Dry Season 2014-2015 Outlook:

El Niño Effects?

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Miami Forecast Office

Rainy Season
2014 Summary

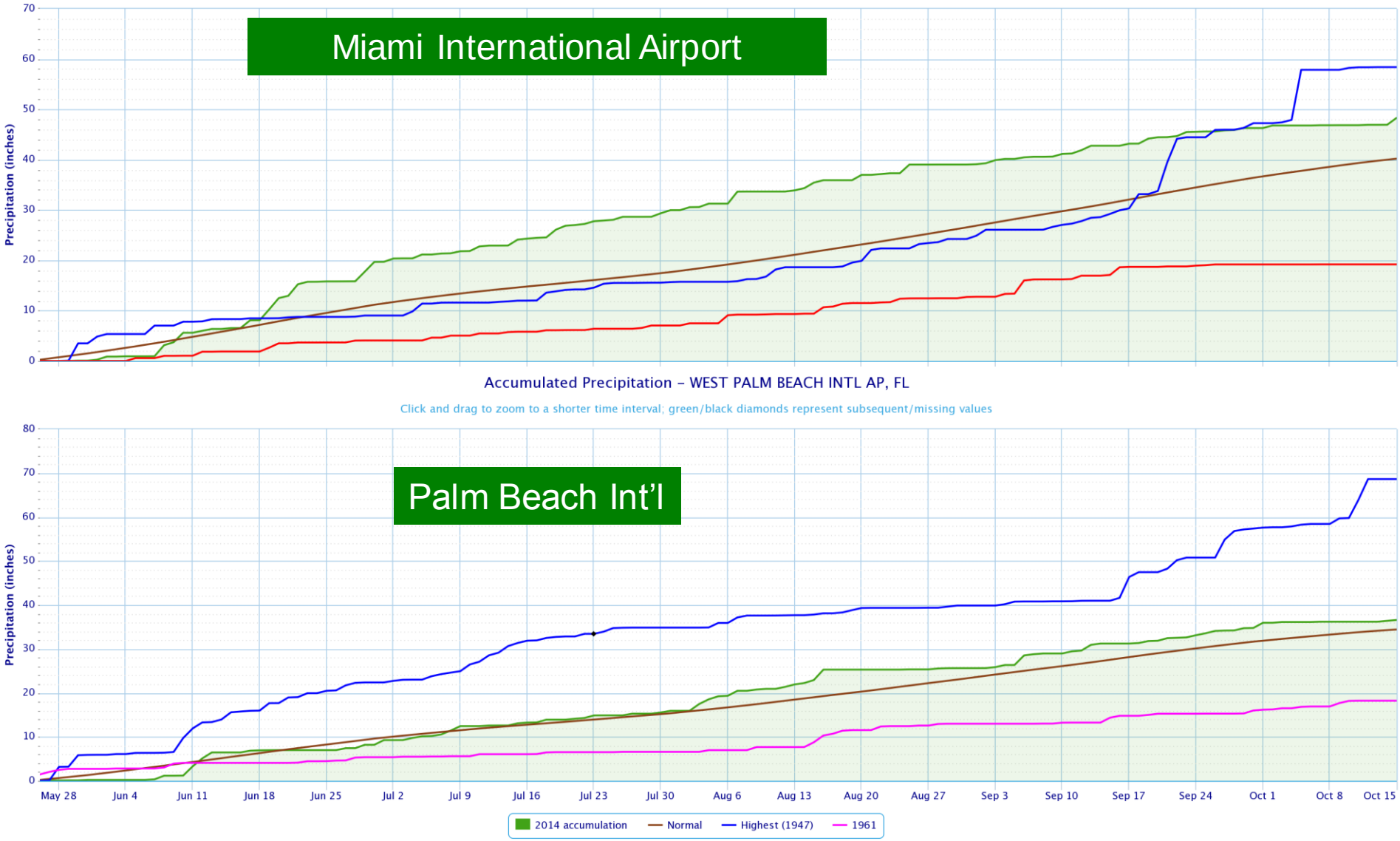
- Slightly wetter than normal
- Average measured rainfall: 39.4 inches (from 50 observation sites).
- Highest rainfall amounts over parts of eastern Palm Beach and northern Miami-Dade counties
- Lowest amounts over southern Miami-Dade County as well as near the eastern shore of Lake Okeechobee.

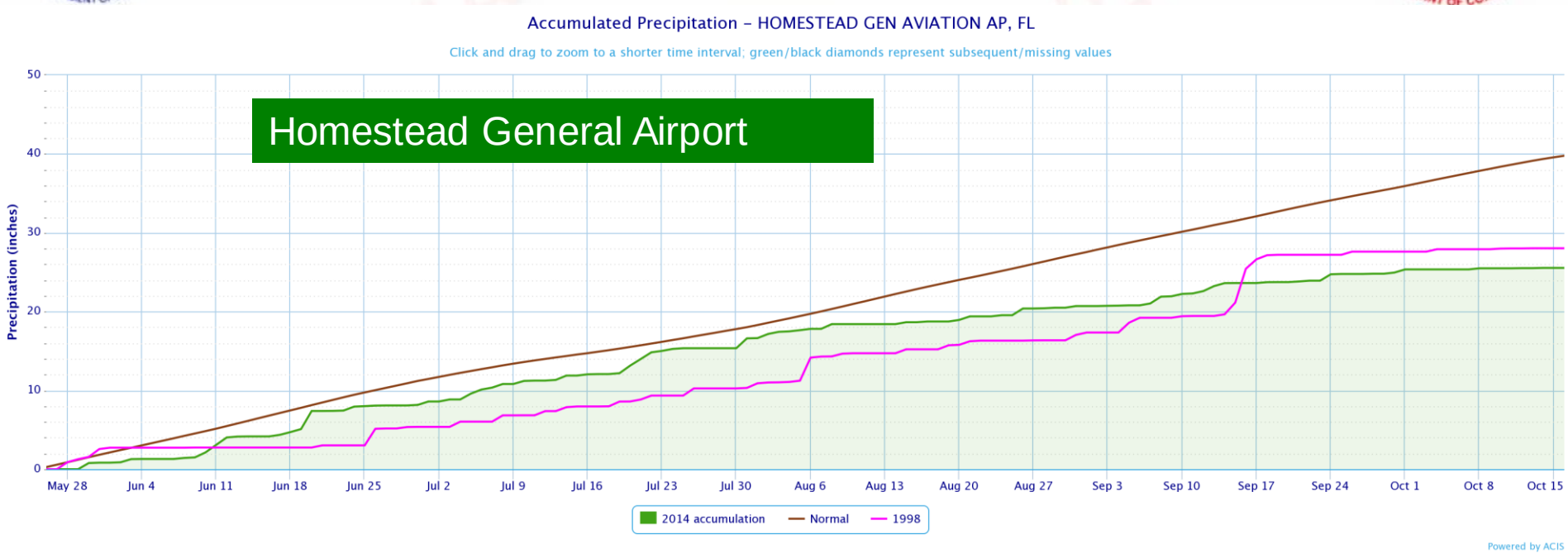
Wet Season Rain Totals (May 26th-Oct 15th)

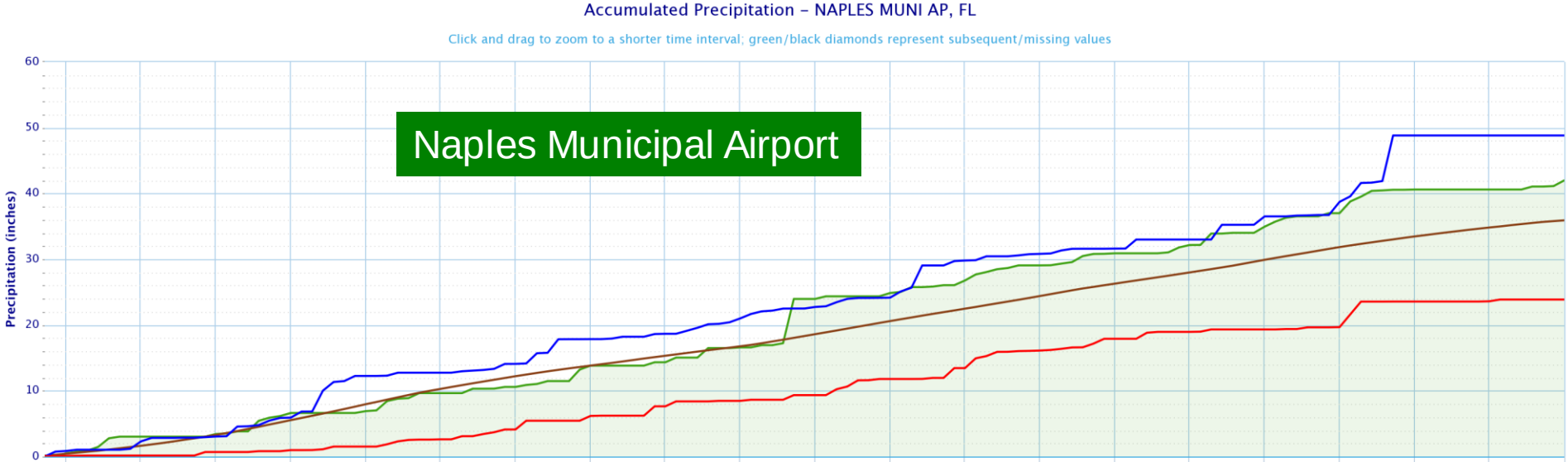
Top 10 Rainfall Sites for 2014 Rainy Season	May 26-Oct 15	Departure from Normal
1. NWS Miami - Sweetwater (NWS COOP)	**53.82**	
2. West Boynton Beach (CoCoRaHS)	**53.23**	
3. Juno Beach (NWS COOP)	**52.93**	
4. Hialeah (NWS COOP)	**48.80**	**+3.68**
5. Miami International Airport (NWS ASOS)	**48.33**	**+8.13**
6. Greenacres (CoCoRaHS)	**47.99**	
7. Naples/Golden Gate (NWS COOP)	**47.07**	
8. North Miami Beach (NWS COOP)	**46.50**	
9. Plantation East (CoCoRaHS)	**45.89**	
10. Golden Gate Estates (CoCoRaHS)	**45.29**	

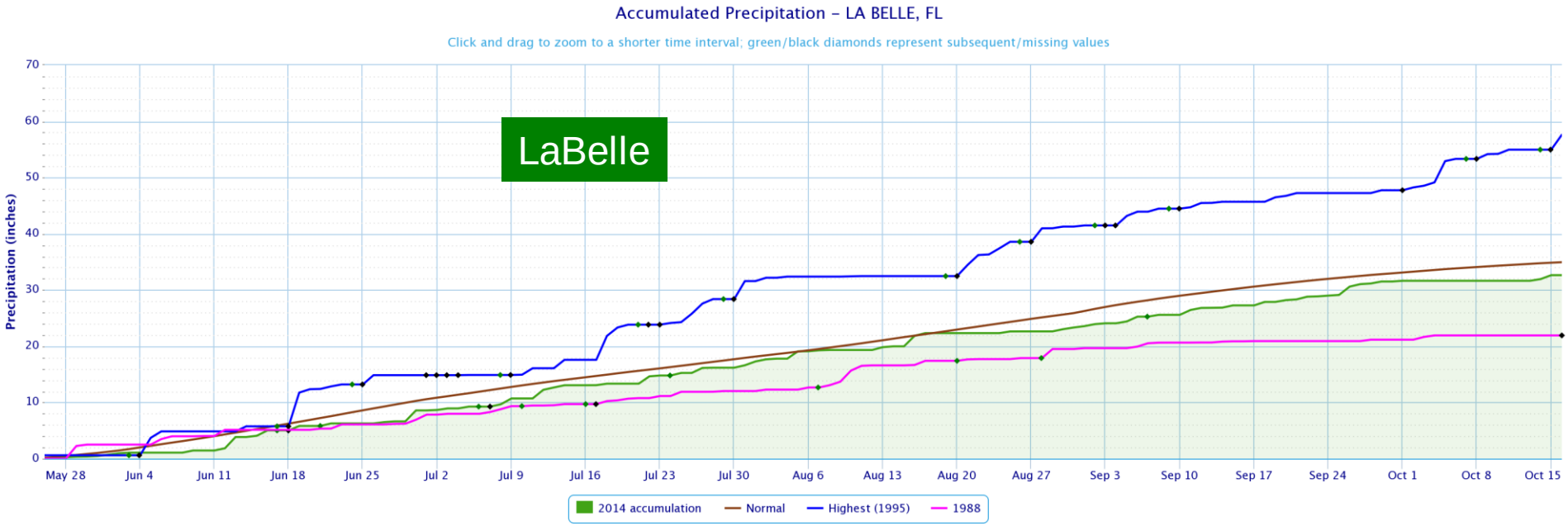
Wet Season Rain Totals (May 26th-Oct 15th)

10 Driest Sites for 2014 Rainy Season	May 26-Oct 15	Departure from Normal
1. Homestead Gen. Airport (NWS COOP)	**25.54**	**-14.23**
2. Pompano Beach Airpark (NWS ASOS)	**26.87**	
3. South Miami (CoCoRaHS)	**26.91**	
4. Moore Haven (NWS COOP)	**29.51**	**-1.20**
5. Royal Palm Ranger Stn (NWS COOP)	**29.92**	
6. South Bay/Okeelanta (NWS COOP)	**30.34**	
7. Miami Beach (NWS COOP)	**32.37**	**+1.31**
8. LaBelle (NWS COOP)	**32.64**	**-2.30**
9. Brighton Reservation (NWS COOP)	**32.76**	
10. Immokalee (NWS COOP)	**32.80**	**+0.62**


Accumulated Precipitation – Miami Area, FL (ThreadEx)
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values
Miami International Airport
Precipitation (inches)
0
10
20
30
40
50
60
70
Accumulated Precipitation – WEST PALM BEACH INTL AP, FL
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values
Palm Beach Int'l
Precipitation (inches)
0
10
20
30
40
50
60
70
80
May 28
Jun 4
Jun 11
Jun 18
Jun 25
Jul 2
Jul 9
Jul 16
Jul 23
Jul 30
Aug 6
Aug 13
Aug 20
Aug 27
Sep 3
Sep 10
Sep 17
Sep 24
Oct 1
Oct 8
Oct 15
2014 accumulation
Normal
Highest (1947)
1961
Powered by ACIS


Accumulated Precipitation – HOMESTEAD GEN AVIATION AP, FL
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values
Homestead General Airport
Precipitation (inches)
50
40
30
20
10
0
May 28
Jun 4
Jun 11
Jun 18
Jun 25
Jul 2
Jul 9
Jul 16
Jul 23
Jul 30
Aug 6
Aug 13
Aug 20
Aug 27
Sep 3
Sep 10
Sep 17
Sep 24
Oct 1
Oct 8
Oct 15
2014 accumulation
Normal
1998
Powered by ACIS


Accumulated Precipitation – NAPLES MUNI AP, FL
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values
Precipitation (inches)
0
10
20
30
40
50
60
Naples Municipal Airport


Accumulated Precipitation – LA BELLE, FL
Click and drag to zoom to a shorter time interval; green/black diamonds represent subsequent/missing values
Precipitation (inches)
0
10
20
30
40
50
60
70
LaBelle
May 28
Jun 4
Jun 11
Jun 18
Jun 25
Jul 2
Jul 9
Jul 16
Jul 23
Jul 30
Aug 6
Aug 13
Aug 20
Aug 27
Sep 3
Sep 10
Sep 17
Sep 24
Oct 1
Oct 8
Oct 15
2014 accumulation
Normal
Highest (1995)
1988
Powered by ACIS

Dry Season Outlook

Seasonal Outlook Factors

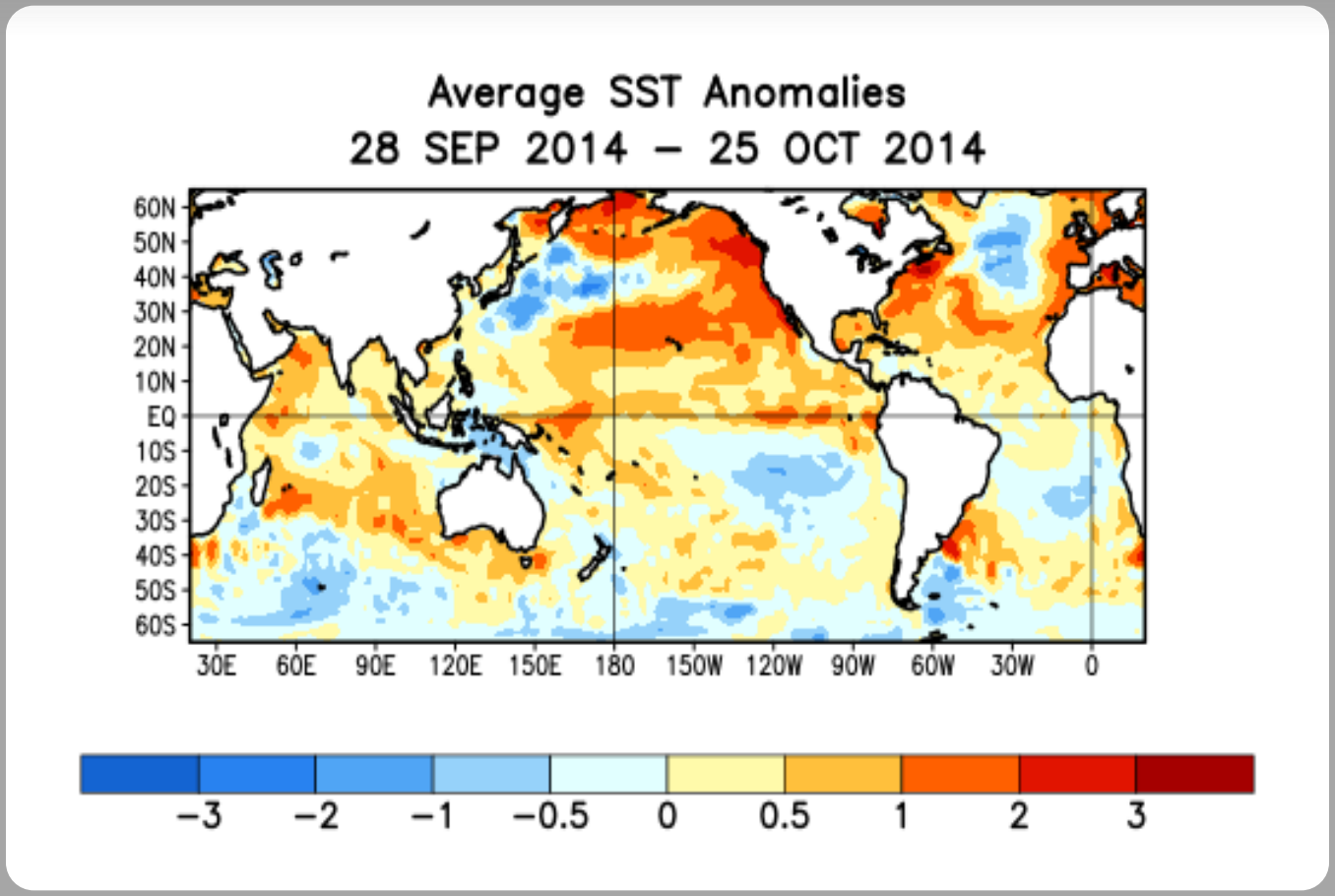
- ENSO (Niño/Niña)
- Intra-seasonal atmospheric cycles (NAO, PNA, etc.)
- Analogs (past years with similar atmospheric conditions)
- Pacific Decadal Oscillaton (PDO)
- Long-range models
- Trends (past 15 years)

El Niño Watch

- Still in “neutral” phase but favored to begin in the next 1-2 months.
- Expected to last through spring.
- Some Niño signals already in place.

Global SST Departures (°C) During the Last Four Weeks

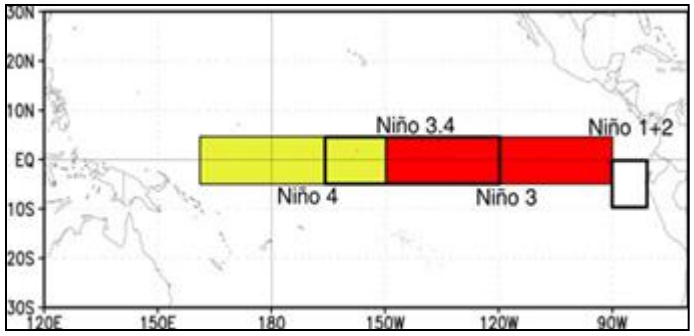
During the last four weeks, equatorial SSTs were above-average across the Pacific and western Indian Ocean and below-average north of Australia (the Maritime Continent).

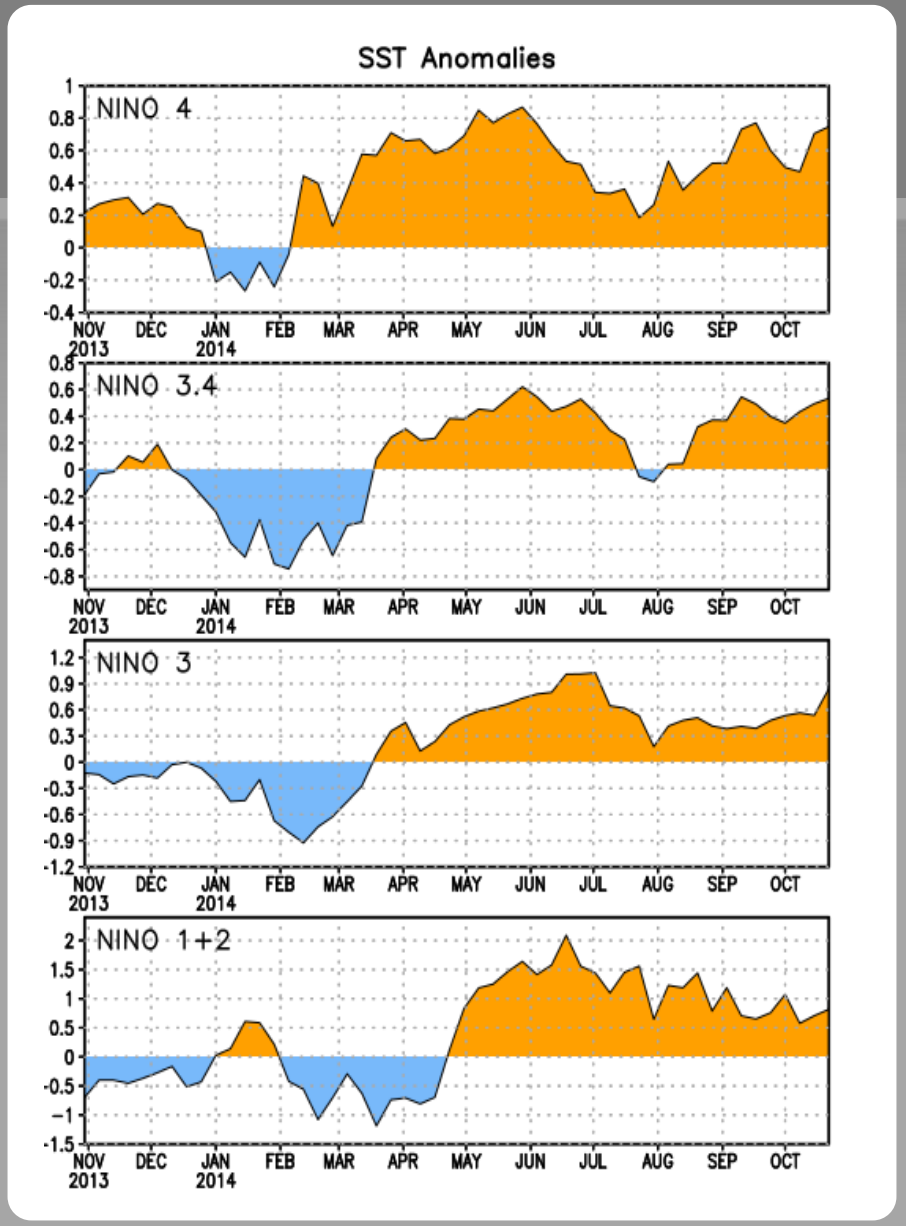


Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

Niño 4	0.7ºC
Niño 3.4	0.5ºC
Niño 3	0.8ºC
Niño 1+2	0.8ºC

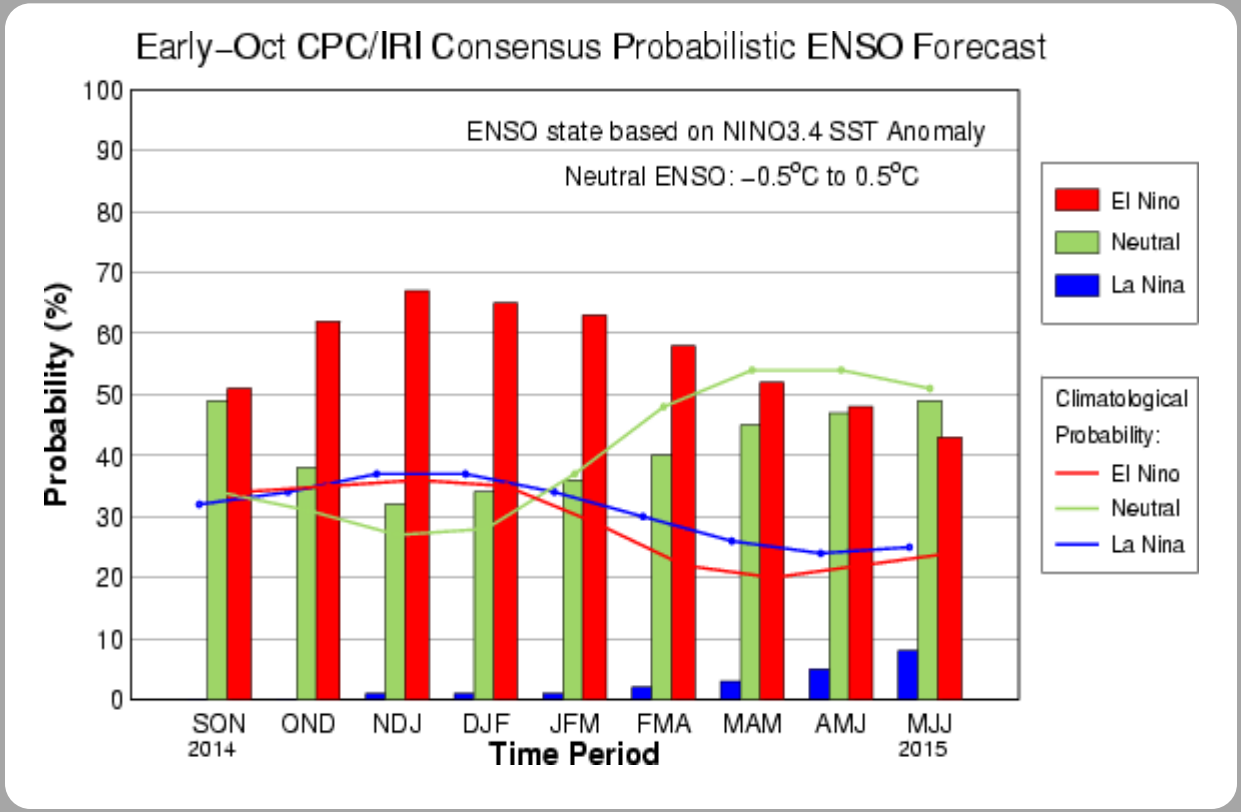




CPC/IRI Probabilistic ENSO Outlook

Updated: 9 October 2014

The chance of El Niño is near 60-65% during the Northern Hemisphere fall and winter.



IRI/CPC Pacific Niño 3.4 SST Model Outlook

Most models favor El Niño (greater than or equal to +0.5°C) to develop during October-December 2014 and persist through Northern Hemisphere spring 2015.

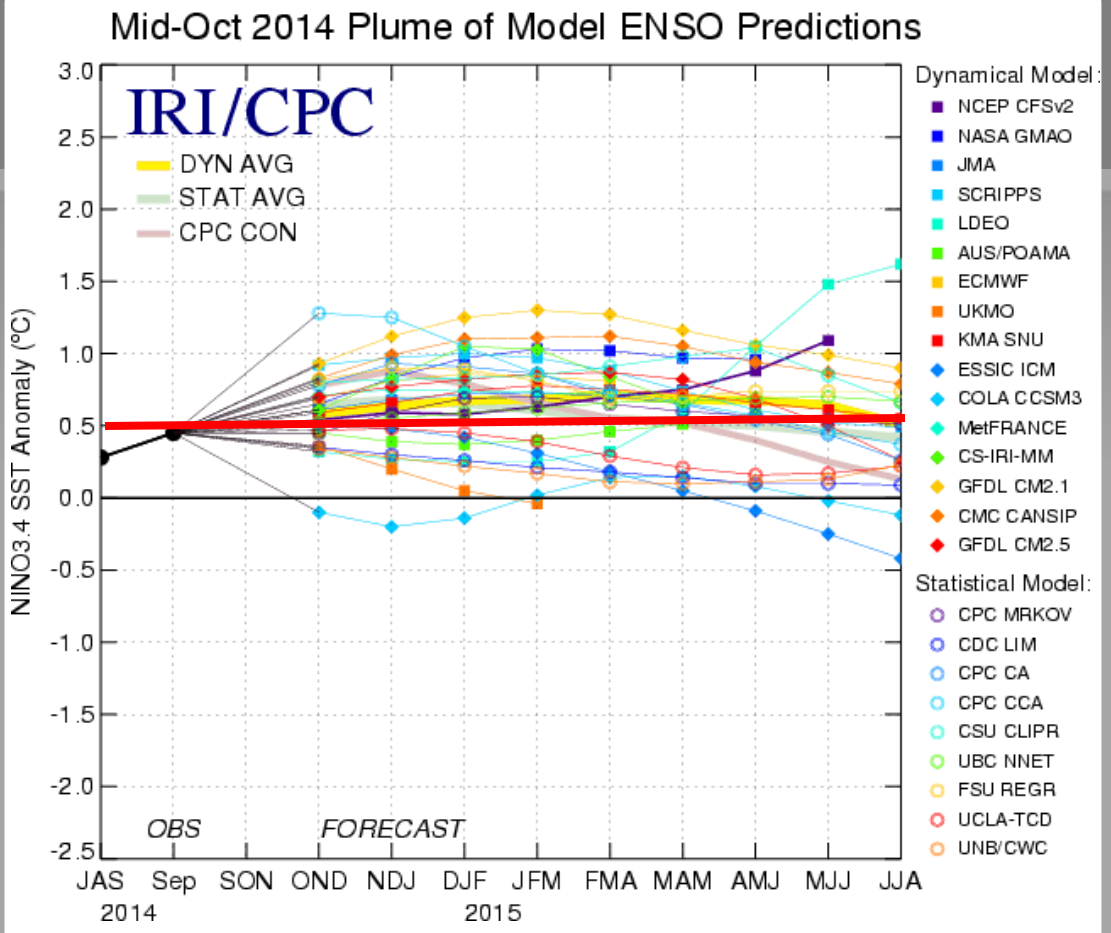
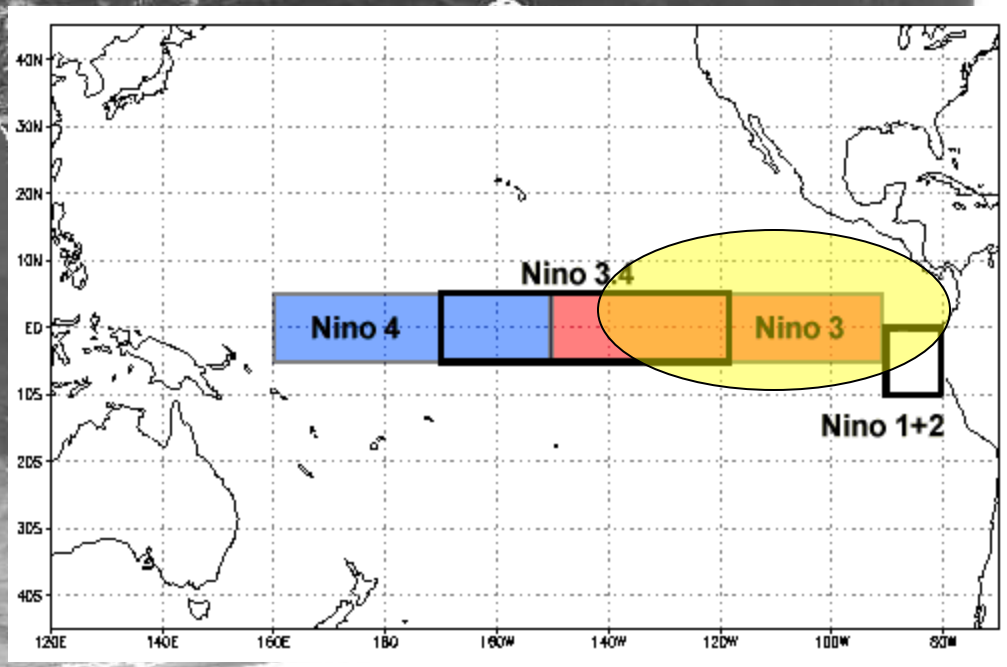


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 16 October 2014).

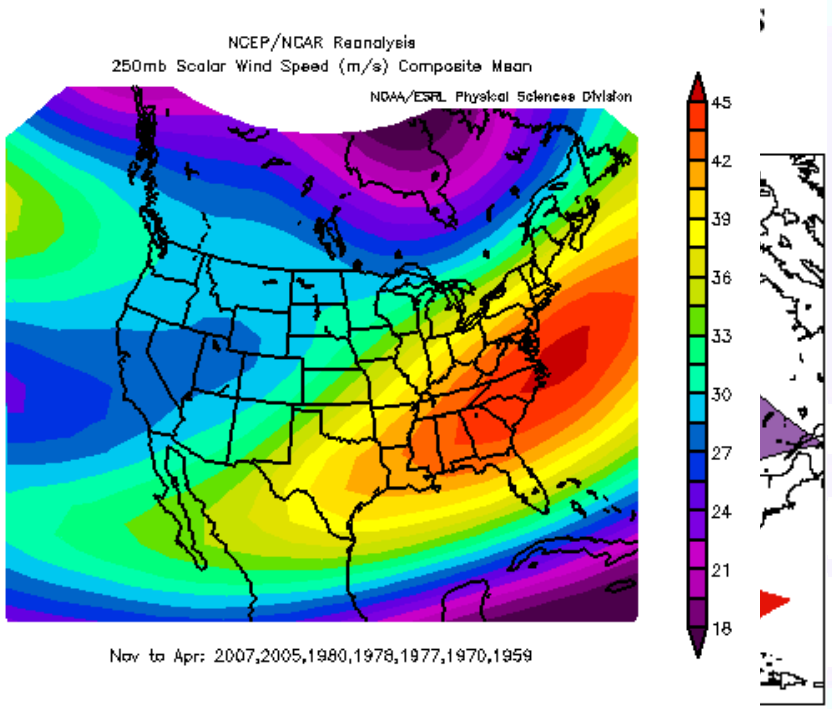
Not easy to see effect of El Nino on U.S. in a given weather Map or satellite picture



Slide Courtesy:
NWS Melbourne, FL

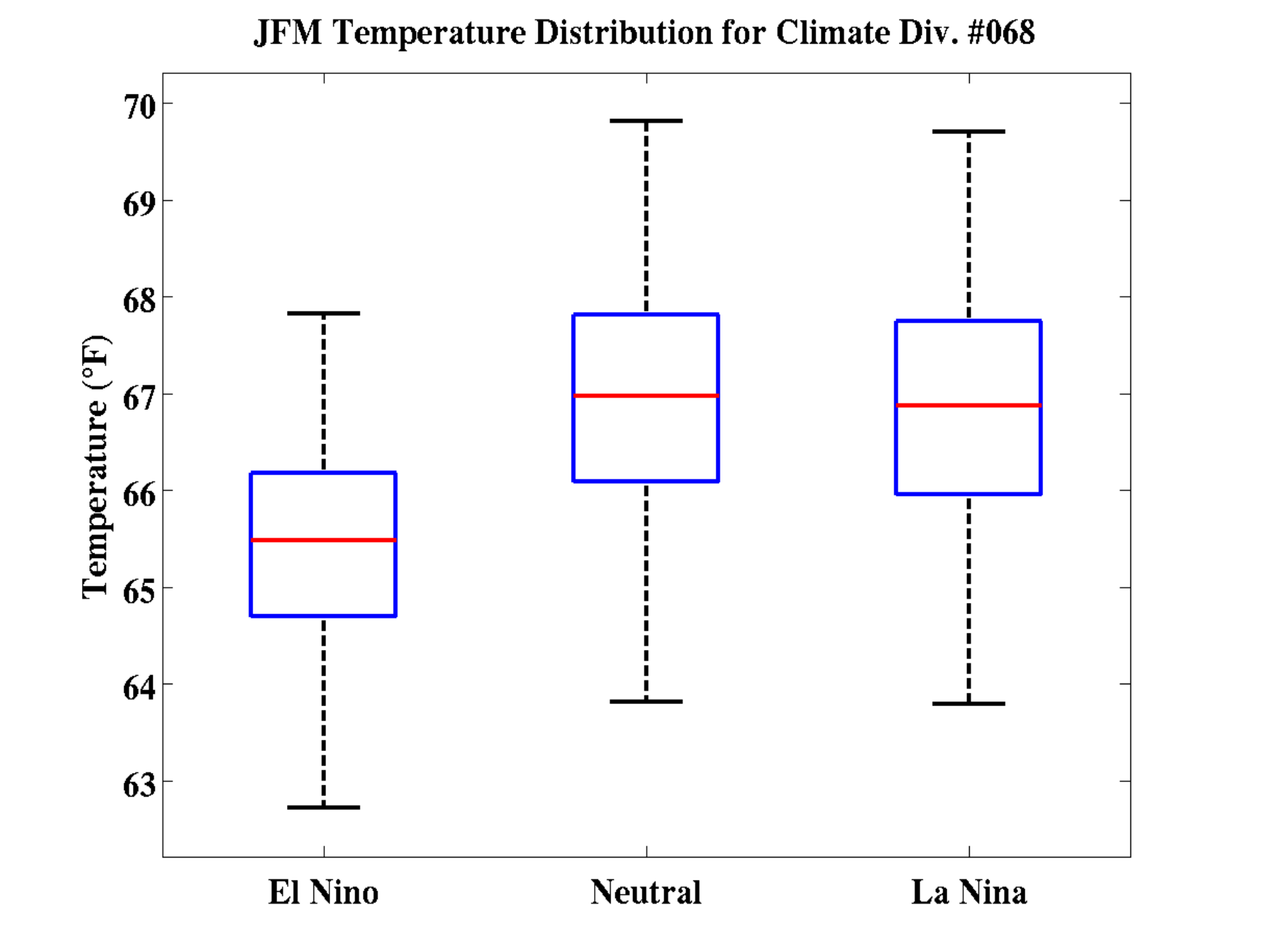
IR 10 25 2009 1745Z

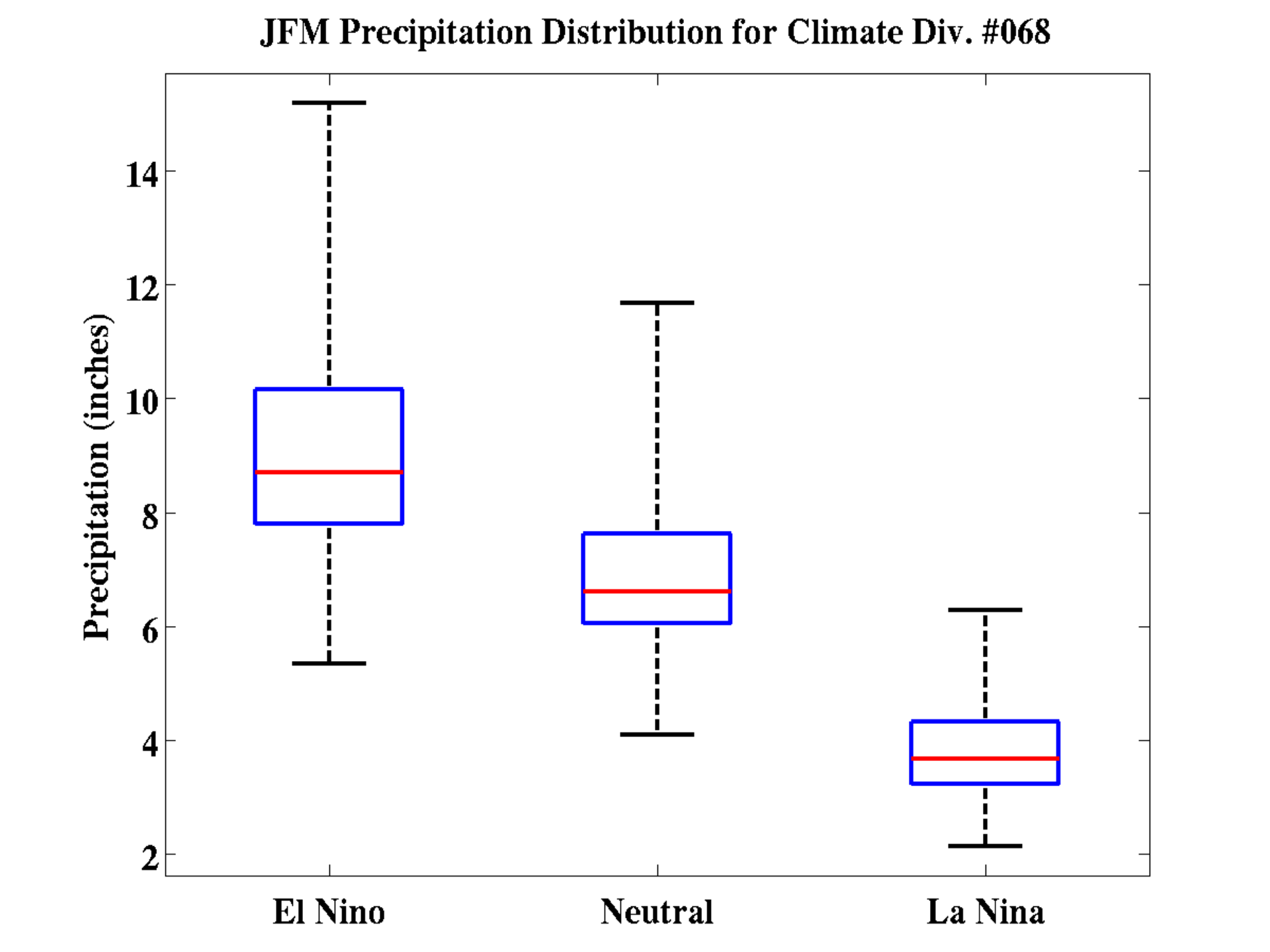
Wintertime Impacts in North America



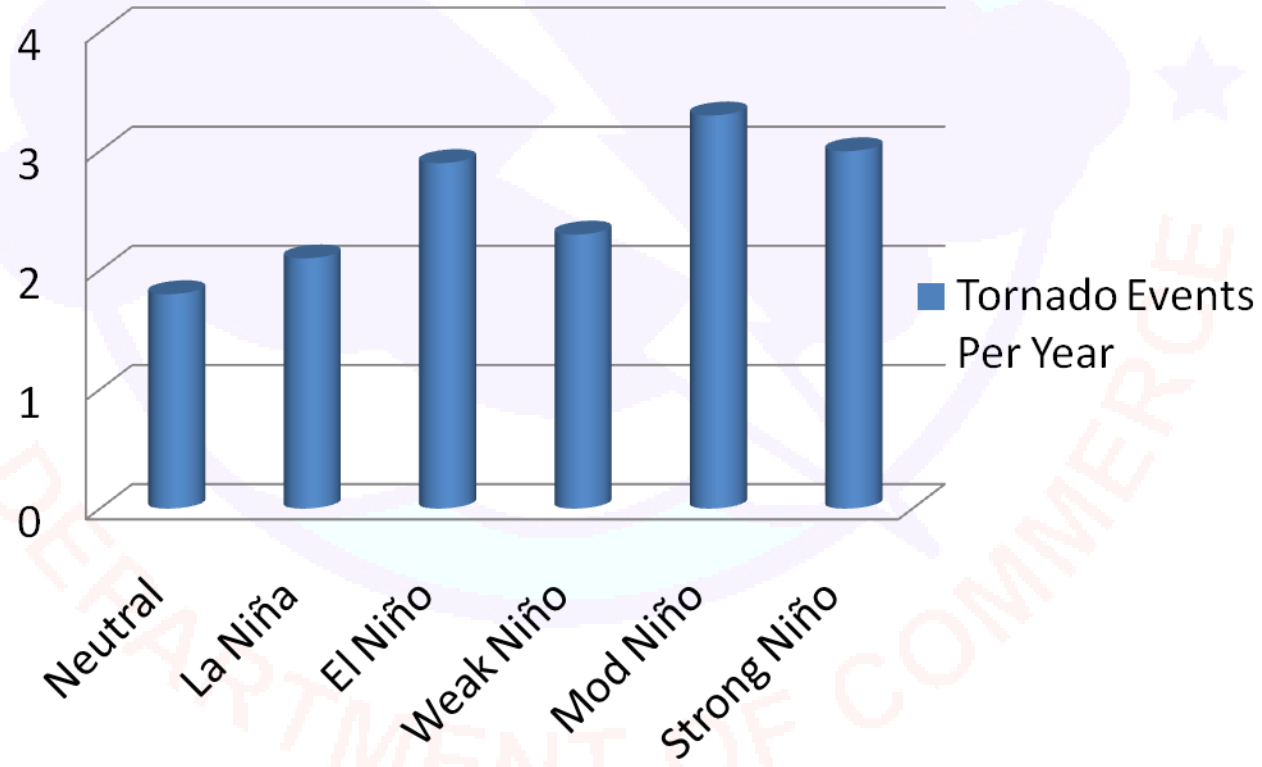
El Niño:

- Pacific jet stream, storm track are south of normal
- Increasing Florida "storminess"
- Polar jet stream well into Canada
- Fewer arctic outbreaks


JFM Temperature Distribution for Climate Div. #068
Temperature (°F)
70
69
68
67
66
65
64
63
El Nino
Neutral
La Nina


JFM Precipitation Distribution for Climate Div. #068
Precipitation (inches)
14
12
10
8
6
4
2
El Nino
Neutral
La Nina

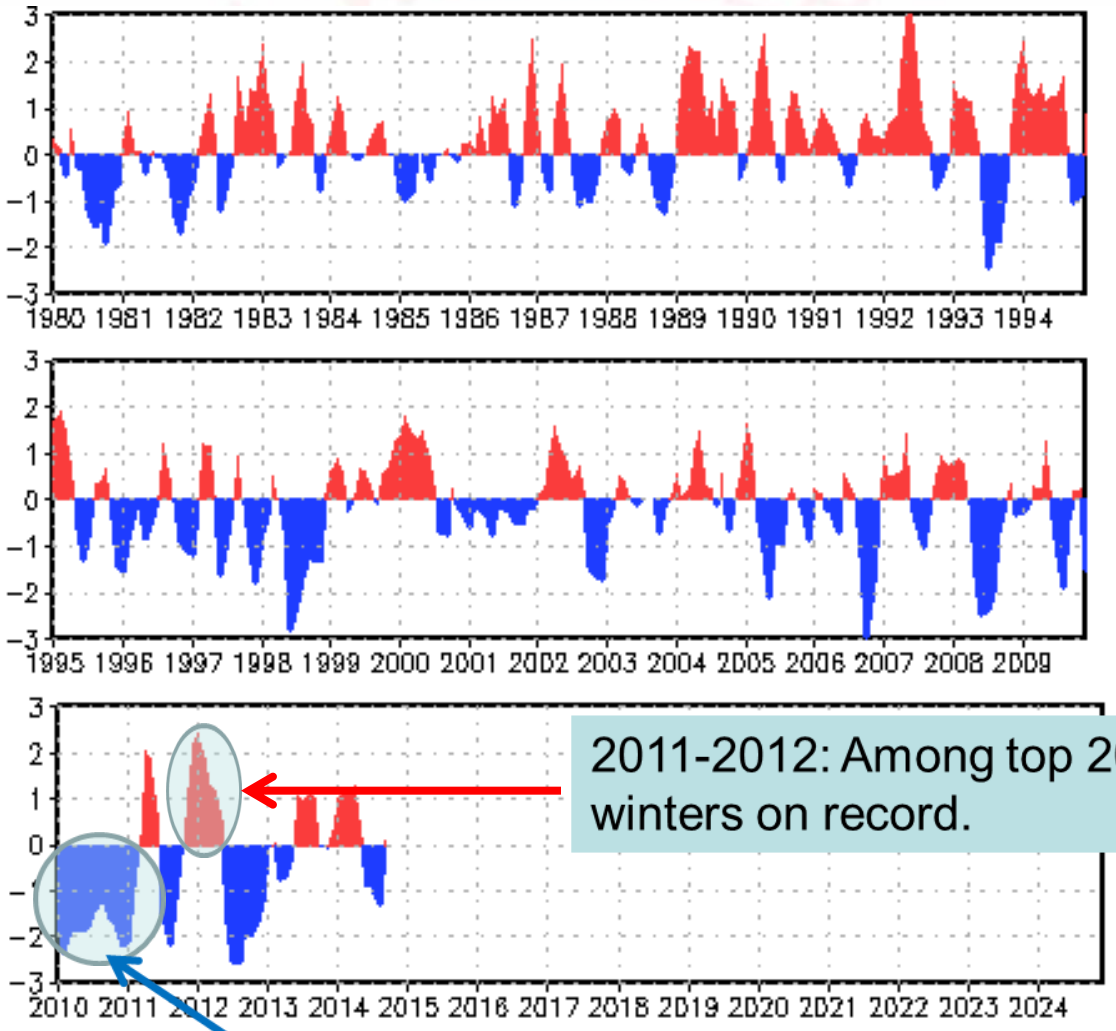
South Florida Tornado Events compared to ENSO phase



Intra-seasonal Cycles

- **NAO, PNA, etc., can modulate ENSO phase or even dominate in neutral ENSO years.**
- **Most intra-seasonal cycles are only reliably predictable up to 14 days in advance.**
- **Conflicting/overriding signals can make long-term prediction of atmospheric conditions very difficult.**

NAO (North Atlantic Oscillation)



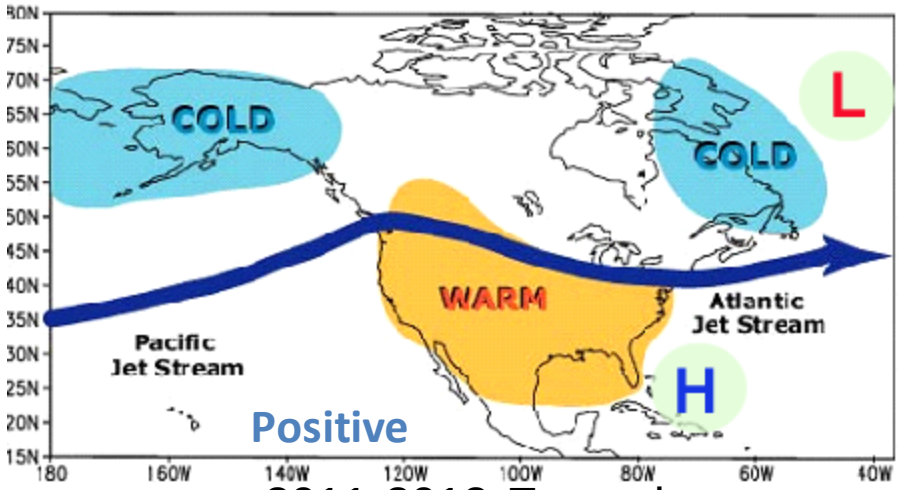
2011-2012: Among top 20 warmest winters on record.

2009-2010: One of coldest winters on record. December 2010 coldest on record

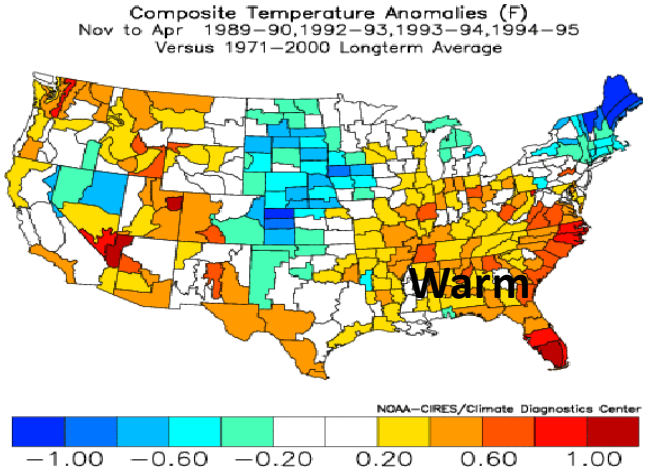
Slide Courtesy:
NWS Melbourne, FL

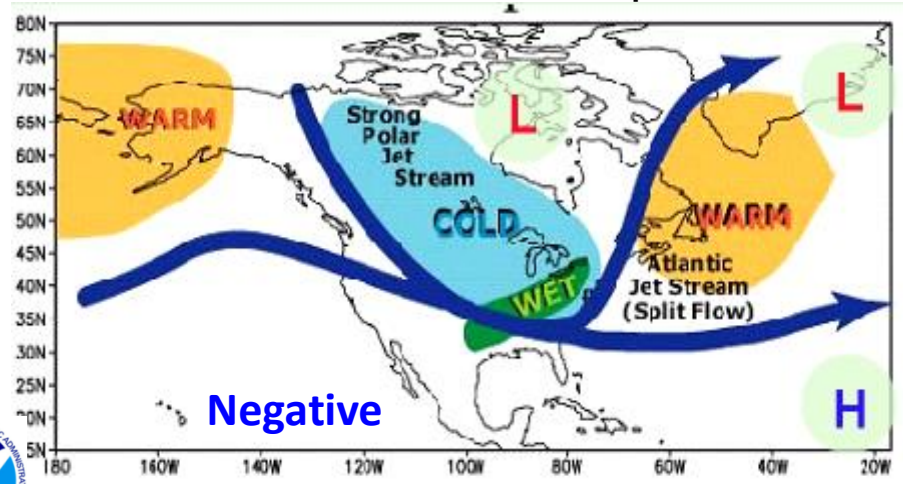
North Atlantic Oscillation

Periodic Fluctuation of Pressure Patterns over the North Atlantic Ocean – Scale of Weeks – Primary Impact on Winter Temperature

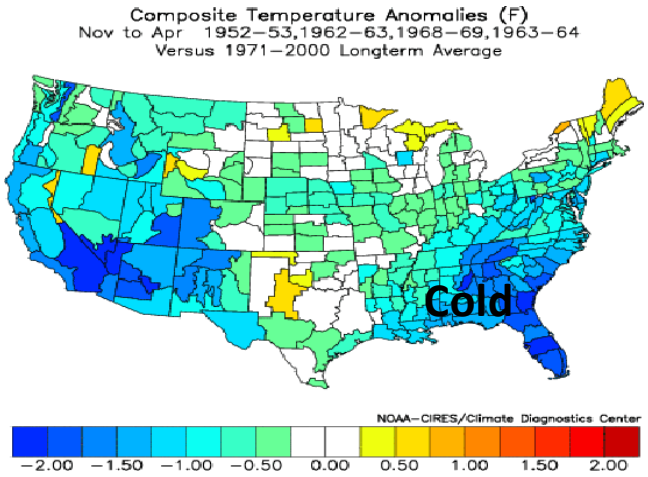


2011-2012 Example





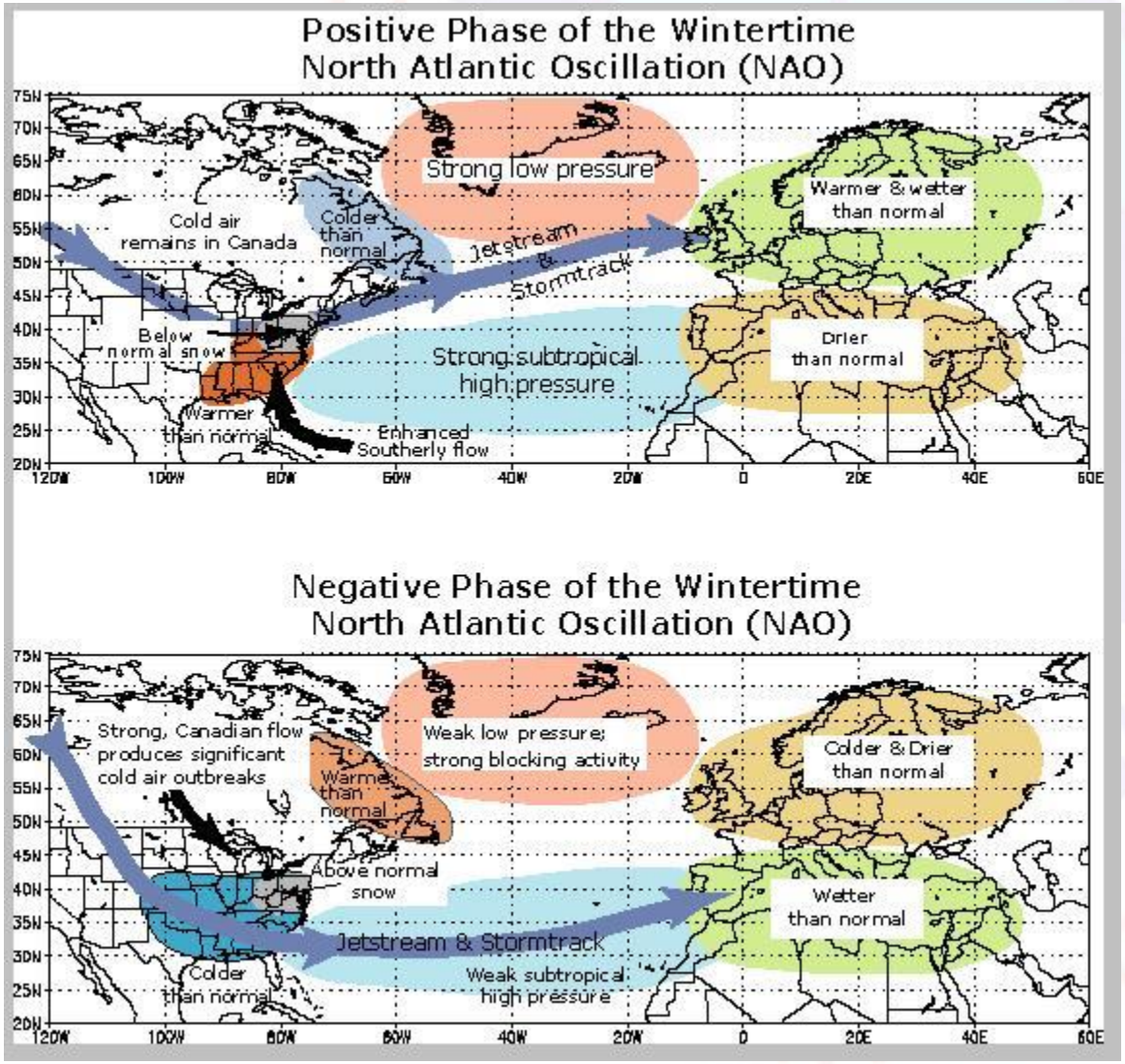
2009-2010 Example



North Atlantic Oscillation

Periodic Fluctuation of Pressure Patterns over the North Atlantic Ocean – Scale of Weeks – Primary Impact on Winter Temperature

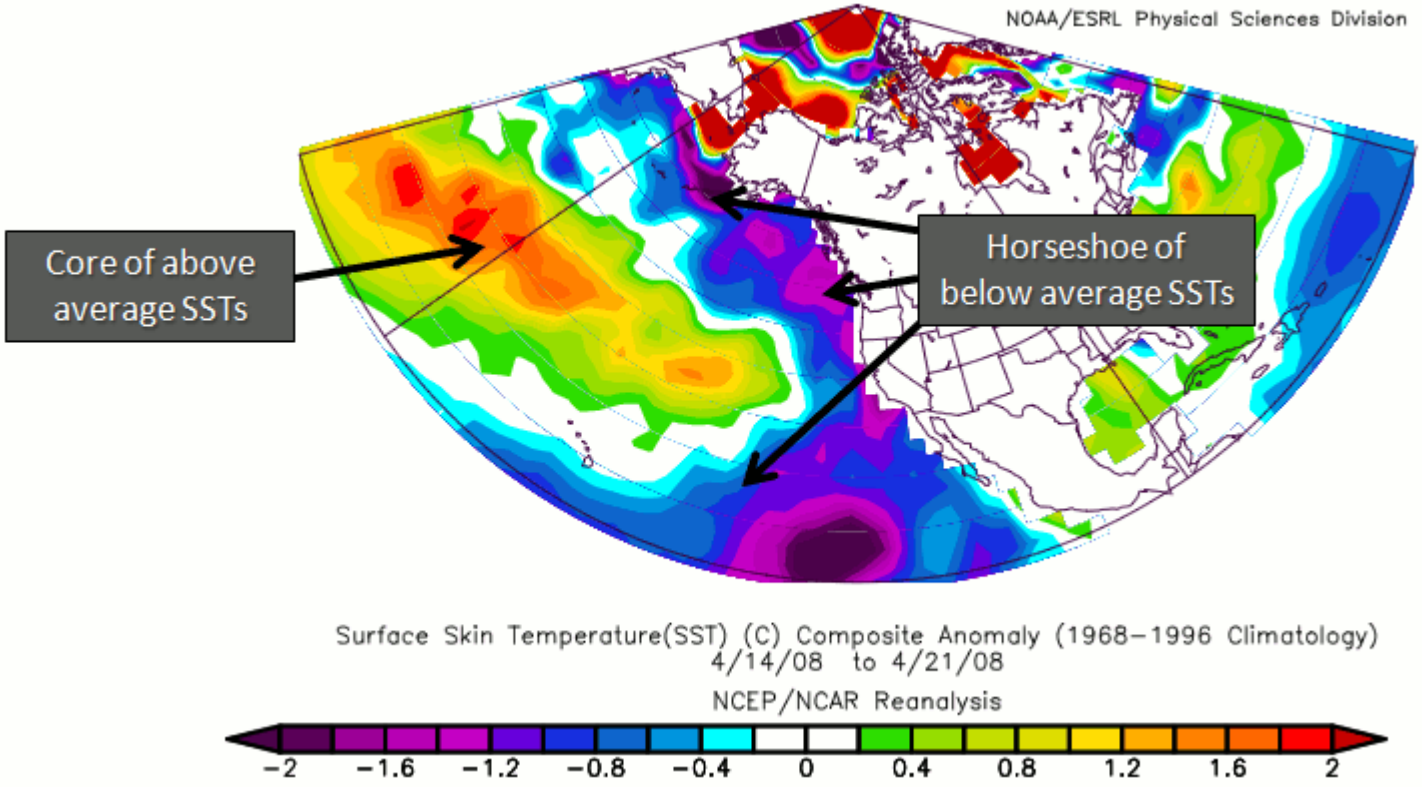
Accounts for almost a third of the variance in winter temperatures (Hurrell 1995)



2011-2012 Example

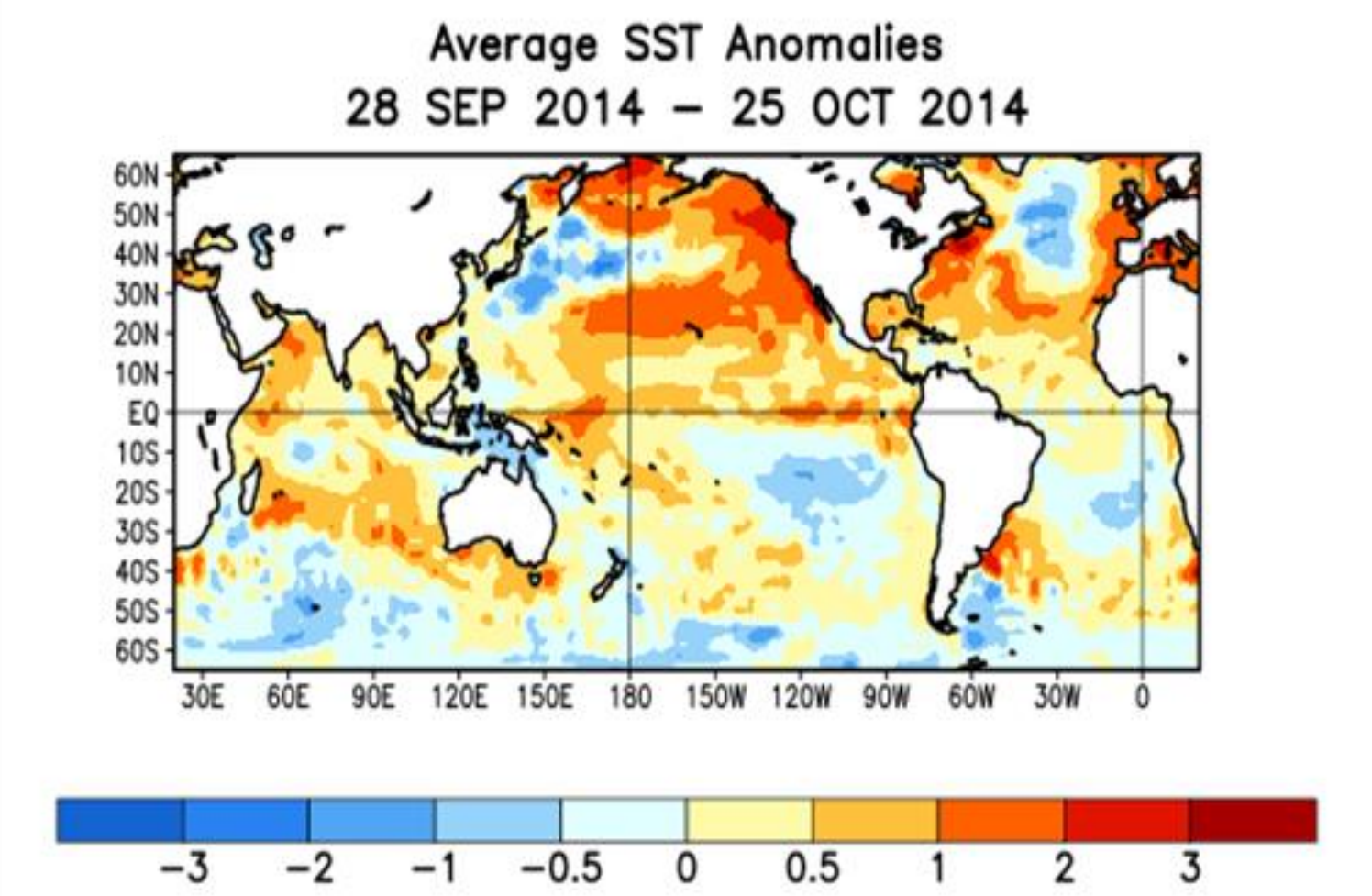
2009-2010 Example

PDO: Pacific Decadal Oscillation



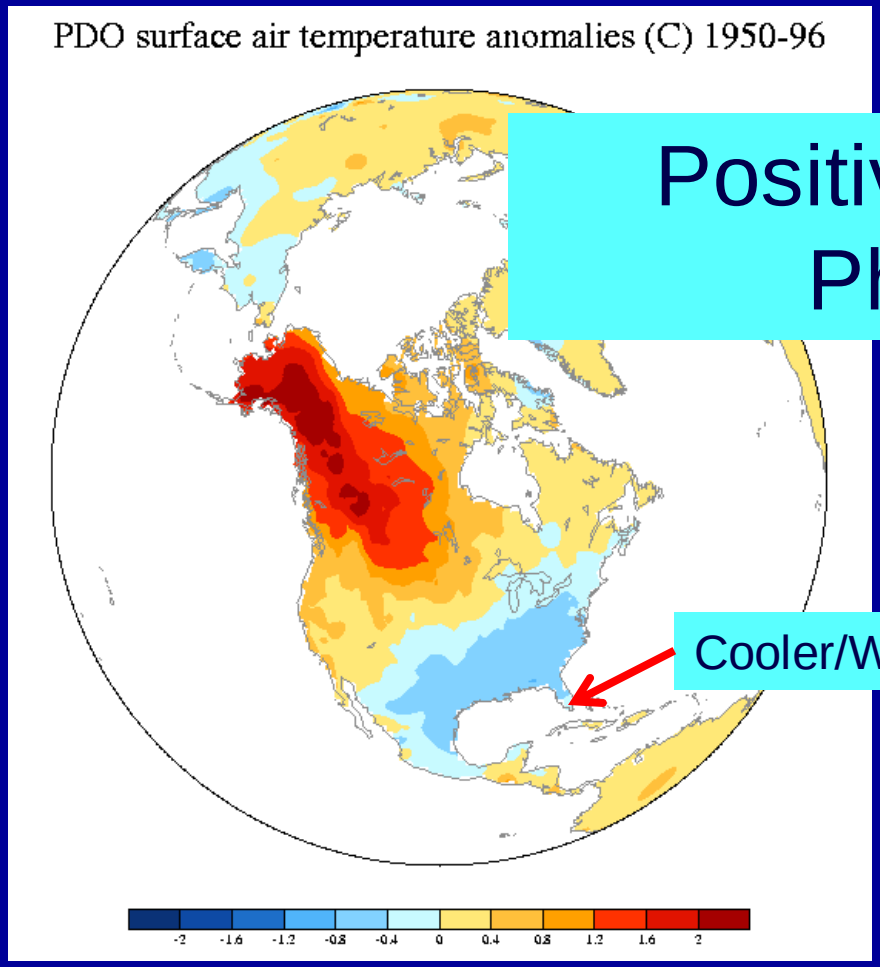
Similar to ENSO except on longer time scale and larger area (north of equator to Alaska region). Can counteract or enhance ENSO.

Current **Warm** Phase

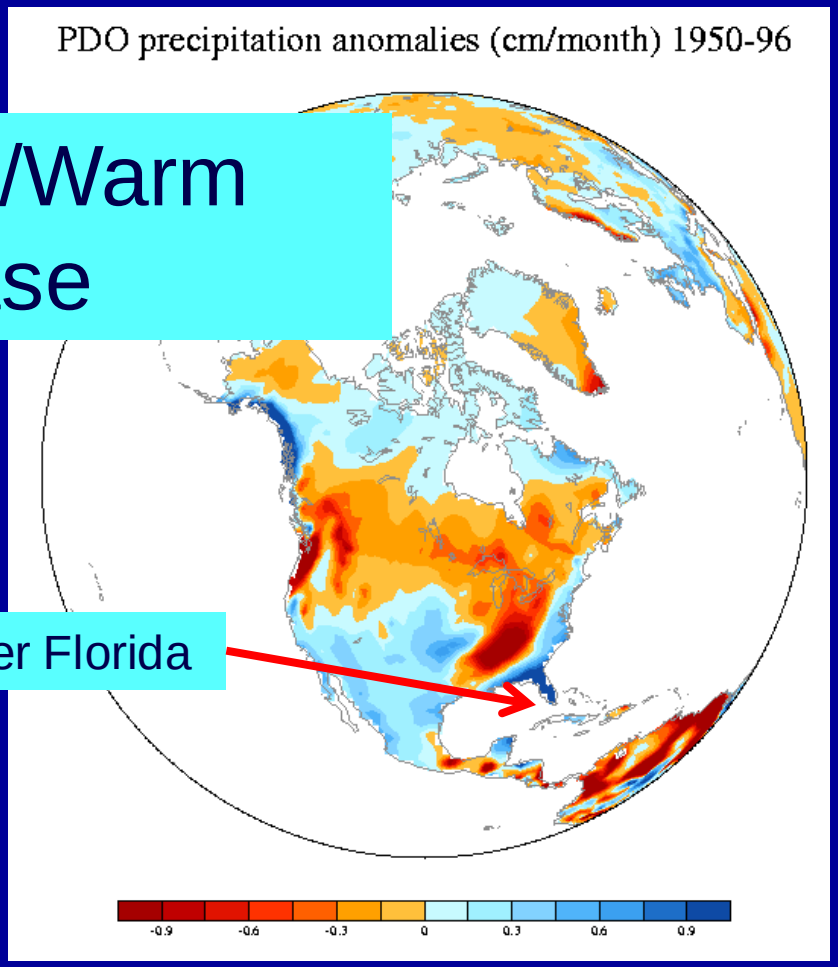


October-March PDO Regression fields

Surface Air Temperature



Precipitation

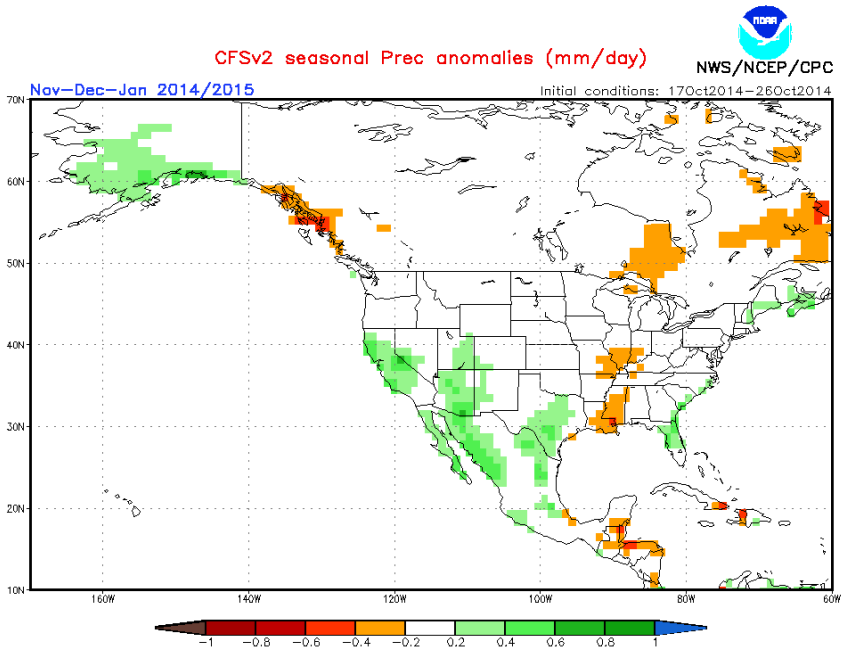


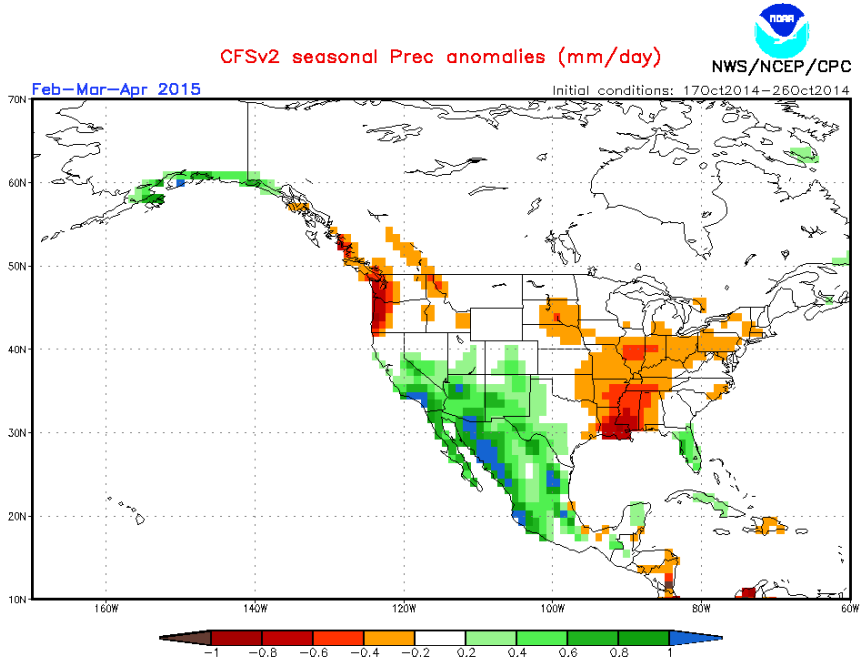
Positive/Warm Phase

Cooler/Wetter Florida

Figures produced by Todd Mitchell, UW/JISAO

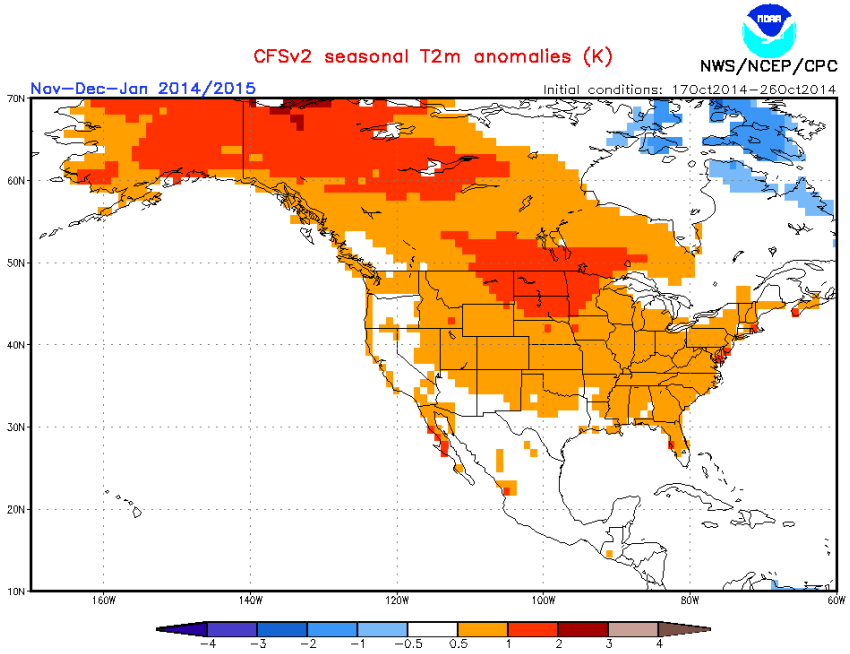
Long-Range Models - CFS

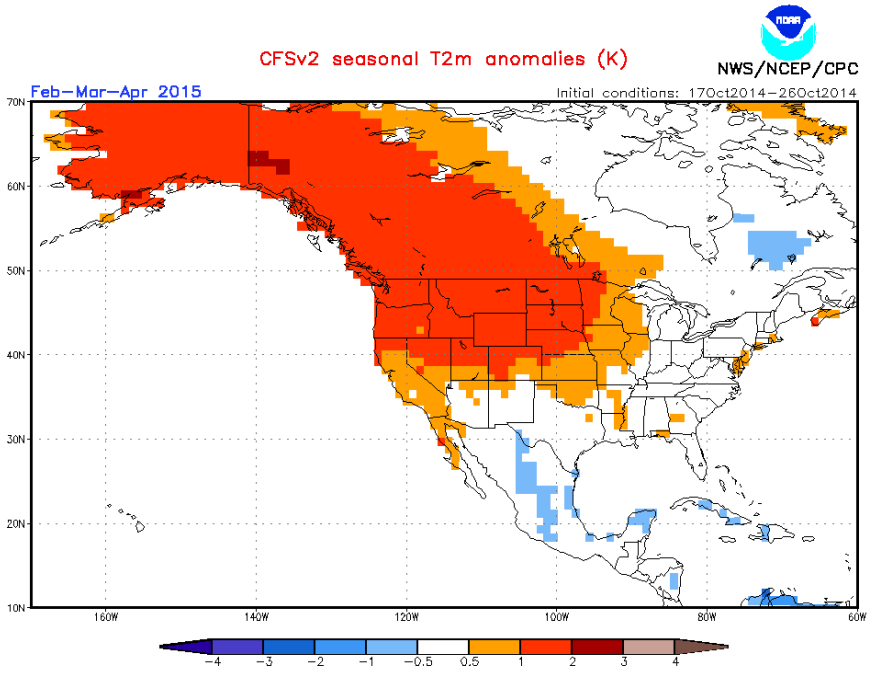




Precipitation departure
(NDJ left and FMA right)

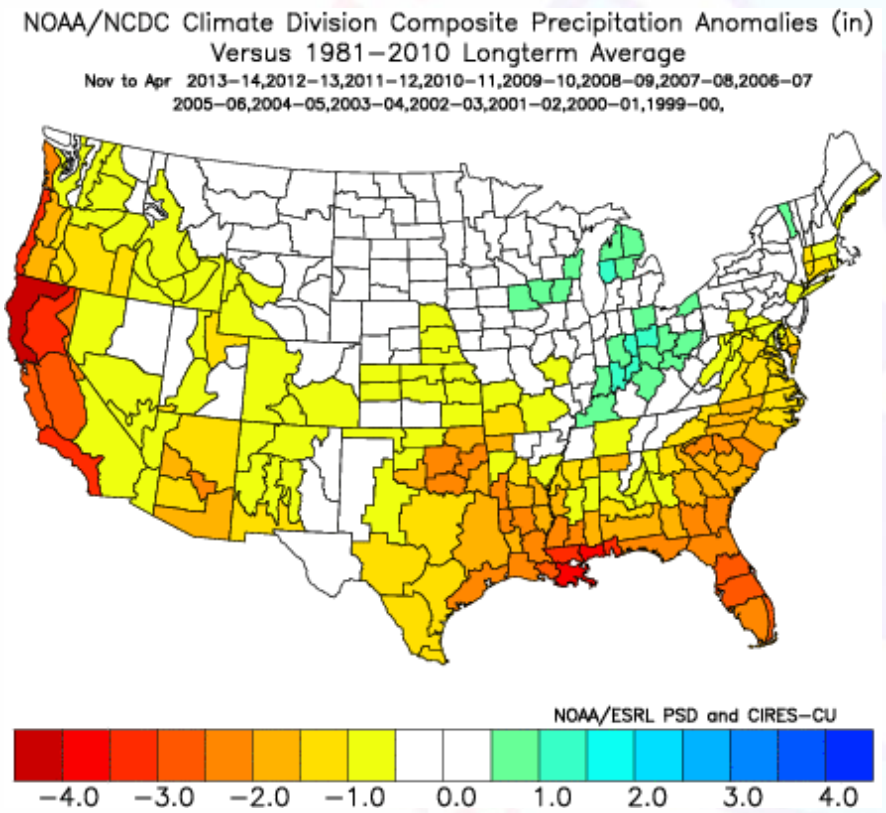
Long-Range Models - CFS

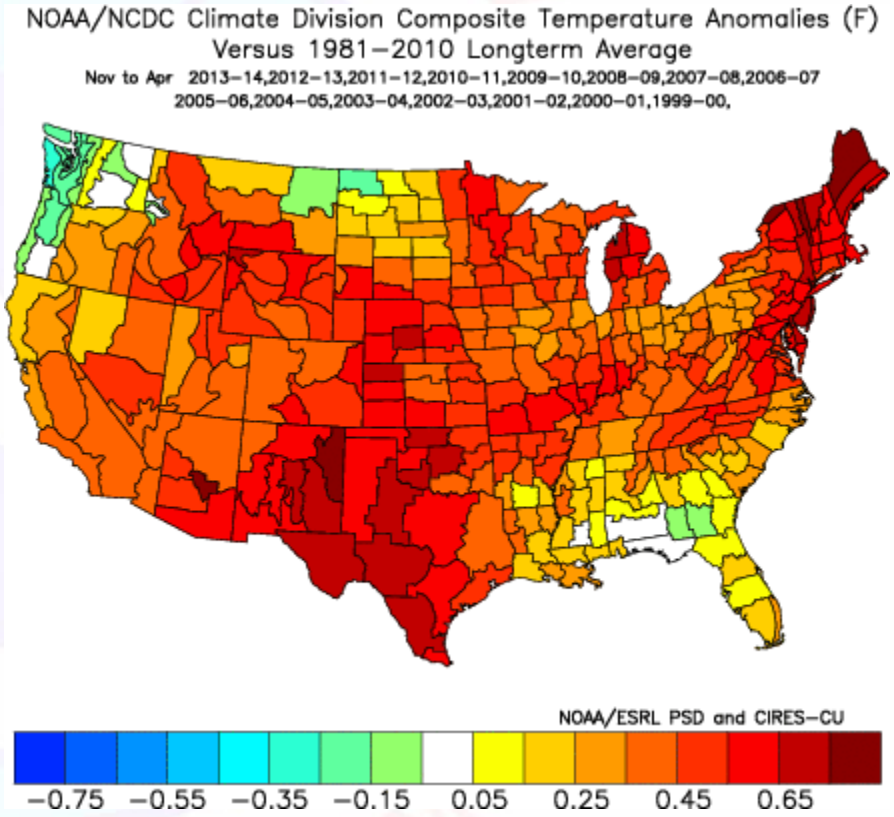


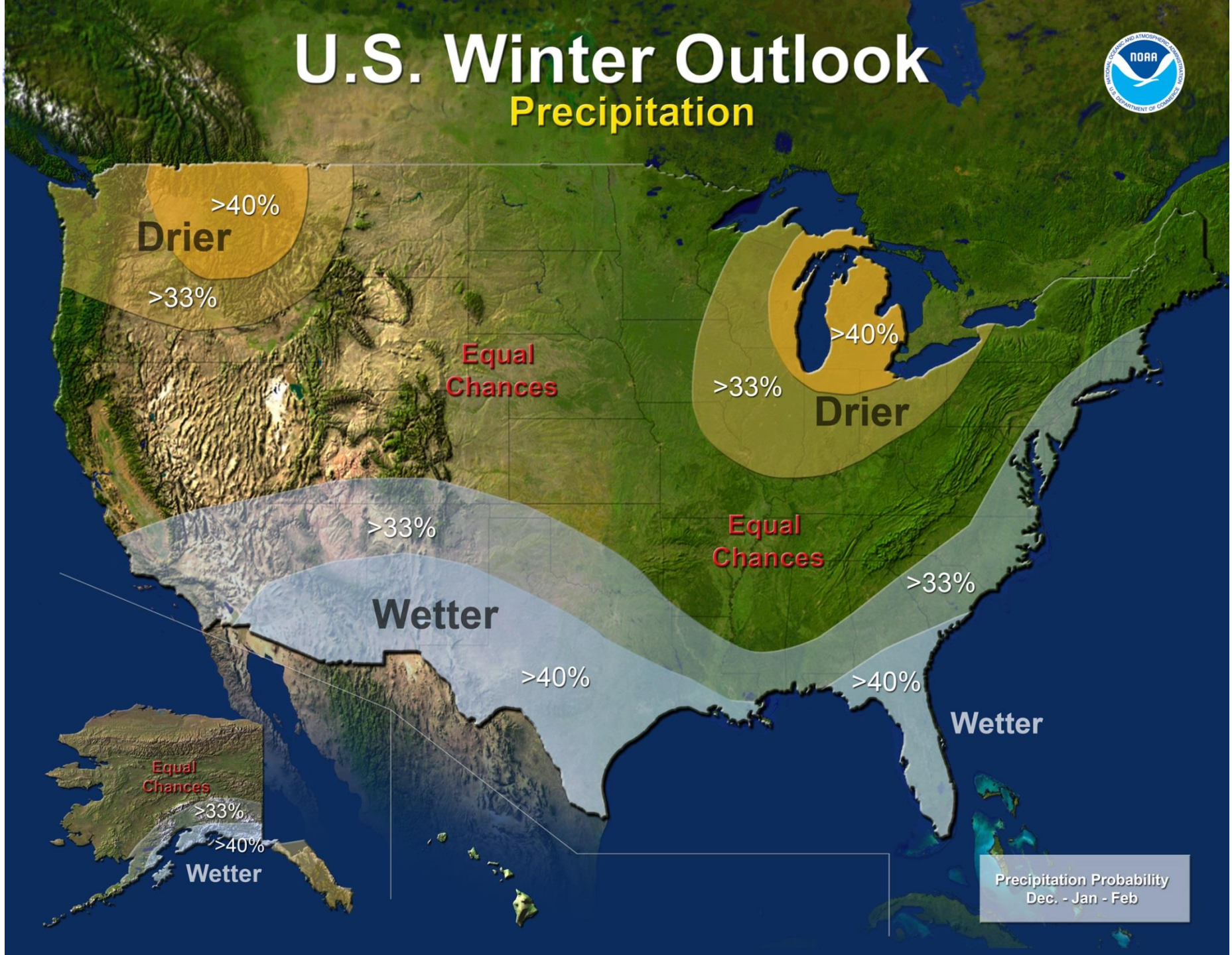


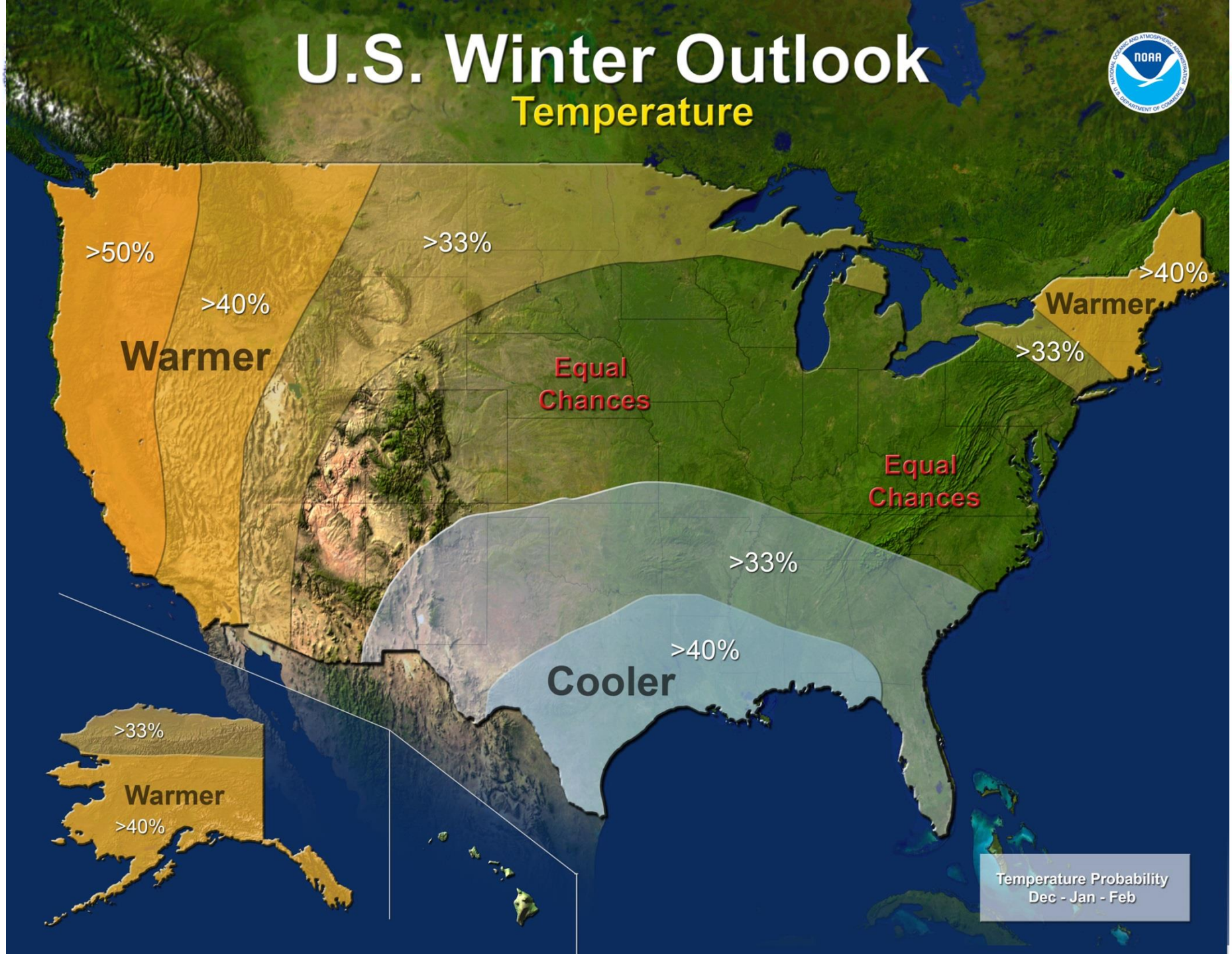
Temperature departure (NDJ left and FMA right)

Trends Since 1999: Drier/Warmer Than Normal

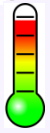





U.S. Winter Outlook
Precipitation
>40%
Drier
>33%
Equal Chances
>40%
>33%
Drier
>33%
Equal Chances
>33%
Wetter
>40%
>40%
Wetter
Equal Chances
>33%
>40%
Wetter
Precipitation Probability
Dec. - Jan - Feb


U.S. Winter Outlook
Temperature
>50%
>40%
Warmer
>33%
Equal
Chances
>40%
Warmer
>33%
Equal
Chances
>33%
>40%
Cooler
>33%
Warmer
>40%
Temperature Probability
Dec - Jan - Feb

South Florida 2014-2015 Dry Season Outlook

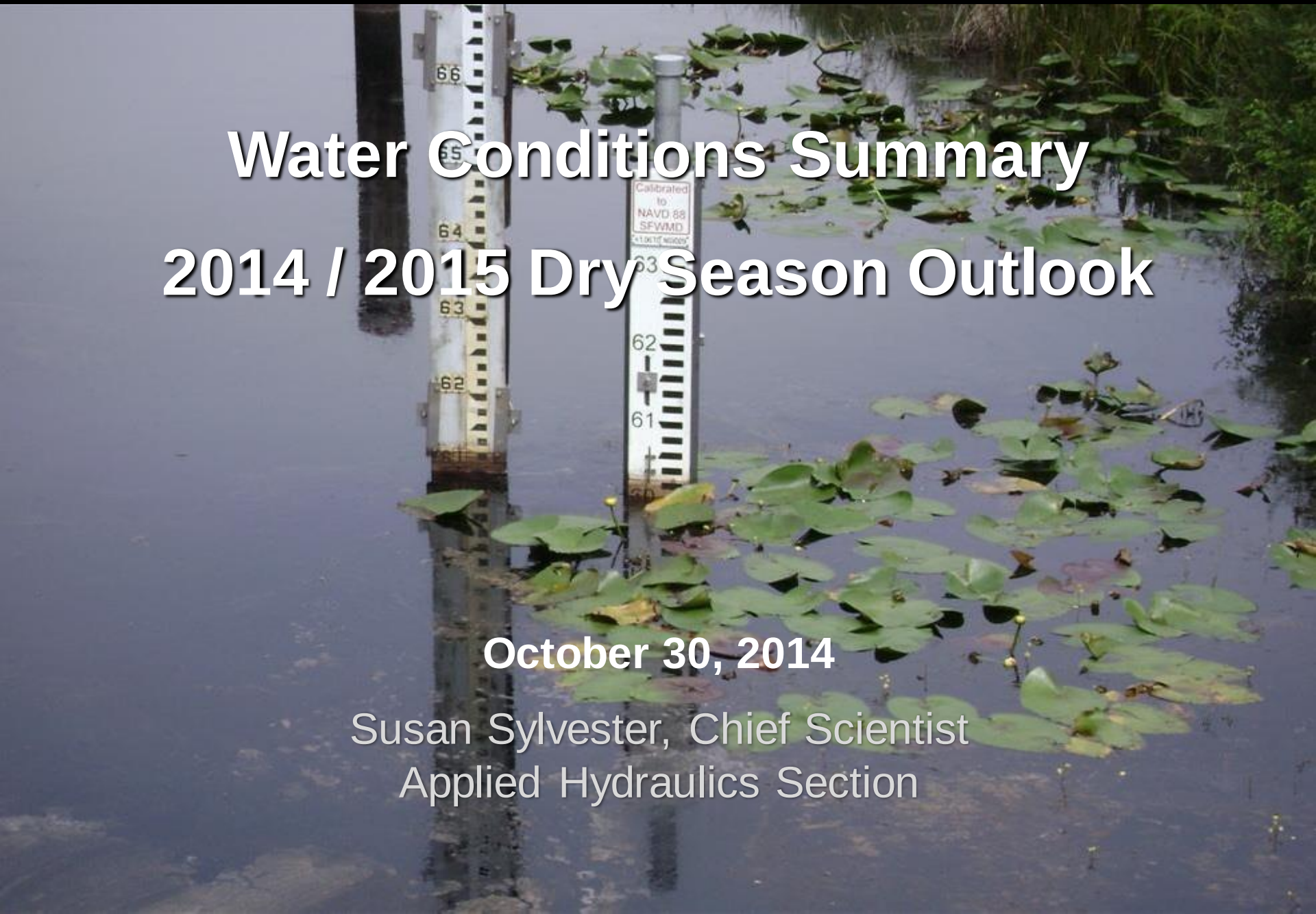
Element	Outlook Nov-Apr	Long-Term Normal Values/Frequency
Temperature 	**Near to Below Normal**	64-66F Interior/W 67-69F East
Precipitation 	**Near to Above Normal**	12-15” Interior/W 15-21” East
Storminess/Severe Weather  	**Normal**	5-6 events per season
Freeze 	**Normal**	At least one per season

Typical Dry Season Impacts

- **Rip Currents**: November and again March/April
- **Freeze/Cold**: December – February
- **Severe Weather**: February – April (hail/tornadoes)
- **Wildfires/Drought**: February - April

Summary

- Normal to wetter-than-normal summer has left region in good shape from water perspective
- Likelihood of El Niño and **near to above normal rainfall** decreases potential of significant drought
- **Near to below normal temperatures**. Damaging freezes can occur any year. Only strongest El Niños significantly limit freeze potential
- Wildfire threat seasonably high in spring



Water Conditions Summary

2014 / 2015 Dry Season Outlook

October 30, 2014

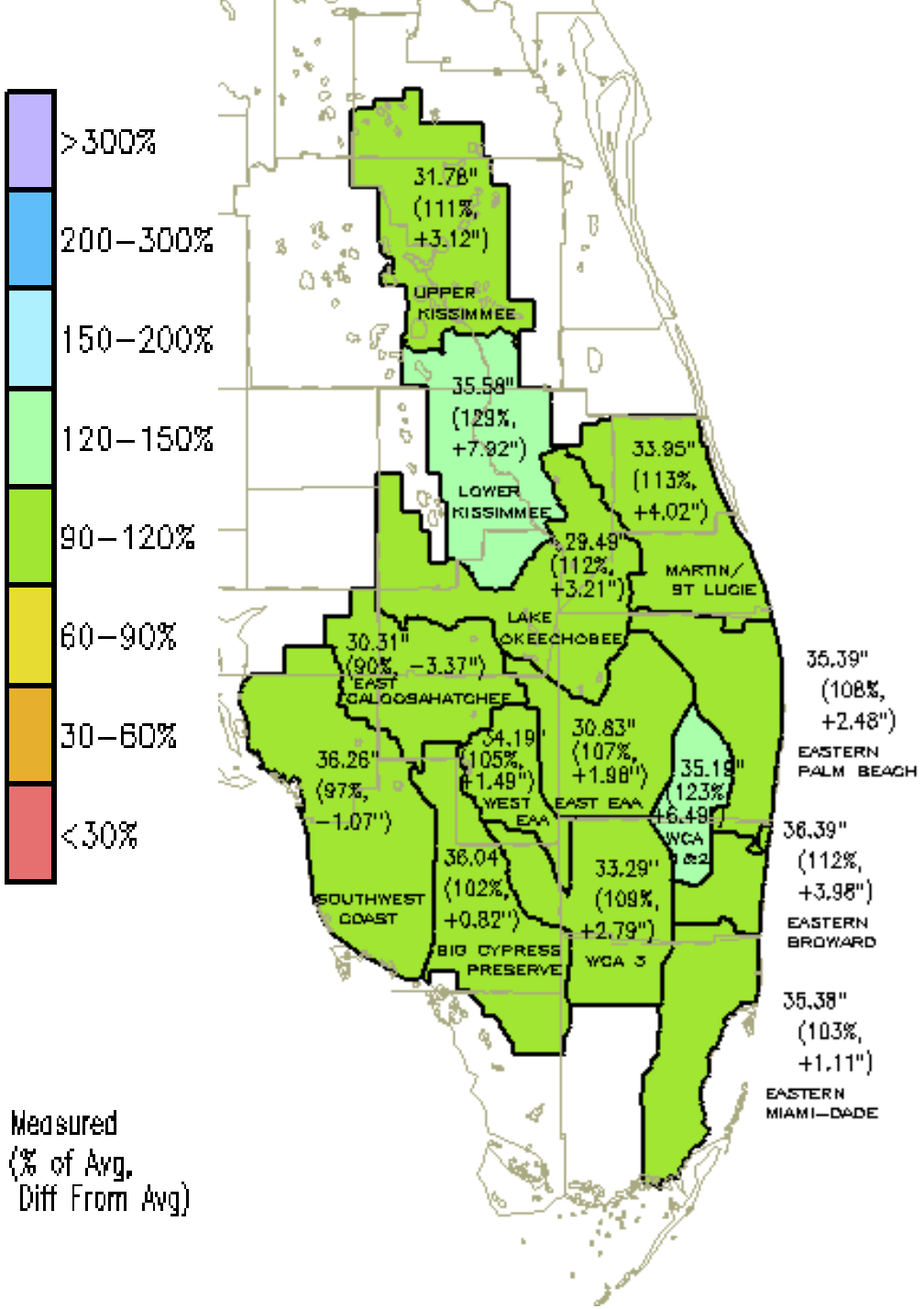
Susan Sylvester, Chief Scientist
Applied Hydraulics Section

SFWMD

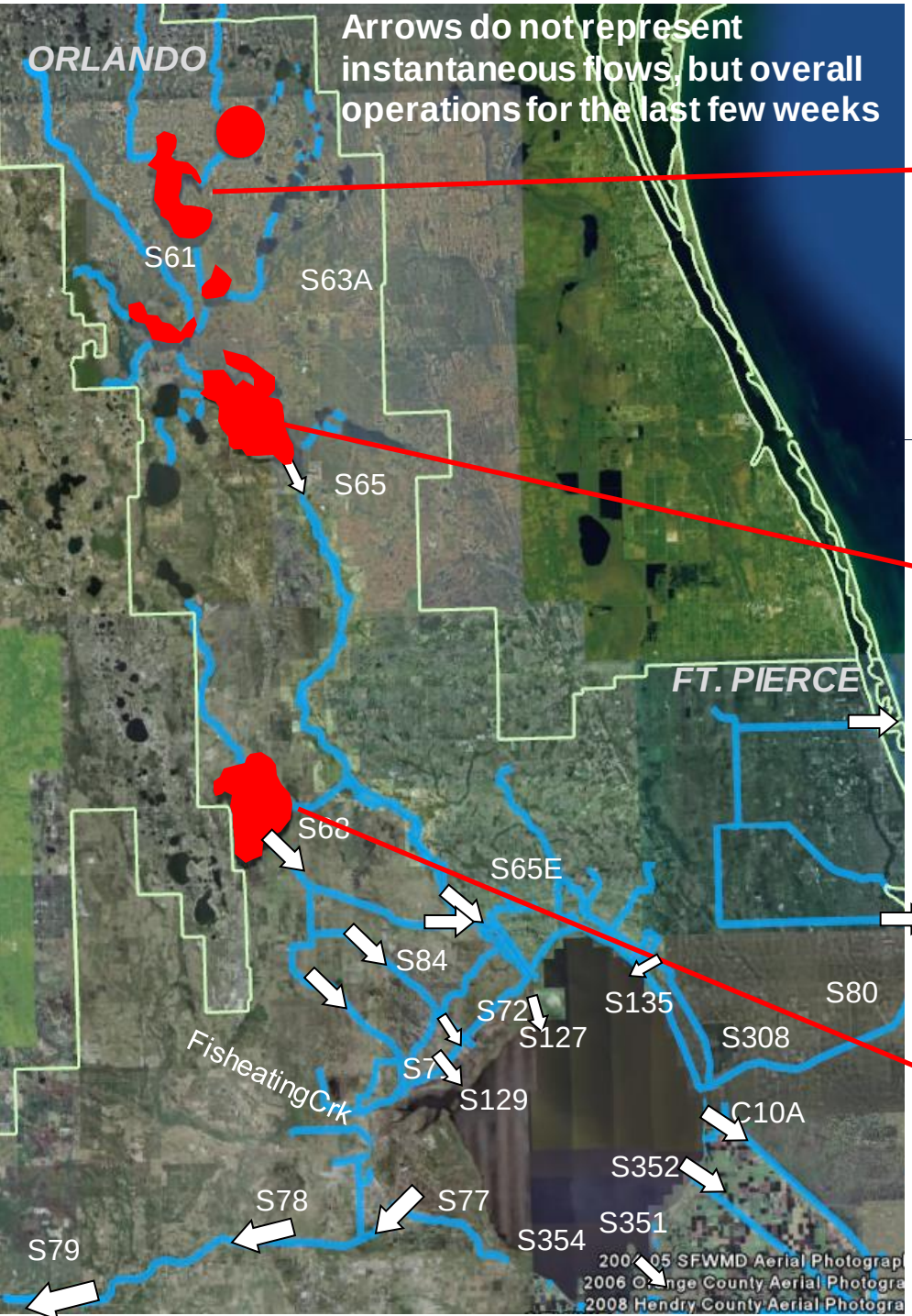
Wet Season Rainfall

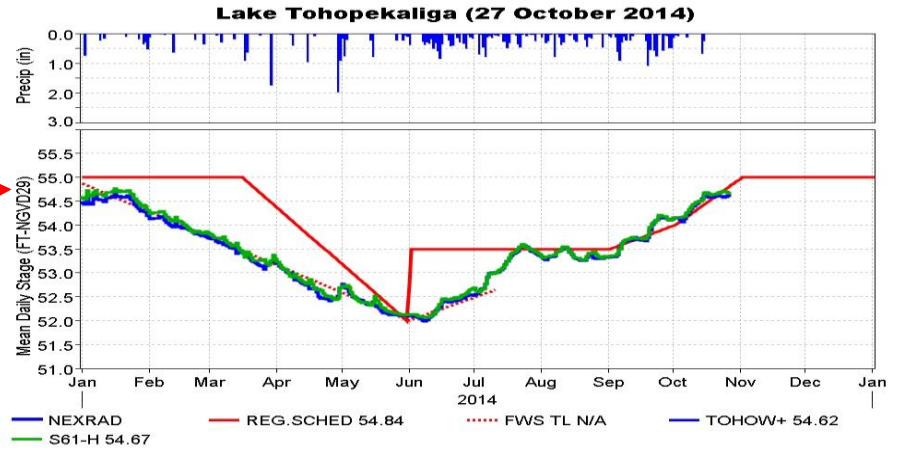
May 26 2014 – Oct 4, 2014

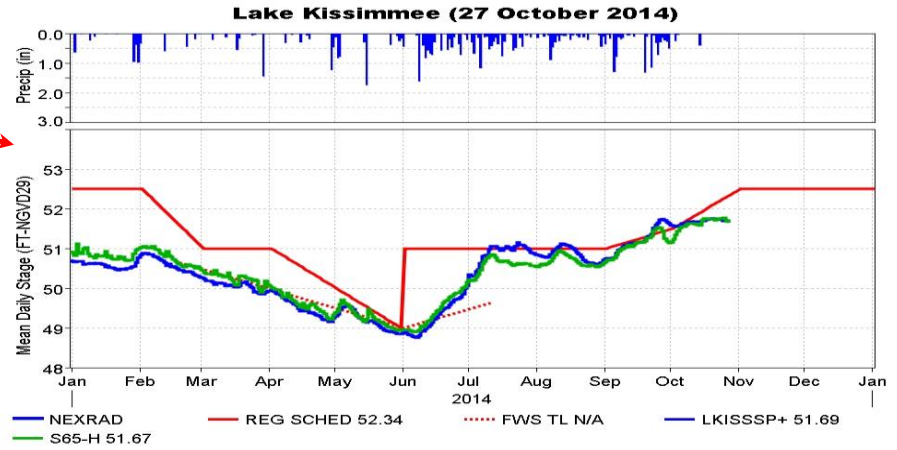
DISTRICT-WIDE:
33.58”
(108% of Avg, or +2.45”)

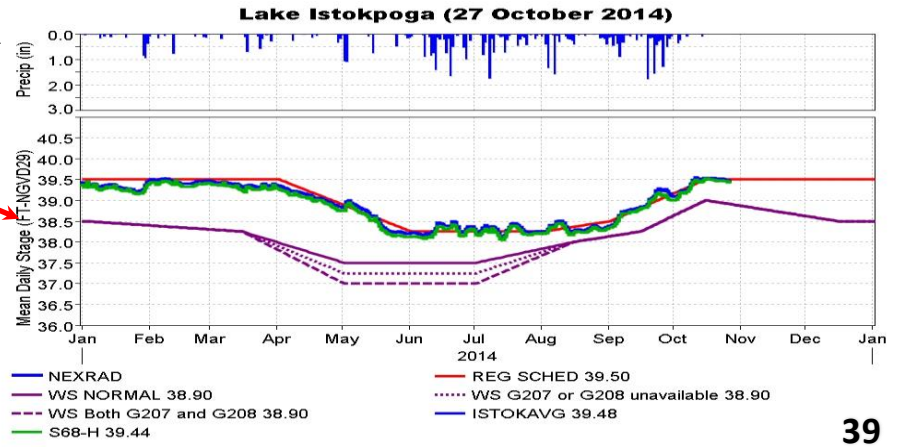


- **All basins received at or slightly above average rainfall**
- **District wide, the timing and coverage of rainfall was well distributed**
- **Operationally the main challenge was the above normal rainfall in September which contributed to a rise in Lake Okeechobee levels.**

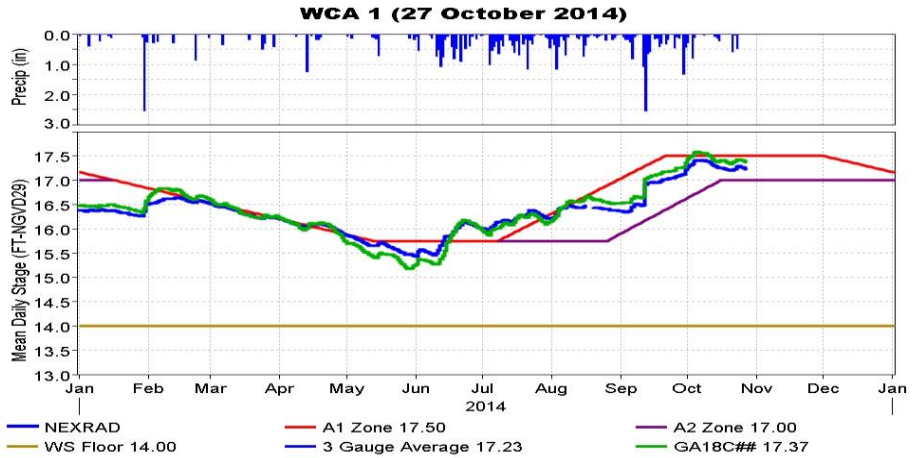

Arrows do not represent instantaneous flows, but overall operations for the last few weeks
ORLANDO
S61
S63A
S65
FT. PIERCE
S63
S65E
S84
S72
S127
S135
S80
S308
FisheatingCrk
S7
S129
C10A
S352
S78
S77
S351
S354
S79
2005 SFWMD Aerial Photograp
2006 Orange County Aerial Photogra
2008 Hendry County Aerial Photogra

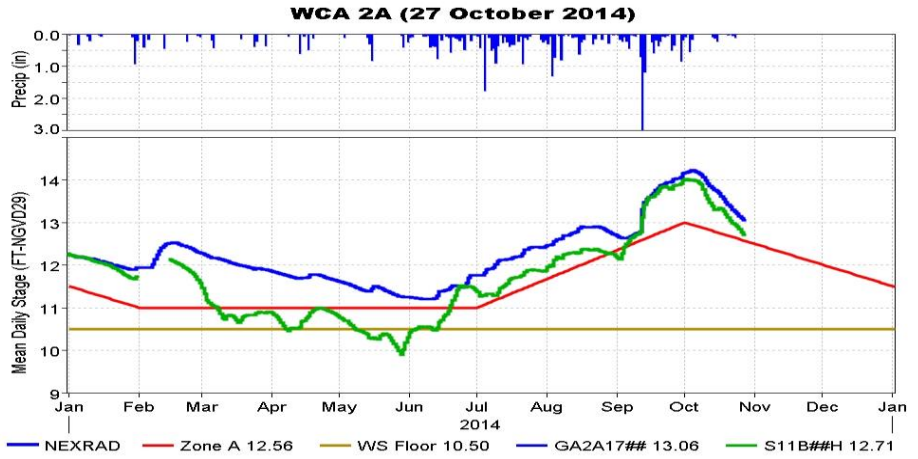

Lake Tohopekaliga (27 October 2014)
Precip (in)
Mean Daily Stage (FT-NGVD29)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
2014
NEXRAD
REG.SCHED 54.84
FWS TL N/A
TOHOW+ 54.62
S61-H 54.67

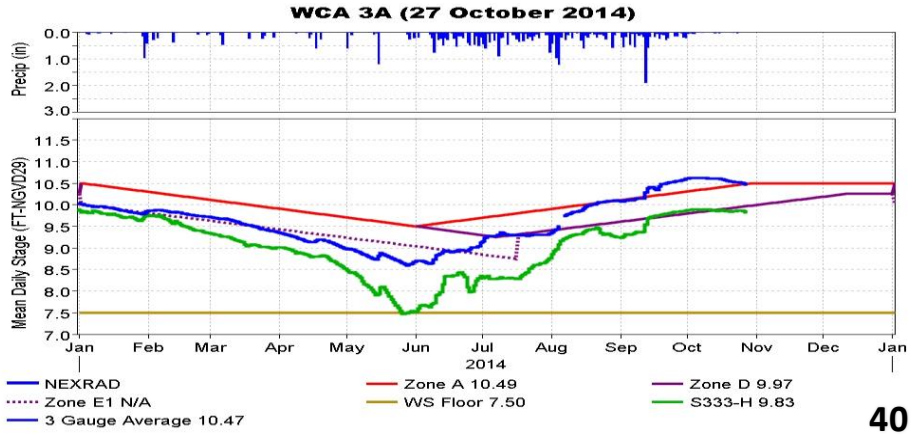

Lake Kissimmee (27 October 2014)
Precip (in)
Mean Daily Stage (FT-NGVD29)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
2014
NEXRAD
REG SCHED 52.34
FWS TL N/A
LKISSSP+ 51.69
S65-H 51.67

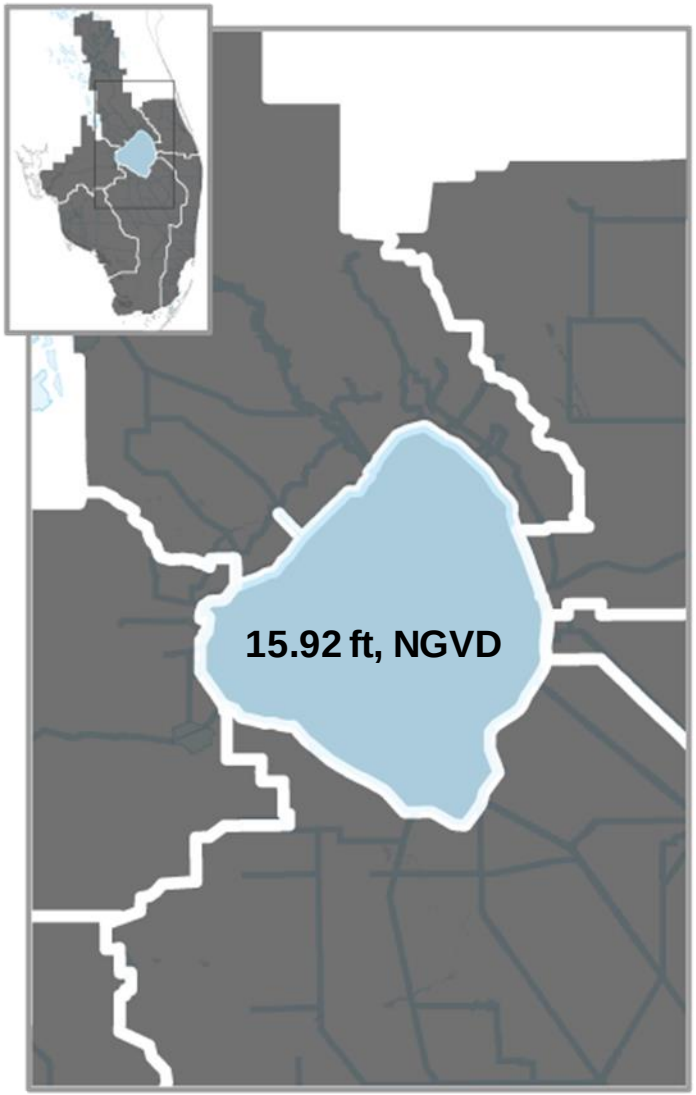

Lake Istokpoga (27 October 2014)
Precip (in)
Mean Daily Stage (FT-NGVD29)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
2014
NEXRAD
REG SCHED 39.50
WS NORMAL 38.90
WS G207 or G208 unavailable 38.90
WS Both G207 and G208 38.90
ISTOKAVG 39.48
S68-H 39.44

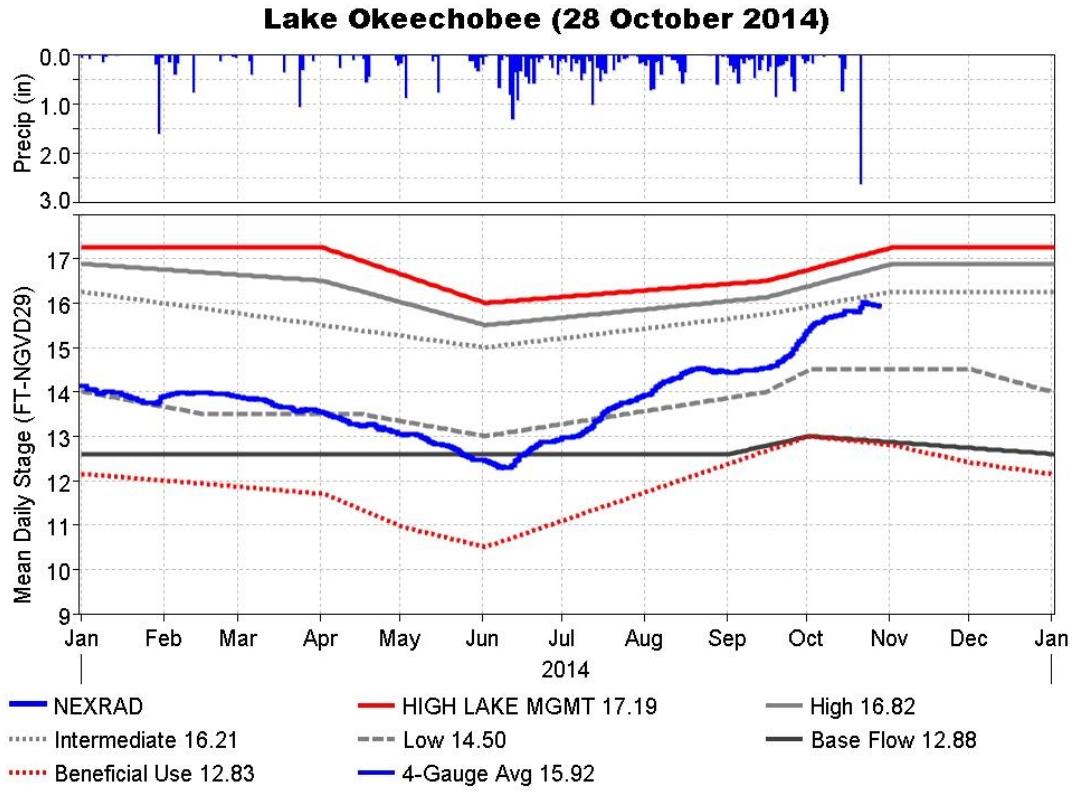

Arrows do not represent instantaneous flows, but overall operations for the last few weeks
S5AE
S5A
WCA-1 (LNWR)
S6
G372
G370
G94C
S-10D
S-10C
S-10A
S7
S8
WCA-2A
S39
S-11C
S-339
S-11B
S-11A
S38
s14 0
S-340
WCA-3A
S9
S13AW
S13
S-151
S31
S-337
S-344
S-343A
S-343B
S-12A
S-12B
S-12C
S-12D
S-333
S-334
S-335
ENP
S-331
Arrows are not to scale


WCA 1 (27 October 2014)
Precip (in)
Mean Daily Stage (FT-NGVD29)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
2014
NEXRAD
A1 Zone 17.50
A2 Zone 17.00
WS Floor 14.00
3 Gauge Average 17.23
GA18C## 17.37

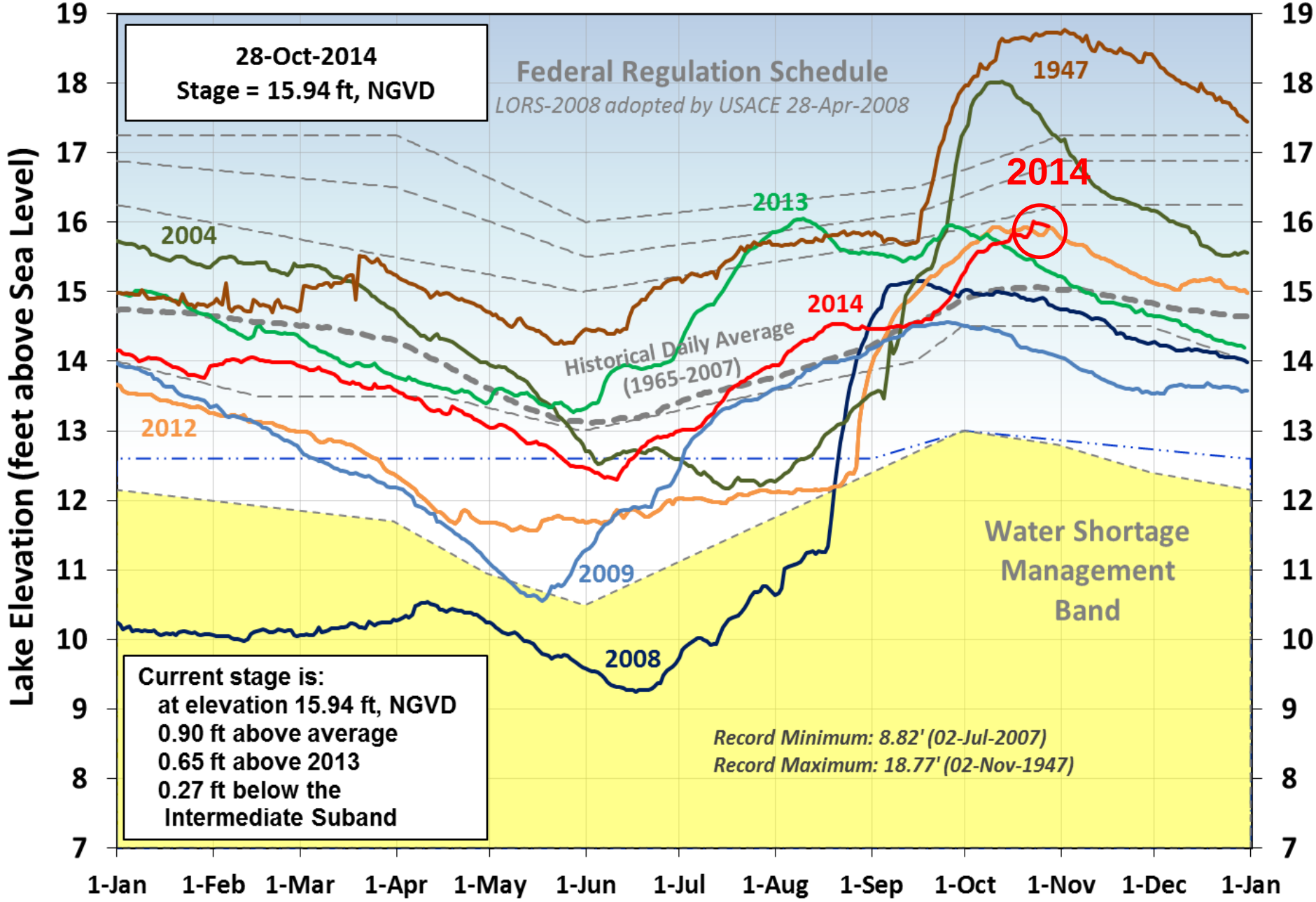

WCA 2A (27 October 2014)
Precip (in)
Mean Daily Stage (FT-NGVD29)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
2014
NEXRAD
Zone A 12.56
WS Floor 10.50
GA2A17## 13.06
S11B##H 12.71

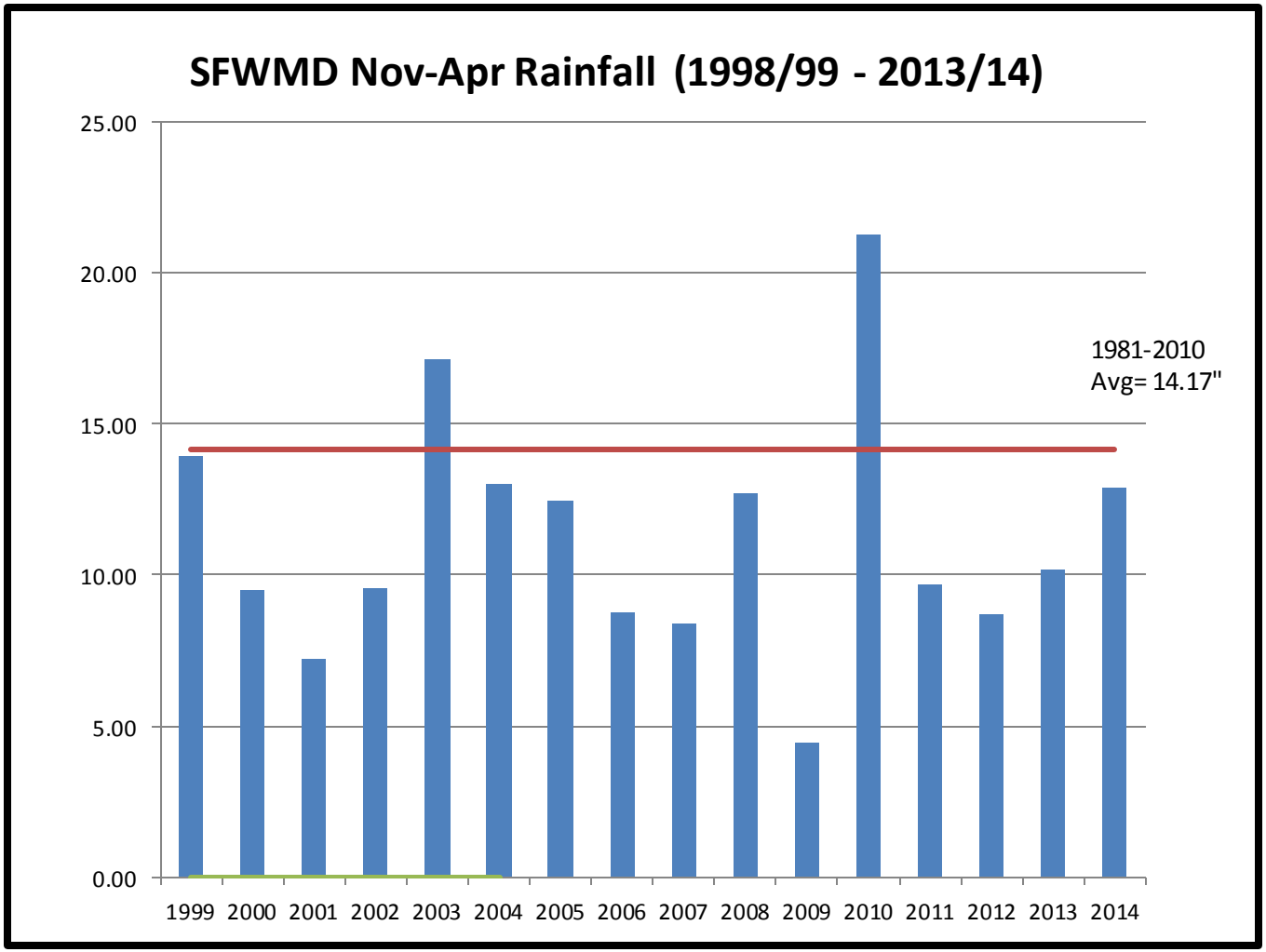

WCA 3A (27 October 2014)
Precip (in)
Mean Daily Stage (FT-NGVD29)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan
2014
NEXRAD
Zone A 10.49
Zone D 9.97
Zone E1 N/A
WS Floor 7.50
S333-H 9.83
3 Gauge Average 10.47


15.92 ft, NGVD


Lake Okeechobee (28 October 2014)
Precip (in)
0.0
1.0
2.0
3.0
Mean Daily Stage (FT-NGVD29)
17
16
15
14
13
12
11
10
9
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
2014
NEXRAD
HIGH LAKE MGMT 17.19
High 16.82
Intermediate 16.21
Low 14.50
Base Flow 12.88
Beneficial Use 12.83
4-Gauge Avg 15.92

Lake Okeechobee Water Level Comparison





Over the past 16 years, the period of Nov-Apr produced above average rainfall twice and near normal rainfall 5 times.

Summary:

- Wet season rainfall was well distributed and has the storage areas in South Florida ready for the dry season.
- Going into the dry season with appropriate water levels provides water managers with some flexibility for water supply and flood control at the start of the dry season
- South Florida's weather and water conditions can change rapidly and we are perpetually preparing for what comes our way.
- SFWMD will manage water levels in an effort achieve an optimum recession rate through the dry season to balance the needs of the natural system, flood control and regional water supply.