



Storm Water Management Program

March 3, 2015

“Pollution is nothing but the resources we are not harvesting...”

—Buckminster Fuller

Driving Forces For Watershed Management & Storm Water Control

- * Clean Water Act - 1972
- * State & Federal Water Laws - NPDES
- * Environmental Protection Agency
- * Lahontan Regional Water Quality Control Board
- * Central Valley Regional Water Quality Control Board
- * TRPA - 208 Water Quality Management Plan



Clean Water Act Goals:

- * “Restore and maintain the chemical, physical and biological integrity of the Nation’s waters”
- * “Water quality which provides for ensuring the Nation’s waters are fishable and swimmable”



NPDES

- * National Pollutant Discharge Elimination System
- * Urban, industrial & construction site storm water runoff
- * Section 402 of Clean Water Act
- * Administered by EPA and RWQCBs
- * Storm Water Management Plan (SWMP)
- * Also Obtain Construction Permits
 - * Storm Water Pollution Prevention Plan (SWPPP)

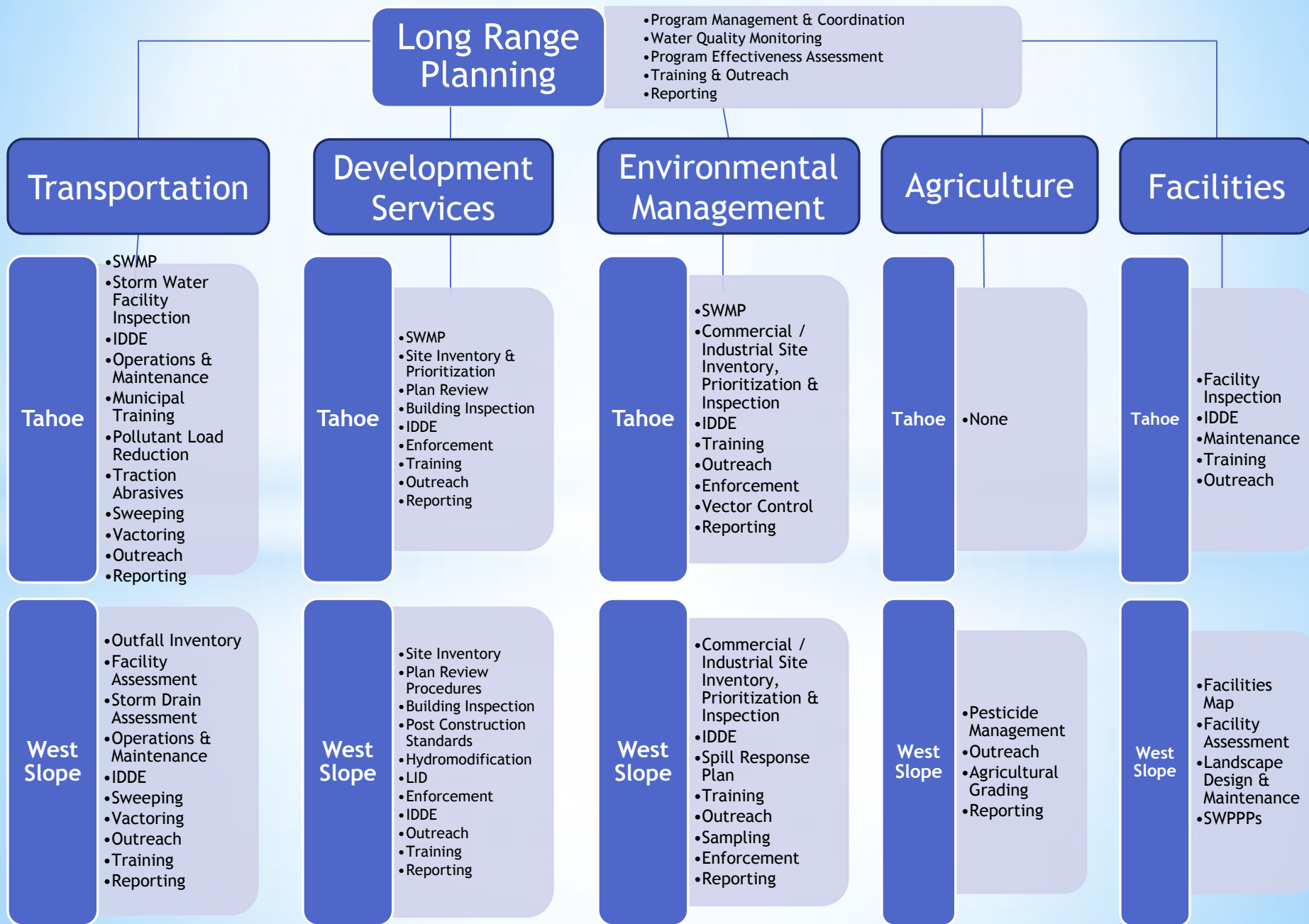


County's Storm Water Program

- * National Pollutant Discharge Elimination System (NPDES)
- * Divided into two parts:
 - * West Slope
 - * Region 5, Central Valley Regional Water Quality Control Board
 - * Phase II CA Statewide MS4 NPDES Permit
 - * Lake Tahoe Basin
 - * Region 6, Lahontan Regional Water Quality Control Board
 - * Phase I Municipal NPDES Permit
 - * Lake Tahoe Total Maximum Daily Load (TMDL)
- * Could become more comprehensive - hydrologic cycle



NPDES Storm Water Management Program - Responsibilities Diagram



NPDES Program Elements

- * Legal Authority
- * Public Outreach / Involvement
- * Illicit Discharge Detection & Elimination
- * Construction Site Management
- * Pollution Prevention / Good Housekeeping
- * Post Construction BMPs
- * Planning & Land Development
- * Hydro-Modification / LID
- * Water Quality Monitoring
- * Fiscal Analysis

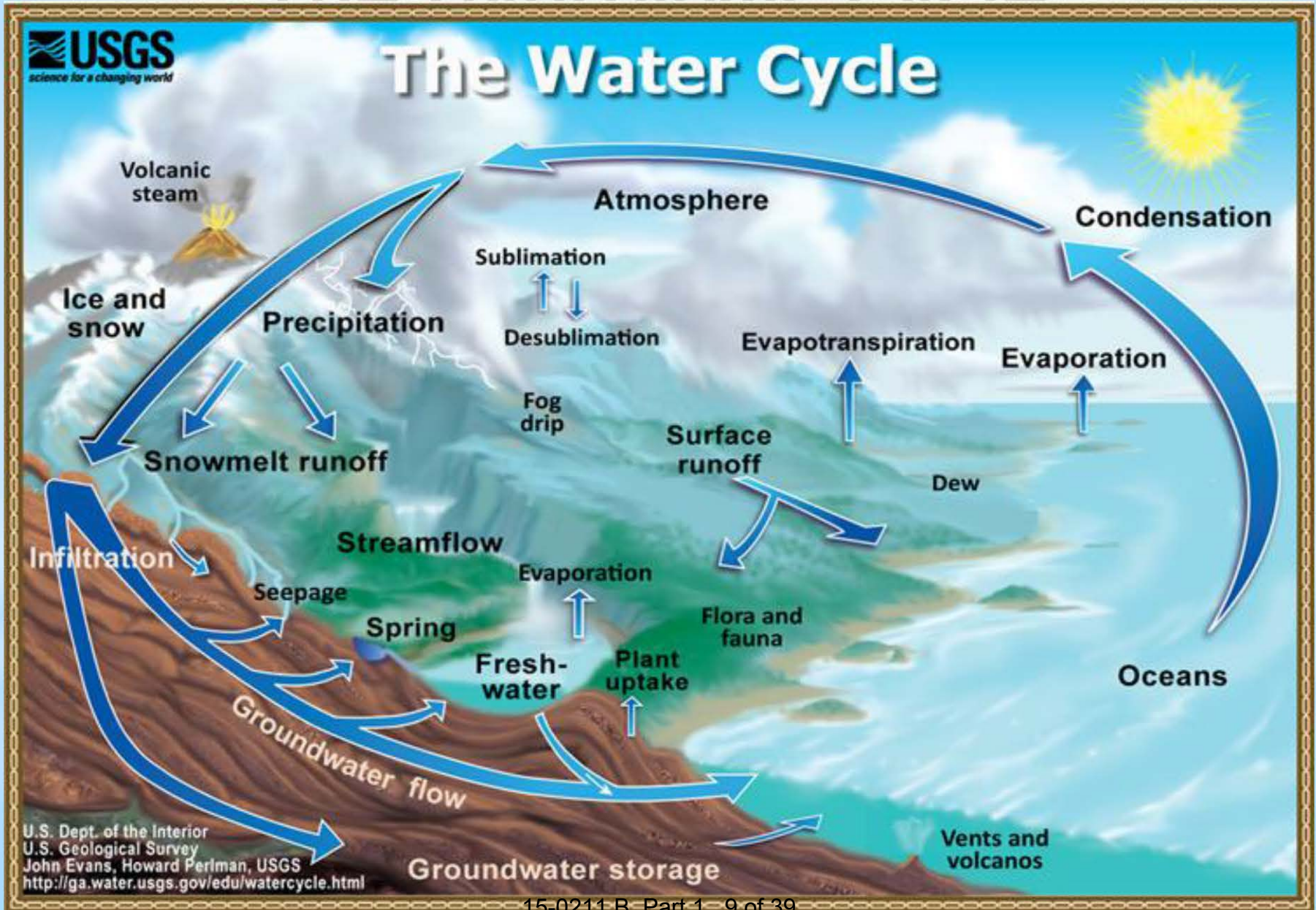


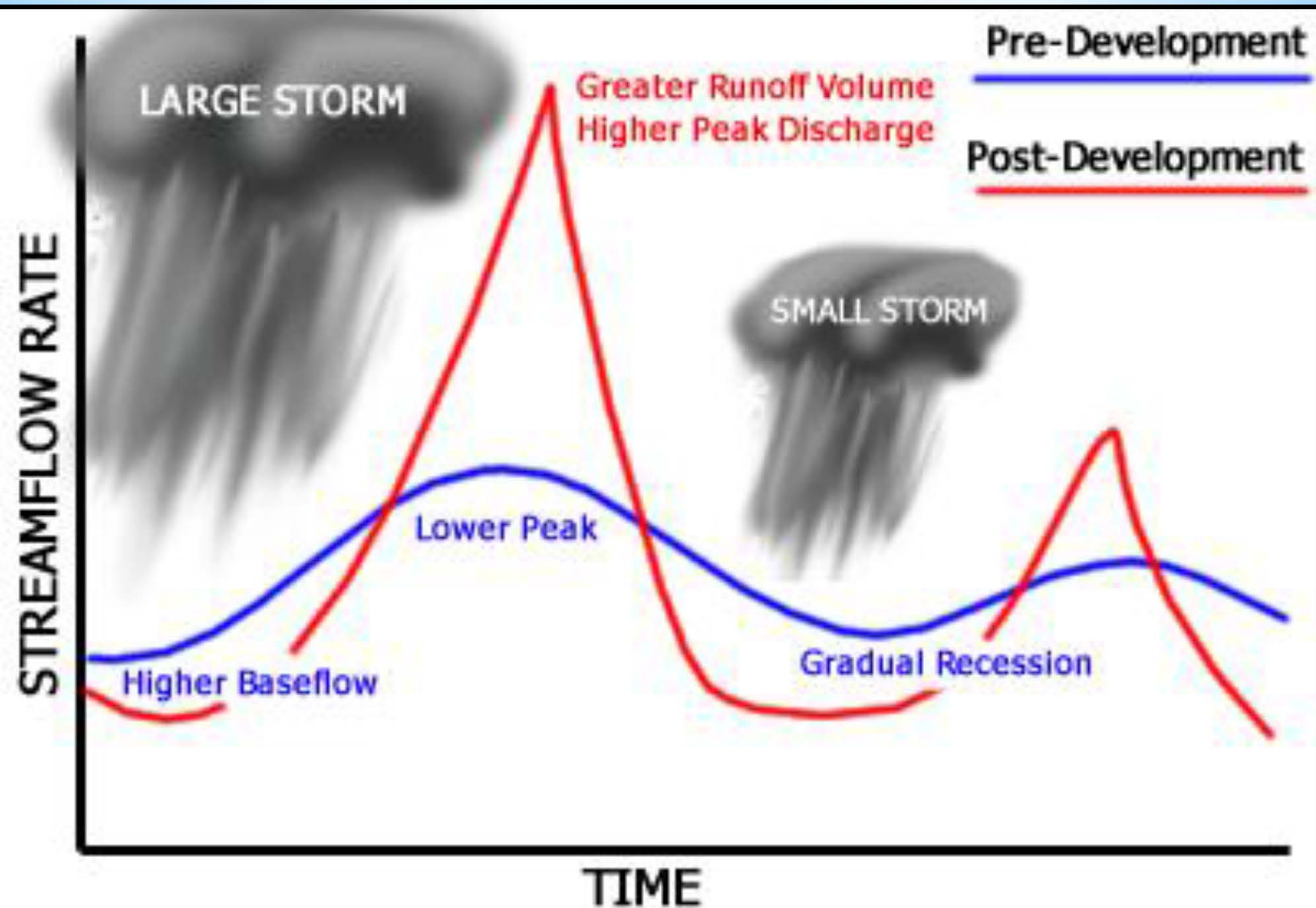
Urban Storm Water Runoff

- * Impervious surfaces (roads) increase runoff
- * Runoff carries pollutants to surface waters
- * Fine Sediment - primary pollutant affecting Lake Tahoe
- * Increased peak flows create flooding and maintenance requirements
- * Pavement increases runoff temperature
- * Connectivity is Key!



The Hydrologic Cycle





Urban Runoff Pollutants

- * Fine Sediment & Nutrients
- * Metals
 - * (Cd, Cu, Hg, Ni, Pb, Zn)
- * Hydrocarbons
 - * (Petroleum products - PAH's, PCB's)
- * Pesticides and Herbicides
 - * (Diazinon, chlorpyrifos, DDT, dieldrin, dioxins)
- * Pathogens
- * Trash and Debris

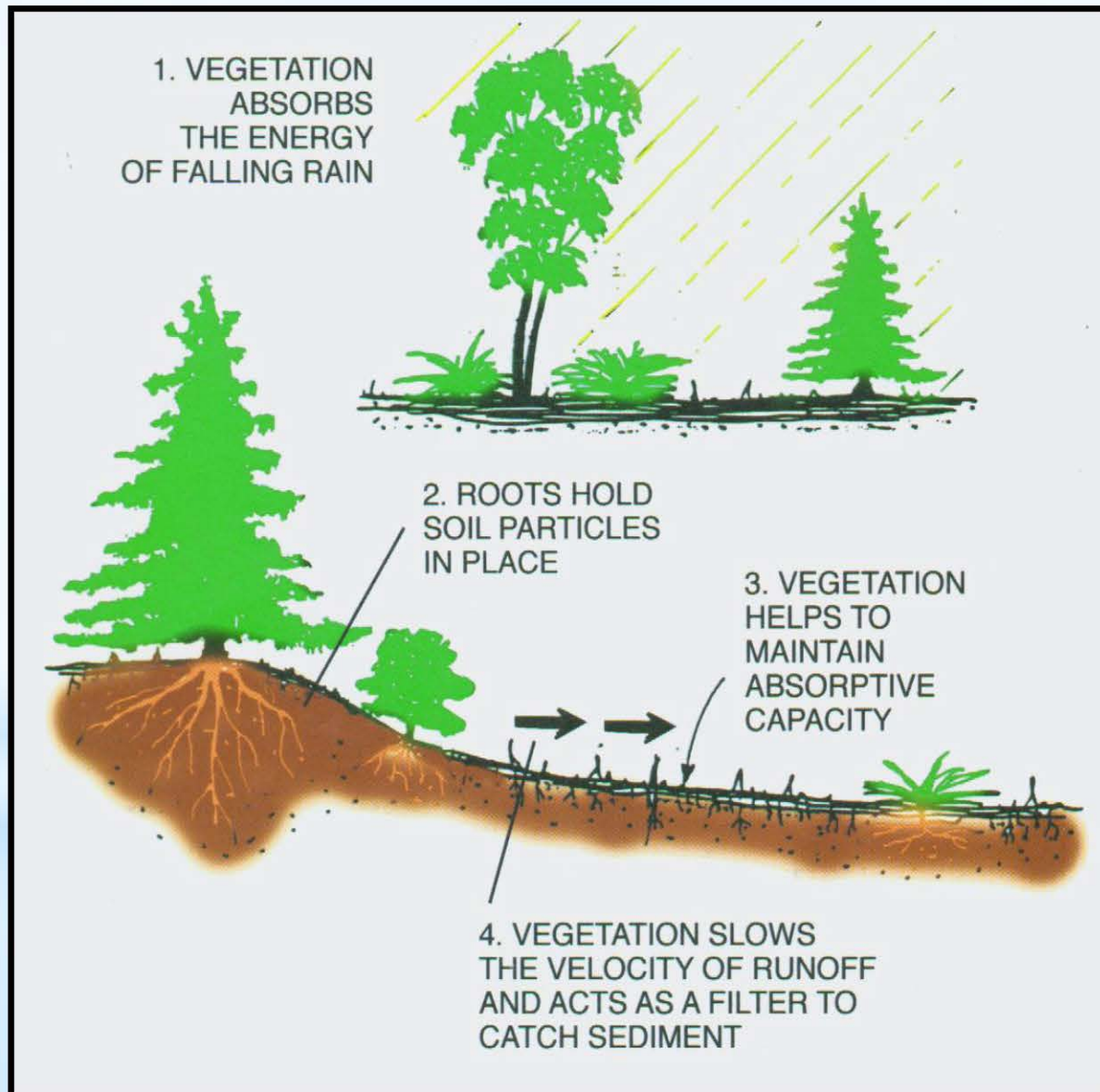


Stormwater Solutions

- * Scheduling/Planning
 - * Low Impact Development Techniques
- * Public Education / Community Engagement
- * Source (Erosion) Control
 - * Preventing sediment from mobilizing
- * Sediment Control
 - * Recovering sediment after the particle has already detached
- * Treatment
 - * Infiltration
 - * Filtration
 - * Particle capture
- * Prioritization & Connectivity
- * Maintenance



Preserve Existing Vegetation



Permanent vs. Temporary BMPs

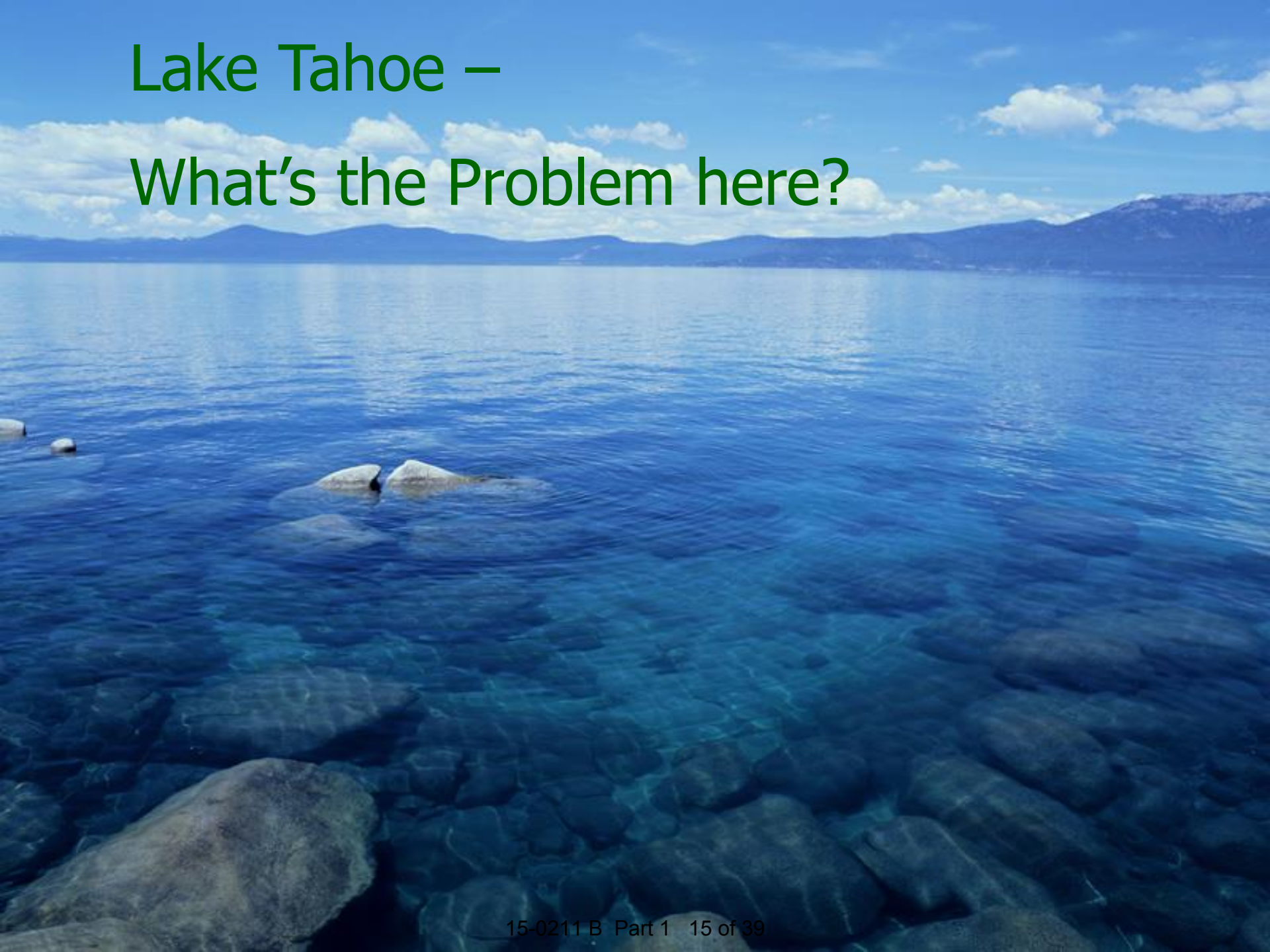
Permanent BMPs

- * Curb & Gutter
- * Sediment Can
- * Detention Basin
- * Pretreatment Vault
- * Grass Lined Swale
- * Rock Lined Channel
- * Rock Check Dam
- * Rock Rip-Rap
- * Retaining Wall
- * Vegetation

Temporary BMPs

- * Silt Fence
- * Fiber Roll (waddle)
- * Drop Inlet Protection
- * Tree Protection
- * Stabilized Construction Entrance
- * Construction Limit Fence
- * Erosion Control Blanket
- * Mulch

Lake Tahoe – What's the Problem here?













OH! Maybe There Is A Problem!



Lake Tahoe has been through a lot of historical disturbance. To name a few...

Logging / Clearcutting



Overfishing



A DAM



Introduction of Invasives





Destruction of Wetlands

12/1940



Image © U.S. Geological Survey

Google earth

15-0211 B Part 1 27 of 39

Imagery Date: 12/31/1939 38°55'47.86" N 120°00'27.60" W elev 6240 ft eye alt 18511 ft

6/2011



Google earth

Urbanization



12/1940



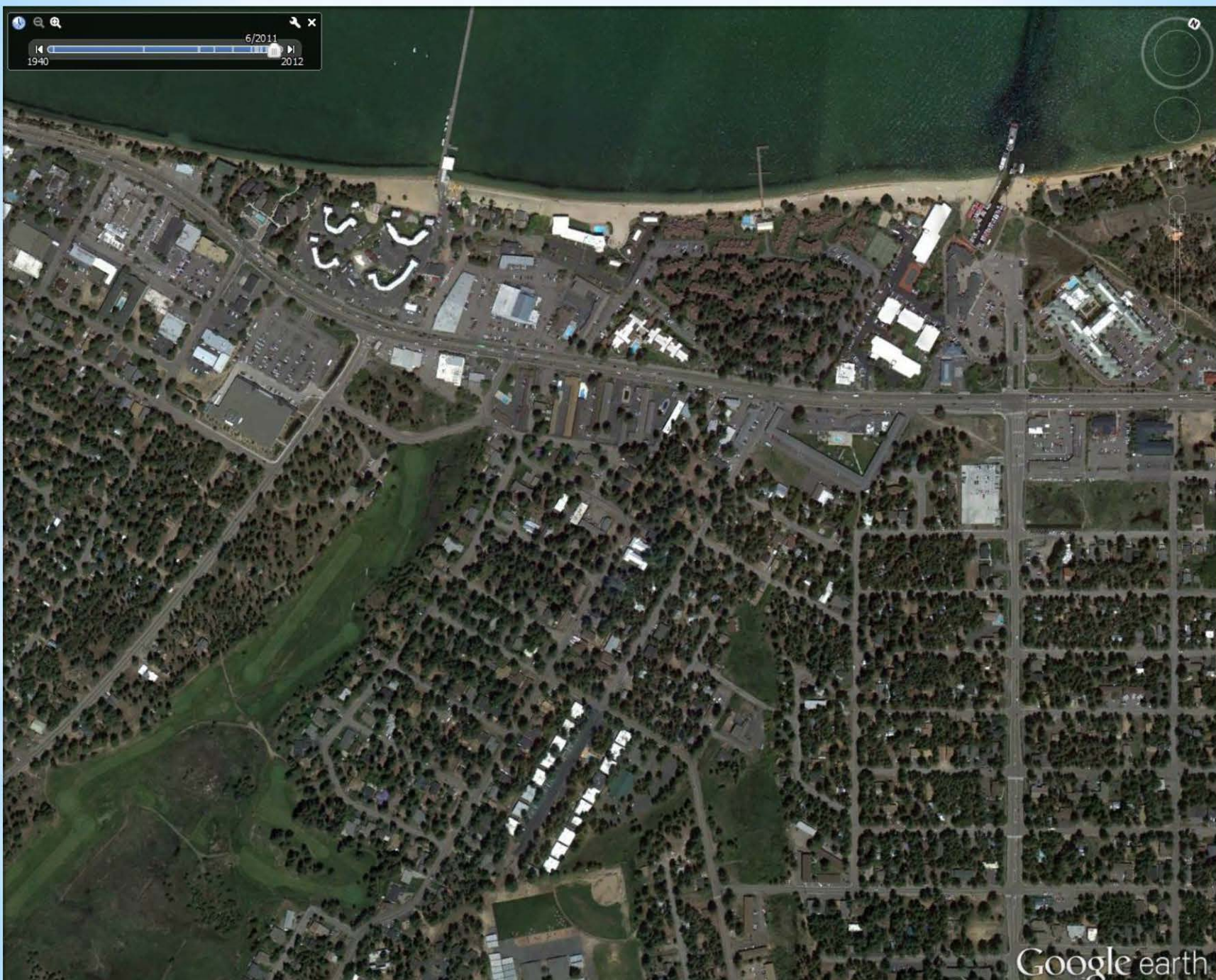
Image U.S. Geological Survey

Google earth

1940

15-0211 B Part 1 30mgeny Dot 12/31/1939 38°56'42.25" N 119°57'43.07" W elev. 6258 ft. eye alt. 10719 ft

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1940 2012



Google earth

15-0211 B Part 1 31 of 39

Imagery Date: 6/14/2011 38°56'42.25" N 119°57'43.07" W elev 6258 ft eye alt 10719 ft

1940

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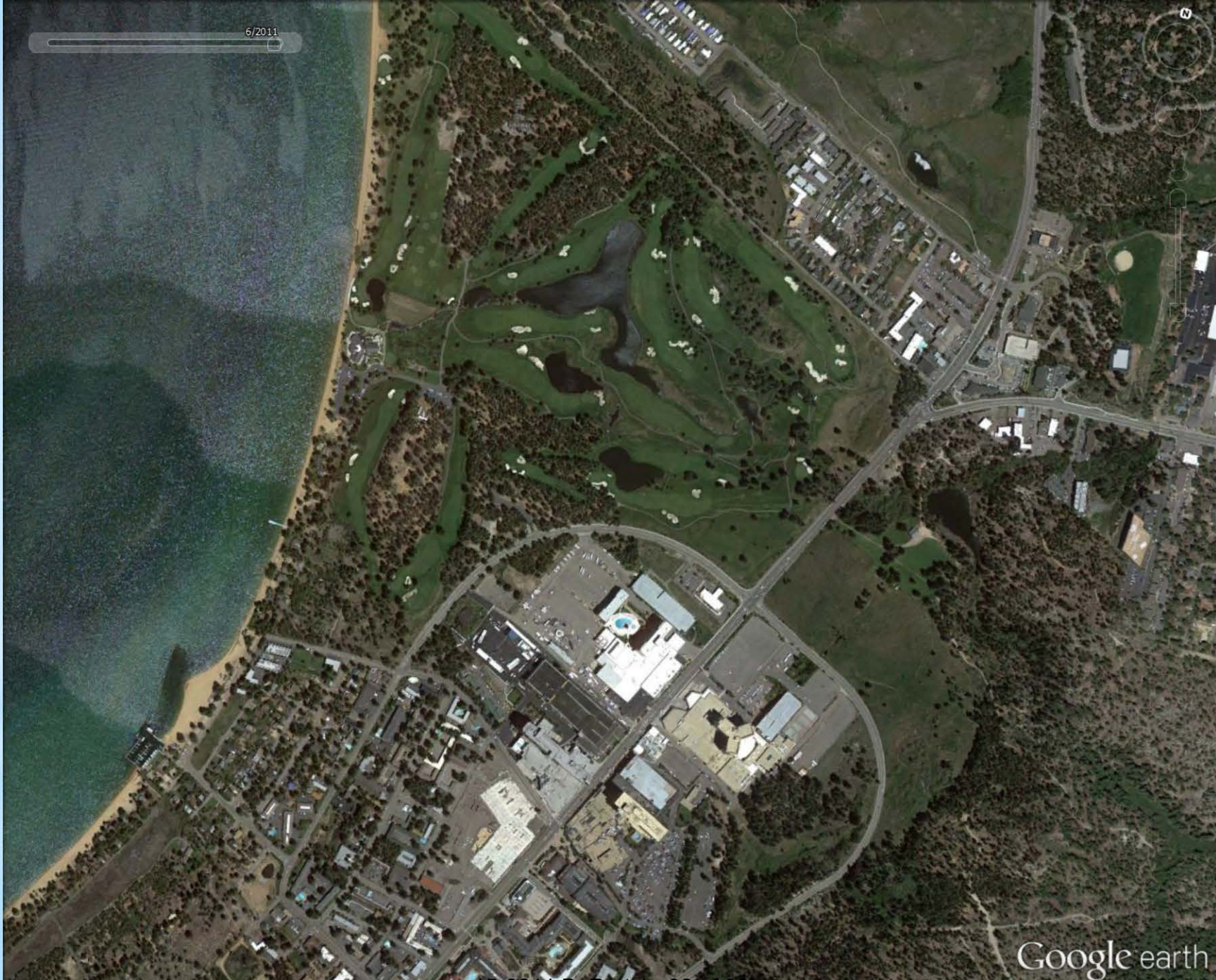
Image U.S. Geological Survey

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15-0211 B Part 1 Image Date: 02/31/1939 38°57'53.46" N 119°56'33.10" W elev 6267 ft eye alt 13099 ft

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15-0211 B Part 1 33 of 39

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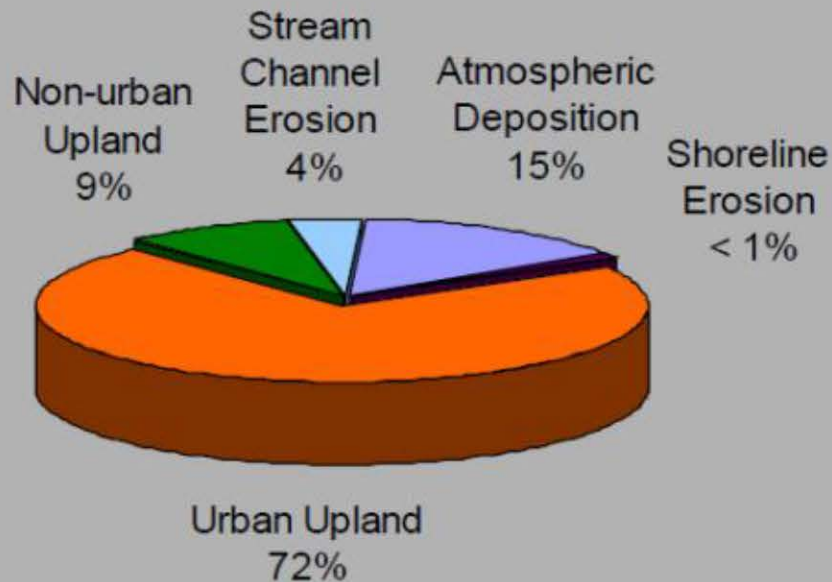
Lake Tahoe TMDL

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?

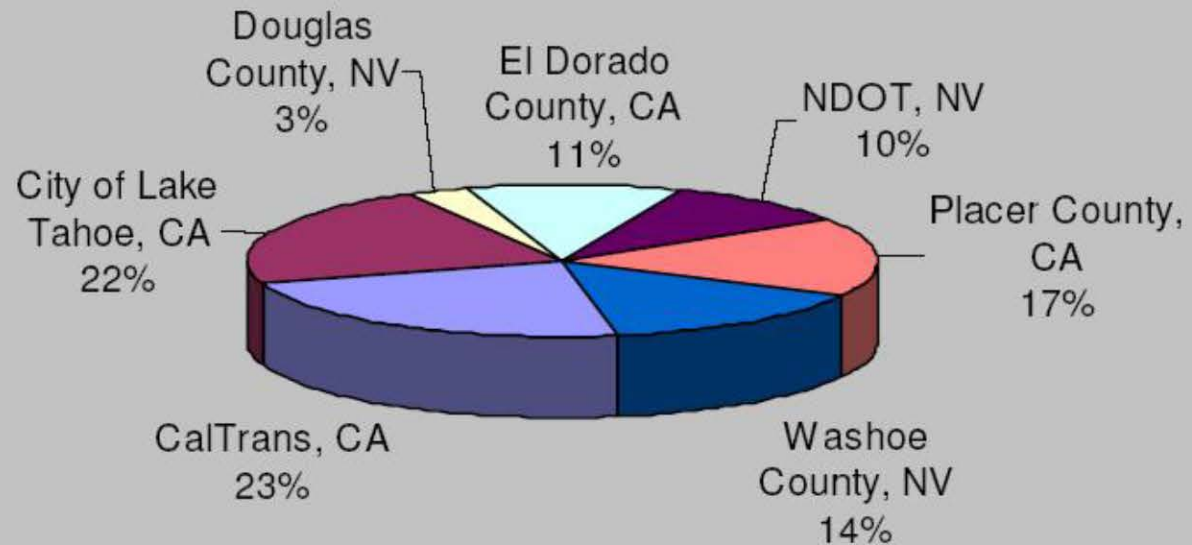
Fine Sediment Particle Number Estimates (particles less than 16 micrometers) Percent Contribution per Source Category



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





Recommended Implementation Strategy Review

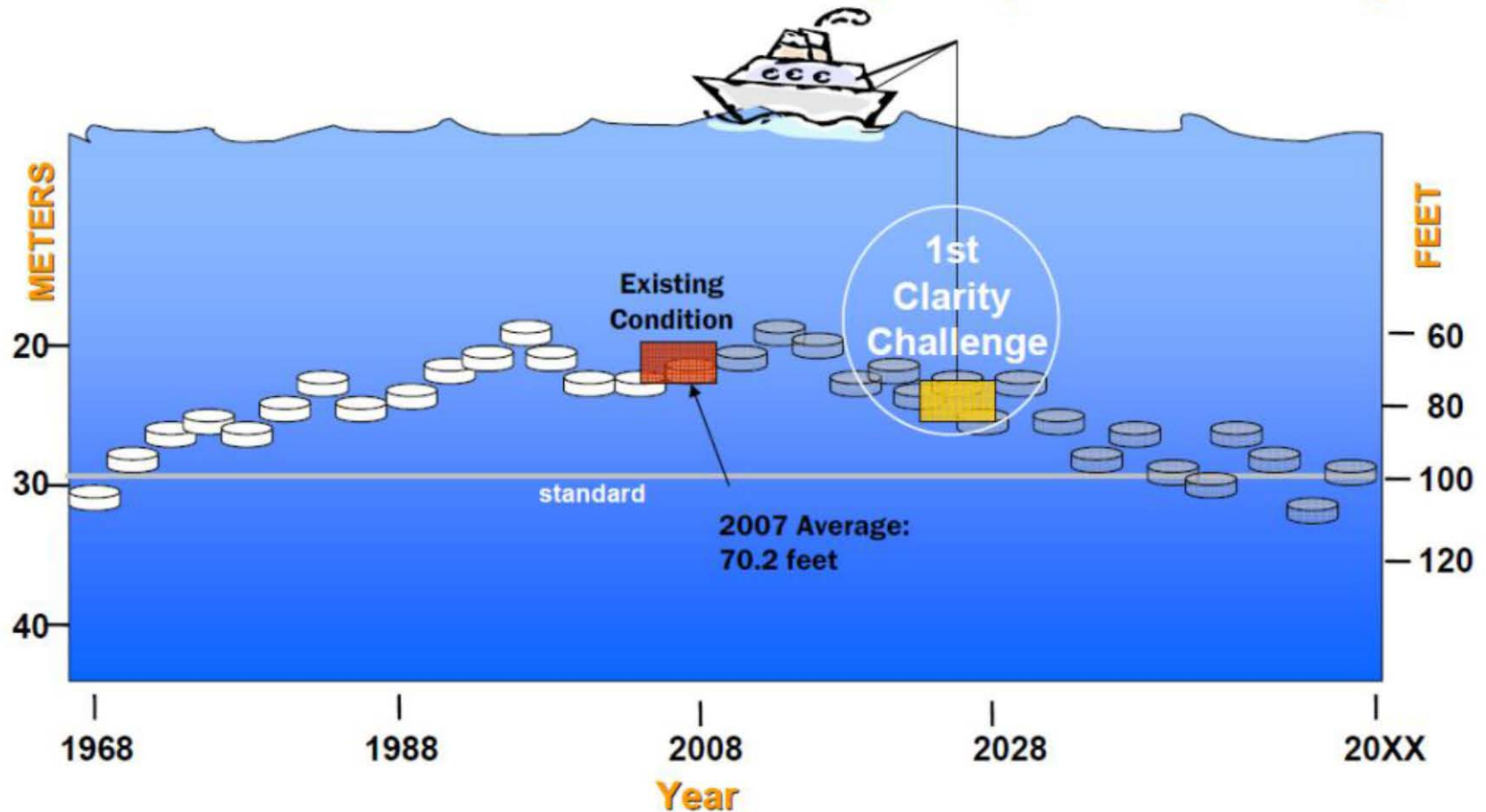
Continue stream restoration efforts

Focus on discrete disturbance in undeveloped areas

Emphasize dust control measures to address atmospheric fine sediment particle inputs

Implement innovative practices, policies, and operations and maintenance programs to treat urban stormwater

The Clarity Challenge: Reverse clarity decline and measurably improve clarity



28 May 2009

9

Lake Clarity Crediting Program

- * 1 Lake Clarity Credit = A box of Fine Sediment Particles (> 16 um) that weighs 200 lbs
- * Based on Average Annual Conditions
- * 65 Years of Load Reduction Strategies to Restore Lake Clarity to the 1968 Standard
- * Storm Water Tools - PLRM, Road RAM, BMP RAM, CAP
- * Our Path to NPDES Permit Compliance
- * BMPs, Sweeping, Abrasives, etc.

