EXTENDED HYDROLOGIC OUTLOOK
APRIL 9, 2019

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

| -3.0 | -2.5 | -2.0 | -1.5 | -1.0 | -0.5 | 0.0 | 0.5 | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 |

Snow depth / Épaisseur de la neige (cm)

1.0  10.0  50.0  100.0

Uncovered sea ice
Glace marine à découvert

CMC Environment Canada
Summary

• The Climate Prediction Center (CPC) is forecasting above normal rainfall for April through June.

• Weak El Niño conditions are likely to continue through the spring 2019 (~80% chance) and summer (~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) index for switch to negative (cold) phase, this has the potential to contribute to drier-than-normal wet seasons.
U. S. Seasonal Outlooks
April-June 2019

The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, ENSO.
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
09 Apr 2019

Anomalie de la température de la mer et épaisseur de la neige
09 Avr 2019

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

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

CMC Environnement Canada

Snow depth / Épaisseur de la neige (cm)
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

- Niño 4 0.8°C
- Niño 3.4 0.9°C
- Niño 3 0.8°C
- Niño 1+2 0.0°C
Weekly Heat Content Evolution in the Equatorial Pacific

In early August, October, and November 2018, positive subsurface temperature anomalies increased, partly due to downwelling Kelvin waves.

Since early January 2019, a downwelling Kelvin wave increased the positive subsurface temperature anomalies across the Pacific.

In the last couple of weeks, positive subsurface temperature anomalies have increased in the eastern Pacific.

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 upwelling and cooling occur in the trailing portion.
The majority of models predict a weak El Niño to continue into the Northern Hemisphere fall 2019.
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 Southern Oscillation phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found here.

<table>
<thead>
<tr>
<th>Year</th>
<th>DJF</th>
<th>JFM</th>
<th>FMA</th>
<th>MAM</th>
<th>AMJ</th>
<th>MJJ</th>
<th>JJA</th>
<th>JAS</th>
<th>ASO</th>
<th>SON</th>
<th>OND</th>
<th>NDJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>0.7</td>
<td>0.3</td>
<td>0.0</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.5</td>
<td>-0.8</td>
<td>-1.1</td>
<td>-1.4</td>
<td>-1.5</td>
<td>-1.6</td>
</tr>
<tr>
<td>2008</td>
<td>-1.6</td>
<td>-1.4</td>
<td>-1.2</td>
<td>-0.9</td>
<td>-0.8</td>
<td>-0.5</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.6</td>
<td>-0.7</td>
</tr>
<tr>
<td>2009</td>
<td>-0.8</td>
<td>-0.7</td>
<td>-0.5</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.4</td>
<td>0.5</td>
<td>0.5</td>
<td>0.7</td>
<td>1.0</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>2010</td>
<td>1.5</td>
<td>1.3</td>
<td>0.9</td>
<td>0.4</td>
<td>-0.1</td>
<td>-0.6</td>
<td>-1.0</td>
<td>-1.4</td>
<td>-1.6</td>
<td>-1.7</td>
<td>-1.7</td>
<td>-1.6</td>
</tr>
<tr>
<td>2011</td>
<td>-1.4</td>
<td>-1.1</td>
<td>-0.8</td>
<td>-0.6</td>
<td>-0.5</td>
<td>-0.4</td>
<td>-0.5</td>
<td>-0.7</td>
<td>-0.9</td>
<td>-1.1</td>
<td>-1.1</td>
<td>-1.0</td>
</tr>
<tr>
<td>2012</td>
<td>-0.8</td>
<td>-0.6</td>
<td>-0.5</td>
<td>-0.4</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.2</td>
<td>0.0</td>
<td>-0.2</td>
</tr>
<tr>
<td>2013</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.2</td>
<td>-0.3</td>
<td>-0.3</td>
<td>-0.4</td>
<td>-0.4</td>
<td>-0.3</td>
<td>-0.2</td>
<td>-0.2</td>
<td>-0.3</td>
</tr>
<tr>
<td>2014</td>
<td>-0.4</td>
<td>-0.4</td>
<td>-0.2</td>
<td>0.1</td>
<td>0.3</td>
<td>0.2</td>
<td>0.1</td>
<td>0.0</td>
<td>0.2</td>
<td>0.4</td>
<td>0.6</td>
<td>0.7</td>
</tr>
<tr>
<td>2015</td>
<td>0.6</td>
<td>0.6</td>
<td>0.6</td>
<td>0.8</td>
<td>1.0</td>
<td>1.2</td>
<td>1.5</td>
<td>1.8</td>
<td>2.1</td>
<td>2.4</td>
<td>2.5</td>
<td>2.6</td>
</tr>
<tr>
<td>2016</td>
<td>2.5</td>
<td>2.2</td>
<td>1.7</td>
<td>1.0</td>
<td>0.5</td>
<td>0.0</td>
<td>-0.3</td>
<td>-0.6</td>
<td>-0.7</td>
<td>-0.7</td>
<td>-0.7</td>
<td>-0.6</td>
</tr>
<tr>
<td>2017</td>
<td>-0.3</td>
<td>-0.1</td>
<td>0.1</td>
<td>0.3</td>
<td>0.4</td>
<td>0.4</td>
<td>0.2</td>
<td>-0.1</td>
<td>-0.4</td>
<td>-0.7</td>
<td>-0.9</td>
<td>-1.0</td>
</tr>
<tr>
<td>2018</td>
<td>-0.9</td>
<td>-0.8</td>
<td>-0.6</td>
<td>-0.4</td>
<td>-0.1</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.4</td>
<td>0.7</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>2019</td>
<td>0.8</td>
<td>0.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
El Niño Southern Oscillation Weekly Tracking


1. Strong El Niño
2. El Niño
3. Neutral
4. Weak La Niña
5. Strong La Niña
El Niño conditions are favored to continue through fall 2019 with diminishing chances (~50% in October-November-December).
El Niño & La Niña Events (1950-2018), and Lake Okeechobee Watershed Rainfall & Net Inflow

Oceanic Niño Index (ONI)
Seasonal ERSSTv5 (centered base periods) Niño 3.4 Region (5°N-5°S; 170°-120°W)

Lake Okeechobee Watershed Rainfall and Net Inflow (Nov-Apr)

Source: Cal Neidrauer (SFWMD)
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-Apr-2019)
  - 41 1-year simulations of system response to historical rainfall conditions
  - Statistical summaries used to display projections
Lake Okeechobee SFWMM Apr 2019 Position Analysis

Percentiles PA_DPA

High Lake Management Band

Water Shortage Management Band

(See assumptions on the Position Analysis Results website)
Lake Okeechobee SFWMM Apr 2019 Position Analysis
All Simulated Years Plot PA_DPA

(See assumptions on the Position Analysis Results website)
Lake Okeechobee SFWMM Apr 2019 Position Analysis

Percentiles PA_DPA

Stage (feet, NGVD)

Month

Mar

Apr

May

Jun

Base-Flow Sub-Band

Water Shortage Management Band

HLM

High

Inter

Low

BasFlo

BenUse

(See assumptions on the Position Analysis Results website)