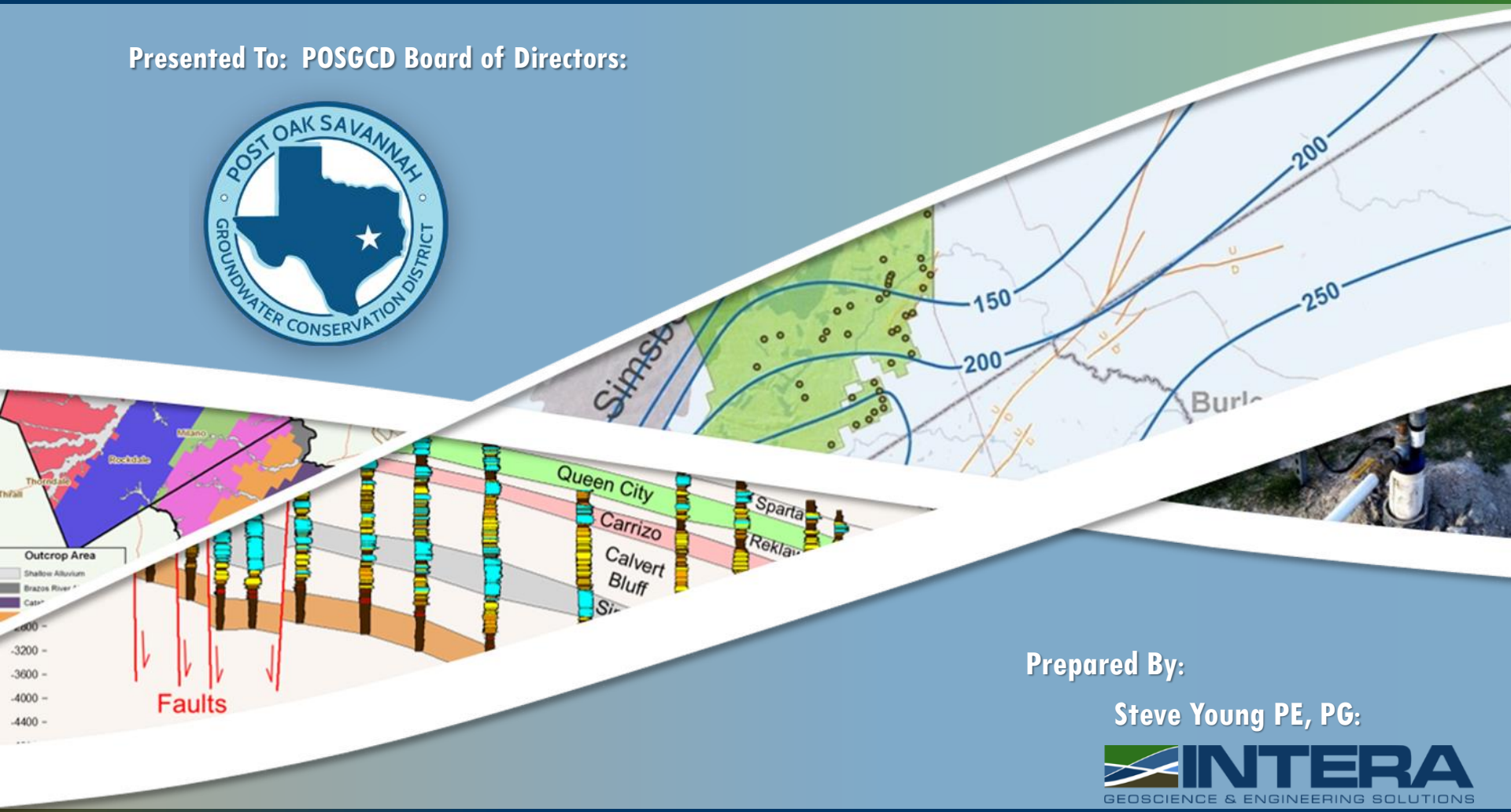
Update on Management Strategies Report

Presented To: POSGCD Board of Directors:



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INTERA
GEOSCIENCE & ENGINEERING SOLUTIONS

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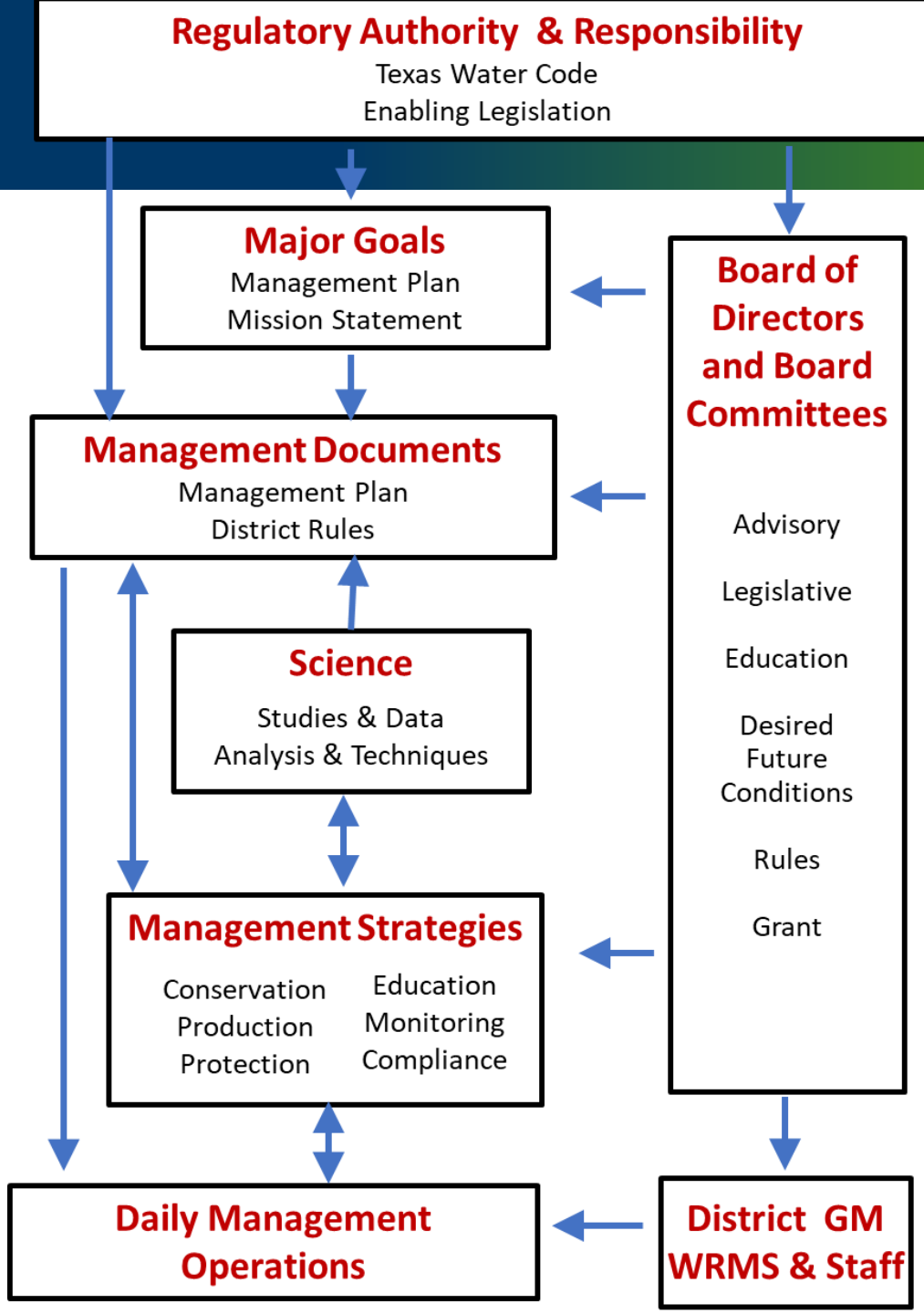
Management Strategies Report Update

- Describe and formalize the District structure for managing groundwater resources;
- Identify factors that could impact the District ability to implement management strategies to accomplish District goals;
- Identify actions that would improve the District's ability to implement strategies to accomplish goals

Structure for Groundwater Management

- Structural framework consists of eight main components
- Flowchart Illustrates Two Key Points
  - Board of Directors is the primary decision maker
  - Management strategies have a central and pivotal role with District's GW management



Issues that are Central to Several Management Strategies

- Maximum Production Volumes Based on Permitted Acreage
- Operating & Transport Permit Fees
- Time Intervals associated with DFCs
- Boundaries of Management Zones Associated with DFCs
- Compatibility of DFCs and PDLs
- Enforcement of DFCs and PDLs by Curtailment of Production
- Unreasonable Impacts to Groundwater & Surface Water
- Incentivize Aquifer Storage and Recovery
- Promote Water Conservation
- Incentivize Conjunctive Water Projects

Maximum Production Volumes Based on Permitted Acreage

Define correlative rights that account for:

- **large spatial differences in the amount of groundwater in-place**
- **large spatial differences in production capacity**

- Possible criteria for developing adjusting the 2 acre-ft/acre correlative right
  - aquifer
  - management zone
  - aquifer thickness

- Potential Benefits of Aquifer Specific Maximum Production Rules
  - better balance between groundwater availability and production in an aquifer
  - help prevent adverse impacts caused by pumping
  - provide an additional tool to manage aquifer pumping

Operating & Transport Permit Fees

Develop a Permit Fee Structure that is Aquifer Specific

- **fee tied to the vulnerability to adverse impacts caused by pumping**

- Potential benefits of Aquifer Specific Permit Fees
  - help prevent adverse impacts caused by pumping
  - help avoid need to mandate curtailment
  - provide an additional tool to manage aquifer pumping

Time Intervals Associated with Desired Future Conditions

TWC §36.001(30) defines a desired future condition as " a quantitative description, adopted in accordance with Section §36.108, of the desired condition of the groundwater resources in a management area at one or more specified future times."

- GMA 12
  - Currently considering only DFCs for 2070 and set by
  - Presumes that permits are continually renewed and stay in effect throughout the entire planning period
  - DFCs historically set 50 years in advance– always after 40-year term limit of all permits

- Potential Benefit of a Less than 40-year Timeline for DFCs
  - Develop DFCs that Could Serve as Regulatory Driver
  - Establish DFCs for dates within lifetime of active permits
  - Avoid kicking DFC 5-year into the future each planning cycle

Compatibility of Desired Future Conditions and Protective Drawdown Limits

TWC §36.108(8) requires that groundwater management areas shall consider the feasibility of achieving the DFC.

- DFCs
  - GMA 12 checks for feasibility of achieving a DFC
  - GMA 12 has traditionally used a single GAM run to demonstrate that the feasibility of all DFCs
- PDLs
  - Set as average drawdown for groundwater above the depth of 400 feet of all aquifers
  - GMA 12 GAM simulations show that PDLs are reached before the DFCs
- Potential Benefit of Compatible DFCs and PDLs
  - Remove concerns regarding how a court would interpret TWC §36.108(8)

Unreasonable Impacts to Groundwater & Surface Water

Prior to granting or issuing a permit, TWC §36.1146, requires that the districts shall consider whether the proposed use of water unreasonably affects existing groundwater and surface water resources or existing permit holders.

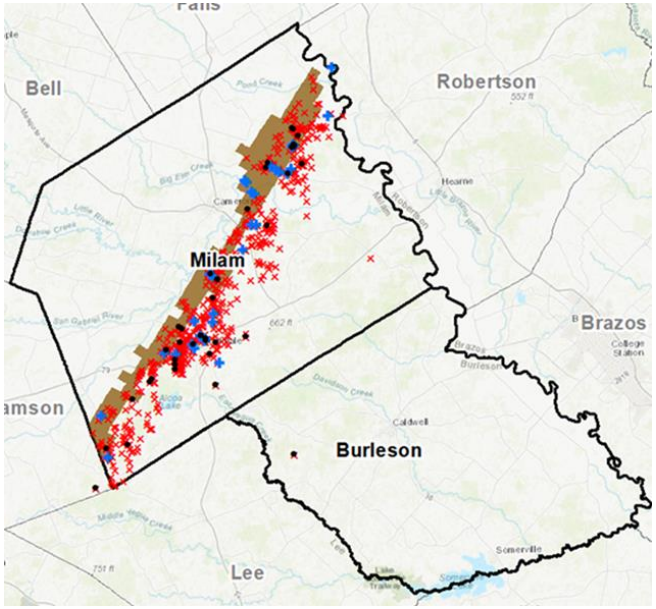
- Unreasonable Impacts
  - not defined in POSGCD rules
  - impacts related to a Maximum Impact Level
  - options
    - Groundwater Resource
    - Surface Water Resource
    - Existing Wells

- Potential Benefit of Defining Unreasonable Impacts
  - developed Independent of GMA 12 process
  - provide another level of safeguarding against impacts of concentrating well field is small area of permitted acreage
  - provide an additional tool to manage aquifer pumping

Boundaries for Management Zones Associated with Desired Future Conditions

TWC §36.001(30) defines a desired future condition as " a quantitative description, adopted in accordance with Section §36.108, of the desired condition of the groundwater resources in a management area at one or more specified future times."

- DFCs
  - GMA 12 sets one DFC for an aquifer
  - DFC set as average drawdown for the entire aquifer
- Management Zones
  - Entire aquifer may be good from a philosophical viewpoint
  - From a regulatory viewpoint, an DFC for entire aquifer is impractical because it cannot me check without data
- Potential Benefit of Limiting Boundaries of a Management Zone to Well Coverage
  - Best Available Science can be used to evaluate compliance
  - Removes some of the burden associated with demonstrating that as averaged drawdown limit has been exceeded



Enforcement of DFCs and PDLs By Curtailment of Pumping

Two Concerns with Enforcement:

- lack of statutory guidance from state agencies regarding the monitoring & analysis of water levels for DFC compliance

- lack of case law in Texas regarding enforcement actions by GCDs to curtail production and permits

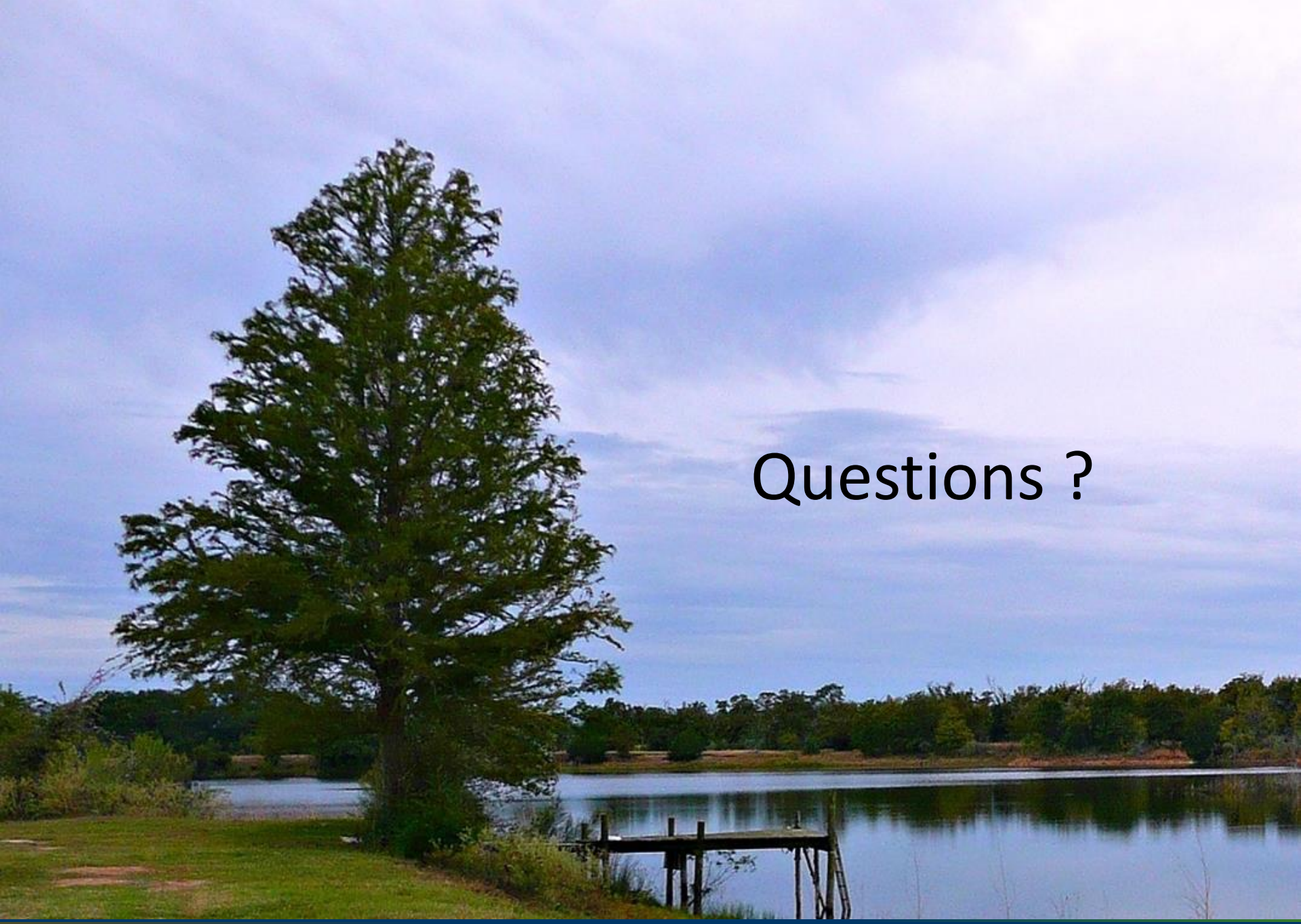
- Comprehensive Review of Entire Management Strategies & Rules
  - supported by Best Available Science per TWC § 36.0015
  - map Interconnections Among Management Strategies, Rules, Data
- Expand Rules and Policies to Provide Additional Guidance
  - selection of wells to be curtailed
  - Schedule and monitoring for curtailment
- Potential Benefit of Comprehensive Review
  - identify critical components & potential gaps in coverage
  - improve information flow and communications among Board Members & District Staff
  - expand and strengthen POSGCD ability to achieve management goals

Interconnection Among Science and Management Strategies

Quantitative Data	Example Hydrogeological Application	Management Strategy with Possible Overlap with Example Applications
Measured Water Level and Water Quality Data	• Maps of water level contours and elevations • Estimates of vertical hydraulic gradients • Measure change in water levels over time • Determine an average water for DFC zones • Maps of water quality including brackish zones	1. Education and Public Outreach 2. Regional Planning 3. Compliance Evaluations for DFC and PDLs 5. Well Monitoring Program 6. District Action Triggered by Exceedances of Tiered Thresholds 9. Curtailment of Permitted Productions
Reported Pumping Rates	• Track compliance with individual operating permits • Track compliance with modeled available groundwater • Provide pumping rates for GAM update • Establish water budgets for management zones	2. Regional Planning 5. Well Monitoring Program 6. District Action Triggered by Exceedances of Tiered Thresholds 7. Well Permitting Requirements 9. Curtailment of Permitted Productions
Aquifer Pumping Tests	• Estimate Transmissivity at District well locations • Use to help identify fault locations • Validate and test groundwater models	2. Regional Planning 3. Compliance Evaluations for DFC and PDLs 7. Well Permitting Requirements 9. Curtailment of Permitted Productions
Driller Logs & Geophysical Logs	• Identify total depth and screen intervals for wells to support aquifer assignment • Identify pump settings • Identify boundaries between aquifers • Locate faults and fault zones • Identify and quantify clay and sand interval	2. Regional Planning 3. Compliance Evaluations for DFC and PDLs 5. Well Monitoring Program 6. District Action Triggered by Exceedances of Tiered Thresholds 7. Well Permitting Requirements

Additional Issues

- Incentivize Aquifer Storage and Recovery
  - recharge credits for unrecoverable injected water
  - options for combining with production permit
- Promote Water Conservation
  - support for regional water planning
  - modification and expansion of current POSGCD conservation programs
- Incentivize Conjunction Water Projects
  - special permit terms for groundwater production to increase firm yield of surface water projects
  - special considerations for combining groundwater production with water reuse, rainfall harvesting, and brackish groundwater


Questions ?