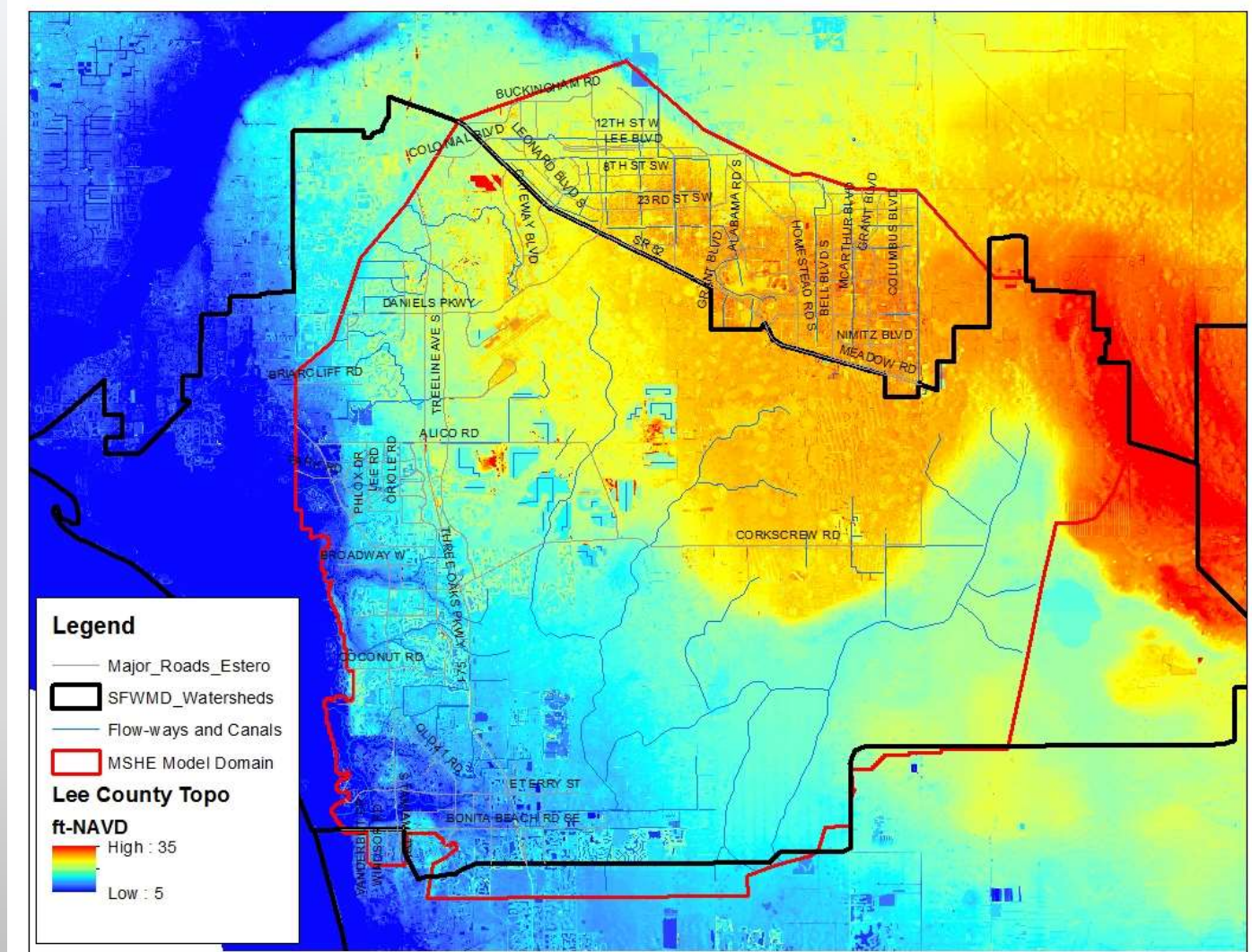


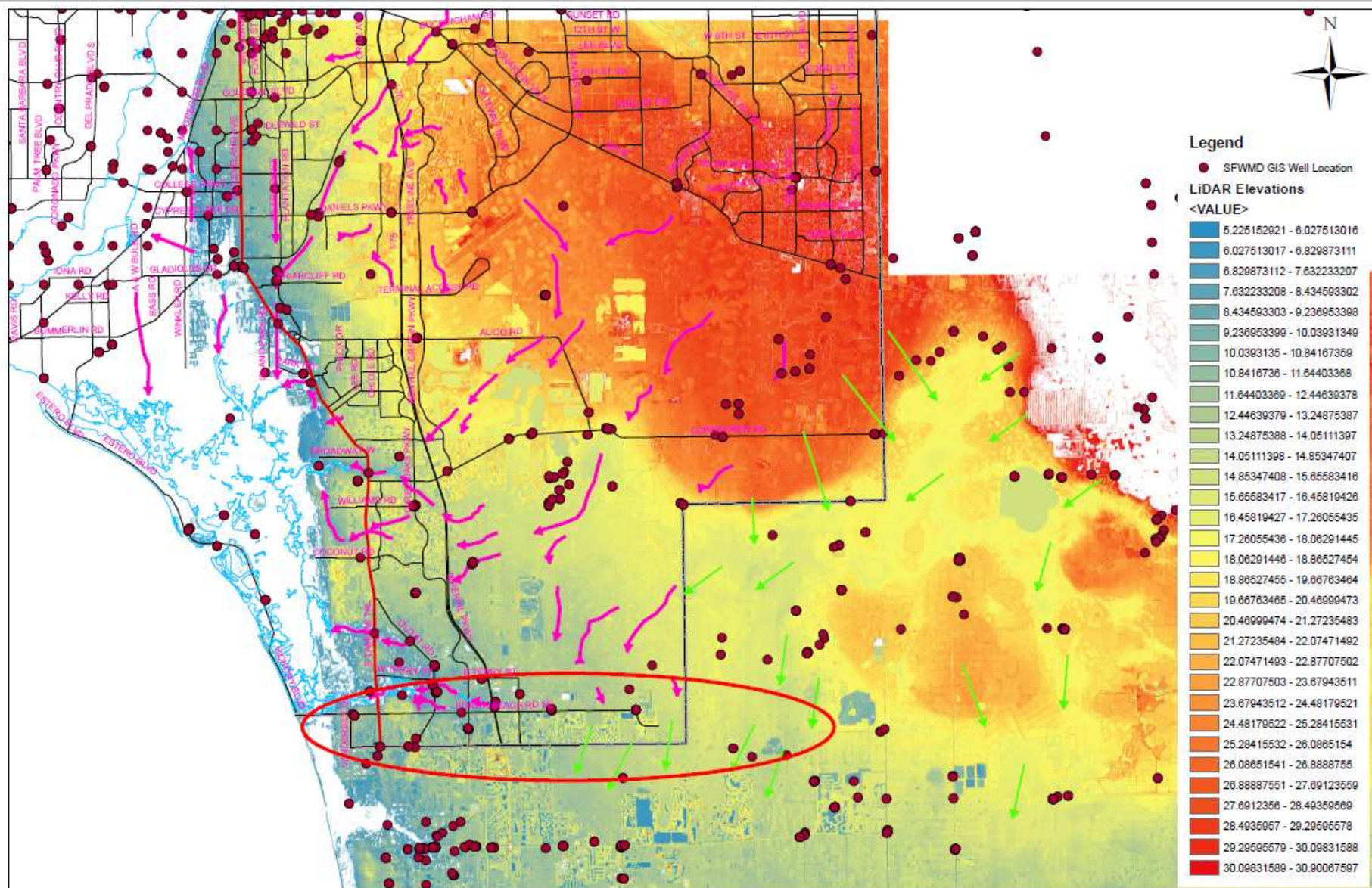
Model Sub-Committee South Lee Watershed Initiative

March 2 2017 Meeting

Roger Copp, Water Science Associates

The Corkscrew Watershed and MIKE SHE Model Domain





Modeling Requirements for South Lee Watershed Initiative

- Multiple ground water layers (surficial, Lower Tamiami, Sandstone, and potentially the Mid-Hawthorn)
- Variable spatial distribution, thickness, and conductivity of aquifers and confining layers
- Distributed overland flow in large wetland areas
- Irrigation and public supply water use from multiple sources (lakes, aquifers, and user-specified)
- Hydraulics in sloughs, rivers, and canals
- Hydraulic control structures, including gates, pumps, culverts, and weirs in surface waters
- Flows to and from wetlands and canals/rivers

Modeling Objectives (drafted by group during 3-2-17 meeting)

- Develop an analytical tool to simulate
 - existing and future land use conditions
 - Reconnectivity of wetlands/flowways and evaluate restoration alternatives
 - Water resource conditions in study area
 - Flooding issues and solutions
 - Flows to estuaries
 - Water use/water supply
 - Minimum flows and levels
 - Groundwater recharge
 - Pollutant loading/transport for existing conditions and various scenarios??
- We may need some additional modeling for this

Prior Modeling Efforts

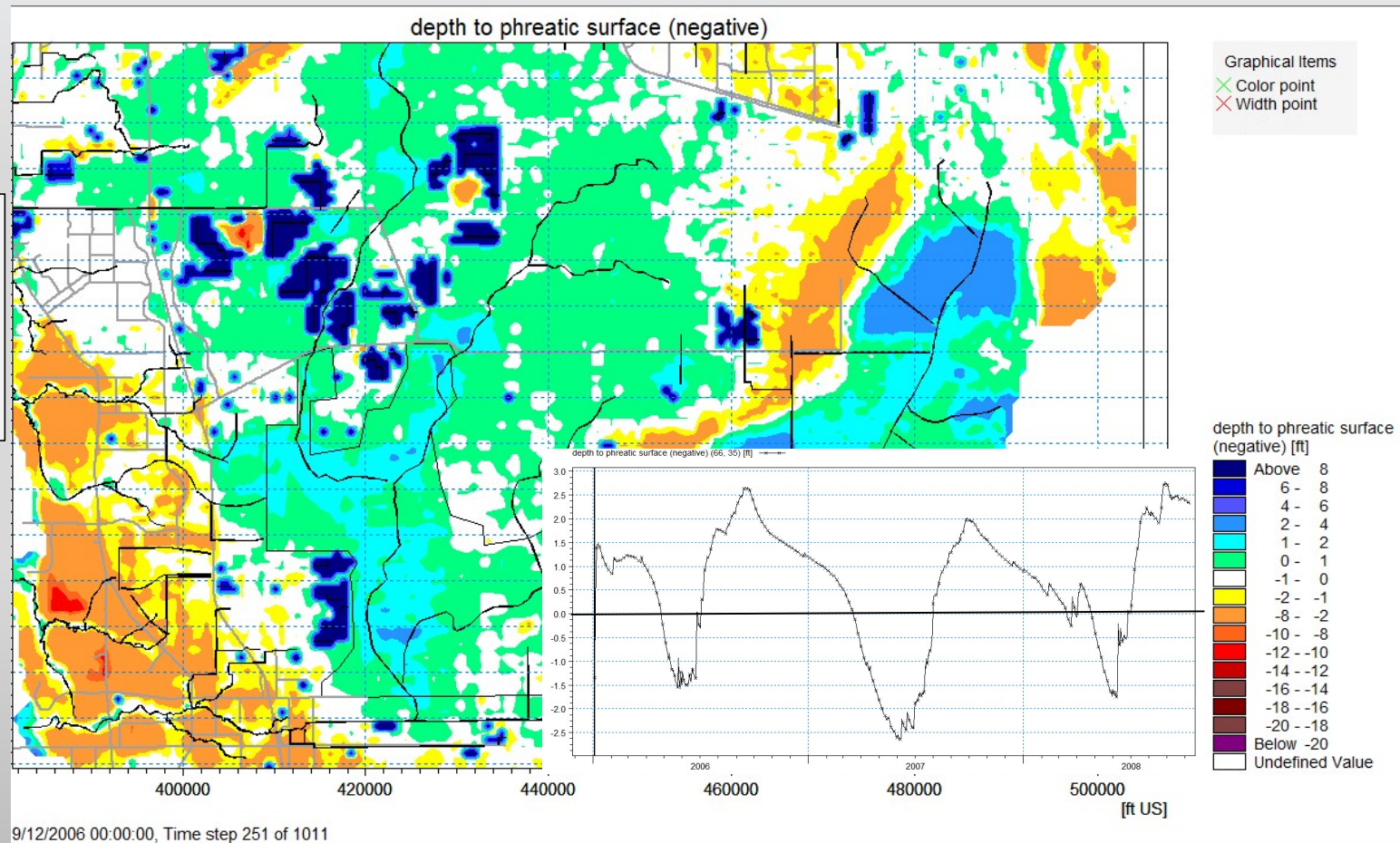
- SLCWP MIKE SHE/MIKE 11 2009
 - Old topo
 - Modified ET approach improved Imperial River Flow Calibration
 - Did not have Kehl Canal XS data, but more detail west of I-75
- Southern CREW MIKE SHE/MIKE 11 model (extension of DR/GR MSHE)
 - Old Collier topo, but surveyed XS for Kehl Canal and side canals (2010 data)
 - Water level and flow peaks not simulated very well
 - ET a question
- Updated 2016 Collier MIKE SHE model
 - New topo, new hydrogeology

Recommended Approach for Improved Water Management

- Utilize an integrated surface/ground water model that simulates the full water balance.
- MIKE SHE/MIKE 11 has been used in the Estero and Imperial River watersheds. Components included in the model include:
 - Rainfall and ET
 - Three groundwater aquifers: surficial, Lower Tamiame, Sandstone
 - Confining units between the surficial and LT, and the LT and the Sandstone
 - Multiple land use categories and impacts from irrigation
 - Overland flow for broad wetland areas
 - Surface water flows in canals and flow-ways with the ability to simulate gates and pumps

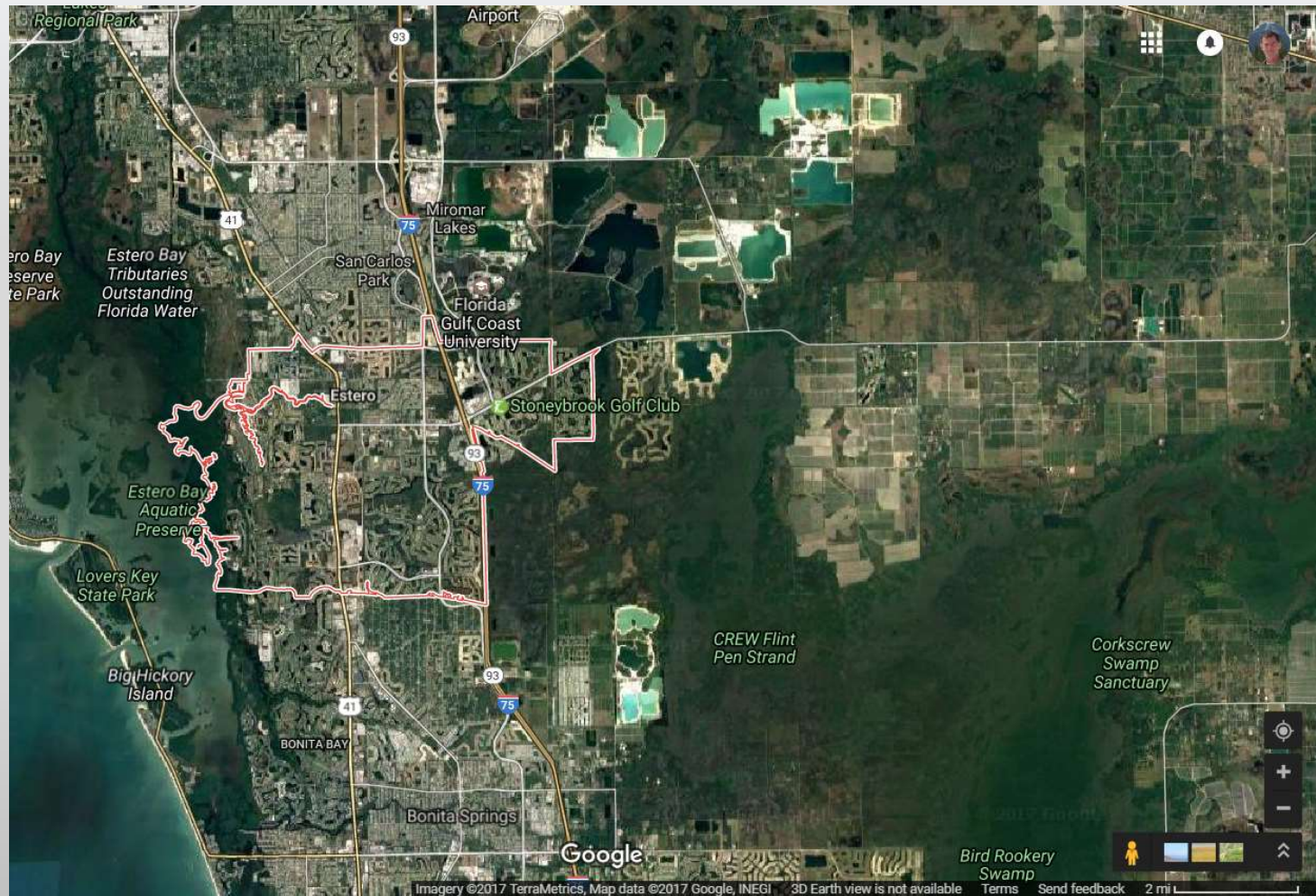
Model Results Assist in Ecologic Studies

Model Results can be used for creative developmental planning



Village of Estero

- The Village wants to make sure that they are aware of potential changes to flows into the Village that could result from proposed developments
- Other Village concerns include traffic and providing municipal services



Description of New Project with Village of Estero

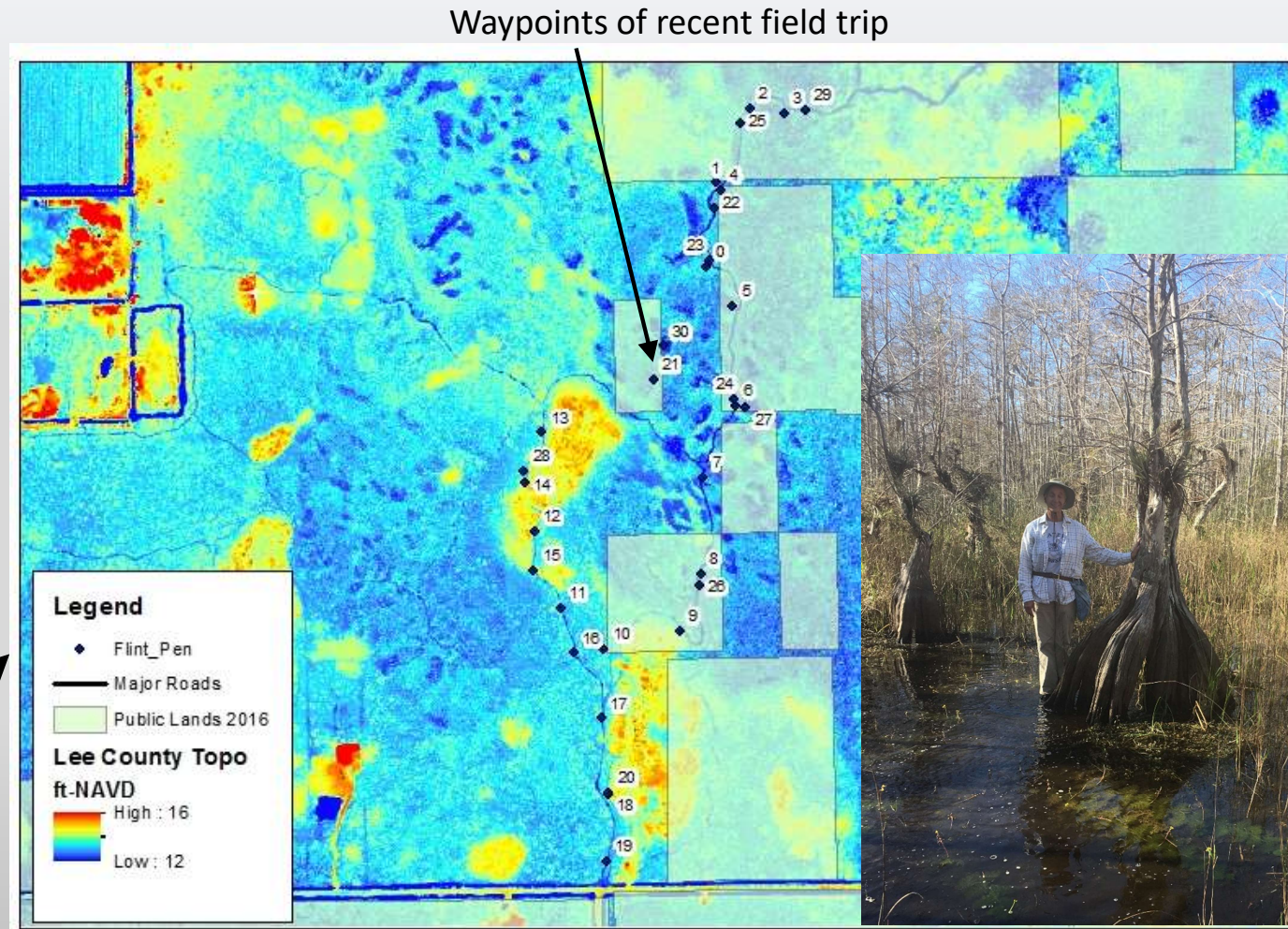
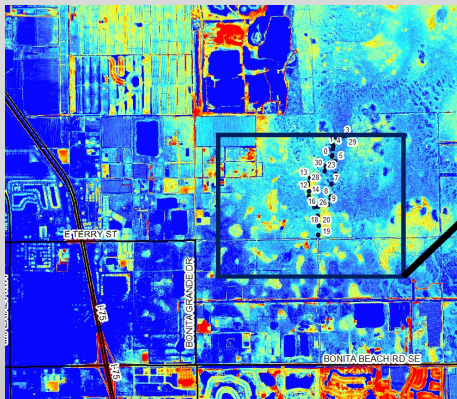
- The Village of Estero has selected JR Evans Engineering and Water Science Associates to prepare a stormwater master plan. Objectives include:
 - Evaluate flooding, ID flooding threats, and recommend improvements
 - Identify water quality enhancement projects
 - Consider impacts for development projects outside of Village limits
- Utilizing DR/GR model and the South Lee County Watershed Plan Update Models to build an updated model for the Estero and Imperial River watersheds
- Model improvements that will be made:
 - Will utilize latest topography from Lee County and Collier County
 - Will overcome southern boundary condition challenges of prior models by utilizing the latest Collier County MIKE SHE/MIKE 11 model which includes the Imperial River Watershed
 - Will utilize latest hydrogeologic characterization from the SFWMD Lower West Coast Water Supply Plan

Description of New Project with Village of Estero, cont'd.

- Additional model improvements:
 - Will utilize more calibration data than prior efforts
 - Will utilize information from recent work that JR Evans and Water Science Associates have conducted in the Estero River watershed
 - Will update surface water network to represent improvements made after the 2009 SLCWP
- Will be calibrated for a one-year period 2013-2014 and will focus on wet season conditions
- Will be used for establishing robust boundary conditions for local **ICPR** and **HEC-RAS** models within the Village of Estero
- This model provides a solid base that could be utilized for ecosystem assessments in the CREW area if the model is enhanced to make it more robust

CREW Lands

- There is some amazing habitat in CREW lands
- See additional photos on next page



Awesome CREW Habitat



Improvements Needed to Evaluate Headwaters to the Estero and Imperial Rivers

- Needed improvements for hydroperiod modeling include:
 - Update land use file to better represent wetlands and include field confirmations of wetland condition (this is needed to properly represent time of travel through wetlands)
 - Refine grid to better simulate overland flow in wetland areas
 - Extend calibration to include additional years so that the model is able to simulate both wet and dry periods
- Carefully coordinate with wetland ecologists to confirm simulated hydroperiods
- Frequent meetings to review initial model development and throughout calibration?

Additional Thoughts

- Additional recommendations on how to have a successful process:
 - Calibration is complete when all parties concur
 - Alternatives are formed with the intent that all parties need to come away with something positive (no one party always gets to have his/her way)
 - All parties treat each other with respect and honestly try to find common ground
 - Win-Win-Win leads to implementable solutions that can be financed