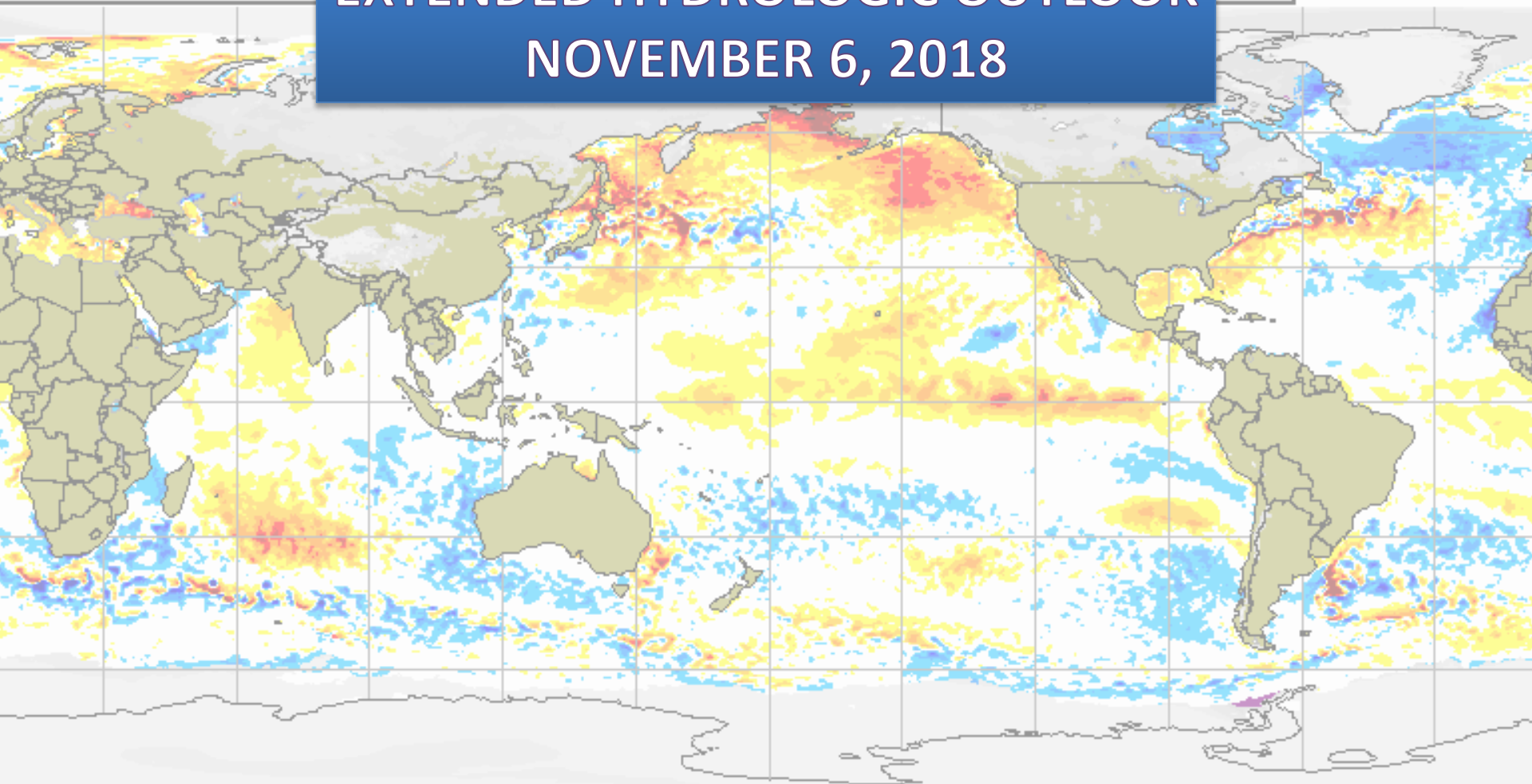


# EXTENDED HYDROLOGIC OUTLOOK

## NOVEMBER 6, 2018



Sea surface temperature anomaly / Anomalie de la température de la mer (C)



Snow depth / Épaisseur de la neige (cm)



Uncovered sea ice  
Glace marine à découvert  
Climatologie 1995-2009 Climatologie



CMC Environnement Canada  
CMC Environment Canada

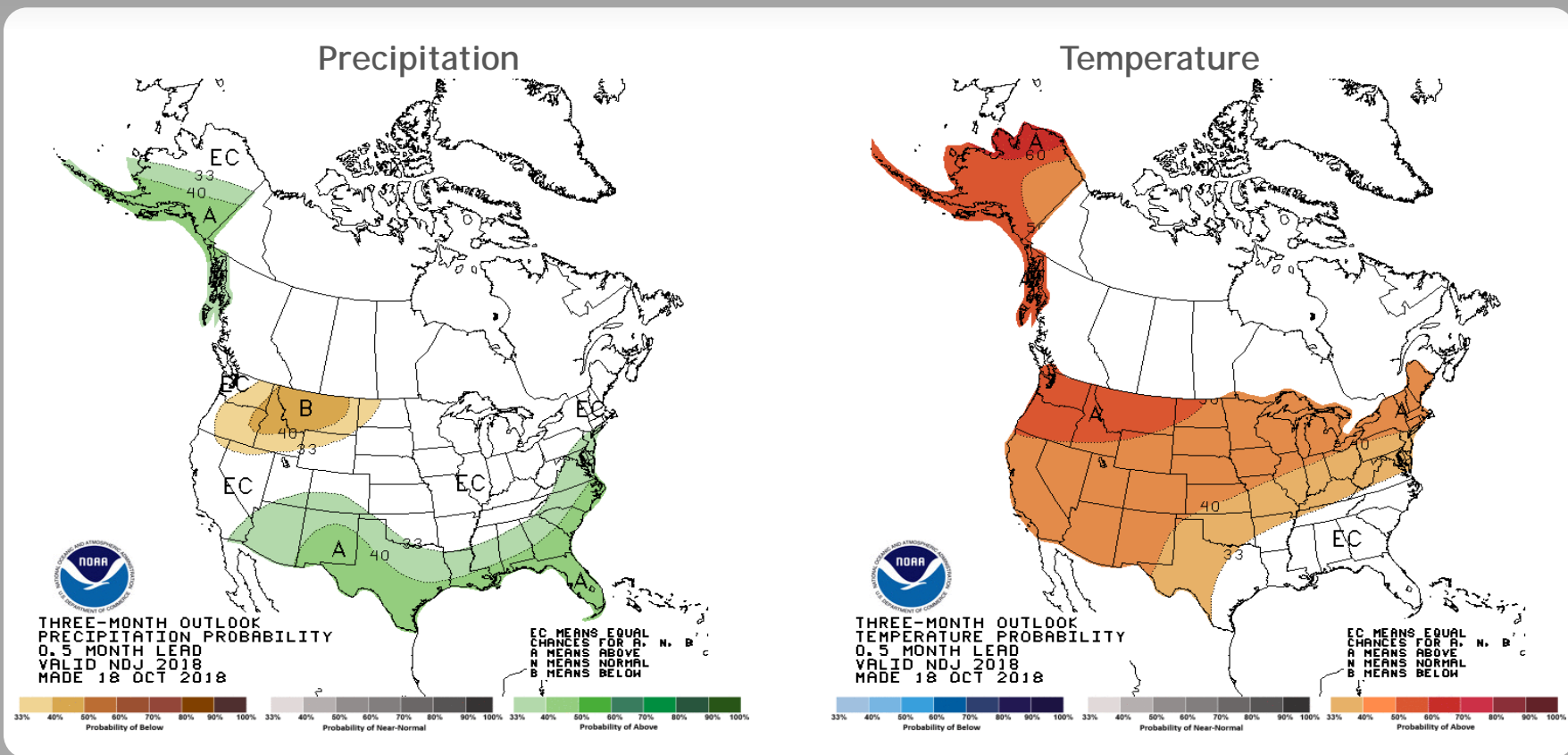
# Summary

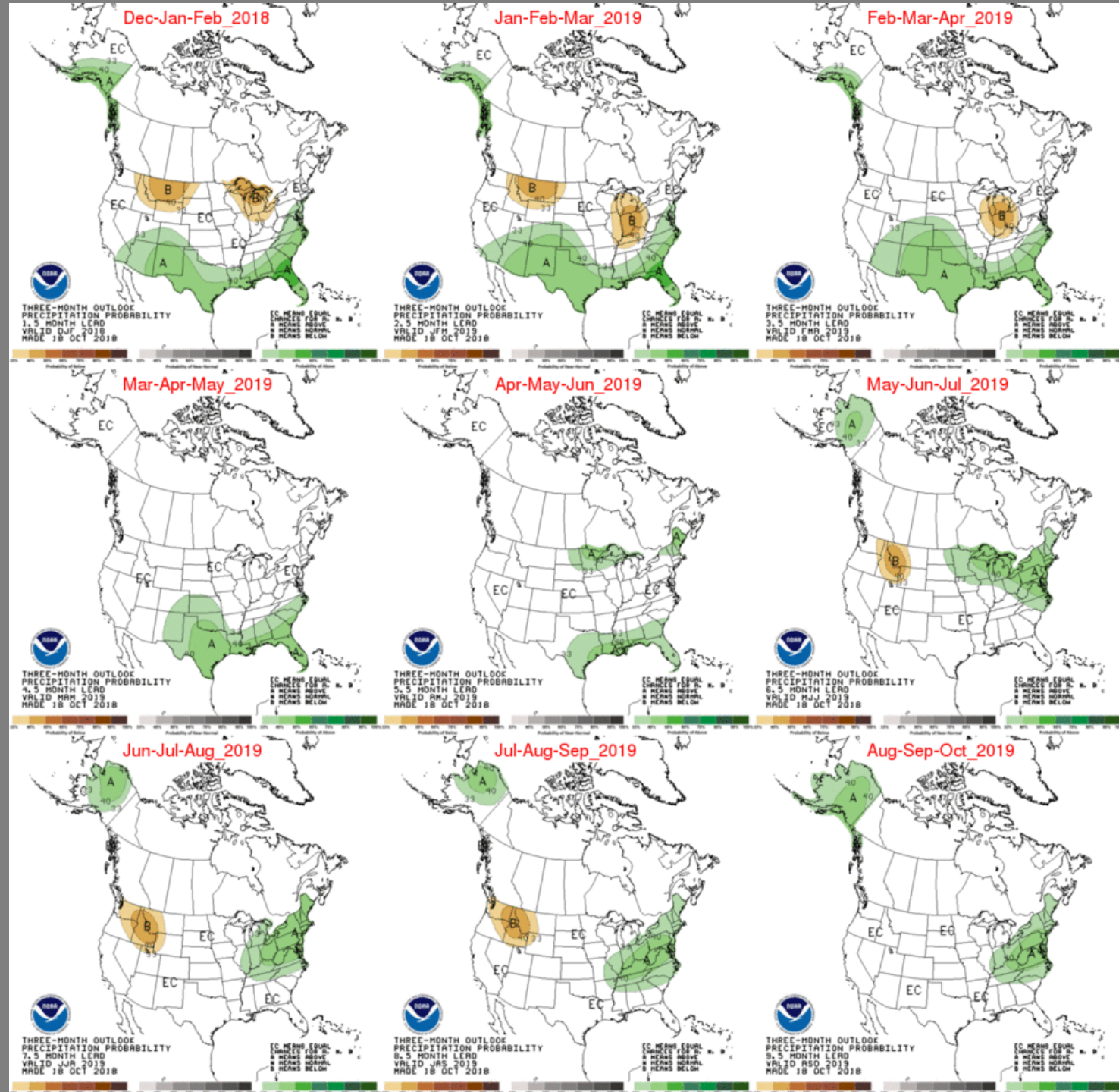
- The Climate Prediction Center (CPC) is forecasting above normal rainfall for November through January.
- ENSO-neutral conditions are present. El Niño is favored to form in the next couple of months and continue through winter 2018-19 (70-75% chance). El Niño increases the chances of a wetter-than-normal dry season.
- Monitoring Atlantic Multidecadal Oscillation (AMO) index for switch to negative (cold) phase, this has the potential to contribute to drier-than-normal wet seasons.

# U. S. Seasonal Outlooks

November-January 2018

The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.

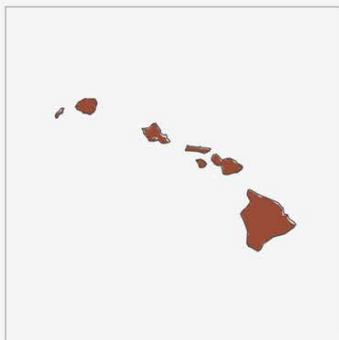




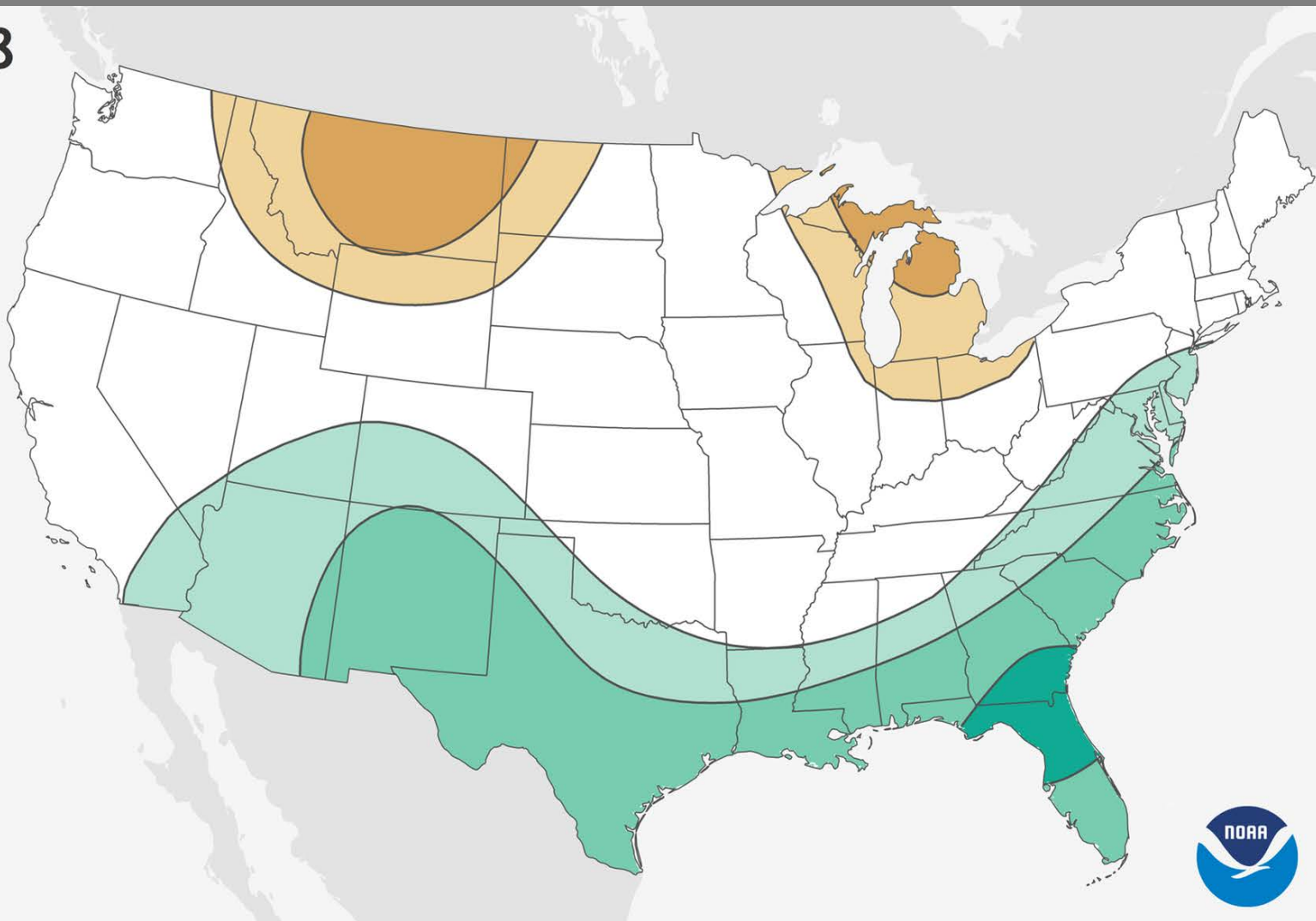


# Winter 2018

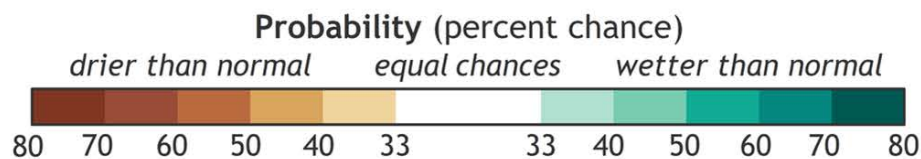
## U.S. Precipitation Outlook



AK and HI not to scale



Precipitation Outlook  
for Dec 2018 – Feb 2019  
Issued 18 October 2018



NWS Climate Prediction Center  
Map by NOAA Climate.gov

Prepared by: Climate Prediction Center

# Teleconnections to South Florida

Climate anomalies being related to each other at large distances:

## El Niño Southern Oscillation (ENSO)

South Florida dry season (November through May) rainfall is positively correlated with El Niño which has a frequency that ranges between 3 to 7 years while rainfall is negatively correlated with La Niña November through March with a potential increase in tropical rainfall during La Niña

## Atlantic Multidecadal Oscillation (AMO)

Average annual inflow to Lake Okeechobee is nearly 50% greater during the warm phase compared to the cold phase of the AMO, easterly flow toward south Florida affected by phase

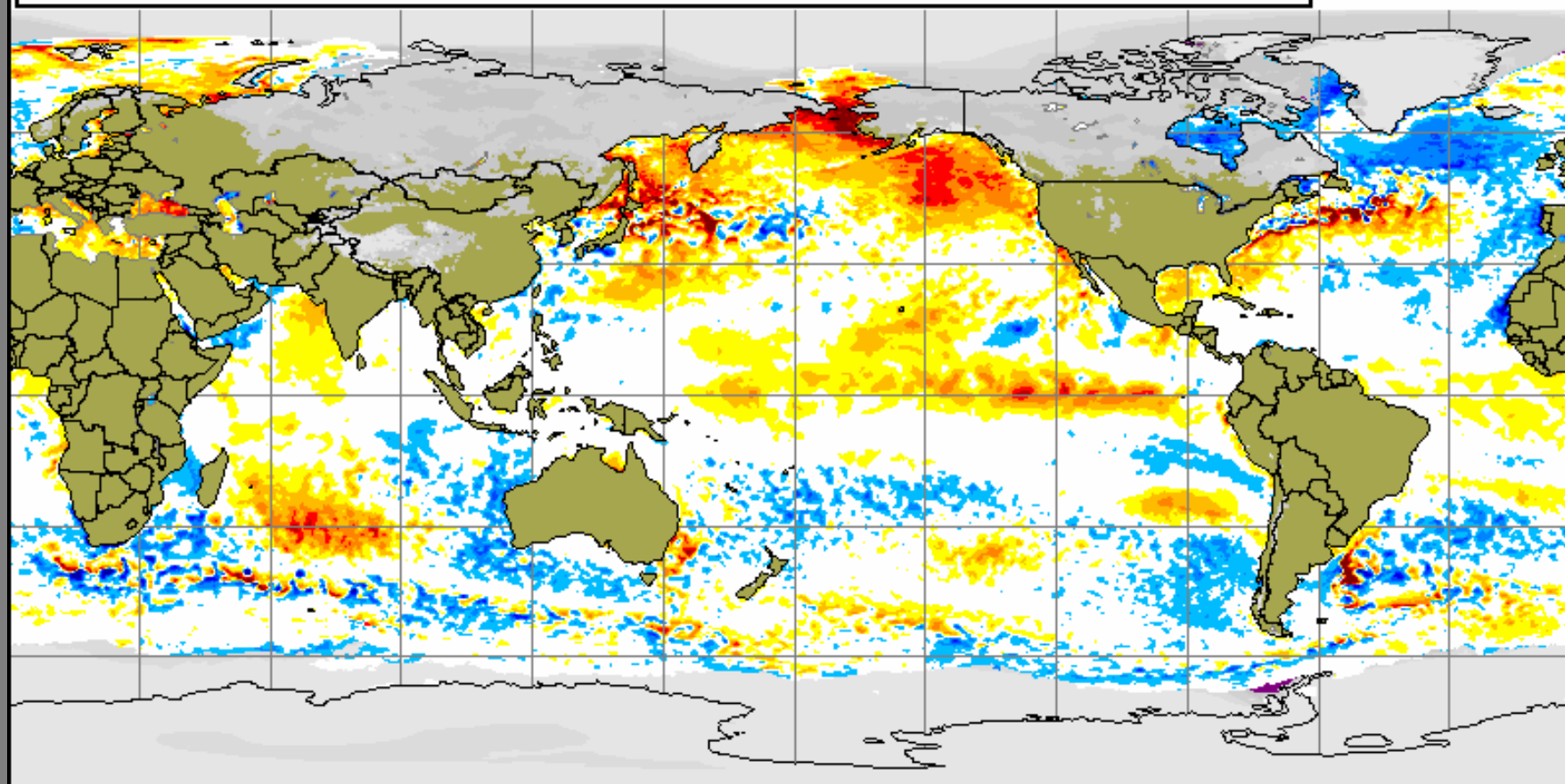
## Pacific Decadal Oscillation (PDO)

Increases variations of south Florida dry season rainfall

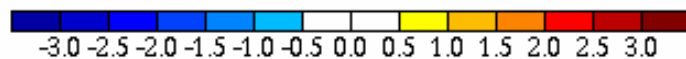
# Current Global Sea Surface Temperature Anomalies

Global sea surface anomaly and snow cover  
06 Nov 2018

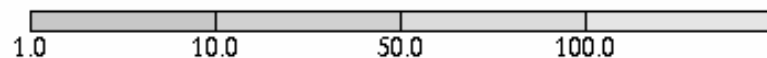
Anomalie de la température de la mer et épaisseur de la neige  
06 Nov 2018



Sea surface temperature anomaly / Anomalie de la température de la mer (C)



Snow depth / Épaisseur de la neige (cm)



Uncovered sea ice  
Glace marine à découvert  
Climatologie 1995-2009 Climatologie

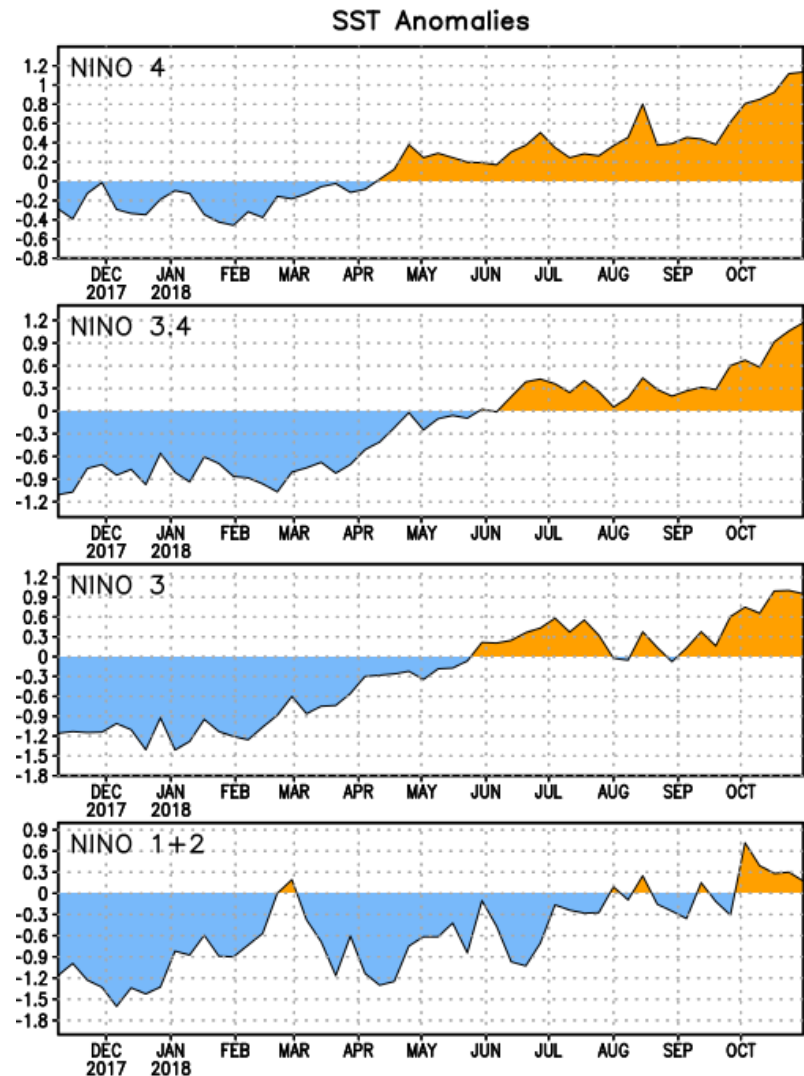
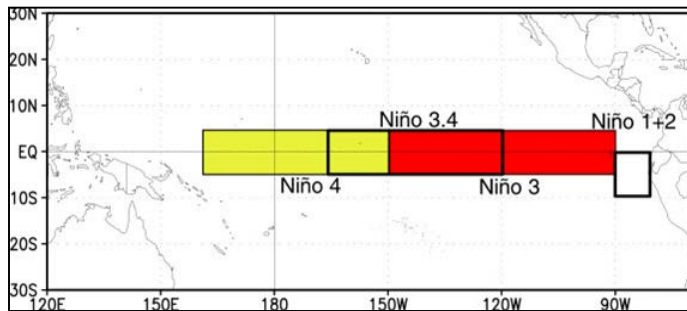


CMC Environnement Canada  
CMC Environnement Canada

# Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

Niño 4	1.1°C
Niño 3.4	1.2°C
Niño 3	0.9°C
Niño 1+2	0.2°C





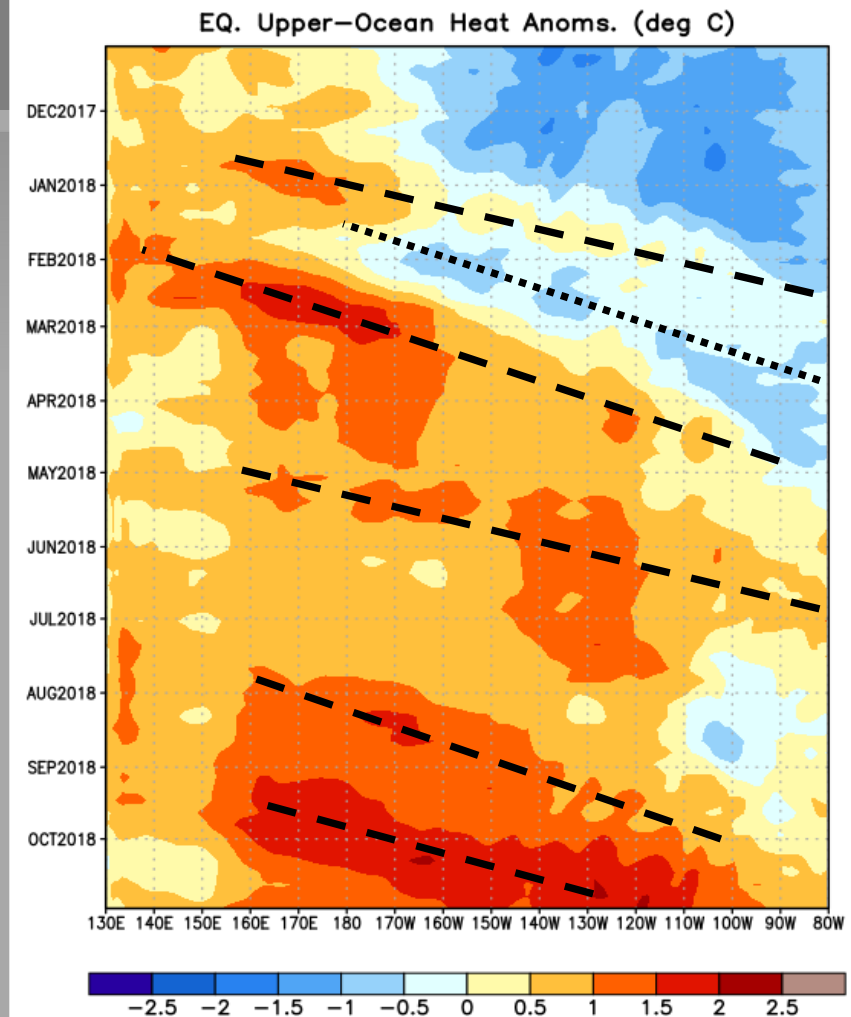
# Weekly Heat Content Evolution in the Equatorial Pacific

From December 2017- May 2018, successive Kelvin waves contributed to the eastward shift of positive and negative subsurface temperature anomalies.

During July-August 2018, positive subsurface temperature anomalies weakened in the eastern Pacific.

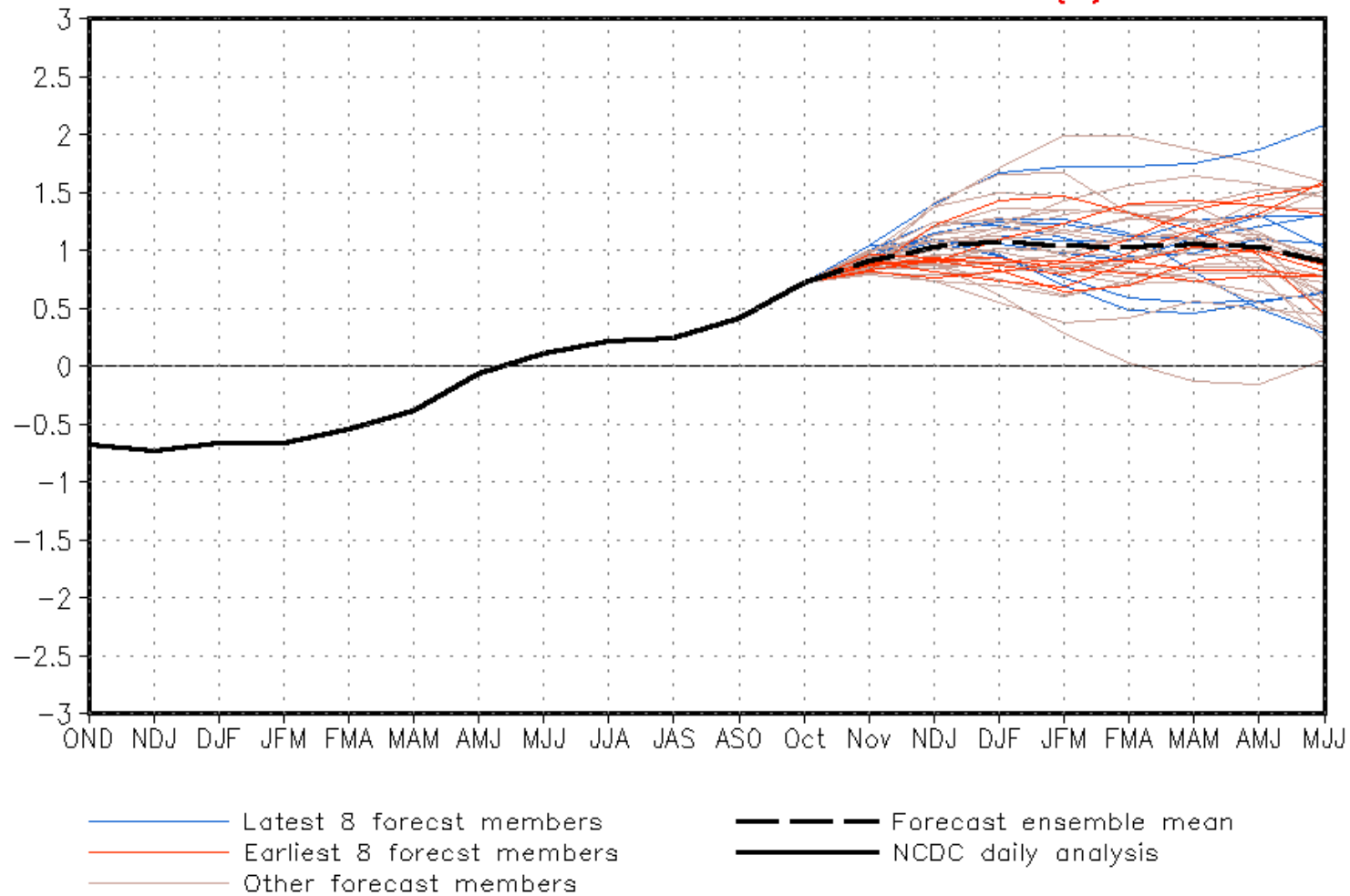
In early August and again in mid September 2018, positive subsurface anomalies increased, partly due to downwelling Kelvin waves.

Equatorial oceanic Kelvin waves have alternating warm and cold phases. The warm phase is indicated by dashed lines. Downwelling and warming occur in the leading portion of a Kelvin wave, and up-welling and cooling occur in the trailing portion.





## CFSv2 forecast Nino3.4 SST anomalies (K)



# IRI/CPC Pacific Niño

## 3.4 SST Model Outlook

The majority of models predict El Niño to develop during October-December 2018.

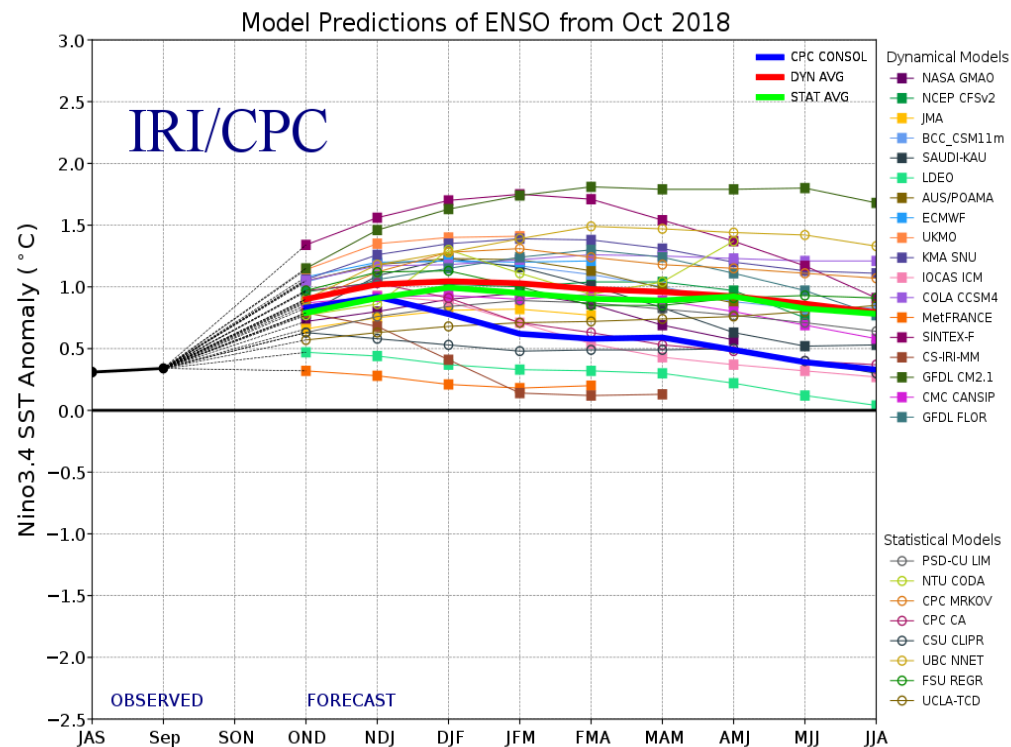


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 October 2018).

# Historical El Niño and La Niña Episodes Based on the ONI computed using ERSST.v5

Recent Pacific warm (red) and cold (blue) periods based on a threshold of  $\pm 0.5$  °C for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v5 SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)]. For historical purposes, periods of below and above normal SSTs are colored in blue and red when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

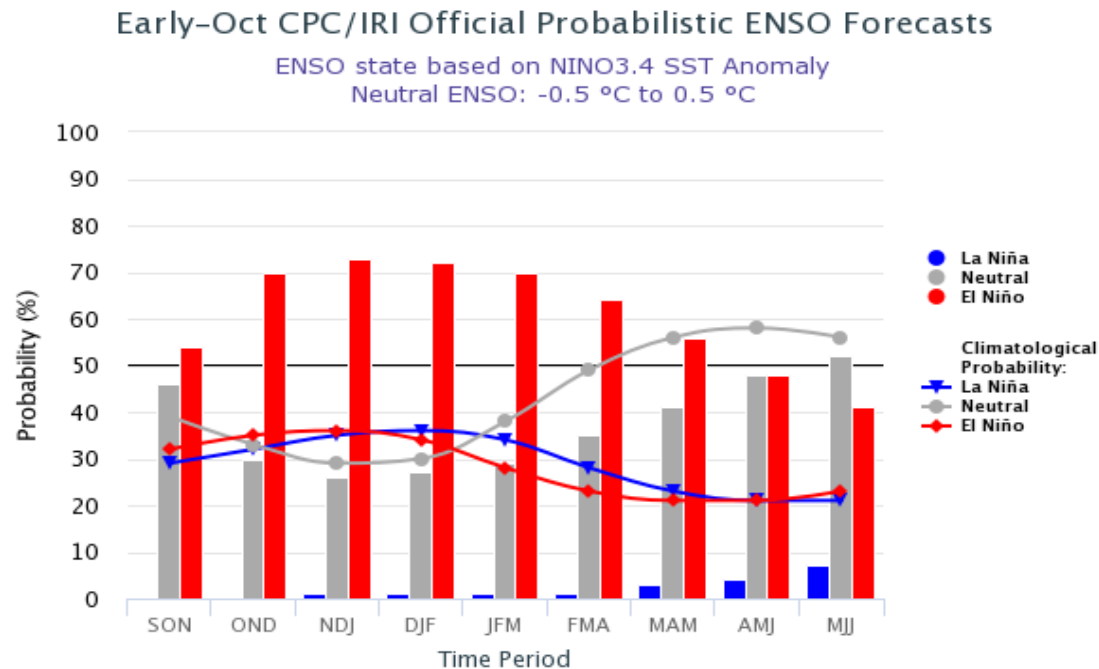
The ONI is one measure of the El Niño-Southern Oscillation, and other indices can confirm whether features consistent with a coupled ocean-atmosphere phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found [here](#).

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2006	-0.8	-0.7	-0.5	-0.3	0.0	0.0	0.1	0.3	0.5	0.7	0.9	0.9
2007	0.7	0.3	0.0	-0.2	-0.3	-0.4	-0.5	-0.8	-1.1	-1.4	-1.5	-1.6
2008	-1.6	-1.4	-1.2	-0.9	-0.8	-0.5	-0.4	-0.3	-0.3	-0.4	-0.6	-0.7
2009	-0.8	-0.7	-0.5	-0.2	0.1	0.4	0.5	0.5	0.7	1.0	1.3	1.6
2010	1.5	1.3	0.9	0.4	-0.1	-0.6	-1.0	-1.4	-1.6	-1.7	-1.7	-1.6
2011	-1.4	-1.1	-0.8	-0.6	-0.5	-0.4	-0.5	-0.7	-0.9	-1.1	-1.1	-1.0
2012	-0.8	-0.6	-0.5	-0.4	-0.2	0.1	0.3	0.3	0.3	0.2	0.0	-0.2
2013	-0.4	-0.3	-0.2	-0.2	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	-0.2	-0.3
2014	-0.4	-0.4	-0.2	0.1	0.3	0.2	0.1	0.0	0.2	0.4	0.6	0.7
2015	0.6	0.6	0.6	0.8	1.0	1.2	1.5	1.8	2.1	2.4	2.5	2.6
2016	2.5	2.2	1.7	1.0	0.5	0.0	-0.3	-0.6	-0.7	-0.7	-0.7	-0.6
2017	-0.3	-0.1	0.1	0.3	0.4	0.4	0.2	-0.1	-0.4	-0.7	-0.9	-1.0
2018	-0.9	-0.8	-0.6	-0.4	-0.1	0.1	0.1	0.2	0.4			

# CPC/IRI Probabilistic ENSO Outlook

Updated: 11 October 2018

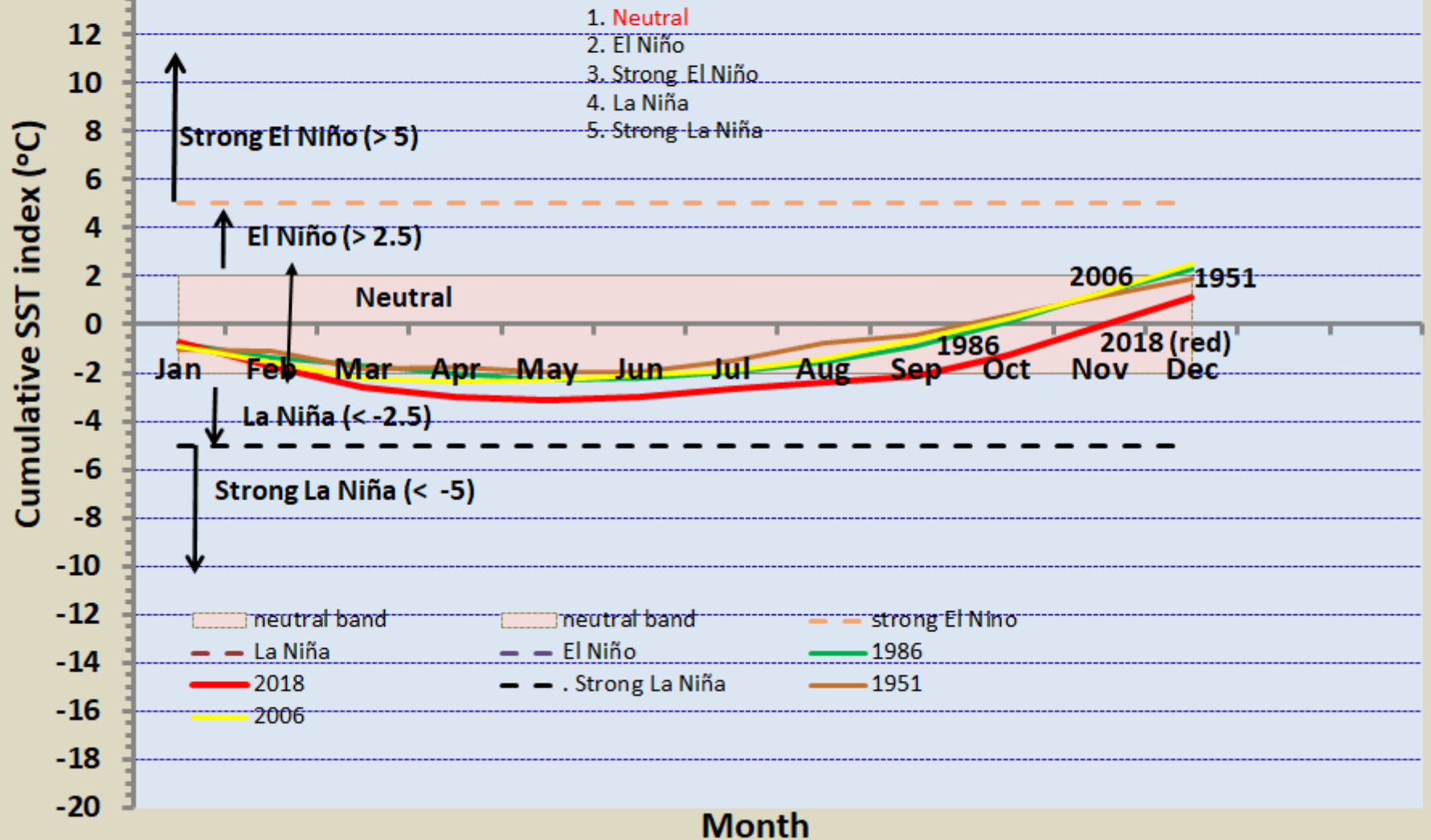
El Niño is favored to form in the next couple of months and continue through the Northern Hemisphere winter 2018-19 (70-75% chance).



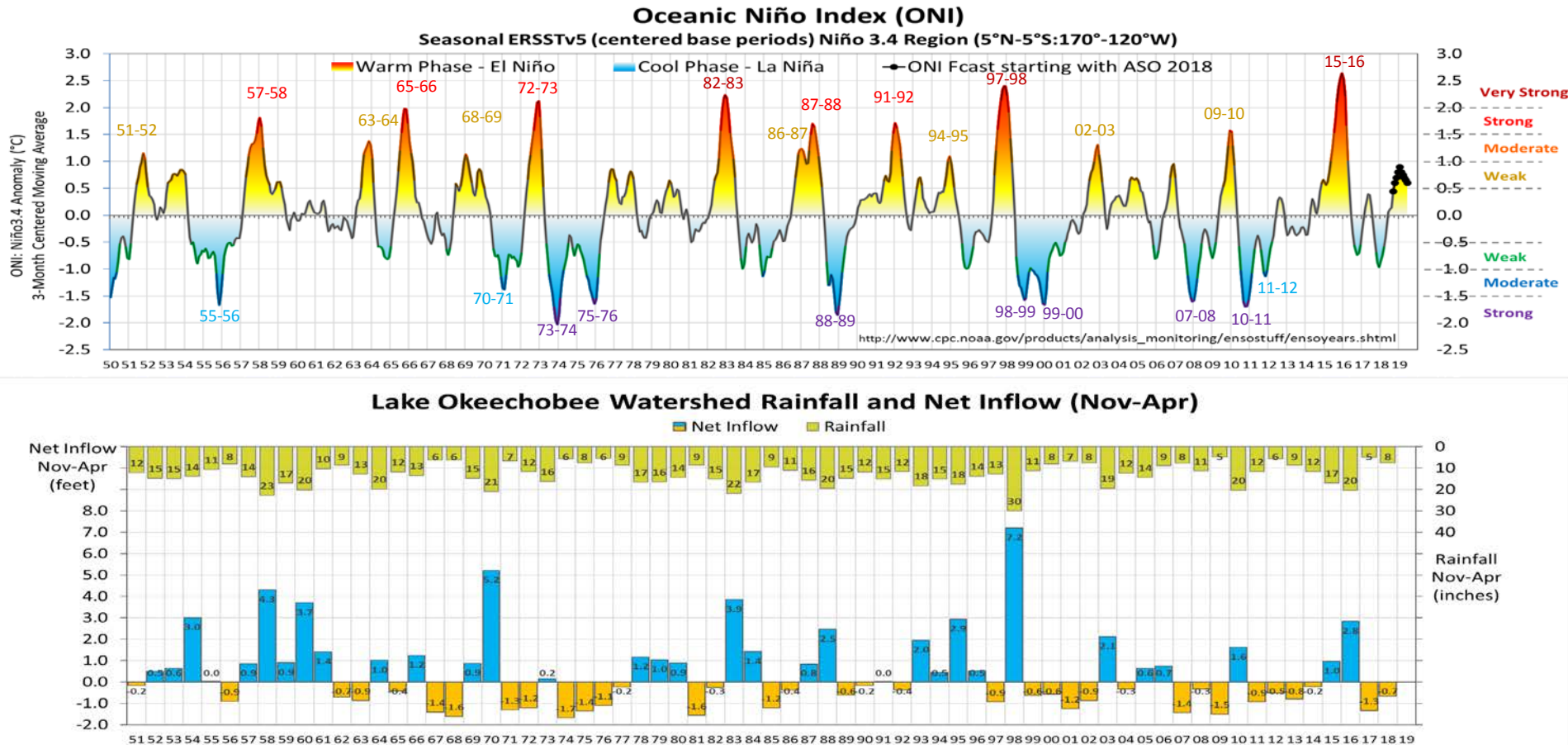


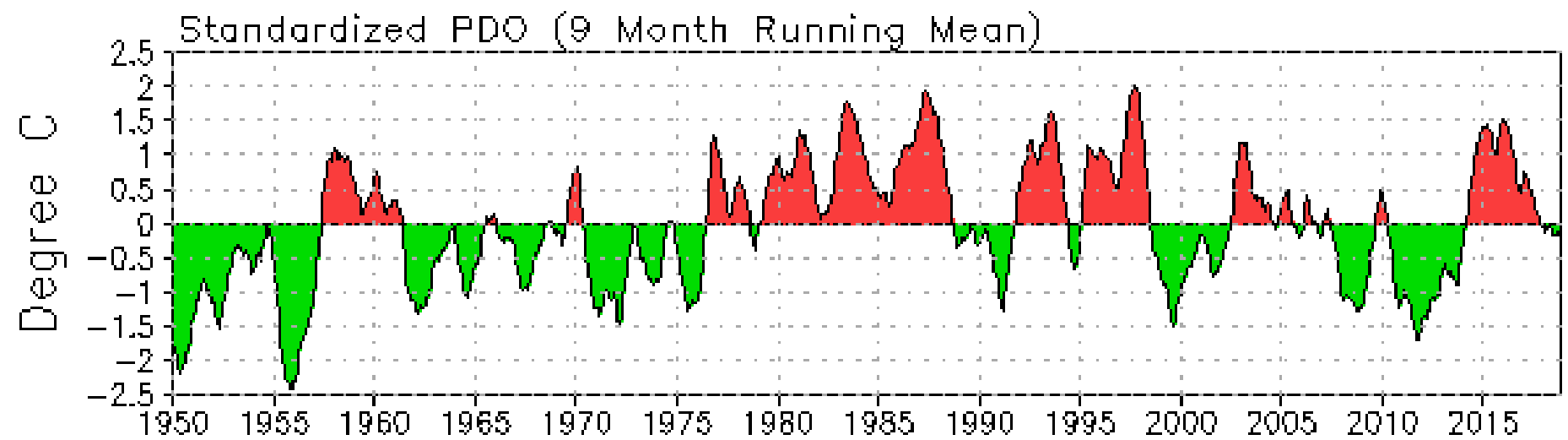
Reference: Abtew, W. and P. Trimble. 2010. *El Niño Southern Oscillation Link to South Florida Hydrology and Water Management Applications*. Water Resources Management, 24(5):4255-4271, DOI:10.1007/s11269-010-9656-2.

## 2018 ENSO development likelihood



# El Niño & La Niña Events (1950-2018), and Lake Okeechobee Watershed Rainfall & Net Inflow





# Standardized Klotzbach/Gray Atlantic Multidecadal Oscillation Index (CSU)

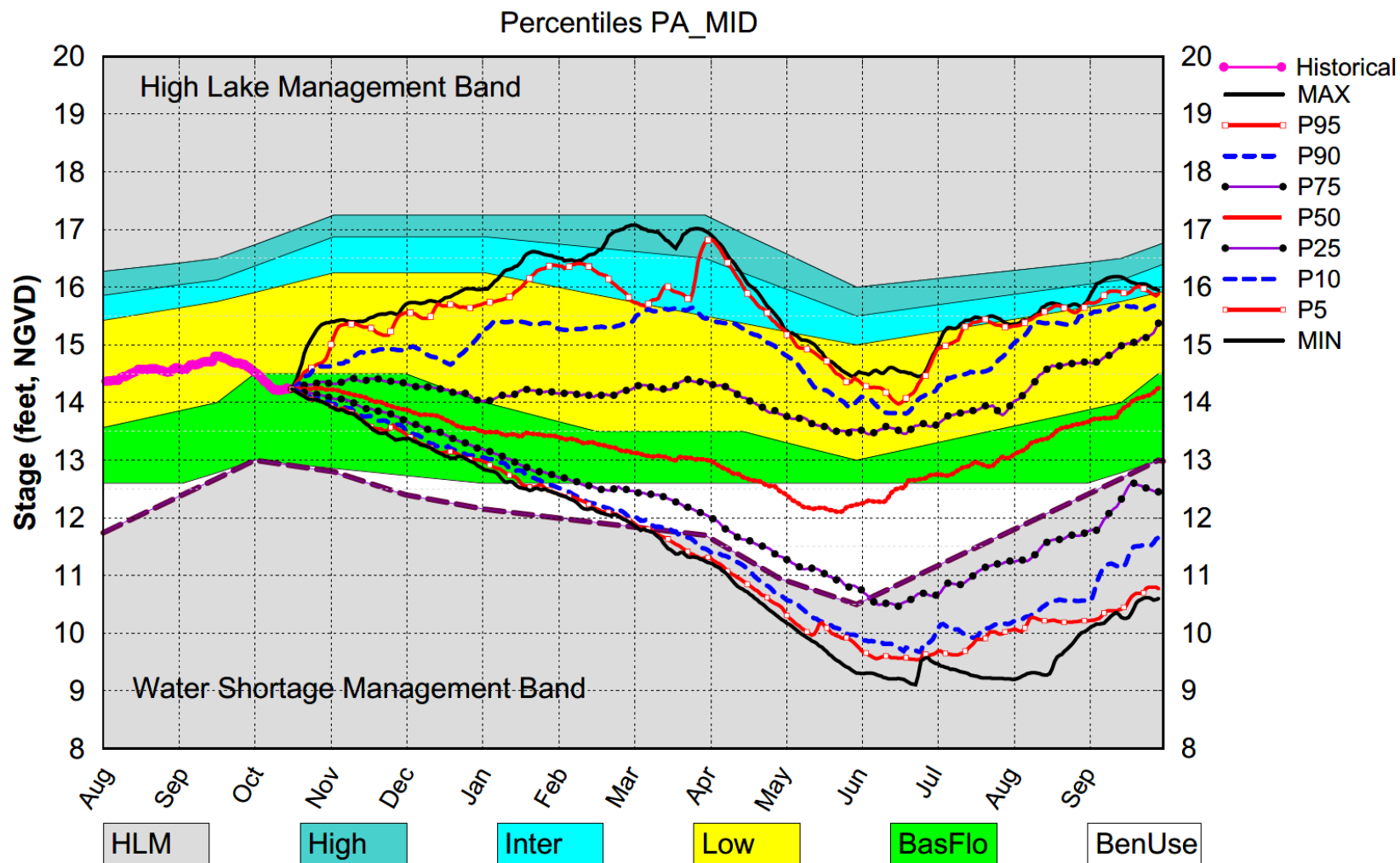


# Dynamic Position Analysis

- Based on historical climatic conditions spanning the period 1965-2005
- Each year the model resets the initial stages for Lake Okeechobee (LOK) and the Water Conservation Areas (WCAs) to value on the 1<sup>st</sup> of the previous month and conditions the simulation using real time data during the previous month to achieve real time stage on the 1<sup>st</sup> of the current month for both Lake Okeechobee and the Water Conservation Areas
- **Dynamic Position Analysis**
  - Each 1-year simulation starts with current hydrologic conditions (e.g., 1-Oct-2018)
  - 41 1-year simulations of system response to historical rainfall conditions
  - Statistical summaries used to display projections



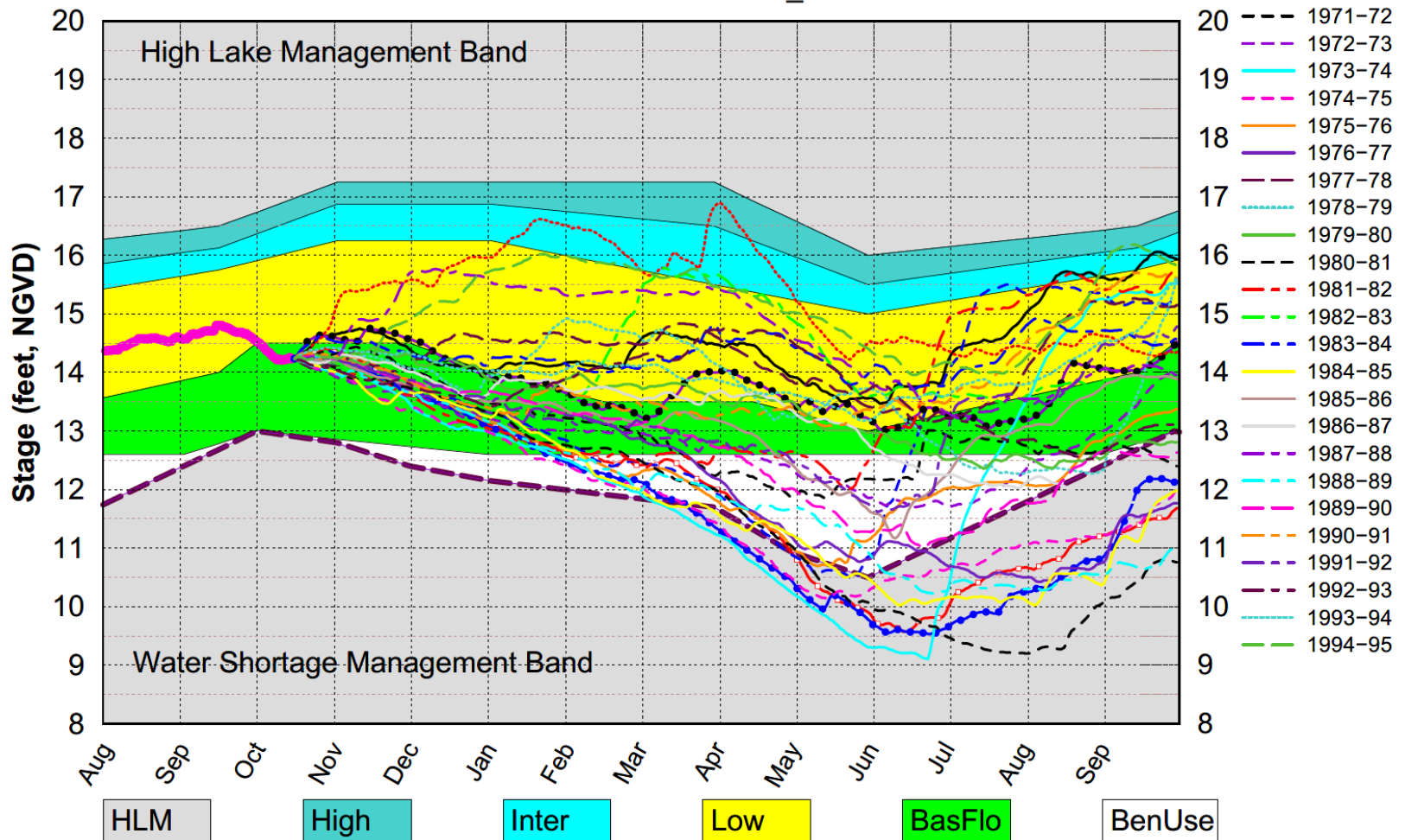
# Lake Okeechobee SFWMM Oct 2018 Mid-Month Position Analysis



(See assumptions on the Position Analysis Results website)

# Lake Okeechobee SFWMM Oct 2018 Mid-Month Position Analysis

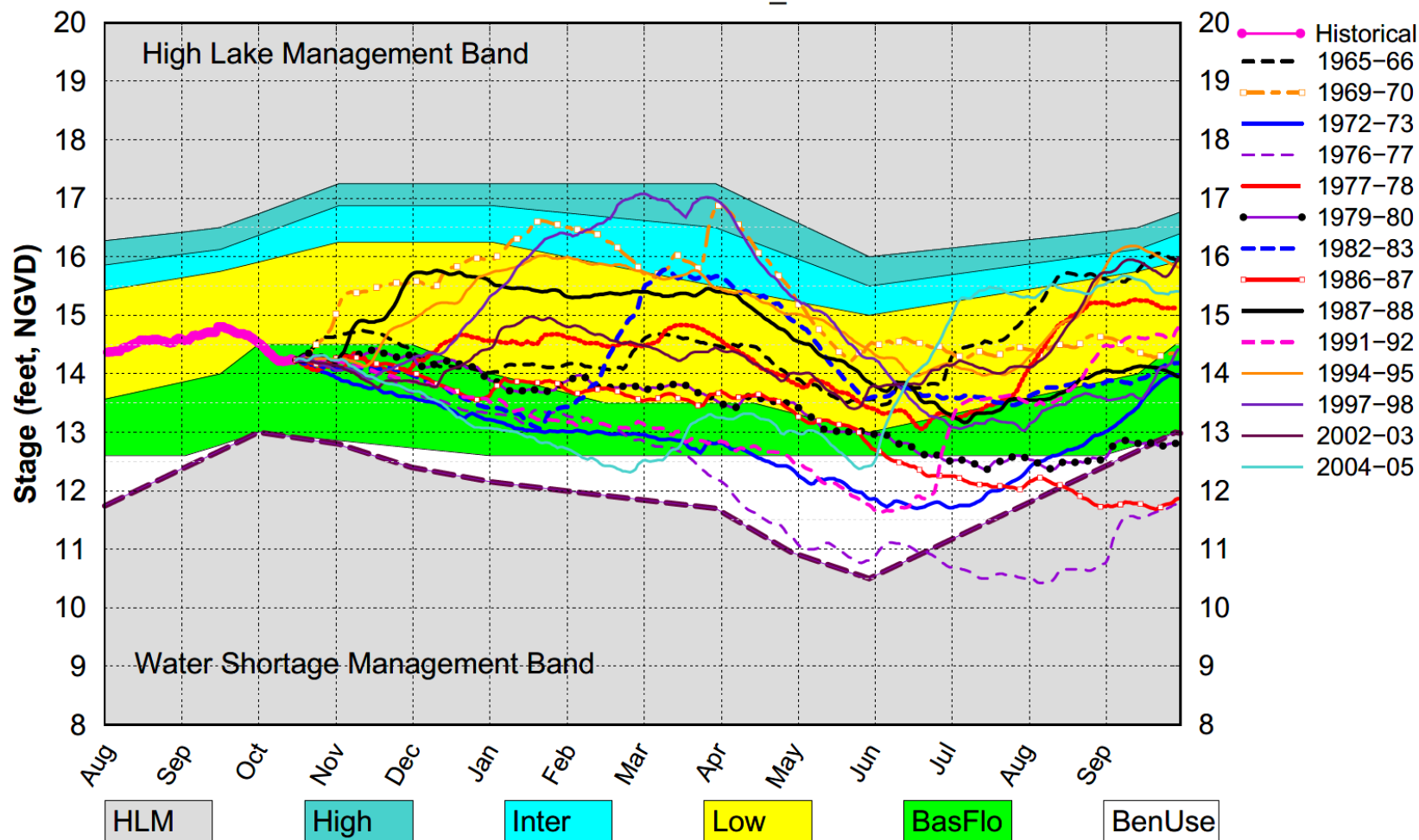
All Simulated Years Plot PA\_MID



(See assumptions on the Position Analysis Results website)

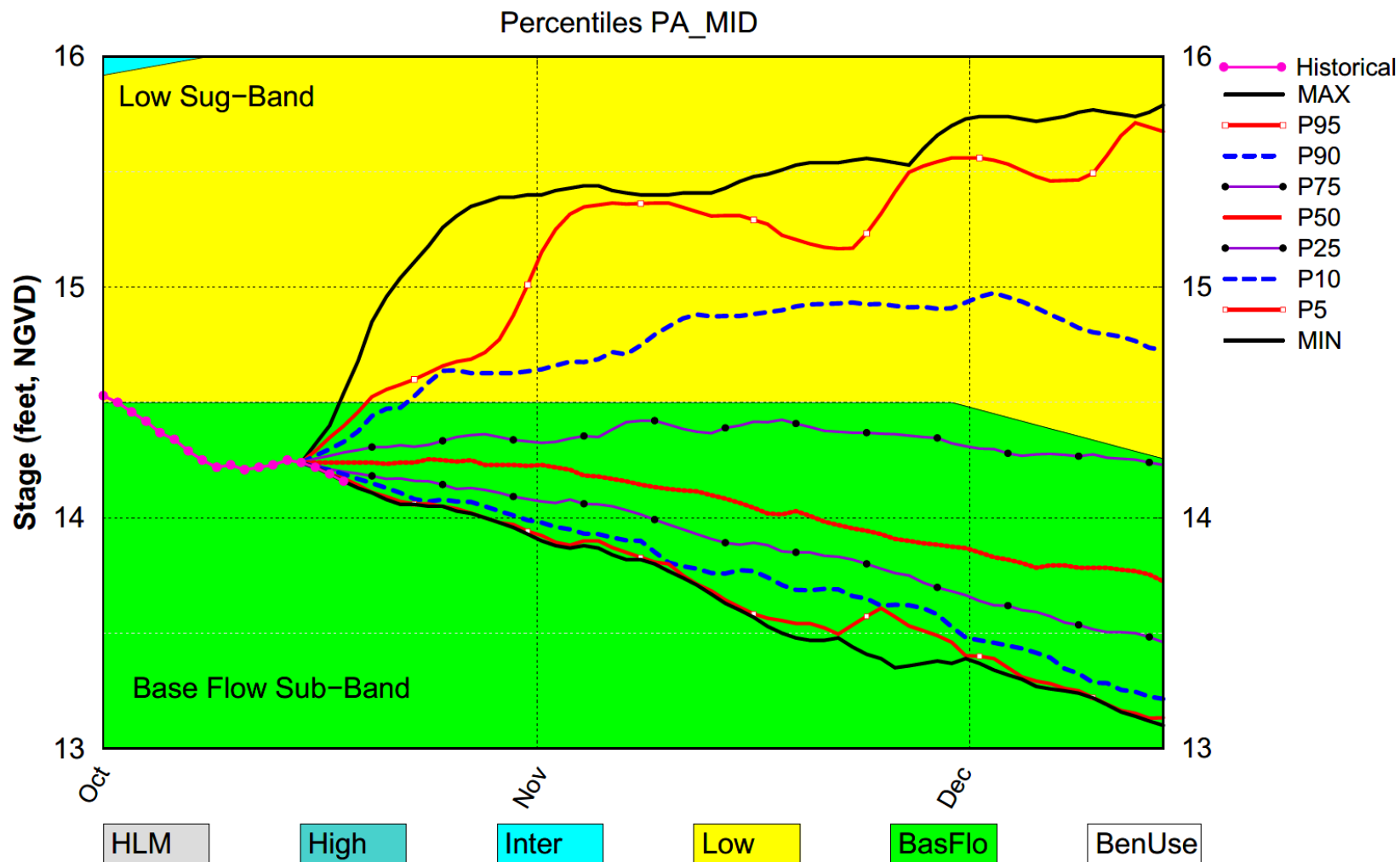
# Lake Okeechobee SFWMM Oct 2018 Mid-Month Position Analysis

All El Nino Years Plot PA\_MID



(See assumptions on the Position Analysis Results website)

# Lake Okeechobee SFWMM Oct 2018 Mid-Month Position Analysis



(See assumptions on the Position Analysis Results website)