2023 JOINT REGULATORY PLAN REVIEW

STAKEHOLDER MEETING EXECUTIVE SUMMARY

NAME OF MEETING:	Stakeholder Meeting 6
DATE:	September 8, 2022
LOCATION:	Virtual and HGSD Office

On Thursday, September 8, 2022 at 10:00 am, the Harris-Galveston and Fort Bend Subsidence Districts (the Districts) held their sixth Joint Regulatory Plan Review Stakeholder Meeting. This meeting was held as a virtual meeting and also offered in person at the Harris-Galveston Subsidence District office. Numerous board members, elected officials, regional water authorities, and representatives from local, State and Federal agencies joined the meeting, with more than 60 panelists and attendees participating. A full list of meeting participants is included in **Attachment A**.

The purpose of this meeting was to provide project element updates from the Joint Regulatory Plan Review. Ms. Ashley Greuter, Director of Research and Water Conservation for the Districts, welcomed the stakeholders to the Districts' sixth stakeholder meeting and introduced the Joint Regulatory Plan Review project team and collaborators, including Mr. Jason Afinowicz of Freese and Nichols and Dr. Steven Craig, Professor of Economics at the University of Houston, who attended as panelists.

They provided a presentation of the following topics:

- Population Projections Methodology and Distribution
- Project Status Update

The formal presentation concluded with a review of the overall project schedule and upcoming milestones. A copy of the meeting presentation is provided in **Attachment B.**

A question and answer session was held after the presentation. A summary of the questions and responses is provided in **Attachment C.**

ATTACHMENT A – MEETING ATTENDANCE

FIRST	LAST	AFFILIATION
Jason	Afinowicz	Freese and Nichols
Wayne	Ahrens	DE Corporation
Rosa	Alvarez	HGSD Board Member
Natalie	Ballew	Texas Water Development Board
Amber	Batson	Carollo Engineers
James	Beach	Advanced Groundwater Solutions, LLC
Krystal	Boggs	North Harris County Regional Water Authority
Rick	Brezik	City of League City
Brian	Butscher	City of Sugar Land
Jun	Chang	North Harris County Regional Water Authority
Jack	Christiansen	University of Houston
Katie	Clayton	City of Sugar Land
Courtney	Corso	Freese and Nichols
Janet	Corte	
Steven	Craig	University of Houston
Katie	Dahlberg	Texas Water Development Board
Chris	Drabek	Advanced Groundwater Solutions, LLC
John	Ellis	United States Geological Survey
Mark	Evans	North Harris County Regional Water Authority
Julia	Frankovich	BGE, Inc.
Matthew	Froehlich	BGE, Inc.
Mark	Gehringer	FBSD Board Member
Ashley	Greuter	Harris-Galveston Subsidence District
Linda	Harnist	FBSD Board Member
Kirstin	Hein	
Zach	Holland	Bluebonnet Groundwater Conservation District
Casey	Hughes	Harris-Galveston Subsidence District
Charles	Jessup	City of Meadows Place
Don	Johnson	HGSD Board Member
Charles	Kalkomey	City of Rosenberg
Manoj	KC	Michael Baker International
Mike	Keester	R.W. Harden and Associates, Inc.
Wendi	Lacki	
Christa	Lopez	Trinity River Authority
John	Lynk	
John	Martin	Southeast Texas Groundwater Conservation District

FIRST	LAST	AFFILIATION
Michael	Martorell	City of League City
Carol	McCutcheon	City of Sugar Land
Temple	McKinnon	Texas Water Development Board
Tom	Michel	San Jacinto River Authority
Christina	Miller	ABHR, LLP
Douglas	Miller	HMW SUD
Paul	Morgan	
Keir	Murray	KLM
Paul	Nelson	
Merritt	Nolte-Roth	City of Sugar Land
Laura	Norton	Montgomery County MUD Director
Veronica	Osegueda	Harris-Galveston Subsidence District
Thomas	Poulose	Michael Baker International
Mark	Ramsey	
Michael	Reedy	Freese and Nichols
Stacey	Reese	Stacey Reese Law, PLLC
Samantha	Reiter	Lone Star Groundwater Conservation District
Melissa	Rowell	
C. Michael	Scherer	FBSD Board Member
Shelley	Sekula-Gibbs	
MA	Shepherd	
Allison	Swann-Davis	Harris-Galveston Subsidence District
Philip	Taucer	Freese and Nichols
Janice	Thigpen	Lone Star Groundwater Conservation District
Robert	Thompson	Fort Bend Subsidence District
Satish	Tripathi	City of Houston
Mike	Turco	Harris-Galveston Subsidence District
Robert	Valenzuela	City of Sugar Land
Gene	Walton	FBSD Board Member
BT	Williams	FBSD Board Member
Gregory	Wine	FBSD Board Member
Joe	Zimmerman	City of Sugar Land

ATTACHMENT B – MEETING PRESENTATION

Thank you for joining us today for the **Joint Regulatory Plan Review Stakeholder Meeting**

All participants have been joined in “listen only” mode.

For meeting audio, you can use your microphone and speakers (VoIP) or call in using your telephone at **877-309-2074.**
Access code: **808-265-564**

If you are having technical difficulty, please send a message to staff in the chat or email *HgGoToMeetings@subsidence.org*

Before we Begin

This webinar is scheduled for two hours. We have left time for questions.

All participants will be muted during the presentation.

Questions can be submitted via the Go To Webinar "Questions" screen at any time.

This webinar is being recorded.

We will post slides on our website after the meeting today.

HARRIS-GALVESTON SUBSIDENCE DISTRICT

FORT BEND SUBSIDENCE DISTRICT

2023 Joint Regulatory Plan Review

Stakeholder Meeting 6

September 8, 2022

KEYS STAKEHOLDER ENGAGEMENT OPPORTUNITIES

Meeting attendance and project awareness

Providing data for technical analyses

Providing feedback on draft material

Participating in targeted outreach efforts

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.

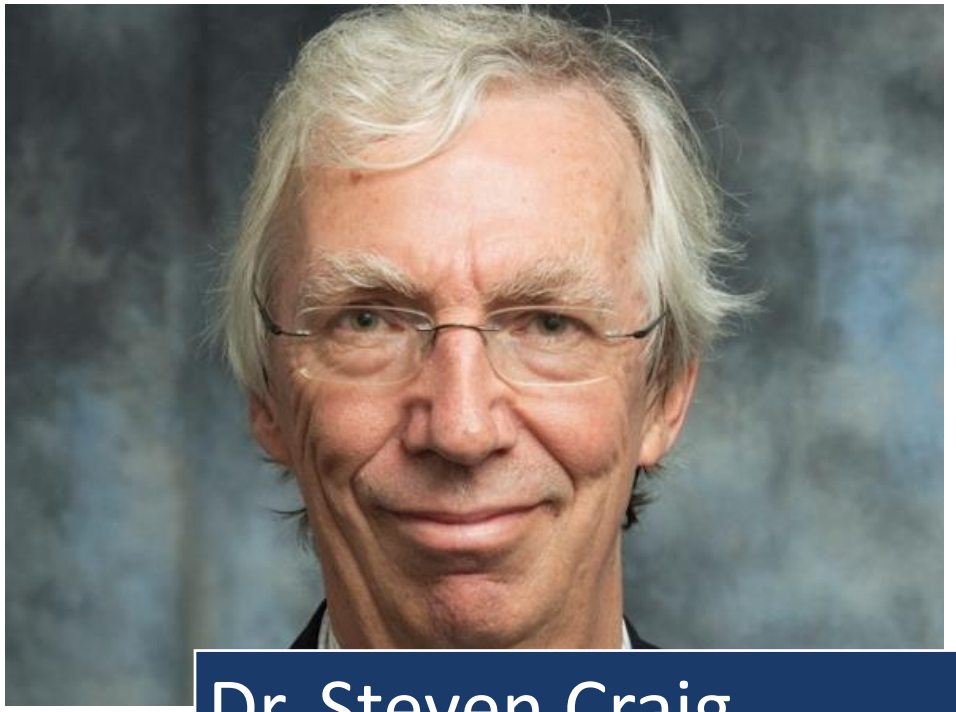
4

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.

Today's Speakers

Jason Afinowicz
- Freese and Nichols



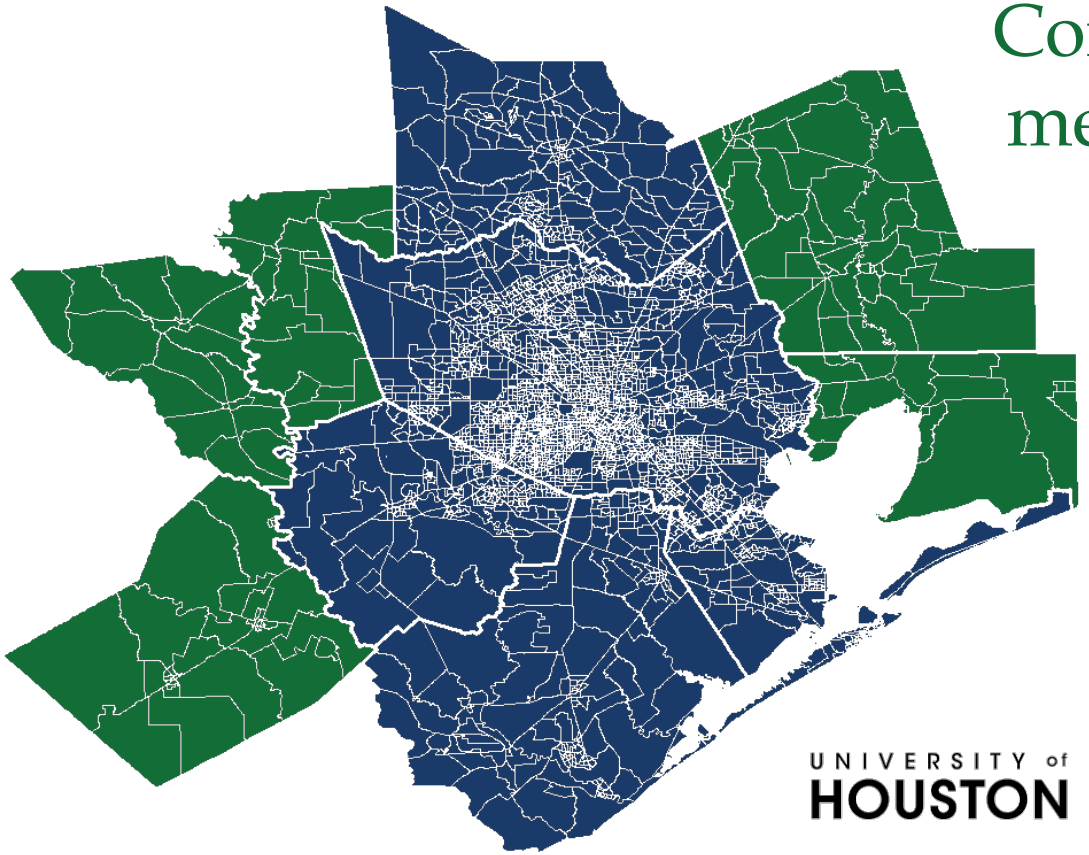
Dr. Steven Craig
- University of Houston

Project Elements

Population Projections

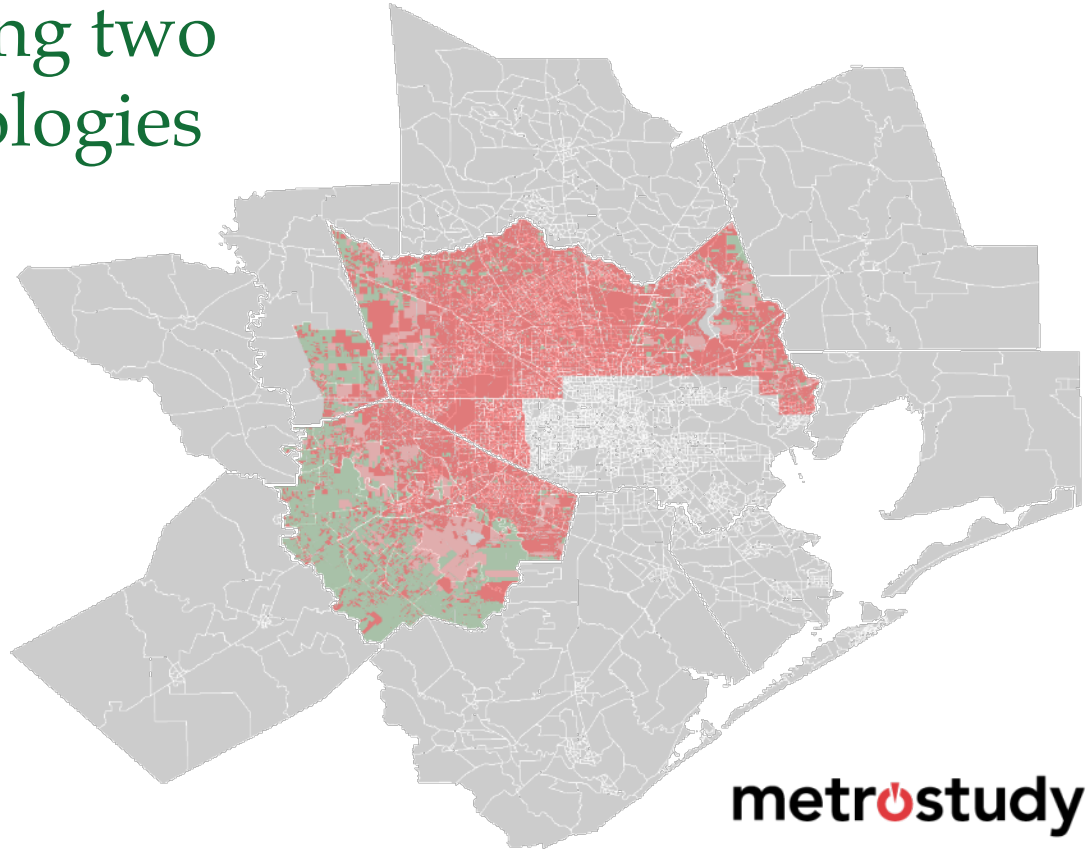
Population Projections

Combining two methodologies



Small Area Model Houston (SAM-Houston)

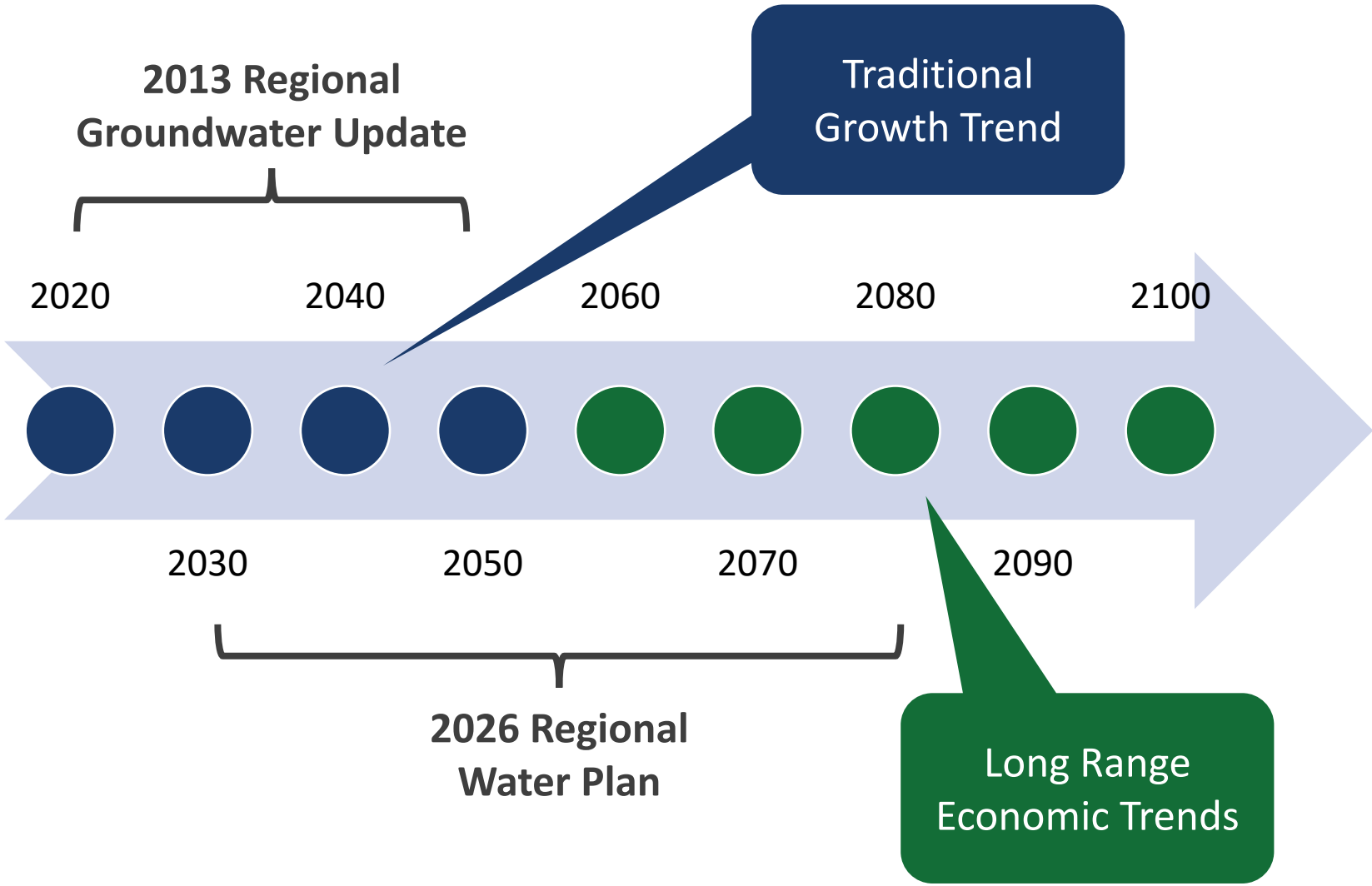
Long-range, wide-area projections



Projected Development Methodology

Short-range, detailed projections

TRENDS


2013 Regional
Groundwater Update
Traditional
Growth Trend
2020
2040
2060
2080
2100
2030
2050
2070
2090
2026 Regional
Water Plan
Long Range
Economic Trends

Population Projections

Petroleum industry is an essential part of Houston's economy	Illustrated by COVID slowdown and economic distress
US oil prices would have increased without fracking	$125/bbl in 2020 forecasted in 2000
Houston significantly benefitted from technological change	May not occur again soon
Oil forecasts not available past 2050	Lack of clear direction

Population Projections

70% of Petroleum production is used in transportation

Petroleum demand will be reduced globally which may impact:

- Oil exploration
- Houston's high-tech geology and related employment
- Transportation of hydrocarbon products (e.g., pipelines)

Developing Long-Term Trends

Urban Case Studies

1 St. Louis 2 Birmingham 3 Pittsburgh 4 Cleveland

Center city growth slows when main industries begin to decline

Suburban growth continues

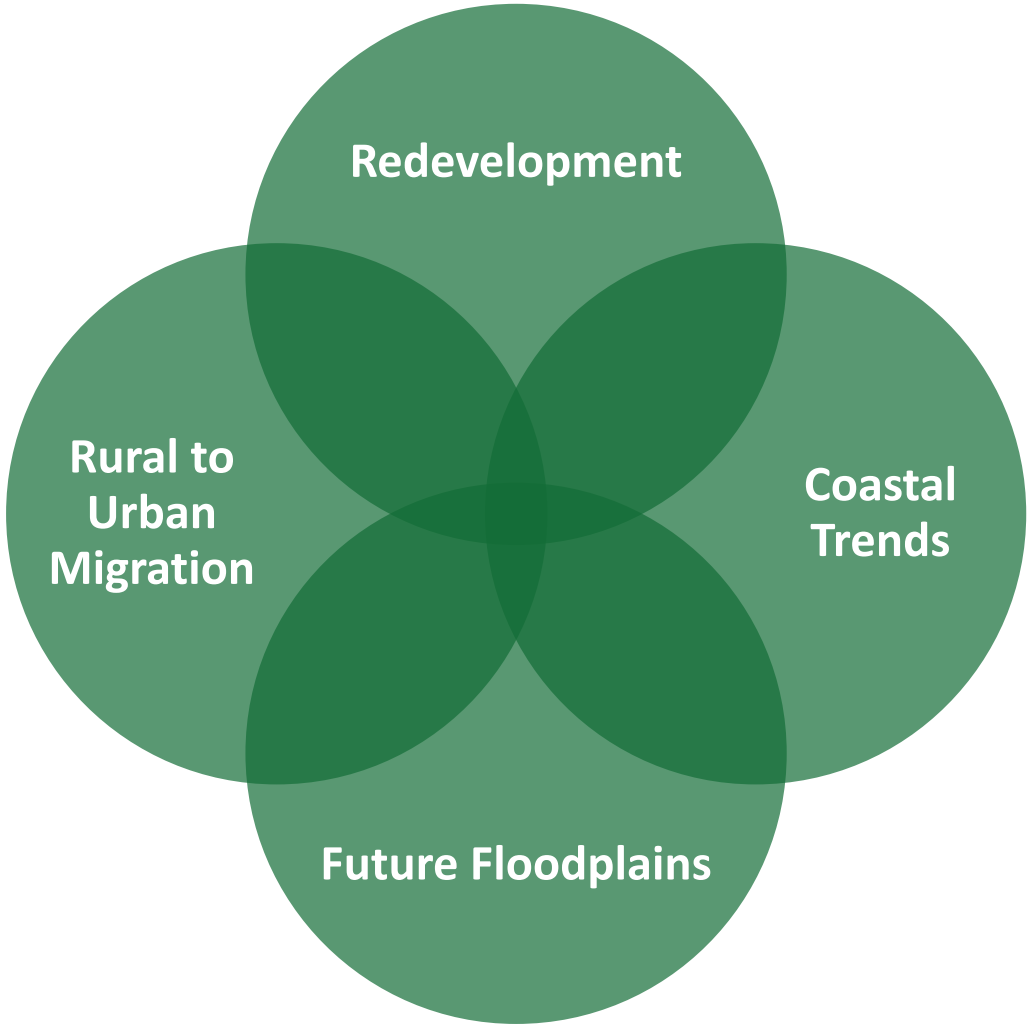
Slow reaction in public sector to economic change

Reduction in average firm size

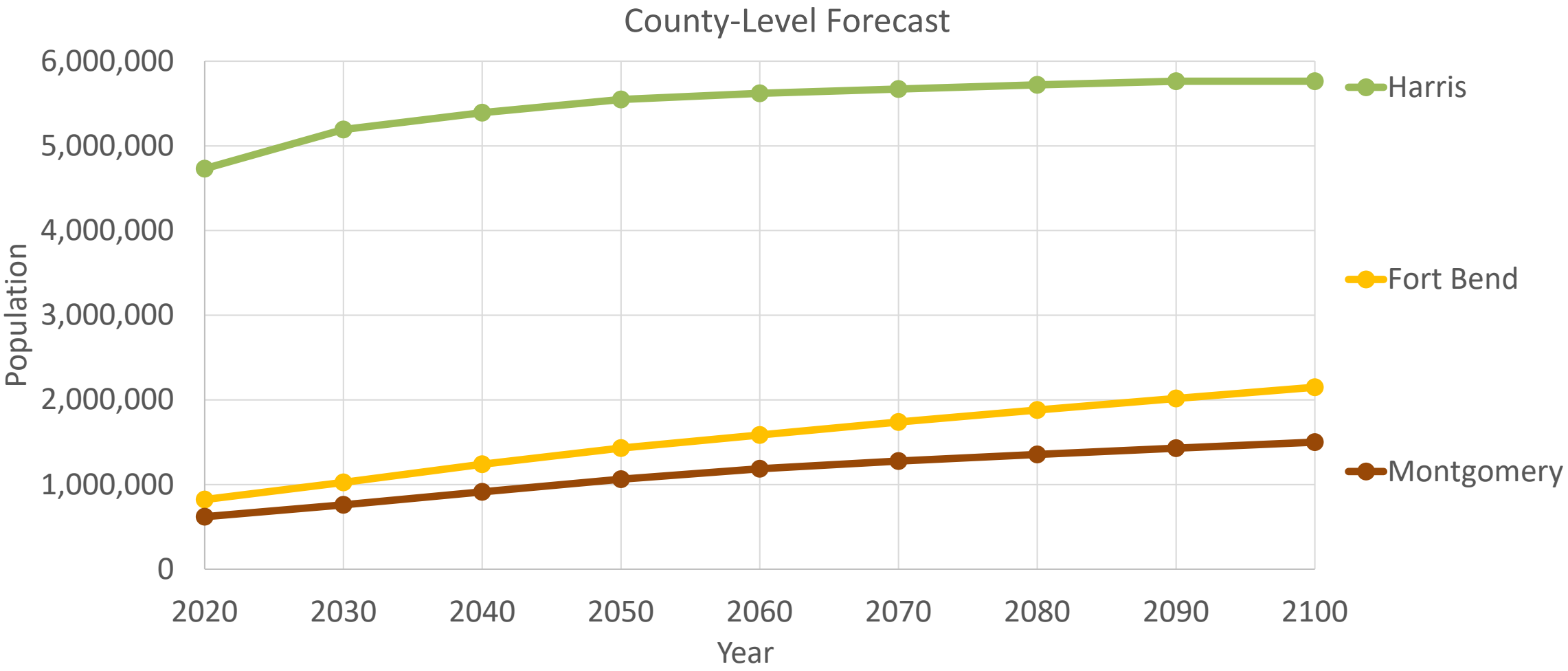
At a more modest pace

Population Projections

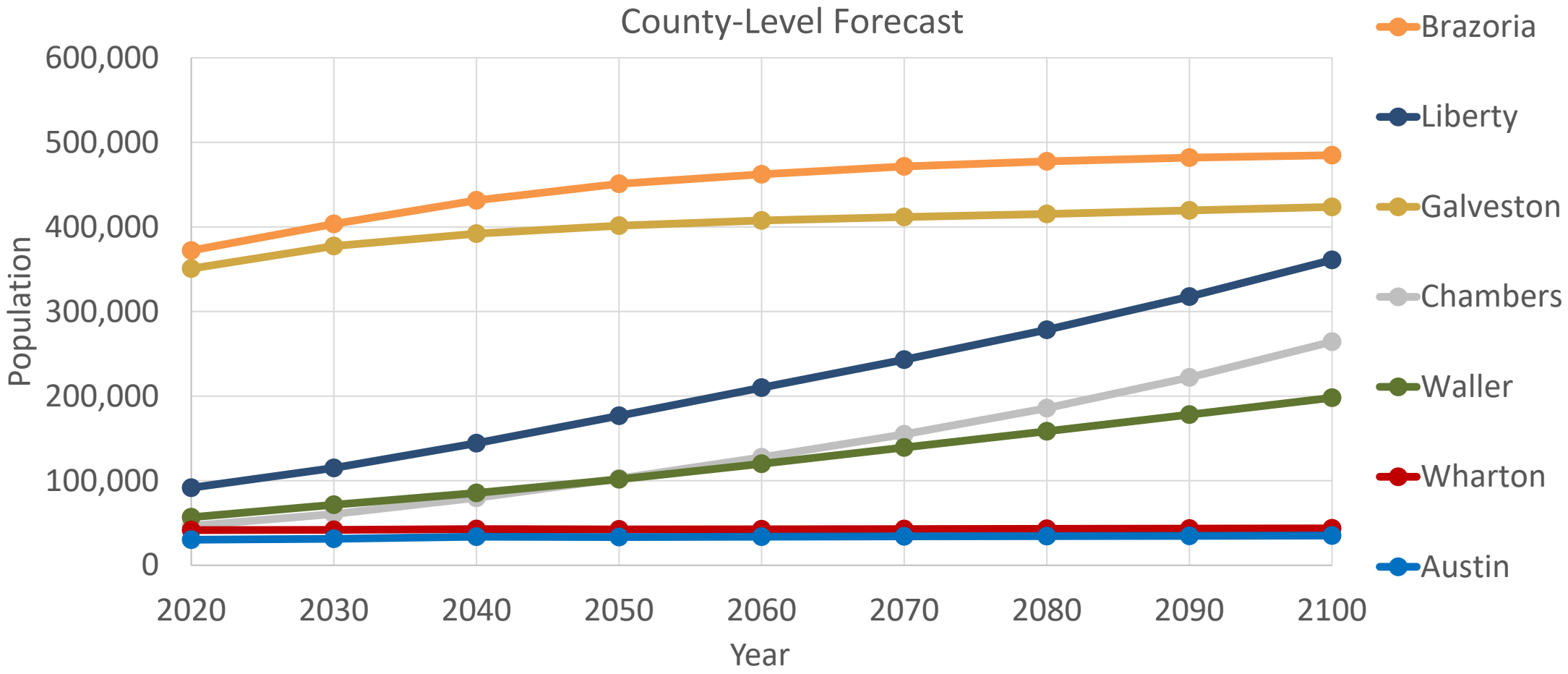
Other Trends



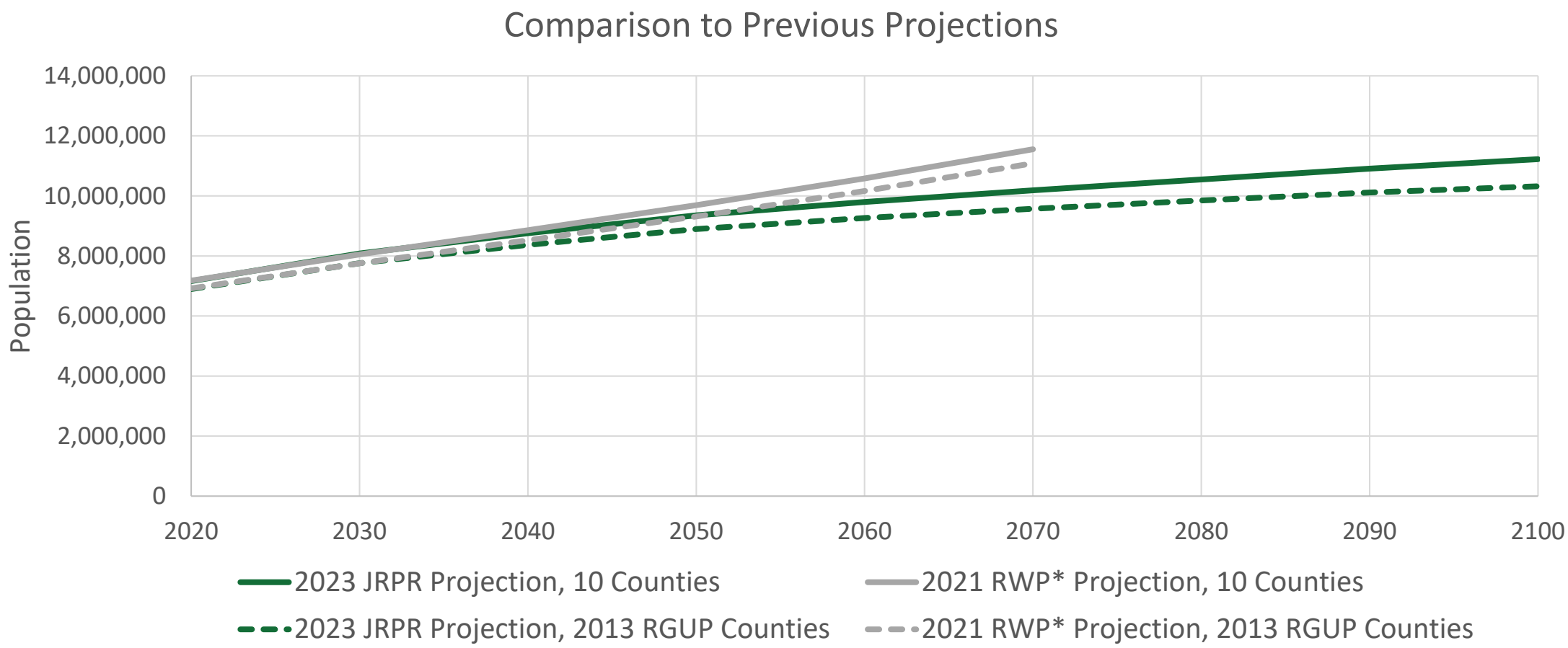
Population Projections



Population Projections

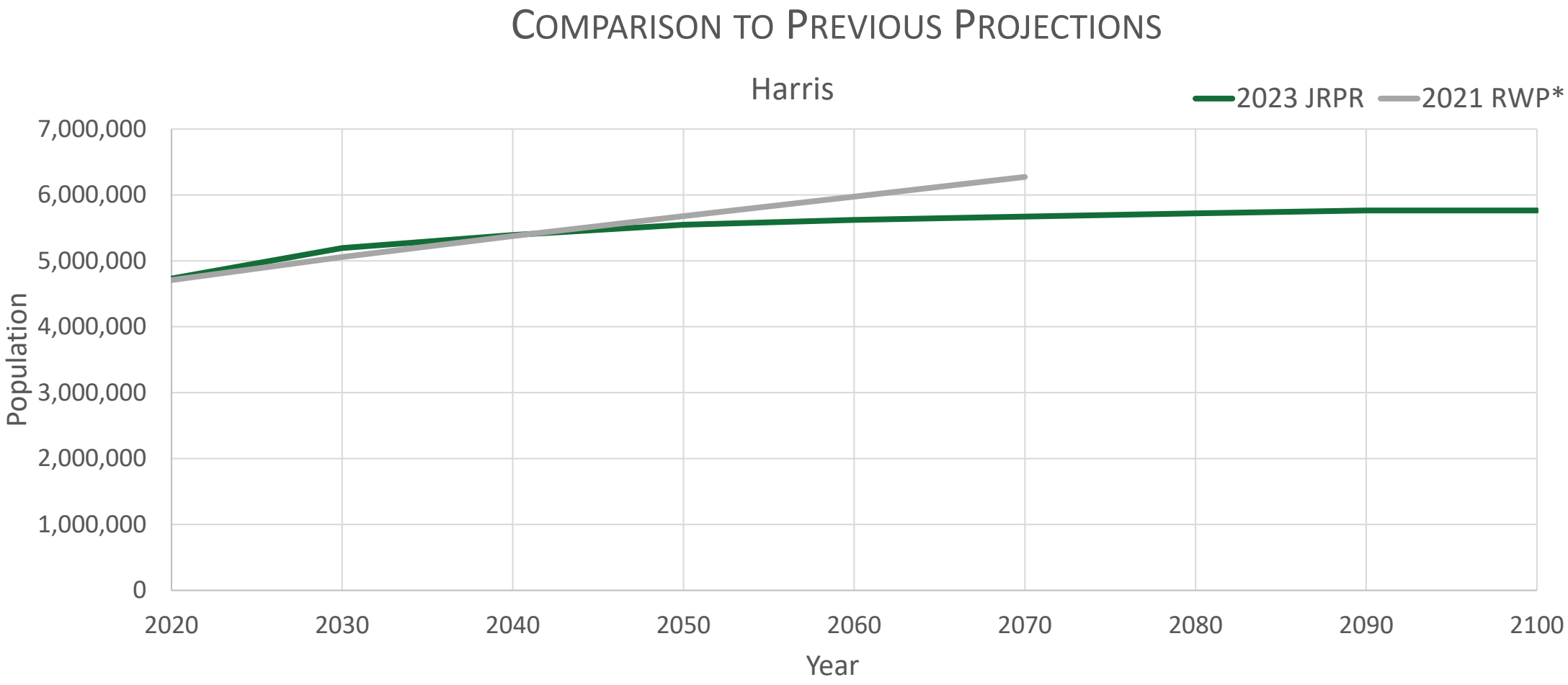


Population Projections

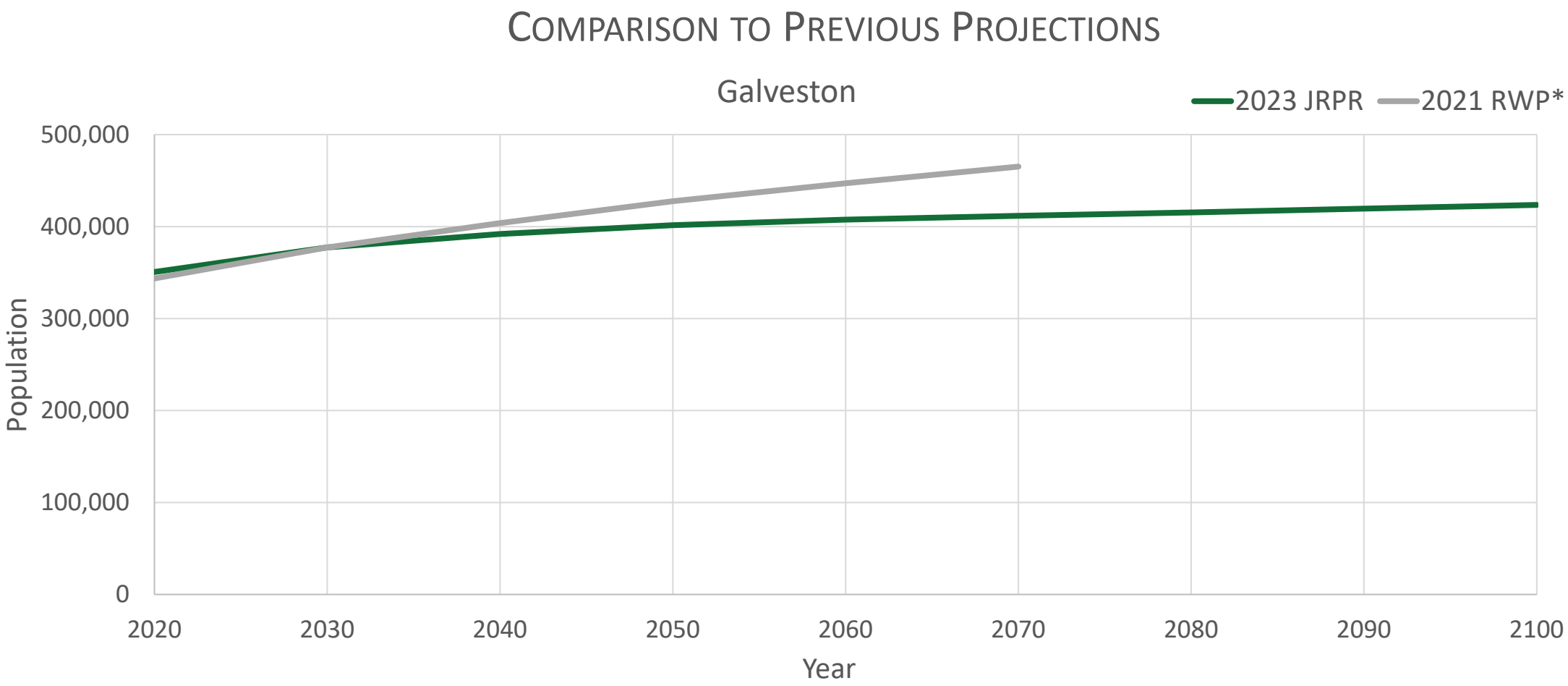


**2021 RWP and 2016 RWP used projections developed in 2013 RGUP for Brazoria, Harris, Galveston, Montgomery, and Fort Bend Counties, with only slight modifications (<0.01%).*

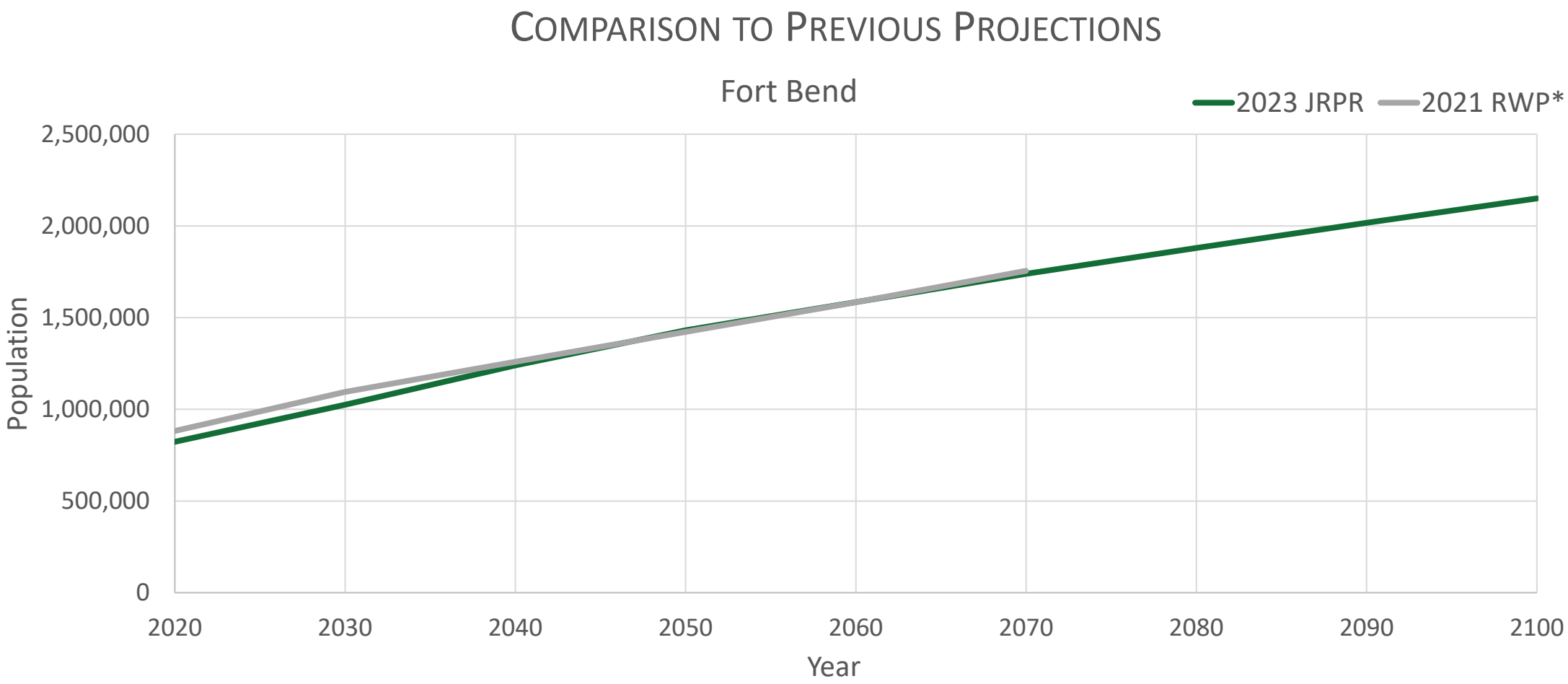
Population Projections



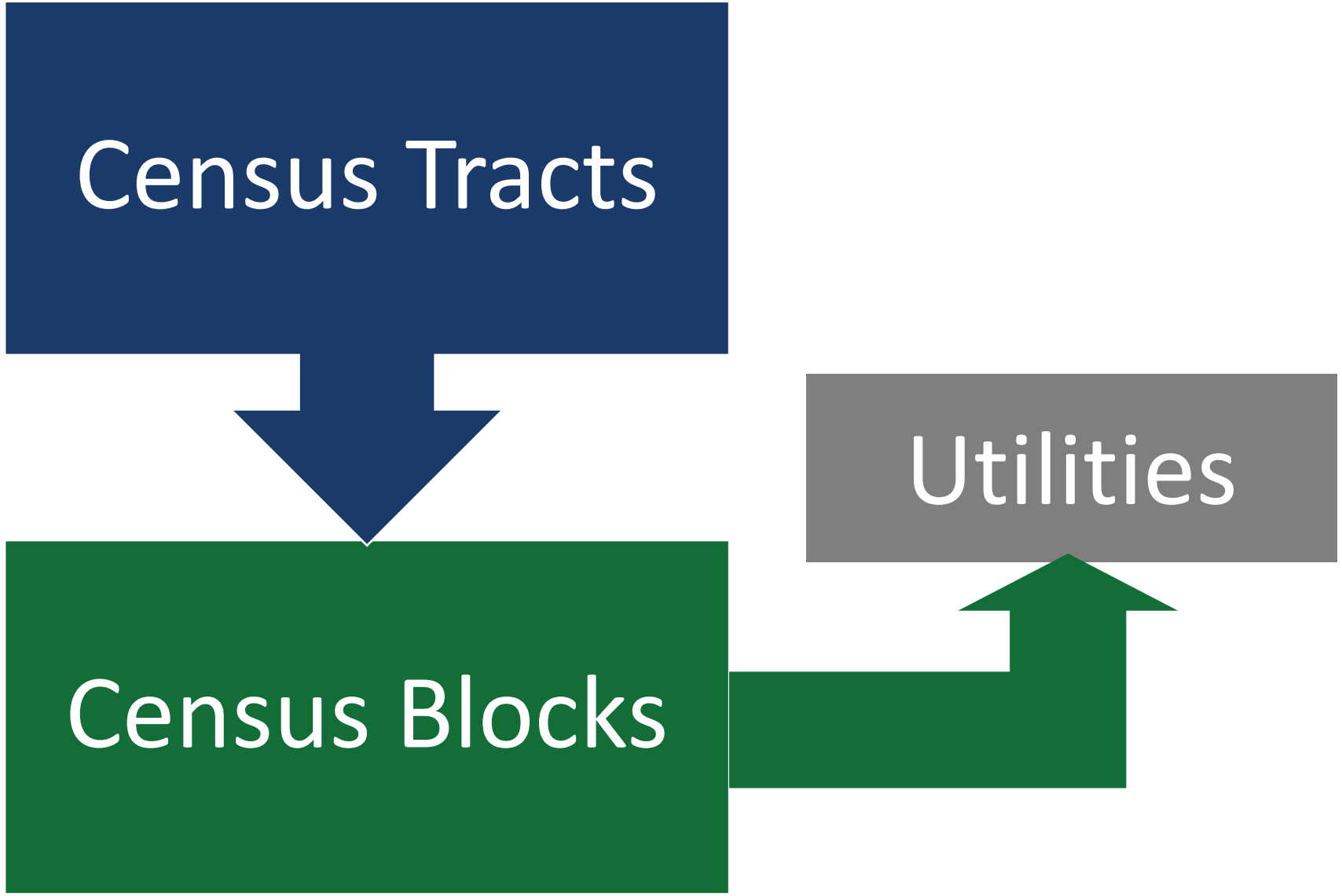
Population Projections



Population Projections



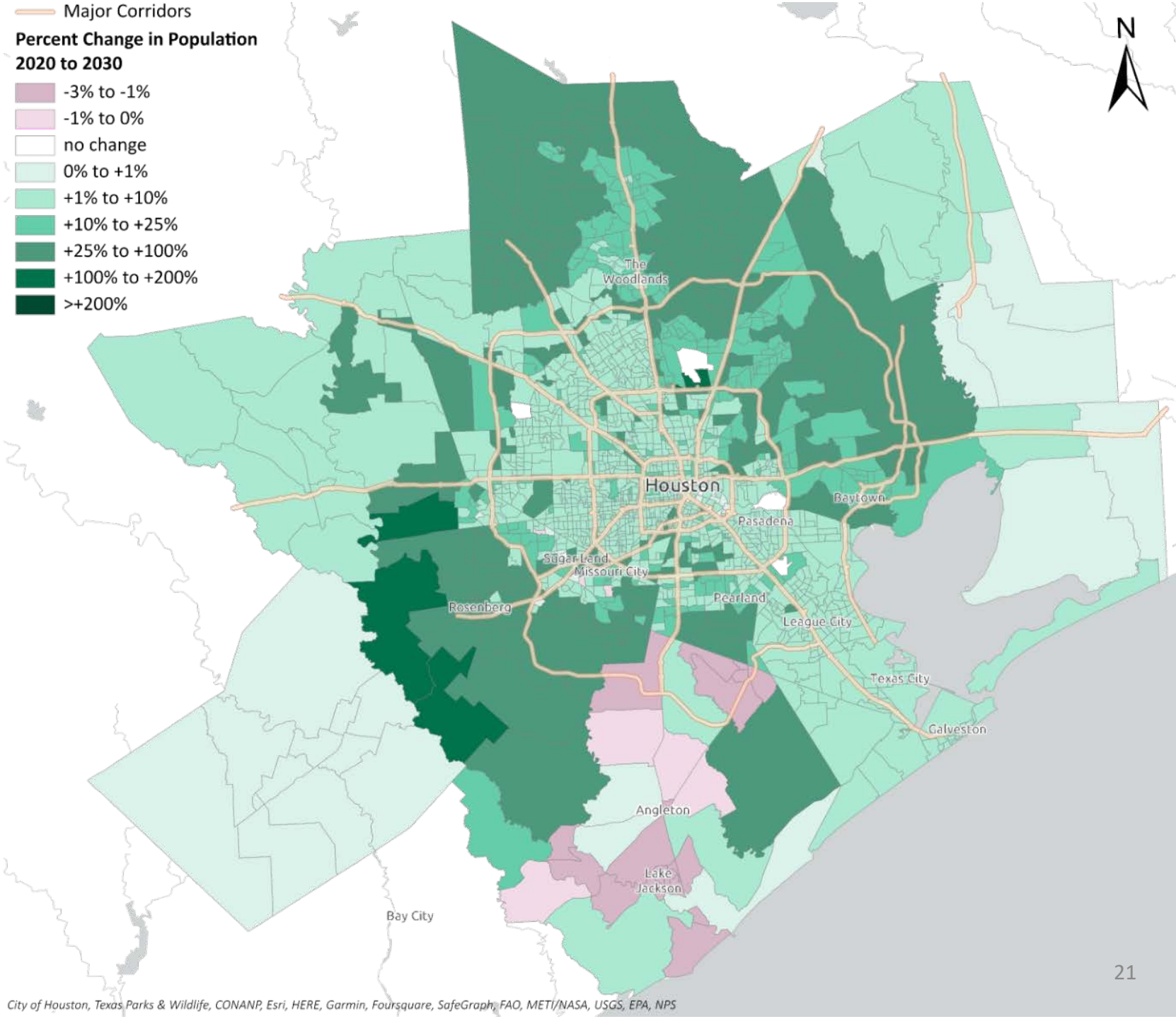
Projections at Varying Spatial Scales



Population Growth Forecast 2020 to 2030

Percent change in population by census tract

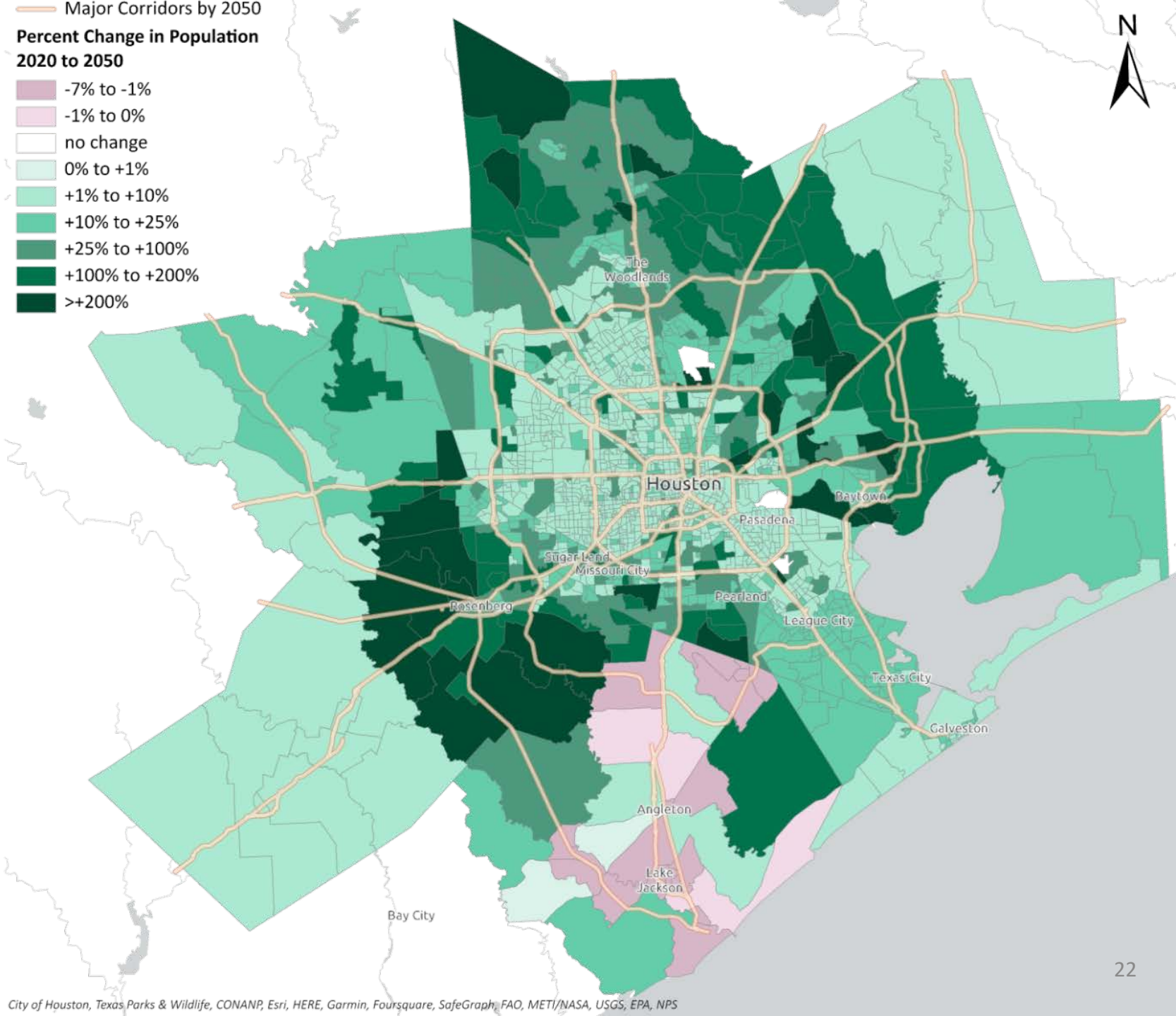
	2020	2030	% Change
Austin	30,167	31,300	+4%
Brazoria	372,031	403,497	+8%
Chambers	46,571	60,631	+30%
Fort Bend	822,779	1,025,010	+25%
Galveston	350,682	377,403	+8%
Harris	4,731,145	5,193,657	+10%
Liberty	91,628	115,074	+26%
Montgomery	620,443	759,919	+22%
Waller	56,794	71,599	+26%
Wharton	41,570	41,827	+1%



Population Growth Forecast 2020 to 2050

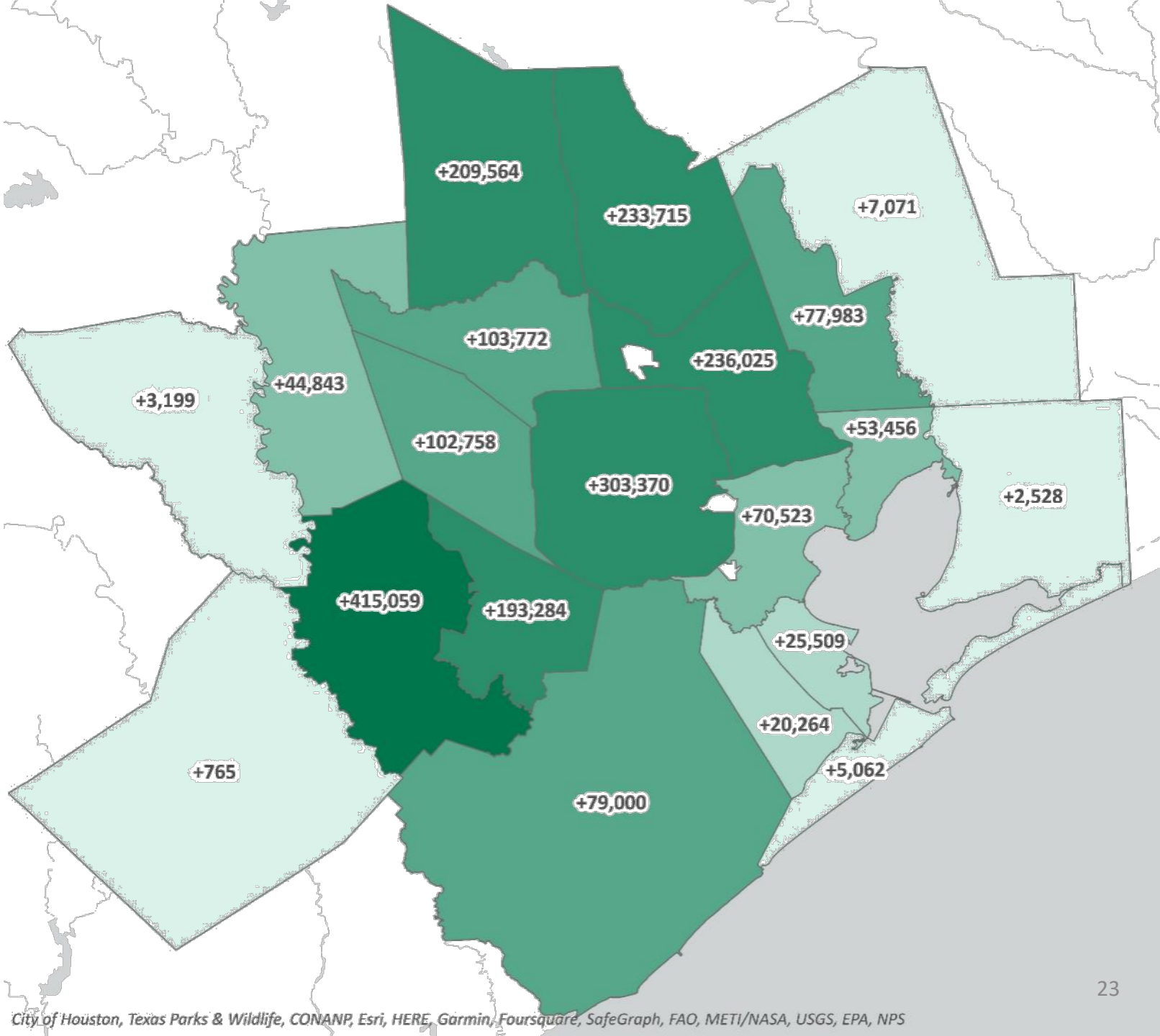
Percent change in population by census tract

	2020	2050	% Change
Austin	30,167	33,366	+11%
Brazoria	372,031	451,031	+21%
Chambers	46,571	102,555	+120%
Fort Bend	822,779	1,431,122	+74%
Galveston	350,682	401,517	+14%
Harris	4,731,145	5,547,593	+17%
Liberty	91,628	176,682	+93%
Montgomery	620,443	1,063,722	+71%
Waller	56,794	101,637	+79%
Wharton	41,570	42,335	+2%



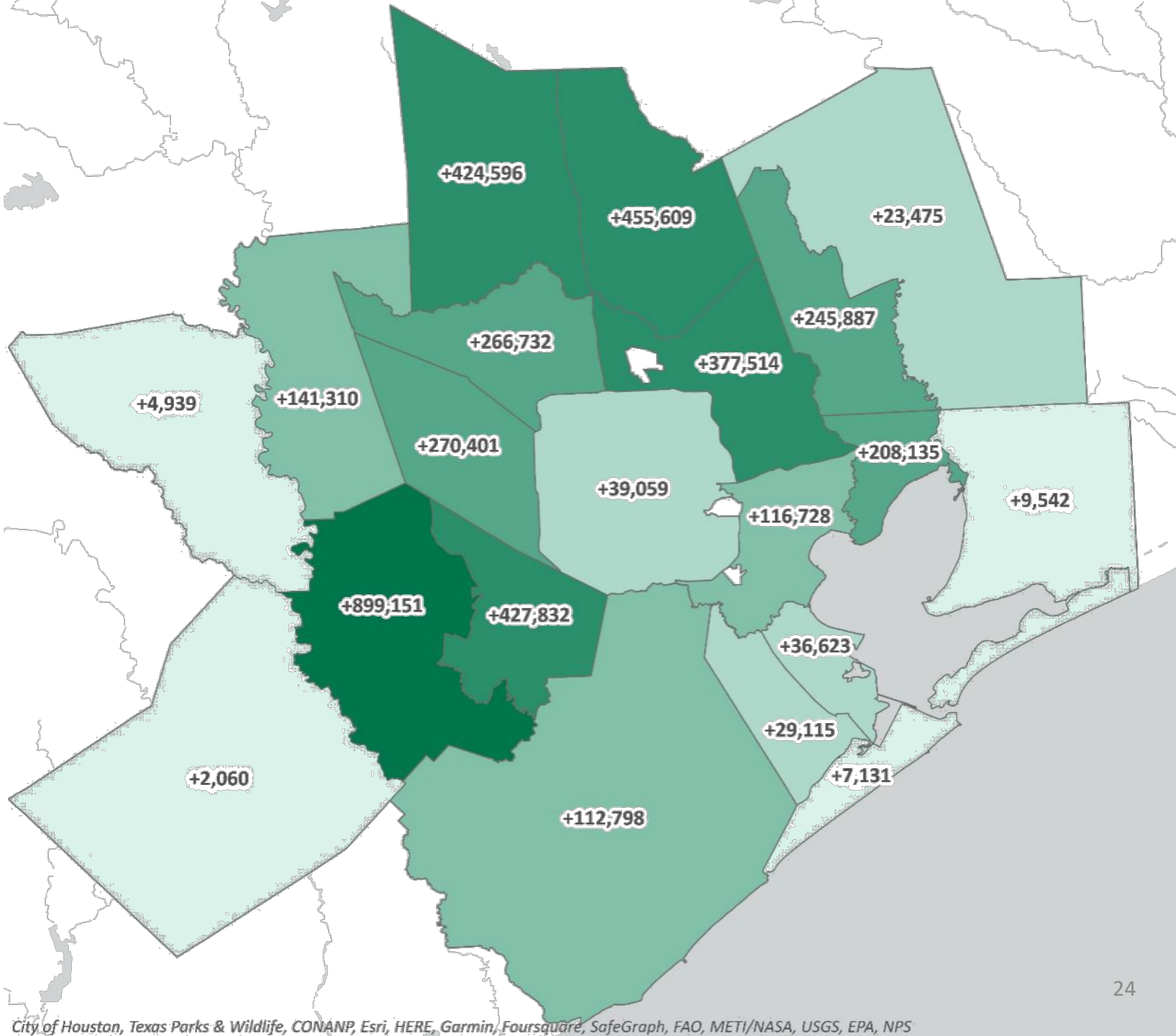
Population Growth Forecast 2020 to 2050

Magnitude of growth in population



Population Growth Forecast 2020 to 2100

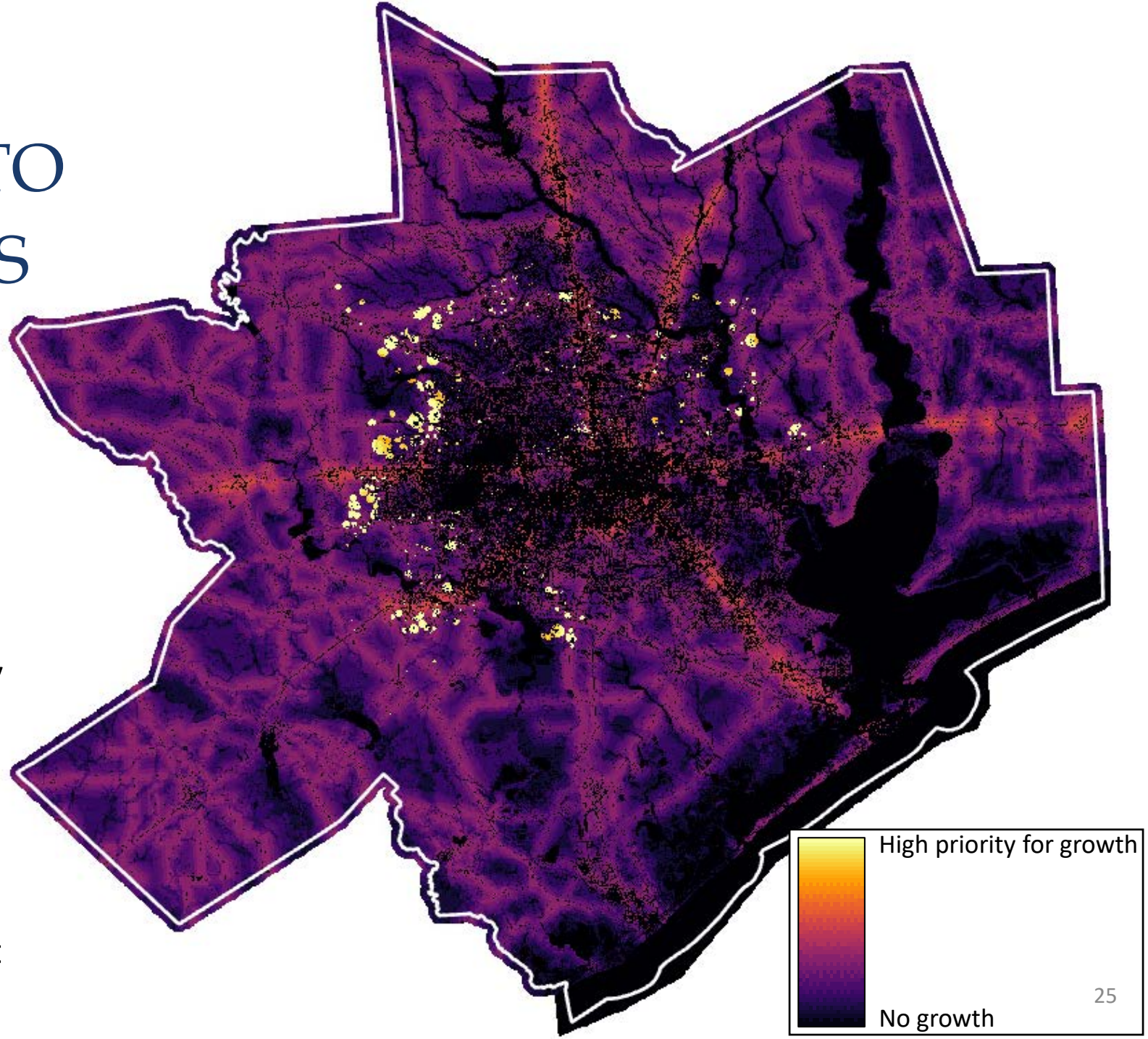
Magnitude of growth in population



Distribution to Census Blocks

Within tracts, growth is distributed based on:

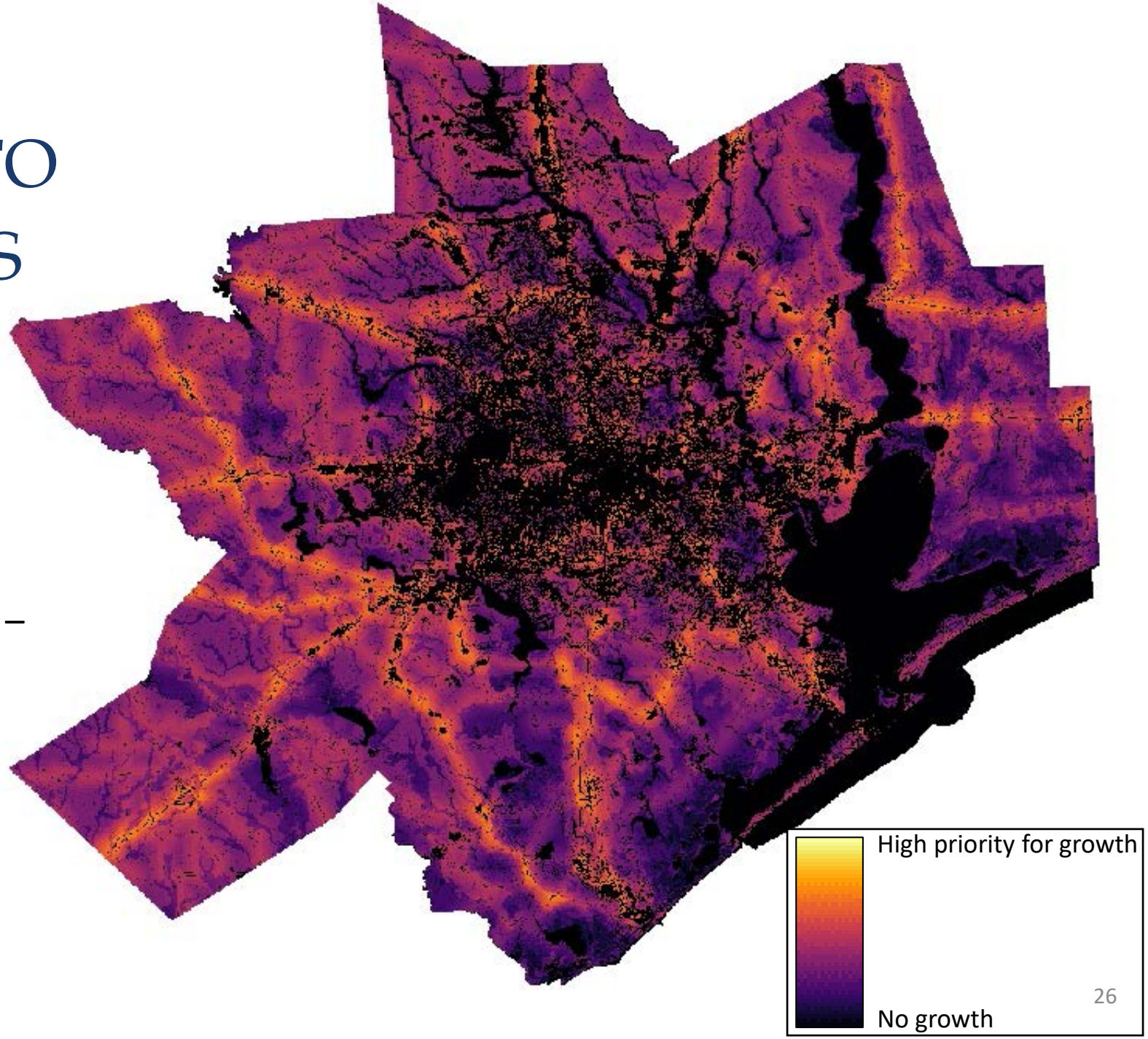
- Near-term development (2020-2030, Metrostudy)
- Interstate and highway proximity
- Wetlands
- Floodplains
- Existing and recent development



Distribution to Census Blocks

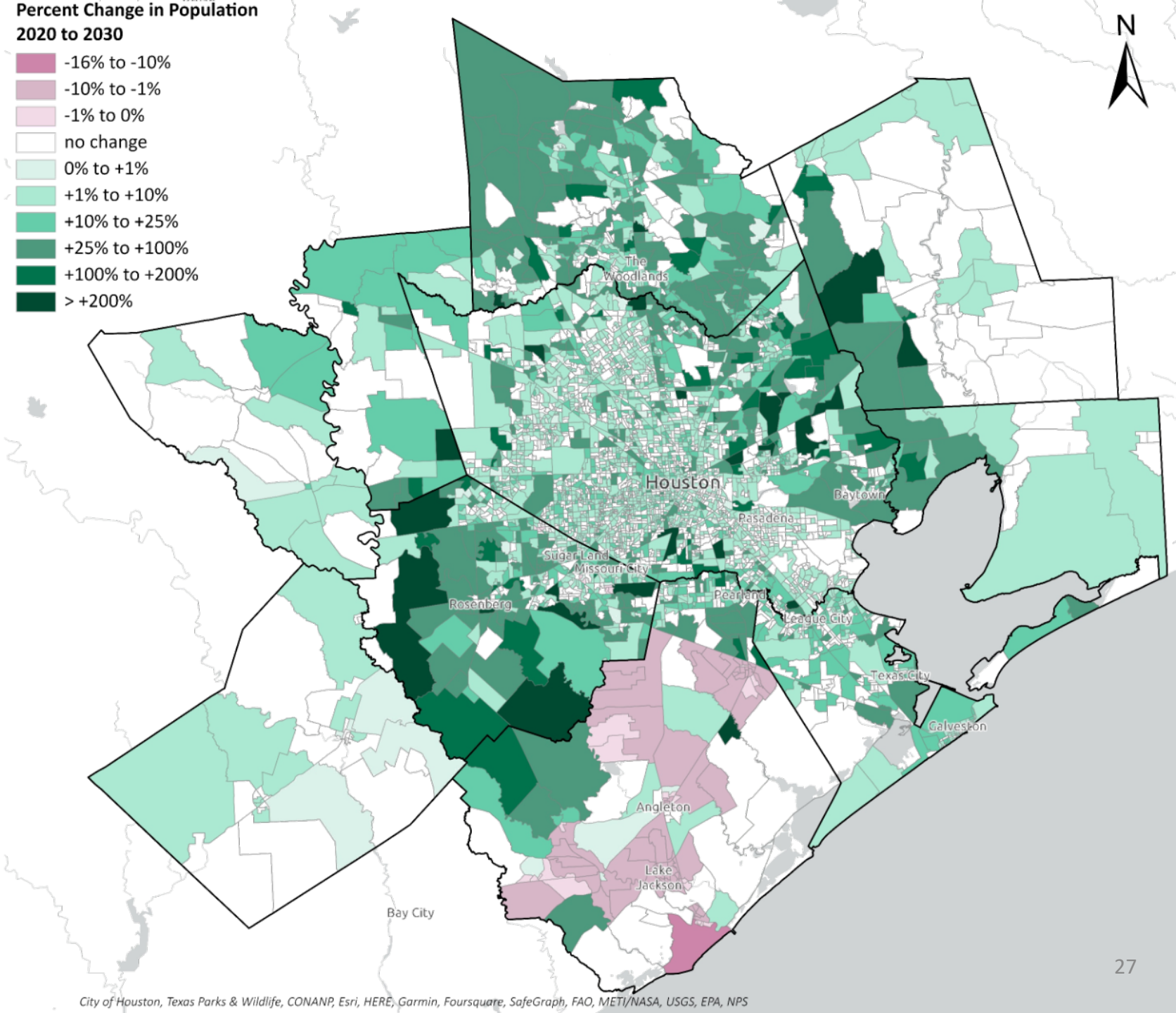
Distribution after 2030:

- Less certainty about precise development locations
- Interstate and highway proximity – **expansion of major corridors**
- Wetlands
- Floodplains – **potential changes**

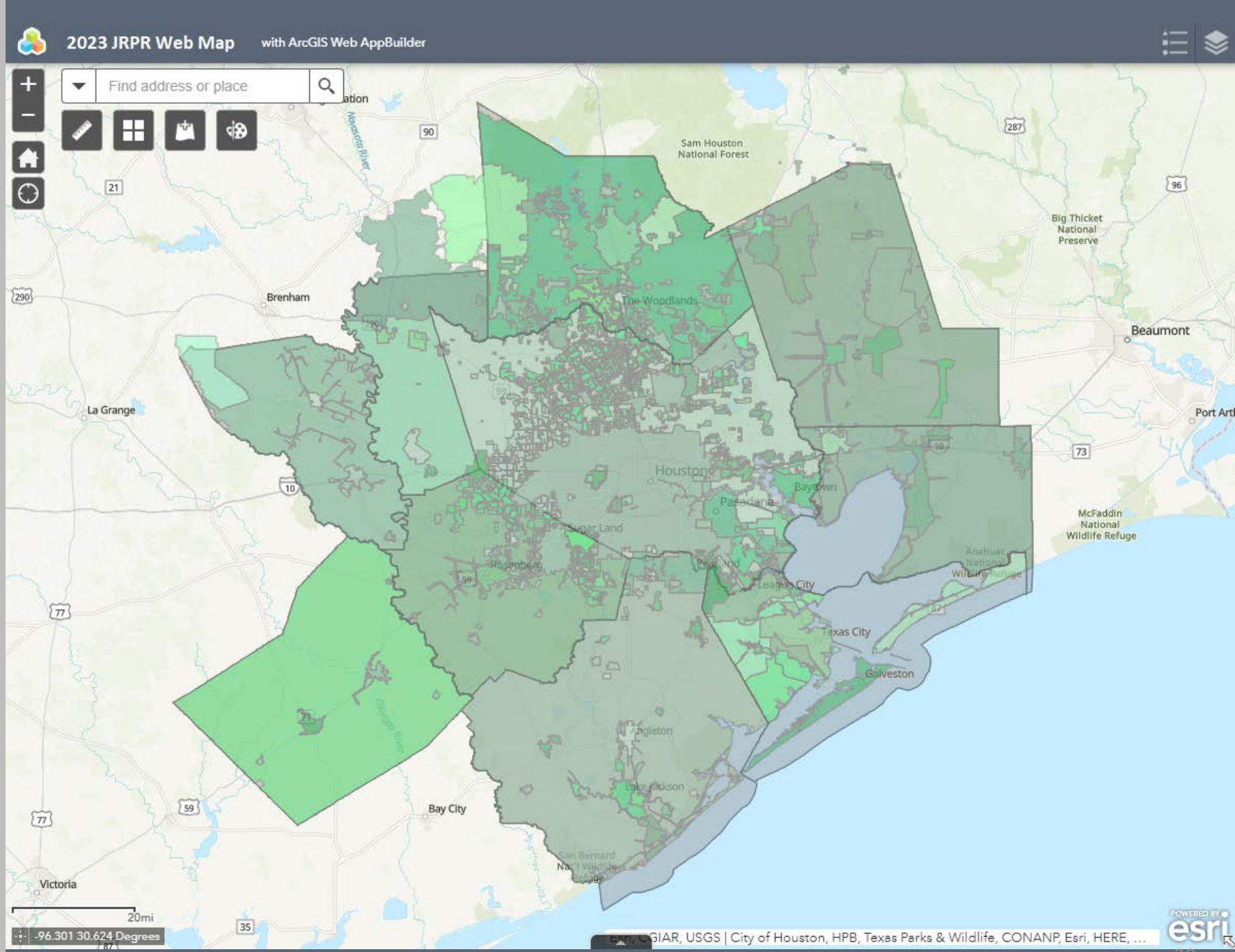


Population Growth Forecast 2020 to 2030

Percent change by block group



STAKEHOLDER ENGAGEMENT



Schedule and Next Steps

	GULF 2023 Model	Projected Water Needs	Alternative Water Supplies	PRESS Assessment	Water Use Scenarios
2020	Model Conceptual Report	Methodology, Model Updates	Overview of Alternatives	PRESS Model Validation	
2021	Complete Model Update	Population and Demand Projections	Technical Characterization, Final Report		
2022	Complete Model Update	Direct Stakeholder Process, Final Projections			Scenario Development
2023				Scenario Testing	Scenario Testing, Recommendations

STATUS

Upcoming Milestones

Q3 2022

Population projections stakeholder outreach

Q4 2022

Baseline Scenario development and execution

Q1 2023

Baseline Scenario evaluation

Questions and Answers

Thank you for attending the Joint Regulatory Plan Review Stakeholder Meeting

We appreciate your interest and engagement in this meeting.

ATTACHMENT C – Question and Answer Session

The following summary documents questions that were received during the stakeholder meeting as well as formal responses provided for the record.

QUESTIONS WITH RESPONSES

1. ***How many variables are in the population projection?***
   The projections are influenced by the conceptual model behind the Small Area Model (SAM)-Houston, numerous underlying assumptions based on study of the region and other case studies, and various input datasets. Input datasets and variables include:

   a. Census population counts by Census tract and block from 1970 to 2020;
   b. Employment estimates from the Census based on the location of employment, not the residence of the employed;
   c. Growth rates of employment in the energy sector, manufacturing, wholesale trade, and overall;
   d. Spatial data for the study region;
   e. Land use data from the county Appraisal Districts for the primary counties in the study region;
   f. Model generated locations of employment subcenters in the region;
   g. Estimated spatial relationships between population density and employment density; and
   h. Estimated employment relationships among counties.

2. ***What is the probability of this single projection you are using, i.e., P50, P10, P90?***
   As the overall model includes a combination of statistically-distributed and non-probabilistic elements, there is no way to determine an overall probability for the comprehensive model. It is certain, however, that the actual outcomes will be different than the exact numbers in the model output. The intent of the overall projection methodology is to provide the "most likely" scenario resulting from the included variables and estimated relationships.

3. ***What are the most sensitive variables, i.e., what are the top factors that influence results?***
   All US cities are decentralizing, meaning suburban areas are growing faster than more central areas. The rate of decentralization is therefore primary. Further, the density by which vacant land is developed is a central determinant of the population capacity of each Census tract.

4. ***What economic factors are included? GPD? Interest Rates? CPI, etc.?***
   County level employment in the energy and manufacturing industries plus wholesale trade is the single most important driver of the overall county population model. All of the spatial relationships between employment and places of residence are the result of the economic models.

5. ***What is the probability of this single projection in the model? P50 or other?***
   Our forecasts report the projected number of people in each Census tract for each decade out to the year 2100. Since the forecasts describe a distinct value for each tract and decade, the exact formal probability that the precise value will be realized is zero. While

the true future population of each tract may be above or below the predicted value, the economic concepts underlying the SAM-Houston model have proven to be more useful for forecasting the level and location of population growth in our area than available alternatives.

The model assumes that population location in the Houston area is driven by employment. This view not only drives our overall population forecasts, but the distribution of forecasted change throughout the metro area. Our model's employment driven forecasts have out-performed other forecasts, including from the Census Bureau, because we do not differentiate the source of population between migration and native born.

Past results of the SAM-Houston methodology have been close to realized population. If the economic environment important to Houston changes in a major way, we would expect our forecasts to decline in utility. The forecasts beyond 2050 have greater uncertainty than those from 2020 to 2050.

The statistical processes, which have been developed in the SAM-Houston model, have been successful for more than two decades at describing the changes experienced by Houston. We believe the changes that we model after 2050 are useful to engage policy-makers to consider how our local economy may change when more fundamental disruptions beset the Houston economy. Over-building infrastructure is as economically disruptive as under-building. Whether the changes occur in the time-frame assumed here, the distribution of population is likely to be captured by our modeling structure.

Finally, for perspective, consider only the economic events that have occurred over the last two decades that were not forecasted. The great recession, which started in 2008, was not forecasted in the year 2000, nor did people forecast the spate of strong storms that have hit our region in the last two decades, from Allison to Harvey. No one forecasted the pandemic and ensuing economic disruptions, just as no one locally forecasted the invasion of Ukraine by Russia and the resulting disruption to energy markets. In spite of these pivotal events, our forecasts made in 2010 for 2020 were very close to realized, thus suggesting that the modelling strategy and its application have been helpful.