Corpus Christi and the Regional Water Supply Plan
• Regional Planning Background
  • Regional Water Supply
  • Opportunities and Impacts
Senate Bill 1 (1997) divided the state into 16 Water Planning Regions with the purpose of developing a water plan by 2001 and every five years thereafter.

- Coastal Bend Regional Water Planning Group N consists of eleven counties (Aransas, Bee, Brooks, Duval, Jim Wells, Kenedy, Kleberg, Live Oak, McMullen, Nueces and San Patricio).

- Regional Water Planning Group must prepare and submit the third round of study, due 2011, to the Texas Water Development Board.

- Bottom up approach to developing a State Water Plan.
Coastal Bend Regional Group completed the 2001 and 2006 plans and is in the first phase of the 2011 plan.

Based on the 2006 Plan there are four select strategies for the region:

- Mary Rhodes Pipeline Phase 2 (Garwood Water)
- Groundwater
- Off-Channel Storage between Choke Canyon and Lake Corpus Christi
- Stage II of Lake Texana
In March 2005, the Coastal Bend Regional Water Planning Group adopted the use of safe yield analysis for the Choke Canyon Reservoir/Lake Corpus Christi/Lake Texana System. The surface water availabilities for the largest water rights in the Nueces Basin are based on safe yield analysis and assume a reserve of 75,000 Ac-Ft for future drought conditions.

A contract amount of 41,840 Ac-Ft/yr with LNRA was included as part of the yield analysis. This includes 10,400 Ac-ft/yr of interruptible supply.

The contract with LNRA is expiring in 2035 with 50 year renewable option.
WATER SUPPLY STORAGE

Choke Canyon
750K Ac-Ft

Lake Corpus Christi
254K Ac-ft

Lake Texana
161,085K Ac-Ft @44.00 msl

Firm Yield 206K Ac-Ft
RAW WATER CUSTOMERS

- WCID # 3
- City of Beeville
- City of Alice
- City of Mathis
- City of Corpus Christi
- Celanese
- City of Three Rivers
- Flint Hills
TREATED WATER CUSTOMERS

- WCID #4
- Portland
- Kingsville
- San Patricio MWD
- South Texas Water Authority
- Violet Water Supply
- O.N Stevens WTP
- City of Corpus Christi
- WCID # 4
Raw Water

<table>
<thead>
<tr>
<th>Customer Class</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
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</thead>
<tbody>
<tr>
<td>Wholesale</td>
<td>36,671</td>
<td>36,016</td>
<td>31,380</td>
<td>32,833</td>
<td>36,620</td>
<td>40,942</td>
<td>32,405</td>
<td>33,747</td>
<td>37,617</td>
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<tr>
<td>ICL+OCL</td>
<td>77,253</td>
<td>73,164</td>
<td>68,514</td>
<td>66,792</td>
<td>72,154</td>
<td>77,039</td>
<td>69,633</td>
<td>72,120</td>
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</table>
Raw Water

Fiscal Year

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<tr>
<th>Customer</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale</td>
<td>36,671</td>
<td>36,016</td>
<td>31,380</td>
<td>32,833</td>
<td>36,620</td>
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<td>32,405</td>
<td>33,747</td>
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<tr>
<td>ICL+OCL</td>
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<td>72,154</td>
<td>77,039</td>
<td>69,633</td>
<td>72,120</td>
<td>76,617</td>
</tr>
</tbody>
</table>
## Water Demand
### Coastal Bend RWP 2006

<table>
<thead>
<tr>
<th>Demands</th>
<th>2000</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
<th>2060</th>
<th>2070</th>
<th>2080</th>
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<tbody>
<tr>
<td>City of Corpus Christi</td>
<td>55,630</td>
<td>61,953</td>
<td>68,212</td>
<td>73,592</td>
<td>78,422</td>
<td>82,961</td>
<td>86,962</td>
<td>90,963</td>
<td>94,964</td>
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<tr>
<td>City of Alice</td>
<td>5,281</td>
<td>5,606</td>
<td>5,912</td>
<td>6,076</td>
<td>6,102</td>
<td>6,033</td>
<td>5,904</td>
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<tr>
<td>City of Beeville</td>
<td>2,529</td>
<td>2,619</td>
<td>2,691</td>
<td>2,722</td>
<td>2,699</td>
<td>2,683</td>
<td>2,618</td>
<td>2,618</td>
<td>2,618</td>
</tr>
<tr>
<td>City of Mathis</td>
<td>671</td>
<td>648</td>
<td>632</td>
<td>615</td>
<td>598</td>
<td>586</td>
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<tr>
<td>Nueces County WCID #4</td>
<td>977</td>
<td>1,913</td>
<td>2,884</td>
<td>3,729</td>
<td>4,460</td>
<td>5,124</td>
<td>5,655</td>
<td>6,186</td>
<td>6,717</td>
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<tr>
<td>San Patricio MWD</td>
<td>40,000</td>
<td>40,000</td>
<td>40,000</td>
<td>41,240</td>
<td>44,837</td>
<td>47,980</td>
<td>51,369</td>
<td>54,759</td>
<td>58,148</td>
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<tr>
<td>South Texas Water Authority</td>
<td>2,284</td>
<td>2,619</td>
<td>2,867</td>
<td>3,011</td>
<td>3,065</td>
<td>3,236</td>
<td>3,260</td>
<td>3,284</td>
<td>3,308</td>
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<tr>
<td>Manufacturing/Industrial</td>
<td>38,791</td>
<td>45,373</td>
<td>49,047</td>
<td>52,119</td>
<td>55,119</td>
<td>57,704</td>
<td>61,765</td>
<td>65,826</td>
<td>69,887</td>
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<tr>
<td>Mining</td>
<td>1,189</td>
<td>1,376</td>
<td>1,454</td>
<td>1,494</td>
<td>1,534</td>
<td>1,572</td>
<td>1,612</td>
<td>1,652</td>
<td>1,692</td>
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<tr>
<td>Steam-Electric</td>
<td>8,799</td>
<td>7,316</td>
<td>14,312</td>
<td>16,733</td>
<td>19,683</td>
<td>23,280</td>
<td>27,664</td>
<td>32,048</td>
<td>36,432</td>
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<tr>
<td><strong>Total City Projected Demand</strong></td>
<td>156,151</td>
<td>169,423</td>
<td>188,011</td>
<td>201,331</td>
<td>216,519</td>
<td>231,159</td>
<td>247,395</td>
<td>263,826</td>
<td>280,256</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Other System Demand</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total CCR/LCC/Texana System Demand</strong></td>
<td>159,630</td>
<td>172,902</td>
<td>191,490</td>
<td>204,810</td>
<td>219,998</td>
<td>234,638</td>
<td>250,874</td>
<td>267,305</td>
<td>283,735</td>
</tr>
</tbody>
</table>

* Desalination is in the Region N Plan as a long term water strategy, but beyond 2080
## Water Supply Projections

<table>
<thead>
<tr>
<th>Current Supplies</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>CCR/LCC/Texana System Safe Yield</td>
<td>206,000</td>
</tr>
<tr>
<td>LNRA Call Back</td>
<td>0</td>
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<tr>
<td><strong>Total Current Supplies</strong></td>
<td>206,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Surplus/(Need)</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
</tr>
<tr>
<td></td>
<td>46,370</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water Management Strategies</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
</tr>
<tr>
<td>Garwood</td>
<td>35,000</td>
</tr>
<tr>
<td>Groundwater</td>
<td>11,200</td>
</tr>
<tr>
<td>USCOE Off-Channel Reservoir</td>
<td>30,340</td>
</tr>
<tr>
<td>Stage II of Lake Texana</td>
<td>23,000</td>
</tr>
<tr>
<td><strong>Total WMS</strong></td>
<td>0</td>
</tr>
</tbody>
</table>
Water Demand Supply Summary
Coastal Bend RWP 2006
Opportunities and Impacts

• Garwood Water rights
• Environmental Flows
• Steam and Electric
• Manufacturing
Garwood Water

• Purchased in 1998 at a cost of $18 Million
• Senior rights on the Colorado River
• Firm yield of 35,000 Ac-ft
• Intake restricted to three sites off the Colorado River
• May require off-channel storage to get the firm yield.
• City Council goal to be shovel ready by late 2012
• Contracted with Freeze & Nichols, Inc. in December 2007

• Pipeline Routing Studies
  Evaluating existing utility corridors
  Evaluating existing TxDOT corridors
  Researching property owner information
  Identifying environmental constraints
  Preparing data for hydraulic modeling

• Secured $8M WIF funding from TWDB
• USACE 404 Permit
Rincon Bayou, Nueces Delta Study
Orders Issued Pursuant to Construction of Choke Canyon Reservoir for Estuary Inflows

**1992**
Texas Water Commission Interim Order set “pass-through” requirements for Lake Corpus Christi and Choke Canyon Reservoir.

**1995**
Texas Natural Resource Conservation Commission Agreed Order modified pass-through requirements.
Orders Issued Pursuant to Construction of Choke Canyon Reservoir for Estuary Inflows (Continued)

2001 Texas Commission on Environmental Quality amended Agreed Order.
Nueces Estuary
Rincon Pump Station

- Completed in 2008
- 3 pumps
- 3000 Ac-ft in a month
Impacts

• Steam and Electric

• Manufacturing
Questions
• If there are inflows the City of Corpus Christi as operator shall provide 151,000 Ac-ft of water per annum for the estuaries.

<table>
<thead>
<tr>
<th>Combined Storage</th>
<th>Ac-ft</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 70 % Capacity</td>
<td>138,000</td>
</tr>
<tr>
<td>&gt; 40 % Capacity</td>
<td>97,000</td>
</tr>
<tr>
<td>&gt; 30 % Capacity</td>
<td>1200</td>
</tr>
<tr>
<td>&lt; 30 % Capacity</td>
<td>Total suspension of pass through</td>
</tr>
</tbody>
</table>
Nueces Delta Features
Pre-Project

• No interchange between Nueces River and Delta until river flow reached 2,100 cubic feet per second (5.4 feet mean sea level).

• Limited to nonexistent tidal exchange in upper Delta most times.

• “Reverse estuary” during extended dry periods.
2001 Agreed Order
Factors Determining Pass-Through Requirements

- Month
- Percent of reservoir capacity (both reservoirs combined) containing water. Trigger points are 70%, 40%, and 30%.
- Return flow volume – set at 54,000 acre-feet per year until increase is demonstrated.
- Salinity of upper Nueces Bay.
- Implementation of watering restrictions during drought.
2001 Agreed Order
Other Requirements

- Re-open Nueces Overflow Channel and Rincon Overflow Channel.
- Construct Calallen Pipeline to deliver up to 3,000 acre-feet per month to Rincon Bayou.
- Implement on-going monitoring program to facilitate an adaptive management program for freshwater inflows into the Nueces Estuary.
Previous Projects
Nueces Delta Mitigation Project

• **Objective:** Create a self-sustaining and persistent salt marsh that would provide wetland habitat for diverse group of species.

• **Conducted by U.S. Army Corps of Engineers.**

• **Mitigation for wetland losses due to dredging in Corpus Christi Ship Channel.**

• **Initiated 1987; Successfully Completed 1997.**

• **Results monitored by TAMU-CC Center for Coastal Studies.**
Rincon Bayou Demonstration Project
Previous Projects
Rincon Bayou Demonstration Project

- **Objective:** Improve management of freshwater resources by improving freshwater inflows to the Upper Nueces Delta.
- **Conducted by Bureau of Reclamation.**
- **Constructed Nueces Overflow Channel and Rincon Overflow Channel.**
- **Initiated 1995; Completed 1999.**
Previous Projects
Rincon Bayou Demonstration Project (Continued)

• Concluded water diverted to Upper Nueces Delta was increased by 732% as a result of the Nueces Overflow Channel.

• Nueces Overflow Channel filled in at completion of study.

• Monitoring by UTMSI.
Allison Effluent Diversion Demonstration Project
Objective: Improve management of freshwater resources by improving freshwater inflows to the Nueces Delta.

- Conducted by City of Corpus Christi.
- Diverted 2 MGD of effluent from Allison WWTP to mud flat by South Lake.
Previous Projects
Allison Effluent Diversion Demonstration Project
(Continued)

• Converted approximately 17 acres of mud flat to emergent vegetation.

• Limited sampling required annually now.

• Monitoring by UTMSI, TAMU-CC Center for Coastal Studies, and TAMU-CC Conrad Blucher Institute.
Rincon Bayou, Nueces Delta Study
Current Project
Rincon Bayou, Nueces Delta Study

Objective: Improve management of freshwater resources by improving freshwater inflows to the Nueces Delta.

- Conducted by City of Corpus Christi.
- Pipeline constructed to deliver up to 3,000 acre-feet per month from the Calallen Pool to Rincon Bayou.
- Monitoring initiated FY 2003. Initially scheduled to be 4-year sampling period with final report prepared in fifth year (FY 2007).
Current Project
Rincon Bayou, Nueces Delta Study

- Construction of pipeline not complete until FY 2008; so, no data yet on post-pipeline conditions. Original date for completion of pipeline was December 31, 2002.

- Monitoring by UTMSI, TAMU-CC Center for Coastal Studies, TAMU-CC Conrad Blucher Institute, U.S. Geological Survey, TAMU-CC Harte Research Institute, and Bureau of Economic Geology.