Corps of Engineers- Brazos River System

Fort Worth District – Building Strong!
Brazos Basin Reservoirs
USACE Role

- Flood control for Brazos River System
- Water supply contracts at all 9 Corps projects within the Brazos River System
- Reallocations, studies, impact analysis
- Water accounting
- Day to day release scheduling
- Permitting intake structures and pipelines
- Cooperative stream gaging program
Maintaining Perspective On Water Management

- Historical Disasters
  - S. Fork Dam, Pennsylvania (Operational Issues)
    - May 1889, 2209 dead, $17 mil damages
  - St Francis Dam, California (Operational & Design)
    - March 1928, 450 dead, several towns destroyed
  - Buffalo Gap, Virginia Tailings Dams (Operational & Des.)
    - Feb 72, 125 dead (COE Involvement)
  - Banqiao & Shimantan Dams (Ru & Hong Rivers, China) (Design Issues)
    - August 75, 85k dead, 11 mil affected
  - Teton Dam, Idaho (Design Issues)
    - June 1976, 11 dead, $.5 billion damages
Flood Control Operations

- Close gates and store flood producing runoff to protect downstream areas
- Use decision support tools (data & forecasts)
- Project safety, monitoring
- Prevent uncontrolled spillway flows when possible
- Forecasts to affected parties (internal, NWS, River Authorities, etc.)
- Wait until runoff from uncontrolled areas has diminished
- Evacuate flood water as quickly as possible to prepare for subsequent flooding events
## Flood Damages Prevented in Brazos Basin

Annual Flood Damages Prevented Through FY 2010
Current Dollars (Not Adjusted For Inflation)

<table>
<thead>
<tr>
<th>PROJECT</th>
<th>FY 2010 DAMAGES PREVENTED</th>
<th>CUMULATIVE BENEFITS THROUGH FY 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquilla</td>
<td>$2,978,559</td>
<td>$38,355,059</td>
</tr>
<tr>
<td>Belton</td>
<td>$23,096,184</td>
<td>$245,949,284</td>
</tr>
<tr>
<td>Georgetown</td>
<td>$1,981,834</td>
<td>$11,169,534</td>
</tr>
<tr>
<td>Granger</td>
<td>$6,710,073</td>
<td>$54,486,273</td>
</tr>
<tr>
<td>Proctor</td>
<td>$175,849</td>
<td>$44,231,849</td>
</tr>
<tr>
<td>Somerville</td>
<td>$1,452,665</td>
<td>$97,609,865</td>
</tr>
<tr>
<td>Stillhouse</td>
<td>$15,001,825</td>
<td>$106,438,925</td>
</tr>
<tr>
<td>Waco</td>
<td>$2,162,013</td>
<td>$177,785,113</td>
</tr>
<tr>
<td>Whitney</td>
<td>$4,489,714</td>
<td>$308,715,514</td>
</tr>
<tr>
<td>Basin Total</td>
<td>$58,048,717</td>
<td>$1,084,741,417</td>
</tr>
</tbody>
</table>
Control Points

Control points are select locations along a river, which are considered representative, for the purpose of evaluating the impact of a flood along that portion of the river. These locations are designated in the plan of regulation as regulatory discharge points.
# Brazos Basin Control Points

<table>
<thead>
<tr>
<th>Gage</th>
<th>Flow (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquilla Creek</td>
<td>3,000</td>
</tr>
<tr>
<td>Gatesville on Leon Creek</td>
<td>5,000</td>
</tr>
<tr>
<td>Georgetown on N. Fk San Gabriel</td>
<td>6,000</td>
</tr>
<tr>
<td>Lane Port on San Gabriel</td>
<td>6,000</td>
</tr>
<tr>
<td>Little River on Little River</td>
<td>10,000</td>
</tr>
<tr>
<td>Cameron on Little River</td>
<td>10,000</td>
</tr>
<tr>
<td>Aquilla on Brazos River</td>
<td>25,000</td>
</tr>
<tr>
<td>Waco on Brazos River</td>
<td>60,000</td>
</tr>
<tr>
<td>Hempstead on Brazos River</td>
<td>60,000</td>
</tr>
<tr>
<td>Richmond on Brazos River</td>
<td>60,000</td>
</tr>
</tbody>
</table>
2007 Brazos Flooding
(15 June – 1 August)
Belton Flood Hydrograph with and without Project

Legend

- BLNT2 OBS FLOW-IN
- BLET2 OBS FLOW

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Lake Proctor

Fort Worth District – Building Strong!
Stillhouse Flood Hydrograph with and without Project
Whitney Flood Hydrograph with and without Project

Fort Worth District – Building Strong!
Waco Flood Hydrograph with and without Project
## Reservoir Use Information

<table>
<thead>
<tr>
<th>RESERVOIR NAME</th>
<th>FLOOD POOL (1000 - AC-FT)</th>
<th>CONSERVATION &amp; WATER STORAGE (1000 - AC-FT)</th>
<th>WATER SUPPLY</th>
<th>NUMBER OF PARKS</th>
<th>AVERAGE ANNUAL HYDROPOWER GENERATION (MWH/YR) (FY10)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AQUILLA</td>
<td>86</td>
<td>34</td>
<td>BRA</td>
<td>6</td>
<td>N/A</td>
</tr>
<tr>
<td>BELTON</td>
<td>640</td>
<td>373</td>
<td>BRA</td>
<td>18 (^3)</td>
<td>N/A</td>
</tr>
<tr>
<td>GEORGETOWN</td>
<td>88</td>
<td>29</td>
<td>BRA</td>
<td>5</td>
<td>N/A</td>
</tr>
<tr>
<td>GRANGER</td>
<td>162</td>
<td>38</td>
<td>BRA</td>
<td>6</td>
<td>N/A</td>
</tr>
<tr>
<td>PROCTOR</td>
<td>310</td>
<td>31</td>
<td>BRA</td>
<td>4</td>
<td>N/A</td>
</tr>
<tr>
<td>SOMERVILLE</td>
<td>338</td>
<td>144</td>
<td>BRA</td>
<td>9 (^3)</td>
<td>N/A</td>
</tr>
<tr>
<td>STILLHOUSE HOLLOW</td>
<td>391</td>
<td>205</td>
<td>BRA</td>
<td>7</td>
<td>N/A</td>
</tr>
<tr>
<td>WACO</td>
<td>554</td>
<td>104</td>
<td>BRA &amp; WACO</td>
<td>9 (^3)</td>
<td>N/A</td>
</tr>
<tr>
<td>WHITNEY</td>
<td>1,372</td>
<td>627 (^2)</td>
<td>BRA</td>
<td>22 (^3)</td>
<td>85,800</td>
</tr>
<tr>
<td><strong>TOTALS</strong></td>
<td><strong>3,941</strong></td>
<td><strong>1,585</strong></td>
<td></td>
<td><strong>86 (^3)</strong></td>
<td><strong>85,800</strong></td>
</tr>
</tbody>
</table>

1. Represents current and future water supply allocations.
2. Whitney has 50,000 AC-FT allocated for water supply.
3. Represents both US Army Corps of Engineers parks and parks operated by others. 65 parks are operated by the US Army Corps of Engineers.
Challenges

- Dam Safety Ratings
- Conflicting goals and interests
- Invasive species in pipelines
  - Golden Algae
- Terminal storage, loss of recreation benefits
- Outlet works modifications
- Climate change

Current Water Supply Studies

- Aquilla reallocation – current
Pipelines

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USACE System Simulation Modeling
Reservoir System Simulations

- Daily Period of Record Model (RiverWare) 1939-2009
- Evaluate deviations and proposed changes to the plan of regulation
  - Flooding issues
  - Recreation interests
  - Users with conflicting needs
  - Environmental concerns
- Evaluate reallocation of flood or hydropower storage
- Perform risk assessments & evaluate what-if scenarios (flooding & drought)
- Water accounting
- Basin wide studies
Erosion Control in Brazos Basin

- Corps will implement tapered release system after flood events to minimize erosion within the Brazos system, most notably along the Little River and Leon River.
Deviations

• Any time reservoir water operations will be modified from normal operations, involves SWD and coordination w/ stakeholders

• Brazos Project Deviations in FY 10
  – Belton - gate repair/liner repair/rip rap
  – Georgetown – accommodate drawdown at Granger
  – Granger - rip rap/gate painting
  – Stillhouse - DSAC
  – Whitney – gate painting
  – Waco - drowning
U.S. Army Corps of Engineers

Questions?