IAFSM
Illinois Association for
Floodplain and Stormwater Management

Waterway Restoration & Climate Resiliency

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Climate Resilience

- “Resilience is the capacity of a system to retain essential functions before, during, and after a hazard strikes.” *(U.S. Climate Resilience Toolkit https://toolkit.climate.gov/#steps)*
- “Climate resilience is the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate. Improving climate resilience involves assessing how climate change will create new, or alter current, climate-related risks, and taking steps to better cope with these risks.” *(Center for Climate and Energy Solutions https://www.c2es.org/content/climate-resilience-overview/)*
- “Climate resilience can be generally defined as the capacity for a socio-ecological system to: (1) absorb stresses and maintain function in the face of external stresses imposed upon it by climate change and (2) adapt, reorganize, and evolve into more desirable configurations that improve the sustainability of the system, leaving it better prepared for future climate change impacts.” (Wikipedia https://en.wikipedia.org/wiki/Climate_resilience)

Climate Action Plan for the Chicago Region

Six high-priority climate hazards and their potential impacts to people, assets & resources:

- Heat & health
- Flooding & homes
- Flooding & infrastructure
- Flooding & transportation
- Drought & water supply
- Air quality, flooding & public health

GRC2 Greenest Region Compact

COLLABORATING FOR SUSTAINABLE COMMUNITIES

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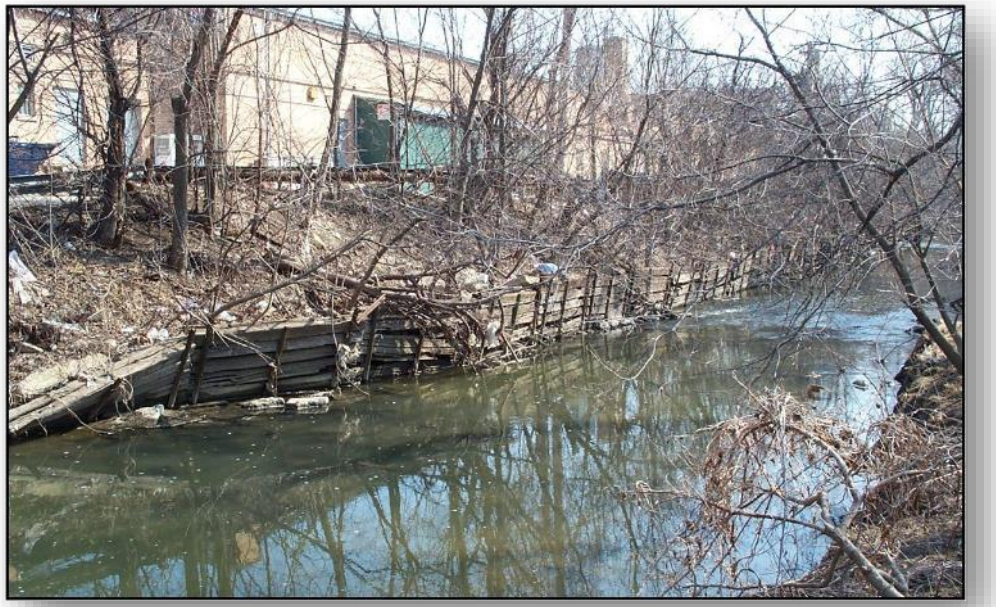
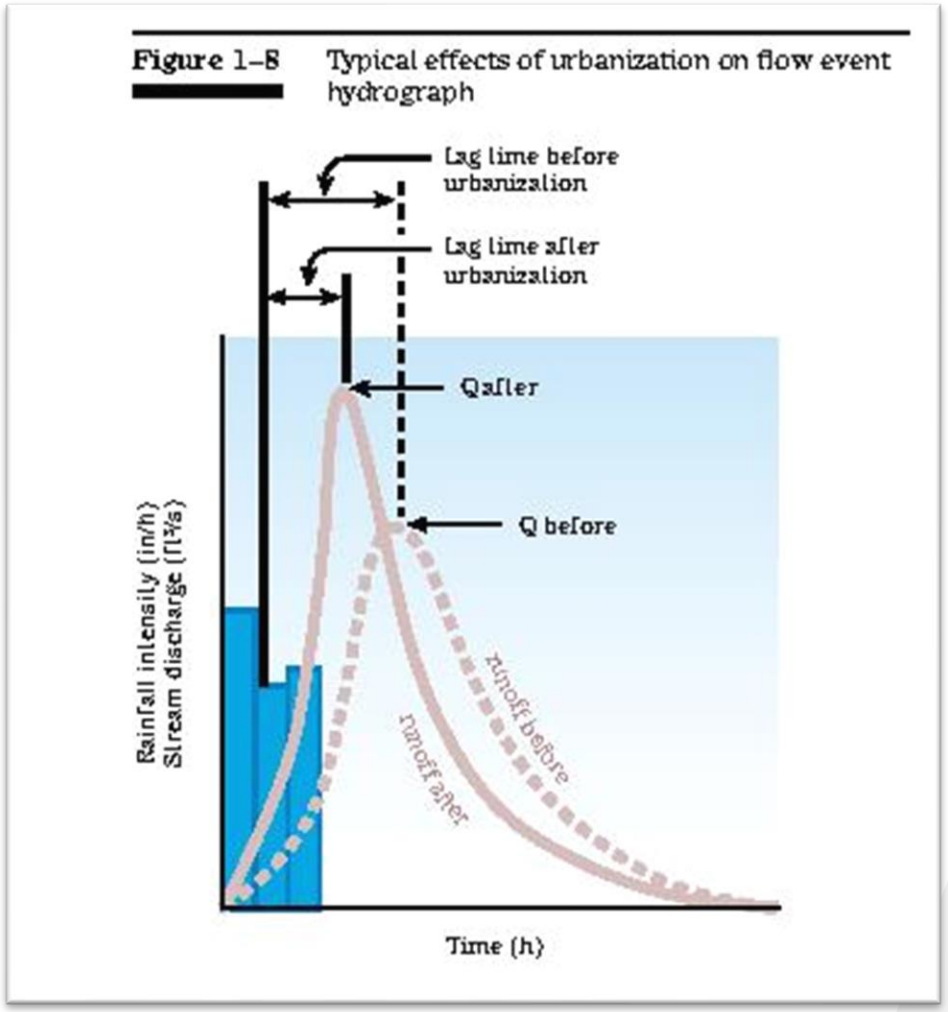
Climate Resilience and Our Waterways



- Changing Land Use – Increased Impervious
- Climate Change – Increased Rainfall/Runoff
- Degraded and Unnatural Waterways
- Channel Evolution – Stuck in the Middle
- How do we adapt?

Changing Hydrology



USDA/NRCS National Engineering Handbook, Part 654

- Urbanization Coupled with Climate Change

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Changing Hydrology

- Updated Bulletin 70 (Bulletin 75)
- 1989 to 2019 (add last 30 years of rainfall data)
- Up to 30+% Increases
- UIUC Presentation

https://www.illinoisfloods.org/content/documents/3a_revised_bulletin_70.pdf

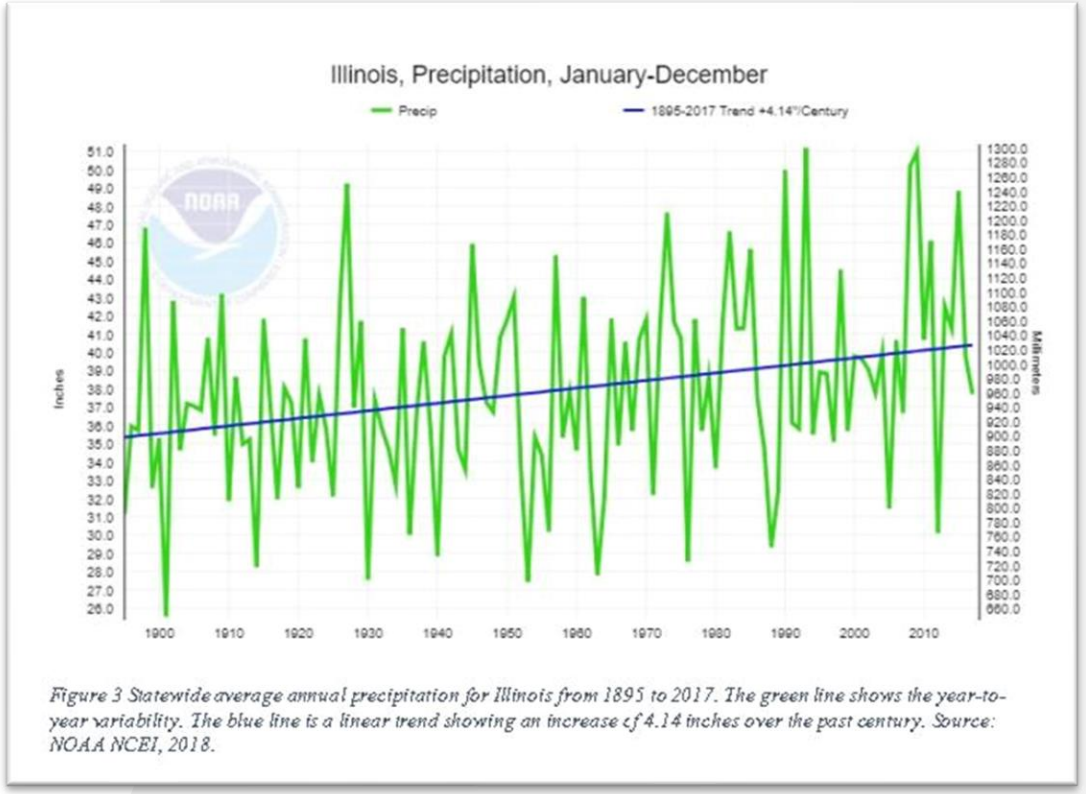
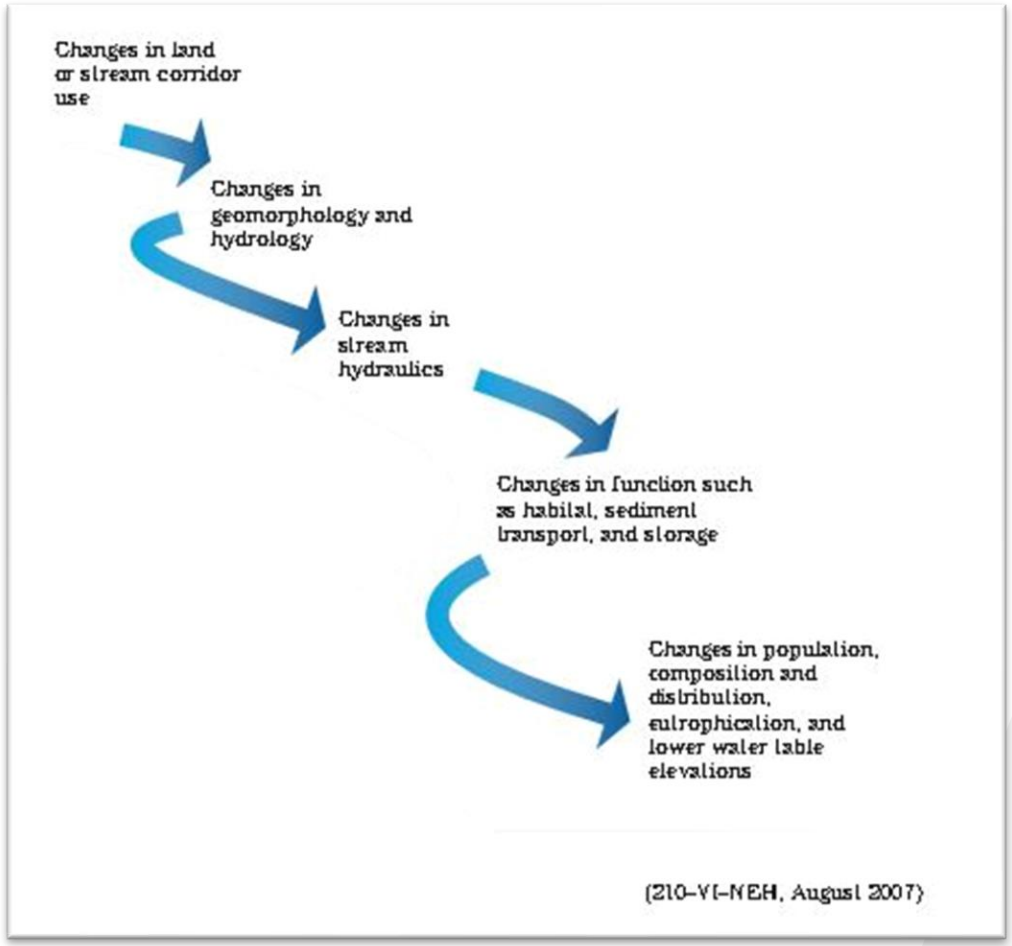


Figure 3 Statewide average annual precipitation for Illinois from 1895 to 2017. The green line shows the year-to-year variability. The blue line is a linear trend showing an increase of 4.14 inches over the past century. Source: NOAA NCEI, 2018.

Angel, Momcilo; Frequency Distributions of Heavy Precipitation in Illinois: Updated Bulletin 70
http://hdl.handle.net/2142/102137

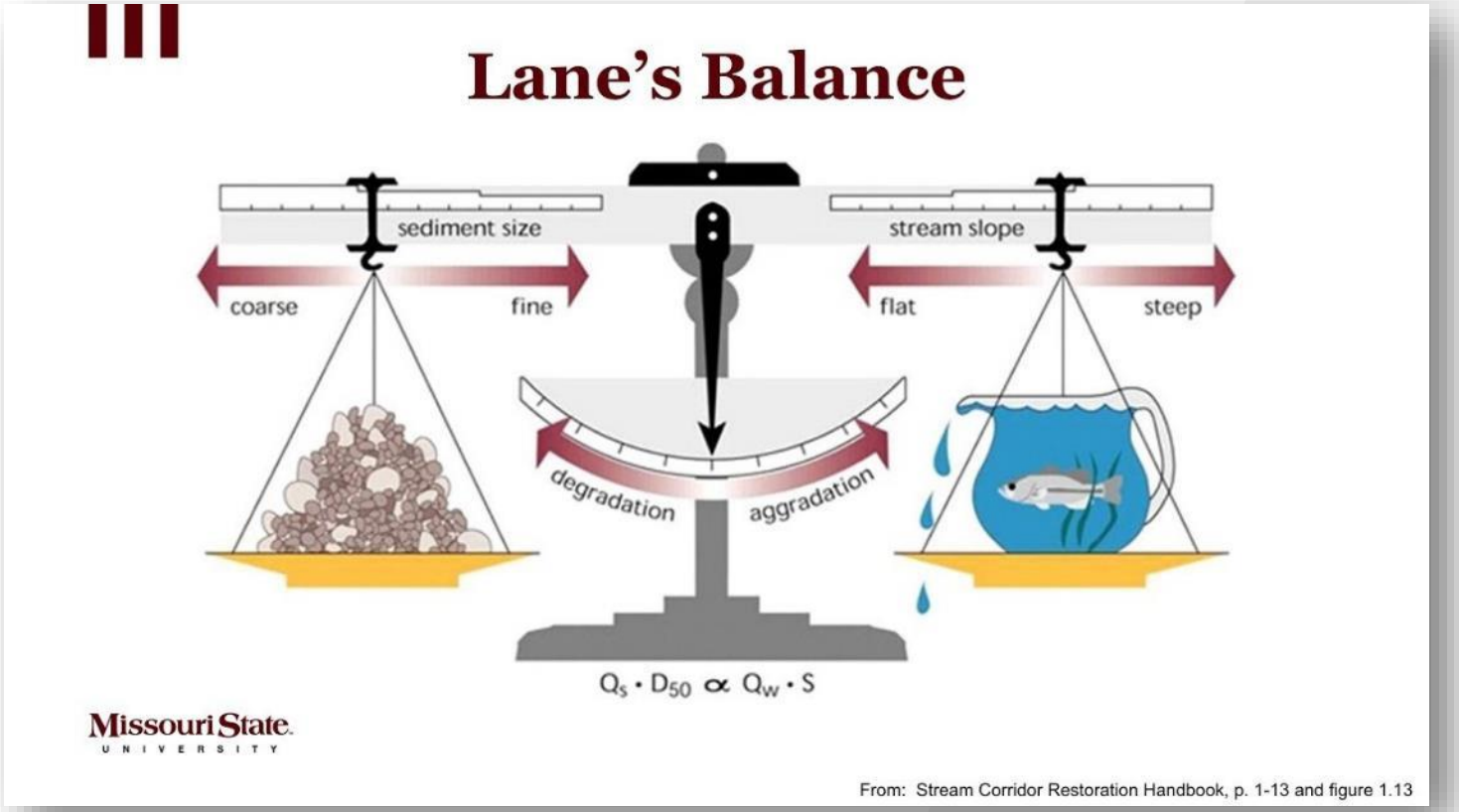
Channel Evolution



USDA/NRCS National Engineering Handbook, Part 654

- More/Faster Runoff and Impinged Corridors=Degradation/Incision
- Stuck in the Middle (Stage II/III)
- Aggradation (Sediment)Pushed Downstream

Channel Evolution



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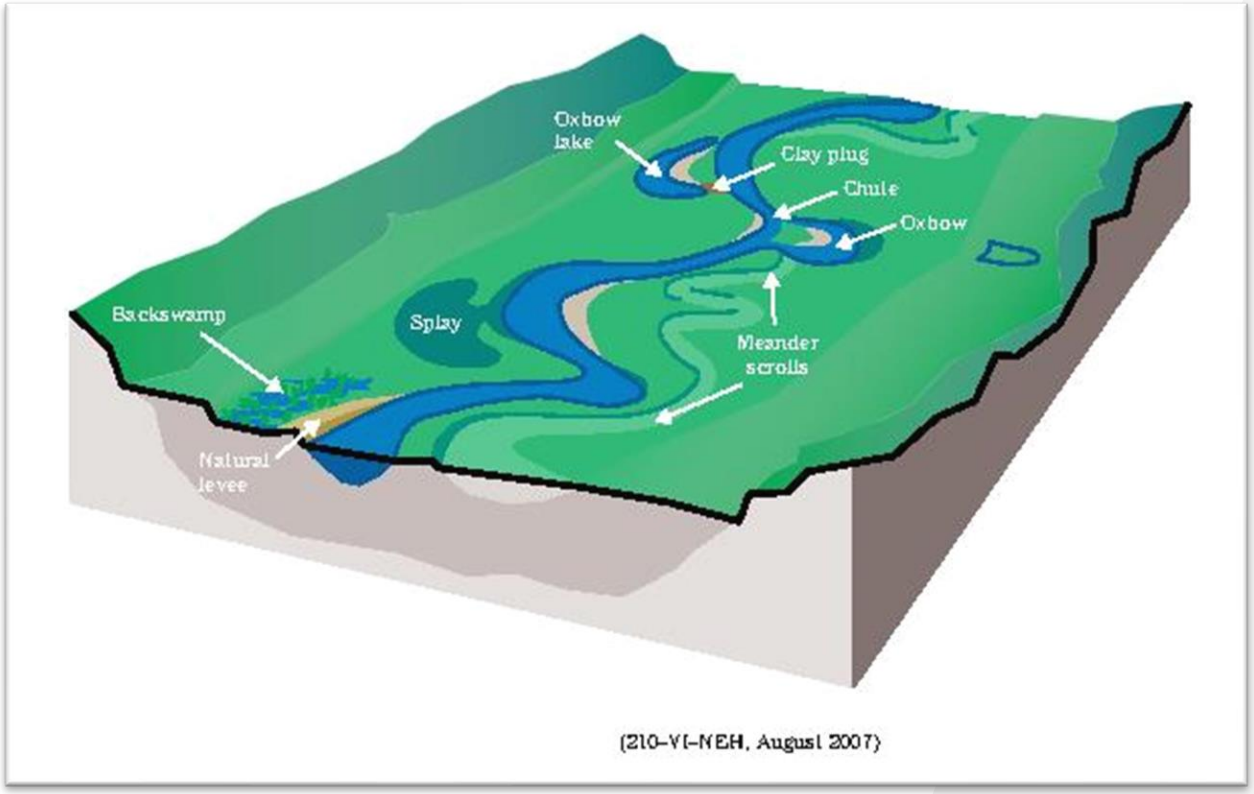
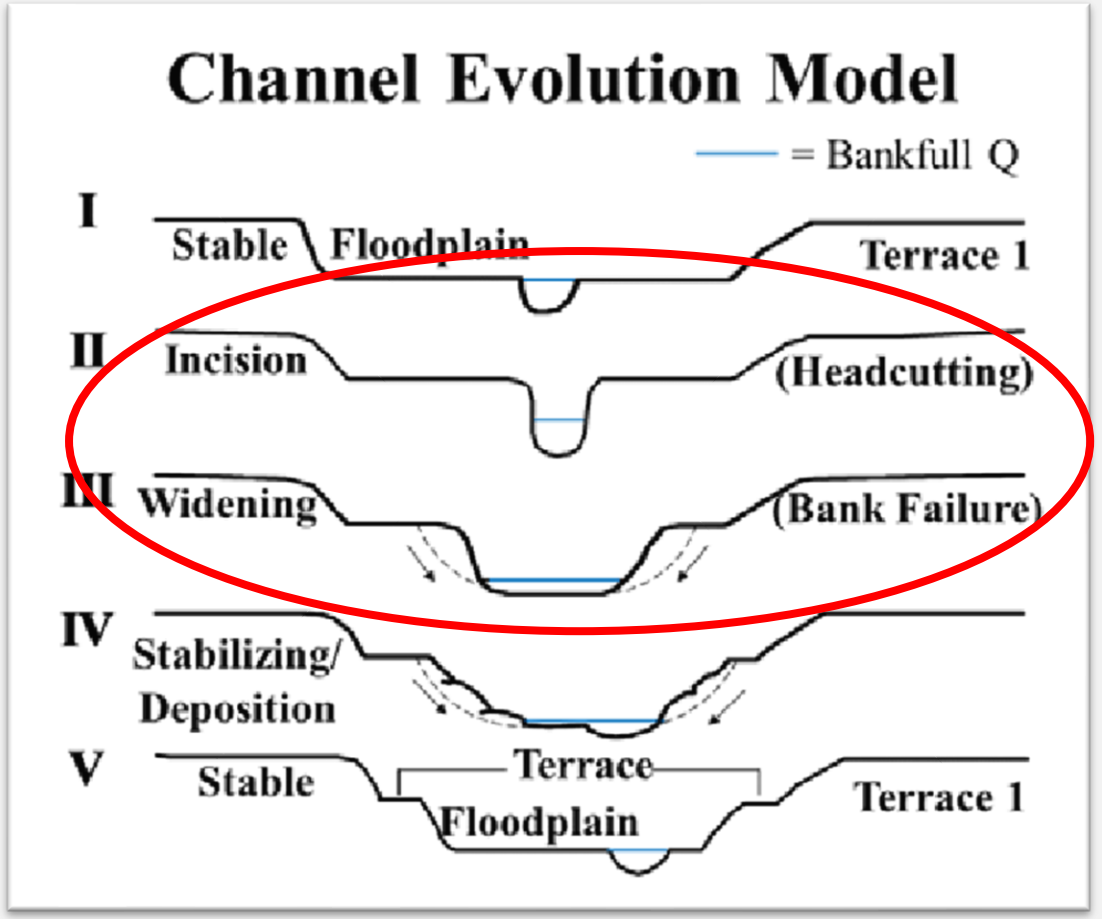
Channel Evolution



USDA/NRCS National Engineering Handbook, Part 654



Schumm, et.al (1984)

How do We Adapt?

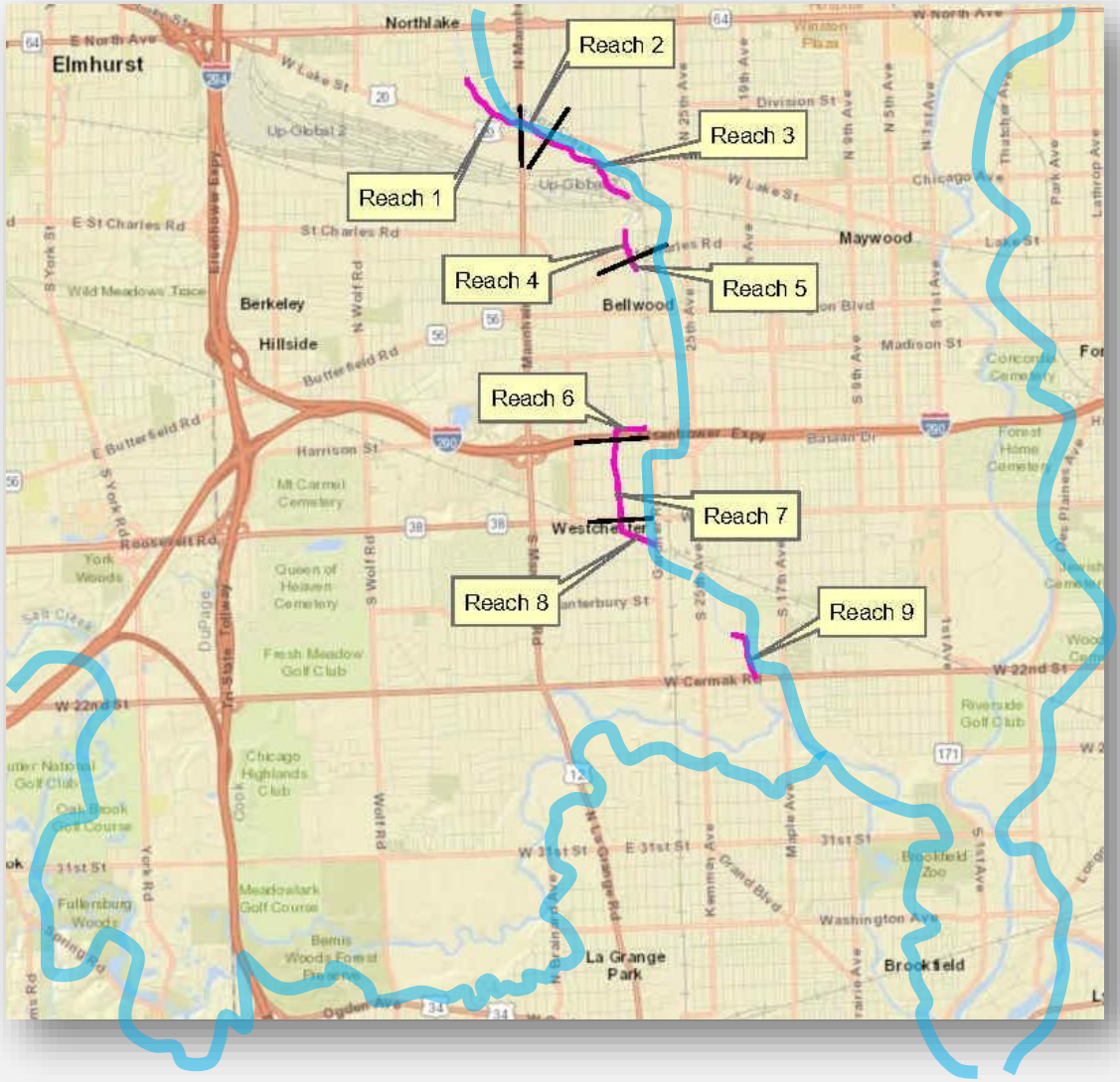
- Modern Stormwater Regulations
- Understand the Problem
- Marry Restoration and Stabilization
- Multi-Outcome Solutions (Storage and Stabilization, Grade Control and Ecology, Habitat and Conveyance, Water Quality and Recreation)
- Creativity and Collaboration

Case Studies

- Addison Creek
- Graue Mill Dam Removal
- Lake Michigan Ravines and Bluffs
- Powderhorn Lake Hydrologic Restoration
- School Springs Stream Mitigation

Addison Creek Channel Improvements

- Project Background
  - MWRD long-term planning for flood conveyance
  - Approximately 5 miles of stream
  - Tributary to Salt Creek
- Goals and Objectives
  - Improved flood conveyance
  - Reach stabilization and water quality
  - Benefits to disadvantaged communities



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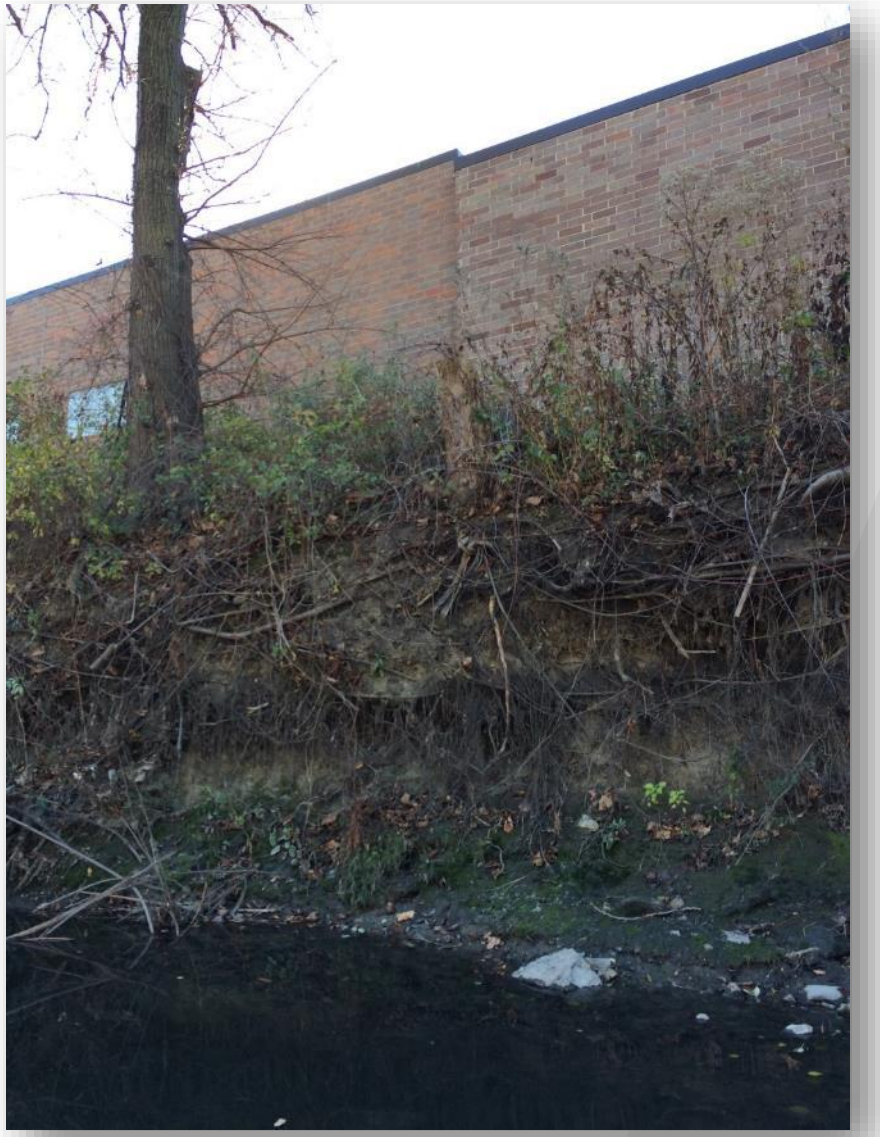
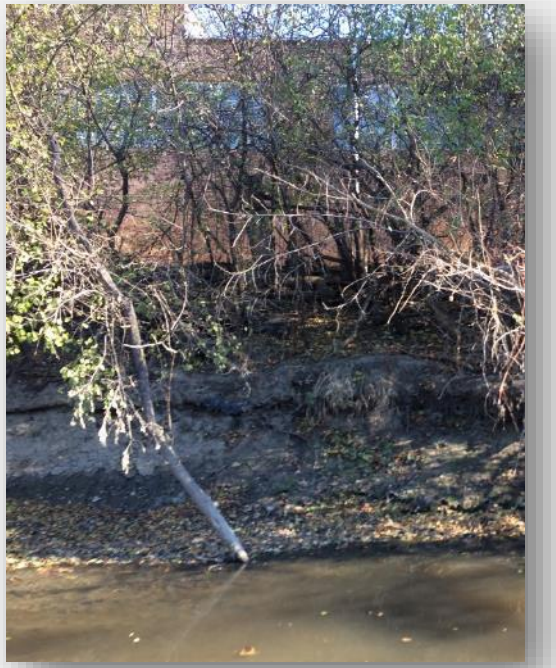
Addison Creek Channel Improvements

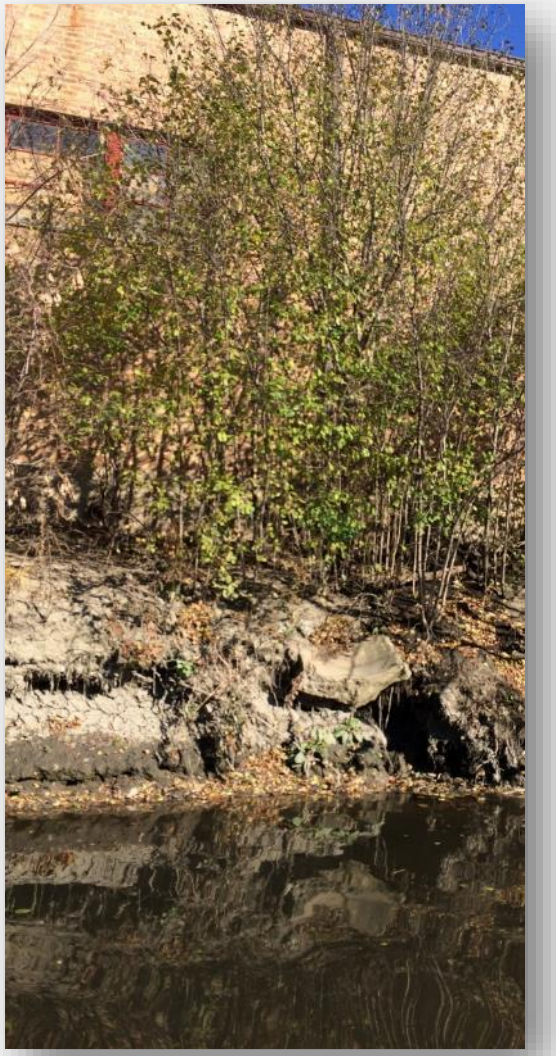


- Urbanized Watershed
- Extensive Use of Structural Bank Stabilization Measures Due to Surrounding Land Uses
- Natural Where Possible

Addison Creek Channel Improvements

- Lower Limits of Vegetation (LLV)
- Natural Channel Design Where/When Possible and Practical





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Addison Creek Channel Improvements

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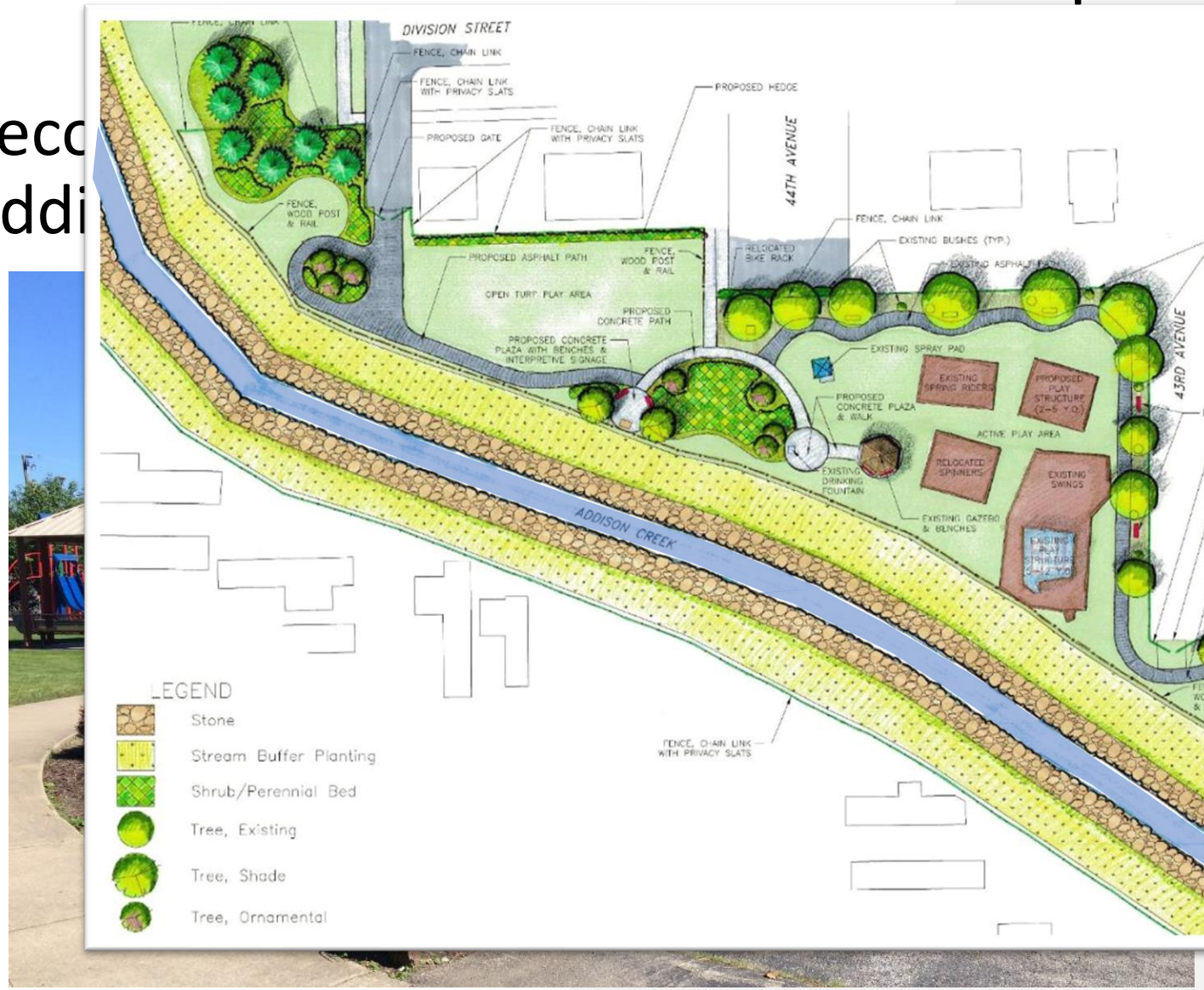

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Addison Creek Channel Improvements

- Environmental Justice at Work: 2,000 Properties in Socio-Economically Disadvantaged Neighborhoods Will No Longer Be In Floodplain Post-Project

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DRSCW Fullersburg Dam Removal

- Project Background
  - FPDDC Owned Dam
  - Worst water quality on Salt Creek US
  - Historic site
- Goals and Objectives
  - Fish passage/habitat connectivity
  - Water quality improvements
  - Flood control
  - Enhanced user experience

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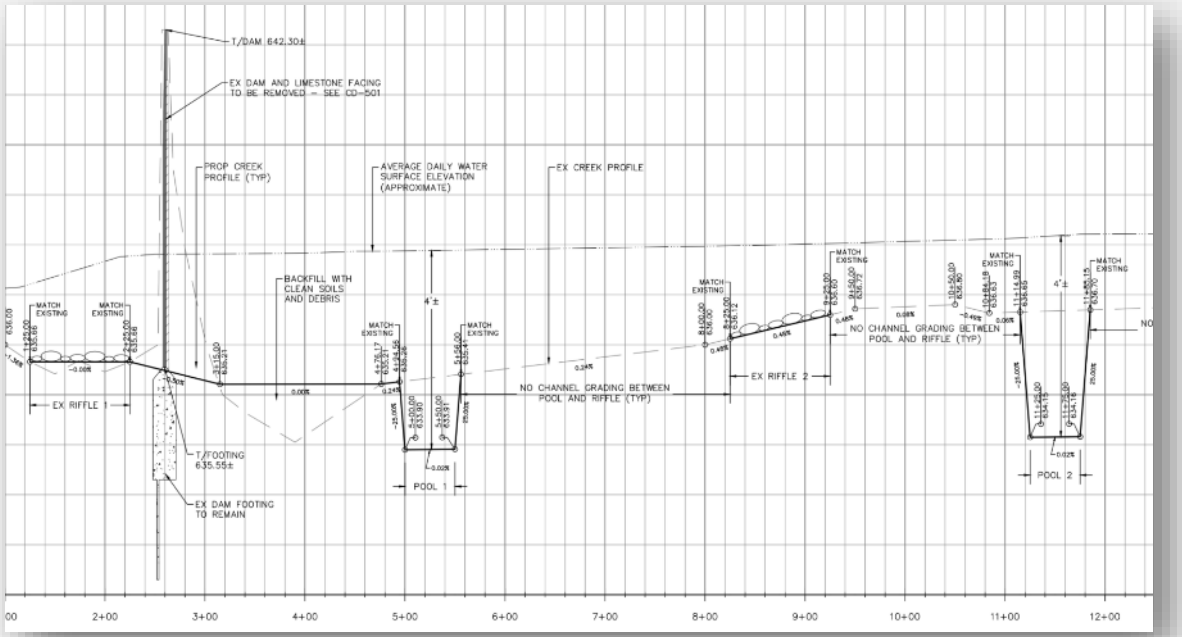
DRSCW Fullersburg Dam Removal

- Formed in 2005, the DRSCW is made up of representatives from local communities and agencies including Publicly Owned Treatment Works, (POTWs), municipalities with a Separate Storm Sewer System (MS4s), environmental organizations and engineering companies in response to concerns about the development of Total Maximum Daily Loads (TMDLs) permit requirements for Salt Creek and the East & West Branches of the DuPage River.
- Organized to implement rigorous analysis and targeted projects and programs that cost effectively work towards the goals of the Clean Water Act.

DRSCW Fullersburg Dam Removal

- Remove dam
- Restore natural riffle-pool geomorphology
- Convert open water to riparian wetlands
- Enhance existing floodplain and wetlands
- Maintain functionality of historic Graue Mill
- Amenities for visitors



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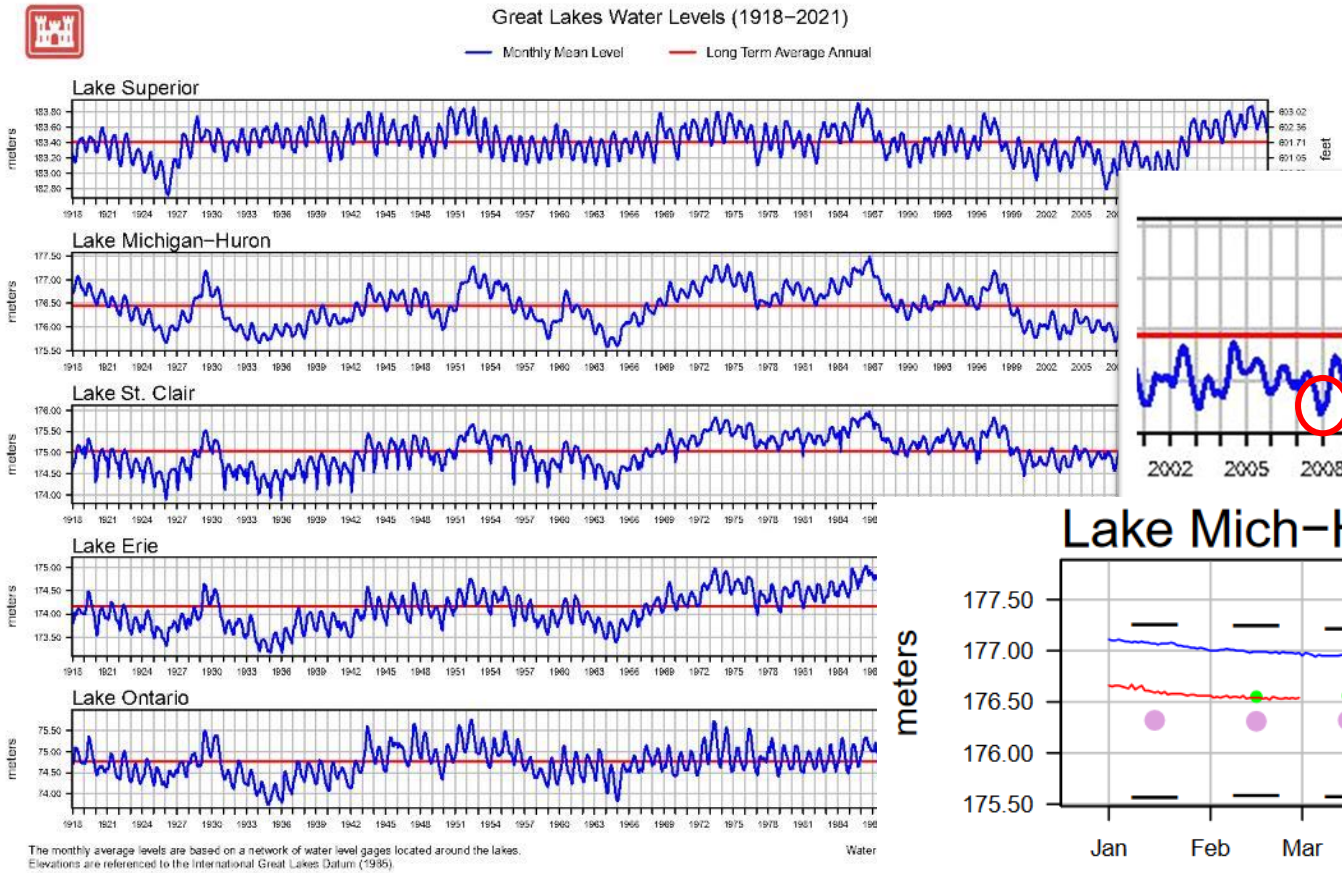
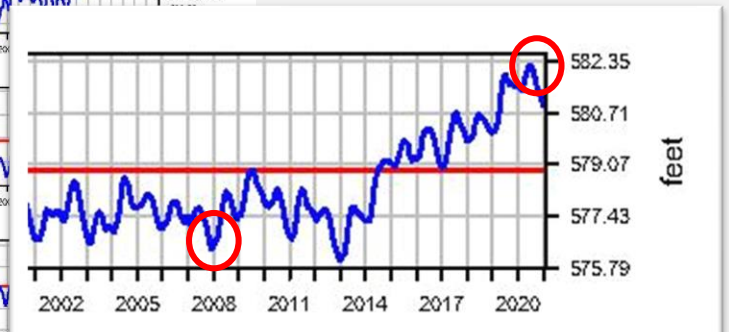
Lake Michigan Ravines and Bluffs

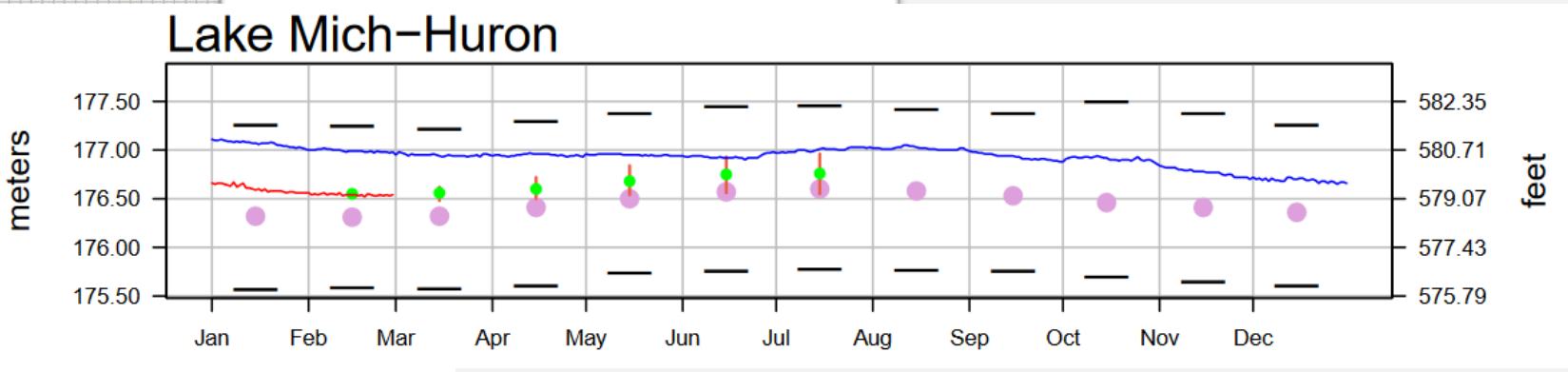
- Project Background
  - High Lake levels/groundwater
  - Historic use as outlets/utility corridors
  - Dramatic erosion and failure
- Goals and Objectives
  - Manage and improve drainage
  - Arrest erosion/improve water quality
  - Protect infrastructure




Lake Michigan Bluff







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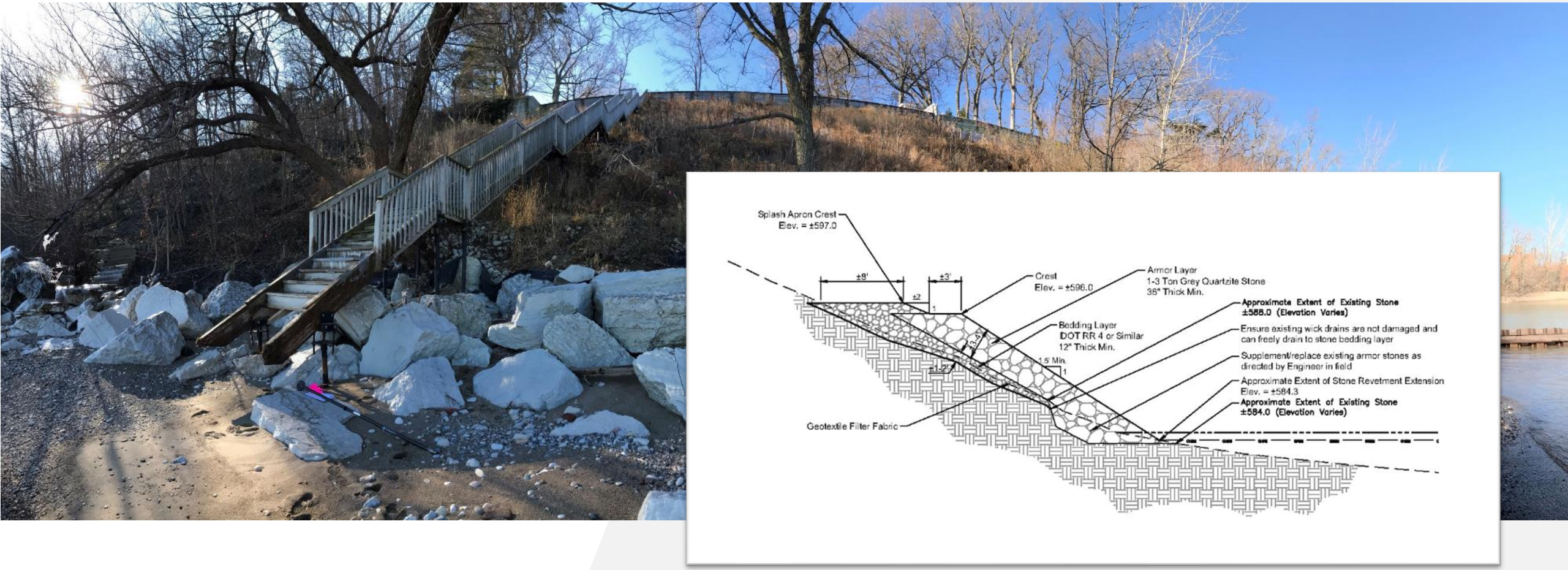
Lake Michigan Bluff



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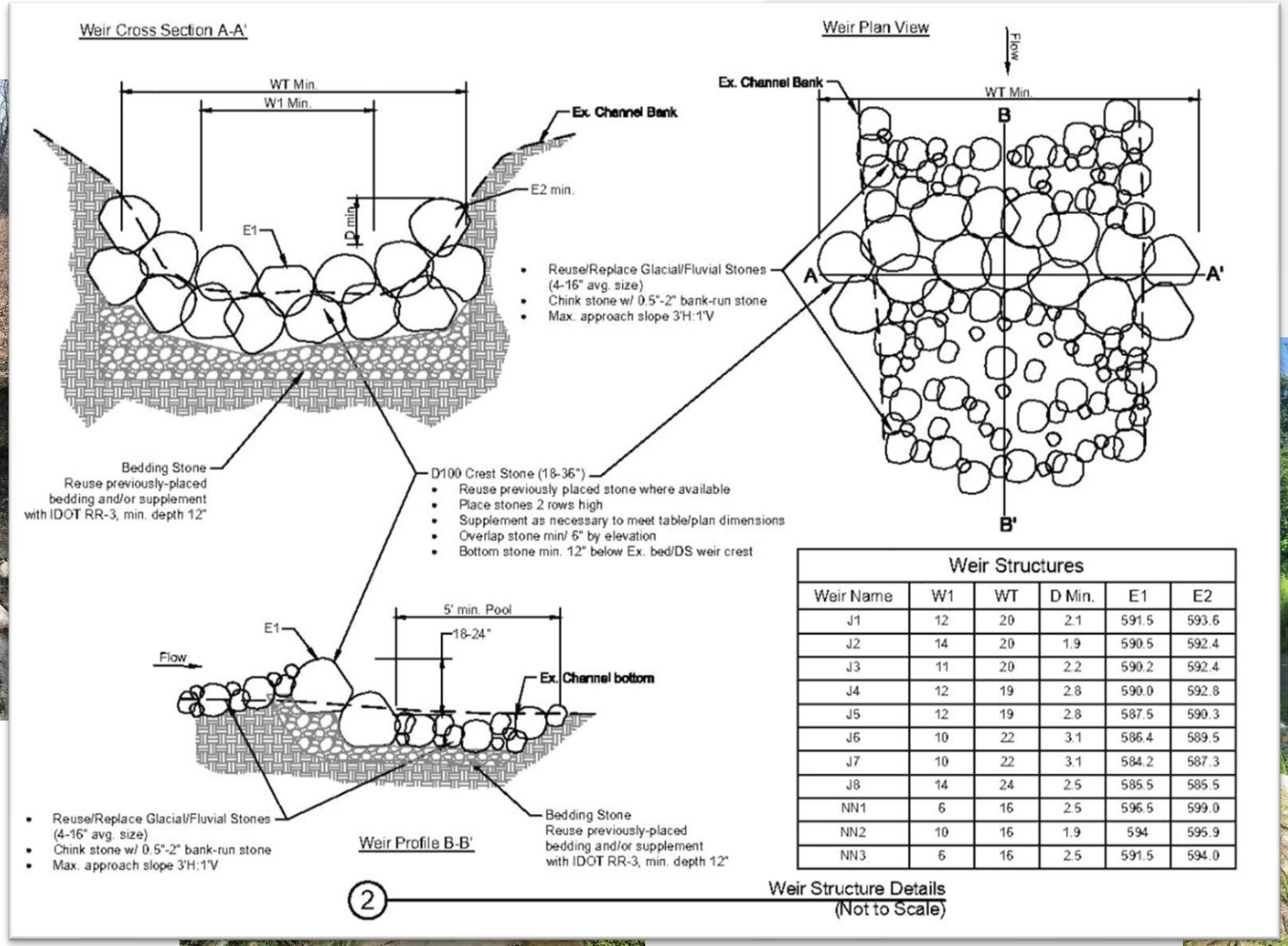
McCormick, Janes, and No Name Ravines

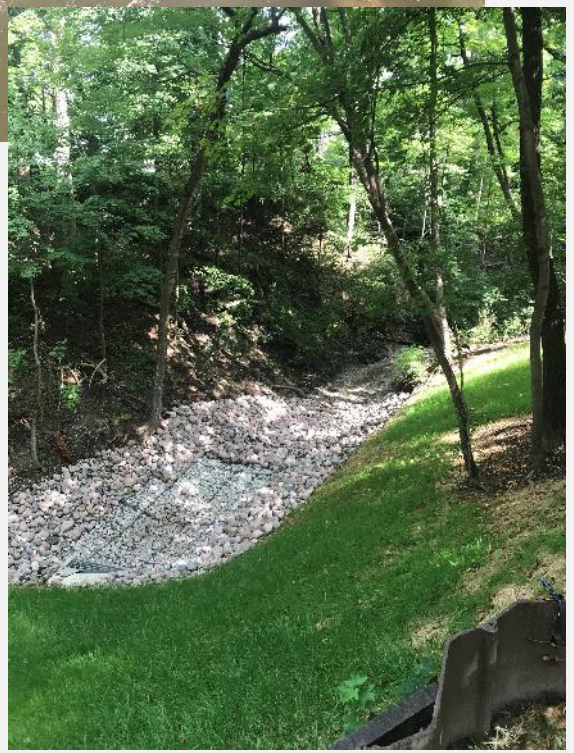


Weir Structures					
Weir Name	W1	WT	D Min.	E1	E2
J1	12	20	2.1	591.5	593.6
J2	14	20	1.9	590.5	592.4
J3	11	20	2.2	590.2	592.4
J4	12	19	2.8	590.0	592.8
J5	12	19	2.8	587.5	590.3
J6	10	22	3.1	586.4	589.5
J7	10	22	3.1	584.2	587.3
J8	14	24	2.5	585.5	585.5
NN1	6	16	2.5	596.5	599.0
NN2	10	16	1.9	594	595.9
NN3	6	16	2.5	591.5	594.0







Powderhorn Lake Hydrologic Restoration– Forest Preserves of Cook County

- Project Background
  - Remnant dune and swale Illinois Nature Preserve
  - Lake levels rising with no gravity outlet
  - Habitat impacts and disconnection
- Goals and Objectives
  - Restore hydrologic connectivity and variability
  - Resolve ongoing residential and street flooding
  - Enhance critical habitat

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Powderhorn Lake Hydrologic Restoration

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Powderhorn Lake Hydrologic Restoration

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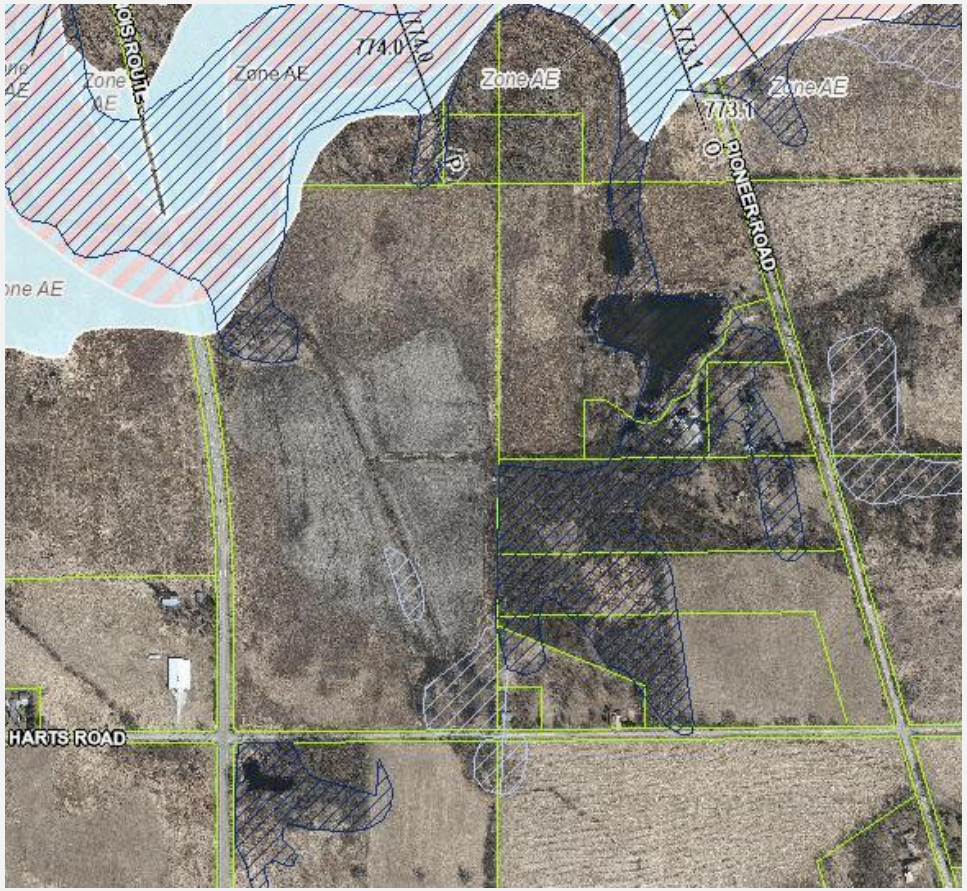
Schools Springs– McHenry County Conservation District

- Project Background
  - McHenry County Conservation District property
  - Former ag. site with tiling/ditching
  - Long-term mitigation site planning
  - Tributary to Nippersink Creek
- Goals and Objectives
  - Full natural restoration of tributary and floodplain
  - Wetland and prairie restoration on remainder of site
  - Wetland and Stream Mitigation Bank



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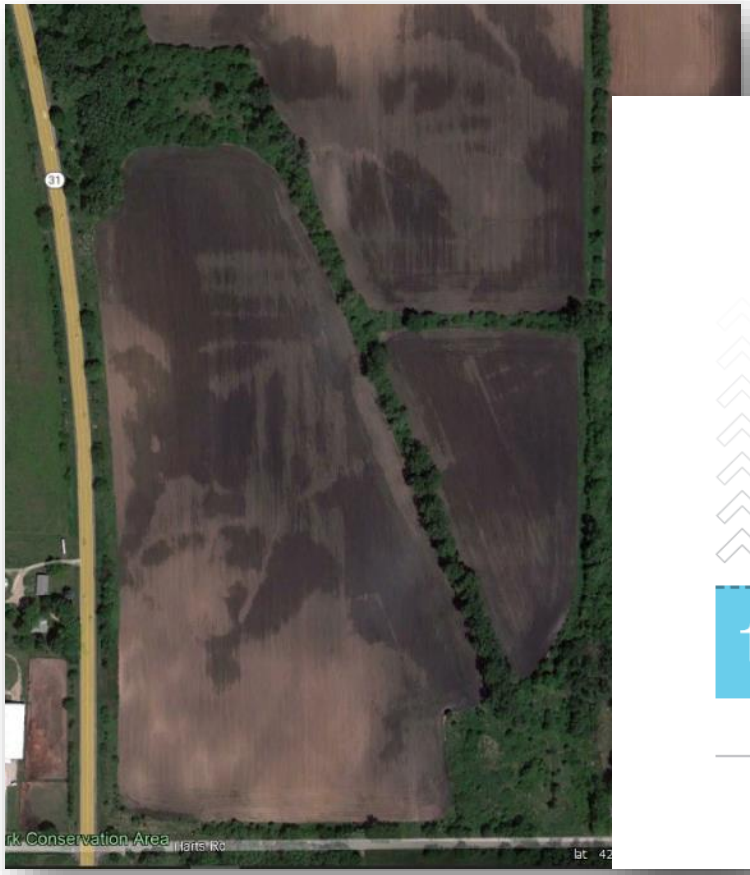
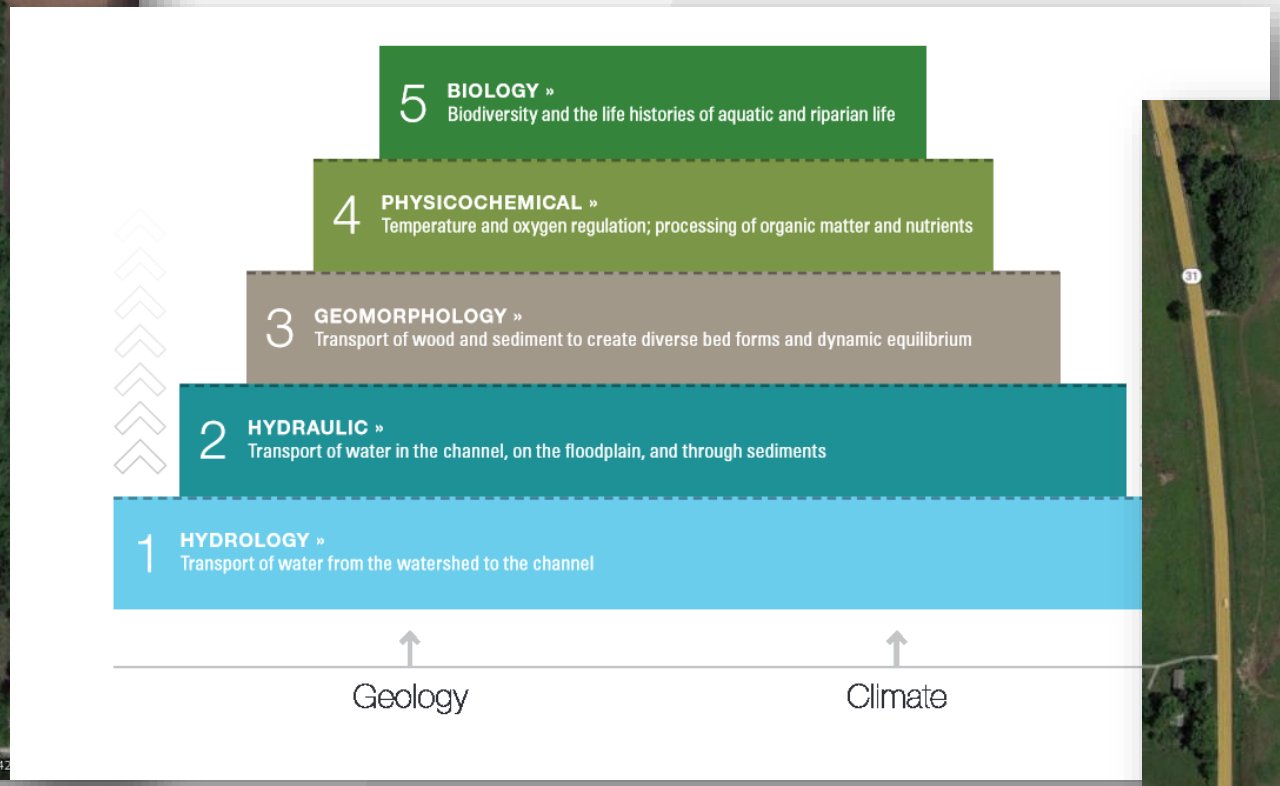
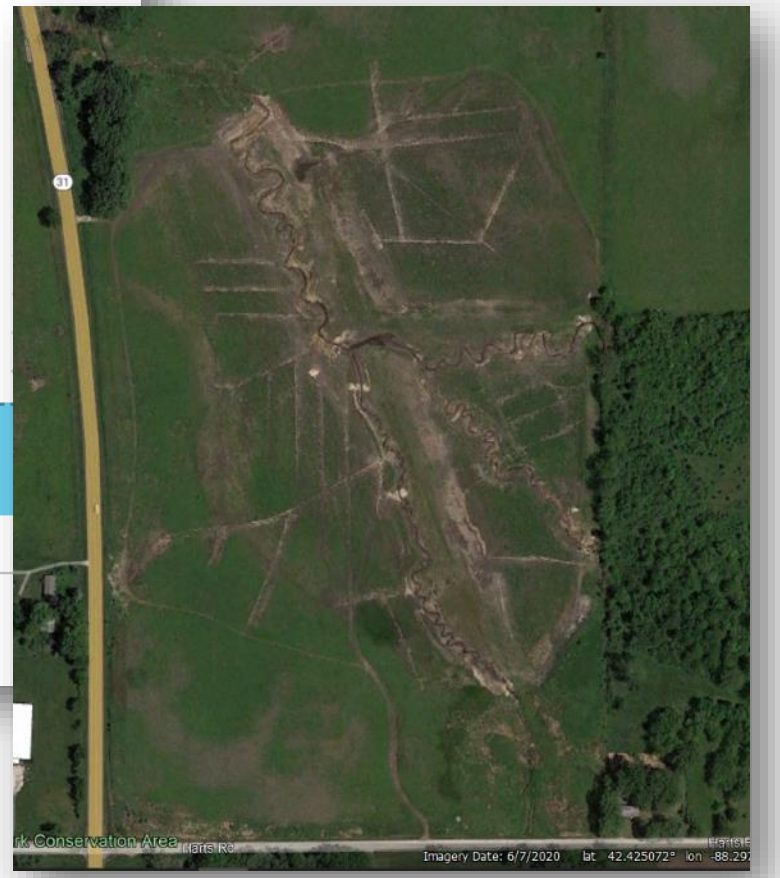
Schools Springs– McHenry County Conservation District







A Function-Based Framework for Stream Assessment & Restoration Projects, EPA 843-K-12-006

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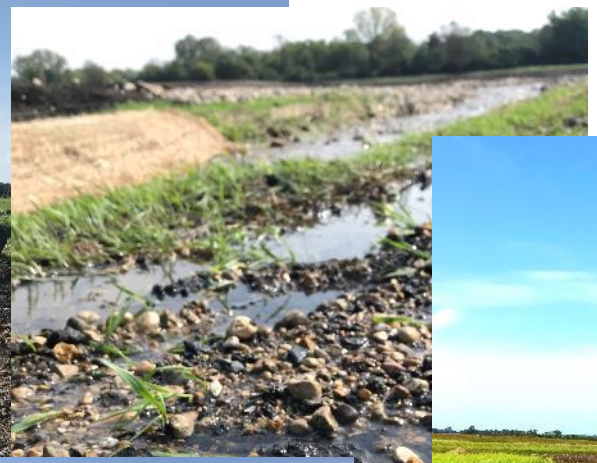
Schools Springs– McHenry County Conservation District



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Questions?

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