Using Texas Rapid Assessment Method for Premine and Postmine Wetland Evaluations

June 2013 ASMR Meeting

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TXRAM Team

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Background – Regulatory Driver

USACE – Clean Water Act, Section 404 permitting:

- Compensatory mitigation required for **some** projects
  - Offset adverse impacts to waters of the U.S.
  - Restore, establish, enhance, or preserve aquatic resources
- Mitigation for "functions" of waters of the U.S.
- **Appropriate assessment method** to determine mitigation requirements (33 CFR 332.3[f][1])

Background - Challenges

USACE Fort Worth & Tulsa (within Texas) Districts

- No standard assessment method prior to 2011
- One HGM guidebook (forested wetlands only) & several other methods
- Inconsistency in assessments for permitting and mitigation calculations
- Inconsistency in mitigation banking evaluation / credit ratios (2008 Mitigation Rule)

TXRAM Objectives

- Rapid, repeatable, field-based method
- Measure multiple observable metrics
- Single score of condition (health)
- Developed to fit USACE 404 Regulatory program in Fort Worth and Tulsa districts

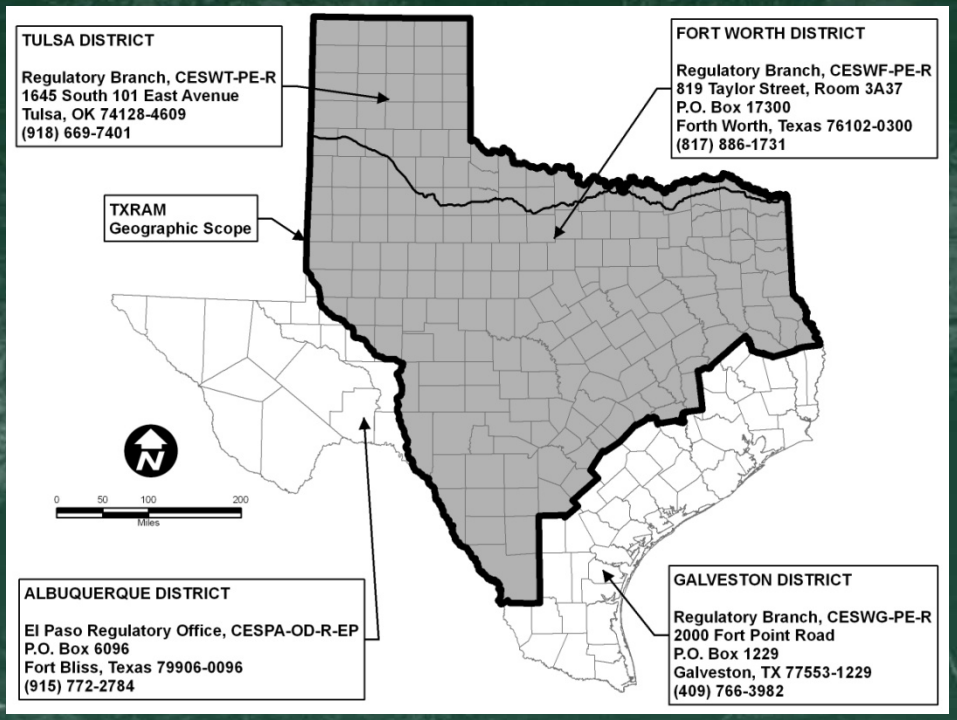
Background – Intended Use

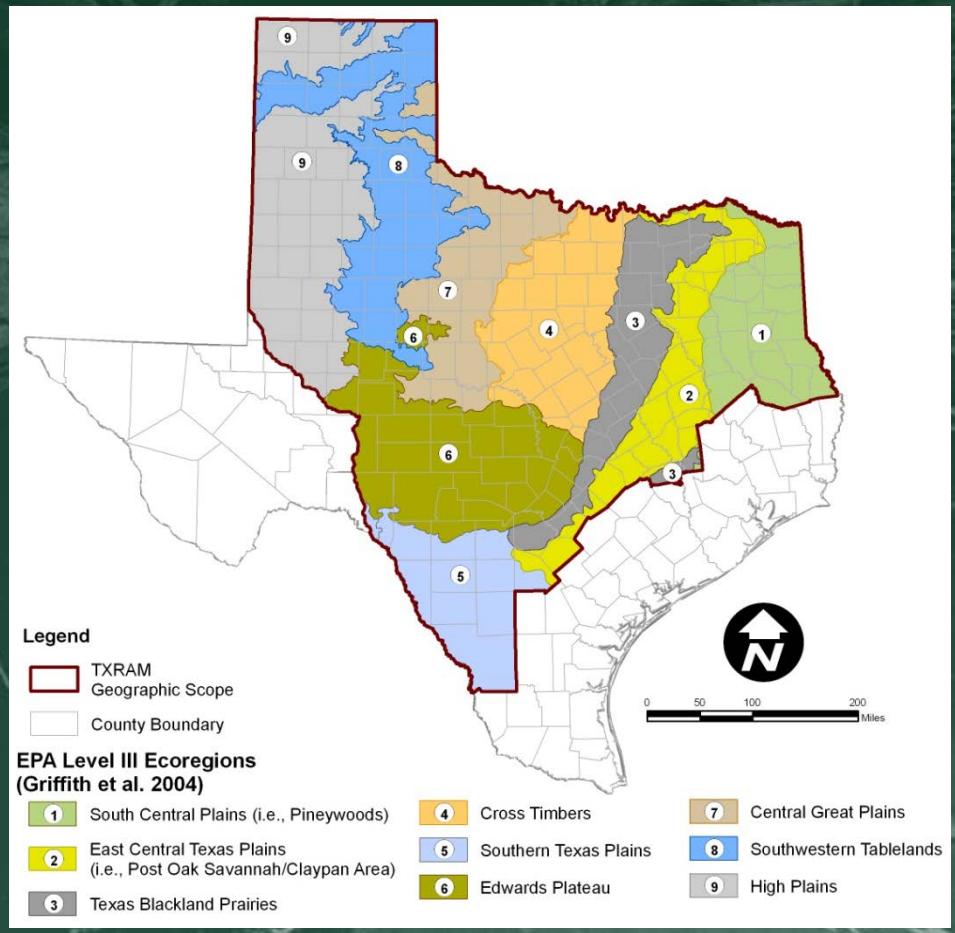
Evaluation of Waters of the U.S.

- Streams (ephemeral, intermittent, and perennial)
- Wetlands - abutting, adjacent, and/or proximate to waters

*No Impoundment Module

Geographic Scope





Intended Uses

- Improve impact assessment
- Compare alternatives (sites or designs)
- Assess premine waters to be impacted and postmine waters for mitigation
- Monitor changes over time
- Measure ecological “lift” of future conditions (mitigation)

Assessment Extent and Timing

- Varies by project type
- Depends on project objective, schedule, planning
- Example: during or after delineation
- Area evaluated to determine score:
  - Stream Assessment Reach (SAR)
  - Wetland Assessment Area (WAA)
- Guidelines encourage consistency

Streams Module

- Stream Assessment Reach (SAR)
- Stream types
  - 3 based on water source and duration of flow
  - Perennial, intermittent, and ephemeral



Streams Module

Core Elements	***Metrics***
Channel Condition	Floodplain Connectivity
	Bank Condition
	Sediment Deposition
Riparian Buffer Condition	Riparian Buffer
In-stream Condition	Substrate Composition
	In-stream Habitat
Hydrologic Condition	Flow Regime
	Channel Flow Status

Metrics are scored 0—5.

Streams Module

- Floodplain Connectivity

1

3

5

Streams Module

- Bank Condition

1

3

5

Streams Module

- Sediment Deposition

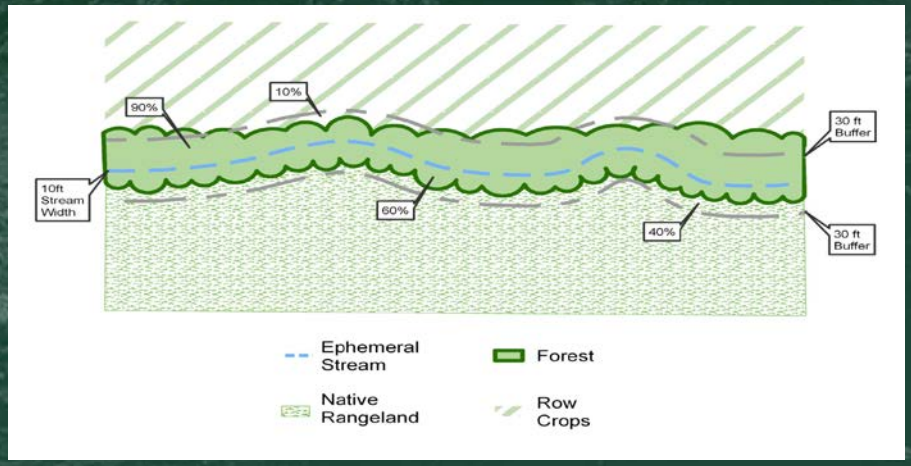
1

3

5

Streams Module

- Riparian Buffer Condition



Left Bank

Buffer Type	Canopy Cover	Vegetation Community	Land Use	Score	Percentage of Area	Subtotal
1. Forest	75	Native	Low	5	90	4.5
2. Row Crops	0	Non-native	Inten	0	10	0.0
					Score:	4.5

Right Bank

Buffer Type	Canopy Cover	Vegetation Community	Land Use	Score	Percentage of Area	Subtotal
1. Forest	75	Native	Low	5	60	3.0
2. Native Rangeland	0	Native	Low	3	40	1.2
					Score:	4.2

Streams Module

- Substrate Composition

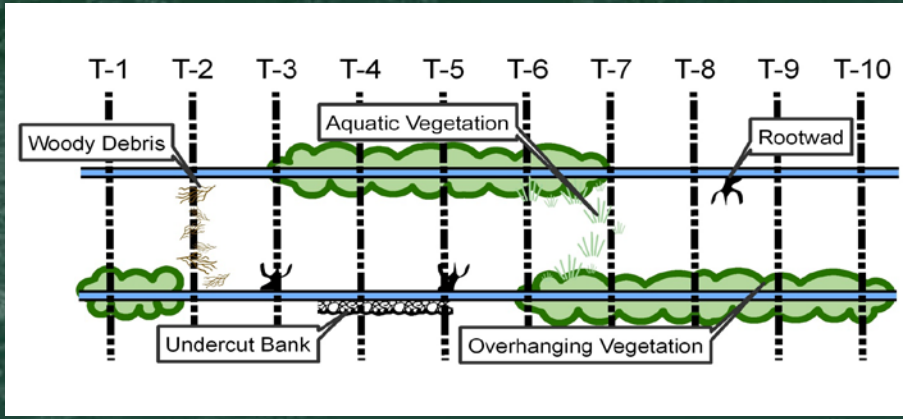
1

3

5

Streams Module

- In-stream Habitat



Habitat Type	*T1*	*T2*	*T3*	*T4*	*T5*	*T6*	*T7*	*T8*	*T9*	*T10*	*T11*	*T12*	*T13*
Undercut Banks				X	X								
Overhanging Vegetation	X		X	X	X	X	X	X	X	X			
Rootmats													
Rootwads			X		X								
Woody/Leafy Debris		X											
Boulders/Cobbles													
Aquatic Macrophytes						X	X						
Riffle/Pool Sequence													
Artificial Habitat Enhancement													
Other													
Total No. Present	1	1	2	2	3	2	2	1	1	1			

Average: 1.6 **Score: 2**

Streams Module

- Flow Regime

1

2

4

Streams Module

- Channel Flow Status

1

3

4

Premine Ephemeral Stream

Overall TXRAM Score: 17

Premine Ephemeral Stream

Overall TXRAM Score: 32

Premine Intermittent Stream

Overall TXRAM Score: 65

Premine Perennial Stream

Overall TXRAM Score: 72

Postmine Ephemeral Stream

Overall TXRAM Score: 33

Postmine Ephemeral Stream

Overall TXRAM Score: 43

Postmine Ephemeral Stream

Overall TXRAM Score: 50

Postmine Intermittent Stream

Overall TXRAM Score: 52

Postmine Intermittent Stream

Overall TXRAM Score: 72

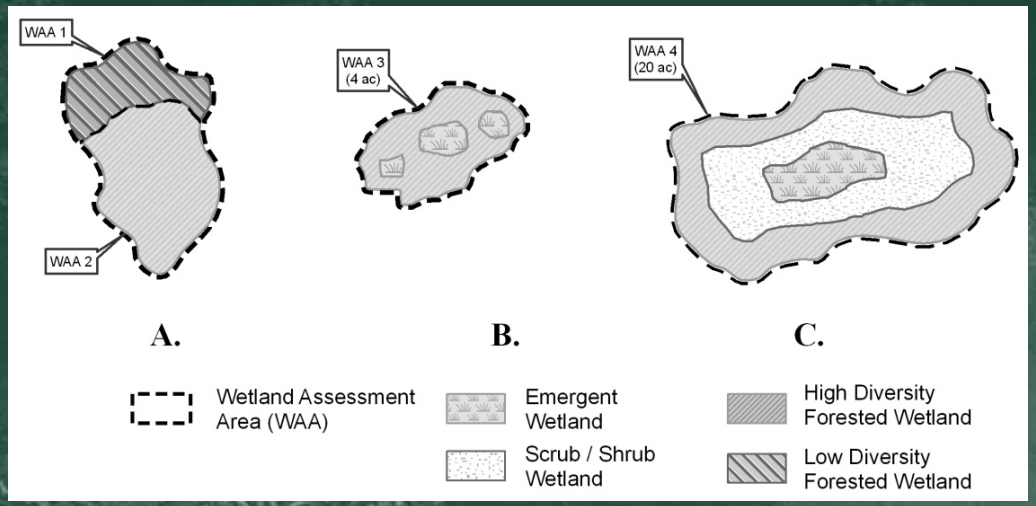
Wetlands Module

- Wetland Assessment Area (WAA)
- Wetland Types
  - 4 defined based on hydrogeomorphic approach
  - Riverine, slope, lacustrine fringe, depressional




Wetlands Module

- WAA boundary
  - Encompass uniform hydrologic processes
  - Separate for different disturbance or stress
  - Not at vegetation community boundaries
  - Not normally at artificial boundaries

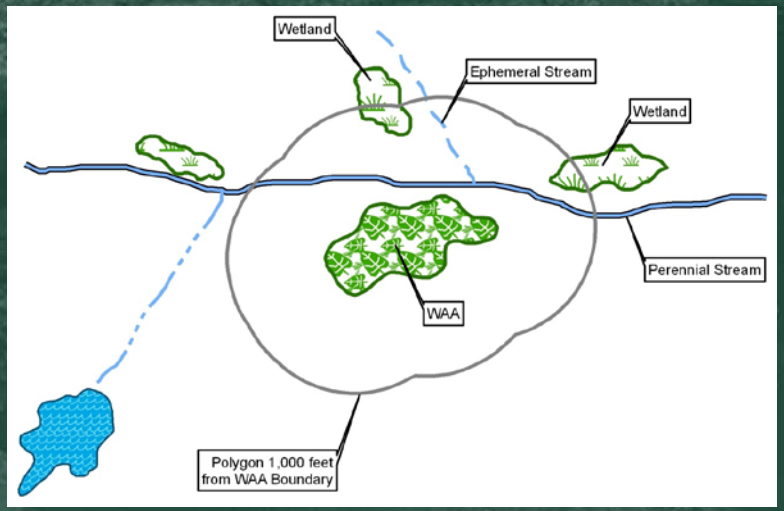


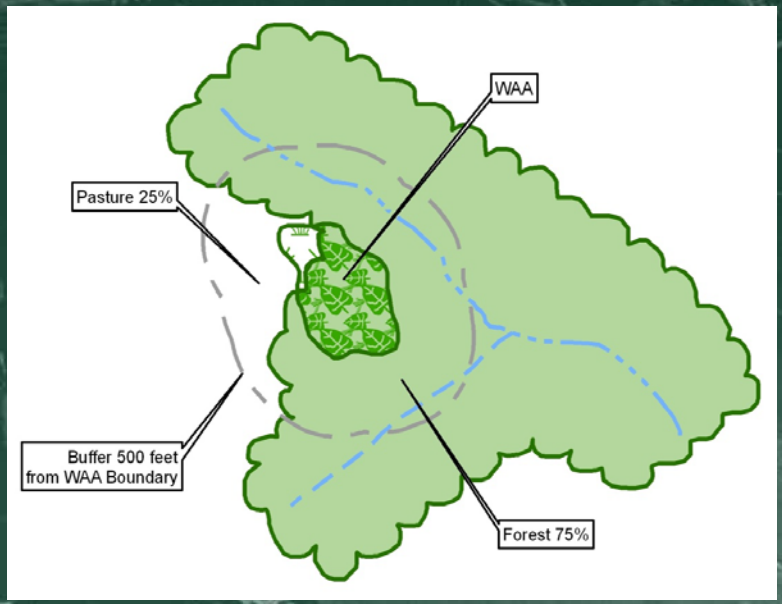
Wetlands Module

Core Elements	***Metrics***
Landscape	Connectivity
	Buffer
Hydrology	Water source
	Hydroperiod
	Hydrologic flow
Soils	Organic matter
	Sedimentation
	Soil modification
Physical Structure	Topographic complexity
	Edge complexity
	Physical habitat richness
Biotic Structure	Plant strata
	Species Richness
	Non-native/invasive infestation
	Interspersion
	Strata overlap
	Herbaceous cover
	Vegetation alterations

Wetlands Module

- Landscape
  - Connectivity
  - Buffer





Wetlands Module

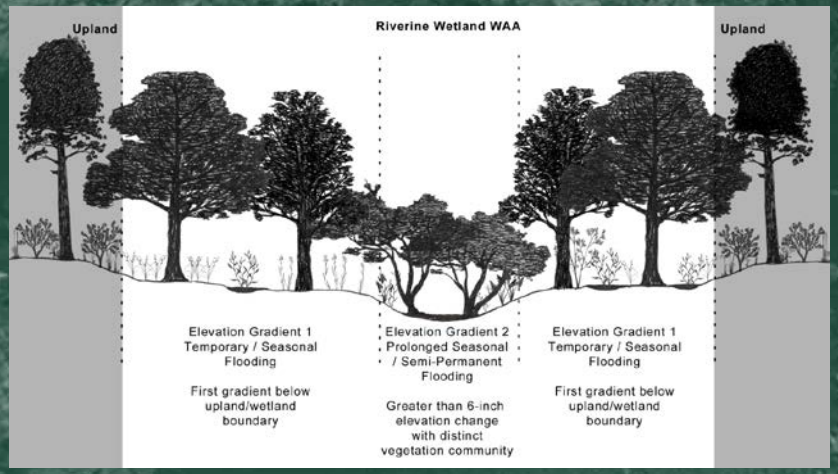
- Hydrology
  - Water source
  - Hydroperiod
  - Hydrologic flow

Wetlands Module

- Soils
  - Organic matter
  - Sedimentation
  - Soil modification

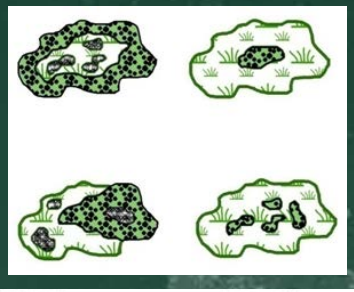
Wetlands Module

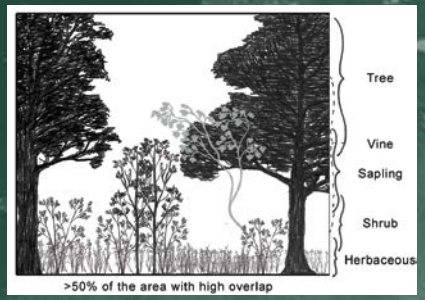
- Physical Structure
  - Topographic complexity
  - Edge complexity
  - Physical habitat richness



Wetlands Module

- Biotic Structure
  - Plant strata
  - Species richness
  - Non-native/invasive infestation
  - Interspersion
  - Strata overlap
  - Herbaceous cover
  - Vegetation alterations





Premine Riverine Wetland

Overall TXRAM Score: 60

Premine Lacustrine Fringe Wetland

Overall TXRA M Score: 62

Premine Riverine Wetland

Overall TXRAM Score: 67

Premine Slope Wetland

Overall TXRAM Score: 69

Premine Lacustrine Fringe Wetland

Overall TXRAM Score: 75

Postmine Depressional Wetland

Overall TXRAM Score: 60

Postmine Lacustrine Fringe Wetland

Overall TXRAM Score: 60

Postmine Riverine Wetland

Overall TXRAM Score: 63

Postmine Riverine Wetland

Overall TXRAM Score: 69

Postmine Lacustrine Fringe Wetland

Overall TXRAM Score: 71

Postmine Slope Wetland

Overall TXRAM Score: 71

Postmine Depressional Wetland

Overall TXRAM Score: 72

Postmine Riverine Wetland

Overall TXRAM Score: 74

Postmine Lacustrine Fringe Wetland

Overall TXRAM Score: 77

Postmine Depressional Wetland

Overall TXRAM Score: 77

Postmine Depressional Wetland

Overall TXRAM Score: 81

Summary of Premine and Postmine TXRAM Scores

Resource Type	Average Premine Score	Average Postmine Score
Perennial Stream	67	64
Intermittent Stream	55	64
Ephemeral Stream	39	47
Depressional Wetland	69	73
Lacustrine Fringe Wetland	72	72
Riverine Wetland	74	73
Slope Wetland	72	71

TXRAM Applications

- Avoid or minimize impacts to resources with higher scores
- Determine “functional loss” / debits for impacted resources
- Compare premine scores with projected postmine scores to demonstrate suitable mitigation replacement for impacts

Summary

- TXRAM is used for premine and postmine assessment of waters in the Fort Worth District
- TXRAM demonstrates adequate compensatory mitigation
- Similar approach may be useful in evaluating mitigation in other Districts