Agenda Item 6.5
Review of Five Phase I Studies

December 3, 2008

BRAZOS G
WATER PLANNING GROUP

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Overview

- ✓ Review findings from 5 studies (Agenda 6.5)
  - Detailed overview of Study 2
- ✓ Public input on 5 studies (Agenda 6.6)
- ✓ Consider submitting draft reports to TWDB (Agenda 6.7)

Phase I Studies

1. Impacts of drought on water supplies in upper Brazos G Region.
2. Re-evaluate water management strategies in the Nolan County area.
3. Regionalization strategies to assist small water systems in meeting new SDWA requirements.
4. Refine water management strategies for Johnson County.
5. Refine water management strategies for McLennan County.

Study No. 1 – Impacts of Drought on Water Supplies in Upper Brazos G Region

- ✓ Scope:
  - Extend period of record hydrology through June 2008 for upper Brazos Basin subset of Brazos WAM
  - Compute yields for reservoirs in Brazos G upstream of Possum Kingdom Reservoir
  - Evaluate water quality at low reservoir levels
- ✓ Draft report is posted on the Brazos G website
  - *"Study 1: Updated Drought of Record and Water Quality Implications for Reservoirs Upstream of Possum Kingdom Reservoir"*
- ✓ Significant findings:
  - The current drought is more severe than the 1950s drought for 12 of the 19 reservoirs studied
  - Water treatment costs will increase during critical drought periods

Study No. 2 – Re-evaluate Water Management Strategies in the Nolan County Area

- ✓ **Scope:**
  - Develop groundwater model of Edwards-Trinity and Dockum Aquifer in vicinity of Champion Wellfield
  - Use model to evaluate water supply that can be counted on from the Champion Well Field
- ✓ **Status:**
  - Groundwater model completed and applied
  - Results presented to City of Sweetwater
  - Draft report posted on Brazos G website

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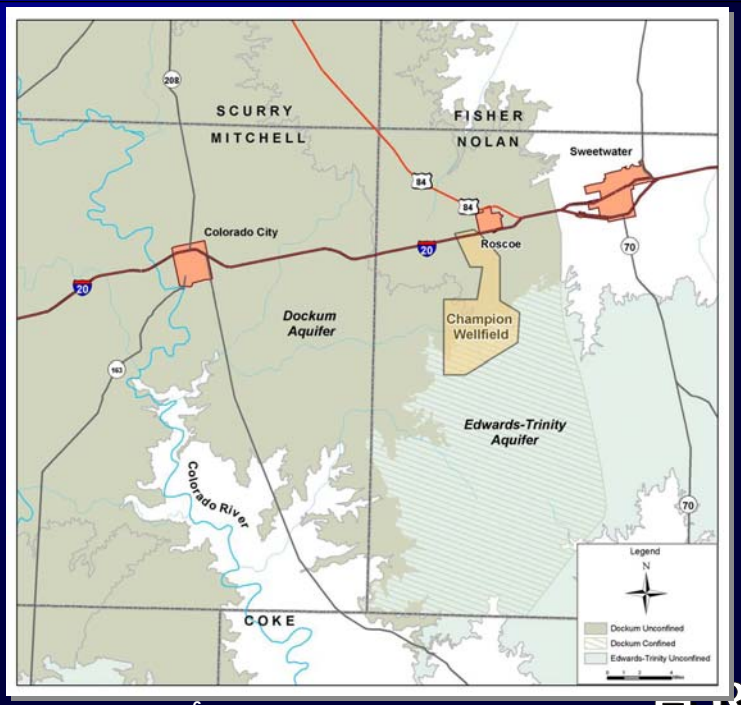
Aquifers and Wellfield Vicinity

- ✓ **Edwards-Trinity:** also called Trinity or Antlers Sand
- ✓ **Dockum:** also called Santa Rosa
- ✓ **Whitehorse:** top formation of Permian



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Geologic Setting

- ✓ Edwards and Trinity
  - Dips to East
- ✓ Dockum and Permian
  - Dips to West

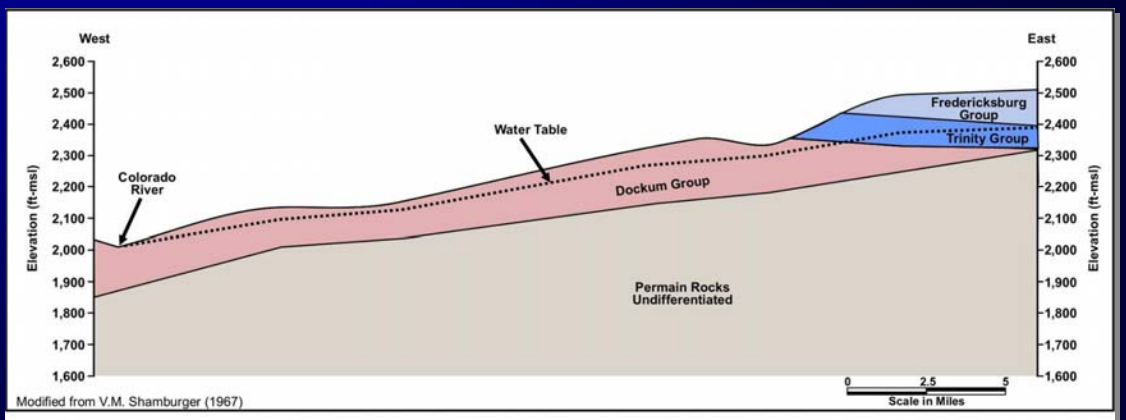
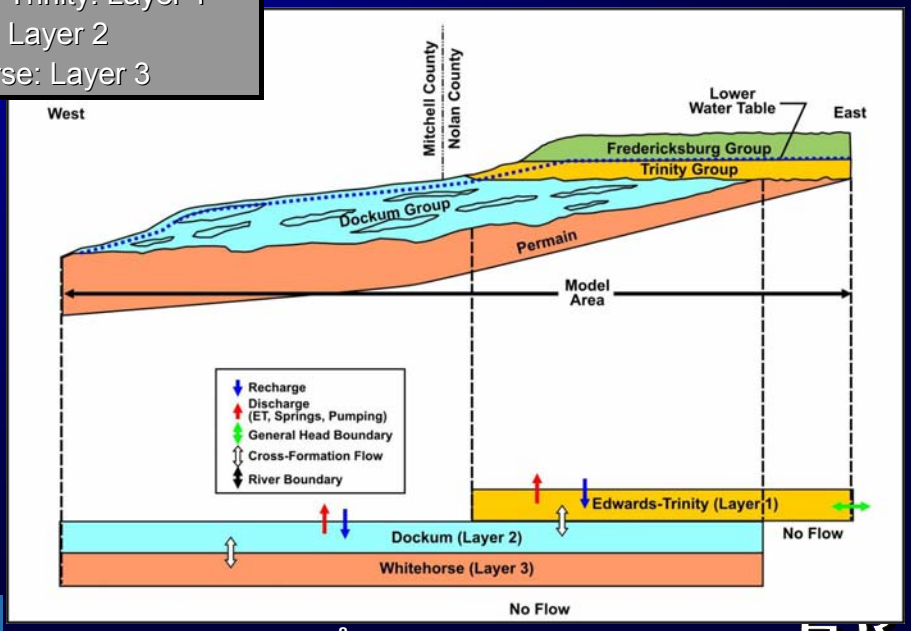


Figure 2-1. Generalized East-West Hydrogeologic Cross-Section

Conceptual Groundwater Model

- ✓ Aquifers
  - Edwards-Trinity: Layer 1
  - Dockum: Layer 2
  - Whitehorse: Layer 3

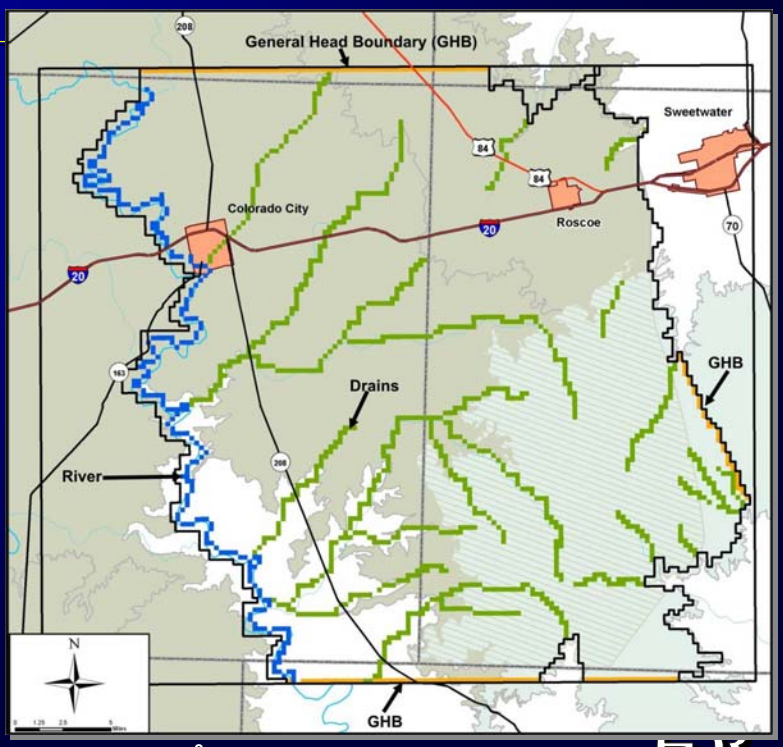


Conceptual Groundwater Model

- ✓ **Boundaries**
  - Edge of Active Area in Model: ***General Head Boundary***

  Tributaries: ***Drains***

  Colorado River: ***River***



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Groundwater Model Parameters and Design

- ✓ Physical
  - Top and Bottom of Each Layer
  - Lateral Edge
- ✓ Hydraulic Properties
  - Hydraulic Conductivity
  - Storage Coefficient
- ✓ Pumping
  - Background
  - Focused
- ✓ Recharge
  - Precipitation
  - Other
- ✓ Calibration Targets
  - Groundwater Level Elevations
  - Baseflow in Streams, if Available
- ✓ Boundaries
- ✓ Design
  - Cells Dimension: (0.25 mile square = 1/16 sq. mi.)
  - Steady-State: 1990
  - Transient: 1990-2007
  - Predictive: 2008-2060

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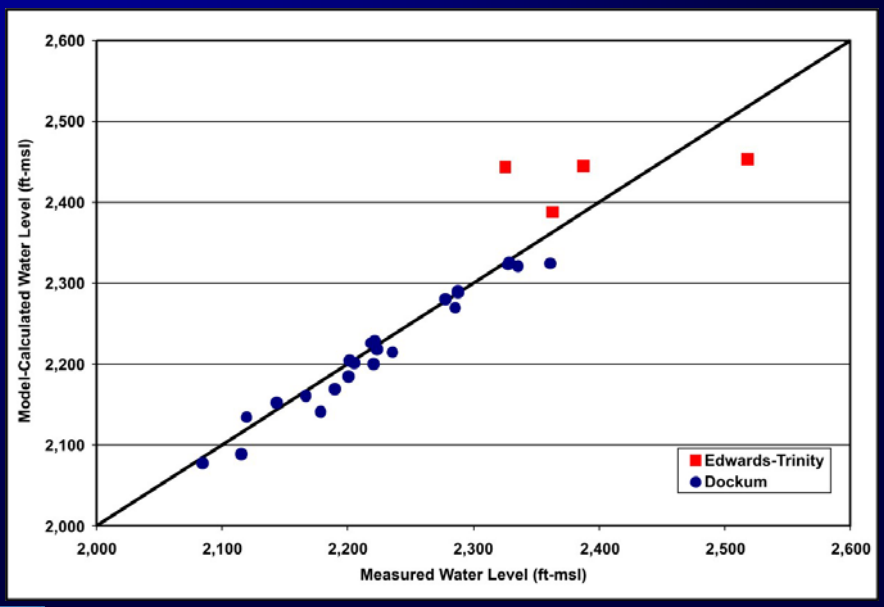
Steady-State Calibration

Evaluation: Compare Modeled and Measured Water Levels



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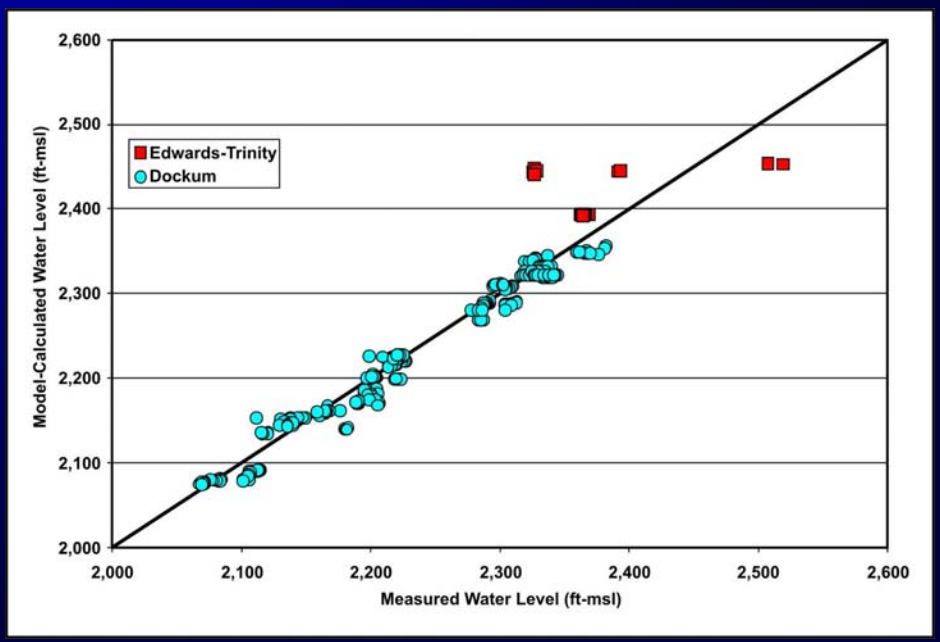
Transient Calibration



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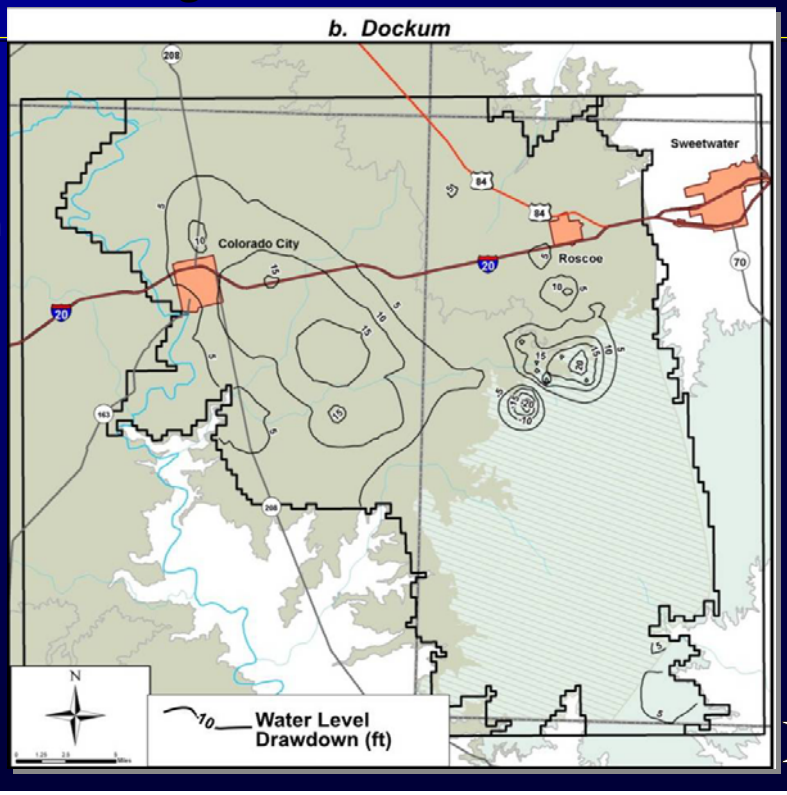
Drawdown during Transient Calibration

- ✓ Greatest
  - Champion Wellfield



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Predictive Scenarios

- ✓ Champion Wellfield
  - Continue with Champion Wellfield (45 wells)
  - Average Pumping: 48 gpm
- ✓ Scenario A
  - Champion Wellfield (45 wells)
  - New Wellfield to Southwest (45 wells)
  - Average Pumping: 24 gpm
- ✓ Scenario B
  - Champion Wellfield (45 wells)
  - New Wellfield to West (45 wells)
  - Average Pumping: 24 gpm
- ✓ Scenario C
  - Champion Wellfield (45 wells)
  - New Wellfield to West (65 wells)
  - New Wellfield to Southwest (25 wells)
  - Average Pumping: 16 gpm

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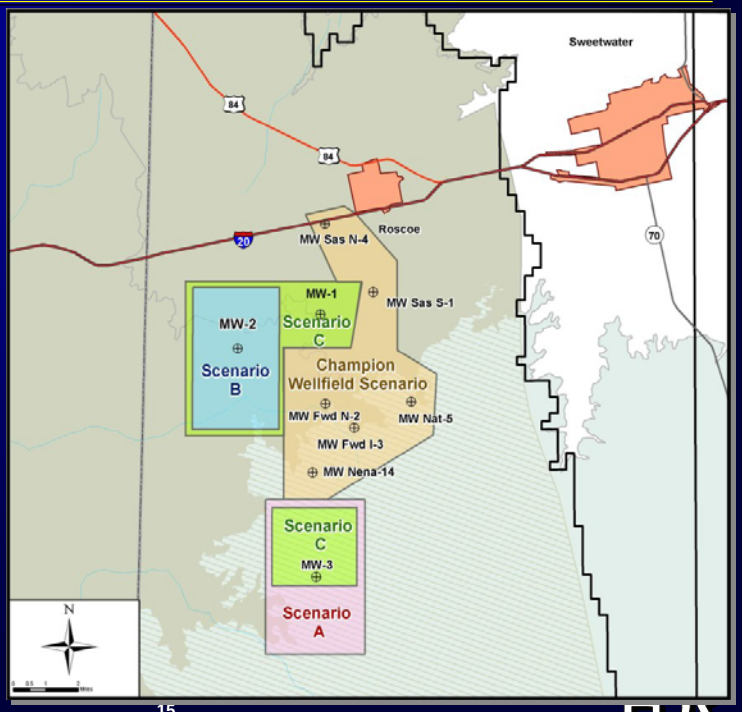
Predictive Scenarios

- ✓ Champion Wellfield
  - Continue with existing wells
- ✓ Scenario A
  - Champion + New Wellfield to Southwest
- ✓ Scenario B
  - Champion + New Wellfield to West
- ✓ Scenario C
  - Champion + Two New Wellfields, West and Southwest



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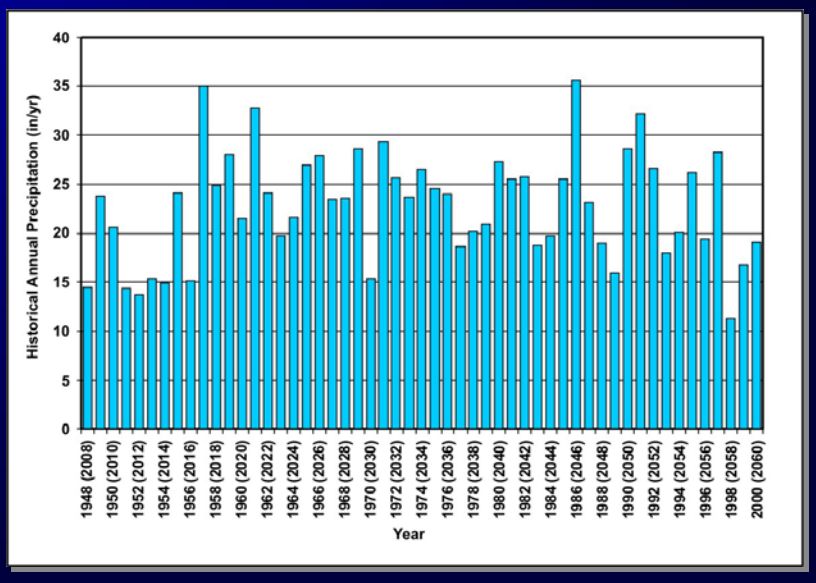
Predictive Period

- ✓ Climatic conditions
  - Assumes 1948 to 2000 is repeated from 2008 to 2060



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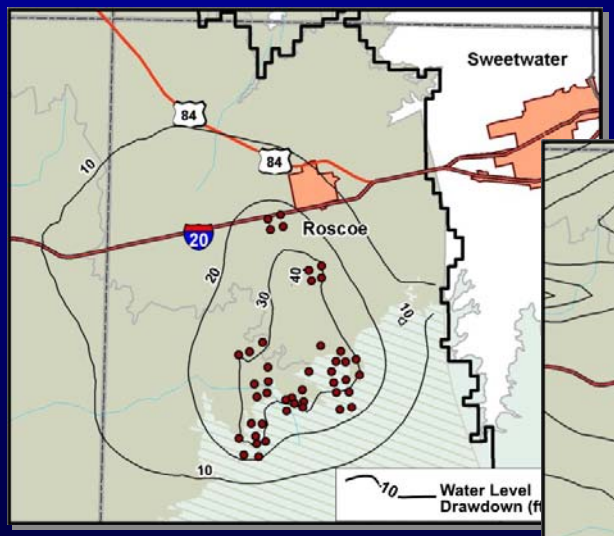
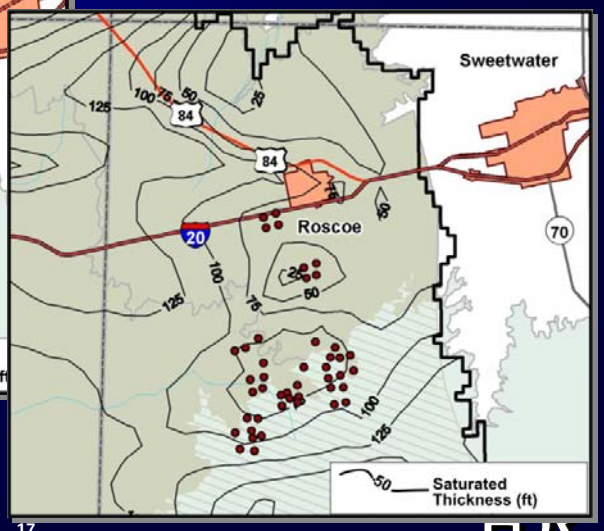
Scenario: Champion Wellfield

Drawdown (2008-2060)



Saturated Thickness (2060)



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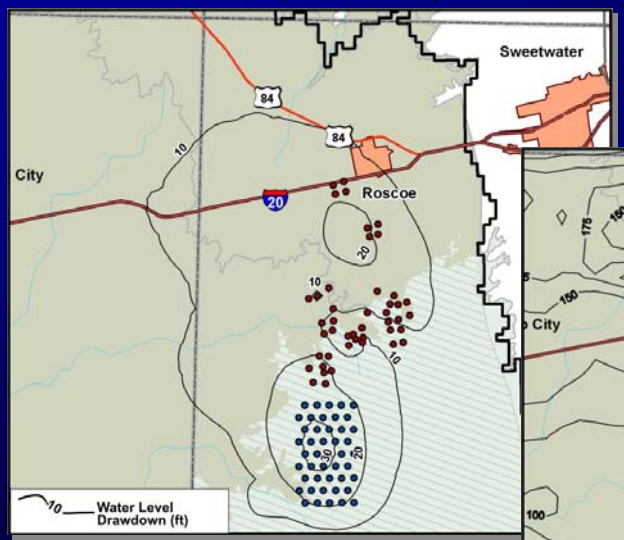
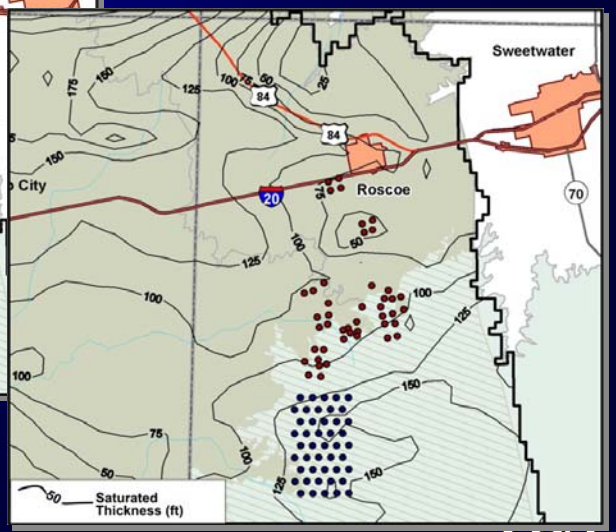
Scenario: A

Drawdown (2008-2060)



Saturated Thickness (2060)



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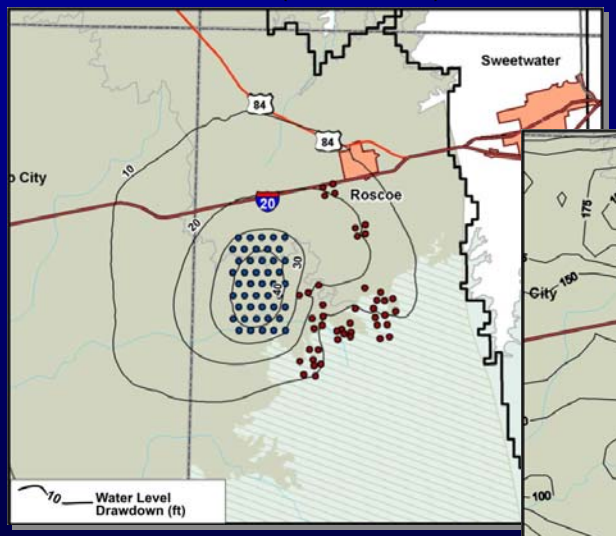
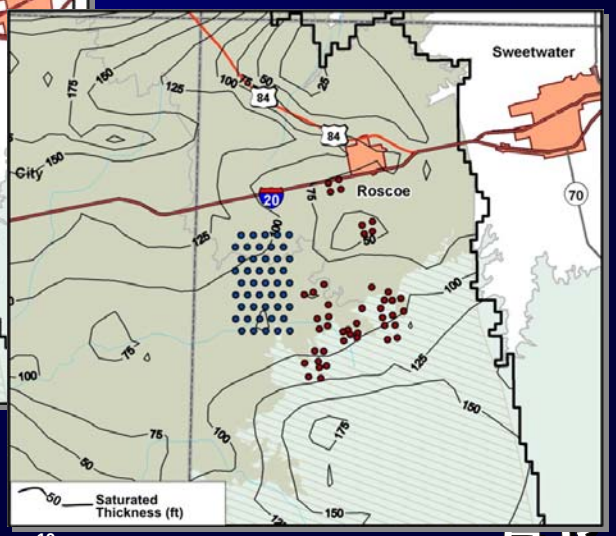
Scenario: B

Drawdown (2008-2060)

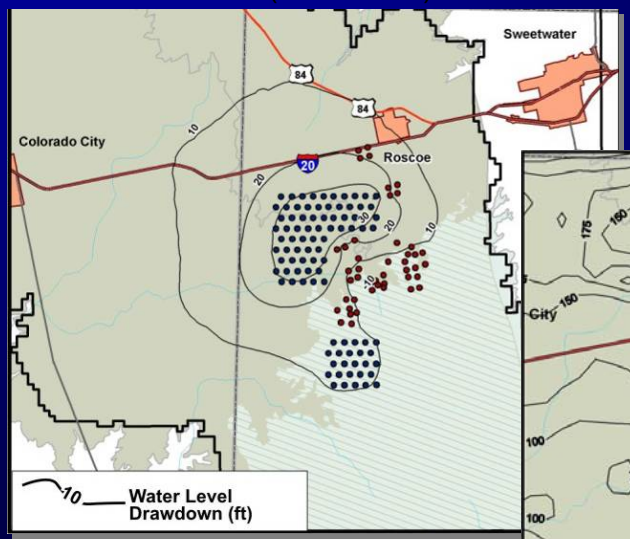


Saturated Thickness (2060)

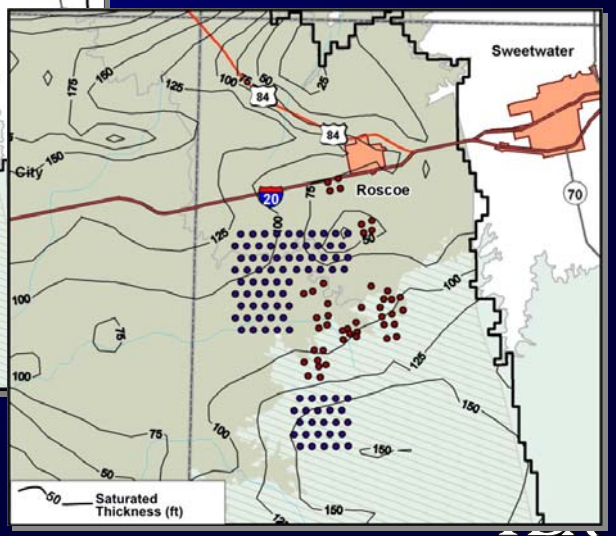


Scenario: C

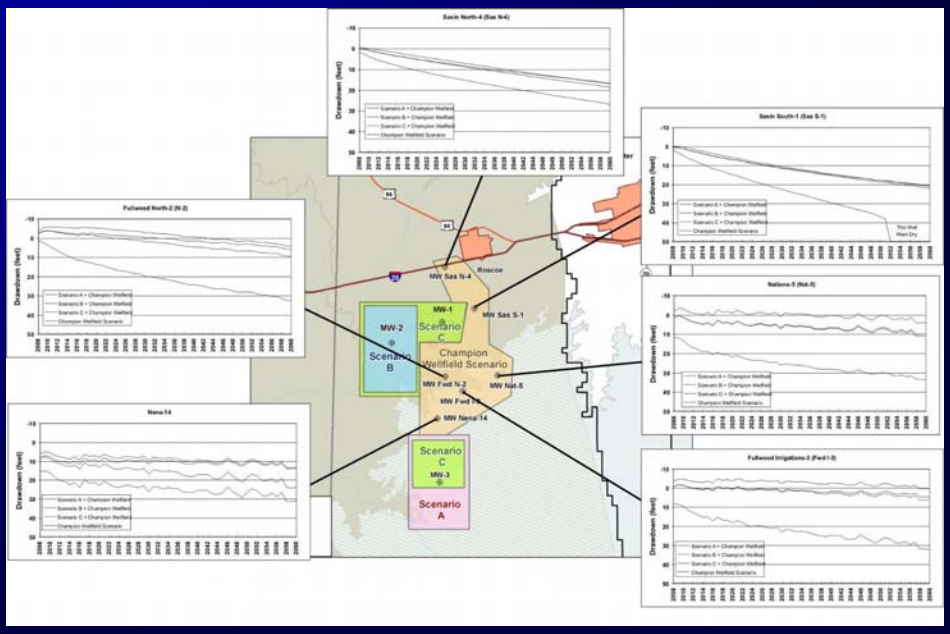
Drawdown (2008-2060)



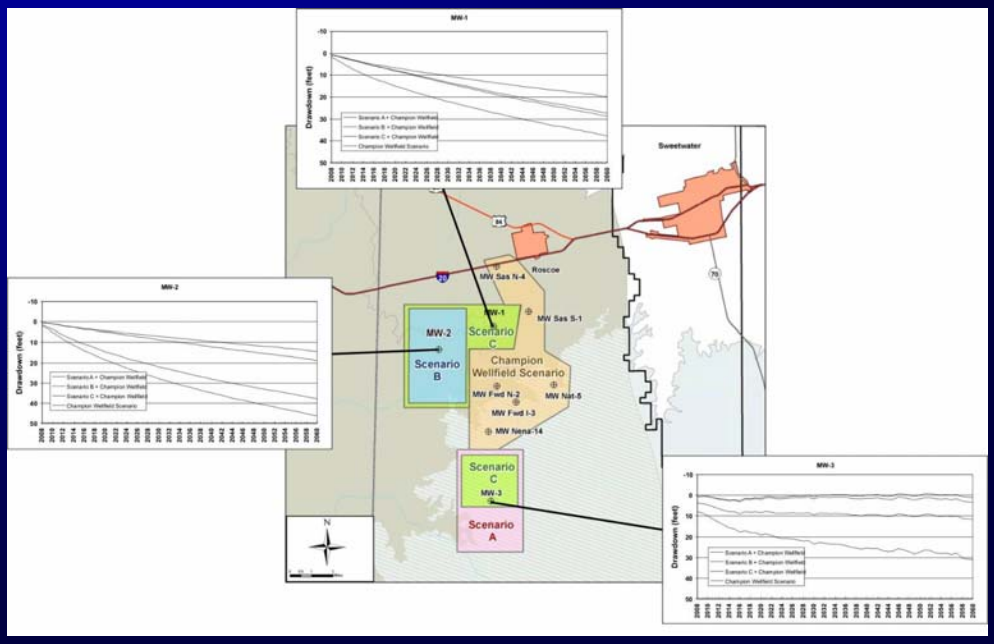
Saturated Thickness (2060)



Predictive Trends in Water Levels – Champion Well Field



Predictive Trends in Water Levels – New Wells



Well Performance: Champion Wellfield

Parameter	Statistics				
	Minimum	25th Percentile	Median	75th Percentile	Maximum
Well Yield (gallons per minute)	20	50	80	130	225
Well Depth (ft)	160	185	210	250	322
Depth to Bottom of Screen (ft)	145	175	200	240	312
Drawdown during Pump Test (ft)	47	72	82	99	114
Saturated Thickness above Bottom of Screen during Static Conditions (ft) January 2006	64	87	102	122	183
Saturated Thickness above Bottom of Screen during Pumping (ft) January 2008	-24	-4	6	27	44

Water Supply Assessments

- ✓ Groundwater
  - Current Champion Wellfield does not appear to be adequate as a sole water supply
  - Expanding the Champion Wellfield to south and southwest at double the size appears to be adequate
- ✓ Surface Water (Oak Creek Reservoir)
  - Appears to be adequate for nearly 40 percent of the time if Sweetwater's water demand is about 4,000 acft/yr
  - Can provide at least half of the water supply for about 85 percent of the time

Findings/Recommendations

- ✓ Continue conjunctive operation of surface water and groundwater
  - Utilize Oak Creek Reservoir for primary supply
  - Utilize groundwater to supplement during drought periods
    - ✓ Existing Champion Wellfield
    - ✓ Add new wellfield if needed during prolonged drought to reduce localized stress
- ✓ Recommend that conjunctive operation be given more detailed evaluation for 2011 Plan to determine actual supply available from conjunctive operation of the two sources
- ✓ Draft report is posted on the Brazos G website
  - *"Study 2: Groundwater Availability Model of the Edwards-Trinity (Plateau) and Dockum Aquifer in Western Nolan and Eastern Mitchell Counties, Texas"*

Study No. 3 – Regionalization Strategies to Assist Small Water Systems in Meeting New SDWA Requirements

- ✓ Scope:
  - Identify two candidate systems for regionalization
    - ✓ Safe Drinking Water Act compliance issues
    - ✓ Documented interest in being evaluated
  - Evaluate candidate systems
    - ✓ Engineering considerations
    - ✓ Financial considerations
    - ✓ Other regionalization considerations
- ✓ Draft report is posted on the Brazos G website
  - *"Study 3: Regionalization Strategies to Assist Small Water Systems in Meeting New SDWA Requirements"*
- ✓ Significant findings:
  - Many public water suppliers are good candidates for regionalization
  - Two candidate groups selected (public health perspective):
    - ✓ FHML: arsenic issues – blending preferred
    - ✓ Abilene Area Subgroup 3A: nitrate issues – treatment preferred

Study No. 4 – Refine Water Management Strategies for Johnson County

- ✓ Scope:
  - Assist Region C with Four-County Study – Dallas, Tarrant, Ellis and Johnson Counties
    - ✓ Assist with Johnson County issues
  - Provide summary of support activities as final Brazos G deliverable
- ✓ Study Objectives:
  - Review recent growth in the study area
  - Consider population and demand projection updates compared to 2006 Plans and recommend revisions (as necessary)
  - Update current and future water supply plans

Study No. 4 – Refine Water Management Strategies for Johnson County

- ✓ Draft Brazos G summary is posted on the Brazos G website
  - *"Study 4: Brazos G Activities in Support of Region C's Water Supply Study for Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties (Four County Study)"*
- ✓ Draft Region C Report is posted on the Region C website
  - *"WATER SUPPLY STUDY FOR ELLIS COUNTY, JOHNSON COUNTY, SOUTHERN DALLAS COUNTY, AND SOUTHERN TARRANT COUNTY"*
  - A link to the study documents is provided on the Brazos G website
- ✓ Significant findings:
  - Population and water demands projections provided in Johnson County are substantially greater than used in the 2006 Plan
  - New water management strategies identified and evaluated for Alvarado, Grand Prairie and Johnson County SUD
  - Updated cost estimates for all water management strategies
  - Some details are still being finalized by Region C. Expected to be finished by mid-December.

Study No. 4 – Refine Water Management Strategies for Johnson County

Schedule

Four County Study Project Activities for Johnson County	Significant Project Milestones for Brazos G Project Involvement															
	2007					2008										
	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Update to Brazos G RWPG (Oct 29, 2008)															♦		
Draft Four County Study Report to WUGs, WWPs, Brazos G planning group (Nov 10, 2008)																♦	
Met with Johnson County WUGs and WWPs (Nov 25, 2008)																♦	
Receive comments from Johnson County (Brazos G) interests																	
Present Draft Four County Study Report to Brazos G RWPG for public comment (Dec 3 2008); Report will be presented for comment to Region C on Dec 8, 2008																	♦
Submit final, approved activity/coordination report to TWDB (Dec 31, 2008)																	♦

Study No. 5 – Refine Water Management Strategies for McLennan County

- ✓ Scope
  - Compile projected water demands and supply information for WUGs
  - Interview a representative for each WUG
  - Review updates to groundwater availability from the Trinity Aquifer
  - Identify and discuss potential new water management strategies
- ✓ Draft Brazos G report is posted on the Brazos G website
  - *"Study 5: Updated Water Management Strategies for Water User Groups in McLennan County"*
- ✓ Significant findings:
  - Trinity Aquifer availability projected to increase 10-fold over that used in 2006 Plan
  - Utilities identified alternative sources including City of Waco, Bluebonnet WSC (Lake Belton), reuse, additional Trinity Aquifer development, FHLM WSC and Tri-County SUD

Path Forward:

- ✓ Take public comments on studies and DRAFT reports
- ✓ Authorize BRA/HDR to submit the DRAFT reports to TWDB before December 31
- ✓ TWDB will review the DRAFT reports and provide comments in early spring – March?
- ✓ Utilize results of studies as 2011 Plan is developed

Questions?