Rye
Community Reconstruction Plan
Planning Committee Meeting #5

September 2, 2014 - 6:00 PM

Rye City Hall

1051 Boston Post Road, Rye, New York

Welcome and Introductions

Committee and Team

- Rye Committee
  - Co-Chairs, Holly Kennedy and Bernie Althoff
  - Committee, 11 Community Members
- Governor's Office of Storm Recovery
  - Kate Dineen
  - Dan Berkovits
  - Alex Brenin
  - Westchester County Lead, Suzanne Barclay
  - Westchester County Community Planner, Ricardo Soto-Lopez
- Consultants (AKRF-Sasaki)
  - Program Lead, Nanette Bourne (AKRF)
  - Project Manager, Jason Hellendrung (Sasaki)
  - Assistant Project Manager, Julia Carlton (Sasaki)
  - Technical Advisor, Jim Nash (AKRF)
  - Natural Resources Expert, Shandor Szalay (AKRF)
  - Risk Assessment Expert, Margaret Hopkins (CDM Smith)

Meeting Overview

- Welcome and introductions
- Old Business – recap from 8/12
- New Business
  - Natural Resource Management with Shandor Szalay of AKRF
  - Risk Assessment with Margaret Hopkins of CDM Smith
- Looking Ahead
  - Public Engagement Event #2 on Sept. 9th

Old Business

8/12 Committee Meeting Recap

- Welcome and Introductions
- Refine and Finalize Asset Inventory
- Review Needs and Opportunities
- Discuss Strategies
- Prepare for Public Engagement Meeting #2
- Looking Ahead

New Business

Principles, Strategies, and Options for Effective Flood Mitigation Planning

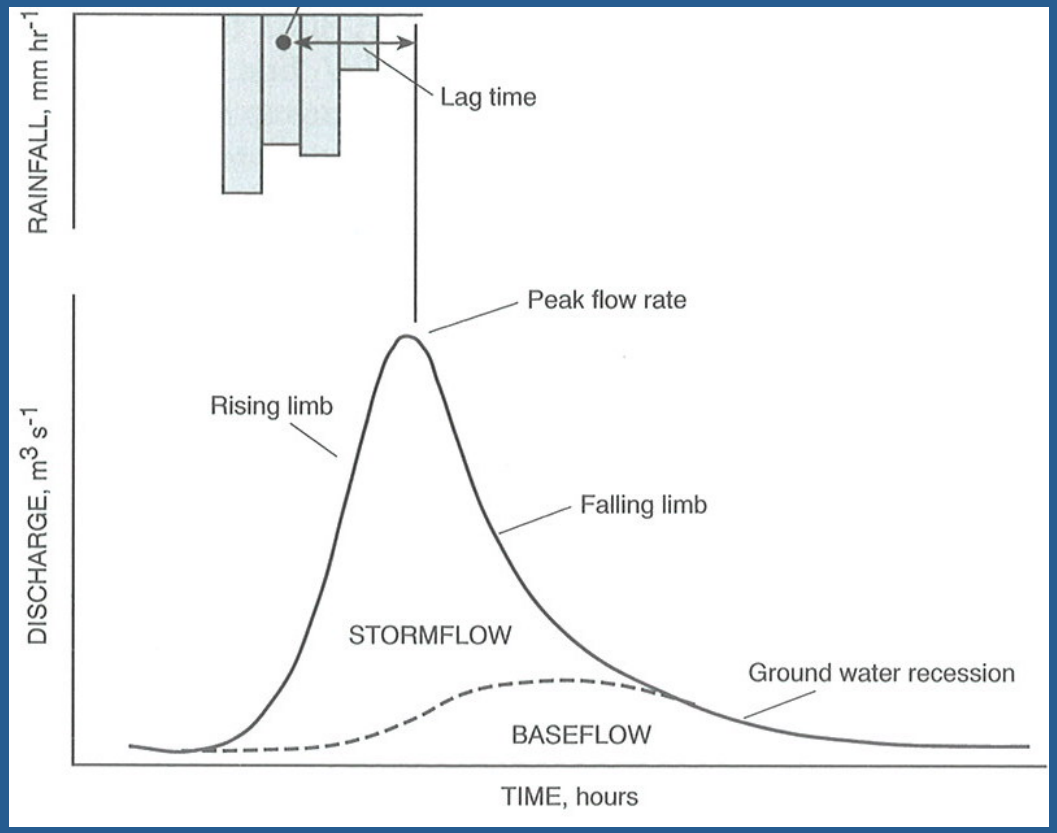
Shandor Szalay, Vice President

AKRF

Starting Principles and Core Concepts

All rivers flood.

Flooding is a natural process that is both beneficial for river ecosystems and potentially destructive for societies – *we need to balance the two.*



Starting Principles and Core Concepts

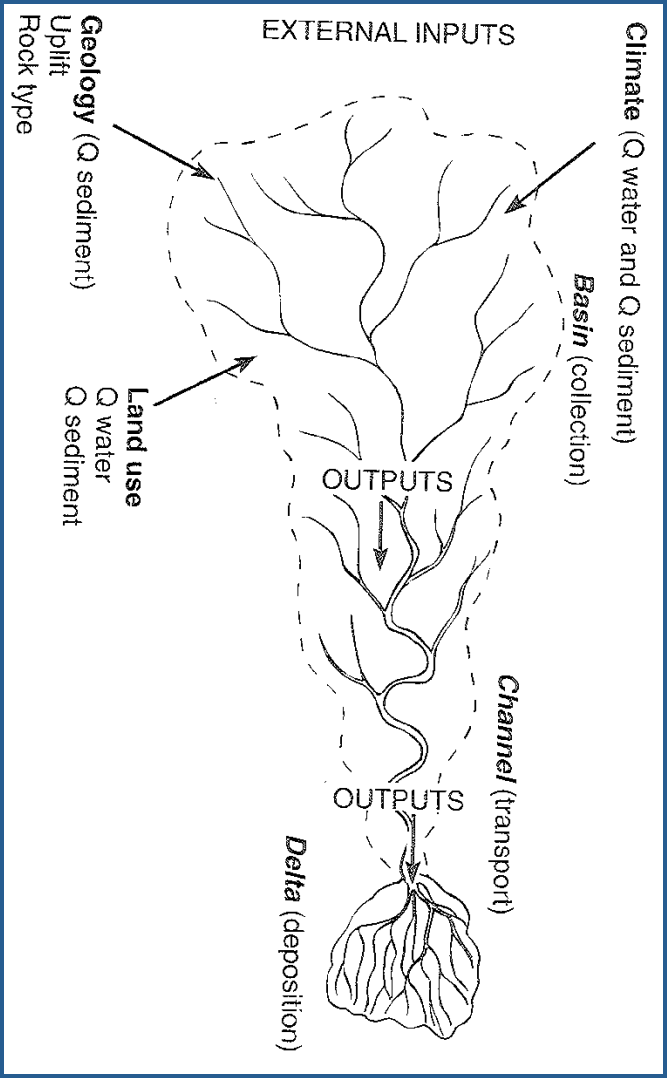
Some rivers flood more than others.

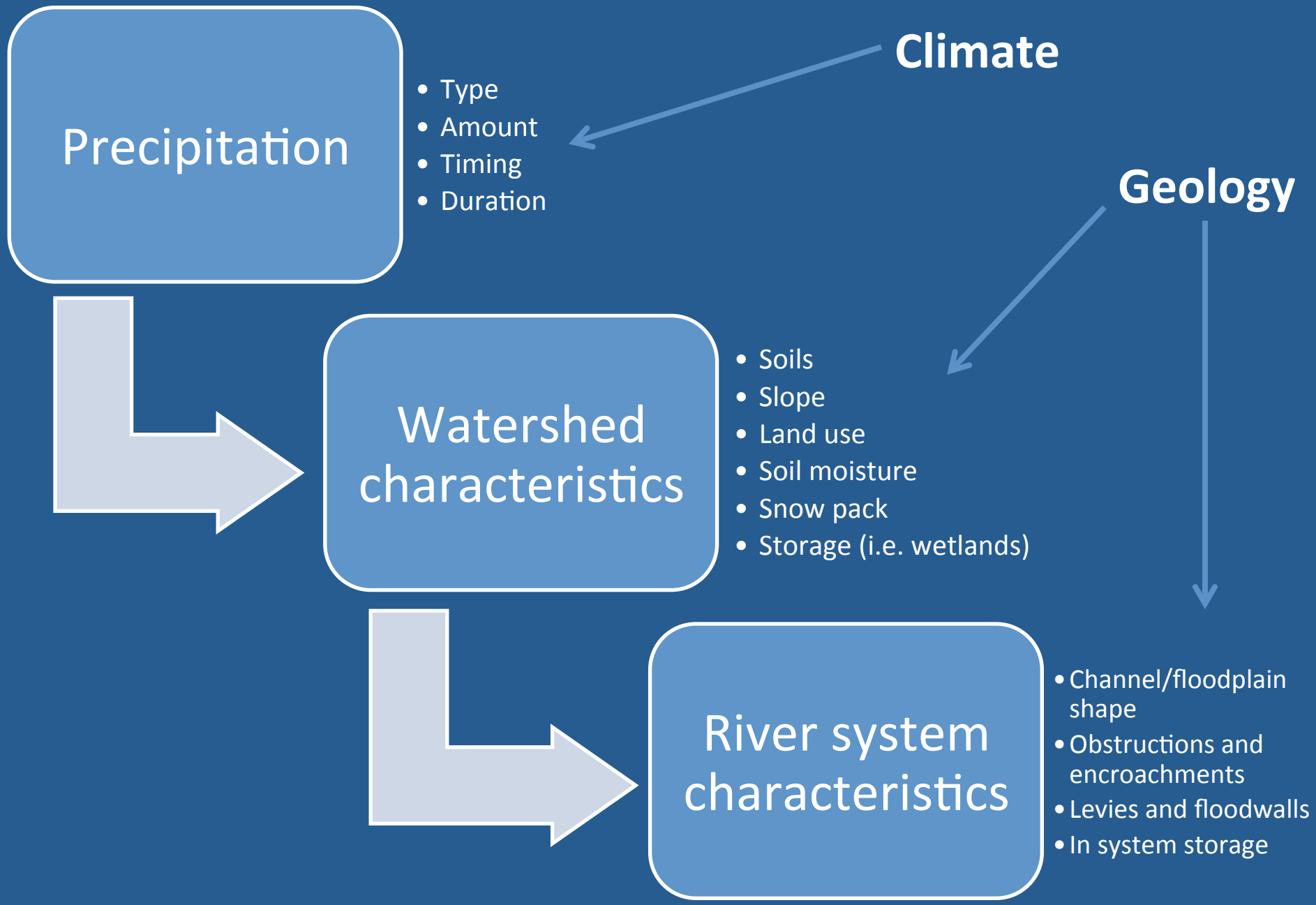
A range of human and natural factors determine how much and how often a river floods.

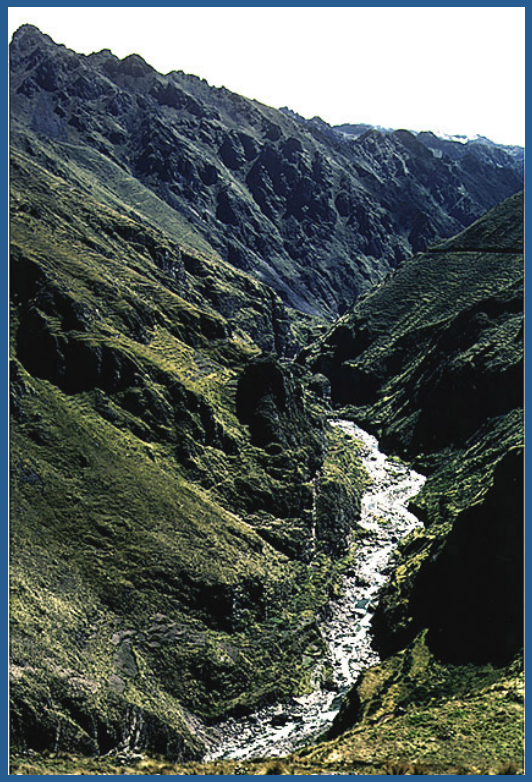
These factors are highly interconnected and interdependent (everything affects everything else!) i.e. river systems are highly dynamic!

So…local flooding is often (always) impacted by upstream/regional factors

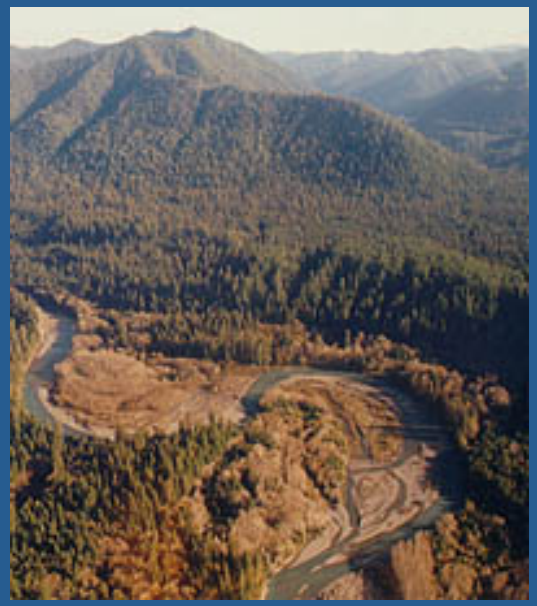
And (beware) local flooding solutions can increase flooding elsewhere!




Climate
Precipitation
• Type
• Amount
• Timing
• Duration
Geology
Watershed characteristics
• Soils
• Slope
• Land use
• Soil moisture
• Snow pack
• Storage (i.e. wetlands)
River system characteristics
• Channel/floodplain shape
• Obstructions and encroachments
• Levies and floodwalls
• In system storage



Confined



Partially Confined

Unconfined

Starting Principles and Core Concepts

Human activity/development impacts flooding in several important ways

Vegetation removal reduces evapotranspiration and increases runoff

Impervious and compacted surfaces reduce infiltration and increase runoff

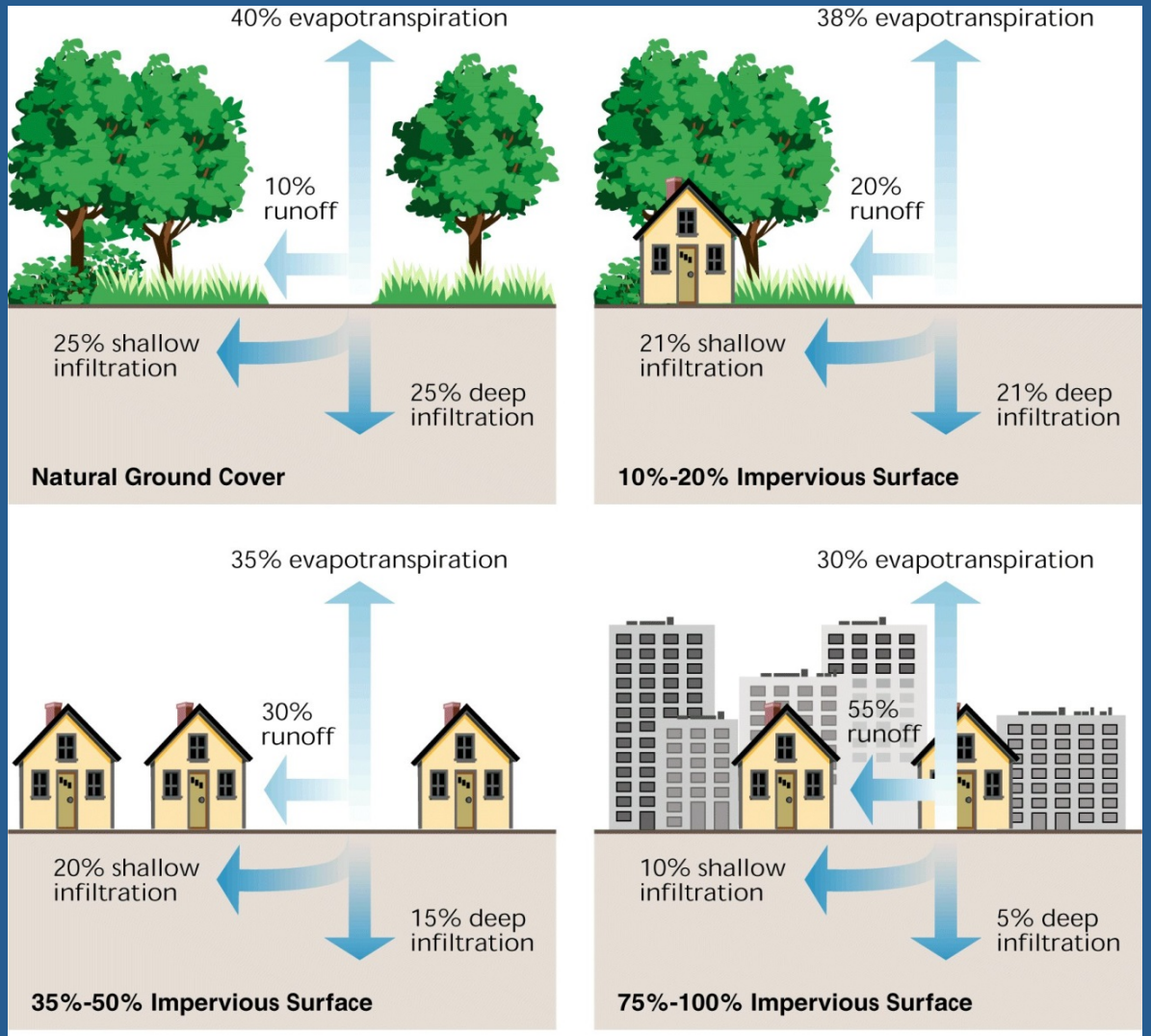
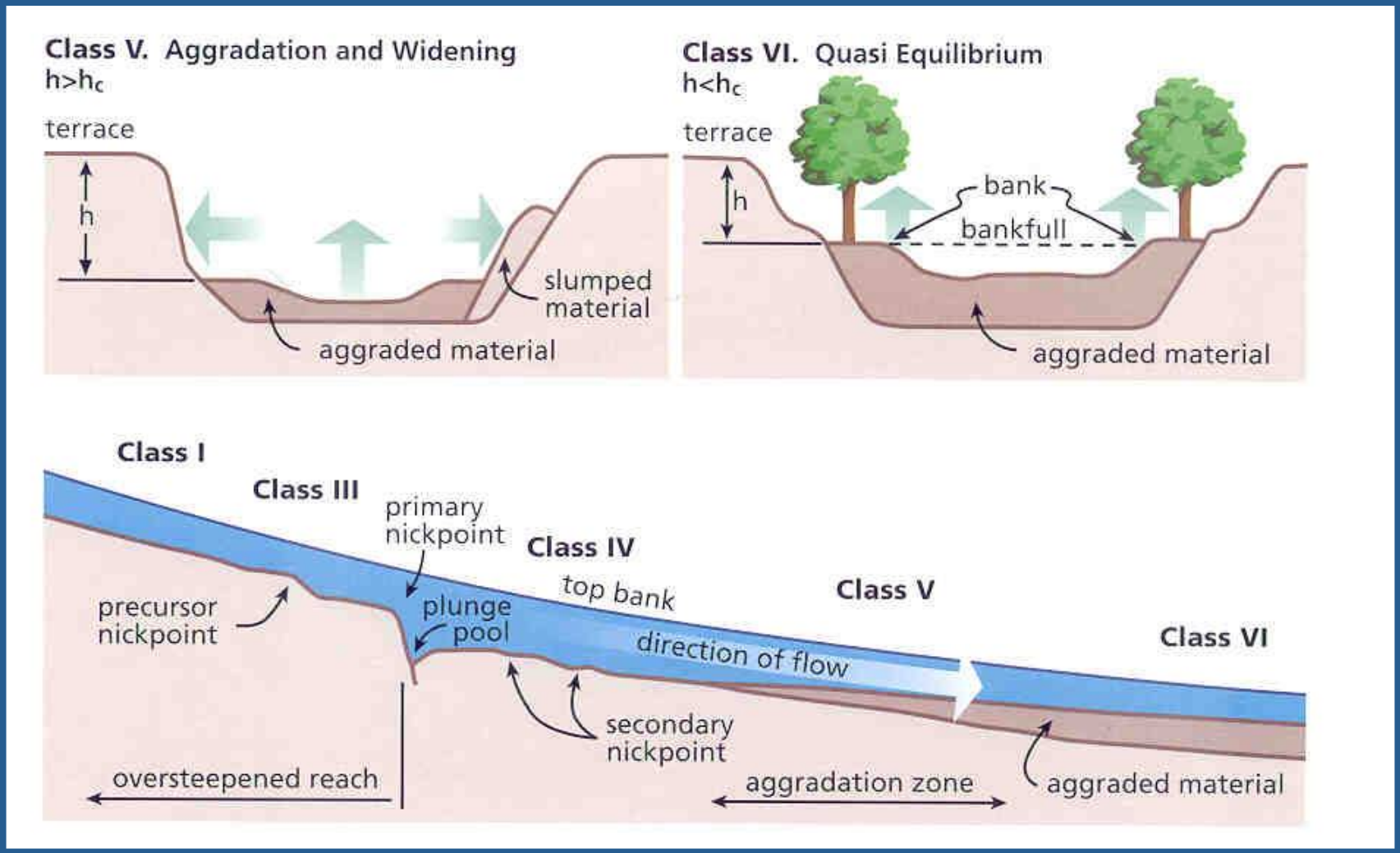
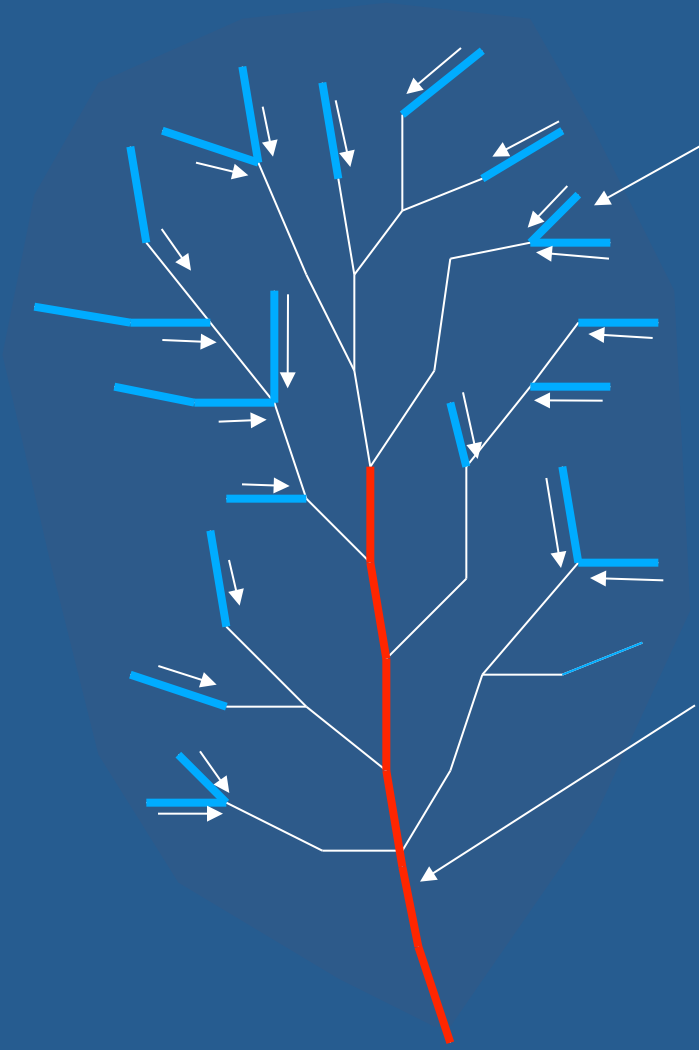


Fig. 3.21 -- Relationship between impervious cover and surface runoff. Impervious cover in a watershed results in increased surface runoff. As little as 10 percent impervious cover in a watershed can result in stream degradation.
In Stream Corridor Restoration: Principles, Processes, and Practices (10/98).
By the Federal Interagency Stream Restoration Working Group (FISRWG) (15 Federal agencies of the U.S.)

Increases in runoff can lead to channel erosion in headwater streams, which in turn can lead to channel filling in larger streams…

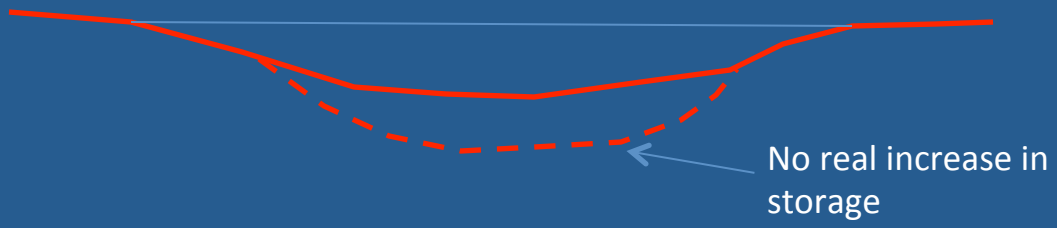


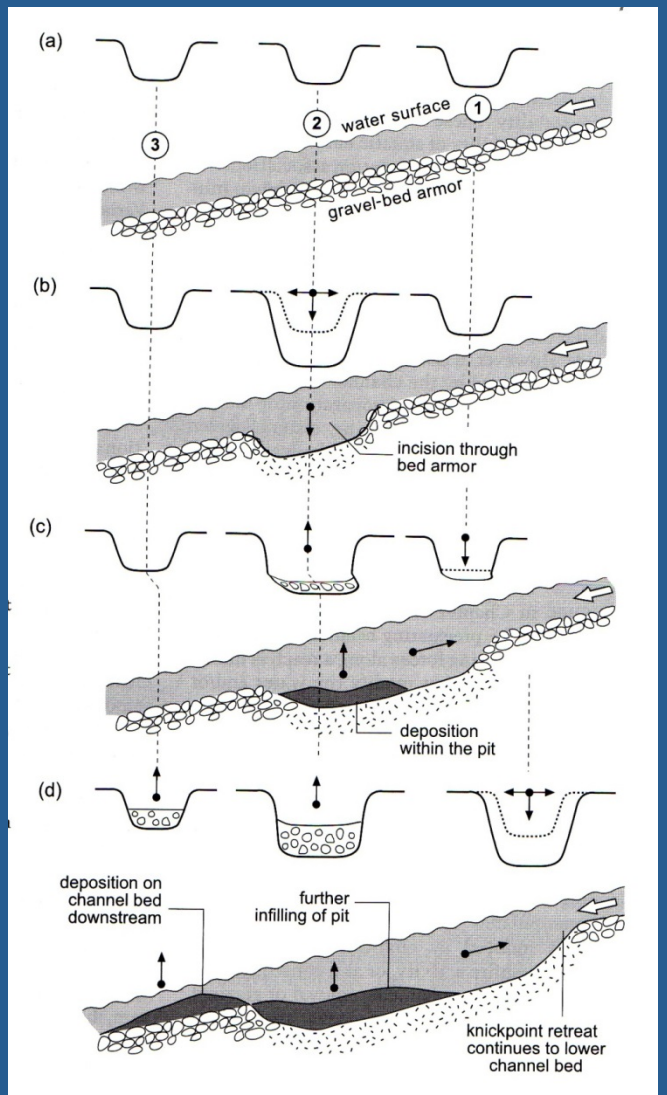


Headwater Stream Destabilization
Channel erosion
Sediment Production

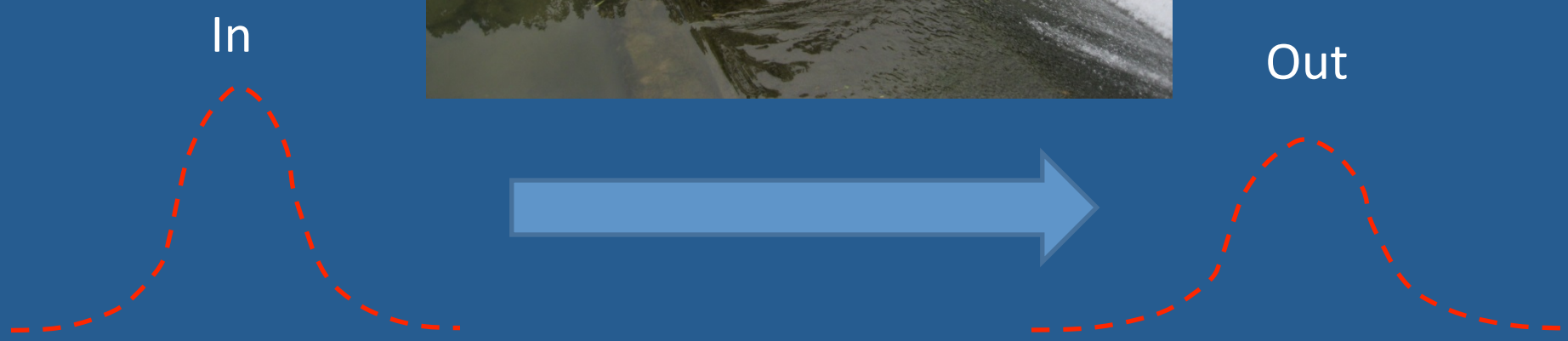
Downstream Response
Channel filling
Sedimentation
Loss of habitat
Erosion and widening
Flooding

Dredging and gravel mining can increase flood storage temporarily, but are often quickly undermined by incoming sediment and can have unintended consequences…

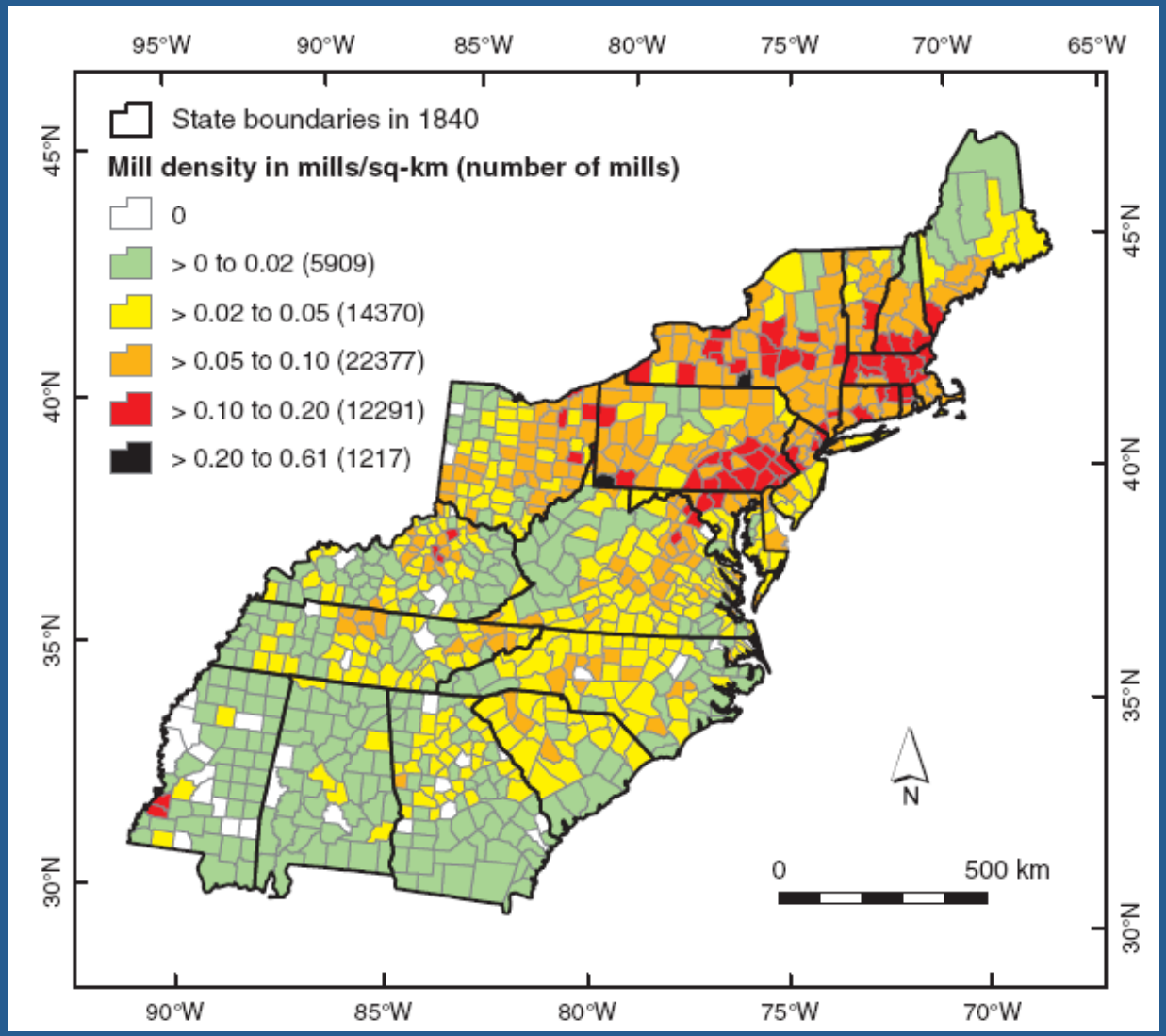


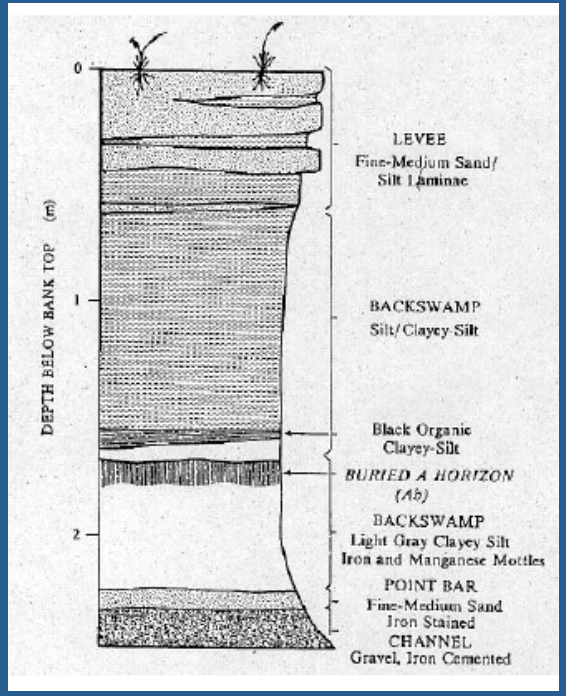


Dams and impoundments can attenuate flooding by increasing in-system storage…



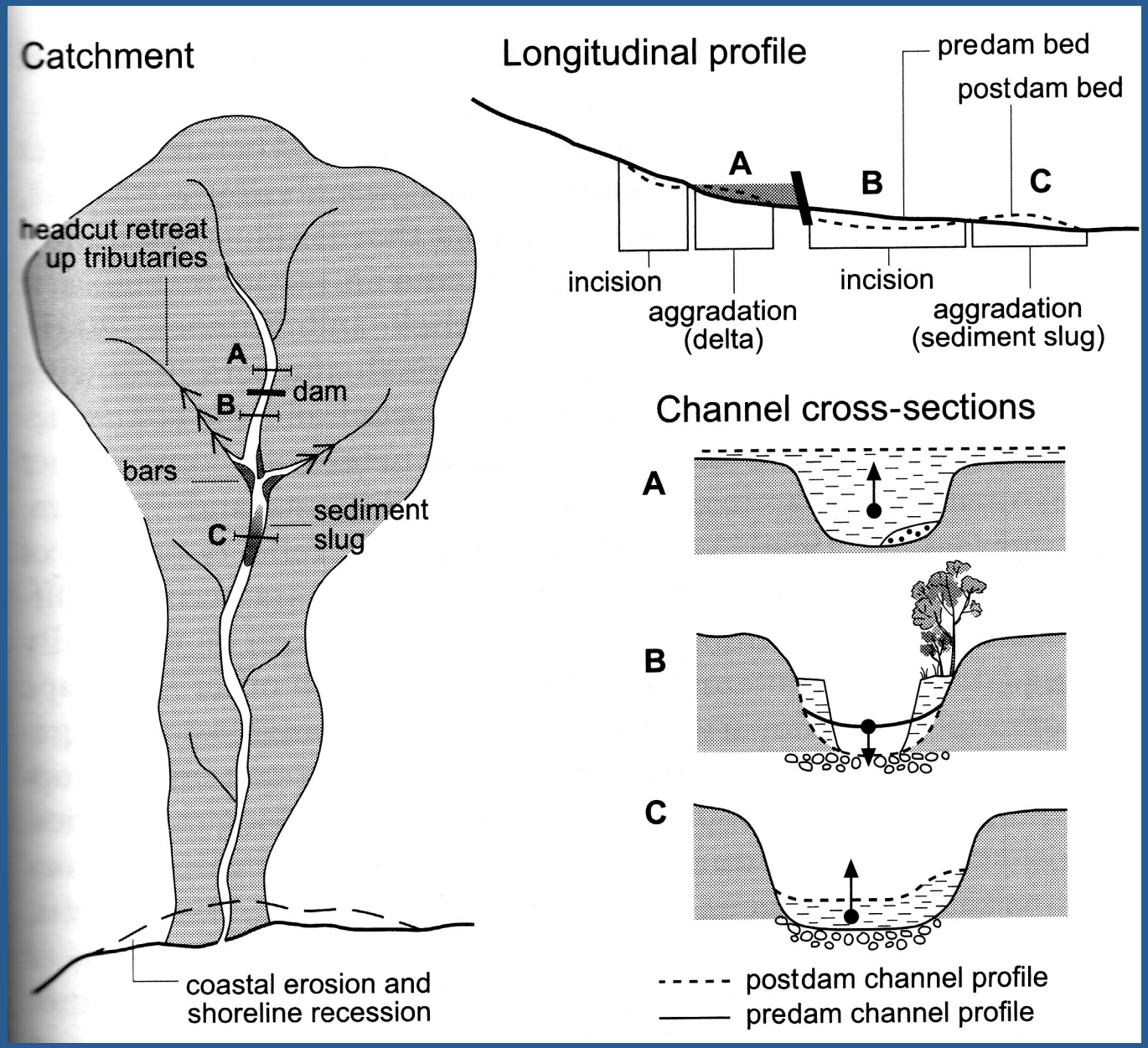
Dams and impoundments can induce sedimentation, leading to localized flooding





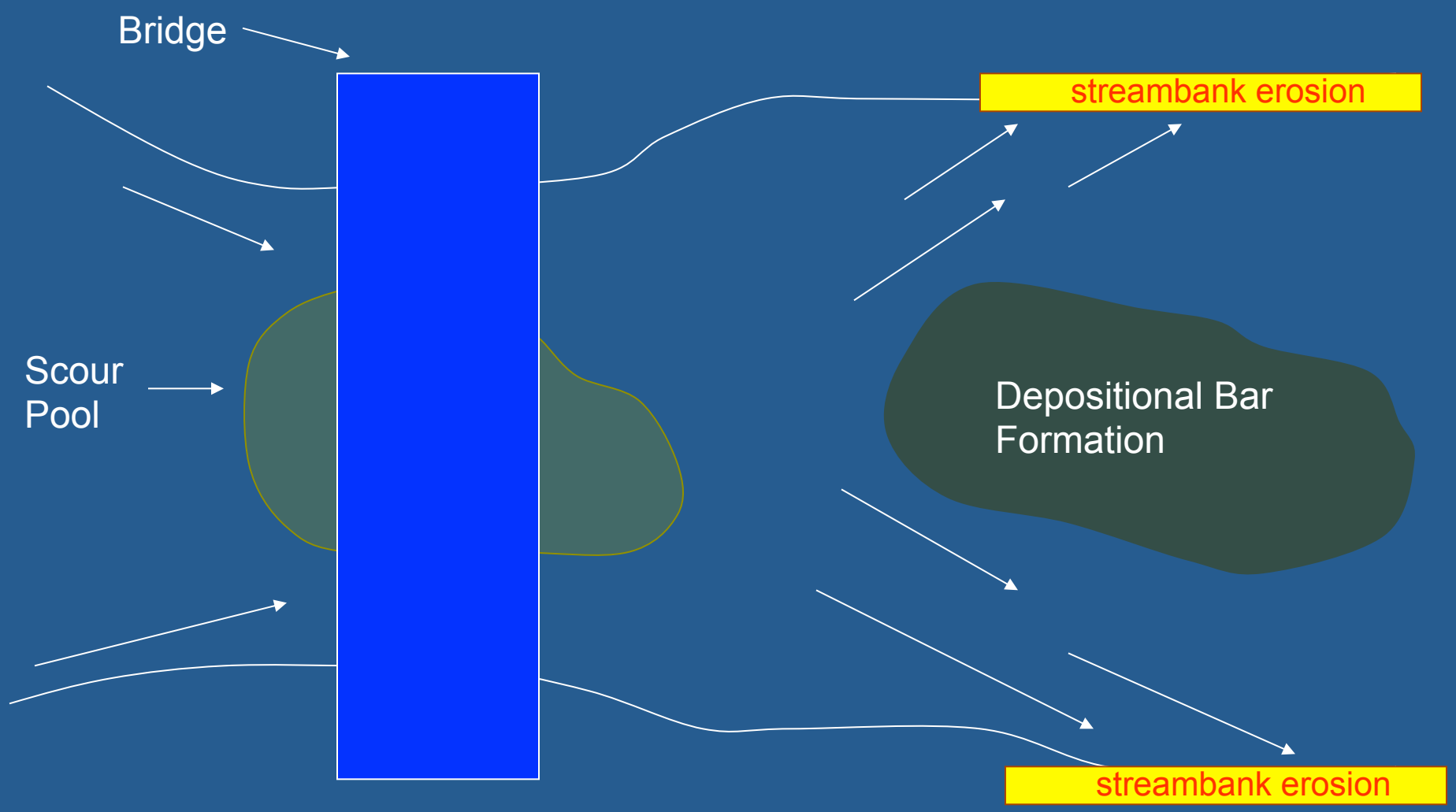
Post settlement floodplain deposition

Dams and impoundments can also cut off sediment supply to downstream channels, leading to changes in channel geometry that impact flooding…



Levees and floodwalls can reduce local flooding, but reduce in-system (floodplain) storage, which can increase downstream flooding…

Levees, bridges, and floodwalls can intensify flows within river channels, leading to scour and downstream deposition…



Principles of Sustainable Floodplain Management and Planning

- **Allow rivers to flood** – work toward uses that are compatible with flooding in floodplains
- **Seek non-structural solutions** – less costly over time, more community/environmental benefits
- **Work across political boundaries** in a watershed/regional context

(Some) Flood Mitigation Options

- Natural floodplain reclamation/ flood storage creation
- Redesign of bridges and obstructions
- Watershed/stormwater management
- Headwater channel/bank stabilization

Shorter term

Longer term

Natural Floodplain Reclamation/ Flood Storage Creation

- **How it works**
  - Building natural floodplains and wetlands creates "safe" places for floodwaters to go and dampens downstream flood pulses.
- **Pros**
  - Creates in-system storage and allows rivers to flood naturally
  - Removes development from flood zones
- **Cons**
  - Existing floodplain development can be difficult to reverse.
- **Strategies**
  - Look for opportunities to build storage on public lands;
  - Acquire properties over time via "managed retreat";
  - Combine with park/community planning to create new recreational amenities;
  - Combine with other environmental mitigation programs to leverage funding

Bridge/Culvert Redesign

- **How it works**
  - Increasing bridge capacity can reduce local flooding elevations and reduce sedimentation
- **Pros**
  - Can have immediate/short term results
- **Cons**
  - Can be costly
  - Potential for unintended downstream consequences
- **Strategies**
  - Use hydraulic and sediment transport models to understand dynamics
  - Focus on bridges in need of other structural upgrades

Watershed/Stormwater Management

- **How it works**
  - Infiltrating/detaining/evapotranspirating stormwater reduces the amount of runoff during storm events
- **Pros**
  - Addresses core "problem" at the source
  - Works effectively for smaller watersheds
- **Cons**
  - Long term solution requiring lots of funding,
  - Often requires coordination across multiple jurisdictions
- **Strategies**
  - Develop a watershed or stormwater master plan to understand overall levels of investment required
  - Use regional hydrologic modeling to understand how individual stormwater systems interact
  - Combine with other stormwater management programs (e.g. MS4, TMDL, etc.) to defray costs;
  - Use green infrastructure to incur "co-benefits"

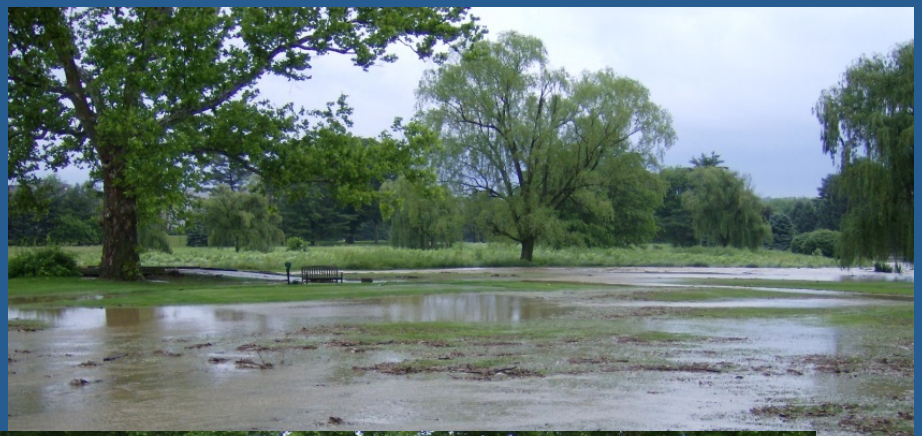
Headwater Stream Channel/Bank Stabilization

- **How it works**
  - Reducing the sediment produced by eroding headwater streams can reduce rates of channel filling downstream
- **Pros**
  - Can have lots of other benefits for upstream communities
- **Cons**
  - Requires a lot of regulatory approvals
  - Can be costly
  - Takes a long time to see results for large watersheds
- **Strategies**
  - Conduct feasibility studies to understand cost/benefit and required investments
  - Combine with other environmental programs for stream restoration (e.g., water quality)
  - Link with stormwater management programs for maximum benefit

Case Study: Combining Multiple Approaches Whitford Country Club

LOCATION

Chester County, PA



PROBLEM

Frequent overbank flooding causing repeated damage to course assets

Case study: Combining Multiple Approaches Whitford Country Club

PROCESS ANALYSIS

Undersized culverts/poor riparian zone/ development

Upstream Channel/Bank Erosion

Downstream Channel Filling

Upstream bank and channel stabilization to reduce potential for channel filling

Wide floodplain in less constrained areas

Narrow floodplain in more constrained areas

Redesign cart and vehicular bridges

Before

After

Build in water quality/ ecological component to secure additional funding

Solve other problems – bank erosion, clogging intake

Making good decisions.

- **Cost**
  - Financial: initial, long-term, environmental costs, social, political
- **Benefit**
  - Reductions in flooding elevations, ecological benefit, social benefits

Thanks.

Questions?

RISK ASSESSMENT

NYRCR: Rye

Maggie Hopkins
Environmental Engineer

September 2, 2014

Risk Assessment Overview

Hazard Score

- Likelihood that a flood event will occur
- Magnitude/destructive capacity of that flood event

All NYRCR communities use constant hazard score, corresponding to 100-year storm event (1% annual chance)

Exposure Score

"Exposure is an expression of the local topographic and shoreline conditions that tend to increase or decrease the effects of coastal hazards on assets."

– NYRCR Program Guidance

Exposure factors evaluated include:

- Hazard area (extreme, high, moderate, N/A)
- Elevation relative to Base Flood Elevation
- Flood defense structures in place (flood walls, levees, etc.)
- Vegetated buffer areas or wetlands

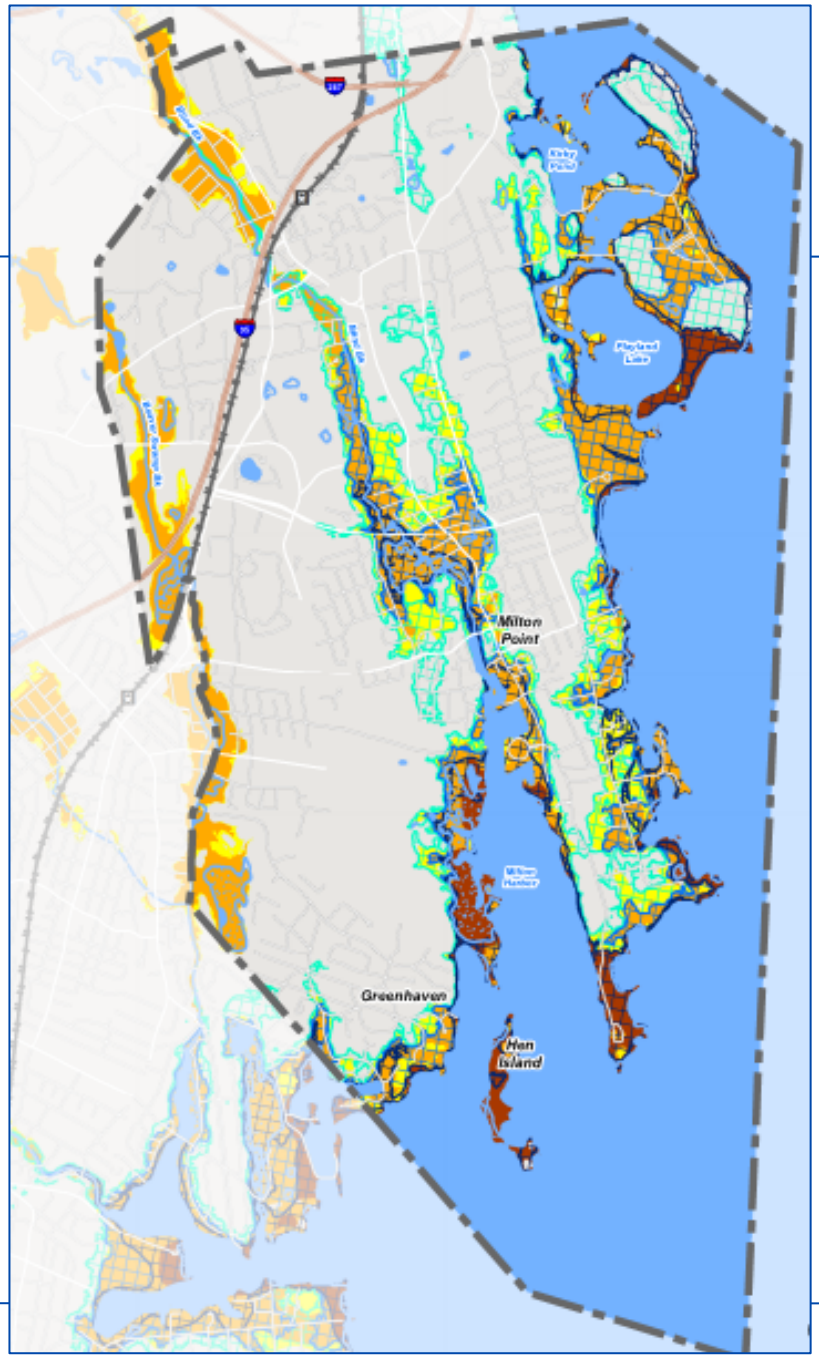
Hazard Area Map

NYSDOS Hazard Zones

- Extreme Risk
- High Risk
- Moderate Risk

FEMA Floodzones

- Extreme Risk
- High Risk
- Moderate Risk



Riverine Landscape Attribute Determination Worksheet

Attribute: Elevation
Asset: Rye Racquet Club **Asset ID:** RCRA141 **Address:** 3 South Road
Determination: ☑ Elevation of the asset site is below BFE. (YES)
☐ Elevation of the asset site is above BFE. (NO)

Determination methodology:

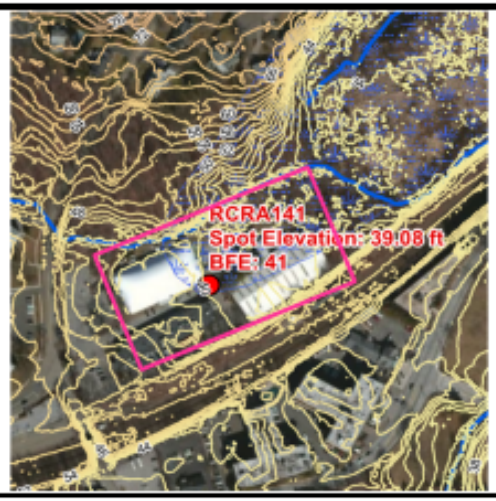
1) Refer to the appropriate FEMA Flood Hazard Area map to determine preliminary Base Flood Elevation (BFE) for the asset area. Compare to the elevation map of the area to determine base ground elevation of the asset. Compare this value to the BFE.

2) If appropriate FEMA maps for the asset area do not list a BFE, assume that assets in the 100-year flood zone are below BFE (YES), and that assets within the 500-year flood zone or outside mapped flood zones are above BFE (NO).
3) If appropriate FEMA maps are not published for the asset area, assume that asset is above BFE (NO) - maps are not published due to absence of flood zones.

Justification: Ground surface elevation at the asset varies from 38 to 48 feet (NAVD88). The BFE in this area is 41 feet (NAVD88). The asset is partially below the BFE.

Data gaps/questions: None.

Aerial photograph:



Legend
Asset

Source Citation:
Westchester County LiDAR 2009
http://gisswww.westchestergov.com/wcgis/Lidar.htm

FEMA FIRM BFE

- Exposure factors defined by NYRCR Program
- Determination worksheets completed for exposure factors for each asset
- Responses based on national and regional mapping data and aerial imagery

CDM Smith

Vulnerability Score

Capacity of an asset to return to service after a storm.

Takes into account the asset's:

- Material strength relative to flood hazard
- Regenerative capacity

Uses asset performance during historic storm as predictor of vulnerability

- Length of service outage
- Degree of damage sustained

Risk Score

Risk = Hazard x Exposure x Vulnerability

Scores range from 0-75

<6: Residual risk

6-23: Moderate risk

24-53: High risk

>53: Severe risk

Excerpt from Risk Assessment Tool

Asset Information		Landscape Attributes - Riverine							Risk Assessment			
Asset	Risk Area	Defensive Flood Protection Measures	Elevation	Free-board	Point of Confluence	Storm Water Discharge	Vegetated Stream Bank Buffers	*Landscape Attribute Score ("Yes" = +0.5)*	Hazard Score	Exposure Score	Vulner-ability Score	Risk Score
Rye Free Reading Room	High	Yes	Yes	Yes	Yes	No	Yes	2.5	**3**	**3.5**	**4**	**42**

Asset Information		Landscape Attributes - Coastal							Risk Assessment			
Asset	Risk Area	Erosion Rate	Beach Width	Shore Defense Structures	Vegetation	Dunes or Bluffs	Soils	*Landscape Attribute Score ("Yes" = +0.5)*	Hazard Score	Exposure Score	Vulner-ability Score	Risk Score
Tide Mill Yacht Basin	Extreme	No	Yes	Yes	Yes	Yes	Yes	2.5	3	4.5	3	**41**

Preliminary Risk Assessment Results

Asset	Risk Score
Edith Reed Natural Park & Sanctuary	54
Central Avenue Bridge over Blind Brook	53
Elm Place Businesses	53
Milton Harbor House Community	48
Rye City Boat Basin	48
Playland	48
Rye Town Park	42
Rye Free Reading Room	42
Tide Mill Yacht Basin	41
American Yacht Club	36
Shenorock Shore Club	36
Rye Marina	36
Milton Road / Garden Drive Homes	36
Phillips Lane / Hewlett Street Homes	36
Martin Butler Court Homes	36
Manursing Island Club	36
Westchester Beach Club	36
Apartments off Wappanocca Avenue	36
Indian Village Neighborhood	36
Wappanocca Neighborhood	36
Central Avenue / Loewen Court Homes	32
Lester's Clothing	32
Rye Middle/High School Athletics Field	32
Milton Point Business District	27
Milton Road / Hill Street Homes	27

Asset	Risk Score
Waterfront Homes off Stuyvesant Avenue	27
Public Fishing Dock	24
Row America Rye	24
Rye Fish and Game Club	24
Rye Meeting House / Bird Homestead	24
Milton Point Fire House	24
South Manursing Island Homes	24
Rye Golf Club	24
North Manursing Island Homes	21
Purchase Street Businesses	21
Boston Post Rd/Roger Sherman Pl. Homes	21
Nursery Field	21
Cemetery Bridge over Beaver Swamp Brook	21
Rye Nature Center	21
Homes off Manursing Way and Kirby Lane	18
Watson Court Homes	18
Water's Edge Condominiums	15
Coveleigh Club	15
Parsonage Point Homes	15
Verizon Facility	15
Playland Parkway Bridge over Blind Brook	14
Moorehead Footbridge over Blind Brook	14
Forest Avenue Pump Station	12
Oakland Beach Ave Bridge over Blind Br.	12
Waterfront Homes off Grace Church St.	12

Preliminary Risk Assessment Results

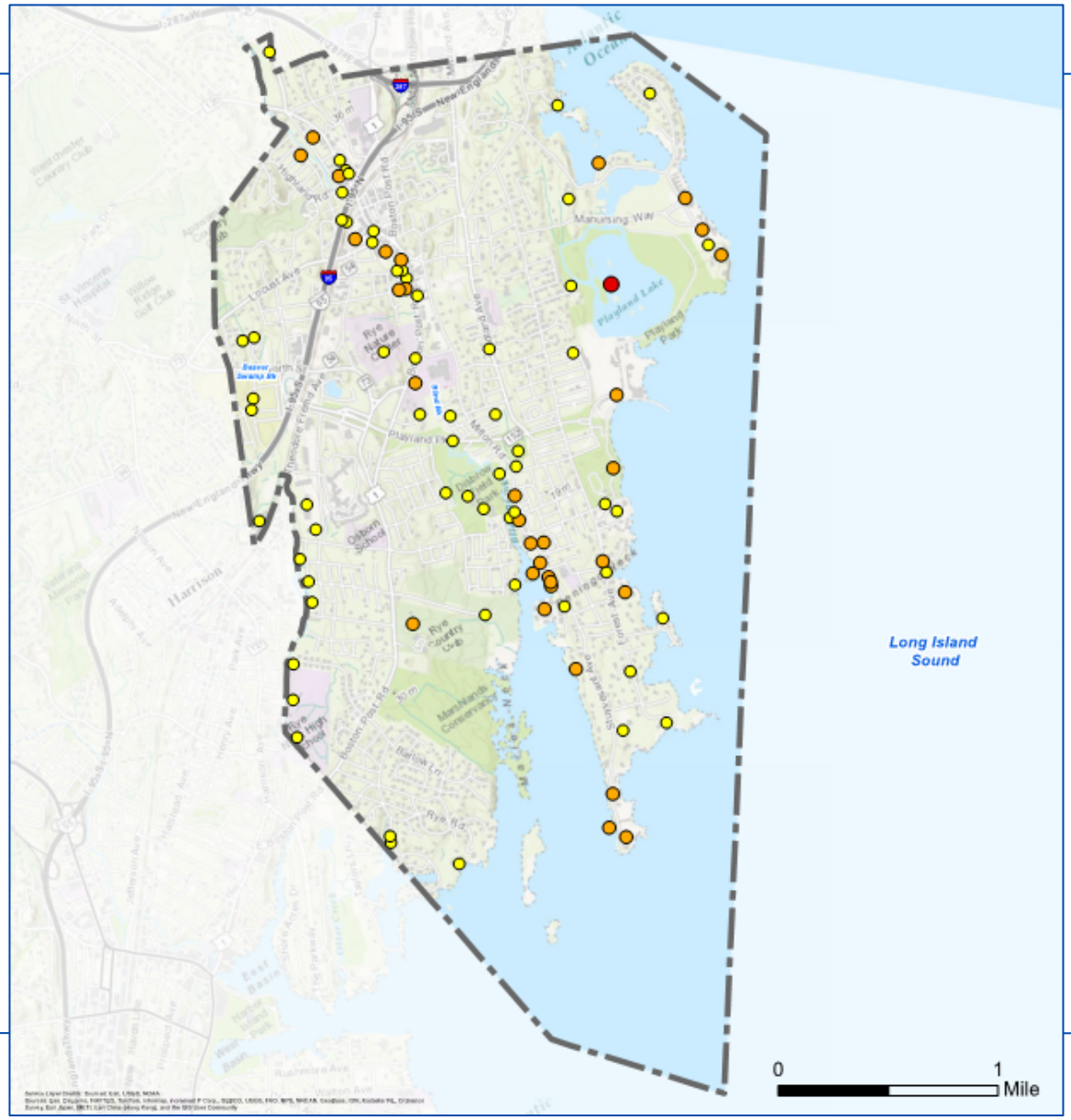
Asset	Risk Score
Rye Neck Middle School	12
Rye Neck Senior High School	12
Johnson Place Homes	12
Brevoort Lane Pump Station	11
Brevoort Lane Homes	11
Pine Island Homes	11
South Forest Avenue Homes	11
Waterfront Homes off Rye Road	11
Rye Brook Services Station	11
Locust Avenue Bridge over Blind Brook	11
Orchard Ave. Bridge over Blind Brook	11
Blind Brook Lodge Apartments	11
Orchard Avenue Apartments	11
US Route 1	11
Glen Oaks Drive Pump Station	11
Faros Corporate Center	11
Homes off Hardling Drive	11
Homes off Park Avenue	11
Glendale Avenue Homes	11
The Ives at Rye	11
Knapp House	11
Milton Road / Playland Parkway Homes	11
Greenwood Union Cemetery	11
Rye Racquet Club	11
Stuyvesant Avenue Pump Station	9

Asset	Risk Score
Con Edison Electric Substation	9
Rye Walk-In Medical Center	9
Metro North Parking Lot	9
Hansa Office Condominiums	9
Rye Manor	9
Blind Brook Sewage Treatment Plant	9
Crescent Avenue Homes	9
Ridge Street Homes	9
Midland Avenue / Playland Parkway Homes	9
Van Rensselaer Road Pump Station	8
Roosevelt Avenue Homes	8
Soundview Avenue Homes	8
Rye Department of Public Works	8
Dearborn Road at Water's Edge Pump Station	6
Hook Road Homes	6
Conrail Rail Lines	6
Interstate 95	6
Metro North Rail Lines	6
Midland Avenue Homes	6

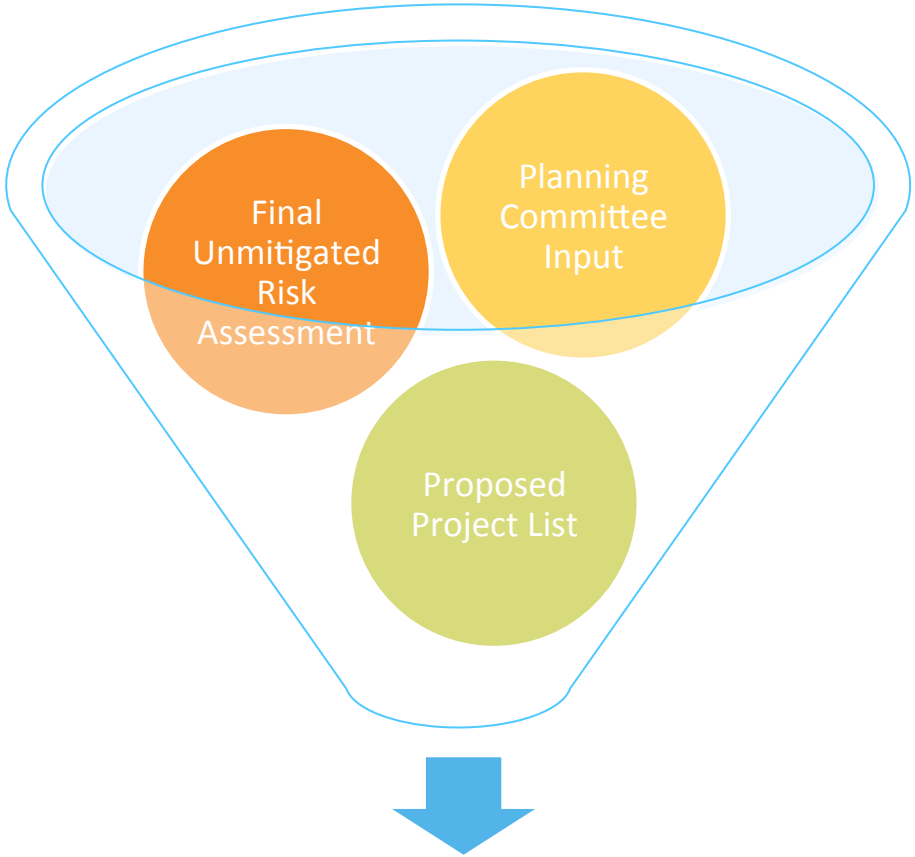
Preliminary Risk Assessment Map

Assets

- Residual Risk
- Moderate Risk
- High Risk
- Severe Risk



Next Steps



Mitigated Risk Score Evaluations

Assignment for today's meeting:

Review the preliminary risk scores and risk map.

- Do any of the scores look surprisingly high or low?
- Are the assets that you generally consider most at-risk near the top of the list?
- Are there any areas on the map with many high or low risk scores that seem out of place or surprising?

Looking Ahead

Public Engagement Event #2

- Welcome and introduction
- Presentation by consultants
  - NYRCR program overview
  - Overview of work to date
  - Draft needs and opportunities, strategies
- Small group discussion facilitated by committee and consultant team