The Impact of Drought on Water Quality in the Monongahela

WV Water Research Institute

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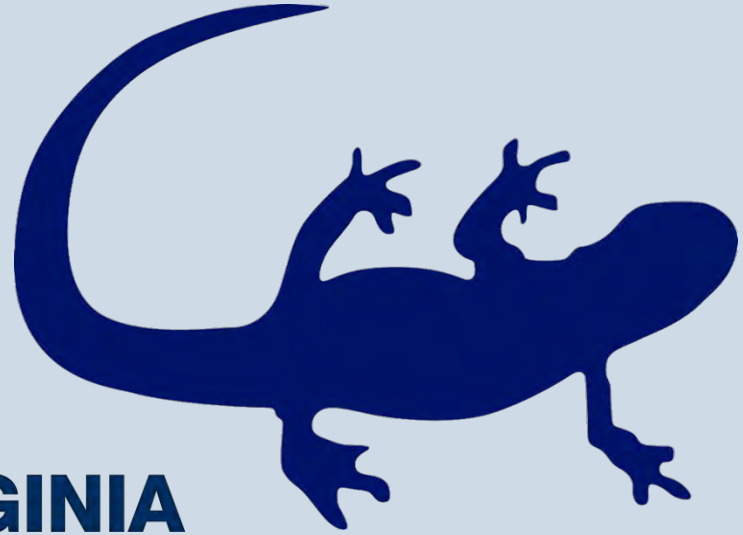

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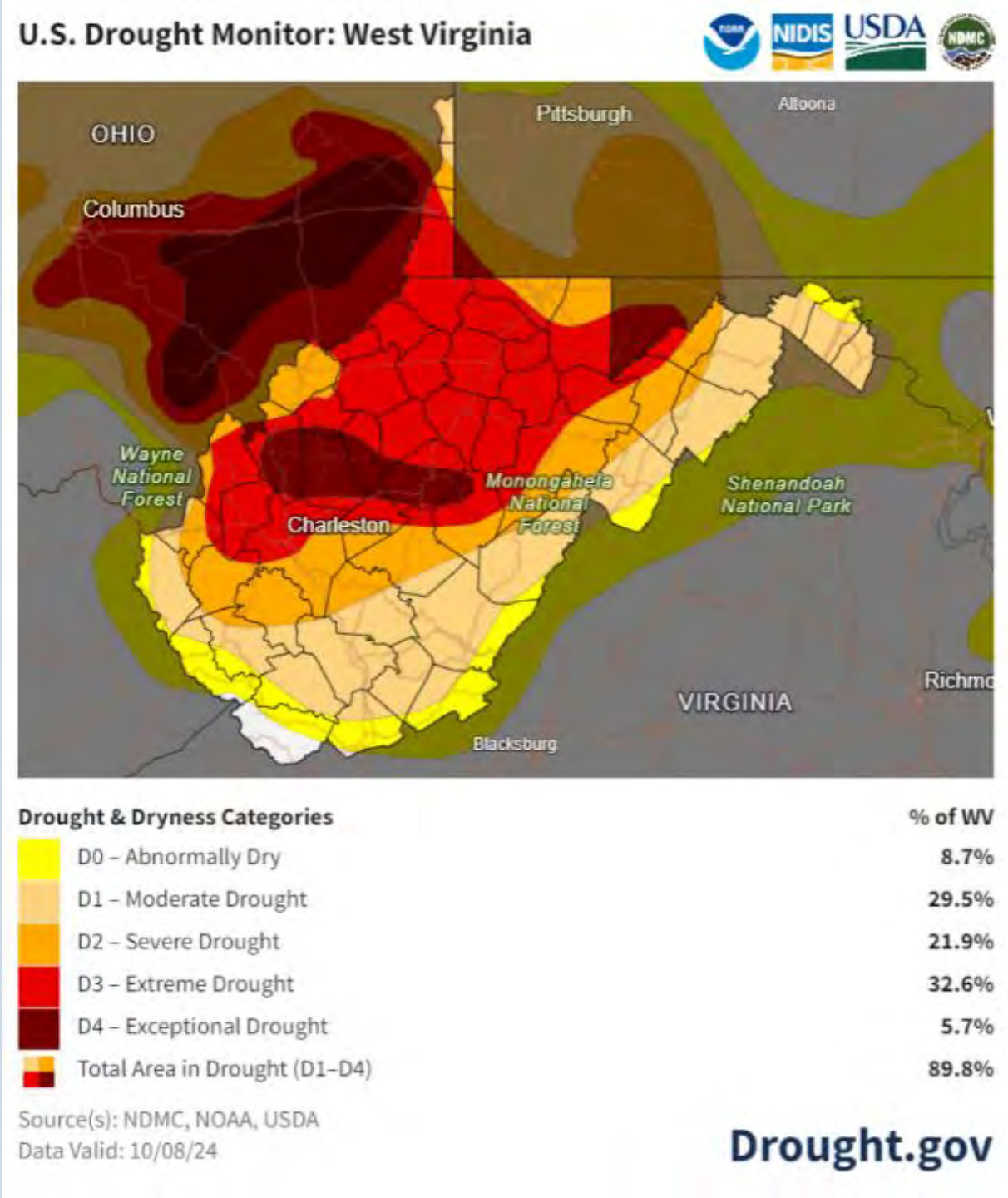
What is a Drought?

The prolonged period of abnormally low rainfall that results in a shortage of water.

- Types of drought
  - Meteorological
  - Agricultural
  - Hydrological
  - Socioeconomic

Droughts in West Virginia

- The Monongahela River is critical for drinking water, recreation, and wildlife habitat.
- Summer-Fall 2024: W.V. experienced one of the worst droughts in 25 years
  - Driest 18 months since 1987, straining water supplies and ecosystems
  - Decreased streamflow leading to the concentration of pollutants
  - 1.9M residents across 51 counties



Impacts of Drought

- Climate change may drive more frequent and severe droughts
- W.V. is predicted to have increased rain in the winter and spring

Water Quality Monitoring

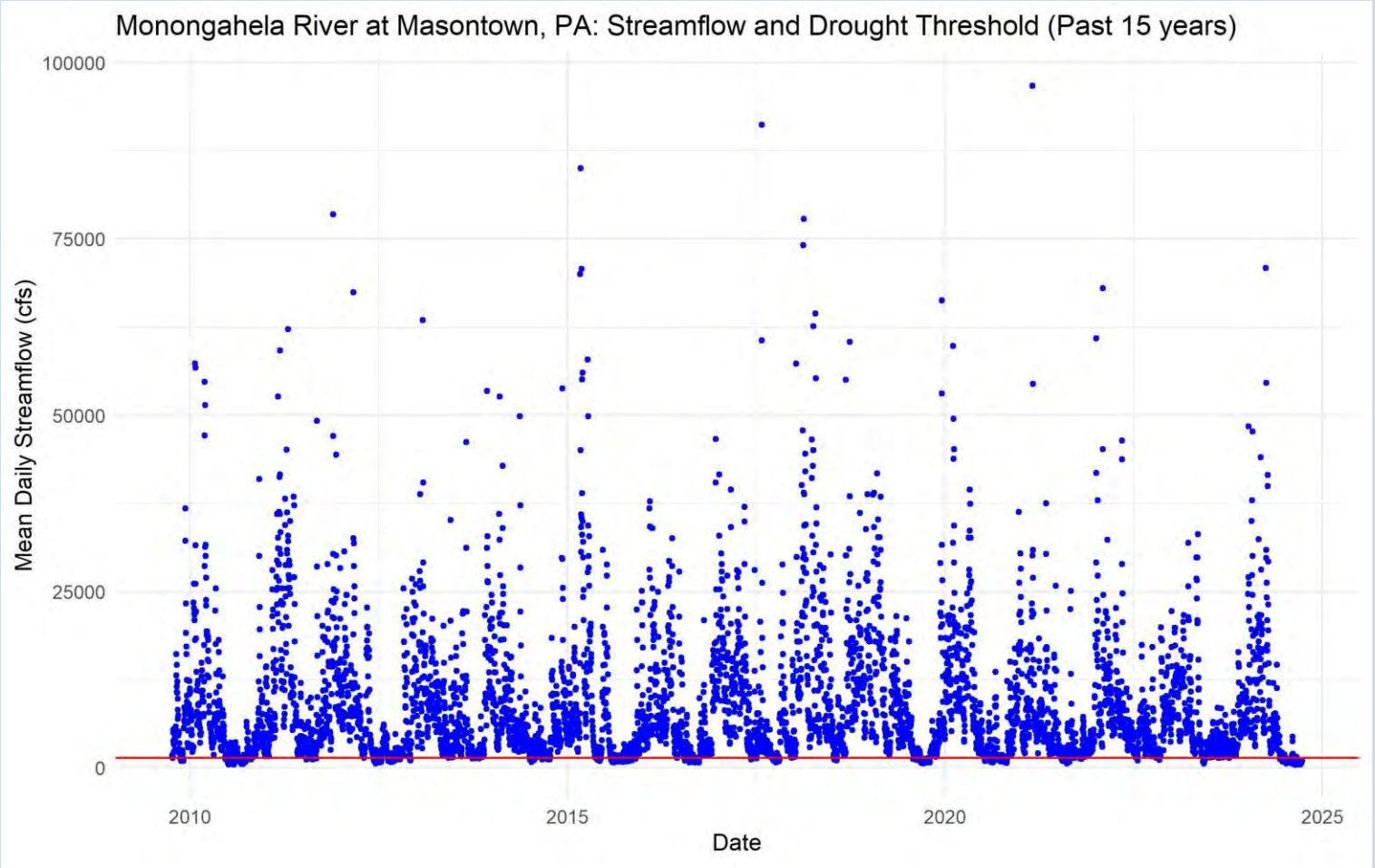
- 3 Rivers Quest (3RQ) conducts monthly sampling along the Monongahela and its tributaries
  - Total Dissolved Solids (TDS): concentration of dissolved minerals, salts, and organic materials. Higher TDS indicates impairment.
  - pH: used to measure the acidity and alkalinity
  - Heavy metals: iron and aluminum levels can become more concentrated during drought events

- Streamflow
  - The 2024 drought caused a sharp decline in flow levels
  - Decreased flow increases the concentration of TDS, directly impacting habitats and humans alike

Drought Threshold

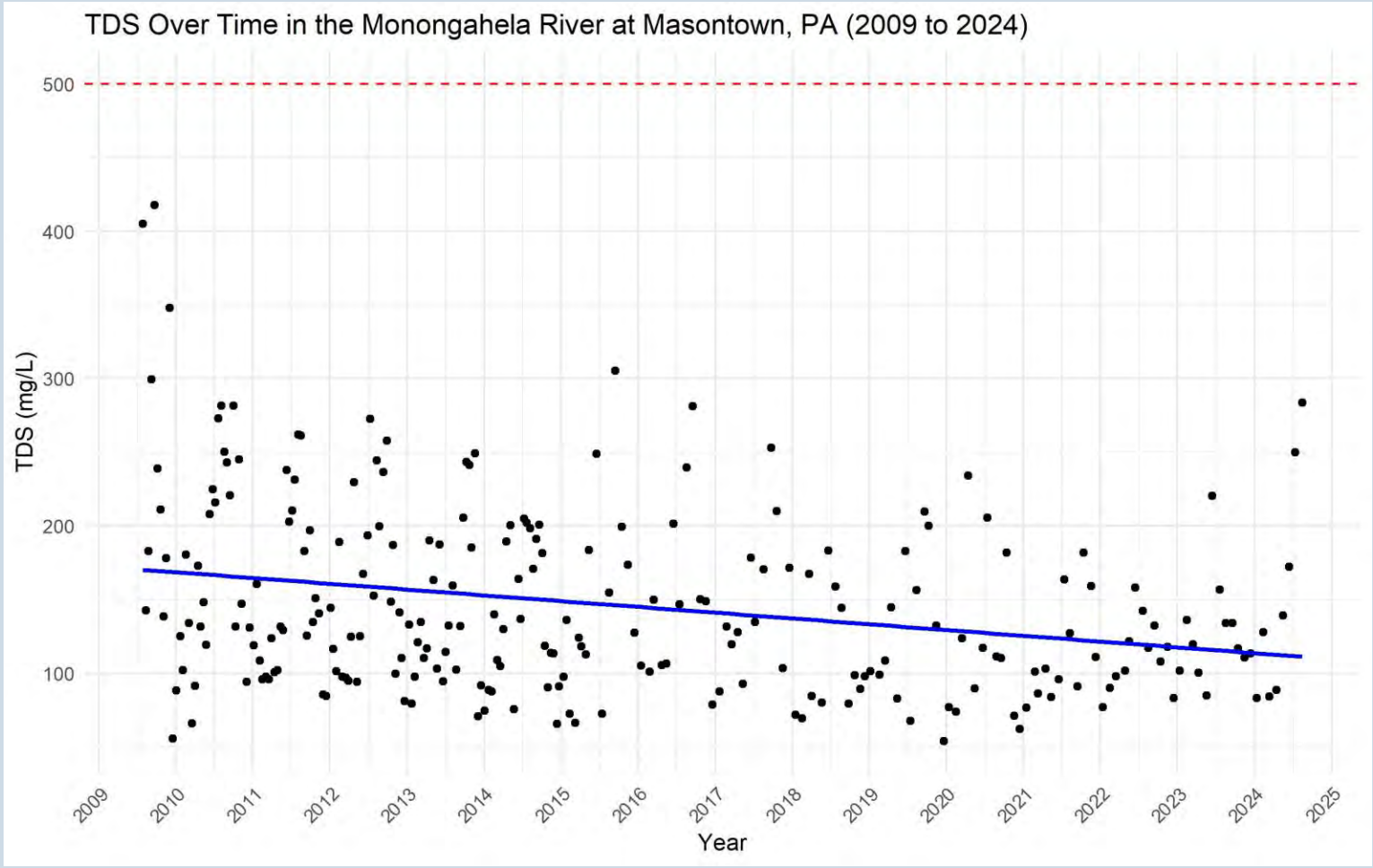
The point at which drought has reached a critical stage.

- Based on conditions such as temperature, soil moisture, precipitation, and streamflow
- Necessary for proactive water management and predicting times of increased risk
- 10th percentile calculations assess a specific environmental factor and display rarities
  - Anytime a data point falls below this, it can be classified as a drought



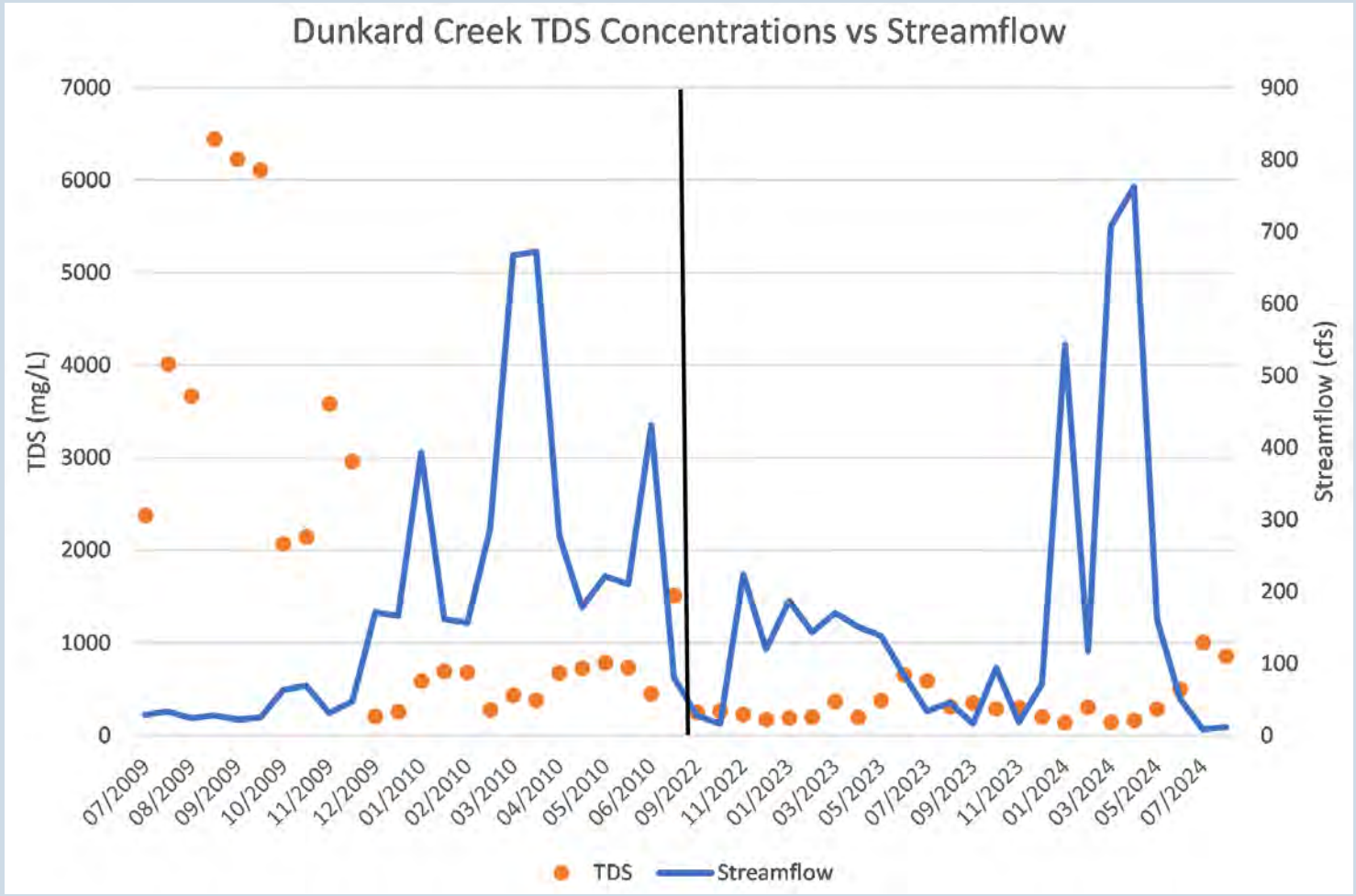
Total Dissolved Solids (TDS)

- TDS in the Monongahela has steadily decreased since 2009
- Voluntary Discharge Management Program
  - Targeted water quality management
  - Collaboration with coal companies
  - Proactive monitoring and intervention



Dunkard Creek Fish Kill

- 2009 fish kill across 37-miles of the creek
  - Toxic bloom of golden algae, killing almost all aquatic life
- Drought conditions led to this event, including the increased TDS from mine drainage
- This event led to increased awareness and efforts of improved water quality
  - Decreased TDS ever since and increased the Mon's resistance to drought



Accomplishments and the Future

- Identification of Causes:
  - WVWRI efforts have been crucial to TDS and water quality monitoring
- Collaborative Monitoring:
  - Working with other groups of differing backgrounds has aided in creating a comprehensive view of water quality for the watershed
- Restoration Efforts:
  - The Voluntary Discharge Management Plan efficiently decreased TDS concentrations
- Public Management and Education:
  - Data and research sharing, educating the public, and promoting stewardship increases public engagement

- 3RQ will continue monitoring and working with groups to maintain appropriate TDS levels
- To view the full StoryMap: https://arcg.is/1y0Oym3

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