Center for Environmental Excellence by AASHTO
Stormwater Management Community of Practice (CoP)

STATE-OF-THE-PRACTICE REPORT:
TMDLs

March 2010

AMERICAN ASSOCIATION OF
STATE HIGHWAY AND
TRANSPORTATION OFFICIALS
AASHTO
THE VOICE OF TRANSPORTATION

CENTER FOR ENVIRONMENTAL EXCELLENCE BY AASHTO STORMWATER MANAGEMENT COMMUNITY OF PRACTICE

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INTRODUCTION

The Center for Environmental Excellence by AASHTO has established a Stormwater Management Community of Practice (CoP). The purpose of the Stormwater Management CoP is to create a forum where State Department of Transportation (DOT) practitioners can engage in facilitated discussions on emerging issues, research data needs, and innovative stormwater quality compliance solutions. The CoP has two primary goals, the first of which is to extend each state DOT's network and contacts, enabling them to share experiences and engage in technology transfer. In this regard, the program is a continuation of efforts that were initiated June 23–25, 2008 at the First National AASHTO Stormwater conference that was held in San Diego, California. The second goal is to develop a State-of-the-Practice Report (this document) on a selected focus topic. The Stormwater Management CoP consists of representatives from 16 state DOTs, the Federal Highway Administration (FHWA), and the Federal Transit Administration (FTA). The Stormwater Management CoP members agreed that total maximum daily load (TMDL) Compliance should be the top priority for this phase of the CoP. A number of state DOTs are currently named stakeholders or potential stakeholders in TMDLs.

A TMDL is a calculation of the maximum amount of a pollutant that a waterbody can receive (on an average daily basis) and still meet water quality standards. TMDLs are determined using waste load allocations (WLAs) and load allocations (LAs). Municipal Separate Storm Sewer Systems (MS4s), including DOTs, may be assigned WLAs and/or LAs for an approved TMDL for one or more pollutants for an impaired waterbody. WLAs are assigned for point source pollutants, where the source of the contaminant is direct and known. LAs are assigned for non-point source pollutants, where the source of the contaminant is indirect and unknown, such as aerial deposition. WLAs and LAs are defined based on the number of allowable days where concentrations of indicators exceed the single sample standard. For each waterbody, the number of allowable exceedance days is set on a specific schedule, such as weekly, monthly, or annually. LAs are typically phased in over a defined period, with load reductions increasing until the target is reached.

This state-of-the-practice report summarizes the discussions of CoP members who spoke as individual members of the community and does not necessarily represent their agency's views or positions. In addition, the contents of this report do not necessarily represent the views or positions of AASHTO or the Center for Environmental Excellence, FTA, or FHWA.

WLAs and LAs for a TMDL are calculated as follows:

> TMDL = Numeric Target x Critical Flow
>
> TMDL = LA for Nonpoint Source (e.g., direct aerial deposition) + WLA for publicly owned treatment works (e.g., water treatment plant) + WLA for stormwater + Margin of Safety
>
> WLA for stormwater = MS4 permit requirement + DOT permit requirement + Construction General Permit requirement

Due to their linear nature, DOTs cross many waterbodies that may be named as a stakeholder in multiple TMDLs throughout a state. The discussion in this report includes federal 303(d) list stormwater quality requirements, challenges, current state-of-the practice of state DOTs, and research needs.

BACKGROUND

U.S. EPA Regulations

The Clean Water Act (CWA) was implemented through the U.S. Environmental Protection Agency's (U.S. EPA's) National Pollutant Discharge Elimination System (NPDES) "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters" and requires control of construction site stormwater runoff water quality using best management practices (BMPs). Under section 303(d) of the CWA, states are required to develop lists of impaired waters for which technology-based regulations and other required controls are not stringent enough to meet the water quality standards set by states. The law requires that states establish priority rankings for waters on the lists and develop TMDLs for these waters.

According to the U.S. EPA, water quality standards for waterbodies consist of designated uses, water quality criteria to protect these designated uses, an antidegradation policy to maintain and protect existing uses, and general policies to address implementation issues. States are required to adopt water quality standards and determine which must be restored, and the pollutant reduction needed to meet receiving water standards. The CWA requires that each state monitor and assess the health of all its waters and report its findings every two years to the EPA.

Section 303(d) requires states to use monitoring data to develop lists of "water quality limited segments" (waters not meeting water quality standards for a particular pollutant even after a technology based permit is in place). States must develop TMDLs for every waterbody/pollutant combination on the 303(d) List. The TMDL represents a calculation of the maximum amount of a pollutant allowed to enter a waterbody (also known as the assimilative load capacity) so that the waterbody will meet and continue to meet water quality standards for that pollutant. The TMDL allocates that load to point sources (WLAs) and nonpoint sources (LAs), which include both manmade and natural background sources of the pollutant.

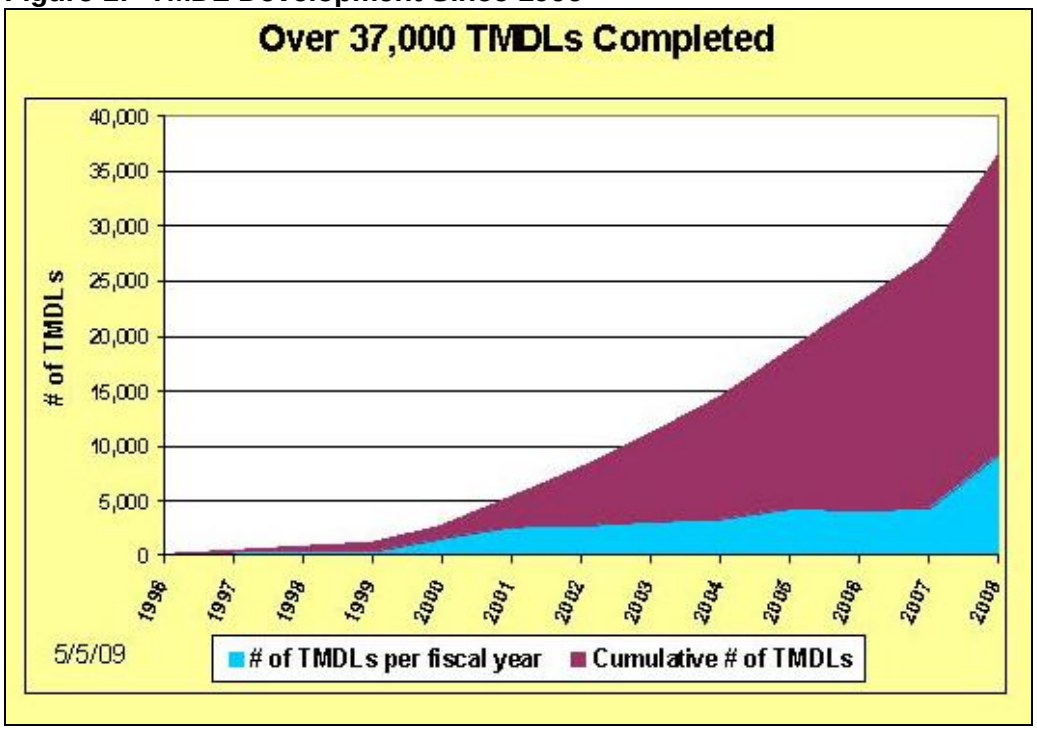
STATE-OF-THE PRACTICE: TMDLs

TMDLs are prescribed in Section 303 of the CWA as a fail-safe to bring jurisdictional waters that are impaired by one or more pollutants into compliance with the standards set by states for the beneficial uses of those waters. The number of waterbodies listed as 'impaired' nationally doubled from 21,749 in 1998 to 43,446 in 2008 (Taylor, 2009). According to the U.S. EPA (2009a), the leading causes of impairments are:

- Pathogens
- Mercury
- Metals
- Nutrients
- Sediment
- Polychlorinated biphenyls (PCBs)

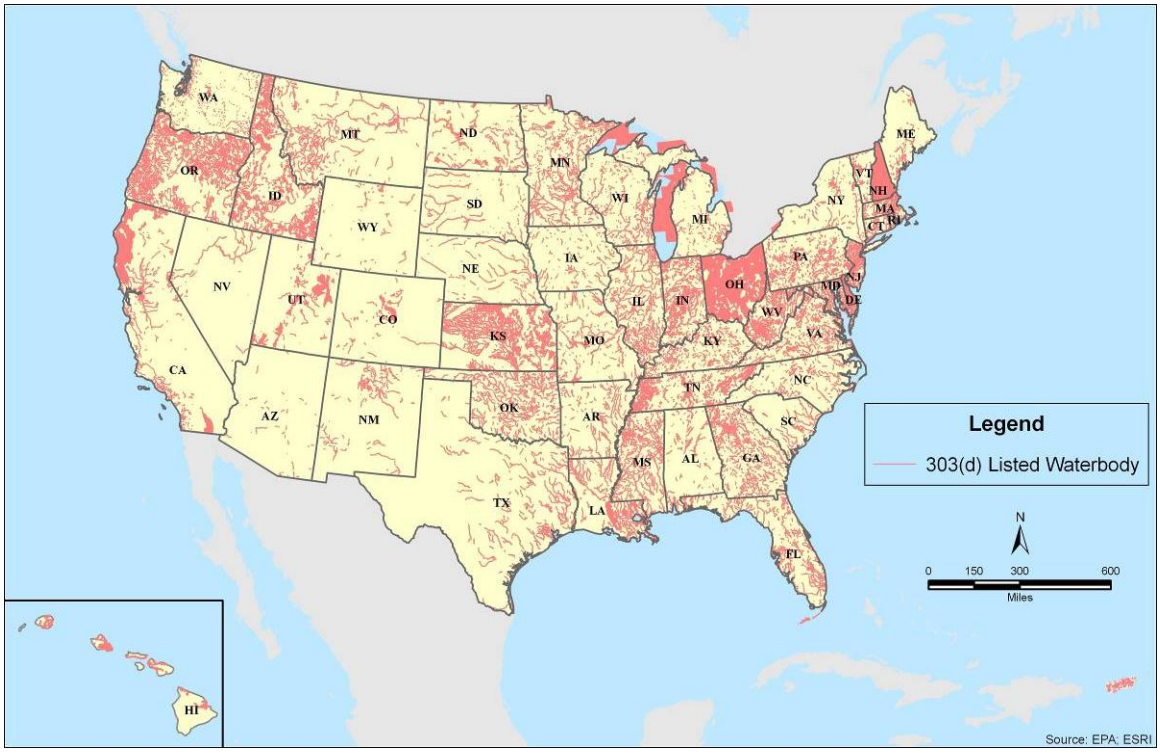
Figure 1 illustrates the rate of increase in TMDL development by the states for impaired water bodies since about 1996. As more and better receiving water quality data becomes available, more waterbodies will be listed as impaired and subsequent TMDL development will become ever more important for DOT stormwater programs.

Figure 1: TMDL Development Since 1996



Source: U.S. EPA, 2009

Water Quality Assessment and Total Maximum Daily Loads Information (ATTAINS) provides information reported by the states to U.S. EPA about the conditions in their surface waters. This information is required every two years under CWA Sections 305(b) and 303(d). Figure 2 shows 303(d) listed water bodies across the United States.



DOTs do not have a broad base of experience in developing TMDLs or participating in the development of implementation plans since most states are just beginning the TMDL implementation process. DOTs that are a named stakeholder in a TMDL, or could potentially become a named stakeholder in a TMDL must participate in the TMDL process led by the state environmental agency or the EPA. Some basic recommendations for working with the regulatory agency in the development of a TMDL include:

- **Collaborative approach.** A collaborative approach for TMDL development and implementation with other stakeholders is highly recommended, since many source and treatment reduction approaches will benefit from economies of scale, and shared costs for measures, such as public education, can reduce the overall implementation cost and increase the effectiveness of the activity.

- **Participate early.** DOTs should participate early in the TMDL development process to avoid being assigned a WLA if the DOT is not a contributor of the pollutant (or is a de minimis contributor), or to ensure the allocations prescribed for the DOT are equitable. It is important to determine the level to participate, based largely on the WLA to be expected, since a DOT may have many TMDL processes proceeding in parallel.

- **Provide good science.** Some of the receiving water impairments and subsequent TMDL listings are based on data that is sparse or of questionable precision. It is imperative that load modeling and WLAs are correct, since reduction of a constituent in stormwater runoff is an expensive undertaking, and becomes increasingly costly as the concentration of the constituent in runoff is reduced. The DOT may be operating in a very high marginal cost removal range for constituents that do not have a direct source within the right-of-way (ROW).

Water Quality Credit Trading

Water quality credit trading for TMDL compliance may be an important tool for DOT TMDL compliance. DOTs have limited ROW to construct treatment controls for TMDL compliance. The DOT may have relatively low concentrations of the constituent of concern in their discharge, making removal costs relatively high. A credit-trading program may ultimately be the most cost-effective method for a DOT to comply with TMDL requirements.

Transportation agencies may be named as stakeholders in TMDLs for constituents that are not generated within the ROW or are present at very low concentrations. This means there are very limited options for constituent reduction. An example is the TMDL for pathogens, the leading cause of impairment of waterbodies in the U.S. Pathogens have few sources within the controlled-access environment of the highway. Highways may show high levels of bacteria indicators in runoff, but there is no documented correlation between the number of indicator organisms and pathogens in stormwater runoff (Caltrans, 2002). Further, few BMPs can be employed in the highway environment that are effective in the removal of pathogens. As a result, for a DOT named in a pathogen TMDL, compliance strategies are limited unless credit trading is available.

Credit trading may also be beneficial to help ensure that resources for environmental improvement are spent efficiently. For example, nitrogen is commonly found in highway runoff, albeit at relatively low levels (the mean value of Total Kjeldahl Nitrogen [TKN] in highway runoff in California is about 2.1 milligrams per liter [mg/L], Caltrans, 2003). Nitrogen is highly soluble and consequently difficult to remove from stormwater runoff.

A study was completed in Atlantic Beach, Florida to assess strategies for meeting nutrient TMDL requirements. The study found that the total cost for nitrogen removal at waste water treatment plants (capital and operation and maintenance [O&M] costs) ranged from $31 per kilogram (kg) to $52/kg, depending on the type of treatment plant (Kaluzniak, et al., 2008). Contrast these values with the cost estimated for removal of nitrogen from stormwater of from $12,000 to $16,500 per kilogram. Clearly, the cost advantage of treating the wastewater is exceptional, and ancillary environmental benefits, such as treating a perennial flow source instead of an episodic flow, may be desirable but hard to quantify. It was also interesting to note that, in this same study of the St. Johns River, municipal stormwater accounted for about four percent of the total nitrogen load to the receiving water.

Credit trading requires extensive coordination within a watershed to operate effectively. The EPA (2009) notes that credit trading can be an effective approach to TMDL compliance in some circumstances where:

> 1) there is a "driver" that motivates facilities to seek pollutant reductions, usually a TMDL or a more stringent water quality-based requirement in an NPDES permit;
>
> 2) sources within the watershed have significantly different costs to control the pollutant of concern;
>
> 3) the necessary levels of pollutant reduction are not so large that all sources in the watershed must be reduced as much as possible to achieve the total reduction needed— in this case, there may not be enough surplus reductions to sell or purchase; and
>
> 4) watershed stakeholders and the state regulatory agency are willing to try an innovative approach and engage in trading design and implementation issues.

The findings below summarize selected states' internal programs for meeting the requirements of TMDLs for which they have been named. This information is summarized in Table 1. DOTs have to comply with TMDL requirements, because their facilities and the roads on which they work are, by definition, point sources for various constituents for which TMDLs have been named. Unfortunately, DOTs are often also required to meet TMDL requirements for pollutants that are included in their discharge but for which the DOTs are not directly responsible, such as pathogens. Some of the more common constituents for which many DOTs have been assigned WLAs include:

- Metals: cadmium, copper, lead, zinc, selenium, cadmium, chromium, mercury, total suspended solids (TSS), total dissolved solids (TDS), boron and chloride (salts), sulfate
- Nutrients: dissolved oxygen, nitrogen, phosphorus
- Pathogens: bacteria, fecal coliform, *E. coli*, enterococci
- Sediment
- Toxics: chlorpyrifos, diazinon, organophosphate pesticides, chlordane, dieldrin, dichlorodiphenyltrichloroethane (DDT), PCBs, toxaphene, organochlorinated compounds

As shown in Table 1, about half of the DOTs are currently or anticipate being involved in TMDLs.

Table 1: Summary of TMDLs for DOTs (selected) those have been named a Stakeholder

State DOT	Constituents of Concern for which a TMDL has been (or may be) Named for the State DOT			
	Nutrients	Toxics/ Metals	Sediment	Pathogens
California (Caltrans)	♦	♦	♦	♦
Colorado (CDOT)			♦	♦
Delaware (DelDOT)	♦	♦		♦
Florida (FDOT)	♦			♦
Georgia (GDOT)				
Illinois (IDOT)		♦		
Maine (MaineDOT)				
Michigan (MDOT)	♦			♦
Minnesota (MNDOT)				
New York State (NYSDOT)	♦			♦
North Carolina (NCDOT)	♦			♦
Texas (TxDOT)				♦
Washington (WSDOT)	♦	♦		♦

STATE-OF-THE PRACTICE: SELECTED STATE GENERAL PROGRAM INFORMATION

The findings below provide information on state-of-the-practice for TMDL compliance programs in the United States as practiced by selected DOTs.

California Department of Transportation (Caltrans)

Generally, Caltrans identifies the lack of TMDL integration as a problem for stakeholders. TMDLs are released sequentially for the same watershed, inhibiting efficient implementation planning. Caltrans has also identified some other program issues:

- TMDLs are a primary driver of stormwater programs in California. Caltrans is currently named in 45 TMDLs, and they anticipate this number will rise to 200 in the next five years. Metals, trash, pathogens, sediment, and nutrients are the most common causes of impairment. Regional monitoring participation, local stakeholder level collaboration, research in BMP retrofits and controls and enhanced institutional controls are the primary implementation strategies. Caltrans is participating in all TMDL development phases, from planning through various stages of implementation.

  Load reduction can reach a plateau quickly, in terms of dollars per pound of constituent removed. DOTs need to keep careful records of costs for TMDL compliance to make informed decisions throughout the TMDL implementation process. The DOT needs to continuously track the cost per unit of constituent removal during each target load reduction phase, understanding that costs will rapidly increase in the later phases of a TMDL. For example, Caltrans is named in a trash TMDL in the Los Angeles area. Initial trash reduction targets were met through public education (the “Don’t Trash California” campaign); subsequent

phase reductions are being met through the construction of gross solids removal devices (GSRDs) by using enhanced maintenance controls and enhanced litter pickup. Caltrans reached a BMP implementation plateau at about a 40% trash load reduction target; marginal increases in load reduction beyond this target are becoming increasingly expensive on a cost per unit basis.

- Caltrans also notes that there are constituents of concern for which DOTs should not be named as a stakeholder, since there is no demonstrated scientific nexus between the load in the DOT discharge of the constituent and the receiving water impairment. There are also constituents, such as metals, which current technologies may be insufficient at removing from stormwater to meet the required WLA.

- Caltrans has found that there is a point of diminishing returns [the point at which continuing application of effort or skill toward a particular project or goal achieves a certain level and beyond which it declines in effectiveness] and cost-benefit for TMDLs. Beyond this point, compliance becomes geometrically more expensive. For the Los Angeles River Trash TMDL, this point is at about a 40% load reduction.

- Caltrans is being named in TMDLs for constituents for which there is no source within the ROW.

- Caltrans uses a three-pronged approach to address TMDLs: enhanced institutional controls, marketing/public relations campaigns (e.g., “Don’t Trash California”), and a capital treatment BMP program. The tools in this approach are optimized to produce the best results with the least cost. A webinar discussing this approach to TMDL compliance was held on March 16, 2010, on the topic of marine debris.

- Caltrans is investigating various treatment BMPs for compliance, including an underground vault/sand filter, low-impact development (LID) type devices, and pervious/porous pavement (full-depth).

Colorado Department of Transportation (CDOT)

- Currently, CDOT is not named in any TMDLs. The primary causes of impaired waters in Colorado are for fecal coliform and phosphorus. Mulch tackifier used for erosion control on DOT projects may be a source of trace amounts of phosphorus. Sediment is a potential pollutant that may impair water bodies in the state and could result in listings in the near term. The Colorado Stormwater Council, a group of MS4s, meets monthly to discuss stormwater program compliance issues. CDOT uses this forum to discuss how it is going to work together with other agencies (as stakeholders) and negotiate TMDLs with the Colorado Department of Health, which administers the TMDL program.

- Every transportation project that exceeds one acre triggers a National Environmental Policy Act (NEPA) process. All receiving waters with a TMDL are considered ‘sensitive’ and incorporated into the NEPA process. Mitigation consistent with the constituent of concern is included in the project development process.

- CDOT has not been considered a TMDL stakeholder except for a total suspended solids (TSS) TMDL, for which they constructed underground vaults to reduce TSS loading from the ROW.

Delaware Department of Transportation (DelDOT)

In Delaware, any project that adds 5,000 or more square feet must include BMPs for nitrogen and phosphorus reduction. Sources of these nutrients are generally atmospheric.

- BMPs used for constituent load reduction include infiltration trenches, infiltration basins, biofiltration swales, biofiltration strips, and sand filters. The DelDOT post-construction BMP inventory is about 600 BMPs. State regulations may include a Chesapeake Bay municipal separate storm sewer system (MS4) permit in the future, as well as include TMDLs for the Bay.

- DelDOT can comply with TMDLs through the installation of a BMP treatment train: install three BMPs in series, and you are presumed to comply with the WLA. DelDOT expects to triple its current treatment control BMP inventory in the near term.

Florida Department of Transportation (FDOT)

- TMDLs are a primary issue for Florida DOT. FDOT works early with the Department of Environmental Protection (DEP) to review all WLAs assigned to the DOT. FDOT is named in a variety of TMDLs statewide. TMDL pollutants typically include nutrients, phosphorus, and fecal coliform. TMDLs are implemented through a Basin Management Action Plan (BMAP) typically developed by the stakeholders. FDOT is becoming involved in all phases of TMDL development and implementation to understand the DOT's exposure, obligations and liabilities for each TMDL.

Illinois Department of Transportation (IDOT)

- IDOT is currently not named in any of the state's TMDLs. Nutrients, metals, turbidity, and oxygen depletion are the leading causes of impairment in the state. Chlorides are also listed as an impairment; therefore, IDOT anticipates being named for this constituent in the future, due to the application of road salt.

Maine Department of Transportation (MaineDOT)

- MaineDOT has not been named on any of the TMDLs in the state. To date in the 32-lake and 12-stream EPA-approved receiving water reports, the DOT is only mentioned in one, and that is as an information resource.

Michigan Department of Transportation (MDOT)

- MDOT is not listed or named in any TMDLs in the state. MDOT has an early coordination agreement that indicates which TMDLs it will be named in. MDOT anticipates that TMDLs will become more of a factor in the future and has asked the state to participate on the TMDL development team. WLAs will be assigned by the Department of Environmental Quality (DEQ). The DOT is currently negotiating stakeholder status for TMDLs for pathogens and phosphorus.

New Hampshire Department of Transportation (NHDOT)

- NHDOT currently has four chloride TMDLs, one mercury TMDL that extends statewide, and one nitrogen salt water TMDL that is under development.

New York State Department of Transportation (NYSDOT)

- NYSDOT is currently participating in five TMDLs: three for phosphorus, one for pathogens, and one for nitrogen/pathogens combined. NYSDOT anticipates that the two TMDL Pathogens watersheds will be subdivided into sixty-nine smaller subwatersheds for the next permit cycle. In NYS, any MS4 in the watershed must comply with load reductions for the impaired waterbody. NYSDOT is not always assigned a WLA under an approved TMDL; rather, the state includes additional requirements in the DOT's MS4 program that are functionally equivalent to a WLA. For example, the DOT may have to enhance its maintenance program or implement a treatment control retrofit program in impaired watersheds.

- NYSDOT has TMDLs for the upstate and downstate (Long Island) regions. Upstate TMDLs are for phosphorus, and these have heightened design criteria requirements in the MS4 permit, which include a retrofit program, enhanced drain inlet mapping, enhance maintenance requirements and frequent inspections.

- Downstate (Long Island) TMDL constituents are primarily nitrogen and phosphorus. A current compliance strategy is to eliminate stormwater outfalls to the receiving water from the DOT facility, and redirect discharges to recharge basins, where the discharge is infiltrated.

North Carolina Department of Transportation (NCDOT)

NCDOT maintains a presence and makes sure they have a public relations campaign in the watershed stakeholder groups. North Carolina DOT currently is participating in the following TMDLs in the state:

- One total nitrogen and total phosphorus (nutrient) TMDL in the Piedmont region

- One coastal pathogen TMDL

- North Carolina also has TMDLs for biological integrity, expressed as impervious cover TMDLs. The DOT is unsure how it will respond to this type of TMDL if it is assigned a WLA.

- Nutrients, especially nitrogen and phosphorus, are a significant compliance challenge in North Carolina. Compliance is measured through a targeted, numeric accounting of the load—an individual or "hard" compliance approach, as opposed to a group or "soft" compliance approach (such as Maryland DOT), which employs a suite of watershed based actions that, if completed, equates to compliance with the WLA. Individual numeric compliance approaches tend to discourage collaboration between stakeholders to meet compliance limits.

- Generally, it appears that the EPA is moving away from the pollutant-based TMDL process and is moving toward an approach where increased stormwater runoff volume from impervious surfaces is considered the receiving water stressor. Accordingly, there may be a proliferation of impervious cover TMDLs. Impervious cover TMDLs will present DOTs with difficult compliance problems.

Oregon Department of Transportation (ODOT)

- ODOT has not been assigned as a stakeholder for any TMDL, but is listed by the DEQ as a "designated management agency" in each TMDL watershed. The state DEQ issues a management plan for each watershed with a TMDL that describes how ODOT will progressively reduce the target pollutant(s). Both the DOT and DEQ prefer development of an overarching plan for easier administration of TMDLs, rather than developing piecemeal plans for each watershed, especially when the plans will be essentially identical.

  A DOT TMDL 'master plan' would describe how the DOT will address TMDL pollutants on a project-by-project basis, with particular emphasis on internal processes that make sure water quality is directly addressed on the project. ODOT is trying to establish a comprehensive stormwater program that consolidates and coordinates all the various water quality permits, programs, and initiatives, including MS4 and 401 certifications, TMDLs, (and, incidentally, the Endangered Species Act [ESA]) under a single administrative umbrella.

- Oregon has many streams in the state with pathogen TMDLs, but the DOT has informed their regulators that they are not a source of pathogens, and the regulators have accepted this assessment. Other constituents of concern for the receiving waters and the DOT include metals and nutrients.

- Oregon is conducting research on the characteristics of dissolved and total metals to more fully understand their behavior in the aquatic environment, which will assist with identifying appropriate BMPs to capture or treat dissolved and total metals. There is also a current National Cooperative Highway Research Program (NCHRP) research project focused on dissolved metals removal from urban stormwater.

Texas Department of Transportation (TxDOT)

- Texas DOT is not currently named in any TMDLs. TxDOT's compliance strategy is early involvement in any listing or potential listing processes. The DOT currently has a research project to quantify bacteria loads at bridge crossings. TxDOT could become a named stakeholder in some pathogen TMDLs.

Virginia Department of Transportation (VDOT)

- Virginia DOT is currently tracking the TMDL process in the state. The DOT is not currently a named stakeholder in any TMDLs.

Washington Department of Transportation (WSDOT)

- TMDLs are a major issue for Washington DOT. The new DOT MS4 permit, issued in February 2009, includes nine TMDLs. Receiving water impairments are for: dissolved oxygen, temperature, mercury, arsenic, pesticides, PCBs, nutrients, fecal coliform, and pathogens. New TMDLs are made enforceable through a permit modification or a separate Administrative Order. A technical issue the DOT faces is that either there are few BMPs that work in the highway environment for the constituents of concern, and/or the highway is not the source of the constituent or impairment.

The TMDL language issued in the DOT MS4 permit reads as follows:

S6. TOTAL MAXIMUM DAILY LOAD ALLOCATIONS

A. This permit requires compliance with applicable approved TMDLs. Applicable TMDLs or applicable TMDL requirements are TMDLs which have been approved by EPA on or before the issuance date of this permit. Appendix 3 of this permit lists approved TMDLs applicable to WSDOT. The following requirements apply if EPA has approved a Total Maximum Daily Load (TMDL) to address stormwater discharges from MS4s owned or operated by WSDOT.

1. WSDOT shall comply with assigned loading allocations of applicable TMDLs and/or assigned best management practices (BMPs) from associated implementation documents for applicable TMDLs.

2. If a specific TMDL listed in Appendix 3 requires WSDOT to conduct water quality monitoring, WSDOT shall develop and implement a TMDL monitoring Quality Assurance Project Plan (QAPP) using the most recent version of *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies,* Ecology Publication #04-03-030, as guidance. WSDOT shall meet the timeframes identified in either the TMDL or Detailed Implementation Plan.

B. WSDOT shall include a TMDL summary implementation report as part of the annual report for every applicable TMDL as described in S8 of this permit. The report shall include:

1. WSDOT's actions required by the applicable TMDLs.
2. Status of compliance with each action.
3. Actions or load reduction strategies assigned to WSDOT but performed by other entities.
4. WSDOT shall also include documentation of all relevant actions implemented that affect discharges to the waterbody segment that is the subject of the TMDL in the annual report.

C. At least once every eighteen months, Ecology will modify this permit and/or issue an administrative order establishing new TMDL-related permit requirements for TMDLs associated with discharges from WSDOT facilities that EPA has approved during the preceding eighteen months. Ecology strongly encourages WSDOT to participate in development of TMDLs that are associated with discharges from its MS4."

(Note: both a permit modification and an administrative order can be appealed by WSDOT.)

- Existing TMDLs are enforceable through NPDES municipal permit requirements; new TMDLs can be added to the permit via a permit modification or an Administrative Order. Specific actions required vary and are included in Detailed Implementation Plans (DIPs), which may assign LAs and/or specific BMPs.

- WSDOT has a statewide municipal permit that applies in both Phase I and Phase II urbanized areas, plus areas (watersheds) subject to a TMDL. Watersheds outside of the covered permit areas that are subject to TMDLs are added as either permit modifications or administrative orders to become enforceable.

- WSDOT is named in TMDLs for constituents that are not generated within the ROW. Compliance with these TMDLs is presumptive through the implementation of required mitigation actions. Implementation of compliance actions for TMDL constituents can have the collateral benefit of also removing pollutants that they were not intended for, such as sediment.

- WSDOT notes that it is very important to be involved with TMDLs from the start of the process to preclude or at least minimize TMDL compliance actions not appropriate for the DOT; they have a full time equivalent (FTE) staff person coordinating TMDLs for the DOT.

SUGGESTED RESEARCH AND FUTURE TOPICS

Following are research and data needs, as well as topic focus areas suggested during the CoP conference call for future discussion as a part of the CoP. Additional topics and research ideas related to TMDL issues are listed in no particular order of priority.

Barriers to compliance:

- DOTs typically occupy a small portion of the watershed and have a proportionately small portion of the pollutant load to a receiving water, but they may carry a disproportionate share of the technical, monitoring and investigative burdens, since they can be perceived as a 'deep pocket' entities with superior technical resources compared to other traditional MS4 stakeholders. These perceptions may lead to DOTs being assigned WLAs for pollutants of which they are a de minimis contributor, or assigned WLAs that exceed their proportionate share.

Waste Load Allocations:

- It is difficult to separate load from off-site flows, and the DOT may be responsible for pollutant load in upstream runoff. DOTs have no authority to require upstream landholders to reduce pollutant loads that run-on to the state ROW. Investigation is needed at the national level to assess options for managing off-site run-on.

- Additional research is needed to confirm appropriate LAs for DOTs for constituents that originate within the ROW.

Other Investigation Topics

- DOTs have very limited authority to regulate activities within their ROW, limiting their options for meeting WLAs. Investigation is needed to assess other administrative options for controlling sources of potential pollutants in the DOT ROW.

- Metals TMDLs should include discussions with the auto industry and brake pad legislation for source reduction. Bills are currently pending in California and Washington to limit copper in auto brake pads.

- True source control will be an important tool for future TMDL compliance. DOTs will need to focus on constituents they can remove at concentration levels that do not have a high marginal cost, with the objective of spending their resources to achieve the greatest overall environmental benefit. Investigation into true source control options is needed.

ACRONYMS AND ABBREVIATIONS

The following acronyms and abbreviations are used in this report:

AASHTO	American Association of Highway and Transportation Officials
ALDOT	Alabama Department of Transportation
ATTAINS	Assessment, TMDL Tracking and ImplementatioN System
BMAP	Basin Management Action Plan
BMP	Best Management Practice
Caltrans	California Department of Transportation
CDOT	Colorado Department of Transportation
CoP	Community of Practice
CWA	Clean Water Act
DDT	Dichlorodiphenyltrichloroethane
DelDOT	Delaware Department of Transportation
DEQ	Department of Environmental Quality
DIP	Detailed Implementation Plan
DOT	Department of Transportation
E. coli	Escherichia coli
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FDOT	Florida Department of Transportation
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
GDOT	Georgia Department of Transportation
GSRD	Gross Solids Removal Devices
IDOT	Illinois Department of Transportation
IEPA	Illinois Environmental Protection Agency
kg	Kilogram
LA	Load Allocation
LID	Low Impact Development
MaineDOT	Maine Department of Transportation
MDOT	Michigan Department of Transportation
mg/L	Milligrams per Liter
MNDOT	Minnesota Department of Transportation
MS4	Municipal Separate Storm Sewer System
NCDOT	North Carolina Department of Transportation
NHDOT	New Hampshire Department of Transportation
NCHRP	National Cooperative Highway Research Program
NPDES	National Pollutant Discharge Elimination System
NYSDOT	New York State Department of Transportation
ODOT	Oregon Department of Transportation
O&M	Operation and Maintenance
PCBs	Polychlorinated Biphenyls
POTW	Publicly Owned Treatment Works
ROW	Right-of-Way
TDOT	Tennessee Department of Transportation
TDS	Total Dissolved Solids
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
TxDOT	Texas Department of Transportation
VDOT	Virginia Department of Transportation

VTrans	Vermont Department of Transportation
WLA	Waste Load Allocation
WSDOT	Washington State Department of Transportation

RESOURCES

NPDES State Stormwater Rules and Regulations

Individual state NPDES permit links are provided here to assist DOTs in researching TMDL requirements when evaluating requirements for their own program. Not all states are listed since some DOT programs are co-permittees under multiple Phase I or Phase II permits.

Alabama	http://www.adem.state.al.us/alEnviroRegLaws/files/Division6Vol1.pdf
Alaska	http://www.dec.state.ak.us/WATER/wnpspc/stormwater/sw_industrial.htm
Arizona	http://www.azdeq.gov/environ/water/permits/stormwater.html
Arkansas	http://www.adeq.state.ar.us/water/branch_permits/general_permits/stormwater/pdfs/arr040000.pdf
California	http://www.waterboards.ca.gov/water_issues/programs/stormwater/gen_caltrans.shtml
Colorado	http://www.cdphe.state.co.us/wq/PermitsUnit/PERMITs/GeneralPermits.htm
Connecticut	http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325702&depNav_GID=1654
Delaware	http://www.swc.dnrec.delaware.gov/Pages/SedimentStormwater.aspx
District of Columbia	http://ddoe.dc.gov/ddoe/cwp/view,a,1209,q,495848.asp
Florida	http://www.dep.state.fl.us/water/stormwater/npdes/MS4_3.htm
Georgia	http://www.georgiaepd.org/Documents/regcomm_wpb.html
Hawaii	http://hawaii.gov/health/permits/environment/index.html
Idaho	http://www.deq.state.id.us/water/permits_forms/permitting/overview.cfm#federal
Illinois	http://www.dot.state.il.us/desenv/environmental/stormwater.html
Indiana	http://www.in.gov/idem/4896.htm
Iowa	http://www.iowadnr.gov/water/stormwater/who.html
Kansas	http://www.kdheks.gov/stormwater/
Kentucky	http://www.water.ky.gov/permitting/wastewaterpermitting/KPDES/storm/
Louisiana	http://www.deq.louisiana.gov/portal/tabid/243/Default.aspx
Maine	http://www.maine.gov/mdot/environmental-office-homepage/surface-water-resources
Maryland	http://www.mde.state.md.us/Programs/WaterPrograms/SedimentandStormwater/storm_gen_permit.asp

Massachusetts	http://www.mass.gov/dep/water/wastewater/stormwat.htm
Michigan	http://www.michigan.gov/deq/0,1607,7-135-3313_3682_3713---,00.html
Minnesota	http://www.pca.state.mn.us/water/stormwater/stormwater-rules.html
Mississippi	http://www.deq.state.ms.us/MDEQ.nsf/page/epd_epdgeneral
Missouri	http://www.dnr.mo.gov/ENV/wpp/permits/wpcpermits-stormwater.htm
Montana	http://www.deq.state.mt.us/wqinfo/MPDES/StormwaterConstruction.mcpx
Nebraska	http://www.deq.state.ne.us/WaterPer.nsf/Pages/NPDES
Nevada	http://ndep.nv.gov/BWPC/storm01.htm
New Hampshire	http://des.nh.gov/organization/divisions/water/stormwater/categories/permits.htm
New Jersey	http://www.nj.gov/dep/dwq/msrp_home.htm
New Mexico	http://www.nmenv.state.nm.us/swqb/StormWater/index.html
New York	http://www.dec.ny.gov/chemical/43133.html
North Carolina	http://portal.ncdenr.org/web/wq/ws/su
North Dakota	http://www.ndhealth.gov/WQ/Storm/MS4/MS4Permit.htm
Ohio	http://www.epa.ohio.gov/dsw/permits/GP_ConstructionSiteStormWater.aspx
Oklahoma	http://www.deq.state.ok.us/WQDnew/stormwater/
Oregon	http://www.deq.state.or.us/wq/stormwater/stormwater.htm
Pennsylvania	http://www.portal.state.pa.us/portal/server.pt/community/stormwater_management/10628/npdes_ms4%C2%A0information/669119
Rhode Island	http://www.dem.ri.gov/programs/benviron/water/permits/ripdes/stwater/index.htm
South Carolina	http://www.scdhec.gov/environment/ocrm/permit/stormwater.htm
South Dakota	http://denr.sd.gov/des/sw/stormwater.aspx
Tennessee	http://www.tennessee.gov/environment/permits/strmh2o.shtml
Texas	http://www.tceq.state.tx.us/nav/permits/sw_permits.html
Utah	http://www.waterquality.utah.gov/UPDES/stormwater.htm
Vermont	http://www.anr.state.vt.us/dec/waterq/stormwater/htm/sw_RDA.htm
Virginia	http://www.dcr.virginia.gov/soil_and_water/vsmp.shtml
Washington	http://www.ecy.wa.gov/programs/wq/stormwater/index.html
West Virginia	http://www.wvdep.org/Item.cfm?ssid=11&SS1ID=540
Wisconsin	http://dnr.wi.gov/runoff/stormwater/permits/
Wyoming	http://deq.state.wy.us/wqd/WYPDES_Permitting/WYPDES_Storm_Water/stormwater.asp

EPA DOT Stormwater Program Link

http://cfpub.epa.gov/npdes/stormwater/municroads/transportprograms.cfm

AASHTO Center for Environmental Excellence Stormwater Program Link

http://environment.transportation.org/center/products_programs/practitioners_resources.aspx?id=11

National Assessment Database

The National Assessment Database summarizes the most recent electronically available state-reported water quality information, including assessments of individual waterbodies, submitted by the states to EPA. The National Assessment Database can be accessed here:
http://www.epa.gov/waters/305b/

Water Quality Assessment and Total Maximum Daily Loads Information

The Assessment Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS) provides information reported by the states to EPA about the conditions in their surface waters. This information is required every two years under Clean Water Act Sections 305(b) and 303(d). ATTAINS can be accessed here:
http://www.epa.gov/waters/ir/index.html

A national summary of impaired waters and TMDLs for each state can be accessed here:
http://iaspub.epa.gov/waters10/attains_nation_cy.control?p_report_type=T