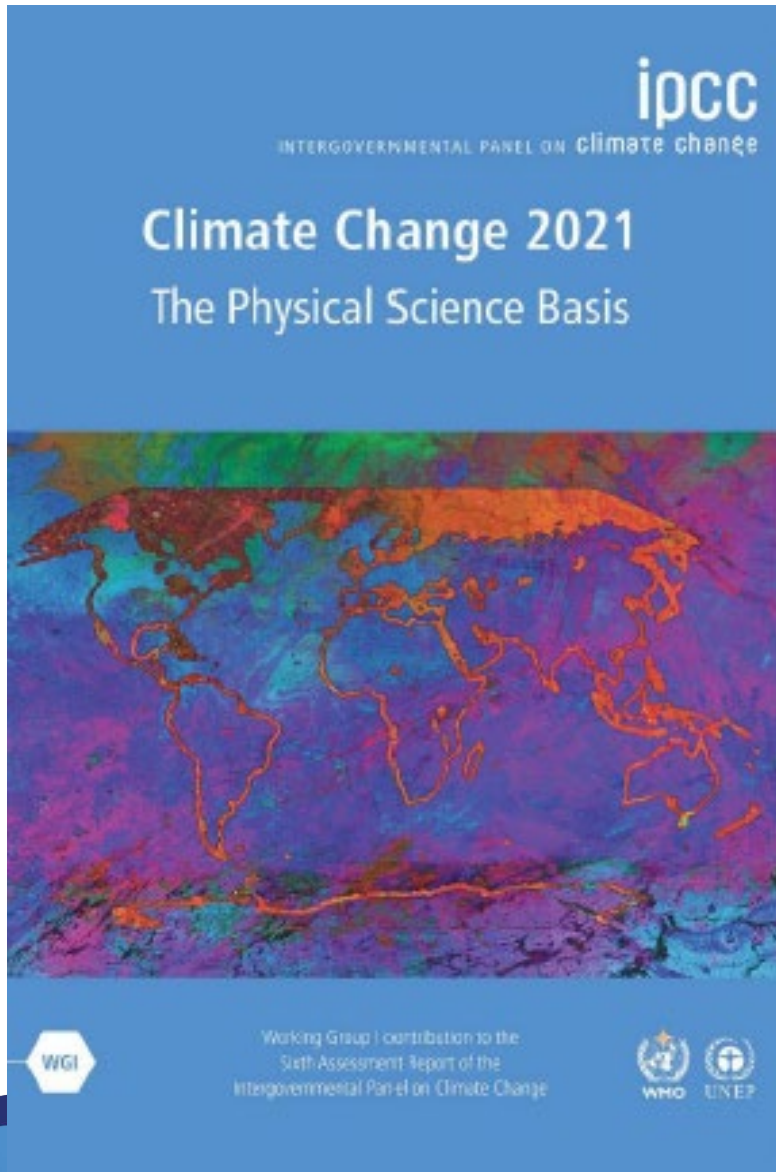




Impact of Climate Change on Alachua County's Rural and Agricultural Lands


April 16, 2024

So What Does the Future Look Like?



- Climate projections are based on the assumption that little effort is made to limit the rise in global temperature.
- Extreme temperatures, drought, and precipitation intensity will increase.
 - This may significantly impact Alachua County's rural and agricultural areas.
 - These impacts will challenge and disrupt farming, livestock, and rural livelihoods.

Crop Failure and Reduced Yields

- Drought and heat can lead to water stress, reducing soil moisture and reducing crop yields.
 - Flooded crops can result in crop failure.
 - Reduced crop yield affects producers financially, which also affects farm workers
 - Heat also affects worker productivity and increases risk of heat related illness/injury
- 

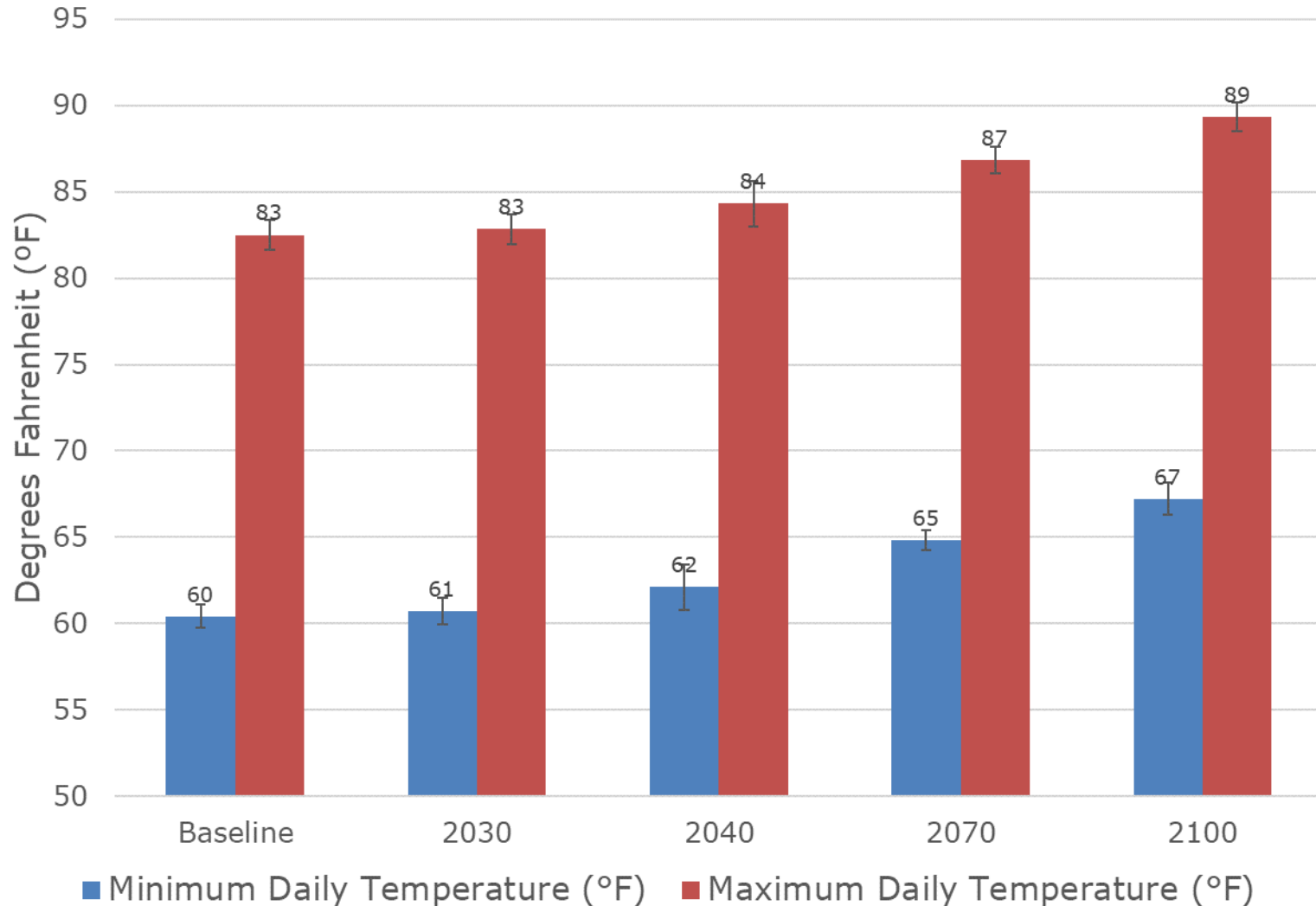
Fertilizer Use and Water Scarcity

- Because of decreasing crop yields, the farm sector may increase fertilizer and irrigation use.
- Surface and groundwater quality may be further degraded.
- Potential for competition for water with other users.

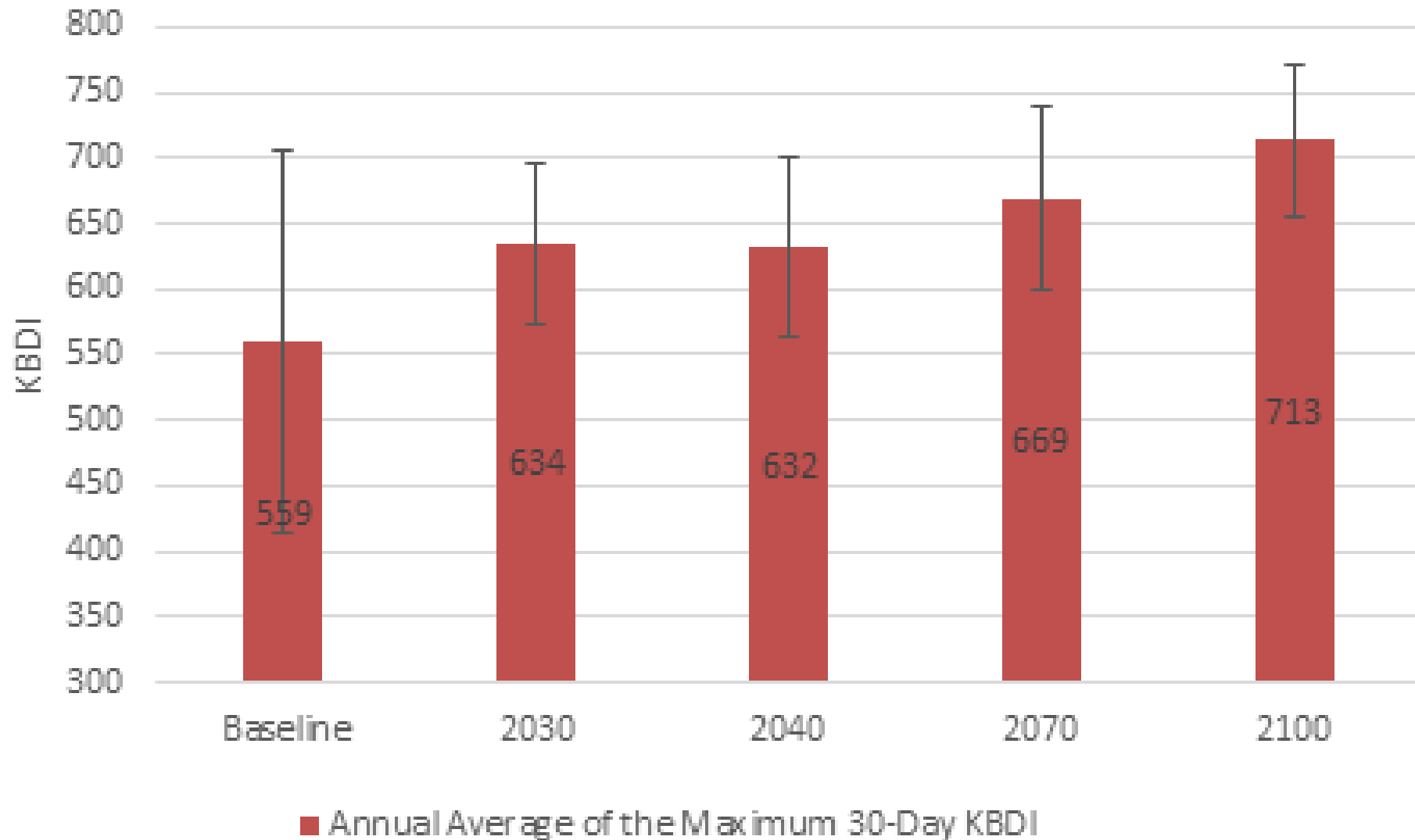


Temperature Slide

- Maximum daily temperature rising about a degree a decade.
- Minimum is also rising. Cool temperatures overnight help lower body temperature.



Keetch-Byram Drought Index

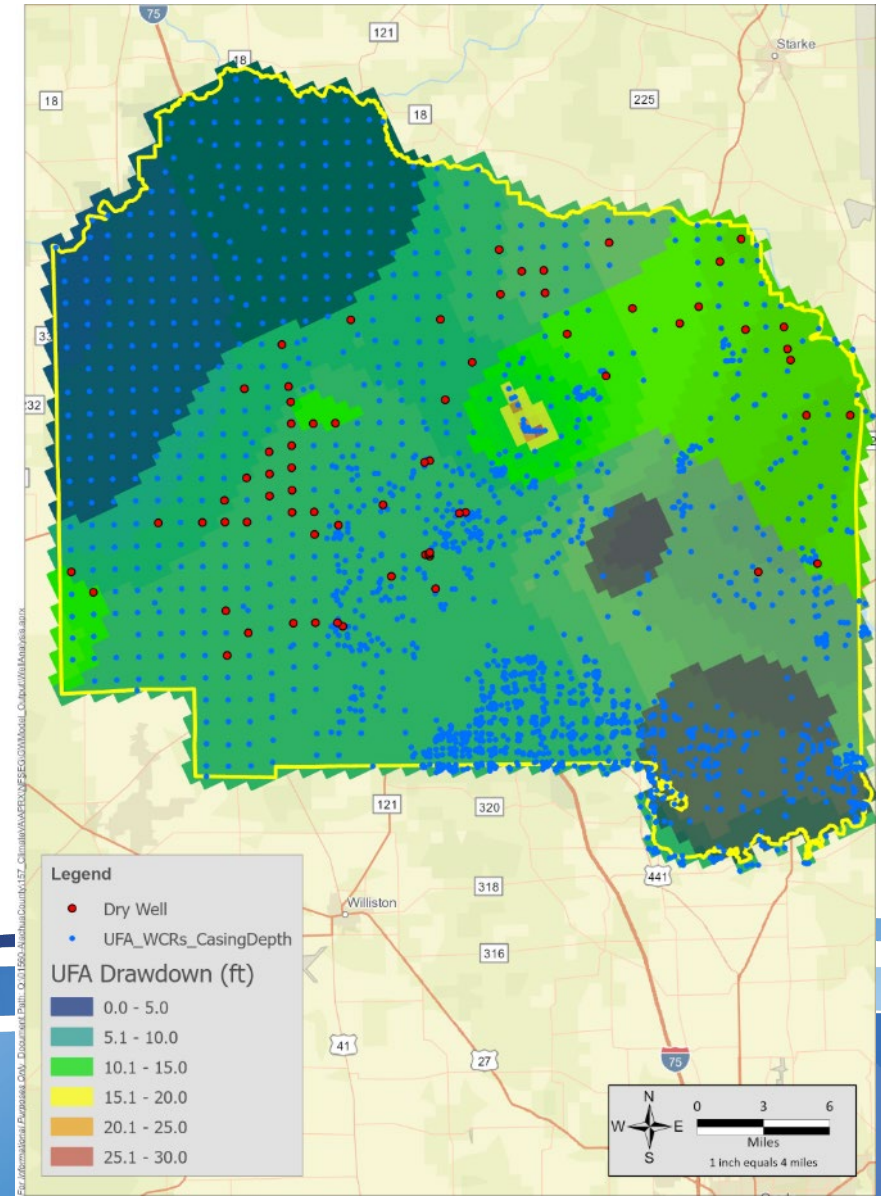


Maximum Heat Index – NOAA Alert Days per Year

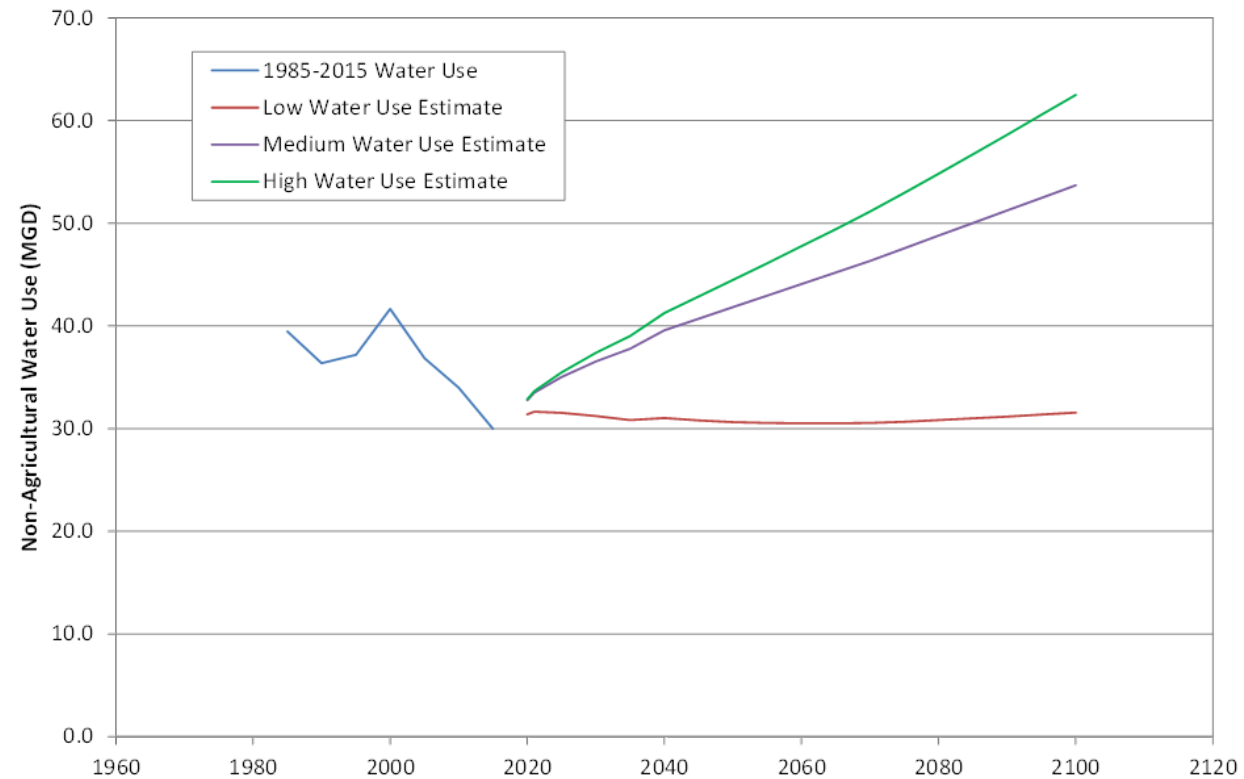
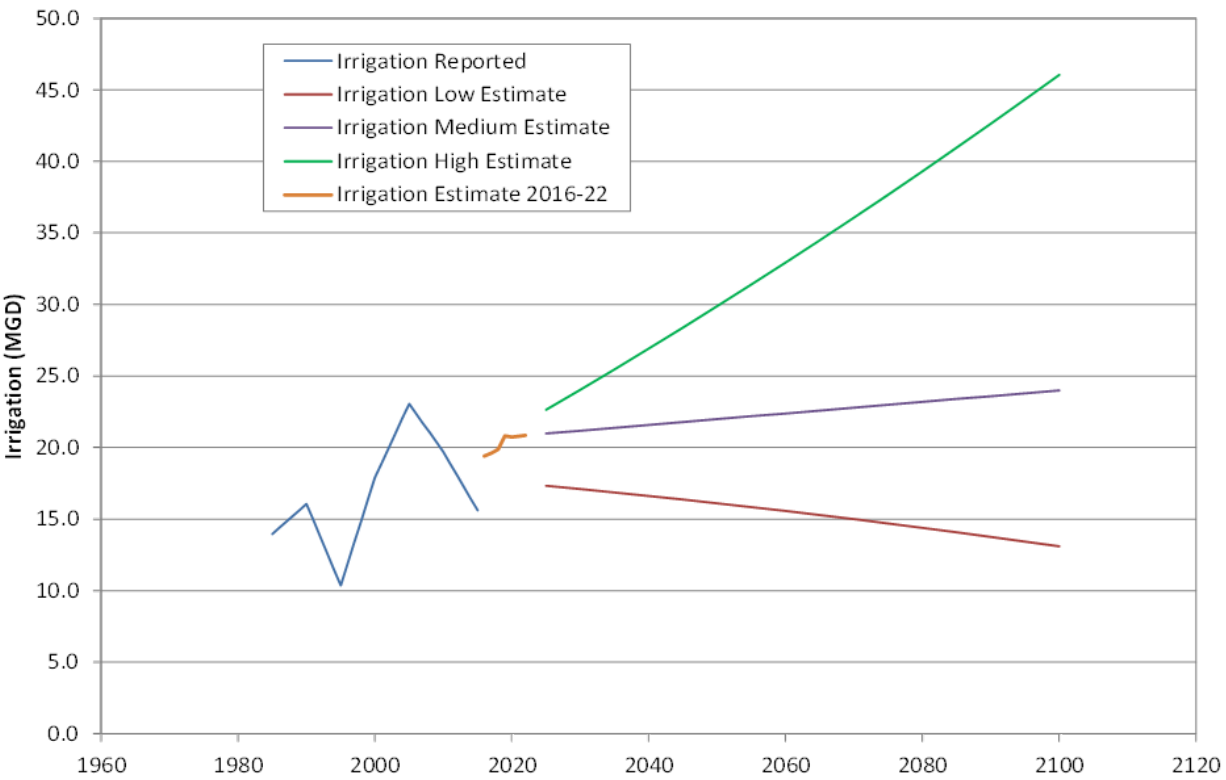
	Very Warm (80 – 89)	Hot (90 – 104)	Very Hot (105 – 129)	Extremely Hot (≥ 130)
Baseline	26	64	95	36
2030	23	51	94	53
2040	27	55	81	70
2070	24	54	75	107
2100	20	43	68	138

Groundwater and Surface Water Impacts

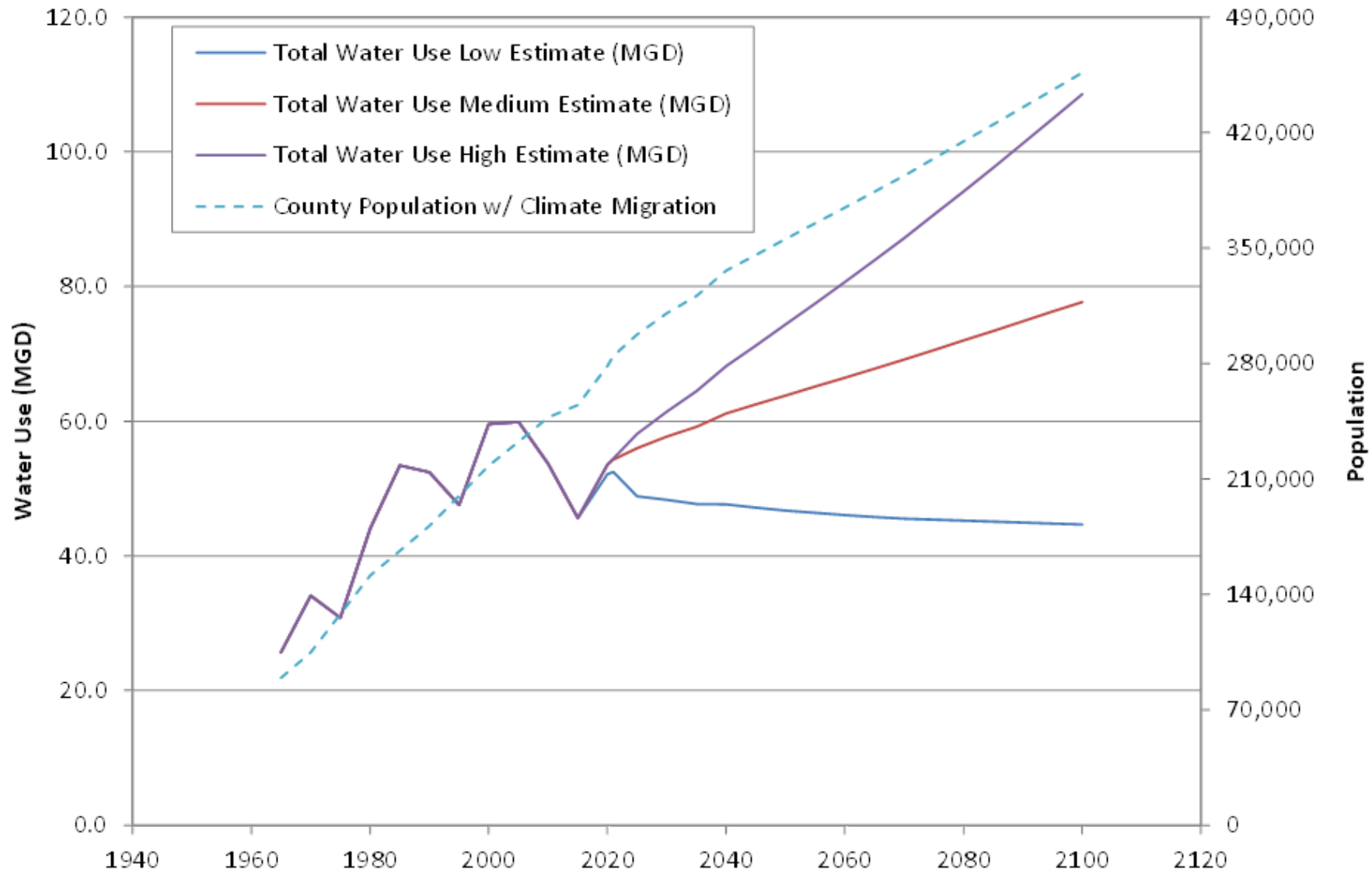
- Trend towards more extreme rainfall itself may not lead to general decline in groundwater level but may result in more variation.
 - In dry years may be lower than current conditions in some areas.
 - Climate change will increase demand, and this is what could cause decline.
- In the long-term surface water levels and flows will be reduced.
 - Decreased water quality in lakes.



Projected Ag and Non-Ag Water Use



Total Projected Water Use



Crop Modeling

- Goal was to assess the potential impact of climate change on crop yield under different irrigation and fertilization practices.
- Looks at three crops grown in the County that had appropriate crop models already developed.



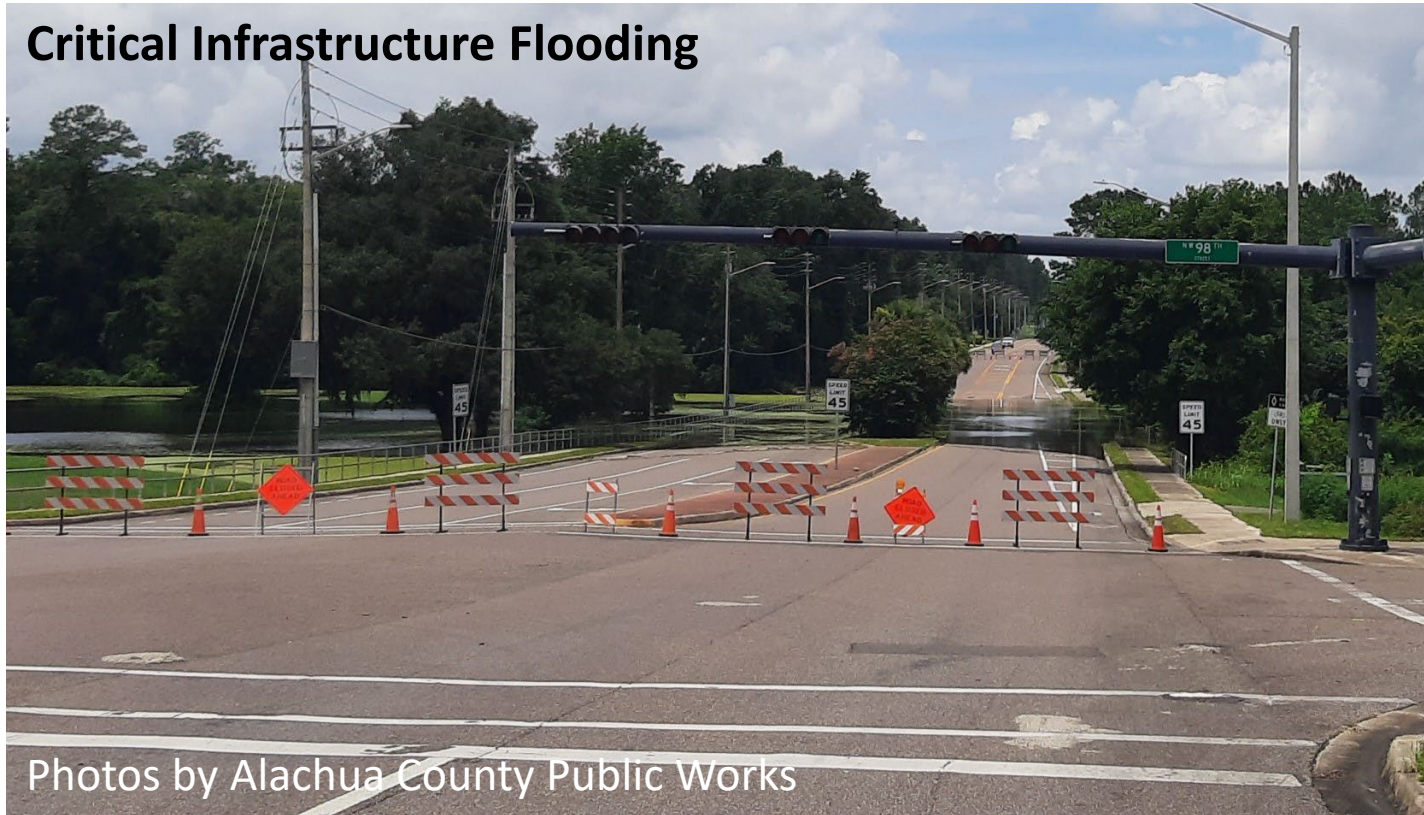
What Does This Mean for Local Agriculture?

- Crop modeling indicates increased irrigation and fertilizer needs. This has potential negative impacts on surface and groundwater quality.
 - Corn will see significantly reduced yields regardless of increased irrigation and fertilizer application.
 - Snap beans will maintain yields until about 2040.
 - Bahia grass for forage will do well and yields will increase.



Extreme Rainfall: What is at Risk?

Critical Infrastructure Flooding



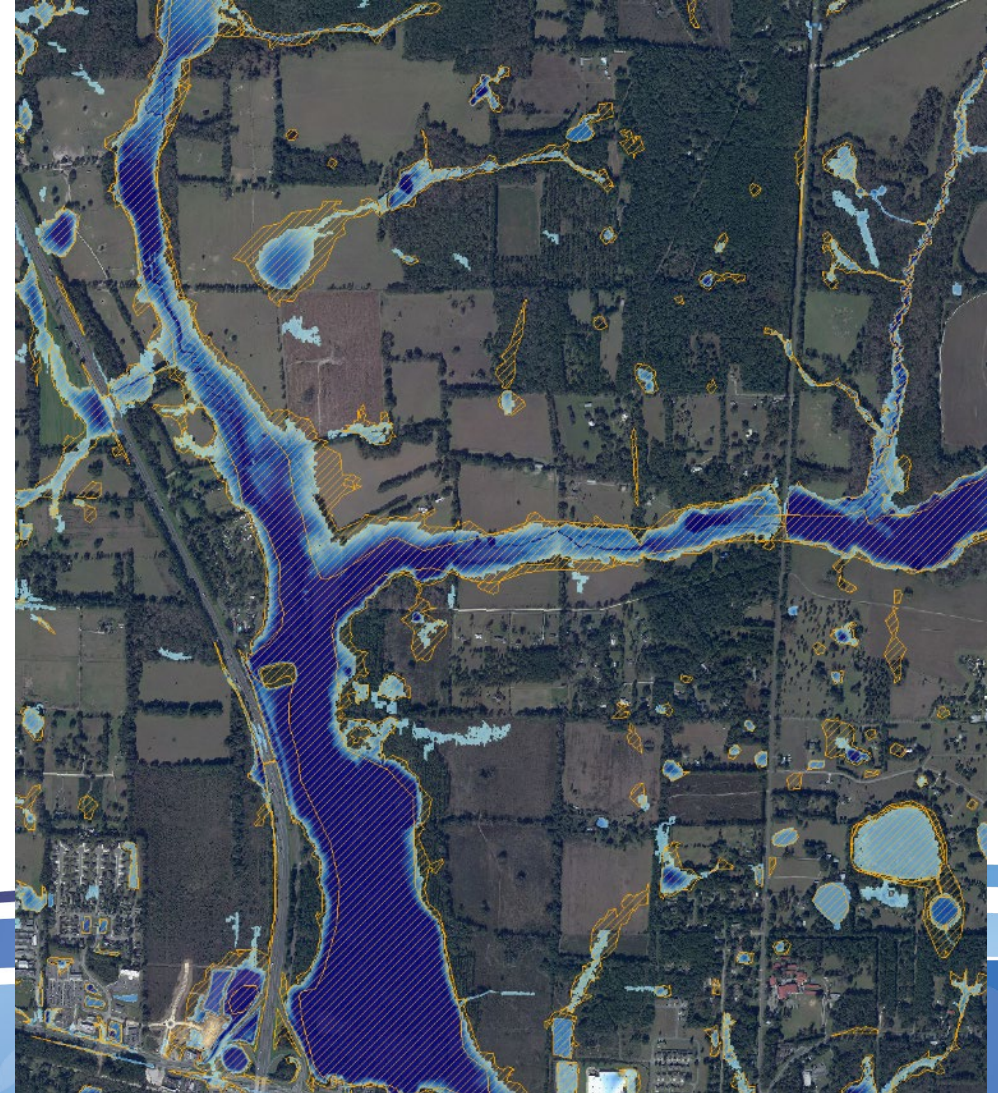
Photos by Alachua County Public Works



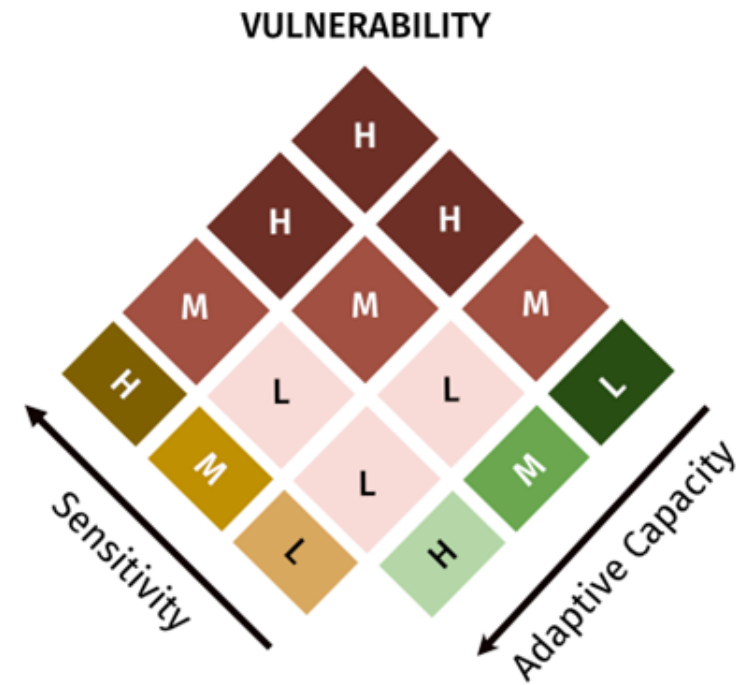
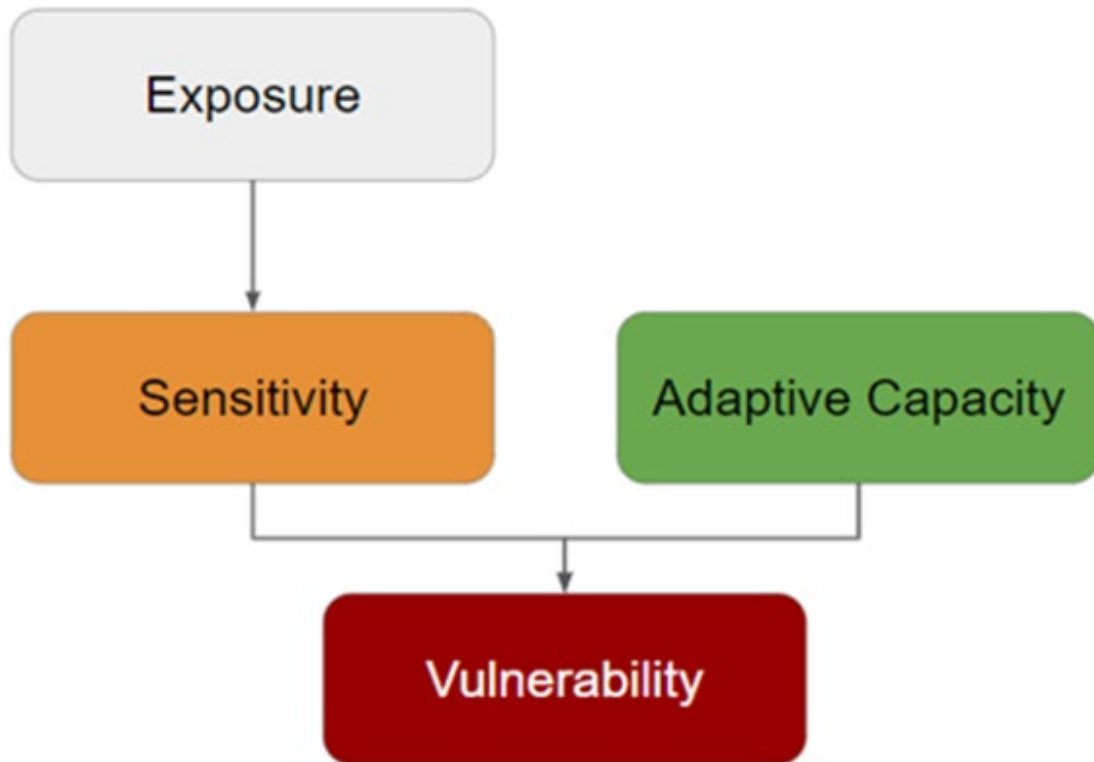
Property Flooding

Countywide Inundation Model

- Over 14,000 stormwater pipes and structures.
- Calibrated against observed flooding from
 - Hurricane Irma (2017) and
 - Tropical Storm Elsa (2021).
- Current, 2040, and 2070 conditions.



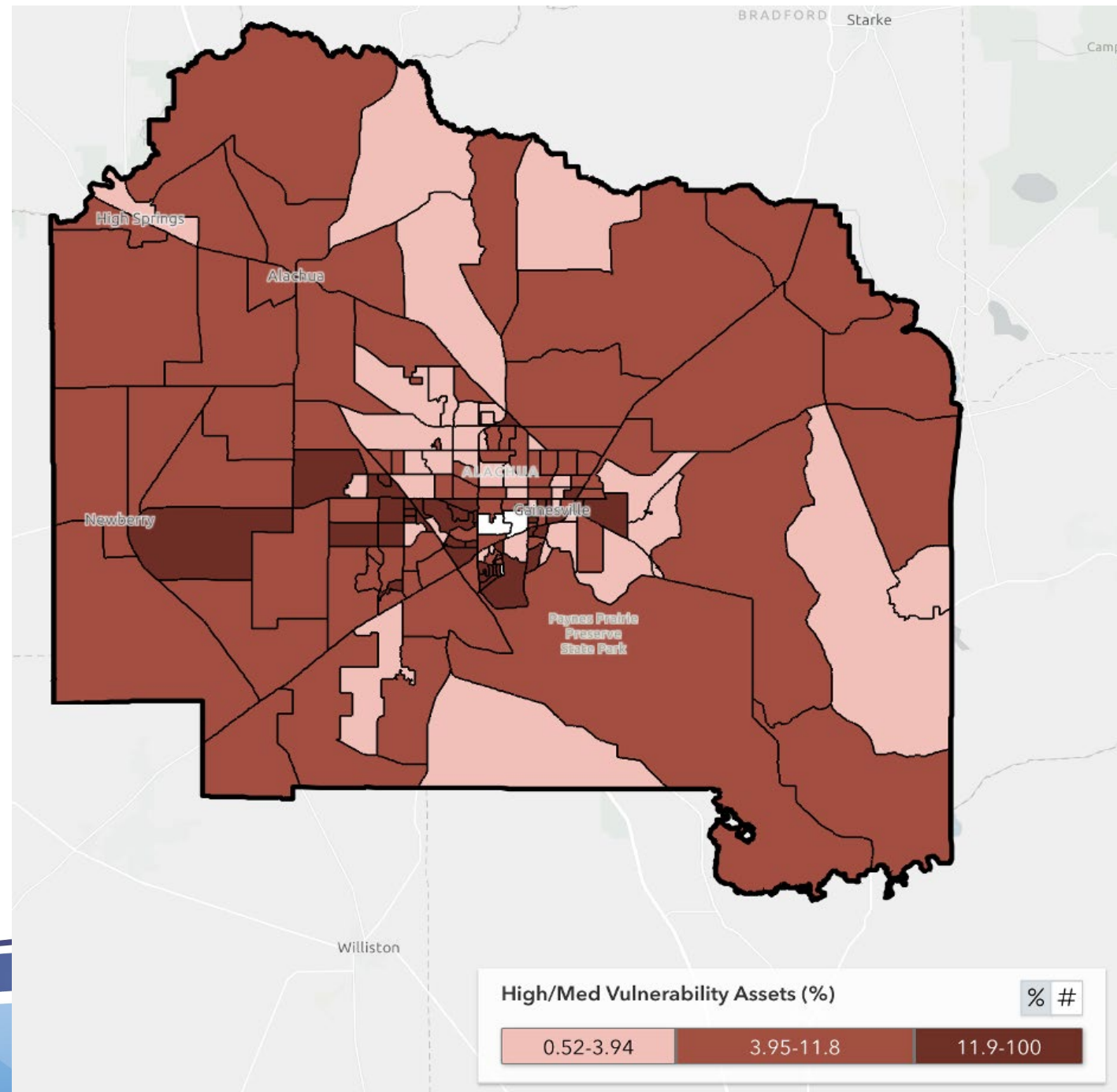
How Do We Measure Vulnerability?




Residential Vulnerability to Extreme Rainfall

**Percent of Residential Properties
Highly Vulnerable to Current
100-Year Rainfall-Induced
Flooding by Census Block Group.**

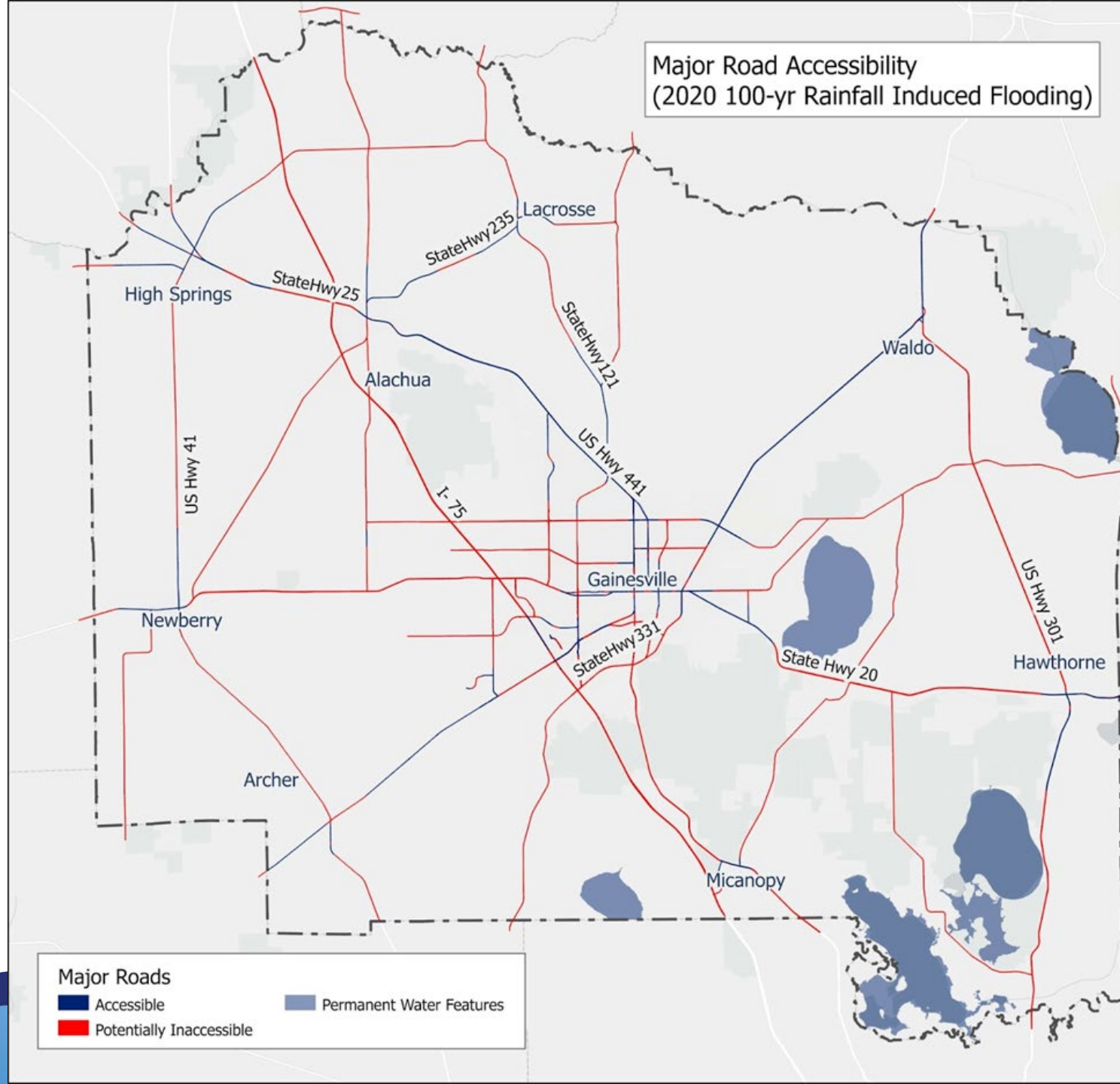
**8% of residential properties
were highly vulnerable
countywide in 2020, This will
rise to 12% in 2040 and 15% in
2070.**



Flooding on Agricultural Land

- Agricultural lands and other undeveloped lands we only measure exposure to flooding.
 - The Vulnerability Analysis determined that 51% of all undeveloped land was exposed to flooding in 2020.
 - This will rise to 60% in 2040 and 64% in 2070.
- 

Major Road Accessibility
(2020 100-yr Rainfall Induced Flooding)



Major Roads

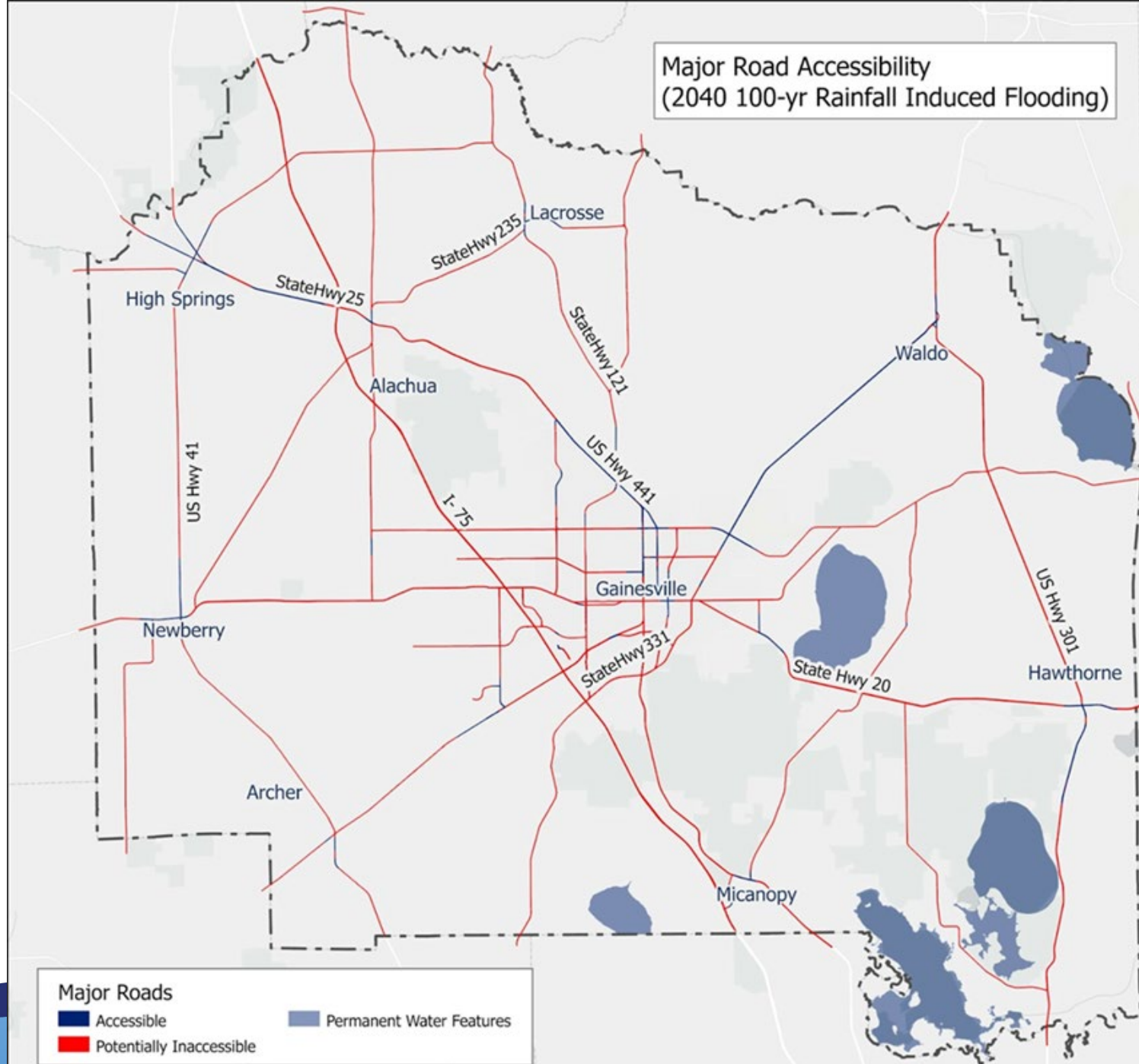
- Accessible
- Potentially Inaccessible
- Permanent Water Features

Major Road Accessibility
(2040 100-yr Rainfall Induced Flooding)

Major Roads

- Accessible
- Potentially Inaccessible

Permanent Water Features

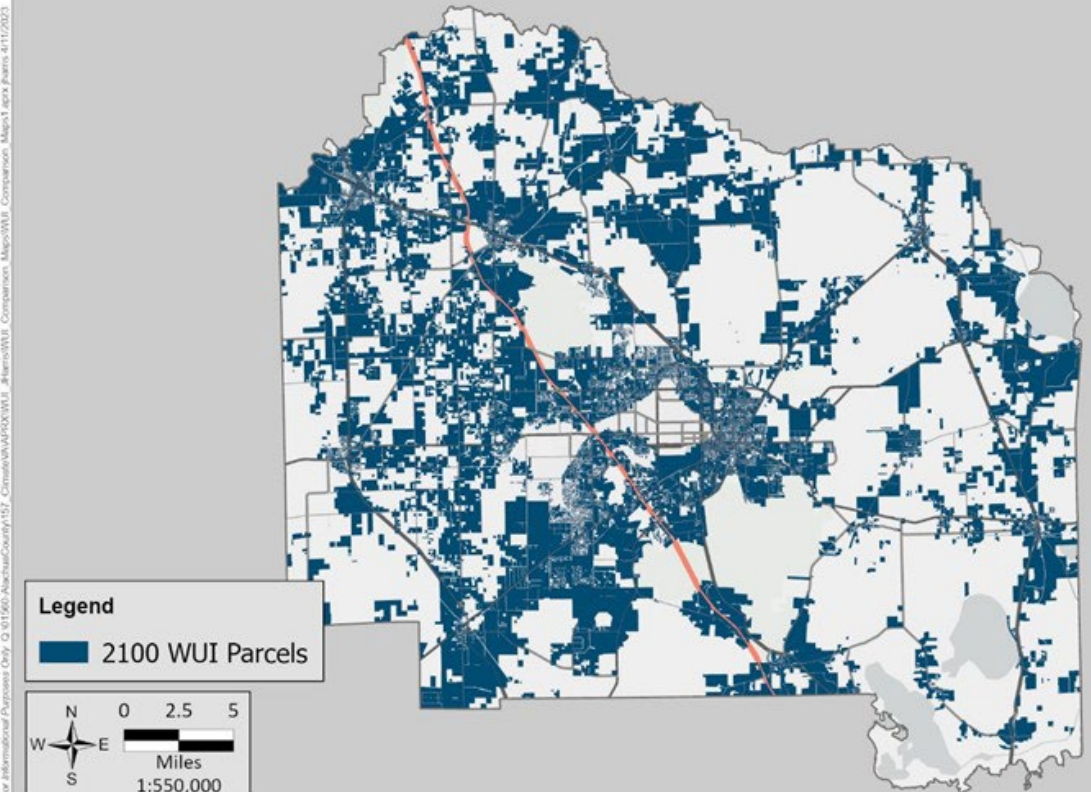
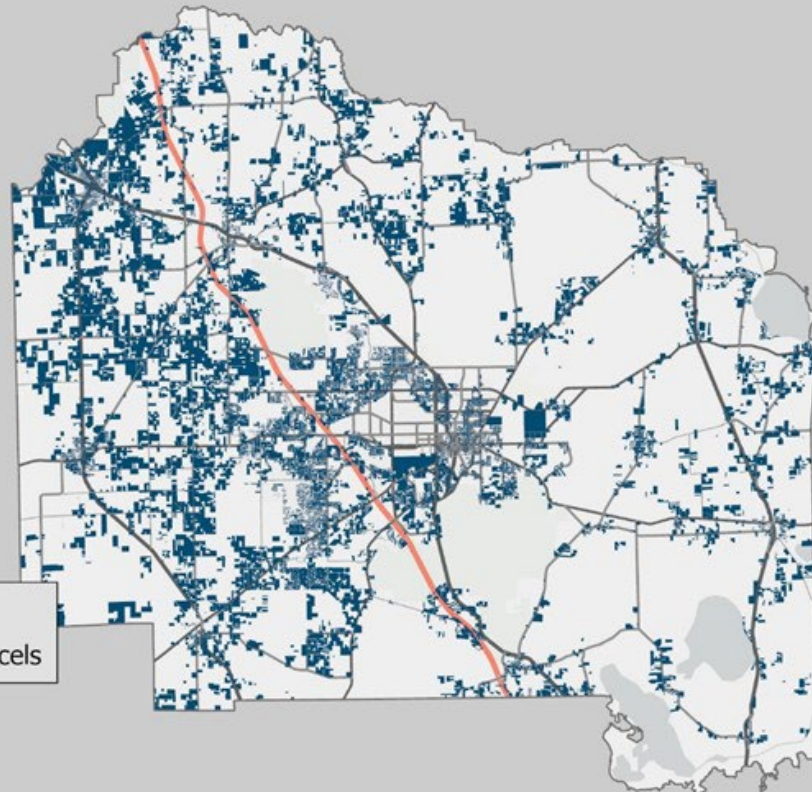


Other Impacts

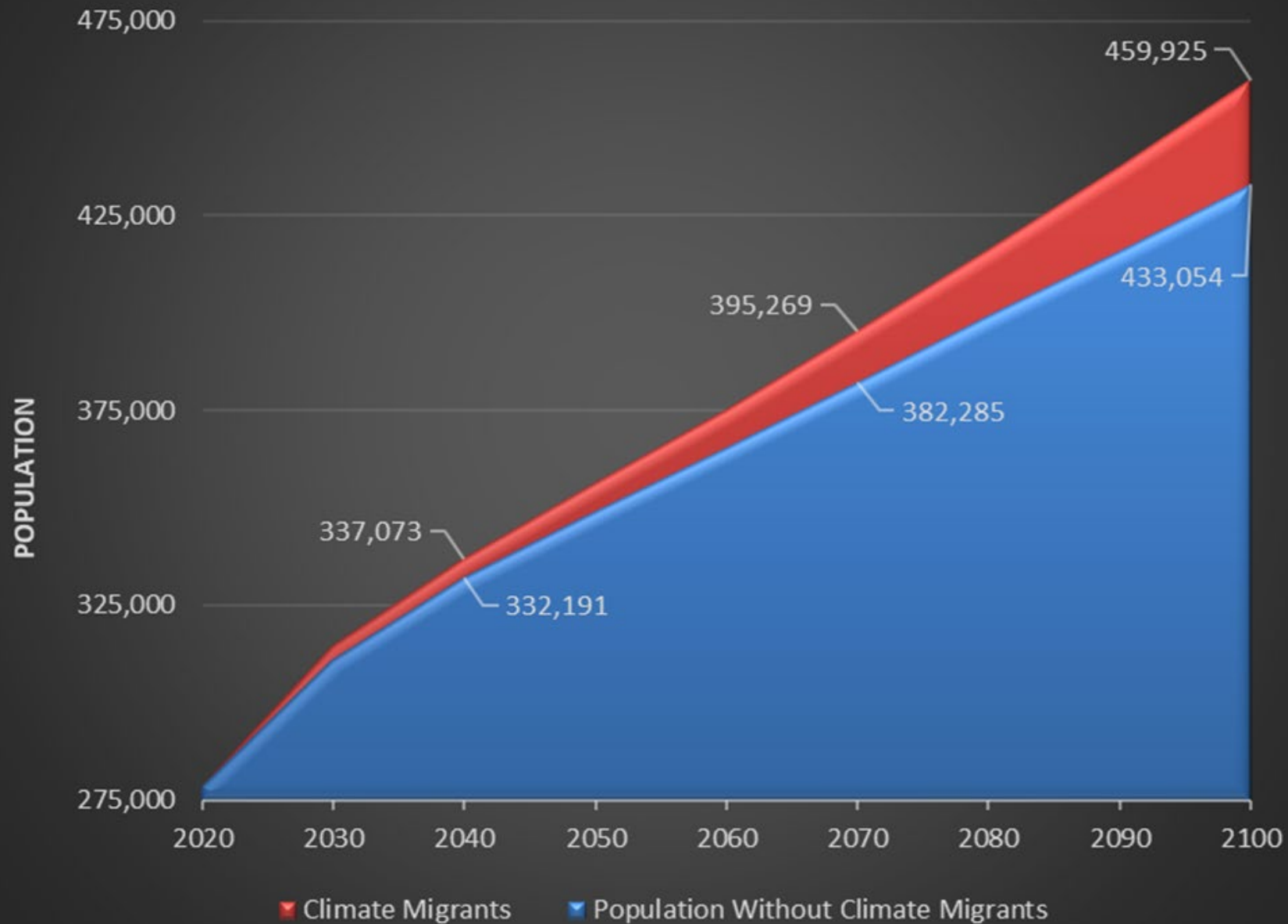
- Drought and extreme temperatures, combined with more extreme precipitation can increase soil erosion.
- Increase in wildland-urban interface combined with drought will increase wildfire risk.
- Migration:
 - Out of rural areas due to economic losses
 - increased development pressure due to migration from coastal areas

Wildland Urban Interface

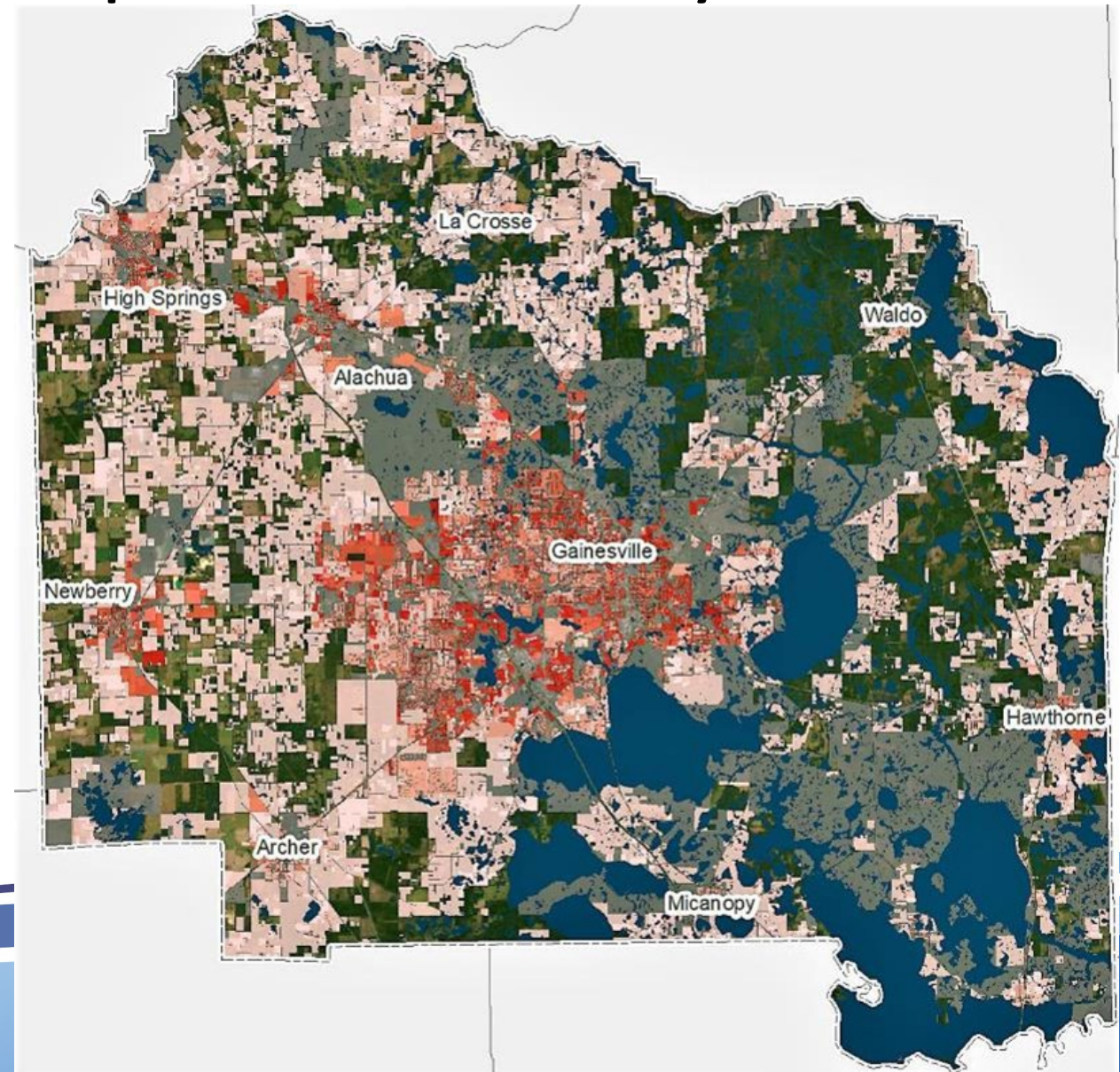
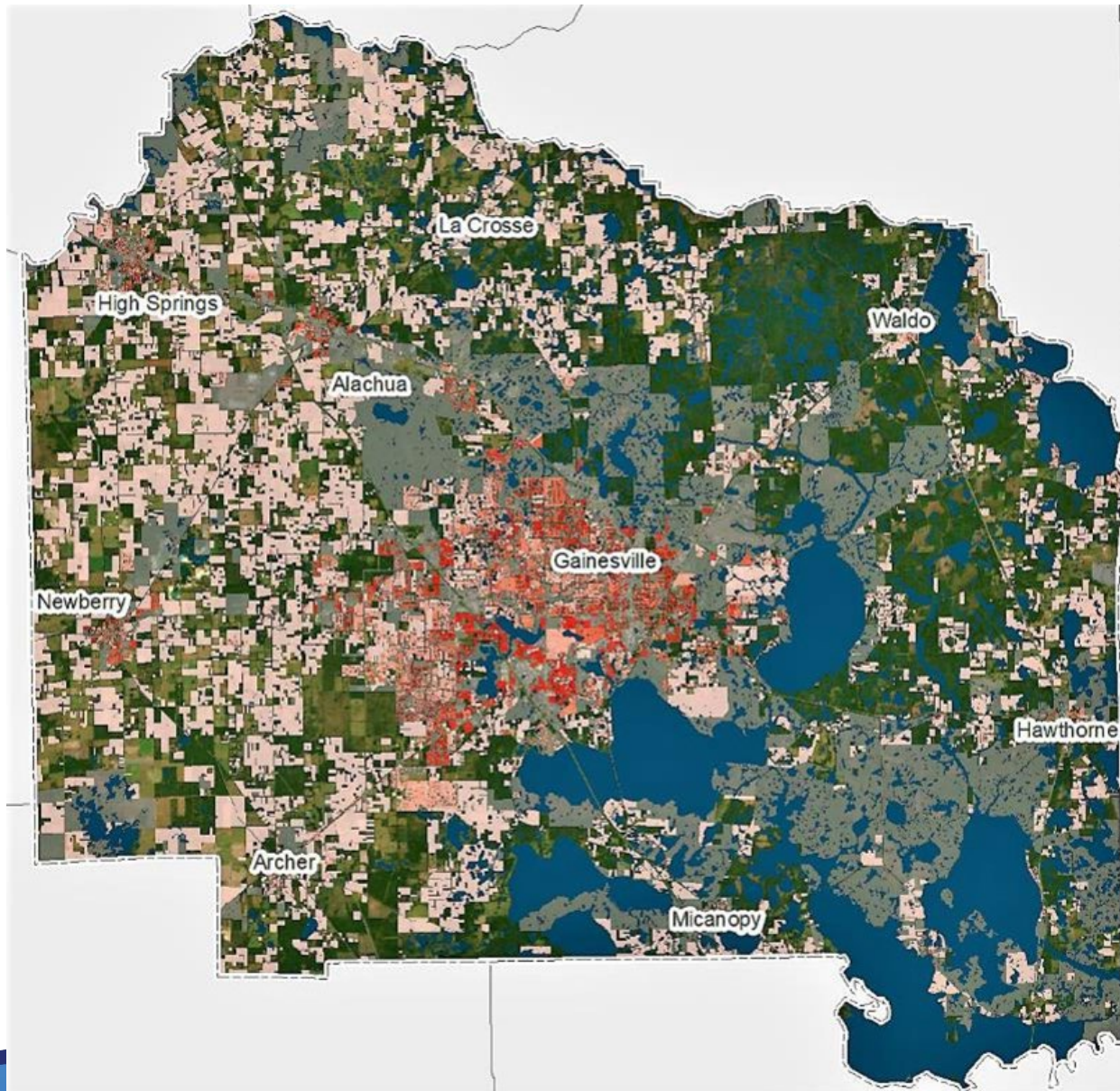
Wildland Urban interface will increase with population growth.
33% increase by 2040, 67% by 2070, 97% by 2100



BEBR Population Projections for Alachua County Including Climate Migrants



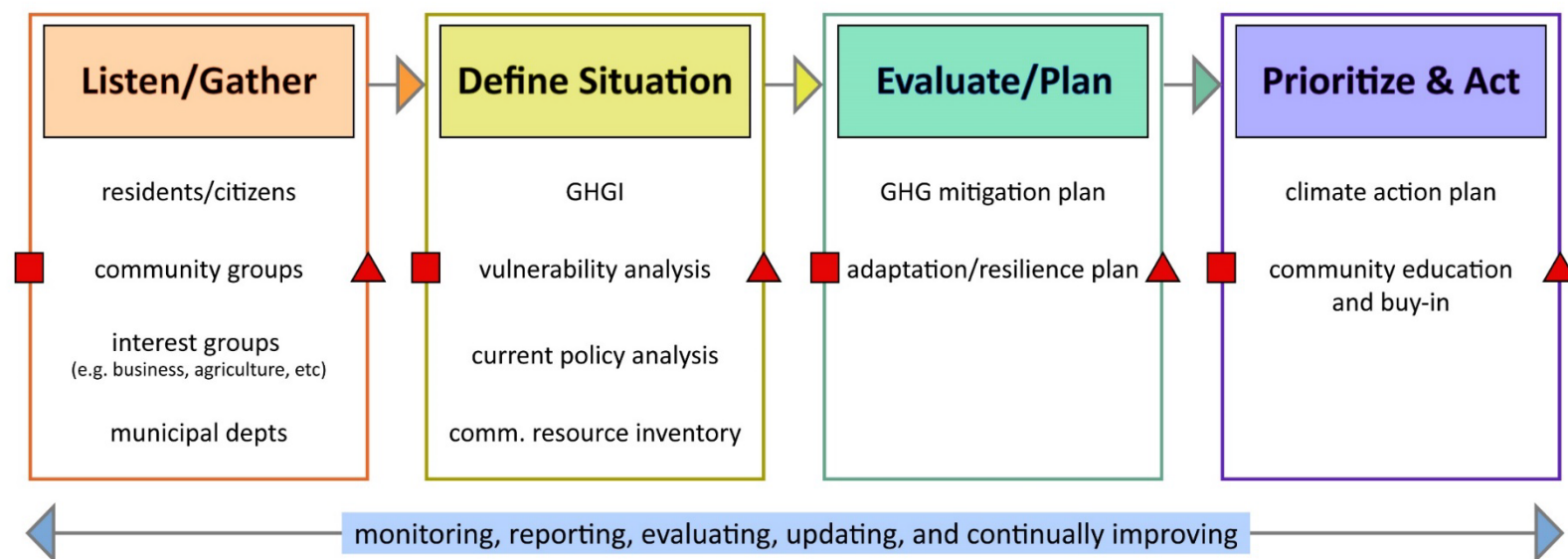
Current and 2100 Population Density



Next Step: Climate Action Plan

- The results will be used to evaluate and plan where adaptation efforts are needed.


Climate Action Planning Process: Phases



*adapted from "Guiding Principles for City Climate Action Planning", UN Habitat for a Better Urban Future

■ Beginning of Phase <ul style="list-style-type: none">define benchmarkscreate plan of actiondetermine timelinecriteria to move on	▲ End of Phase <ul style="list-style-type: none">summation of findingscriteria to move on met?
--	--

Potential Action Areas

- Physical Infrastructure
 - Implementing water management and conservation strategies
 - Investing in climate-smart agriculture and technologies
 - Policy
 - Requiring sustainable land management practices to prevent soil erosion
 - Implement policies that can reduce heat related injury and illness
 - Planning
 - Hold planning exercises with farmers to understand impact of climate change
 - Ensure existing agricultural land is protected when planning for population growth
- 

Potential Action Areas

- Communication
 - Promoting drought-resistant and heat-tolerant crop varieties
 - Educate farmers and workers on the health risks of extreme heat
- Finance
 - Find methods to support farmers and farm workers with financial assistance during challenging seasons



Questions?