Texas Rapid Assessment Method (TXRAM) – Overview and Applications

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Overview

- Need, Purpose and Objectives for Texas Rapid Assessment Method (TXRAM)
- Overview of TXRAM Stream and Wetland Modules
- Permitting and Mitigation Applications
TXRAM Need – Section 404 Activities

If dredge / fill placement impacts exceed minimal thresholds:

- **Compensatory mitigation required**
  - Offset adverse impacts to waters of the U.S.
  - Restore, enhance, preserve, or create aquatic resource “functions”

- **Section 404 Regulations require an appropriate assessment method for impacts & mitigation plan** (33 CFR 332.3[f][1])
Need for Conditional Assessment

USACE - Fort Worth District

- No standard assessment method prior to 2011
- One HGM guidebook (forested wetlands only) & several other methods
- HDR Team selected by USACE to develop assessment method
  - Review of existing methods
  - Develop wetlands and streams modules
  - Lead agency field review
Purpose - Intended Uses

- Assess potential impact
- Compare alternatives
- Monitor changes over time
- Measure ecological “lift” of future conditions
TXRAM Objectives

- Rapid, repeatable, field-based method
- Measure multiple observable metrics
- Single score of condition
- Developed to fit USACE regulatory program in Fort Worth and Tulsa districts
Geographic Scope
TXRAM Assessment Description

- Flexible depending on project objective, schedule, planning
- Guidelines encourage consistency
- Two modules
  - Streams Module
  - Wetland Module
Basic Assumptions

- **Function vs. Condition**
  - Function = process or attribute
  - Condition = quality, integrity, or health

- **Condition is related to overall ability to perform functions**

- **TXRAM measures condition**
  - Indicator(s) of potential to perform multiple integrated functions
Varies by project type

Example: during or after delineation

Area evaluated to determine score:

- Stream Assessment Reach (SAR)
- Wetland Assessment Area (WAA)
Streams Module

- Stream Assessment Reach (SAR)
- Stream types
  - 3 based on groundwater influence and flow duration
  - Perennial, intermittent, and ephemeral
## Streams Module

<table>
<thead>
<tr>
<th>Core Elements</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel Condition</td>
<td>Floodplain Connectivity</td>
</tr>
<tr>
<td></td>
<td>Bank Condition</td>
</tr>
<tr>
<td>Riparian Buffer Condition</td>
<td>Sediment Deposition</td>
</tr>
<tr>
<td>In-stream Condition</td>
<td>Riparian Buffer</td>
</tr>
<tr>
<td>Hydrologic Condition</td>
<td>Substrate Composition</td>
</tr>
<tr>
<td></td>
<td>In-stream Habitat</td>
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<tr>
<td></td>
<td>Flow Regime</td>
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<tr>
<td></td>
<td>Channel Flow Status</td>
</tr>
</tbody>
</table>
Streams Module

- Floodplain Connectivity
Streams Module

- Bank Condition

1

3

5
Streams Module

- Sediment Deposition

1  3  5
Streams Module

- Riparian Buffer Condition

<table>
<thead>
<tr>
<th>Left Bank</th>
<th></th>
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<tbody>
<tr>
<td>Buffer Type</td>
<td>Canopy Cover</td>
<td>Vegetation Community</td>
<td>Land Use</td>
<td>Score</td>
<td>Percentage of Area</td>
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<td>1. Forest</td>
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Score: 4.5

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<td>Percentage of Area</td>
<td>Subtotal</td>
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Score: 4.2
Streams Module

- Substrate Composition

1 3 5
Streams Module

- In-stream Habitat

![Diagram of stream habitat features](image)

<table>
<thead>
<tr>
<th>Habitat Type</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>T4</th>
<th>T5</th>
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<th>T8</th>
<th>T9</th>
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<td>1</td>
<td>1</td>
<td>1</td>
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</tbody>
</table>

Average: 1.6 Score: 2
Streams Module

- Flow Regime

1 2 4
Streams Module

- Channel Flow Status

1

3

4
Wetlands Module

- Wetland Assessment Area (WAA)
- Wetland Types
  - Four - defined by hydro-geomorphic conditions
  - Riverine, slope, lacustrine fringe, depressional
# Wetlands Module

<table>
<thead>
<tr>
<th>Core Elements</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landscape</td>
<td>Connectivity</td>
</tr>
<tr>
<td></td>
<td>Buffer</td>
</tr>
<tr>
<td>Hydrology</td>
<td>Water source</td>
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<td></td>
<td>Hydroperiod</td>
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<td>Hydrologic flow</td>
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<tr>
<td>Soils</td>
<td>Organic matter</td>
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<tr>
<td></td>
<td>Sedimentation</td>
</tr>
<tr>
<td></td>
<td>Soil modification</td>
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<tr>
<td>Physical Structure</td>
<td>Topographic complexity</td>
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<td>Edge complexity</td>
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<td>Physical habitat richness</td>
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<td>Biotic Structure</td>
<td>Plant strata</td>
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<td>Species Richness</td>
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<td>Non-native/invasive infestation</td>
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<td></td>
<td>Interspersion</td>
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<td>Strata overlap</td>
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<tr>
<td></td>
<td>Herbaceous cover</td>
</tr>
<tr>
<td></td>
<td>Vegetation alterations</td>
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</tbody>
</table>
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
TXRAM Applications

- Help resource managers avoid or minimize impacts to resources
- Measure potential "functional loss", or debits
- Compare existing vs. proposed conditions to measure "lift" / mitigation credit
Strategies for Timing / Phasing

- **Planning Phase** –
  - Tool for alternative comparison
  - Site access required

- **Baseline / Delineation Phase**
  - Reduces overall costs / schedule
  - For projects with limited alternatives

- **Permitting / Design Phase** –
  - Typically needed if PCN is required
  - TXRAM mitigation bank transactions
Recommended for:
- Projects requiring USACE permitting / notification
- Projects requiring mitigation
- Future mitigation bank transactions

Plan for additional time / effort – 20% to 50%
TXRAM - Case Study 1

- Stream restoration / stabilization project
- Urban stream with heavy erosion / migration
- Comparison of existing and proposed conditions
- Demonstrate “ecological lift” for NWP 27
### Metric scores increased by design of the project:

**MAIN CHANNEL**

<table>
<thead>
<tr>
<th>Core Element</th>
<th>Metric</th>
<th>SAR - F1</th>
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<th>SAR - F2</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Existing</td>
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<td>Existing</td>
<td>Proposed</td>
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<tr>
<td>Channel Condition</td>
<td>Floodplain Connectivity</td>
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<td>Bank Condition</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Sediment Deposition</td>
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<td>3</td>
<td>2</td>
<td>4</td>
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<tr>
<td>Riparian Buffer Condition</td>
<td>Riparian Buffer (Left Bank)</td>
<td>1.5</td>
<td>3</td>
<td>1.2</td>
<td>3</td>
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<td></td>
<td>Riparian Buffer (Right Bank)</td>
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<td>3</td>
<td>1.5</td>
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<tr>
<td>In-stream Condition</td>
<td>Substrate Composition</td>
<td>3</td>
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<td>In-stream Habitat</td>
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<td>2</td>
<td>1</td>
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<tr>
<td>Hydrologic Condition</td>
<td>Flow Regime</td>
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<td>Channel Flow Status</td>
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<tr>
<td><strong>Overall TXRAM Score</strong></td>
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<td>52</td>
<td>68</td>
<td>45</td>
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</tbody>
</table>

**Existing Average TXRAM Score** 49

**Proposed TXRAM Score** 68
TXRAM - Case Study 2

- Stream enhancement / restoration project
- Perennial spring flow stream in park setting
- Evaluate existing conditions using TXRAM
- Identify enhancement measures in preliminary design
- Demonstrate “ecological lift” for NWP 27
TXRAM Questions?
Permit Planning

- 2012 Nationwide Permits limit the use of “traditional” stabilization methods
- Individual Permits (IP) or Pre-Construction Notifications (PCN) require mitigation planning
- Delays and cost increases compared to bio-engineering
Permitting Strategies

- Involve permitting specialists in planning phase
- Avoid / minimize impacts where practicable
- Document alternative(s) evaluation
- Money spent in alternative analysis and permitting = mitigation savings
Permit Planning

- Early planning is key
- Delaying or ignoring permitting
  - Increases costs
  - Causes delays
  - Can result in non-compliance / enforcement
  - Increases risks
Mitigation Goals

- Avoid and minimize impacts to the extent practicable
- Offset unavoidable adverse impacts to the aquatic environment
- “No net loss” of biological, chemical, and physical functions of waters
Mitigation – Historic Approach

- Focused on surface area ratios
- Preference for on-site and in-kind permittee responsible projects
- Off-site and mitigation banks considered lower priority until 2008
2008 Mitigation Rule – Key Aspects

- **Goal** – level playing field (permittee, Mitigation Banks, ILFs) to the maximum extent practicable

- **Performance Standards** – ecologically-driven, equivalent/effective standards, best available science

- **Compliance** – increase compliance visits, establish enforceable success criteria, prescribed monitoring reports

- **Mitigation Sequence Preserved** - avoid, minimize, compensate for unavoidable impacts and lost aquatic functions
2008 Mitigation Rule – Preference Hierarchy

- **Third-party mitigation**
  - Mitigation banks (proposed, not currently available)
  - In-lieu fee (ILF) (currently not an option in area)

- **Watershed approach, permittee-responsible mitigation projects**

- **Permittee-responsible mitigation projects**
  - On-site / in-kind
  - Off-site / out-of-kind
Permittee-Responsible Mitigation Plan Components

1. Objective(s)
2. Site selection information
3. Site protection instrument to be used
4. Baseline information (impact site and mitigation site)
5. How project will mitigate for lost functions and values
6. Work plan (plans and specifications)
7. Maintenance plan
8. Performance standards (ecologically-based)
9. Monitoring requirements
10. Long-term management plan (post-monitoring)
11. Adaptive management plan
12. Financial assurances

Level of information must be commensurate with the scope and scale of the impacts
2008 Mitigation Rule – Watershed Approach

- Improve and maintain watershed functions
- Efficiency of managing large vs. multiple small sites
- Opportunity to achieve multiple purposes
- Reduce land use conflicts & enhance probability of success
Watershed approach

- Lower construction costs per linear foot
Mitigation Banking in Texas

- Approved Mitigation Bank
- Proposed Mitigation Bank
Service Area Determination

- Combination of Level III Ecoregions and 8-Digit Hydrologic Unit Code (HUC)
Local Government – Involvement

- Mitigation credit buyer
- Permittee-responsible off-site / in-kind recipient
- Joint watershed mitigation site (phased) coordination
- Mitigation bank sponsor / partner
Local Government Role

• Self-mitigating projects
  – NWP 27 – Stream restoration
  – Bio-technical stabilization efforts
Site Selection – What to look for

- **Restoration** first…then enhancement, preservation, & establishment
- Diverse aquatic / upland conditions
- Public lands - no conflicting federal / state restrictions
- Private lands - fee for title acquisition preferable
- Intangibles (ecology, location, history, etc.)
Challenges

• Urban settings require special design considerations
  – Biotechnical channel design
  – Fluvial geomorphology analysis

• Restoration - engineering complexity and contingency planning

• Invasive, exotic species encroachment

• Long-term monitoring (5-years), management, and sustainability
Special Considerations

Plan with 20+ years in mind
Opportunities

Public-private partnerships

• Shared risk / costs
• Minimize project-by-project requirements
• Credits available for public projects at reduced rate
• Mitigation credits available to expedite local development
Mitigation Planning

- Watershed planning
- Feasibility study / market analysis
- Mitigation site identification
- Baseline surveys / condition assessment
- Conceptual site planning
- Formulate approach (bank, ILF, or phased PRM area)
- Initiate formal USACE process
Permitting & Mitigation Questions?