

StormH₂O Regulations in the Lake George Basin

**EXISTING WATER QUALITY, REGULATORY CONTROLS, &
MODIFICATIONS BEING CONSIDERED**

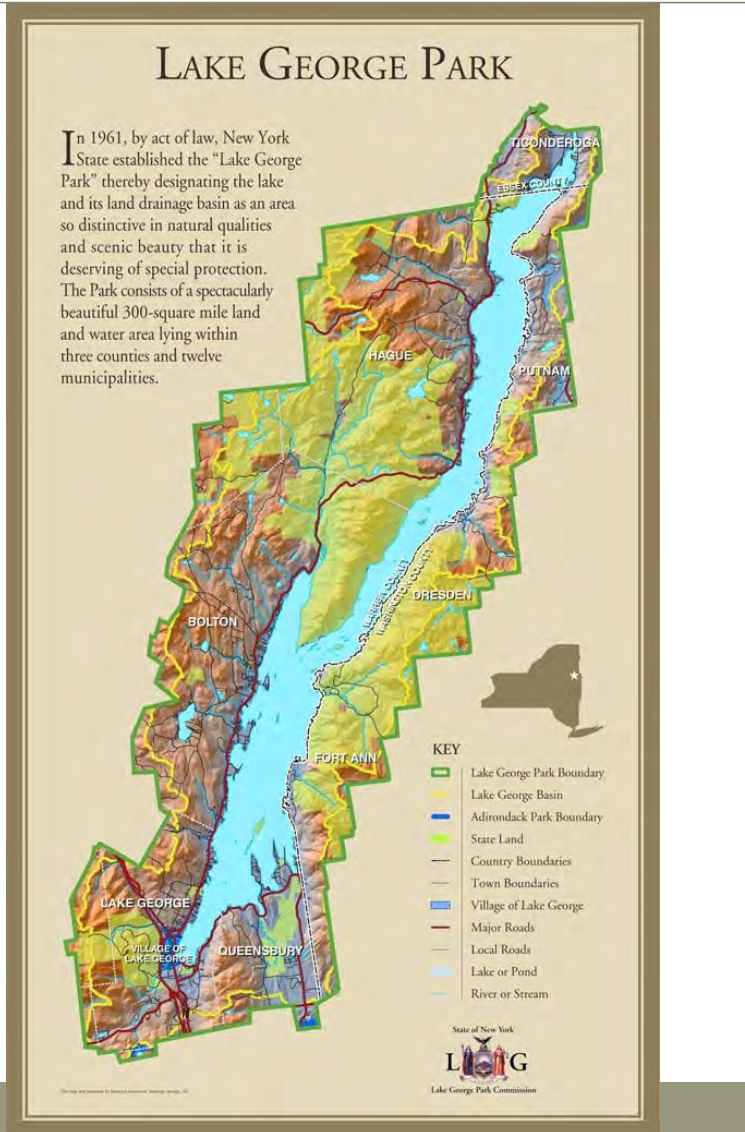


**NORTH COUNTRY STORMWATER TRADESHOW & CONFERENCE
OCTOBER 2017**

What is the Lake George Park Commission?

The Lake George Park Commission is a NYS agency established to oversee and manage the unique resources of the “Lake George Park” especially the lake’s superior water quality.

To do so, the Commission is conveyed special authority and responsibility by New York State. The Commission’s programs fill critical gaps to ensure the lake’s protection and encourage cooperation among the many public and private entities whose common goal is the lake’s preservation.



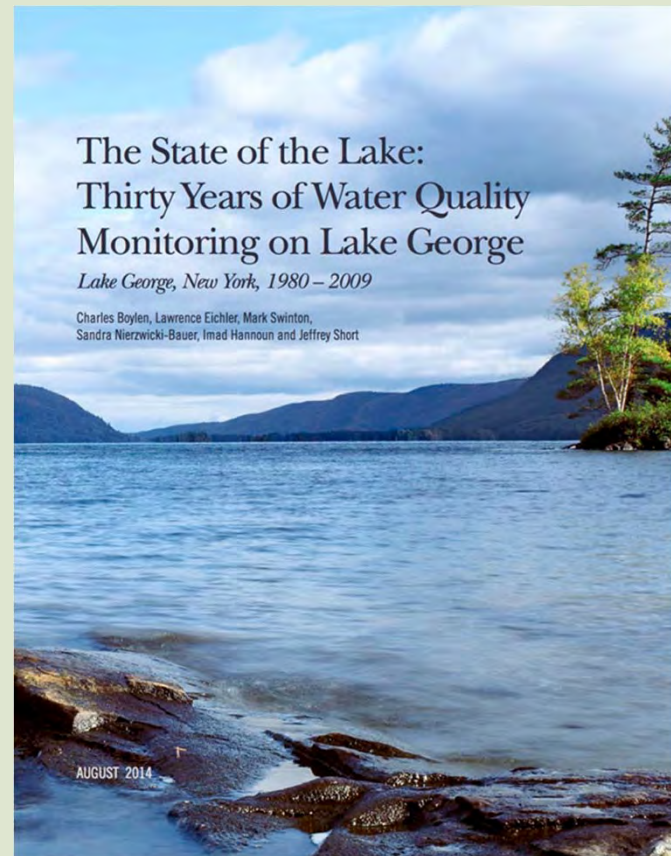
Stormwater Runoff and Water Quality

- “Nation’s largest source of water quality problems”, EPA
- Pollutants in stormwater runoff are the single largest impact to Lake George water quality and clarity
- Primary pollutants: phosphorus, nitrogen, sediment, chlorides

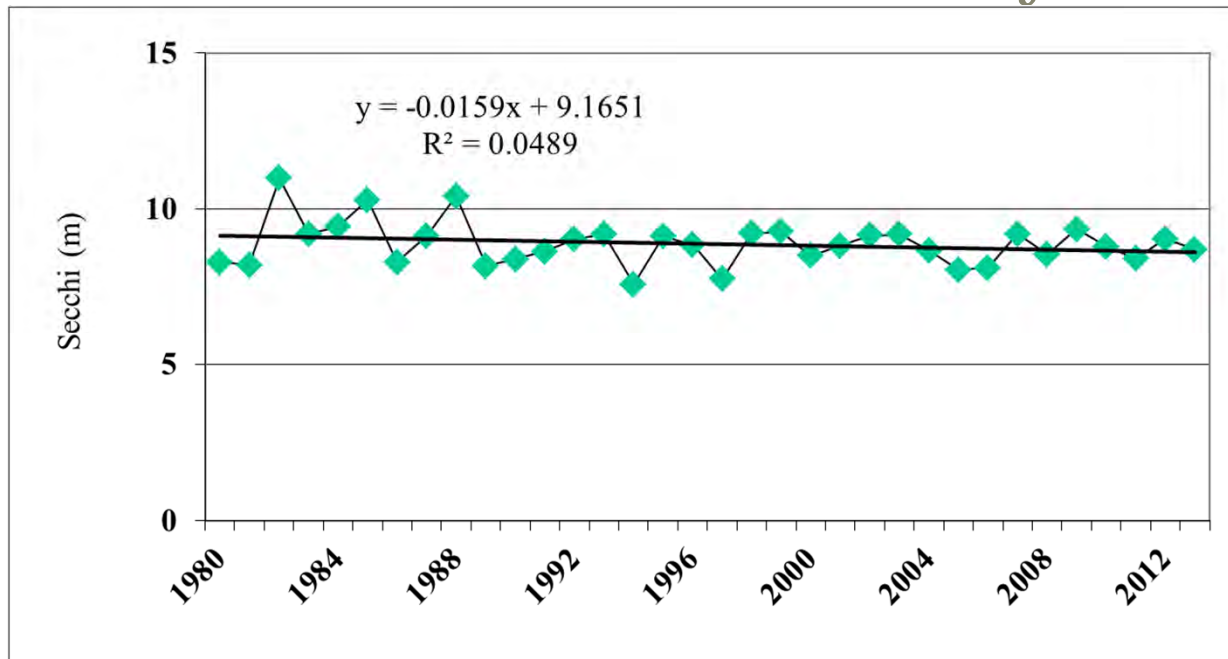


Science, Not Opinion

- Studies documenting this fact are many, including
 - National Urban Runoff Program – Lake George Report (1983)
 - The Plan for the Future of the Lake George Park (1987)
 - Stearns and Wheeler Phosphorus Budget Report (2001)
 - State of the Lake Report – 30 Years of LG Monitoring (2014)
 - Many more...

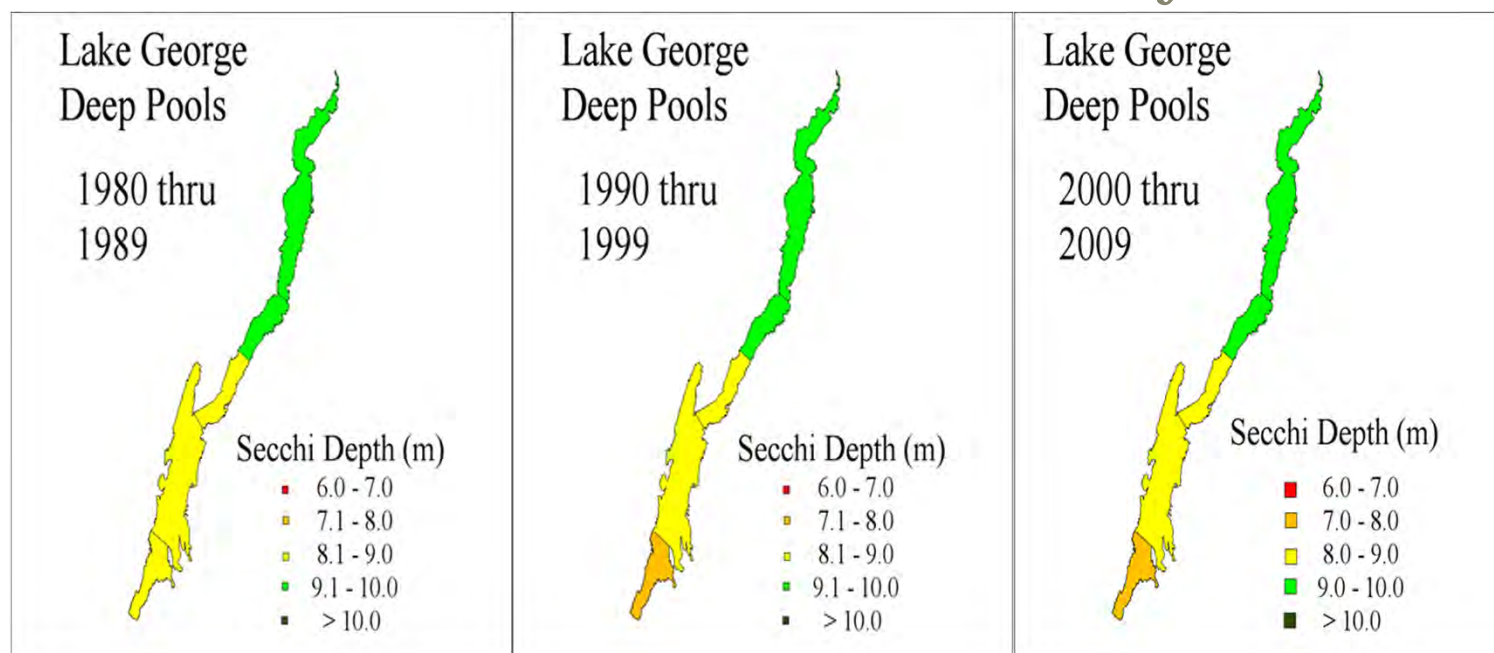


Reductions in water clarity



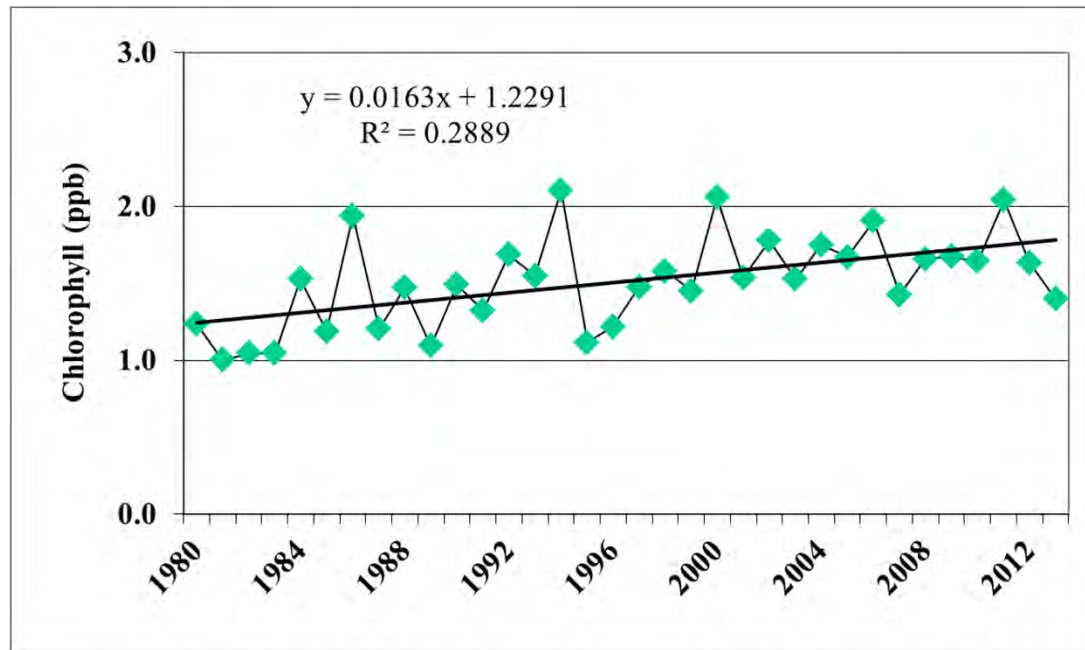
- Lakewide, transparency has shown a decline of 6% over 30 years

Reductions in water clarity



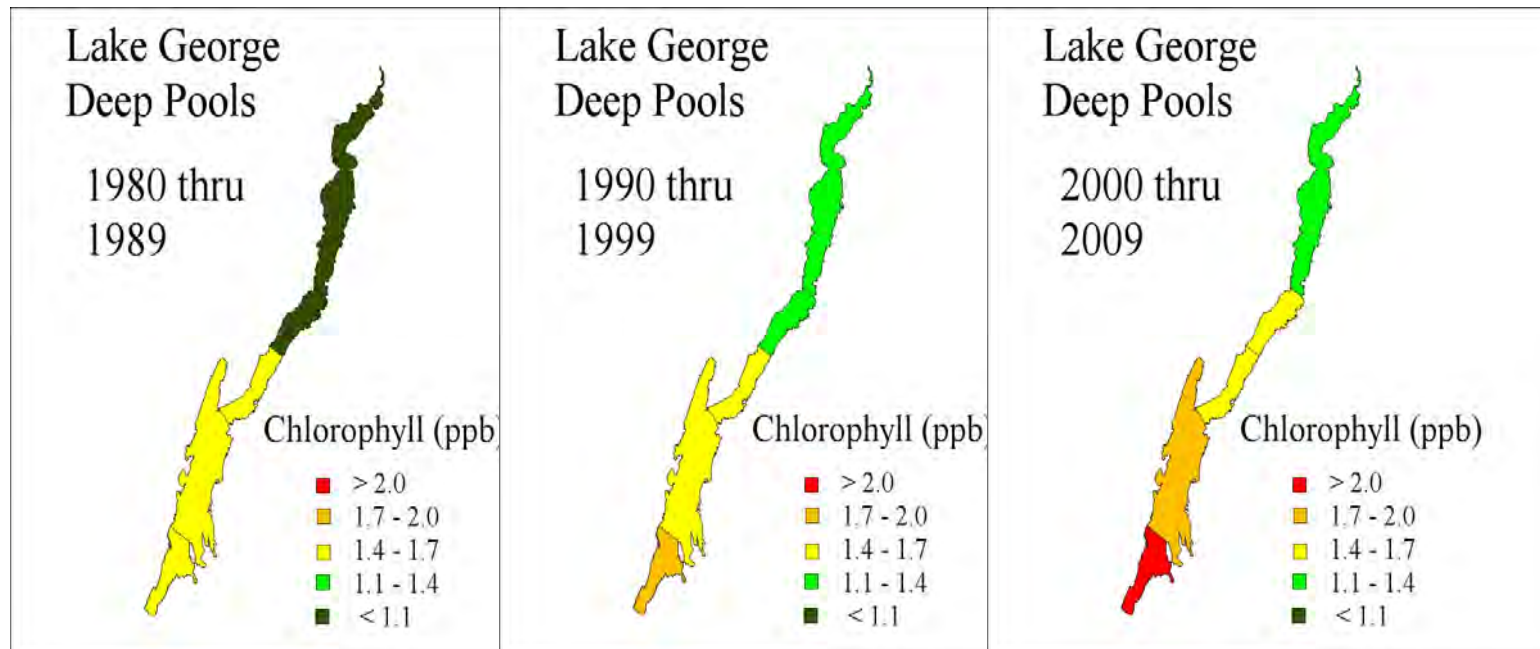
- Secchi disk data show a decline in transparency over time
- Rate of decline is similar in all basins
- A clear south to north gradient in transparency is present
- Difference of 1.6 m from south to north
- Increased algal production may account for the difference

Increased Chlorophyll Levels Observed



- Chlorophyll increased lake-wide by 33% over 30 years
- Indicative of increased primary productivity

Increased Chlorophyll Levels Observed



- Chlorophyll levels show a strong south to north gradient
- The differences between basins are increasing over time

Trends in Water Quality Correlate with Development

LAKE GEORGE WATERSHED DATA ATLAS

This figure includes the Lake George Watershed boundary, conserved lands, and relevant (combined) US Census Block Groups. This figure also illustrates how the watershed encompasses large portions of some communities (e.g., Bolton, Hague, Lake George, etc.) and a smaller portion of other communities (e.g., Horicon, Lake Luzerne, Warrensburg, etc.)



Municipality	Watershed Acres	Impervious Category	Watershed Acres	(%) Town Watershed	(%) Total
Bolton	32,835	Built or Hardscape	1,190.8	3.6%	7.5%
		Maintained Landscape	206.0	0.6%	
		Dev. Open Space & Cleared	1,076.5	3.3%	
Dresden	9,273	Built or Hardscape	132.0	1.4%	3.3%
		Maintained Landscape	19.8	0.2%	
		Dev. Open Space & Cleared	152.7	1.6%	
Fort Ann	11,521	Built or Hardscape	132.8	1.2%	3.0%
		Maintained Landscape	3.4	0.0%	
		Dev. Open Space & Cleared	210.0	1.8%	
Hague	29,728	Built or Hardscape	652.7	2.2%	4.5%
		Maintained Landscape	52.1	0.2%	
		Dev. Open Space & Cleared	623.7	2.1%	
Horicon	3,633	Built or Hardscape	12.6	0.3%	0.4%
		Dev. Open Space & Cleared	0.9	0.0%	
		Built or Hardscape	1,139.2	8.0%	
Lake George (T)	14,270	Maintained Landscape	259.9	1.8%	16.9%
		Dev. Open Space & Cleared	1,017.2	7.1%	
		Built or Hardscape	222.4	58.1%	
Lake George (V)	383	Maintained Landscape	61.2	16.0%	95.1%
		Dev. Open Space & Cleared	80.6	21.0%	
		Built or Hardscape	5.3	2.4%	
Lake Luzerne	223	Dev. Open Space & Cleared	4.8	2.2%	4.5%
		Built or Hardscape	131.5	2.4%	
		Maintained Landscape	19.7	0.4%	
Putnam	5,528	Dev. Open Space & Cleared	135.6	2.5%	5.2%
		Built or Hardscape	528.7	6.1%	
		Maintained Landscape	219.1	2.5%	
Queensbury	8,623	Dev. Open Space & Cleared	860.2	10.0%	18.6%
		Built or Hardscape	197.9	6.6%	
		Maintained Landscape	87.5	2.9%	
Ticonderoga	2,979	Dev. Open Space & Cleared	522.3	17.5%	27.1%
		Built or Hardscape	7.8	0.4%	
		Maintained Landscape	928.6	0.8%	
Warrensburg	1,864	Dev. Open Space & Cleared	4,684.6	3.9%	8.2%
		Built or Hardscape	4,353.8	3.6%	
		Maintained Landscape	928.6	0.8%	
Total Watershed	120,860	Dev. Open Space & Cleared	4,684.6	3.9%	8.2%
		Built or Hardscape	4,353.8	3.6%	
		Maintained Landscape	928.6	0.8%	

- Similar to water quality, land development has a strong south to north gradient
- More development, associated with areas of decreased water quality
- In the south basin, 19% of the watershed contains 43% of the hardscape

We can do Better & We have been doing Better

- History of Public works projects
- NYS DOS and NYS DEC grants
 - >\$10 million to Lake George projects in the past decade.
 - More than any other lake in NYS
 - Significant funds directed to address runoff from highways, local roads, public properties
- Great partnerships
 - State, County, Town, LCLGRP, SWCD, Fund, LGA



We can do Better & We have been doing Better

- Great local, professional resources
 - Educate the community
 - Incentivize water quality improvement projects & design
 - Facilitate projects
- Examples
 - Fund's Do It Yourself Water Quality
 - LGA's Lake Saving Projects
 - WCSWCD's Watershed & Retrofit Assessments

Do-It-Yourself Water Quality
A Landowner's Guide to Property Management that Protects Lake George

Lake-Friendly Living

15 simple strategies to protect Lake George

Town of Bolton Stormwater Retrofit Opportunities
Prepared by the Warren County Soil and Water Conservation District
For the Town of Bolton under the Lake George Park Commission Community Stormwater Grant Program
April 2013

English Brook Watershed Assessment
Warren County Soil and Water Conservation District

Town of Queensbury Stormwater Identification Project
Prepared by the Warren County Soil and Water Conservation District
For the town of Queensbury under the Lake George Park Commission Community Stormwater Grant Program
March 2013

A WINNING SCORE TO PROTECT WATER QUALITY—AND PROPERTY VALUES
The FUND's Low Impact Development Certification System™, moved from drawing board to launch pad in 2014.

Lake George Association

Systematic Approach: Commission Stormwater Regulations

- Effective September 1990
- Key Elements
 - Low Threshold of Jurisdiction
 - ✦ 1,000 sqft of new impervious area, or
 - ✦ 5,000 sqft of land disturbance
 - Post Construction SWCM's Limiting Offsite Impacts through onsite Volume Control



PROJECT PLAN STEPS

1 Prepare a Project Plan: a scale drawing showing key features of the site.

The project plan can be developed from a tax map, site survey, or other accurate drawing of the site. The property and boundaries should be accurate in scale. The project plan should include:

- a line showing the limit and location of area(s) that will be cleared for buildings, driveways and lawns.
- the location of all structures, existing and proposed (house, shed, garage, etc.). Include driveways, parking areas, any other impervious surfaces, well and septic system.
- the location of property boundaries, any streams or wetlands, and separation distances of structure(s) to any water body or stream.
- indication whether property soil is normally wet or dry, and the angle/slope of the property in relation to any water body or stream.

2 Calculate the newly created impervious area.

Identify the newly created impervious areas. Note on the plan the area of each proposed structure and impervious surface (paved, walkways, etc.) and calculate the sum of the areas. *For example:*

- 10' x 50' driveway = 500 sq.ft.
- 30' x 42' building footprint = 1,260 sq.ft.
- 20' x 20' shed = 400 sq.ft.
- 6' x 60' walkway = 360 sq.ft.
- Total impervious area = 2,520 sq.ft.

3 Calculate the volume of stormwater runoff.

For small and medium size projects, simply multiply the total square footage of newly created total impervious surface by 1.5 gallons.

For Example:

$$2,520 \text{ sq.ft.} \times 1.5 \text{ gallons/sq.ft.} = 3,780 \text{ gallons}$$

This volume is now used to size the stormwater control storage devices. Information about selecting stormwater storage devices follows.

4 Identify/choose the stormwater and erosion control measures. (see page 6&7)

5 Size and place the selected stormwater control measures. (see page 7&8)

6 Add stormwater and erosion control measures to the project plan. (see page 9)

Commission Stormwater Regulations

- **Minor Projects**

- <15,000 sqft land disturbance
- Infiltration Device Performance:
 - ✦ 1.5 gallons / sqft Impervious Area

- **Major Projects**

- >15,000 sqft land disturbance
- Akin to Full SWPPP
- Infiltration Device Performance
 - 10-yr/24-hr Storm Volume
 - 25-yr/24-hr Storm Rate
- Retrofit existing development



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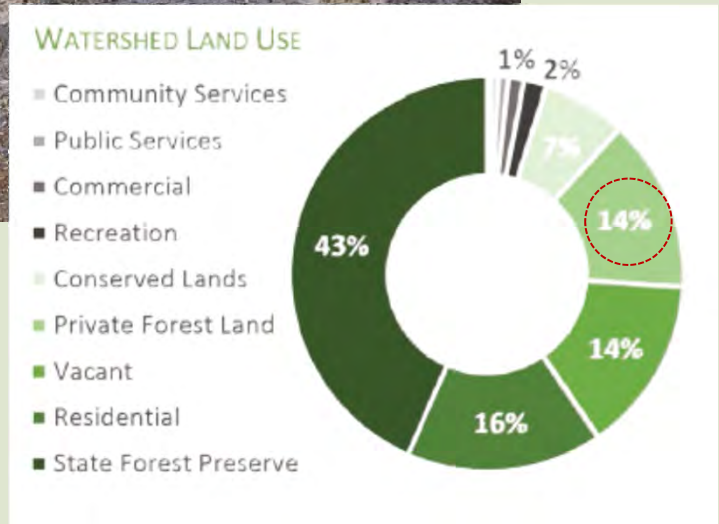
Bending The Curve

- For the first time in 20+ years, the Commission is conducting a full evaluation of its regulations, and seeing where they can be improved
- Current condition still leads to slow decline
- How do we change?

- Timber Harvesting
- Fertilizers
- SW Retrofits
- Stream Corridors



Timber Harvesting



- Logging regulations not well understood or followed:
 - Exempt if compliant with a conservation plan approved by DEC or Soil & Water Conservation District
 - Enforcement more common than compliance
- Close the Gap
 - Conservation Plan approved in-house
- Same Forestry Standards
- Different Results:
 - Less violations, practices

Timber Harvesting



FIGURE 3: WATER BAR

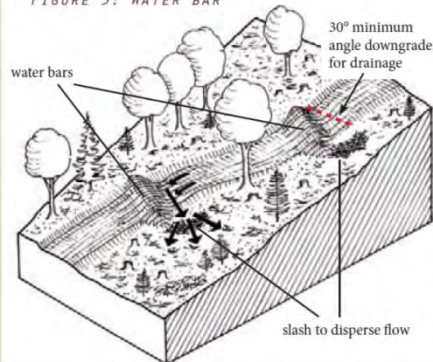


TABLE 2:
WATER BAR
SPACING
GUIDELINES

Slope (percent)	Spacing (feet)
2	250
5	135
10	80
15	60
20	45
25	30
30	35

SKID TRAILS

- Logging regulations not well understood or followed:
 - Exempt if compliant with a conservation plan approved by DEC or Soil & Water Conservation District
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- Same Forestry Standards
- Different Results
 - Less violations, better practices

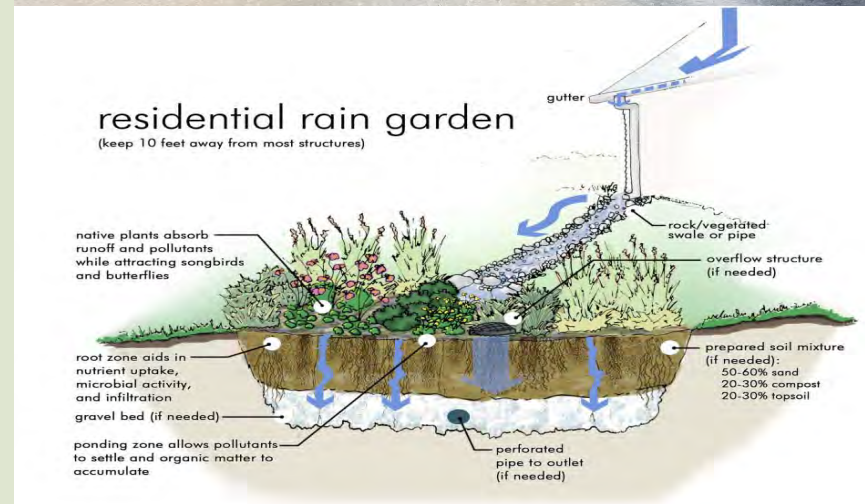
Fertilizer Restrictions

- Reduce nutrient inputs
- No lawn fertilizer applications within 50 feet of a waterbody
- Apply Queensbury and Lake George fertilizer code to the entire watershed



Retrofitting: Making it Better

- Apply existing retrofit standard to all jurisdictional projects
 - Currently only applies to Major Projects, extend to Minor Projects
 - Infiltrate existing stormwater from a site
 - Devices sized for minimum volume control of 0.5" from all impervious areas
- Simple fixes
 - Trenches
 - Swales
 - Rain gardens
- Low cost, great impact



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50% of housing within the Lake George watershed is seasonal and over 70% of seasonal housing within the 12 towns along the lake is within the watershed.

"Lake George Watershed Atlas", 2016, Lake George Association

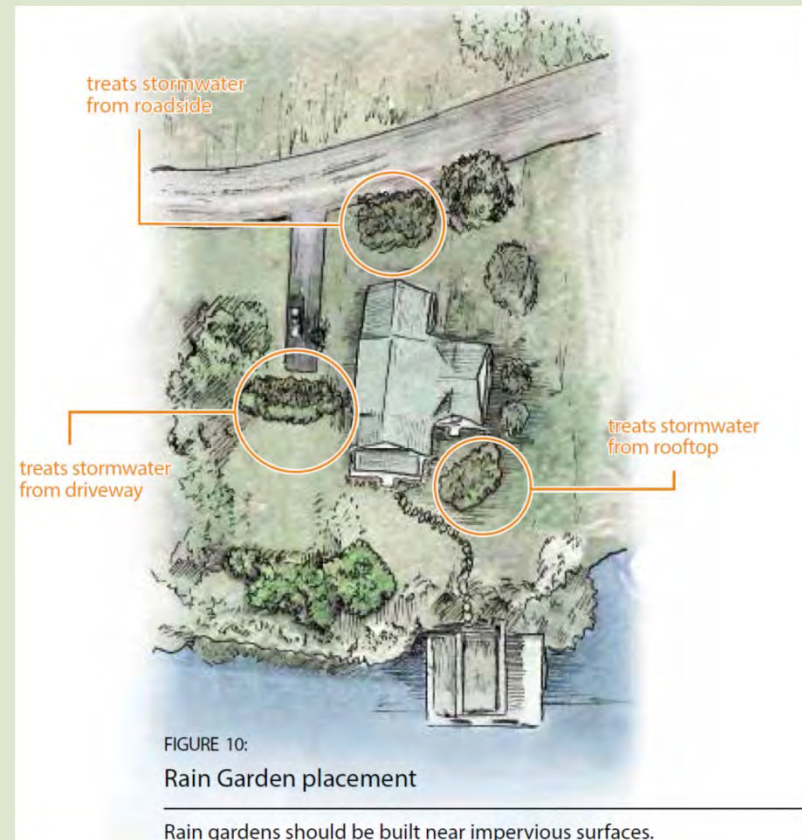


FIGURE 10:
Rain Garden placement

Rain gardens should be built near impervious surfaces.

"Do It Yourself Water Quality", 2010 Fund for Lake George, LG Waterkeeper

Stream Corridors

- **Multiple benefits of stream buffers**
 - Reduce sediment, nutrients, stream bank erosion, flood impacts, stream temps, etc.
- **Balance protection & property rights**
- **Proposal:**
 - Apply APA shoreline cutting standards to DEC streams
 - No impervious area within 35' buffer
- **Established, well-understood standard**
 - Queensbury & Bolton currently apply the cutting standard to streams
- **Removal Efficiency:**
 - TSS: 53-95%,
 - Total P: 46-79%
 - Total N: 48-74%



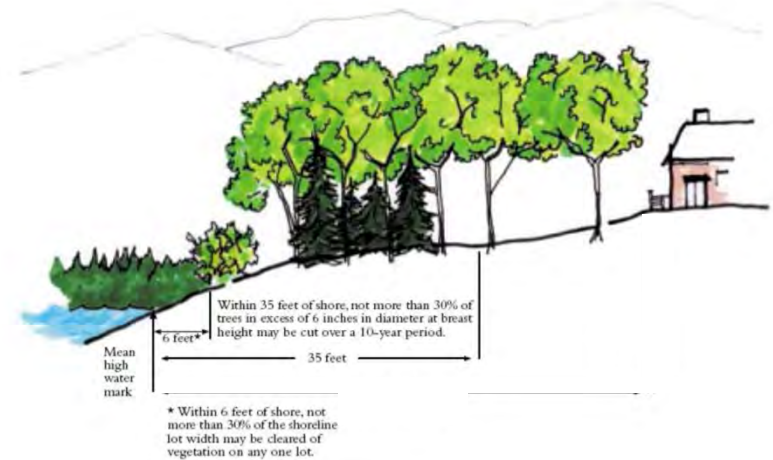
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SHORELINE CUTTING RESTRICTIONS

Except to allow for the removal of diseased vegetation and rotten or damaged trees, all vegetative cutting on a parcel with shoreline on a lake, pond, or navigable river or stream must comply with the following restrictions:

- (a) Within 35 feet of the mean high-water mark, no more than 30 percent of the trees in excess of six inches diameter at breast height (4½ feet above ground) may be cut over any 10-year period.
- (b) Within 6 feet of the mean high-water mark, no more than 30 percent of any vegetation may be removed.



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Author	Width (m)	% Slope	% Removal of TSS
Dillaha et al (1988)	4.6	11	87
Dillaha et al (1988)	4.6	16	76
Dillaha et al (1988)	9.1	11	95
Dillaha et al (1988)	9.1	16	88
Dillaha et al (1989)	4.6	11	86
Dillaha et al (1989)	4.6	16	53
Dillaha et al (1989)	9.1	11	98
Dillaha et al (1989)	9.1	16	70
Magette et al (1989)	4.6	3.5	66
Magette et al (1989)	9.1	3.5	82

Study	Total P Removal	
	4.6 m buffer	9.1 m buffer
Dillaha et al 1988	71.5%	57.5%
Dillaha et al 1989	61%	79%
Magette et al 1987	41%	53%
Magette et al 1989	18%	46%

Table 2. Removal of Total Phosphorus by Grass Buffers.

With one exception, studies by Dillaha et al and Magette et al found a positive correlation between the width of grass riparian buffers and the ability to trap total phosphorus in surface runoff.

Study	Total N Removal	
	4.6 m buffer	9.1 m buffer
Dillaha et al 1988	67%	74%
Dillaha et al 1989	54%	73%
Magette et al 1987	17%	51%
Magette et al 1989	0%	48%

Table 3. Removal of Total Nitrogen by Grass Buffers.

Studies by Dillaha et al and Magette et al found a positive correlation between the width of grass riparian buffers and the ability to trap total nitrogen in surface runoff.



Bending The Curve



- Each proposed element is a simple, common sense, balanced approach
 - Timber Harvesting
 - Fertilizers
 - SW Retrofits
 - Stream Corridors
- Not overly burdensome to landowners
- In concert, these items will collectively strengthen stormwater regulation and improve water quality in the long term



Thank You

Please call and email with thoughts and suggestions...

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Photo courtesy of Carl Hellman