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Nine Element Watershed Plans

March 17, 2016
Water Quality Symposium/NYS CDEA Annual Training Session
1:00 PM – 4:30 PM

Outline

- Background
- **Module 1:** introduction to 9E plans
- Understanding the elements
- Difference between 9E plans, TMDLs and DOS plans
- Importance of plans
- Administrative stuff
- Questions

Outline

Module 2: demystifying modeling

- Why are models needed for 9E plans
- Types of models
- Watershed modeling
- Waterbody modeling
- Managing pollution in models
- Questions

Outline

Module 3: case studies

- Genesee River
- Black River
- Small Pond
- Questions
- Discussion

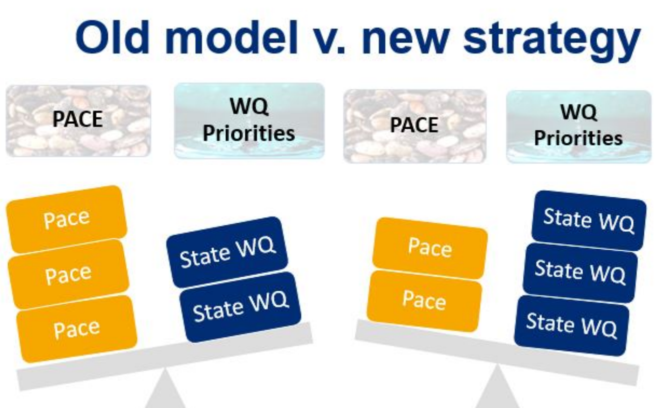
Background

- 1987- Section 319 Nonpoint Source Management Program was added to Clean Water Act
- Watershed-based plans part of program goals
- EPA & states re-envisioned Clean Water Act programs
  - 319 – Nonpoint Source
  - 303(d) – Impaired Waterbodies
- Program integration
- Water quality priorities
- Restoration & protection plans

How are waterbodies prioritized—303(d) & beyond?

DEC developed a strategy to prioritize waterbodies listed on the 303(d):

1. Identified pollutants of concern—nutrients & pathogens
2. Identified priority uses (impaired or unimpaired)--PUBLIC
3. Scored & ranked waterbodies based on water quality data, public health & access, public interest, ecological importance
4. Developed list of waterbodies for TMDL or alternative plans



Name	Class	T or TS	Access	Multiple Pollutants	Multiple Use Impairments	Proximity	BAP Score	Ecological Importance	Score
Saw Mill River	A	-	Public	DO, Path, Nut	Bath, Rec, Aquatic Life	5	3.57	TBD	
Steele Creek	A	TS	None/ Private	Nut, Slt, Alg	Water supply	1	Need Data	TBD	

Name	Class	T or TS	Access	Multiple Pollutants	Multiple Use Impairments	Proximity	BAP Score	Ecological Importance	Score
Saw Mill River	1	0	1	0.75	0.75	0.5	0.5	0	4.5
Steel Creek	1	2	0	0.75	0.25	0.25	0	0	4.25

Clean water plans

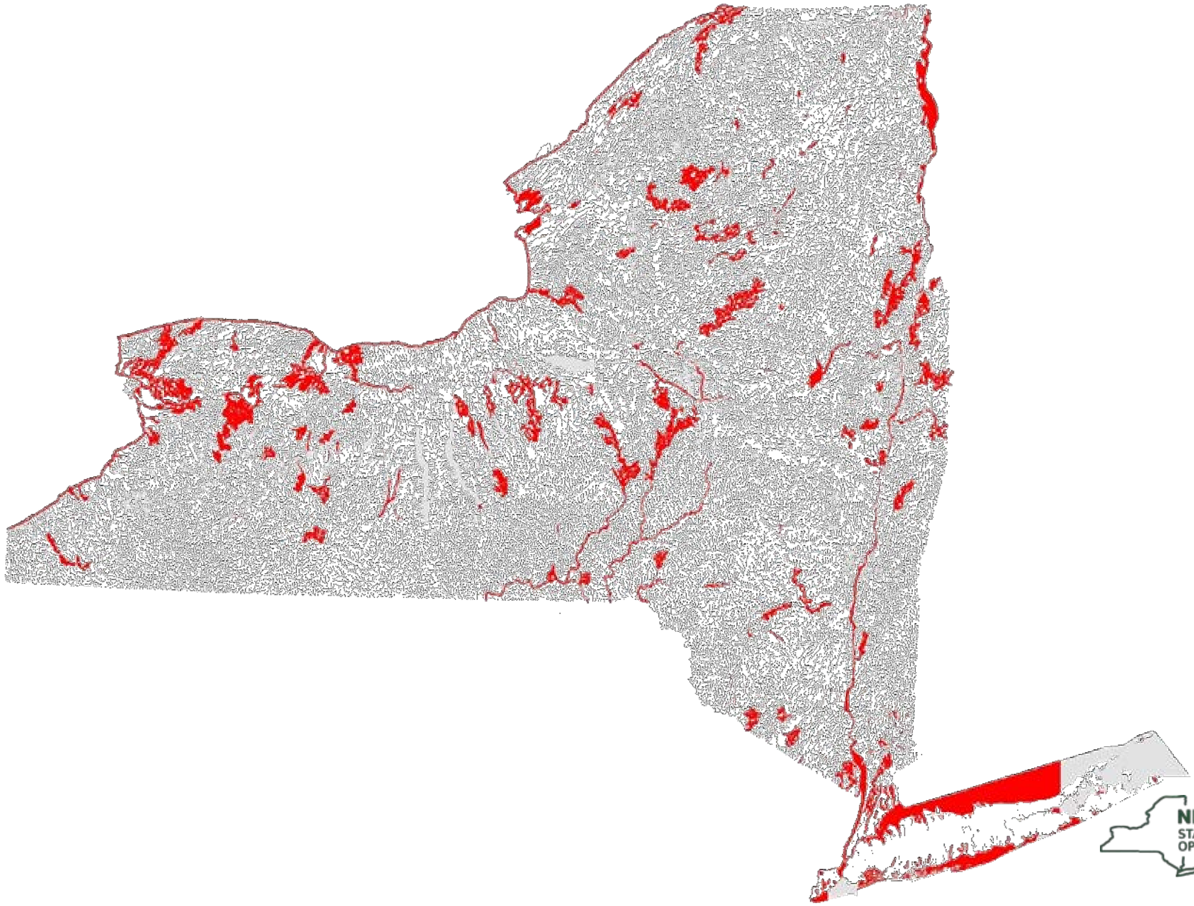
- Watershed-based approach to that outlines a strategy to improve water quality.
- TMDLs, 9E Plans
- These plans document the:
  - Pollutant sources and loads
  - Allowable pollutant level
  - Actions will improve water quality

9E Plans v. TMDLs

Feature	9E Plan	TMDL
Pollutant sources	Better for Nonpoint	Better for Point (regulatory)
Public comment period	No (public participation throughout)	Yes
Implementation	Required	Optional
Approval	NYS DEC	EPA
Funding	Eligible for state & federal	Eligible for state & federal

TMDLs: required by the Clean Water Act for restoration

Section 303d of the CWA requires states to develop a list of impaired waters.



9E Plan v. Department of State watershed plans

- Watershed- based approach (point and nonpoint sources)
- May or may not quantify pollutant loads or estimate reductions
- Great starting point for completion of 9E plan
- Funded by Department of State
- Public participation through plan
- No agency approval process

Why plans important

- Watershed approach
- Adaptive management
- Strong implementation plan
- Effective plans-protection and restoration
- Eligible for federal and state funding

Module 1: Introduction to 9E plans

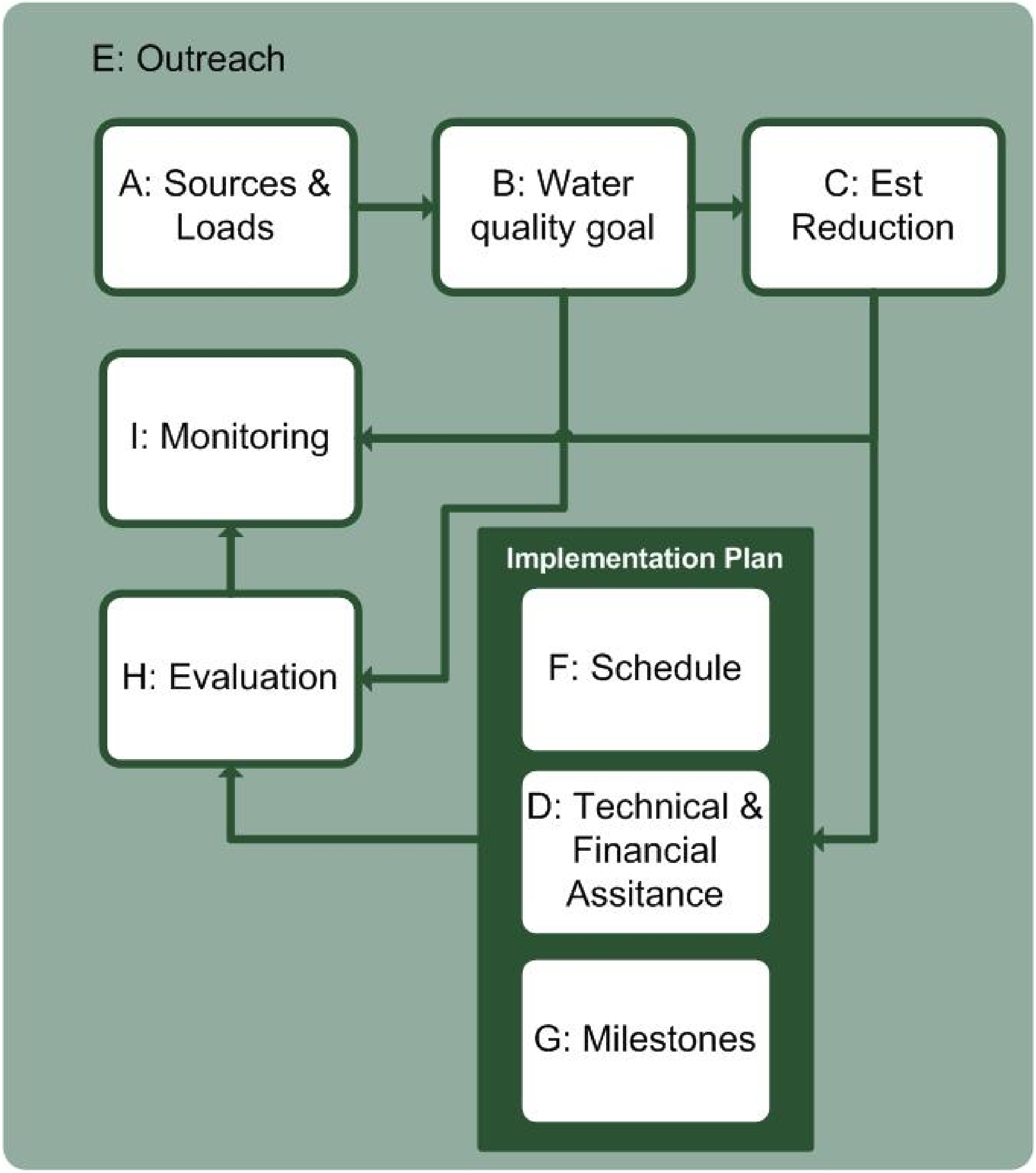
- 319 Program guidelines emphasize 9E watershed-based planning
- Nine Key Element Guidance developed by EPA
- Plans approved DEC

Different "types" of plans

- New
- Update to an existing plan

Module 1: Understanding the elements

A. pollution loads sources identified & quantified in watershed
B. identify target or goal to reduce pollutant load to reach water quality goal(s)
C. BMPs to get reductions (estimated load reduction/BMP to achieve total reduction needed to improve WQ
D. how to pay for and implement BMPs identified in C
E. Stakeholder input & getting help at local level to implement plan
F. schedule to implement C
G. progress on implementation of BMPs
H. criteria to assess water quality improvement due to implementation of BMPs
I. monitoring plan to collect water quality data to measure water quality improvement against criteria in H


E: Outreach
A: Sources & Loads
B: Water quality goal
C: Est Reduction
I: Monitoring
H: Evaluation
Implementation Plan
F: Schedule
D: Technical & Financial Assitance
G: Milestones

Module 1: Element E—outreach

- Watershed plans need partnerships to be successful
- Coordinate efforts
- Combine resources
- Build awareness
- Identify new ideas

Stakeholders are defined as those who make and implement decision, those who are affected by the decisions made, and those who have the ability to assist or impede implementation of the decisions.

Module 1: Element E—outreach

- Identify potential programs and activities relevant to your watershed
  - DEC monitoring programs stream & lake monitoring
  - DEC volunteer programs—CSLAP, WAVE, PEER
- Existing plans or activities/accomplishments
  - TMDL
  - Completed state funded projects
  - Agricultural Environmental Management (AEM)
  - Technical reports
  - Existing watershed plans
  - USDA programs

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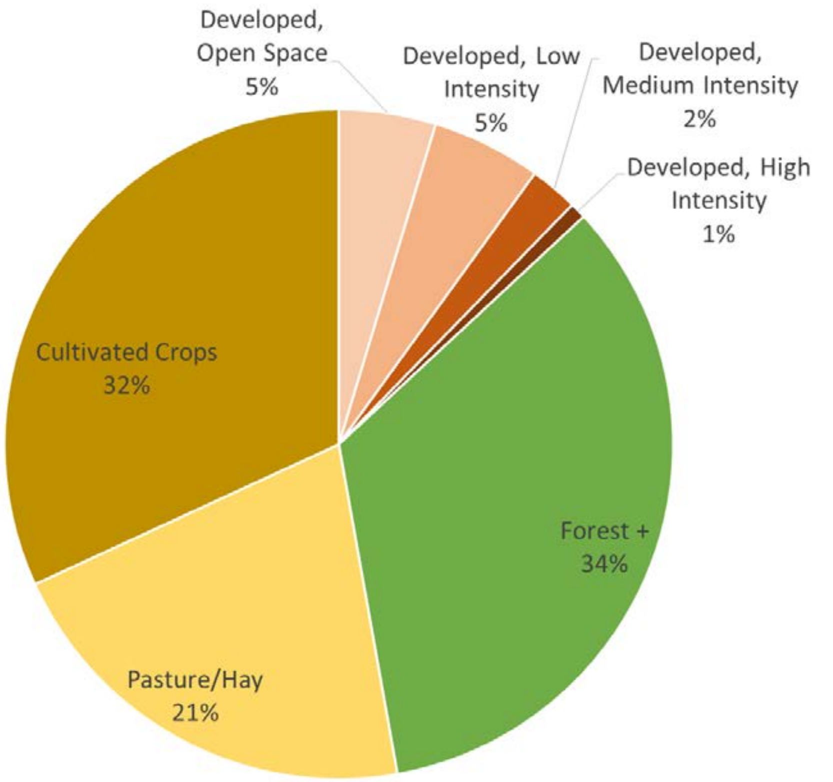
Module 1: Element A—characterize watershed & quantify loads

- Basis to develop effective management strategies
- Baseline to evaluate implementation
- Describe water quality data used & land use characterization
- Inventory of point and nonpoint sources



Module 1: Element A—characterize watershed & quantify loads

- Indicates pollutants addressed by plan
- Assign loads to point and nonpoint sources
  - Modeling note: various approaches can be used for loading analysis
- Reference to modeling Quality Assurance Project Plan (QAPP)

Module 1: Element A—modeling…briefly

Information be included about modeling

- Complexity of the system (e.g., watershed size, coastal influence)
- Type of model (watershed, hydrologic)
- Time scale of the analysis in relation to the pollutant of concern (i.e., pathogens—daily; DO—hourly, P—daily, monthly, annual),
- Assumptions of source load contributions from land uses
- Summary of model inputs (rainfall data, soils, etc..)
- Explanation that model output is sufficient to show water quality goals can be achieved, and
- Description of user experience with model

Module 1: Element A

Watershed Analysis

Land use

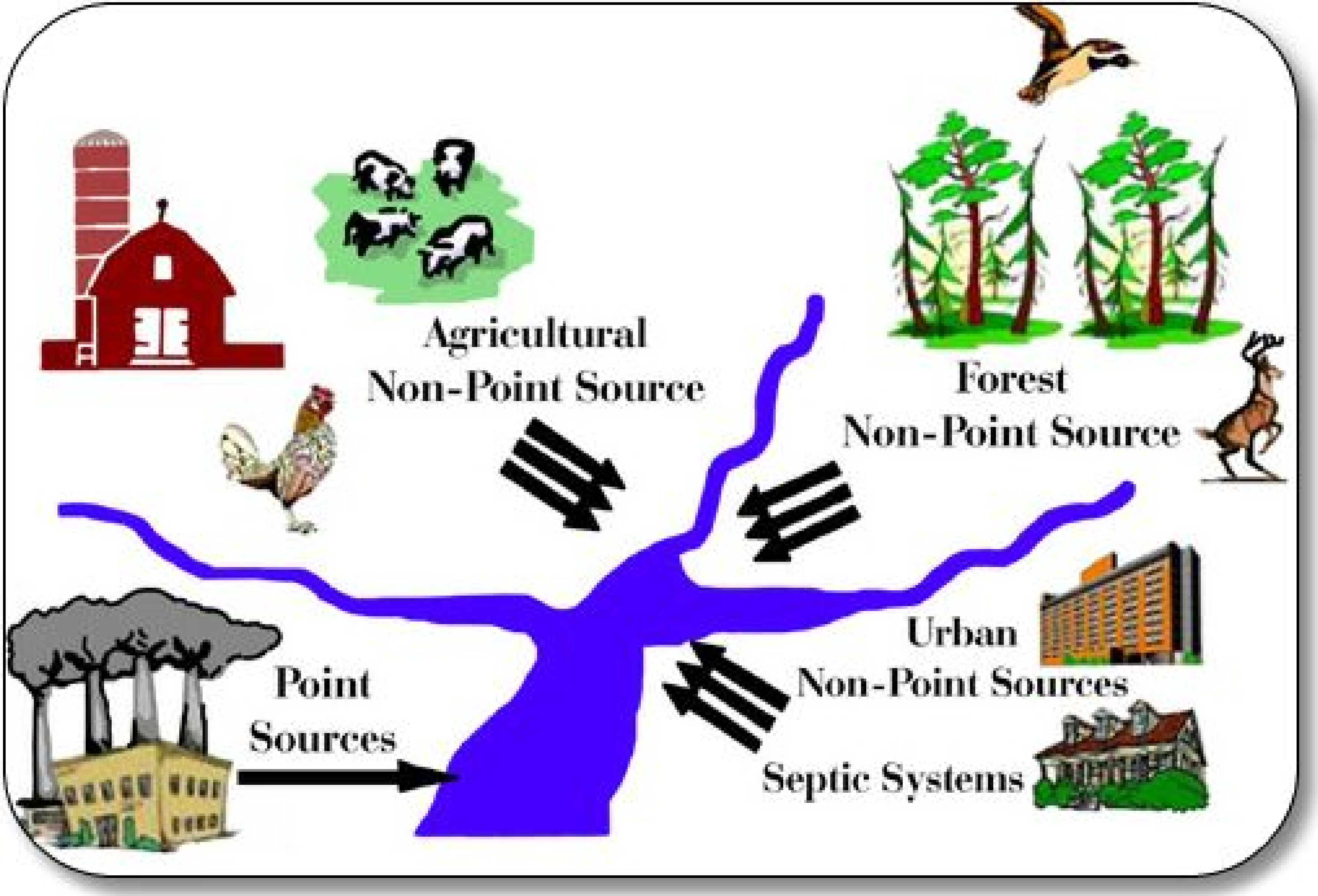
- Developed, low intensity
- Developed, medium intensity
- Developed, high intensity
- Forest
- Pasture/Hay
- Cultivated crops

Point sources

- Wastewater treatment plants
- Concentrated Animal Feeding Operations (CAFOs)
- Other permitted facilities that discharge pollutant of concern

Septic system loads

- Number within watershed
- Number within a specified distance of the waterbody (e.g., 250 ft)
- Number of seasonal homes with septic systems within a specified distance of waterbody (e.g., 250 ft)


Agricultural
Non-Point Source
Forest
Non-Point Source
Point
Sources
Urban
Non-Point Sources
Septic Systems

Module 1: Element B—water quality goal

Identify target or goal to reduce pollutant load to reach water quality goal(s)—the issues of concern to stakeholders (this is part of Element E)

- Goals may be based on improving water quality to achieve standards or best uses
- Identification of goal will help to determine the effective best management practices (Element C)
- Help to identify most appropriate evaluation criteria (Element H)

All waterbodies are classified for best use

- 6 NYCRR Part 701provides for the Classifications of Surface Waters and Groundwaters
- Waterbody classification denotes the waters best use
  - suitable for fish propagation
  - public water supply
  - primary and secondary contact recreation
- Part 703: Surface Water and

Groundwater Quality Standards and Groundwater Effluent Limitations)

- Narrative or numeric

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New York State narrative water quality standard for phosphorus:

"None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages."

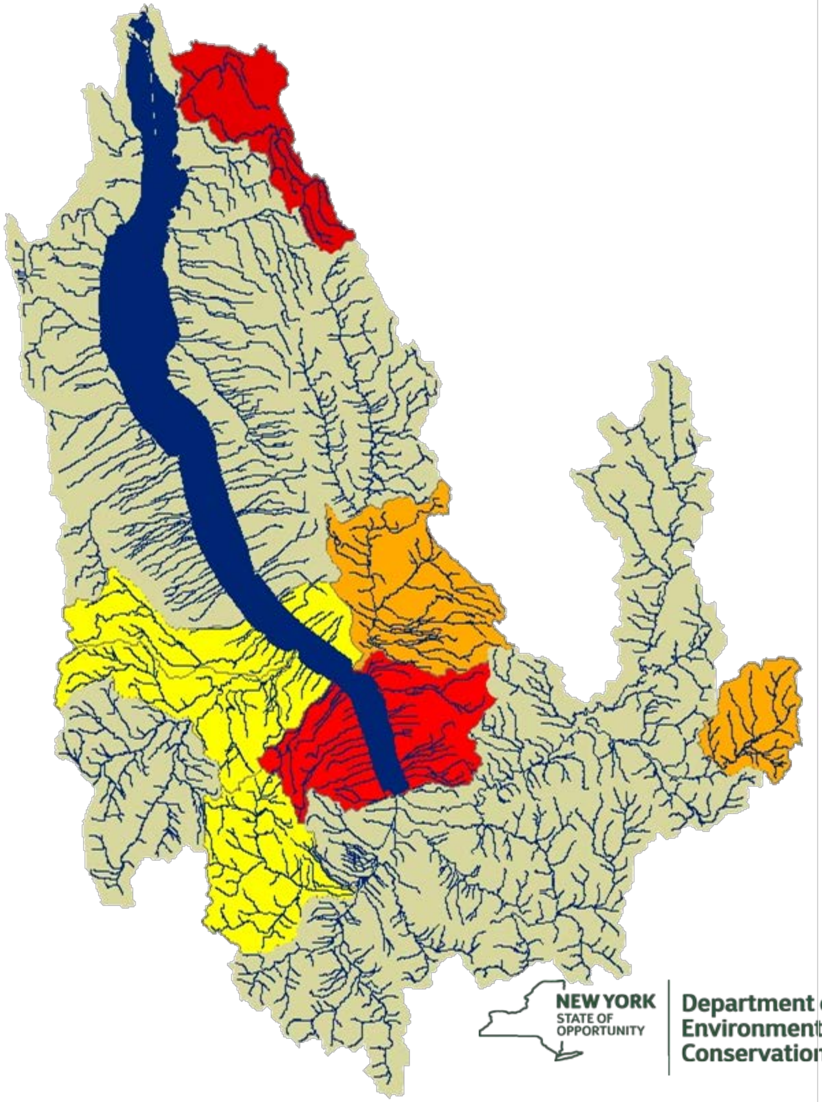
Guidance value—20ug/L

Module 1: Element B—water quality goal

- Resources to help identify
  - Waterbody Inventory/Priority Waterbody List (WI/PWL) (state identified concerns)—uses & impairments
  - Stakeholder meetings (local identified concerns)—trash, protecting wetlands
  - Analysis of watershed information (Element A)

Module 1: Element C—how to meet the goal

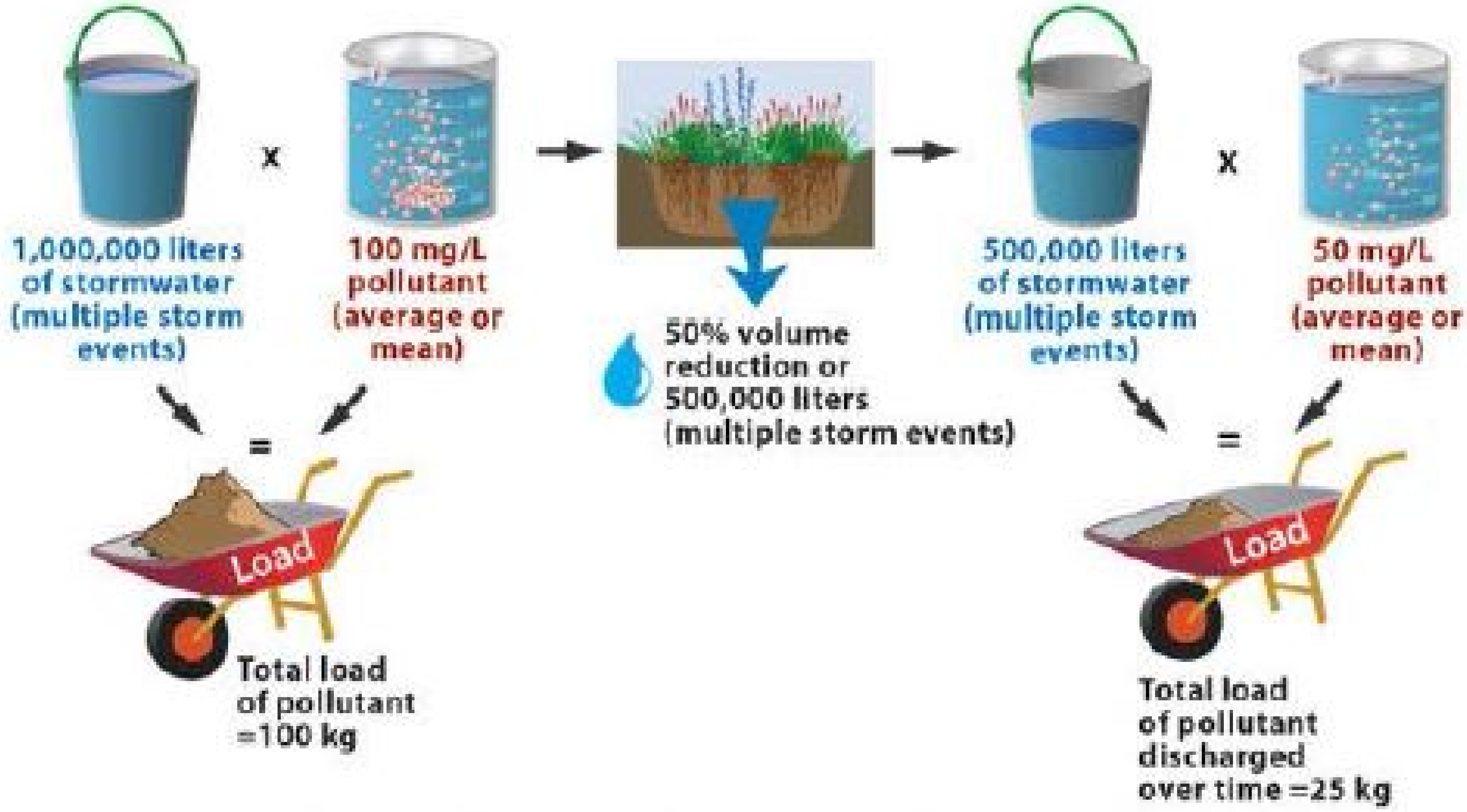
- Describes best management practices (BMPs)
- Rationale for selection
- Identification of priority areas
- Description of methods used to quantify reductions



Module 1: Element C—how to meet the goal

Things to consider

- What’s working now?
- Will it get the reductions needed (based on model)?
- Are there practices that have really worked, but you don’t have funding source?



In this example, the BMP removes 75 kg or 75% of the "total load" of this pollutant. The "true" performance of this BMP is only apparent when we factor in the impact of volume reduction and calculate the total load of the pollutant.

Module 1: Element D—assistance to support implementation actions

- Estimate of technical & financial assistance
- Describe potential funding sources, options for leveraging and opportunities for collaboration
- State & federal funding opportunities
  - Water Quality Improvement Program (WQIP)
  - Agricultural Nonpoint Source Abatement and Control Program
  - EPA Great Lakes Restoration Initiative (GLRI)
  - USDA programs

Module 1: Element F—schedule

Includes:

- Management practices and associated technical and financial assistance needed to complete
- Short-term (3 yrs), mid-term (3-5 yrs) and long-term (5-10 yrs) activities
- For experienced watershed groups, implementation schedules could be estimated based on past experience.
- Milestones identified to evaluate progress
- Updates & review of plan

Module 1: Element G—track progress of implementation

- Included in Element F (part of schedule)
- Identify measurable milestones
  - Completion of projects in critical areas
  - Acres or miles of practices installed

Example: 10,222 acres of riparian forest buffers by 2025

Module 1: Element H—evaluation criteria

- Criteria used to track progress (Element G)
- Direct measurements based on monitoring data (nutrients, bacteria)
- Indirect (number of beach closures, frequency of blue-green algae blooms)
- Measurable and quantifiable
- Appropriate measure goal/target for plan

“If you can’t measure it, you can’t manage it”

Module 1: Element I—monitoring

Determined by elements A (pollution sources), F (implementation schedule), G (milestones) and H (criteria to evaluate load reductions):

- water quality trend analysis,
- paired watershed designs, or
- frequency of blue-green algae blooms (HABs)
- tracking beach and shellfishing closures.

- Supports the criteria described in Element H
- Requires sampling QAPP
- Recommend use of DEC monitoring programs

Module 1: Additional documentation

- Summary of qualifications & contact information
- QAPP
- Other plans or reports used to develop 9E plan (TMDL, existing watershed plan, technical report)

Recommendation:

Data collected and BMP implementation progress, as well as, model input/output and maps should be maintained in a database.

Will help to update and revise the analysis, track trends and ensure consistency of the data.

Module 1: QAPP—what?!

- Quality Assurance Project Plans (QAPP)
  - Outlines how environmental data will be collected: directly, other sources, or compiled
  - Outlines model selection or selection process, how model will be setup, run, calibrated, and validated
  - How data will be analyzed
  - Identifies quality control steps to ensure data collected meets intended objective

Ensures that the data collected are of known quality and quantity to meet project objects.

Module 1: QAPP—what?!

- Consistent data collection overtime
- Historical documentation of project
- Required for DEC and EPA projects

Module 1: Administrative stuff

- Technical support from DEC
  - Informal review
  - Modeling questions
  - Modeling support
  - QAPP templates & review
  - Reviewer guidance and checklist
- DEC approves QAPPs
- DEC approves final plans

Questions?

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Module 2: Modeling

Outline

Module 2: demystifying modeling

- Why are models needed for 9E plans
- Types of models
- Watershed modeling
- Waterbody modeling
- Managing pollution in models
- Questions

Why are models needed?

Models are used to understand, test, perturb, or control some system of interest. Models are used because they are simpler, faster, less expensive than analyzing the real system, or because some questions cannot be answered by look at the real system (predict future conditions).

Why are models needed?

To estimate:

- loads,
- loading capacity, and
- reductions needed to me a target, goal, or water quality standard.

Why are models needed?

- **Element A** – characterize watershed & quantify loads
- **Element B** – water quality goal
- **Element C** – how to meet the goal
- **Element H** – evaluation criteria

George E. P. Box

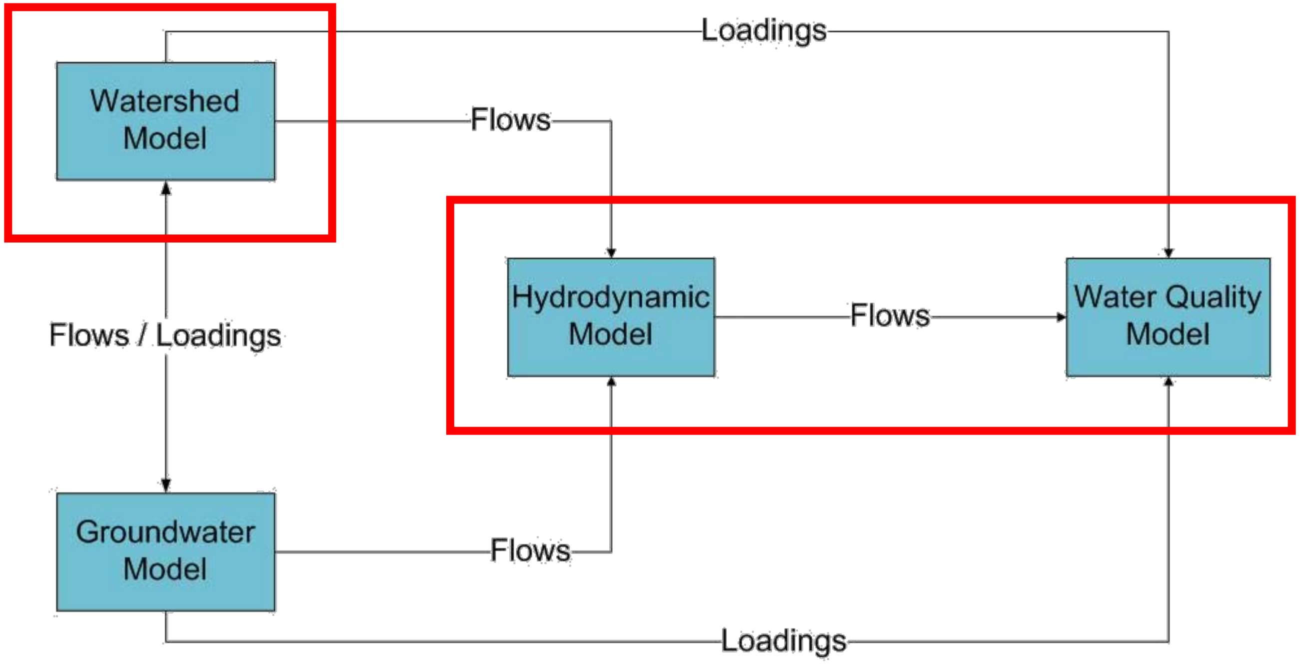
Essentially, all models are wrong, but some are useful.

DOW basic modeling tenet

- All modeling requires a NYSDEC approved Quality Assurance Project Plan (QAPP)

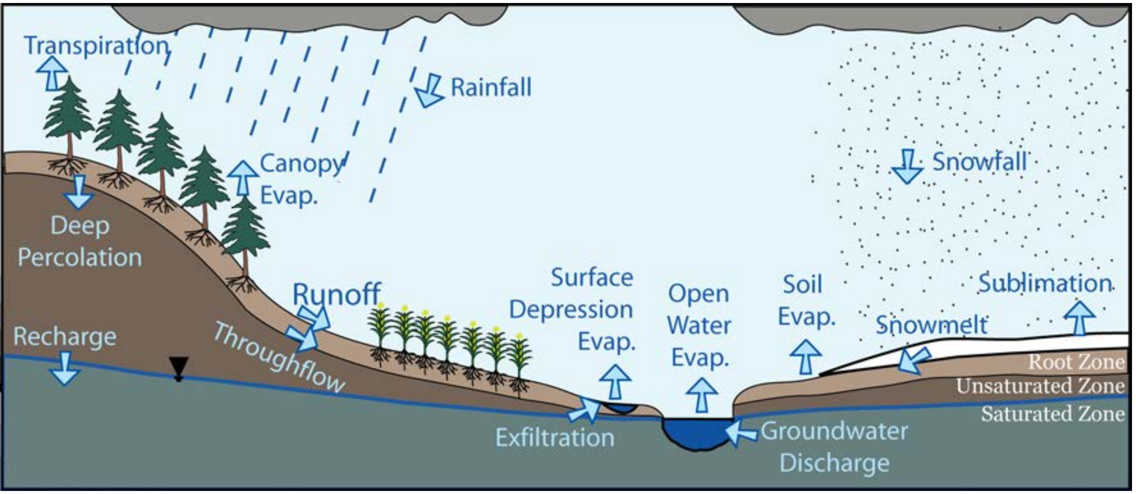
Types of models for a TMDL and 9E plan

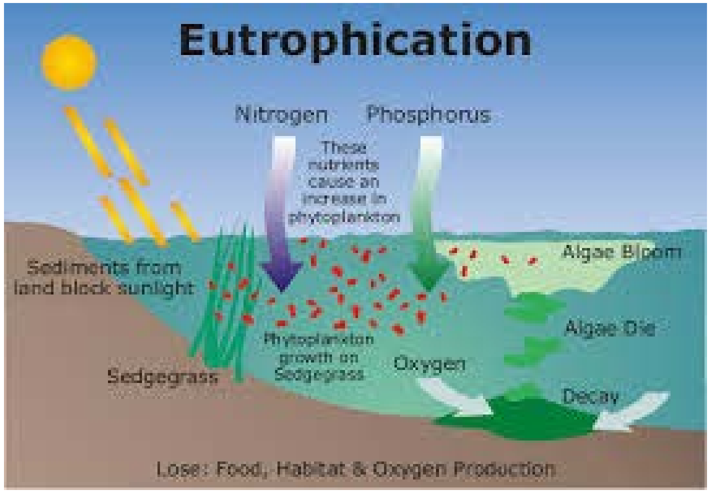
- Watershed
- Hydraulic / Hydrodynamic
- Water quality
- Groundwater



Types of models

Watershed vs. Waterbody





Modeling – categories

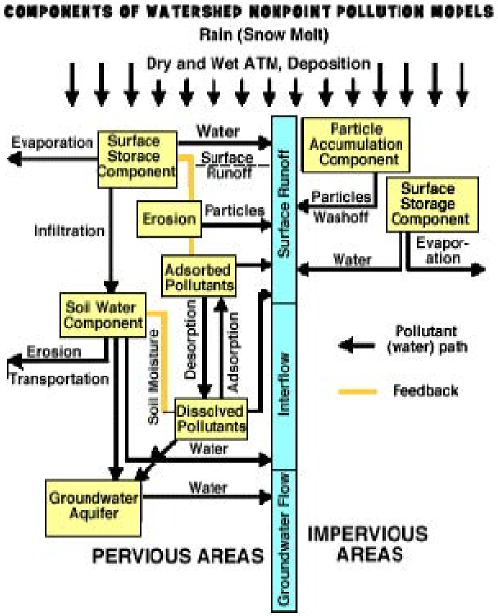
Simple

$$L = R \times C \times A \times \frac{2.72}{12}$$

Where:

- L is the pollutant load (lbs/yr)
- R is the annual runoff (in)
- C is the pollutant concentration (mg/l)
- A is the area of a particular land use (ac)
- $\frac{2.72}{12}$ is a conversion factor

Complex



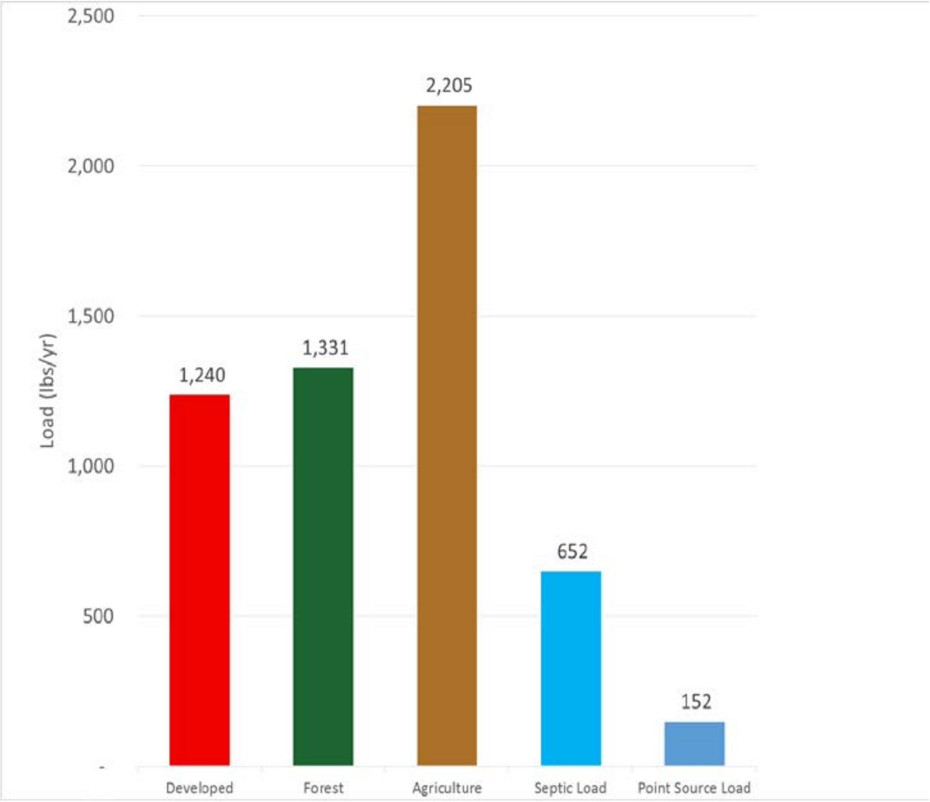
Modeling – categories

Simple

- Usually spreadsheet based
- Annual time scale
- Steady state (constant input/output)
- Not event based
- Event mean concentration
- Limited parameter adjustment
- Suitable for small watersheds

Examples

- Simple method, export coefficient, PLoad, WTM, STEPL, NLM



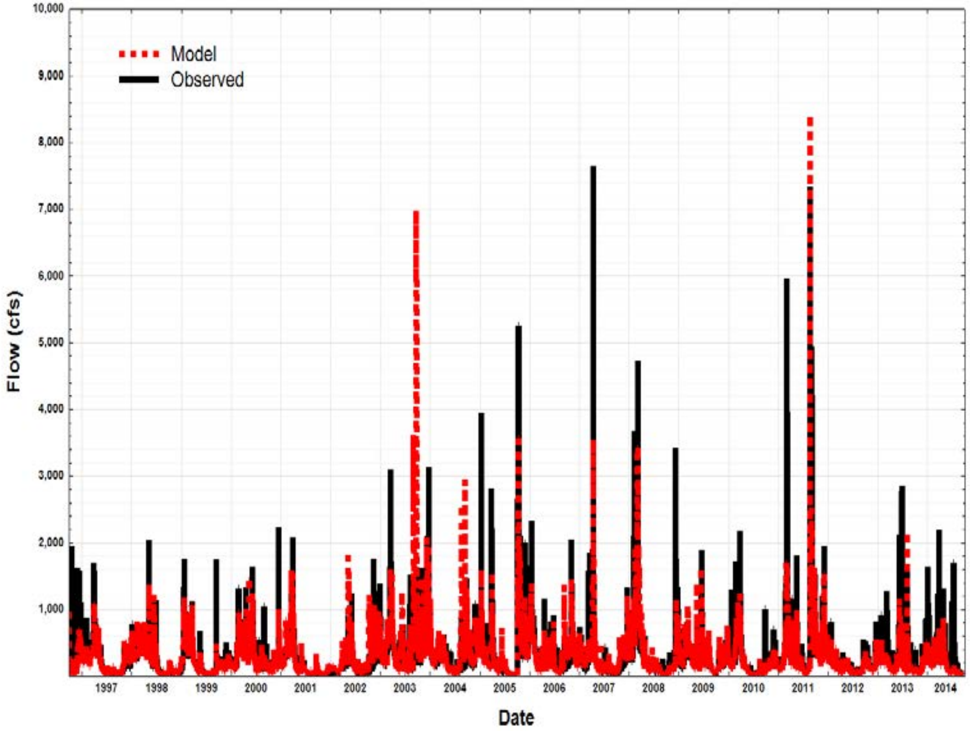
Modeling – categories

Complex

- Variable time scale monthly, daily, hourly, sub-hourly
- Dynamic (variable input/output)
- Extensive data requirements (e.g., hourly rainfall)
- Event based
- Expansive parameter adjustment
- Suitable for all watershed sizes

Examples

- Mapshed, SWAT, HSPF, SWMM



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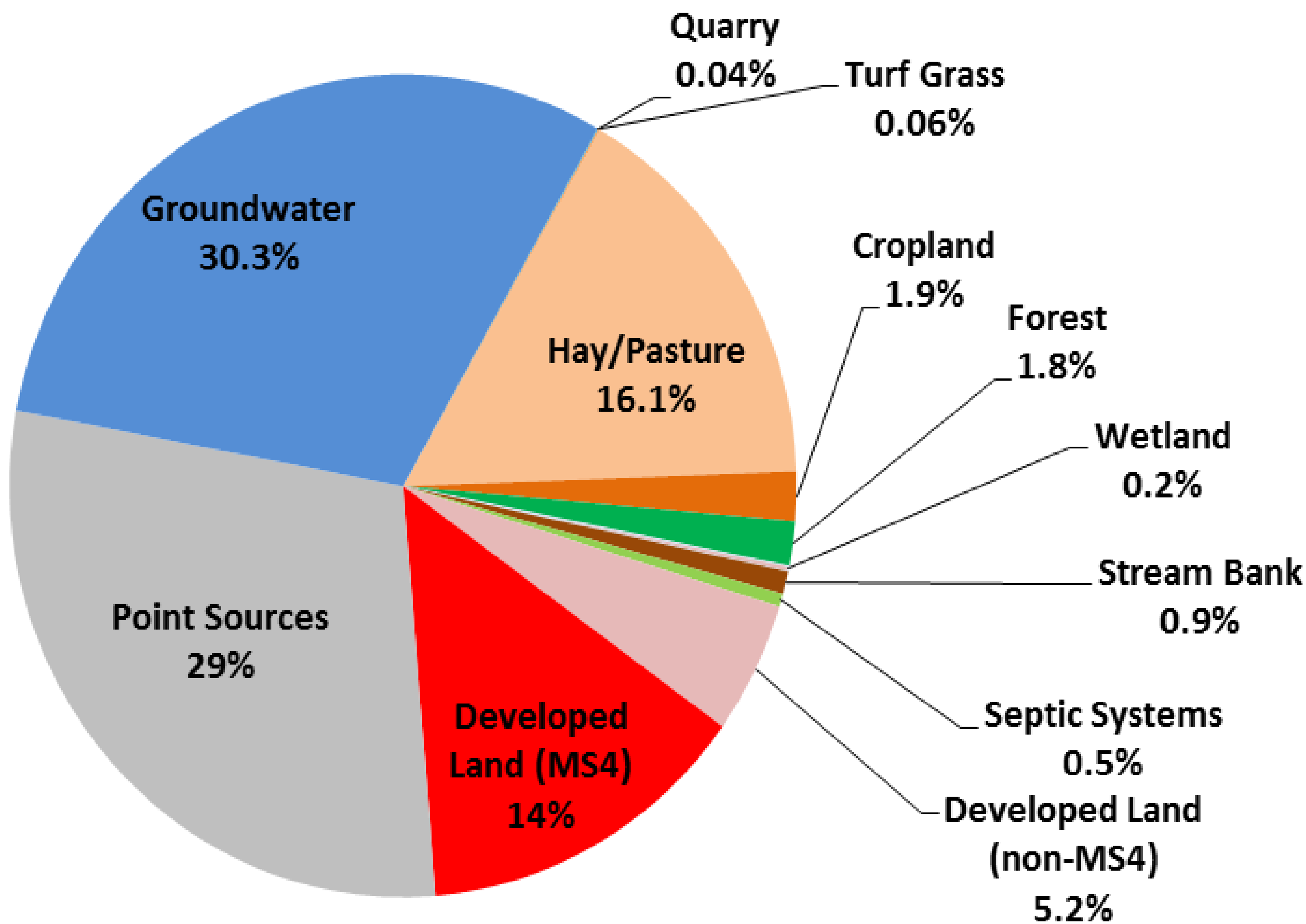

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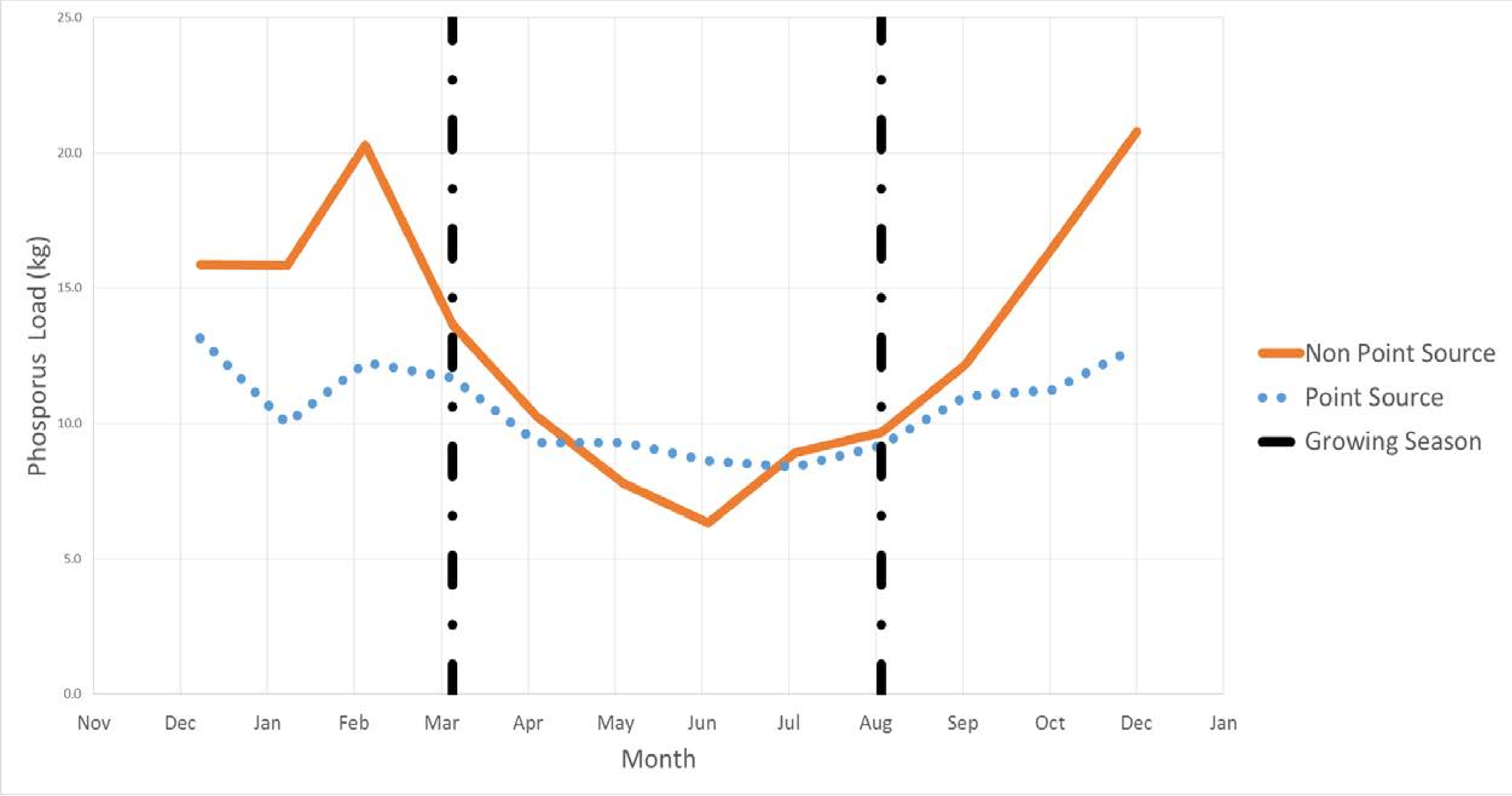


25.0
20.0
15.0
10.0
5.0
0.0
Phosporus Load (kg)
Nov
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Dec
Jan
Month
Non Point Source
Point Source
Growing Season

Modeling – categories

Simple vs Complex

- What are you trying to explore (e.g., DO)?
- Available data?
- Size of model domain?
- Pollution sources?
- Steady state or dynamic?
- Parameters of interest?

QAPP

Modeling – the process

Phase I

- Data collection
- Model input preparation
- Parameter evaluation

Phase II

- Calibration
- Validation

Model Testing

Phase III

- Analysis of alternatives

QAPP

Modeling – effort (experienced)

- Problem definition – 5%
- Modeling strategy – 10%
- Learn operational aspects – 10%
- Development and input of time series – 30%
- Parameter development – 15%
- Calibration and validation – 30%

Modeling – data requirements

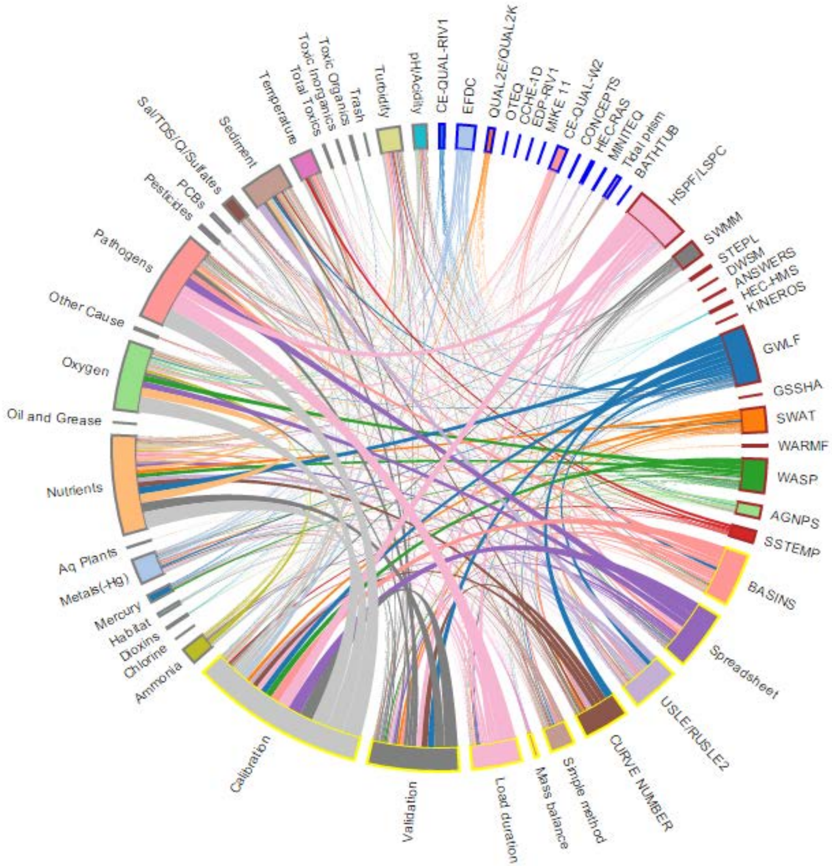
- Land uses (e.g. urban, forest, agricultural, wetland)
- Metrological data
- Land topography
- Waterbody characteristics
- Number of residential on-site septic systems / wastewater treatment plants
- Water quality sampling data
- Flow monitoring data
- Kinetic parameters

Modeling – data requirements

Where do you find data?

- Data mining
  - EPA BASINS
  - Model websites
  - GIS clearing house
  - Other agencies or partners (USGS, NOAA)
  - Other TMDLs or watershed plans

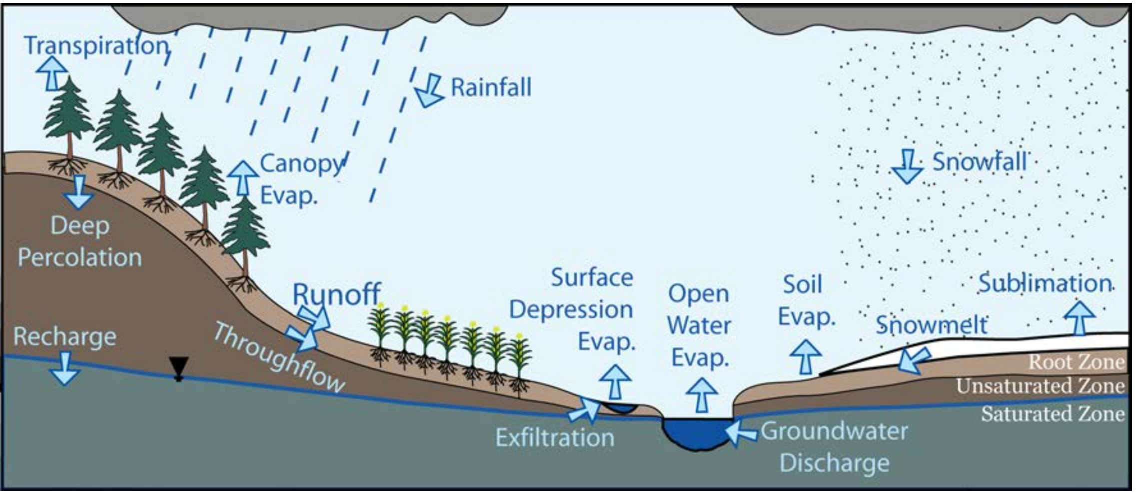
TMDL report selection tool

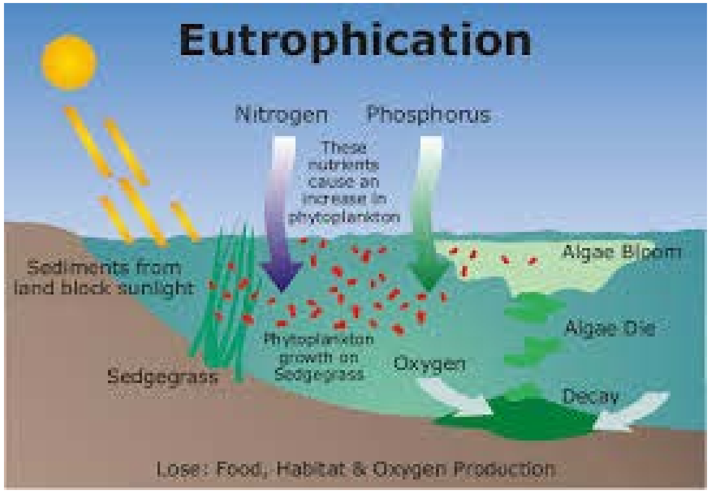


Kumar, S. (2016). TMDL Report Selection Tool. Retrieved 16 Mar 2016, from https://occviz.com/tmdl

Types of models

Watershed vs. Waterbody

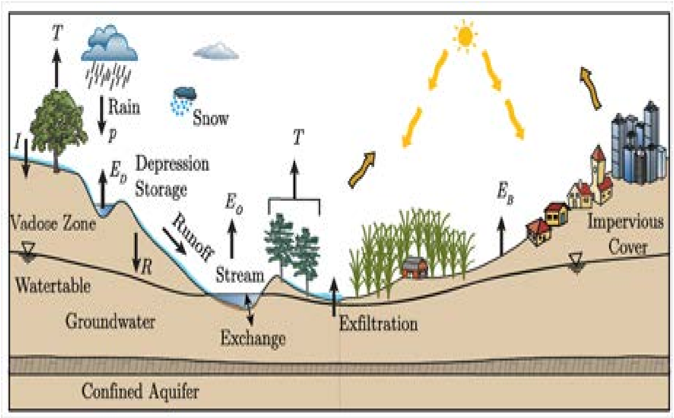


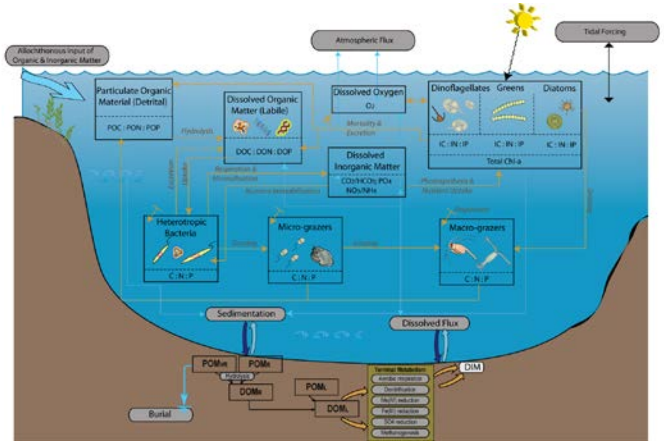


Modeling – linkage

To describe system models often have to be linked

- Manually feed information from one model to another
- Automatically feeds information from one model to another



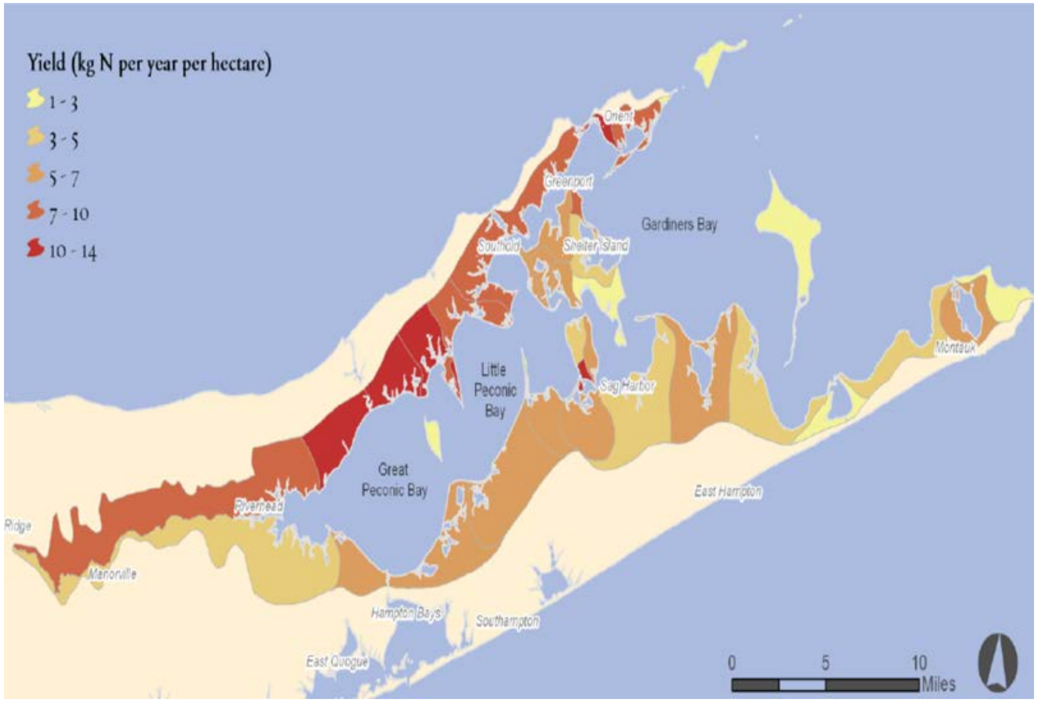


Watershed models – what are they?

A mathematical representation of pollutant fate, transport, and degradation within a watershed.

Include equations to simulate:

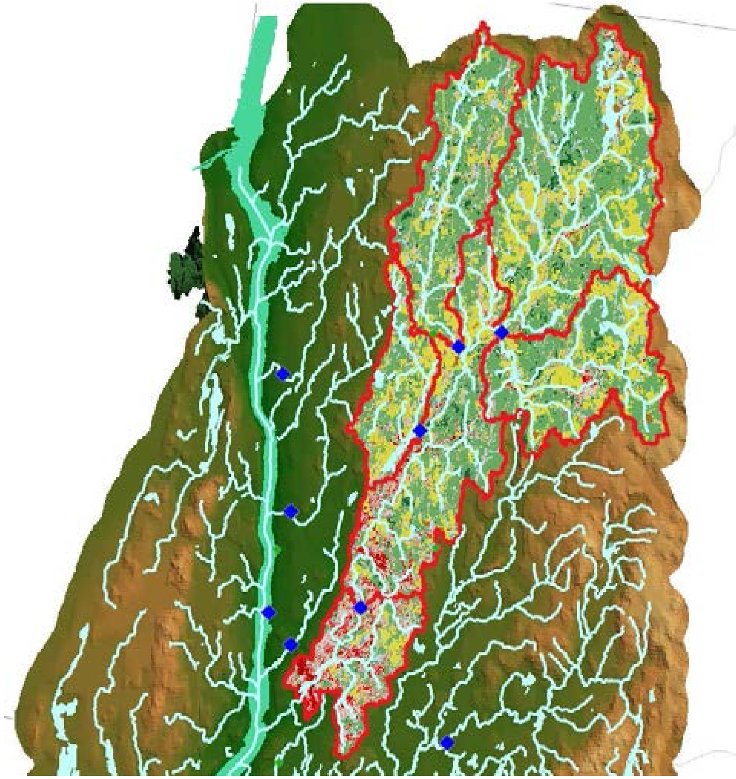
- watershed hydrology
- water quality,
- runoff,
- erosion,
- wash off of sediment and pollutants.



Watershed modeling – what are they used for?

Models that determine watershed loads and reductions

- Point source load – user defined based on permit or DMR data
- Non point source load – simulated by model, based on user supplied information and calibration



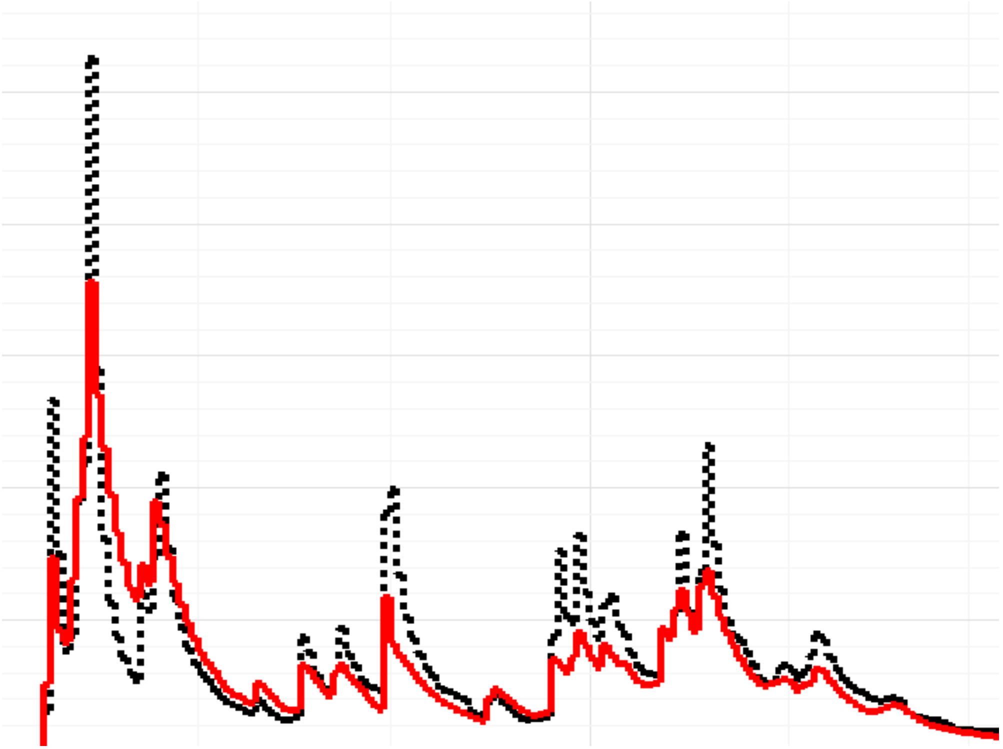
Watershed modeling – commonly used models

- Export Coefficient
- Simple Method
- Watershed Treatment Model (WTM)
- Nitrogen Loading Model (NLM)
- Mapshed
- Soil and Water Assessment Tool (SWAT)
- Hydrological Simulation Program—Fortran (HSPF)
- SWMM

Increasing Complexity

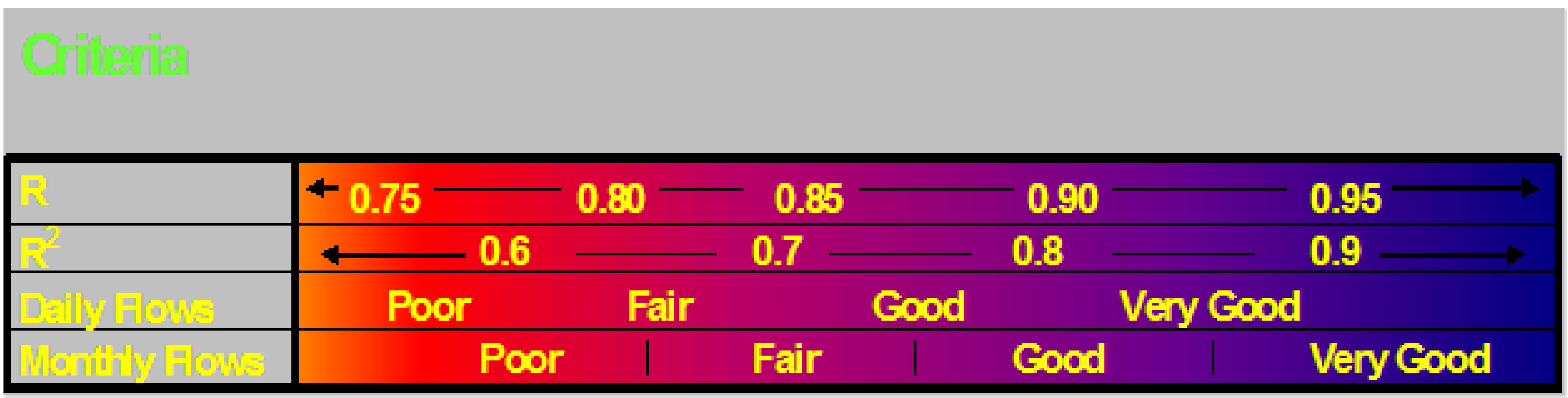
Watershed Modeling – calibration process
(hydrology only)

1. Annual total flow volumes
2. Total seasonal volumes (summer & winter)
3. High and low flows
4. Hydrograph shape and peak flows (timing and storm response)



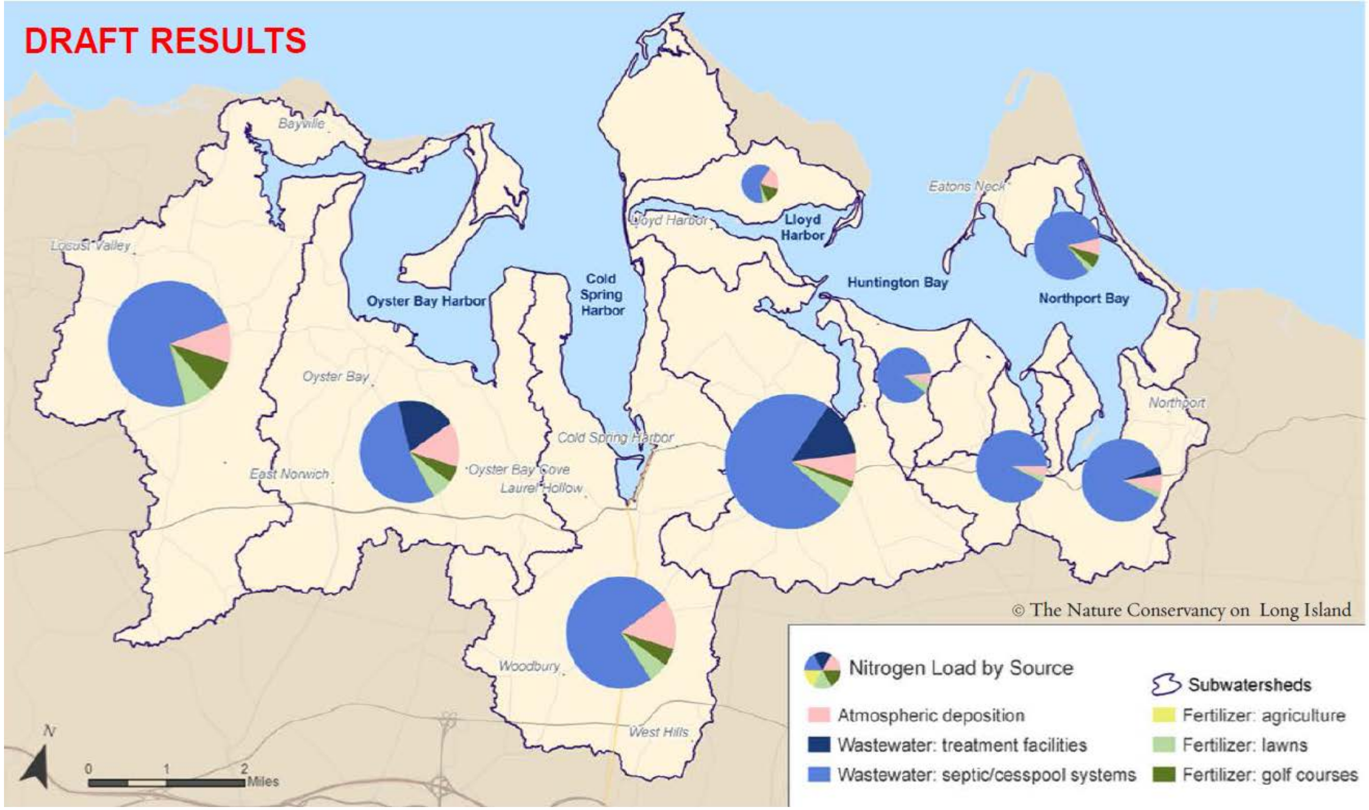
Watershed Modeling – calibration process
(hydrology only)

	% Difference Between Simulated and Recorded Values		
	Very Good	Good	Fair
Hydrology/Flow	< 10	10 - 15	15 - 25



The reason for watershed modeling

- **Element A** – characterize watershed & quantify loads
- **Element B** – water quality goal
- **Element C** – how to meet the goal
- **Element H** – evaluation criteria



Waterbody modeling – what are they?

A collection of formulations representing physical mechanisms that determine position and momentum of pollutants in a waterbody.

Include equations to simulate:

- Movement and circulation of water
- Fate and transport of pollutants
- Response to pollution

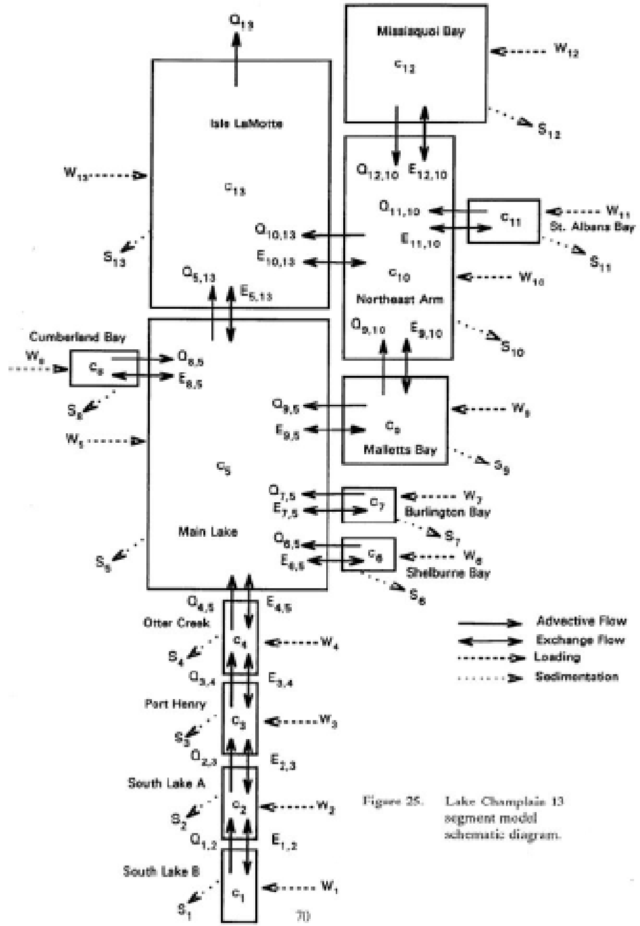


Figure 25. Lake Champlain 13 segment model schematic diagram.

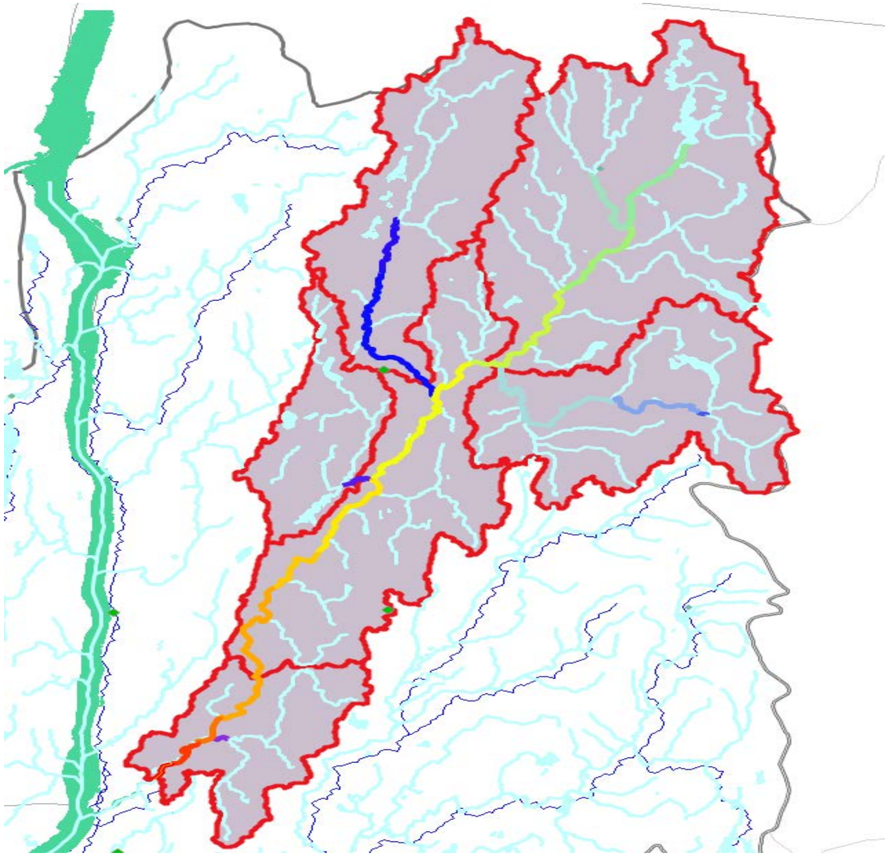
Waterbody modeling – what are they used for?

Models that simulate waterbody responses.

- Predict water quality responses to natural phenomena and manmade pollution for various pollution management decisions
- Determine ambient concentrations based on changes in watershed

Waterbody modeling – when would I use one?

- Want to know waterbody response to reduction in pollutant loads
- Want to quantify other non-point source loads (e.g., internal loading)



Waterbody modeling – waterbody specific

- Waterbody types
  - Rivers
  - Lakes
  - Estuaries
  - Ocean/Coastal
  - Groundwater

"The Lighter Side Of The Cloud" Comic by David Fletcher @ CloudTweaks

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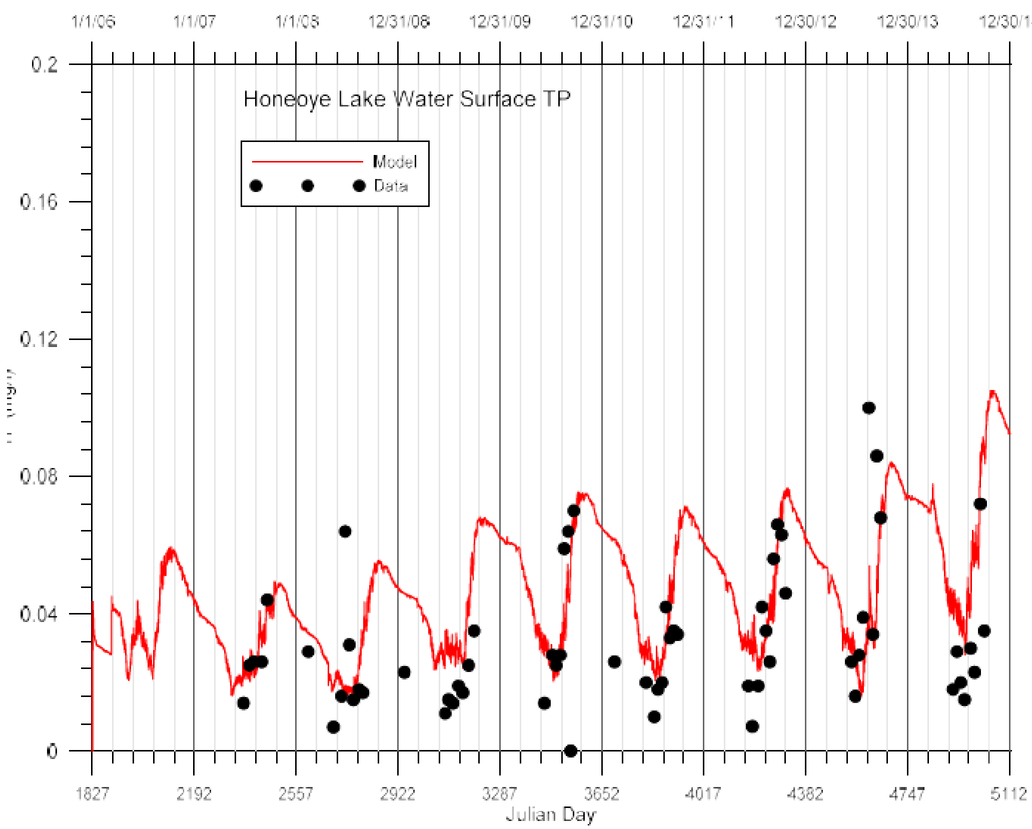
Waterbody modeling– commonly used

- Empirical equations
- Streeter-phelps
- Bathtub
- QUAL2K
- L2K
- HEC-RAS
- WASP
- CE-QUAL-W2
- EFDC

Waterbody Modeling – calibration process
(eutrophication)

1. Total Loads
2. DO & BOD
3. Ammonia
4. Organic nutrients
5. Inorganic nutrients
6. Algae and phytoplankton
7. Light

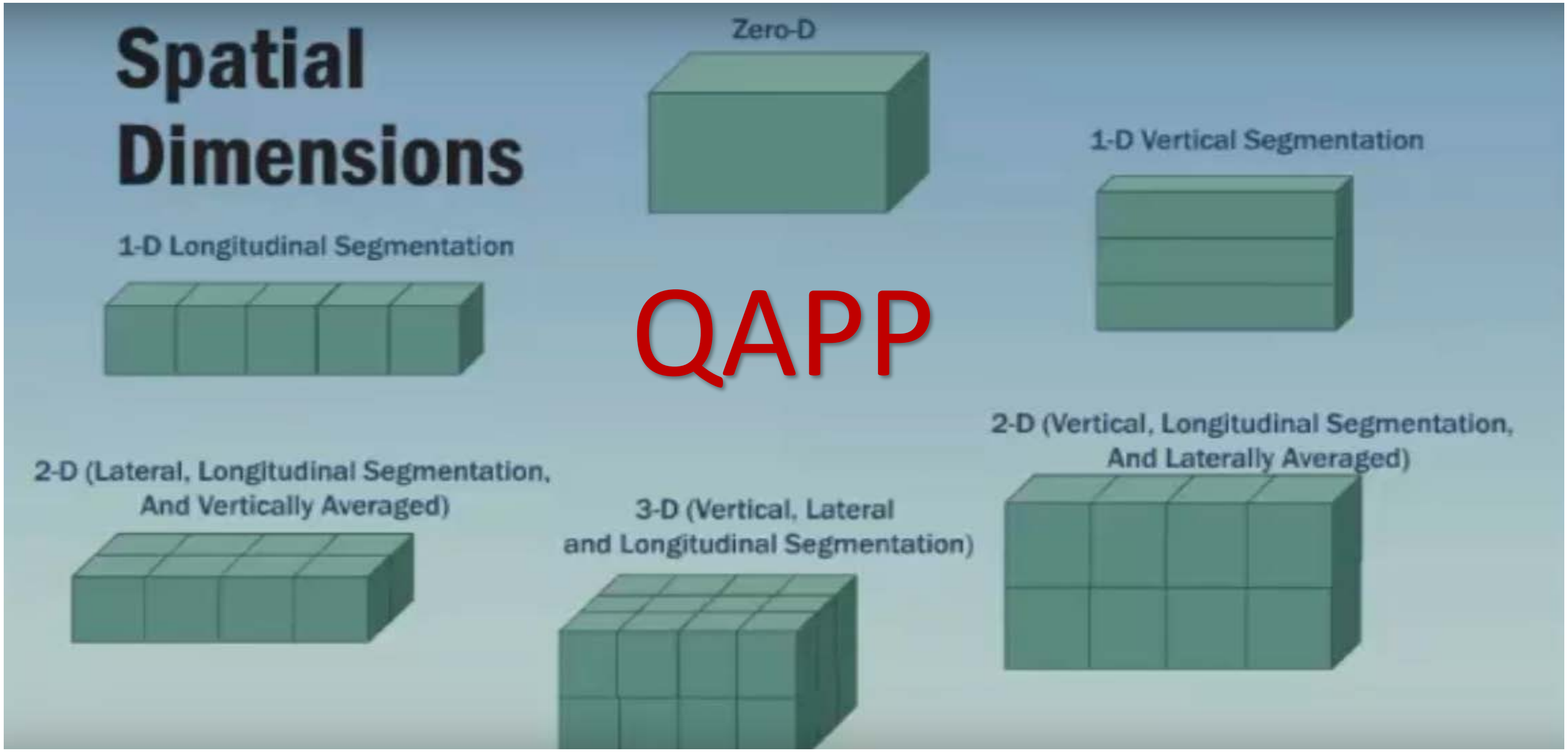


Waterbody Modeling – calibration process (eutrophication)

- Percent difference between simulated and measured values (monthly and annual values)

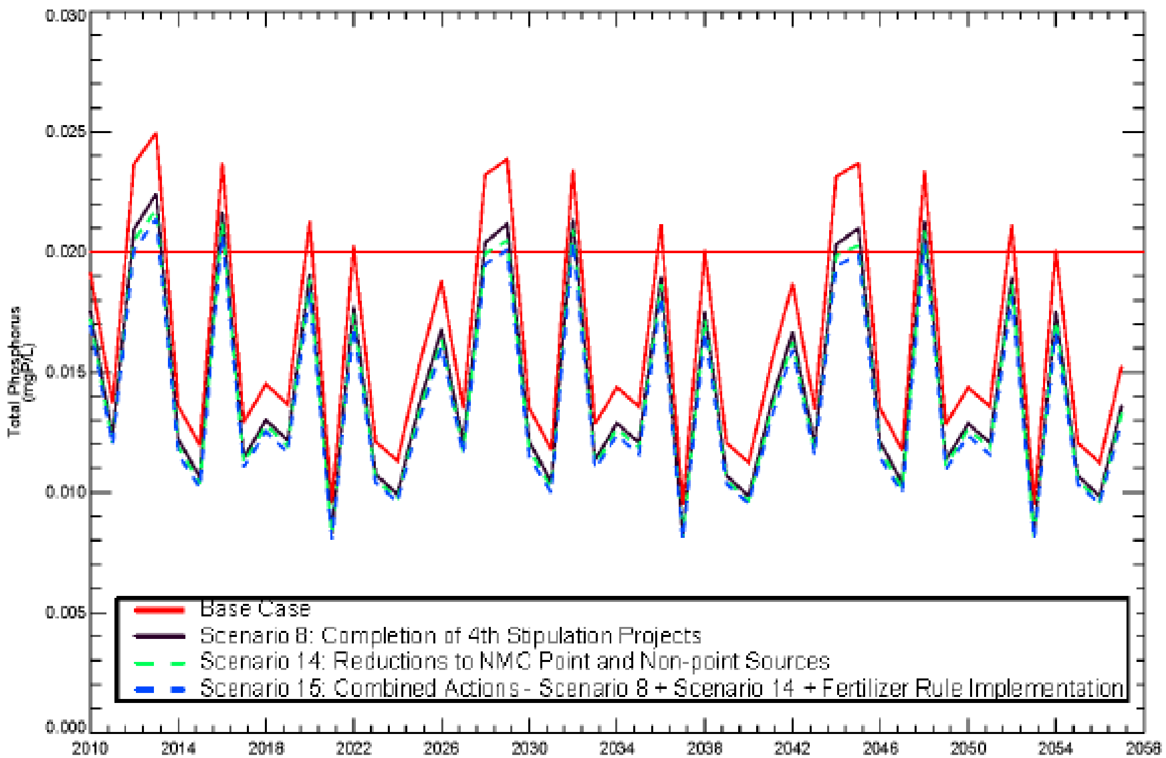
	Very Good	Good	Fair
Water Quality / Nutrients	<15	15-25	25-35
Sediment	<20	20-30	30-45
Toxics	<20	20-30	30-40

Waterbody modeling – spatial dimensions



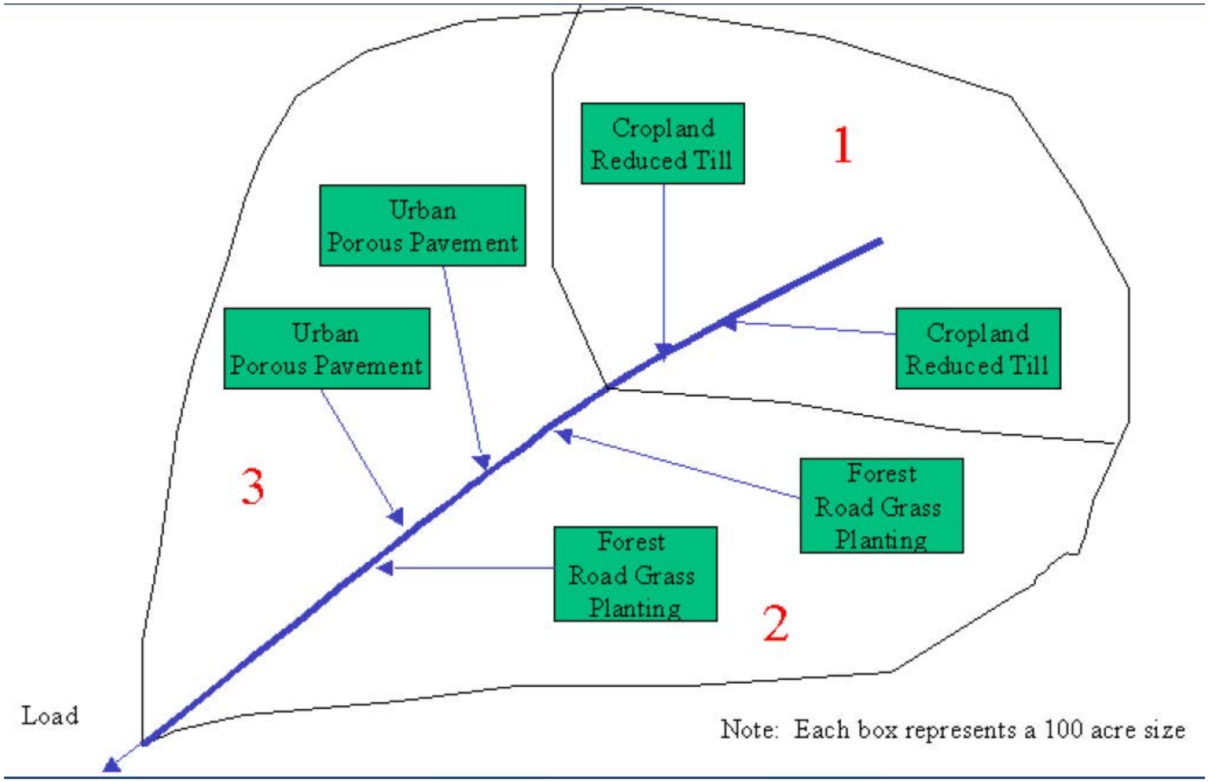
The reason for waterbody modeling

- **Element A** – characterize watershed & quantify loads
- **Element B** – water quality goal
- **Element C** – how to meet the goal
- **Element H** – evaluation criteria

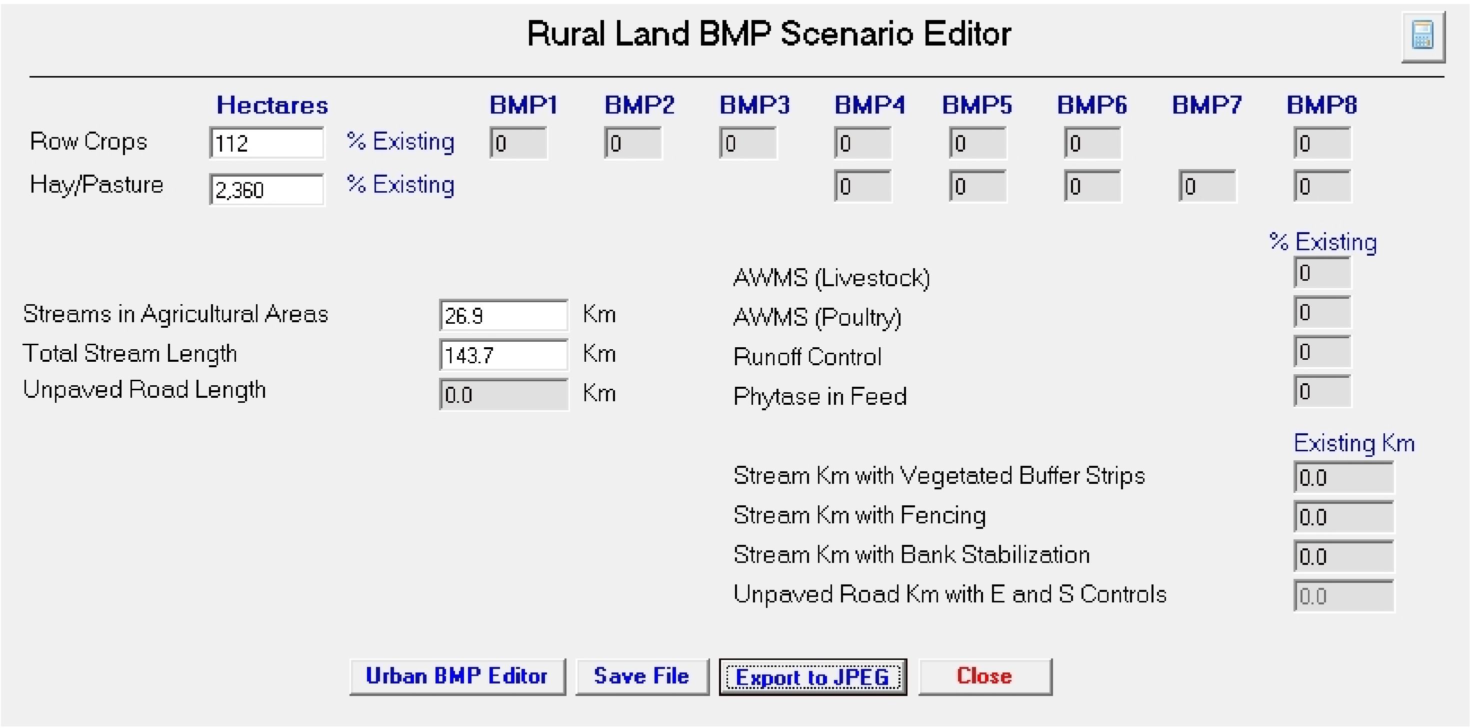


Modeling – managing pollution

Best management practices (BMPs)



Modeling – managing pollution



Modeling – managing pollution

Management Practice	Land Use	NRCS Standard Code	Lifespan Years	Nitrogen Efficiency Average	Phosphorus Efficiency Average	Sediment Efficiency Average
Barnyard Runoff Control	Agriculture (pasture)	367	15	20%	20%	40%
Bioretention/raingardens	Urban (HID)	570	25	40%	40%	80%
Conversion of Impervious Surface	Urban (HID)	---	---	40%	40%	80%
Cover Crop	Agriculture	340	1	25%	11%	15%
Riparian Forest Buffers	Agriculture (pasture)	391	75	42%	38%	50%
Rooftop Runoff Disconnection	Urban (HID)	---	---	40%	40%	80%
Septic Connection	---	---	25	100%	100%	---
Septic Pumping	---	---	3	5%	5%	---
Wetland Restoration	Agriculture	657	15	16%	31%	10%

Modeling – managing pollution

Practical load reduction scenarios for phosphorus

- Developed land: 0-20%
- Forest: no reduction
- Agriculture: 0-60%
- Septic load: 0-100%
- Point source: effluent limits should consider technology capabilities (0.05 - 1.0 mg/L TP)

Modeling – managing pollution

Considerations for implementation

- What can be implemented?
- Who will be implementing?
- What practices have been implemented?
- How is implementation going to be tracked?

Questions?

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Module 3: Case studies

Outline

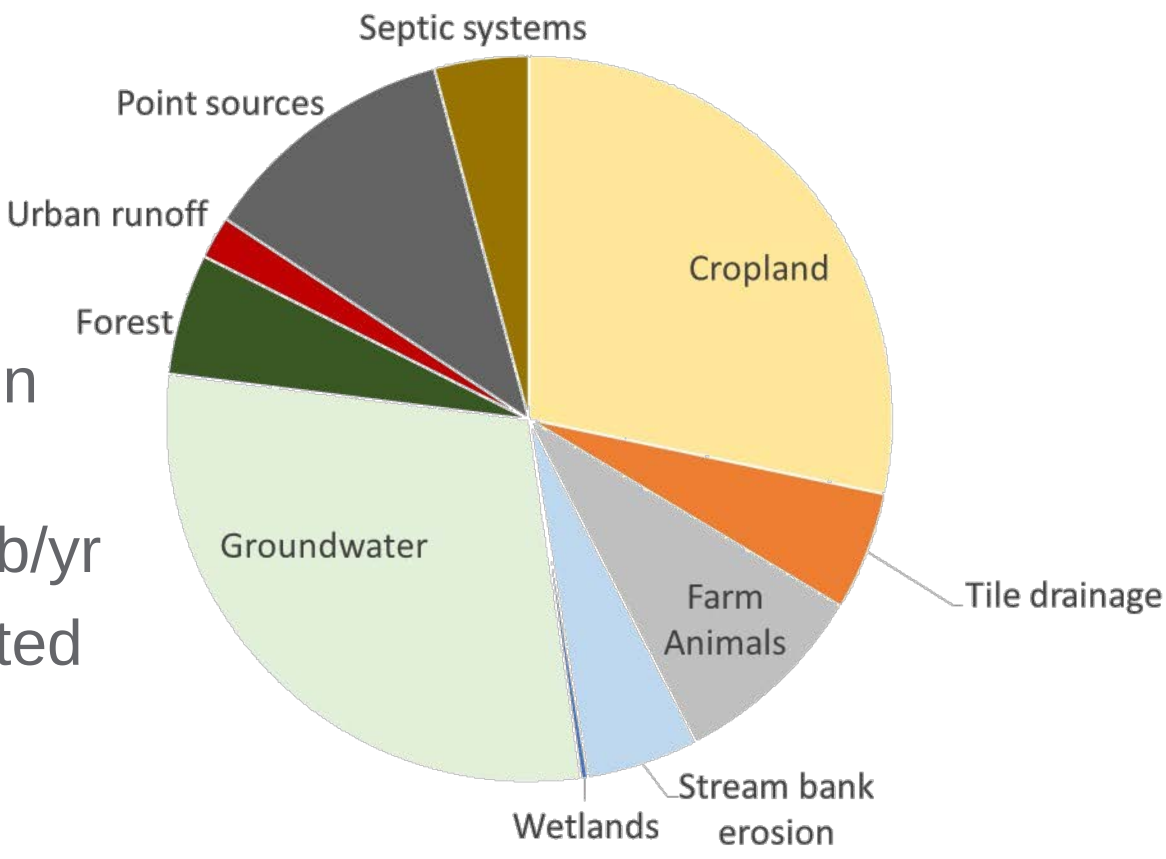
Module 3: case studies

- Genesee River
- Black River
- Small Pond
- Questions
- Discussion

Case Study: Genesee

Case Study: Genesee

- Element A—pollutant loads identified & quantified
- Prioritized watersheds within major basins
- SWAT model
- Current loads based on models:
  - Sediment—8.5x108 lb/yr
  - Phosphorus—estimated between 909,417 to 968,000 lb/yr



Case Study: Genesee

- Element B—goal to reduce pollutant loads
- The estimated load reductions expected from the implementation of management measures found in this section come from the work completed by the Makarewicz research group
- The SWAT and SWMM models developed by the group were used to identify the most efficient use of management measures by specific area as well as estimate the percent reduction of phosphorus and sediment

Case Study: Genesee

- Element B—goal to reduce pollutant loads
- Total phosphorus reduction of 79,000 lb/yr, or approximately 8% of the current total phosphorus load
- Sediment reduction of 3.4×10^8 lb/yr, or about 40% of the annual load

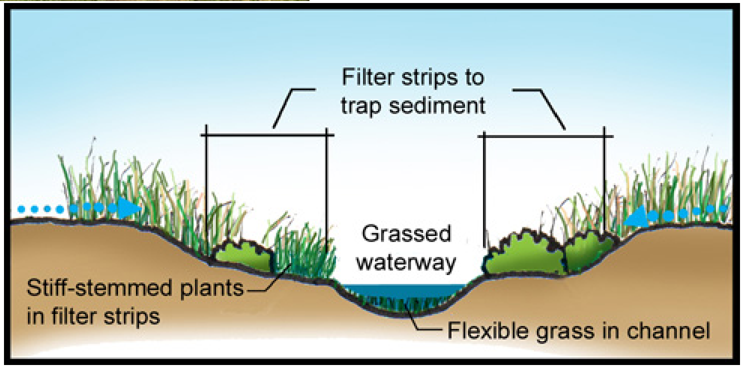
Case Study: Genesee

- Element C—getting reductions
- Based on SWAT and SWMM models developed by the group to identify the most efficient use of management measures
- To achieve reduction, practices applied to whole watershed—not realistic

- Grassed waterway
- Stream bank stabilization
- Buffer strips
- Contouring
- Terracing
- Cover crops
- Conservation tillage
- Strip cropping

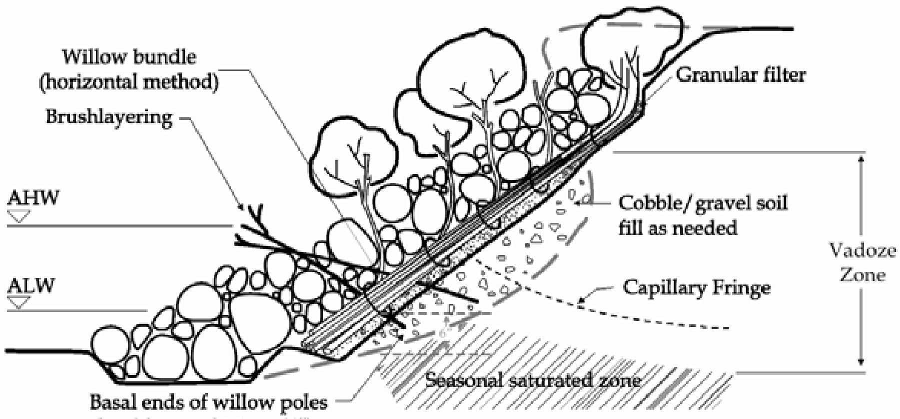
Case Study: Genesee

- Grassed waterway



Case Study: Genesee

- Stream bank stabilization



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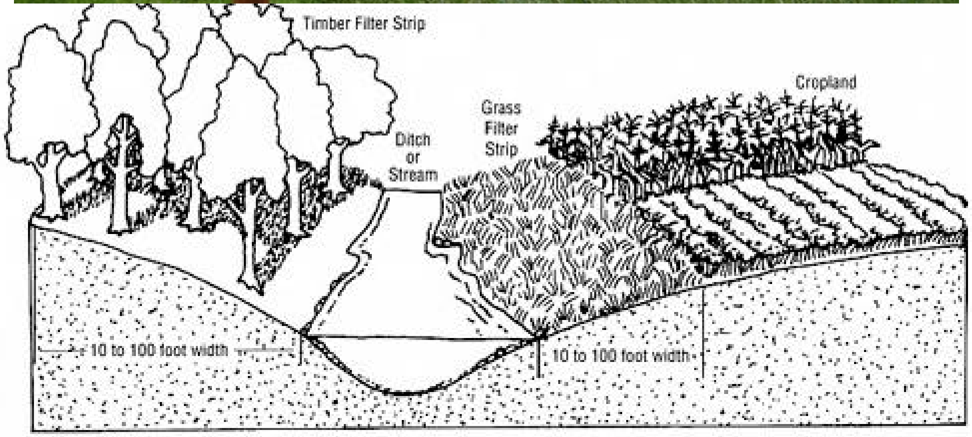
Case Study: Genesee

- Buffer strips



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- Contouring

Case Study: Genesee

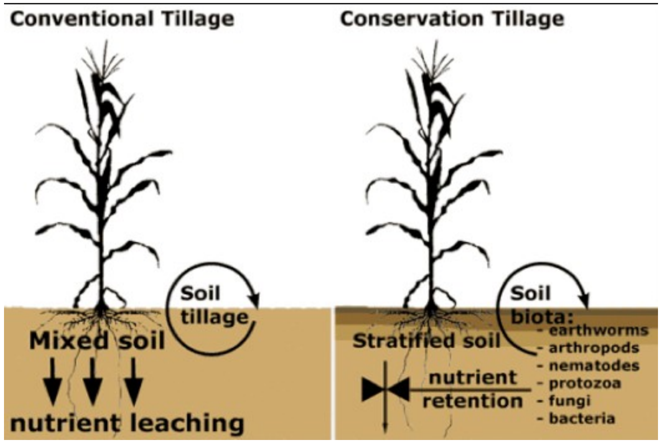
- Terracing

Case Study: Genesee

- Cover crops

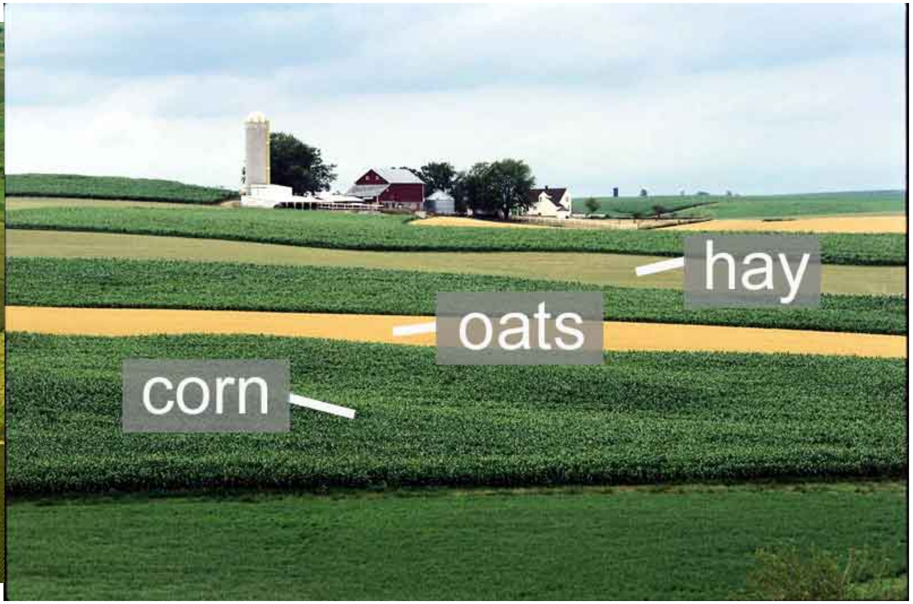
Case Study: Genesee

- Conservation tillage



Case Study: Genesee

- Strip cropping

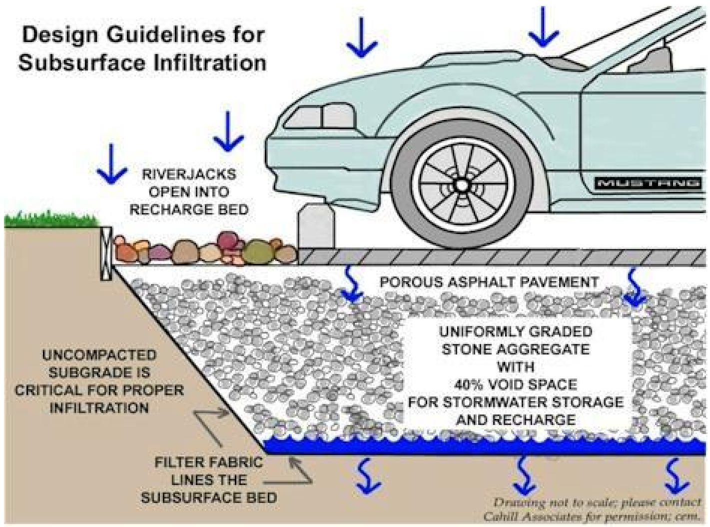


Case Study: Genesee

- Green infrastructure

Case Study: Genesee

- Green infrastructure



Case Study: Genesee

- Green infrastructure

Case Study: Genesee

- Element D—technical & financial assistance
- Plan relies on voluntary implementation of practices
- Identifies potential funding sources
  - Great Lakes Restoration Initiative (GLRI)
  - Water Quality Improvement Program (WQIP)
  - Resource Conservation Partnership Program (RCPP)

Case Study: Genesee

- Element E—outreach
- Information and data collected by these groups has been used to develop this watershed plan:
  - Water Assessments by Volunteer Evaluators (WAVE)
  - Genesee/Finger Lakes Regional Planning Council (G/FLRPC)
  - Water Education Collaborative (WEC)
  - Genesee River Wilds
  - Center for Environmental Initiatives (CEI)
  - Soil and Water Conservation Districts (SWCD)
  - New York State Department of Environmental Conservation

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Case Study: Genesee

- Element F—schedule

Depends on funding

- High priority watersheds – 10 years from plan date
- Medium priority watersheds – 15 years from plan date
- Low priority watersheds 25 – years from plan date

Case Study: Genesee

- Element G—progress milestones
- 60% implementation at within priority watershed
- Measured by:
  - Miles of stream banks stabilized
  - Miles of buffer strips
  - Acres of cover crops
  - Acres of contouring
  - Acres of conservation tillage
  - Miles of grassed waterways

Case Study: Genesee

- Element H—criteria to assess progress
- Total phosphorus
- Total suspended solids

Case Study: Genesee

- Element I—monitoring
- DEC monitoring programs
- USGS monitoring
- Monroe County

Case Study: Black River Watershed

In 2010, Black River Watershed Management Plan was released by Bergmann and Associates, with funding from the NYS Department of State, and support from the Tug Hill Commission, Lewis County Soil and Water Conservation District, and the Town of Greig, as part of the Black River Initiative. Has been useful in leveraging DOS funding and other state agency funding. The plan used DOS guidance for developing watershed management plans.

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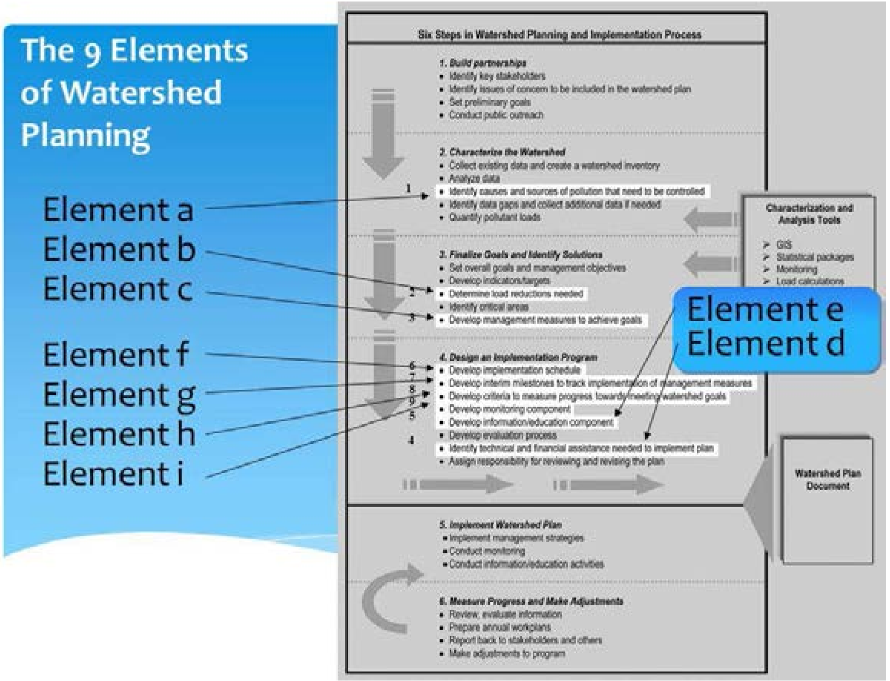
Case Study: Black River

- Since 2010, The Environmental Protection Agency, in it’s work with the NYSDEC and other stakeholders, has been increasingly only providing funding to those watersheds with a state approved 9 element plan. Black River stakeholders, including Tug Hill Commission and Lewis and Jefferson County Water Quality Coordinating Committees, expressed an interest in developing the 9 element plan in order to leverage EPA GLRI and Clean Water Act Funds.



Case Study: Black River

Gaps identified in the Black River Watershed Management Plan that did not meet the EPA required 9 key elements included:

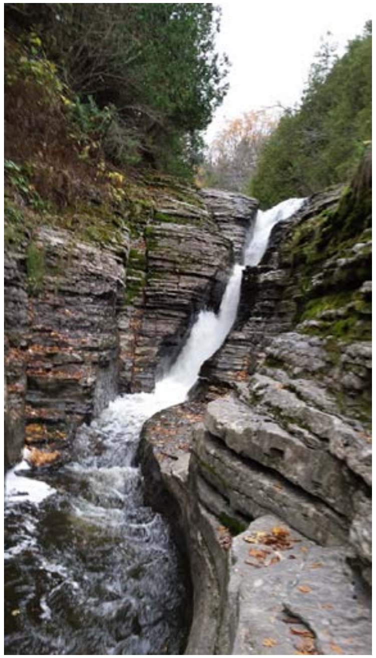
- Element B: Estimated load reductions needed.
- Element D: Estimated cost, financial and technical assistance needed.
- Element G: Measurable milestones (ie # of acres of BMP implemented)
- Element H: Criteria used to determine whether loading reductions are being achieved

  -Quantitative- loading data or modeling

  -Qualitative- beneficial uses are improved/maintained

Element I: Monitoring component to evaluate effectiveness over time.

- Reporting mechanisms, Tracking BMP implementation, using DEC RIBS water quality monitoring data to determine success, etc.



Case Study: Black River

- A Draft Addendum to the existing plan was developed to meet the minimum 9 element' required by EPA, in partnership with stakeholders and with support from DEC's Great Lakes program and Tug Hill Commis
- The draft addendum was promoted to stakeholders including Lewis and Jefferson County WQCC and the Storm Water Coaliti by sharing the draft and updates at regular meetings. Feedback was gathered to inforn plan.
- An article was written in the Black River Initiative newsletter sent to over 400 stakeholders to promote awareness of the ! element addendum and gain additional feedback.

Winter 2015

Fish Island, Dexter

Black River Initiative

Partners continue progress to achieve goals in the Black River

Throughout 2015, partners in the Black River Watershed have been working collaboratively to advance The Black River Initiative. Partners including Jefferson and Lewis County Soil and Water Conservation Districts, Jefferson and Lewis County Planning, the City of Watertown, Tug Hill Commission, and the Department of Environmental Conservation have advanced actions identified by the Black River Watershed Management Plan (WMP). Efforts have included the Black River Watershed Conference, an addendum to the existing Black River WMP, the Factory Street Reconstruction, invasive species management and green infrastructure projects. These efforts are essential to ensure the 1.2 million acres of land within the watershed continues to provide communities with quality natural resources.

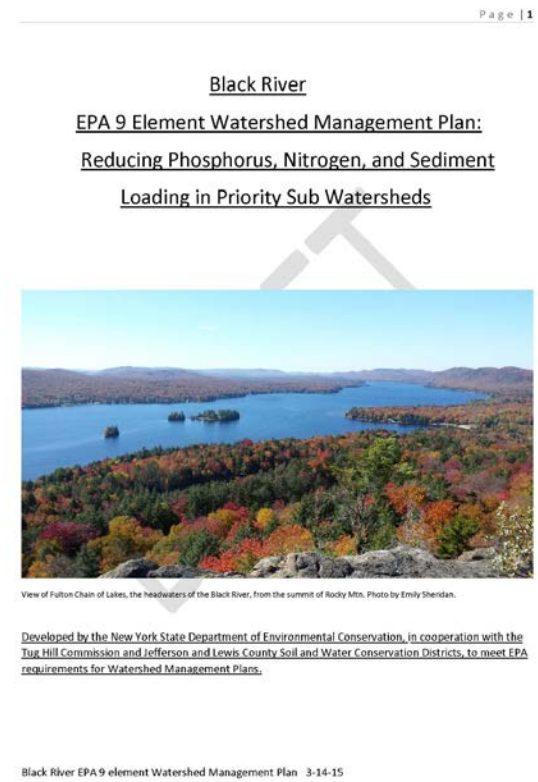
Whitaker Falls. Photo by Emily Sheridan

Addendum to Black River Watershed Management Plan will meet federal guidance

Progress is underway, led by the DEC Great Lakes Program, DEC Division of Water, and the Tug Hill Commission, to update the existing Black River Watershed Management Plan (WMP). An addendum to the existing WMP will meet the Environmental Protection Agency's minimum 9 element guidance for watershed management plans, and allow for the plan to be used to leverage federal funding, as well as target management actions to achieve measurable results in the most degraded sub watersheds. The addendum identifies existing phosphorus, nitrogen, and sediment loading in high priority sub-watersheds, identifies specific management actions needed to address loading issues, estimates load reductions that will be achieved by management actions, identifies lead organizations that will implement (cont. on p. 2)

Case study: Black River

- In working with DEC Division of Water Staff, the approach was refined, and the addendum evolved into a 9 element plan (rather than an addendum to the existing plan) for the Black River.
- Stakeholders were kept updated on the progress, and all feedback was incorporated as appropriate and consisten with the purpose of the 9 element plan to leverage EPA funding, address gaps in the original plan and meet requirements of 9 element plans, provide measurable implementation, align with statewide monitoring, and provide mechanisms for evaluating progress.



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Black River

EPA 9 Element Watershed Management Plan:

Reducing Phosphorus, Nitrogen, and Sediment

Loading in Priority Sub Watersheds

View of Fulton Chain of Lakes, the headwaters of the Black River, from the summit of Rocky Mtn. Photo by Emily Sheridan.

Developed by the New York State Department of Environmental Conservation, in cooperation with the Tug Hill Commission and Jefferson and Lewis County Soil and Water Conservation Districts, to meet EPA requirements for Watershed Management Plans.

Black River EPA 9 element Watershed Management Plan 3-14-15

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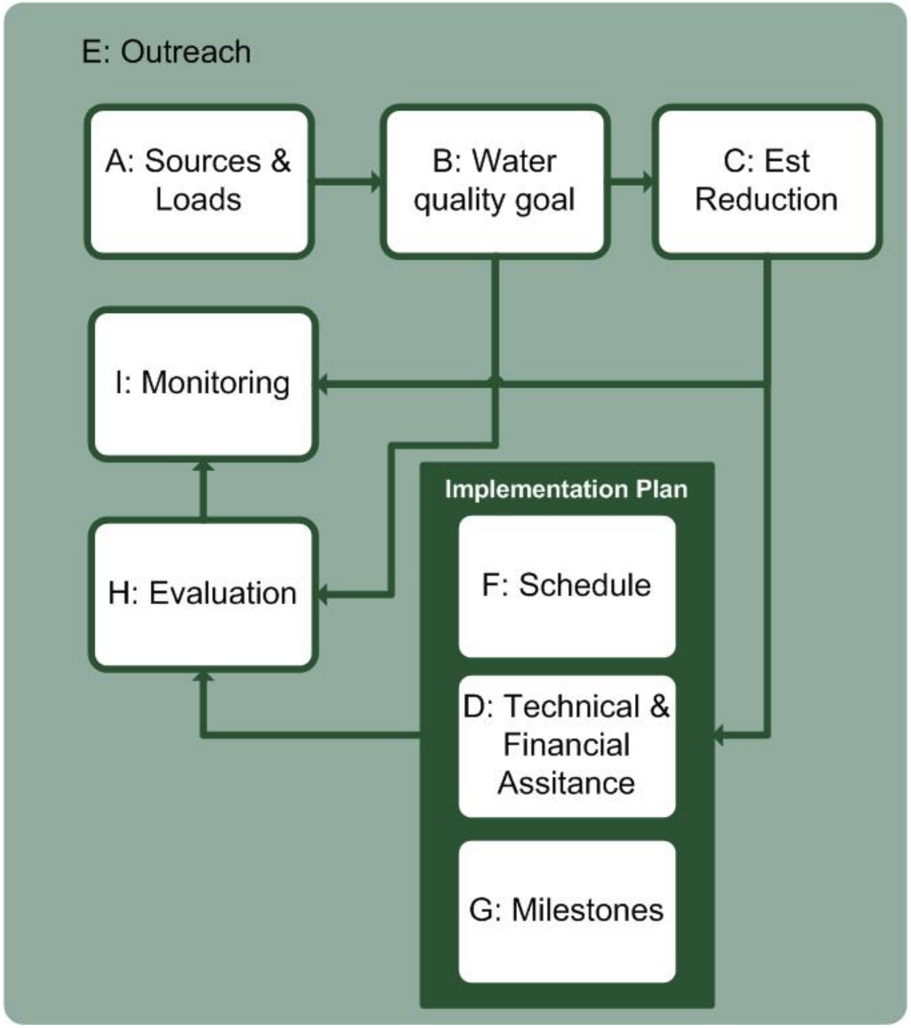
How would you start this process from scratch?



Case Study: Small Pond

Element E – Outreach

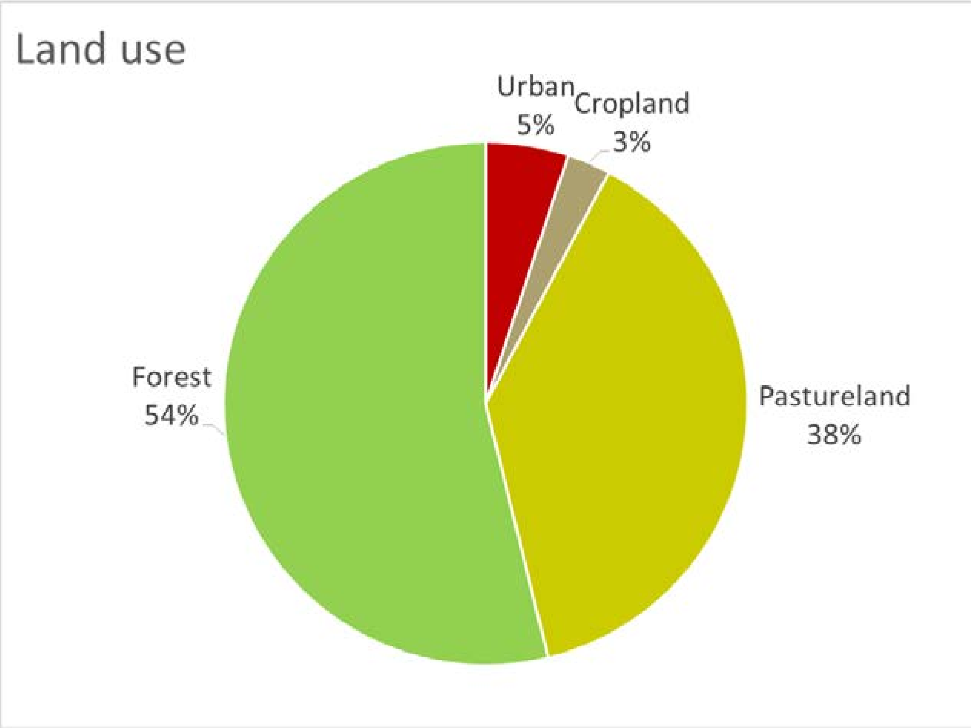
- Start communication of the local level
- Setting the stage
  - What do you want for the waterbody
  - What information (data/plans) exist
  - Are their interested stakeholders
- Public meetings
  - Pitch plan
  - Identify help
  - Identify what is needed and why

Case Study: Small Pond

Element A (pollution loads sources identified & quantified in watershed)

Watershed Characterization

- Area – 522 Acres
- Septic - 21 septic systems
- Point source - none



Case Study: Small Pond

Element A (pollution loads sources identified & quantified in watershed)

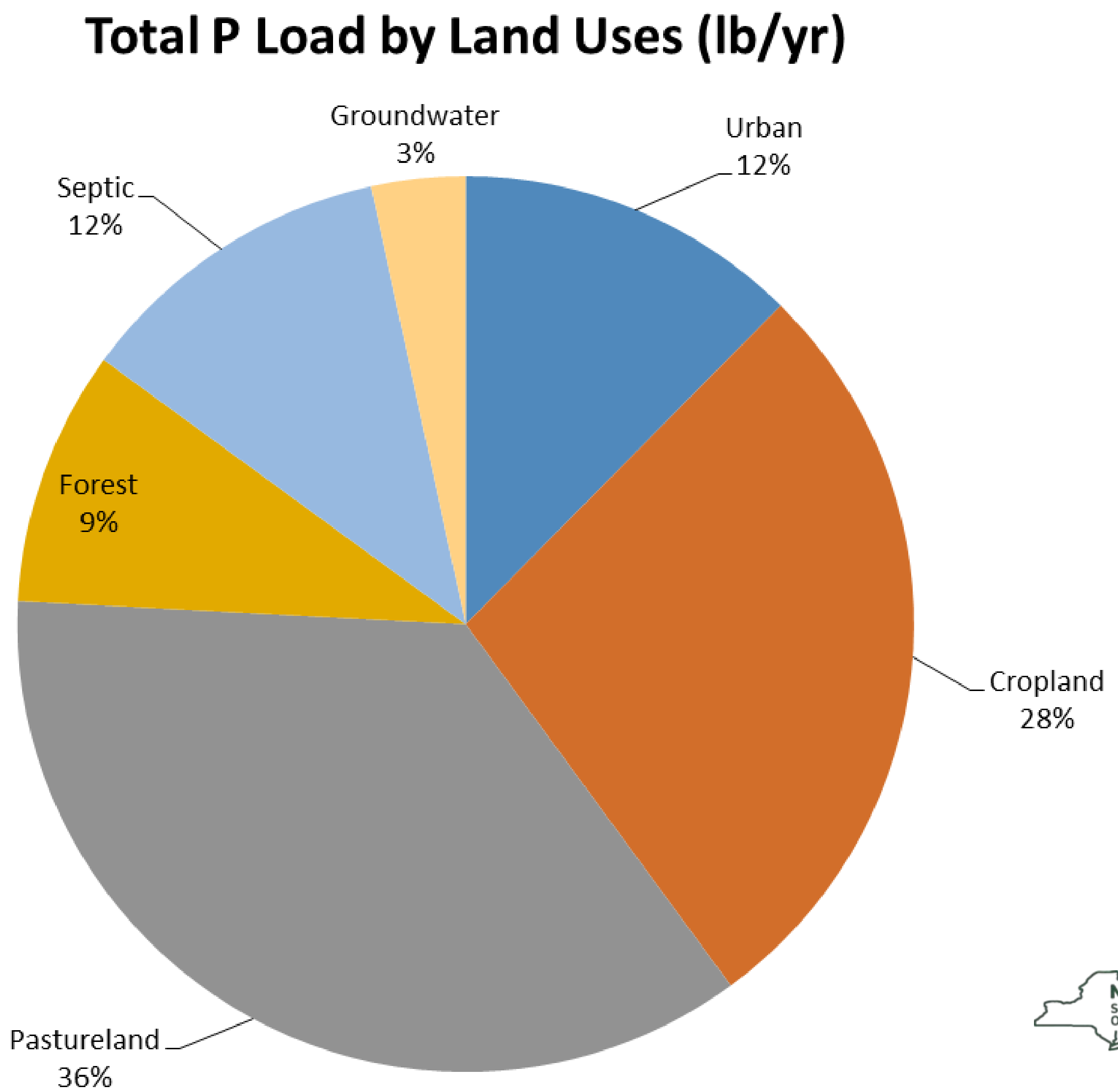
Simple spreadsheet loading model -> STEPL

Series of empirical relationships which relate load to average waterbody concentration of TP and CHL-a

- Vollenweider and others
- Steady state
- Annual average

QAPP

Case Study: Small Pond



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Case Study: Small Pond

Element B: water quality goal

Goals

- Remove from waterbody from 303(d)
- Less frequent HABS as reported to NYSDEC
- 20 ug/L ambient total phosphorus concentration

Case Study: Small Pond

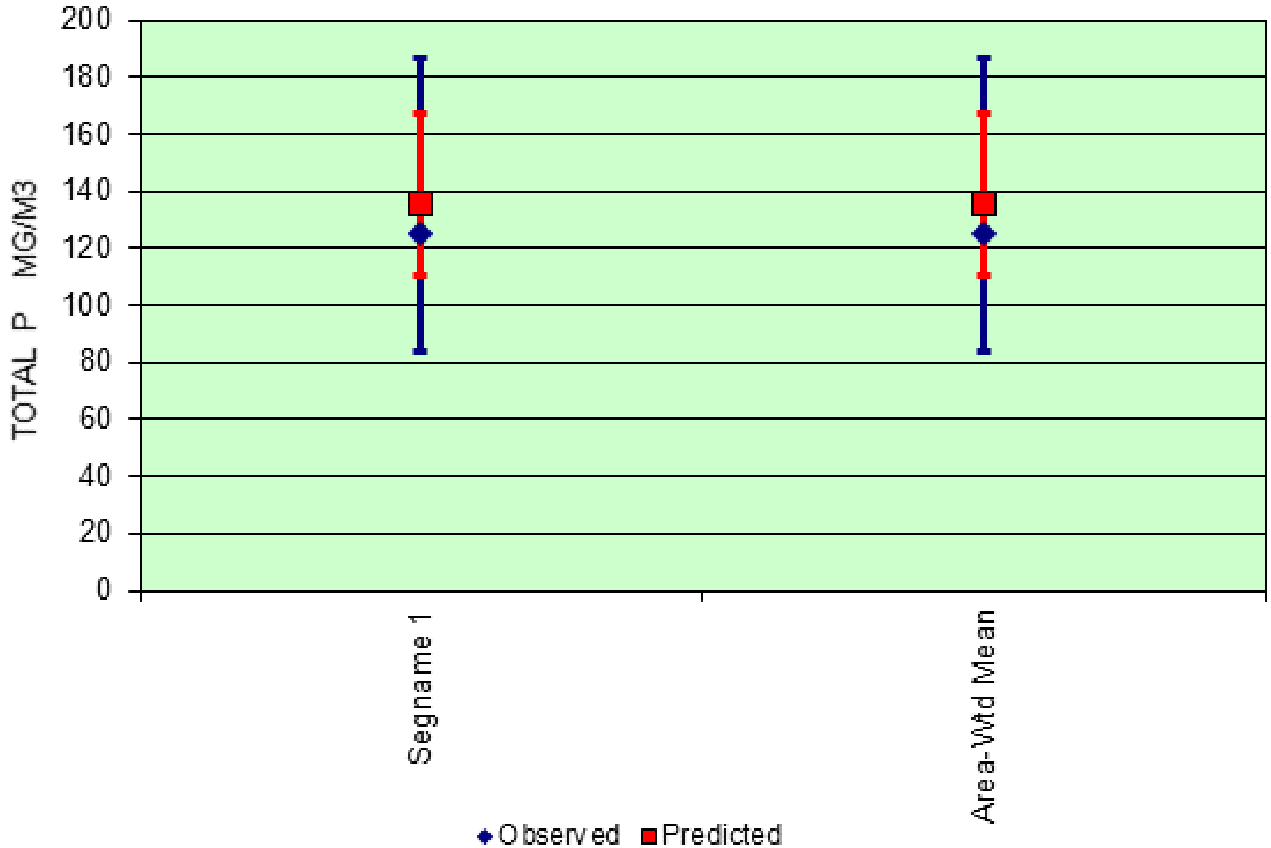
Element B: water quality goal

Predicted

- TP = 136 ug/L
- CHL-a = 73 ug/L

Observed

- TP = 125 ug/L
- CHL-a = 46 ug/L



Case Study: Small Pond

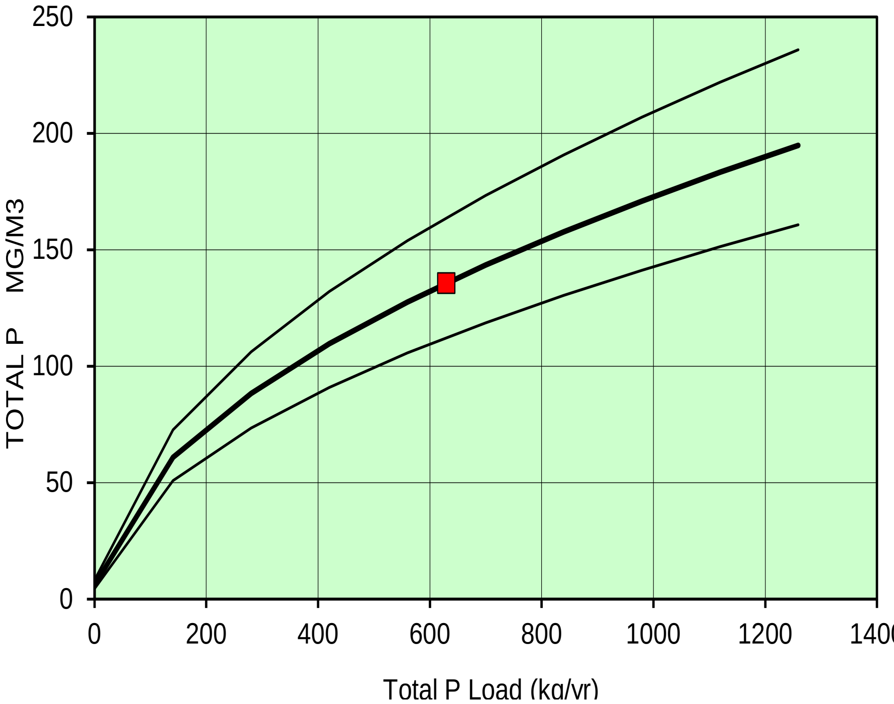
Element B: water quality goal

Element C: how to meet the goal

Reductions needed to meet goal

- Current 629.5 kg/yr (136 ug/L)
- Need 35.7 kg/yr (20 ug/L)

Approximately a 94% reduction?!?



Case Study: Small Pond

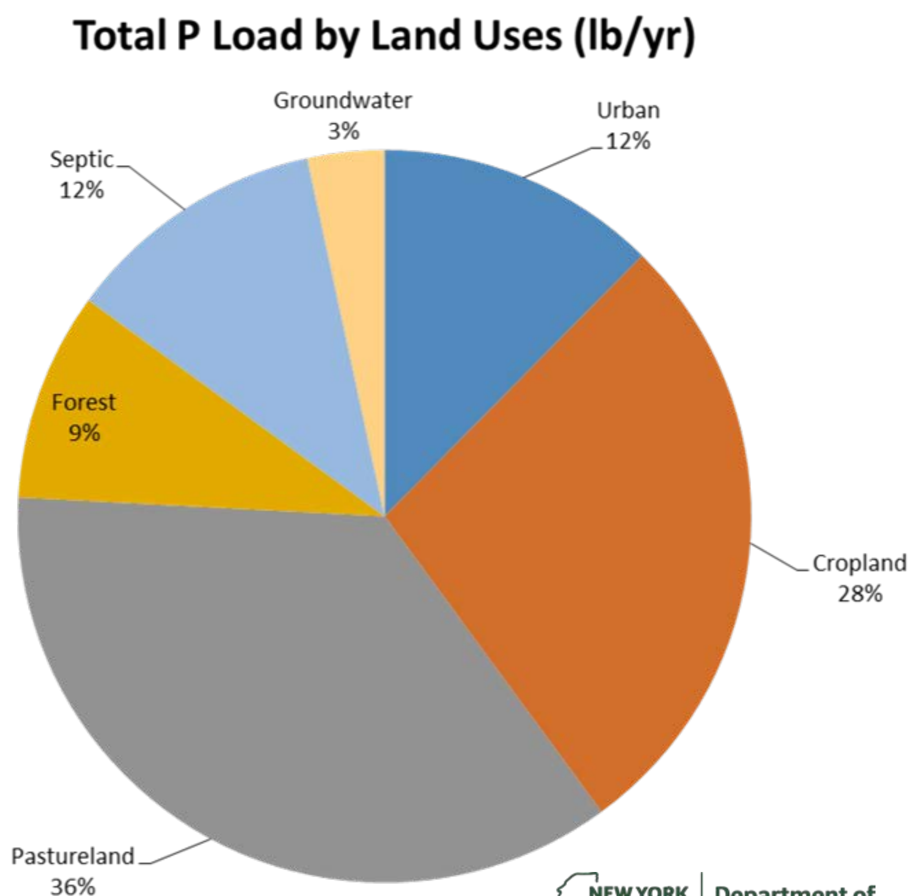
Revisit Element B: water quality goal

- Remove from waterbody from 303(d)
- Less frequent HABS as reported to NYSDEC
- 20 ug/L ambient total phosphorus concentration
- 25% reduction in total phosphorus and evaluate ambient concertation

Case Study: Small Pond

Element C: how to meet the goal

- Goal is to achieve a 25% reduction in TP load
- Pastureland and cropland accounts for 64% of load.



Case Study: Small Pond

Element C: how to meet the goal

Practices to consider

- Stream fencing – 38% efficient (pastureland)
- Riparian forest buffer – 38% efficient (cropland)
- Cover crops – 11% efficient (cropland)
- Prescribed grazing – 24% efficient (pastureland)

Case Study: Small Pond

Element C: how to meet the goal

25% reduction in TP load can be achieved by applying the following BMPs:

- Cropland – 14 ac of cover crops, and
- Cropland – 14 ac need to be directed through a forest buffer,
- Pastureland – 200 ac need to have stream fencing,
- Pastureland – 200 ac need to have prescribed grazing,

Case Study: Small Pond

Element D—assistance to support implementation actions

- State & federal funding
  - AgNPS
  - USDA programs
    - CREP
    - EQIP
    - Resource Conservation Partnership Program (RCPP)
  - Great Lakes Restoration Initiative (GLRI)

Case Study: Small Pond

Element H—evaluation criteria

- Track BMP implementation
- Use DEC lake monitoring to track trends
- Monitor for HABs and track reporting frequency to NYSDEC

Case Study: Small Pond

Element F – schedule

- Short-term(3yrs) implement ½ of BMPS
- Mid-term (3-5yrs) complete implementation of BMPs
- Long-term (5-10 yrs) track progress and reevaluate watershed and update goals and implementation plan.

Case Study: Small Pond

Element G—track progress

- Develop system to keep track of implemented projects

Case Study: Small Pond

Element I—monitoring

- Recommend use of DEC monitoring programs

Avoid a QAPP

Questions?

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