

HARRIS-GALVESTON



SUBSIDENCE
DISTRICT



FORT BEND
SUBSIDENCE DISTRICT

JOINT REGULATORY PLAN REVIEW

Fort Bend Subsidence District

June 25, 2025

PROJECT SPONSORS AND COLLABORATORS

HARRIS-GALVESTON



SUBSIDENCE
DISTRICT



FORT BEND
SUBSIDENCE DISTRICT

Texas Water
Development Board



1

Develop Population and Demand Projections

Develop projections of population and water demand over a ten-county area through the year 2100.



2

Conduct Alternative Water Supply Assessment

Review alternative water supplies for the capability of reducing future groundwater demand.



3

Develop the Gulf Coast Land Subsidence and Groundwater Flow Model

Development of the GULF-2023 model for simulating regional groundwater flow and subsidence in the Gulf Coast Aquifer.



4

Evaluate Regulatory Scenarios

Evaluate the performance of the HGSD and FBSD regulatory plans and consider refinements to the regulatory plan framework to accommodate future growth, alternative water supplies, and the most recent aquifer science.



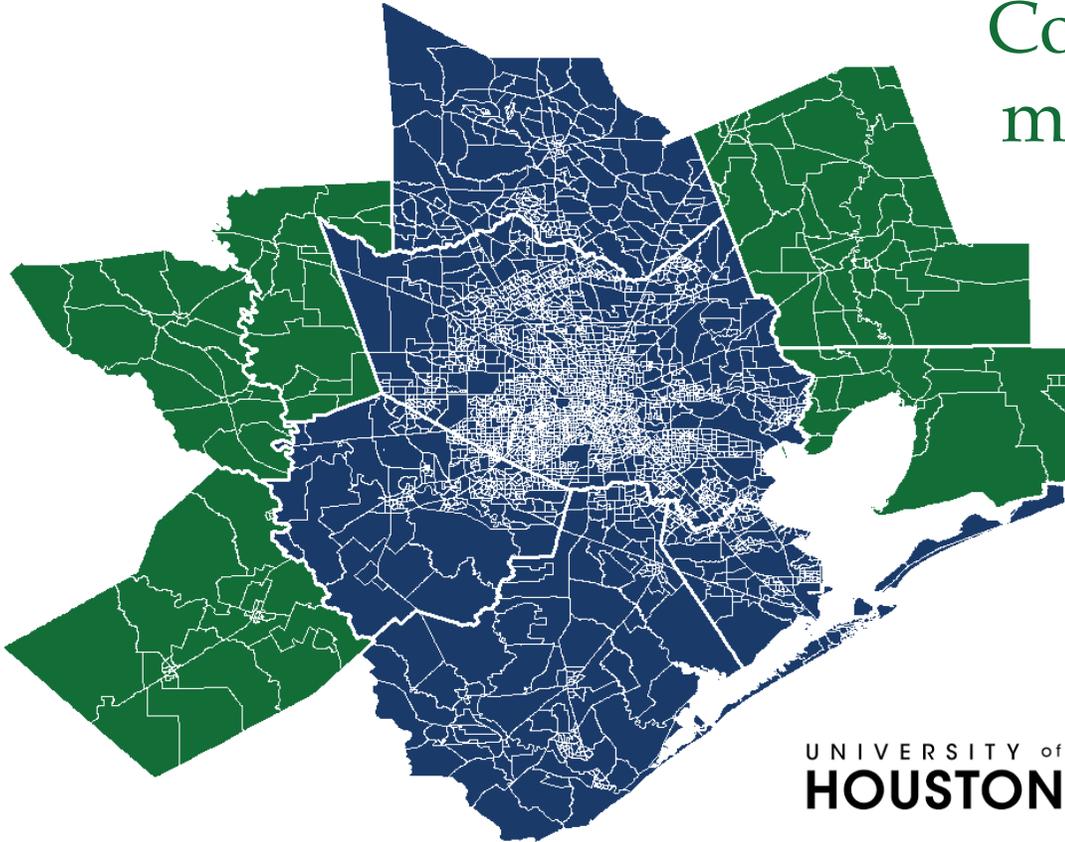


POPULATION
DEMANDS
AND
PROJECTIONS

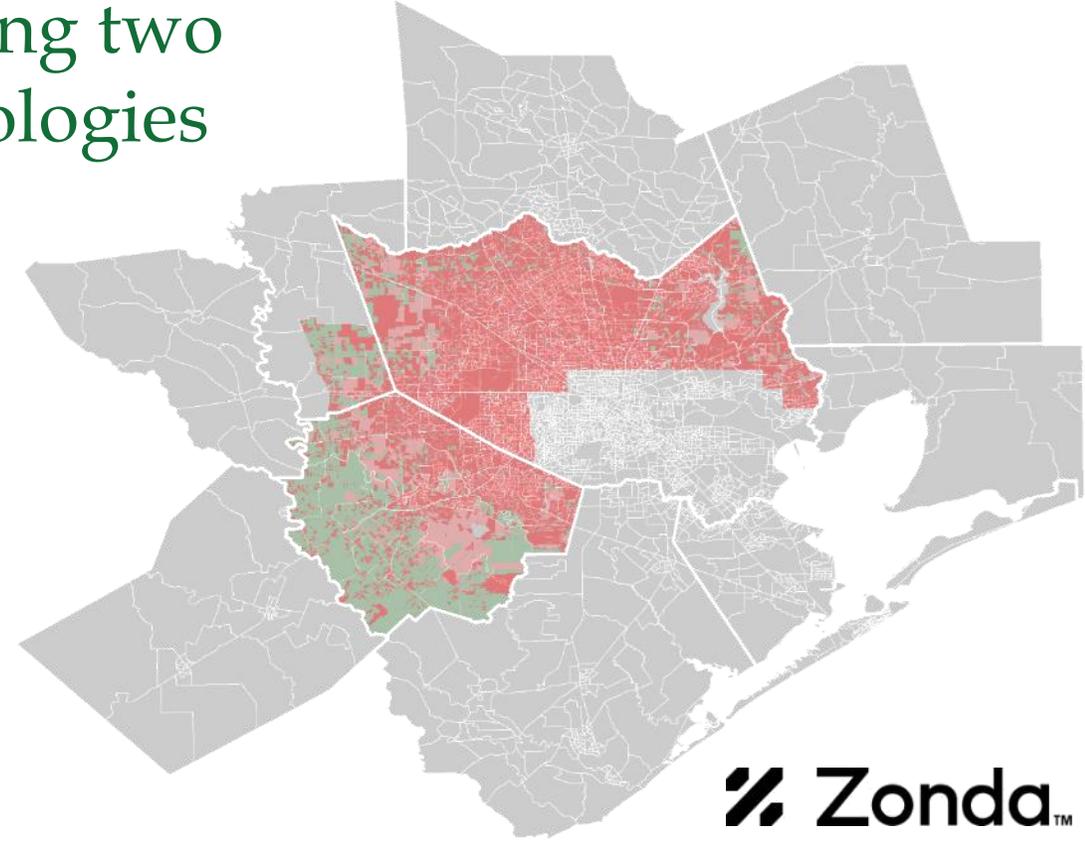
Population and water demands drive the total demand for water and, therefore, projects the future demands that may be placed upon groundwater

POPULATION PROJECTION METHODOLOGY

Combining two methodologies

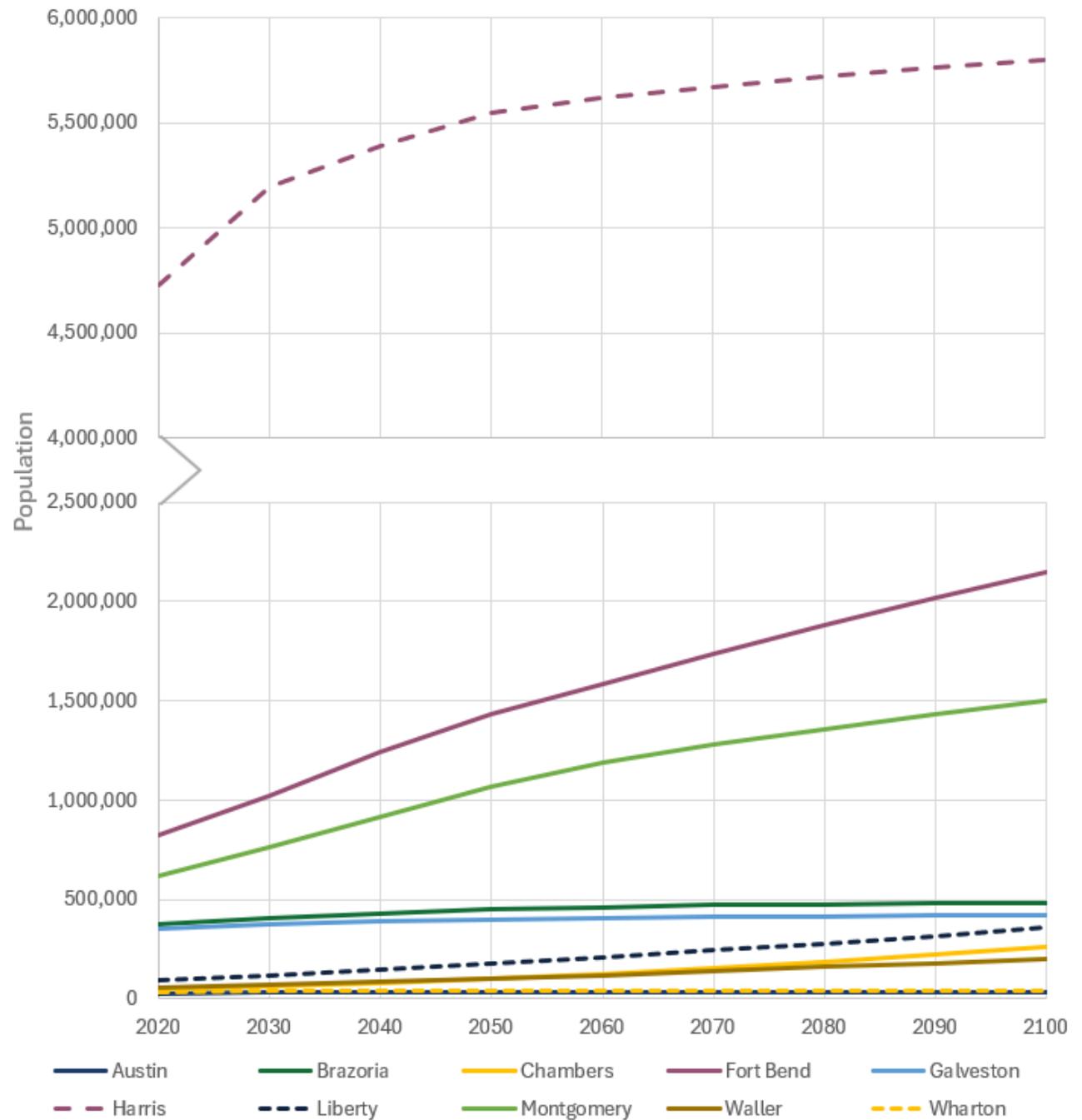


Small Area Model Houston (SAM-Houston)
Long-range, wide-area projections



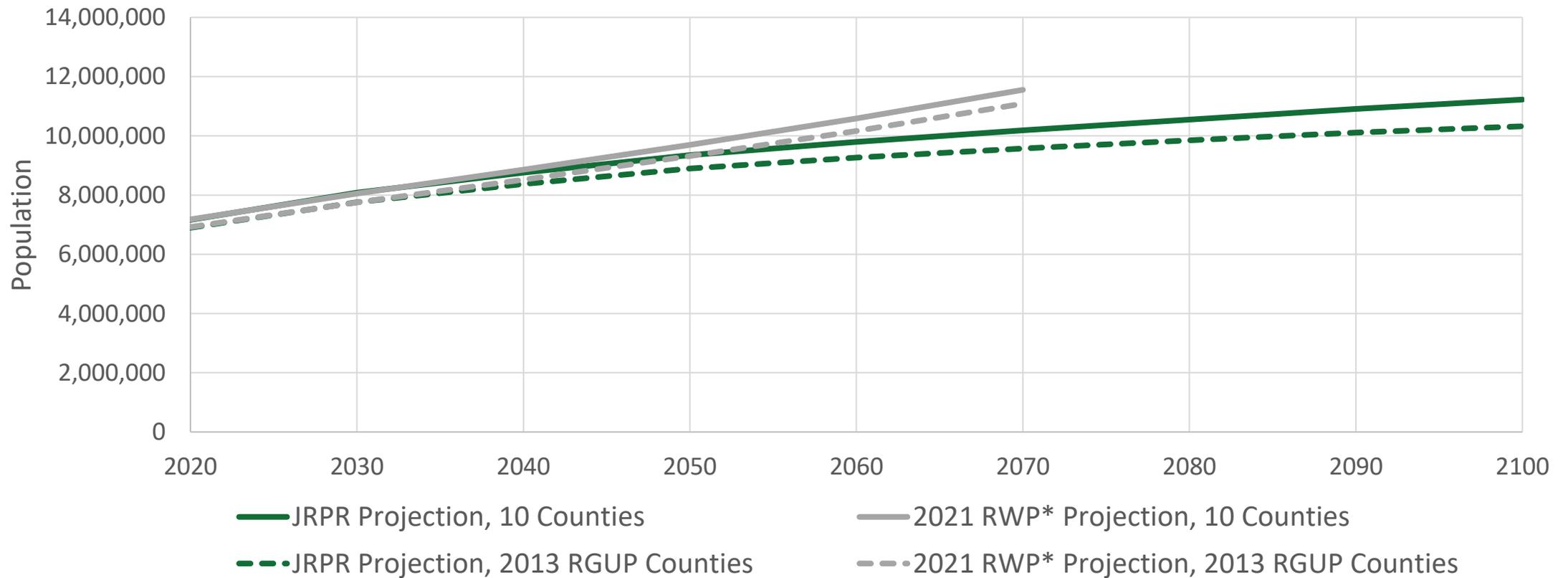
Projected Development Methodology
Short-range, detailed projections

POPULATION PROJECTIONS



POPULATION PROJECTIONS

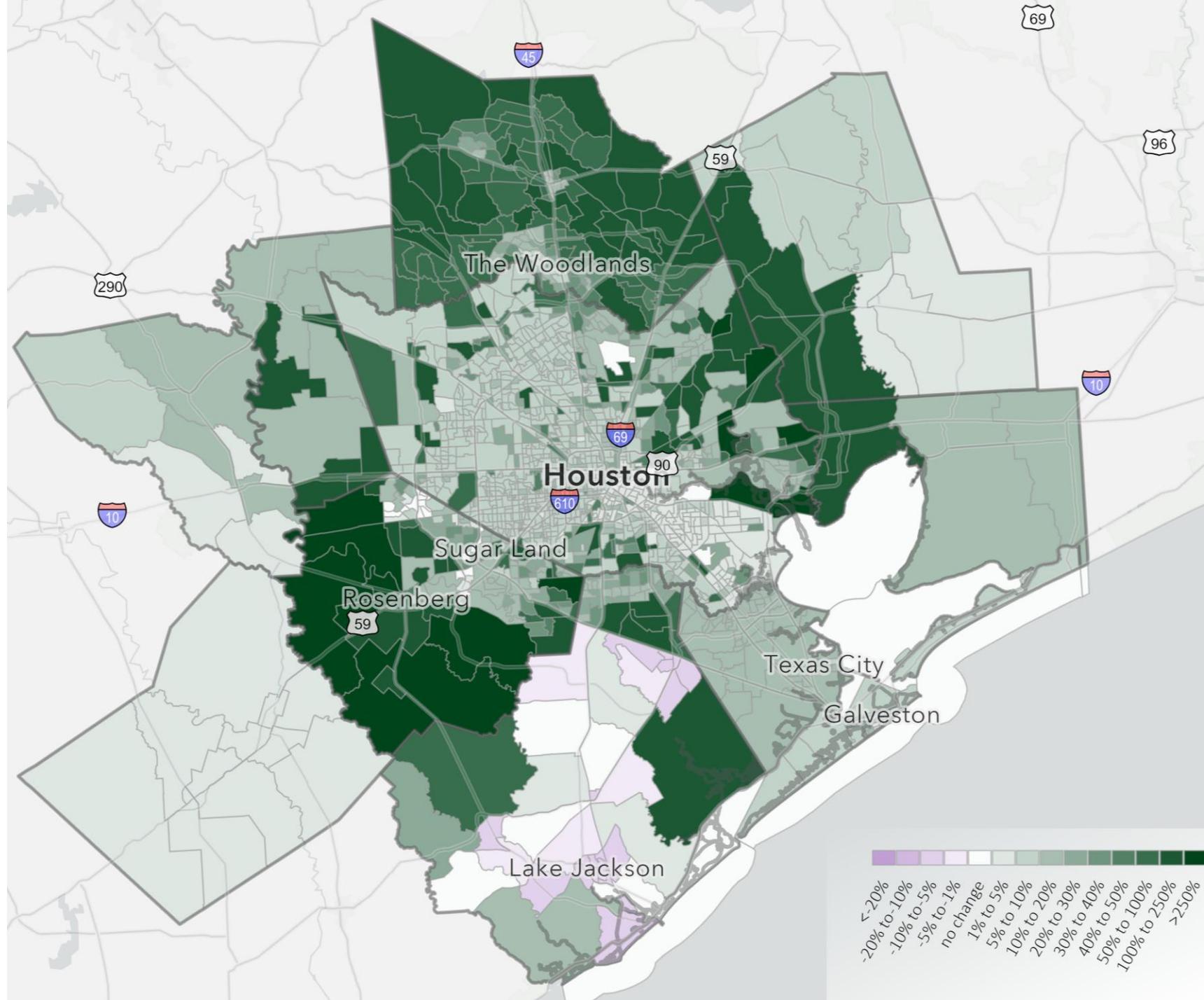
Comparison to Previous Projections



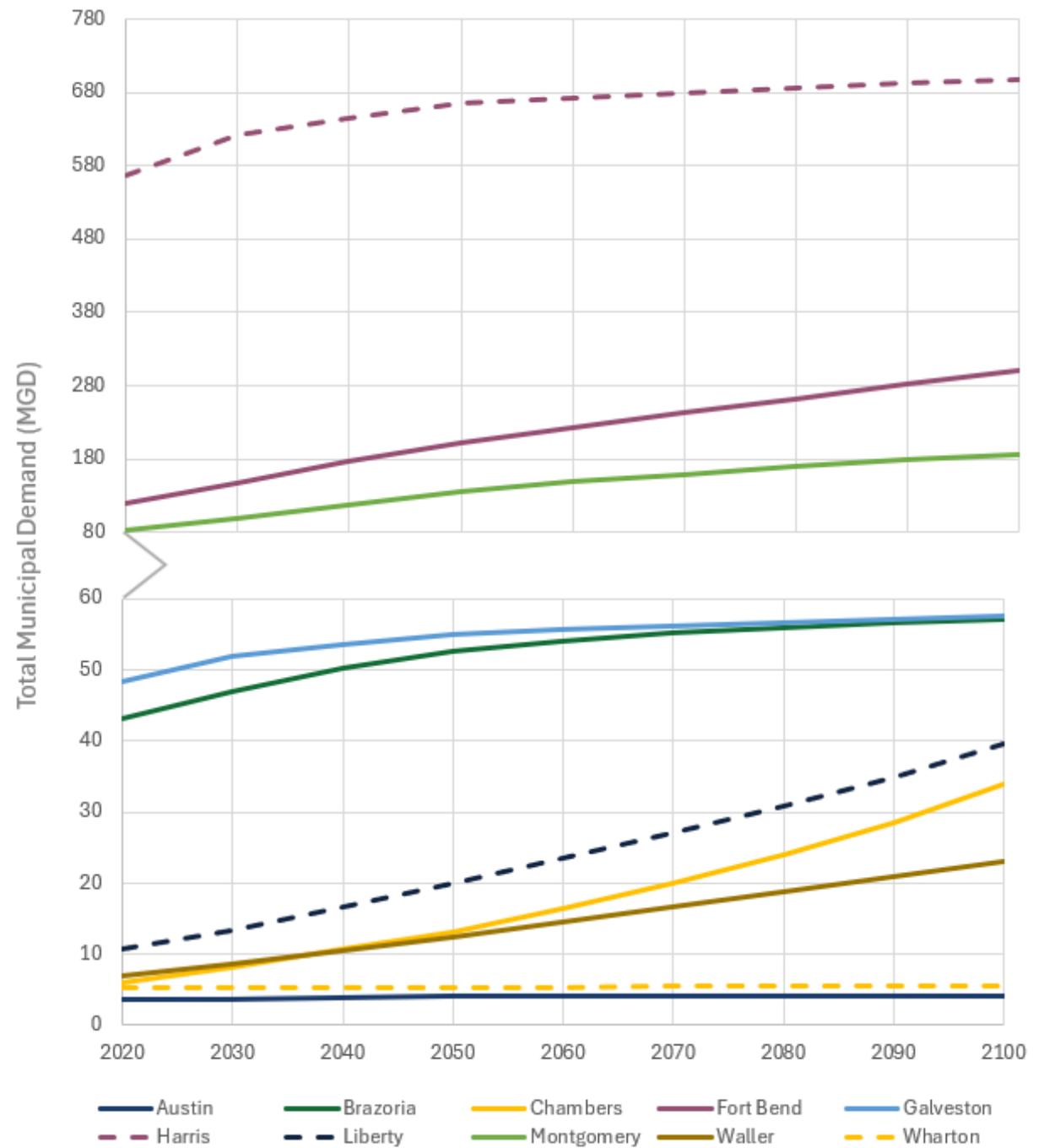
**2021 RWP and 2016 RWP used projections developed in 2013 RGUP for Brazoria, Harris, Galveston, Montgomery, and Fort Bend Counties, with only slight modifications (<0.01%).*

POPULATION GROWTH FORECAST (2020 TO 2050)

percent change
by Census tract



MUNICIPAL DEMAND PROJECTIONS



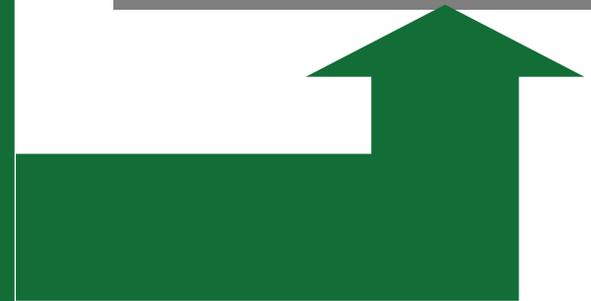
PROJECTIONS
AT VARYING
SPATIAL
SCALES

Census Tracts

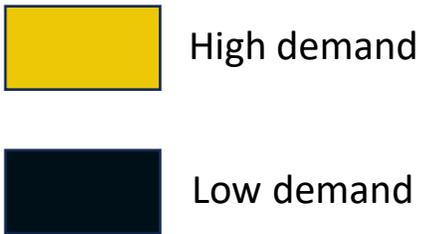
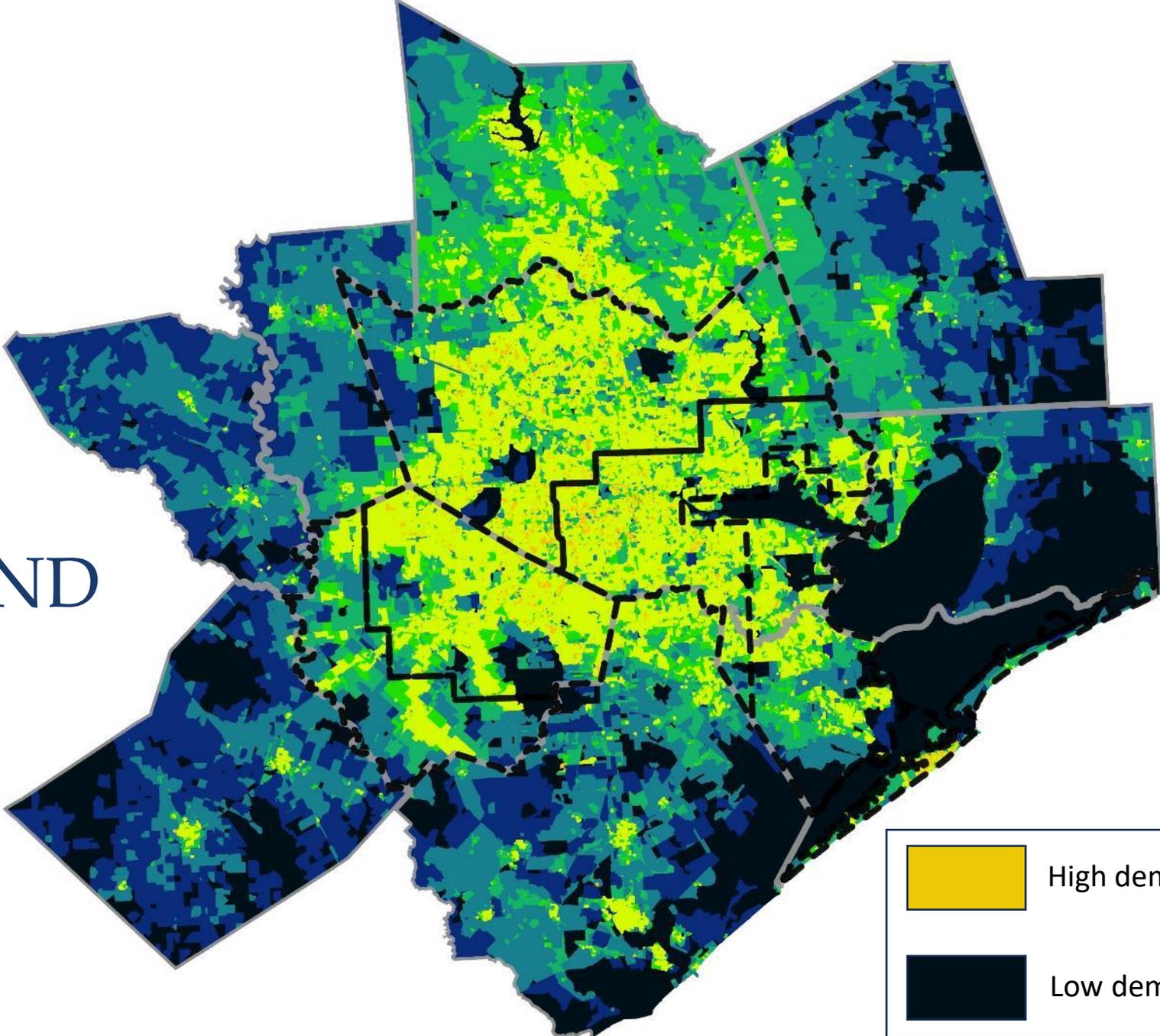


Census Blocks

Utilities



PROJECTED MUNICIPAL WATER DEMAND (2050)



NON-MUNICIPAL DEMANDS

Industrial

- TWDB Projections
- Historical groundwater percentage

Mining

- TWDB Projections
- Historical groundwater percentage

Agricultural

- Irrigation and livestock use
- Historical data
- Continued decline in Fort Bend County



ALTERNATIVE
WATER
SUPPLY
ASSESSMENT

*The availability of alternative
water supplies provides a means
to achieve the adopted
Regulatory Plan*

AWS OPTIONS

Identified 20+ Options

NW - New Water
SS - Storage Solution

RS - Reclaimed Supply
DM - Demand Management

Surface Water Development

SS

NW

New Reservoirs

Off Channel Reservoirs

Inter-Basin Transfers

Appropriated but Undeveloped Water

Reclaimed Water

RS

Purple Pipe Network

Direct Potable Reuse

Indirect Potable Reuse

Satellite Plants / Onsite Reuse

Industrial Process Water

Seawater Desalination

NW

Onshore Facility Desalination

Offshore Facility Desalination

Brackish Groundwater Desalination

NW

Brackish Groundwater Wells and Treatment

Aquifer Storage and Recovery

SS

ASR w/ Surface Water

ASR w/ Stormwater

ASR w/ Reclaimed Water

Stormwater Capture and Reuse

NW

Rainwater Harvesting

Detention Basins

Amenity Lake Filling

Water Demand Management

DM

Baseline Conservation

Basic Conservation

Advanced Conservation

Water Loss Control / Advanced Metering Infrastructure

SHORTLISTED OPTIONS

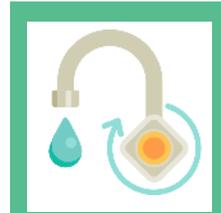


CHARACTERIZATION OF SHORTLISTED OPTIONS

*Develop
Narrative
Descriptions*



*Estimate
Magnitude of
Supplies*



*Prepare Planning
Level Cost
Estimates*



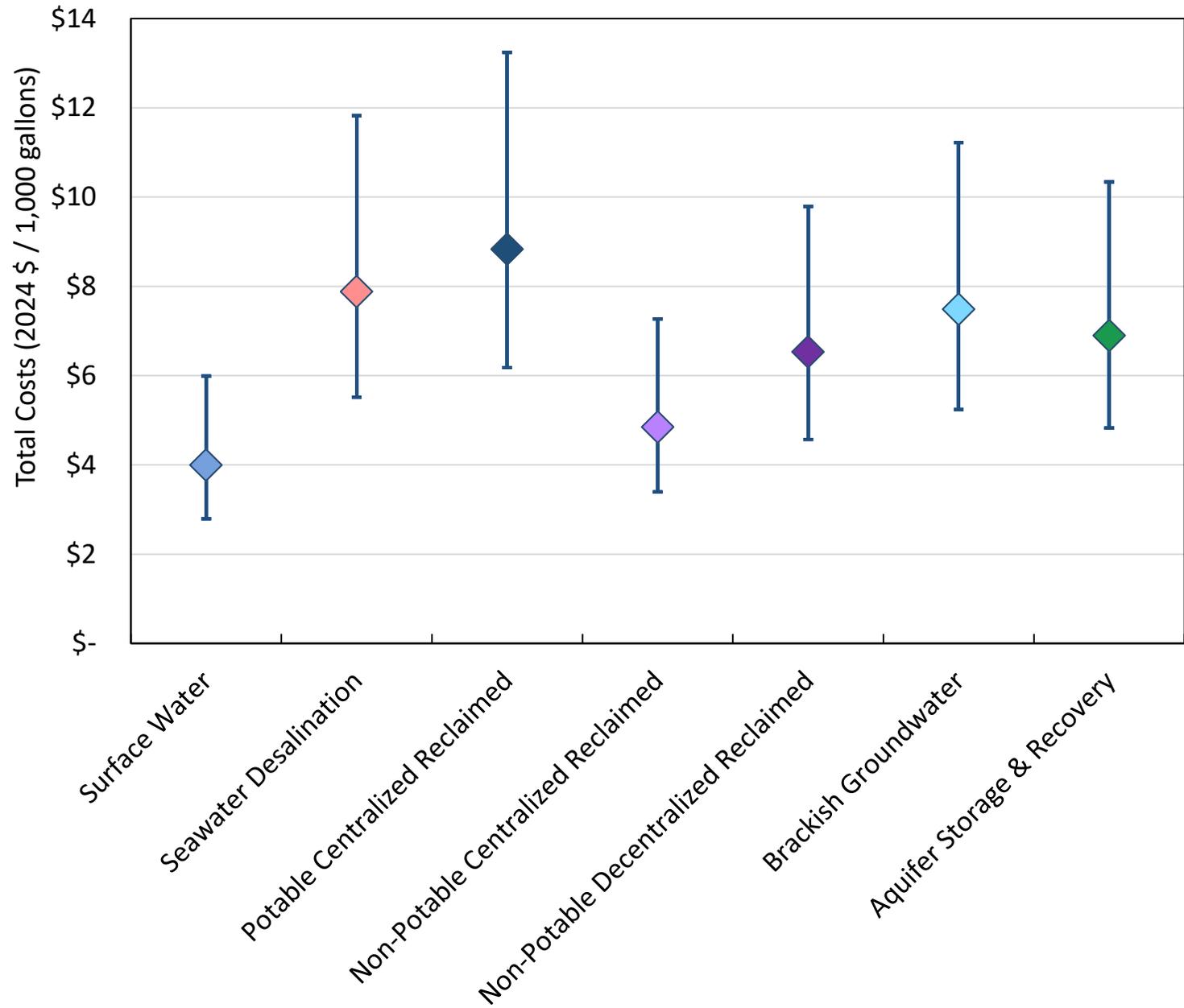
*Identify
Implementation
Timelines*



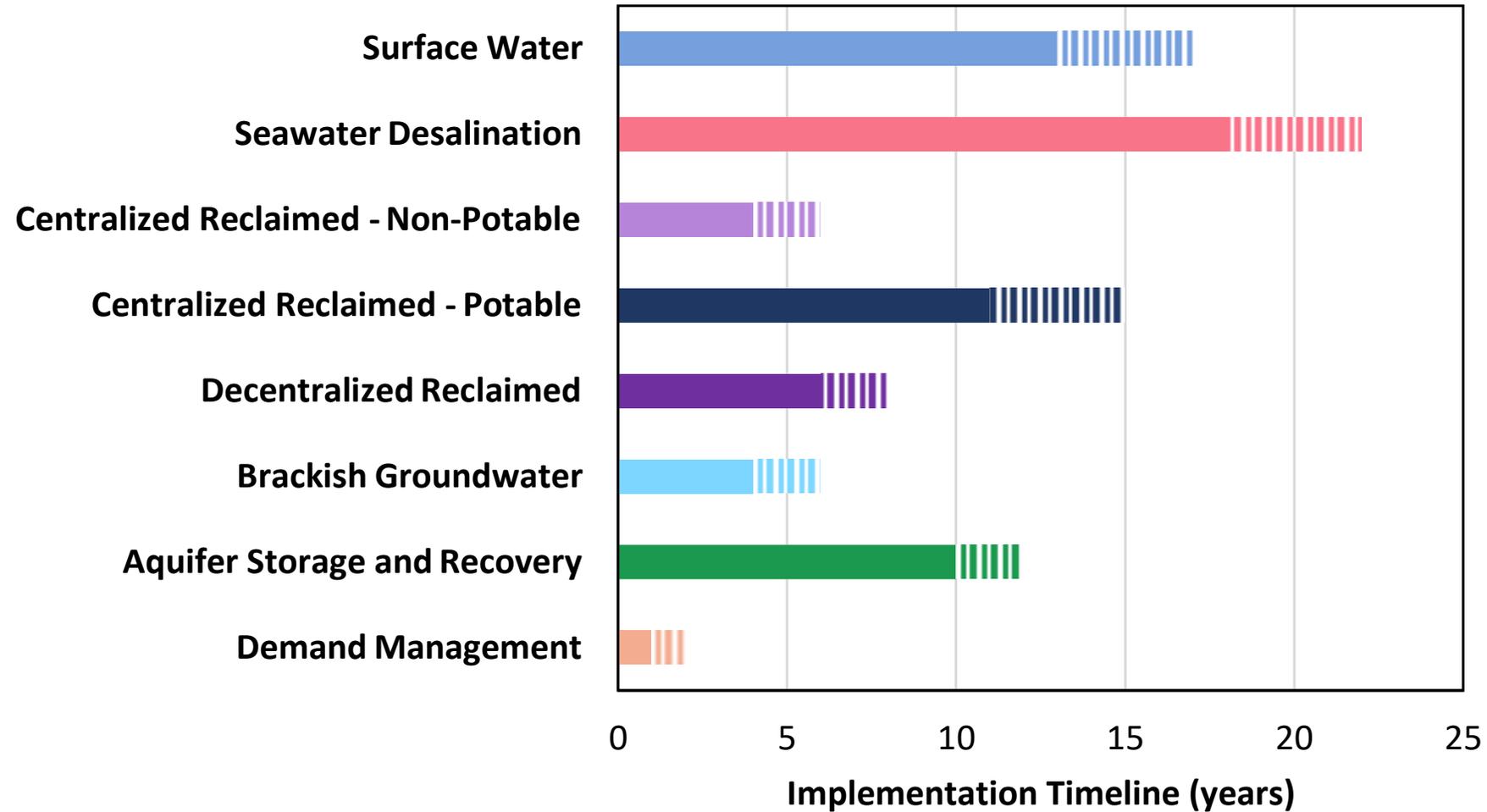
*Assess
Vulnerability to
Climate Change*



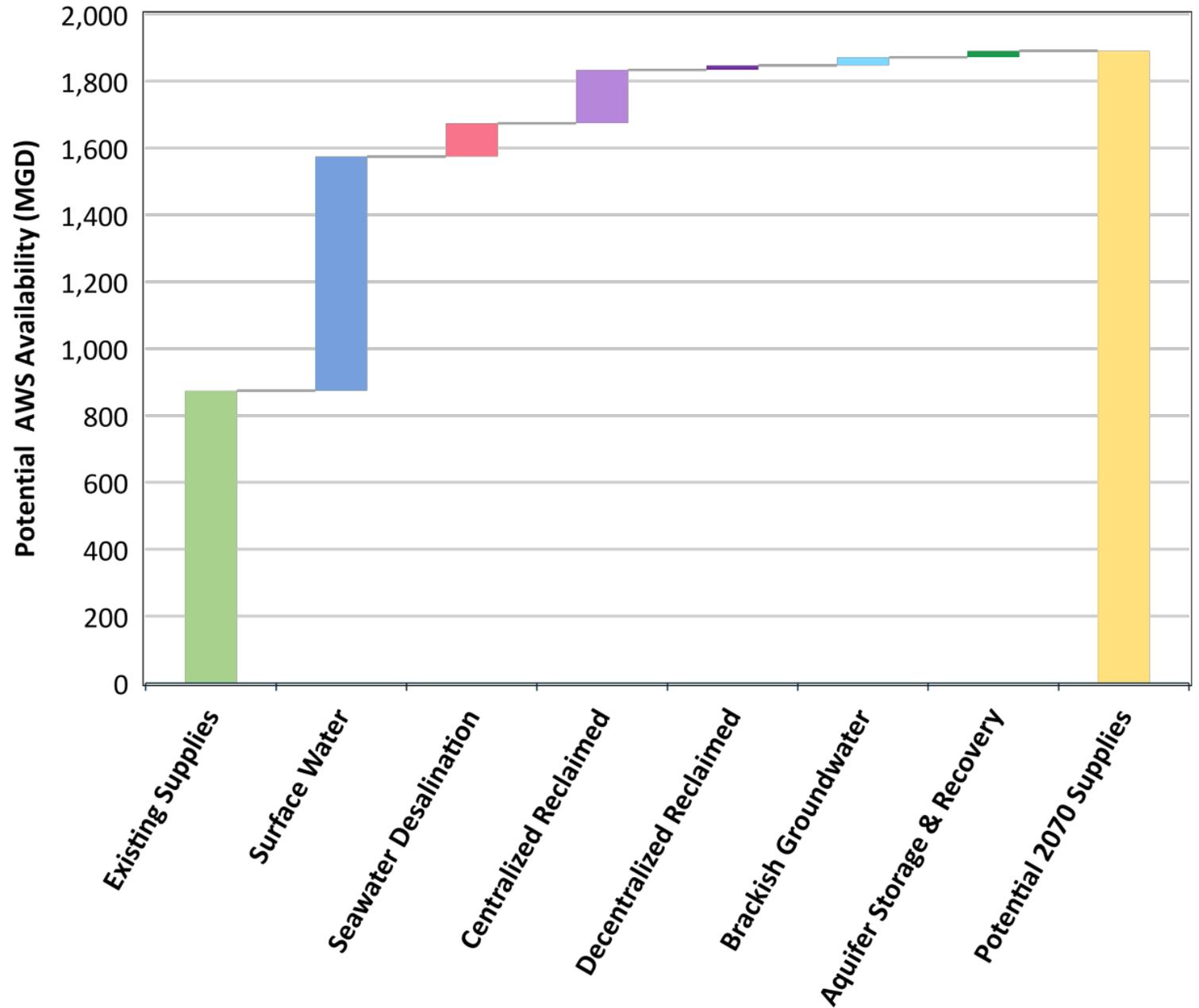
ESTIMATED COSTS



IMPLEMENTATION TIMELINES



BALANCE OF AVAILABLE ALTERNATIVE SUPPLIES



STUDY CONCLUSIONS

Adequate alternative water supplies are available to meet future demands in the regulatory areas

Surface water will continue to be the predominant alternative water supply

Reclaimed water will become a prominent supply for non-potable use and diversification of supplies

Regional coordination is needed to develop sea water supply and inter-basin transfer of surface water





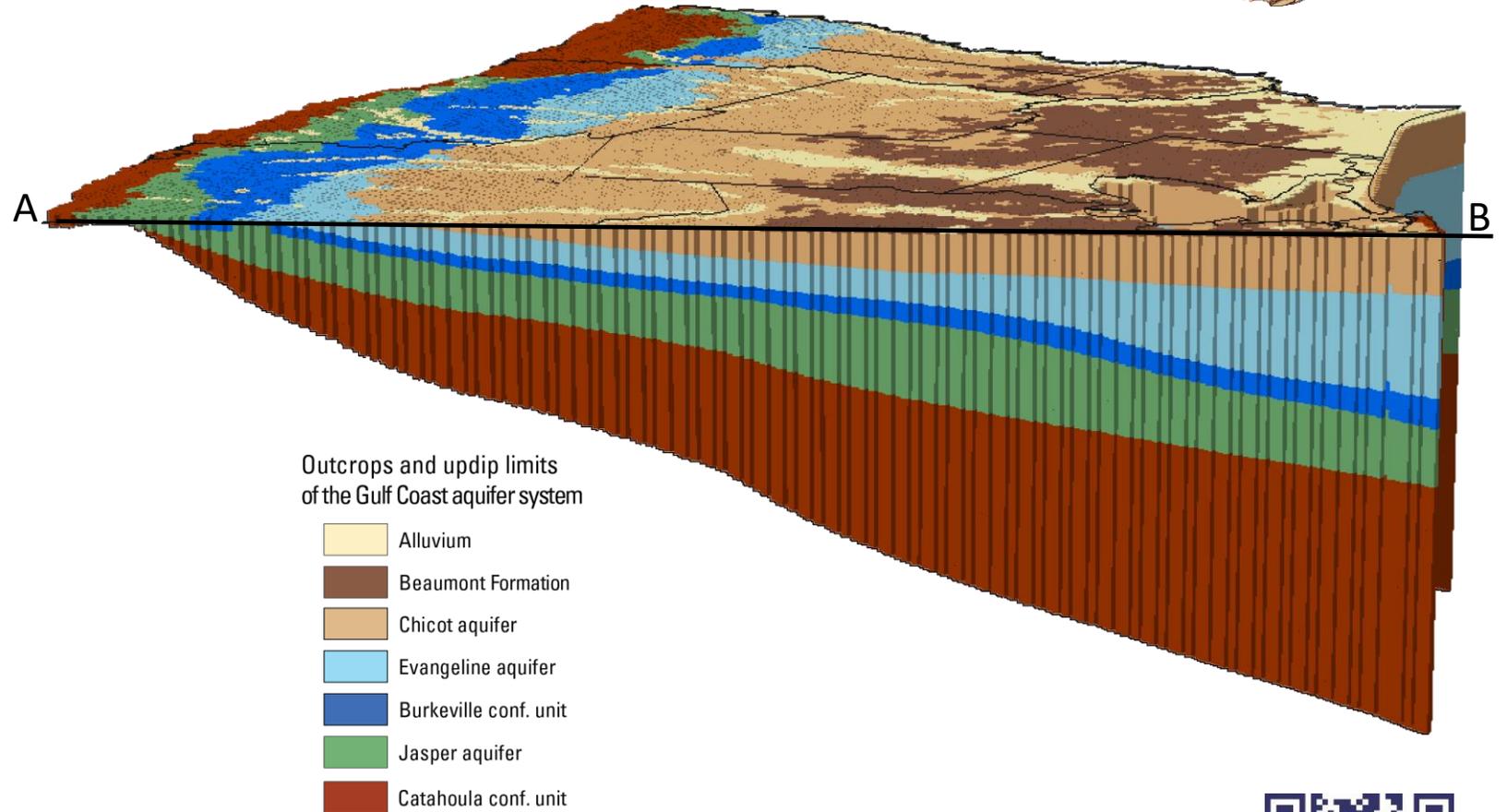
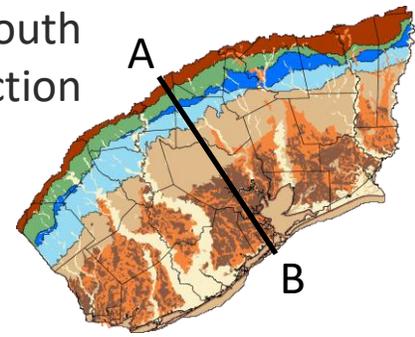
GULF COAST
LAND
SUBSIDENCE
AND
GROUNDWATER
FLOW MODEL

An updated model provides a more robust tool for evaluating future subsidence based on projected groundwater demands

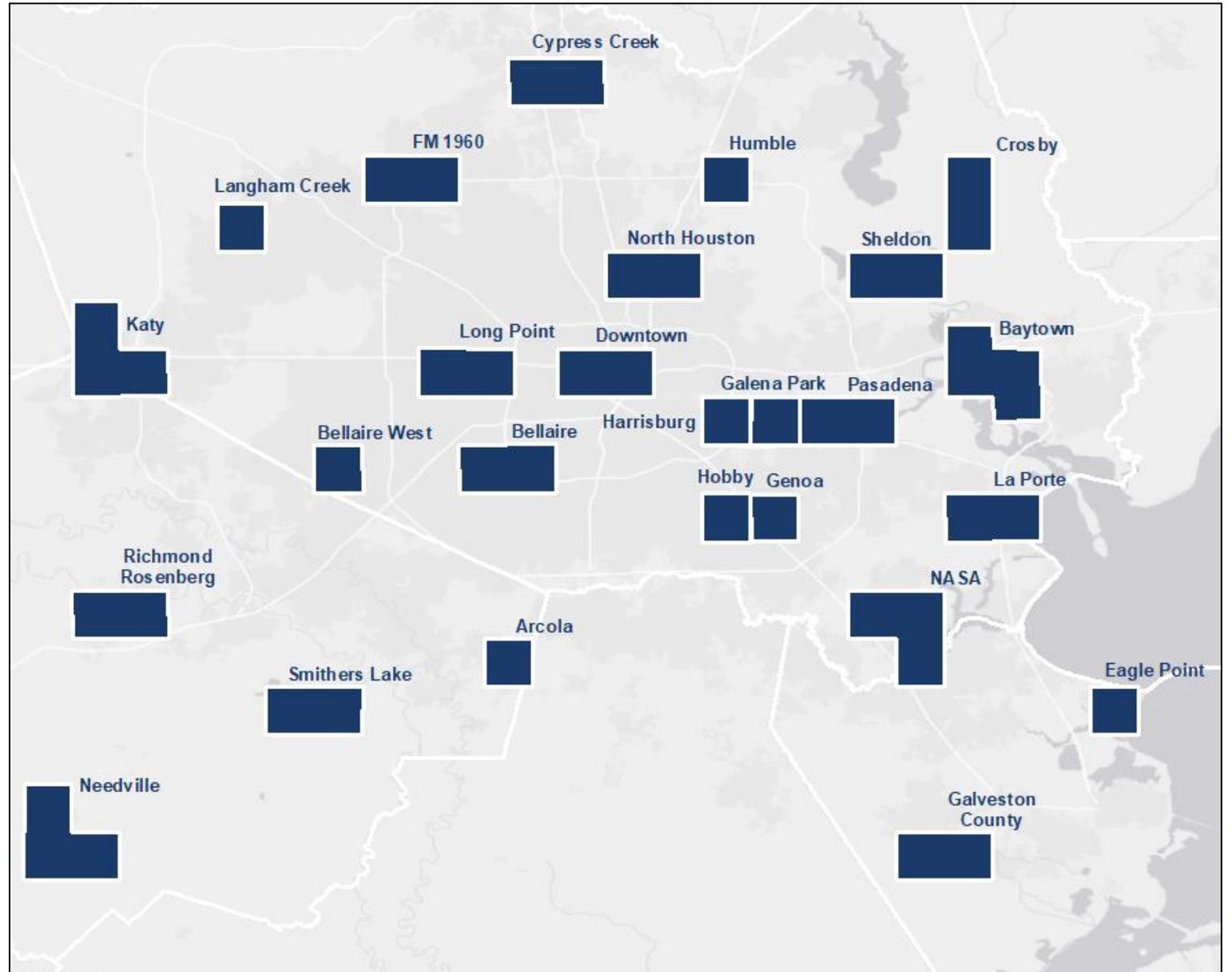
GULF 2023

- Included 115 years of water level and subsidence data.
- Updated model packages and parameters.
- Incorporated full Gulf Coast Aquifer System.
- Enhanced calibration and uncertainty ensembles.
- Adopted as the model of record and groundwater availability model (GAM) for GMA-14 on February 23, 2024.
- Presented to HGSD Board of Directors on March 13, 2024.

North-South
cross section



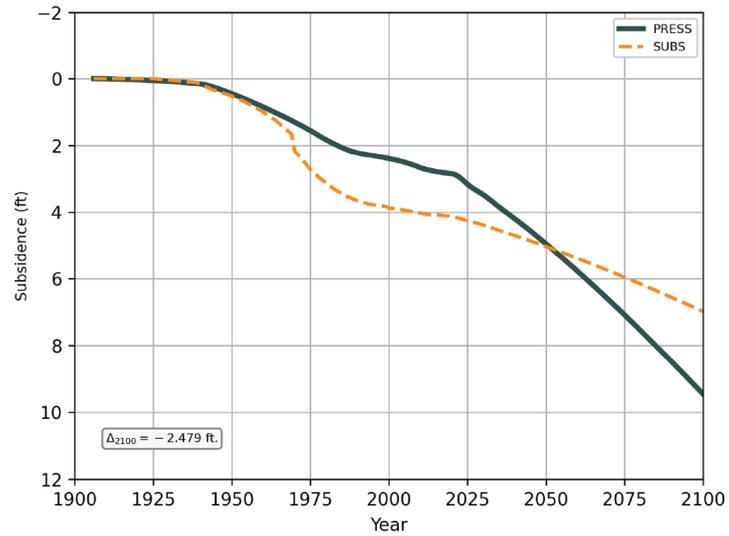
PRESS MODEL CALIBRATION VERIFICATION



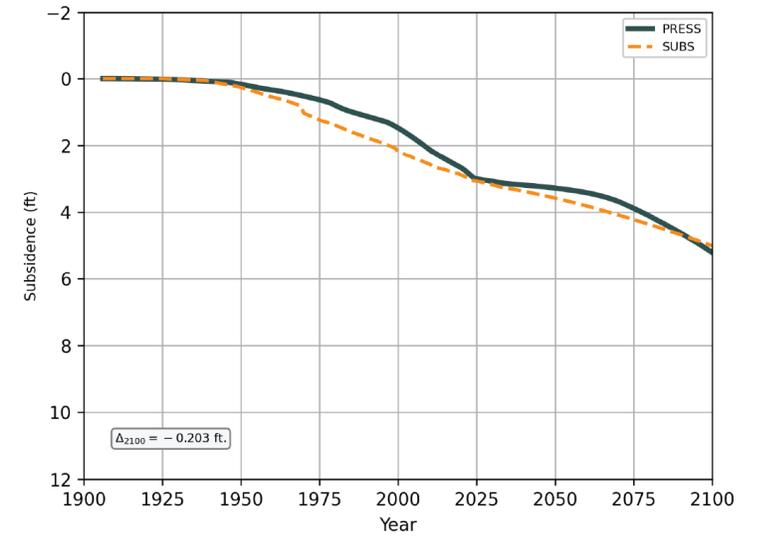
PRESS MODEL CALIBRATION VERIFICATION



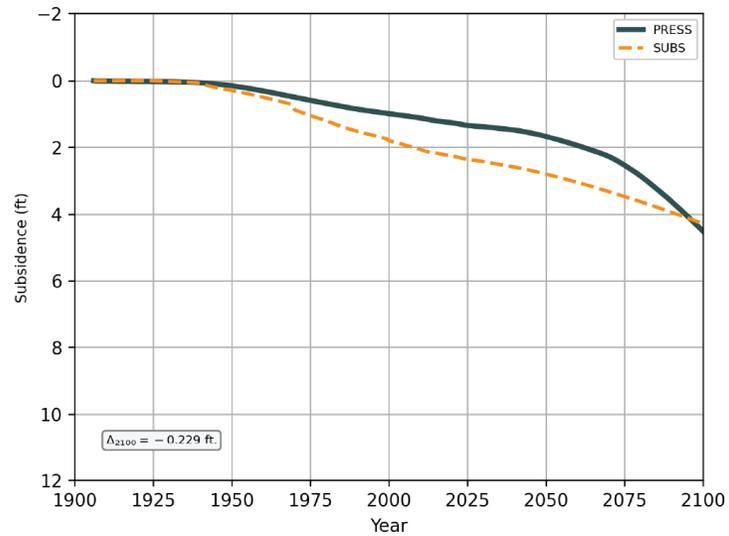
ARCOLA SITE December 2023



KATY SITE December 2023



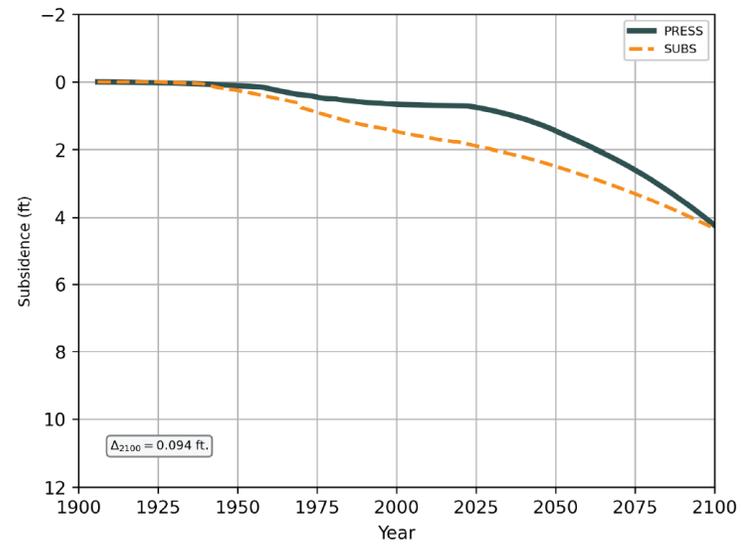
RICHMOND-ROSENBERG SITE December 2023



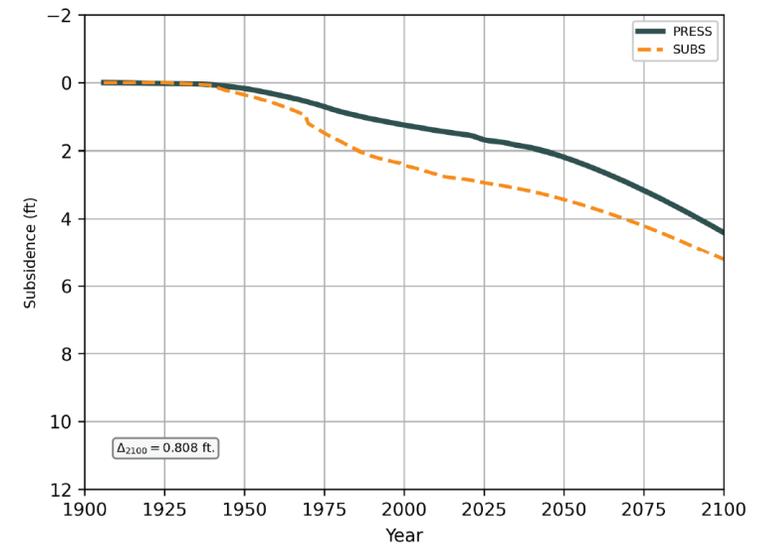
PRESS MODEL CALIBRATION VERIFICATION



NEEDVILLE SITE December 2023



SMITHERS LAKE SITE December 2023





EVALUATE
GROUNDWATER
SCENARIOS

*Groundwater demand
projections, alternative supply
availability, and an updated
model allow for the evaluation of
the current Regulatory Plan and
future scenarios*

GROUNDWATER SCENARIO DEVELOPMENT

Baseline

- Current regulatory plans
- Current usage patterns

FBSD Area B Conversion in 2050

- Limit groundwater use in Area B to no more than 60%

No New Conversions

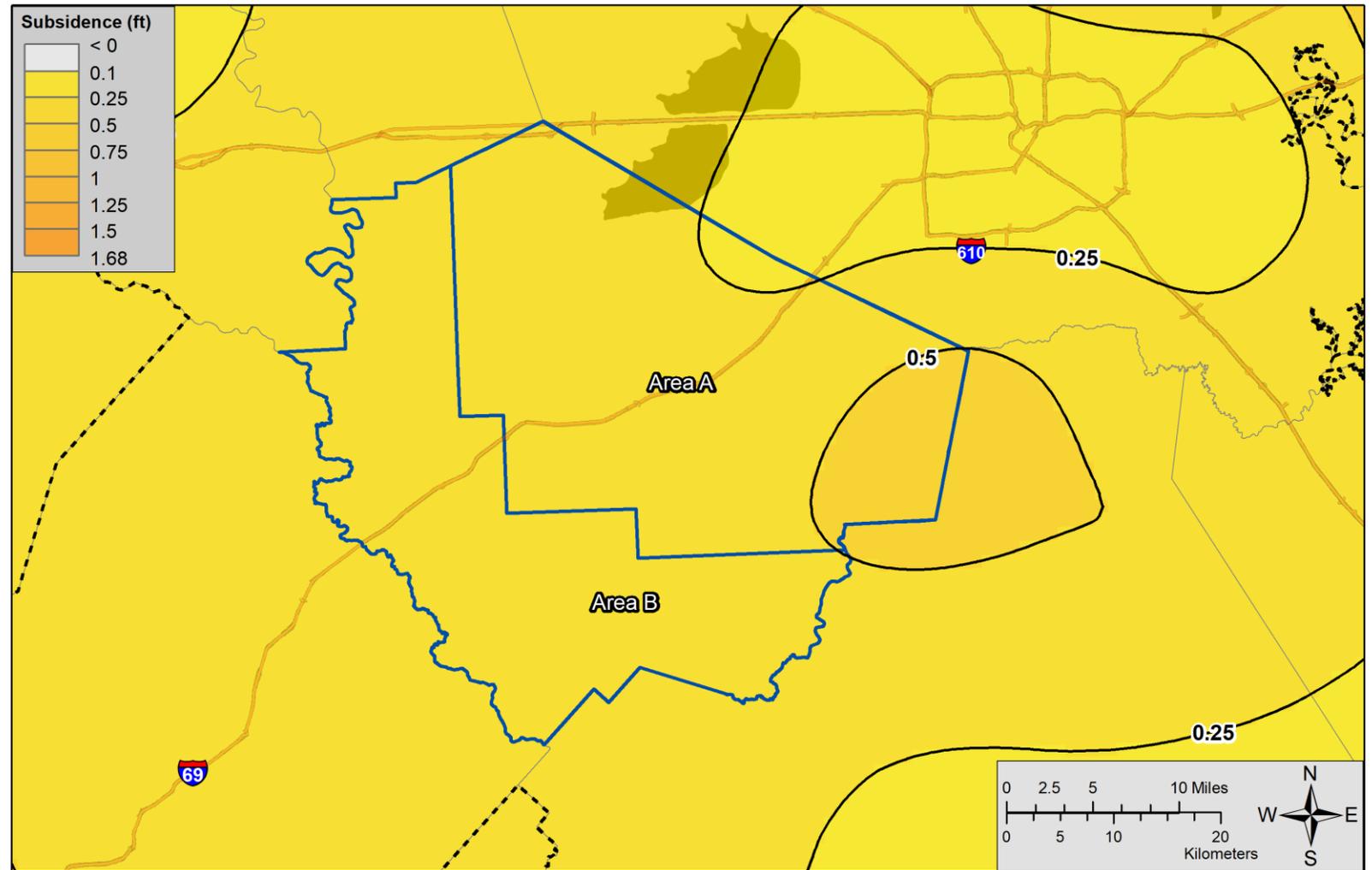
- No additional conversions in Fort Bend County

FBSD Delay to 2030

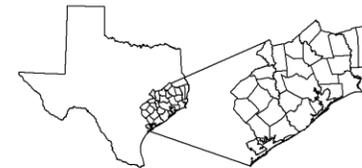
- Delay 2027 conversion to 2030



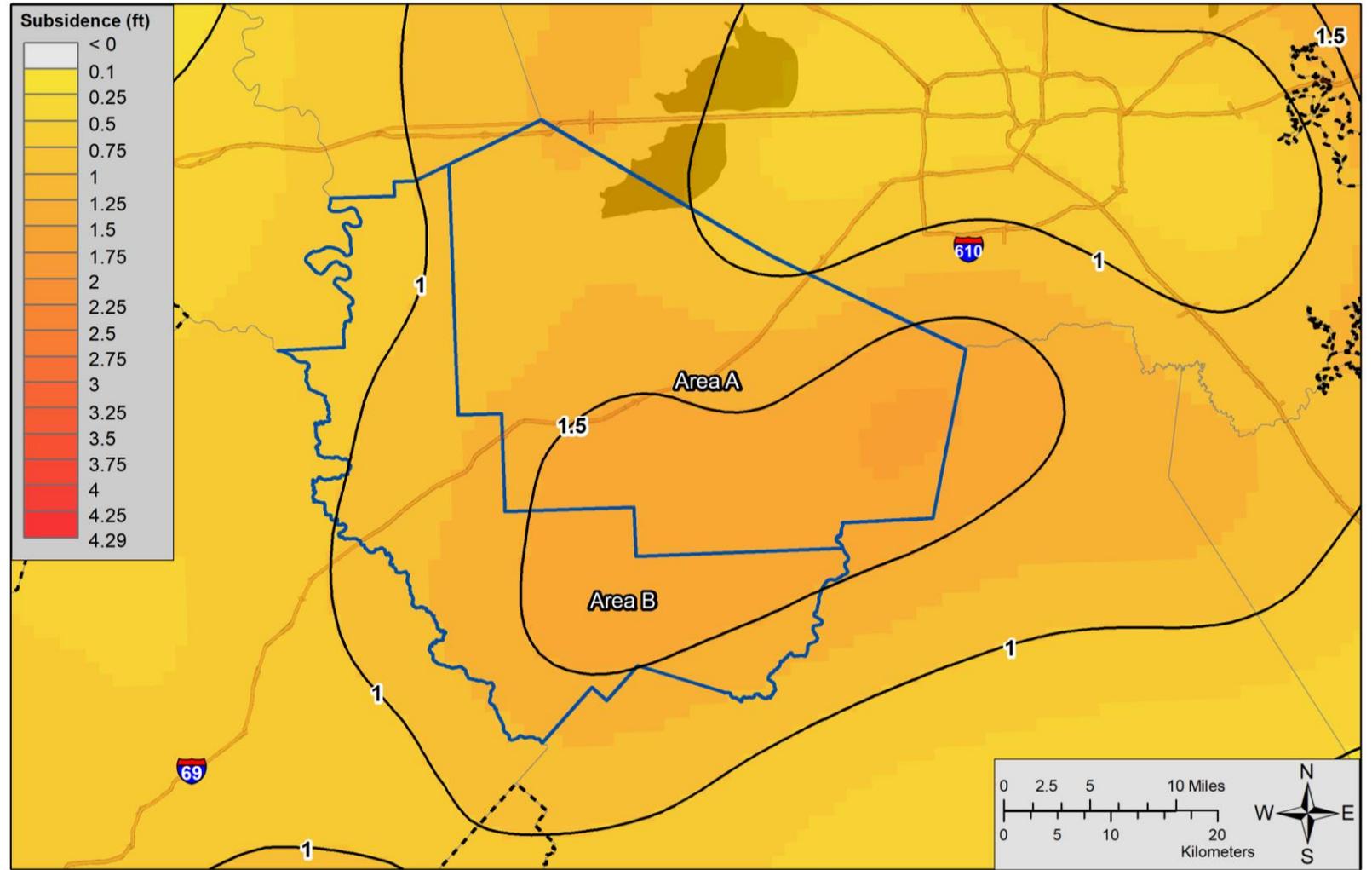
BASELINE 2025-2050



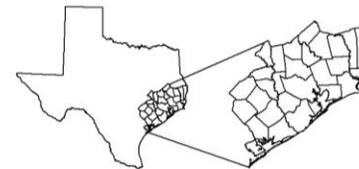
- Major Roads
- Counties
- Demand Dataset Boundary
- Regulatory Areas



BASELINE 2050-2100

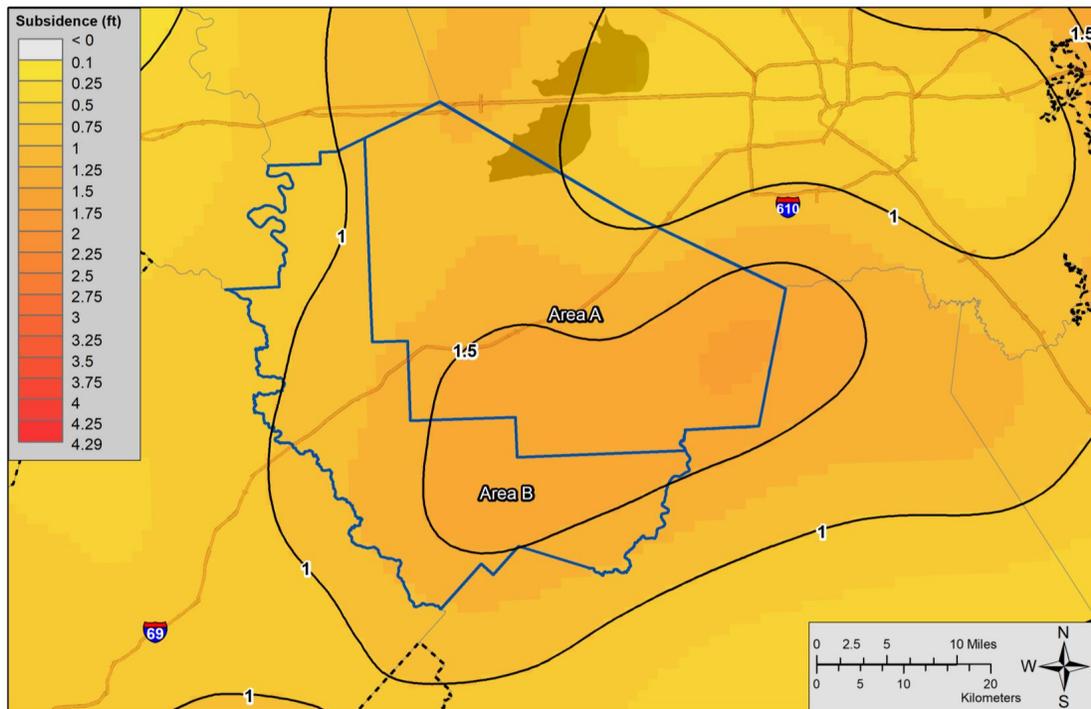


- Major Roads
- Counties
- Demand Dataset Boundary
- Regulatory Areas

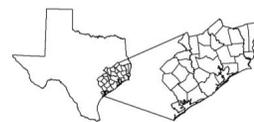


What if conversion requirements were enacted in Area B beginning in 2050?

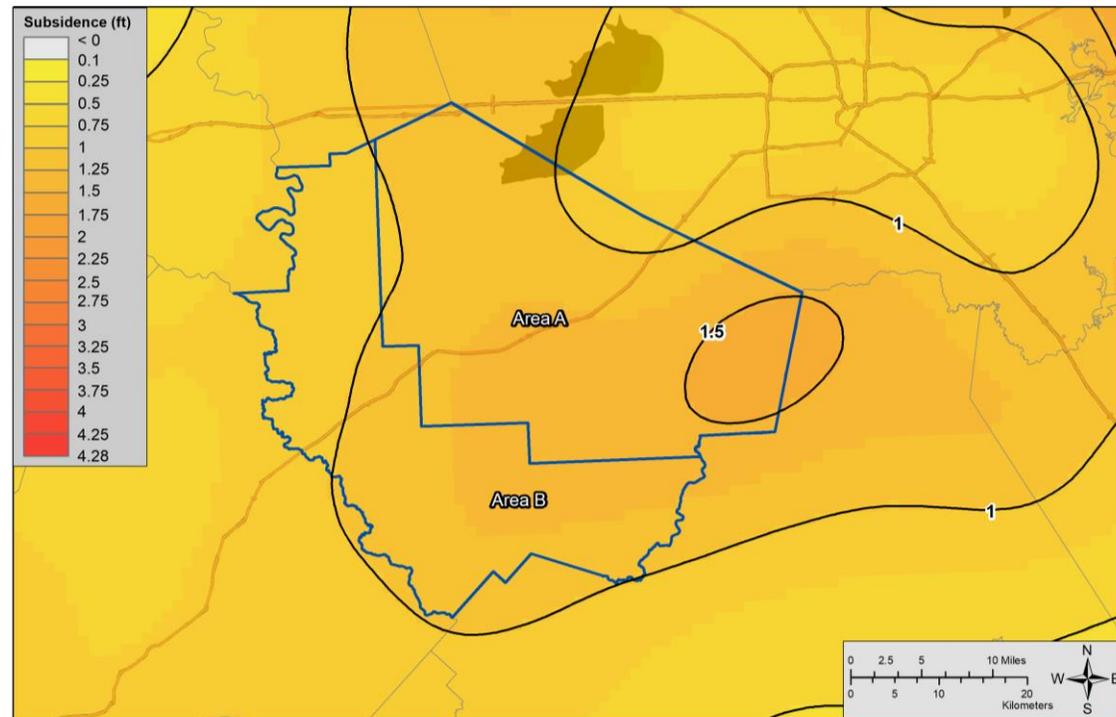
Baseline 2050-2100



- Major Roads
- Counties
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- Regulatory Areas



Area B Regulation 2050-2100

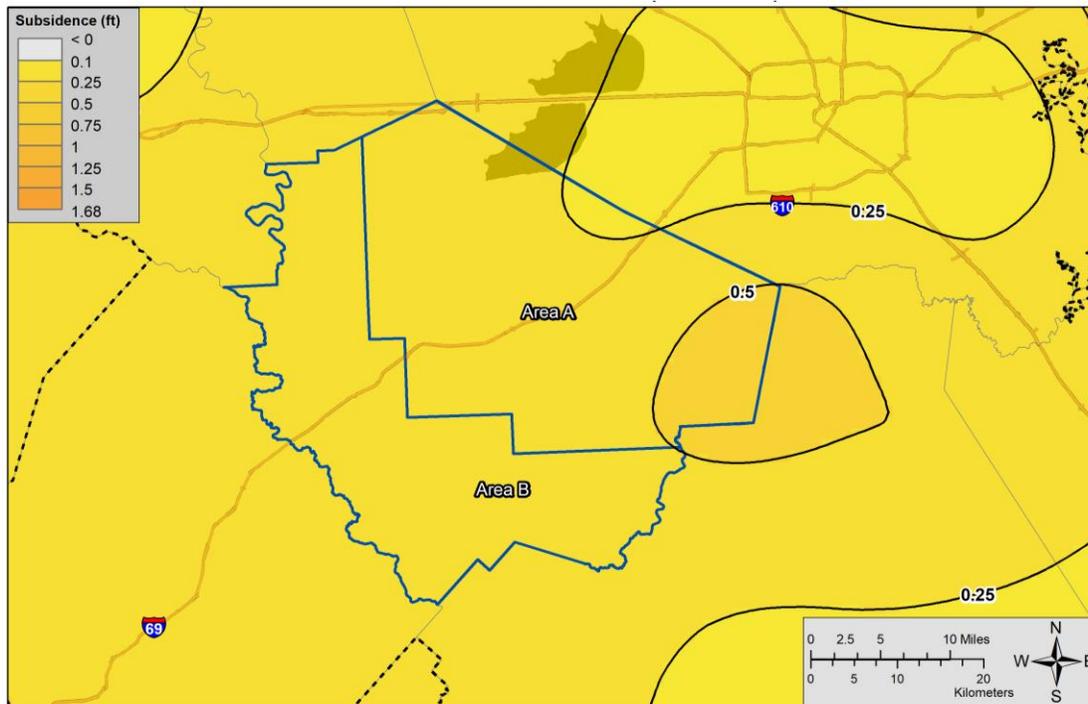


- Major Roads
- Counties
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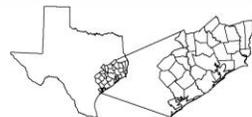


What if there were no new conversions in Fort Bend County?

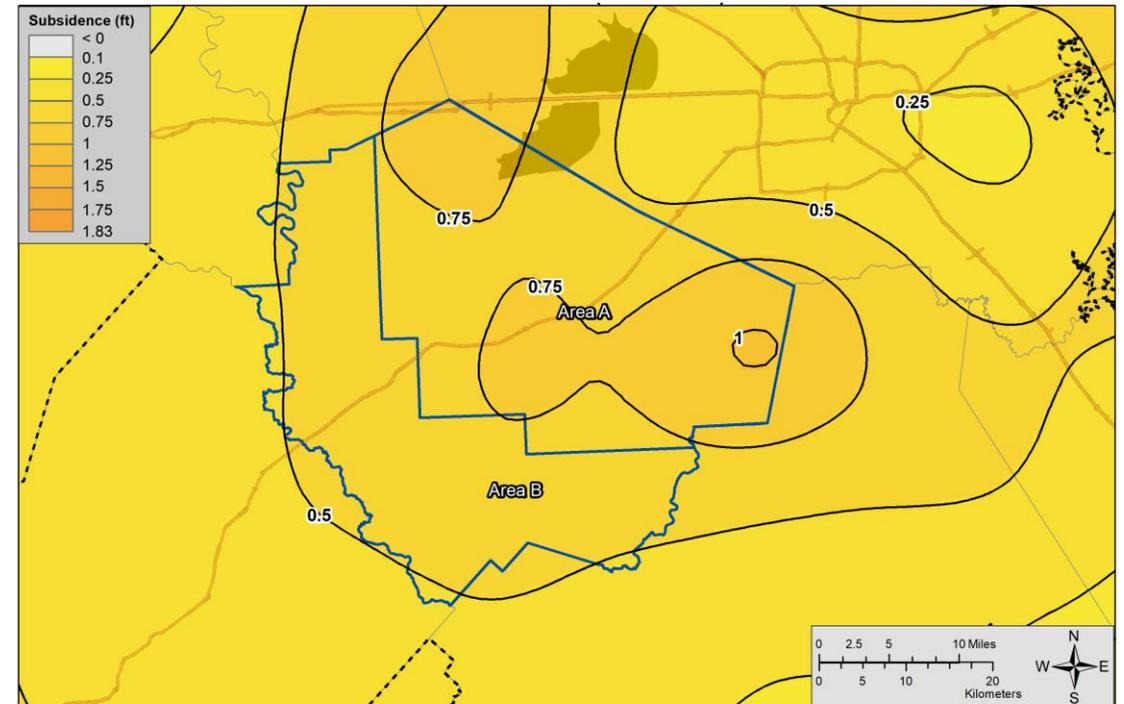
Baseline 2025-2050



- Major Roads
- Counties
- Demand Dataset Boundary
- Regulatory Areas



No New Conversions 2025-2050

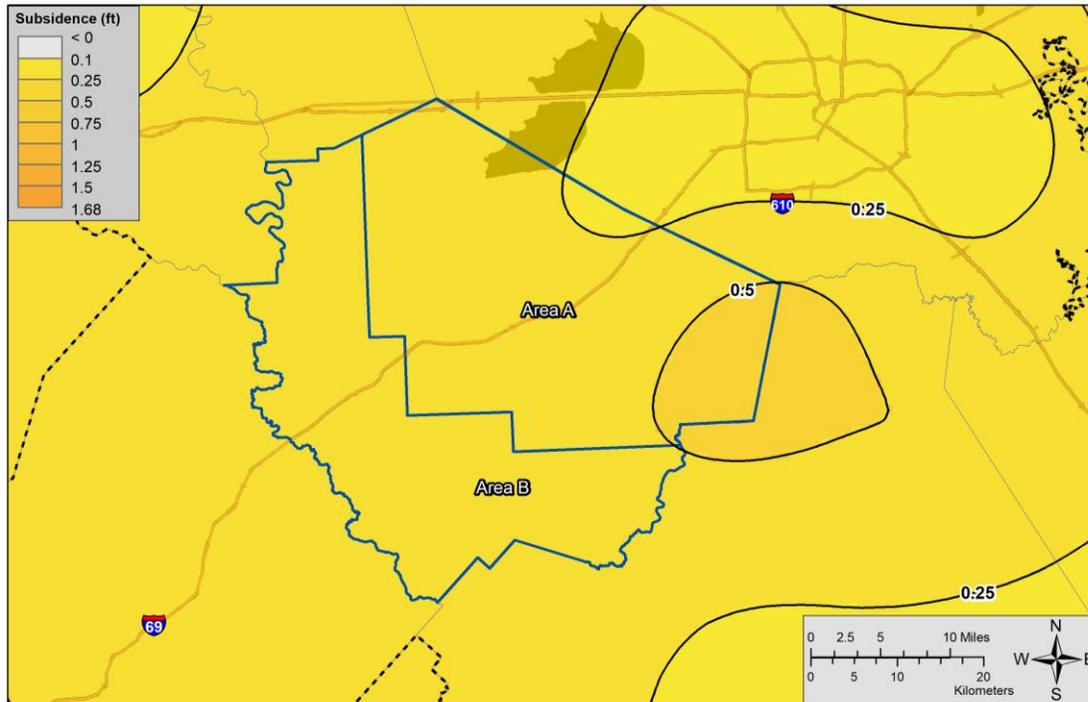


- Major Roads
- Counties
- Demand Dataset Boundary
- Regulatory Areas

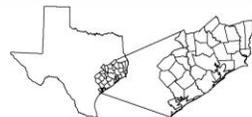


What if FBSD delayed conversion from 2027 to 2030?

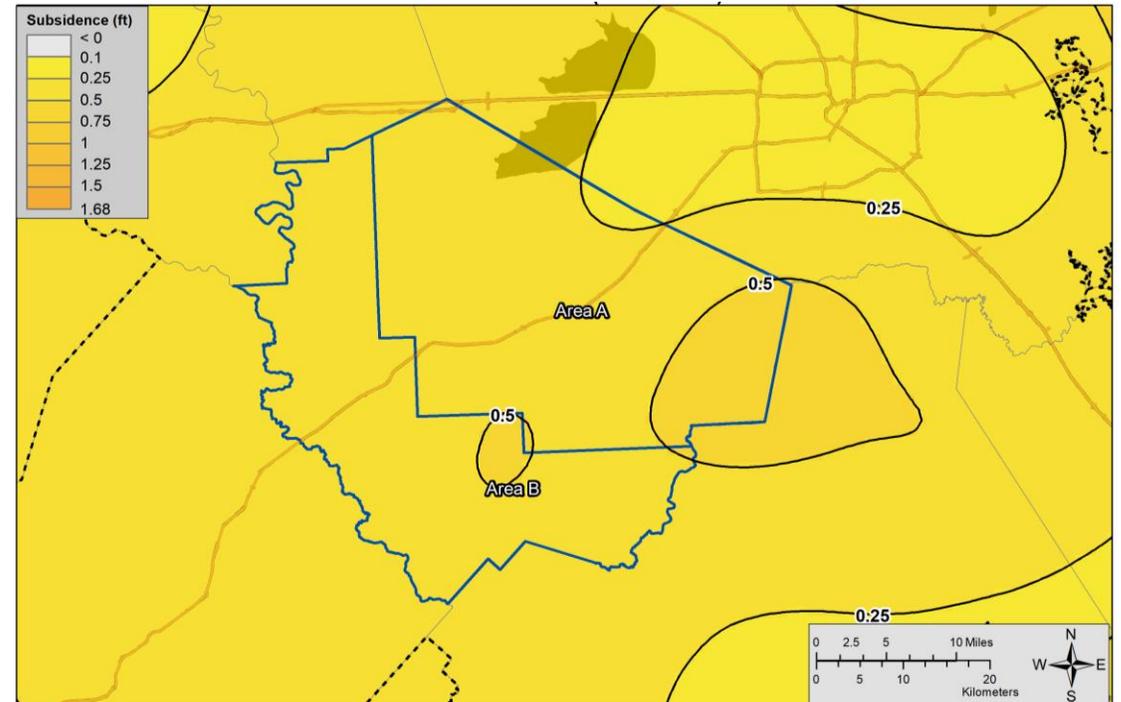
Baseline 2025-2050



- Major Roads
- Counties
- Demand Dataset Boundary
- Regulatory Areas



FBSD Delay 2025-2050



- Major Roads
- Counties
- Demand Dataset Boundary
- Regulatory Areas





RECOMMENDED
FUTURE
STUDIES

Investigate occurrence of subsidence in central Fort Bend County

Evaluate the availability and timing of alternative water supplies to prevent subsidence in Area B

Expand subsidence monitoring program to evaluate future regulations and regional models

