Improvement	Objective	Approach	Benefit Of Improvement	Additional Stakeholder Comments	Status June 21 (004b)	Status October 5 (005c)	Status December 1 (006e)
Update river and drain package	Increase model stability; minimize unrealistically high flux exchanges among boundary conditions; improve simulated flux distribution along rivers	Merge multiple river BC in one cell; implement a different river and drain conductance adjustment approach; Check isolated Drain Package features	Aims to minimize the unrealistically high flux exchanges among boundary conditions (which was one of the major concerns of technical team). Increases model stability, decreases run time, eliminates conflicting boundary conditions within same cell	Since RIV, DRN & GHB boundary conditions (BCs) form the basis for baseflow calculation in MODFLOW, the Technical Team provided several comments and figures illustrating issues such as: inconsistent bottom elevations, overlapping/conflicting BCs, inconsistent layer assignment, uncharacteristically high conductance values, and stages not consistent with the river flow direction. We think that it is important that these issues be satisfactorily resolved.	Aggregation of multiple River Package and Drain Package features within each cell has been completed. The updated River and Drain Package input files were constructed so that (for most model grid cells) there will be at most one River and one Drain Package feature per cell (exceptions occur at stream-lake confluences and at the mouths of tributaries along the St. Johns River). Additional checking of river and drain stages was performed as part of this process. Additional Drain Package features are being added to represent drainage not delineated in NHDPlus flowline dataset in selected areas (ongoing). Computer programs have been created to generate maps of River and Drain Package fluxes on a cell-by-cell basis.	Additional Drain Package features were added to represent drainage not delineated in the NHDPlus flowline dataset. No additional adjustments planned at this time.	No changes since October.
Update and recalibrate HSPF models	Improve HSPF simulations in critical areas; increase confidence in overall simulated water budget for critical subwatersheds; Improve recharge and maximum saturated ET estimates; reduce uncertainty in recharge	Improve poor fit of observed streamflow hydrographs in critical subwatersheds; align conceptualization of HSPF with real system in watersheds with rivers sustained by discharge from UFA	Increase confidence in recharge estimates by incorporating comments expressed during Tech Team review, specifically inconsistencies between adjacent HSPF models/basins	A number of concerns with the HSPF calibration and modeling process were expressed in stakeholder comments. These issues included changes to 1) eliminate tendency toward underprediction of flows for 2009, 2) address calibration of basins with no observed data, 3) address simulation of springflows in HSPF, 4) address simulation of closed basins, and 5) review the effect of using a constant land use for all model simulations.	Recalibrated all HSPF models increasing the importance of literature evaporation estimates and total volumes which generally improved the history match. Added two flow stations for the history match on the Suwannee River. Added Silver Springs, Rainbow Springs, St. Marks Rise, and Wakulla Springs as modeled systems within HSPF, where previously they were represented by using flow observations. This new approach for modeling spring systems allows a better calibration for some closed basins. Noticeable differences in recharge between models can usually be explained as expected differences in surface hydrology and land cover.	Removed precipitation and evaporation from reaches since that area was already accounted for in the water and wetland land use elements. Changed weighting to have a more even representation of the observation groups within the objective function. Detailed description will be in the draft final documentation. Made interception storage a calibration parameter. This was needed since the interception storage significantly affects recharge in wetlands.	Implemented process to distribute recharge within closed basins.
Improve simulated SAS water levels	Increase confidence in model's ability to assess impacts on wetlands and potential indirect recharge projects	Identify locations in the model where simulated SAS water levels are unrealistically high or low; Develop synthetic SAS targets based on water levels estimated using review of wetland coverages and more recent data	Correct obvious deficiencies where groundwater levels were simulated much lower (or higher) than physically possible or would be inferred by review of soils/USGS quad maps, etc. Correcting these will inherently increase stakeholder confidence in the model's ability to assess wetland/surficial aquifer impacts		Additional SAS head targets have been estimated using land surface elevations in wetland areas, and subsequently incorporated into the history match for stress period 2 (calendar-year 2009). These new targets and the new delineations of Drain Package features have improved simulation of SAS water levels, but evaluation of this aspect of the history match is ongoing.	No changes since case_004b.	Added synthetic SAS head targets, Lawtey/Trail Ridge, Bradford County near Brooker
Reassess the use of MNW2 package for modeling multi-aquifer wells	Increase model stability	Remove MNW2 wells with zero flows; review simulated fluxes from MNW2 package; develop an alternative approach to simulate multi-aquifer wells if necessary	Decreased run time, initial review/testing appears to indicate the wells as specified are satisfactory		Removal of MNW2 wells with zero flows has been completed, and testing to date indicates that the wells as specified are satisfactory.	The spatial distribution of MNW2 withdrawals were updated based on new information about the location and existence of withdrawals in the 2001 and 2009 calibration periods.	No changes since October.
Improve simulated spring flows	Improve simulated flows at selected springs; add capability of simulating a priority spring that was not included in the original model; improve predictive accuracy of flow changes in springs	Add Crescent Springs and Rock Sink Springs (missing priority spring); Improve poor fit to the selected spring flows(absolute residual > XX% of estimated flow); review and update (as necessary) target spring flows and/or pool elevations	Increased confidence in model's predictions in spring flows.	The proposed changes should improve the calibration of springflows. However, due to the future use of the model for springs MFLs, a verification simulation is critical for assessing the suitability of the NFSEG. An additional consideration given the importance of springflows is whether or not the modeling of a constant "spring pool" stage in GHB BCs for historic conditions and predictive simulations is appropriate.	Crescent Springs and Rock Sink Springs to be added in next model run. Spring pool elevations have been updated at a limited number of features. Springflow targets have been updated at a limited number of springs to reflect more recent data collection. Review of spring features is ongoing.	Crescent Springs and Rock Sink springs were added. Some springflow targets have been updated to reflect improved estimates.	No changes since October.

Improvement	Objective	Approach	Benefit Of Improvement	Additional Stakeholder Comments	Status June 21 (004b)	Status October 5 (005c)	Status December 1 (006e)
Improve baseflow simulations in the groundwater model in critical areas	Improve accuracy of predictions of flow changes at critical stream gages	Review and update (as necessary) baseflow estimates at selected stream gages and river reaches; investigate the watersheds where groundwater could not simulate baseflows	Increased confidence in model and predictions, particularly with respect to flowing systems and application of model to their assessment.	One of the key concerns identified by the Technical Team was the accuracy achieved by MODFLOW in its baseflow estimates. There were also concerns about the limited number of baseflow calibration targets utilized. These concerns should be addressed prior to MFL use of the NFSEG. In addition, validating MODFLOW baseflow estimates is one reason that a verification simulation is critical for assessing the suitability of the NFSEG.	Evaluation of baseflow estimates and simulation results is ongoing.	Baseflow estimates were updated using methods suggested by reviewers. All baseflow information is posted to the NFSEG website under both Tasks A.4 and B.2. https://northfloridawater.com/groundwaterflowmodel.html	No changes to baseflow targets since October.
Improve point-source recharge distribution	Improve recharge estimates; better simulate natural recharge in closed basins	Review and reassign injection wells representing natural point-source recharge to the appropriate aquifer if needed; update layer 3 well package injections in closed basins as necessary; convert some of point-source recharge to areal recharge	Eliminate potential concern of direct injection to UFA in closed basins where there may not be a clear distinction this transfer is happening via an active sink/swallet (like Alachua Sink)	If a new process is implemented that would convert point recharge to basin-wide areal recharge, then the new recharge estimates would need to be made consistent with HSPF. Also, as noted above, the accuracy of closed basin results in HSPF was noted as a concern.	Identification of injection wells to be reassigned as diffuse recharge to layer 1 is complete. Reprocessing of HSPF outputs is in process.	Point-source recharge through sink features in closed basins has been updated, along with diffuse recharge rates in affected basins.	These are essentially complete with refinement of drainage well fluxes and redistribution of same to areal recharge.
Improve aquifer parameter estimates in the model	Improve confidence and reduce uncertainty in model predictions	Review parameters that are hitting their upper or lower bounds in PEST and adjust these bounds (or make other adjustments) if justifiable by hydrogeological settings; improve ICU leakance estimates in critical areas	Addresses tech team comments that certain areas in UFA are hitting their bounds and the appropriateness of bounds we have set. Increases confidence in simulating pumps-off scenario	In addition, the Technical Team provided comments that regardless of the hydrogeologic values selected by PEST at an individual point, the bounds should be regionally consistent and not allow PEST to select results that vary dramatically unless hydrogeologically justified by the data. A lack of data should not cause these types of changes as noted in comments.	Initial review of bounds has been completed and bounds have been adjusted in some areas to reflect uncertainty in parameter values, but still within reasonable parameter limits. Covariance matrices have been reintroduced to the PEST history match process to represent spatial correlation in parameter values, and minimize the potential for unwarranted heterogeneity in estimated parameter fields.	The upper and lower bounds of hydraulic-conductivity pilot points were adjusted to reflect uncertainty in parameter values, as described for case_004b. Preprocessing of hydraulic conductivity arrays updated to address issue with Kv exceeding Kh. Upper bounds of hydraulic conductivity in the Floridan aquifer system were also updated to be more consistent across the NFSEG domain.	Allowed for spatial variation in anisotropy in Layer 3 by adding additional pilot points throughout the model domain.
Null Space Monte Carlo Uncertainty Analysis	Quantify Model/Predictive Uncertainty	DD, FG, TG work with Watermark/John Doherty to set up process and implement	Uncertainty analyses were conducted for Version 1.0. Based on verbal comments made during tech team meetings, it is anticipated that a similar and/or more comprehensive evaluation will be required for NFSEG v1.1	The Districts performed a predictive uncertainty analysis. However, it is essential that the Peer Reviewers determine if the scope of the predictive uncertainty analysis actually addresses the potential uncertainty associated with the NFSEG Model. Given the importance of rainfall in the water budget, it appears that the effect of HSPF's recharge estimates being in error in portions of model should be evaluated as a source of error.	Preliminary discussion of parameter and predictive uncertainty analysis has begun to aid in planning for the analysis that will occur once the PEST history match/calibration for NFSEG v1.1 has been completed.	Draft scope of work for a nonlinear uncertainty analysis is being prepared. We are using the Sepulveda and Doherty paper, Uncertainty Analysis of a Groundwater Flow Model in East-Central Florida, as a guide in developing NFSEG scope. This paper is available on the NFSEG website under Peer Review Related Documents.	Draft scope has been distributed to Panel and stakeholders. Comments have been received and will update and/or clarify scope by mid-December 2017.
Implement miscellaneous improvements and corrections.	Improve model inputs and outputs					Updated preprocessing to address issue with vertical hydraulic conductivity exceeding horizontal hydraulic conductivity in layer 4. Added two missing lakes. Updated observation weights. Observations associated with dry wells in Marion County were zero weighted. Assigned vertical head differences to different observation groups, by stress period/year. Covariance matrices were added to regularization section of PEST control file.	Added synthetic UFA head targets, Lawtey (west of Trail Ridge), between Santa Fe and New Rivers, and Satsuma (north end of Crescent City Ridge).