

Geodatabase Development for Hydrological Modeling Support

An ArcSDE geodatabase was developed to provide a centralized data management system to support contaminant flow and transport modeling of the Oak Ridge Reservation (ORR) watersheds. The geodatabase stores information that can be used for comparative contaminant flow, transport analyses, and calculation of TMDLs for EFPC based on various simulated D&D scenarios within the Y12-NSC. Configuration files stored in the geodatabase include high-resolution spatial and temporal data such as shapefiles which represent the spatial properties of the model domain, timeseries data for the boundary conditions (e.g., rainfall and evapotranspiration), land use, and other spatially distributed surface parameters required by numerical models. Output files include computed simulation data (e.g., discharge and contaminant concentrations) from model calibration, sensitivity analyses during model development, simulation of remediation alternatives and historical data. As FIU ARC continues to conduct model simulations to support the D&D remediation activity at ORR, there will be an ongoing need for the update of the geodatabase and the utilization of the integrated GIS-hydrological modeling system developed.

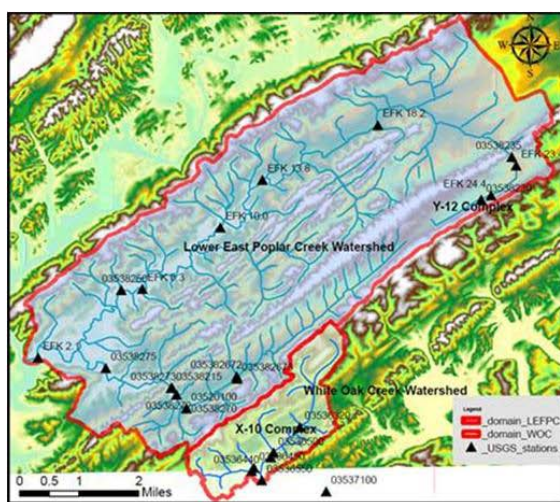


Figure 1. Oak Ridge Reservation watersheds.

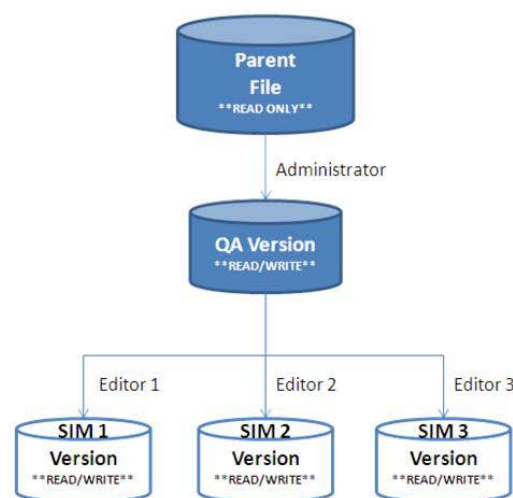


Figure 2. Multi-user editing and versioning capability of the ORR geodatabase.

Project Objectives

- To create geodatabases that support hydrological model development and simulation of contaminant fate and transport at Oak Ridge Reservation (ORR), TN.
- In this case, the geodatabases will facilitate testing of the potential impacts of various D&D scenarios on the ORR watersheds.
- Contaminant flow and transport analyses require large amounts of high-quality spatial and temporal data in order to ensure reliability and validity of modeling results, therefore, each geodatabase will serve as a centralized data management system facilitating storage, editing, and versioning of model parameters.

Project Benefits

- Facilitates centralized storage, backup, access and management of model configuration files and computed simulation data (which in many cases exceed 20 GB per simulation).
- Organizes data into a structured, coherent, and logical computer-supported system that can be used to automate and simplify retrieval of stored GIS and timeseries data.
- Possesses versioning tools that enable proper security management and quality assurance while data editing.
- Possesses a database structure that enables linkage with scalable hydrologic modeling tools and applications that model hydrologic systems.