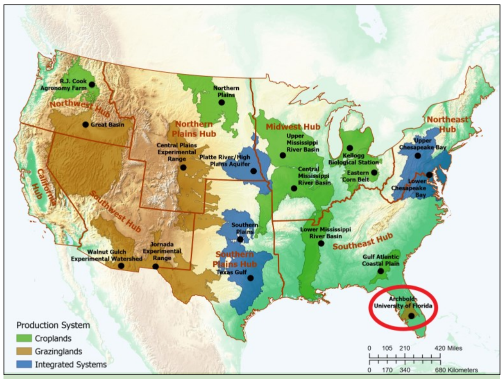
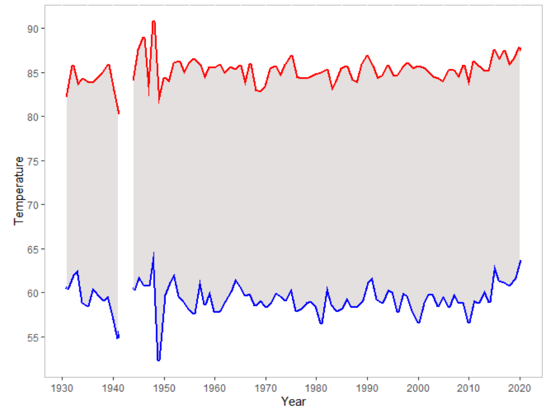
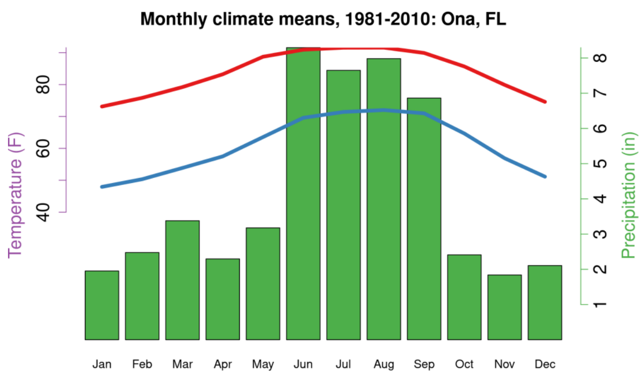
Archbold - University of Florida (ABS-UF)

The LTAR Network and [USDA Climate Hubs](#) are working to develop knowledge and technology for sound resource-management via research with partners. The goal is to ensure sustained crop + livestock production and ecosystem services from agroecosystems, and to forecast and verify the effects of environmental trends, public policies, and emerging technologies.





Average annual temperature variation, plotted from daily min/max temperatures at site from 1931-2020 *(credit: Archbold Biological Station).*



Monthly precipitation, minimum, and maximum temperature for the thirty-year period 1981-2010. *(credit: Sarah Goslee, climatetoolbox.org)*

Location and Climate

ABS-UF is comprised of Archbold Biological Station's Buck Island Ranch and University of Florida's Range Cattle Research and Education Center located in Highlands and Hardee counties, South Central Florida. ABS-UF falls within the [USDA Southeast Climate Hub](#) region and represents subtropical humid grazinglands.

Historic Temperature

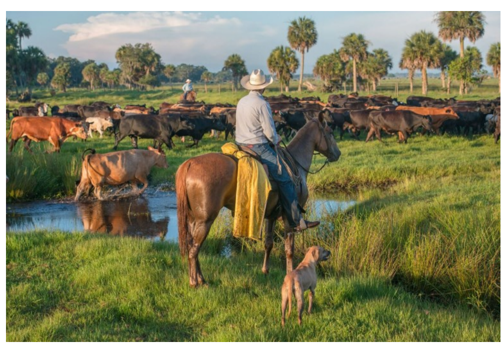
The mean, maximum and minimum average annual temperature (1952-2018) is 68°F, 85°F and 59°F with record daily high/low of 110°F/13°F.

Historic Precipitation

Average annual precipitation (1932-2019) is 54 in, with more than 60 % falling during June to September. Historical annual precipitation varies almost three-fold (693– to 1949-mm from 1945-2019).

Growing Season

Growing season typically ranges from February/March to September/October; however the lack of frost and freezes most years, and proper moisture conditions allow year-round growth of many forage species.



Measuring Weather and Climate

A network of weather stations have monitored weather since the 1940s. The subtropical humid climate is characterized by long wet summers and dry cool winters. Atlantic hurricanes impact nearly yearly. Highly localized convective thunderstorms of short duration occur during summer months. Daily rainfall varies from 0.01 - 16.02", much of which is lost via ET.

Impacts to Agriculture

Agricultural production in the region is challenged by large seasonal and interannual variability in rainfall. Future climate projections in FL indicate the likelihood of shifting precipitation seasonality, with increasing magnitude and frequency of heavy rainfall events and longer dry spells (Stefanova et al. 2012, Infanti and Kirtman 2014, Kirtman et al. 2017). Heavy rains may cause flooding in summer, reducing grass growth and decreasing land availability for grazing, while increasing rainfall in the dry season may increase forage production.

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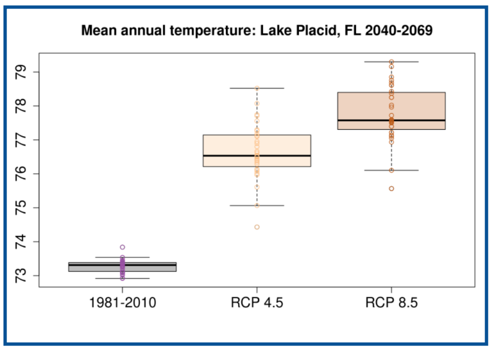
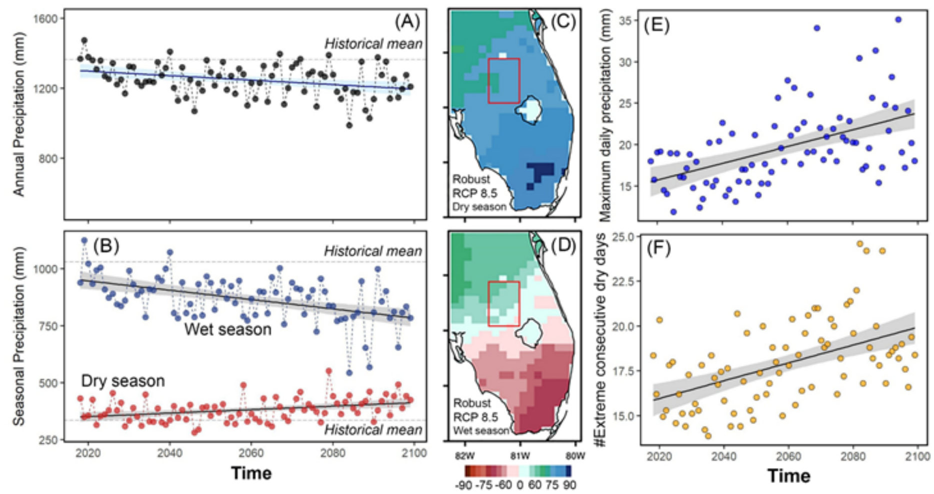
Climate Change projections

Both average and extreme temperatures are projected to increase considerably under all greenhouse gas emissions scenarios (RCP 4.5, 8.5). Precipitation is also projected to vary, with longer dry periods punctuated by extreme high rainfall events, which may lead to increased nutrient loading to sensitive downstream ecosystems such as the Everglades and coastal estuaries.



Mean temperature projections for 2040-2069 for RCP 4.5 and 8.5 (credit: Sarah Goslee, climate-toolbox.org).



Downscaled climate projections up to 2100 under RCP 8.5: Multi-GCM ensemble means for annual precipitation (A), and seasonal precipitation (B); Spatial pattern of robustness (measurement of similarity of multi-model ensemble) to demonstrate uncertainty of precipitation projections for dry (C) and wet (D) season (modified from Infanti et al. In revision with permission); Projections of maximum daily precipitation (E) and # extreme consecutive dry days from estimates of multimodel ensemble. Date source: Brekke et al. (2013) credit: Jiangxiao Qiu

Climate Change Implications for Subtropical Humid Grazinglands

- Florida grazinglands encompass cultivated pastures (i.e. improved pastures), semi-native pastures and native rangelands representing a gradient of intensification. These grazinglands differ in many ways, especially in terms of plant diversity with cultivated pastures dominated by warm-season grass species such as bahiagrass (*Paspalum notatum*) whereas native and semi-native rangelands are composed of a diverse set of desirable and undesirable grass and non-grass species.
- It is expected that grazingland type will have a strong influence on ecosystem resistance and resilience in response to climate anomalies. Despite being more productive, cultivated pastures are expected to be more sensitive to climate anomalies such as drought compared to more diverse semi-native and native rangelands.
- Florida is in the potential pathway of major tropical storms and hurricanes. As hurricanes are expected to become more intense, impacts on grazinglands (eg flood -limited forage production, off-site nutrient transport) are also expected to worsen. This could have a major impact on cattle production.

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Mitigating climate change through management of grazinglands

- Grazingland soils store up to 30% of global terrestrial C; however, carbon sequestration potential can be affected by climate land management.
- In Florida, grazingland management (prescribed fire, adoption of more productive forage species, nutrient management) is often used to increase forage and animal productivity. Ongoing research investigates how management practices impact carbon sequestration and global warming potential.
- Because the cumulative loss of wetlands has impacted climate regulation, the retention and restoration of remaining wetlands in grazinglands is prudent climate mitigation (Swain et al. 2013).