Using Stream Enhancement in Urban Settings to Protect Valuable Infrastructure and Prevent Potential Water Quality Impacts From Infrastructure Failure

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- Outline of presentation
  - Overview of importance of infrastructure protection
  - Review several example projects and associated costs
    - Fourmile Creek
    - Force main example
    - Long Creek – Spot Fix
    - Long Creek - Restoration
- Urbanization Stressors
  - Increased impervious area in watersheds
  - Increasing population that needs SS services
  - Increase in length of sanitary sewer pipes along stream banks and aerial crossings
  - Results in an increase in locations where infrastructure needs to be protected from bank erosion

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Sanitary Sewer Spills

- 19,500 sewer systems nationwide, 50 billion gallons per day of raw sewage (epa.gov)
- 23,000 – 75,000 sanitary sewer overflows per year
- Much of SS infrastructure is between 30 and 100 years old
- Estimates of 1 billion +/- gallons of sewage spilled annually
- “In rivers, streams, and estuaries, the major contaminants contributing to the impairment were pathogens, nutrients, and metals – all contaminants typically found in sewage” - EPA’s National Water Quality Inventory Report.

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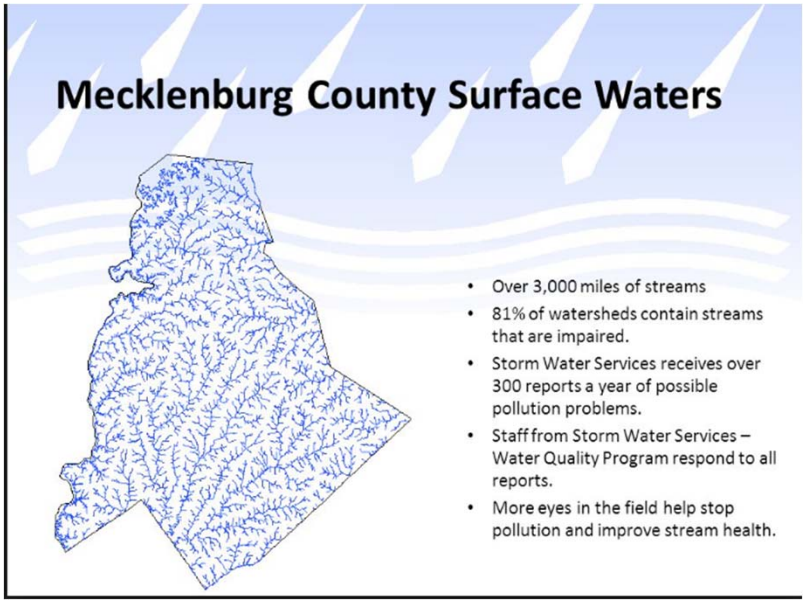
Photo Courtesy of the Catawba Riverkeeper

Charlotte Water Example

- 4,200 Miles of Wastewater Mains
- Over 3,000 miles of streams



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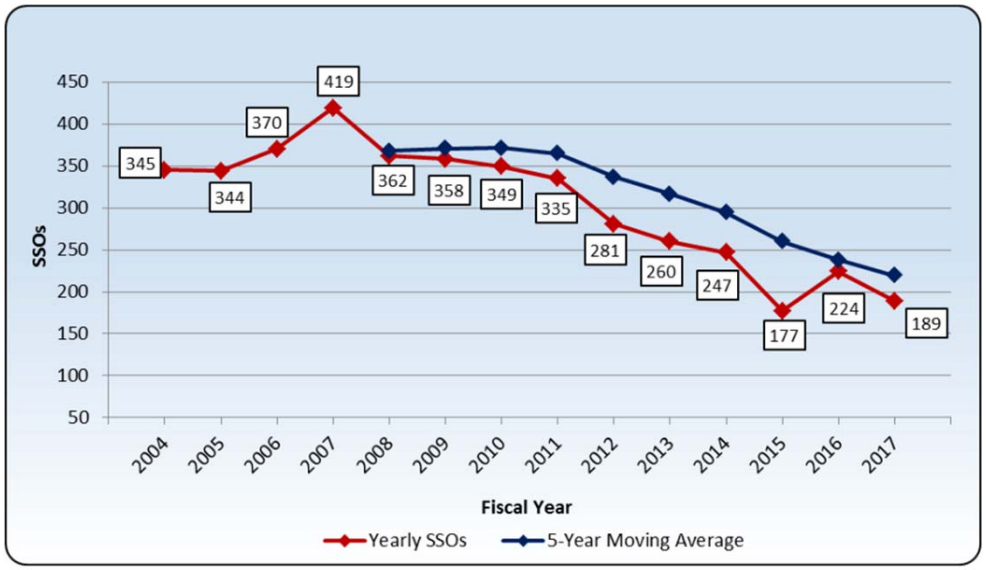
Charlotte Water Assistance

- CW maintenance staff identify stability issues
- Send locations of most concern to KH to assess
- Prioritize sites based on risk of failure
- CW authorizes design and repair
- Currently designing 16 separate stabilization/infrastructure protection sites
- 8 have gone to construction over past year



Charlotte Water annual SSOs

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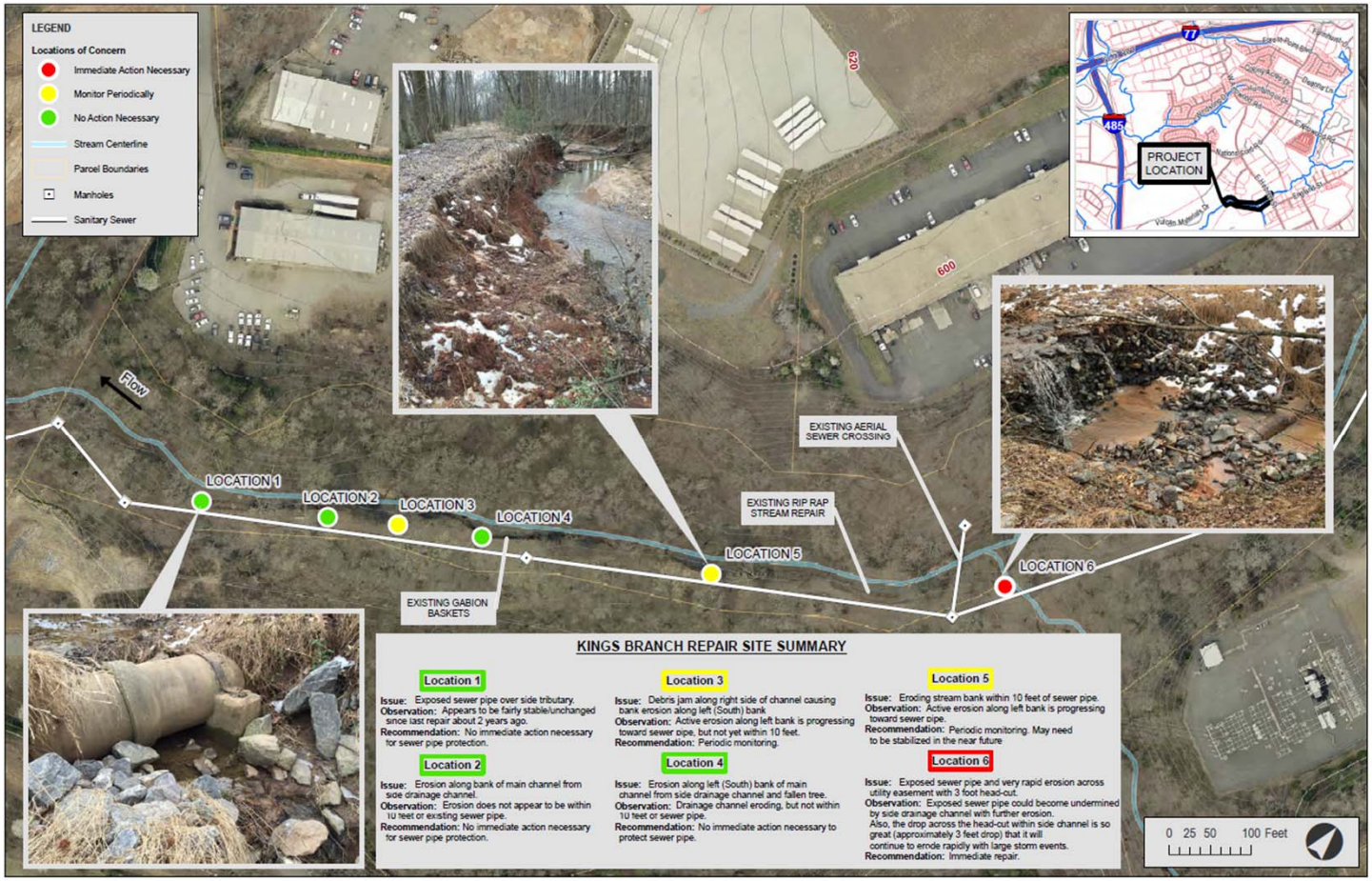
Image Courtesy of the Catawba Riverkeeper

Reach Assessment and Prioritization



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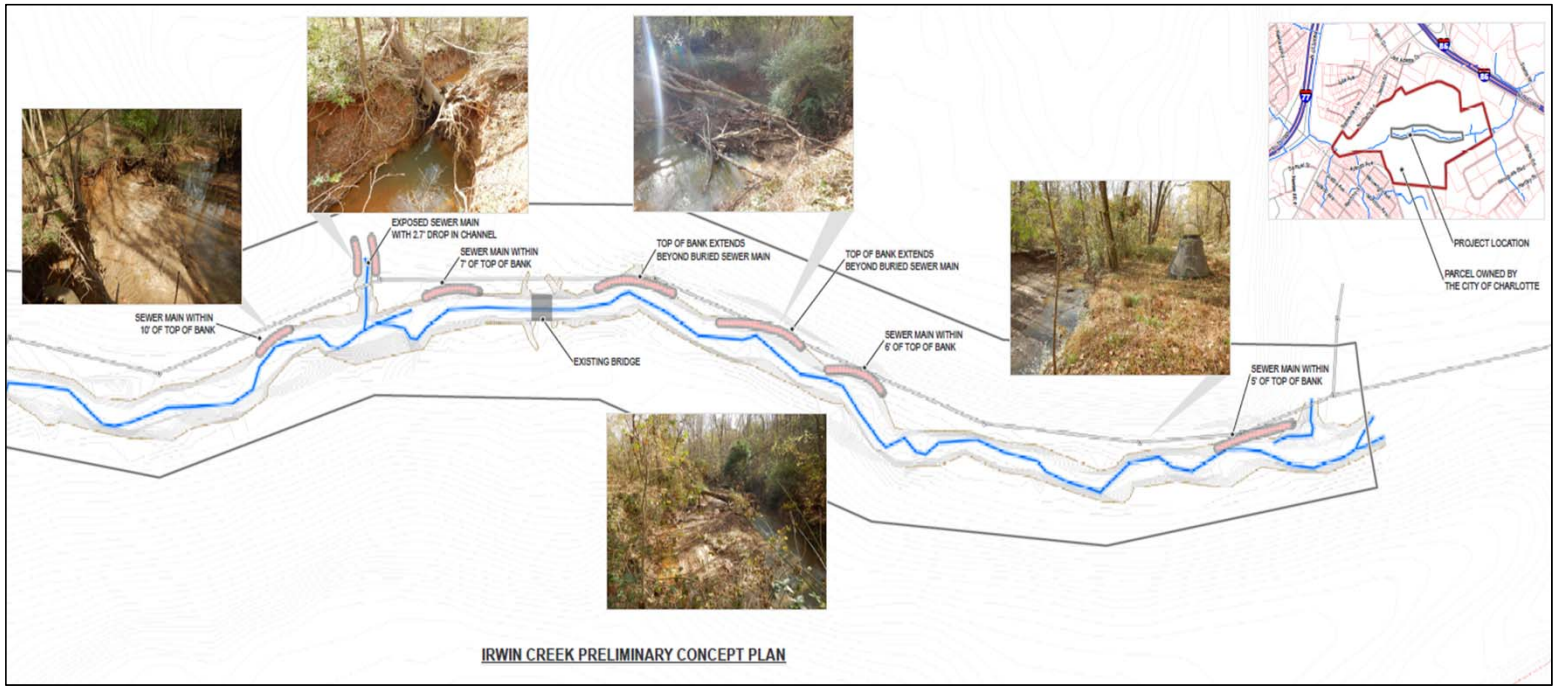
Utilizing LiDAR and GIS to Locate Potential Failures



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Fourmile Creek

- Identified as one of 16 locations by maintenance staff
- Accelerated erosion of about 12” lateral movement per year
- 10-year storm event contained within banks (very incised)

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Fourmile Creek – Before

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Fourmile Creek – Before

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Fourmile Creek - Construction Costs

- First designed as boulder toe protection with rock vane, and associated stone armoring for structure.
- Construction entrance/haul road was along sanitary sewer easement
- Only access was through private asphalt road
- Stream contractor was responsible for repairs
- First bids averaged $230,000
- Re-designed as toe-wood protection and vegetated soil lifts
- Re-bid price came in at $78,000

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Fourmile Creek

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Fourmile Creek – After Hurricane Matthew

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Fourmile Creek

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Fourmile Creek

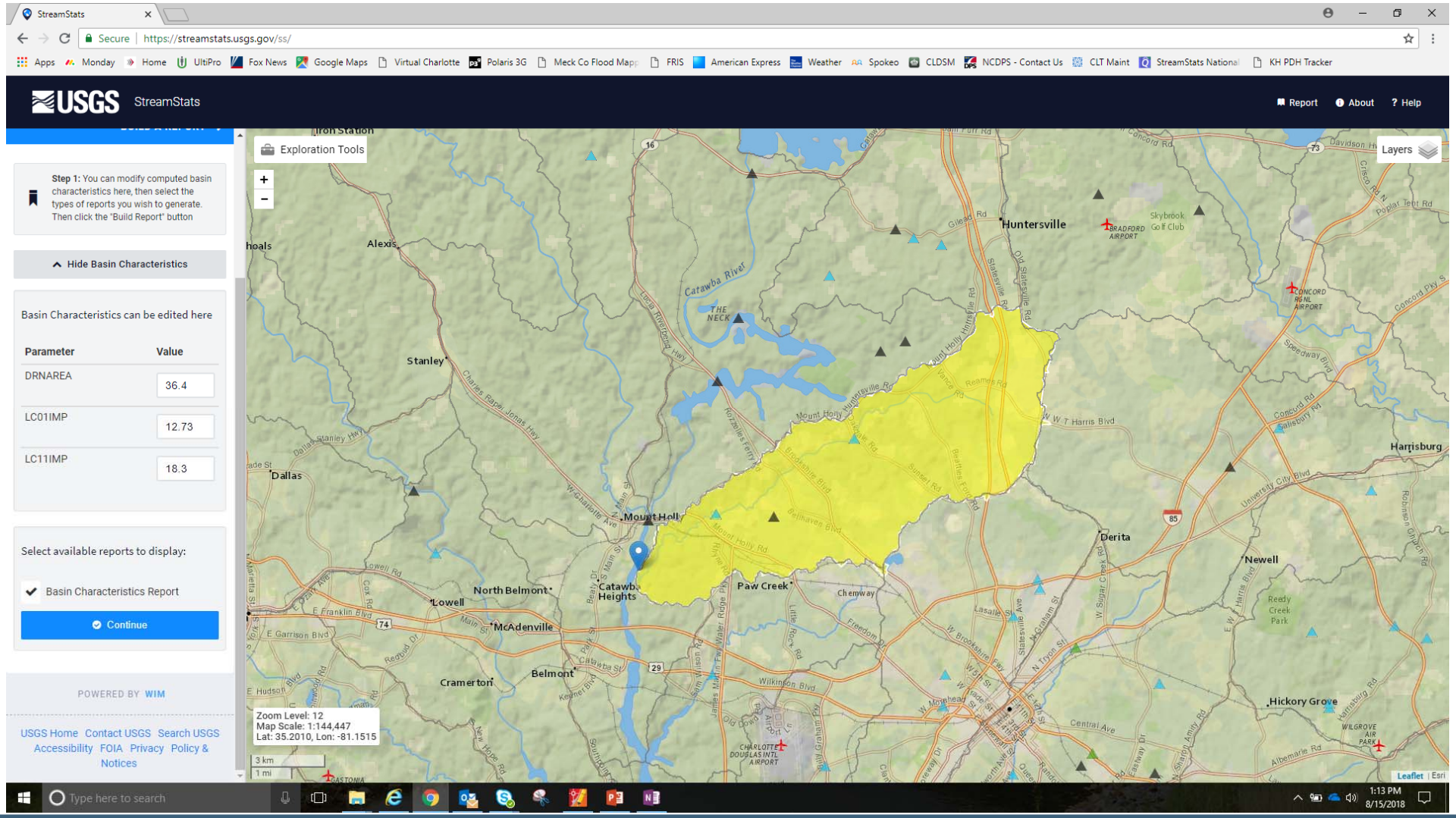
Fourmile Creek

Force Main Conflict

- 24” Force Main, 80 PSI
- 1.2 square mile drainage area for stream


Colonial
Construction Materials

Long Creek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USGS StreamStats
Report
About
Help
Exploration Tools
Layers
Step 1: You can modify computed basin characteristics here, then select the types of reports you wish to generate. Then click the "Build Report" button
Hide Basin Characteristics
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Catawba Heights
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Long Creek - Before

- What Happened
- Includes 3,100 linear feet of channel re-location
- Qualified for Clean Water Management Trust Fund Grant

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Long Creek - Before

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Long Creek - Before

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Long Creek – During Construction

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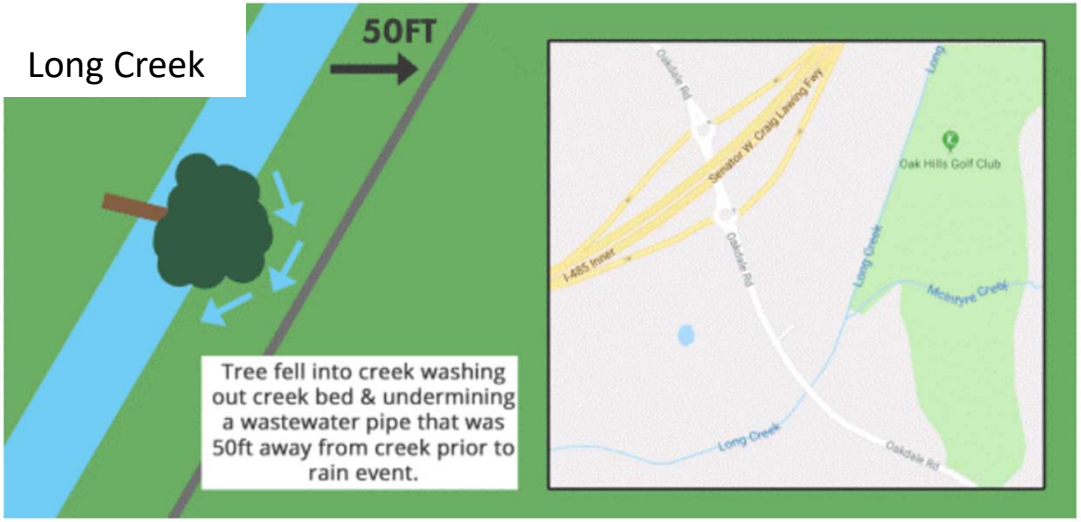
Recent Spill Example

- 15.4 million-gallon (47 acre-feet) raw sewage
- Hard to predict (tree fell causing erosion)
- Prevention costs 10% of fixing after a spill (not counting environmental damage)



Depiction of how creek flow washed away the soil around a sewer pipe, causing it to collapse and spill.

Image Source: Catawba Riverkeeper

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Recent Spill Example

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Recent Spill Example

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Other Examples – Mallard Creek

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Other Examples

Other Examples

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Other Examples

Other Examples

Thank You

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