RECENT IMPROVEMENTS IN ESTIMATING RECHARGE FOR LARGE REGIONAL GROUNDWATER FLOW MODELS IN FLORIDA

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Water management districts have recently developed large regional groundwater flow models to assess the hydrologic impacts from current and future groundwater extraction on the state's water resources. These simulation tools include the North Florida-Southeast Georgia (NFSEG) model and the East-central Florida Expanded Transient (ECFTX) model. Each model's domain covers a large part of the state or includes portions of multiple states to assess regional changes due to withdrawals. Unlike fully integrated surface water/ground-water simulations, both models employ standard MODFLOW-based code that requires the introduction of recharge fluxes from external sources. In the past, empirical estimation techniques using simplified water budgets were usually employed to develop recharge packages. These techniques often led to a greater degree of uncertainty in recharge fluxes. More recently, surface water modeling has played a key role in more accurately determining water budget terms through the partitioning of rainfall into recharge, evapotranspiration (ET), and runoff contributions. For both model domains, the surface water models were calibrated to long-term transient conditions using gauged streamflow.

For the NFSEG model, the Hydrologic Simulation Program Fortran (HSPF) simulation code was used to estimate recharge fluxes for three steady-state periods: 2001, 2009, and 2010. For the ECFTX model, the methodology to develop ET and recharge estimates consisted of AFSIRS (Agricultural Field Scale Irrigation Requirement Simulations) combined with the USDA National Resources Conservation Service (NRCS) Curve Number (CN) method for partitioning rainfall into runoff, ET, and recharge. Recharge from the AFSIRS/NRCS methodology was input into the ECFTX groundwater flow model on a monthly basis for an 11-year transient simulation.

Benefits of utilizing surface water models for groundwater recharge fluxes include recharge is better constrained through calibration of surface water hydrology, fewer parameters are required to be modified in the groundwater flow model during the calibration process, and aquifer parameter distributions are often improved.

PRESENTER BIO: Ron Basso is a chief hydrogeologist with the Southwest Florida Water Management District. He has over 30 years of experience in groundwater issues in the state of Florida. He has authored or co-authored over 20 District publications on hydrogeologic conditions, numerical models, and minimum flow and level evaluations.