



Lake Tahoe TMDL

**California Regional Water Quality Control Board
Lahontan Region**

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28 May 2009

What is the Lake Tahoe TMDL?

A science-based
plan to restore
Lake Tahoe's
clarity





What pollutants are causing Lake Tahoe's clarity loss?

Lake Tahoe Clarity Model

- **10+ years of research and development**
- **A Process Based Numerical Model**
- **Several Models Combined Into One:**
 - Hydrodynamic/Thermodynamic Model
 - Biological/Ecological Model
 - Particle Fate Model
 - Optical Model

What pollutants are causing Lake Tahoe's clarity loss?

- Suspended fine sediment particles
- Floating algae – fed by nutrients
- Fine sediment particle (<16 micrometers) accounts for ~2/3 of the clarity conditions



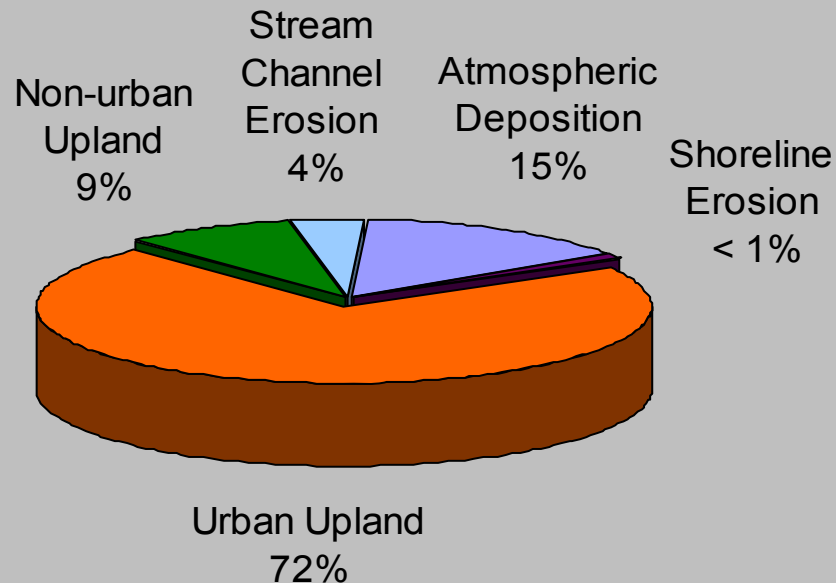
How much of each pollutant is reaching Lake Tahoe?

\$6M research effort to quantify current loads

- **Lake Tahoe Watershed Model**
- **National Sed. Lab Stream Channel Erosion**
- **USACE Groundwater study**
- **CARB/UC Davis Atmospheric Deposition**

How much of each pollutant is reaching Lake Tahoe?

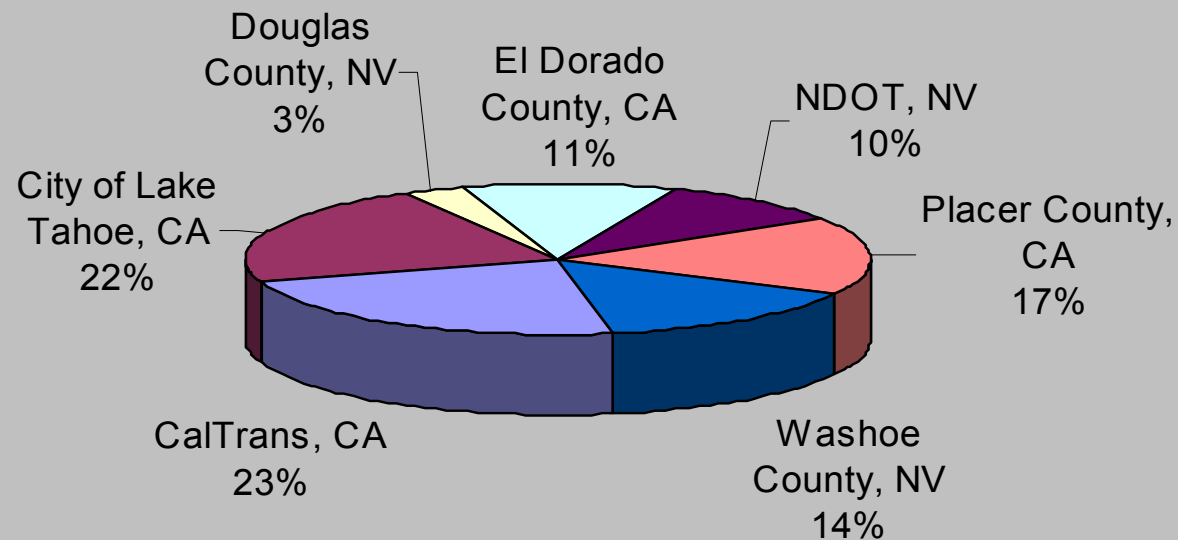
Fine Sediment Particle Number Estimates (particles less than 16 micrometers) Percent Contribution per Source Category



Total Fine Particle Load: 481×10^{18} Particles

Urban Particle Loads – How the 72% is Distributed

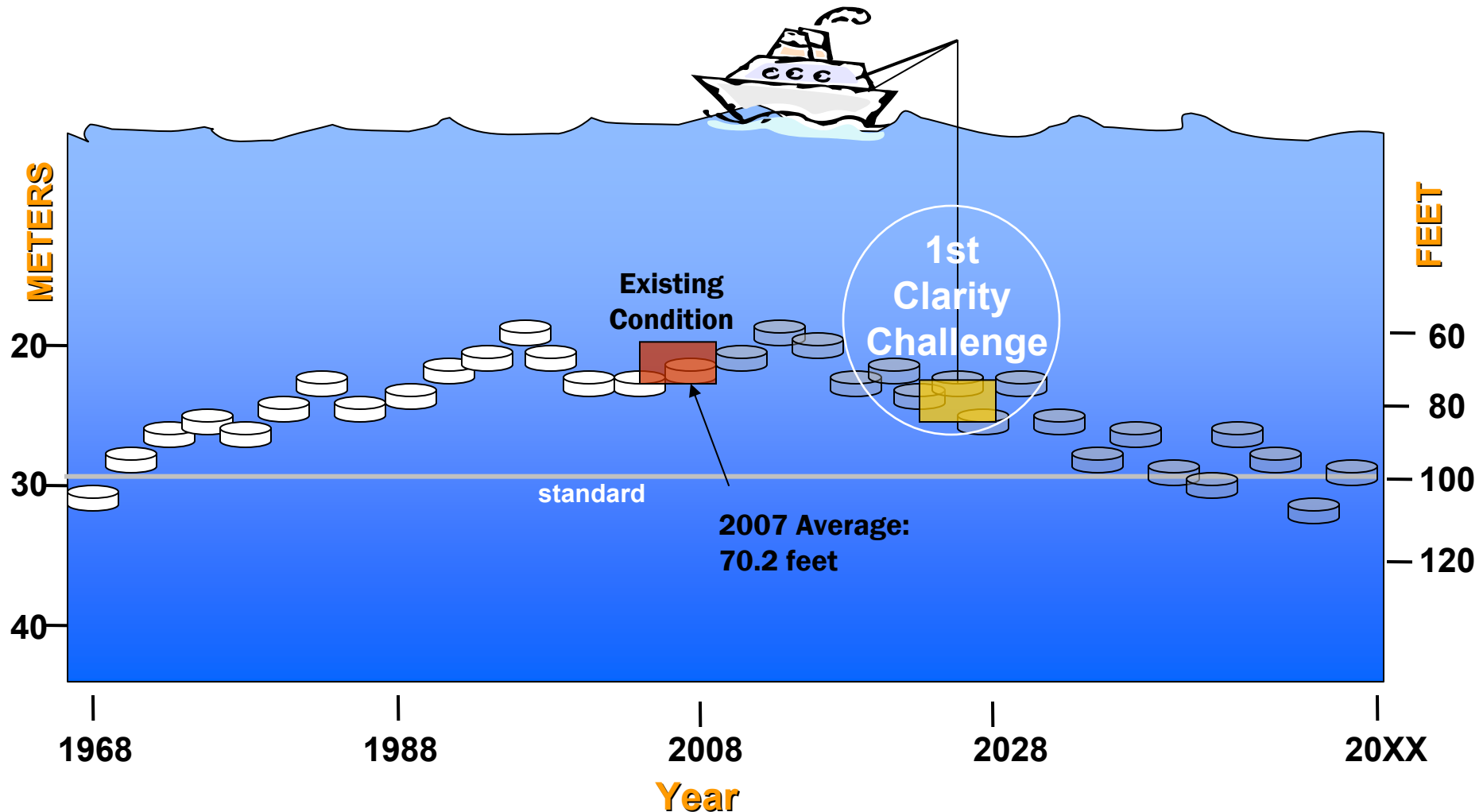
Urban Fine Sediment Particle Number Estimates - Percent by Jurisdiction



What is a reasonable interim target?



The Clarity Challenge: Reverse clarity decline and measurably improve clarity



What are the options for reducing pollutant inputs to Lake Tahoe?





Pollutant Reduction Opportunity Project

Four Source Category Groups

Assessed different levels of effort

Evaluated site-scale and basin-wide implementation

Provided average load reductions and costs

Estimates offer relative benefit comparisons

Forest Uplands Recommended Strategy

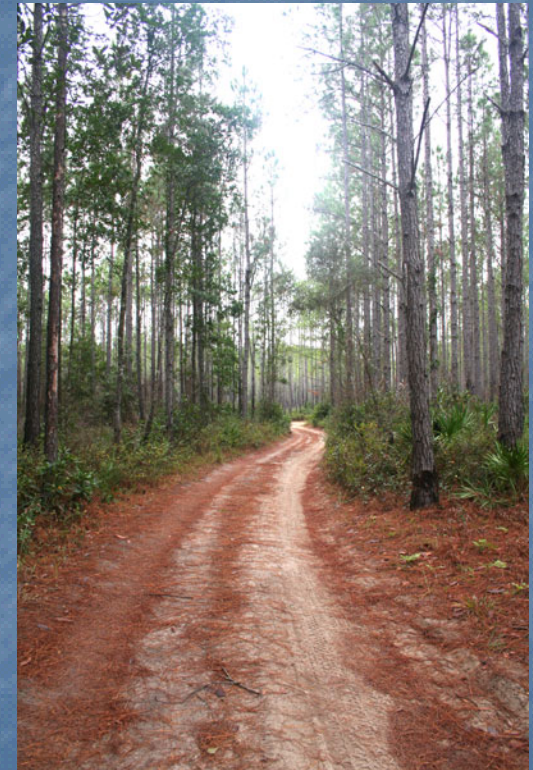
Restore/maintain roads as planned

Revegetate/treat disturbed lands

Treat forest fuels

Achieve ~1% reduction in total fine particle budget (12% of Forest load)

**Estimated Cost: \$120M Capital,
\$4.5M Annual O&M**



Stream Channel Restoration Recommended Strategy



Continue current restoration activities on the UTR, Blackwood and Ward Creeks

Support monitoring and research

Achieve ~2% reduction in total fine particle budget (53% of Stream source)

Estimated Cost: \$40M Capital

Atmospheric Deposition Recommended Strategy

Focus on dust control measures

Continue VMT reduction efforts

**Achieve ~5% reduction in total
fine particle budget (31% of
Atmospheric source)**

**Estimated Cost: \$45M Capital,
\$0.4M Annual O&M**



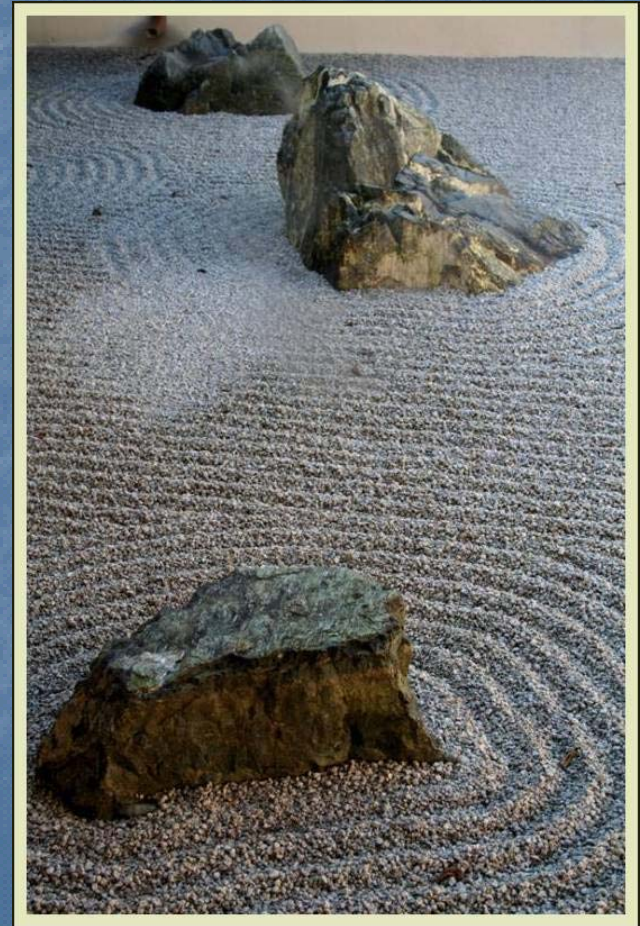
Urban Uplands Recommended Strategy

Continue to implement known technologies

Move toward more innovative practices and intensive operations and maintenance

Achieve ~25% reduction in total fine particle budget (34% of Urban Source)

Estimated Cost: \$1.3B Capital, \$6M Annual O&M



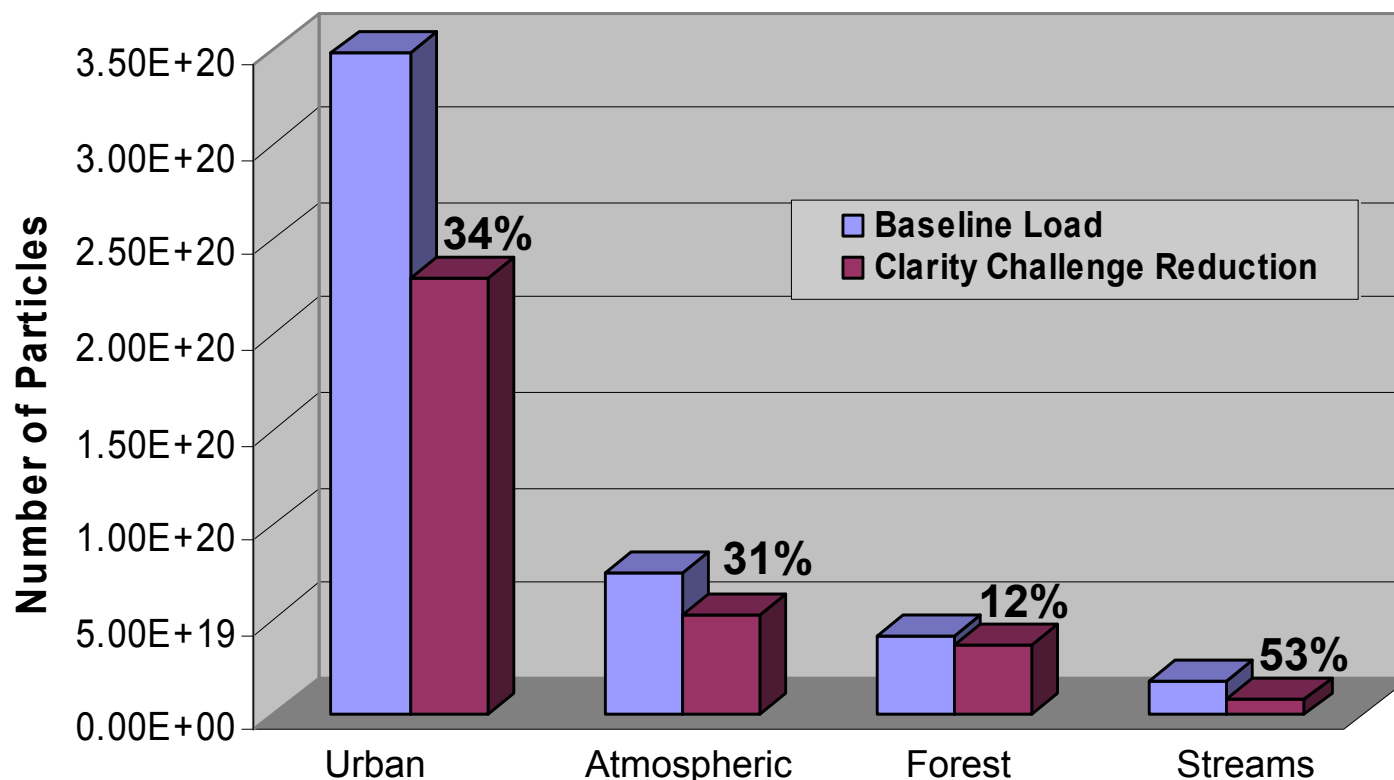
Recommended Strategy

Percent Reduction of Basin-wide Particle Load

Pollutant Source Category	Recommended Strategy Load Reduction
Forest Uplands	1.0%
Stream Channel	1.8%
Atmospheric Deposition	4.6%
Urban Uplands	24.5%
Clarity Challenge	32%

Recommended Strategy

Particle Load Reductions by Source Category



Current Particle Load and Percent Reduction Target

DRAFT

**Lake Tahoe Total Maximum Daily Load
Technical Report
California and Nevada**

September 2007

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**Lake Tahoe TMDL
Pollutant Reduction
Opportunity Report**

September 2007
v1.01



[http://www.waterboards.ca.gov/lahontan/water_issues/
programs/tmdl/lake_tahoe/index.shtml](http://www.waterboards.ca.gov/lahontan/water_issues/programs/tmdl/lake_tahoe/index.shtml)



Are expected pollutant reductions being achieved?

Lake Clarity Crediting Program

Implementation Tools

Pollutant Load Reduction Model

Operations and Maintenance RAM

Roadway Conditions RAM

TMDL Accounting and Tracking System



Lake Clarity Crediting Program

Link actions and activities in the urban landscape to fine sediment particle load reductions

Define a standard metric to track implementation progress

Motivate action & focus on effectiveness to improve water quality and create incentives for innovation

Increase flexibility for and cooperation between permitted entities



Pollutant Load Reduction Model and Rapid Assessment Methods

Provide a consistent method to estimate pollutant load reductions

Provide a consistent method to assess stormwater facility maintenance needs

Provide a consistent method to assess roadway conditions/pollutant potential



TMDL Accounting and Tracking System

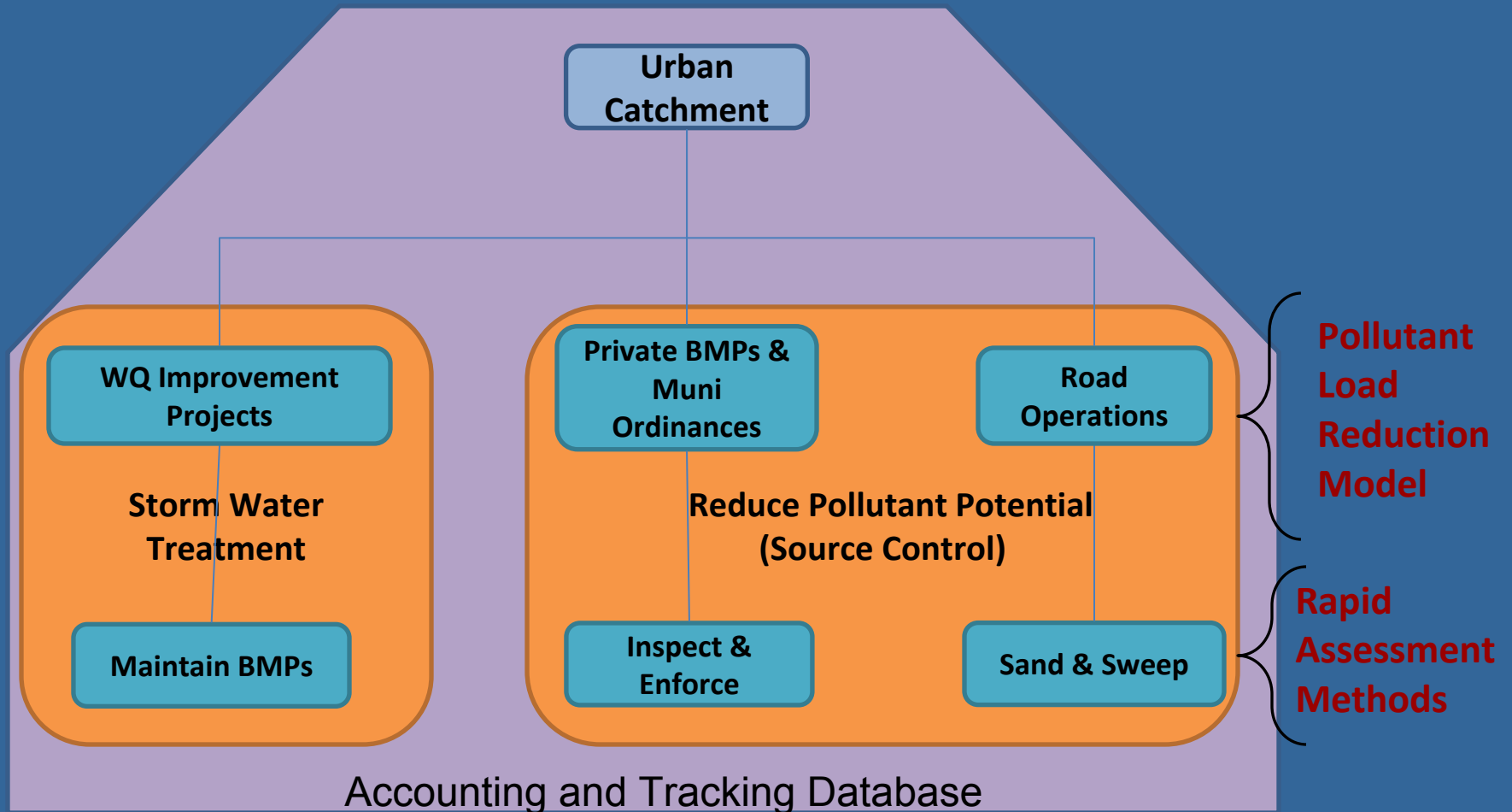
Comprehensive load reduction database

Supports the Lake Clarity Crediting Program

Able to track reductions from all pollutant sources

Offers transparent, simple reporting capabilities

Lake Clarity Crediting Program & Implementation Tools



Stormwater Regulation Approach

	Existing Policy	TMDL Implementation Plan
Regulatory Focus	Concentration limits – everywhere, all the time	Load limits – average annual
Compliance Prospects	Not reasonable – even advanced measures may not meet effluent limits	Reasonable – possible demonstrate progress toward achieving stated goals
Linkage between actions/benefits	Poor - hard to link projects/actions to lake clarity response	Strong – TMDL load reductions directly related to clarity response
Comparability	Little ability to compare results across implementers	Direct performance comparisons, transparent through reporting
Responsibility	Funders & regulators	Municipal stormwater managers & maintenance personnel

Transition Process

**One year “Beta” testing period:
Summer 2009-Summer 2010**

- Lake Clarity Crediting Program**
- Pollutant Load Reduction Model**
- Rapid Assessment Methodologies**
- Accounting and Tracking System**



Schedule

TMDL Peer Review – Summer 2009

Agency and Public Review – Winter 2009

CEQA – Fall 2009

TMDL adoption – Spring 2010

Municipal NPDES Permit & MOA – Fall 2010

A scenic landscape photograph of a large lake, likely Lake Tahoe, with mountains in the distance. The foreground is filled with dense green trees and bushes. The water is a deep blue, and the sky is clear and bright. The word "Questions?" is overlaid in the center in a large, bold, red font. The entire image is framed by a blue border.

Questions?



28 May 2009

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What do we need to do differently?

- Focus on fine sediment particles in the urban landscape
- Implement innovative stormwater treatment measures
- Enhance storm water facility operations and maintenance practices
 - Sweeping
 - Inspections