Fact Sheet:
The TMDL Program Results Analysis Project

For much of the Total Maximum Daily Load (TMDL) program's history, it has been challenging to track program progress and related environmental improvements. Tens of thousands of TMDLs have been developed in recent years, but an unknown number of these have been implemented on the ground. Impaired waters recovery often takes several years, and monitoring can be complex and costly – thus many results may not have occurred yet, or are undocumented. Further, implementing a TMDL often involves numerous pollution control practices subsequent to completing the TMDL, and it can be difficult to pinpoint the causes of success or failure as TMDL-related. In fact, a TMDL is a technical plan, one stage in a sequence by which other programs implement that plan – thus, what specifically are TMDL program results?

Results Analysis involves assessing environmental outcomes, their probable causes, and programmatic progress in order to generate the insights needed to make program improvements. The EPA's National TMDL Program is conducting the ***TMDL Program Results Analysis Project*** to assess impaired waters program progress at stages before, during, and after the TMDL program, and provide insights for TMDL program improvement. The project focuses on building and analyzing evidence of program performance in 303(d) listing, TMDL development, approved TMDL alternatives (e.g., category 4b projects), implementation of permits and non-point pollution management practices, and post-project monitoring. Results analysis will help us make program improvements based on evidence of environmental results and their probable causes.

The project's basic approach follows four steps:
1. ***Identify expected program results*** *(see Fig. 1),* the state of knowledge about them, and gaps
2**. *Identify key program elements and measures*** (*see Fig. 2)* and ways for analyzing them
3. ***Carry out program analysis*** and interpret informative patterns
4. ***Assess implications for the program*** to support decisions and improvements

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Figure 1: Results expected of the Clean Water Act impaired waters program

Environmental Outcomes:
► more recovered waters
► more incremental progress on recoveries
► minimal new impairment rates
► optimized timing to maintain aquatic resources

Programmatic Features:
► adequate program milestones and tracking
► restoration partners
► documentation of impairments and recovery cases
► efficient program spending

Explanatory Insights:
► scientific explanations of recoveries
► plausible links of outcomes to CWA/TMDLs

Figure 2: Three types of results measures

Environmental response measures: changes in waterbody condition; environmental outcomes.
Example: # of waters with fully implemented TMDLs in State X showing improvement after two years

Programmatic progress measures: work completed in successive stages of the TMDL program process.
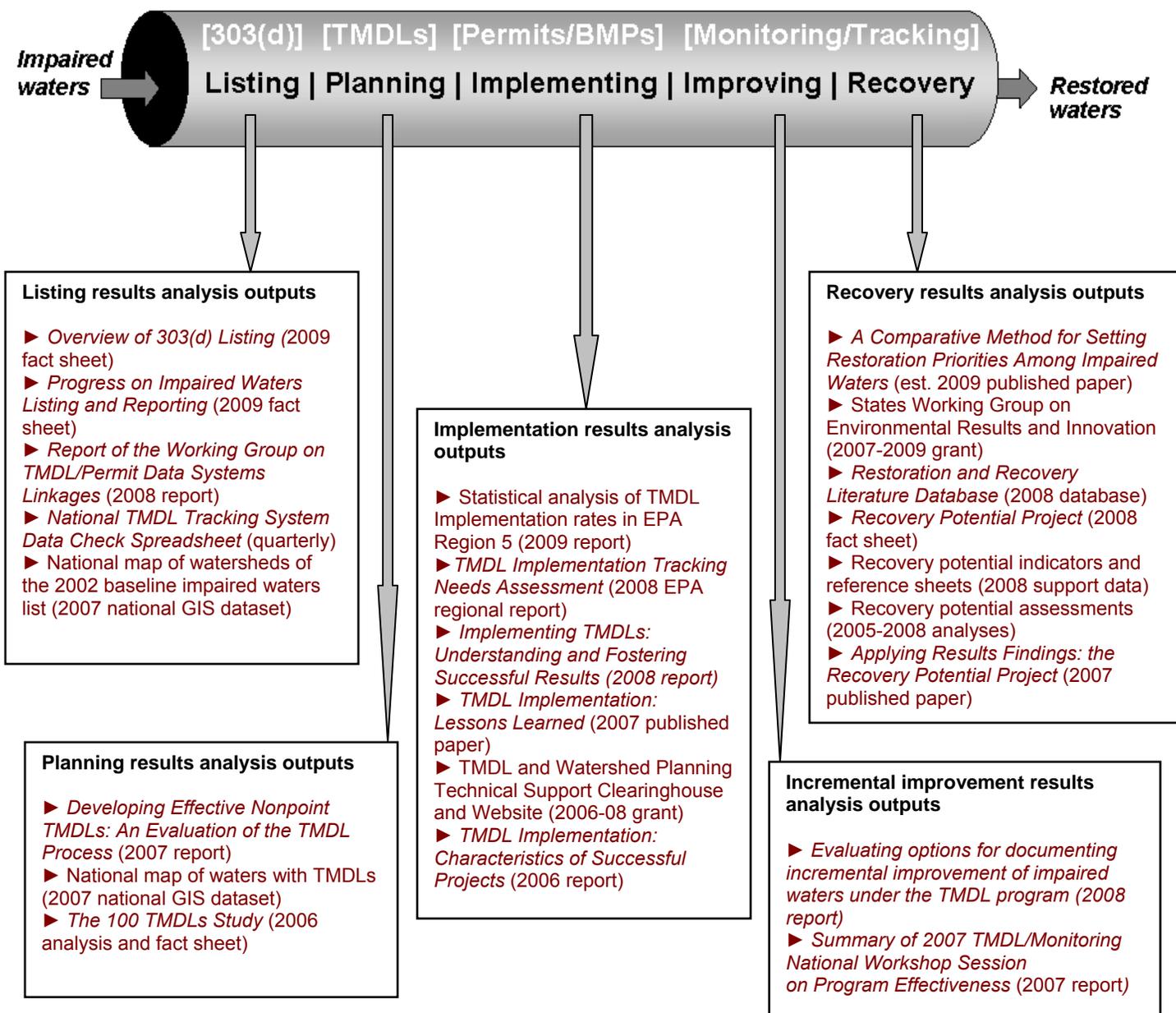*Example: % of Region A's TMDLs with Implementation Plans and NPDES Permits that implement the TMDL*

Explanatory measures: watershed traits or other factors that may influence the observed environmental change.
Example: % of improved or restored waters with active watershed organizations and a watershed plan

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The TMDL Program Results Analysis Project is carrying out new results assessments from existing EPA and other databases while also integrating with existing EPA activities that track results. Although the EPA Strategic Plan officially is the source for water program tracking measures (www.epa.gov/water/waterplan), these general measures are at the national scale and mostly address broadly grouped programs (e.g., overall surface water protection programs). The TMDL Program Results Analysis Project complements the Strategic Plan by focusing more specifically on the TMDL program's role (see Fig. 3) in the impaired waters program, and investigating results patterns at regional, statewide and local scales. In this manner, the project has been able to utilize more diverse data at less expense in the following activity areas (over):

Figure 3: The Clean Water Act's impaired waters program pipeline is a simplified graphical representation of how impaired waters are restored in a step sequence involving TMDLs and other program actions. TMDL program results analysis has addressed all these stages in order to better understand TMDL results in a broader context.

Impaired waters → **[303(d)] [TMDLs] [Permits/BMPs] [Monitoring/Tracking]**
Listing | Planning | Implementing | Improving | Recovery → *Restored waters*

Listing results analysis outputs

► *Overview of 303(d) Listing (*2009 fact sheet)
► *Progress on Impaired Waters Listing and Reporting* (2009 fact sheet)
► *Report of the Working Group on TMDL/Permit Data Systems Linkages* (2008 report)
► *National TMDL Tracking System Data Check Spreadsheet* (quarterly)
► National map of watersheds of the 2002 baseline impaired waters list (2007 national GIS dataset)

Planning results analysis outputs

► *Developing Effective Nonpoint TMDLs: An Evaluation of the TMDL Process* (2007 report)
► National map of waters with TMDLs (2007 national GIS dataset)
► *The 100 TMDLs Study* (2006 analysis and fact sheet)

Implementation results analysis outputs

► Statistical analysis of TMDL Implementation rates in EPA Region 5 (2009 report)
► *TMDL Implementation Tracking Needs Assessment* (2008 EPA regional report)
► *Implementing TMDLs: Understanding and Fostering Successful Results (2008 report)*
► *TMDL Implementation: Lessons Learned* (2007 published paper)
► TMDL and Watershed Planning Technical Support Clearinghouse and Website (2006-08 grant)
► *TMDL Implementation: Characteristics of Successful Projects* (2006 report)

Recovery results analysis outputs

► *A Comparative Method for Setting Restoration Priorities Among Impaired Waters* (est. 2009 published paper)
► States Working Group on Environmental Results and Innovation (2007-2009 grant)
► *Restoration and Recovery Literature Database* (2008 database)
► *Recovery Potential Project* (2008 fact sheet)
► Recovery potential indicators and reference sheets (2008 support data)
► Recovery potential assessments (2005-2008 analyses)
► *Applying Results Findings: the Recovery Potential Project* (2007 published paper)

Incremental improvement results analysis outputs

► *Evaluating options for documenting incremental improvement of impaired waters under the TMDL program (2008 report)*
► *Summary of 2007 TMDL/Monitoring National Workshop Session on Program Effectiveness* (2007 report)

Additional overview and synthesis products from this project include
• TMDL Program Results Analysis Website at http://www.epa.gov/owow/tmdl/results/
• Results Analysis Fact Sheet 1 (*Overview*) and 2 (*Impaired Waters Program Pipeline*)
• *The TMDL Program Results Analysis Project: Matching Results Measures With Program Expectations* (2006 white paper)
• *Results Analysis Measures and Methods Report (2006 report)*
• *WEFTMDL2007. Introspection at EPA: Evaluating TMDL Program Results (*six paper session*)*
• *The TMDL Program Results Analysis Project (2008 publication in WaterPractice Journal)*

For more information, contact the TMDL Program Results Analysis Project Leader (Doug Norton, Watershed Branch norton.douglas@epa.gov)

Results Analysis: Improvements with Evidence, not Decisions without Data