NTMWD’s Water Planning and Challenges

Presented to:
Society of American Military Engineers
July 21, 2014
Major North Texas Water Providers

Map showing the major water providers in North Texas, including Tarrant Regional Water District, Dallas Water Utilities, North Texas Municipal Water District, and Upper Trinity River Water District.
NTMWD Authority

- **Enabling Legislation**: Created as a Conservation & Reclamation District under Chapter 62, Act of 1951, 52nd Legislature of Texas, Regular Session

- **Member Cities**: Allen, Farmersville, Forney, Frisco, Garland, McKinney, Mesquite, Plano, Princeton, Richardson, Rockwall, Royse City, & Wylie

- **Population Served**: 1.6 million

- **Service Area**: 2,000 square miles in Collin, Dallas, Denton, Fannin, Hopkins, Hunt, Kaufman, Rains, & Rockwall Counties
NTMWD Raw Water Supply Map
Projected NTMWD Demands and Supplies with Main Stem Pump Station

Average Day Demand and Supply in MGD

- Lake Lavon
- SRA Sabine
- Main Stem Pump Station
- Total Existing
- Lake Chapman
- Dallas Purchase
- Lower Bois d'Arc Creek Reservoir
- Wilson Creek
- Lake Bonham
- Additional Lake Texoma - Blend with LBA
- East Fork Raw Water Supply
- Lake Texoma Pipeline
- Dry Year Demand with Losses
## NTMWD Reservoir Elevations (July 18, 2014)

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Conservation Pool Elevation</th>
<th>Current Elevation</th>
<th>Down</th>
<th>% of NTMWD’s Remaining Supply</th>
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</thead>
<tbody>
<tr>
<td>Lavon</td>
<td>492.0’ (Last full on 5-14-12)</td>
<td>480.18'</td>
<td>-11.82'</td>
<td>38</td>
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<tr>
<td>Chapman</td>
<td>440.0’ (Last full on 4-14-10)</td>
<td>431.91'</td>
<td>-8.09'</td>
<td>41</td>
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<tr>
<td>Tawakoni</td>
<td>437.5’</td>
<td>428.00'</td>
<td>-9.50'</td>
<td>50</td>
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<tr>
<td>Texoma</td>
<td>617.0’</td>
<td>611.10'</td>
<td>-5.90</td>
<td>96</td>
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</tbody>
</table>
Lake Lavon Elevations by Month

- **2010**: [Graph data points]
- **2011**: [Graph data points]
- **2012**: [Graph data points]
- **2013**: [Graph data points]
- **2014**: [Graph data points]

- **Stage 3 (478')**: 490.18
- **Stage 4 (475')**: 488.22, 490.26, 484.27
- **Raw Water Intakes**: 5.19' Drop, 10.84' Drop, 9.27' Drop, 5.21' Drop
Lake Chapman Elevations by Month
Lake Level Modeling with Planned Measures
Water Conservation

- All Member Cities and Customers have adopted the **twice per month** irrigation restrictions

- During FY 13/14, NTMWD Members and Customers have achieved a **16 %** reduction from the last year with no restrictions - FY 10/11
Comparison of Member City Water Use and Goal
October 2013 – June 2014

Cumulative Use (Percent of Goal)

Month
Allen, Farmersville, Forney, Frisco, Garland, McKinney, Mesquite, Plano, Princeton, Richardson, Rockwall, Royse City, Wylie

Use up To Goal
Use Over Goal

Good
5-year Running Average Municipal w/Credit for Reuse GPCD for NTMWD Member Cities
NTMWD’s “Perfect Storm”

1. Denied Access
   Loss of 28% Water Supply

2. Long-Term Drought

3. Regional Growth
Near-Term Water Supply Plans

- Dallas Interim Purchase
- Lake Texoma Supply
- Dredging Lavon and Chapman
- Main Stem Pump Station
- Lake Texoma Desalination WTP
Projected NTMWD Demands and Supplies without Short-Term Supply 2017-2020

Short-Term Supply Need
25 to 45 MGD - Dry Year
Dallas Contract Extension
Dallas Raw Water Supply

- Executed three year contract with Dallas in May 2013
- Up 60 MGD
- Supplied from:
  - LRH
  - Tawakoni
  - Lake Fork
- Using existing NTMWD infrastructure to deliver
  - Tawakoni WTP
  - Tawakoni pipeline to Lavon
  - Reuse pipeline to Lavon
Dallas Raw Water Supply

• Extend interim purchase from Dallas until 2020
  – Dallas staff has concerns
  – Continued reliance on Dallas partnership
  – Cost at least $10 million per year
  – Costs are lower than desalination alternative
Lake Texoma Pipeline Project Update
Texoma Pipeline System

- Engineering  
  - September 2011 and June 2012

- USACE Permit to construct pipeline  
  - May 2012

- Pipe Manufacturing Began  
  - July 2012

- Pipeline Design Completed  
  - October 2012

- Lacey Act Exception (HR 6007)  
  - December 2012

- Construction:  
  5 Pipeline Contracts  
  1 Balancing Reservoir Contract  
  - Awarded - October 2012  
  - Completed - November 2013
Pipeline Completion

- Construction completed November 2013
- Pressure testing completed December 2013

Last pipe joint installed October 22, 2013
Blending Process
Plant Blending

- Maximum quantity of Texoma water to blend while achieving target finished water quality
  - Pipeline capacity: 125 mgd
  - Target blend ratio: 3:1
  - Target average Texoma usage: 75 mgd
Blending Facilities

- WTP III and IV Blending Structure
- WTP III and IV Blending Tanks
- Raw Water Pump Station No. 3
Completing blending structure and blend tanks for WTP III and IV
## Overall Project Cost Summary

<table>
<thead>
<tr>
<th>Item</th>
<th>Budget (Million)</th>
<th>Current (Million)</th>
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</thead>
<tbody>
<tr>
<td>CMAR/Construction</td>
<td>$282</td>
<td>$280</td>
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<td>(Guaranteed Maximum Price set at Jan. 2013 Board mtg)</td>
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<td>Engineering</td>
<td>$17</td>
<td>$17</td>
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<tr>
<td>Land</td>
<td>$11</td>
<td>$9</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>$310</strong></td>
<td><strong>$306 +/-</strong></td>
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</tbody>
</table>
Summary

- Balancing Reservoir – **Complete**
- Pipeline – **Complete**
- Plant Connections/Blending – **100% Complete**

In service:
- WTP III/IV - May 2014
- WTP I/II - June 2014

Currently using approx. 60 MGD
Oklahoma-Texas Boundary Issue in Lake Texoma

- The Oklahoma-Texas boundary was not identified in accordance with the Red River Boundary Compact in 2000.

- Causes part of NTMWD’s Lake Texoma Pump Station to be within the State of Oklahoma:
  - 7 of the 8 pumps are wholly or partially in Oklahoma.

- Requires action by:
  - Texas Legislature
  - Oklahoma Legislature
  - US Congress
Federal Legislative Efforts
Exemption from Lacey Act/Lacey Act Amendment

- The North Texas Zebra Mussel Barrier Act of 2012 (HR 6007) was enacted on December 28, 2012
  - Exempts NTMWD & GTUA from the Lacey Act/Lacey Act Amendments for water transfers containing zebra mussels from Lake Texoma in closed conveyance systems to water treatment facilities

- Currently working to amend this law to exempt water transfers containing any aquatic invasive species whose transfer is prohibited by the Lacey Act/Lacey Act Amendments - HR 4032
  - Passed House
  - Passed Senate
  - Signed by the President
Intake Dredging Projects
Lake Chapman

Access to 420:
240,000 Ac-Ft
94.5 MGD Yield

Current Silt Barrier – 420’

Post-dredging Pumping Limit – 415.5’

Post-dredging Channel Bottom – 412’

Conservation Pool

Sediment Pool

Current Lake Level – Approx. 428’

Additional 33,000 Ac-Ft
8.5 MGD Additional Yield

Remaining 37,000 Ac-Ft
0 MGD Remaining Yield

Conservation Pool

Sediment Pool

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0 MGD Remaining Yield
Dredging Benefits (Chapman)

Elevation 415.5’ – Pumping Limit After Dredging

Elevation 412’ – Channel Bottom After Dredging

Chapman Statistics

- Wet (50%)
- Dry (20%)
- Very Dry (4.5%)

Elevation 420’

Elevation 415.5’ – Pumping Limit After Dredging

Elevation 412’ – Channel Bottom After Dredging

Graph showing the elevation changes from January 2011 to August 2020 with different levels of dryness and wetness indicated.
Lake Jim Chapman Project Status

• **Schedule:**
  - Contract time bid: 140 days
  - Completion: July 2014

• **Cost:**
  - $1.8 Million
Lake Lavon

RWPS 3
Lake Normal Pool – 492’

- Current Lake Level – Approx. 480’
- Current RWPS 3 Pumping Limit – 471’
- Post-dredging RWPS 3 Pumping Limit – 467’
- Remaining 64,129 Ac-Ft

Current Pumping Limits: 311,220 Ac-Ft

Access to Elevations (Post-Dredging):
+34,011 Ac-Ft

RWPS 2
Lake Normal Pool – 492’

- Current Lake Level – Approx. 480’
- Current RWPS 2 Pumping Limit – 468’
- Post-dredging RWPS 2 Pumping Limit – 462.5’
- Remaining 34,599 Ac-Ft

Current Pumping Limits: 337,438 Ac-Ft

Access to Elevations (Post-Dredging):
+37,323 Ac-Ft

Note: Max. Pumping Elevation Limit is Approx. 2’ Above Channel Bottom
Dredging Benefits (Lavon)

Lavon Statistics and Shortages for Planned Measures

- Elevation 415.5'
- Wet (50%)
- Normal-Dry (25%)
- Stage 3 Trigger
- Stage 4 Trigger
- Elevation 470 - Current Assumed Silt Barrier
- Elevation 460.5 (RWPS 2) & 465.0 (RWPS 3) - After Dredging

Minimum Historical Elevation Minimum (Historical Flows) 5th Percentile Median 25th Percentile
Lake Lavon Project Status

- **Final Engineering Tasks:**
  - Permitting
  - Acquire Disposal Site
  - Construction Documents
  - Bid and Construction Phase

- **Schedule:**
  - Design/Permitting: May 2014
  - Construction: Dec. 2014

RWPS 2 Survey
Main Stem Pump Station & Pipeline
Main Stem Pump Station & Pipeline

- New 100 MGD Pump Station on Main Stem Trinity River
- 17 M of 72” Pipeline
- Existing Conveyance Pump Station Expansion
- $95 million cost
- 2 to 2.5 year schedule
Texoma Desalination WTP
Desalination Plant Using Texoma Water

Option 2

- Construct near Sherman
- 11 m 84” pipeline parallel to existing Texoma pipeline
- 18 M 24” brine disposal pipeline
- Treated water & brine disposal PS at Sherman
- Texoma Pump Station Improvements
- 40 M 60/72” treated water pipeline -Leonard to McKinney
- $582 million cost
- 3 year schedule
Longer Term Water Supply Projects
Lower Bois d’Arc Creek Reservoir Project
Lower Bois d’Arc Creek Reservoir

Two Major Permits Required

- CWA Section 404
  - USACE

- Water Rights
  - TCEQ
Property Acquisition

- NTMWD Board approved - Nov. 2007
- Reservoir site property needed - 22,590 acres
- Acquisitions to date - 18,560 acres (82%)
- Riverby Ranch mitigation area - 14,959 acres
- North (Leonard) WTP site - 661 acres
## Current Cost Estimates*

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<tr>
<th>Project Component</th>
<th>Cost Estimate</th>
<th>Expenditures</th>
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<tbody>
<tr>
<td>Reservoir (Land, Dam, Intake, PS, Conflicts, Permitting, Mitigation)</td>
<td>$ 413.0 M</td>
<td>$104.2 M</td>
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<td>Terminal Storage</td>
<td>$30.7 M</td>
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<tr>
<td>90-Inch Pipeline**</td>
<td>$ 183.2 M</td>
<td>$4.4 M</td>
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<tr>
<td>Total</td>
<td>$626.9 M</td>
<td>$109.8 M</td>
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*January 2014 cost estimates

**Entire cost of Final Pipeline Alignment, Pump Station and Intake and Terminal Storage Location Study included in 90-Inch Pipeline expenditures figure
## Lower Bois d’Arc Creek Reservoir Project Timeline

### More Likely Schedule

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<td>Other Key Activities</td>
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# 2012 State Water Plan for NTMWD

<table>
<thead>
<tr>
<th>Water Management Strategy</th>
<th>Supply (Ac Ft/Yr)</th>
<th>Online (Year)</th>
<th>NTMWD Share of Capital Costs</th>
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<tbody>
<tr>
<td>Lower Bois d’Arc Creek Reservoir</td>
<td>123,000</td>
<td>2020</td>
<td>$615,498,000</td>
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<td>Additional Lake Texoma</td>
<td>113,000</td>
<td>2025</td>
<td>$152,900,000</td>
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<td>Marvin Nichols Reservoir</td>
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Questions