

Addressing 303(d) Listed Waters through Total Maximum Daily Loads (TMDLs)

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303(d) Listing & TMDLs

- Objectives of this module:
 - Present a brief overview of CWA Section 303(d)
 - Discuss process of identifying impaired waters
 - Describe State reporting & submission options
 - Define Total Maximum Daily Loads (TMDLs)
 - Discuss process to develop TMDLs
 - Provide elements of a TMDL submission
- Questions

WATER QUALITY STANDARDS

....what we're aiming for



Regulations (40 CFR 130.7)

Each State shall identify those water quality-limited segments still requiring TMDLs within its boundaries for which:

- Technology based effluent limitations
- More stringent effluent limitations
- Other pollution control requirements

Are not stringent enough to implement any water quality standards applicable to such waters

Regulations (40 CFR 130.7)

For waters identified in the 303(d) list:

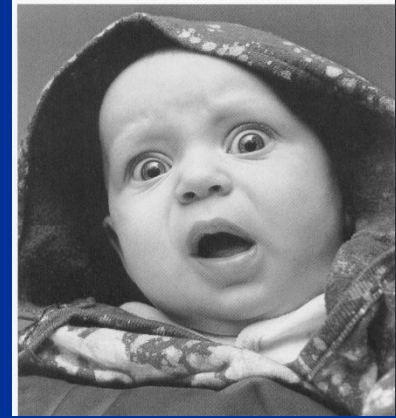
- “TMDLs shall be established for all *pollutants* preventing or expected to prevent attainment of water quality standards...”
- “TMDLs shall be established at levels necessary to attain and maintain the applicable narrative and numerical WQS...”



No statutory or regulatory timeframe for TMDL development

- EPA guidance establishes 8-13 year time frame from time of initial listing

Pollutant



“Means dredged spoil, solid waste, incinerator residue, filter backwash, sewage sludge, munitions, chemical wastes, biological materials, (some) radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt and industrial, municipal, and agricultural waste discharged into water.”

(CWA Sec. 502(6))

State Options for Reporting WQ Status

Minimally
Required by
Regulations

Recommended
Reporting
Format

Separate 305(b) & 303(d)

Integrated Report

A State's Section 303(d) list is comprised of waters impaired or threatened by a pollutant, and needing a TMDL

A single state developed report that integrates the reporting requirements of CWA Sections 303(d), 305(b) and 314

States submit their 303(d) list to EPA for review/approval **April 1, every 2 years** (2006, 2008, etc).

EPA's Integrated Report Guidance (IRG) developed for 2002 -2010 reporting cycles (www.epa.gov/owow/tmdl/)

Reporting

Most States are using the Integrated Report format

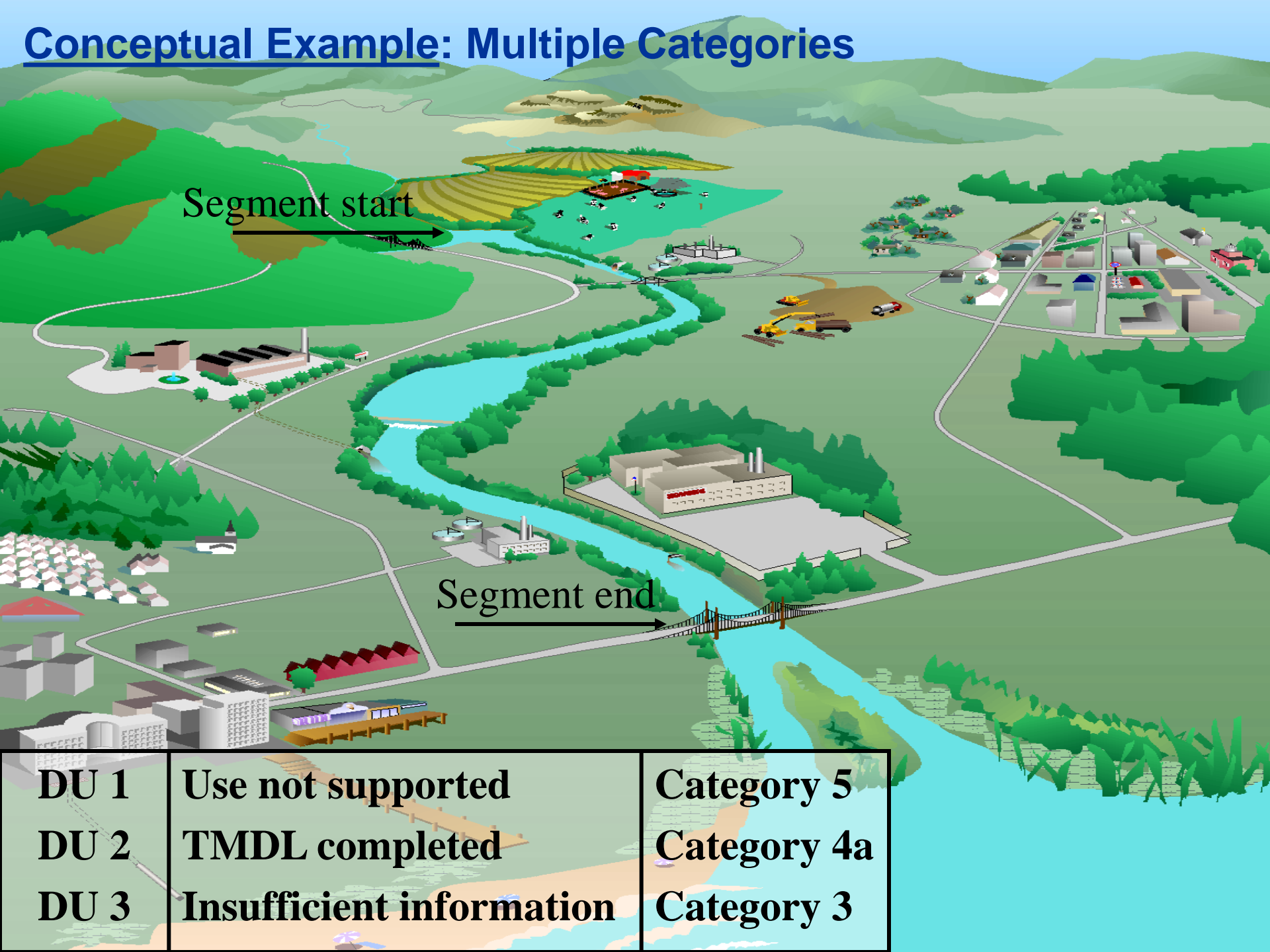
Five Reporting Categories

Category	Description
1	All designated uses (DU) met
2	Some, but not all, DUs met
3	Can not determine if any DUs met
4	<u>Impaired/threatened</u> –TMDL not needed
4a	TMDL completed
4b	TMDL alternative
4c	Non-pollutant causes
5	<u>Impaired/threatened</u> by pollutant –TMDL needed

Section 303(d) List



Conceptual Example: Multiple Categories



Segment start

Segment end

DU 1
DU 2
DU 3

Use not supported
TMDL completed
Insufficient information

Category 5
Category 4a
Category 3

State driven
process

Listing of Impaired Waters

1. States identify waters not meeting WQS based on “*all existing and readily available information*”
2. States establish priorities for TMDL development
3. States develop schedule of TMDLs to be developed within 2 years
4. States provide long term plan – complete TMDLs 8 to 13 years from first listing
5. EPA has 30 days to approve or disapprove list submitted April 1st of each even year
 - If EPA disapproves State list, EPA has 30 days to develop list for the State

Listing of Impaired Waters

- Over 41,000 listed segments, with one or more impairments
- Approximately 72,000 waterbody-pollutant combinations reported
 - Indication of TMDLs that will need to be completed
- Top causes of impairment (updated November 2011)
 - Pathogens: 15%
 - Metals (other than Mercury): 11%
 - Nutrients: 10%
 - Organic enrichment/oxygen depletion: 9%
 - Sediment: 9%
 - Polychlorinated Biphenyls (PCBs): 8%



**Before we continue with
TMDLs...**

Any Questions?

What is a TMDL?

A calculation of the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards, and an allocation of that amount to the pollutant's sources.

** The TMDL comes in the form of a technical document or plan.*

TMDL Calculation

$$\text{TMDL} = \sum \text{WLA}_i + \sum \text{LA}_i + \text{MOS}$$

$\sum \text{WLA}_i$: Sum of waste load allocations (point sources)

$\sum \text{LA}_i$: Sum of load allocations (nonpoint sources)

MOS: Margin of Safety

Completed for each waterbody/pollutant combination

Point Sources



Ditch/Conveyance



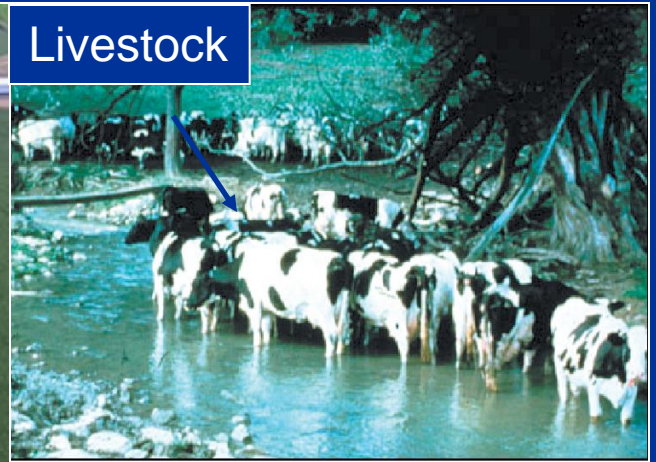
Concentrated Animal Feeding Operation (CAFO)

Note: EPA regulations require that a TMDL include WLAs, which identify the portion of the loading capacity allocated to individual existing and future point source(s) (40 C.F.R. §130.2(h) and (i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit.



Pipe

Nonpoint Sources



Nonpoint sources do not need NPDES permits.

TMDL Calculation

Margin of Safety:

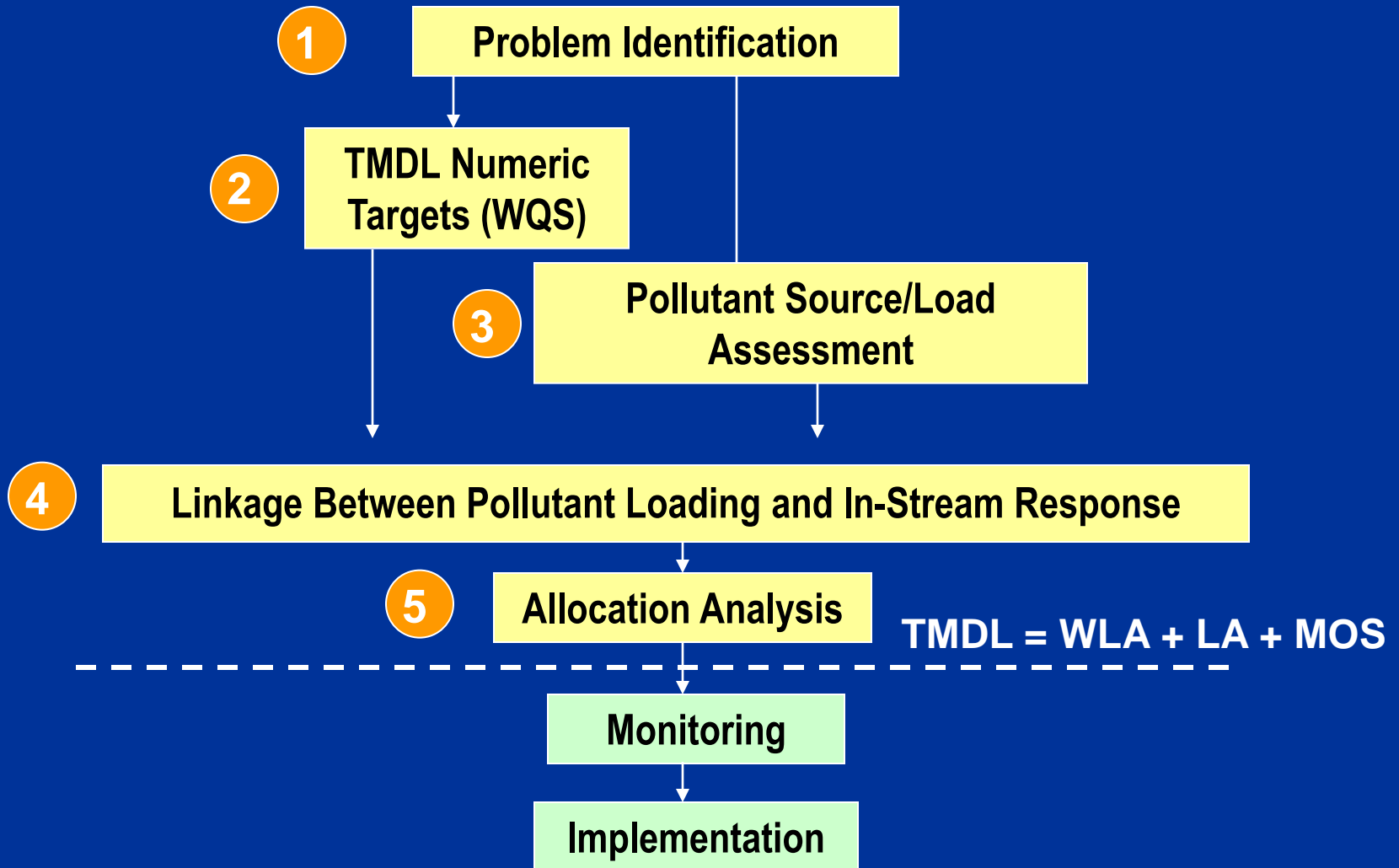
- Takes into account *lack of knowledge* concerning the relationship between effluent limitations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).
- Can be *explicit* (e.g., 10%) or *implicit* (conservative assumptions in modeling, etc.) (EPA’s 1991 TMDL Guidance: “Guidance for Water Quality based Decisions: The TMDL Process”).

Margin of Safety Made Simple

“There are *known knowns*. These are things we know that we know. There are *known unknowns*. That is to say, there are things that we know we don't know. But there are also *unknown unknowns*. These are things we don't know we don't know.”

Donald Rumsfeld

TMDL Development Process



Task 1: Problem Identification

- Identify the waterbody as it appears on the State's/Tribe's 303(d) list.
 - Waterbody should be identified/georeferenced using the National Hydrography Dataset (NHD)
- Identify the pollutant for which the TMDL is being established.
 - Remember TMDL is done for a waterbody pollutant combination

Task 2: Set Target for TMDL

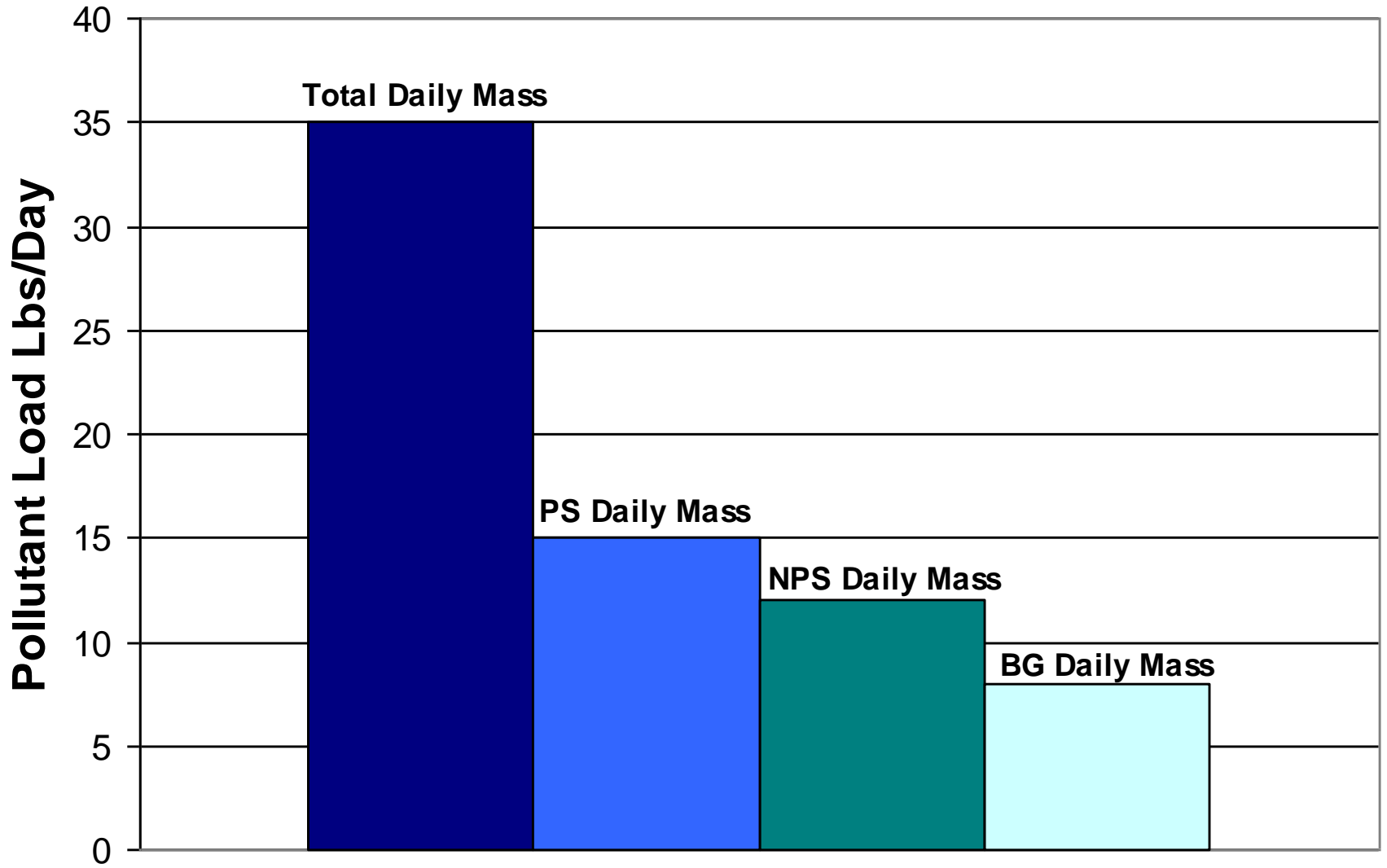
- Identify a numeric water quality target(s) - a quantitative value used to measure whether or not the applicable water quality standard is attained.
 - If the segment was listed using a narrative WQC, then select an indicator as surrogate quantitative target.
- The TMDL expresses the relationship between any necessary reduction of the pollutant of concern and the attainment of the numeric water quality target.

Also known as
Loading Capacity

Task 3: Pollutant Source/Load Assessment

- Identify the point and nonpoint sources of the pollutant of concern, including location of the source(s) and the quantity of the loading.
 - Provide the identification numbers of the NPDES permits within the waterbody.
- Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of the natural background.

Initial Pollutant Load to Segment X

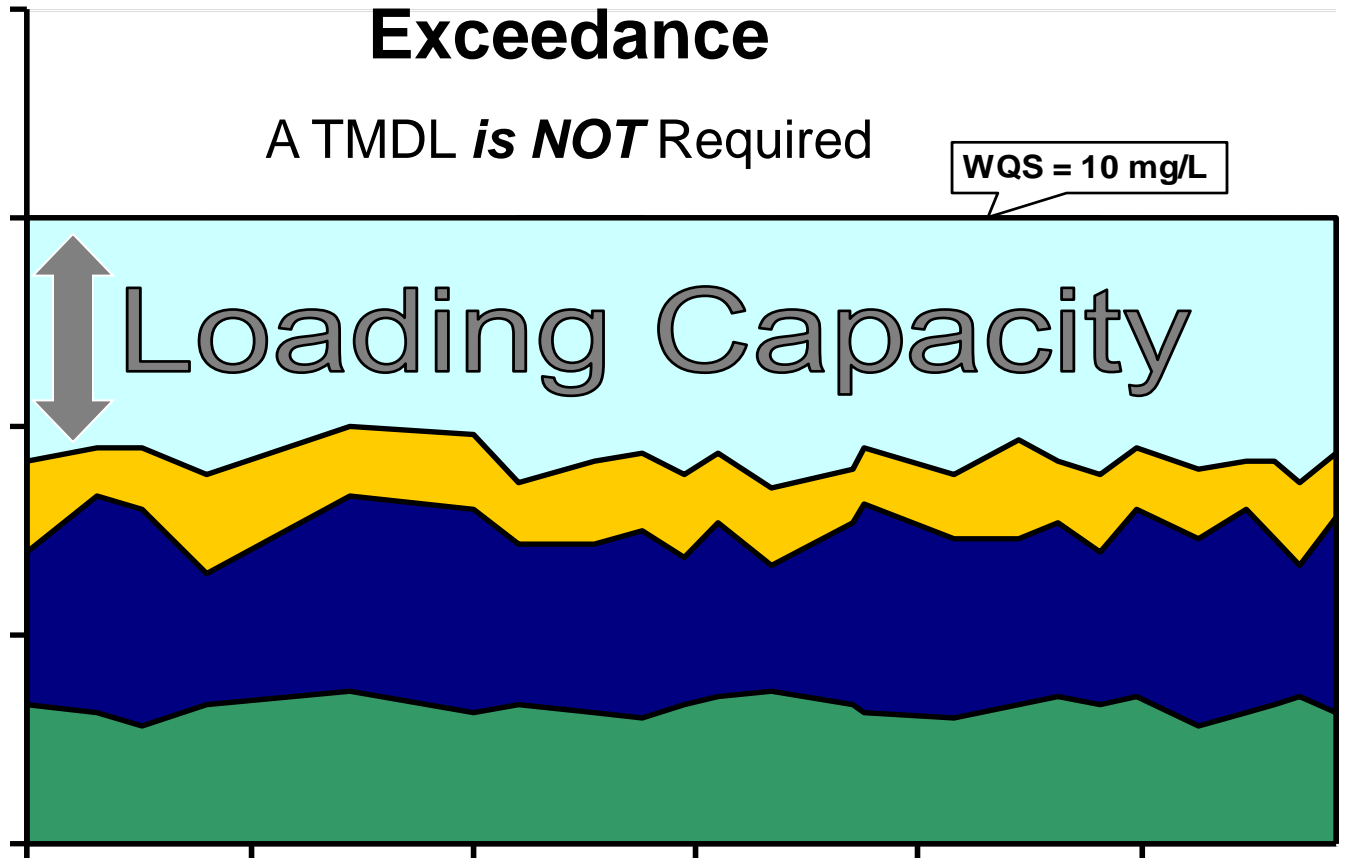


Load does not cause Criterion Exceedance

A TMDL *is NOT* Required

WQS = 10 mg/L

Pollutant concentration (mg/L) or relative load of pollutant

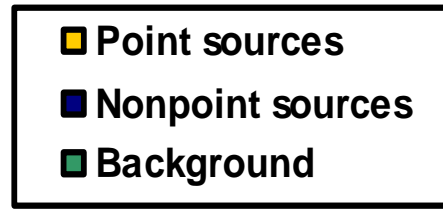
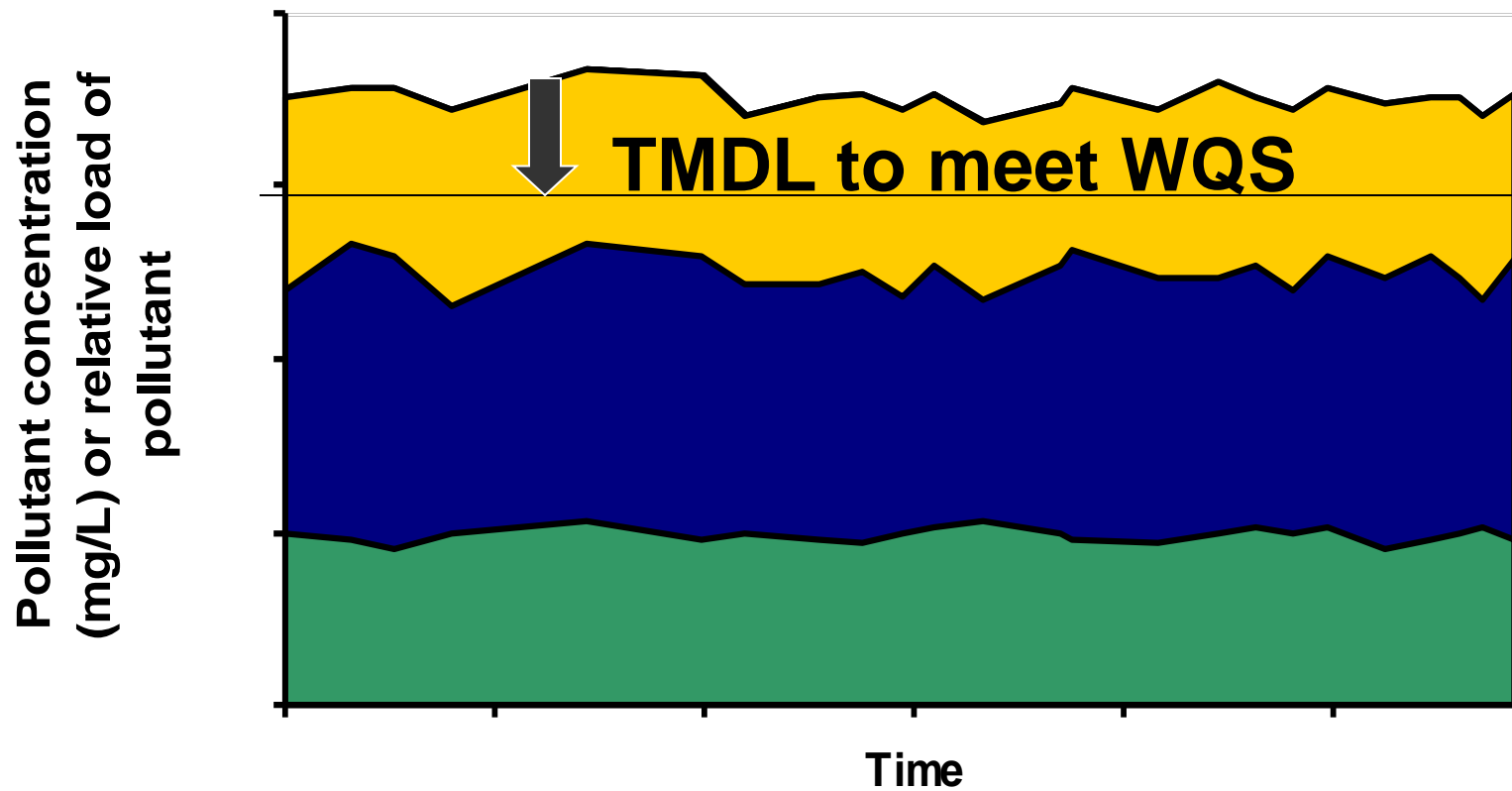


Time

- Assimilative Capacity
- Point Sources
- Nonpoint Sources
- Background

No Remaining Loading Capacity

Need a TMDL to Meet WQS



Task 4: Linkage between pollutant load and in-stream response

- Select an analytical/modeling approach based on:
 - Nature and complexity of the receiving water
 - Nature of pollutant – temporal & spatial considerations
 - Sources of pollutants
 - Expression of the Water Quality Criterion
 - Quantity and quality of data and information
 - Budget and available resources

Modeling Tools

- Modeling tools vary in complexity
- Some are more suitable to model specific pollutants

Table 9-4. Overview of Various Receiving Water Models

Model	Source	Type			Level of Complexity			Water Quality Model							
		Steady-state	Quasi-dynamic	Dynamic	1-dimensional	2-dimensional	3-dimensional	User-defined	Sediment	Nutrients	Toxic substances	Metals	BOD	Dissolved oxygen	Bacteria
AQUATOX	USEPA	-	-	•	•	-	-	-	•	•	•	-	•	•	-
BASINS	USEPA	-	•	•	•	-	-	•	•	•	•	•	•	•	•
CAEDYM	University of Western Australia	-	-	•	•	•	•	•	•	•	-	•	•	•	•
CCHE1D	University of Mississippi	-	-	•	•	-	-	-	•	-	-	-	-	-	-
CE-QUAL-ICM/TOXI	USACE	-	-	•	•	•	•	•	-	•	-	•	•	•	-

Steps to Calculate the TMDL using a modeling tool

1. Calibrate and verify selected model

- May require collection of additional ambient water column and loadings data

2. Evaluate pollutant reduction scenarios

- Start with point source reductions (regulated)
- Assess potential nonpoint source reductions

3. Define Maximum Daily Load that meets WQS

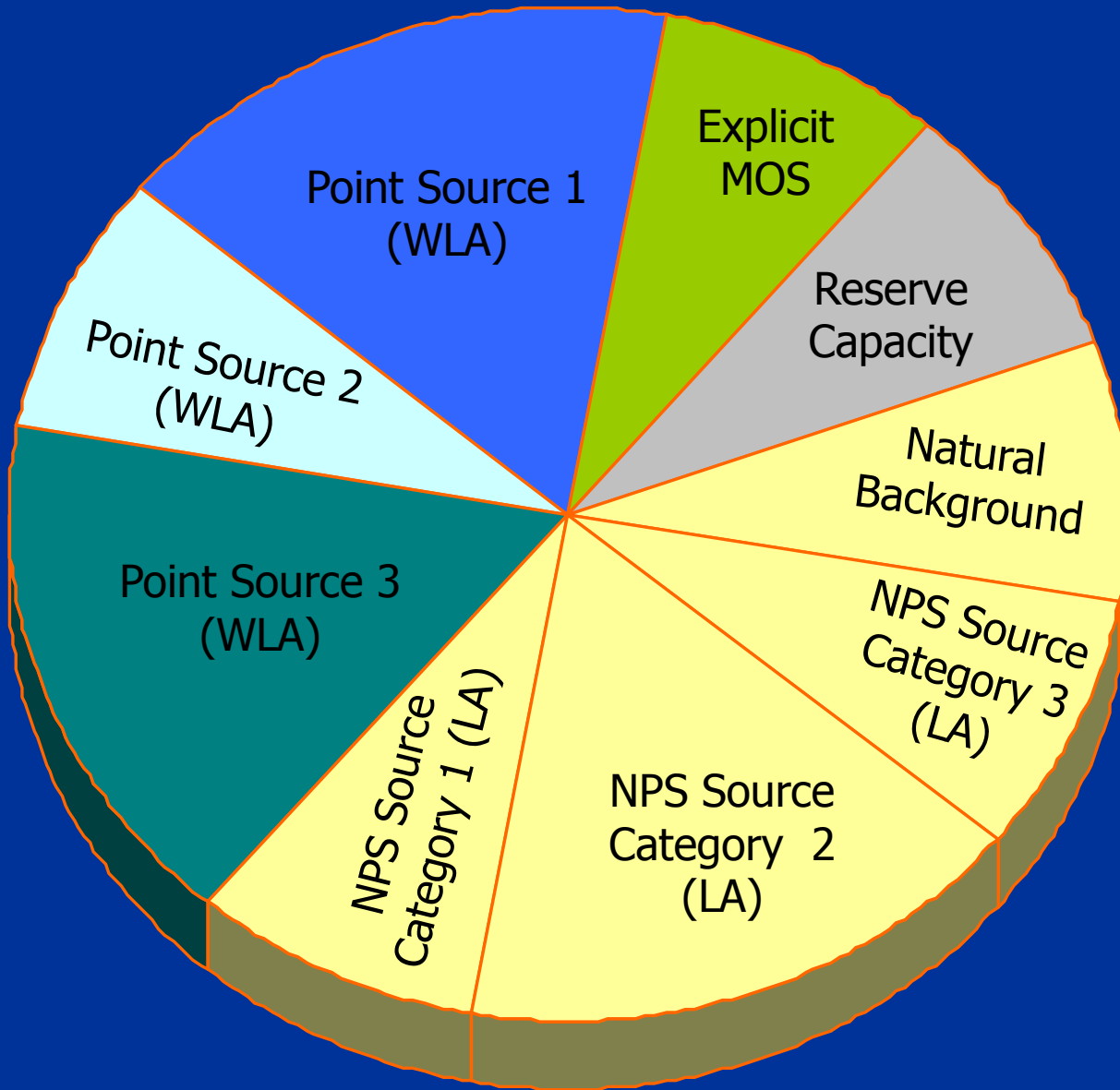
- Account for seasonal variation and critical conditions (40 C.F.R. §130.7(c)(1)).

Task 5: Allocate Loadings

Considerations when making allocation decisions:

- **Source** of the pollutant (point source or runoff)
- **Controllability** of the pollutant (i.e., atmospheric)
- **Regulatory authority** to control pollutant
- **Cost** of each allocation option
- **Certainty** of water quality impact in receiving water
- **Reasonable assurance** that allocation can be met
- **Stakeholders objectives**

TMDL Allocation



Allocation Example

TMDLs are Expressed as:

- Mass (e.g., pounds per day)
- Toxicity (e.g., toxic units)
- Energy (e.g., heat in temperature TMDLs)

***Emphasis on TMDLs expressed as daily loads**

Elements of a Typical TMDL Document

- Identification of Waterbody, Pollutant of Concern, Pollutant Sources, and Priority Ranking
- Applicable WQS & Numeric Water Quality Target*
- Loading Capacity*
- Load Allocations and Waste Load Allocations*
- Margin of Safety*
- Consideration of Seasonal Variation*
- Reasonable Assurance for PS/NPS
- Monitoring Plan to Track TMDL Effectiveness
- Implementation Plan
- Public Participation

**Required by 40 C.F.R. Part 130*

TMDL Implementation

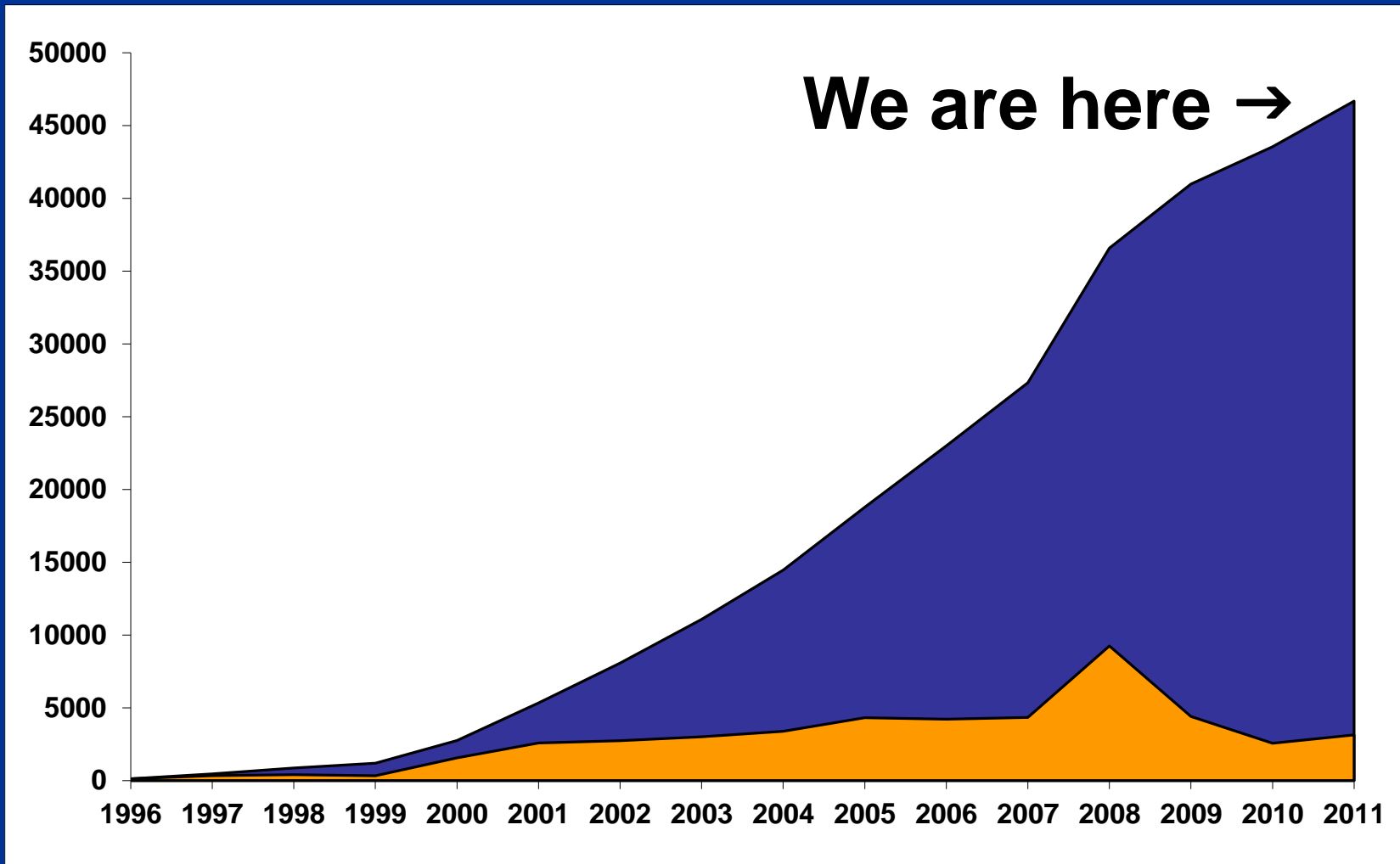
- TMDLs not self implementing under 303(d)
- Point Sources:
 - Permit limits consistent with WLA are enforceable under CWA through National Pollutant Discharge Elimination System (NPDES)
 - Issued by EPA or States w/ delegated authority
- Nonpoint Sources:
 - No federal regulatory enforcement program
 - Primarily implemented through State/Tribal/local NPS management programs (few w/ regulatory enforcement)

Public Participation

- **Public/stakeholder role:**
 - Provide data and information to the states
 - Review and comment on draft 303(d) list
 - Review and comment on draft TMDLs
 - Assist in the development of 3rd party TMDLs

Over 46,000 TMDLs Completed

Status: TMDLs Completed



For more information...

TMDL Home Page

<http://www.epa.gov/owow/tmdl/>

2012 Integrated Report Memo

http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/upload/final_2012_memo_document.pdf

Draft Handbook for Developing Watershed TMDLs

http://www.epa.gov/owow/tmdl/pdf/draft_handbook.pdf

TMDLs at Work

<http://water.epa.gov/lawsregs/lawsguidance/cwa/tmdl/TMDLsWork.cfm#impairment>

TMDL Program Results Analysis

<http://www.epa.gov/owow/tmdl/results>

The fun and easy way to calculate loads, cause arguments, and confuse everyone!

TMDLS

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Questions?