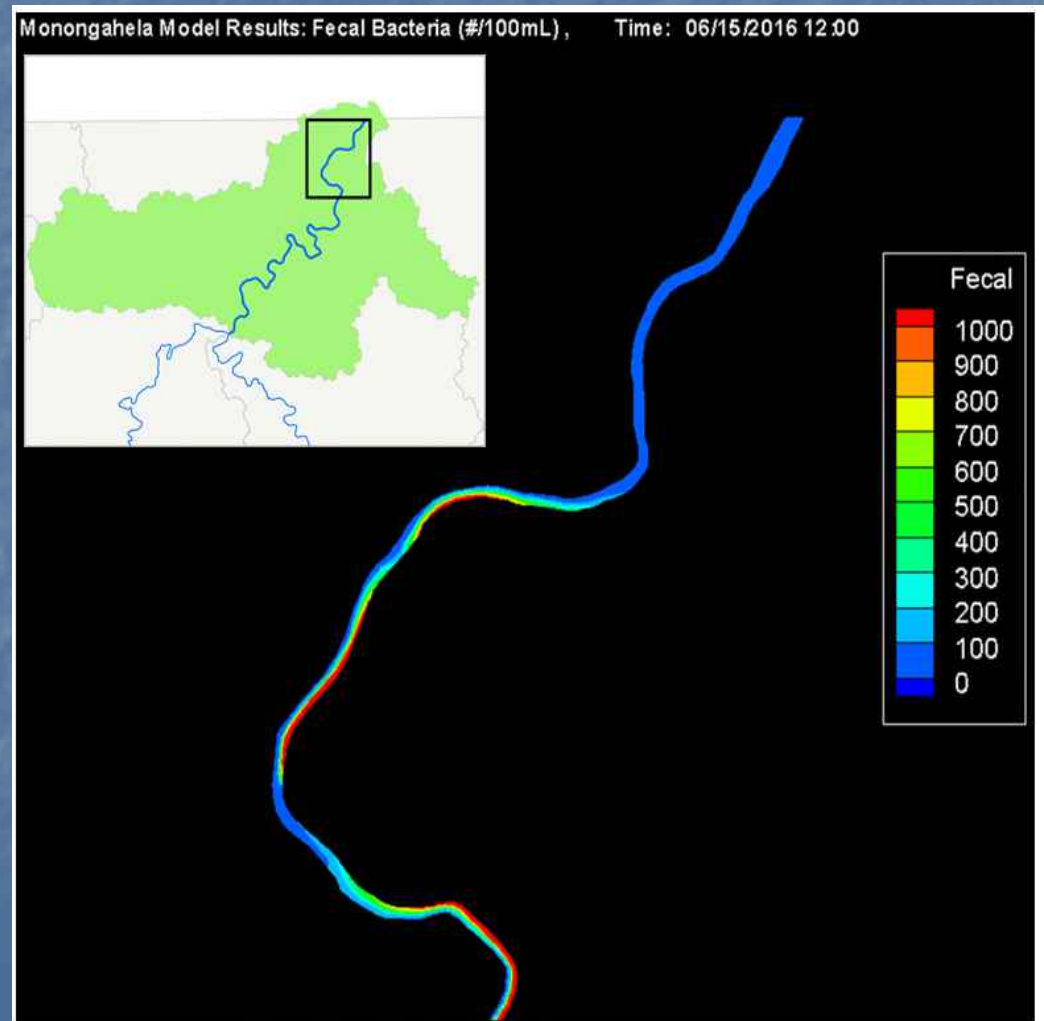
# EFDC Model

- Receiving Streams Model incorporate MDAS output
- Hydrodynamic model – used in 2-D to simulate flow and water quality (temperature and pollutants)
- 3 lateral grids, longitudinal grid cells range from 45 m-150 m



# EFDC Model Calibration

- Processes impacting fecal coliform: transport and die-off
- Flow calibrated accounting for pools
- Fecal coliform calibration compared to field data and goodness of fit statistics





# Fecal Coliform Sources

## ➤ Point sources

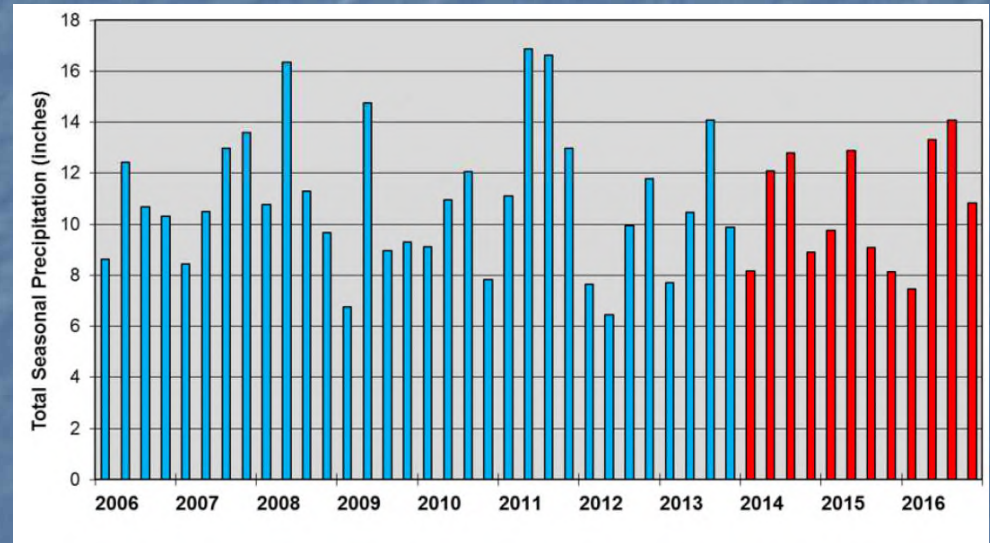
- HAU's
- Package Plants
- Municipal Sewage Plant
- Combined Sewer Overflows
- MS4 areas (Municipal Separate Storm Sewer System)

## ➤ Nonpoint source

- Failing septic systems and/or straight pipe illicit discharges
- Stormwater runoff from urban/residential lands outside of MS4 areas
- Stormwater runoff from agricultural lands

# Baseline Condition

- Design precipitation period
  - Hourly precipitation data for a six-year period
  - Design period includes wet and dry years
- Applied to land uses identified in earlier TMDLs and that in the calibration period
- Permitted discharges equal to permit limits



Seasonal precipitation totals for the Morgantown Hart Field (WBAN 13736) weather station

# TMDL Condition

- Existing pollutant sources reduced such that TMDL endpoints are achieved in each modeled subwatershed and grid recognizing
  - Criteria value, duration and exceedence frequency
  - Margin of safety

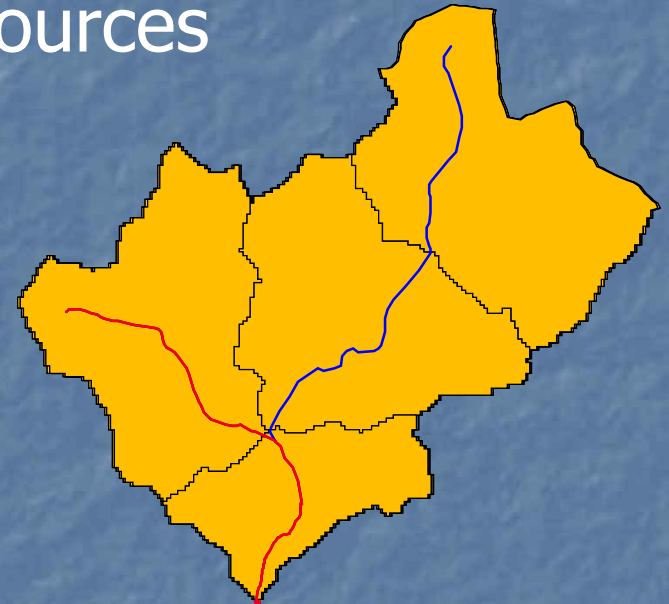


# Margin of Safety

- Required component of TMDLs
- Explicit 5% used in most TMDLs
- TMDL endpoints for numeric criteria are 95% of criterion value  
(ex. 380 cts/100 ml for 400 cts/100  
and 190 cts/100 ml for 200 cts/100 ml  
Fecal coliform criteria)

# MDAS Allocation Methodology

- Universal Reduction of targeted sources
  - Failing Septics
- Top-down approach
  - Headwater subwatersheds analyzed first
- Allocation strategy dictates order and magnitude of reduction
- If necessary, loads are reduced then routed to downstream subwatershed



# Allocation Methodology

- WVDEP priorities:
  - Ensure criteria compliance at all sws outlets
  - Target the primary causative sources
- Strategy in general
  - Critical conditions must be considered
  - Sometimes only one significant source in sws
  - Always some amount of professional judgement



# EFDC Allocation Runs

- Run 1: Study sensitivity to sources
  - Point source - baseline
  - non-point source - baseline
  - Tributaries - baseline
  - CSO reduced to 200 counts/100 mL
- Run 2: Study sensitivity to sources
  - Point source - baseline
  - non-point source - baseline
  - Tributaries - baseline
  - CSO reduced to 200 counts/100 mL
  - Tributaries near CSOs eliminated

# EFDC Allocation Runs

- Run 3: Test trib impact
  - tributaries -TMDL conditions
  - point sources - permit limits (baseline/TMDL conditions)
  - non-point - baseline
  - CSO - baseline (100,000 counts/ 100 mL)
  
- Run 4: TMDL scenario
  - tributaries -TMDL conditions
  - point sources - permit limits (baseline/TMDL conditions)
  - non-point – baseline
  - CSO – 200 counts/100 ml Wasteload Allocation (not daily max)

# Fecal Coliform Strategy

- 100% reduction of all untreated sewage discharges (failing septics, straight pipes) as required by WV Bureau for Public Health regulations
- Permit limits on point sources
- No reductions to non-point or MS4
- CSOs in to protect local water quality



# Future Growth Highlights

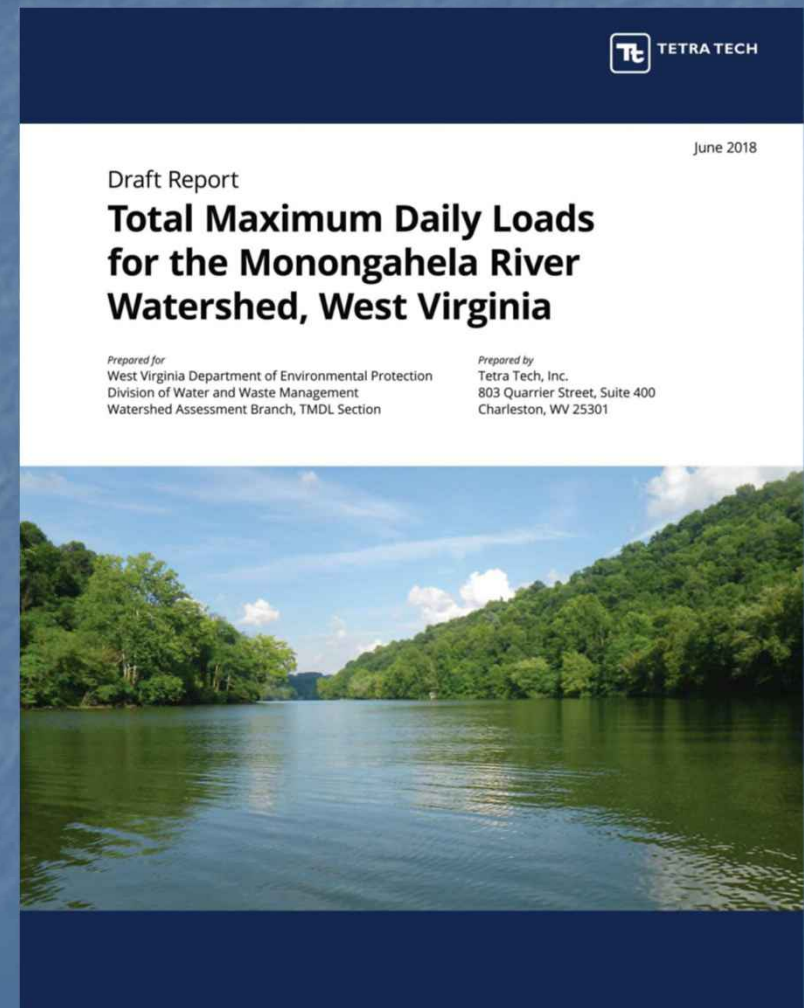
- New facility anywhere in watershed if meeting water quality criteria end of pipe
- Further details on Future Growth can be found beginning in Section 8 of the Draft report

# Monongahela River Watershed TMDL Path Forward

- Formal public comment period ends 6/25/2018
- Address comments, prepare final draft and submit to EPA for approval (final draft will include Response Summary)

# TMDL Products

- Main Report – Overall description of the TMDL development process for the Mainstem Monongahela River watershed
- Technical Report with detailed appendices



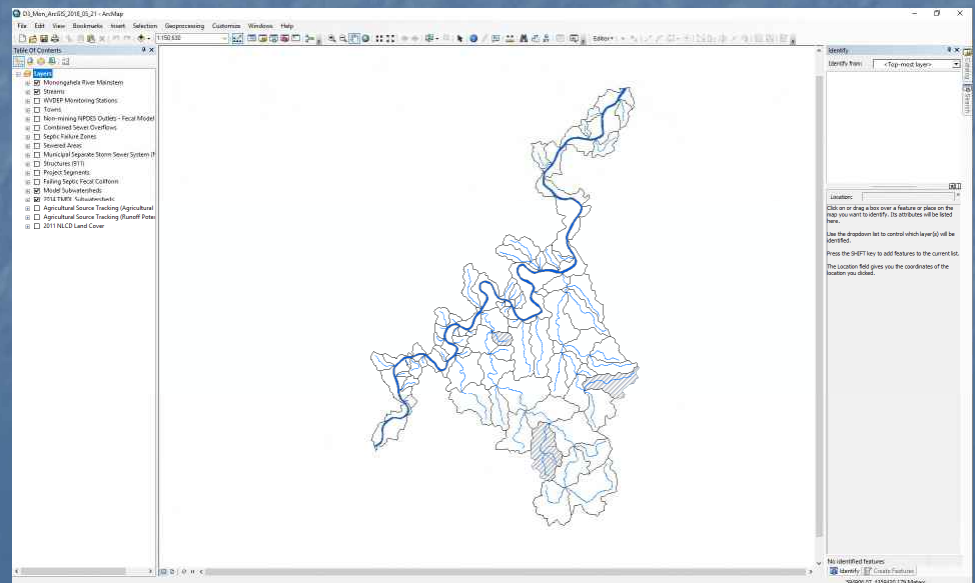


# TMDL Products

- Allocation spreadsheets:
  - Fecal Coliform
  - TMDL for each stream, WLAs and LAs by SWS
  - Filterable

TMSL Watershed	Project Segment	Subwatershed	RMD Code	Stream Name	WV Code	Percent/Cropload Baseline Load (ton/year)	Percent/Cropload Allocated Load (ton/year)	Percent/Cropload Percent Reduction	Background & Other Nonpoint Sources Baseline Load (ton/year)	Background & Other Nonpoint Sources Allocated Load (ton/year)	Designated & Other Nonpoint Sources Percent Reduction	Designated Sources Baseline Load (ton/year)	Designated Sources Allocated Load (ton/year)	Designated Sources Percent Reduction	Residual Load
Monongahela River	U-2	0500	WV-00-01	UPP/Monongahela River RW 121.74	WV-01	2,712+11	2,712+11	0.0	2,812+11	2,812+11	0.0	4,532+01	4,532+01	0.0	100
Monongahela River	U-2	0501	WV-00-01	Monongahela River	WV-01	2,712+11	2,712+11	0.0	2,812+11	2,812+11	0.0	4,532+01	4,532+01	0.0	100
Monongahela River	U-2	0502	WV-00-01	Monongahela River	WV-01	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0503	WV-00-01	UPP/Monongahela River RW 110.82	WV-01	0.00+00	0.00+00	0.0	2,242+11	2,242+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0504	WV-00-01	Monongahela River	WV-01	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0505	WV-00-02	Turns Run	WV-12	1,782+11	1,782+11	0.0	5,422+12	5,422+12	0.0	2,972+11	2,972+11	0.0	100
Monongahela River	U-2	0506	WV-00-02	Monongahela River	WV-12	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0507	WV-00-02	Leahs Run	WV-13	4,842+11	4,842+11	0.0	5,322+11	5,322+11	0.0	6,082+01	6,082+01	0.0	100
Monongahela River	U-2	0508	WV-00-02	UPP/Monongahela River RW 113.36	WV-13	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0509	WV-00-02	Monongahela River RW 113.32	WV-13	0.00+00	0.00+00	0.0	3,972+11	3,972+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0510	WV-00-02	UPP/Monongahela River RW 113.75	WV-13	0.00+00	0.00+00	0.0	4,442+11	4,442+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0511	WV-00-02	Monongahela River	WV-13	0.00+00	0.00+00	0.0	3,972+11	3,972+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0512	WV-00-02	UPP/Monongahela River RW 113.18	WV-13	0.00+00	0.00+00	0.0	2,822+11	2,822+11	0.0	1,882+11	1,882+11	0.0	100
Monongahela River	U-2	0513	WV-00-02	Monongahela River	WV-13	0.00+00	0.00+00	0.0	4,942+11	4,942+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0514	WV-00-02	UPP/Monongahela River RW 113.57	WV-13	0.00+00	0.00+00	0.0	1,022+11	1,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0515	WV-00-02	Monongahela River	WV-13	0.00+00	0.00+00	0.0	3,962+11	3,962+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0516	WV-00-29	UPP/Monongahela River RW 111.85	WV-29	1,222+11	1,222+11	0.0	4,542+11	4,542+11	0.0	3,022+01	3,022+01	0.0	100
Monongahela River	U-2	0517	WV-00-29	Monongahela River	WV-29	0.00+00	0.00+00	0.0	1,122+11	1,122+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0518	WV-00-29	Leahs Run	WV-29	1,082+11	1,082+11	0.0	2,822+11	2,822+11	0.0	1,122+11	1,122+11	0.0	100
Monongahela River	U-2	0519	WV-00-29	Monongahela River	WV-29	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0520	WV-00-17-B	Leahs Run	WV-18	2,482+11	2,482+11	0.0	3,022+11	3,022+11	0.0	2,082+11	2,082+11	0.0	100
Monongahela River	U-2	0521	WV-00-17-C	Leahs Run	WV-18	2,482+11	2,482+11	0.0	3,022+11	3,022+11	0.0	2,082+11	2,082+11	0.0	100
Monongahela River	U-2	0522	WV-00-17	Leahs Run	WV-18	4,962+11	4,962+11	0.0	4,962+11	4,962+11	0.0	4,962+11	4,962+11	0.0	100
Monongahela River	U-2	0523	WV-00-15	Coal Creek	WV-15	6,872+11	6,872+11	0.0	2,882+11	2,882+11	0.0	1,882+11	1,882+11	0.0	100
Monongahela River	U-2	0524	WV-00-15	UPP/Coal Creek RW 1.60	WV-15	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	1,122+11	1,122+11	0.0	0
Monongahela River	U-2	0525	WV-00-17-D	Coal Creek	WV-15	3,882+11	3,882+11	0.0	3,882+11	3,882+11	0.0	3,882+11	3,882+11	0.0	100
Monongahela River	U-2	0526	WV-00-17	Shady Creek	WV-15	8,962+11	8,962+11	0.0	8,962+11	8,962+11	0.0	8,962+11	8,962+11	0.0	100
Monongahela River	U-2	0527	WV-00-17	Shady Creek	WV-15	1,142+11	1,142+11	0.0	4,962+11	4,962+11	0.0	1,142+11	1,142+11	0.0	100
Monongahela River	U-2	0528	WV-00-17	Shady Creek	WV-15	1,142+11	1,142+11	0.0	4,962+11	4,962+11	0.0	1,142+11	1,142+11	0.0	100
Monongahela River	U-2	0529	WV-00-17	Shady Creek	WV-15	8,962+11	8,962+11	0.0	3,022+11	3,022+11	0.0	3,022+11	3,022+11	0.0	100
Monongahela River	U-2	0530	WV-00-25	UPP/Brandy Run RW 0.27	WV-25	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0531	WV-00-25	Brandy Run	WV-25	3,772+11	3,772+11	0.0	4,962+11	4,962+11	0.0	3,772+11	3,772+11	0.0	100
Monongahela River	U-2	0532	WV-00-25	UPP/Brandy Run RW 0.22	WV-25	0.00+00	0.00+00	0.0	2,772+11	2,772+11	0.0	2,772+11	2,772+11	0.0	100
Monongahela River	U-2	0533	WV-00-21	Brandy Run	WV-21	3,022+11	3,022+11	0.0	3,772+11	3,772+11	0.0	2,022+11	2,022+11	0.0	100
Monongahela River	U-2	0534	WV-00-21	Monongahela River	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0535	WV-00-21	UPP/Monongahela River RW 108.91	WV-21	0.00+00	0.00+00	0.0	4,422+11	4,422+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0536	WV-00-21	Monongahela River	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0537	WV-00-21	UPP/Monongahela River RW 108.28	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0538	WV-00-21	Monongahela River	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0539	WV-00-21	UPP/Monongahela River RW 101.95	WV-21	0.00+00	0.00+00	0.0	4,422+11	4,422+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0540	WV-00-21	Monongahela River	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0541	WV-00-21	UPP/Monongahela River RW 101.95	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0542	WV-00-21	Monongahela River	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0543	WV-00-21	UPP/Monongahela River RW 92.47	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0
Monongahela River	U-2	0544	WV-00-21	Monongahela River	WV-21	0.00+00	0.00+00	0.0	3,022+11	3,022+11	0.0	0.00+00	0.00+00	0.0	0

- GIS shapefiles, along with Technical Report and Appendices, available on CD



# Public Comment

- Public Comment period ends 6/25/2018
- Documents may be reviewed/downloaded from DEP webpage: [www.dep.wv.gov/tmdl](http://www.dep.wv.gov/tmdl)
- CD available upon request – *CD includes GIS Shapefiles and Technical Report*
- Comments should be submitted to Mindy Ramsey at [Mindy.S.Ramsey@wv.gov](mailto:Mindy.S.Ramsey@wv.gov)
- Questions - contact Mindy Ramsey, Jim Laine, Mike McDaniel
- **(304) 926-0499 (Ext 1063, 1061, 1055)**
  - [Mindy.S.Ramsey@wv.gov](mailto:Mindy.S.Ramsey@wv.gov)
  - [James.C.Laine@wv.gov](mailto:James.C.Laine@wv.gov)
  - [Michael.L.McDaniel@wv.gov](mailto:Michael.L.McDaniel@wv.gov)

# Spreadsheet/GIS Demonstration

Discussion/Questions