

Master Gardener Water Quality Training Module

Darren L. Haver
Watershed Management Advisor
UCCE Orange County

Tammy Majcherek
Program Coordinator
UC Davis Plant Sciences



Training Module Outline

- Watershed 101
 - What is a watershed?
 - Locate Your Watershed
- Water Quality Regulations
 - Clean Water Act
 - NPDES Program
 - TMDL Program



Training Module Outline

- Water Quality Monitoring
 - Pollutants
 - Sediment
 - Nutrients
 - Pathogens
 - Pesticides
 - Trash
 - Quantification

The background is a solid blue gradient. At the top, there is a decorative wavy shape that transitions from a lighter blue to a darker blue, resembling a stylized horizon or a wave. The text "Watershed 101" is centered in the middle of the page.

Watershed 101



What is a Watershed?

- A basin or catchment where water flows into a specified water body of water.
- Watersheds are usually bordered or separated from each other by mountain ranges or naturally elevated areas
- Larger basins/catchments are often divided in subwatersheds or hydrological units.



South Coast

HYDROLOGIC REGION



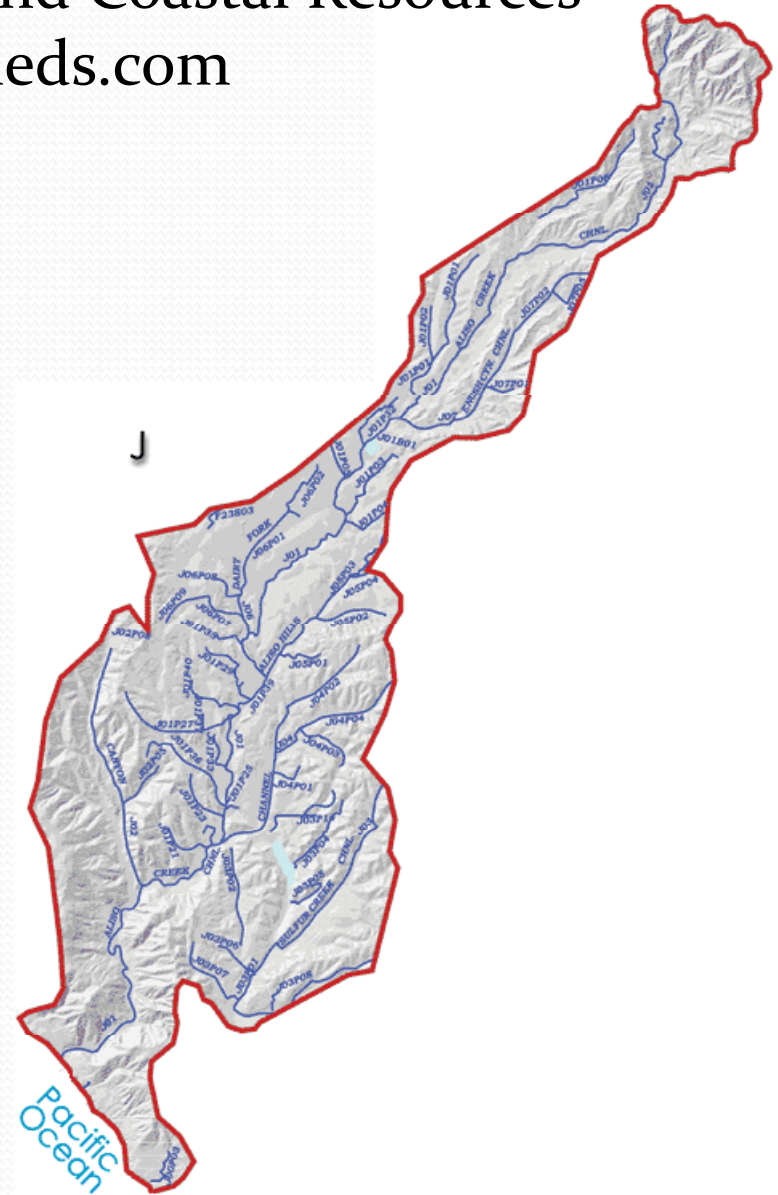
Graphics: California Environmental Resources Evaluation System (CERES) & SWRCB / OIT
Source: CalWater 2.2 and Named Hydrologic Units: SWRCB, 1988.

Orange County Watershed and Coastal Resources

www.ocwatersheds.com



Aliso Creek Watershed



EPA's Surf Your Watershed

www.epa.gov/surf/

U.S. Environmental Protection Agency



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Surf Your Watershed

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Locate Your Watershed

Watersheds are those land areas that catch rain or snow and drain to specific marshes, streams, rivers, lakes, or to ground water. Choose from the options below to Locate Your Watershed.

Search By Map

Use clickable state maps to locate your watershed



Find Place

Search all the geographic navigation tables in Surf Your Watershed. Insert the name of your city, river, county, or state (*example*)

Places

Use USGS's Geographic Names Information System to locate your watershed by querying on lakes, airports, rivers, parks, schools and more.

Locate by geographic unit by entering in your zip code, state, county, tribal nation, watershed number or stream name.

Zip Code (5 digit number)

Your Entry:

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Revised: Friday, March 23, 2007
URL: <http://cfpub.epa.gov/surf/locate/index.cfm>

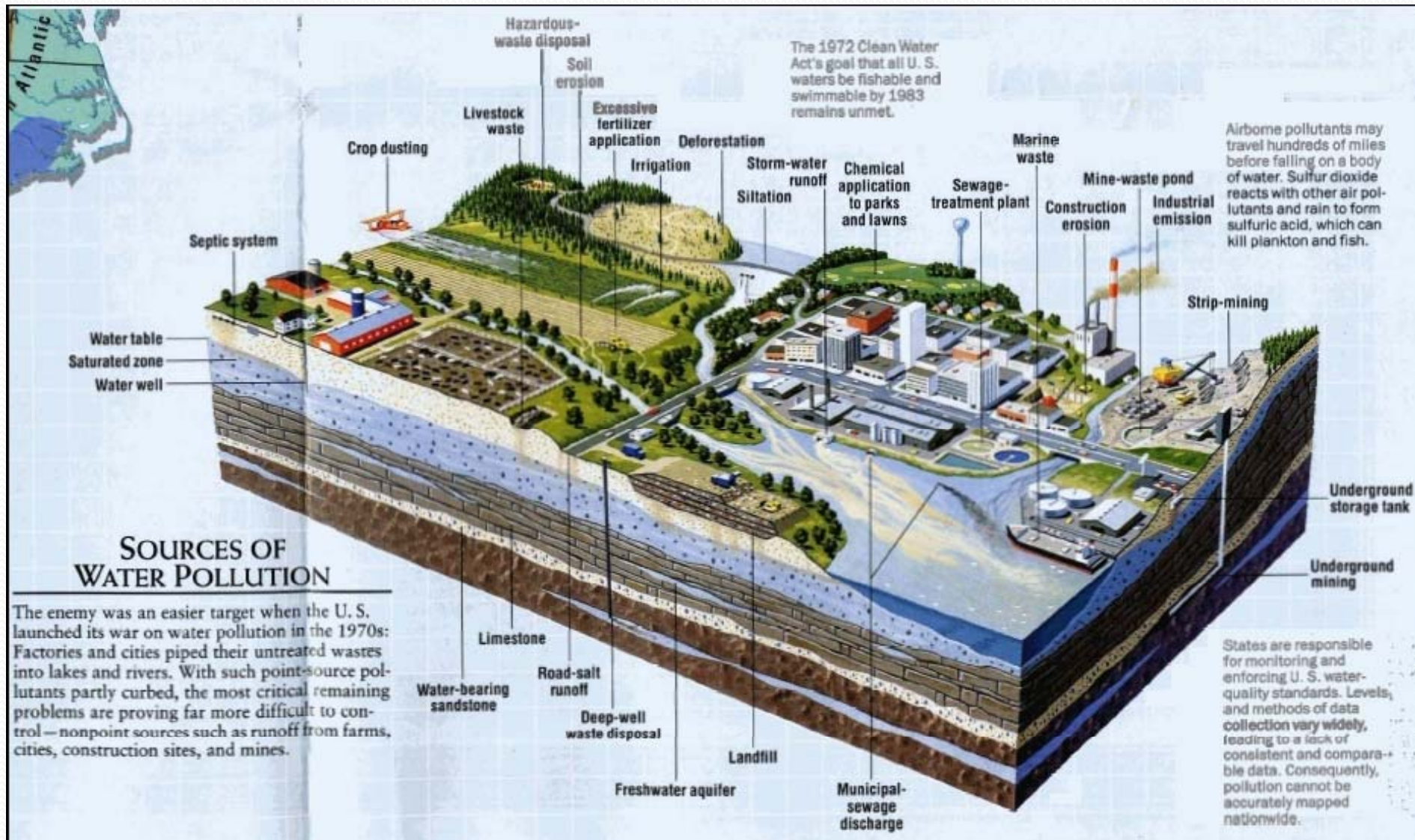


Locate Your Watershed

- Orange County Watershed and Coastal Resources
 - www.ocwatersheds.com
- EPA's Surf Your Watershed
 - www.epa.gov/surf/



Water Quality Regulations

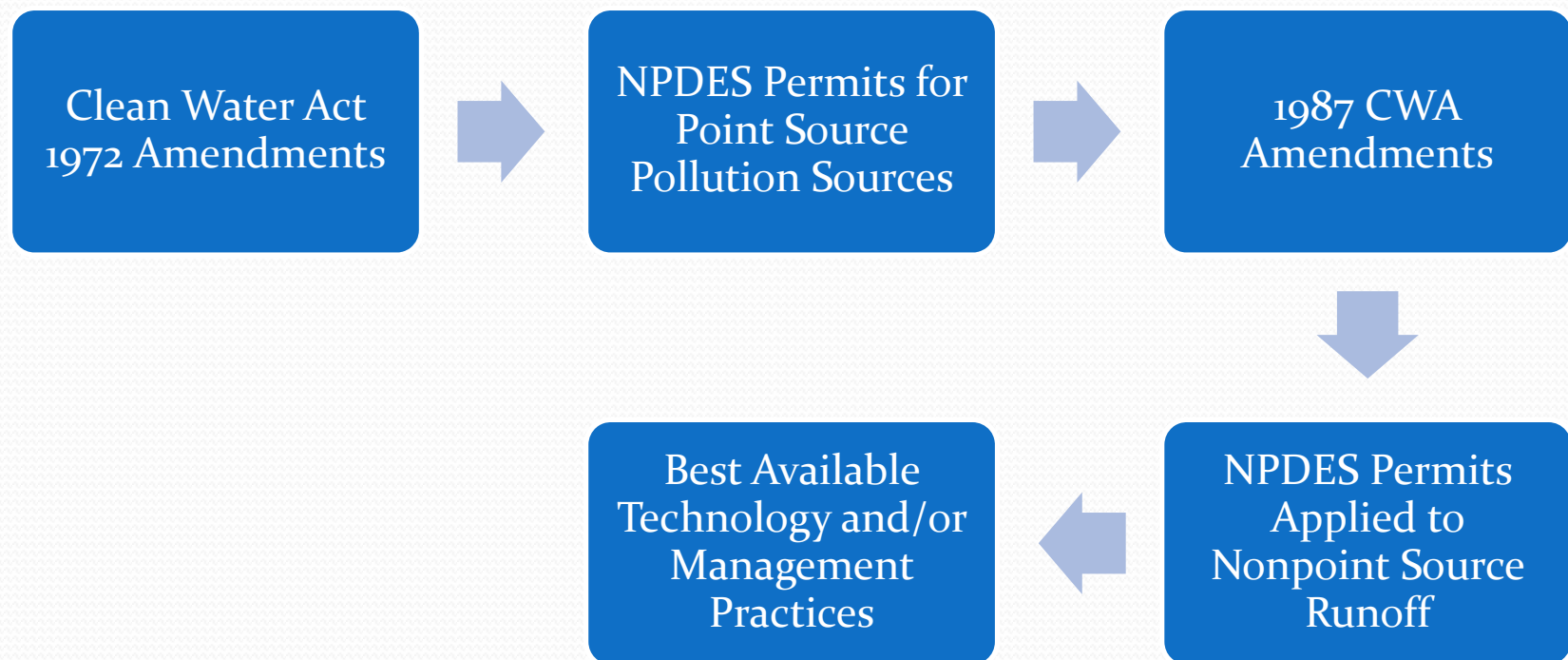


Source: National Geographic

Sources of Pollution

- Point Source
 - Sewage Treatment Facilities
 - Industrial Factories
- Nonpoint Source
 - Diffuse and thereby difficult to associate to a specific source.
 - Urban runoff, agriculture, open space, atmospheric deposition.

Water Quality Regulations





Orange County NPDES Permit

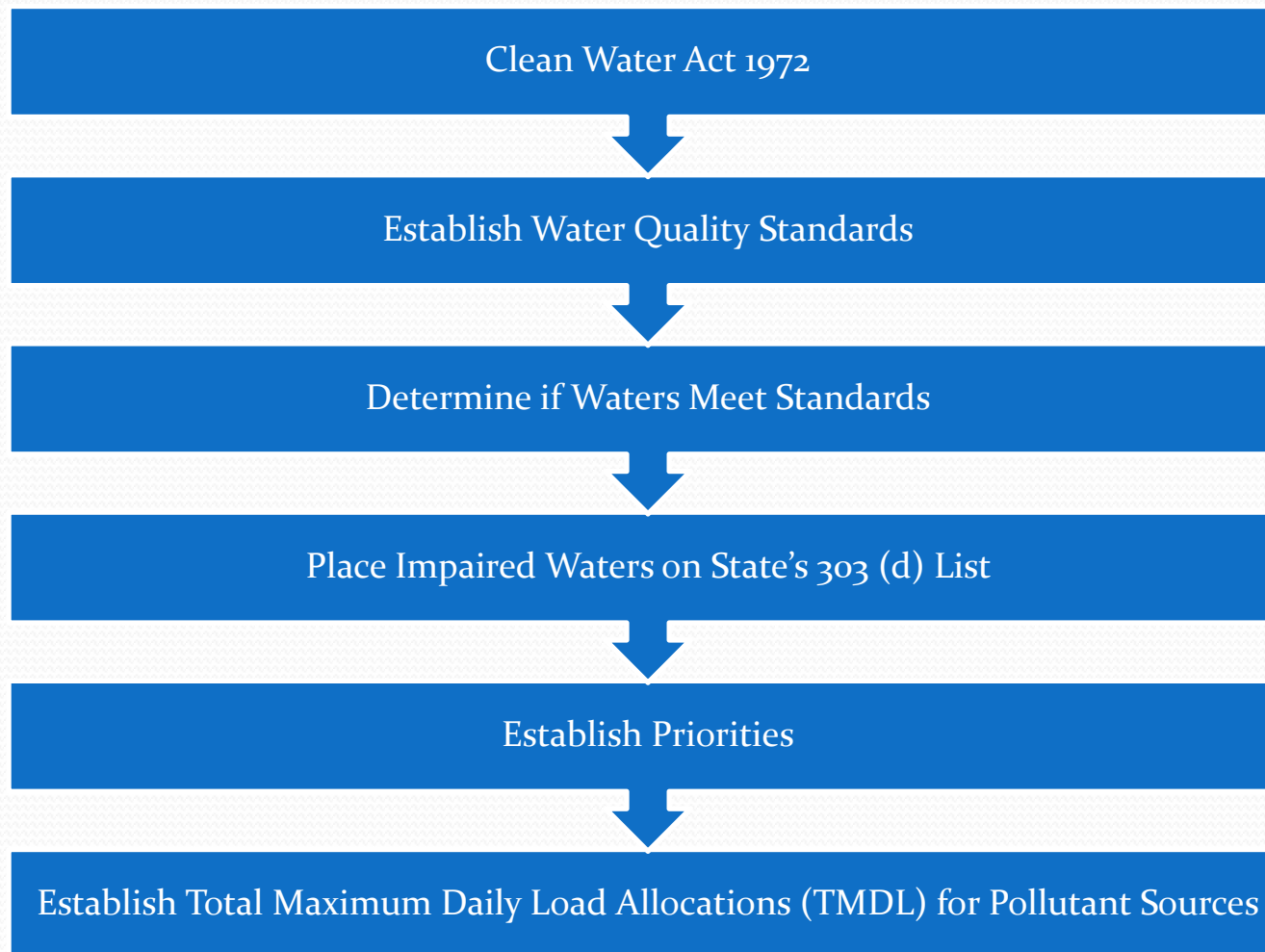
- Permits issued in 5-year terms by Regional Water Quality Control Boards
- Northern part of Orange County is under the jurisdiction of the Santa Ana RWQCB and the San Diego RWQCB in southern part of the county.
- Last permit issued in 2002.
- RWQCBs currently developing new permits.



NPDES Requirements

- Required by jurisdictions wanting to discharge water to the stormwater system (streams, rivers, lakes, bays, ocean, etc...)
- Drainage Area Management Plan (DAMP)
 - Includes details on how each urban sector will address nonpoint source pollution utilizing Best Management Practices (BMPs)
 - Monitoring of storm drains and water bodies for pollutants of concern
- Cost Orange County ~\$70 million each fiscal year

Water Quality Regulations



Regional Water Quality Control Board Basin Plans

- Water quality standards
 - Designate beneficial uses
 - Set criteria to protect uses
 - Establishing provisions to protect a waterbody from pollutants.



303 (d) List of Impaired Waters

- Inventory of all waters of the state not meeting water quality standards
- Waters are prioritized based on level of impairment and beneficial uses
- Clean Water Act requires list to be updated every 2-3 years
- RWQCBs are responsible for developing TMDLs for waterbodies on the list.



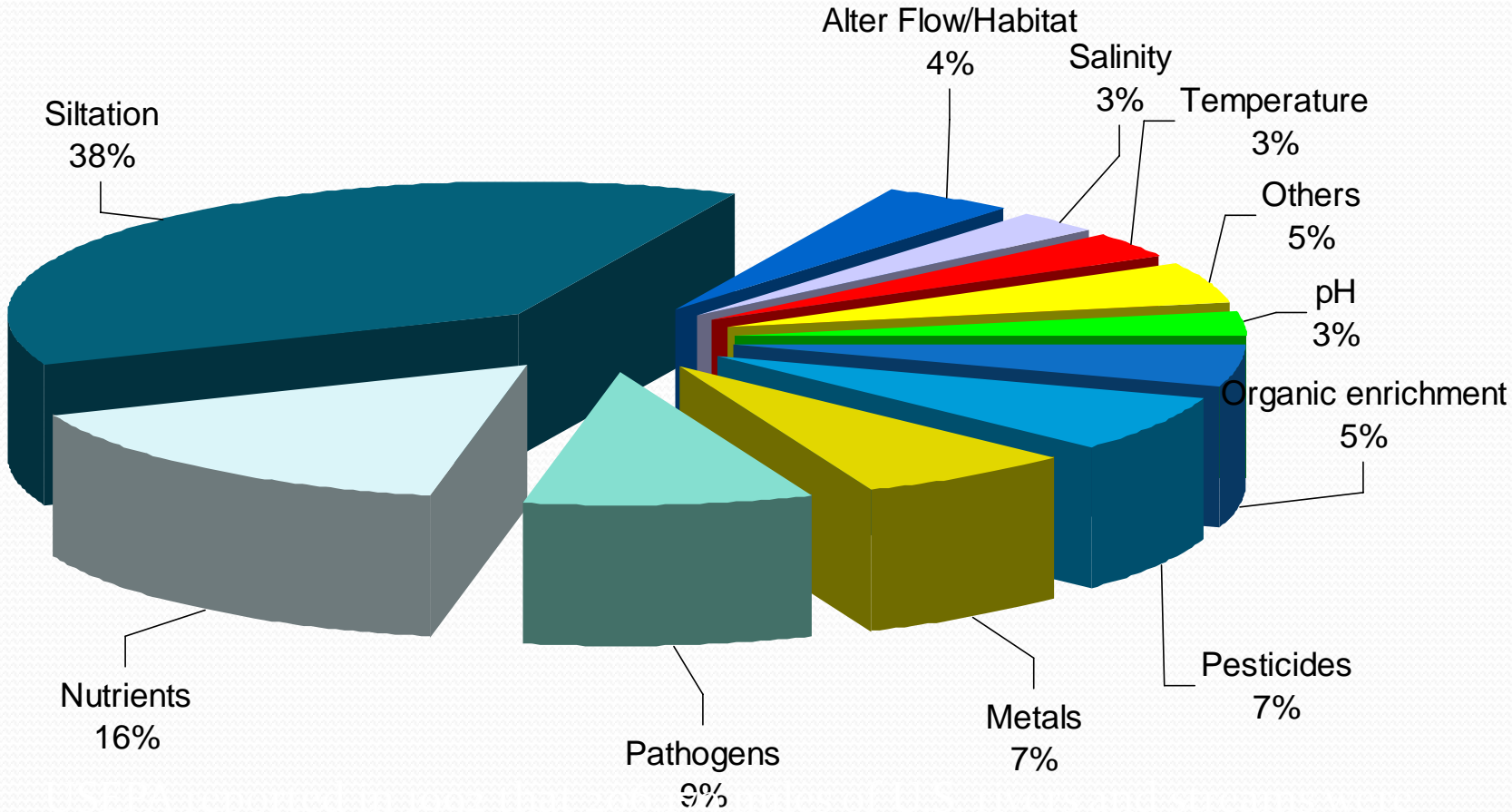
Total Maximum Daily Loads

- Maximum load (ex. lbs. of N) a waterbody can receive and still maintain beneficial uses.
- TMDL Development
 - Establish maximum load
 - Identify all sources of pollutant
 - Allocate a load to its source of pollutant
 - Monitor sources to ensure loads are not exceeded

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Water Quality Monitoring

Nonpoint Source Pollution in U.S. Rivers



Pollutants of Concern in Orange County

- Sediment
- Pathogens
- Nutrients
- Pesticides
- Heavy Metals
- Trash

Pollutants Associated with Urban Landscapes

- Nutrients (nitrogen and phosphorus)
 - Fertilizers
 - Lawn and leaf debris
- Pesticides
 - Insect control
 - Weed control
 - Fungal control
 - Vertebrate control
 - Molluscide control
- Sediment
 - Bare soil, landscape construction

Nutrients

- Nitrogen
 - Nitrite
 - Nitrate
 - Ammonia
 - TKN (Organic N)
- Phosphorus
 - Soluble P
 - Insoluble P
- Impacts
 - Excess growth of algae
 - Oxygen depletion
 - Human health issue



Pesticides

- Organophosphates
 - diazinon
 - chlorpyrifos
- Synthetic pyrethroids
 - bifenthrin
 - cypermethrin
 - cyfluthrin
 - etc....
- Fipronil
- Carbamates
 - carbaryl
- Impacts
 - aquatic acute toxicity
 - aquatic chronic toxicity
 - mutations
 - bioaccumulation in higher animals



Sediment

- Sources
 - bare soil surfaces
 - landscape construction
 - erosion
- Impacts
 - habitat destruction
 - reduces capacity of water bodies
 - carries nutrients, pesticides, pathogens, heavy metals





Water Quality Sampling

- Grab
 - Discrete sample
 - Manually taken
- Composite
 - Several discrete samples combined
 - Automatic sampling equipment
- Field and/or laboratory analysis
 - Basic water quality characteristics
 - Concentration of pollutant(s)
 - Evaluation of toxicity (survival of aquatic species)

Basic Water Quality Characteristics

- pH
- EC
- Dissolved Oxygen (DO)
- Total Suspended Solids (TSS)
- Total Dissolved Solids (TDS)
- Total Organic Carbon (TOC)
- Dissolved Organic Carbon (DOC)
- Temperature



Flow Monitoring

- Continuously measure velocity and depth of water in order to calculate flow over time
- Flow * Concentration = Load
- Utilize various types of flow sensing equipment
 - Bubble/pressure transducer
 - Doppler
 - Flumes
 - Weirs
- Difficult and expensive

Why Conduct Water Quality Monitoring?

- Determine the health of a water body and its ability to meet beneficial uses
 - Is it safe to drink? Is it safe to swim in? Are the fish safe to eat?
- Accurate load allocations depend on large water quality data sets
- Determine if efforts to reduce pollutants are successful
 - Evaluation of the effectiveness of BMPs