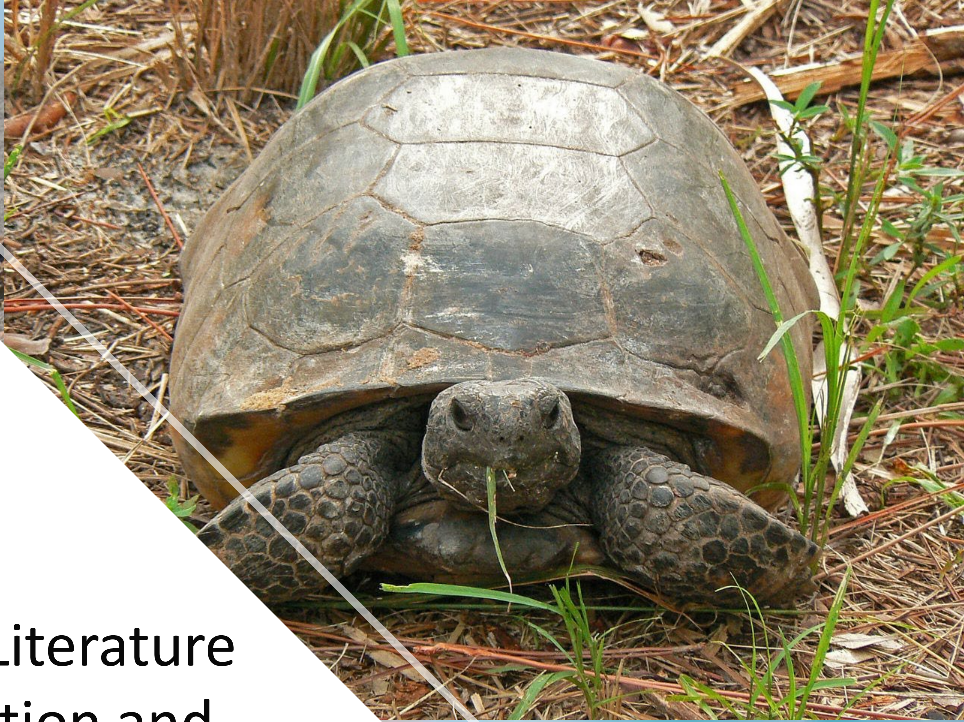
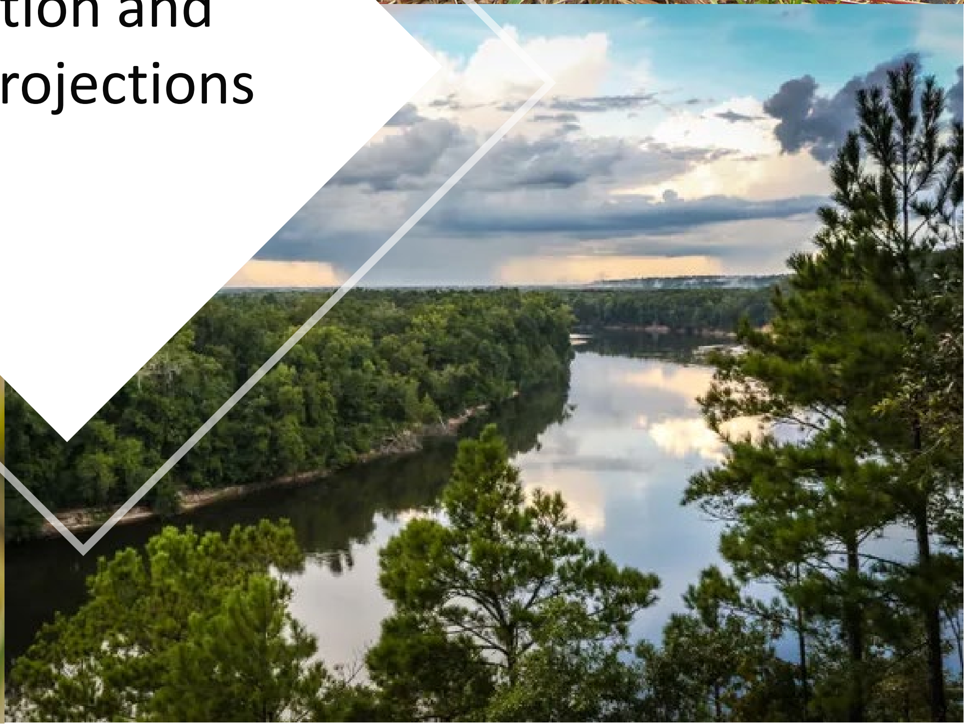



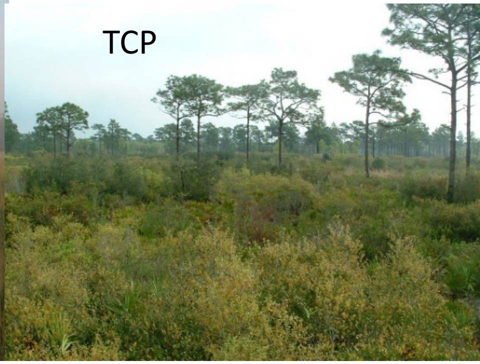
Climate Literature Information and Climate Projections

Climate change in Florida - projected changes for temperature and rain

How are temperature and rain predicted to change by 2050?

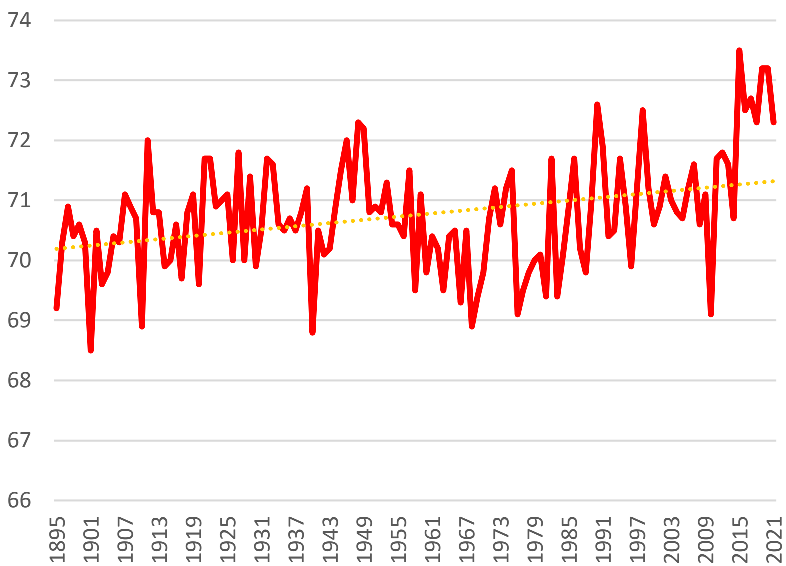
- For each of the four CCI campuses?



Climate change– Florida mean temperature

FL state-wide mean annual temp (ºF) (1985-2020)

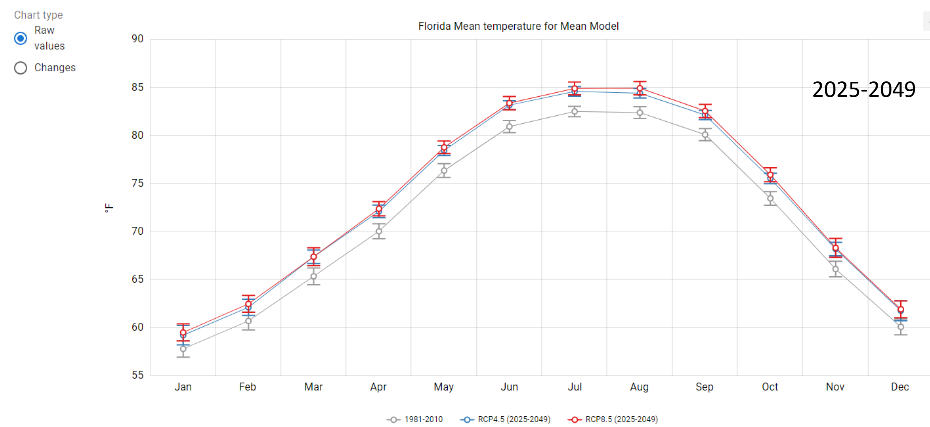
data from the National Climatic Data Center, Asheville NC

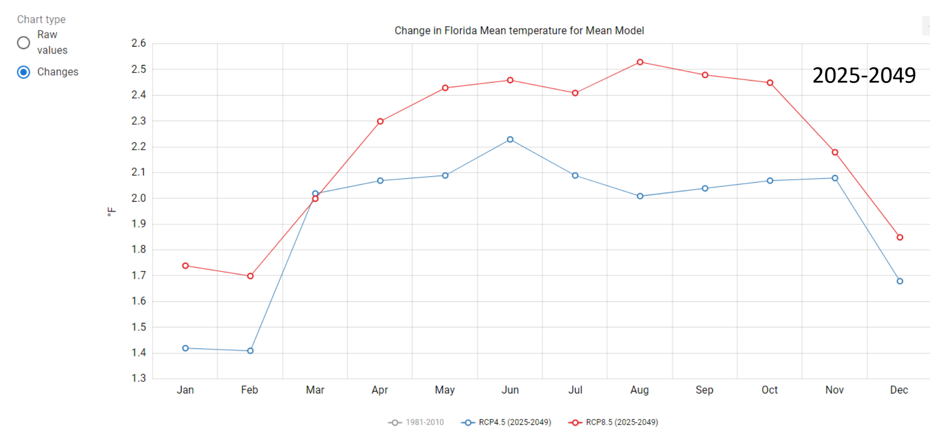


- Temperature has increased and will continue to increase
- Both mean highs and lows will increase

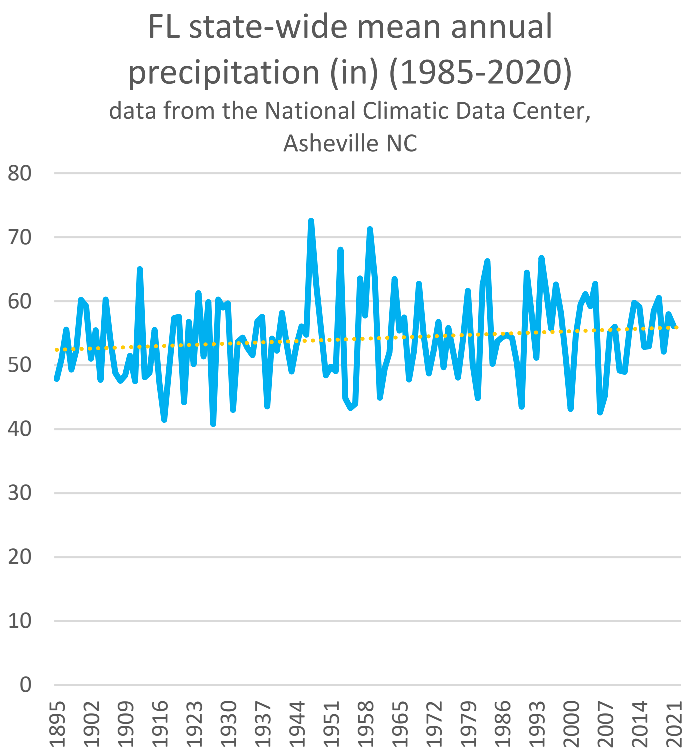
Temperature change projections

From USGS National Climate Change Viewer

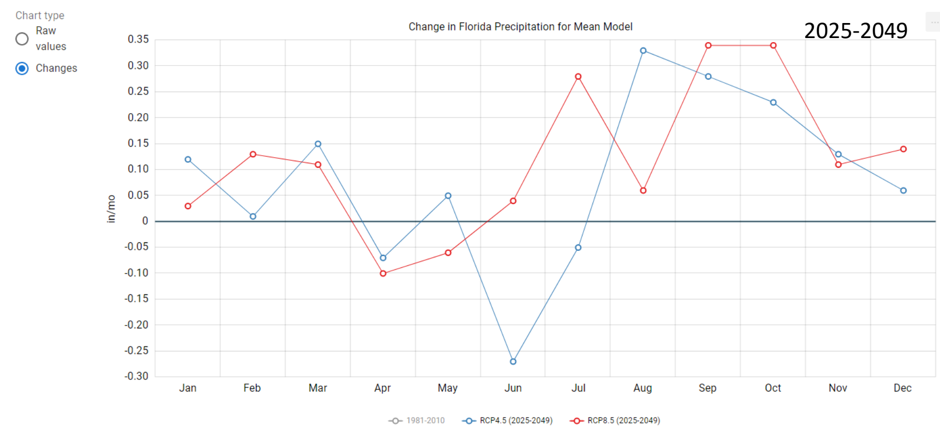


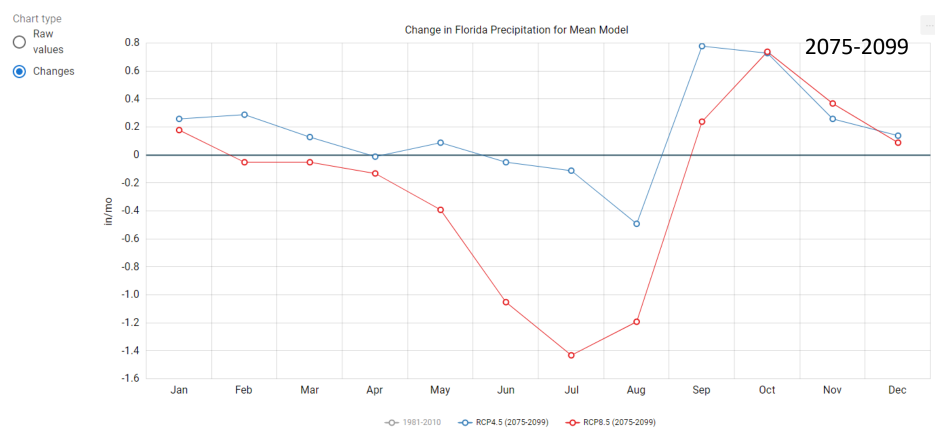


Climate change projections – Florida mean precipitation



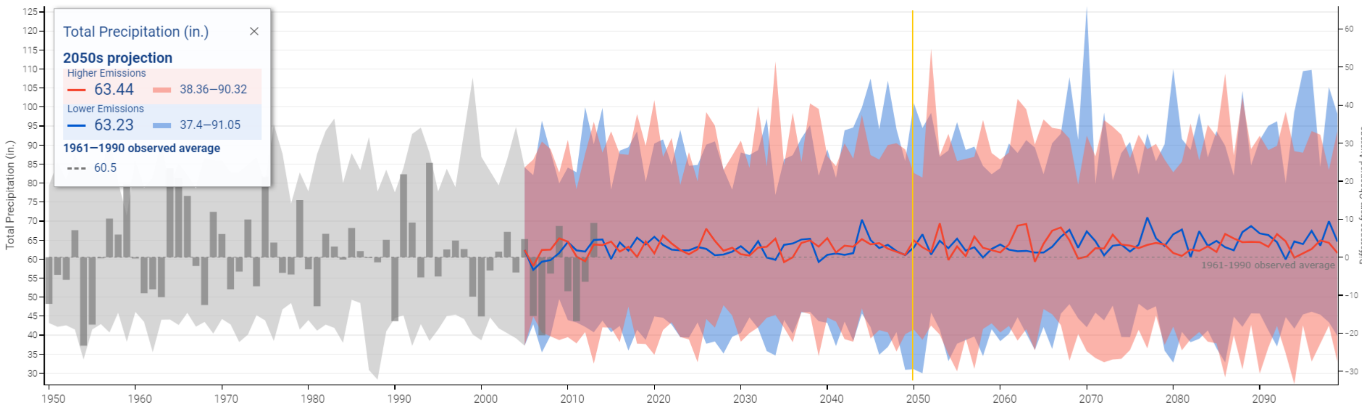
Precipitation change projections
From USGS National Climate Change Viewer





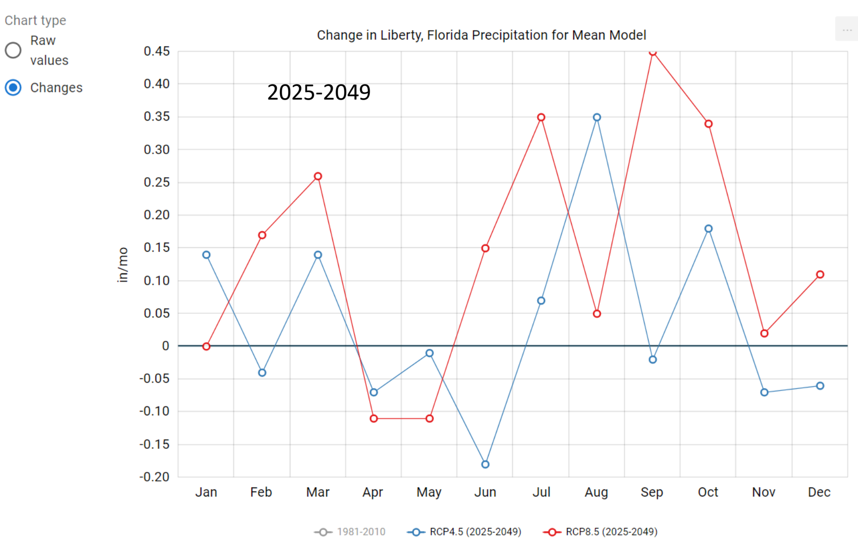
- Annual rain has slightly increased and will continue to increase
- Long-term rain pattern shift - less in summer and more in the fall
- Heavier rain, but less rainy days and hotter summers will lead to more drought
- More frequent and intense hurricanes

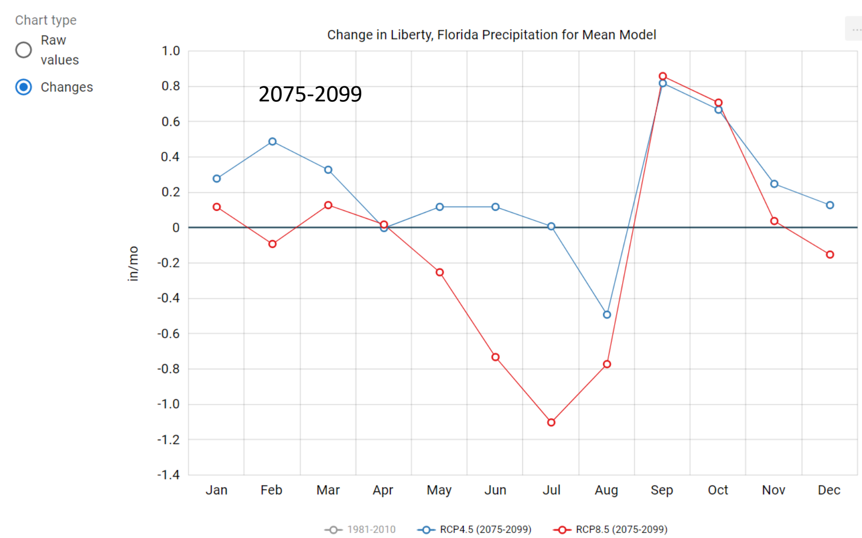
Climate change projections –**ABRP** (Liberty County) mean precipitation



from the NOAA/NEMAC Climate Explorer

Observations | Modeled History | Lower Emissions | Higher Emissions

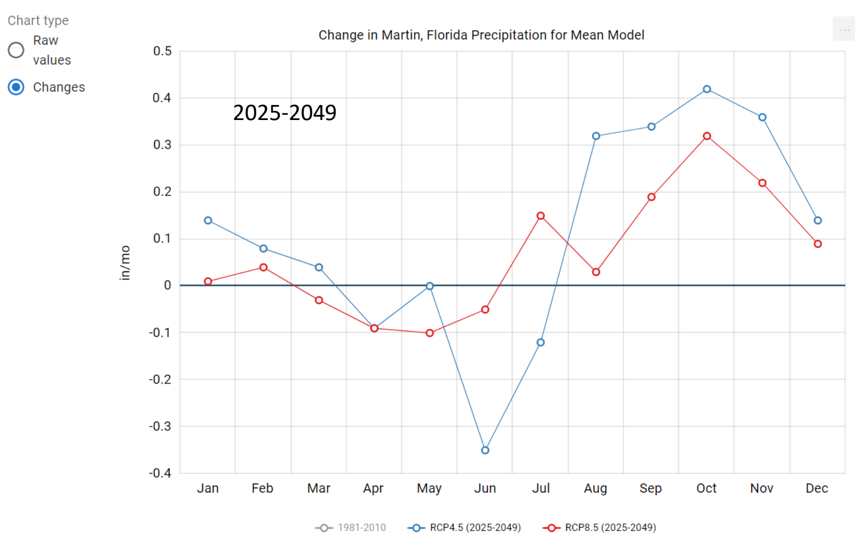


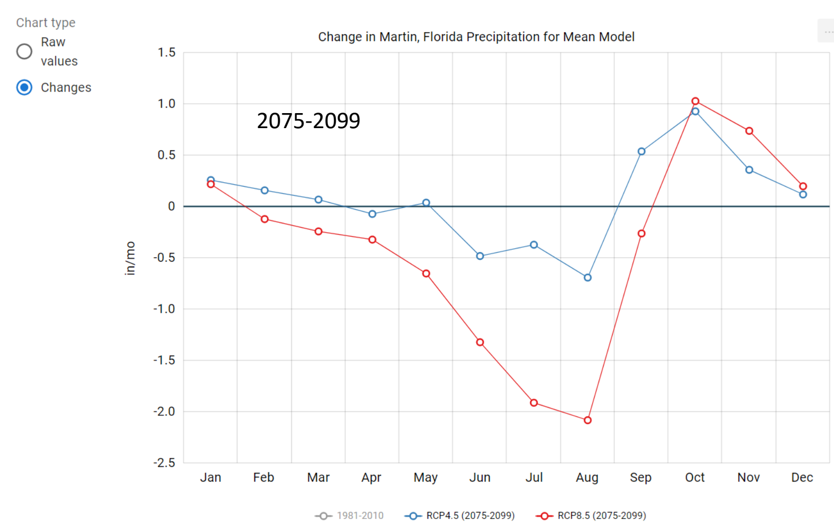


From USGS National Climate Change Viewer

Climate change projections –**BRP** (Martin County) mean precipitation

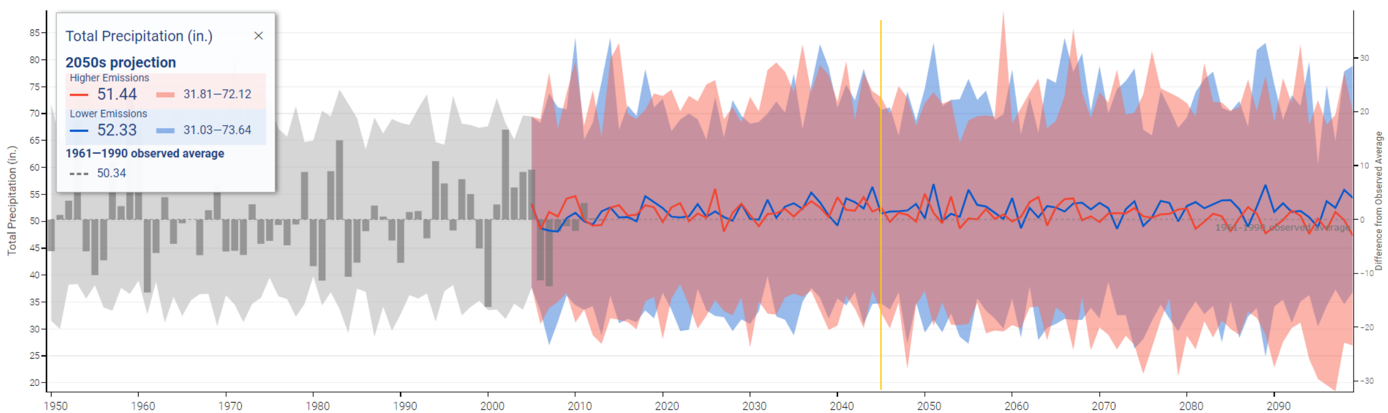
from the NOAA/NEMAC Climate Explorer



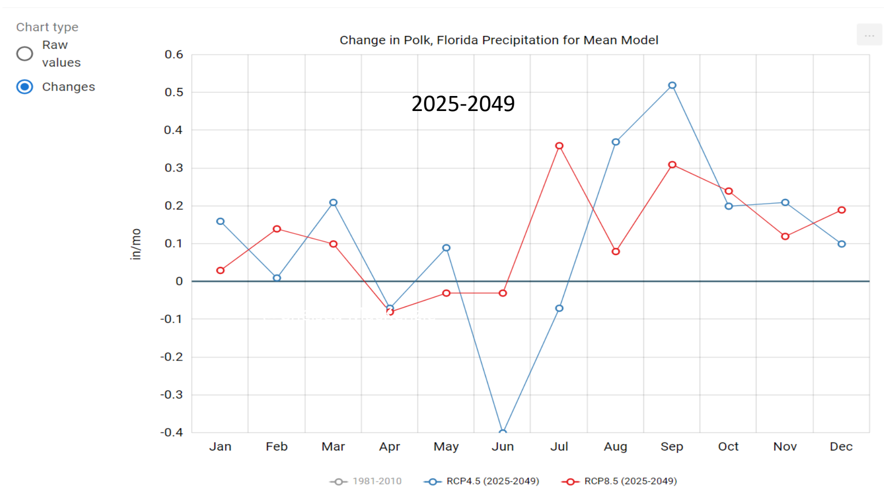


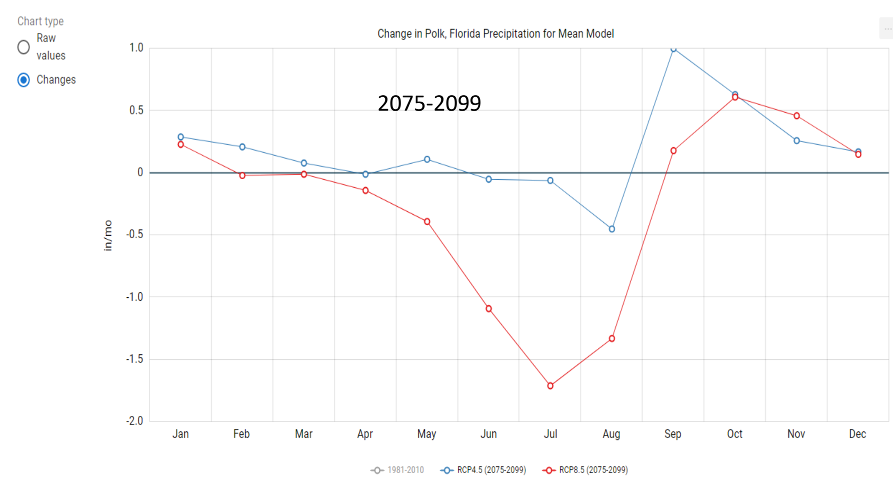
From USGS National Climate Change Viewer

Climate change projections – **DWP/TCP** (Polk and Osceola Counties) mean precipitation



from the NOAA/NEMAC Climate Explorer





From USGS National Climate Change Viewer

Climate change projections – Preserve summaries

Projected Changes (2025-2049)									
	Max T			Min T			Rain		
	1961-1990	RCP4.5	RCP8.5	1961-1990	RCP4.5	RCP8.5	1961-1990	RCP4.5	RCP8.5
ABRP	78.7	+3.4	+4.3	56.1	+3.4	+4.3	60.5	+2.73	+2.94
BRP	83	+3.6	+4.7	64.4	+3.4	+4.5	50.19	-0.49	-0.69
DWP/TCP	83.7	+3.4	+4.5	61.7	+3.5	+4.6	50.34	+1.99	+1.1

Climate change projections –Drought

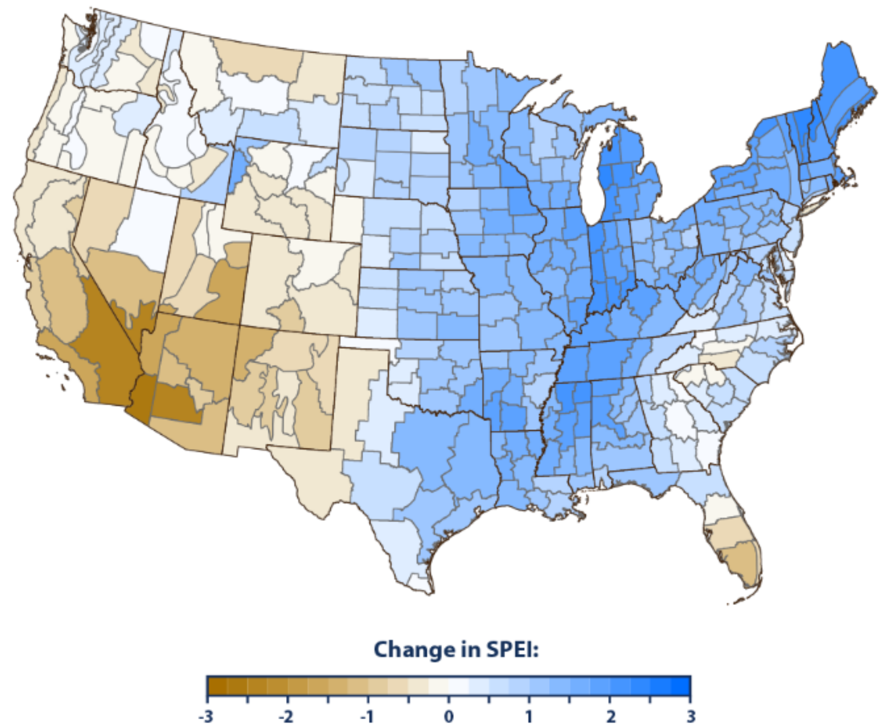
Droughts may be more frequent and of longer durations

↑Temp → ↑ET → ↑PPT, ↓Soil moisture

Notes from SECASC

- Heavier rain events with more dry spells in between
- Higher temps will lead to fewer wetting rain days, high VPD, and increased frequency of flash drought

Figure 3. Average Change in Drought (Five-Year SPEI) in the Contiguous 48 States, 1900–2020



SPEI – standardized precip – ET index

This map shows the total change in drought conditions across the contiguous 48 states, based on the long-term average rate of change in the five-year SPEI from 1900 to 2020. Data are displayed for small regions called climate divisions. Blue areas represent increased moisture; brown areas represent decreased moisture or drier conditions.

Data sources: WestWide Drought Tracker, 2021;[10] PRISM, 2021[11]

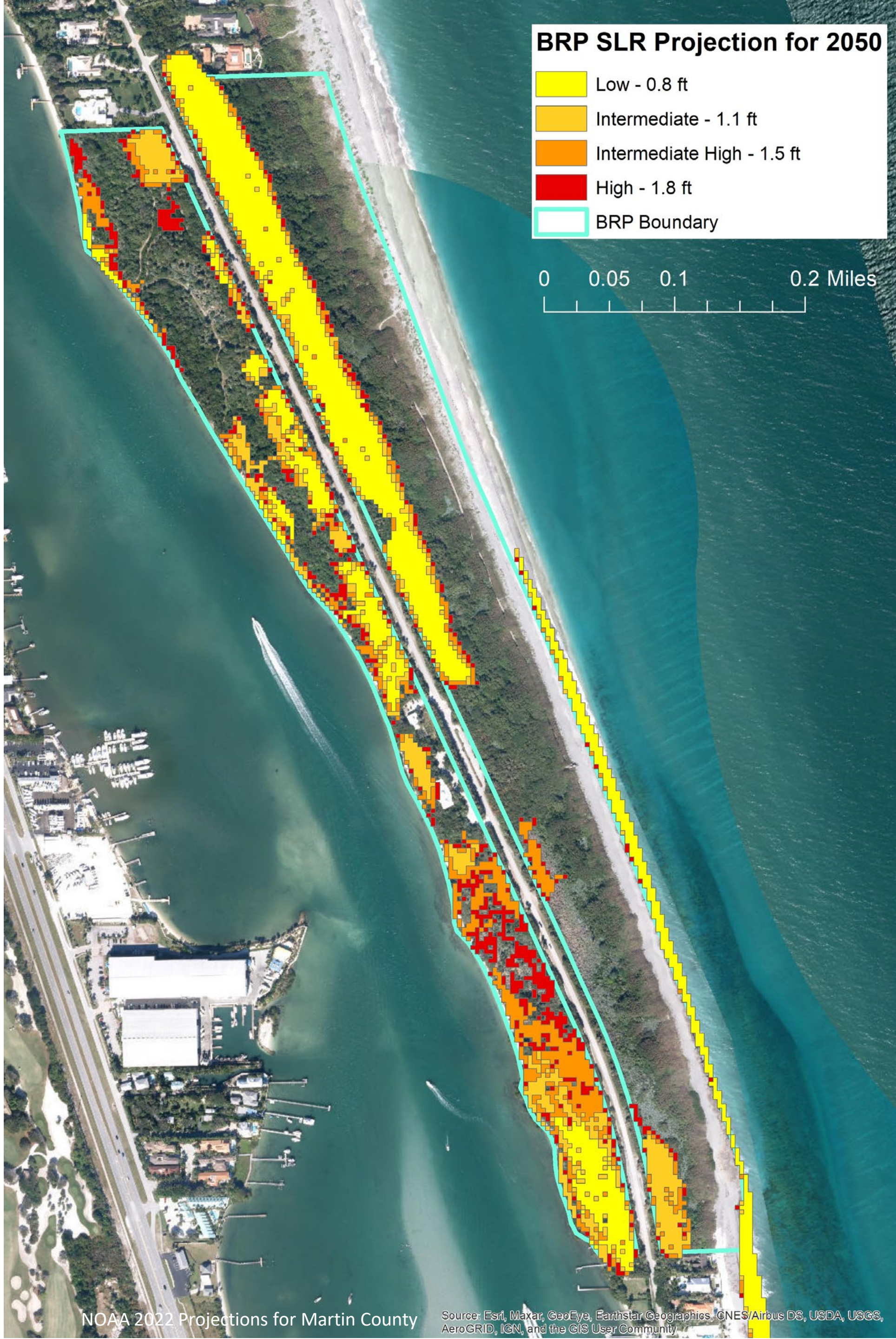
Web update: April 2021

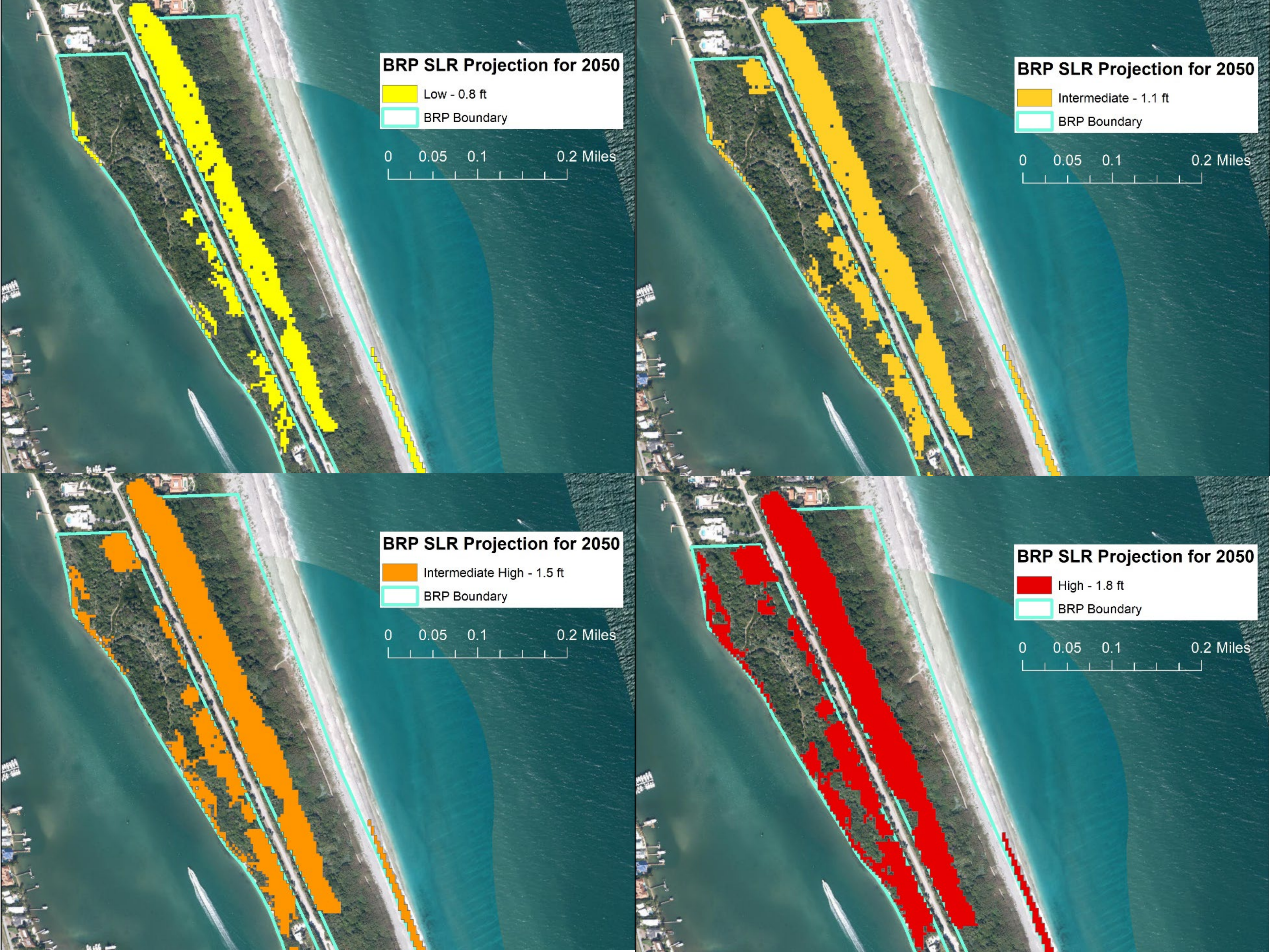
From EPA.gov/climate-indicators

SLR Projections

- NOAA's 2017 Martin County SLR GIS data
- NOAA's 2022 projections for SLR in the Southeast
  - Intermediate to Intermediate High are most likely scenarios

NOAA 2022 Report – 2050 Projections
Low = 0.92 feet
Intermediate = 1.18 feet
Intermediate High = 1.41 feet
High = 1.61 feet





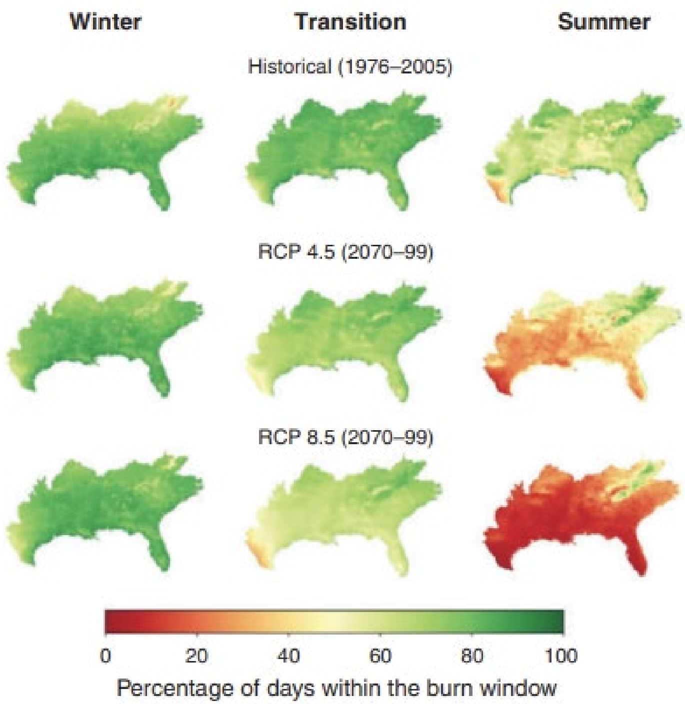
BRP SLR Projection for 2050
Low - 0.8 ft
BRP Boundary
0 0.05 0.1 0.2 Miles
BRP SLR Projection for 2050
Intermediate - 1.1 ft
BRP Boundary
0 0.05 0.1 0.2 Miles
BRP SLR Projection for 2050
Intermediate High - 1.5 ft
BRP Boundary
0 0.05 0.1 0.2 Miles
BRP SLR Projection for 2050
High - 1.8 ft
BRP Boundary
0 0.05 0.1 0.2 Miles

Prescribed Fire

- Future of prescribed burns:
  - Less often
  - More complex
  - More intense burns = riskier
  - More costly
  - Suitable burn days to decline from ~15 to < 2-6 per month from May – August
  - Burning in fall may compensate for the loss of burn days in the summer
  - Conduct early morning burns
  - Take advantage of days that are suitable even if they're during weekends/holidays
  - Urbanization and smoke management
  - Flash drought
  - Wildfires

- Variables to consider:
  - temp
  - humidity
  - wind speed
    - will vary depending on understory density and height and canopy tree density
  - fire behavior
  - targeted fire effects to meet predetermined objectives
  - moisture dynamics of forest fuel
  - rate of fire spread
  - vertical transmission of heat

Prescribed Fire



Kupfer et al. 2020

- > Relative humidity = less fuel combustion = lower fireline intensity = patchier burn
- Increase in fire frequency:
  - Reduce carbon stock
  - Shift from soil carbon to tree carbon as dominant pool
  - Reduce carbon storage
  - Reduce understory plant productivity
- Increase in fire frequency ≠ increase in any of the carbon pool sizes or flux rates
- Relative plant stress may or may not impact the post-fire effects, especially with mortality due to drought stress

Carbon sequestration: is the process of capturing and storing atmospheric carbon dioxide
Carbon storage: is the total amount of carbon contained in a forest
Carbon stock/pool: is a system that has the capacity to store or release carbon
Flux: Processes that transfer carbon from one pool to another


W. A. Djatmiko

Invasive Species

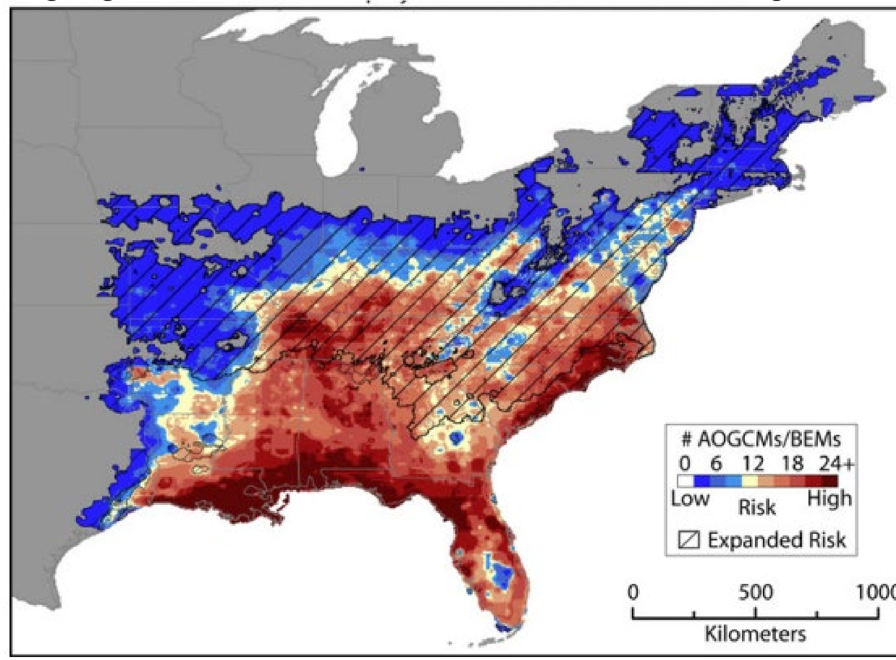
- Climate change and invasives are highly interconnected
  - Managing for one most likely will benefit the other
- Climate change will potentially exacerbate negative impacts to ecosystems that are already occurring due to invasives
- Combined effect of climate change and invasives may be no worse than invasions alone
- Preventing new invasive species from being established will aid in our goal to make our preserves climate resilient
- Climate change can facilitate invasions and invasions can increase magnitude of climate impacts on people
- Be aware of potential invasives and what conditions they need to thrive
- Due to uncertainty it's important to do a model ensemble

Invasive Species

- Some invasive species of current and future concern:
  - Cogon grass
  - Kudzu
  - Privet
- Privet & kudzu have similar spatial extents
- Cogon grass is very high risk all throughout FL
  - Current risk concentrated in more southern portions of SE then is the case for privet and kudzu
- Risk of kudzu invasion is high across SE
  - Not as much all over FL
  - somewhat in North & Central FL
- Privet invasion high across SE US
  - Medium risk of privet invasion throughout North FL
  - Privet may already exist in northern states – used in landscaping – causing more rapid expansion with climate change
- Risk assessments
  - Species specific risk assessments = critical to land management

<u>BEMs</u>: bioclimatic envelope models
<u>AOGCM</u>: atmosphere-ocean general circulation models

Cogon grass climatic habitat distribution with climate change



Ensemble of AOGCM and BEM projections at 95% occurrence level
B. A. Bradley et al.