Tonight's Agenda

- TMDL Overview – Jason Hill (VDEQ)
- TMDL Details – Raed El-Farhan and Djamel Benelmouffok (Berger Group)
- Question and Answer - All

DEQ
Virginia Department of Environmental Quality

Why Am I Here?

- Water Quality Problem = Special Study (TMDL)
  - Bacteria Standard Violations *(De-listed)*
  - Dissolved Oxygen Standard Violations
  - Biological Monitoring Indicates Stressed Community

- Need Community Participation to make the Study more Accurate

DEQ
VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

What is a TMDL?

TMDL = **T**otal **M**aximum **D**aily **L**oad

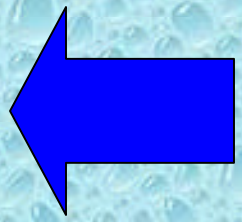
- The Amount of Pollution A Stream Can Receive and Still Meet Water Quality Standards
- A TMDL Study ID's All Sources of Pollution
- Calculate the Amount of Pollutants Entering the Waterbody from Each Source.
- Calculate the Reductions in Pollutants, by Source, Needed to Attain/Maintain Water Quality Standards.

Why Do A TMDL?

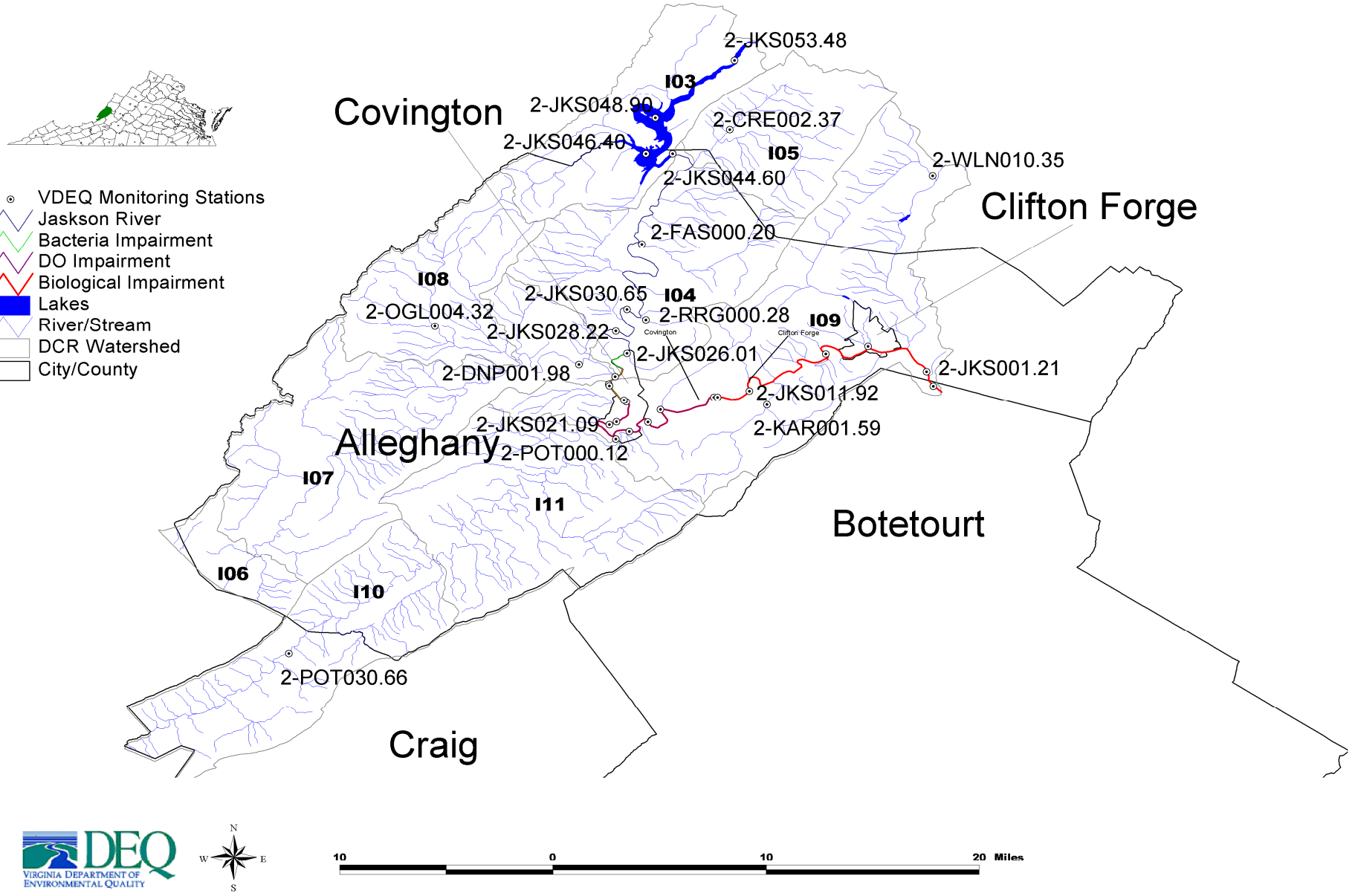
- 1972 Clean Water Act (CWA)
  - Periodic Assessment and Impaired Waters Listing
  - Develop TMDLs for Impaired Waters
- 1997 Water Quality Monitoring Information and Restoration Act (WQMIRA)
  - Requires TMDLs for Impaired Waters
  - Requires an Implementation Plan

TMDL Development Steps

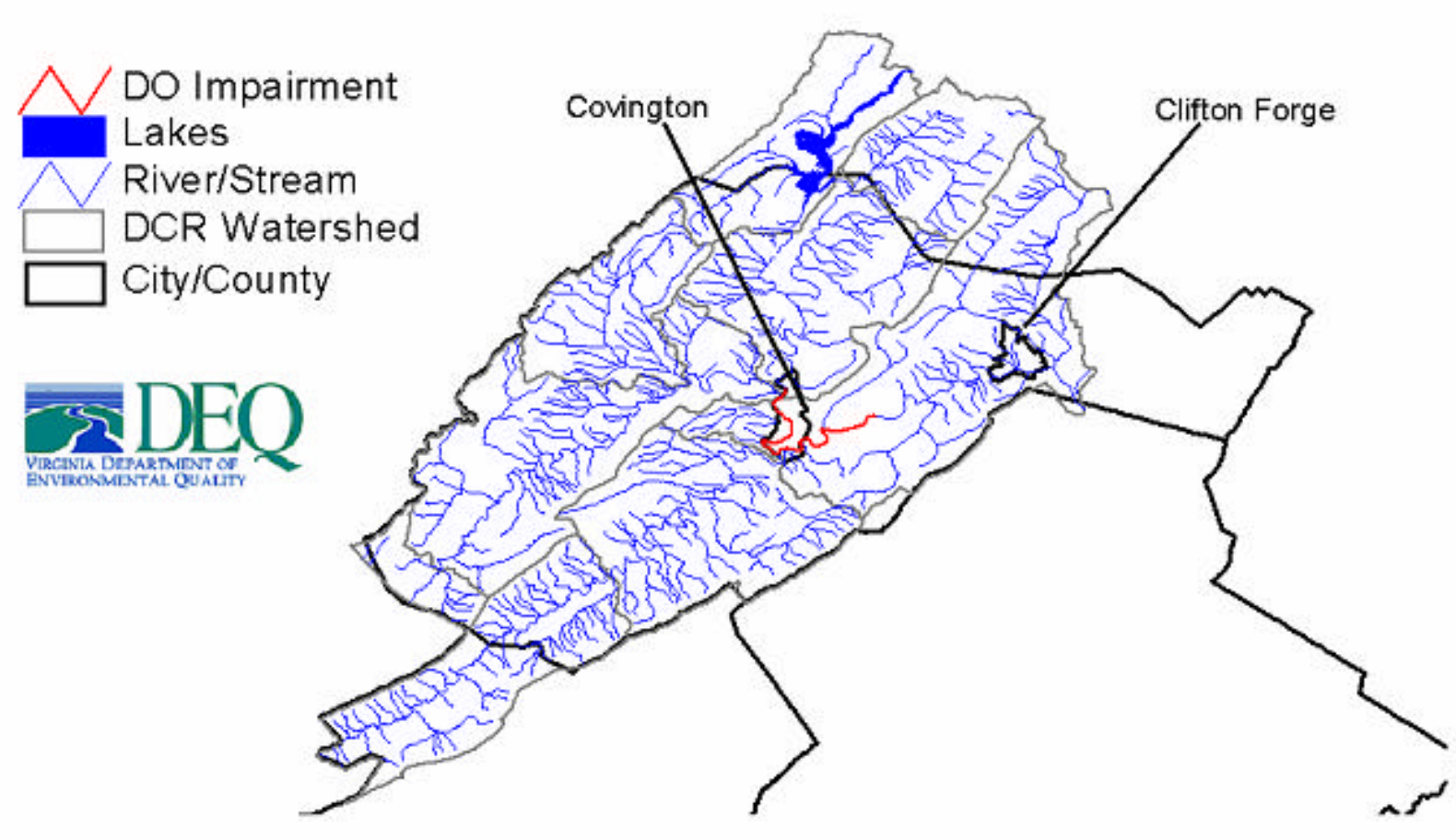
- Place impaired waters on 303(d) list due to water quality standards violations
- Develop TMDL(s) - for impaired waters (one per pollutant)
- Develop TMDL implementation plan
- Implement TMDL
- Remove waters from 303(d) list when water quality standards achieved



Jackson River TMDL Study Area

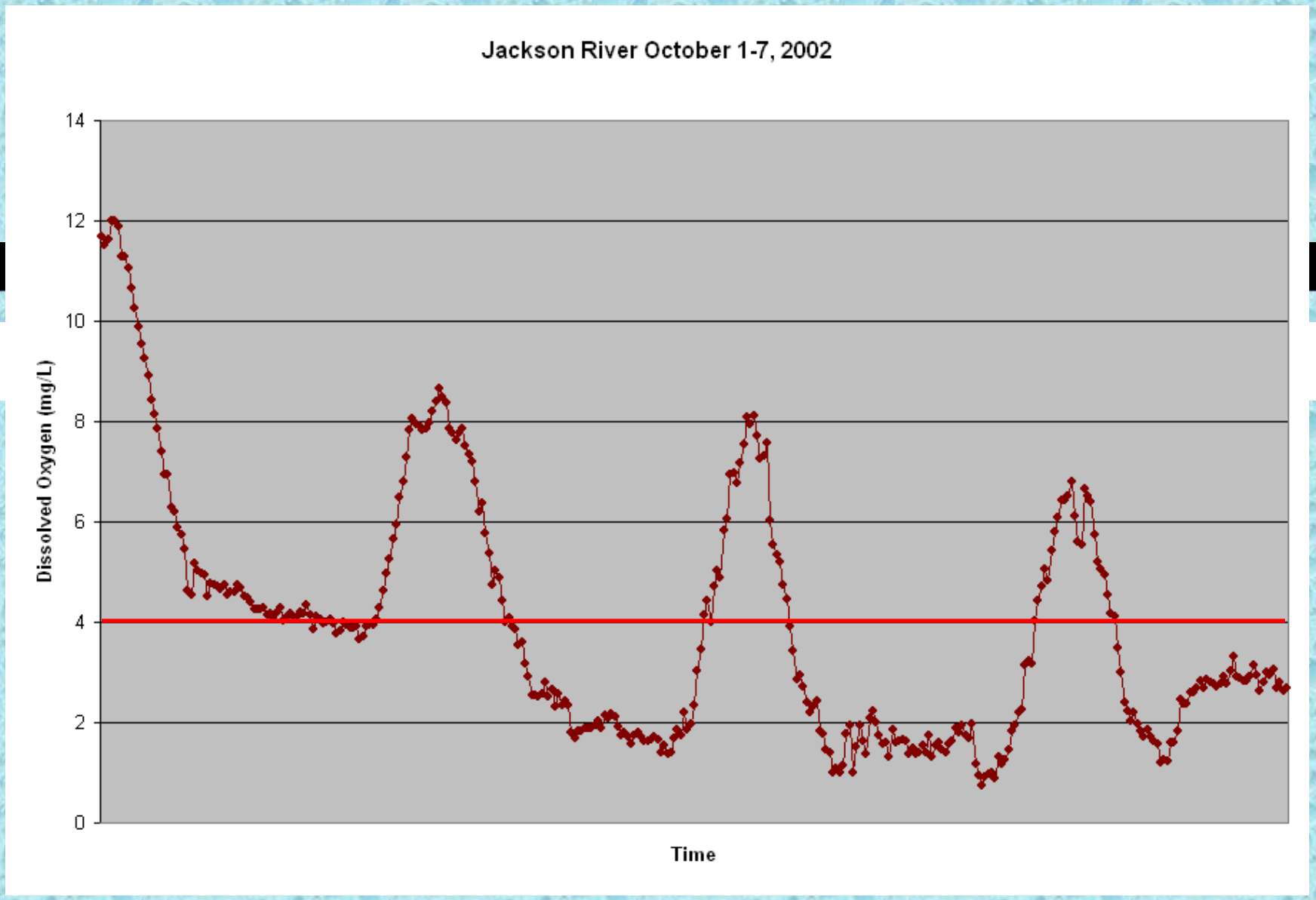


Dissolved Oxygen



11.21 mile segment was listed for low dissolved oxygen (not supporting aquatic life use). Diurnal DO recorders during early fall in the past have found large diurnal swings.

Dissolved Oxygen



Biological Impairment

24.21 mile segment was listed as not supporting aquatic life use using biological monitoring data.

Biological Monitoring

A tool for detecting environmental impacts that are too subtle to be detected by standard chemical monitoring networks

Why? General Standard => "*all state waters shall be free from substances... which are harmful to aquatic life*"

- **Benthic macroinvertebrate communities reflect overall ecological integrity (chemical, physical, biological)**
- **Chemical monitoring can miss periodic pollution events and does not assess habitat quality**

When impairments are discovered, an in-depth investigation must be completed to identify the source(s) of the impairment (TMDL)

Intolerant Organisms

Mayfly

Stonefly

Caddisfly

Water Penny

Riffle Beetle

Moderately Tolerant Organisms

Crayfish

Dragonfly

Netspinning Caddisfly

Aquatic Sowbug

Cranefly

Stressor Development

Reviewed of Biological, Habitat and Chemical Data

Primary Stressors:

- Nutrients (Nitrogen and Phosphorus)
- Excess Peripyton Growth

TMDL Results

To Reach TMDL Goal of 100mg/m^2 of peripyton during growing season

Nutrient Limits at Permitted Facilities:

- MWV – (3.7 mg/L TN, 0.021 mg/L ortho-P)
- Covington STP – (6.0 mg/L TN, 0.5 mg/L TP)
- Clifton Forge STP – Closed (going to lower Jackson)
- Lower Jackson STP – (6.0 mg/L TN, 0.5 mg/L TP)
- Low Moor STP – (14.0 mg/L TN, 1.15 mg/L TP)

Alter Flow Regime to Mimic Storm Events

Monitoring Plan

216 Special Study (2010-2012)

- Bimonthly: Solids, Nutrients, DO, pH, Conductivity, Temp
- Biannual: Metals, Peryipyton Samples
- Biannual: Macroinvertebrate monitoring (flow dependant)
- Annual Fish Community monitoring

Current Conditions

Already seen significant decrease in phosphorus loads, which improved water quality

Biomonitoring Results:

	Impaired Sites (1994-2003)			
	City Park	Route 18	Low Moor	Dabney Lancaster
Average (n=12-15)	29.4	45.0	38.8	41.5
	Impaired Sites (2004-2007)			
	City Park	Route 18	Low Moor	Dabney Lancaster
Spring 2004	57.4		40.3	54.5
Fall 2004	48.8	67.3	38.6	58.8
Fall 2006	33.3	50.3	57.6	68.4
Spring 2007	32.9	57.0	36.7	64.3
Average (n=3-4)	43.1	58.2	43.3	61.5

Dissolved Oxygen Results:

- DO levels now above minimum standards even during the drought with flow variance (100 cfs)
- Diurnal swings 2-3 mg/L per day instead of 6-8 mg/L
- Model output show nutrient reduction reduces DO swings

Contact Info

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Presentations:
http://www.deq.virginia.gov/tmdl/mtgppt.html
Reports:
https://www.deq.virginia.gov/TMDLDataSearch/DraftReports.jspx