



WEST TULE CREEK SEDIMENT POND AND HABITAT ENHANCEMENT PROJECT

ARANSAS COUNTY REGIONAL
STORMWATER MANAGEMENT

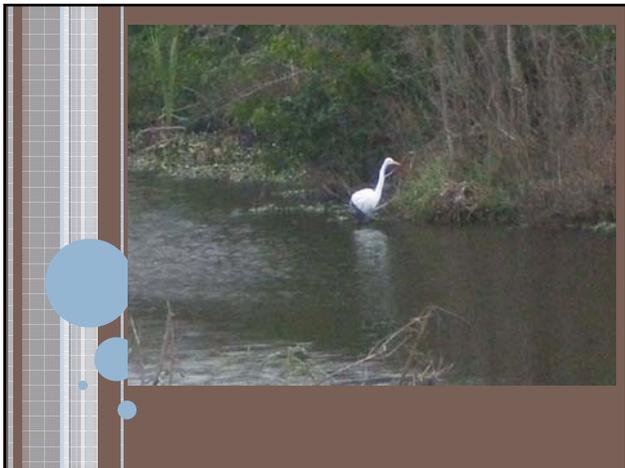
LDP Consultants, Inc.
Water Resources Management and Permitting



LARRY BARTWRIGHT & ROBERTS, INC.

ARANSAS COUNTY

- The topography is mainly a flat coastal plain surrounded by estuaries and bays
- Elevation from sea level to about 35 feet
- AC is poorly drained when compared to riverine systems
 - Few sluggish low-gradient streams
 - Many prairie pothole depressions
 - Small Watersheds, averaging less than 2 sq. miles (1,150 acres) with direct outfall to open water / bay systems.



CLIMATE

- Coastal climate -periodic cycles of significant storm events
- Average annual precipitation is about 35 inches
- Runoff from recent significant storm events have increased in volume – thereby increasing the flooding potential
- There is little perennial surface flow other than
 - rain events
 - permitted WWTP discharge

COUNTY HYDROGEOLOGY

- Geologic formations composed of sand, silt, clay, gravel
- Given method of deposition, formations are not constant in character or thickness
- Sand beds may grade laterally and may be vertically connected with other beds
- 1970 TWDB AC Groundwater Report suggests that all of these sand layers are hydrologically interconnected to form a single aquifer
- The aquifer can not be considered at any one place to have a single water level

REGIONAL CONSIDERATIONS

- AC population has been rapidly expanding over past 10 years
- AC is not a regulated MS4 or currently located in an urbanized area
- The region is on the cusp of urbanizing
 - Abundant native upland, marsh and aquatic habitats
 - Oak tree mottes
 - Prairie potholes
 - Winter Endangered Species Resident—
 - Whooping Cranes

PRAIRIE POTHOLE DEPRESSIONS

- Potholes are water bearing depressions
- Diverse habitats
- Collect rainwater and runoff from sheet flow
- Provide aquifer recharge
- Depressions when coupled to the hydrologically interconnected sand bed layers constitute an important component of the natural drainage system

PRAIRIE POTHOLES



DRAINAGE

- Natural drainage system
 - Prairie Pothole Depressions - interconnected w/ sand beds/ aquifer:
 - Balances the water between precipitation, runoff, infiltration evaporation and evapotranspiration processes
- Engineered drainage system:
 - Can encroach on the natural drainage system and affect it with placement of fill, compaction, dewatering actions, impervious cover, directly connected impervious cover

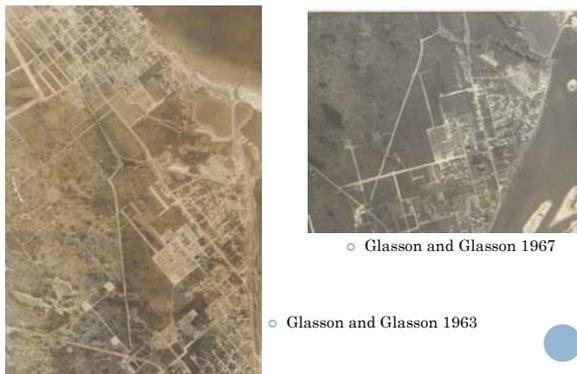
TULE CREEK WATERSHED - HISTORY



o Fred Percival 1947

o DIX-7P-18 1956

TULE CREEK WATERSHED - HISTORY



o Glasson and Glasson 1967

o Glasson and Glasson 1963

TULE CREEK WATERSHED - HISTORY



o Glasson and Glasson 1970

o Glasson and Glasson 1978

TULE CREEK WATERSHED - HISTORY



o Glasson and Lanmon 1983

o Glasson and Lanmon 1992



TULE CREEK WATERSHED – 1956 VS. 2010



o There is no going back!



ARANSAS COUNTY REGIONAL STORMWATER MANAGEMENT PLAN

THREE MAIN PRINCIPLES:

- o Drainage and Flood Protection
- o Stormwater Quality – *Construction and Post Construction BMP's*
- o Natural Resource Protection – *Ecological / Habitat Integrity*

STORMWATER MANAGEMENT WITH AN INTEGRATED APPROACH:

- o Compatible and consistent with entity needs
 - Decrease flooding impact and Improve drainage
 - Decrease siltation, pollutants and nutrients
 - Preserve ecological integrity
- o Sustainable Growth / Low Impact Development Techniques (LID)
- o Construction Guidelines and Design Criteria
 - o Geographic Information Systems (GIS)

REGIONAL PARTNERS – *Drainage knows no boundaries*



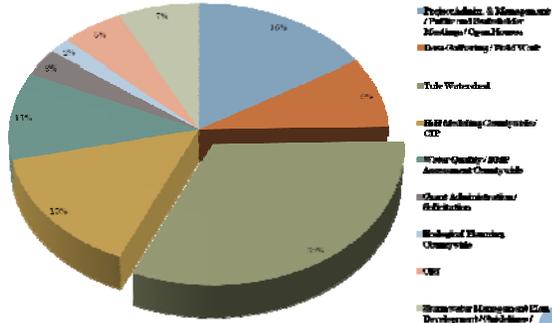
ARANSAS COUNTY REGIONAL STORMWATER MANAGEMENT PLAN

PROJECT REQUIREMENTS:

- o Public Involvement and “Buy-in”
 - Open Houses
 - Workshops
 - Educational Tools
- o Identify Drainage Issues
 - Countywide Drainage Maps
 - Prioritization - Varying degrees of modeling effort
- o Funding Strategies and Implementation Program
- o Inter-Jurisdictional Involvement
 - Implementation Strategies
 - Regional Approach
- o Adaptive Management Strategy
 - Management Plan review, assessment, and modification



ARANSAS COUNTY REGIONAL STORMWATER MANAGEMENT PLAN BUDGET ALLOCATION

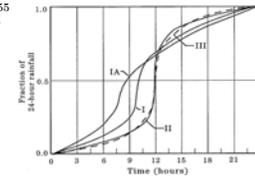


TULE CREEK WATERSHED PROJECT HYDROLOGY AND HYDRAULICS

HYDROLOGY

- Watershed Delineation
- Watershed Parameters
 - Curve Number / Land Use / Soil Type
- Impervious Cover
- Time of Concentration
 - Flow Path / Travel times
- Routing
- Rainfall
 - Region III Rainfall Distribution – TR55
 - Design Storms – 2-, 5-, 10-, 25, 100-yr
 - Calibration Storms
 - May 2004 – 7-yr
 - July 2007 – 2-yr
 - November 2009 – 25-yr

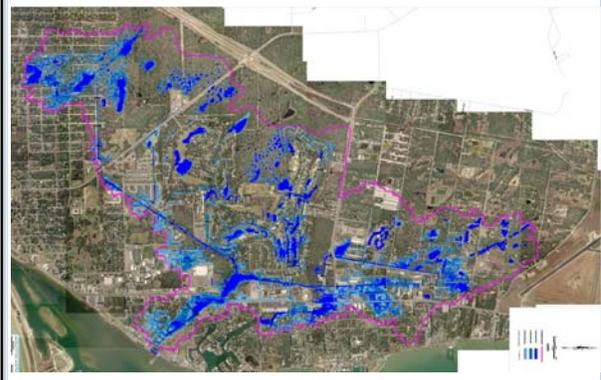
Duration	2-yr	5-yr	10-yr	25-yr	100-yr
15 min	1.10	1.50	1.90	1.90	2.90
30 min	0.8	0.95	1.30	1.75	3.45
60 min	1.00	2.00	2.00	2.60	4.80
2 hour	0.70	0.70	1.20	1.50	3.00
3 hour	0.60	0.60	1.10	1.40	2.70
6 hour	0.40	0.40	0.70	0.90	1.80
12 hour	0.30	0.30	0.50	0.65	1.30
24 hour	0.20	0.20	0.30	0.40	0.80



PROJECT MAP



EXISTING CONDITIONS FLOOD MAP

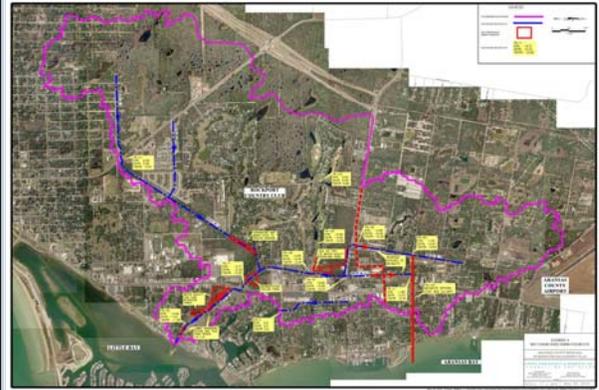


TULE CREEK WATERSHED PROJECT HYDROLOGY AND HYDRAULICS

RECOMMENDED H/H IMPROVEMENTS

- **Mesquite Bypass** – 3,200 LF 5x5 box culverts from Railroad ROW Ditch to Aransas Bay
 - Diverts approximately 25% of the Tule Creek Watershed (Area)
 - Includes sediment control devices
 - Outfall into Aransas Bay
 - Cost - \$1,600,000
- **Henderson Street / Church Property** – Detention Ponds and improved stream routing along the North Tule Ditch
 - Develop routing for Railroad ROW Ditch
 - Divert runoff from Rockport CC – Hole #8
 - Detain runoff, reducing peaks downstream, positive water quality impact
 - Cost - \$1,325,000 (CMP Grant)
- **Lower Tule Park, Picton, and Sorenson Roads** – Allow flood waters to overflow roadways during extreme storm events
 - Provides the greatest flood mitigation by reducing dam effect of these roads
 - Cost - \$1,325,000 (CMP Grant)

RECOMMENDED IMPROVEMENTS MAP



ECOLOGICAL AND HABITAT PROTECTION AND ENHANCEMENT

*Policy and Goal to Protect/Enhance/Restore Water Quality and Ecological Integrity

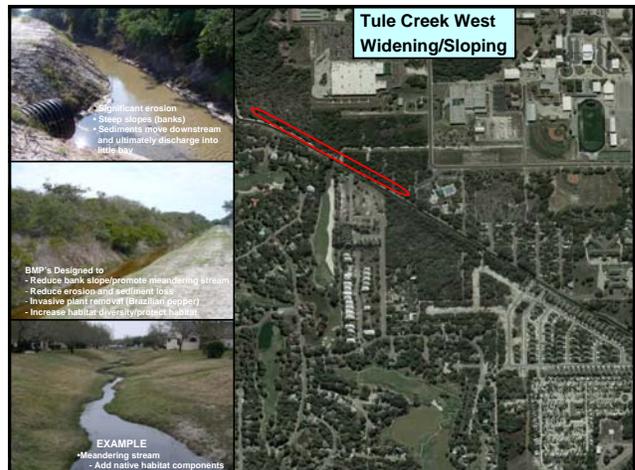
- To preserve Aransas County unique aquatic ecosystem
- To protect and enhance wetlands, estuaries, bay, other water bodies from stormwater pollution

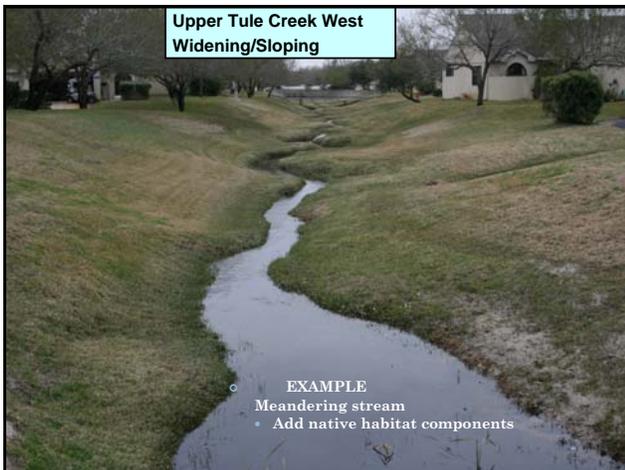
*Ecological Plan to Accomplish these Goals

- Coordinate with agencies, stakeholders, conservation groups
- CBBEP/MANERR
- Establish Water and Ecological Resource Advisory Group/Technical Committee
- Integrate into the stormwater planning process by incorporating habitat protection/enhancement and restoration features
- Obtain Grants to fund these habitat/ecological features (purchase habitat, BMP funding, shoreline enhancement)
- Identify Water and Ecological Resources and Opportunities for Protection/Enhancement/Restoration County-Wide (not just stormwater related)

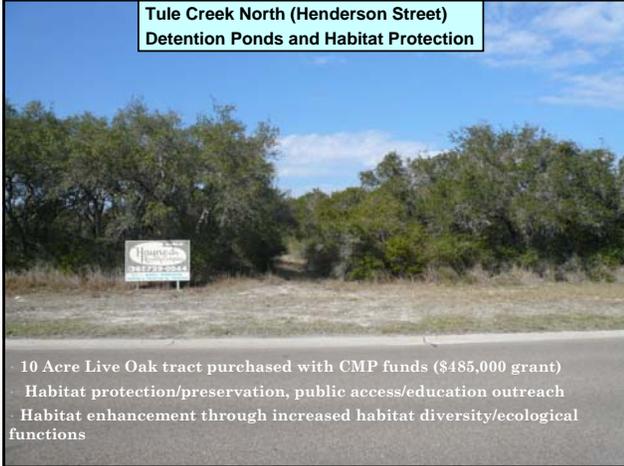
*U.S. Army Corps of Engineers Nationwide Permit for Stormwater Management

- Permittable and Regulatory/Public/Stakeholder Acceptable
- Corps of Engineers Nationwide Permit for Stormwater Management
- Must have only "minimal" adverse impact on the environment.
- Meeting County goals requires that there is a "net increase" in ecological (woodlands/aquatic) resource functions and services.





**Tule Creek North (Henderson Street)
Detention Ponds and Habitat Protection**



- 10 Acre Live Oak tract purchased with CMP funds (\$485,000 grant)
- Habitat protection/preservation, public access/education outreach
- Habitat enhancement through increased habitat diversity/ecological functions

**Tule Creek North (Henderson Street)
Detention Ponds and Habitat Protection**



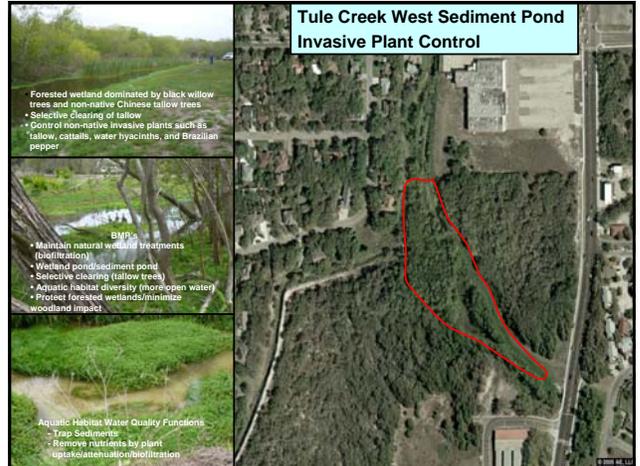
- Native Live Oak woodlands to be protected/preserved
- Woodland/aquatic habitat enhancement (BMP's) to be constructed in disturbed woodland areas
- Existing drainage shaped with riparian habitat enhancement/off-line ponds

**Tule Creek North (Henderson Street)
Detention Ponds and Habitat Protection**



- Woodland/riparian habitat enhancements (BMP's) will:
 - Increase habitat diversity (vegetation) for resident/migratory birds and other wildlife
 - Improve water quality through soil conservation/erosion control

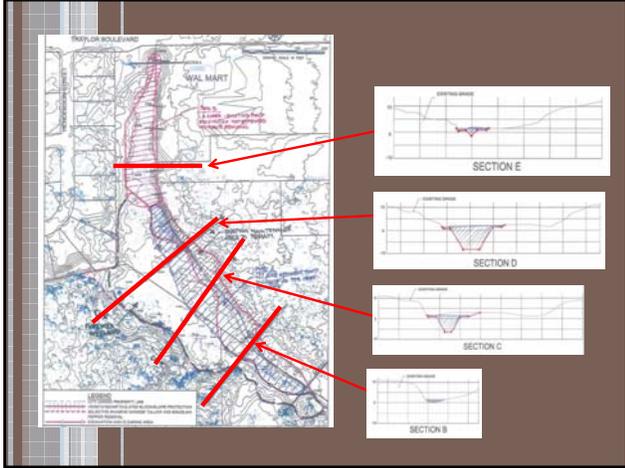
**Tule Creek West Sediment Pond
Invasive Plant Control**



Forested wetland dominated by black willow trees and non-native Chinese tallow trees
 • Selective clearing of tallow
 • Control non-native invasive plants such as tallow, catalpa, water hyacinths, and Brazilian pepper

BMP's
 • Maintain natural wetland treatments (biofiltration)
 • Wetland pond/sediment pond
 • Selective clearing (tallow trees)
 • Aquatic habitat diversity (more open water)
 • Protect forested wetlands/minimize woodland impact

Aquatic Habitat Water Quality Functions
 • Trap Sediments
 • Remove nutrients by plant uptake/denitrosification/nitrification



**Tule Creek West Sediment Pond
Invasive Plant Control**



Forested wetland dominated by black willow trees and non-native Chinese tallow trees

- Selective clearing of tallow
- Control non-native invasive plants such as tallow, cattails, water hyacinths, and Brazilian pepper



**Tule Creek West Sediment Pond
Invasive Plant Control**

BMP's

- Maintain natural wetland treatments (biofiltration)
- Wetland ponds/sediment ponds
- Selective clearing (tallow trees)
- Aquatic habitat diversity (more open water)
- Protect forested wetlands/minimize woodland impact



**Tule Creek West Sediment Pond
Invasive Plant Control**

Aquatic Habitat Water Quality Functions

- Trap Sediments
- Remove nutrients by plant uptake/attenuation/biofiltration

PROCESS TO IDENTIFY A NPS TOPIC

- Evaluate current local projects underway
- Look for relevant gaps in knowledge or unaddressed components of an existing water quality plan or program
 - Look for opportunities to apply new technologies
 - Is it relevant to other areas/ regions of Texas?
 - Is there enough local data?
 - Need good understanding of the common denominators between the grantor and grantee – make it a win-win partnership
 - Need trust/ confidence that goals of project will be met by the applicant
- List the known opportunities and constraints to implement the project
- Plan for success

