

## Total Maximum Daily Loads A Formula for Reducing Pollution in New York's Waters

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## Total Maximum Daily Loads Federal Clean Water Act

- Legal Mechanism to Address Impaired Waters (Requirement for State)
- Amount of pollutant a waterbody can receive and still meet State Water Quality Standards
- TMDL = WLA + LA + MOS
  - Waste Load Allocation (permitted discharges)
  - Load Allocation (diffuse "unregulated" pollution)
  - Margin of Safety (account for uncertainty)

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## Why be involved?

- SPDES discharge to impaired waters
  - Municipal or industrial treatment plant
  - Combined Sewer Overflows
  - Municipal Storm Sewer Systems (MS4s)
  - Construction general permits
- Watershed planning and restoration
  - Local value of natural resources
  - Economic development
  - Assessed valuation

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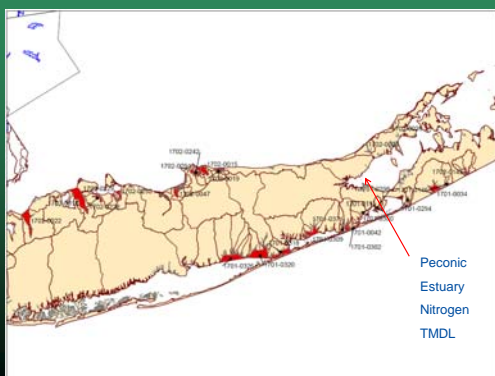
## New York TMDLs

- Lake Champlain - Phosphorus
- Peconic Estuary - Nitrogen
- New York City Reservoirs - Phosphorus
- Small Lakes – Phosphorus
- Shellfishing Waters – Pathogens
- Northeast Regional (NEIWPPC) - Mercury

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## Map of Pathogen TMDLs

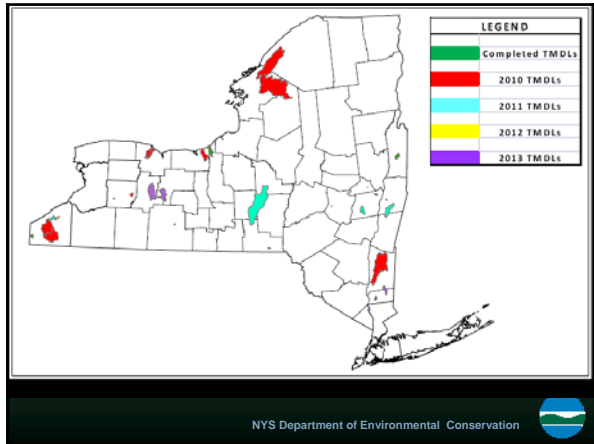


## Onondaga Lake

- TMDL revision under consideration
- Will reset clock on timetable for implementation plan for retrofit program
- Consider specifics in new GP to help prepare for TMDL revision

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### Continuing Assessment Process

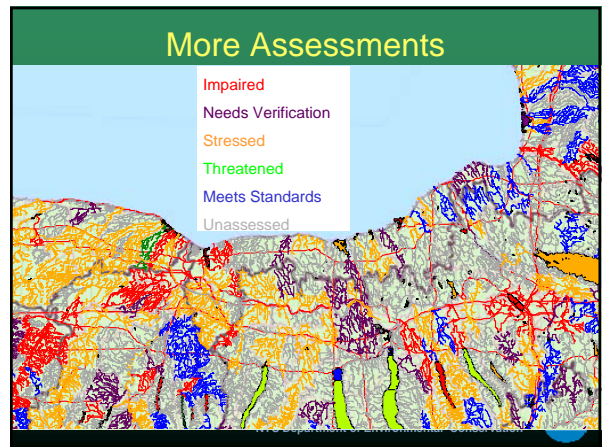
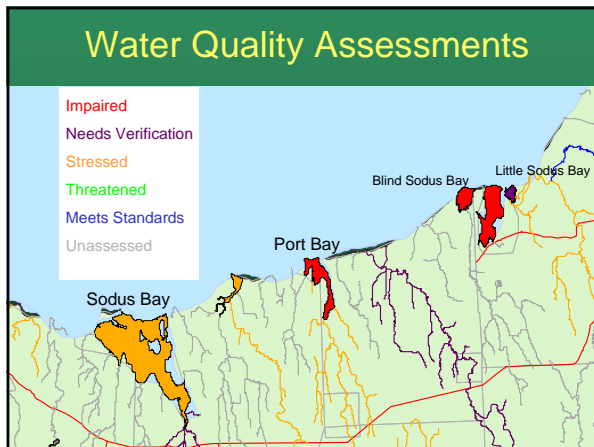
- Rotating Sampling (5-yr cycle)
  - 2009 – Genesee River Basin
  - 2010 – Western Lake Ontario Basin
  - 2011 – Central LO/Oswego R./Finger Lakes
  - 2012 – Eastern LO/ Black River Basin
- Un-assessed waters
- Priority Waterbody List
  - Threatened
  - Stressed
- 303 (d) list - 2008 (2-yr update)
- Evolving contaminants/standards

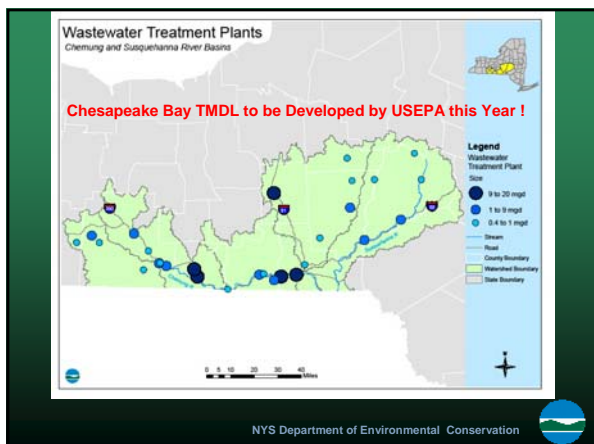
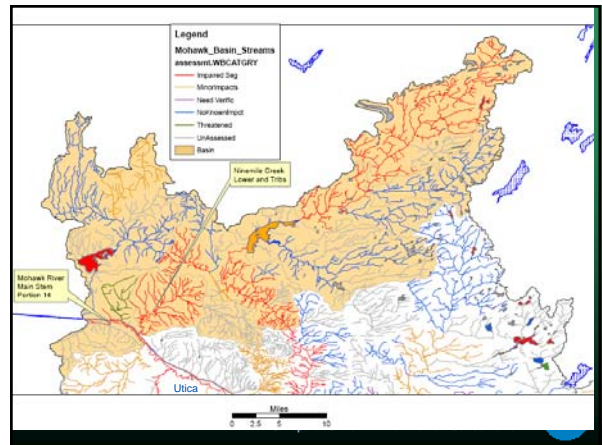
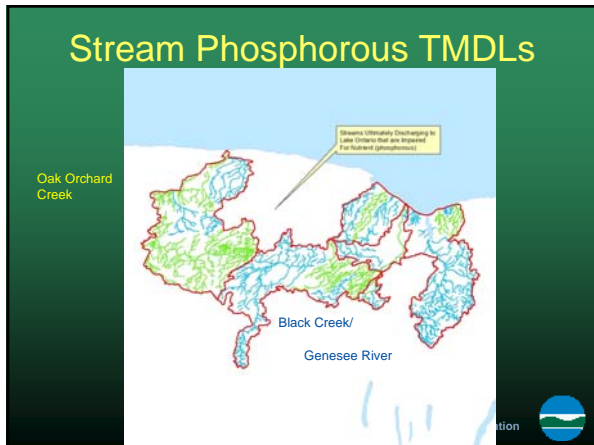
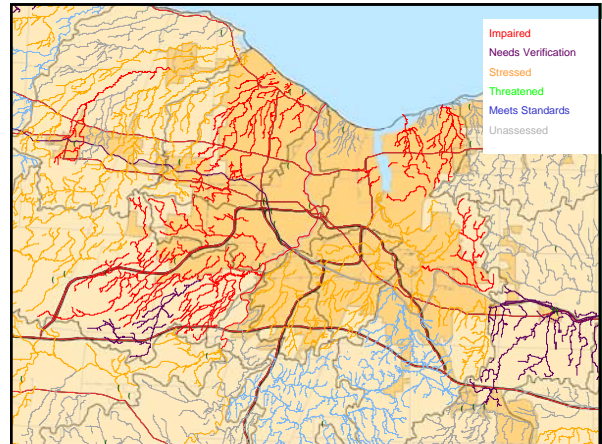
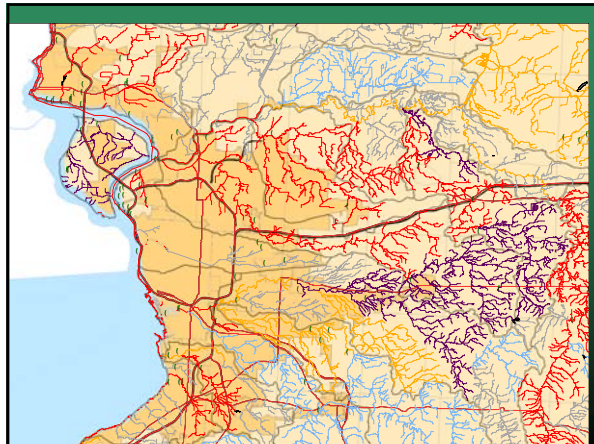
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### Impaired Waters 303 (d) list

- Lake Ontario
  - PCBs, Mirex, Dioxin
  - Pathogens (Rochester Embayment – West)
- > Other waters
  - Oxygen depletion
  - Floatables
  - Pathogens
  - Phosphorus
  - Silt/Sediment

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### What Chesapeake Bay TMDL May Mean to NY

- Permit Limits for nitrogen and phosphorus
- EPA to propose new federal rules?
- NYDEC expects EPA to establish a TMDL for Chesapeake Bay that includes important "fairness" caveats:
  1. Equal opportunity for growth in NY
  2. Equal time for implementation in NY
  3. Equal commitments from federal government to support implementation in NY

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## What does a TMDL involve?

- Describing the Problem
- Setting Numerical Targets
- Identifying Pollutant Sources
- Assigning Allocations
- Developing an Implementation Plan
- Developing a Monitoring Plan

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## Describing the problem

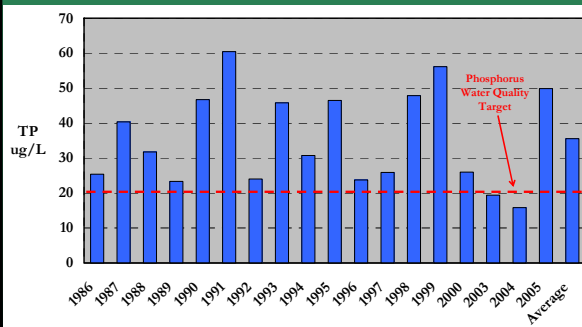
- Need more information to fix than list
  - Temporal variation (TMDL)
  - Association with flow (concentrations/loads)
- Sources of information
  - Other government agencies
  - Academic institutions
  - Volunteer (Quality Control)
    - Citizen Statewide Lake Assessment Program (CSLAP)

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## CSLAP Lake Monitoring

Average Growing Season Epilimnion TP Concentration



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## Setting Numerical Targets Cause and effect relationship

- Water quality simulation model is used to
  - Link the pollutant of concern to the impaired waterbody
  - Relate level of impairment to loads from pollution sources
  - Determine total loading capacity
- Consider
  - Critical flow and level conditions
  - Seasonality

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## Setting Numerical Targets Lakes- Cause and effect relationship

- Lake model is used to define the relationship between phosphorus loading to the lake and the resulting phosphorus concentration.
- Net accumulation in Lake (nutrient balance)
  - Nutrient (P) load input to lake (watershed model)
  - Nutrient (P) load output from lake (monitoring)
  - Nutrient (P) losses in lake (algae: chlorophyll-a, sediment, oxygen depletion)
- What is the maximum load that results in phosphorus concentration of 20 micrograms/liter ???

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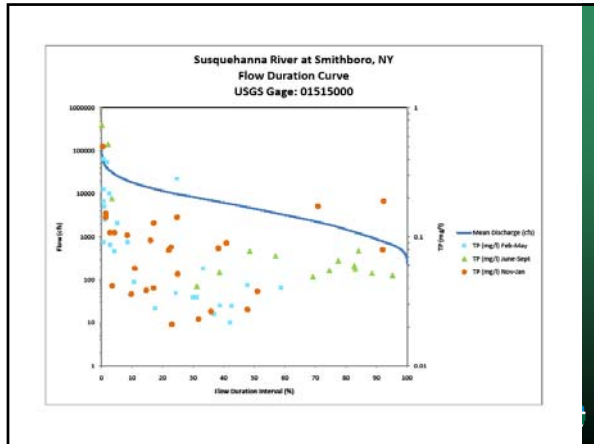


## Setting Numerical Targets Streams - Cause and effect relationship

- Strategy is under development to interpret narrative standards for nutrients meant to prevent the common problems caused in surface waters (e.g. low dissolved oxygen, algal blooms, increased turbidity, weed growth) that can result in the preclusion of designated uses (protect aquatic life, such as benthic macroinvertebrates, diatoms, and periphyton)
- Factors that affect the biological integrity of flowing waters:
  - phosphorus (and nitrogen ?)
  - bottom substrate type (cobble versus sand, silt, etc.),
  - stream discharge (low flow versus storm events),
  - stream cover (water temperature),
  - inorganic turbidity, and pH,
  - other toxic substances, such as ammonia.

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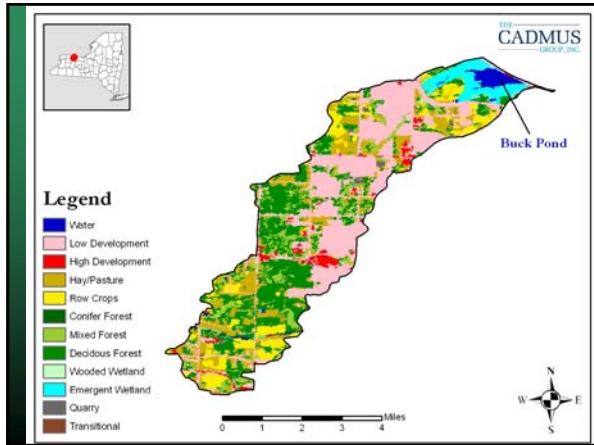




## Identifying pollutant sources

- delineating the watershed
- describing hydrologic and geologic characteristics
- quantifying land use and land management practices
- identifying and locating loads from all pollutant sources by using a watershed model

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Land Use Category	Acres	% of Drainage Basin
Open Water	48	0.4%
Agriculture	2,702	25%
Hay & Pasture	1,714	16%
Cropland	988	9%
Developed Land	3,799	35%
Low Intensity	3,484	32%
High Intensity	315	3%
Forest	3,629	34%
Wetlands	532	5%
Quarry	81	1%
<b>TOTAL</b>	<b>10,791</b>	<b>100%</b>

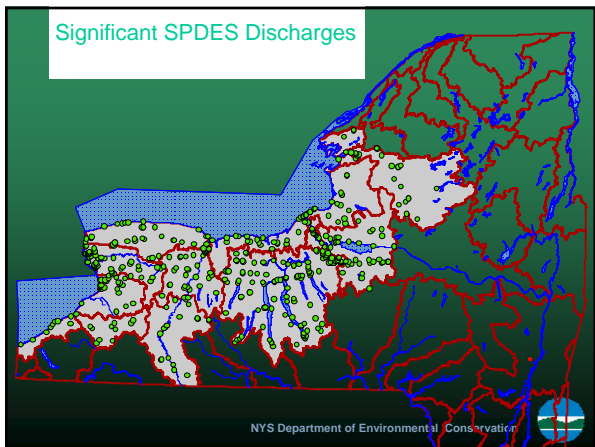
  

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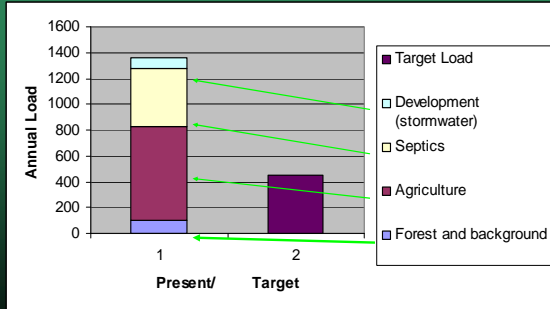
## Identifying pollutant sources

- Watershed Model will attribute load to source categories:
  - Wastewater discharges
  - Stormwater from developed land
    - Lawn fertilizer, animal droppings, erosion
  - Forest, wetlands, other natural background
  - Agriculture (fertilizer, manure, soil loss)
  - On-Site Wastewater (Septics)

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## Load Allocation (living on a budget)



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## Assigning Allocations

- Time and Resource intensive
- Need to be clear with stakeholders
  - How allocation scenarios are designed and tested
  - How will the solution be implemented
    - Technical and environmental considerations; economic, social, and political considerations
    - Practical considerations for implementation, such as landowner acceptance of management practices, funding, and other constraints
    - “reasonable assurance” for NPS reduction

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## Assigning Allocations

- TMDL = WLA + LA + MOS
  - Waste Load Allocation (permitted discharges)
  - Load Allocation (diffuse “unregulated” pollution)
  - Margin of Safety (account for uncertainty)
- SPDES discharges - regulatory consequences of the TMDL (Waste Load Allocation).
  - MS4 Permits
  - **Construction Permits:** (disturb > 1 acre) must address Phosphorus (Design supplement)
  - Concentrated Animal Feeding Operations (CAFO)

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## Lake Oswawana Allocation Table

Table 6. Total Annual Phosphorus Load Allocations for Lake Oswawana<sup>1</sup>

Source	Total Phosphorus Load (lbs/yr)			% Reduction
	Current	Allocated	Reduction	
Agriculture	7	6	1	9%
Developed Land (non-regulated MS4 groundwater)	49	44	5	10%
Septic Systems	313	284	29	9%
Forest, Wetland, Stream Bank, and Natural Background	141	141	0	0%
<b>LOAD ALLOCATION</b>	<b>509</b>	<b>475</b>	<b>34</b>	<b>7%</b>
Point Sources	0	0	0	0%
Developed Land (regulated MS4 stormwater)	153	125	28	18%
<b>WASTELOAD ALLOCATION</b>	<b>153</b>	<b>125</b>	<b>28</b>	<b>18%</b>
<b>LA + WLA</b>	<b>663</b>	<b>600</b>	<b>62</b>	<b>9%</b>
Margin of Safety	MOS of 10% built into the TMDL endpoint.			
<b>TOTAL</b>	<b>663</b>	<b>600</b>	<b>62</b>	<b>9%</b>

1 - Note: The values reported in Table 6 are the annually integrated values. The daily equivalent values are provided in Appendix C.

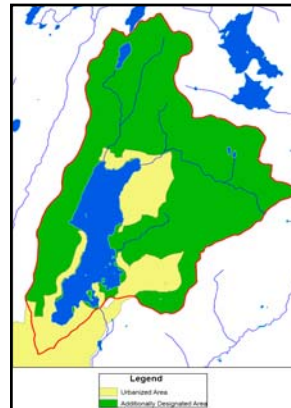
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## TMDL Regulatory Consequences

- Waste Load Allocations
  - MS4 Permits
    - Retrofit Program with plan and schedules
    - Additionally designated areas
    - Additional BMPs for Watershed Improvement Strategies
  - **Construction Permits:** (disturb > 1 acre) must address Phosphorus using Enhanced Phosphorus Removal Standards

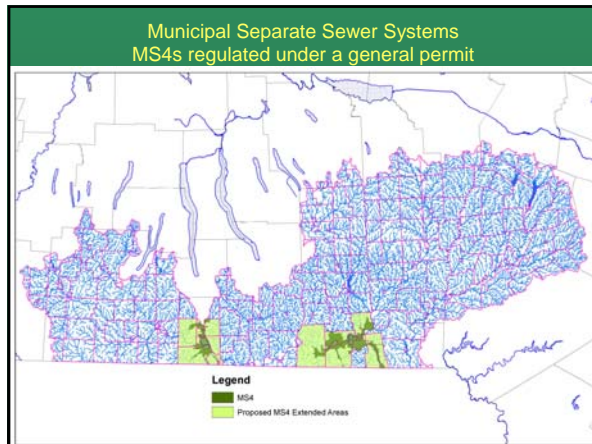
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## Map of Lake Oswawana Watershed



-Additionally designated area as defined in Part X, Sect. B, criterion 1 of the permit

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### Additional BMPs for Watershed Improvement Strategies

Additional BMP's For Watershed Improvement Strategies				
	NYC EOH	Other Phosphorus TMDLs	Pathogen TMDLs	Nitrogen TMDLs
<b>1 Public Education &amp; Outreach on Stormwater Impacts</b> Describe impacts of POC on waterbodies, identify potential sources of POC in stormwater and describe steps to reduce POC in runoff	X	X	X	X
<b>2 Public Involvement/Participation</b>	-	-	-	-
<b>3 Illicit Discharge Detection and Elimination</b> Map of conveyance system Program for septic	X X	- X (Except Onondaga)	- X	- X
<b>4 Construction Site Stormwater Runoff Control</b> Program to reduce pollutants in stormwater from construction activities disturbing 5,000 sq. ft. or more.	X	-	-	-
<b>5 Post-Construction Stormwater Management</b> Retreat Program Enhanced Phosphorus Removal Design Standards	X X	X X	X -	X -
<b>6 Pollution Prevention/Good Housekeeping for Municipal Operations</b> Stormwater Conveyance System inspection & maintenance program Turf management practices Greener & Fit waste provisions	X X -	- X -	- - X	- X -

- ### MS4 Modeling
- Use DEC supported model or equivalent
    - NYC Reservoirs EOH
    - Nassau Co – simple method
    - Peconics -- Restoration (pathogens and nitrogen)
  - Model load reduction of practices
    - Non structural (e.g. fertilizer regs)
    - Structural retrofits or reconstruction
  - Quantify additional loads from new development
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- ### Developing an Implementation and Monitoring Plan
- TMDL to Address Cause of Problem: Too much pollutant load
  - Management for each source of POC load
    - WLA – set load limits in SPDES permits
      - Municipal, Commercial, Industrial
      - Stormwater (MS4 and Construction)
      - CSOs
    - LA – Reasonable assurance for NPS reduction
      - Agriculture
      - Septics
      - Other?
  - Monitoring to demonstrate improvements
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- ### TMDL Off-ramps
- Delist waters
    - Need several years of ambient W.Q. data to account for variations in wet weather load
    - Requires EPA approval
  - End points may change
    - Nutrient criteria (P criteria being developed)
    - Dissolved Oxygen being assessed
  - Adaptive Implementation
    - Revise TMDL and MS4 WLA's
    - Reasonable assurance of NPS reductions
    - Revise Margin of Safety
    - Maintain offsets for new loads/development
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