Aquatic Mitigation
Riverside Oxbow and Sycamore Creek Restoration

Brian Murphy, P.E., D.WRE
July 30, 2014
Overview

- Central City Project
- Marine Creek
- Sycamore Creek
- Design (Criteria & Approach)
- Summary & Conclusions
Central City Project

• “The Central City Project is located within the vicinity of the downtown area of Fort Worth, Texas, along the West Fork and Clear Fork of the Trinity River and consists of a bypass channel, levee system, and associated improvements to divert flood flows around a segment of the existing floodway system. “
  – Final Supplement No. 1 to the Final Environmental Impact Statement
Central City Project

Sycamore Creek Aquatic Mitigation Design
Marine Creek

“Construction of a low water dam on Marine Creek…result in inundation of riparian and aquatic habitat in Marine Creek that would require mitigation…”

Decrease aquatic habitat by ~0.97 average annual habitat units (AAHUs)
Sycamore Creek

- Sycamore Creek was separated from old oxbow when the river was channelized and straightened in the 1950’s.

- The Sycamore Creek improvements include:
  - reestablishing Sycamore Creek channel
  - reconnecting this channel to the West Fork of the Trinity River channel and old oxbow.
  - projected mitigation outputs from Sycamore Creek restoration ~0.64 AAHUs
Sycamore Creek

• Aquatic habitat would also be improved by:
  – providing riparian forest and native grassland vegetative buffers adjacent to the oxbow
  – improving and adding additional acreages of wetlands
  – restoring highly disturbed floodplain areas to native grasslands with riparian forested mottes
  – selectively clearing of forested floodplain along West Fork and planting of native hard and soft mast trees.
Design Criteria - Aquatic Species

• Keystone Species
  – Selected from Marine Creek survey list (prepared by USFWS)
  – Species most impacted by the loss of habitat (riffle-pool morphology)
  – Used primarily for developing design criteria

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spotted Sucker</td>
<td>Minytremæ melanops</td>
</tr>
<tr>
<td>Central Stoneroller</td>
<td>Campostoma anomalum</td>
</tr>
<tr>
<td>Blacktail Shiner</td>
<td>Cyprinella venusta</td>
</tr>
<tr>
<td>Golden Shiner</td>
<td>Notemigonus crysoleucas</td>
</tr>
<tr>
<td>Blackstripe Topminnow</td>
<td>Fundulus notatus</td>
</tr>
<tr>
<td>Bluntnose Darter</td>
<td>Etheostoma chlorosomum</td>
</tr>
<tr>
<td>Orangethroat Darter</td>
<td>Etheostoma spectabile</td>
</tr>
</tbody>
</table>
Design – Criteria

• Sycamore Creek channel design is constrained by:
  – Preservation of mature trees along former creek
  – Low flow (River) - 10 cfs
  – Profile of the existing oxbow channel
    • Inlet/Outlet elevation of Sycamore Creek
    • Slope
  – Sanitary sewer MH and sewer line
  – Beach Street Low Water Dam
Design – Approach

• Revised Plan

Sycamore Creek Aquatic Mitigation Design
Design – Approach

**Sycamore Creek/Riverside Oxbow Profiles**

- **Existing Ground (Scenario 1)**
- **Modified Oxbow (Scenario 2)**
- **Significant Modifications (Scenario 3)**
- **Sycamore Crk**

**High Points**
(March 2013 Survey)

**Station (feet upstream of Oxbow outfall)**

**Elevation (ft. MSL)**

- 470
- 475
- 480
- 485
- 490
- 495
- 500
- 505
- 510
- 515
- 520

- 100+00
- 120+00
- 140+00
- 160+00
- 180+00
- 200+00
- 220+00

**Sycamore Creek Aquatic Mitigation Design**

CDM Smith
Comparison

<table>
<thead>
<tr>
<th>Structure</th>
<th>Marine Creek</th>
<th>Sycamore Creek</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Length (ft)</td>
<td>Percentage</td>
</tr>
<tr>
<td>Pool</td>
<td>1,175</td>
<td>63%</td>
</tr>
<tr>
<td>Riffle</td>
<td>550</td>
<td>29%</td>
</tr>
<tr>
<td>Concrete-lined</td>
<td>150</td>
<td>8%</td>
</tr>
<tr>
<td>Run</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Length</td>
<td>1,875</td>
<td>100%</td>
</tr>
<tr>
<td>Low Flow Width</td>
<td>30-50 ft</td>
<td></td>
</tr>
<tr>
<td>Average Gradient</td>
<td>0.80%</td>
<td></td>
</tr>
<tr>
<td>Low Flow Run Depth</td>
<td>0.8 ft</td>
<td></td>
</tr>
<tr>
<td>Substrate</td>
<td>silt-sand-gravel-cobble</td>
<td>silt-sand-gravel-cobble</td>
</tr>
</tbody>
</table>

Table 6 Comparison of Marine and Sycamore Creek Structure
Conclusions

- Target 0.64 AAHUs achievable in Sycamore Creek
- Constraints limited the restoration of Sycamore Creek
- Future in-stream habitat measures for the old oxbow – restore riffle-pool morphology, an additional 3.96 AAHUs – Net improvement (functional lift)
- Old oxbow channel improvements – Major improvements will be part of future ecosystem restoration package.
Thank you!

• Acknowledgements
  – Army Corps of Engineers, Fort Worth District
  – Trinity River Vision Authority
  – Tarrant Regional Water District
  – City of Fort Worth
  – U.S. Fish and Wildlife Service

• Questions