

Florida Rainfall Characteristics

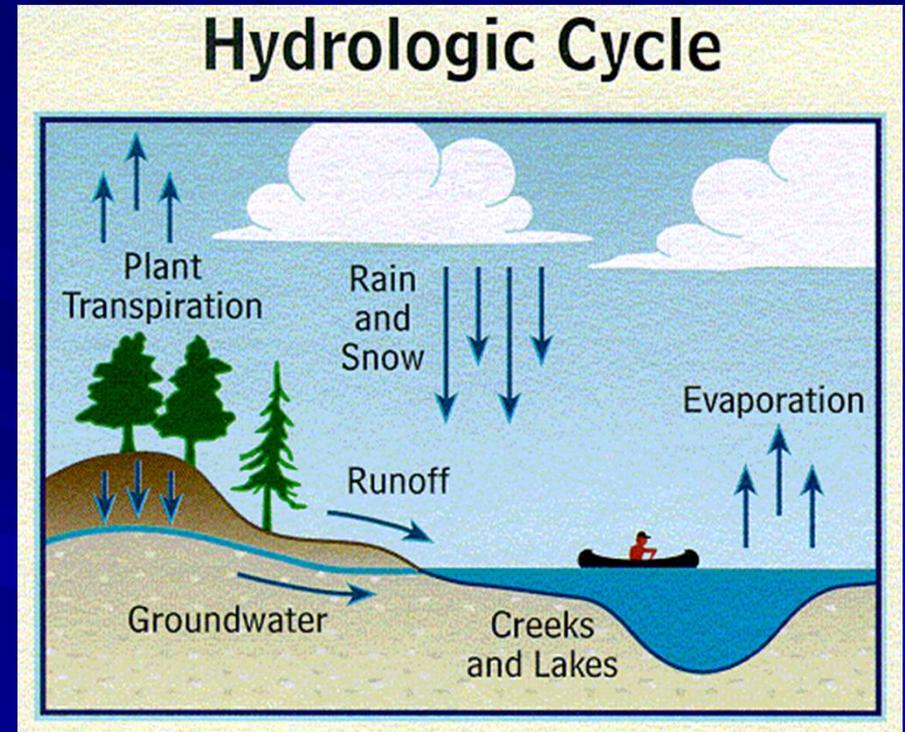
By: Harvey H. Harper

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Precipitation

- Precipitation drives the hydrologic cycle
- The runoff component must be conveyed and treated
- Understanding precipitation is essential to understanding and quantifying runoff



Basic Hydrologic Equation:

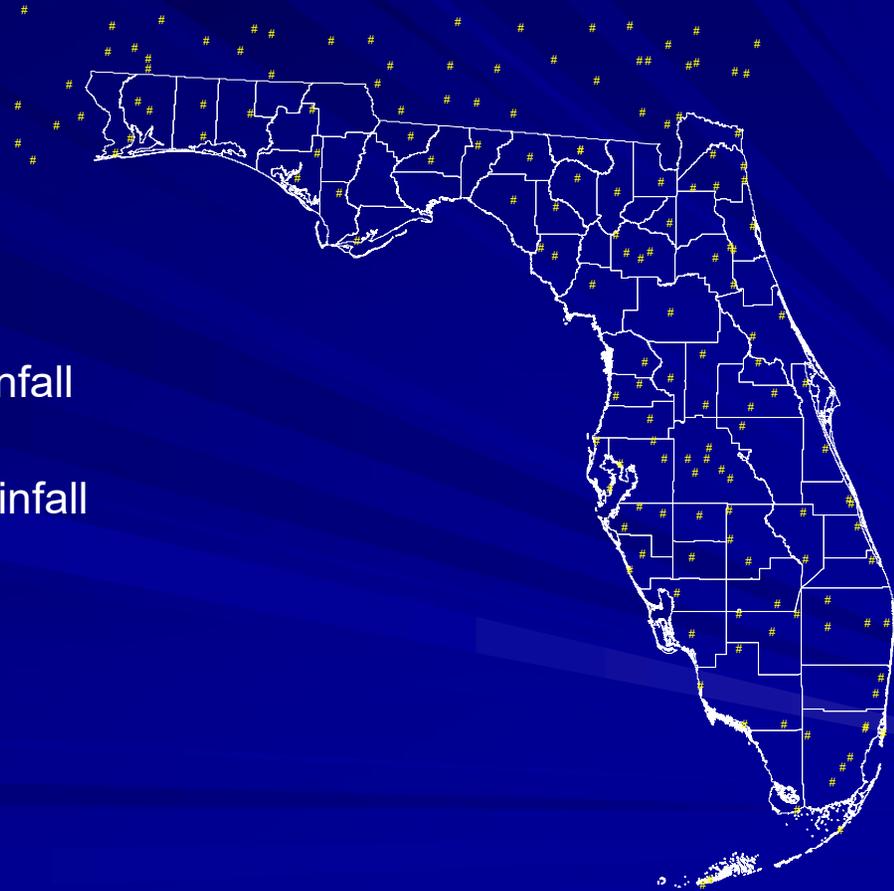
$$\text{Rainfall} = \text{Runoff} + \text{Infiltration} + \text{Evapotranspiration}$$

Rainfall Data

- Since rainfall drives the hydrologic cycle, the 2007 study included an evaluation of rainfall characteristics throughout the State, including
 - Annual and event rainfall depths
 - Rainfall variability throughout Florida
 - Total annual rainfall
 - Variability in individual events
 - Inter-event dry periods

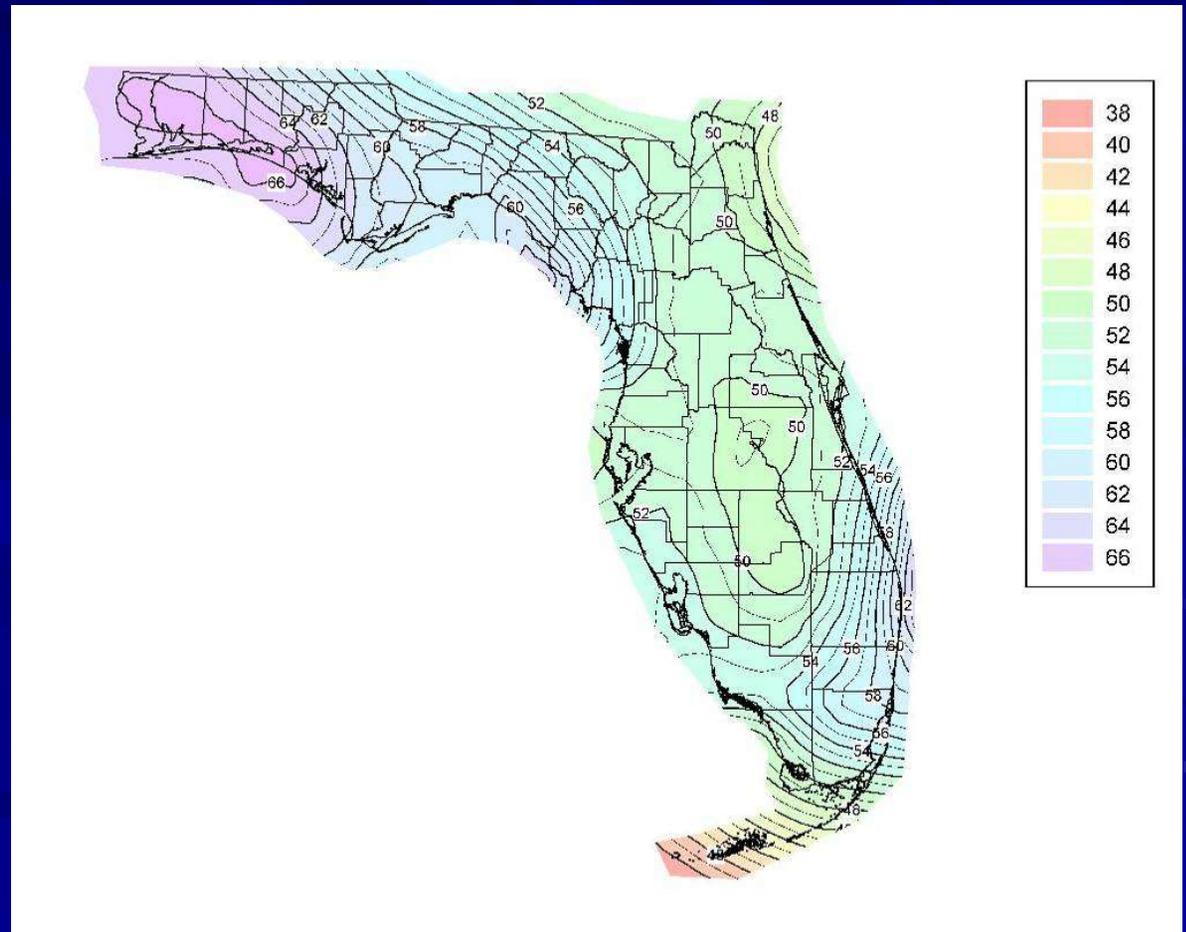
Available Meteorological Data

- **Historical data downloaded for each site for 1971 – 2000**
 - 111 recording stations
 - Evaluated annual rainfall depths and rainfall variability throughout Florida
 - Used primarily to characterize annual rainfall



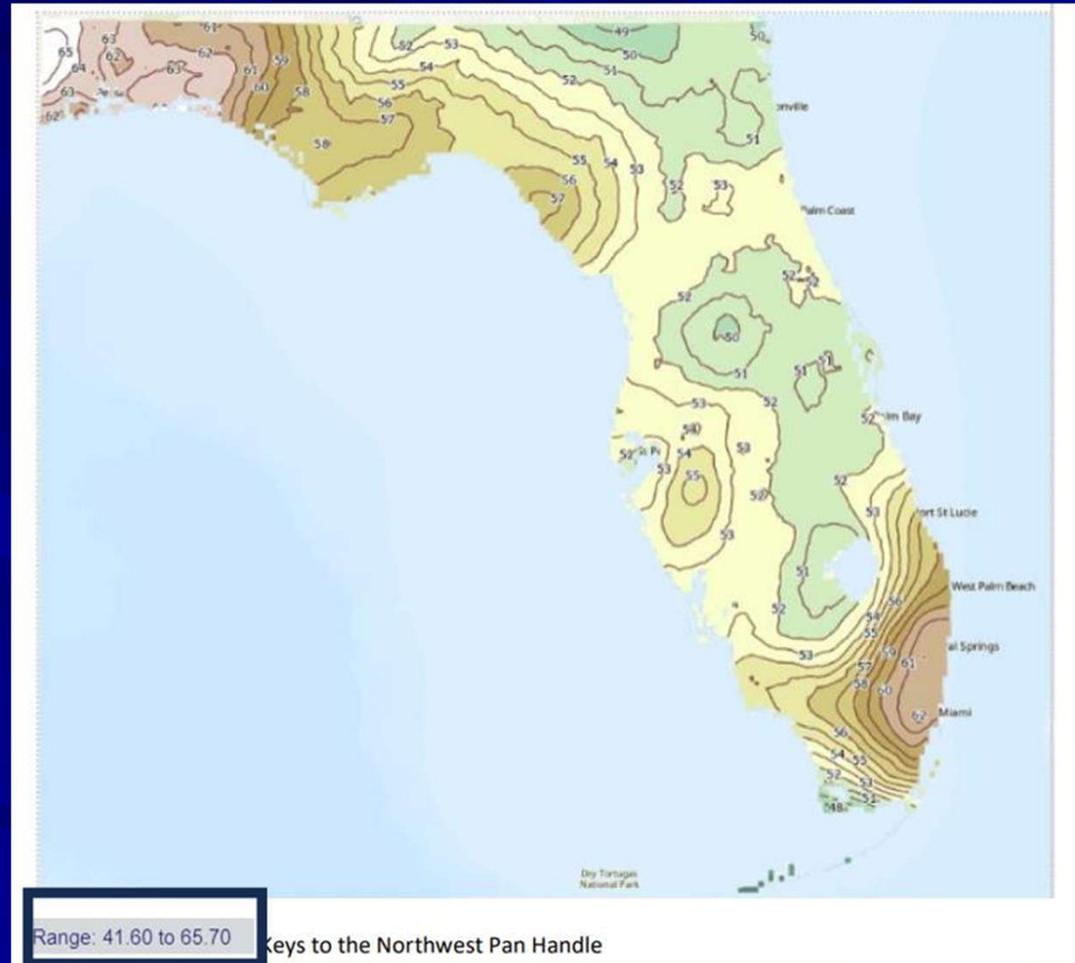
Average Annual Florida Precipitation 1971 – 2000

- Rainfall isopleths were developed for 1971 – 2000 based on the historical data
- Florida rainfall is highly variable ranging from ~ 38 – 66 in/yr, depending on location
- Isopleth maps are used to determine project rainfall for WMD permits and in BMPTRAINS
- FDEP has developed an updated annual rainfall map from 1990-2020



Revised FDEP Rainfall Contour Map

- Little difference between the ERD and FDEP maps
- Slightly lower values in Panhandle
- Slightly higher values in Tampa area

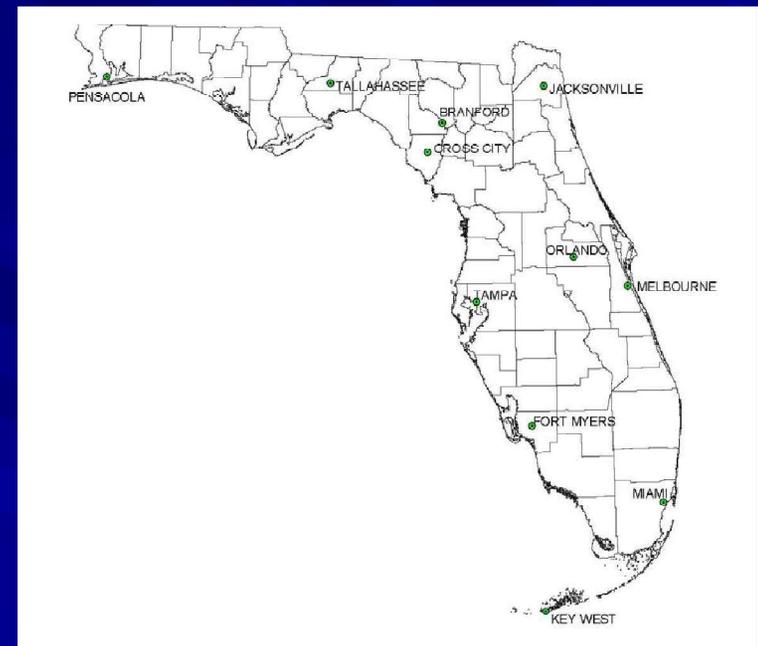


Meteorological Evaluation

- Historical 1-hour rainfall data were obtained from the National Climatic Data Center (NCDC) for each available meteorological station – 45 of 111 Florida stations
 - Data availability ranged from 25 – 59 years per site
- Grouped data into individual rain events
 - Used 3-hour separation to define individual events
- Created historical data set of daily rain events over period of record for each site
 - Variability in individual events
 - Inter-event dry periods
- Developed frequency distribution of individual rain events for each monitoring site

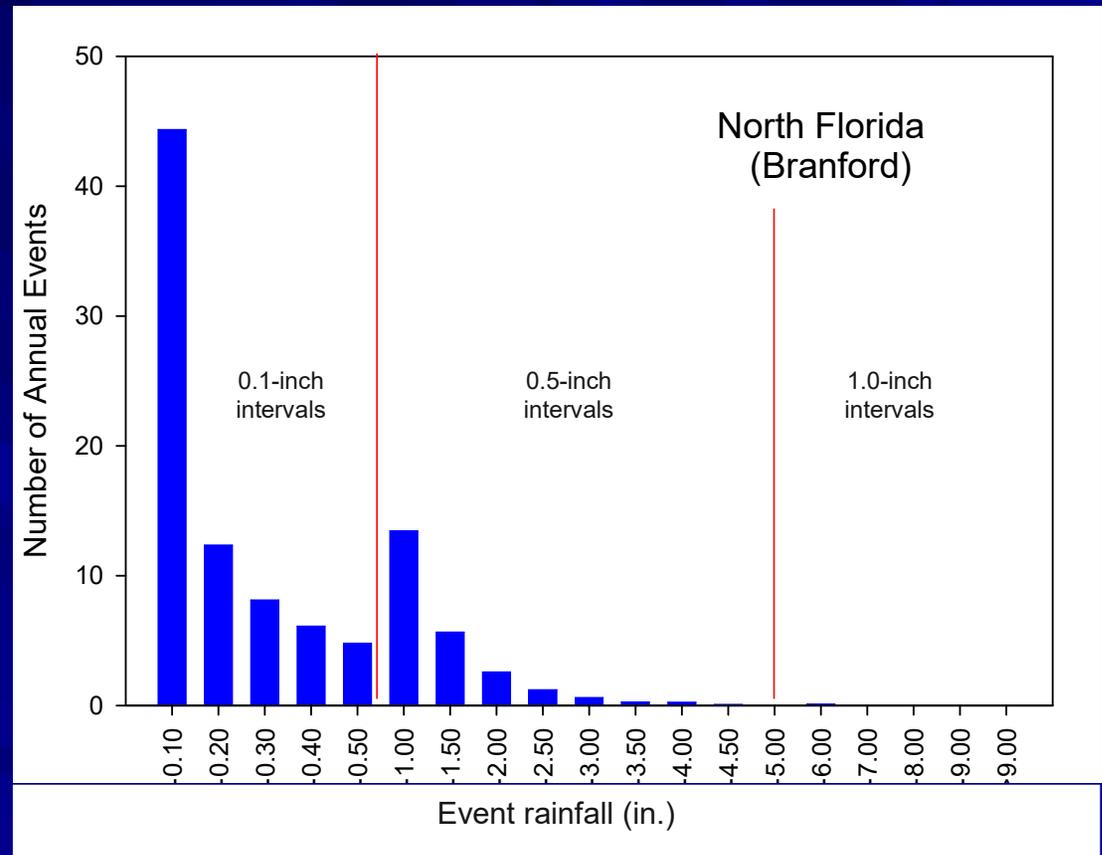
Evaluation of Meteorological Variability

- **Obtained historical 1-hour rainfall data from the National Climatic Data Center (NCDC) for each available meteorological station**
 - 11 stations were selected with hourly data
 - Data availability ranged from 25 – 59 years per site
 - 9 of the 11 stations have 45 years or more
- **Grouped data into individual rain events – variable criteria**
 - Events ≤ 0.25 " - 3 hour separation to define individual events
 - Events > 0.25 " - 6 hour separation to define individual events
- **Created historical data set of daily rain events over period of record for each site**
- **Developed annual frequency distribution of individual rain events for each monitoring site**

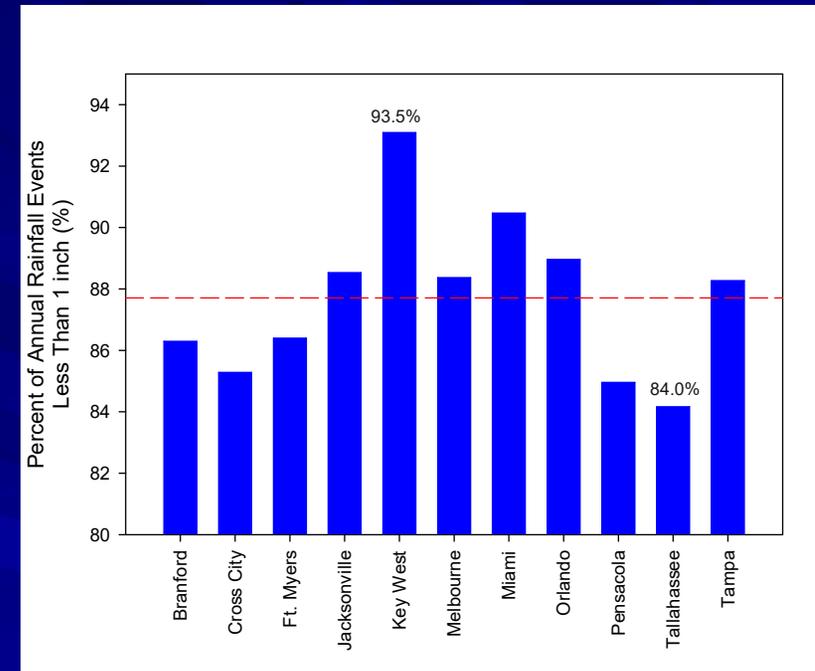
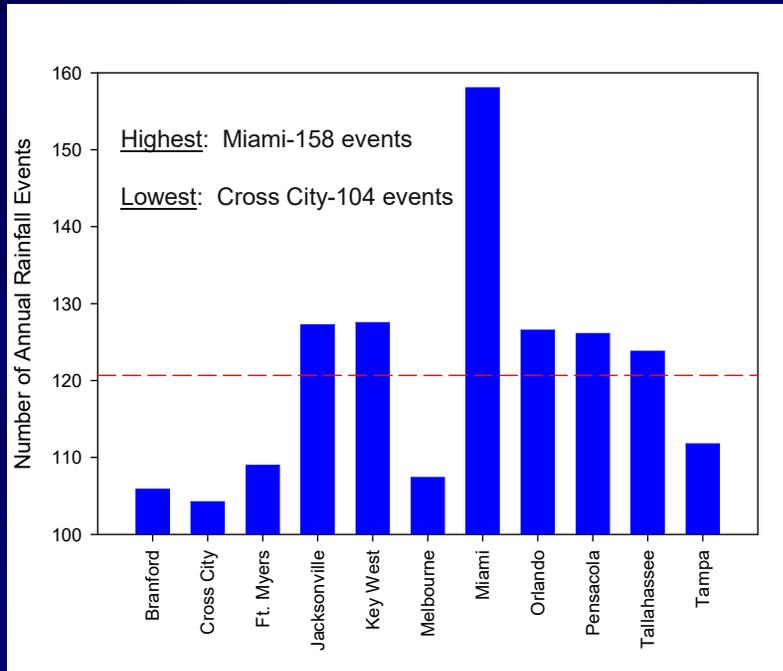


Typical Rainfall Event Frequency Distribution

- Most rain events are < 0.5"
- A relatively small number of annual events are large depth
- Similar, but variable, patterns for stations throughout Florida



Characteristics of Rainfall Events at Selected Meteorological Sites

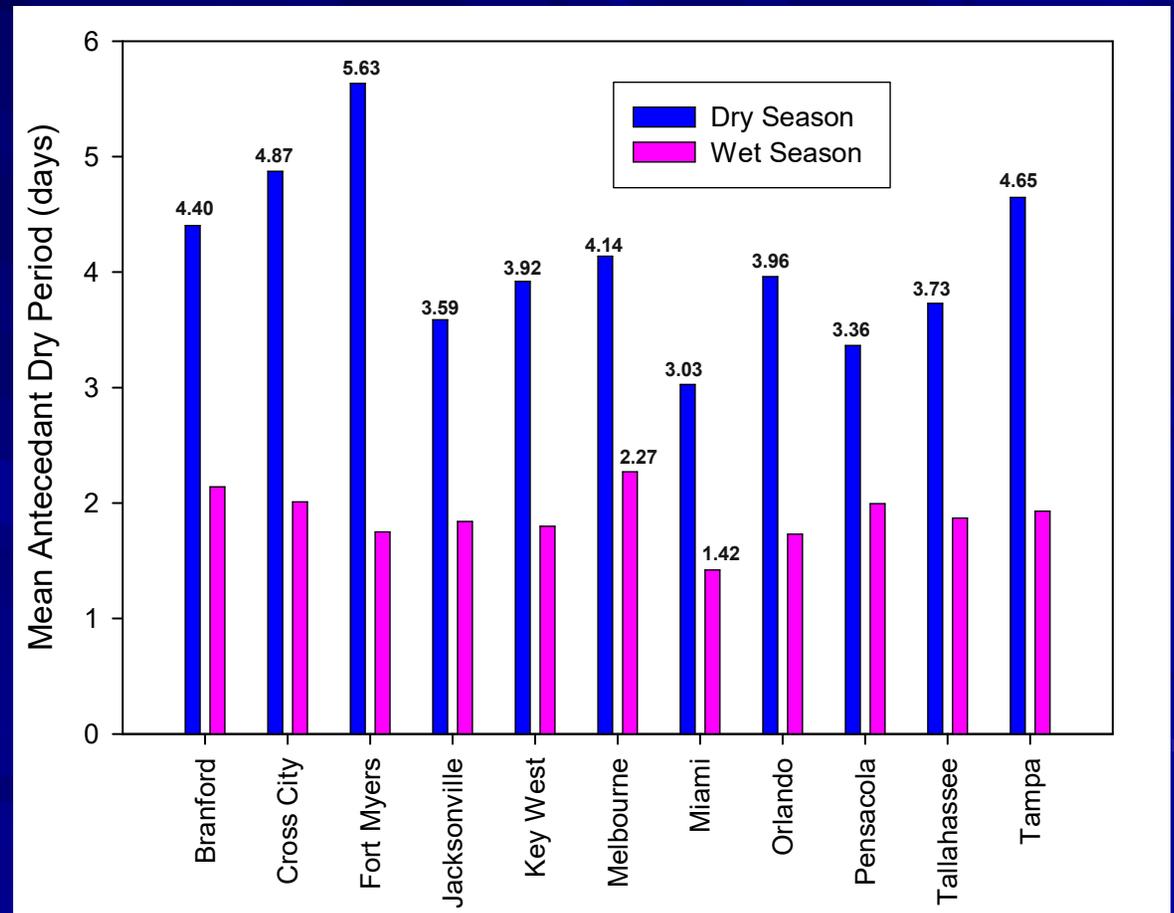


- Florida rainfall is highly variable in the number of “small” and “large” events
- Rainfall depth impacts both runoff generation and treatment system efficiency

Variability in Inter-Event Dry Period

Variability in rainfall frequency impacts:

- Runoff C values
- Recovery and performance efficiency of stormwater management systems, especially retention



Summary

- **Rainfall in Florida is highly variable**
 - Annual rainfall
 - Ranges from 38 in/yr in Key West to 68 in/yr in Tallahassee and Pensacola
 - Number of annual rain events
 - Ranges from 104 events/yr in Cross City to 158 events/yr in Miami
 - Rain event depths
 - Most rain events in Florida are less than 0.5 inch
 - Approximately 84 – 94% are less than 1 inch
 - Inter-event dry period
 - Wet season – 1.42 days (34 hrs.) – 2.27 days (54 hrs.)
- **Rainfall variability impacts runoff volumes and BMP efficiencies throughout the State**

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