North Central Texas Watershed Stakeholders Virtual Meeting

March 23, 2022

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Prepared in cooperation with the
Texas Commission on Environmental Quality and
U.S. Environmental Protection Agency

North Central Texas Council of Governments
Environment & Development

www.nctcog.org/WaterResources

Procedures for Virtual Meeting

- All registrants and attendees will receive an email with the presentation slides.
- Please keep your microphone on mute during the presentations to prevent feedback.
- Thank you!

Presentation

Speakers

Kathy Jack, Ph.D.

Dallas Healthy Cities Program Director

The Nature Conservancy, Texas Chapter

Fouad Jaber, Ph.D.

Professor, Extension Specialist

Texas A&M AgriLife Extension Service

Tentative Speaker:

Susan Alvarez, P.E., CFM

Assistant Director

Office of Environmental Quality & Sustainability

City of Dallas

Green Stormwater Infrastructure for Urban Flood Resilience

Opportunity Analysis for Dallas, Texas

Kathy Jack, Ph.D. ,
The Nature Conservancy

Fouad Jaber, Ph.D., P.E,
Texas A&M AgriLife Extension

Susan Alvarez, PE, CFM,
City of Dallas - OEQS

Nature.org/DallasGSI
Executive Summary

The Nature Conservancy

Texas A&M AgriLife Extension

Analysis and report produced by The Nature Conservancy (TNC) and Texas A&M AgriLife Extension, in collaboration with the City of Dallas and The Trust for Public Land (TPL). This analysis was made possible with the support of Lyda Hill Philanthropies.

Kathy Jack, Ph.D.

Fouad Jaber, Ph.D., P.E.
Bardia Heidari Ph.D., E.I.T.
Victoria Prideaux

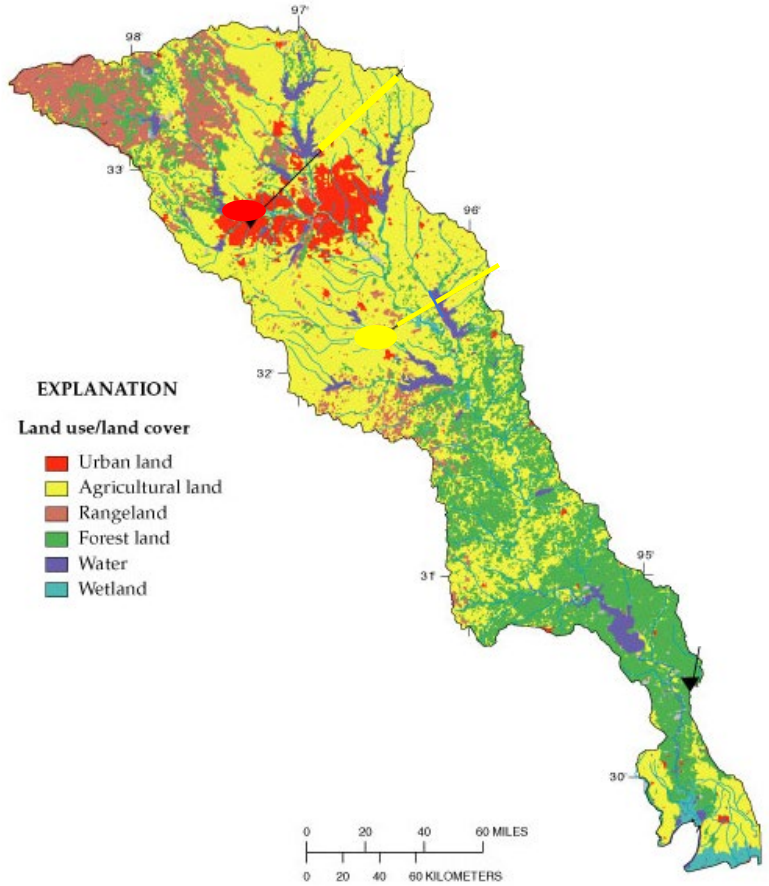
Susan Alvarez, P.E., CFM

Sarah Standifer
Kim Dewailly, P.E., CFM
Stephen Parker, P.E., CFM
David Phan, P.E., CFM

Mitch Hannon
Nick Viau
Robert Kent
Molly Plummer

The Challenge: Impervious Cover & Stormwater

Dallas-Fort Worth is the fastest growing metropolitan area in the United States (U.S. Census Bureau, 2020). With rapid and widespread conversion of natural land cover to impervious surfaces.



Trinity Basin Land Uses. Adapted from USGC.

KJ

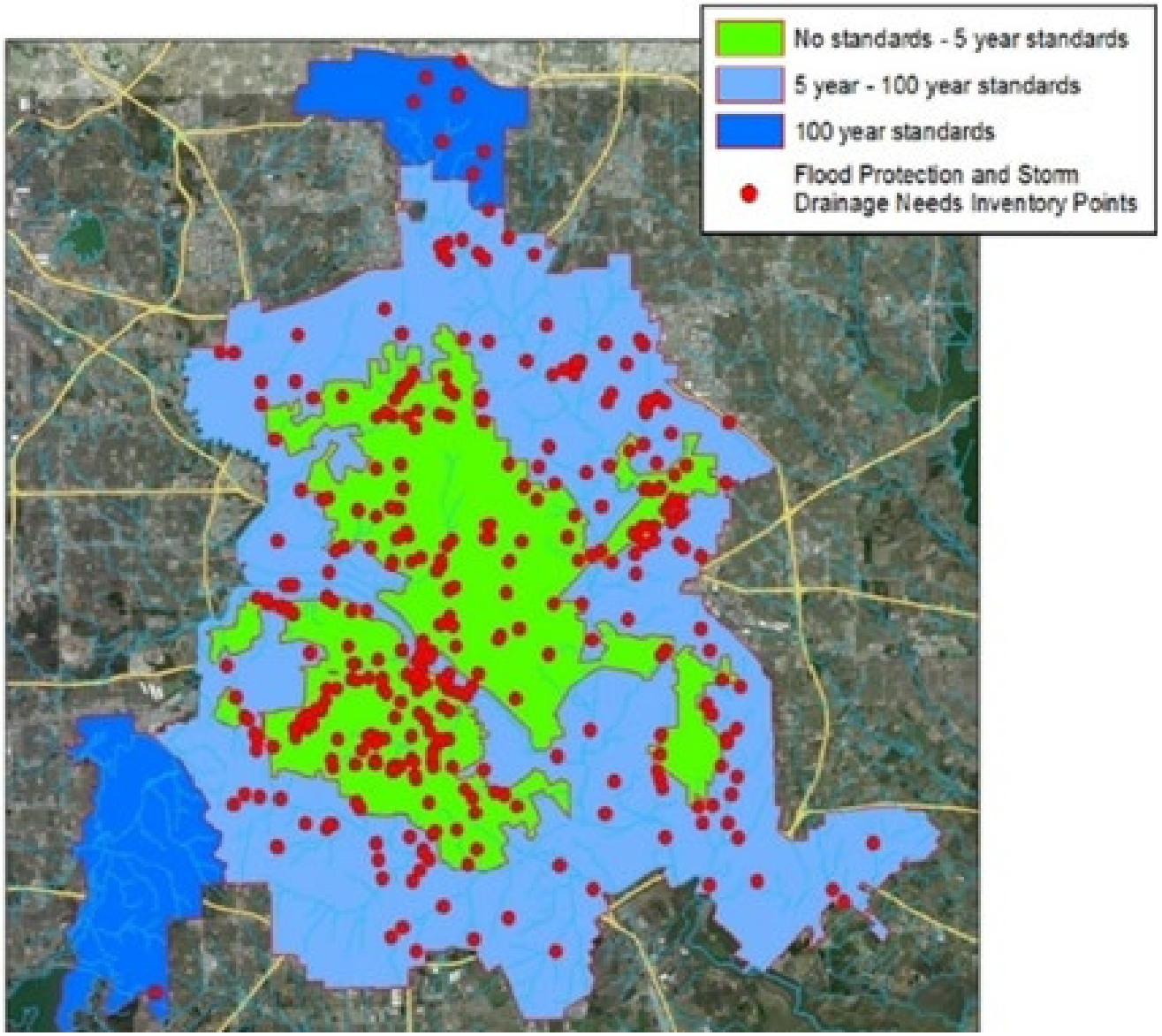
The Challenge: Climate Change

- "This last year has proven that climate change is no longer a distant threat; its effects are happening right now, in real-time." (Dr. Katharine Hayhoe, Chief Scientist for the Nature Conservancy)
- "It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred."(IPCC AR6)
- Texas leads the country in federally declared natural disasters[1] and "Texas has seen its number of natural disasters increase by 244% over the past four decades."[2] ([1]Congressional Research Services, 2017; [2] Insurancenews.net. January 9, 2020).
- Texas is expected to see "increases in the magnitude and frequency of heavy precipitation," due to climate change, which " will place more stress on existing water resource infrastructure." (U.S. Global Change Research Program, Fourth National Climate Assessment (NCA4), 2018)
- By 2036, flooding in our cities is estimated to become up to 50% more frequent, and projections show that floodplains are already expanding in real-time across many parts of the state. (Texas A&M University. Office of the Texas State Climatologist. Assessment of Historic and Future Trends of Extreme Weather in Texas, 1900-2036)

KJ

The Challenge: Outgrowing Drainage Networks

Most of the drainage needs in the City are associated with areas developed prior to current Drainage Standards



Total City-wide Estimated Needs:
$2.1 B

2017 Drainage Bond Proposition:
$48.75 M

City of Dallas

City of Dallas Drainage Standards & Needs Inventory

SA

The Opportunity: Natural Solutions

- Cities across the world are increasingly utilizing green stormwater infrastructure (GSI) practices, engineered plant and soil systems that recreate natural hydrological processes, to enhance stormwater management in urbanized watersheds.

- In addition to improving water quality, GSI can provide an important and cost-effective tool to enhance urban flood management.

The Nature Conservancy

Texas A&M AgriLife Extension

Dallas Environmental Quality & Sustainability

City of Dallas

The Trust for Public Land

KJ/ SA

City of Dallas- GSI

Since 2007, The City has worked to better integrate GSI, into City planning and design manuals, and to support regional efforts.

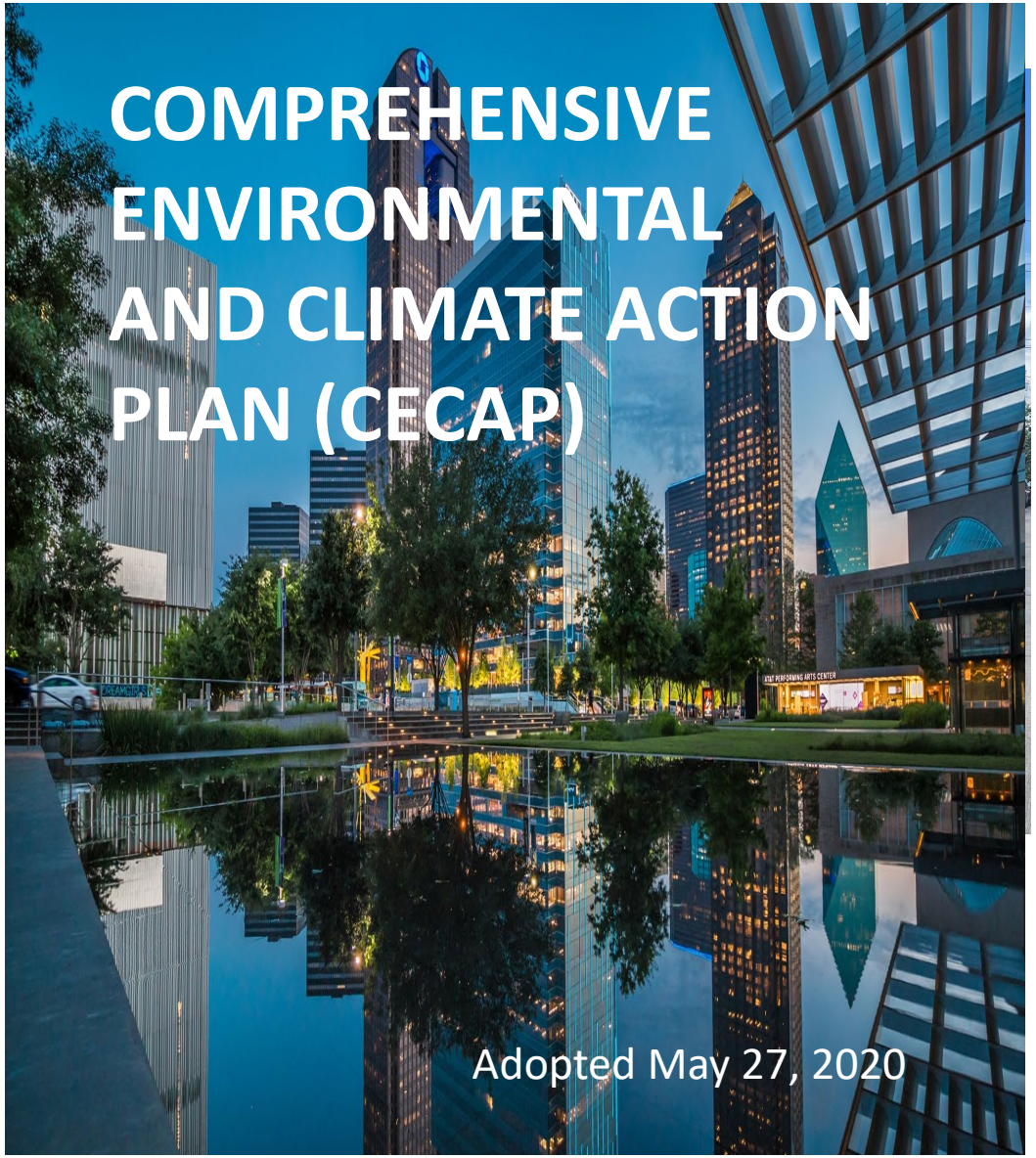
- iSWM- voluntary
- USEPA report on GSI Barriers and Opportunities.
- Impervious surface drainage fees
- Complete Streets; Green Streets
- *Resilient Dallas*
- iSWM in Paving, Street and Drainage Design Manuals

Sidewalk bioretention areas in Deep Ellum. © Katy Evans/ City of Dallas

City of Dallas

SA

City of Dallas



CECAP GSI Goals

- **Incorporate green infrastructure** to mitigate adverse impacts of development. (WR10)
- Establish **urban greening factor** that quantifies stormwater benefits. (EG1)
- **Increase and improve access to Green Space** to reduce impacts of urban heat islands, localized flooding, and improve public health. (EG1)
- **Assess opportunities for Blue-Green Infrastructure** in the Public realm to reduce flood risk. (EG2)
- **Implement green infrastructure programs** that treat the ROW as both a mobility and green infrastructure asset. (T15)

SA

Green Stormwater Infrastructure for Urban Flood Resilience: Opportunity Analysis for Dallas, Texas.

Research question:

Where can green stormwater infrastructure (GSI) most effectively enhance urban flood management within the City of Dallas, Texas, when considering capacity, cost, and future impacts of climate change?

This study utilized hydrologic modeling (USEPA SWMM v. 5.1) and spatial analysis to help answer this question.

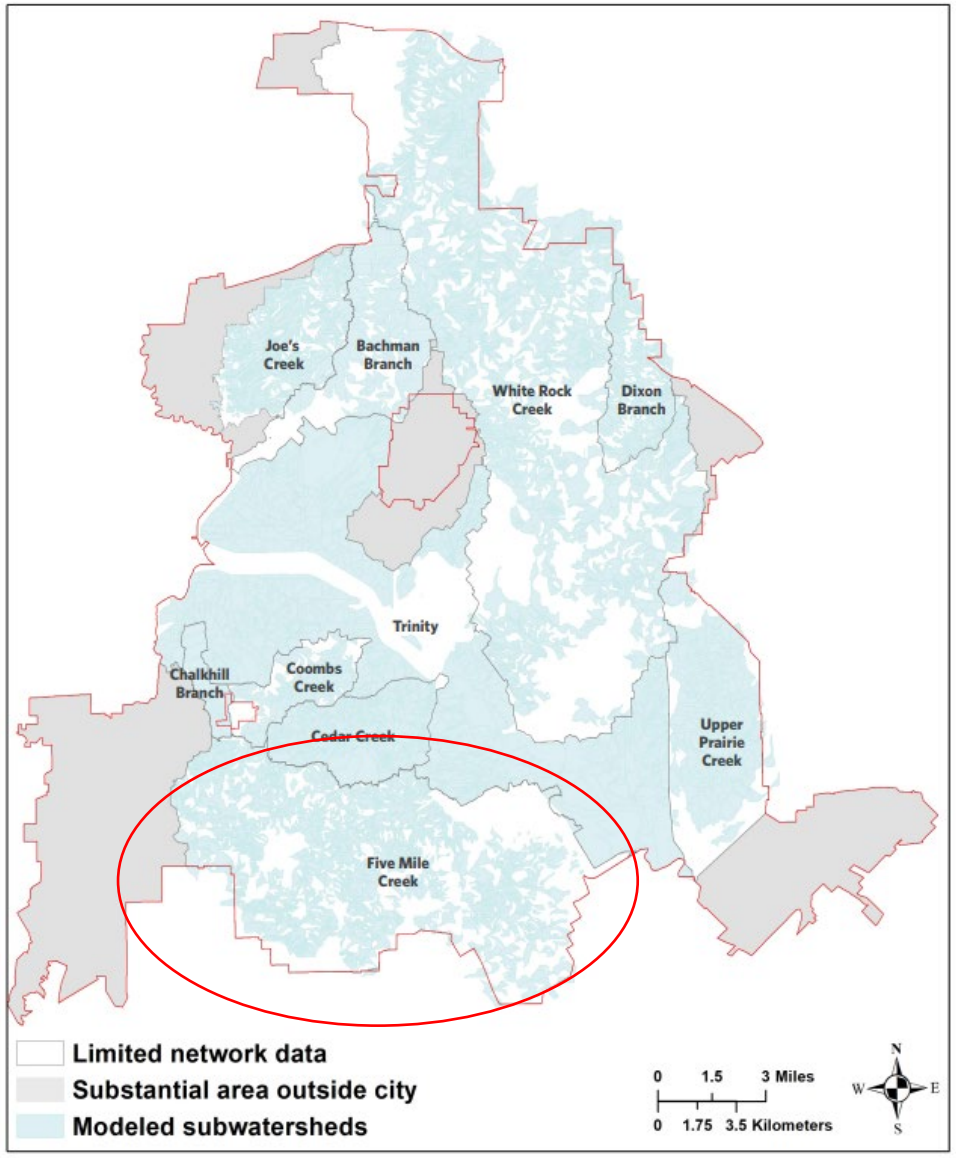
Dallas flooding. © Steven Luu.

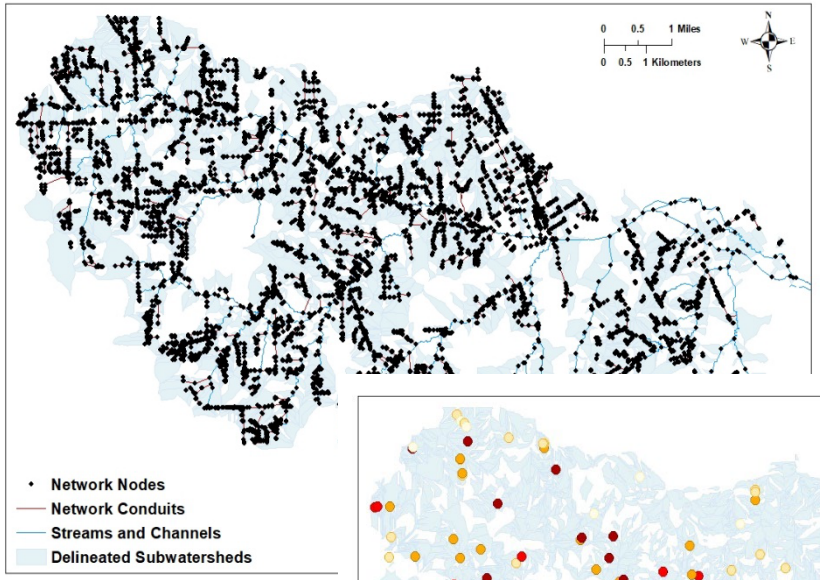
KJ

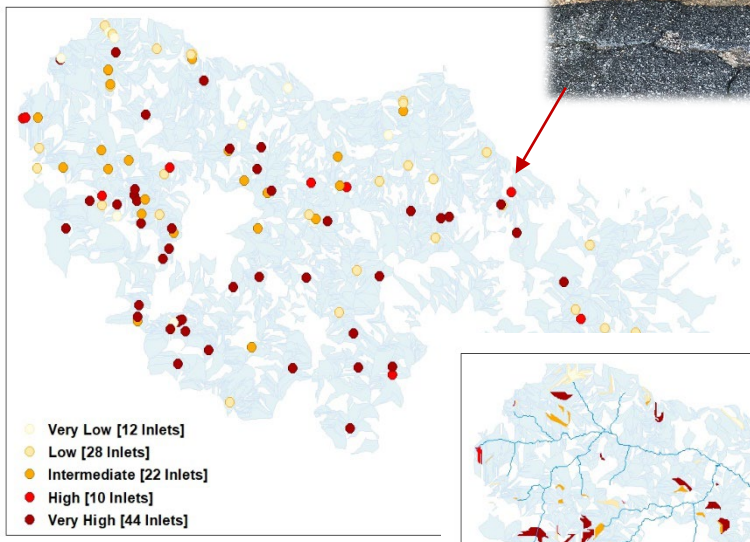
Overview

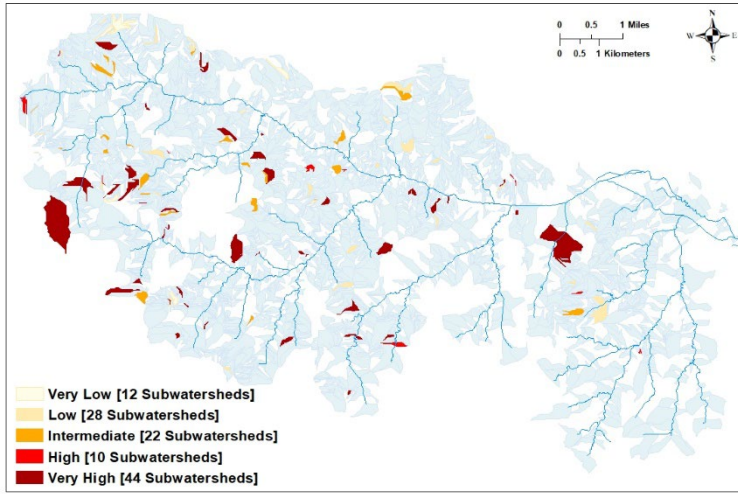
- Part I : Identify System Hotspots, and Challenged Sub-watersheds
- Part II: Identify and Quantify Green Stormwater Infrastructure Opportunities
- Part III: Pre- and Post-GSI Analysis
- Recommendations

Part I : Identify System Hotspots and Challenged Sub-watersheds





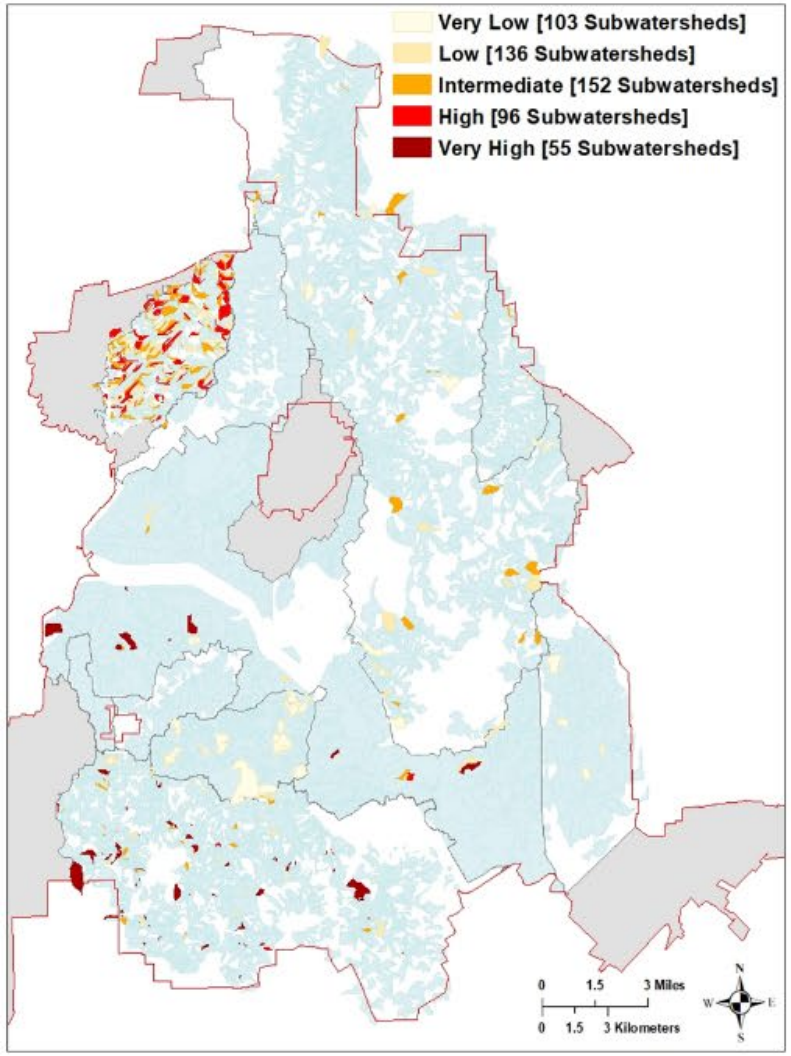




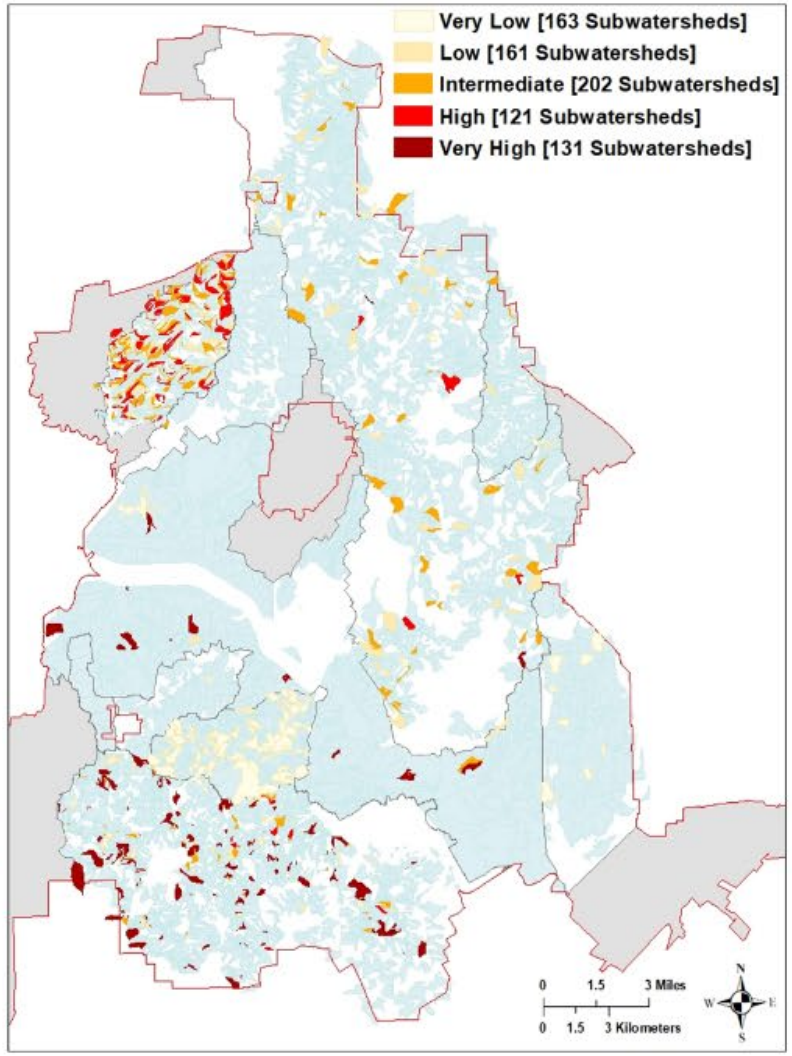
The study was limited to areas with complete stormwater drainage system, and included a total of 118,418 acres, or 53% of watershed area within the City.

KJ/FJ

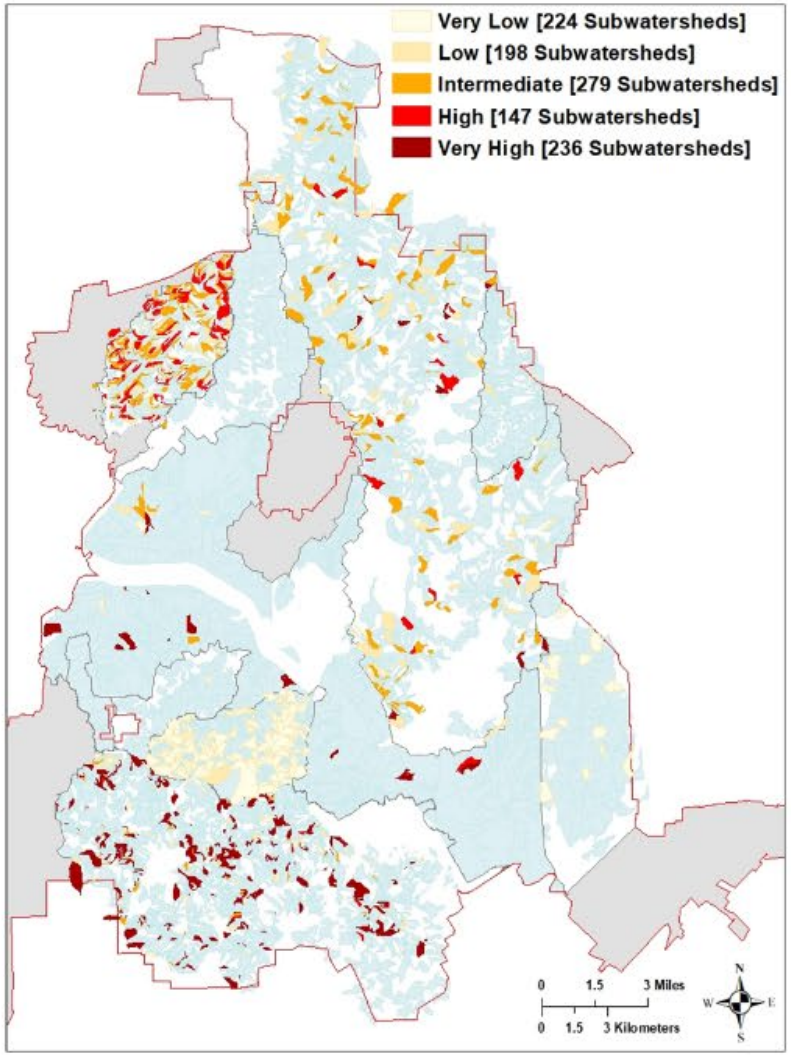
Part I : Identify System Hotspots and Challenged Sub-watersheds



2-year (50%)

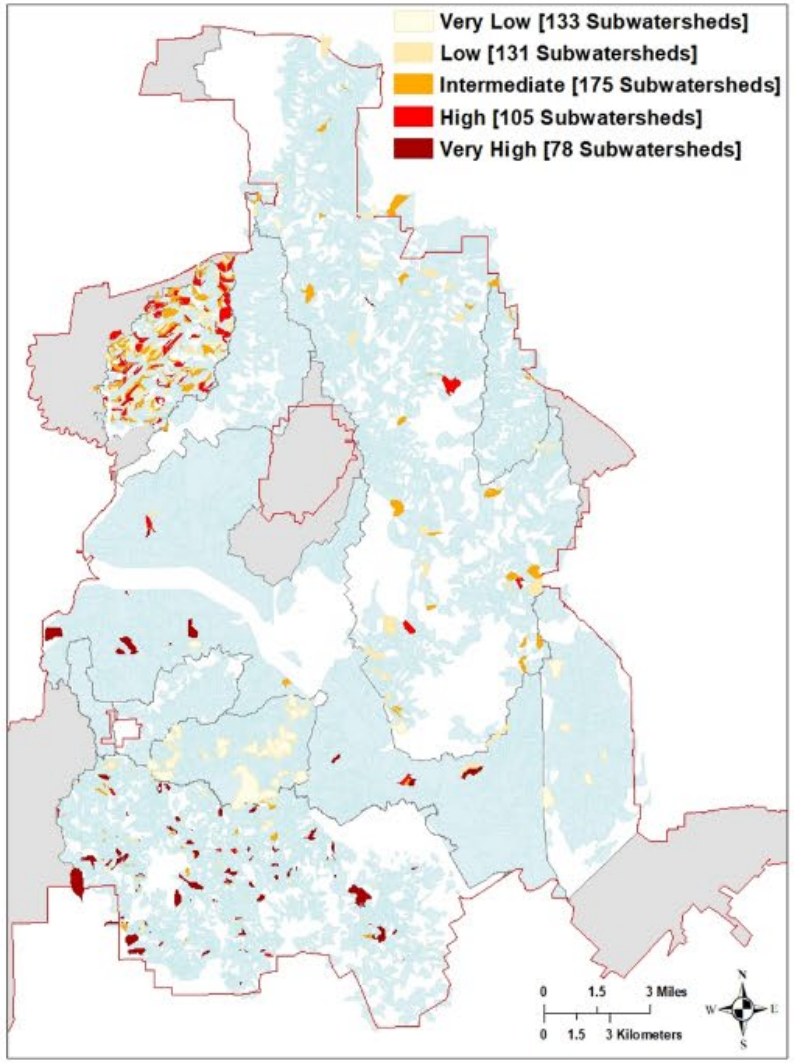


10-year (10%)

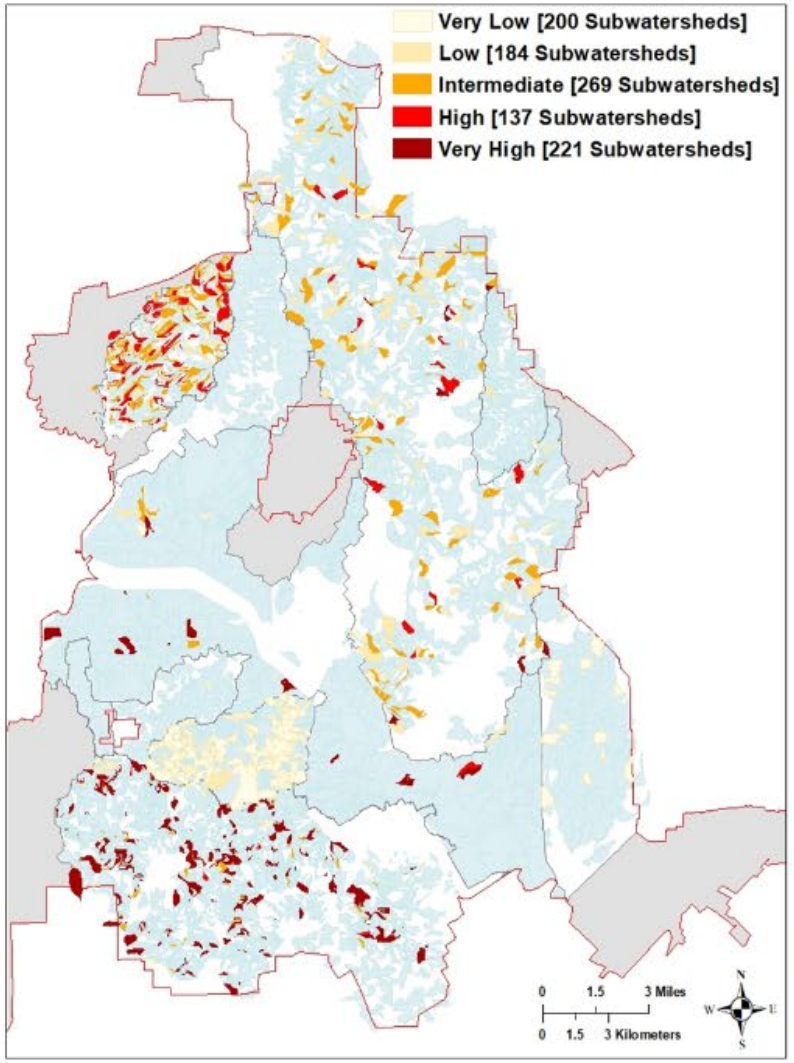


100-year (1%)

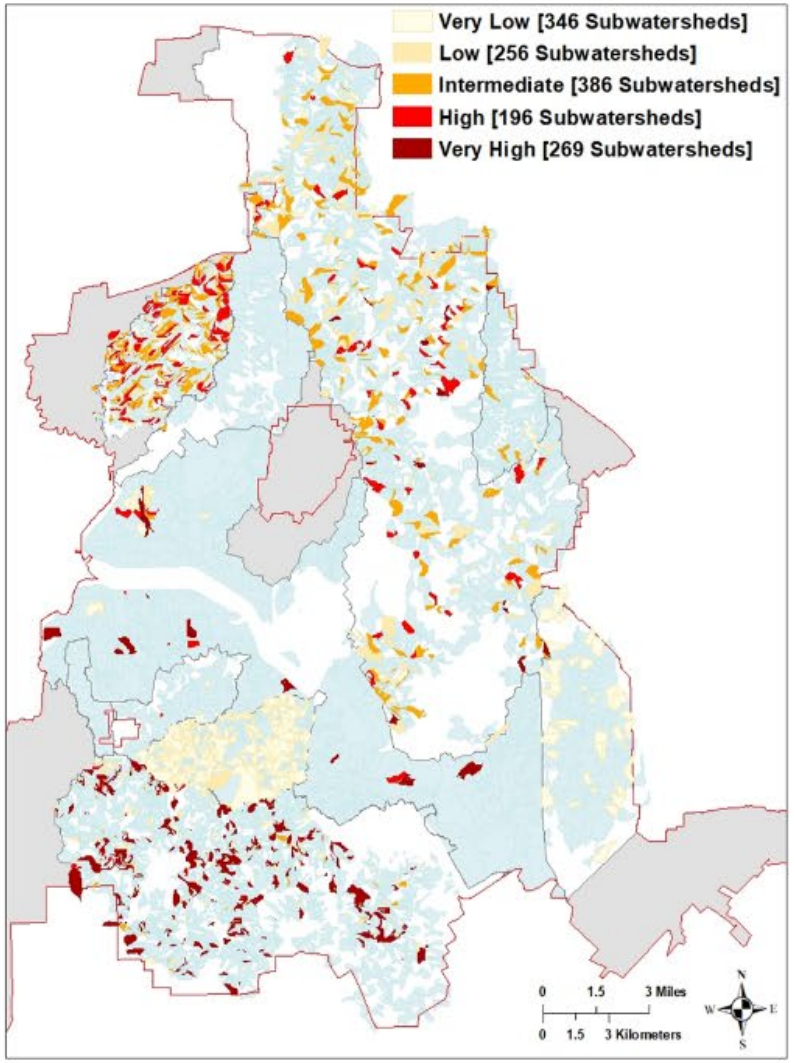
Challenged Subwatersheds, Classified by Severity of Inlet Overflows, as Modeled for Return Period Storms, **Current Conditions**



2-year (50%)



10-year (10%)



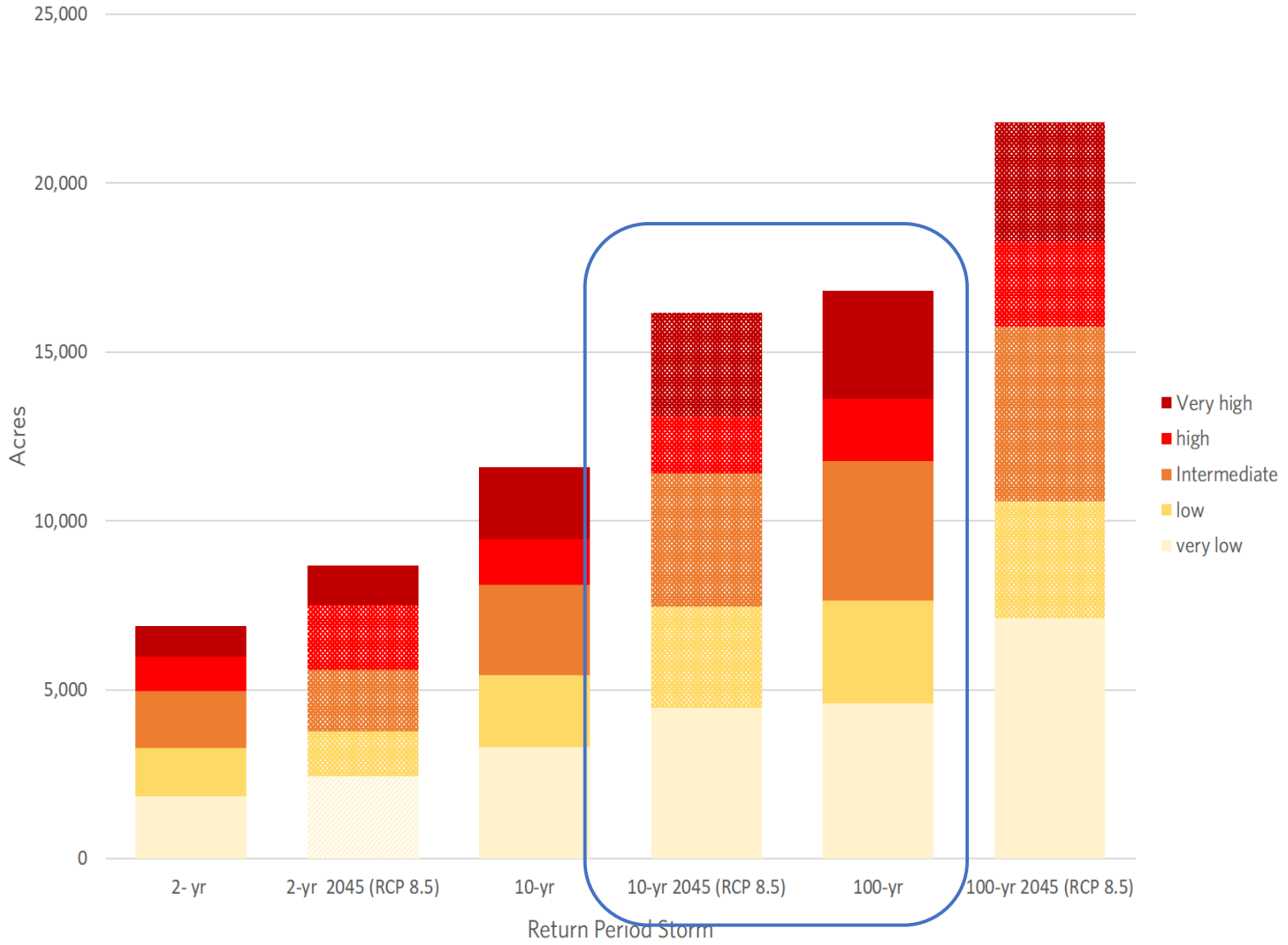
100-year (1%)

Challenged Subwatersheds, Classified by Severity of Inlet Overflows, as Modeled for Return Period Storms,

Forecasted Conditions (2045)

Part I: Key Findings

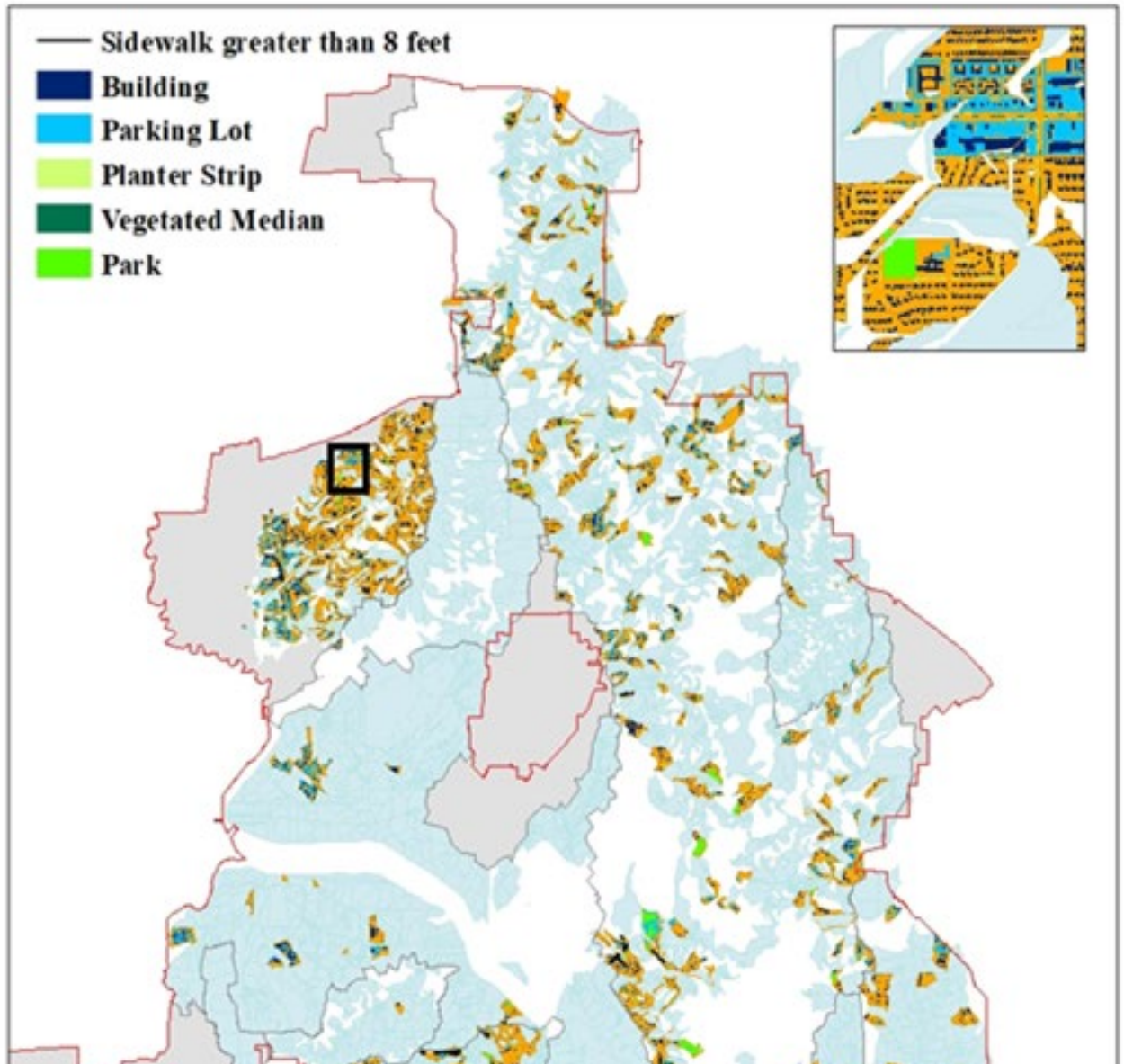
- Identified areas of concern.
- More precipitation will lead to more and more severe, system hotspots and contributing subwatersheds.
- Climate change will result in an average increase in the number of system hotspots (+26%) and area of challenged watersheds (+30%)
- Precipitation amounts and hotspots for the 10-year storm forecasted for 2045 resemble those for today's 100-year storm.



Challenged Subwatershed Area (acres), Classified by Severity of Inlet Overflows, as Modeled for Return Period Storms, Current and Forecasted Conditions

KJ

Part II: Identify & Quantify Green Stormwater Infrastructure Opportunity



Bioretention areas

Raingarden

Rainwater Harvesting

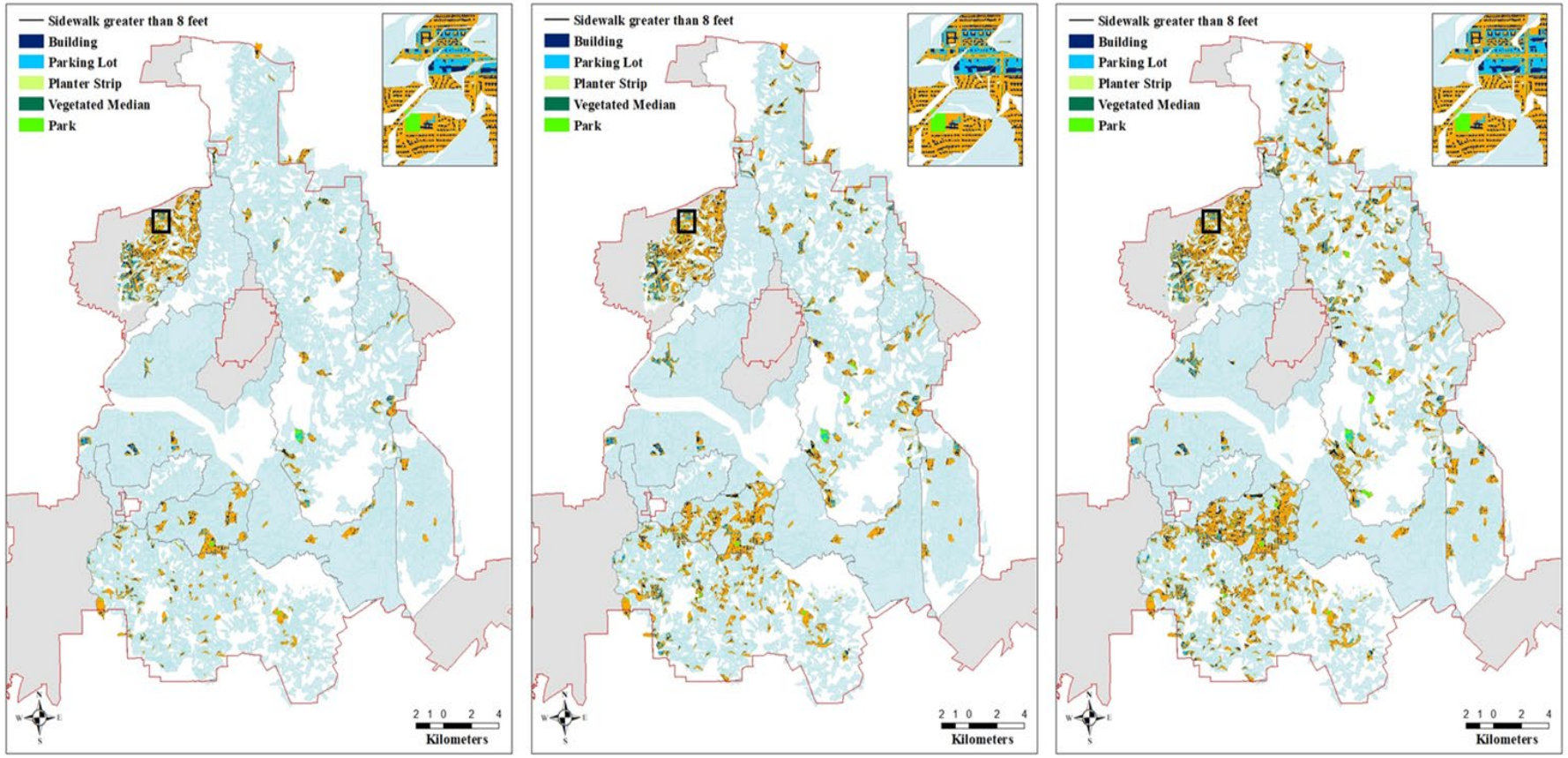
FJ

Part II: Identify and Quantify Green Stormwater Infrastructure Opportunities

	BIORETENTION AREAS	RAIN GARDENS	RAINWATER HARVESTING CISTERN
Design criteria	1ft^2=1.5 ft^3=11.2 gal	1 ft2 = 0.5ft3 = 3.7 gal	1 tank= 750 gal (1000-gal tank, 75% empty)
Spatial criteria	apply following (%) to available area. • Parking lots (10%) • Parks and Trails (10%) • Planting Strips and Medians (35%) • Commercial sidewalks nonresidential sidewalks, > 8 ft wide. (35%)	• Residential and Commercial structures: a (100%), a 200 ft2 rain garden, each	• Residential and Commercial structures: a (100%), a 1,000-gal cistern each
Construction costs (20% engineering)	$17.70/ft2	$12.72/ft2	$2.09/gal
Estimated costs per gallon (no maintenance)	$1.58/gal	$3.44/gal	$2.09/gal
Estimated costs per gallon (with maintenance)	$1.76/gal	$4.78/gal	$2.63/gal

Part II: Identify & Quantify Green Stormwater Infrastructure Opportunity

2-year (50%) | 10-year (10%) | 100-year (1%)



- Identified substantial opportunities to deploy GSI.
- Bioretention areas—particularly in parking lots—have the most widely available siting opportunities and represent the "biggest bang for the buck."

Estimated Maximum Stormwater Volume Capture Capacity for GSI in challenged sub-watersheds, Based on Standard System Designs and Spatial Criteria

2-year (50 %)	GSI TOTAL	111.2 MG
	Bioretention	78.4 MG
	Raingarden	16.4 MG
	Rainwater Harvesting	16.4 MG

10-year (10 %)	GSI TOTAL	191.6 MG
	Bioretention	135.6 MG
	Raingarden	28.1 MG
	Rainwater Harvesting	27.9 MG

100-year (1 %)	GSI TOTAL	284.7 MG
	Bioretention	200.9 MG
	Raingarden	42 MG
	Rainwater Harvesting	41.8 MG

Part II: Identify and Quantify Green Stormwater Infrastructure Opportunities

Estimated Stormwater Management Capacity Potential Reduction of Modeled Overflows, and Costs per Gallon Captured by GSI, per Storm Event

WATERSHED	2-Year (50%) CAPTURE CAPACITY/EVENT (MG)	2-Year (50%) OVERFLOW REDUCTION (%)	2-Year (50%) AVERAGE COST ($/GAL)[c]	2-Year (50%) AVERAGE COST WITH MAINTENANCE ($/GAL)	10-Year (%10) CAPTURE CAPACITY/EVENT (MG)	10-Year (%10) OVERFLOW REDUCTION (%)	10-Year (%10) AVERAGE COST ($/GAL)[c]	10-Year (%10) AVERAGE COST WITH MAINTENANCE ($/GAL)	100-Year (1%) CAPTURE CAPACITY/EVENT (MG)	100-Year (1%) OVERFLOW REDUCTION (%)	100-Year (1%) AVERAGE COST ($/GAL)[c]	100-Year (1%) AVERAGE COST WITH MAINTENANCE ($/GAL)
Bachman	No overflow				No overflow				No overflow			
Cedar Creek[b]	11.9	49%	2.3	2.9	27.9	0.4	2.3	2.9	47.0	23%	2.2	2.8
Chalk Hill	No overflow				No overflow				No overflow			
Coombs Creek	No overflow				0.2	33.9%	2.3	2.9	0.2	21.4%	2.3	2.9
Dixon[a]	0.3	58.9%	1.7	2.0	1.1	37.0%	2.0	2.4	1.1	19.5%	2.0	2.4
Five Mile[a,b]	15.5	35.9%	1.9	2.2	38.7	29.1%	1.9	2.2	55.5	19.4%	1.9	2.2
Joe's[a,b]	51.4	29.1%	1.9	2.3	56.6	19.6%	1.9	2.3	61.7	12.4%	1.9	2.2
Trinity	10.9	25.8%	1.7	1.9	15.0	19.4%	1.7	2.0	18.6	12.8%	1.7	1.9
Upper Prairie	1.7	20.9%	2.1	3.1	5.0	16.2%	2.1	2.6	11.0	10.6%	2.1	2.6
White Rock[b]	19.5	28.7%	2.0	2.4	47.3	28.7%	1.9	2.3	89.5	20.6%	1.9	2.3
City of Dallas TOTAL	**111.2**	**31%**	**1.9**	**2.4**	**191.6**	**25%**	**2.0**	**2.4**	**284.5**	**17%**	**2.0**	**2.4**

Gray (Pipe) Infrastructure	**414.4**	**24.6%**	**10.6**
Green & Gray Infrastructure	**699.1**	**41.5%**	**7.1**

[a] Problematic watersheds as identified by the City of Dallas watersheds.
[b] Key Opportunity watersheds identified in the analysis.
[c] Maintenance not included.

- GSI reduced modeled overflows for all storms (17-31% reduction).
- GSI is 77% less costly than upgrading gray infrastructure alone, to meet modelled overflows.
- Combination of green and gray provides the maximum cost-effective benefits.

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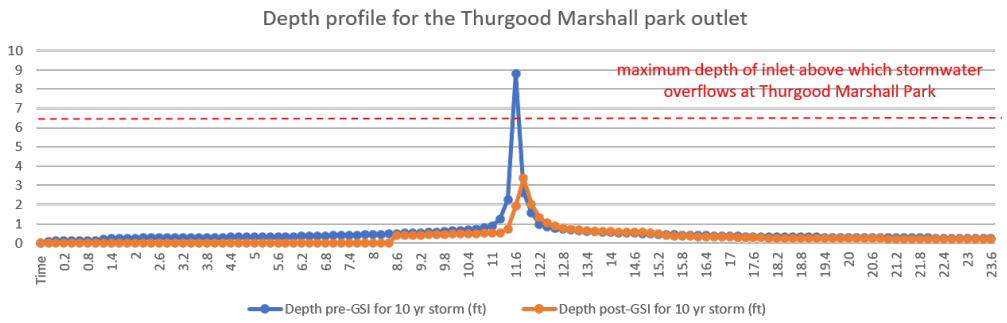
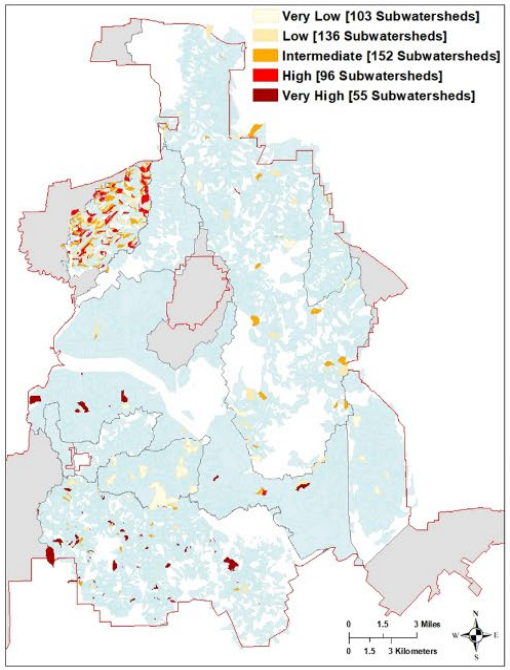
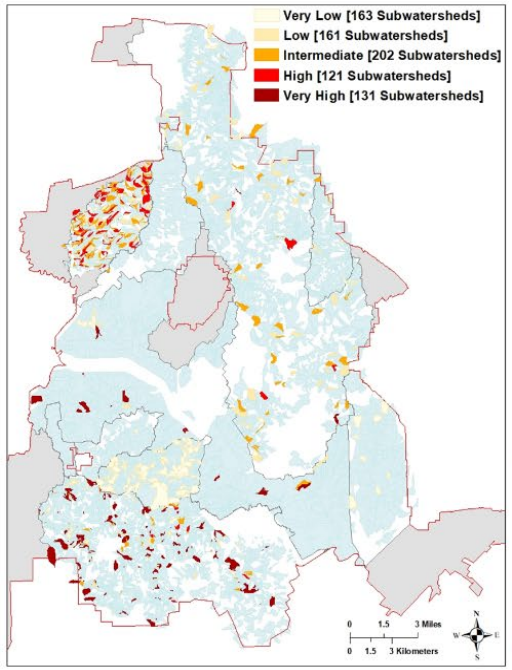
Part III: Pre- and Post-GSI Analysis

- Reduction in hotspots and challenged subwatersheds.
- Less severe flooding.
- Substantial peak flow reduction and delay resulting from GSI

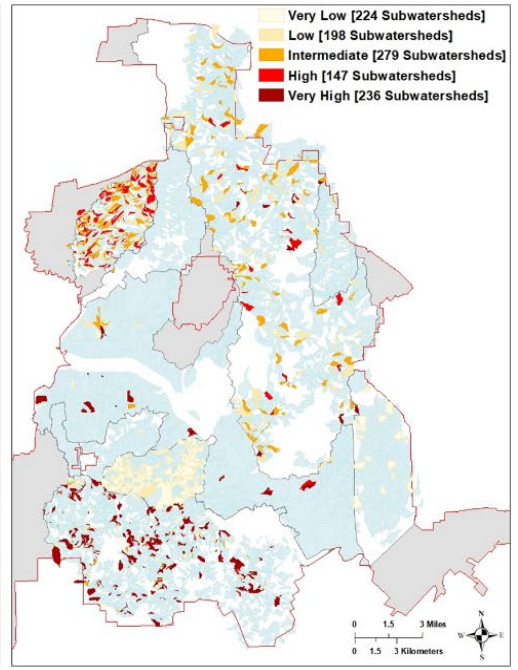




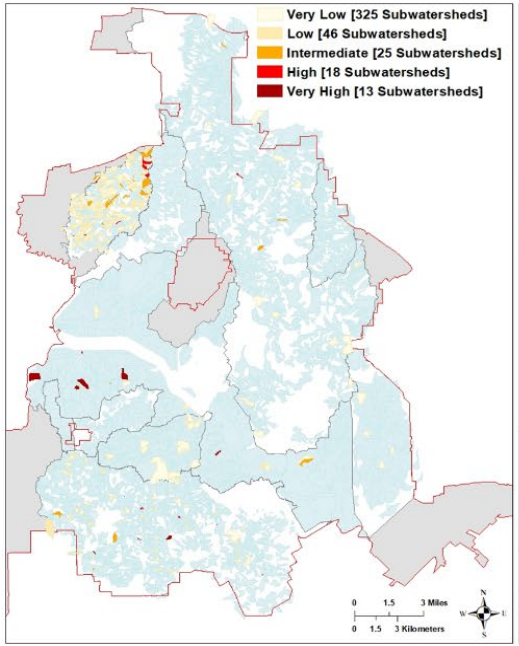
2-year (50%)

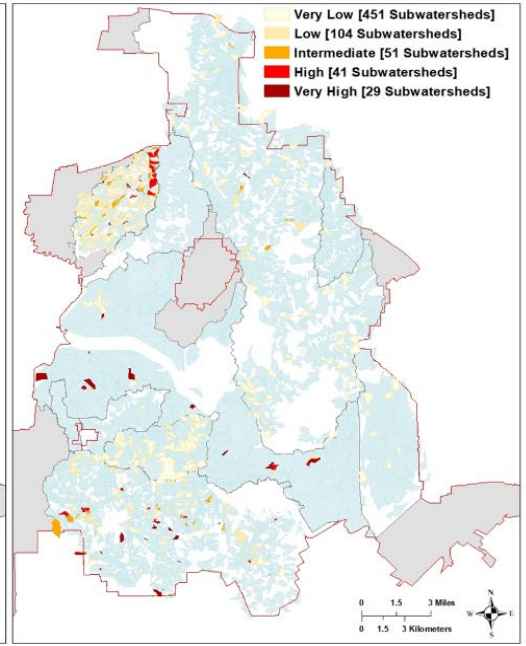


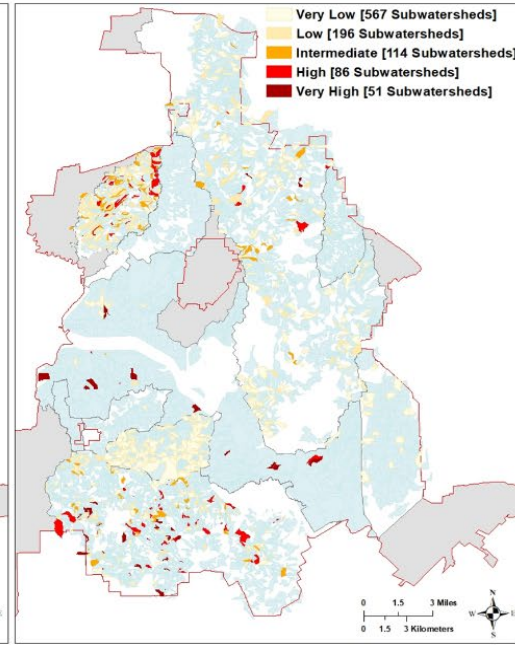
10-year (10%)



100-year (1%)







FJ

Overall

- When comprehensively deployed in the fabric of a City, GSI can achieve substantial cost-effective flood management benefits, particularly in combination with gray solutions.

- GSI should be considered for stormwater management from site to scale.

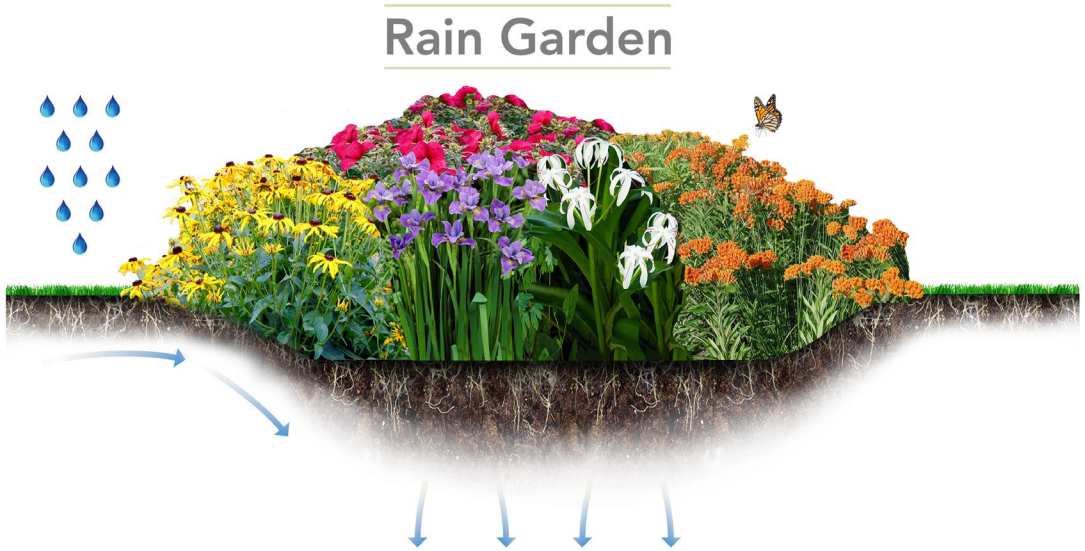
- Together with additional “greening” interventions— GSI can support multiple community health and resilience goals, by enhancing urban flood management, improving water quality, reducing urban heat island impacts, and improving ecological function of city landscapes.

KJ

Application & Next Steps

- GIS layers have been integrated into TPL's Smart Growth decision-support tool for consideration with additional data and planning objectives, including equity and land-use.

- Outputs shared with additional City departments and stakeholders to evaluate planning and policy opportunities, and consideration with complementary datasets, including with parking ordinance.



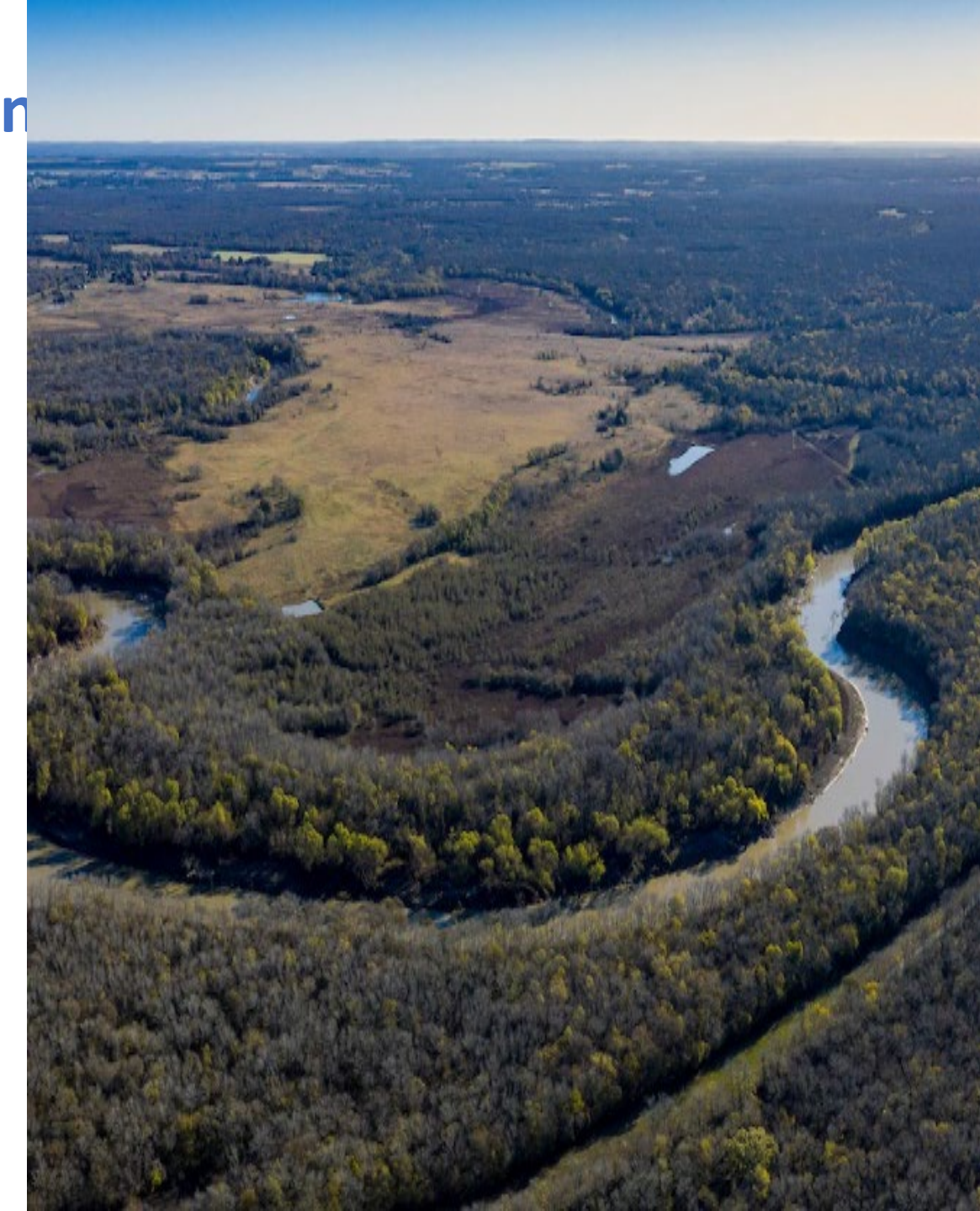
Additional Efforts: NBS for Flood Resilience

The Nature Conservancy

Floodplain Protection & Prioritization

- Protection and restoration of floodplains, wetlands, and natural infrastructure provides important- often cost effective- flood mitigation, water quality and ecosystem benefits-for people and nature.

- TNC is Collaborating with the USACE Silver Jackets partner for Fort Worth District (USACE-SWF) to support the protection and restoration of natural areas and greenspace in the floodplain for mitigating flood impacts, reducing risk to communities, improving water quality and ecosystem function and associated community and conservation benefits.



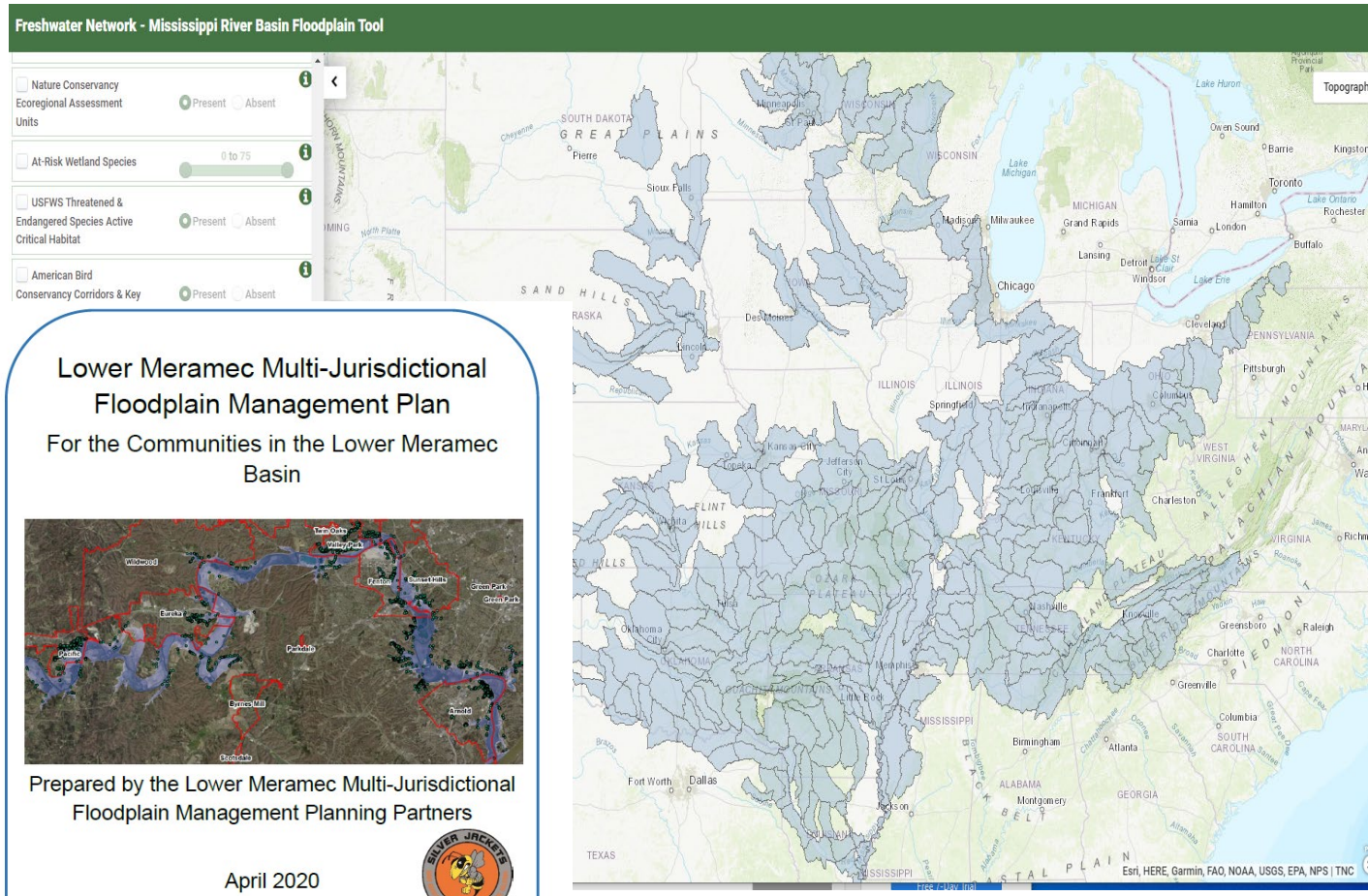
Trinity Floodplain Prioritization Tool

TNC's Floodplain Prioritization Tool (FPPT) helps stakeholders to identify greenspace within the floodplain to protect or restore for multiple benefits.

- Water quality
- Habitat
- Reduction of flood risk

The FPPT was originally built for the Mississippi Basin, but has been adapted for the Lower Meramec, Western Tennessee and now for the Trinity Basin.

- In the Lower Meramec, the FPPT was adapted to support their FMP.
- For the Trinity, the hope is to support Regional Flood Planning and Hazard Mitigation Plans.



Community Rating System Explorer

TNC partners with NOAA to support communities, including in Texas, to reduce FEMA flood insurance rates through greenspace protection; the [CRS Explorer Tool] supports this effort.

The Nature Conservancy

Thank You.

Kathy Jack, Ph.D. ,
The Nature Conservancy
kathy.jack@tnc.org

https://www.facebook.com/natureconservancytexas
https://twitter.com/nature_tx
https://www.instagram.com/nature_tx/

Roundtable

NCTCOG Updates

Trash Free Waters: Project Update

Connecting volunteers to litter cleanup opportunities

TrashFreeTexas.org

North Central Texas Council of Governments

March 23, 2022

TRASH FREE TEXAS

Five Overarching Objectives of Trash Free Waters Project

North Central Texas Council of Governments

The Meadows Center for Water and the Environment
Texas State University

1. Facilitate and foster volunteer cleanup efforts by promoting and enhancing the Trash Free Texas website.
   - **22 new entities have added sites to the TFT AAS Map**
   - **2 new toolkits already added**
   - **New partner graphics and partner website**
   - **"How-to" Video and FAQs added to website**
   - **Trash Free Texas social media**

TRASH FREE TEXAS

Trash Free Texas Adopt-A-Spot Map

22 entities have added sites to the map since project initiation.

- Groundwork Dallas
- Keep Lake Dallas Beautiful
- Keep Midland Beautiful
- Coastal Bend Council of Governments
- Village of Surfside Beach
- Keep Kennedale Beautiful
- Keep Corinth Beautiful
- City of Mansfield
- Keep Grapevine Beautiful
- Keep Rowlett Beautiful
- Keep Ennis Beautiful
- City of Mesquite
- City of Pattison
- Keep Cleburne Beautiful
- Keep Haltom City Beautiful
- Galveston Bay Foundation
- The Woodlands Waterway Warriors
- Keep Dickinson Beautiful
- Rio Grande Valley Fishing Area and Waterway Cleanups
- City of Carrollton
- City of Watauga
- City of Frisco

Two New Toolkits On Trash Free Texas Website

- New toolkit available on Trash Free Texas website here!

Image Source: Trash Free Texas website: https://www.trashfreetexas.org/community-cleanup-challenge-toolkit.

- Includes resources to plan, promote, and host a cleanup event or a competition-style event with a neighboring community or communities.

Questions? Contact Kendall Guidroz, kendall.guidroz@h-gac.com

Two New Toolkits on Trash Free Texas Website

- **New toolkit now available on Trash Free Texas website here!**

Includes:

- Videos
- Social media templates
- Outreach materials
- Reports
- Litter campaigns and initiatives
- Potential funding sources for litter cleanup
- Past webinar recordings
- Resources for litter enforcement

Questions? Contact Crysta Guzman, cguzman@nctcog.org

Trash Free Texas Resources for Partners

New materials on the Trash Free Texas Partner page!

- Graphics for partners to copy and use (examples in next slide!), including the Trash Free Texas logo
- Trash Free Texas brochure
- 30-second Trash Free Texas video
- Trash Free Texas PowerPoint template
- Information about the resources and toolkits available on Trash Free Texas
- Coming soon! Pre-made social media posts to use

Trash Free Texas Resources for Partners

- **New graphics now available for Trash Free Texas Partners!**

To view all the graphics and resources or to “Partner Up” with Trash Free Texas go here: https://www.trashfreetexas.org/partner

Trash Free Texas Website Enhancements

- Frequently Asked Questions for volunteers and coordinators

- Brief video for coordinators on how to add sites

Five Overarching Objectives of Trash Free Waters Project

North Central Texas Council of Governments

The Meadows Center for Water and the Environment
Texas State University

2. Host regional cleanup efforts.
   - **2nd North Texas Cleanup Challenge (March 1 – May 31, 2022)**

     www.communitycleanupchallenge.com

   - **Coordinating with communities and recreational groups on cleanup efforts, i.e. walking, running, or paddling groups, and creating toolkit**

TRASH FREE TEXAS

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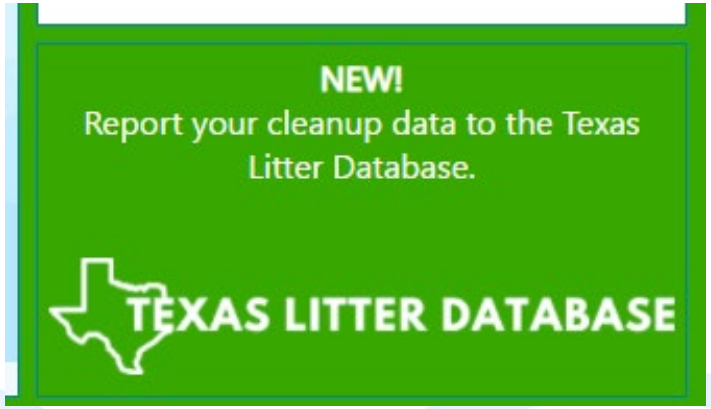
3. Promoting a sole platform for entering trash data in Texas that is available to all users – the Texas Litter Database.

   (Texas Litter Database now linked to Trash Free Texas website)

NEW



TRASH FREE TEXAS

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4. Work with restaurants to determine ways to voluntarily reduce the use of single-use plastics.
   - **Toolkit to be developed**
   - **Call for pilot cities/restaurants to participate**

5. Replicate these efforts statewide through Texas regional councils.
   - **Presentations and Provided Email Text**

TRASH FREE TEXAS

Contact

NCTCOG Trash Free Waters Team

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Connect

Project Webpages

www nctcog.org/trashfreewaters

www h-gac.com/TrashFreeTexas

Trash Free Texas

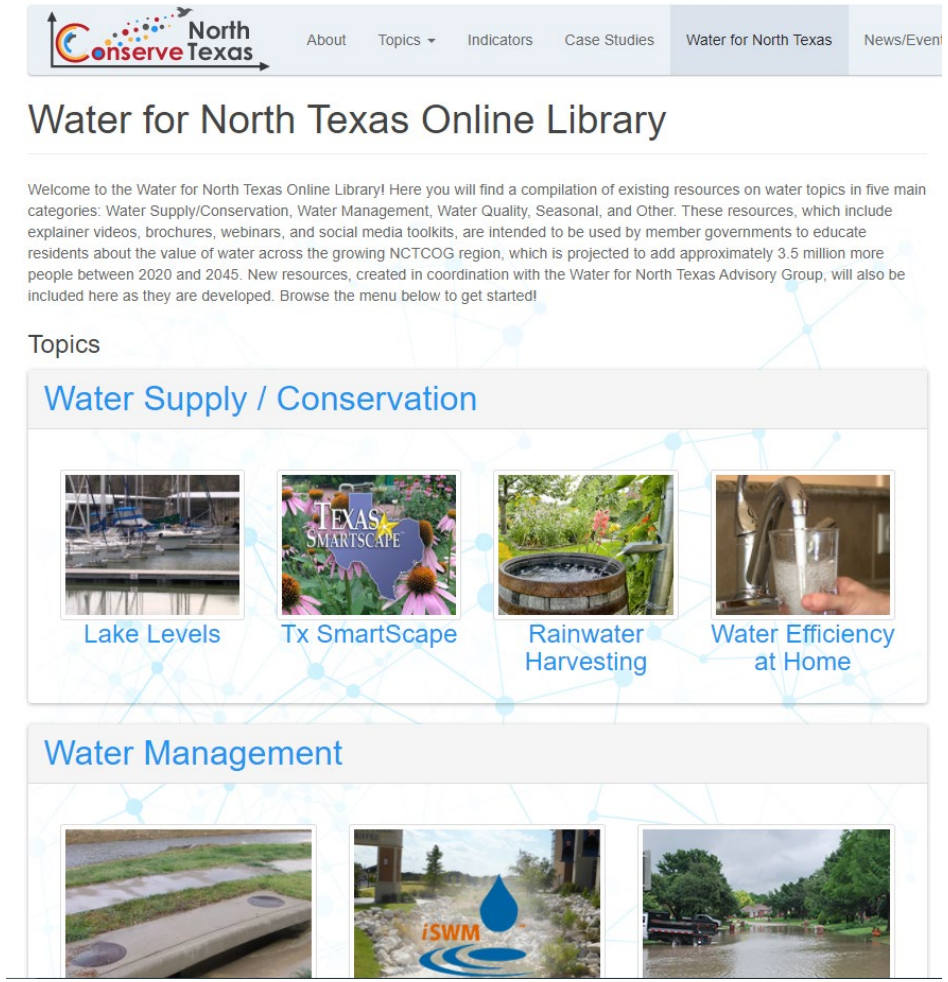
www https://www.trashfreetexas.org/

https://www.instagram.com/trashfreetexas/

https://twitter.com/TrashFreeTexas

https://www.facebook.com/TrashFreeTexas

Water for North Texas Online Library



http://conservenorthtexas.org/water-north-texas-online-library

Regional GHG Emissions Inventory Efforts

- NCTCOG is conducting a **Regional Greenhouse Gas (GHG) Emissions Inventory** for 12 counties in North Texas and assisting 12 cohort cities with their own inventories.

Participant Cities:

- Carrollton
- Cedar Hill
- Dallas
- Denton
- Farmers Branch
- Fort Worth
- Frisco
- Grand Prairie
- Grapevine
- Lewisville
- Mesquite
- Plano

Counties:

- Collin
- Dallas
- Denton
- Ellis
- Hood
- Hunt
- Johnson
- Kaufman
- Parker
- Rockwall
- Tarrant
- Wise

- Calculating total GHG emissions for all sectors: Energy, Transportation, Solid Waste, **Water,** and **Wastewater**
- Based on self-reported data and best practice estimates
- Requested by communities and completed with technical assistance from Local Governments for Sustainability (ICLEI)

More information here: https://nctcog.org/trans/quality/air/emissions-inventories/local-regional-greenhouse-gas-emission-inventory

Regional GHG Emissions Inventory Efforts

- NCTCOG is requesting energy consumption and emissions data from **Water and Wastewater Treatment Providers** serving the inventory cities and counties, for the **year 2019.**
- Data request includes:
  - Electricity and natural gas consumption
  - On-site anaerobic digestion data
  - On-site combustion data
- Data is requested for all facilities (plants, office buildings, lift stations, etc.) serving the focus area.
- Data will be used to assist communities in tracking GHG emissions over time and in setting long-term emissions reduction/energy efficiency targets by sector.

Data has already been received from:

- **City of Garland Water and Wastewater**
- **Tarrant Regional Water District (TRWD)**
- **Dallas Water Utilities**

For questions, or to receive another copy of the data request template, contact Breanne Johnson at (817) 695-9148 or Bjohnson@nctcog.org.

More information here: https://nctcog.org/trans/quality/air/emissions-inventories/local-regional-greenhouse-gas-emission-inventory

EPA-Funded Organic Waste to Fuel Feasibility Study

- Wastewater data from the template will also be used to support the **North Texas Organic Waste to Fuel Feasibility Study.**
  - EPA-funded study to evaluate the potential for expanding organic waste-to-energy technologies in the region
  - In partnership with the University of Texas at Arlington and a private contractor, Burns & McDonnell
- Regional study goals:
  - Advance regional efforts to divert food waste and other organics from landfills
    - Key organic feedstocks: residential and commercial food waste, **wastewater biosolids**
  - Increase regional renewable energy opportunities via renewable natural gas (RNG), particularly for vehicle fleets
  - Identify pilot projects and partnerships to advance waste-to-energy projects, including potential sites for new anaerobic digestion facilities

- **Next Stakeholder Meeting:** Tuesday, March 29th at 9:30 a.m. via Microsoft Teams
  https://www.addevent.com/event/eP12645742

More information here: https://nctcog.org/envir/materials-management/materials-management-plan-1

Upcoming NCTCOG Webinars

Bacteria Source Tracking

Friday, April 1, 2022

10:00 a.m. – 12:00 p.m.

Register and Add to Calendar

Avian Management

Tuesday, May 10, 2022

10:00 a.m.

Details to come via email.

Upcoming NCTCOG Meetings

Water Resources Council – April 13, 2022
Add to Calendar

Wastewater and Treatment Education Roundtable – April 28, 2022

Add to Calendar

Connect with NCTCOG E & D Happenings!

Environment and Development Events Webpage:
https://www.nctcog.org/envir/events

Subscribe to E & D Email Lists:

https://www.nctcog.org/envir/mail

Watershed Stakeholders Meeting: Staff Contacts

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Thank you!