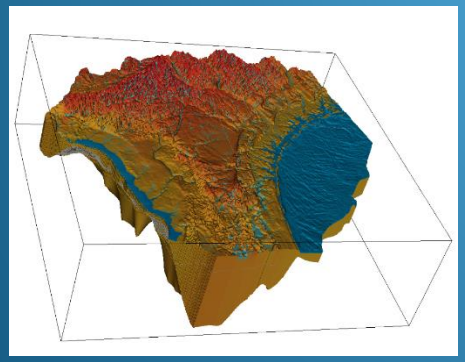
Planned Updates for NFSEG v1.1



March 29, 2017

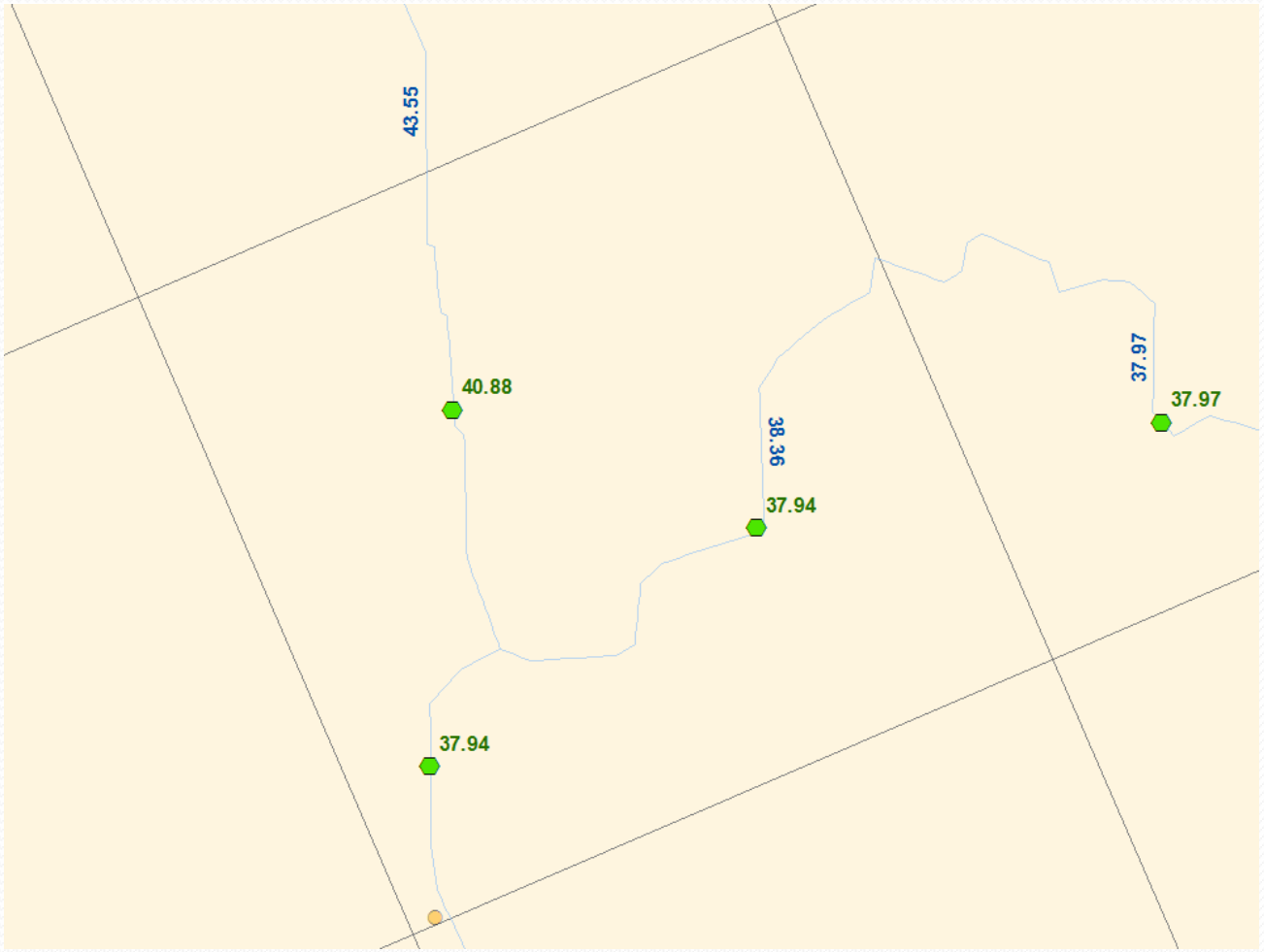
Internal review identified several areas for focusing improvement efforts:

- Improve model stability and run times
- Test simplification of river and stream representation
- Selected spring improvements/updates
- Improve SAS head sims in poorly or excessively well drained areas
- Correct point recharge in closed basins
- HSPF improvements
- Conduct additional uncertainty analysis

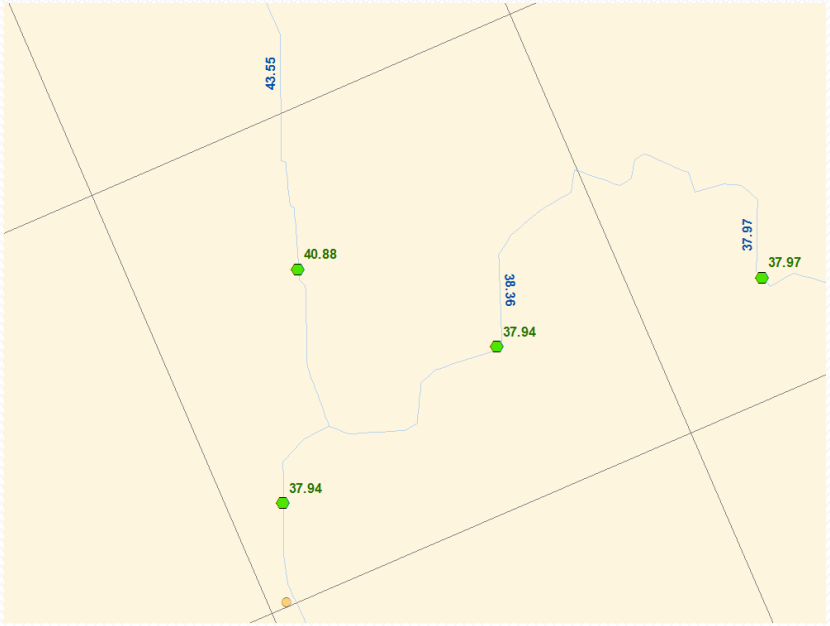
Updates for NFSEG Version 1.1

- Updates/recalibrate HSPF
- Updates to river and stream representation
  - Simplification (one RIV feature per cell)
  - Updated Drain Package elevations
  - Simplification of parameterization
- Improve SAS heads
- MNW2 update
- Improve history match at selected springs
- Add Crescent Springs and Rock Sink Springs
- Additional baseflow evaluation for selected reaches
- Closed-basin recharge
- Additional uncertainty analysis

Simplification of River and Drain Packages



River and Drain Package Changes



- One feature per cell per BC type
- May have improved model stability (convergence of numerical solution)
- Performed additional checking and improvements of stage changes along flowpaths (Drain and River Package)
- Coastal Drain elevations updated to use same source DEM as flowline features

Simplification of Conductance Parameterization

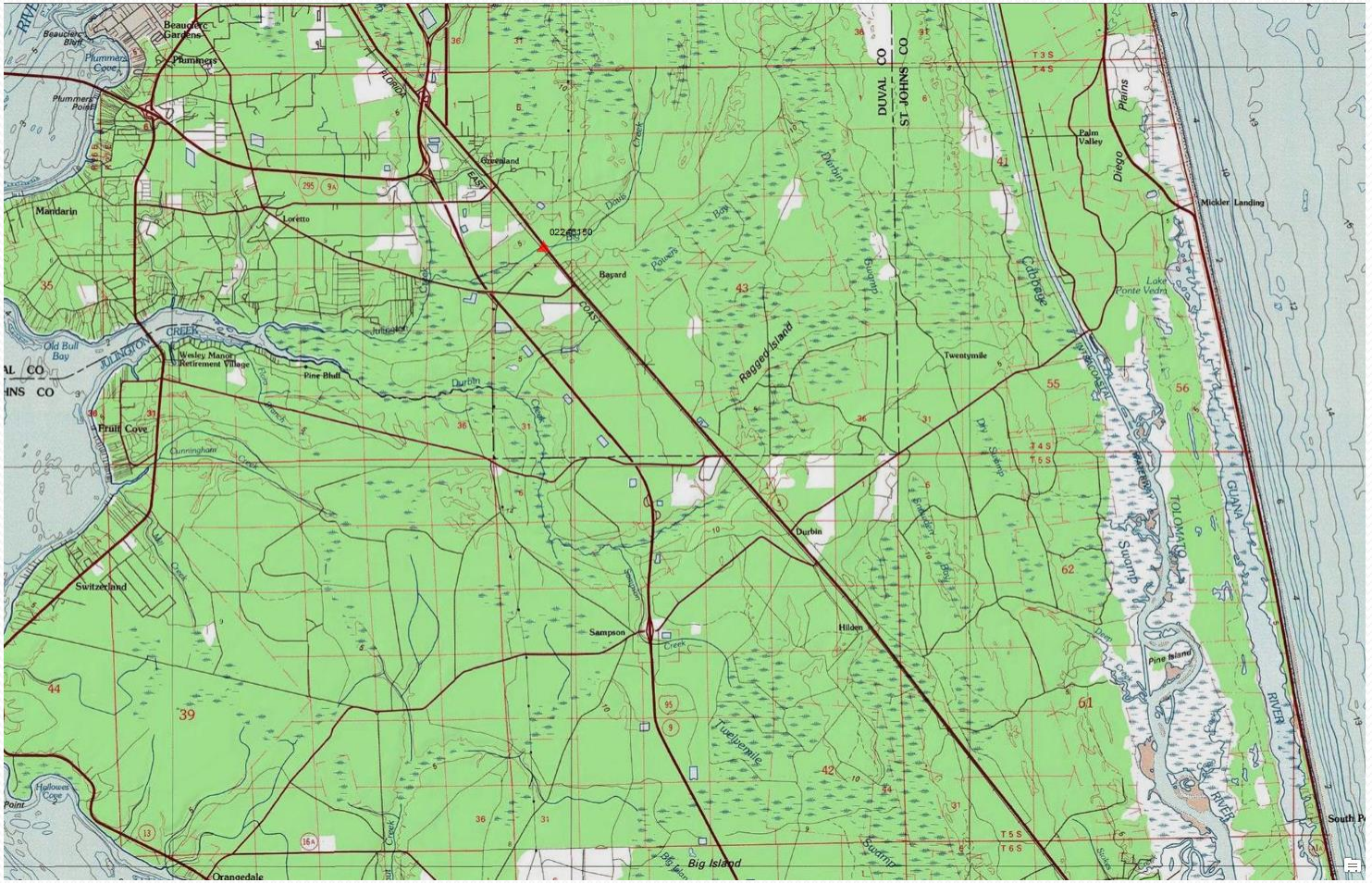
NFSEG v1.0: $$C_{RIV} = c_i \frac{K_{aquifer} * l_{flowline} * w_{flowline}}{l_{flowpath}}$$

NFSEG v1.1 (testing): $$C_{RIV} = c_i * l_{flowline} * w_{flowline}$$

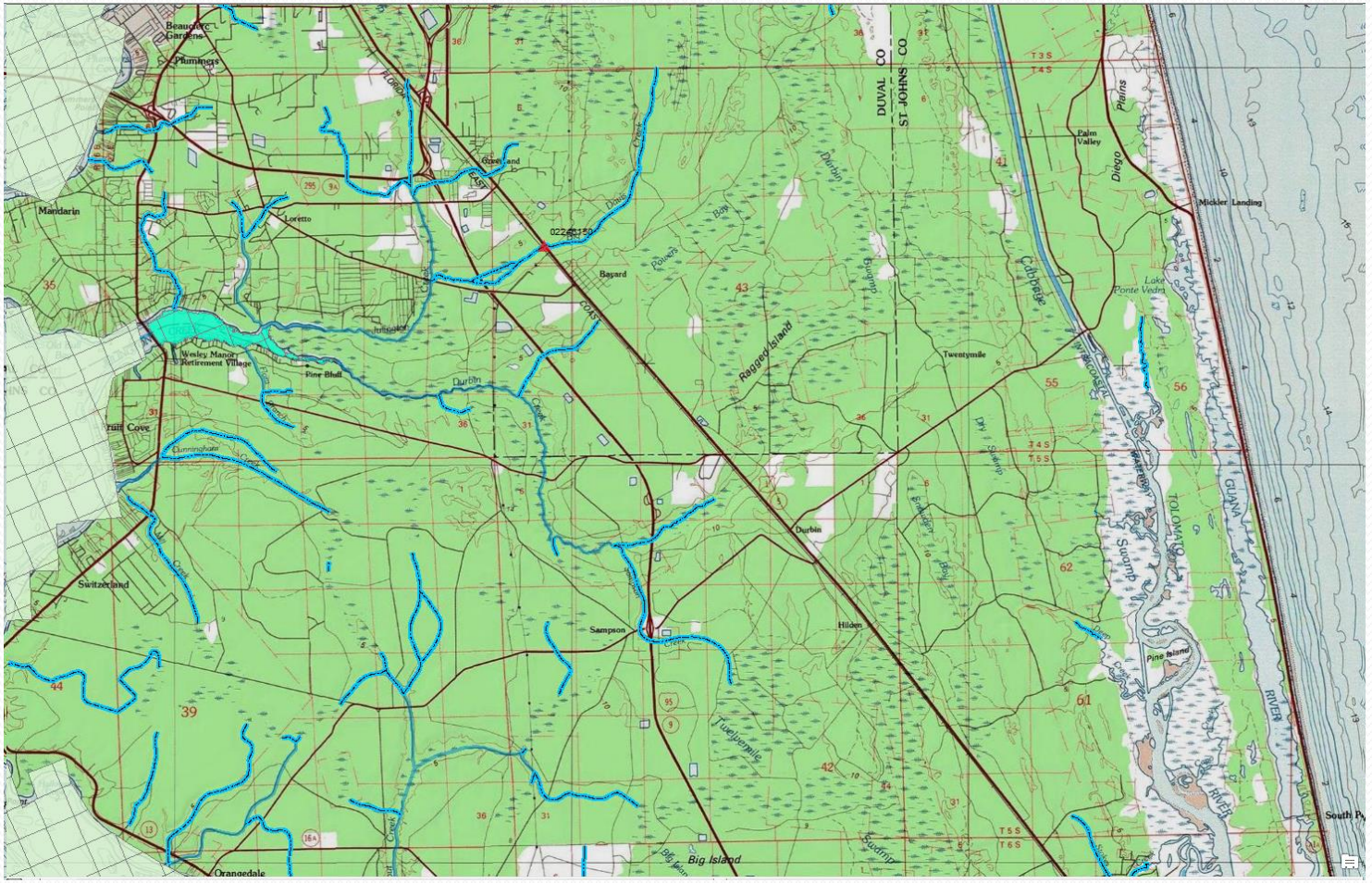
where:

C_{RIV}	*is the conductance of a given River Package feature*
c_i	*is a subwatershed-specific scaling factor*
$K_{aquifer}$	*is the hydraulic conductivity of the grid cell associated with the River Package feature*
$l_{flowline}$	*length of NHDPlus flowline feature*
$w_{flowline}$	*estimated width of flowline feature*
$l_{flowpath}$	*assumed flow path length*

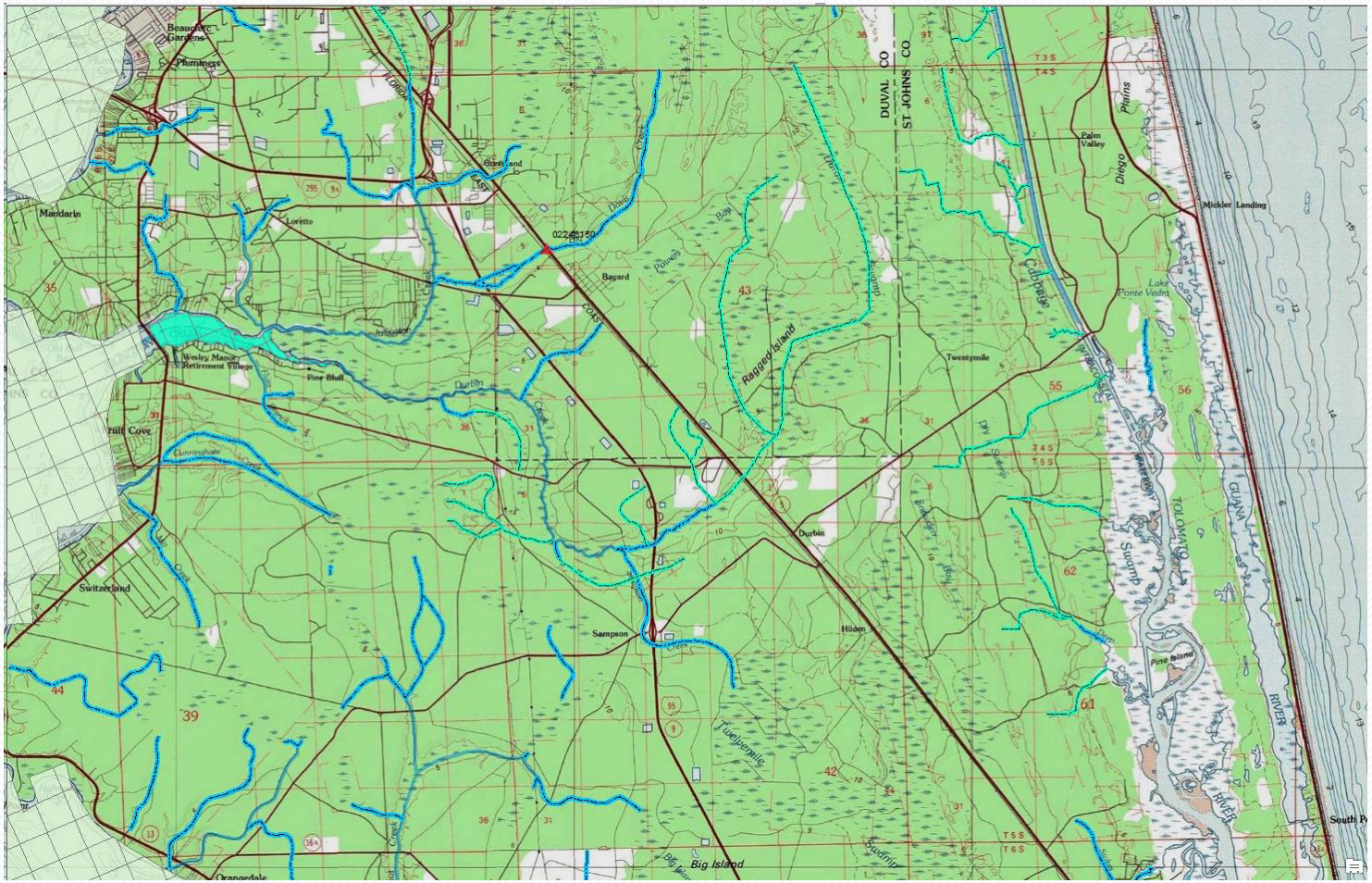
Addition of surface drainage detail



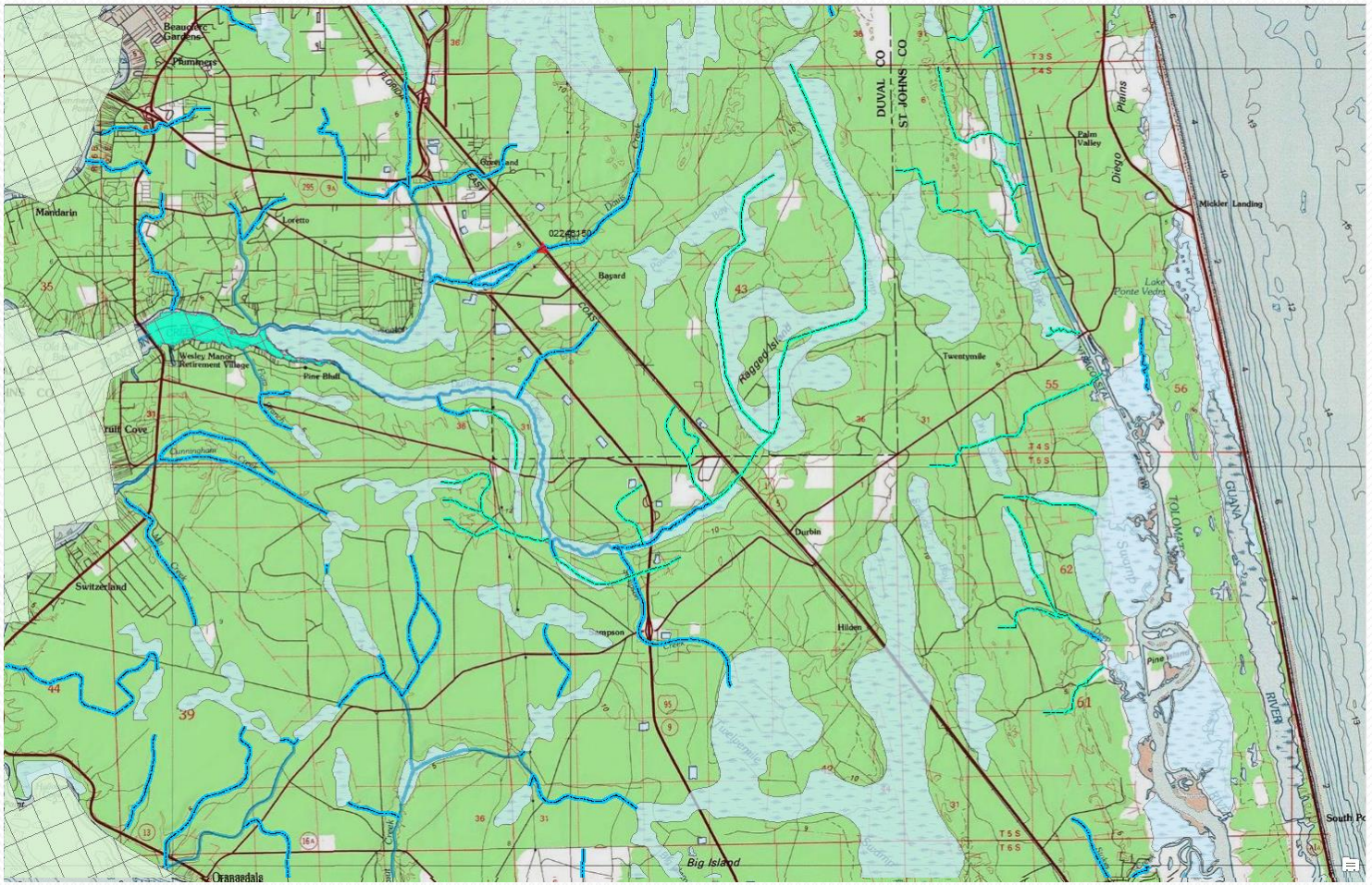
Addition of surface drainage detail



Addition of surface drainage detail



Addition of surface drainage detail



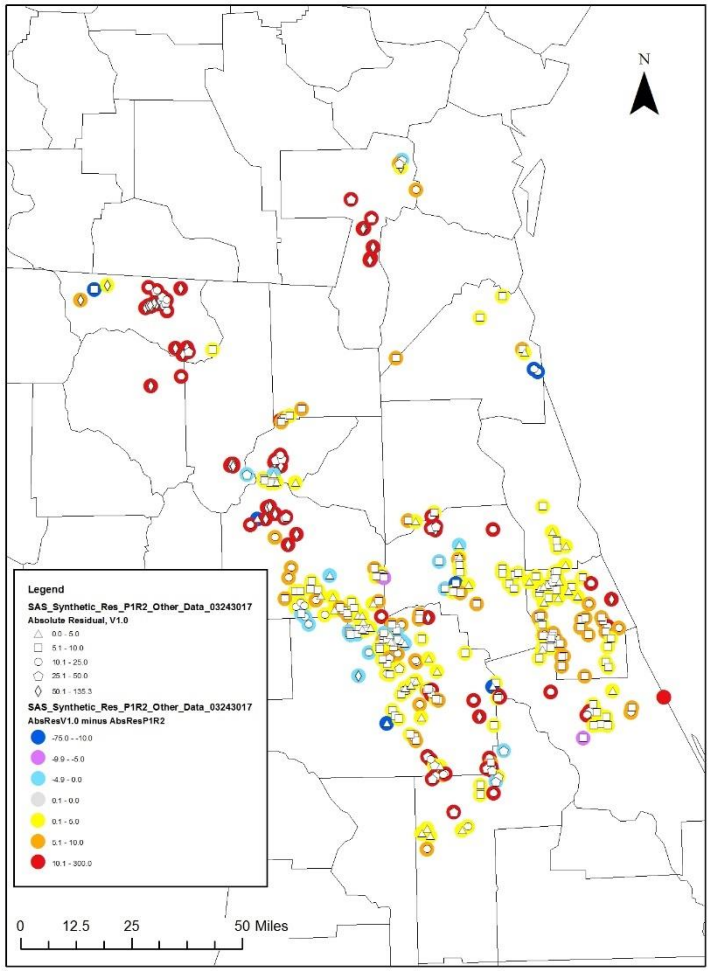
Addition of SAS Synthetic Water Levels

- Applied to areas in which the water table was judged to be either too high or too low;
- Areas in which it was judged to be too low were mainly wetlands with simulated depth to water table in excess of 6 feet. Grid cells were judged to be comprised predominantly of wetlands in cases in which the percentage of wetlands was 70% or greater based on the National Wetlands Inventory Wetlands Map (https://www.fws.gov/wetlands/data/Mapper.html);
- The water table was estimated typically as being within 5 feet of land surface in cases of wetlands;

Addition of SAS Synthetic Water Levels (con't)

- In cases in which the simulated water table is above land surface, a preferred estimate was determined based on nearby wetland/surface-water features or regression equations developed for limited areas;
- Typically, points were added for this problem only in cases of limited or no surface-water runoff. As discussed previously, the solution in cases of under-represented surface-water drainage was to add drains.

Synthetic Water-Table Points—Current Residuals and Comparison to V1 Residuals



Synthetic Water-Table Points (P1R2 Residuals)