

# Peninsular Florida Modeled Water Table Depth Arboviral Transmission Risk Assessment

**Current Assessment:**     **09/09/2007 – Week 36 – Secondary Wetting Phase**

## Modeled Water Table Depth:

MWTD has remained low across much of Peninsular Florida due to the extreme drought reported from the fall of 2006 through the spring of 2007, with the wettest areas being located around Lake Okeechobee and north of Tampa Bay (Figure 3). The MWTD throughout the majority of Peninsular Florida continues to be low except for areas of Southeast Peninsular Florida, which did not experience a drought during the previously indicated time span. MWTD in those areas is at or near normal for this time of year. We are now four weeks into the Secondary Wetting (SWET) phase with some areas experiencing a wetting trend while others remain dry.

## Arboviral Transmission Risk:

**Secondary Wetting (SWET) Phase (Weeks 32 – 37):** Previously high risk MWTD profiles in eastern Broward, Dade, and Palm Beach counties drifted away from the Arboviral Transmission Risk Model during the Initial Wetting (IWET) and Secondary Dry Down (SDD) phases (Figure 5). This deviation, along with the failure to realize a SWET event during the current phase, has resulted in MWTD profiles in these counties moving away from high risk potentials fairly quickly. MWTD profiles in Marion and Citrus counties have also drifted away from high risk potentials with the failure to initiate a substantial IWET in weeks 22 to 27. With the removal of these areas from high risk potentials, Peninsular Florida appears to have settled into a low risk scenario for **EPIDEMIC** WNV and SLE transmission through the remainder of the calendar year (Figure 4). No current MWTD profiles in Peninsular Florida now have the potential to return to **EPIDEMIC** high risk based upon the current Arboviral Transmission Risk Model.

## Historical Assessment for 2007:

### Arboviral Transmission Risk:

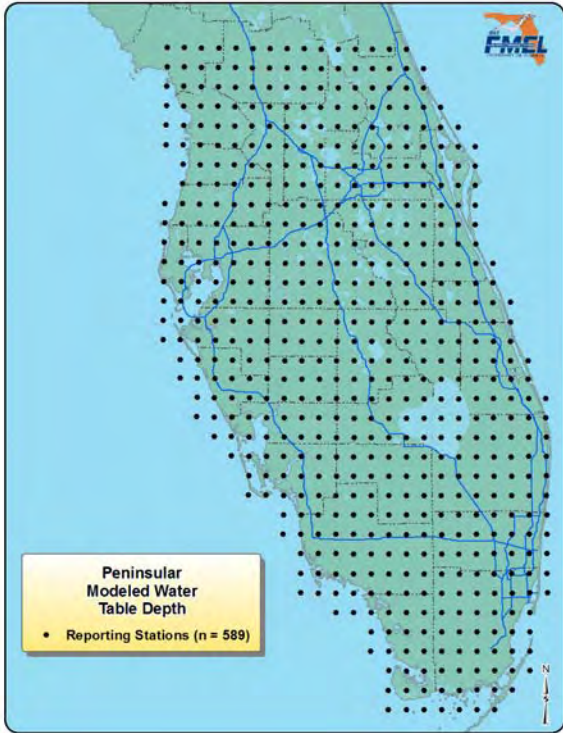
**Initial Dry Down (IDD) Phase (Weeks 1 – 22):** MWTD remained low during this phase with the only noticeable exceptions being southeast and northwest Peninsular Florida which reported normal rainfall during the winter months. As a result, all areas of Peninsular Florida, except for the areas mentioned above, were considerably drier than the MWTD profiles of the Arboviral Transmission Risk Model and considerably outside the risk criteria. MWTD profiles in the areas of eastern Broward, Dade, and Palm Beach counties closely followed the Arboviral Transmission Risk Model during the IDD phase (Figure 5).

**Initial Wetting (IWET) Phase (Weeks 23 – 27):** MWTD values increased across Peninsular Florida as the drought broke right on schedule in week 22 (Figure 5). However, due to the majority of Peninsular Florida reporting below normal MWTD values during the IDD phase, most areas continued to be considerably drier than the MWTD profiles of the Arboviral Transmission Risk Model and continued to fall considerably outside the risk criteria. However, the increase in MWTD in eastern Broward, Dade, and Palm Beach counties put these areas at higher risk for arboviral transmission **IF** other criteria such as bird populations and mosquito populations line up spatially and temporally. Initial indications are that the widespread drought across Peninsular Florida had a negative influence on mosquito reproduction and resulting populations.

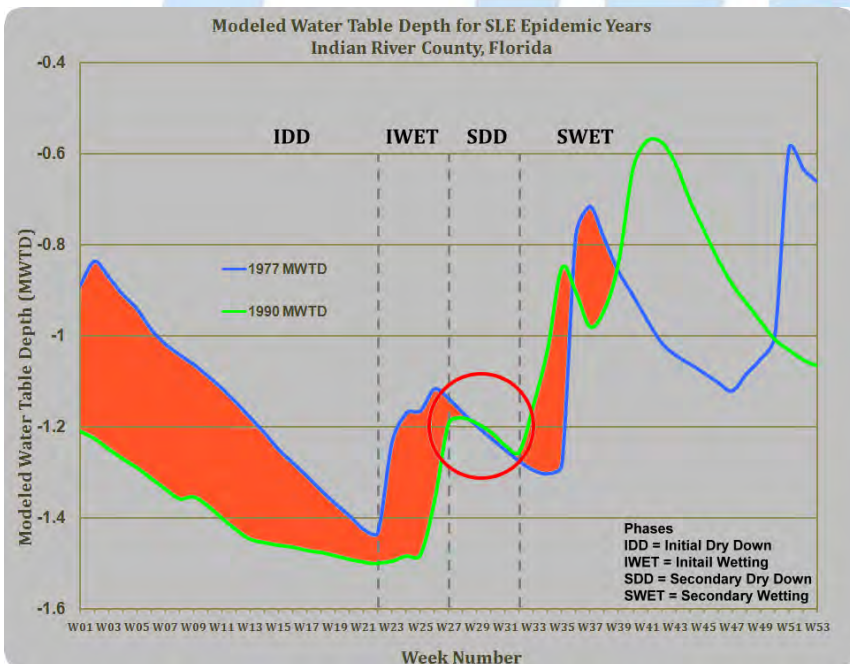
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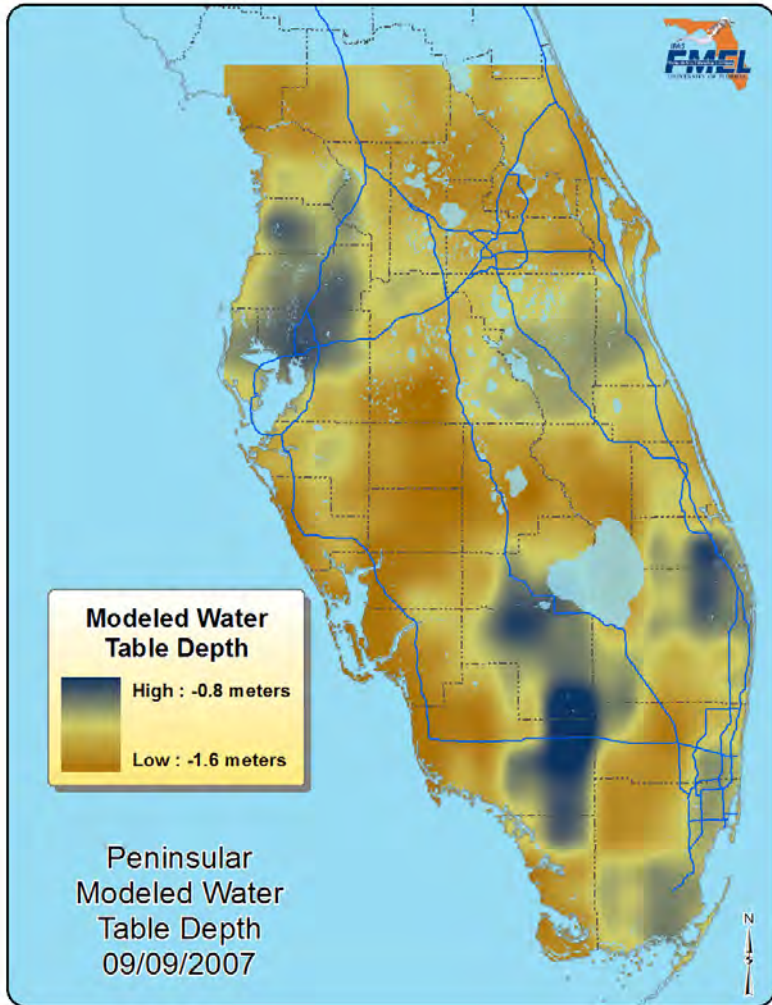
**Secondary Dry Down (SDD) Phase (Weeks 28 – 32):** MWTD profiles in eastern Broward, Dade, and Palm Beach counties started to move away from the Arboviral Transmission Risk Model as the summer rains continued into the into the first 2 weeks of SDD phase (Figure 5). This wetting trend reversed in week 29 as a significant SDD event began in these areas. However, MWTD profiles in these counties had previously move away from **EPIDEMIC** high risk potentials fairly quickly due to the high amount of rainfall experienced during the IWET phase. MWTD profiles in Marion and Citrus counties have also drifted away from high risk potentials with the failure to initiate a substantial IWET in weeks 22 to 27. With the failure of these areas to exhibit any limited **FOCAL** arboviral transmission during the late summer, supporting bird and mosquito populations may not have existed to sustain any arboviral amplification earlier in the year.



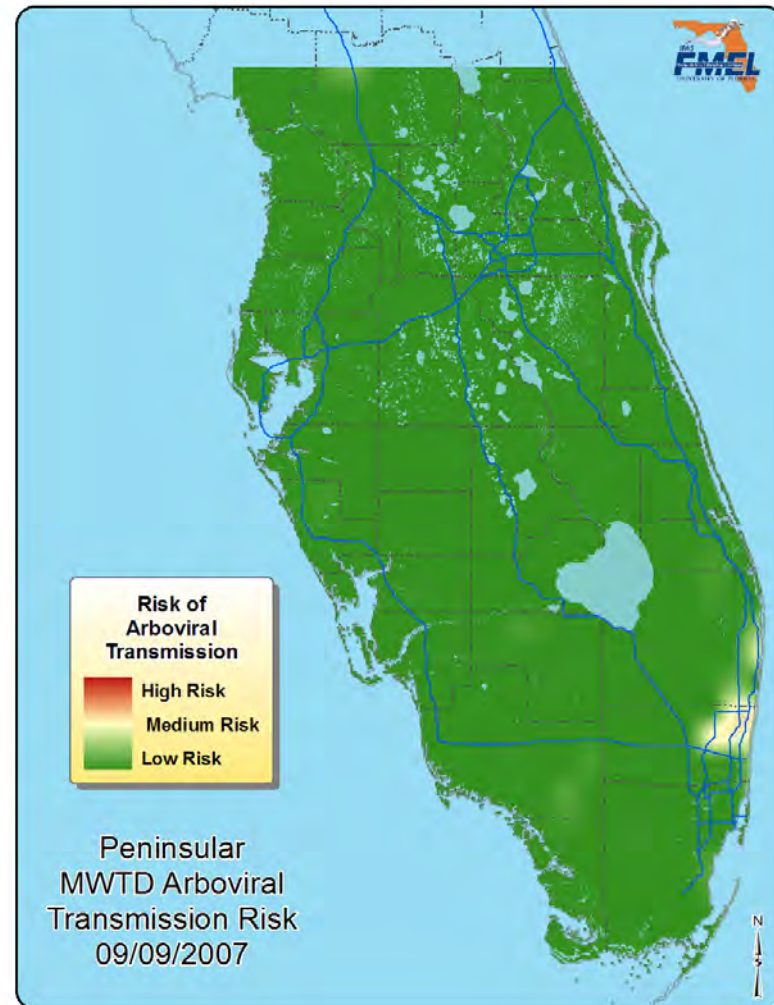
**Figure 1.** Map of Peninsular Florida representing Modeled Water Table Depth calculation points located on a 0.125 degree resolution grid. A Topographically Based Hydrology (TBH) model is used to simulate variations in water table depth at the 589 sites. Mean area water table depth provides an integrated measure of near surface soil wetness conditions and are inputted into a Geographical Information System (GIS) based model to produce arboviral transmission risk maps.



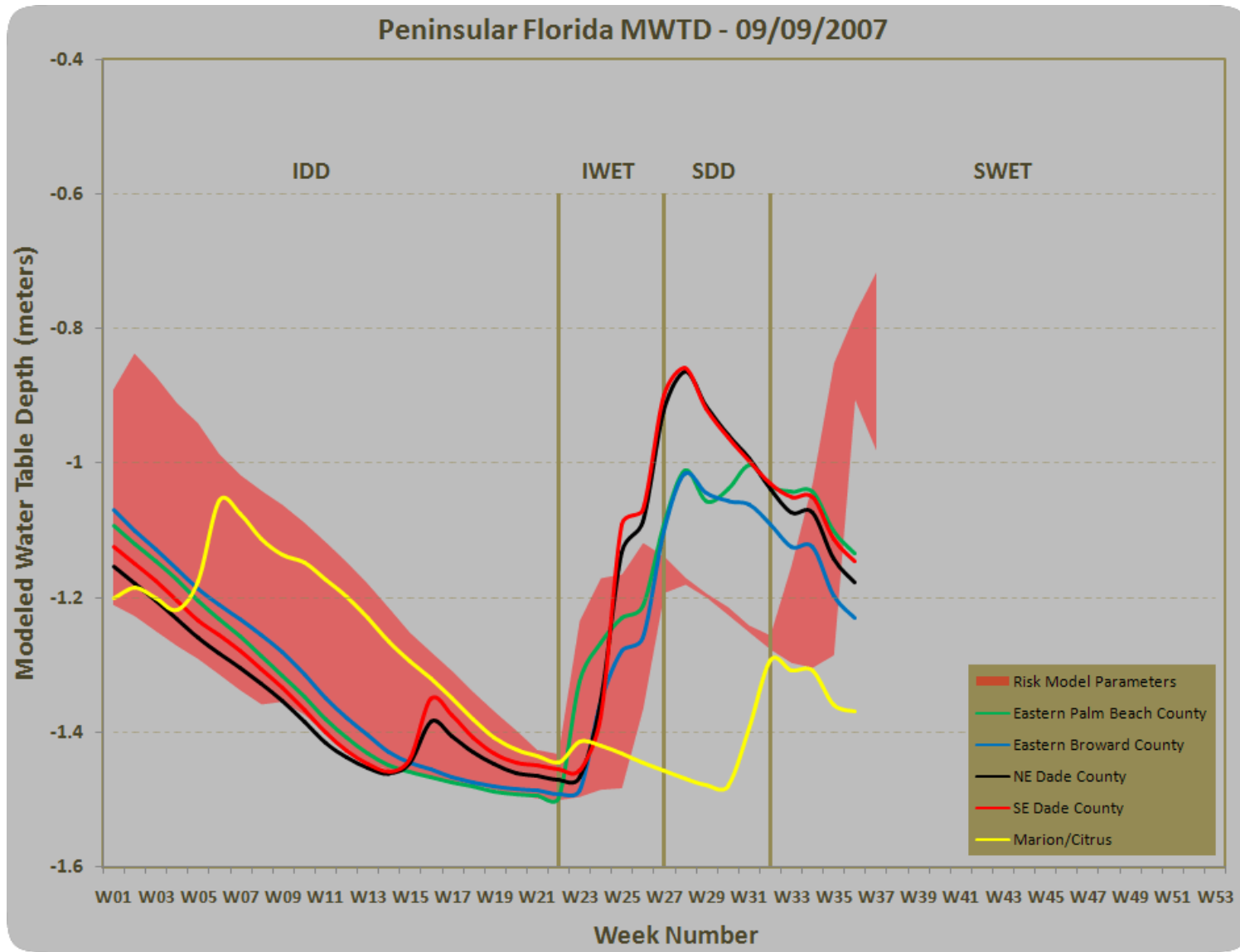
**Figure 2.** Chart of weekly Modeled Water Table Depth (MWTD) values in Indian River County for SLE epidemic years 1977 and 1990. Arboviral Transmission Risk Model values (highlighted in orange) are compared to real-time values across peninsular Florida. MWTD values falling continuously within the shaded area through the Initial Dry Down (IDD) and Initial Wetting (IWET) phases are necessary for the amplification of St Louis Encephalitis (SLE) or West Nile Virus (WNV). Areas following the trends of these first 2 phases are considered at high risk for FOCAL arboviral transmission. The Secondary Dry Down (SDD) phase, circled in red, along with a Secondary Wetting phase, is considered critical for EPIDEMIC arboviral transmission. The last 2 phases provide for a second round of amplification followed by subsequent spread of the virus outside of focal amplification zones. The highlighted orange areas end at week 39 as amplification after this time is limited and any subsequent transmission risk through the remainder of the year has been determined.



**Figure 3.** Map of Peninsular Florida indicating the current Modeled Water Table Depth (MWTD) situation. Areas with lower water table depth below the surface (highlighted in orange) have less near surface water, while areas with higher water table depth (highlighted in blue) have more near surface water. Even with the increase of summer rainfall, the majority of Peninsular Florida reports below normal MWTD profiles. . It is unlikely any MWTD profiles in Peninsular Florida will enter the parameters of the risk model during the remainder of this calendar year.



**Figure 4.** Map of Peninsular Florida indicating areas at high risk (highlighted in red) for arboviral amplification (SLE, WN). Highlighted areas indicated on the map closely followed the MWTD signature for arboviral amplification through the Initial Dry Down (IDD) phase but deviated sharply starting through the Initial Wetting (IWET) and Secondary Dry Down (SDD) phases (Figure 5). With the failure of these areas to exhibit any limited **FOCAL** arboviral transmission during the late summer, supporting bird and mosquito populations may not have existed to sustain any arboviral amplification earlier in the year.



**Figure 5.** Chart of MWTD values for areas of arboviral transmission risk in Peninsular Florida. The MWTD profiles in these areas closely followed the Arboviral Transmission Risk Model (shaded in red) through the Initial Dry Down (IDD) phase and the early portion of the Initial Wetting (IWET) phase. However, MWTD profiles in these areas moved away from **EPIDEMIC** high risk potentials fairly quickly during the Secondary dry Down (SDD) phase. With the removal of these areas from high risk potentials, Peninsular Florida appears to have settled into a low risk scenario for **EPIDEMIC** WNV and SLE transmission through the remainder of the calendar year. No current MWTD profiles in Peninsular Florida now have the potential to return to **EPIDEMIC** high risk based upon the current Arboviral Transmission Risk Model.

## References

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