THE MEADOWS CENTER FOR WATER AND THE ENVIRONMENT

No natural resource is more important to our future than Water. Water is what we do.

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The Meadows Center
for Water and the Environment
Texas State University

Clean Rivers Program Steering Committee Meeting

March 24, 2016

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The Meadows Center
for Water and the Environment
Texas State University

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Watershed Services & Texas Stream Team

The Meadows Center for Water and the Environment
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Watershed Services

- Economic, ecosystem valuation
- Watershed characterizations
- Water quality modeling and monitoring
- Watershed Protection Planning
- Groundwater/source water protection/planning
- Land Conservation Planning
- Community assistance for outreach, grants, loan applications, planning

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The Cypress Creek Watershed Protection Plan

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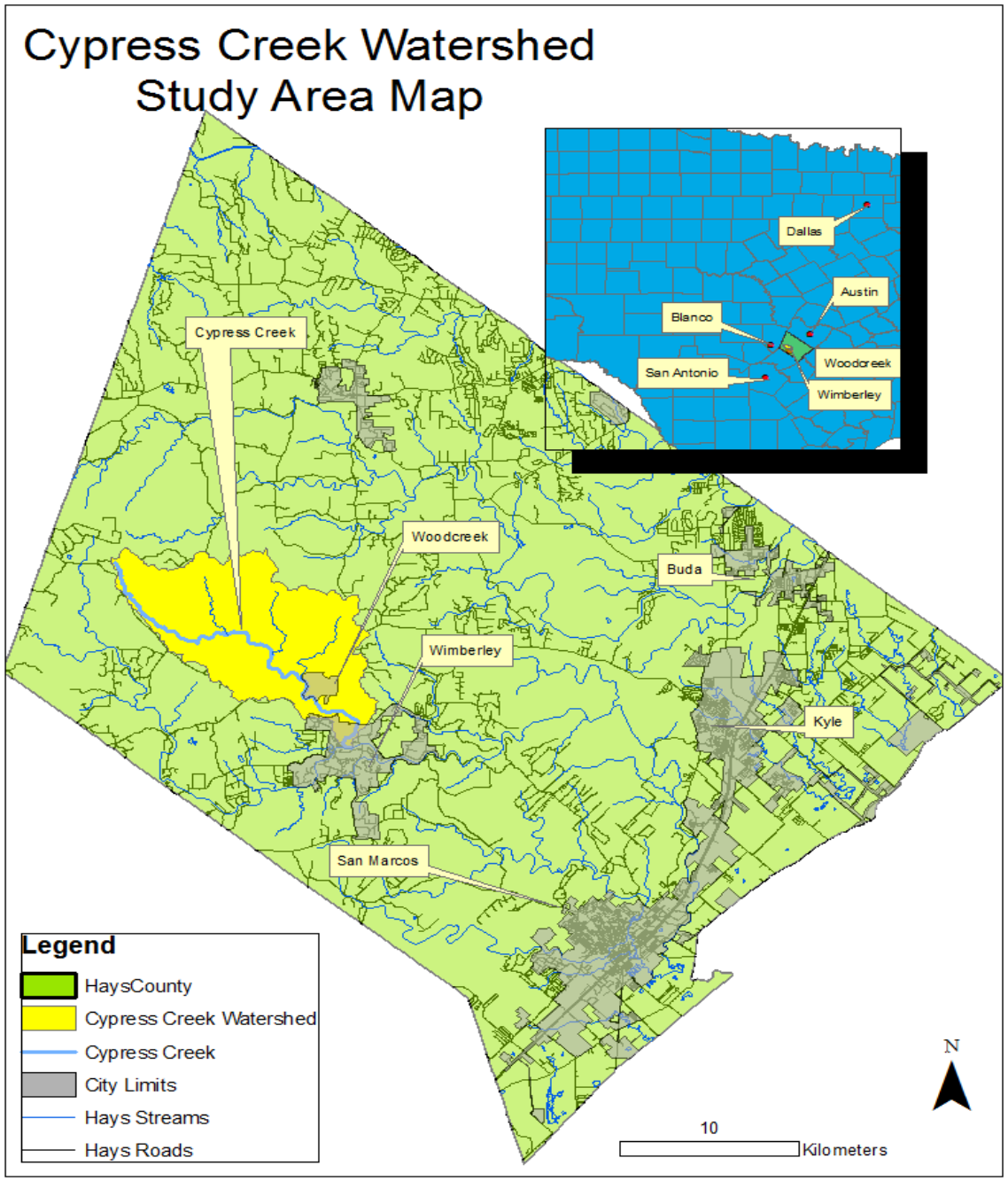

Cypress Creek Watershed
Study Area Map
Dallas
Austin
Blanco
San Antonio
Woodcreek
Wimberley
Cypress Creek
Woodcreek
Buda
Wimberley
Kyle
San Marcos
Legend
HaysCounty
Cypress Creek Watershed
Cypress Creek
City Limits
Hays Streams
Hays Roads
N
10
Kilometers

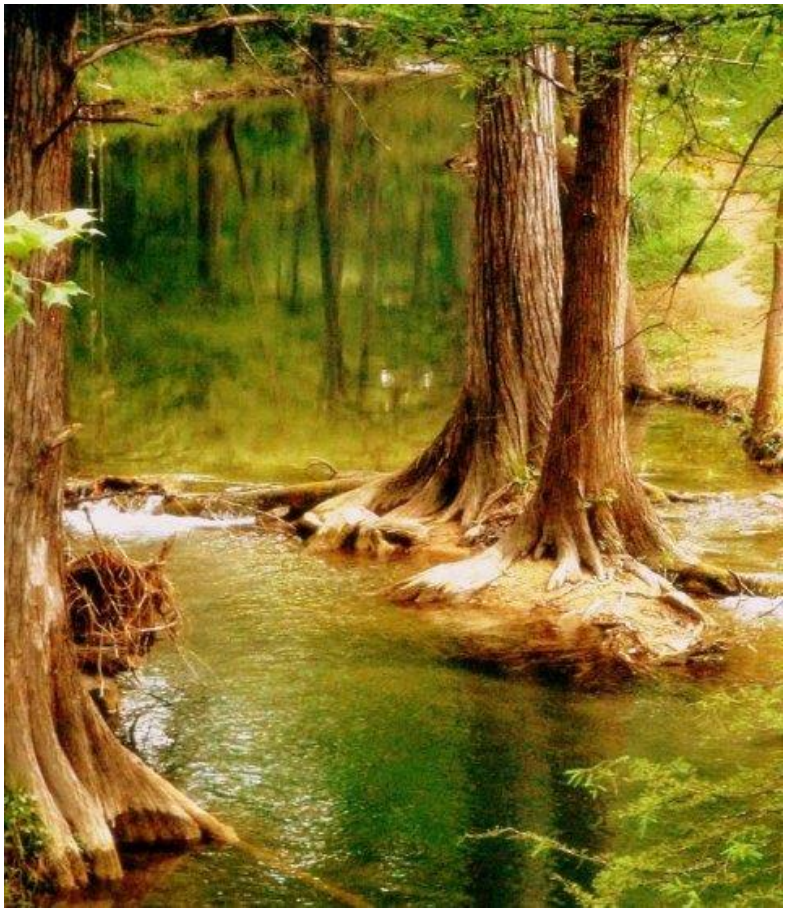
Cypress Creek Watershed Protection Plan

- Background – Listed in 2000 for inadequate DO. That year the creek stopped flowing.
- Stakeholder partnership formed, led by City of Wimberley, City of Woodcreek, Hays County, Wimberley Valley Watershed Association
  - Supported by The Meadows Center
- TCEQ 319 funding to develop a science-based, stakeholder driven Watershed Protection Plan

Parameters Exceeding Target Levels		
	Primary Sources (land use) Identified with EMCs	**Primary Causes**
Nitrogen 1.65 mg/L (Stakeholder target)	Residential and Undeveloped	Residential and Commercial application of Fertilizer. OSSFs, animal waste, overland flow, impervious cover, atmospheric deposition and low flows.
Parameters of Concern		
Total Suspended Solids 4.0 – 5.0 mg/L	Residential and Undeveloped	Anthropogenic activities where land cover is disturbed, impervious cover and natural processes on undeveloped land. Soil across much of the watershed is shallow which limits ground cover. Low base flows.
E. coli	Residential and Commercial	Septic tanks (OSSFs), pets, wildlife. Low flows in the creek lead to high concentrations.
Dissolved Oxygen	Residential and Commercial	Low base flows limit aeration of water downstream of ground/source waters.
Oil and Grease	Residential	Residential wastewater (kitchen and bathroom),
Impervious Cover increases	Residential, Commercial and Transportation	Increased urbanization
Preferred Base Flows	Residential and Commercial	Most people living in the Cypress Creek rely on well water from the same aquifer that feeds the creek.

Cypress Creek Watershed Protection Plan

- Accepted by TCEQ and EPA
- Implementation grant funded
  - State/Federal Contribution $804,843
  - Partner and stakeholder Contributions $529,362
  - Total Cost: $1,334,205
- Timeline: April 2016 – Dec 2018



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Cypress Creek Watershed Goals

- Implement activities to reduce/prevent (NPS), protect flow
- Increase capacity to preserve water quality through local permitting, ordinances, and BMPs
- Improve accuracy of tools for decision makers to calculate effects of land use changes on water quality
- Coordinate site-specific retrofits for LID, provide these as community education projects and demonstration sites
- Conduct outreach and education efforts
- Monitor water quality and model projected water quality changes

Cypress Creek Watershed Plan Components

- Structural BMPs
- Non-structural BMPs
- Source water protection
- Land management, conservation
- Community education
- Research
- Monitoring

Highest Prioritization	Second Highest Prioritization	Medium Prioritization	Low Prioritization
Water Conservation Pricing Strategies	Urban Wildlife Management – Deer	Rainwater Harvesting Strategies	Rock Weirs/Cross-vanes
Water Conservation Program for Water Providers or Municipalities	Riparian Buffers	Cypress Creek Land Trust	Vegetative Filter Strips
Special Groundwater Management Area	Water-intensive Turf Grass Ordinances and/or Ban	Nutrient & Fertilizer Management	Livestock Water Quality Management Plan
Groundwater Protection Strategy	Groundcover Establishment – Agricultural	Habitat Conservation Areas – Urban	Rain/soil moisture sensors
	Parking Lot Pervious Design Strategies	Rock Berms/Gabions	Water treatment plant
	Xeriscaping/Nativescaping	Biofiltration/Rain Garden	Septic replacement program
	Engineered Swales	Tree Protection	
	Conservation Easements	Groundcover Establishment – Urban	
	Karst Feature Protection Measures	Porous/Pervious Pedestrian Walkways	
	Comprehensive Stormwater Assessment	Alternative Brush Control -- Prescribed burns	
	Purchase of Development Rights	Grazing Management Strategies	
	Landscape Mulching	Landowner Incentive Program	
		Pet Waste Ordinance & Stations	

Cypress Creek Watershed Protection Plan Implementation Monitoring

- CRP sites
- USGS gage at Jacob's Well
- Stormwater, TST & routine monitoring
- Biomonitoring and riparian habitat monitoring
- Trinity Aquifer groundwater monitoring (w/ HTGDC)
- BMP Effectiveness Monitoring
- Bacterial source tracking (future effort)

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Cypress Creek Watershed Flooding

- Better assess impacts of flooding
  - monitoring, modeling, data analyses
  - calculating BMP mitigation effects
- Incorporate into ordinances, codes – Green Infrastructure
- Want BMPs assist in flood mitigation but located outside flood plain to prevent damage
- Promote functioning flood plain, inundation area, vegetation to control/mitigate effects

Upcoming Meetings

- The Cypress Creek WPP partners will host informational and kickoff meetings later this spring.

- The Meadows Center for will host a Blanco Watershed citizen forum this spring to discuss the state of the watershed, ongoing research collaborations and goals for protecting the surface and groundwater resources.

Details will be posted at www.meadowscenter.org, www.cypresscreekproject.net, and www.wimberleywatershed.org.

Upper San Marcos Watershed Protection Plan

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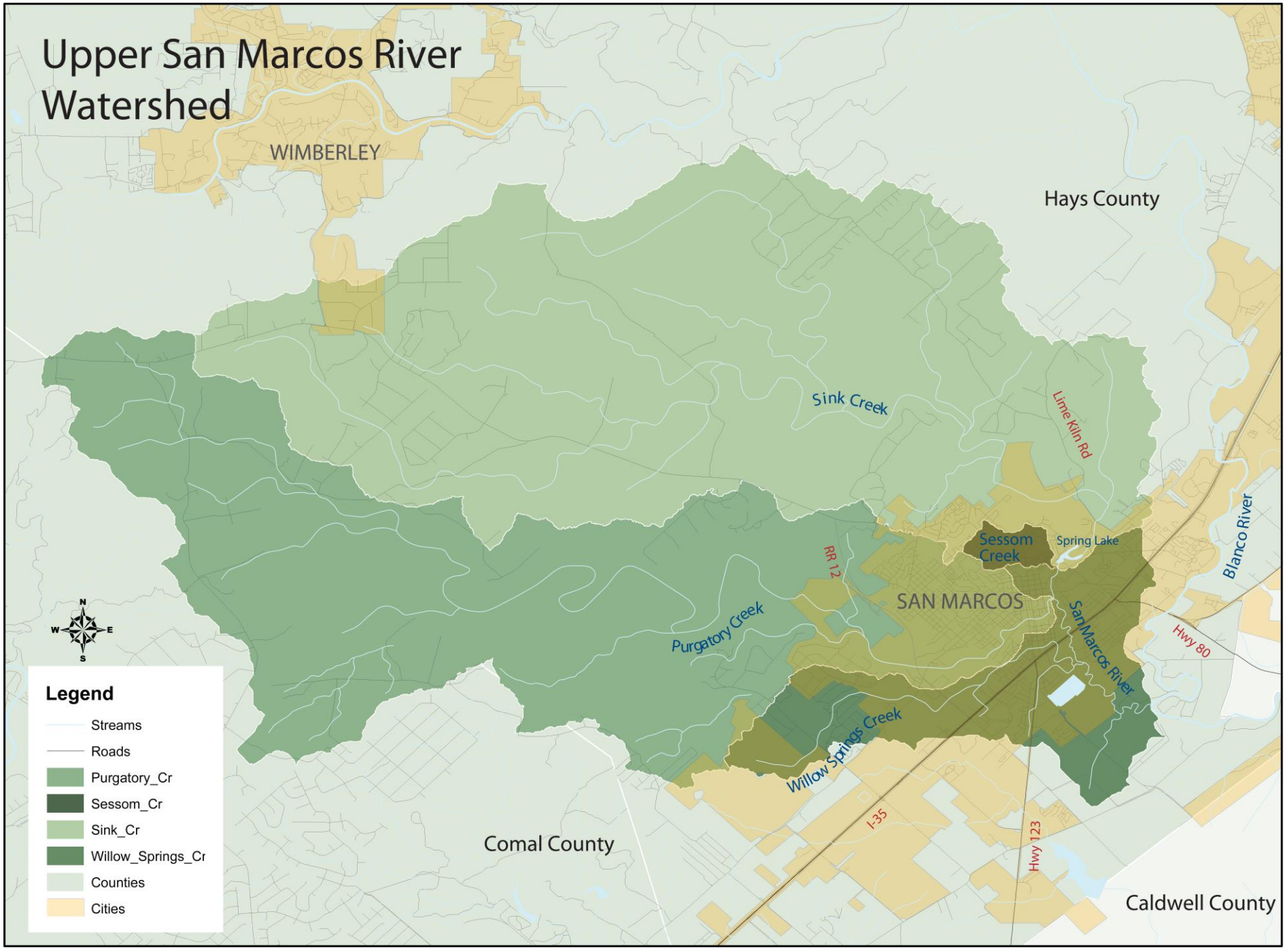
Upper San Marcos River Watershed
WIMBERLEY
Hays County
Sink Creek
Lime Kiln Rd
Blanco River
Sessom Creek
Spring Lake
RR 12
SAN MARCOS
Purgatory Creek
San Marcos River
Hwy 80
Willow Springs Creek
I-35
Hwy 123
Comal County
Caldwell County
N
W
E
S
Legend
Streams
Roads
Purgatory_Cr
Sessom_Cr
Sink_Cr
Willow_Springs_Cr
Counties
Cities

- In 2010, the Upper San Marcos River was cited on TCEQ's 303(d) list for exceeding total dissolved solids (TDS) water quality standards.

- Several other pollutants identified as a concern (nutrients, total suspended solids, bacteria, oil and grease).

- TCEQ 319 funding to develop a science-based, stakeholder driven Watershed Protection Plan

Timeline

- Completed BMP list and expected pollution reductions draft January, 2015
- Final recommendations expected early May, 2016
- WPP available for comment late May, 2016
- Final WQPP expected in a similar time frame, Code SMTX completed Summer, 2106 (?)

Coordinated Efforts

- SMWI/WPP
- COSM Water Quality Protection Plan/WQPP
- COSM MS4
- University MS4
- Habitat Conservation Plan/HCP
- City Planning & Land Development Code Rewrite
- University Planning

Project	2010	2011	2012	2013	2014	2015	2016	2017	Notes
San Marcos Observing System									Meadows Center for Water and the Environment comprehensive study
Spring Lake Underwater Archaeology									Meadows Center for Water and the Environment Underwater Archaeology in Spring Lake
Spring Lake Watershed Characterization									Meadows Center for Water and the Environment analysis of sediment inputs and stakeholder process
San Marcos Watershed Initiative									Meadows Center for Water and the Environment managed Watershed Protection Plan
Water Quality Protection Plan									Protect surface water and groundwater, because both provide habitat for aquatic endangered species
Comprehensive Plan									Revised San Marcos comprehensive master plan.
Stormwater Master Plan									Texas state University.
Drainage Master Plan									City plan to address flooding and erosion.
Sessom Creek Study									Sediment removal options to determine the best procedure to remove sand and gravel bar
Texas Pollution Elimination Discharge System									MS4 Regulatory program to control discharges of pollutants into surface waters
Revisions to Construction Standards									Texas state University
Habitat Conservation Plan									Plan to protect threatened and endangered species associated with the Edwards Aquifer
Texas State Master Plan									Texas State University-San Marcos to review and update of the 2006-2015 Campus Master Plan

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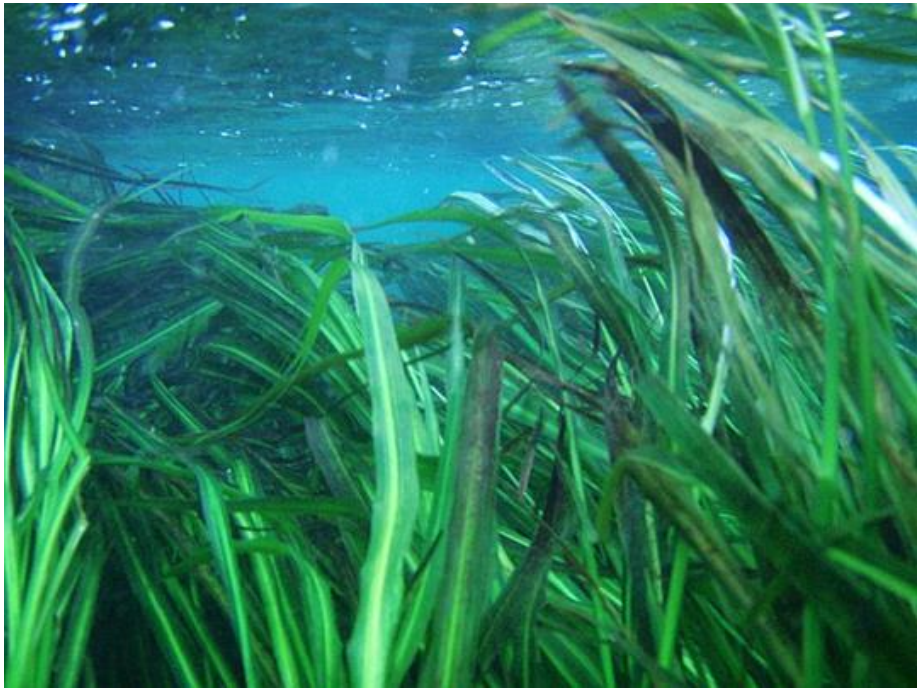
Recommended Best Management Practices

- Structural BMPs for new developments and retrofits for existing development
- Demonstration projects to encourage adoption of water quality protection practices
- Education and Outreach Strategies
- Non-Structural Management Measures including land management strategies and preservation of undeveloped land
- Information gathering and monitoring to address remaining data gaps

Structural BMPs and demonstration projects

- Assessed, ranked by Stakeholders
- Coordinates WQPP and other City, County, University efforts
- BMPs recommended watershed-wide, by land use density and site specific



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Watershed Wide BMPs

For Urban Applications	For Rural Applications
Stormwater retrofit programs	Incentivizing landscaping with flooding benefits/run off (uplands)
Urban water conservation strategies	Land trust/Conservation easements
Promotion of compact development	Feral hog removal measures
Low impact development/green infrastructure	Groundwater protection strategies
Water-intensive turf grass regulation	Deer population control measures
Stormwater retrofit program	Landowner incentive programs
Enhanced riparian corridors/buffers	Preservation of natural features
Promoting cluster development techniques	Alternative brush control- prescribed burns
Requiring % of land preserved in dense development areas	Habitat conservation areas
Monitoring outfalls on City and University property	Agricultural and Ranch Land Management Tool Box BMPs

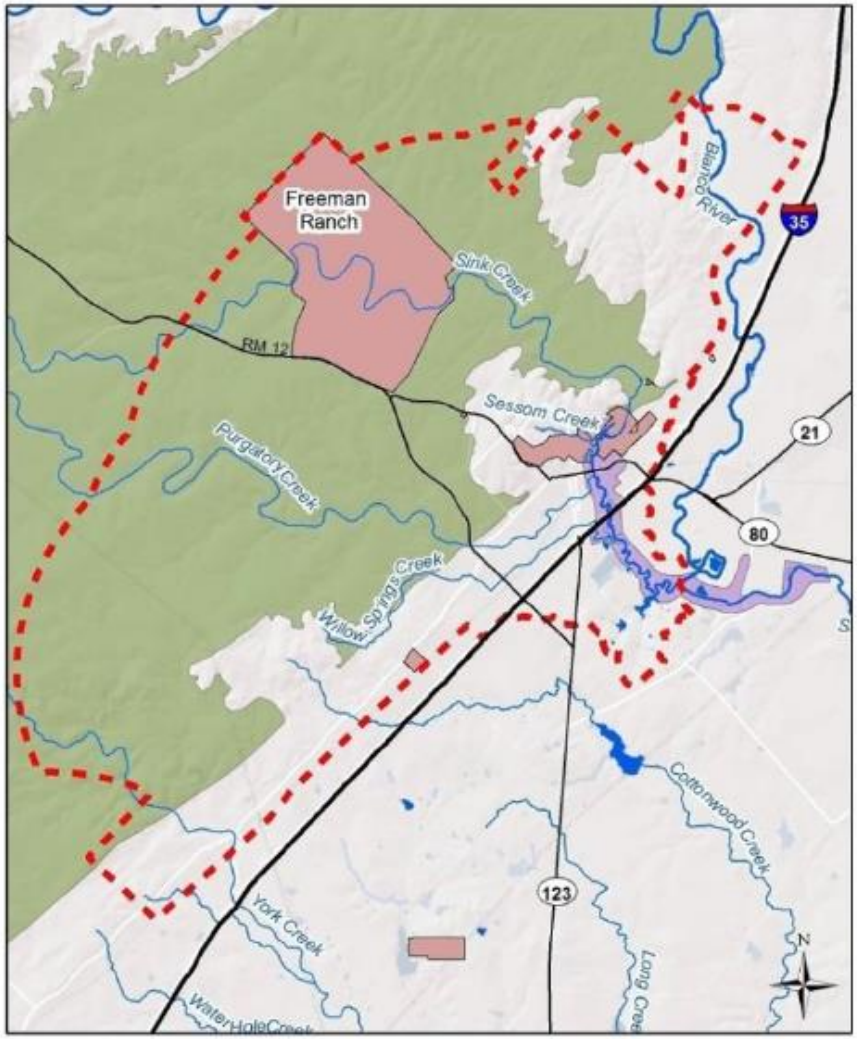
Watershed Wide BMPs

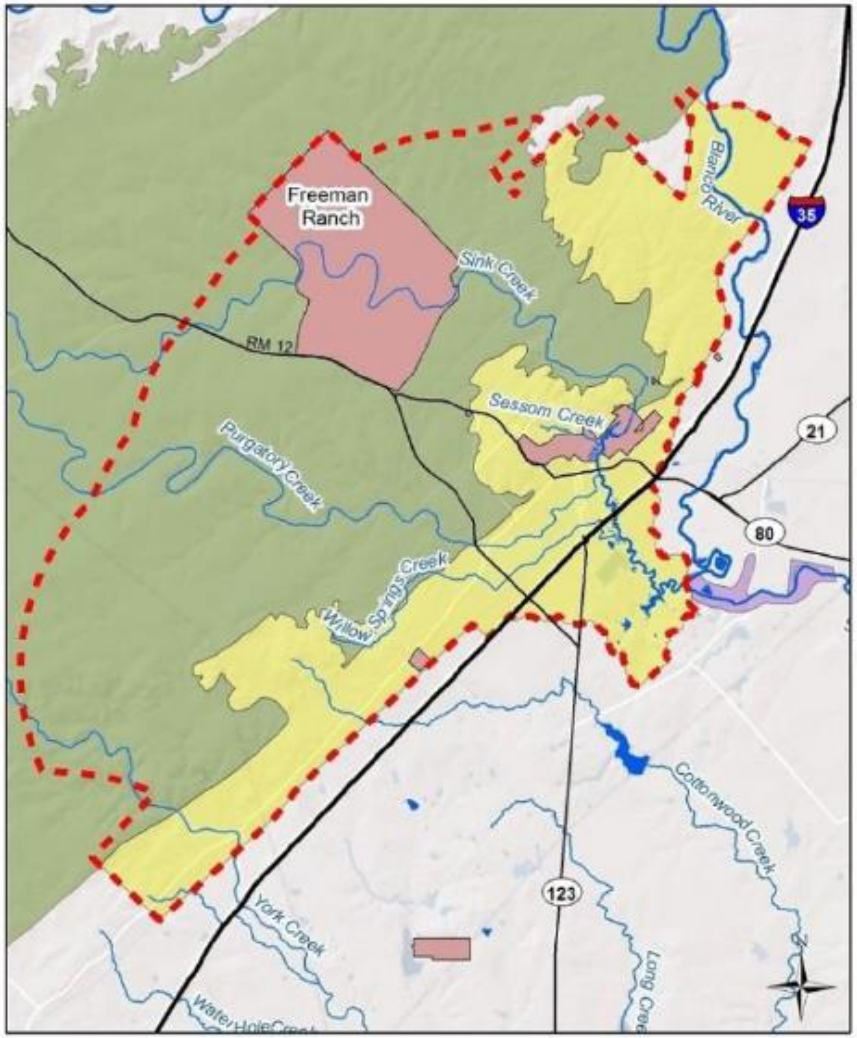
Both Rural and Urban Applications		
Monitoring BMPs for effectiveness	Xeri/nativescaping incentives and resources	Constructed wetlands
Water conservation strategies	Tree protection/ordinances	Dry detention ponds
Construction sediment management	Improved BMP performance standards	Engineered swales
Education and outreach/Promotion of watershed stewardship	Improved buffer zone requirements	Green roofs
Chemical disposal and storage	BMP requirements for water quality zones	Karst protection measures
Riparian setbacks, buffers	Fee-in-lieu and cost recovery	Pet Waste Ordinance & Stations
Reduction of impervious cover	Pet Waste Ordinance & Stations	Vegetated filter strips
Sustainable site design	Development of more accurate EMCs	Rain gardens
Curbside recycling program in ETJ	Analysis of contributions of pollutants from recreation	Rainwater Harvesting
Landscape mulching	Enhanced Land Development Codes	Groundcover establishment
Nutrient & Fertilizer Management regulations	Parking Lot Pervious Design Strategies	Walkway Pervious Design Strategies
Limiting square footage of new lawns	TCEQ Edwards Aquifer Protection Rules	Wet ponds

Non-Structural BMPs

Enhanced Measures for the Protection of Water Quality in the Edwards Aquifer

- Implement over recharge zone 1st
- Recommend expansion to contributing zone and all City and ETJ boundaries
- WPP will calculate differences in pollution with existing and enhanced measures implemented over all possible areas
- Recommend expansion of stream buffer requirements over the Edwards Aquifer Recharge Zone – SM river corridor, focusing on east side corridor/future development (ETJ)
- Changing current river corridor ordinances enhanced rules to mirror Enhanced Rules (increase width, etc)





Areas of Existing Protection

- San Marcos River Corridor
- Edwards Aquifer Recharge Zone

Legend

- WQPP Boundary
- Texas State University

Proposed Expansion of Protection

- Area of expansion includes the unprotected EA zones (Transition Zone and the Contributing Zone within the Transition Zone) and the land area that drains directly to the Upper San Marcos River

Flooding

- Addressed in WPP – Stakeholders taking a 2nd look
- Incorporate into WPP/Codes – Green Infrastructure
- Flood ordinance needs
- Want BMPs assist in flood mitigation but located outside flood plain to prevent damage
- Promote functioning flood plain, inundation area, vegetation to control/mitigate effects

TEXAS STREAM TEAM

Mission *- To facilitate environmental stewardship by empowering a statewide network of concerned volunteers, partners, and institutions in a collaborative effort to promote a healthy and safe environment though environmental education, data collection, and community action.*

TEXAS STREAM TEAM

Volunteers collect water quality data from established sites

- Temperature, pH, dissolved oxygen, conductivity, water clarity, field observations
- Advanced training for E. coli, nitrates, phosphates, turbidity

TEXAS STREAM TEAM

Participation in local planning, protection, restoration and educational events

- Watershed protection plans, TMDLs, water conservation initiatives
- University research, long term monitoring efforts
- Clean ups, restoration, habitat monitoring
- Community events, school programs, youth programs

TST BY THE NUMBERS

Since 1991

- 6,000 trainings
- 8,000+ educational events
- 1,500 sites monitored
- 40,000+ individual sampling events
- 300+ currently monitored sites
- 80+ Partners

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TST Partners, network

- Provide kits, supplies, materials
- Host trainings and educational events
- Create Monitoring Plans for citizen scientists
- Conduct quality assurance and submit data
- Incorporate TST data into projects, planning
- Use TST data to supplement professional water quality monitoring
- Act as watershed ambassadors, regional hubs
- Provide education and outreach, special projects, other support

Data Uses

- Inform citizens, communities about local water quality
- Municipalities can incorporate into outreach messaging
- WPP and TMDLs
- TST Partners
- Interpretive displays, education and outreach event
- Teachers and students use data for research projects

- *Presented on Dataviewer*
- *Compiled in Data Summary Reports*
- *Submitted to EPA's water quality database*

New TST Programs

- TST Paddlers
- TST Anglers
- TST Divers
- TST on Campus
- Monofilament Finders
- Biomonitoring
- Riparian Assessments

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EXPLORE SPRING LAKE.ORG