


# Welcome – to a **WATERSHED** Event!

Long-Term Flood Resiliency for Communities:  
A Watershed Management Approach

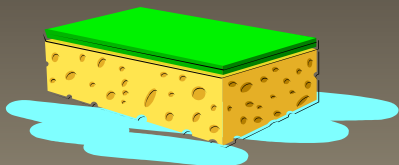
April 16, 2015

Kim Sherwood  
Watershed Consultant  
from Chautauqua County, NY





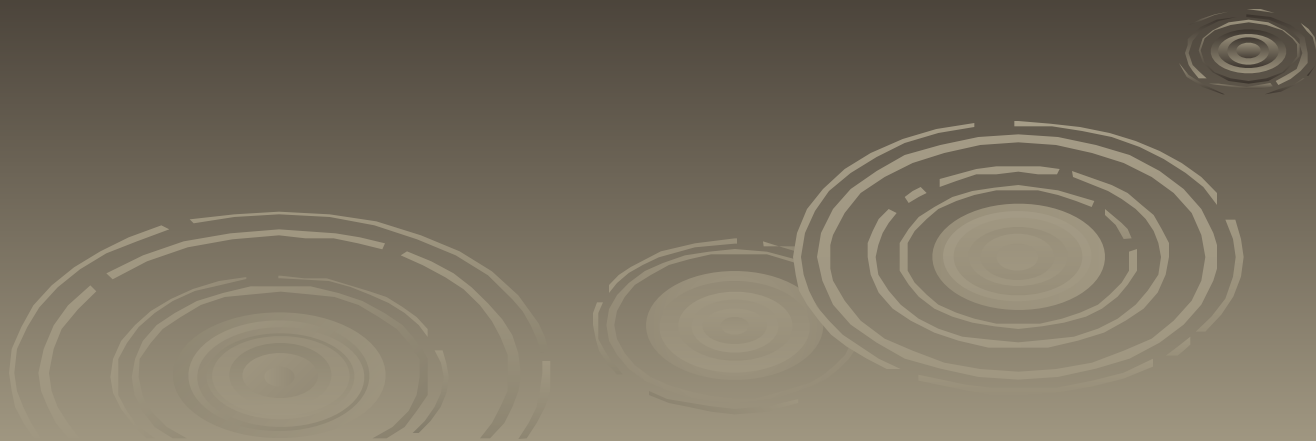
# WATERSHEDS—THE FUNNEL, THE SPONGE, AND THE SLIDE



# Who Cares?

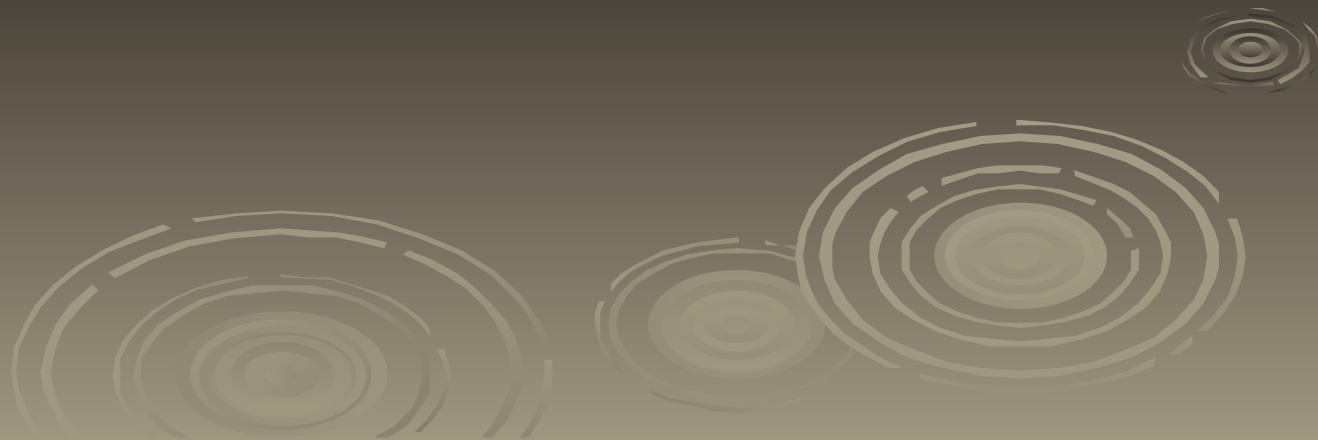


# Why You Might Care



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- *Flood damage – homes, property, cropland, etc.*



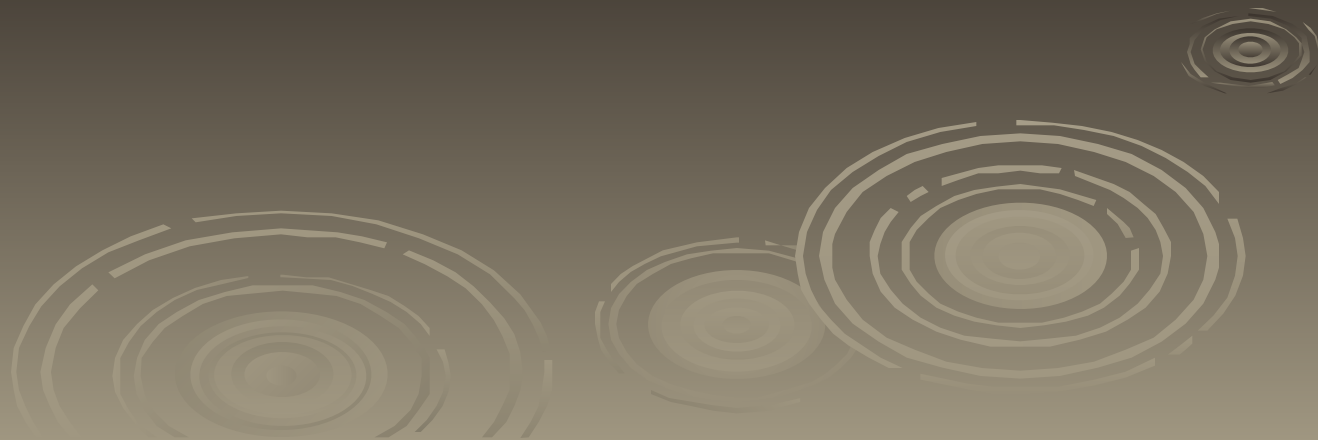
# Why You Might Care

- *Flood damage – homes, property, cropland, etc.*
- *Landowner complaints*



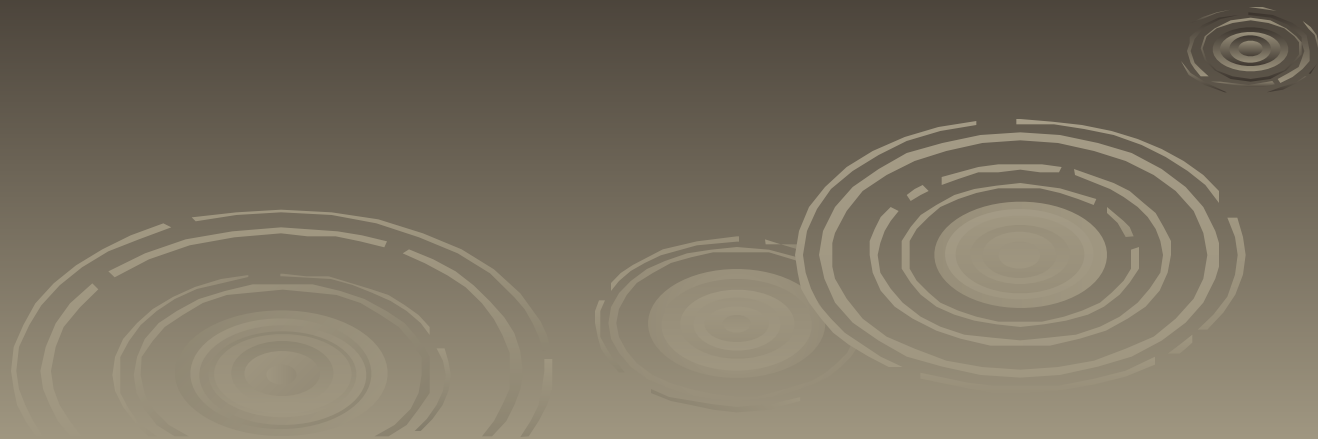
# Why You Might Care

- *Flood damage – homes, property, cropland, etc.*
- *Landowner complaints*
- *Groundwater quality & quantity*



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- *Jobs & Quality-of-life issues for growing area*





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- *Flood damage – homes, property, cropland, etc.*
- *Landowner complaints*
- *Groundwater quality & quantity*
- *Jobs & Quality-of-life issues for growing area*
- ***MUNICIPAL COSTS***

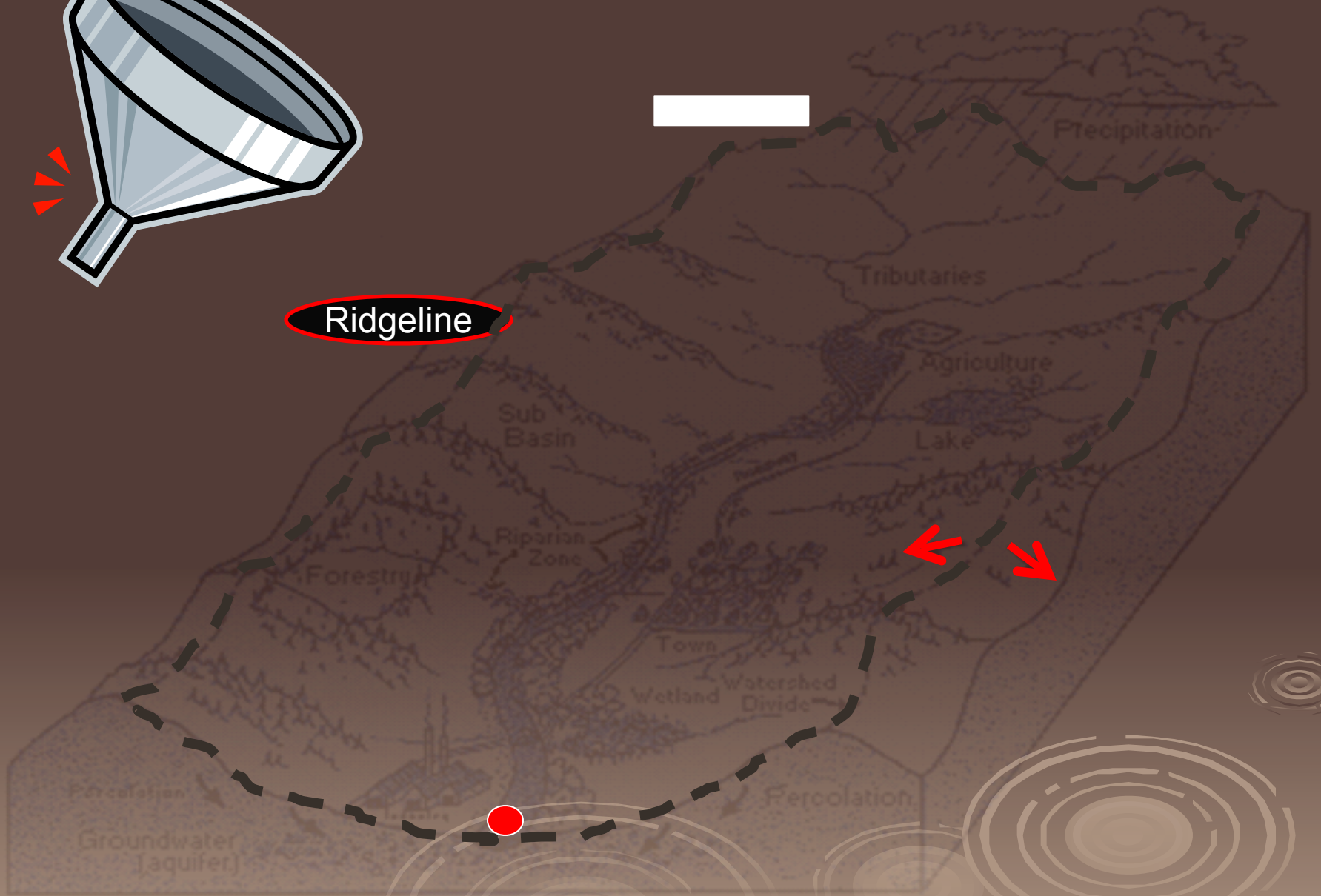
# What Is A Watershed?



Produced by Lane Council of Governments



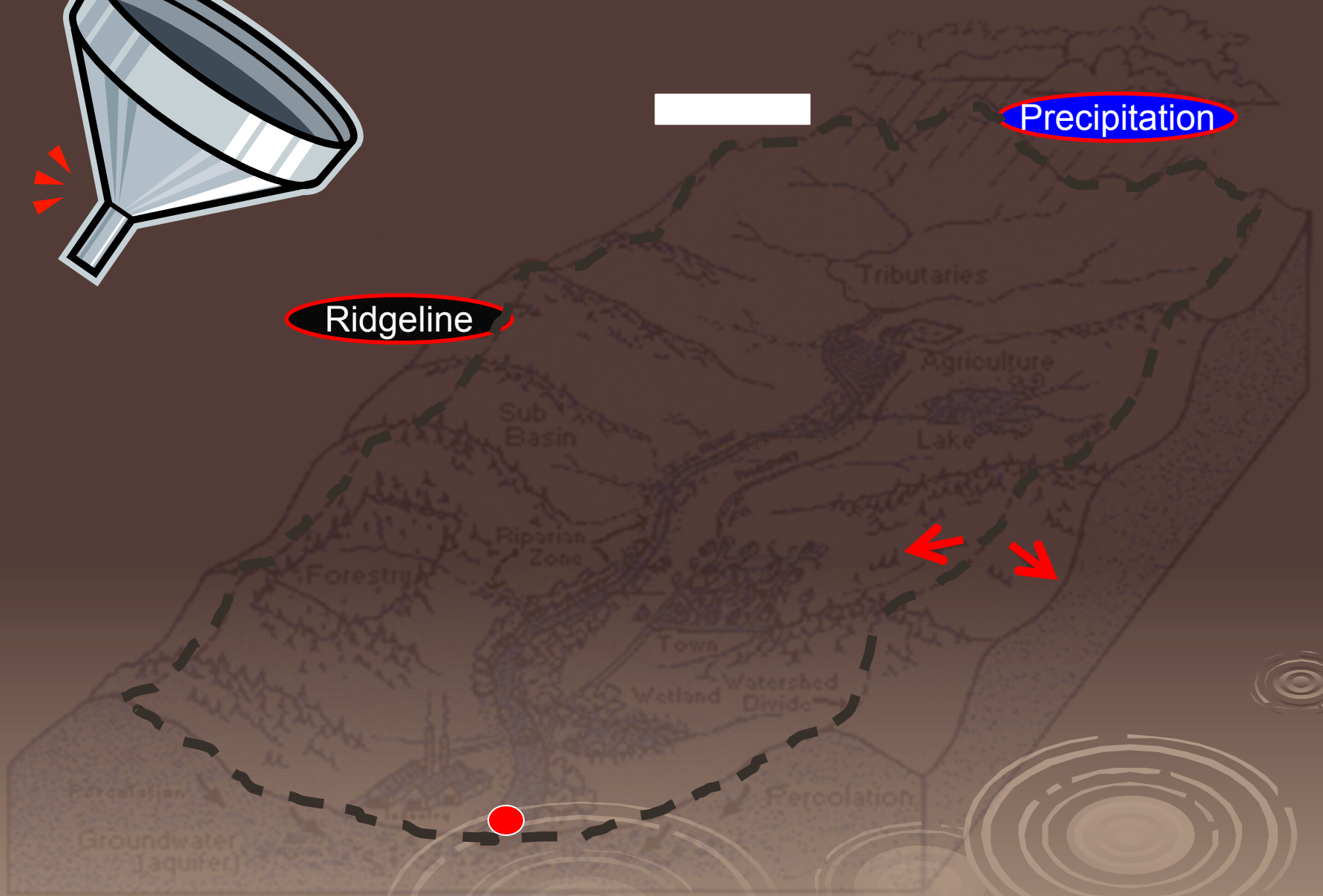
Ridgeline





Precipitation

Ridgeline







Precipitation

Tributaries

Ridgeline

Lake

Wetland

Groundwater

Runoff



Precipitation

Tributaries

Ridgeline

Agriculture

Rural Homes

Lake

Towns

Forestry

Industry

Wetland

Groundwater

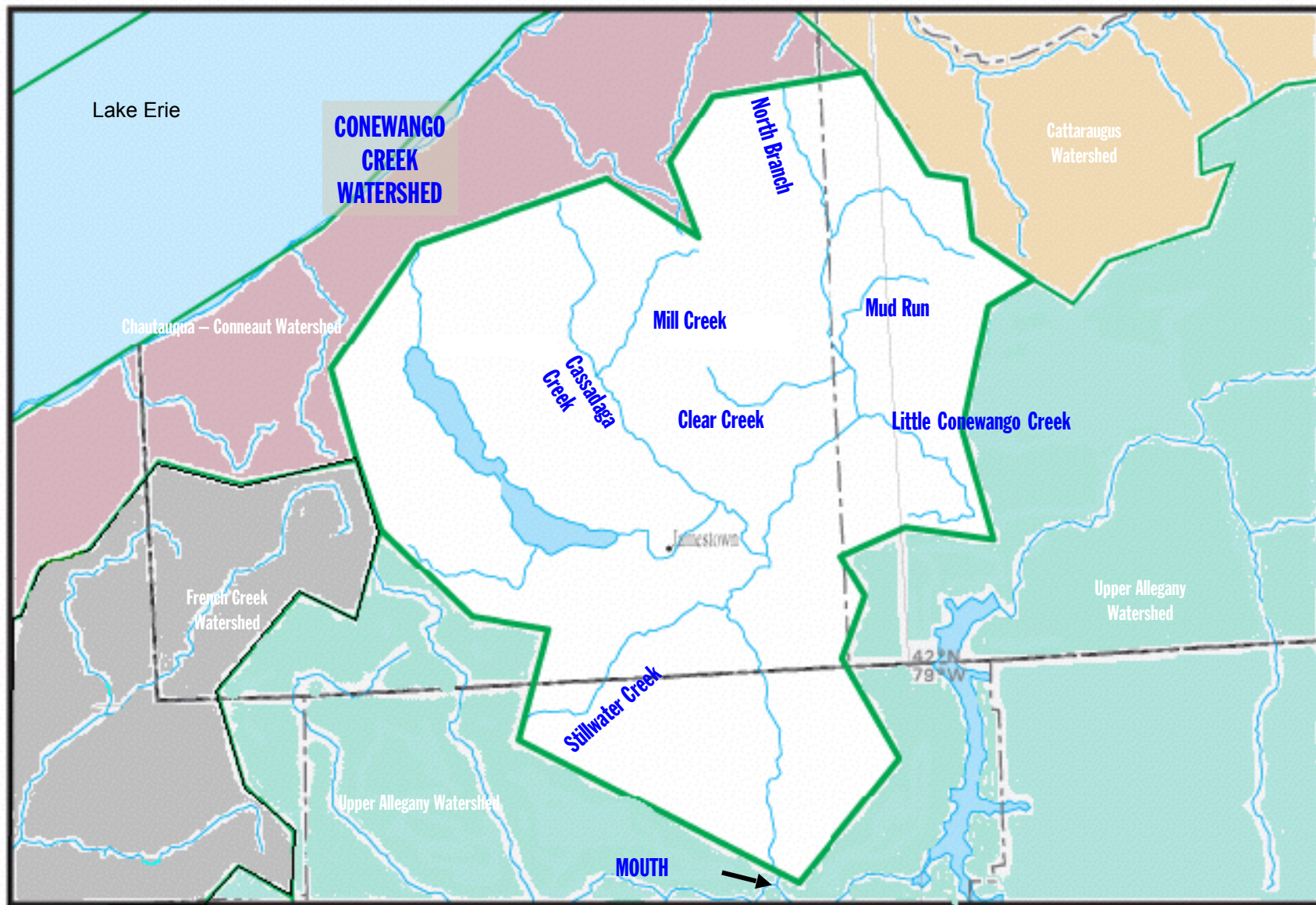
Runoff

# Who's 'in-charge' -- of watershed management?

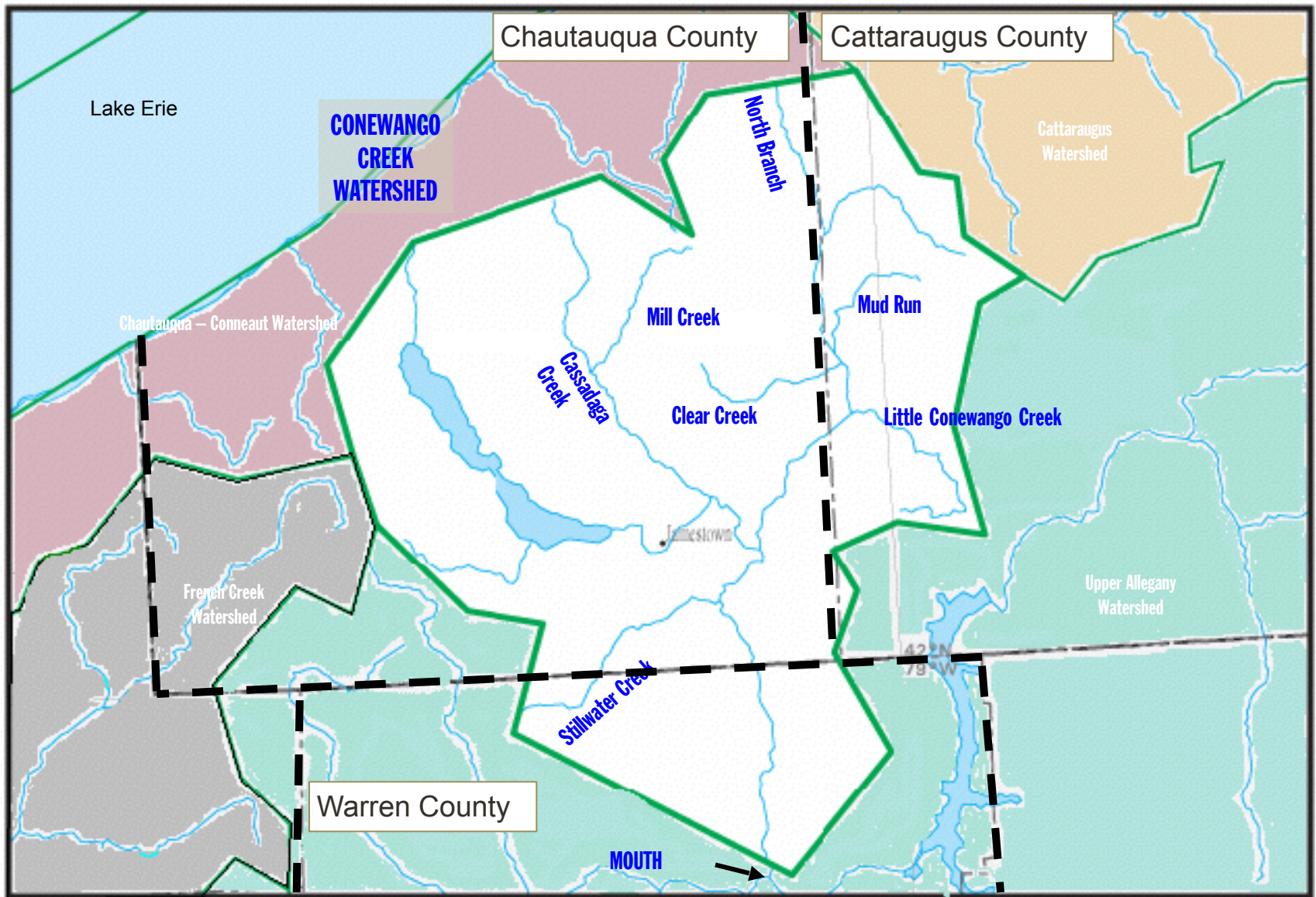


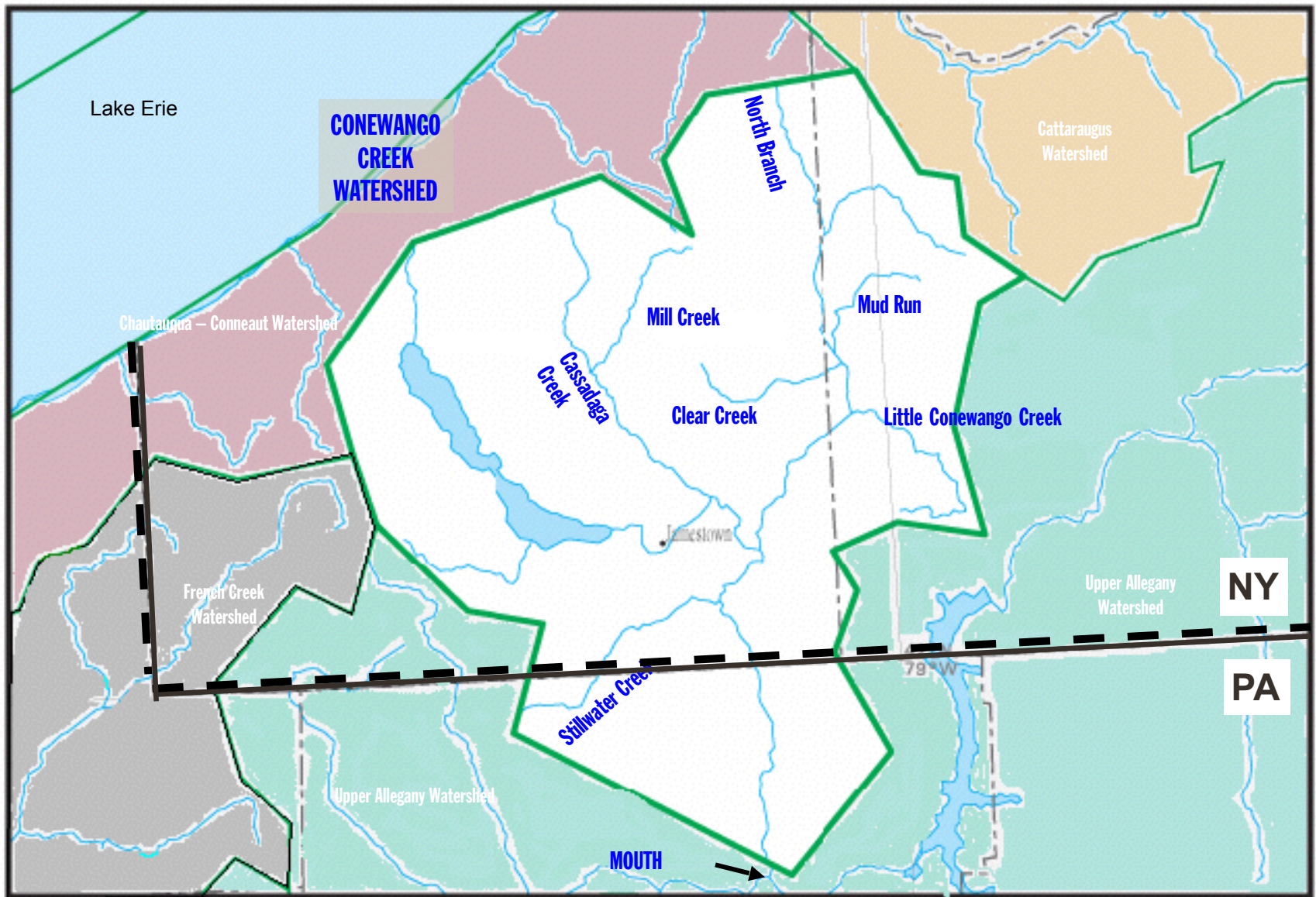
Photo: Rick Constantino



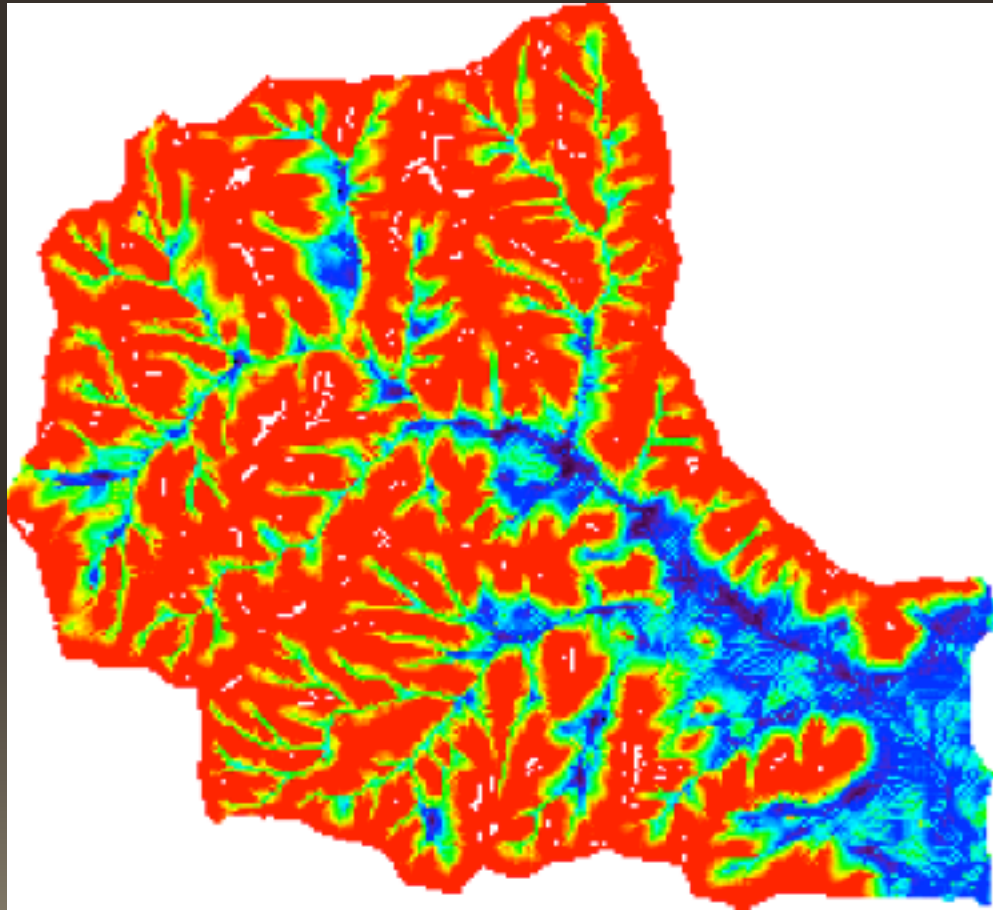








# Hypothetical Watershed Stream Network



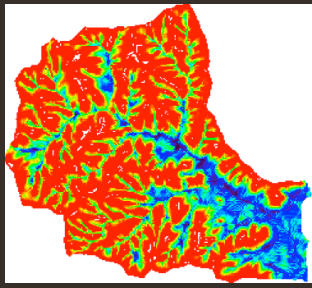


# Factors Influencing Stream Runoff (Water Quantity & Quality)

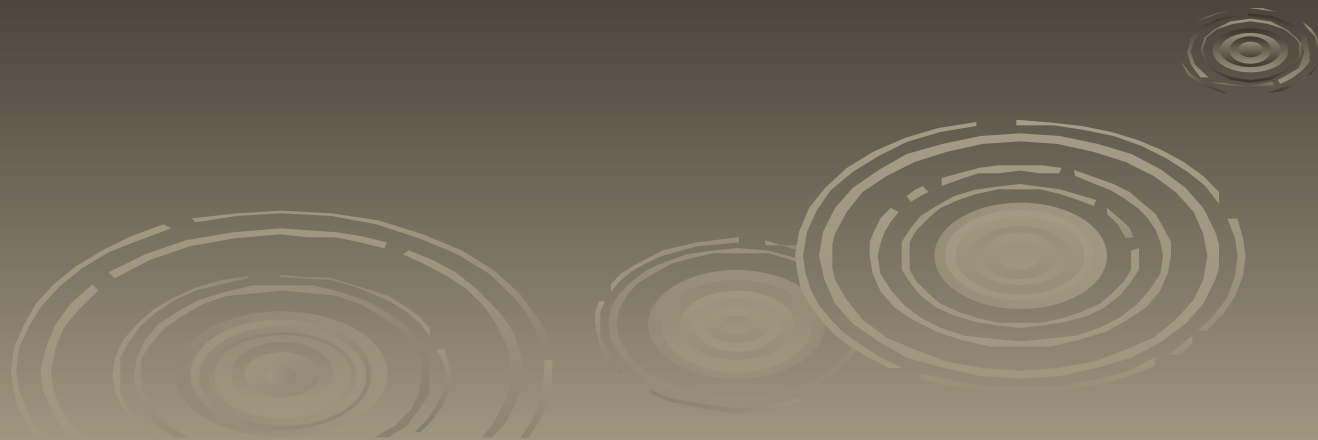
## ➤ Upland Watershed Factors

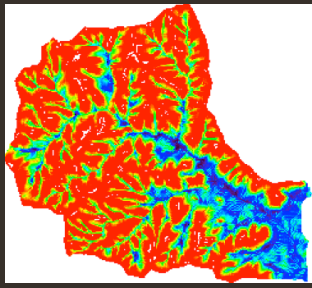
- watershed size and shape
- precipitation
- geology & soils
- vegetation
- land use
- impervious cover
- groundwater storage





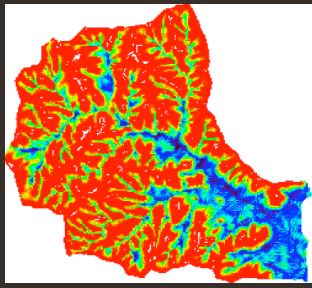
# Soils, Vegetation & Land Use





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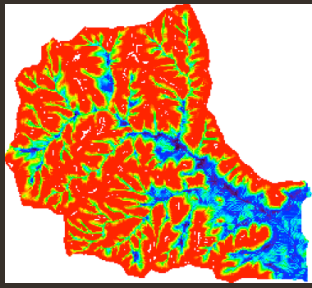




# Soils, Vegetation & Land Use



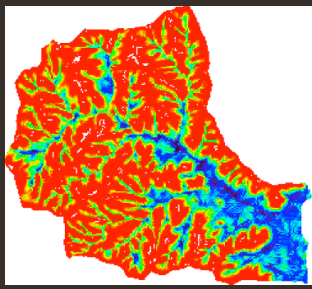




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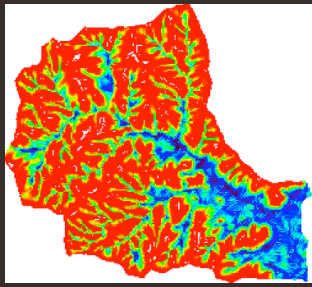






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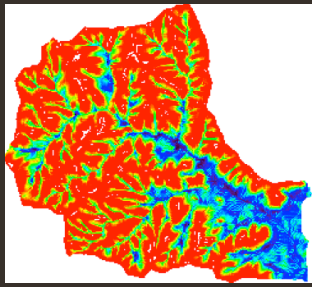




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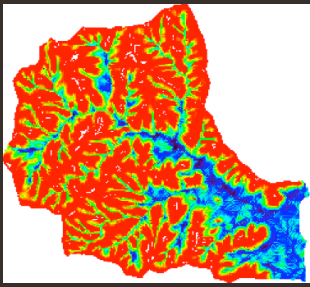




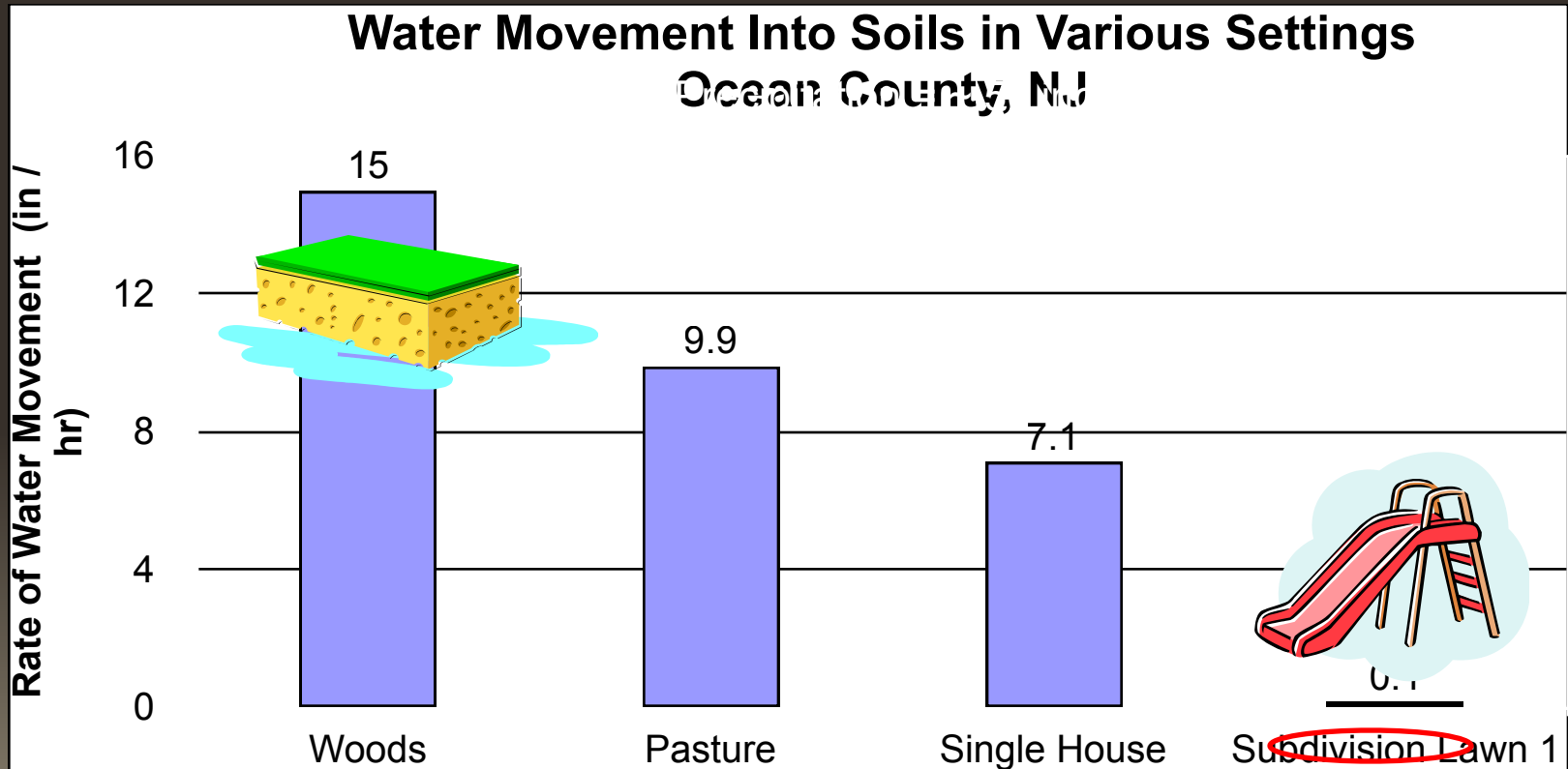


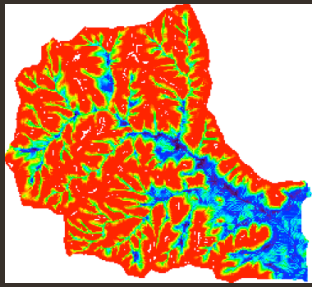
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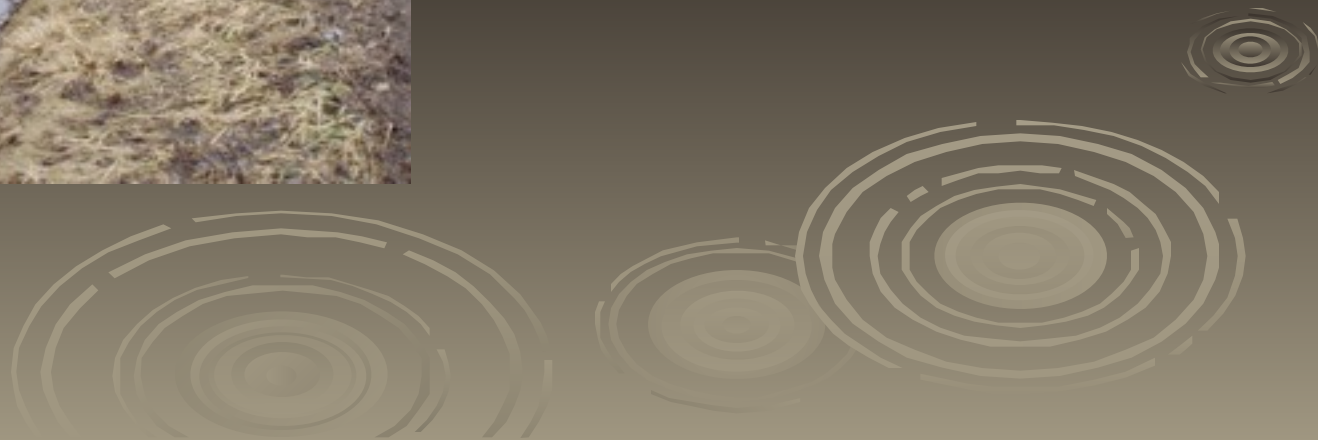


# Compaction Effects

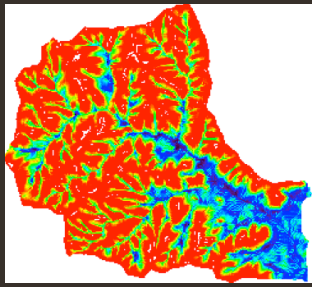




# Impervious Cover

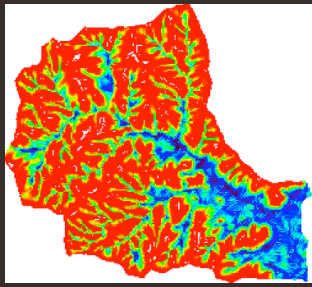






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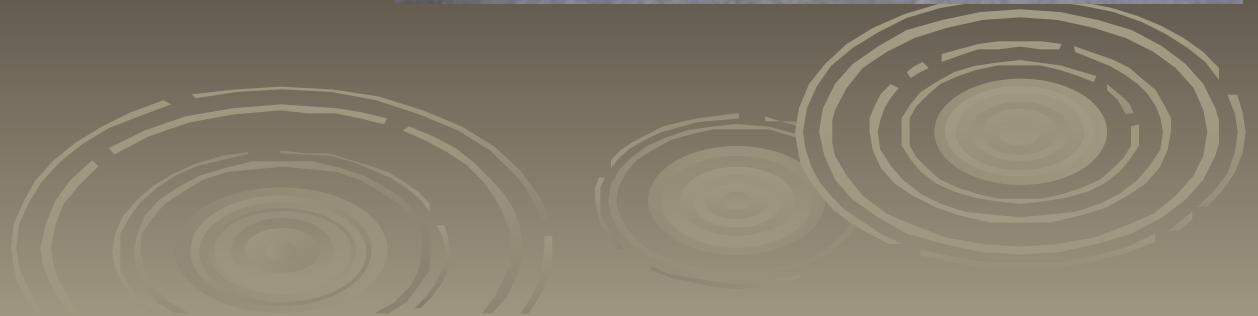


# Groundwater

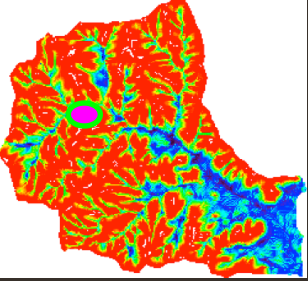
Storage



Loss



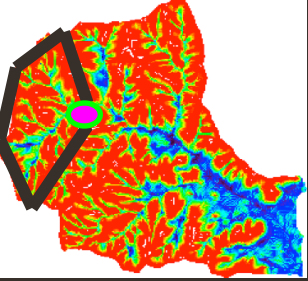




# Municipal Costs







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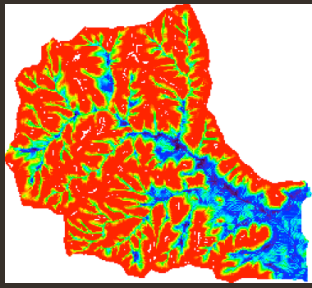
# Factors Influencing Stream Runoff (Water Quantity & Quality)

## ➤ Stream, Time and Space Factors

- channel characteristics
- riparian function
- floodplain function
- watershed “plumbing”
- time & space

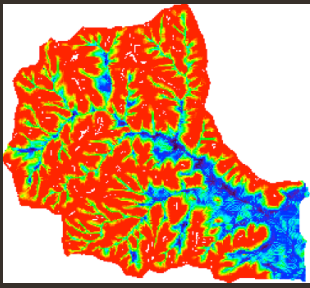






# Channel Characteristics





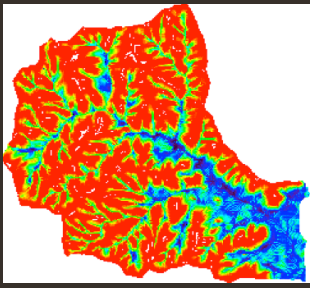
# Channel Characteristics

## Headwater streams:

- ~ 80% of any watershed
- Small & steep → high energy
- Source of sediment & debris





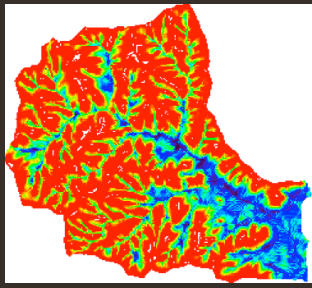


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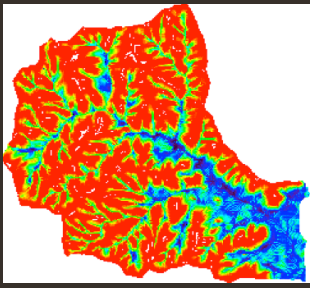




# Channel Characteristics



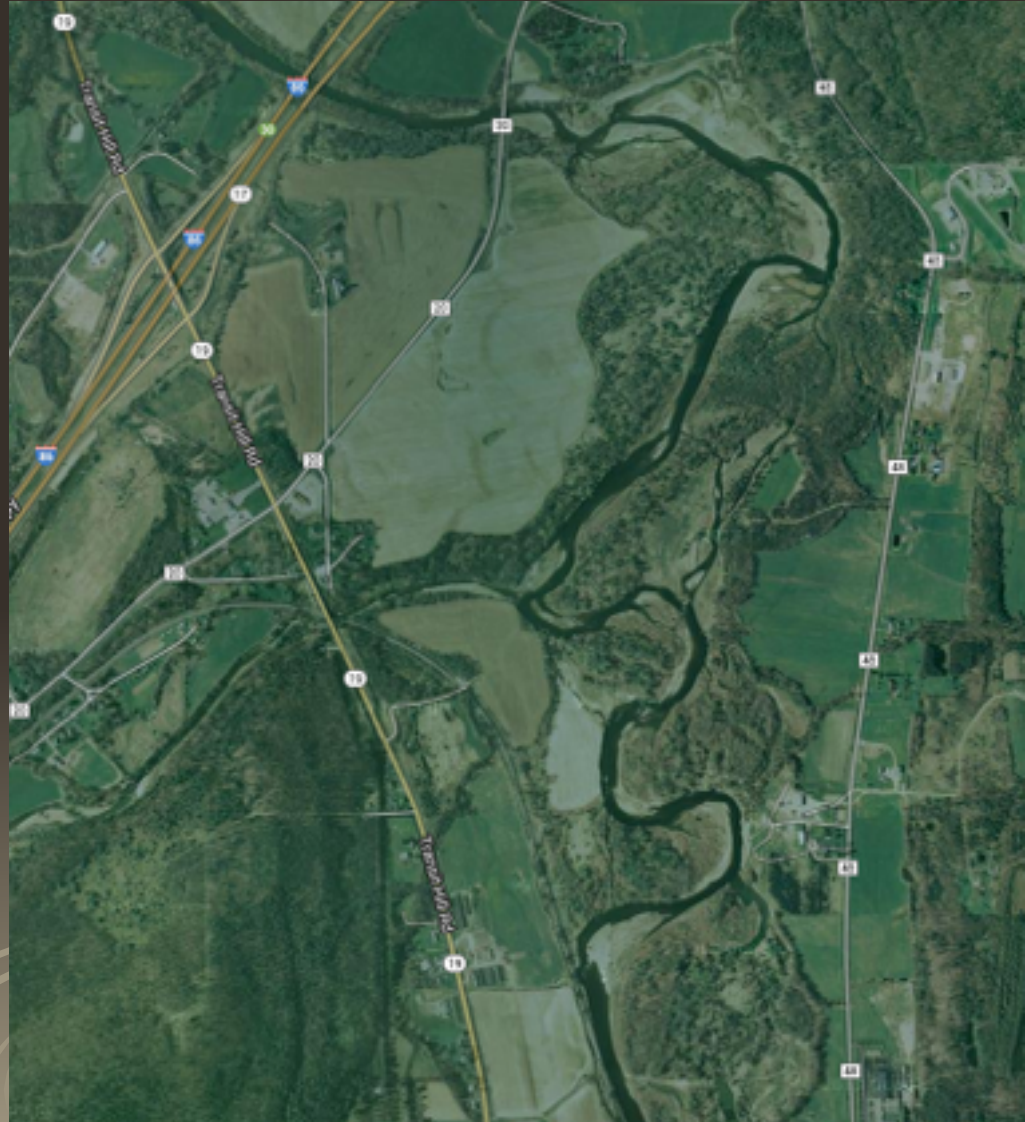


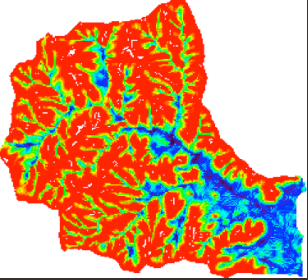


# Channel Characteristics

## Lowland Streams:

- Historically meandered
- Relatively large & flat
- Deposition areas – sediment & debris

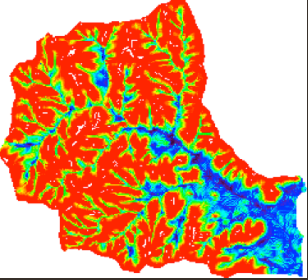




# Riparian Function







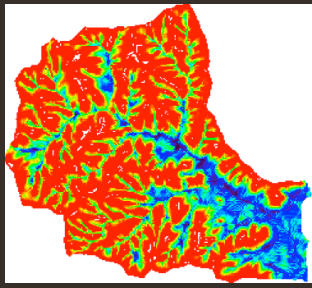
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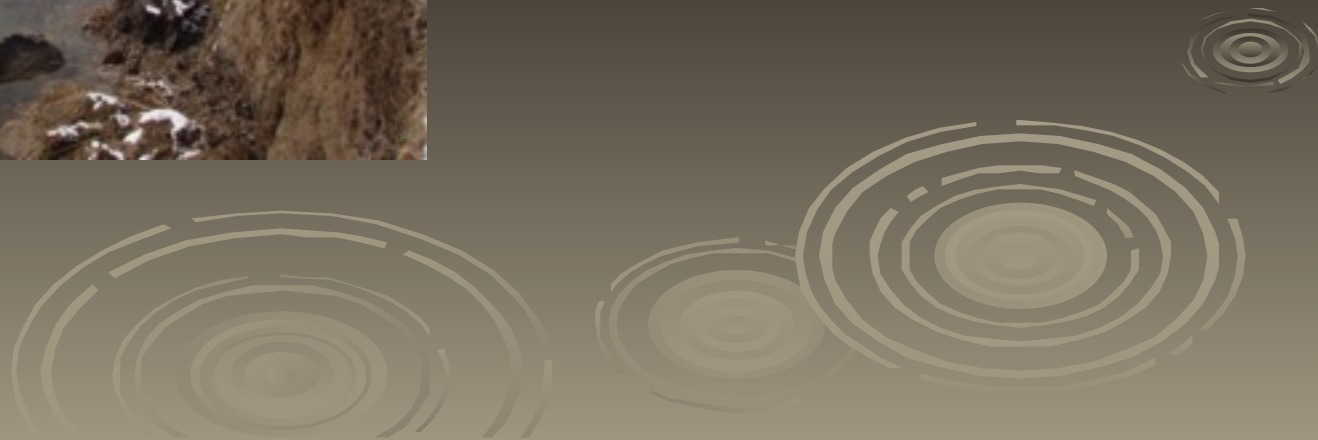
## Functional Riparian Zones:

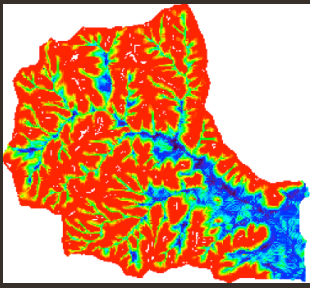
- Reduce Erosion
- Filter Pollutants
- Provide Fish & Wildlife Habitat





# Floodplain Function

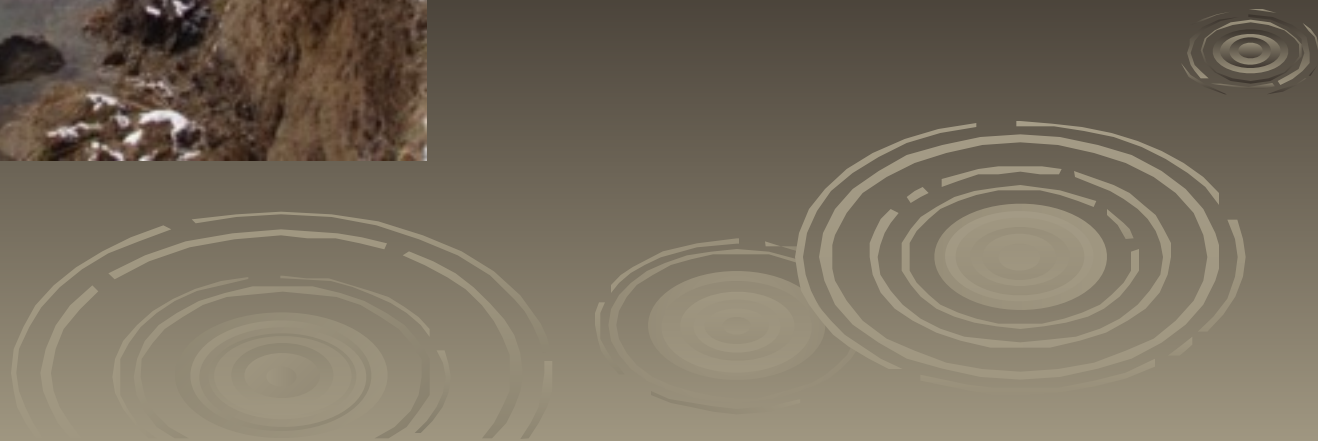




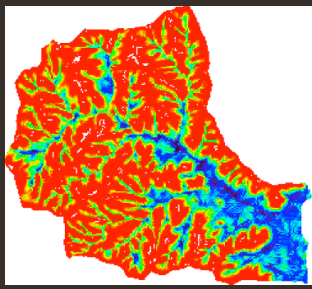
# Floodplain Function

Functional floodplains:

- Reduce stream energy & erosion
- Absorb excess water
- Slowly release water to the stream







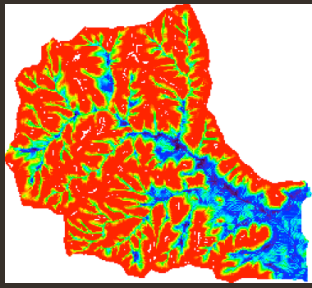
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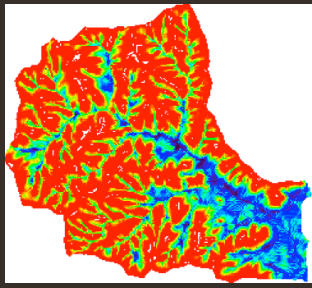






# Watershed Plumbing



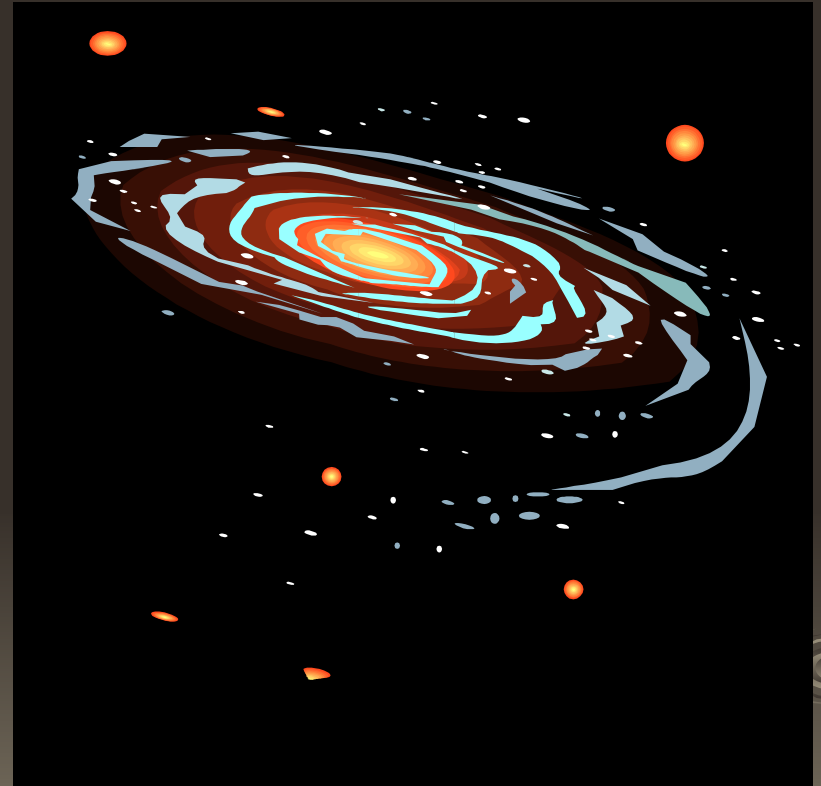


# Watershed Plumbing



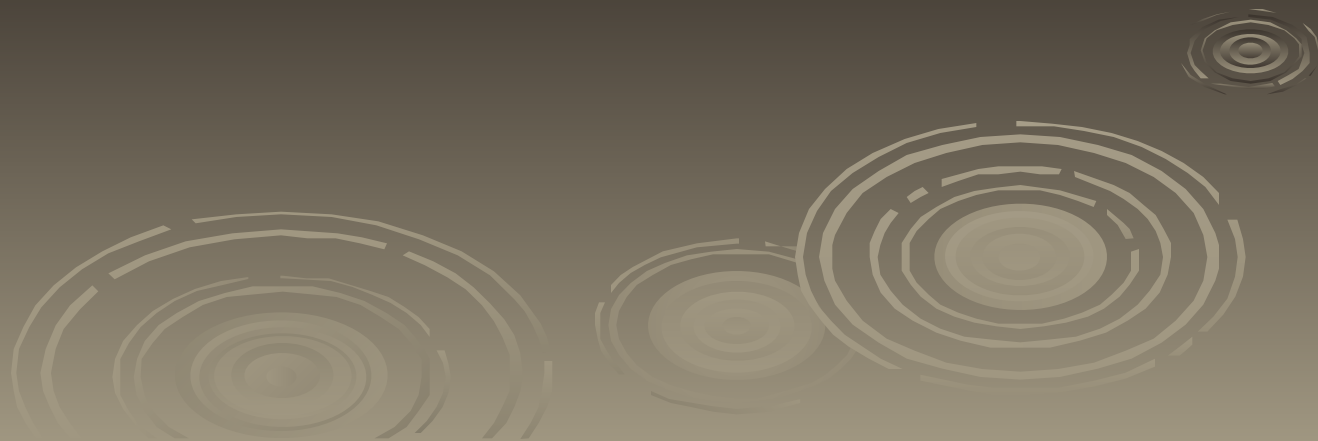


# Changes in Time & Space



**A local example...**

# Lakewood NY, 1938 & 2004





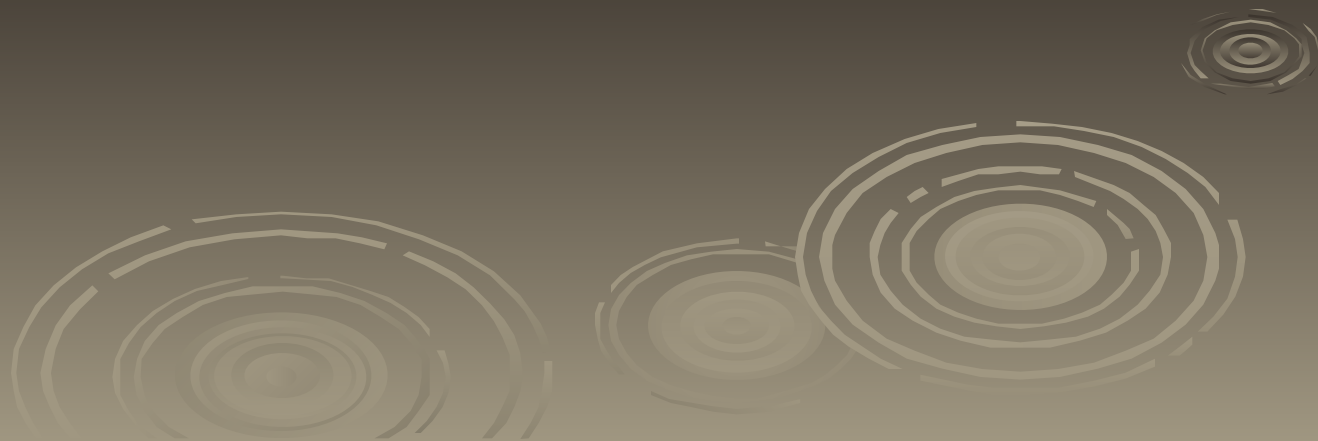
# Lakewood NY, 1938 & 2004



# Lakewood NY, 1938 & 2004



# Cumulative Effects





# Cumulative Effects

## SCENARIO A:

### Development Proposal:

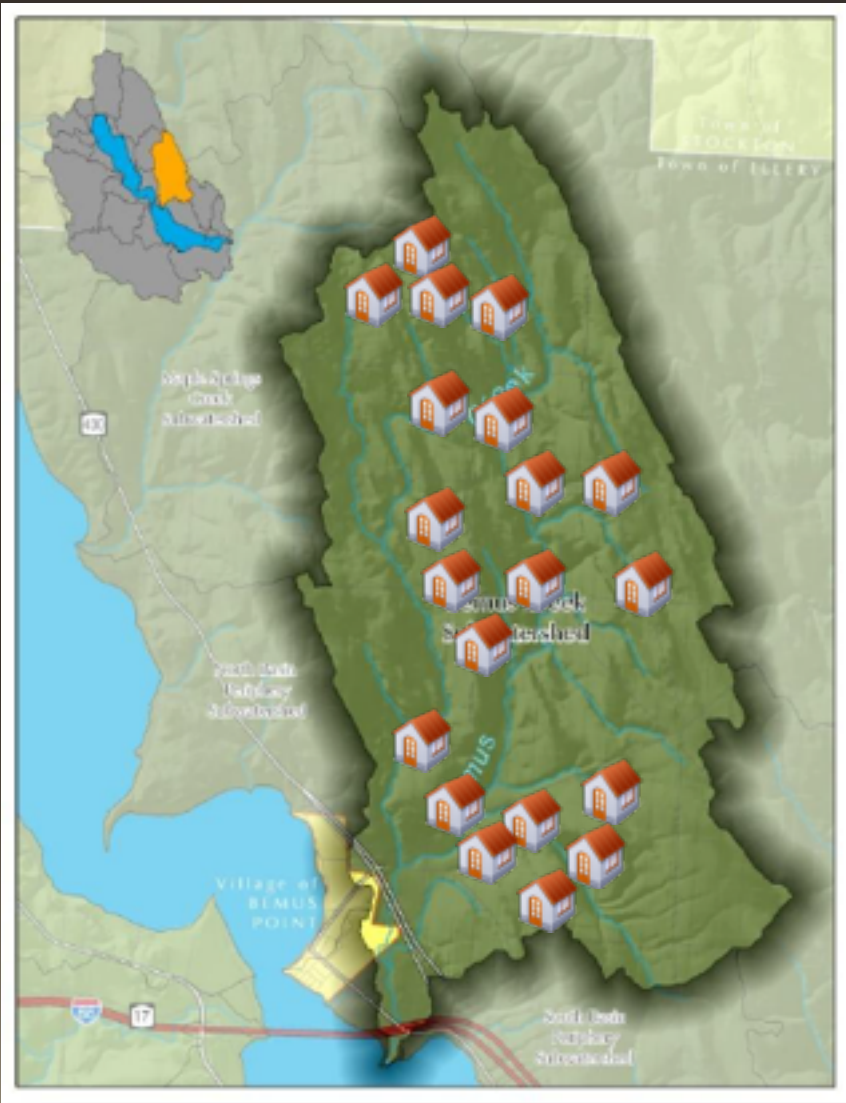
- 20 New Homes - 20 acres
- All within the same watershed
- Constructed in 2015

### Triggers:

- SEQR
- NYS DEC SWPPP

### Municipal Discussions?

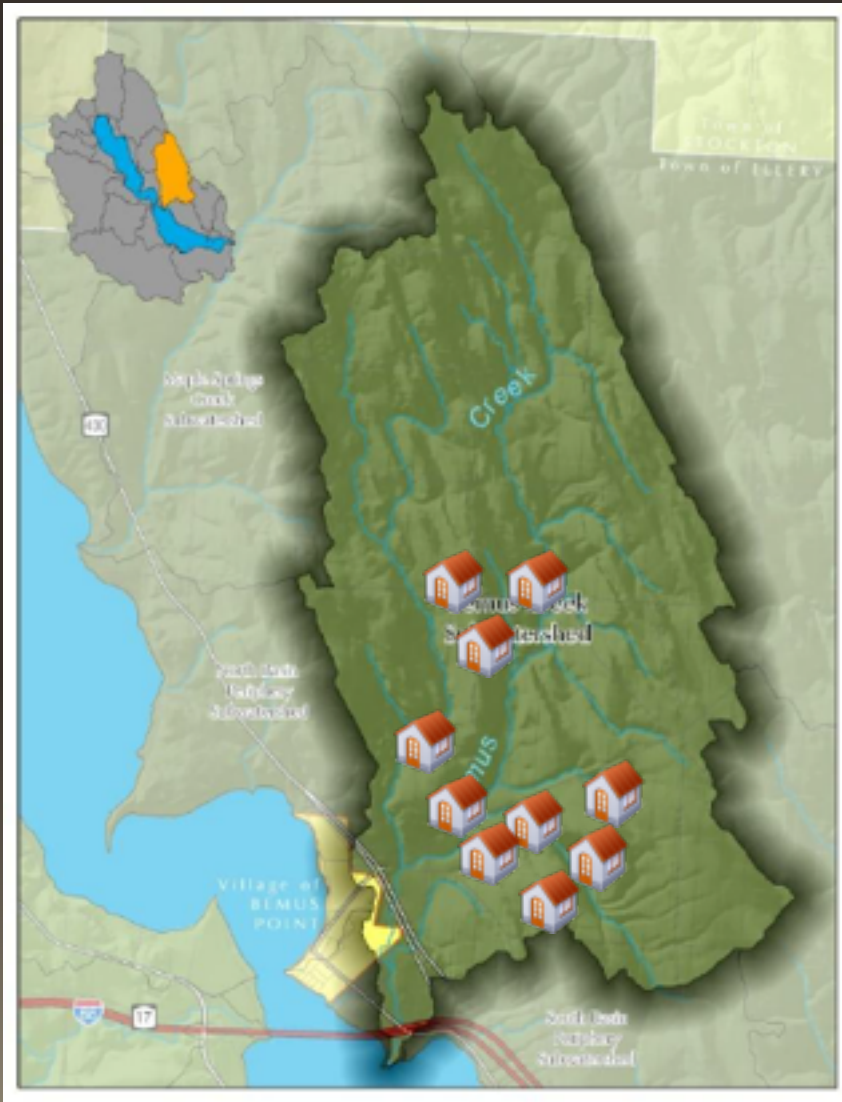
- Wastewater Management
- Emergency Services, etc.



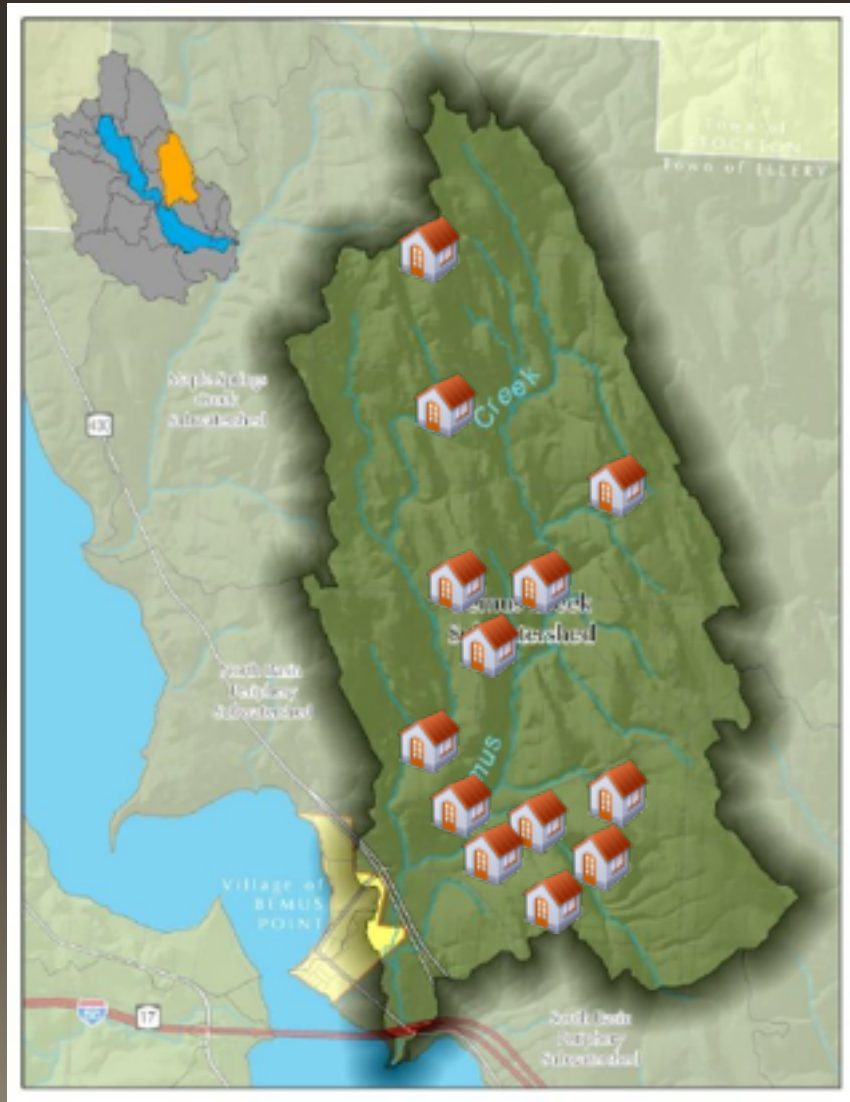
# Cumulative Effects

SCENARIO B-1 (2015):

- 10 Existing Homes – 10 acres



# Cumulative Effects



SCENARIO B-2 (2017):

- 10 Existing Homes – 10 acres

No Proposal:

- 3 Additional Homes - 3 acres
- All within the same watershed

Triggers:

Municipal Discussions?



# Cumulative Effects

SCENARIO B-3 (2020):

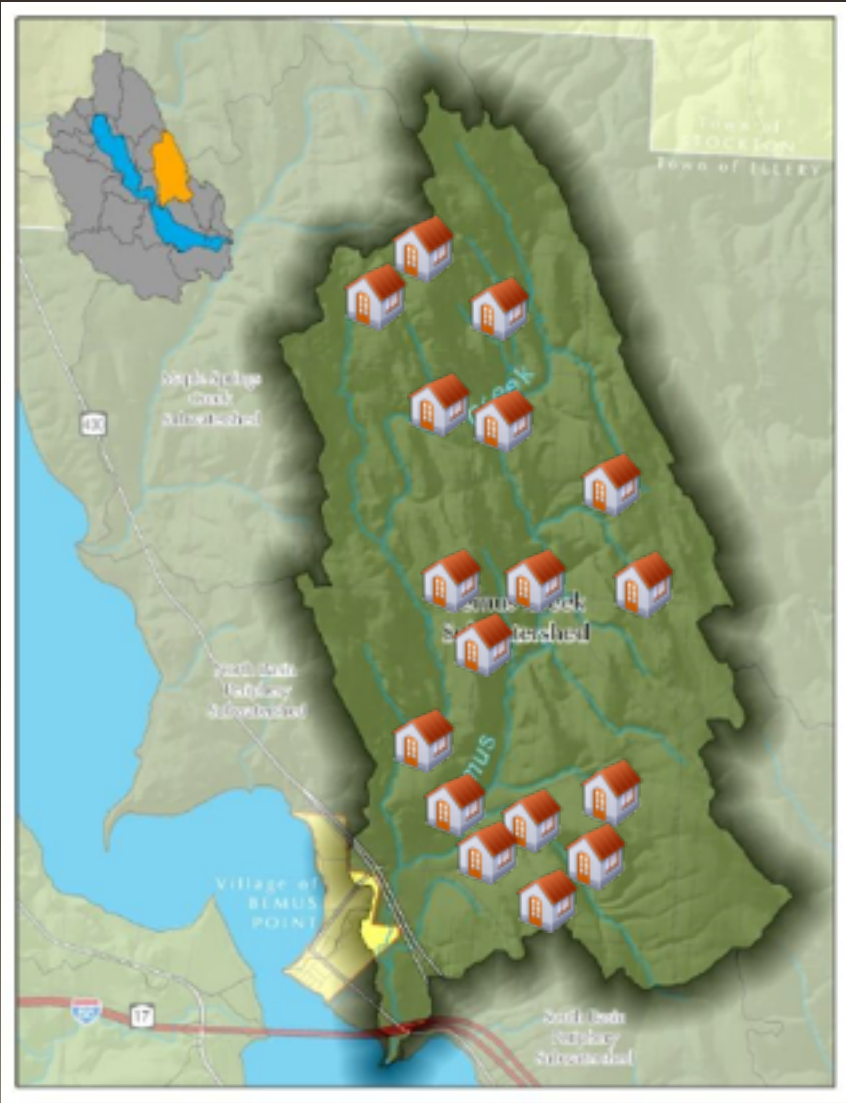
- 10 Existing Homes – 10 acres

No Proposal:

- 4 Additional Homes - 4 acres
- All within the same watershed

Triggers:

Municipal Discussions?



# Cumulative Effects

SCENARIO B-4 (2023):

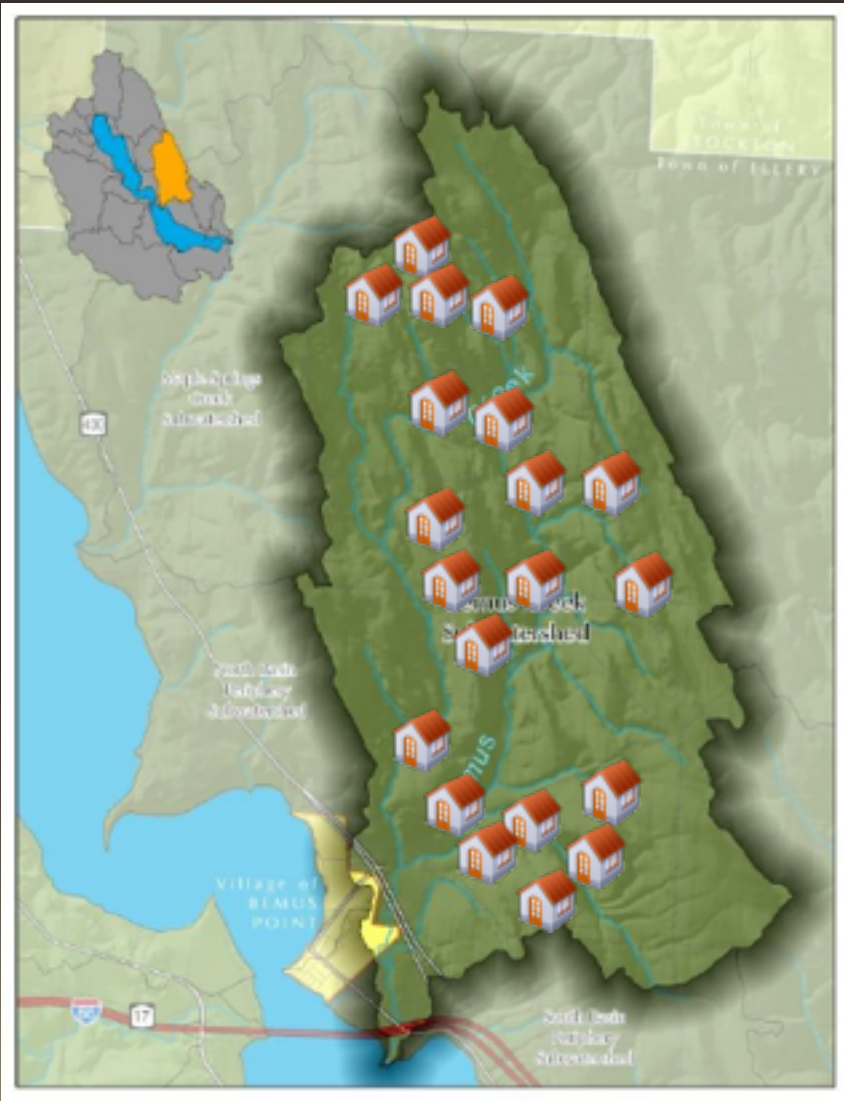
- 10 Existing Homes – 10 acres

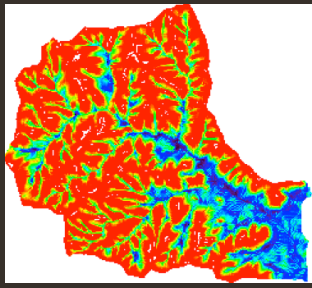
No Proposal:

- 3 Additional Homes - 3 acres
- All within the same watershed

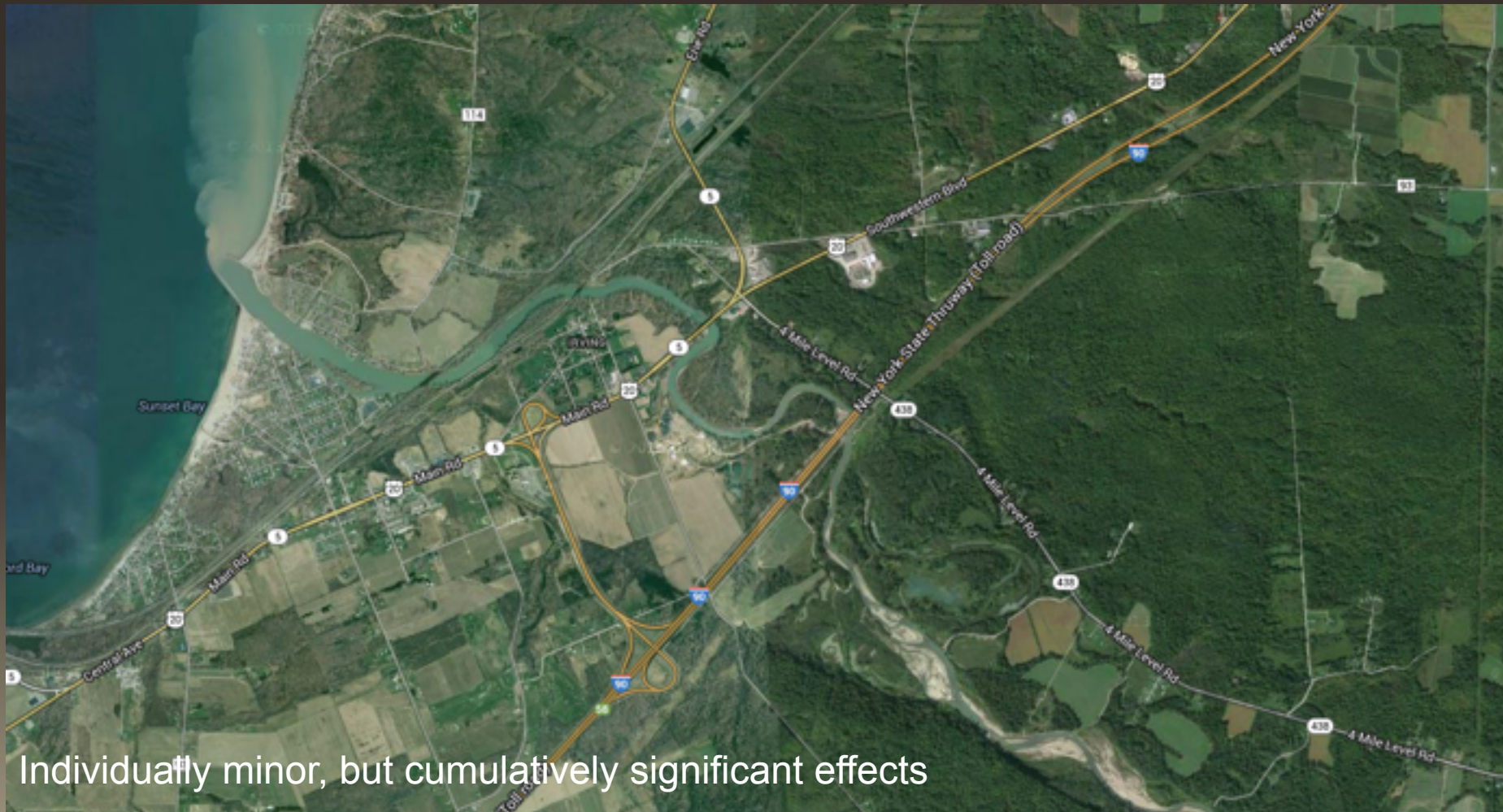
Triggers:

Municipal Discussions?





# Cumulative Effects



Individually minor, but cumulatively significant effects



# Factors Influencing Stream Runoff

## (Water Quantity & Quality)

➤ **Stream runoff** is influenced by inherent and changed upland and stream characteristics of the watershed:

- watershed size and shape
- precipitation
- geology & soils
- vegetation & land use
- impervious cover
- groundwater storage
- channel characteristics
- riparian function
- floodplain function
- watershed plumbing
- time & space



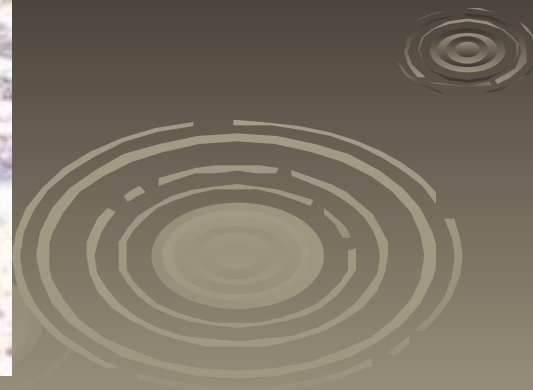
# Municipal Costs



Rebuilt 5 times  
In 3 years: \$15,000



Stabilized in 2005:  
\$3,500





# Municipal ~~Costs~~ Benefits



Rebuilt 5 times  
In 3 years: \$15,000



Stabilized in 2005:  
\$3,500

Until 2009:  
\$0



# The Eight Tools of Watershed “Investment”



8. Watershed Stewardship



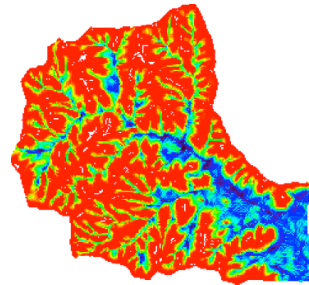
1. Watershed Planning



2. Land Conservation



7. Non-Stormwater Discharges



3. Aquatic Buffers



6. Stormwater Management



5. Erosion & Sediment Control



4. Better Site Design

# Who's 'in-charge' -- of watershed management?

- Mayors / Supervisors
- Business Owners
- Conservation Groups
- Planning / Zoning
- Highway Departments
- NYS DEC
- Private Landowners
- All Of The Above



Photo: Rick Constantino



# A Lesson Learned... the Hard Way



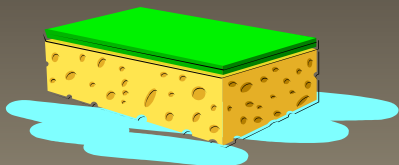


# Thanks for your time!

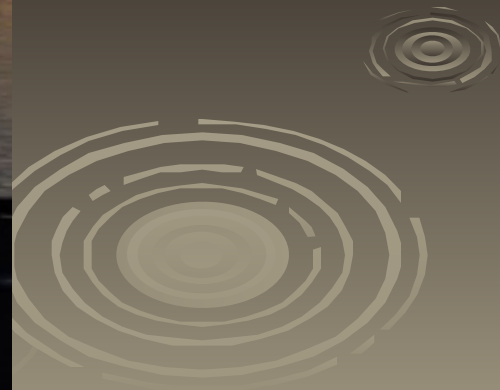
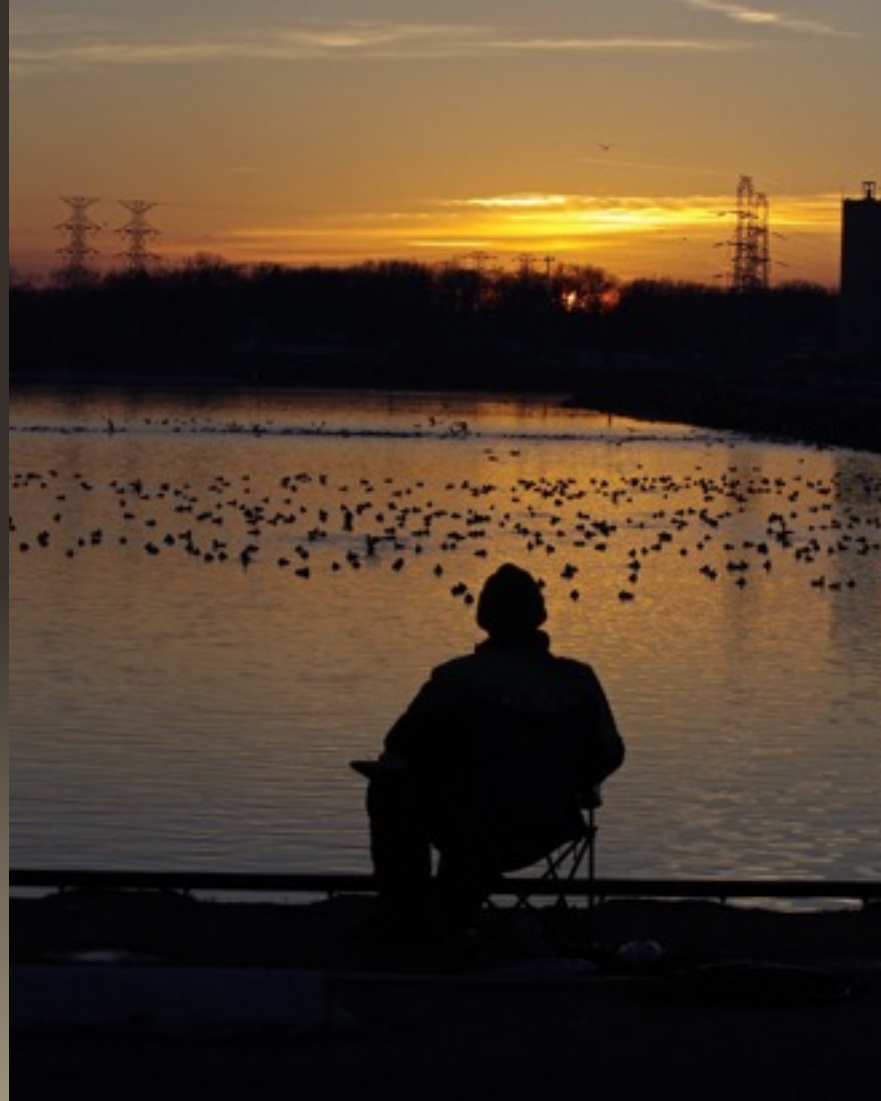




Comments  
or  
Questions?



# Thank You...





# Roundtable Discussions

- Group Discussion (10 minutes)
  - Introductions, flooding stories, lessons learned
- Group Homework (20 minutes)
  - Choose 1 (or more) from handout; discuss
- Report Back (2 minutes / group)
  - Choose a Discussion or Homework topic; report your group's issue / concern