

Technical Oversight Committee
September 14, 2011



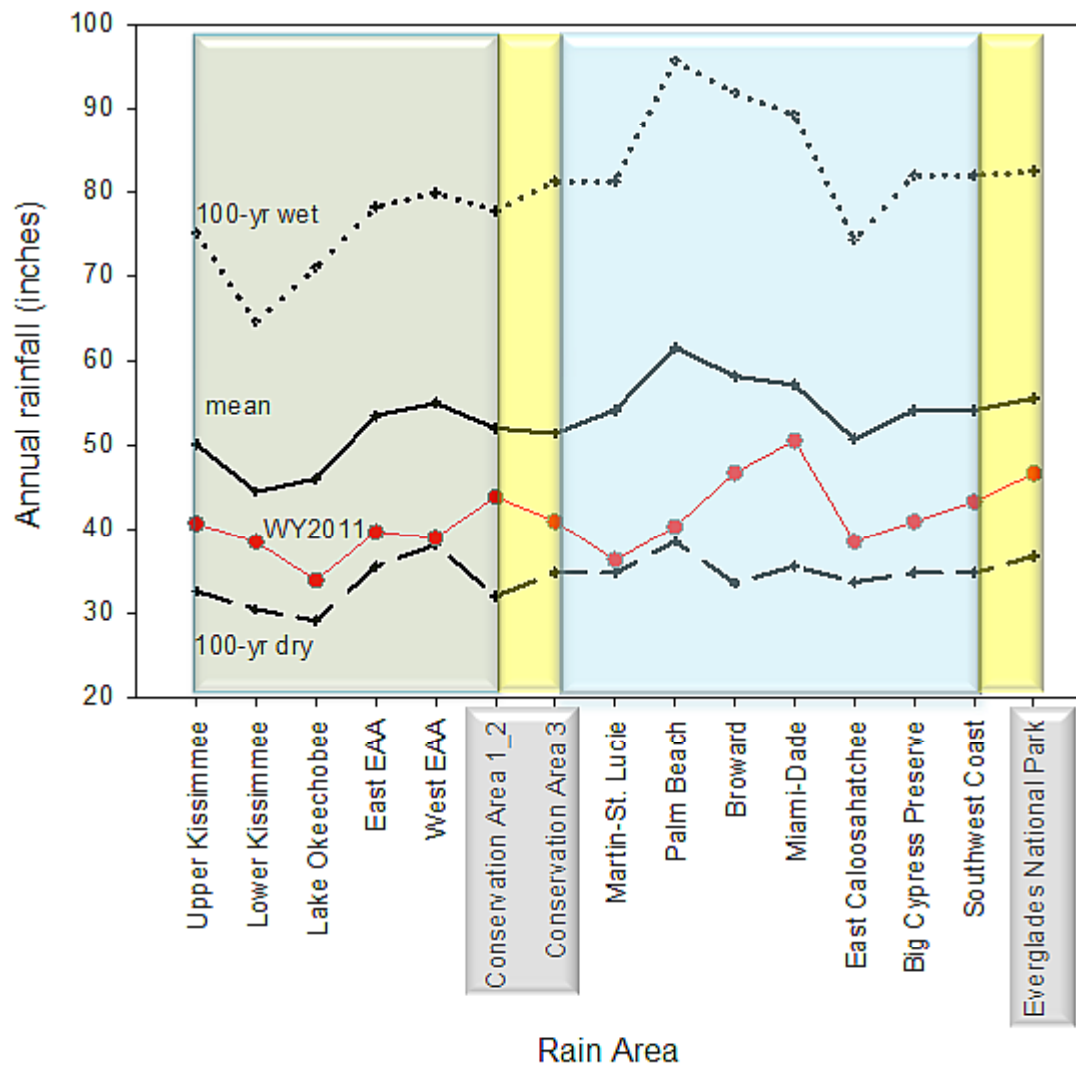
Briefing on the 2010 – 2011 Drought in South Florida

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Principal Engineer, Water Quality Bureau

Factors Determining the Severity of a Drought

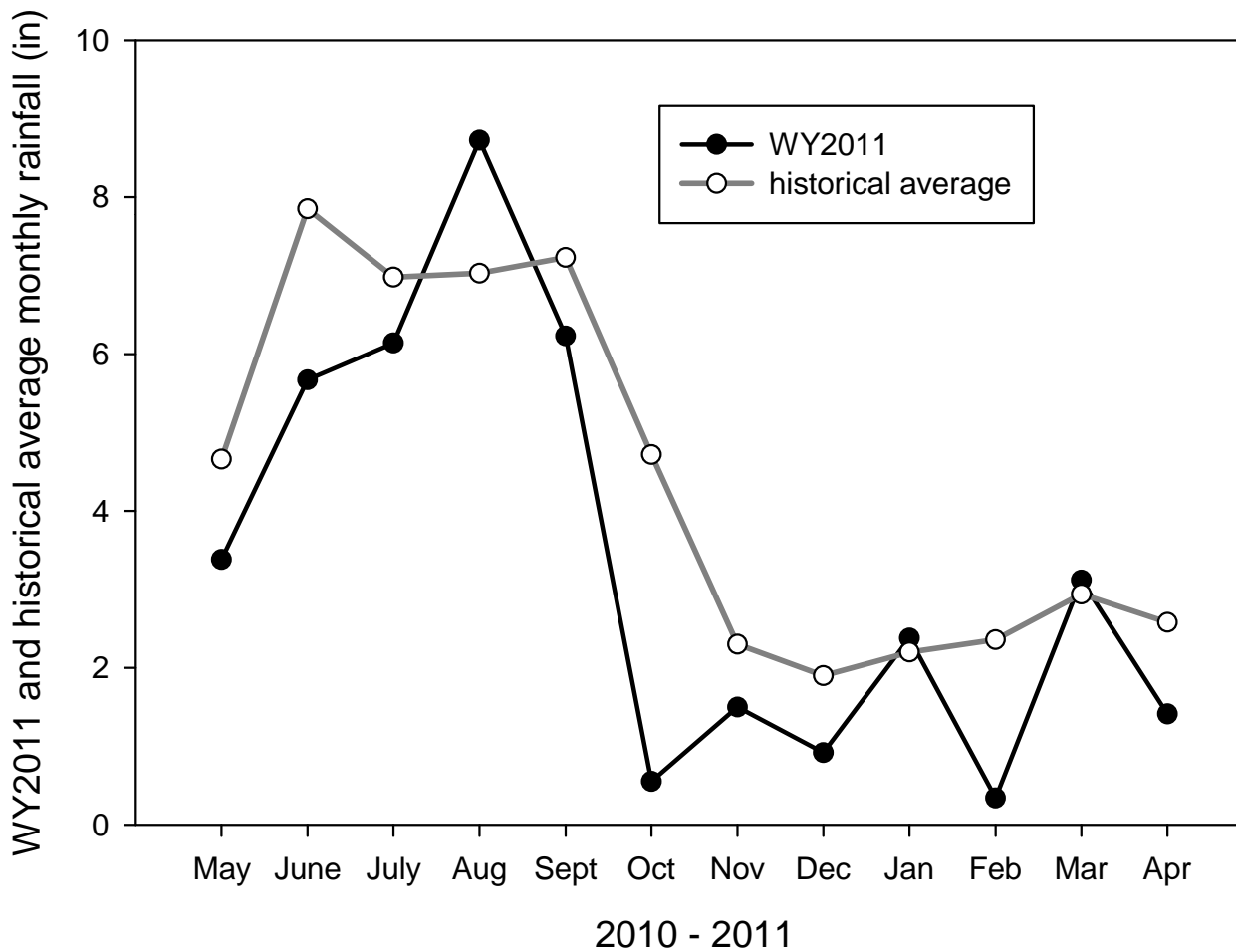
- **Rainfall Amount**
- **Rainfall Temporal Distribution**
- **Rainfall Spatial Distribution**
- **Antecedent Hydrologic Condition**

Spatial Variation of Annual Rainfall with Temporal Extremes (100-year return periods)



Monthly Variation of WY2011 and Historical Average Rainfall

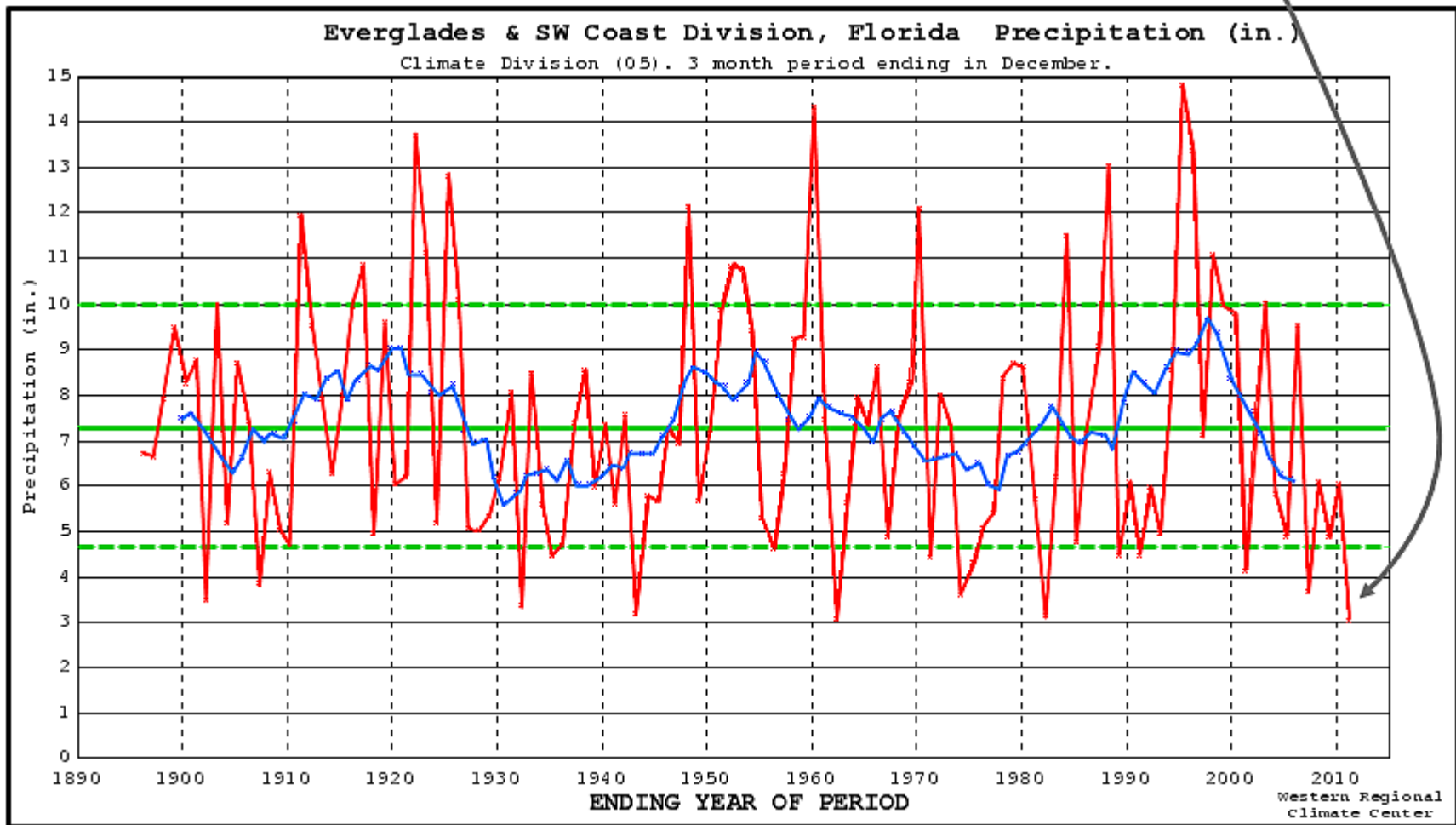
Most months had far below average rainfall



October rainfall was a 1-in-100 yr drought

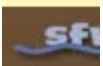
Upper Kissimmee
 Lower Kissimmee
 Lake Okeechobee
 Martin/St. Lucie
 Palm Beach

Driest 3-month Rainfall since 1895 (October through December, 2010)



<http://www.wrcc.dri.edu/>
http://www.wrcc.dri.edu/cgi-bin/divplot1_form.pl?0804

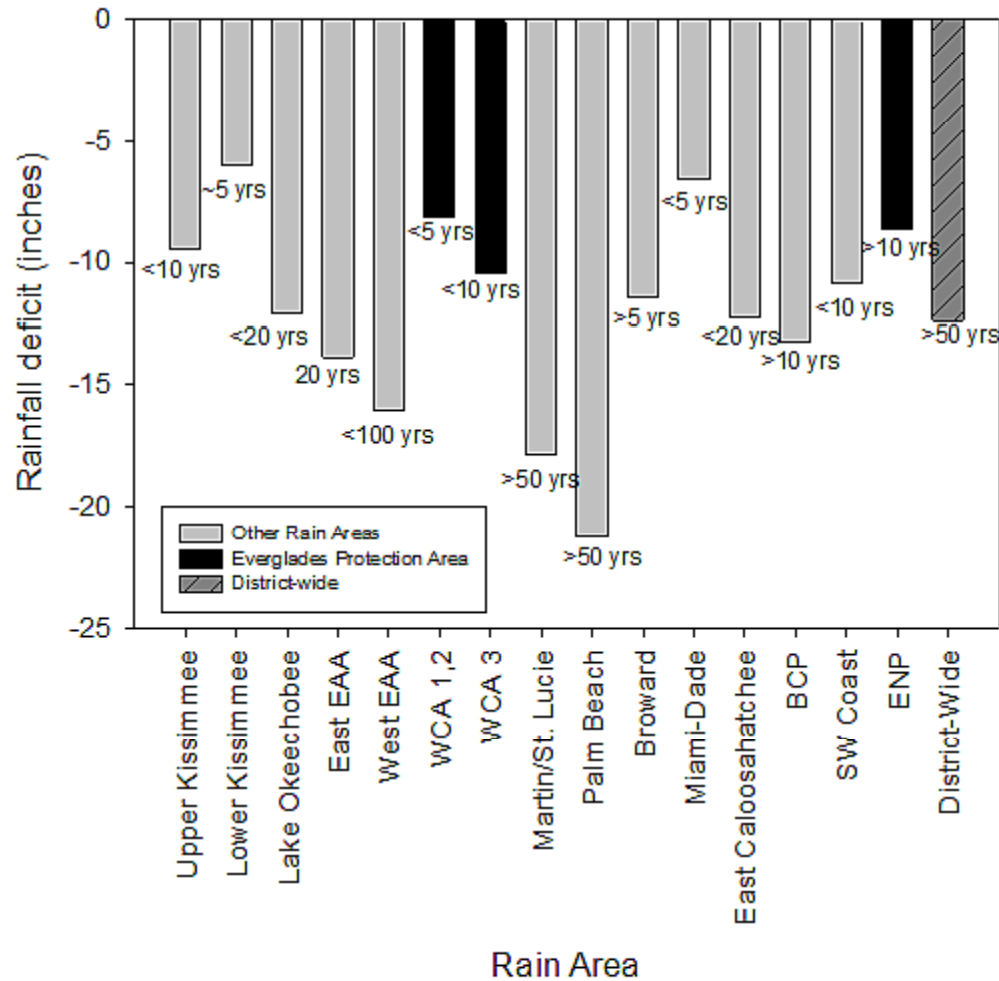
red - 3 month period ———
 blue - 10 year running mean ———
 green - average (solid), ± sigma (dashed) — — —



WY2011 Rainfall Deficits and Return Periods by Rain Area

Return Period is expected frequency or recurrence interval

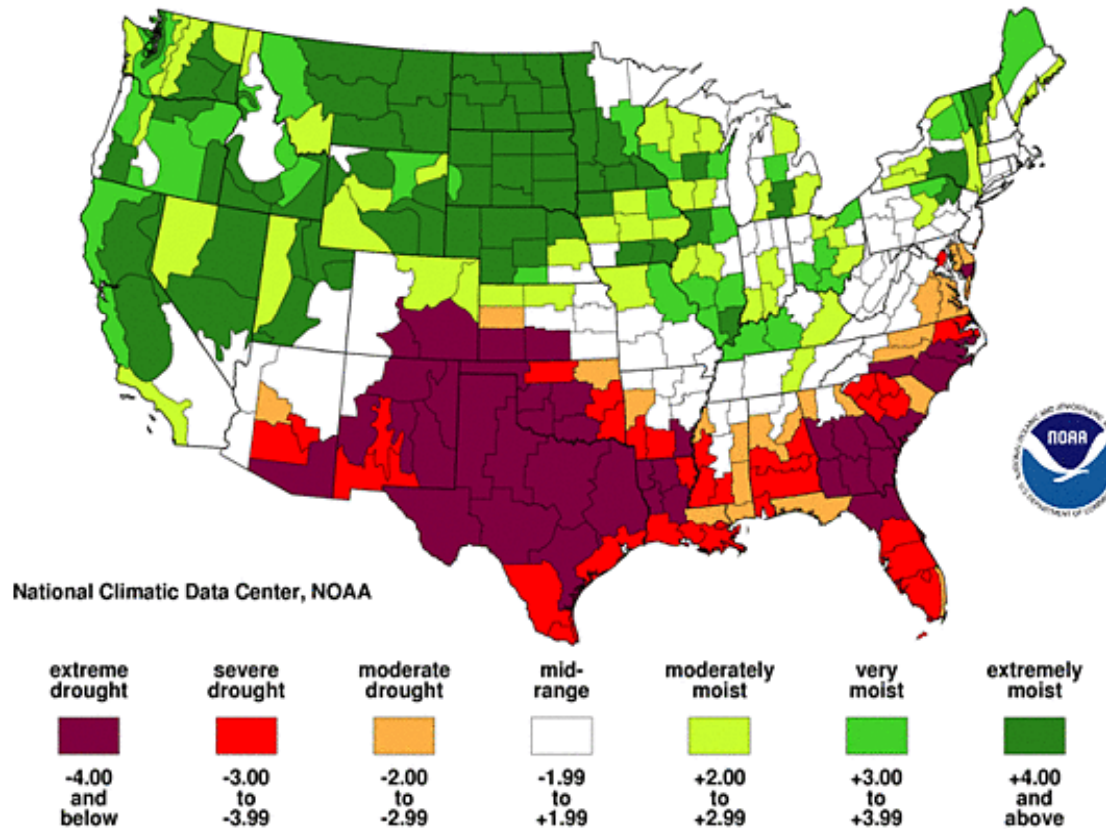
Return Period in years	Probability of being exceeded in any year (%)
5	20
10	10
20	5
50	2
100	1



Palmer Drought Severity Index (July 2011)

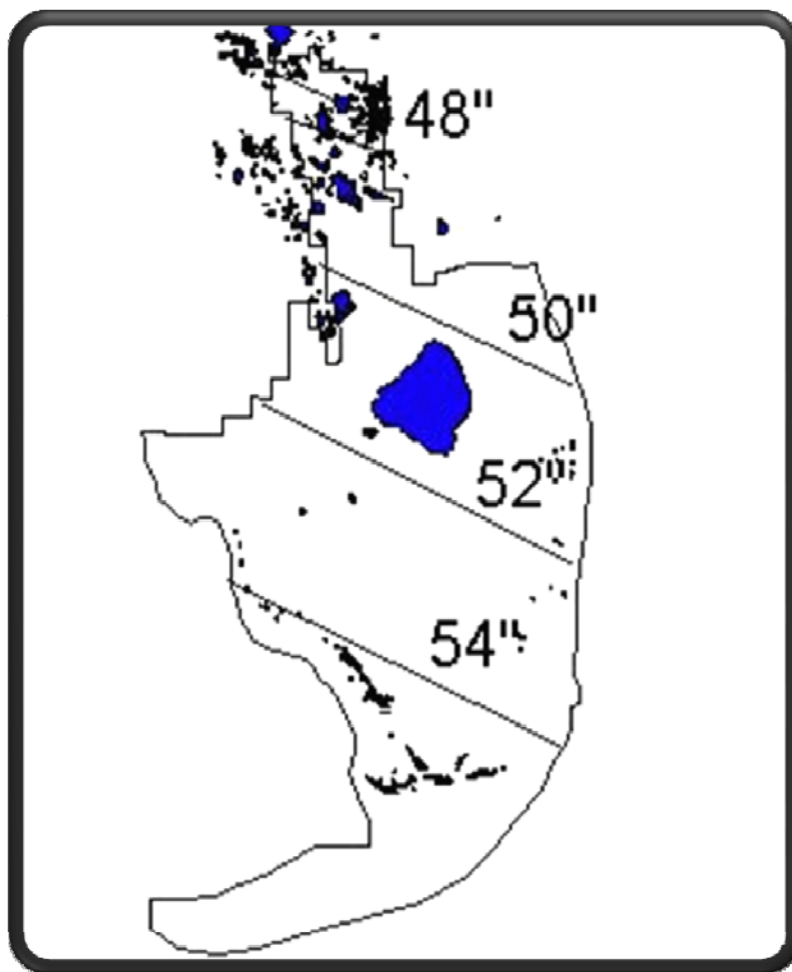
Palmer Hydrological Drought Index Long-Term (Hydrological) Conditions

July 2011

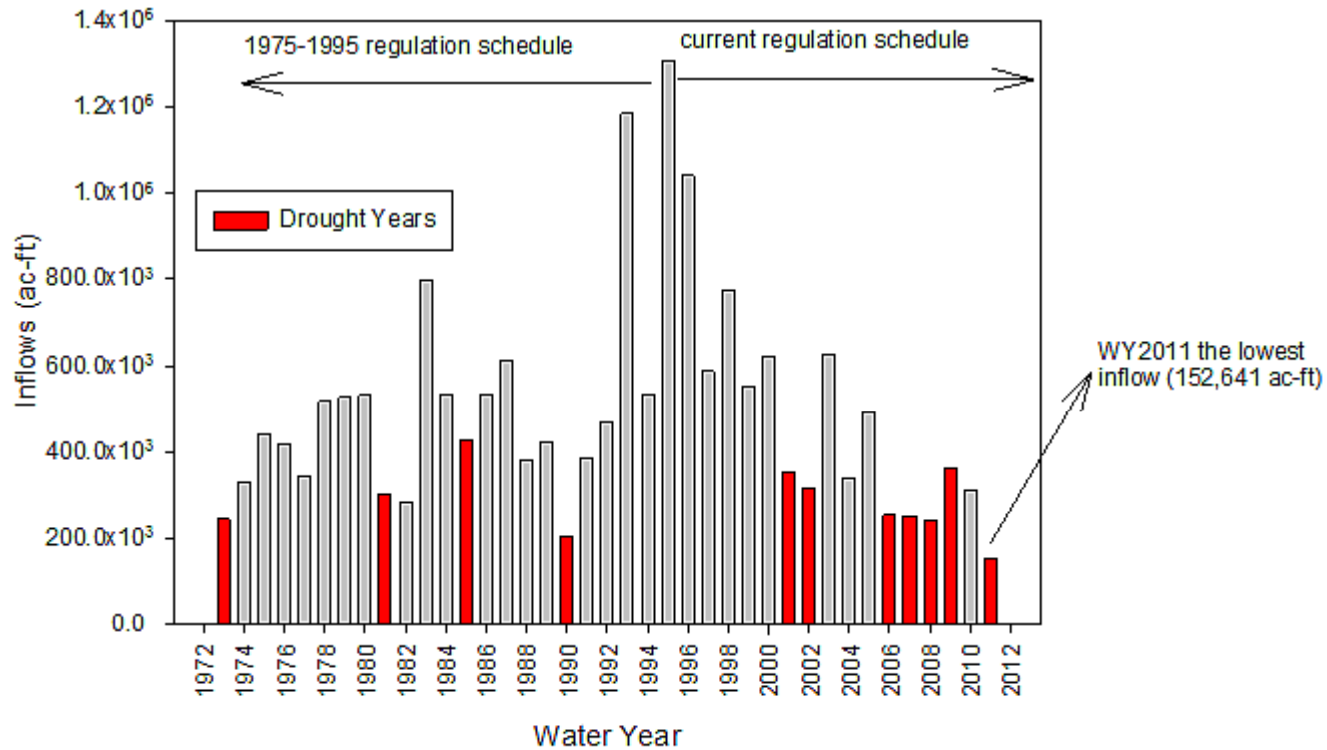


South Florida Evaporation

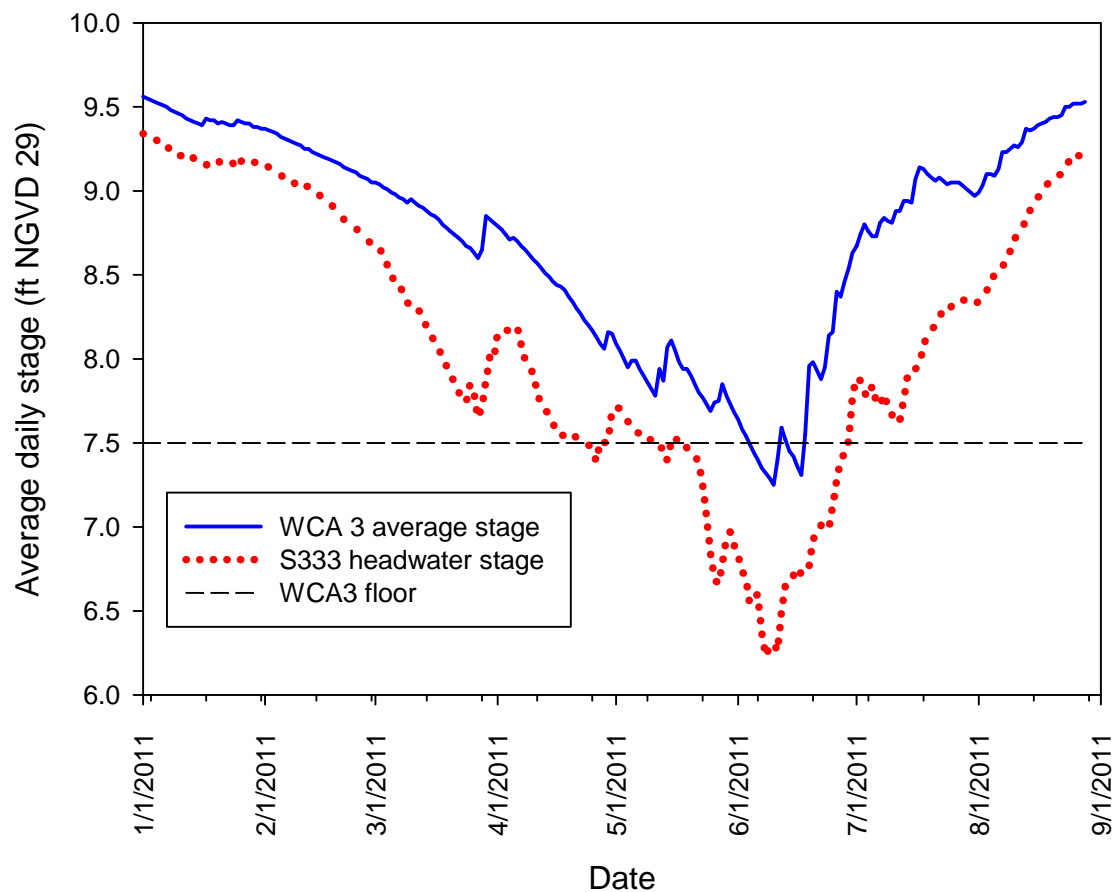
Drought severity increases by increasing Evaporation



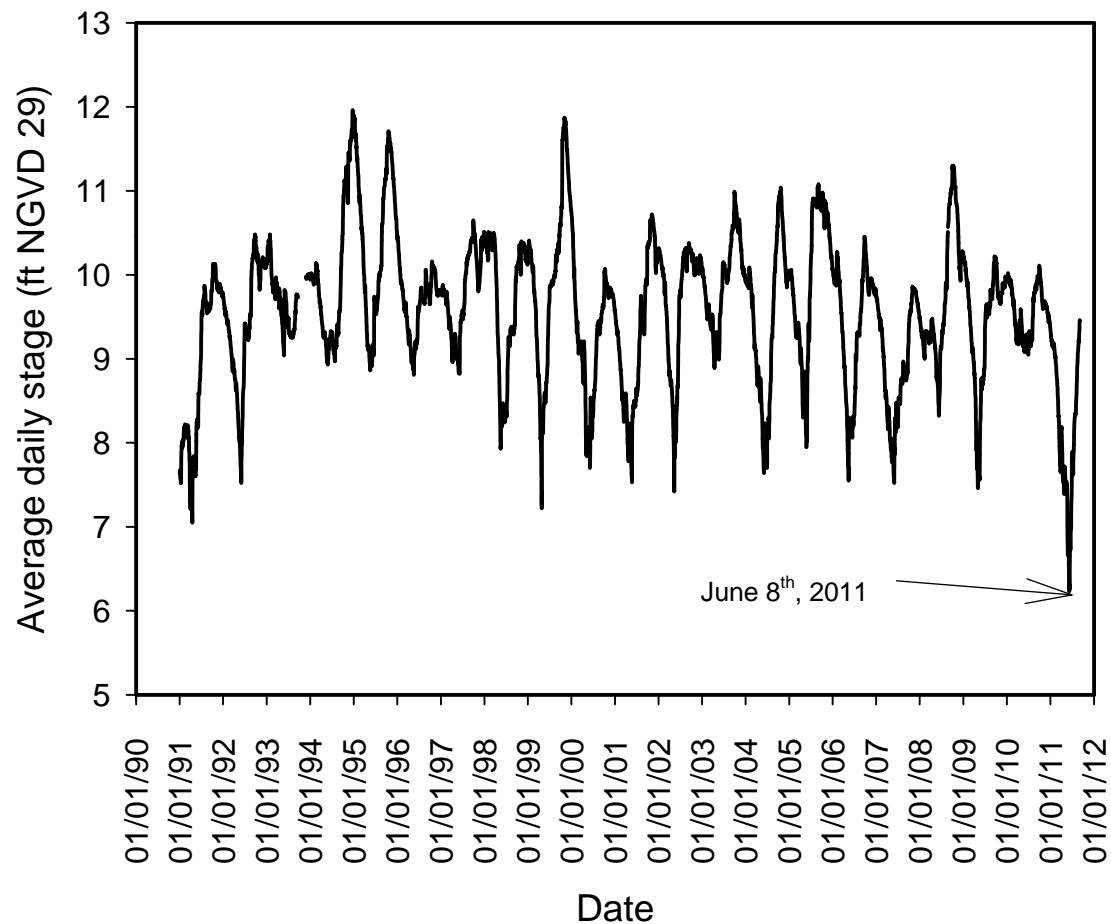
Water Conservation Area 1 Inflows



Water Conservation Area 3 and S333 Headwater Stages

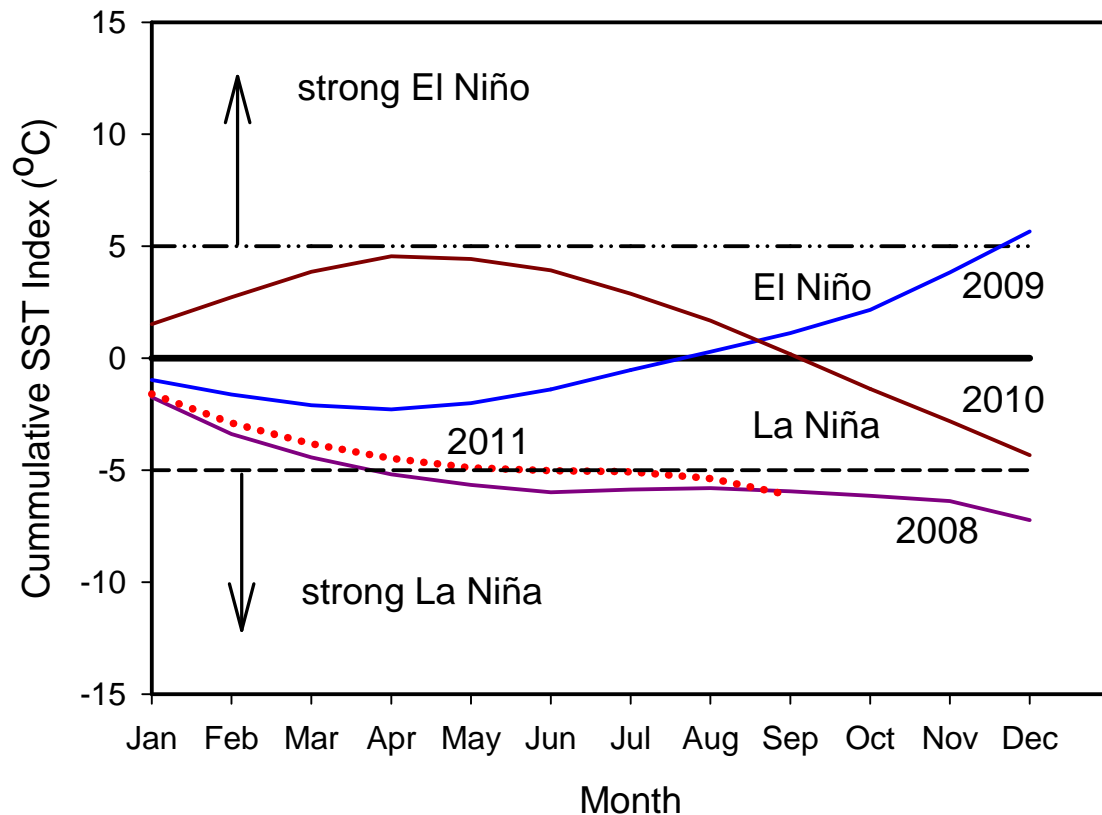


S333 Headwater Stage (record low in the last 20 years)



El Niño Southern Oscillation Prediction with Cumulative Sea Surface Temperature Index

Cumulative SST Index
(Abteu and Trimble, 2010; Abteu et al., 2009)



Abteu, W. and P. Trimble. 2010. *El Niño Southern Oscillation Link to South Florida Hydrology and Water Management Applications*. Water Resources Management, 24(5):4255-4271, DOI:10.1007/s11269-010-9656-2.

Abteu, W., A. Melesse and T. Dessalegne. 2009. *El Niño Southern Oscillation link to the Blue Nile River Basin Hydrology*. Hydrological Processes. Vol. 23:3653-3660; DOI:10.1002/hyp.7367.

What does La Niña Mean for the Everglades Protection Area?

- **Reduced inflows**
- **Lower water levels**
- **More wildfires**
- **Less water quality sampling events in the EPA**

Hydrology Impact on Number of Sites Sampled (Refuge Monitoring, 1994-2011)

- **The 2011 number of sites in the Refuge that were not sampled due to low stages is the highest since 1994**
- **In calendar year 2011 (through July), there were 59 events with no sampling**

Droughts and Wildfire (Water Conservation Area 1, 5/7/11)



SOUTH FLORIDA WATER MANAGEMENT DISTRICT

Dry Conditions in Water Conservation Area 2 (5/4/11)



Summary

- **WY2011 was a severe drought year and WY2012 is likely to be another dry year**
- **Hydrologic conditions impact water quality sampling and parameter concentrations**
- **Interpreting Refuge and Park TP compliance must take antecedent and prevailing hydrology into account**