TULSA DISTRICT
US ARMY CORPS OF ENGINEERS

40TH ANNUAL OKLAHOMA GOVERNOR’S WATER CONFERENCE AND RESEARCH SYMPOSIUM: WATER MEANS BUSINESS

RESILIENT PUBLIC WATER

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Commander, Tulsa District Corps of Engineers

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"The views, opinions and findings contained in this report are those of the authors(s) and should not be construed as an official Department of the Army position, policy or decision, unless so designated by other official documentation."
Resiliency of Public Water

Over-Arching Themes

- Aging Infrastructure and Budget Constraints
- Sedimentation within our Lakes
- Water Supply Storage availability
- Takeaways
- Examples
Flood Control Lakes in Oklahoma

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Lakes with Flood Control</td>
<td>31</td>
</tr>
<tr>
<td>Corps of Engineers Lakes</td>
<td>22</td>
</tr>
<tr>
<td>Section 7 Reservoirs</td>
<td>9</td>
</tr>
</tbody>
</table>
Annual O&M Budget for Oklahoma Lakes

FY10  FY11  FY12  FY13  FY14  FY15  FY16  FY17  FY18  FY19  FY20

$70,000,000  $75,000,000  $80,000,000  $85,000,000  $90,000,000  $95,000,000  $100,000,000  $105,000,000

Annual Budget  Average
Anatomy of a Lake / Reservoir

Storage Zones
Flood Risk Management Project
with Surcharge

INDUCED SURCHARGE POOL

FLOOD CONTROL POOL

CONSERVATION POOL
(Hydropower pool)
(Water Supply)

INACTIVE POOL

DAM

TAINTER Gate
Reservoir Sedimentation

A. NEW RESERVOIR

B. INITIAL OPERATIONAL PERIOD
(sediment impacts not a concern)

C. DIMINISHING BENEFICIAL STORAGE

D. SEVERE SEDIMENT IMPACTS
Conservation Pool Remaining Percentage

Current % of initial CP capacity
Flood Pool Remaining Percentage

Current % of initial FP capacity

- Canton
- Sardis (Clayton)
- Pine Creek
- Arcadia
- Fort Gibson
- Copan
- Skiatook
- Hugo
- Heuburn
- Waurika
- Bitch
- Tenkiller
- Oologah
- Kaw SP
- Great Salt Plains
- Lake Texoma SP
- Fort Supply
- Broken Bow SP
- Hulah
- Keystone
- Wister
- Eufaula
Flood Pool Sedimentation: Current vs Projected

- Current % of initial FP capacity
- Projected % of initial FP capacity

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Estimate Date to Fill Conservation Pool with Sediment

- Hulah: 2078
- Great Salt Plains: 2087
- Heyburn: 2098
- Keystone: 2128
- Copan: 2157
- Canton: 2177
- Fort Supply: 2177
- Kaw SP: 2256
- Oologah: 2285
- Pine Creek: 2301
- Lake Texoma SP: 2369
- Birch: 2388
- Hugo: 2503
- Eufaula: 2639
- Waurika: 3234
- Sardis (Clayton): 3834
- Arcadia
- Skiatook
- Broken Bow SP
- Wister
- Fort Gibson
- Tenkiller

Date (yr)
Water Supply Storage

<table>
<thead>
<tr>
<th>Lake</th>
<th>WS Storage af</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birch</td>
<td>7,630</td>
</tr>
<tr>
<td>Broken Bow</td>
<td>37,045</td>
</tr>
<tr>
<td>Eufaula</td>
<td>37,045</td>
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<tr>
<td>Ft Supply</td>
<td>400</td>
</tr>
<tr>
<td>Hugo</td>
<td>2,197</td>
</tr>
<tr>
<td>Kaw</td>
<td>60,211</td>
</tr>
<tr>
<td>Keystone</td>
<td>2,000</td>
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<tr>
<td>Pine Creek</td>
<td>20,600</td>
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<tr>
<td>Skiatook</td>
<td>24,659</td>
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<tr>
<td>Texoma</td>
<td>150,000</td>
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<tr>
<td>TOTAL</td>
<td>341,787</td>
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</tbody>
</table>
Extreme Example of Reservoir Sedimentation

Tuttle Creek Lake, KS

1984

2016
Tuttle Creek Lake, KS
Satellite View

Source: HNTB 2012

1962 To 2010
Keystone Lake
Satellite View

1984

2016

~ 5% reduction in Flood Storage
Reservoir Sediment Management: Building a Legacy of Sustainable Water Storage Reservoirs
National Reservoir Sedimentation and Sustainability Team White Paper June 12, 2019
Takeaways

- Corps projects are aging
  - Average age over 55 years
  - Flat budgets increases risks in performing critical maintenance
- Sedimentation results in an Expiration Date of our Lakes
- Corps has over 341,000 af of Water Supply Storage available at Oklahoma Lakes
Questions ???