Texas Groundwater Management: Joint Planning Process

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Groundwater Management in Texas

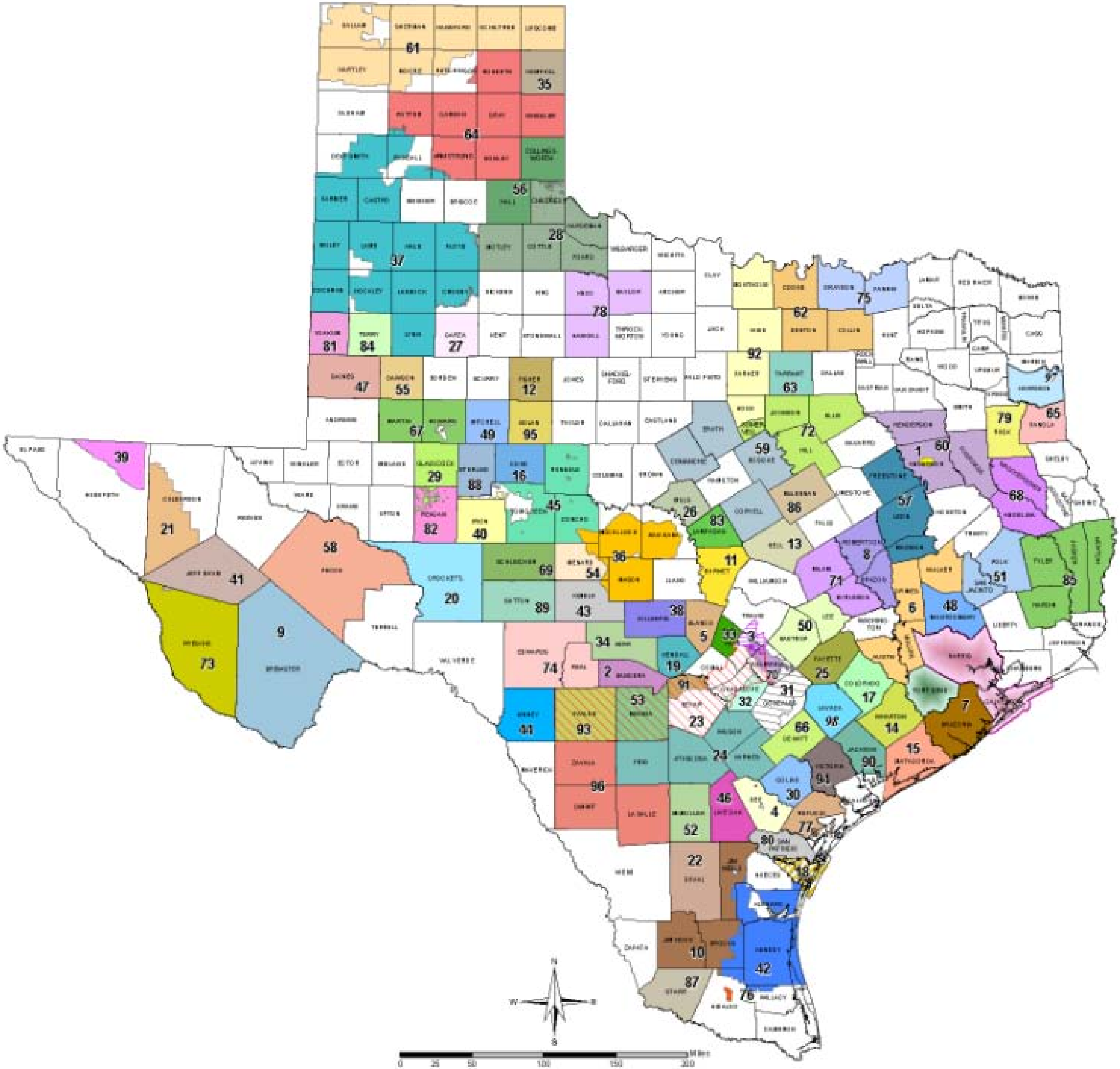
- 1904 – Rule of Capture
  - Pumping a well and drying up a neighbors well results in no liability
- 1949 – Groundwater Conservation Districts
  - Can alter, modify or discard Rule of Capture
- 1997 – SB 1
  - Groundwater Conservation districts are the preferred method of groundwater management

Groundwater Management in Texas

- 2001 – Groundwater Management Areas
  - Part of SB 2
- 2005 – Joint Planning
  - HB 1763

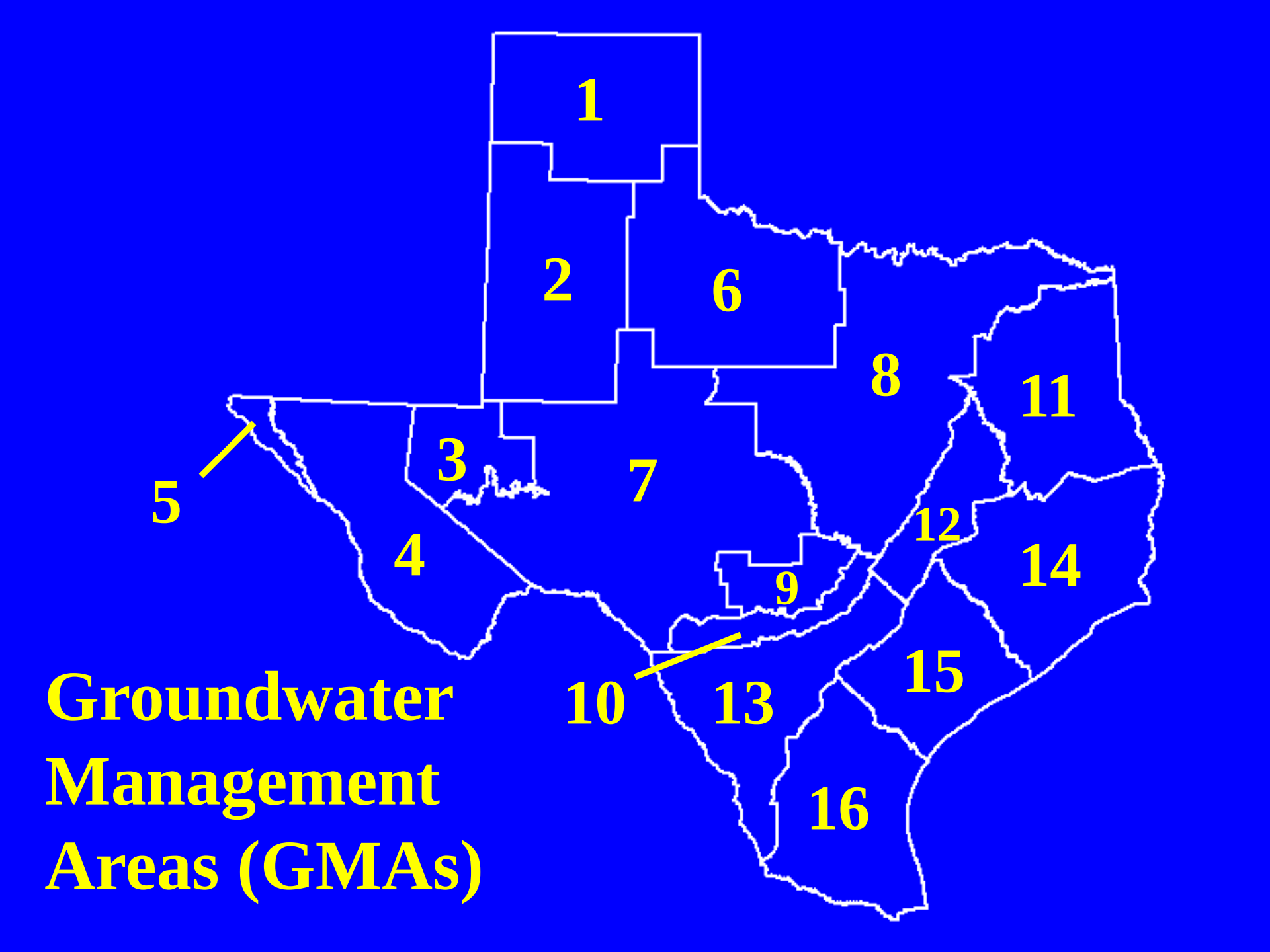
Groundwater Conservation Districts

- Local management of groundwater resources
- Preferred method of groundwater management
- Can limit, modify or discard the Rule of Capture
- Currently – 96 districts


N
W
E
S
Miles
0 25 50 100 150 200

Groundwater Management Areas

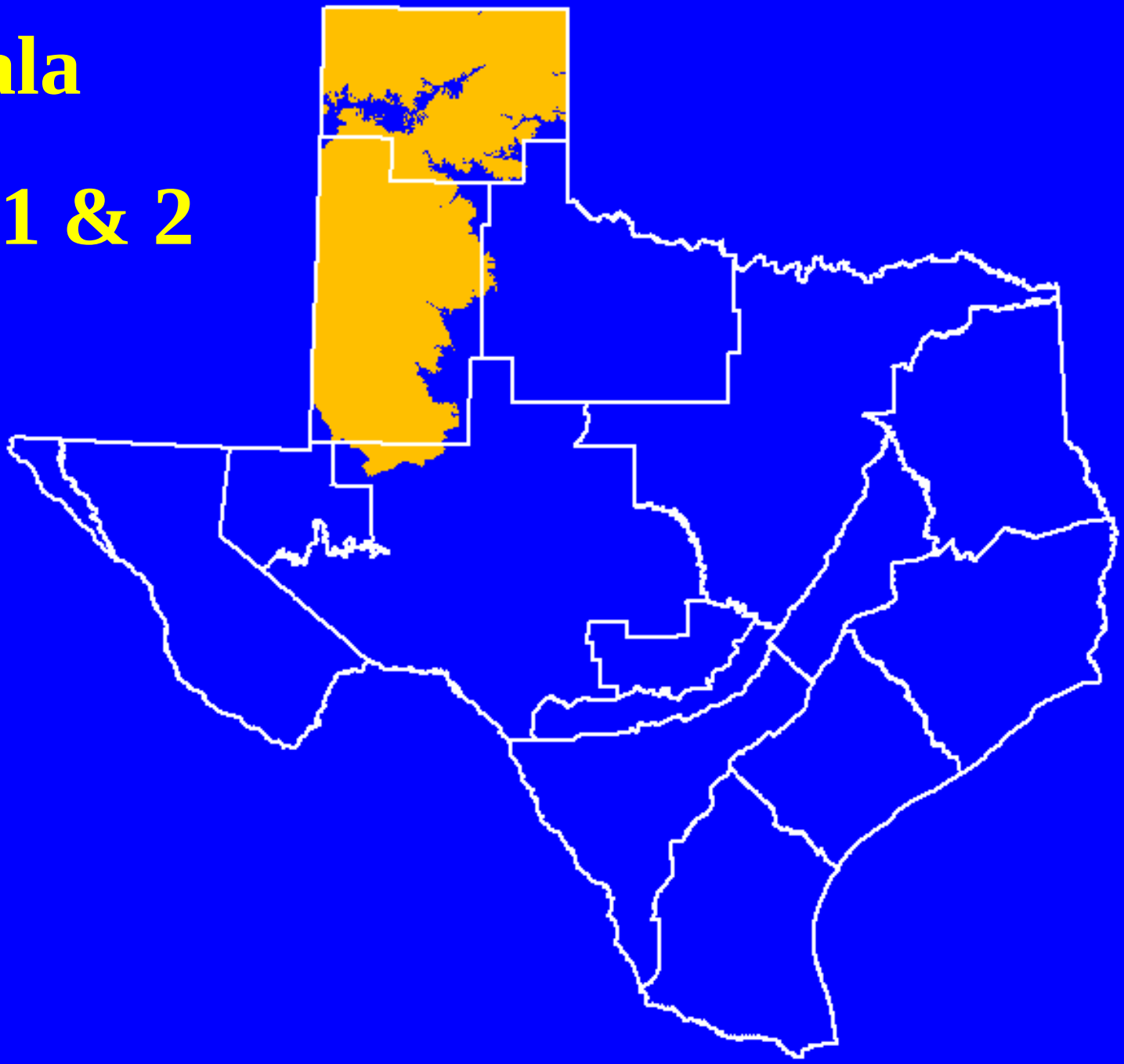
- SB 2 (2001)
  - TWDB designated 16 GMAs
  - Groundwater Conservation Districts (GCD) share management plans
  - Voluntary joint planning (if a GCD called for it)



Groundwater Management Areas (GMAs)

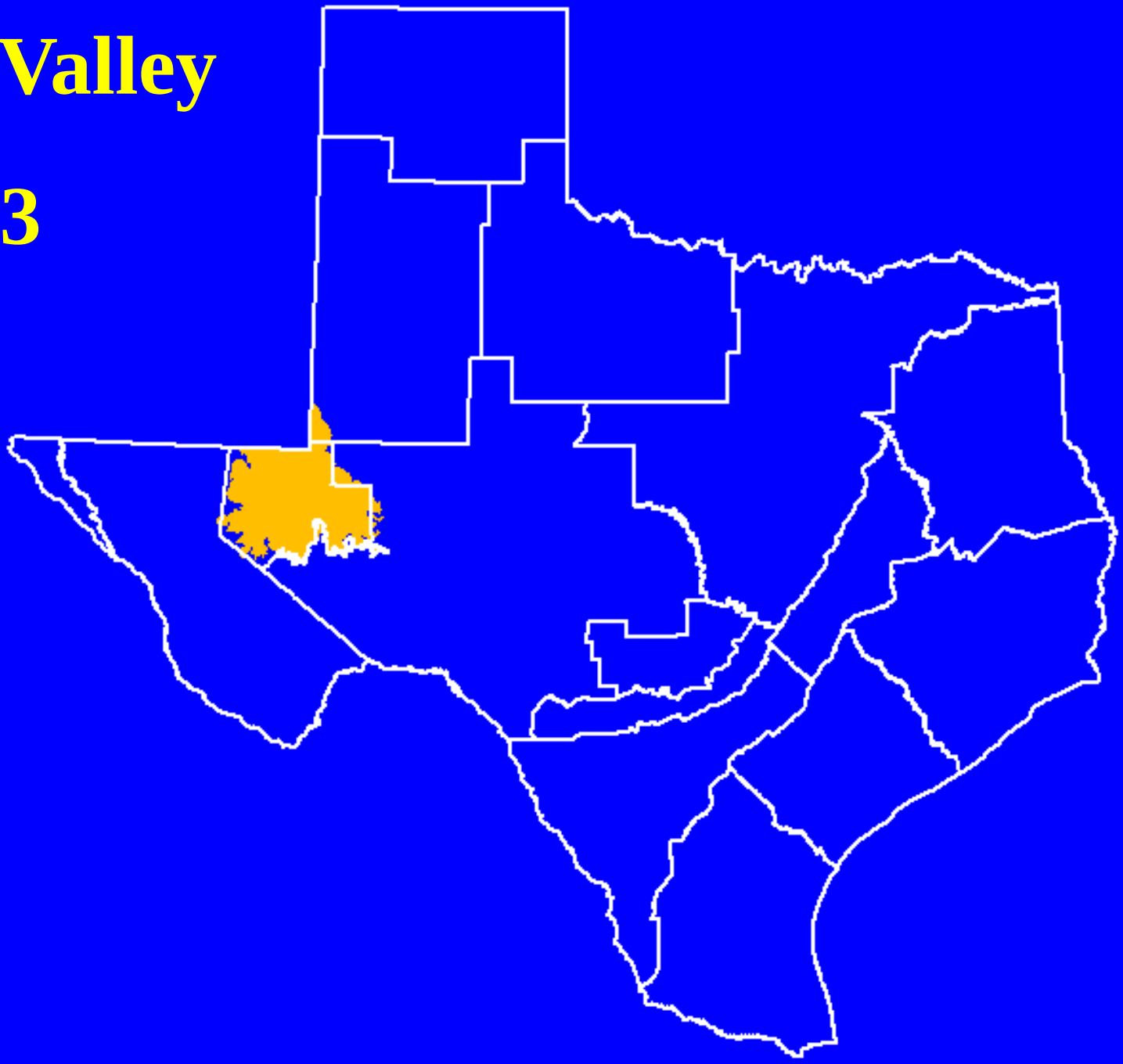
Ogallala

GMA 1 & 2



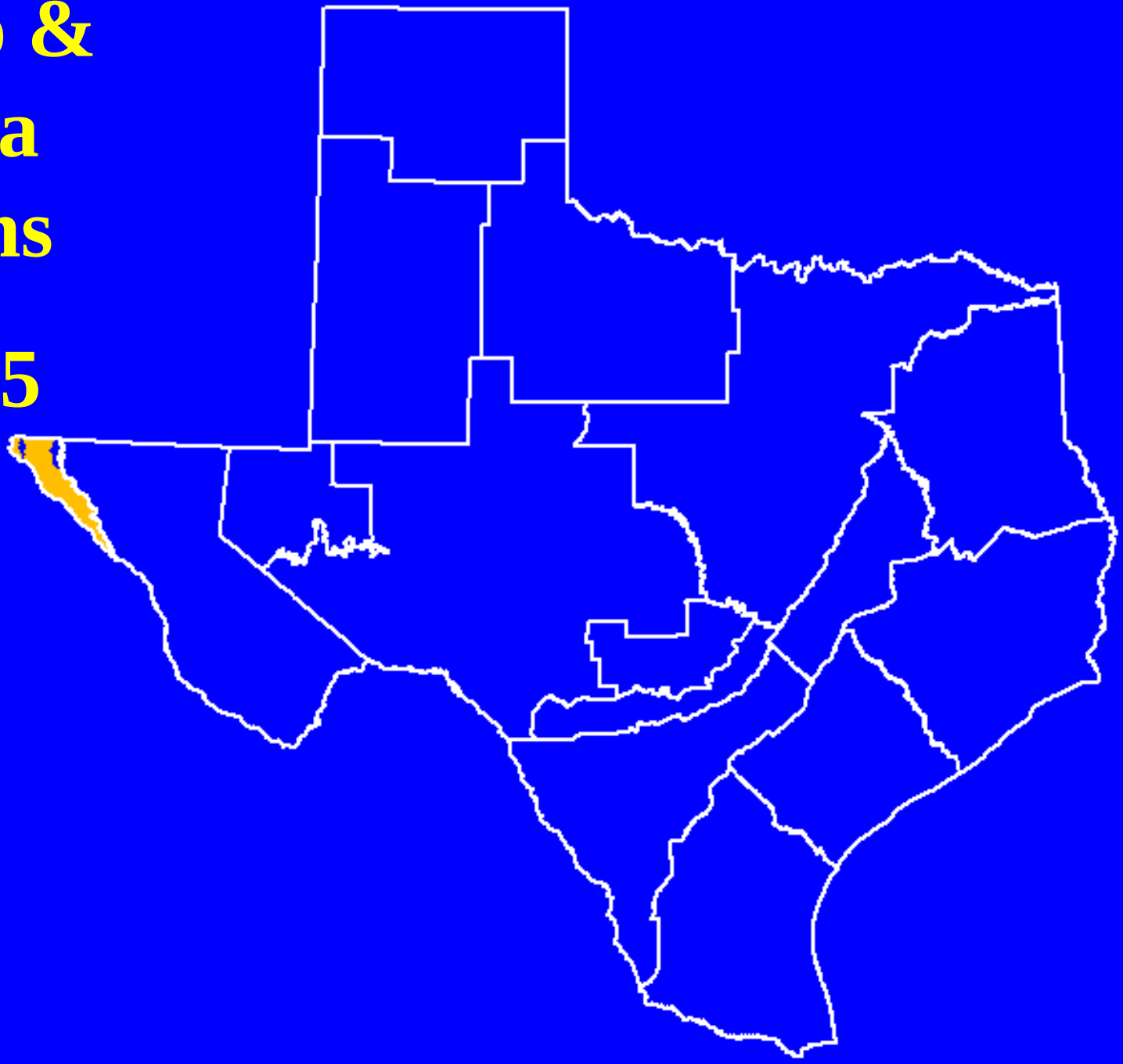
Pecos Valley

GMA 3



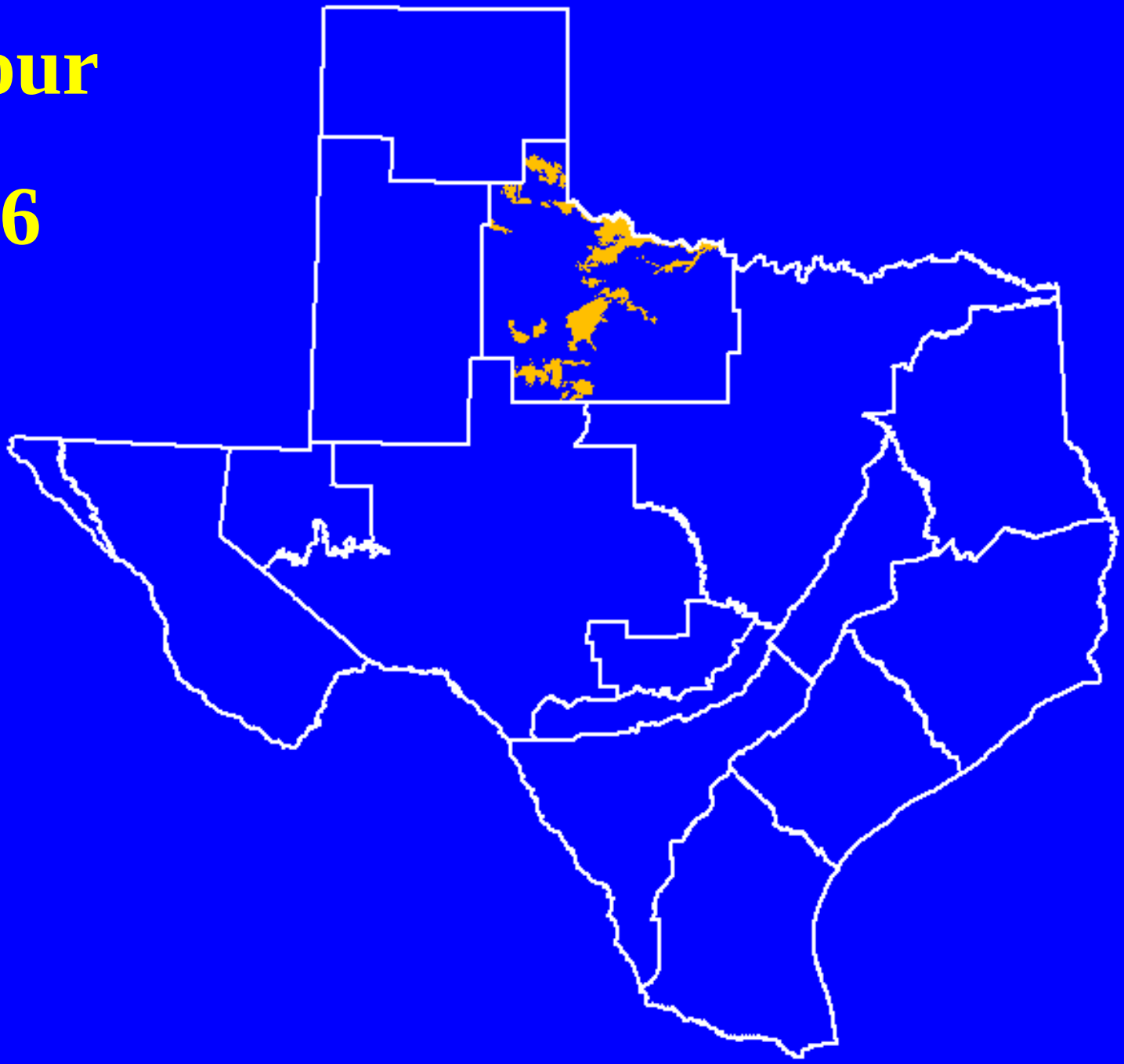
Hueco & Mesilla Bolsons

GMA 5



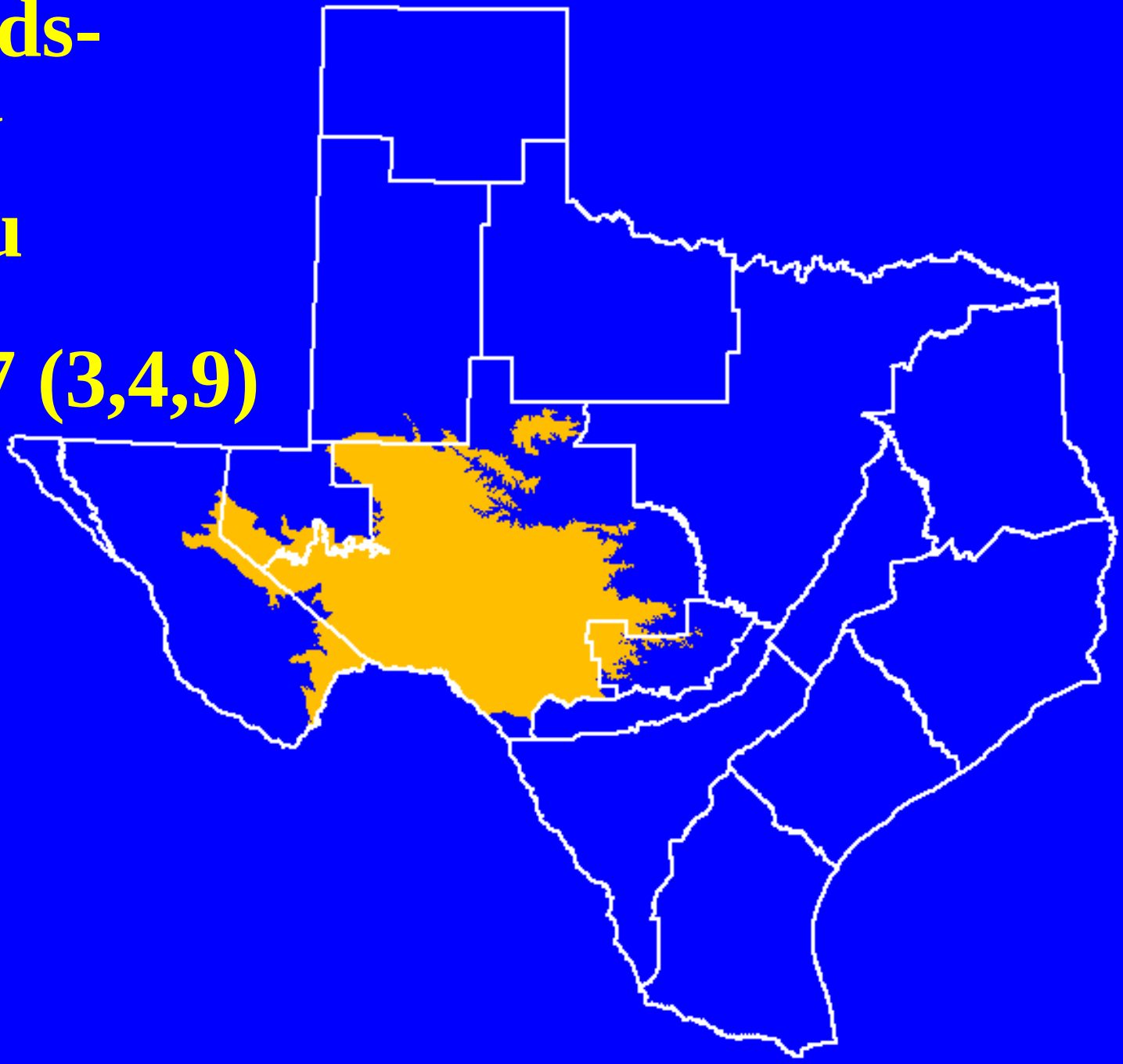
Seymour

GMA 6



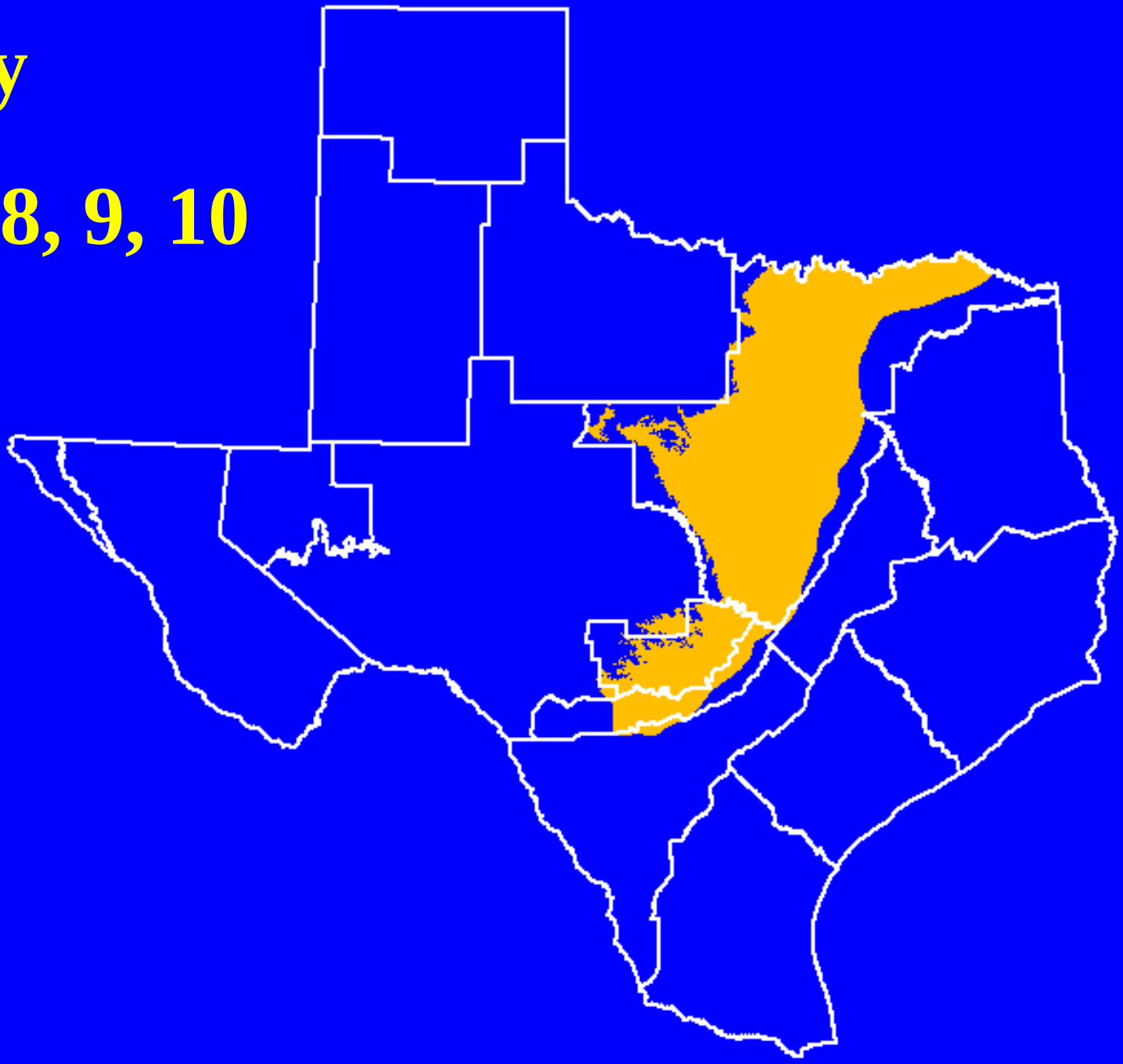
Edwards-Trinity Plateau

GMA 7 (3,4,9)



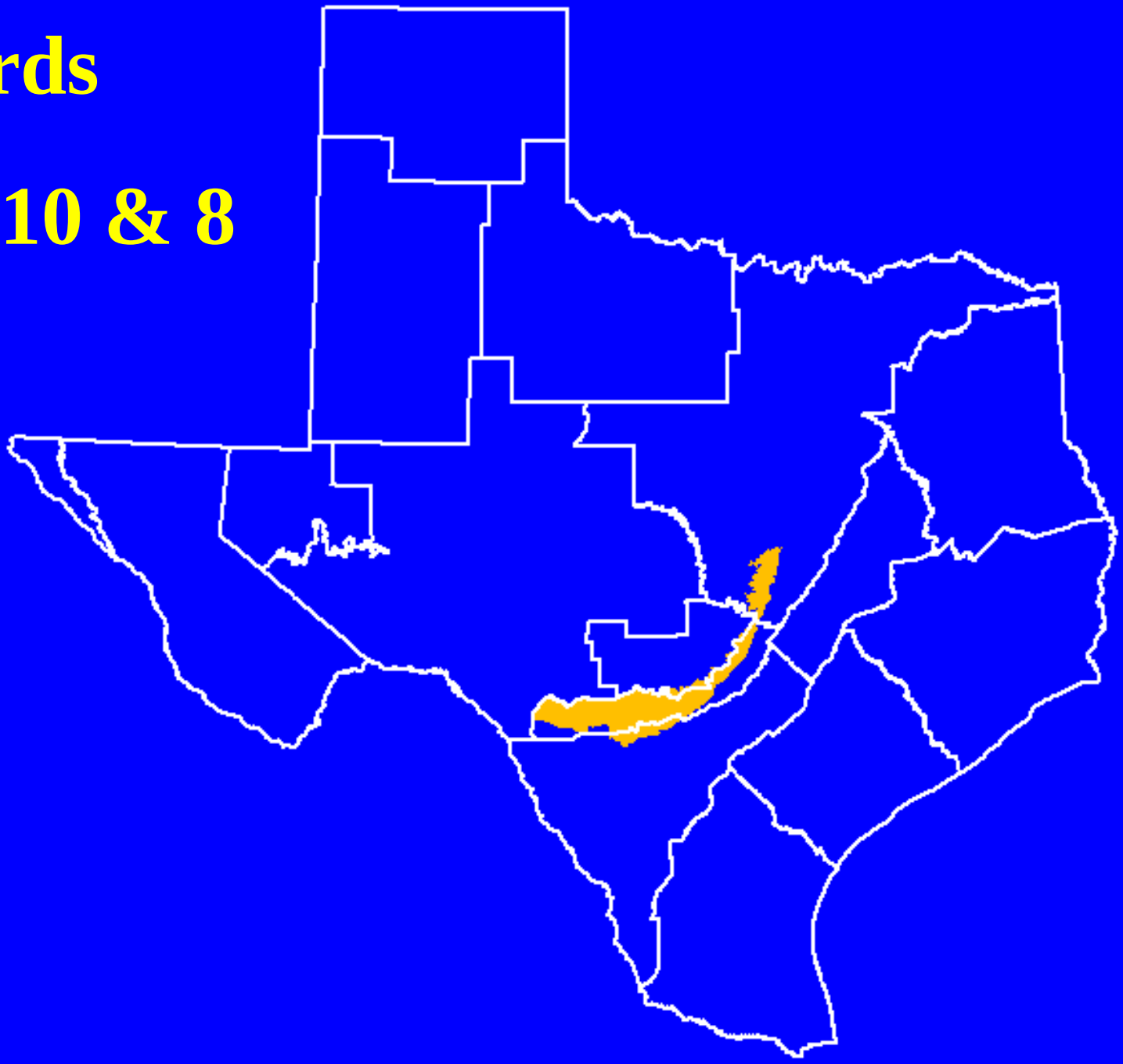
Trinity

GMA 8, 9, 10



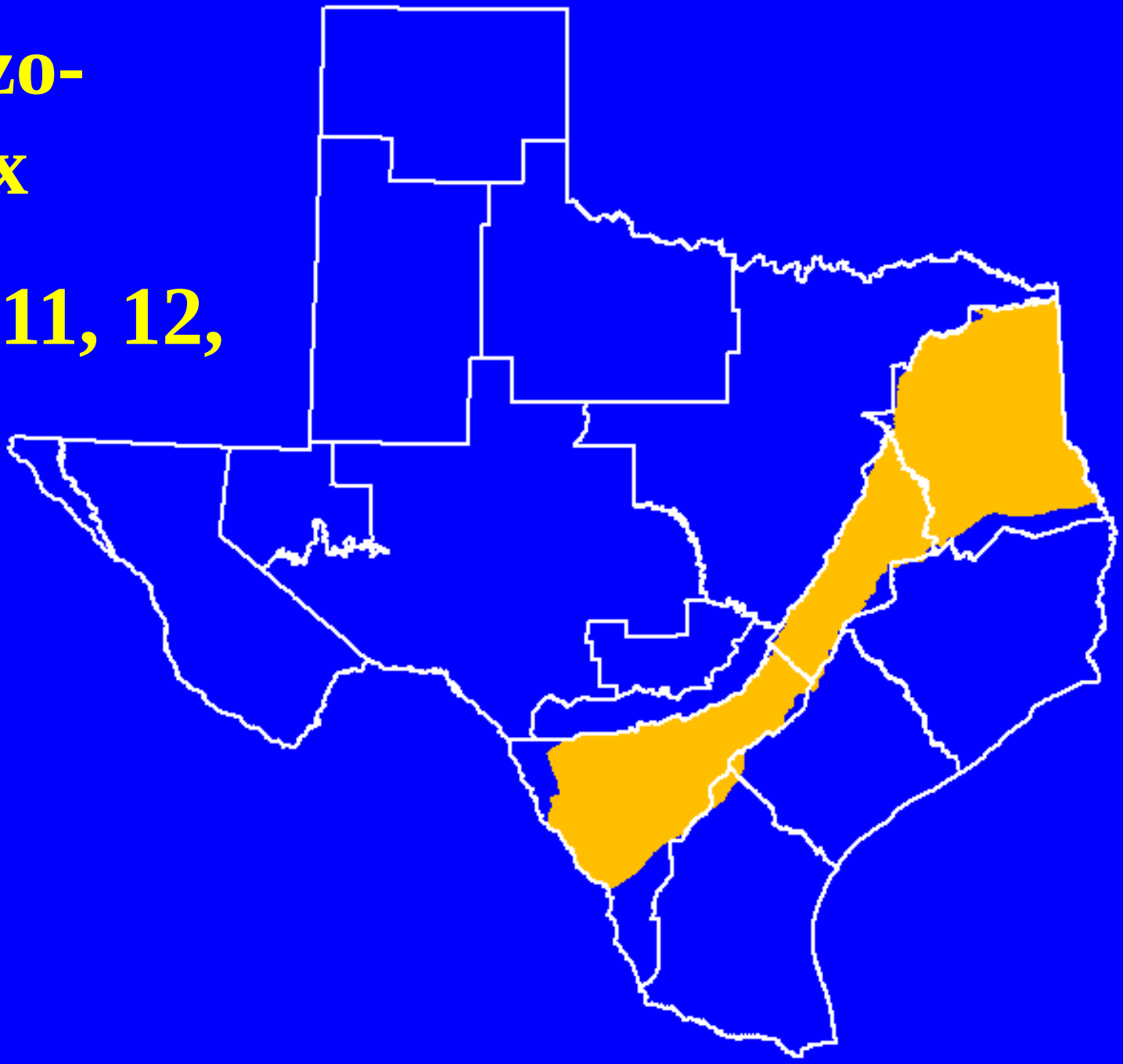
Edwards

GMA 10 & 8



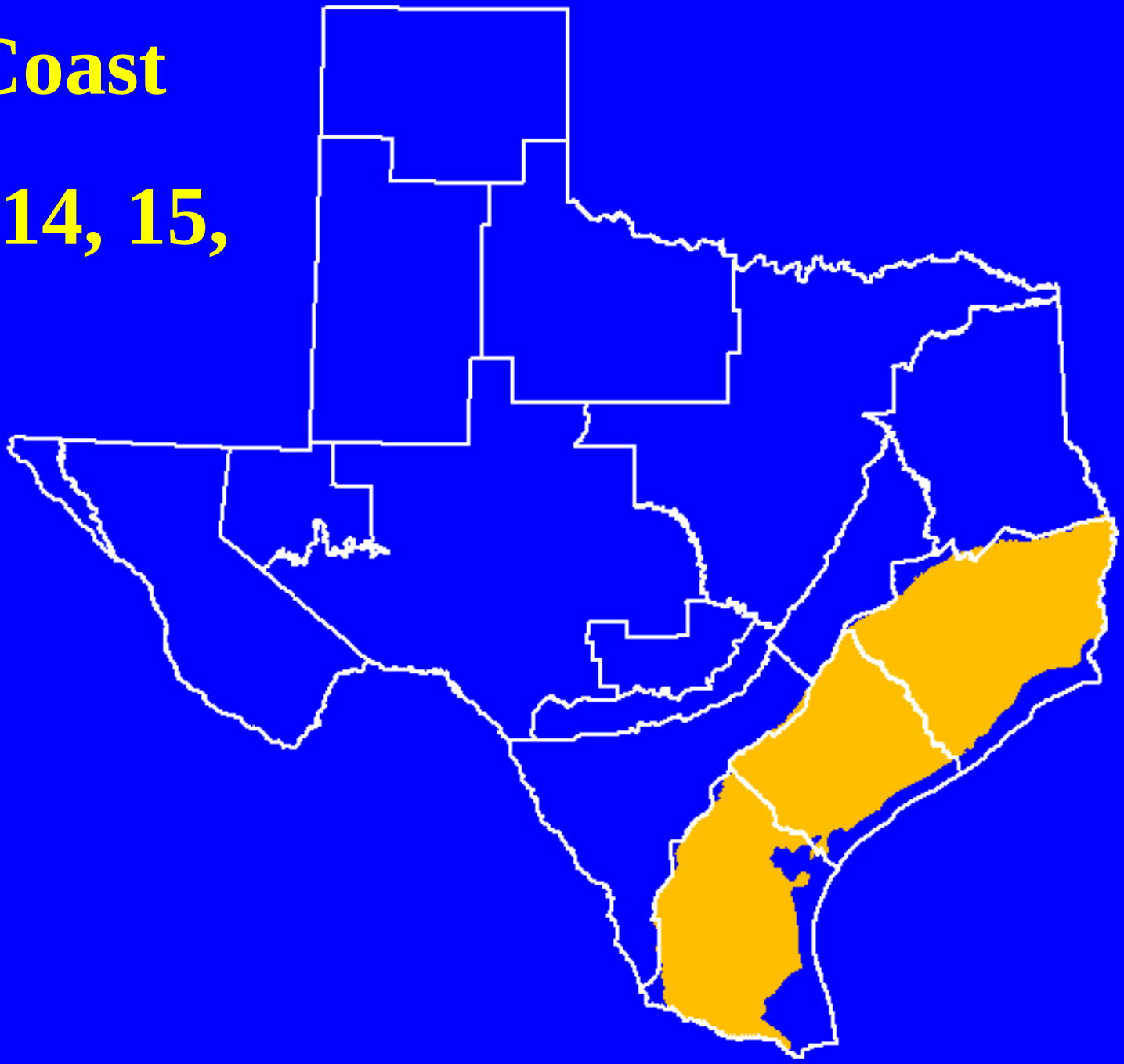
Carrizo-Wilcox

GMA 11, 12, 13

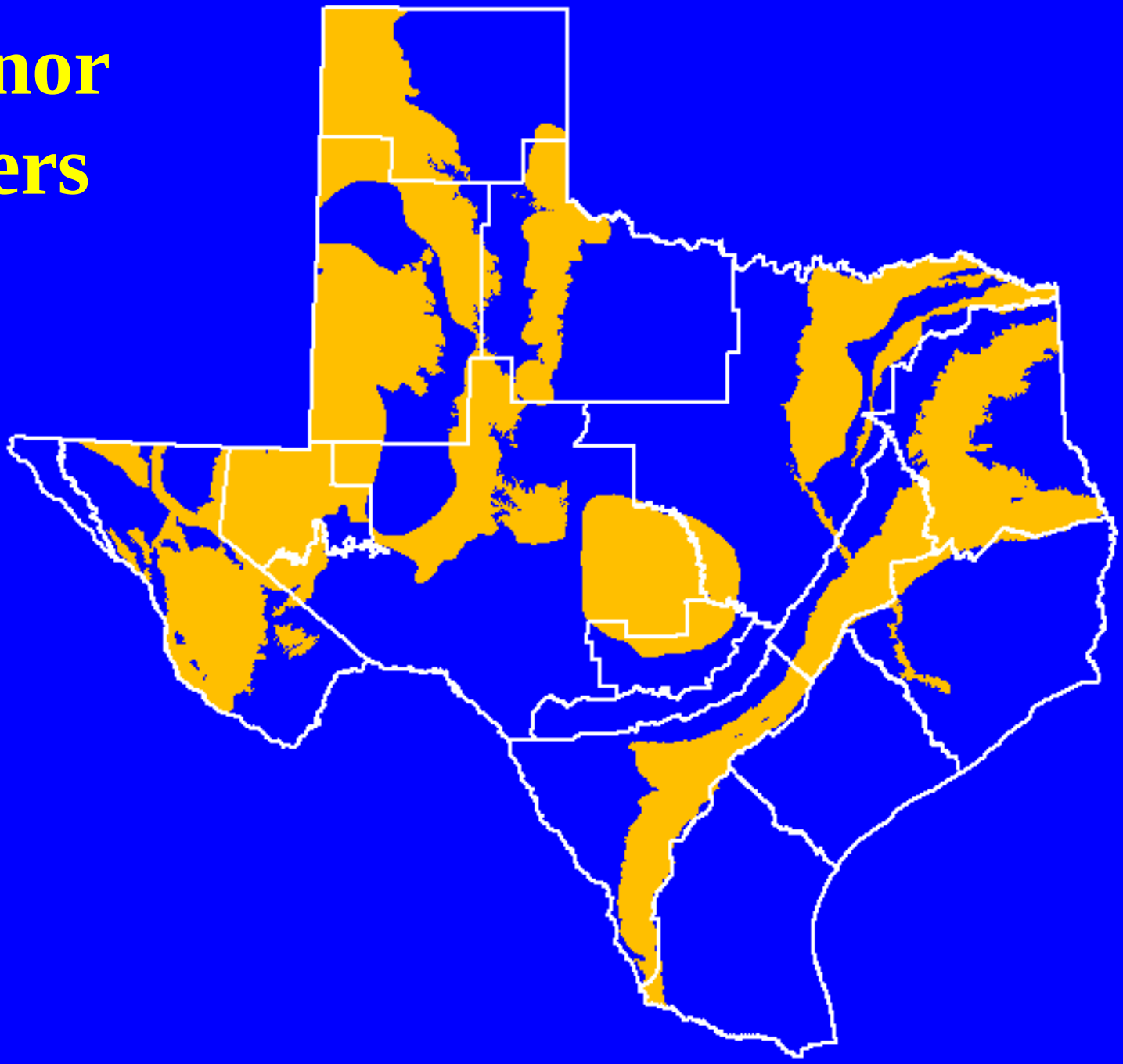


Gulf Coast

GMA 14, 15, 16



19 Minor Aquifers

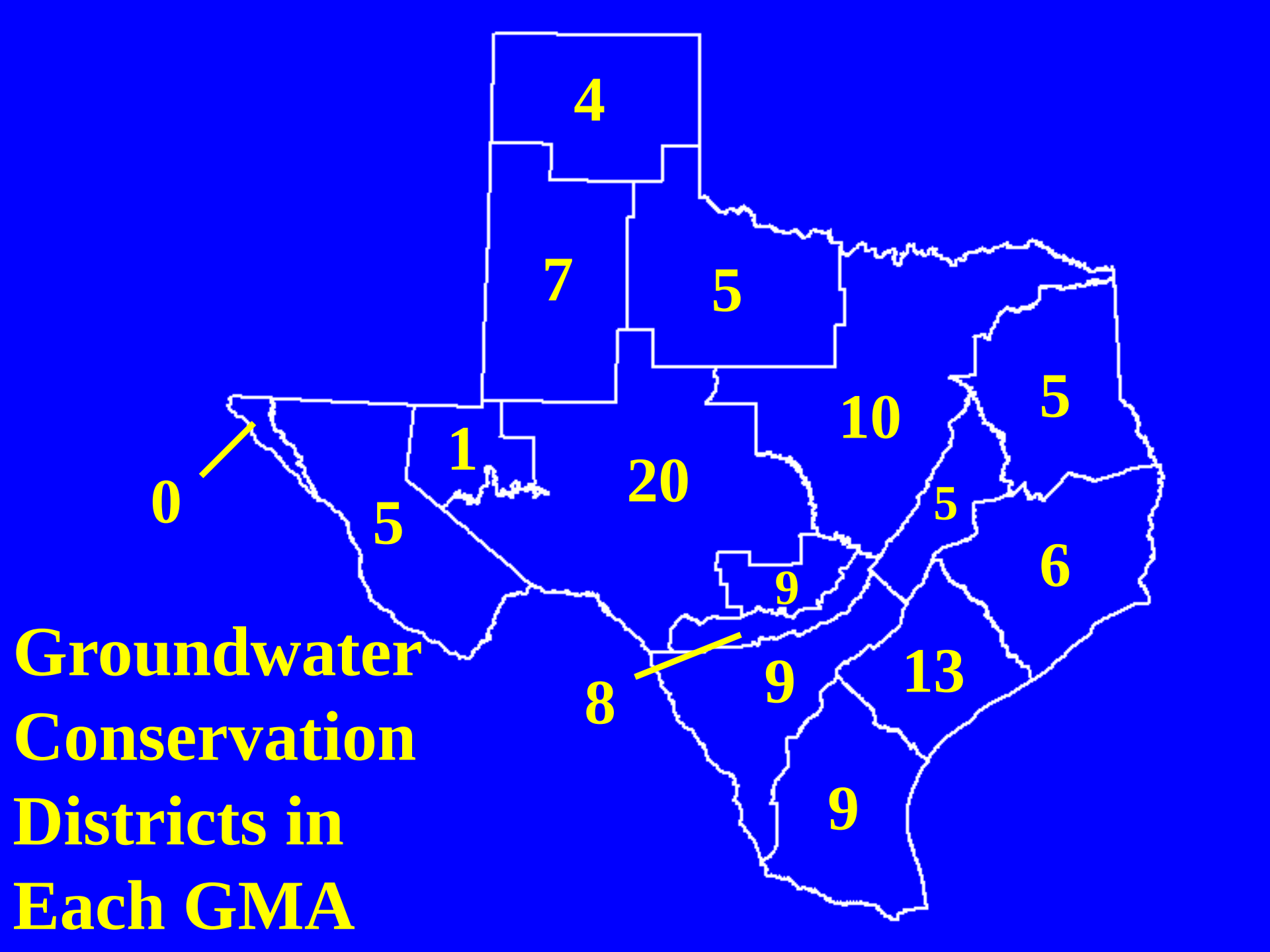


HB 1763 (2005)

- Regionalized groundwater planning
- Required annual review of management plans and accomplishments
- Required joint planning

Joint Planning

- GCDs within a GMA required to establish desired future conditions (DFC) by September 1, 2010
- Each GCD has one vote
  - 2/3 majority to adopt a DFC



Groundwater Conservation Districts in Each GMA

Joint Planning

- Desired Future Condition (DFC)
  - Adopted by Groundwater Conservation Districts (GCD) within a Groundwater Management Area (GMA)
- Managed Available Groundwater (MAG)
  - Calculated by Texas Water Development Board
  - Pumping that will achieve a DFC

Desired Future Condition (DFC)

- Quantified conditions of groundwater resources
- Specified time or times in the future
- Broad Policy Goal
  - Drawdown
  - Spring flow
  - Storage volumes
- Updated at least every 5 years

Managed Available Groundwater (MAG)

- TWDB calculates based on DFC
  - Models
  - Water budget calculations
  - District provided data and information
- Will be included in GCD Management Plans
- To be used in permitting decisions

Groundwater Availability = DFC + MAG

Groundwater Availability = Policy + Science

Groundwater Availability = DFC + MAG

Groundwater Availability Models (GAMs)

- Program started in 2000 to model all aquifers in Texas
- Stakeholder involvement
- Continuous improvement of the models
- Tools for Joint Planning Process

Groundwater Modeling

- Approximations of reality
- Objective driven
- Simulate groundwater flow
  - Pumping and recharge are key inputs
  - Groundwater levels, spring flows are two examples of output

GAMs and Joint Planning Process

- 24 models developed
- One GMA has no districts (GMA 5)
  - 2 models cover GMA 5
- 22 developed models available for use in process

GAMs Used in Support of Joint Planning Process

- 18 out of 22 GAMs were used as developed
- 4 GAMs were only used as foundations for improved models
  - Dockum
  - Edwards-Trinity (Plateau) and Pecos Valley
  - Edwards BFZ (Barton Springs Segment)
  - Gulf Coast (Southern)

5 “Non-GAMs” Used in Joint Planning Process

- Developed in-house by TWDB
- 3 represent recalibrations of existing GAMs
  - Better address proposed DFCs (calibration time period, boundary conditions)
- 2 represent combined existing GAMs

Model Runs

- Simulations of changes in:
  - Groundwater pumping and/or
  - Drought conditions
- Output examples:
  - Drawdown
  - Spring Flows
  - Storage Volumes

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DFC

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  - Drawdown
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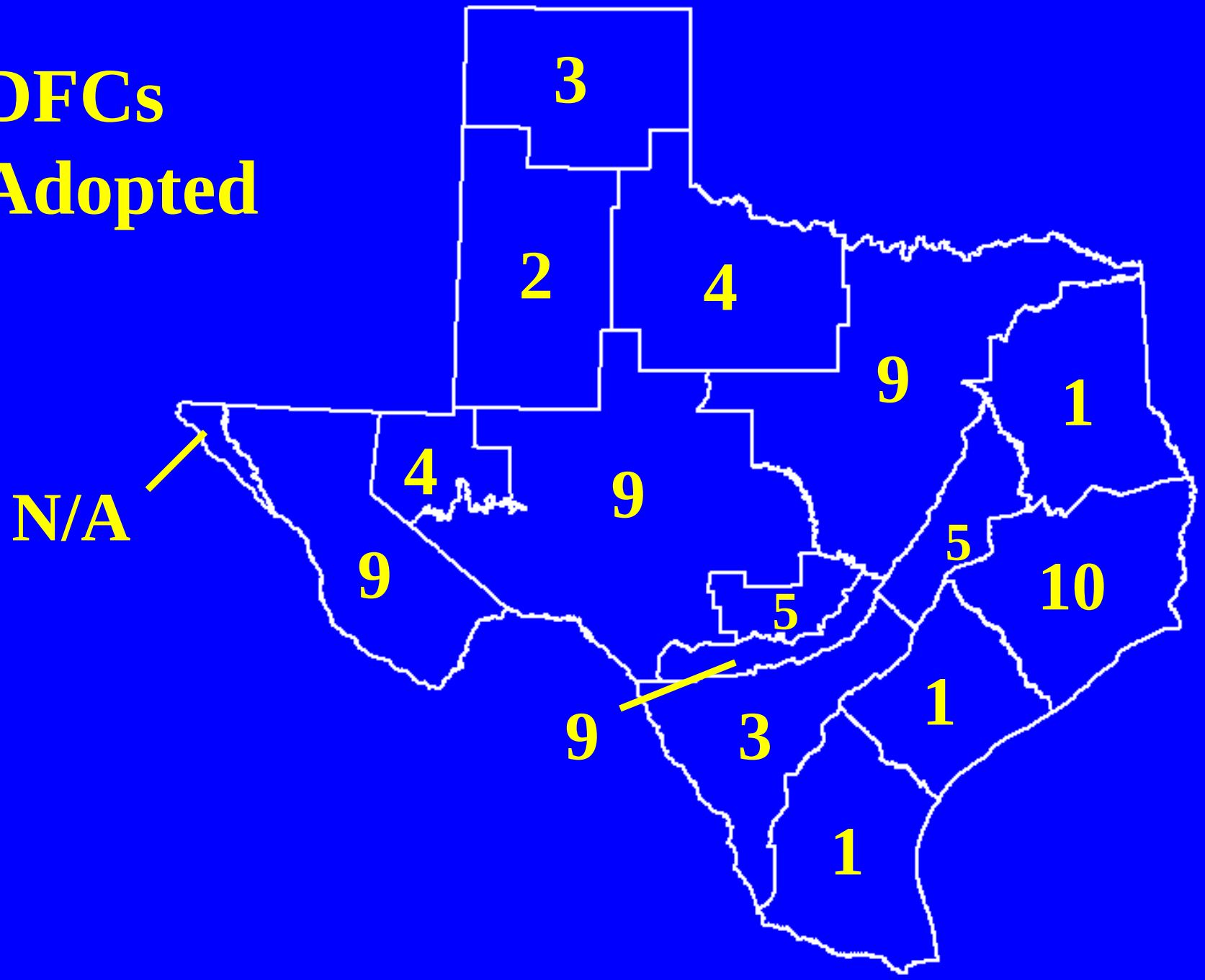
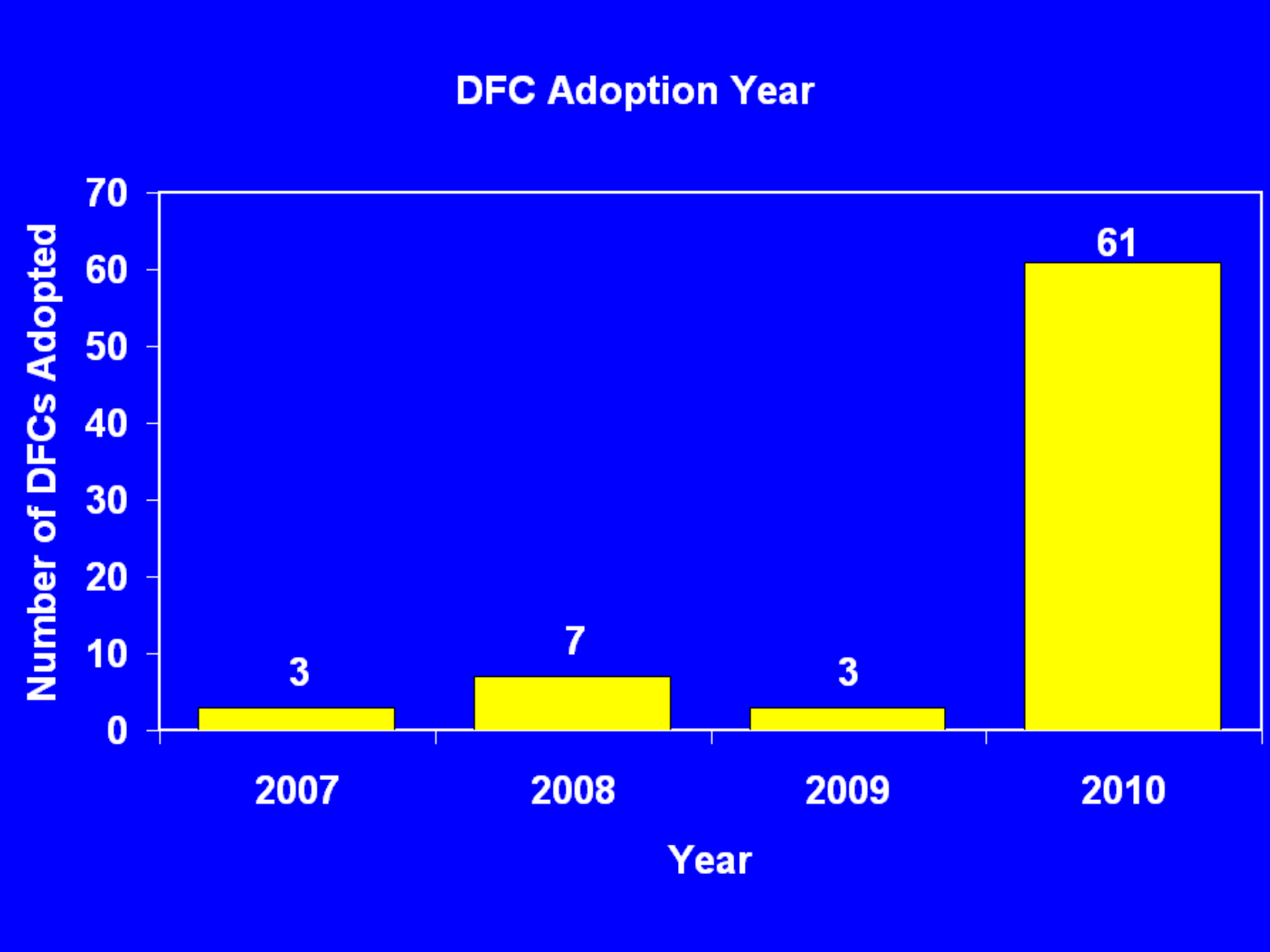
MAG

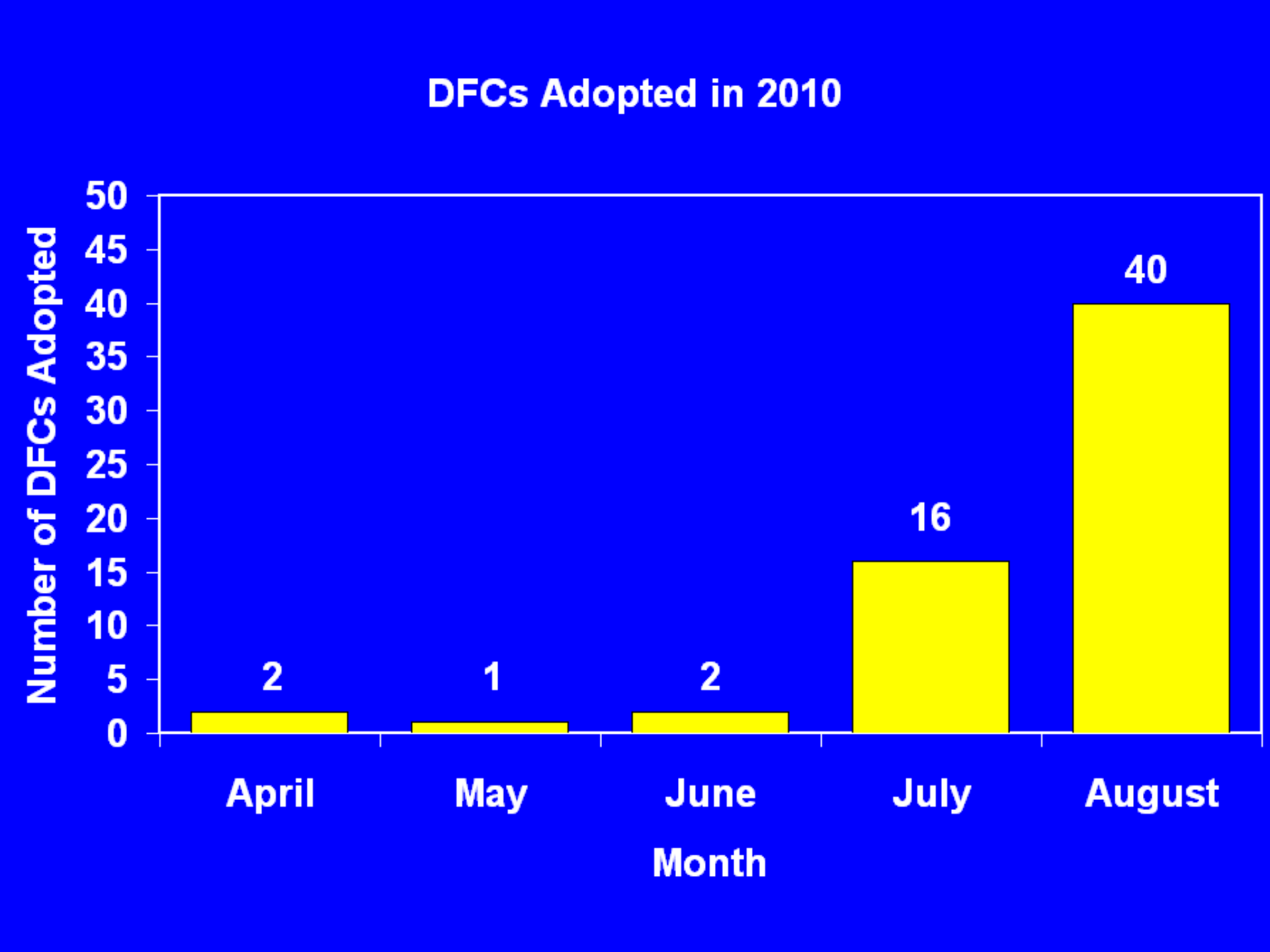
Desired Future Conditions

- Deadline to adopt initial DFCs was September 1, 2010
- 74 DFCs adopted
  - First = December 17, 2007
  - Last = August 30, 2010
- Submittal to TWDB complete
  - All have been found to be administratively complete

DFCs Adopted




DFC Adoption Year
Number of DFCs Adopted
70
60
50
40
30
20
10
0
3
7
3
61
2007
2008
2009
2010
Year


DFCs Adopted in 2010
Number of DFCs Adopted
50
45
40
35
30
25
20
15
10
5
0
2
1
2
16
40
April
May
June
July
August
Month

Summary of DFCs

Drawdown	54
Spring Flow	3
Volume	13
Minimum Groundwater Elevation	1
Hybrid (Drawdown and Volume)	2
Hybrid (Drawdown and Spring Flow)	1
Total	**74**

Summary of DFCs

Groundwater Management Area (GMA)	19
County	39
District	8
Area	6
Hybrid (County and District)	1
Hybrid (GMA and County)	1
Total	**74**

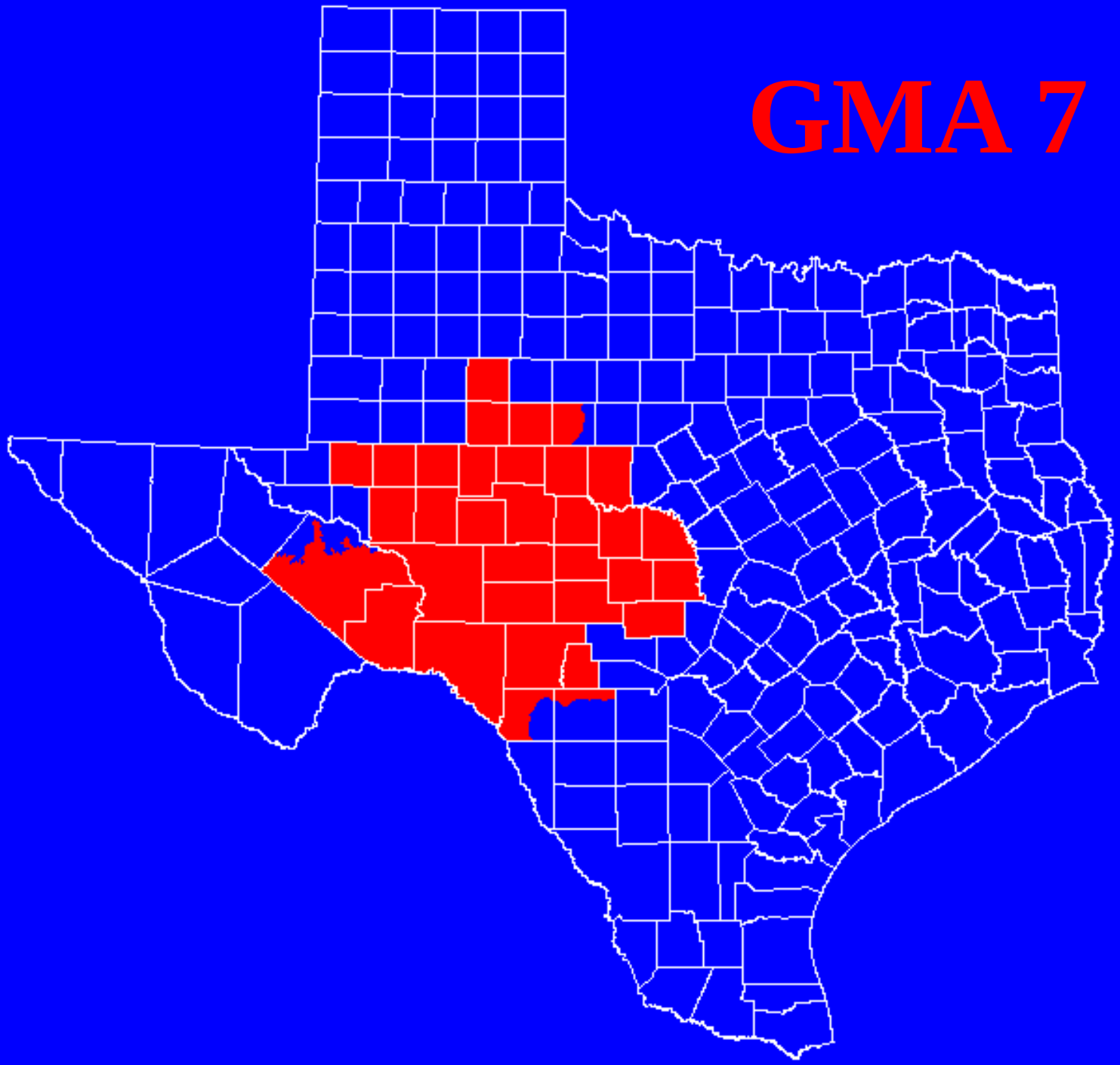
Recharge Assumption Summary

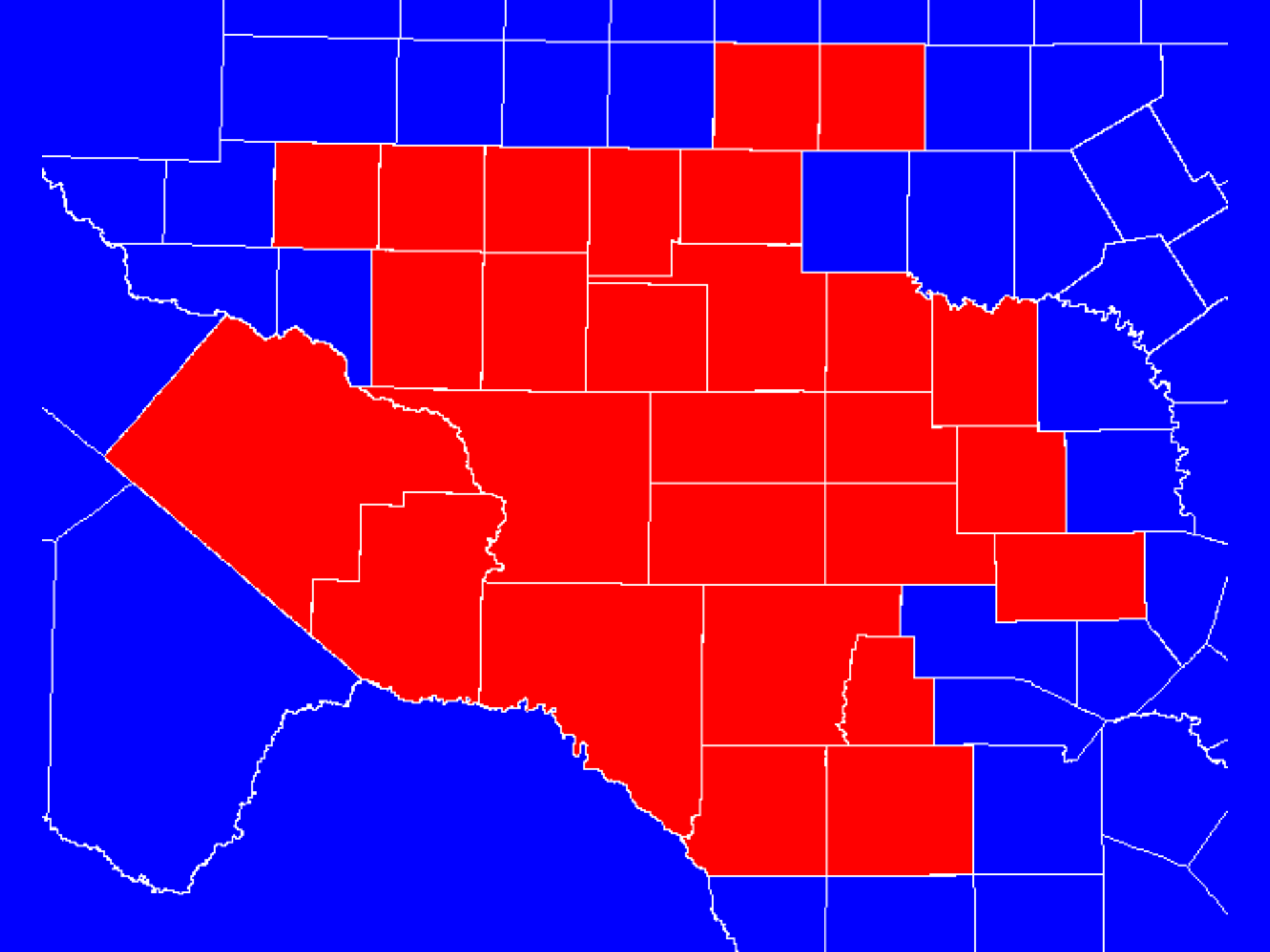
- 4 DFCs considered drought conditions
- 70 DFCs assumed “average” recharge conditions

DFCs in GMA 7

- Edwards-Trinity (Plateau) Aquifer
- 7 feet of drawdown in 2060 (GMA 7 Average)
- Summary of how DFC was established

GMA 7





GMA 7 “Vision”

- Minimize drawdown in east (headwaters area)
- Provide for irrigation demands in west (significant drawdown)

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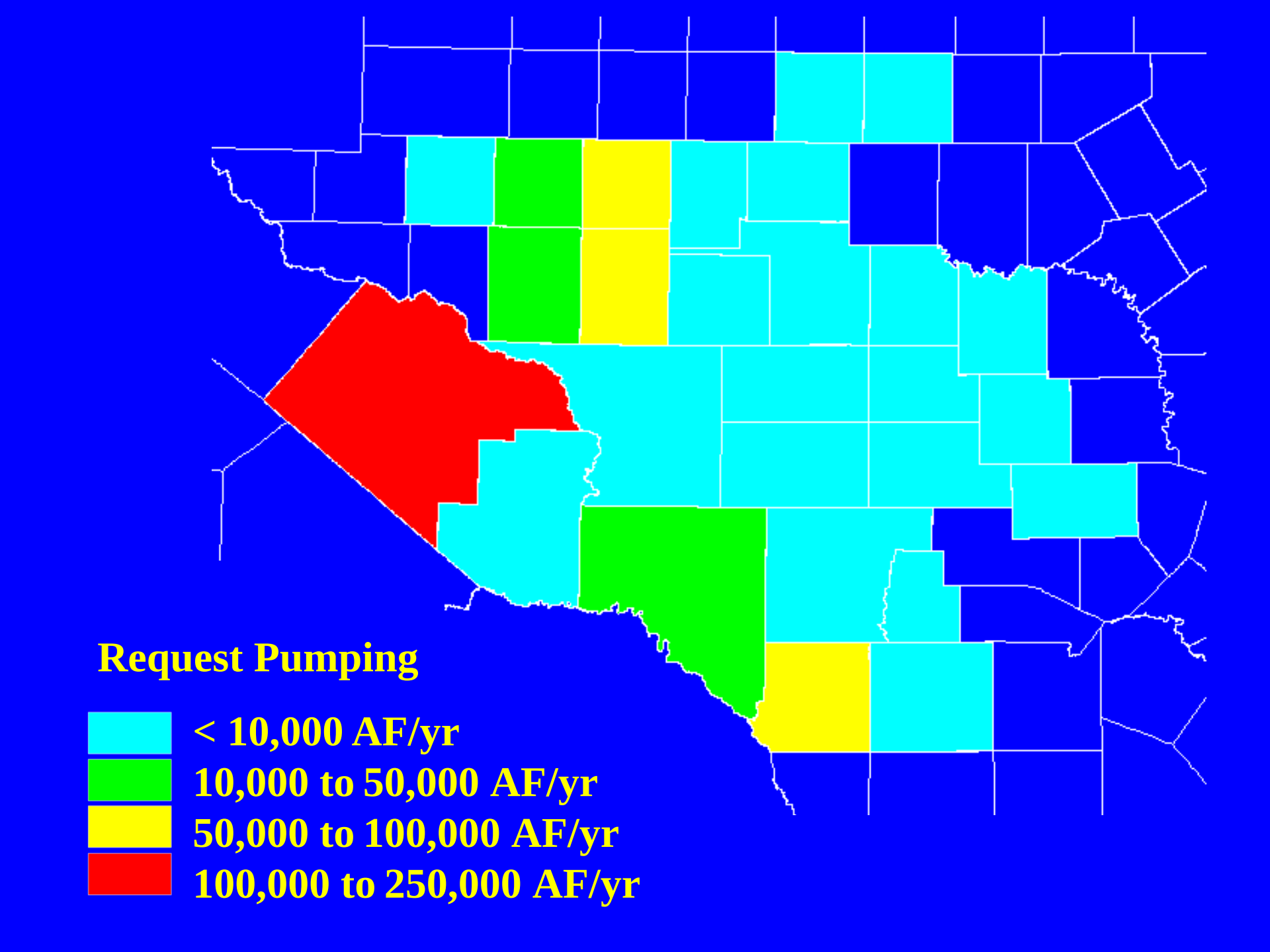
Is this compatible?

“Request” Pumping

- County-by-county pumping (27 counties)
- Total GMA 7 “request” = 530,000 AF/yr
  - 2005 GMA 7 pumping = 400,000 AF/yr
- Assumed average recharge
- Estimate drawdown in 2060

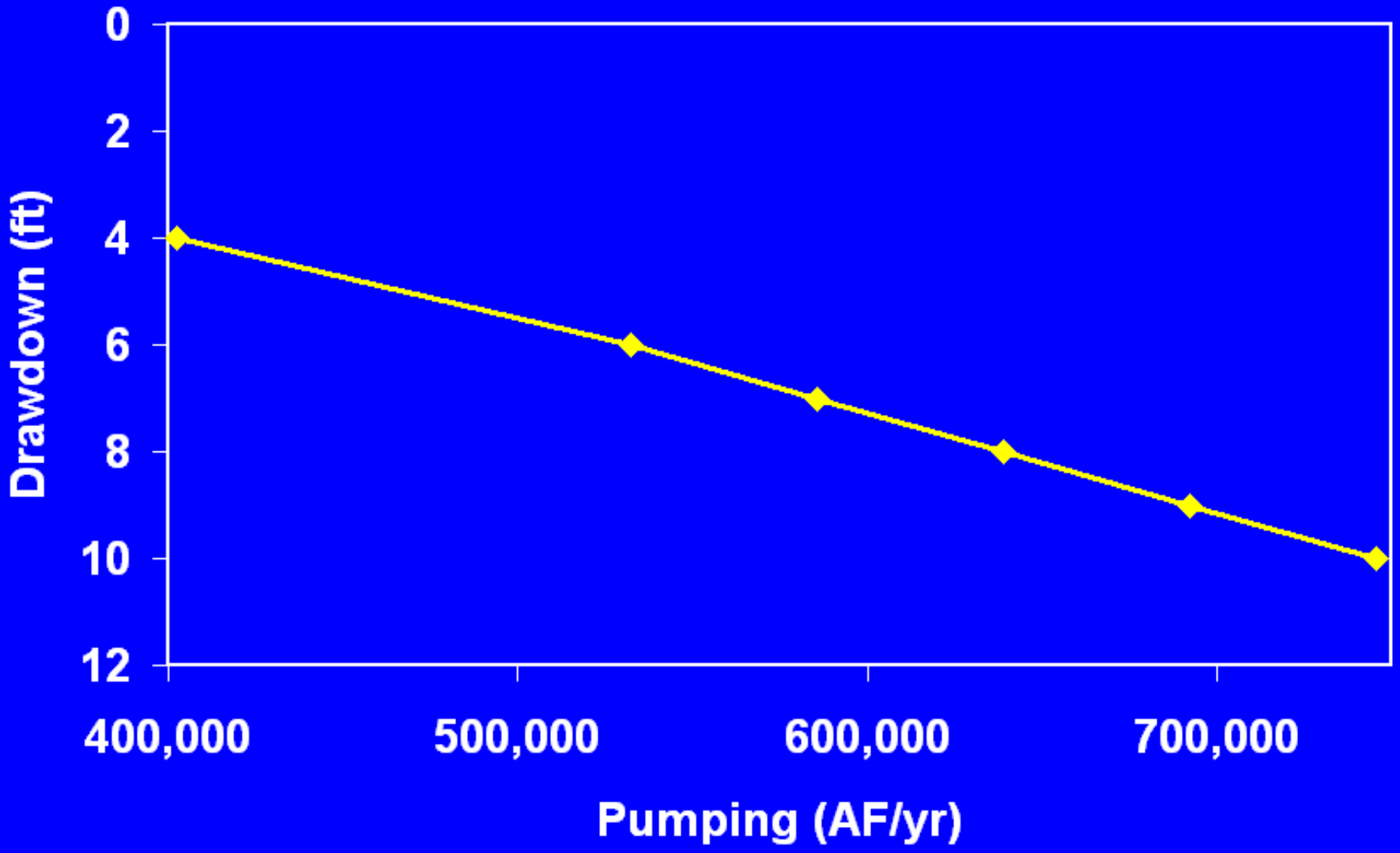

Request Pumping
< 10,000 AF/yr
10,000 to 50,000 AF/yr
50,000 to 100,000 AF/yr
100,000 to 250,000 AF/yr

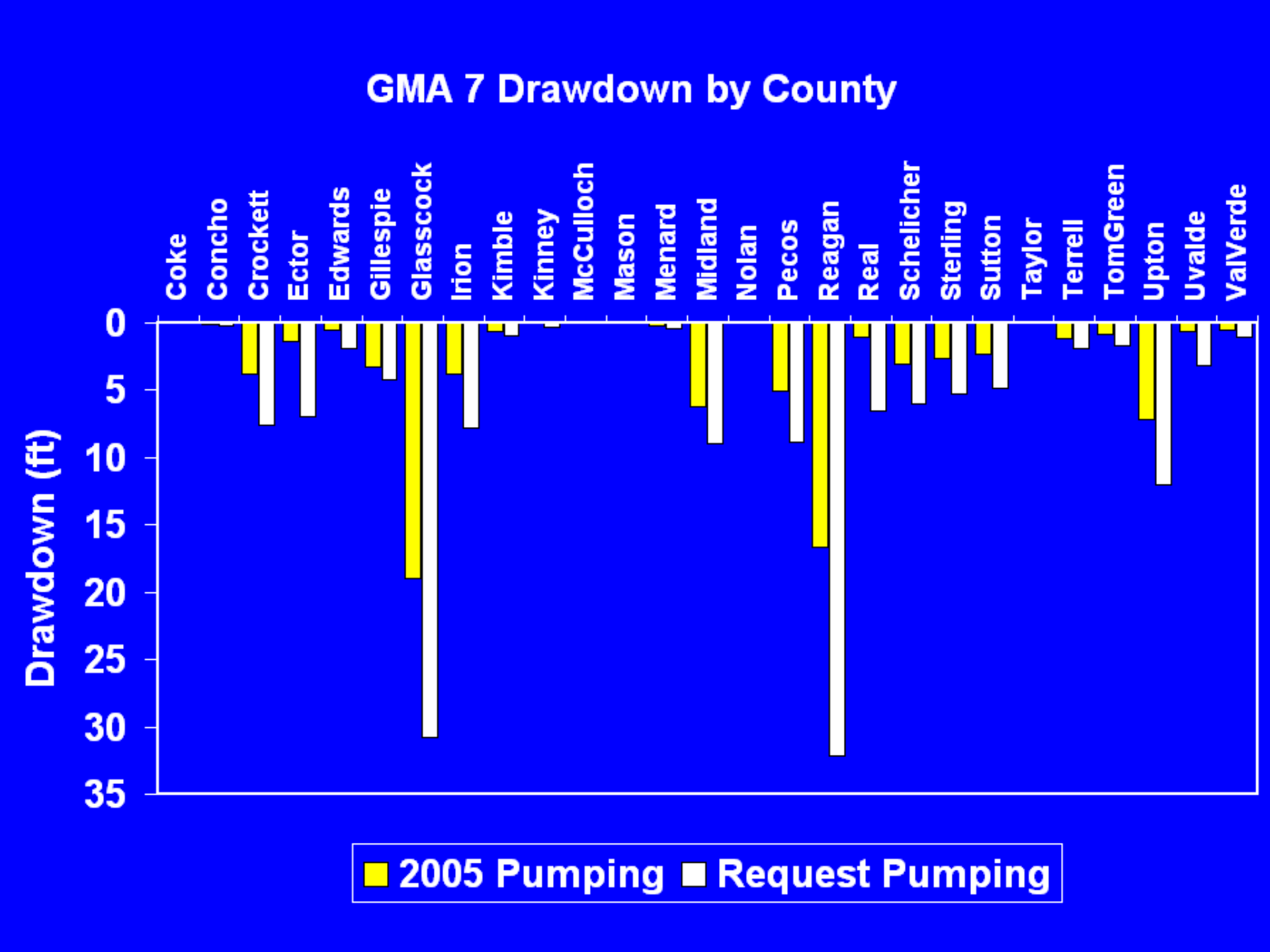
Six Initial Scenarios

- Scenario 0 (2005 Pumping)
- Scenario 1 (“Request” Pumping)
- Scenario 2 (110% of Request Pumping)
- Scenario 3 (120% of Request Pumping)
- Scenario 4 (130% of Request Pumping)
- Scenario 5 (140% of Request Pumping)

Pumping and Drawdown Summary

• Scenario 0	400,000 AF/yr	4 feet
• Scenario 1	530,000 AF/yr	6 feet
• Scenario 2	586,000 AF/yr	7 feet
• Scenario 3	639,000 AF/yr	8 feet
• Scenario 4	692,000 AF/yr	9 feet
• Scenario 5	746,000 AF/yr	10 feet


GMA 7 Drawdown in 2060
Drawdown (ft)
0
2
4
6
8
10
12
400,000
500,000
600,000
700,000
Pumping (AF/yr)


GMA 7 Drawdown by County
Drawdown (ft)
0
5
10
15
20
25
30
35
Coke
Concho
Crockett
Ector
Edwards
Gillespie
Glasscock
Irion
Kimble
Kinney
McCulloch
Mason
Menard
Midland
Nolan
Pecos
Reagan
Real
Schelicher
Sterling
Sutton
Taylor
Terrell
TomGreen
Upton
Uvalde
ValVerde
2005 Pumping
Request Pumping

July 28, 2010 GMA 7 Meeting

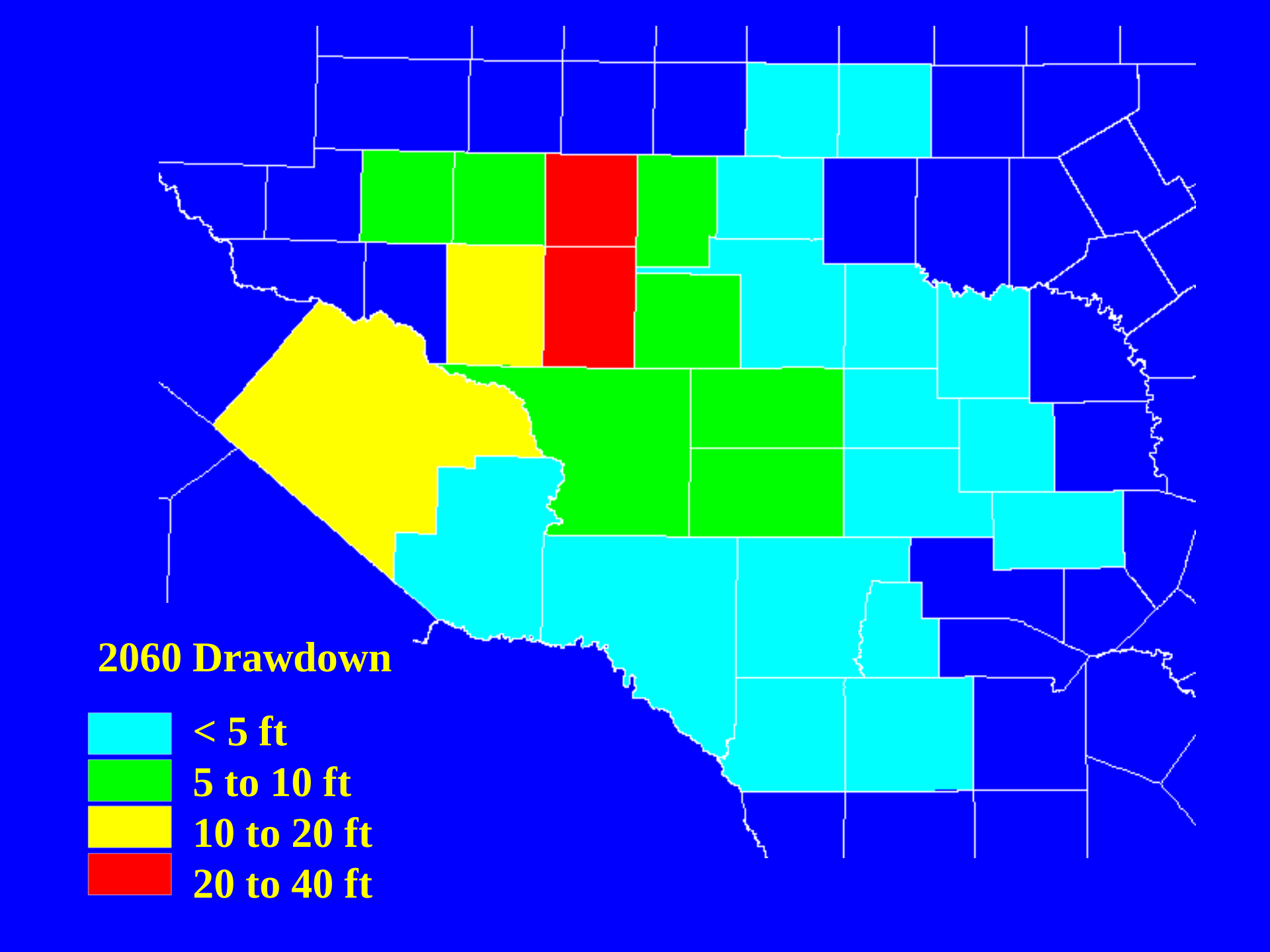
- Discussed “request pumping” scenario
- Compare and contrast with continuation of 2005 pumping
- Compare and contrast with incremental increases
- GCD representatives developed 5 new scenarios (individual county adjustments)
  - Model runs completed at meeting

Pumping and Drawdown Summary

- Scenario 6 548,000 AF/yr 7 feet
- Scenario 7 550,000 AF/yr 7 feet
- Scenario 8 566,000 AF/yr 7 feet
- Scenario 9 571,000 AF/yr 7 feet
- Scenario 10 571,000 AF/yr 7 feet

GMA 7 Adopted Scenario 10

- 7 feet of drawdown in 2060 (GMA Average)
- Pumping = 571,000 AF/yr
  - "Request pumping" of 530,000 AF/yr
- Met predefined "vision"


2060 Drawdown
< 5 ft
5 to 10 ft
10 to 20 ft
20 to 40 ft

Next Steps

- TWDB developing Managed Available Groundwater values
  - Over half have been delivered in draft form
- Model improvement continuing
  - Preparing for “next” round of DFCs
- Legislative session begins January 2011
  - Potential changes to the process

Questions?

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Texas Water Development Board