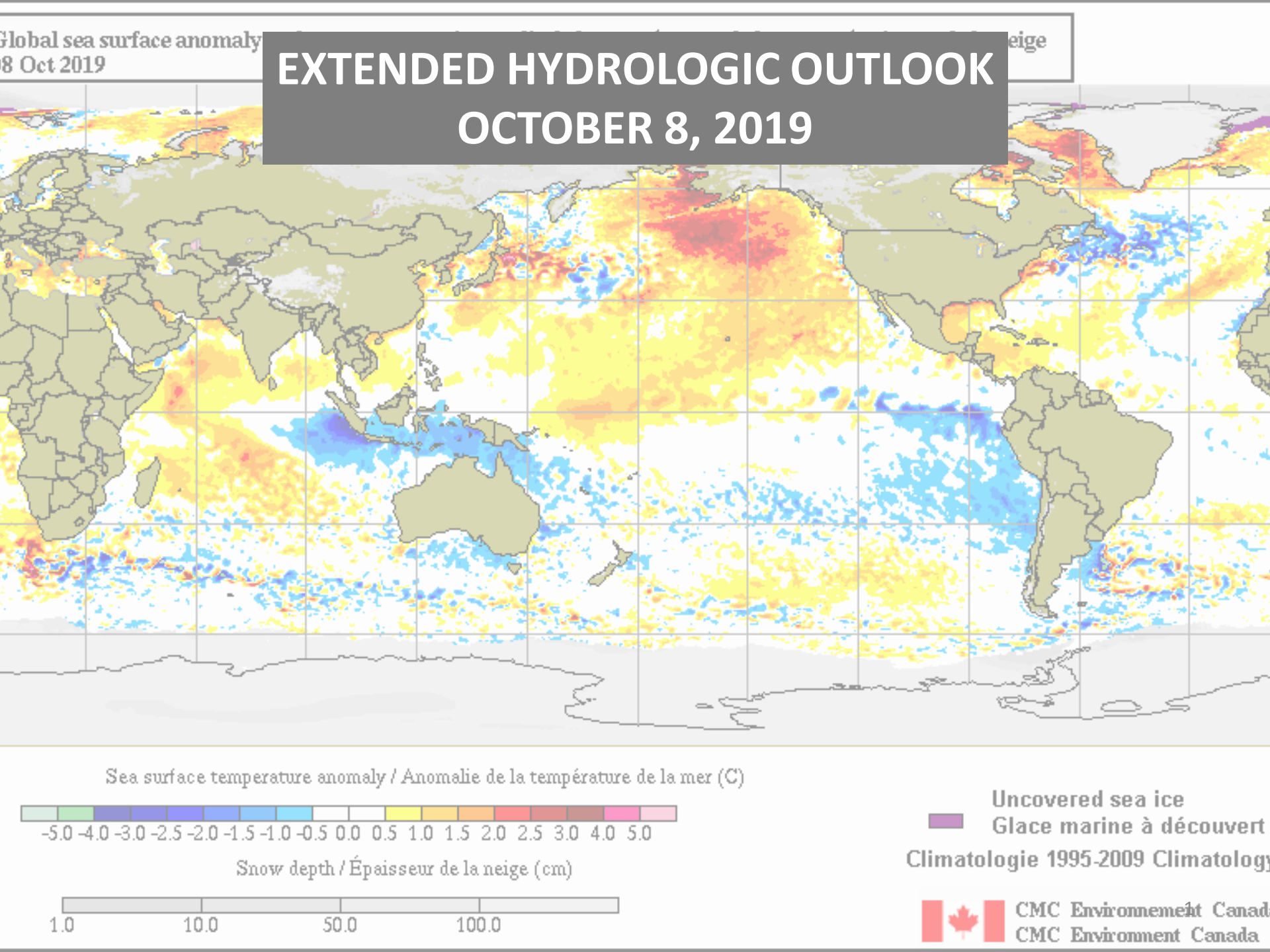
# EXTENDED HYDROLOGIC OUTLOOK
# OCTOBER 8, 2019



# Summary

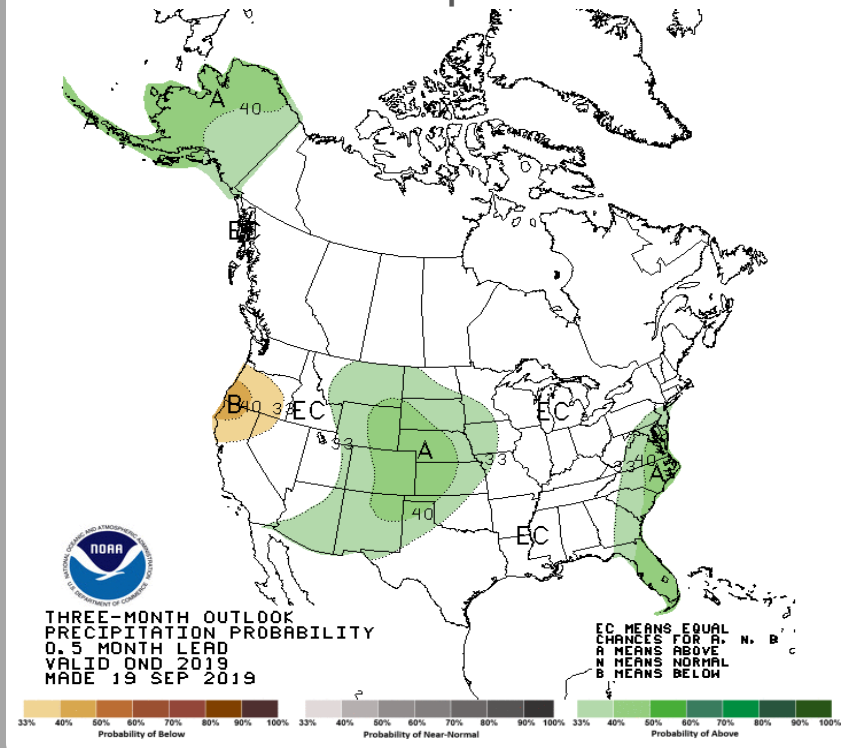
- The Climate Prediction Center (CPC) is forecasting above normal rainfall for October through December.
- ENSO-neutral conditions are present and are favored during the fall 2019 (~75% chance), continuing through spring 2020 (55-60% chance).
- El Niño increases the chances of a wetter-than-normal dry season and decreases the potential for tropical storm activity from the Main Development Region in the Atlantic Ocean.
- Monitoring Atlantic Multidecadal Oscillation (AMO) which is currently in the warm phase
  - Average annual inflow to Lake Okeechobee is nearly 50% greater during the warm phase compared to the cold phase

# U. S. Seasonal Outlooks

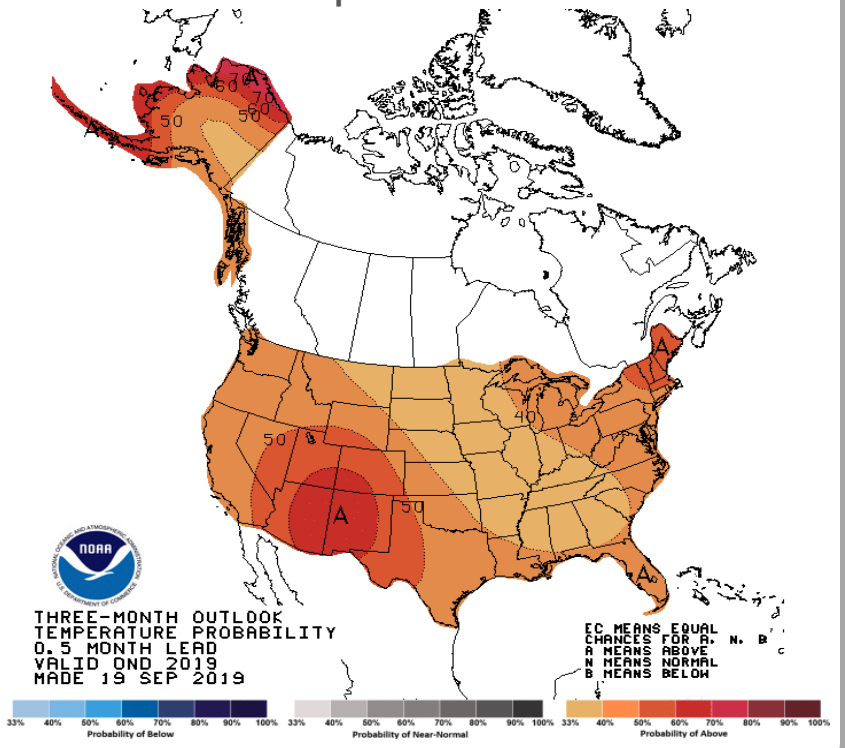
## October-December 2019

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

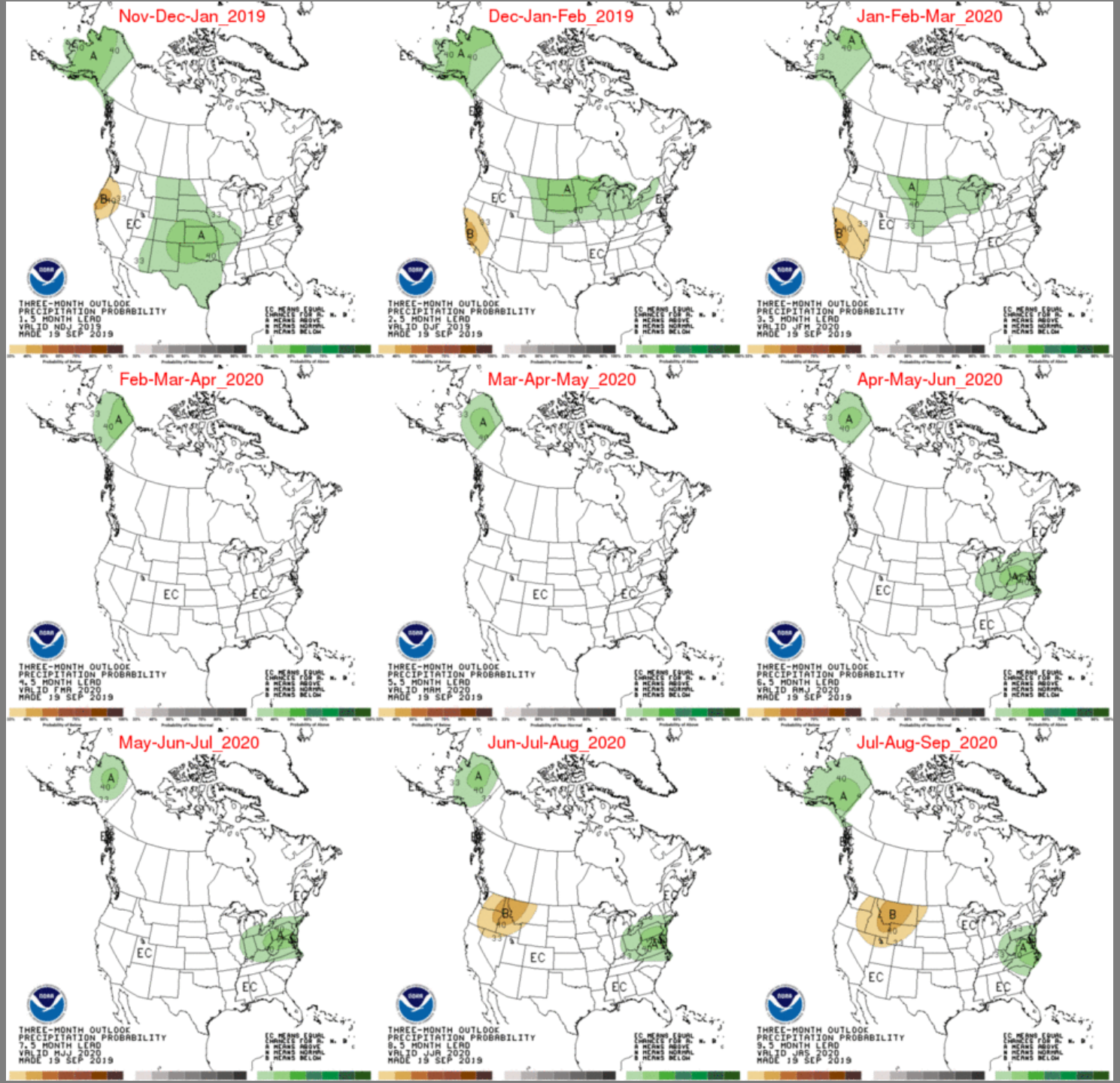
### Precipitation




### Temperature




Prepared by: Climate Prediction Center/NCEP




Prepared by: Climate Prediction Center/NCEP

# 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

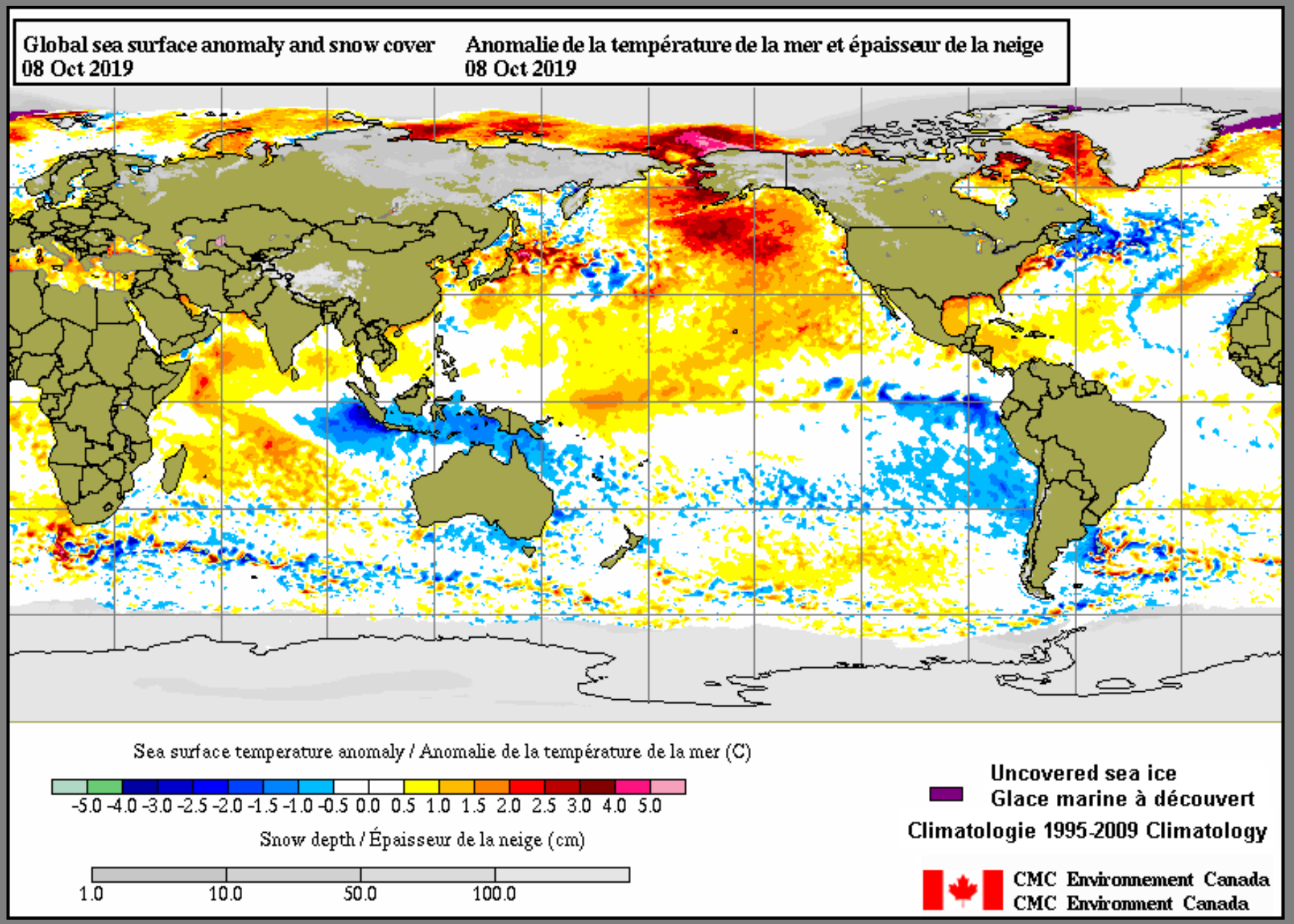
Atlantic Multidecadal Oscillation (AMO)

- 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

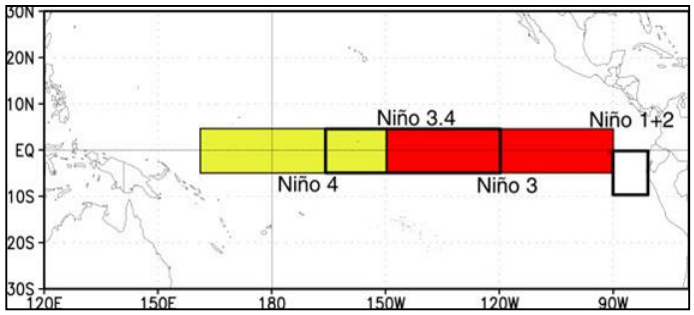
# Current Global Sea Surface Temperature Anomalies

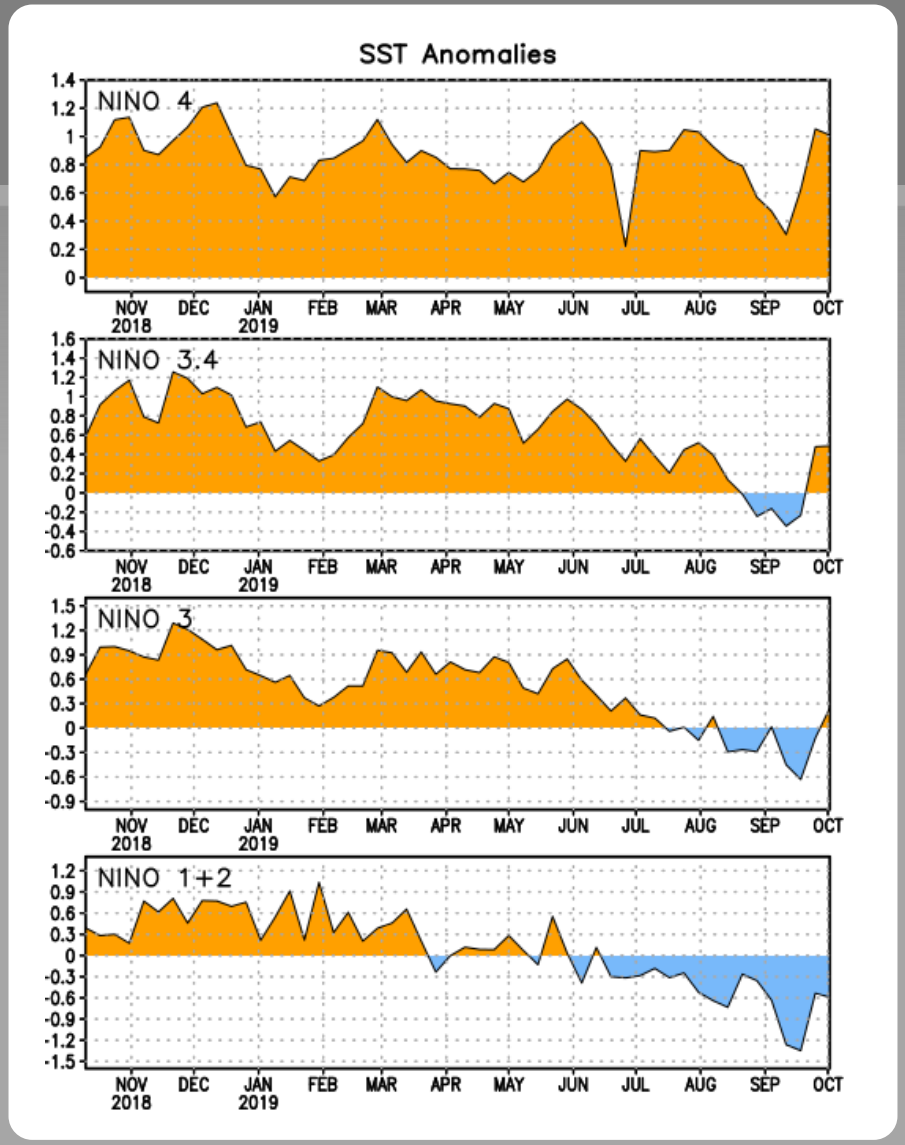


# Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

| | |
|---|---|
| Niño 4 | 1.0ºC |
| Niño 3.4 | 0.5ºC |
| Niño 3 | 0.3ºC |
| Niño 1+2 | -0.6ºC |



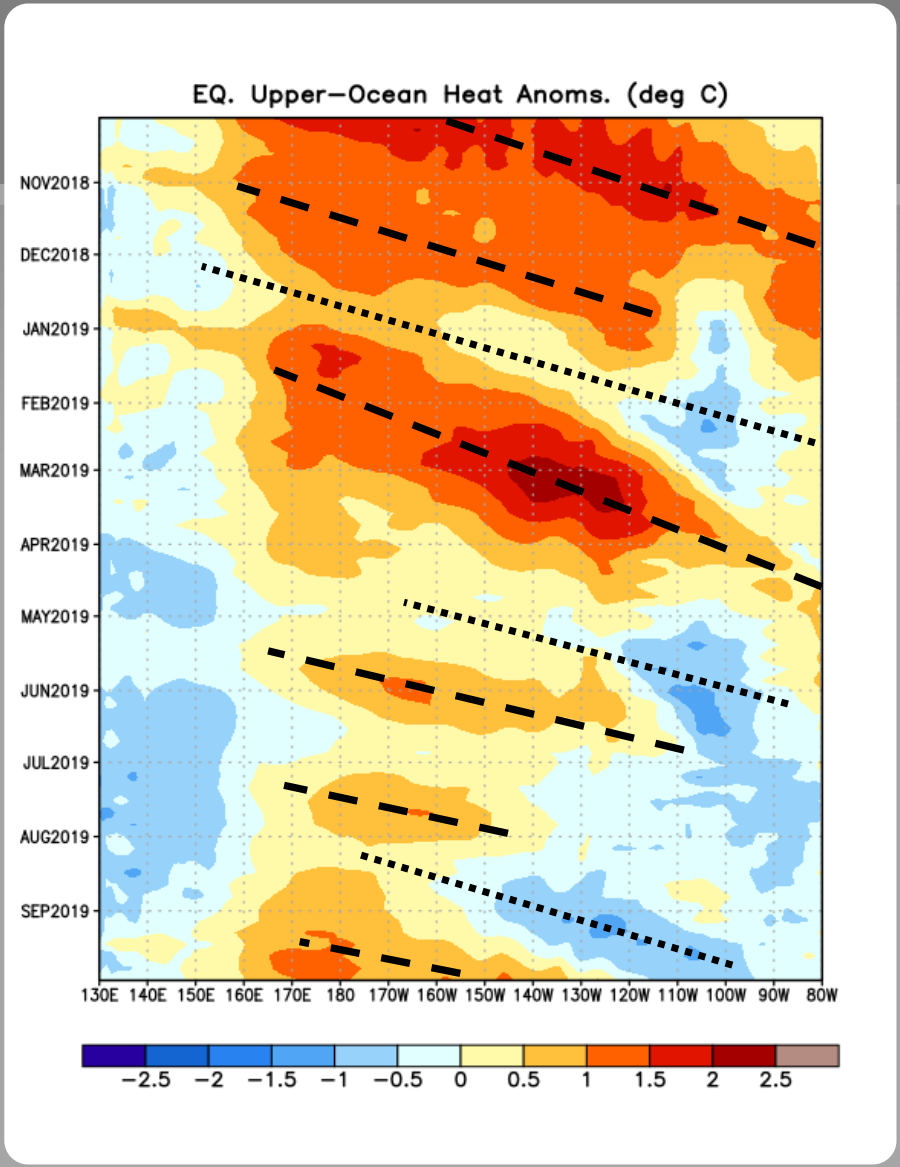

Prepared by: Climate Prediction Center/NCEP

# Weekly Heat Content Evolution in the Equatorial Pacific

In October, November 2018, and in January-March 2019, positive subsurface temperature anomalies increased, partly due to downwelling Kelvin waves.

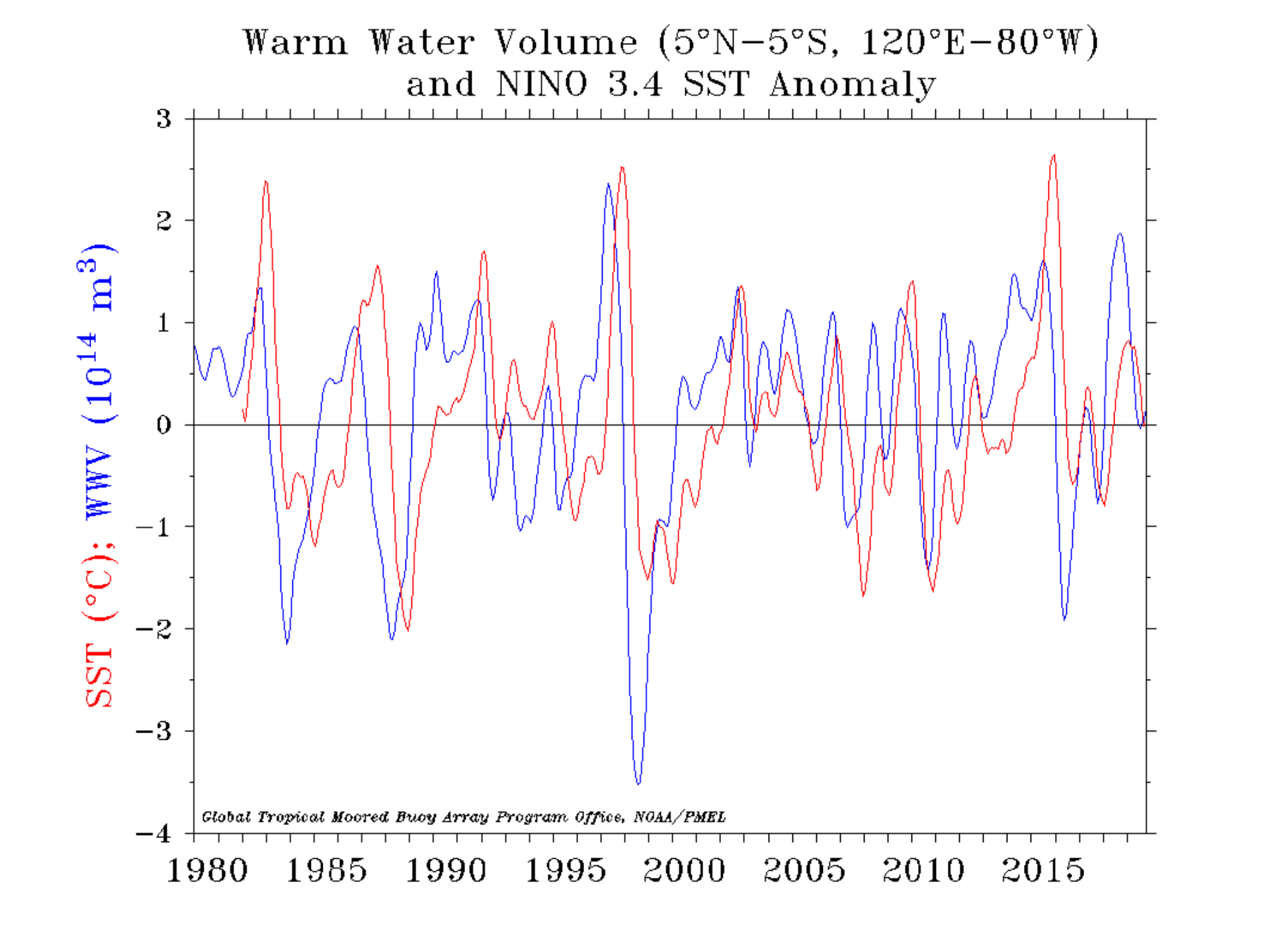
During May 2019, an upwelling Kelvin wave contributed to a reduction of positive subsurface temperature anomalies and the emergence of negative anomalies around 110°-90°W.

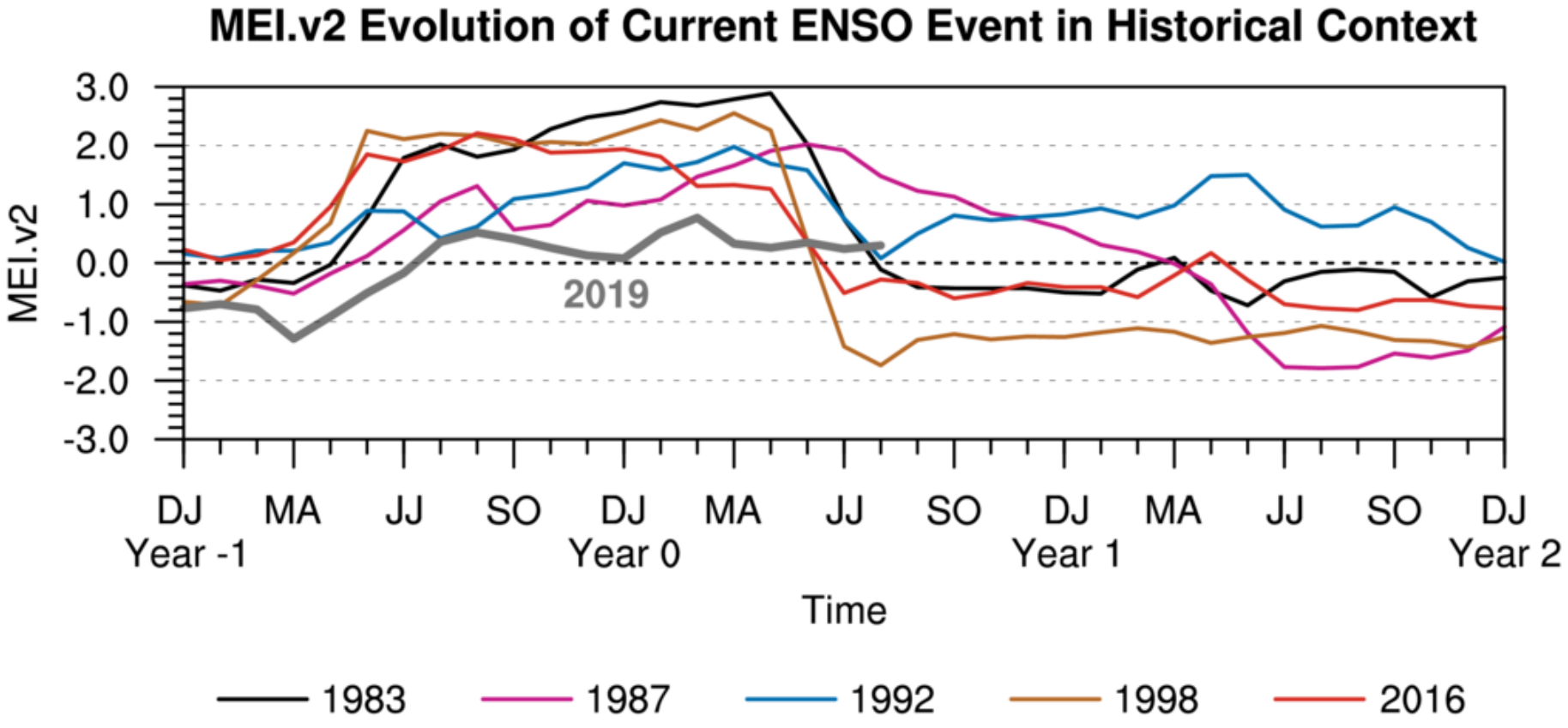
Since mid-September, a downwelling Kelvin wave has increased subsurface temperature anomalies in the east-central Pacific, while the eastern Pacific remains below-average.



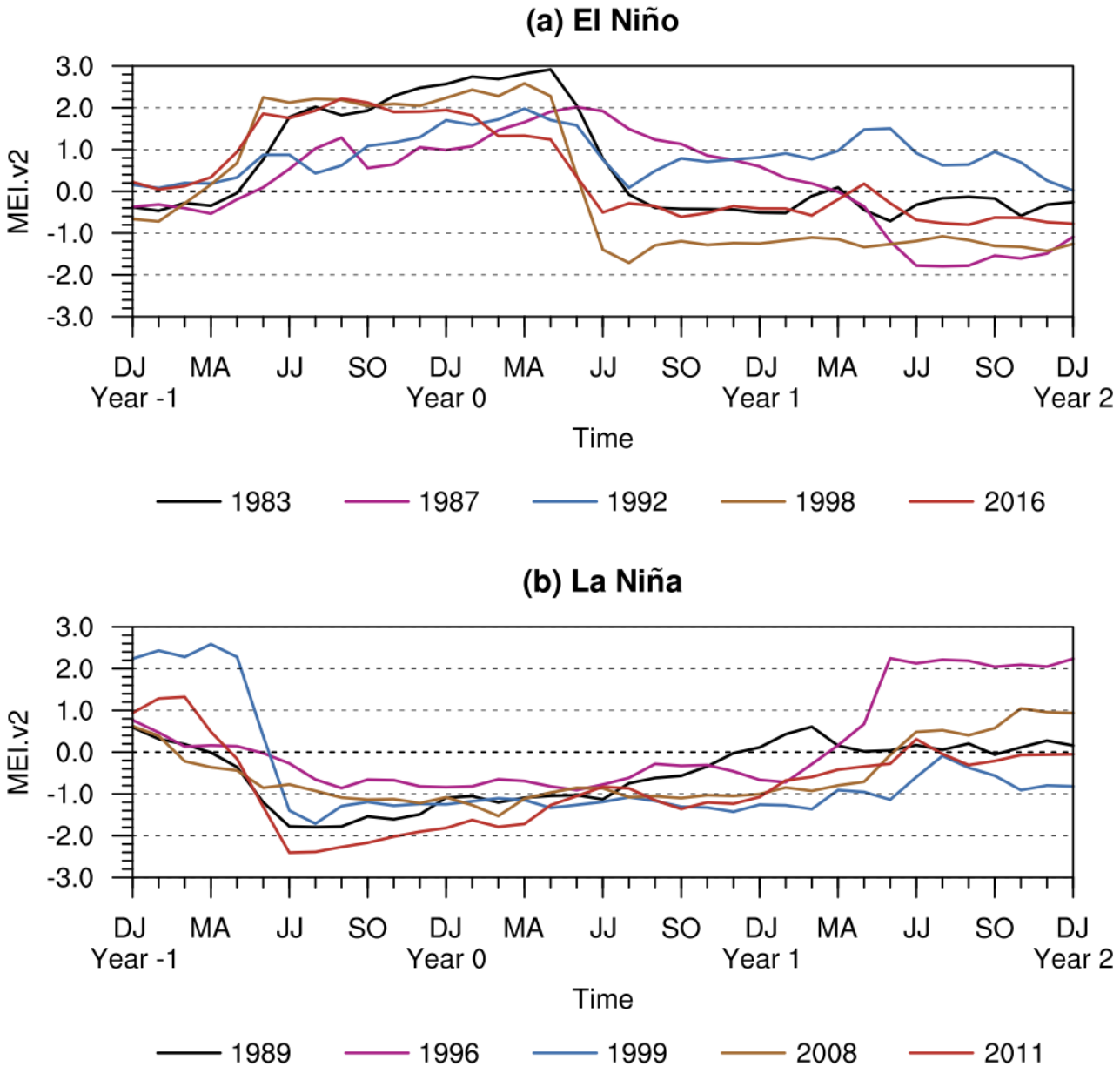

Equatorial oceanic Kelvin waves have alternating warm and cold phases. The warm phase is indicated by dashed lines. Down-welling and warming occur in the leading portion of a Kelvin wave, and up-welling and cooling occur in the trailing portion.

Prepared by: Climate Prediction Center/NCEP


Warm Water Volume (5°N–5°S, 120°E–80°W)
and NINO 3.4 SST Anomaly
SST (°C); WWV ($10^{14}$ $m^3$)
3
2
1
0
−1
−2
−3
−4
1980
1985
1990
1995
2000
2005
2010
2015
Global Tropical Moored Buoy Array Program Office, NOAA/PMEL

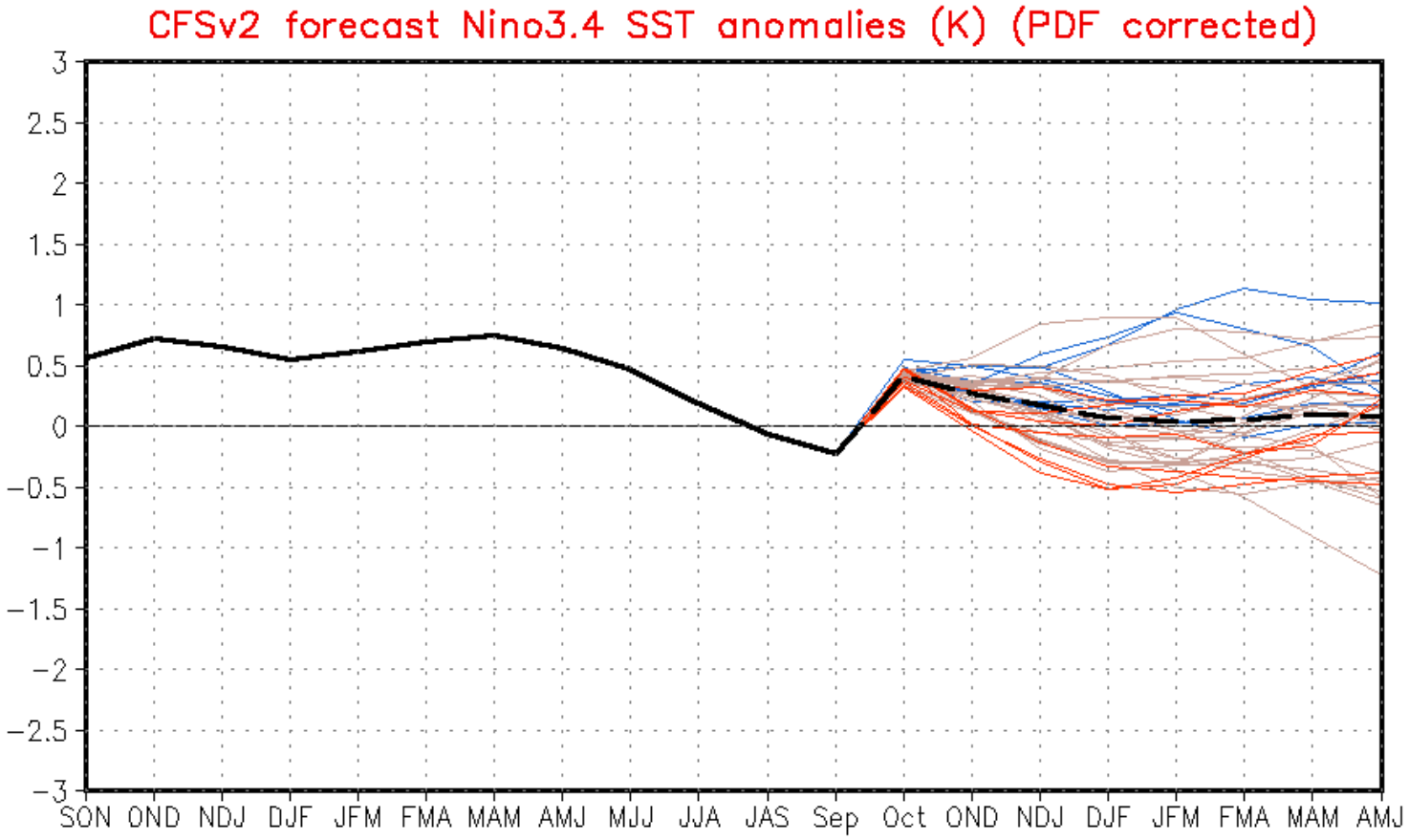

MEI.v2 Evolution of Current ENSO Event in Historical Context
MEI.v2
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
2019
DJ
MA
JJ
SO
DJ
MA
JJ
SO
DJ
MA
JJ
SO
DJ
Year -1
Year 0
Year 1
Year 2
Time
1983
1987
1992
1998
2016

# MEI.v2 Evolution of Historical ENSO Events



NWS/NCEP/CPC

Last update: Tue Oct 8 2019
Initial conditions: 27Sep2019–60ct2019




(Model bias correct base period: 1999–2010; Climatology base period: 1982–2010)

# IRI/CPC Pacific Niño 3.4 SST Model Outlook

A majority of models favor ENSO-neutral through Northern Hemisphere spring 2020, with multi-model averages of Niño-3.4 values remaining close to El Niño thresholds (+0.5°C).

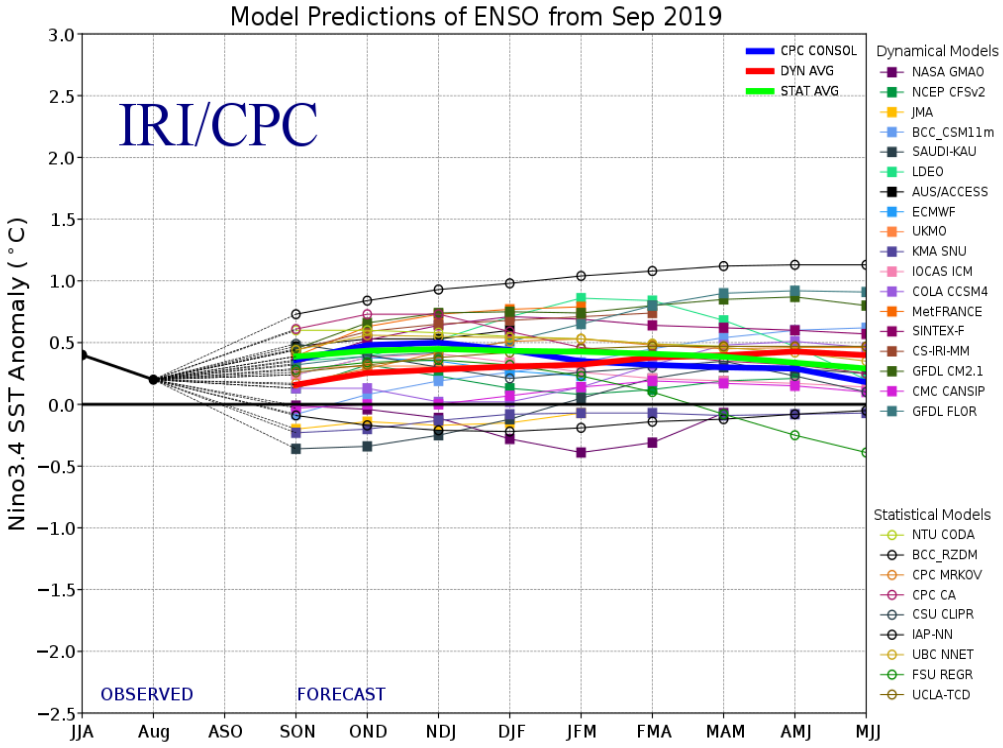



Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 September 2019).

Prepared by: Climate Prediction Center/NCEP

# 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 +/- 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.

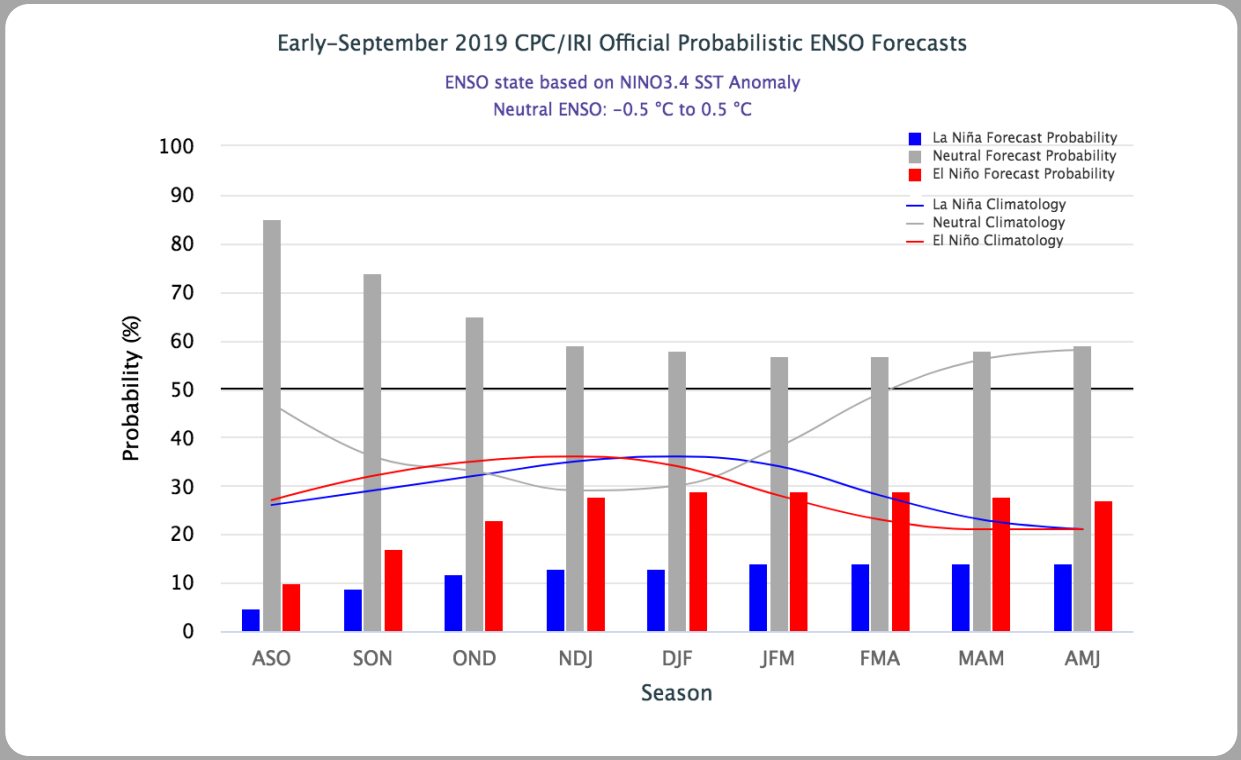
| Year | DJF | JFM | FMA | MAM | AMJ | MJJ | JJA | JAS | ASO | SON | OND | NDJ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2007 | 0.7 | 0.3 | 0.0 | -0.2 | -0.3 | -0.4 | -0.5 | -0.8 | -1.1 | -1.4 | -1.5 | -1.6 |
| 2008 | -1.6 | -1.4 | -1.2 | -0.9 | -0.8 | -0.5 | -0.4 | -0.3 | -0.3 | -0.4 | -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 | 0.7 | 0.9 | 0.8 |
| 2019 | 0.8 | 0.8 | 0.8 | 0.8 | 0.6 | 0.5 | 0.3 | | | | | |

Prepared by: Climate Prediction Center/IRI

# CPC/IRI Probabilistic ENSO Outlook

## Updated: 12 September 2019

**ENSO-neutral is most likely to continue through the Northern Hemisphere spring 2020.**

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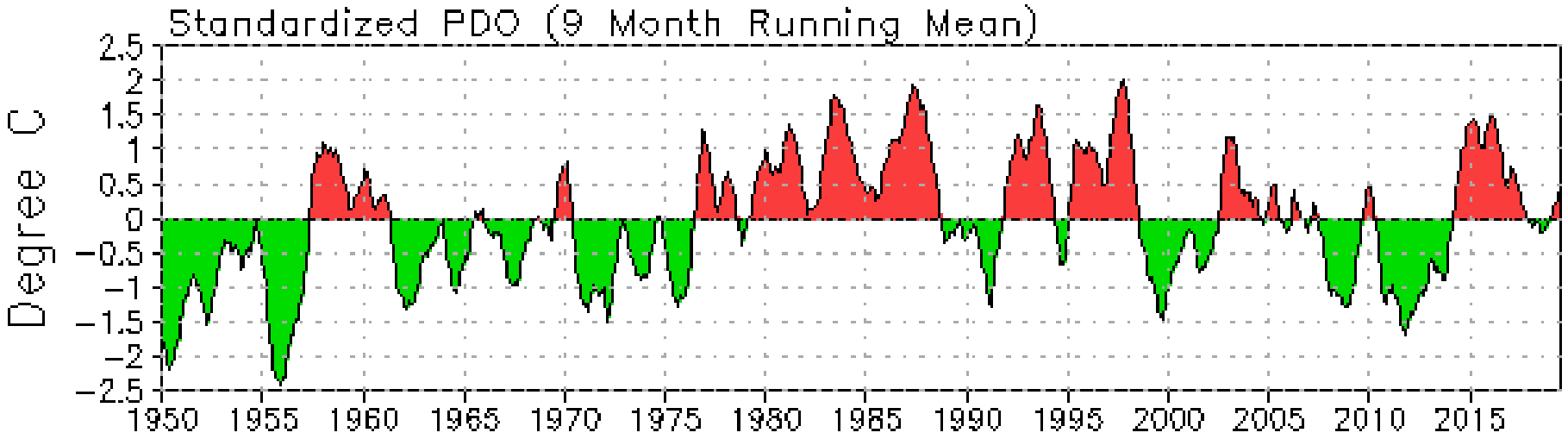
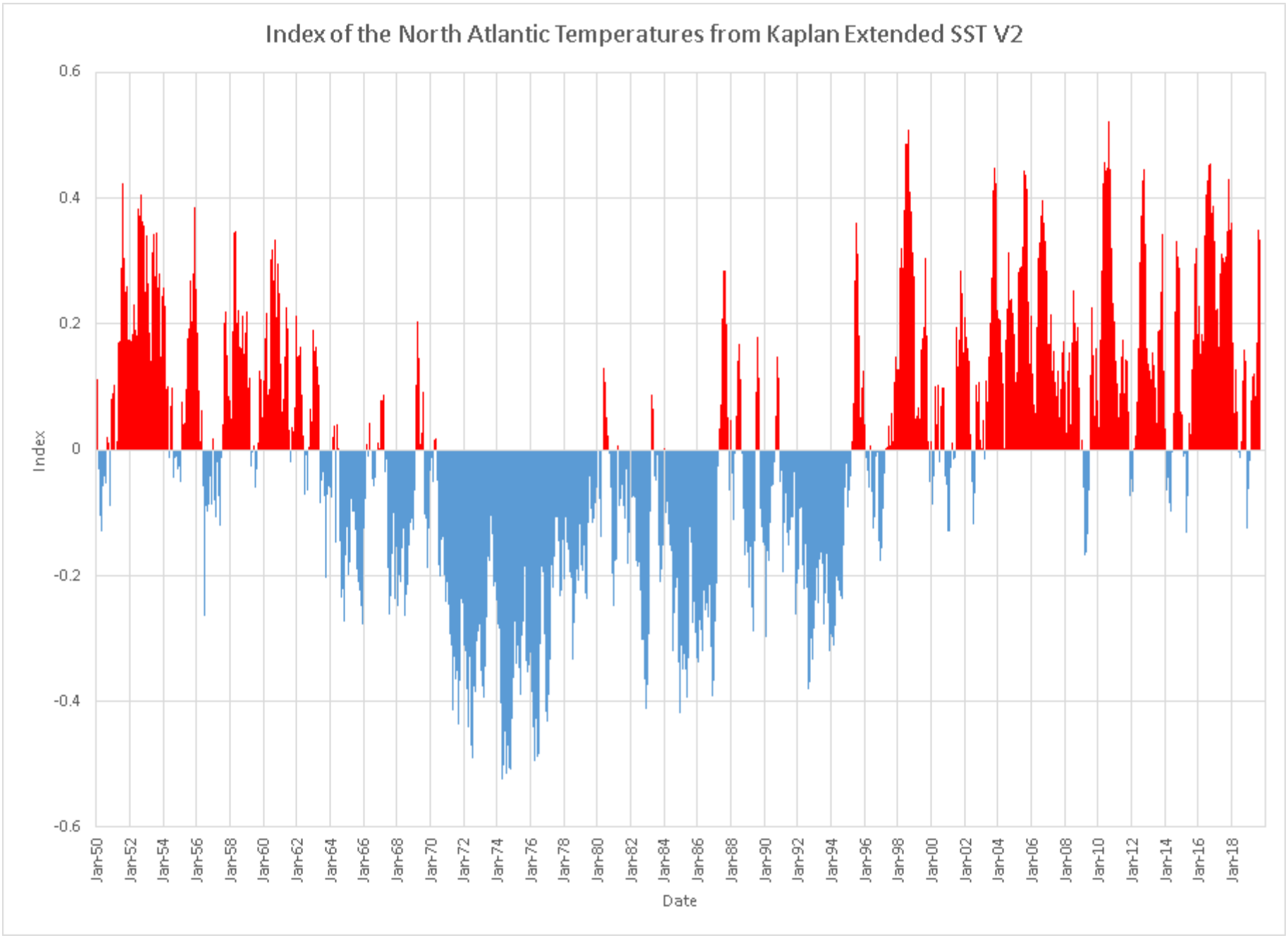
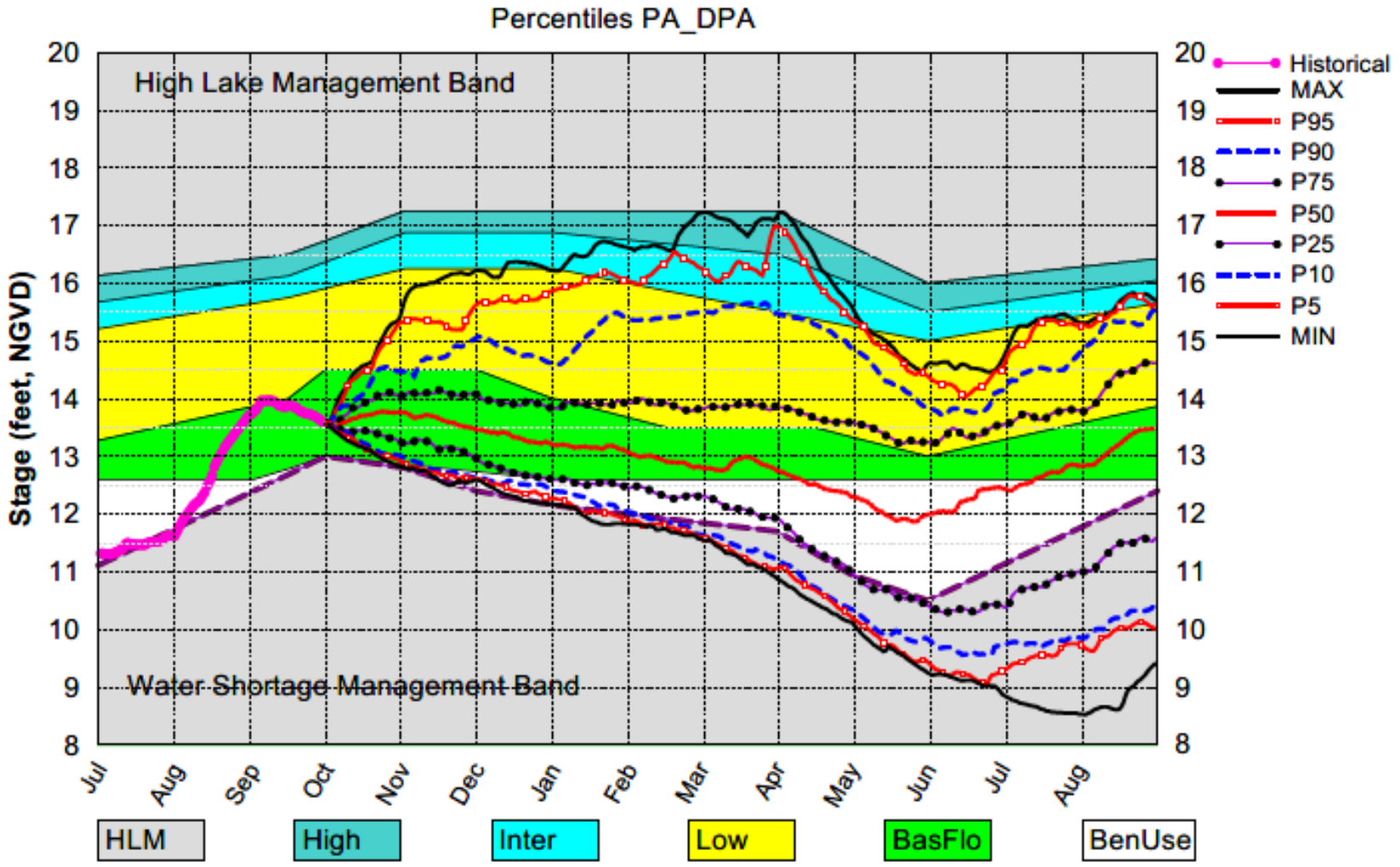

Standardized PDO (9 Month Running Mean)
Degree C
2.5
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015


Index of the North Atlantic Temperatures from Kaplan Extended SST V2
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
Index
Jan-50
Jan-52
Jan-54
Jan-56
Jan-58
Jan-60
Jan-62
Jan-64
Jan-66
Jan-68
Jan-70
Jan-72
Jan-74
Jan-76
Jan-78
Jan-80
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Date

# 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 1st of the previous month and conditions the simulation using real time data during the previous month to achieve real time stage on the 1st 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-October-2019)
  - 41 1-year simulations of system response to historical rainfall conditions
  - Statistical summaries used to display projections

# Lake Okeechobee SFWMM Oct 2019 Position Analysis

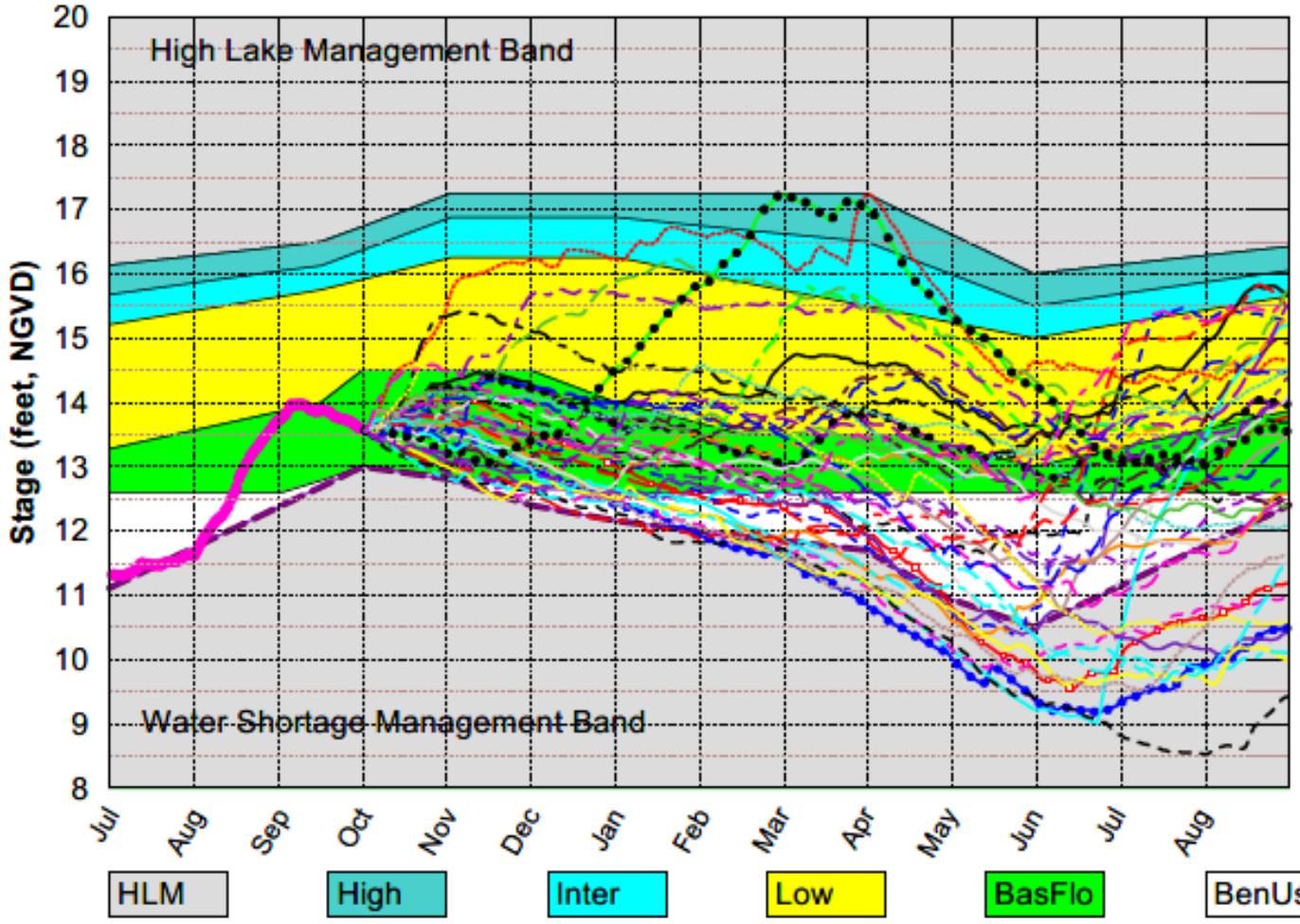



(See assumptions on the Position Analysis Results website)

Sun Oct 6 17:41:12 2019

# Lake Okeechobee SFWMM Oct 2019 Position Analysis

All Simulated Years Plot PA_DPA

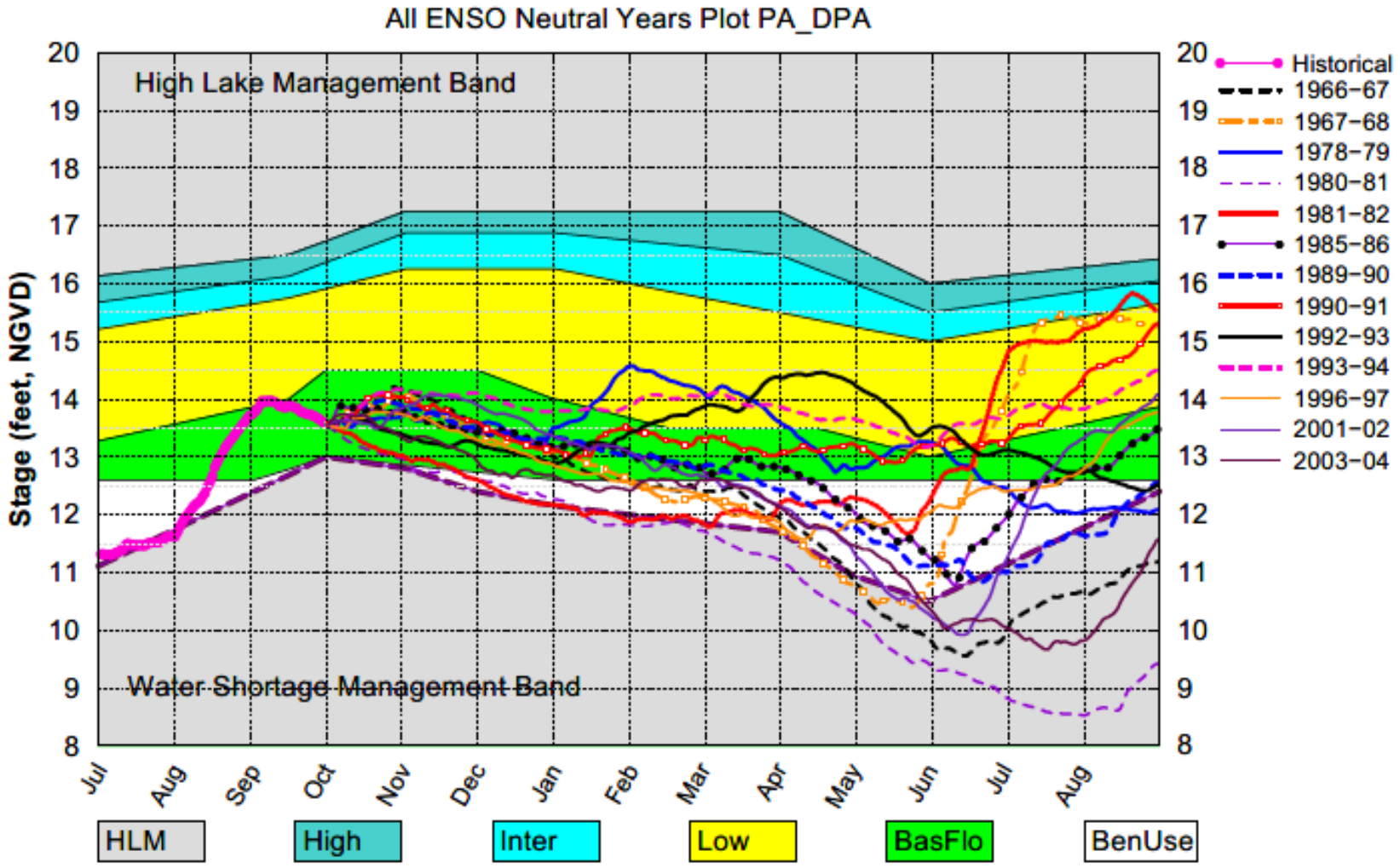



Historical
1965-66
1966-67
1967-68
1968-69
1969-70
1970-71
1971-72
1972-73
1973-74
1974-75
1975-76
1976-77
1977-78
1978-79
1979-80
1980-81
1981-82
1982-83
1983-84
1984-85
1985-86
1986-87
1987-88
1988-89
1989-90
1990-91
1991-92
1992-93
1993-94
1994-95
1995-96
1996-97
1997-98
1998-99
1999-00
2000-01
2001-02
2002-03
2003-04
2004-05

(See assumptions on the Position Analysis Results website)

Sun Oct 6 17:43:56 2019

# Lake Okeechobee SFWMM Oct 2019 Position Analysis




(See assumptions on the Position Analysis Results website)

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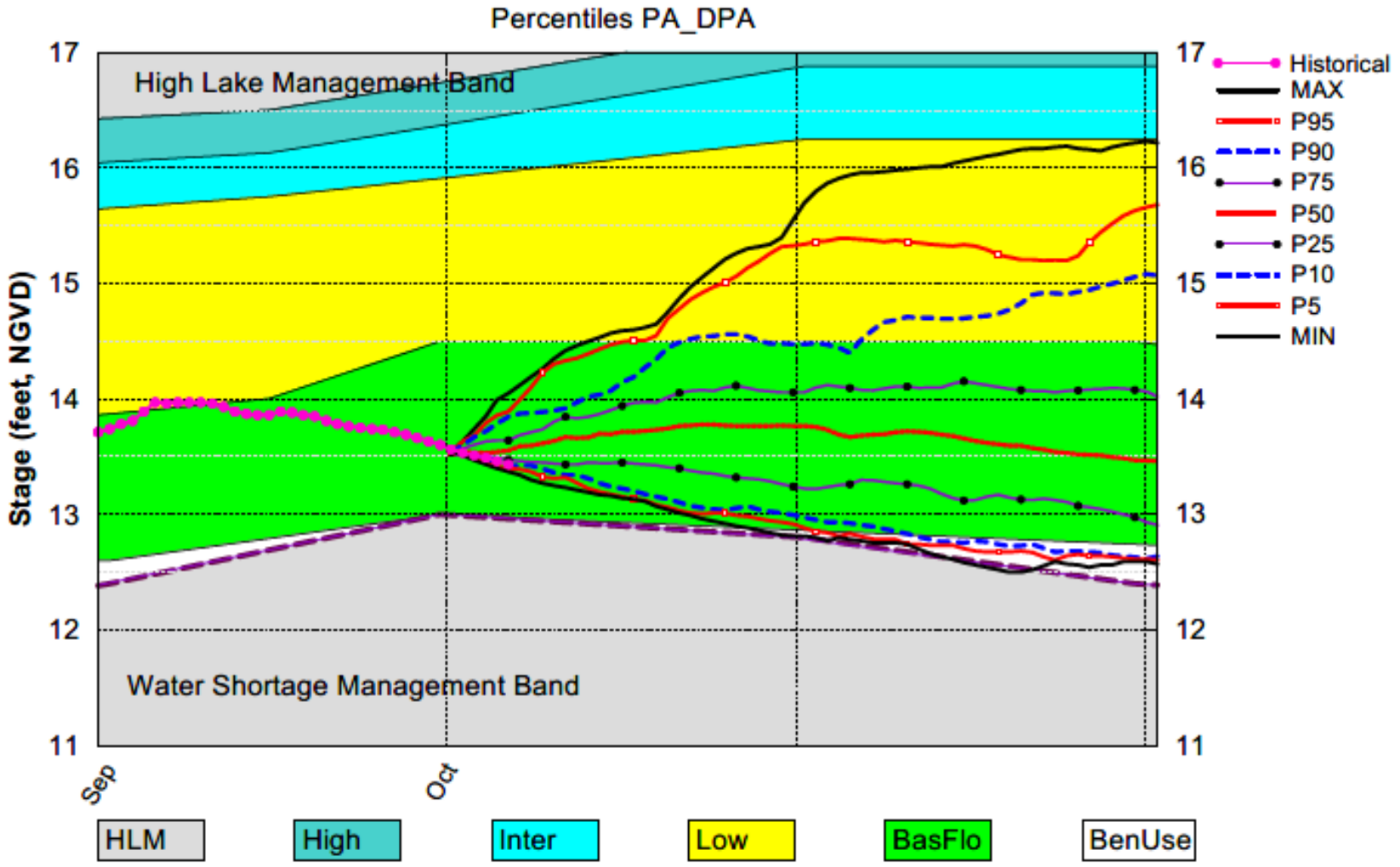


(See assumptions on the Position Analysis Results website)

Sun Oct 06 17:44:22 EDT 2019