

FIU PROJECT 3 - 2012 FACT SHEET

Geodatabase Development for Hydrological Modeling Support

FIU-ARC is providing technical assistance and performing research on mercury remediation at Oak Ridge Reservation (ORR), TN. The objective of this project is to support the remediation efforts at ORR through hydrological modeling in order to provide a better understanding of the fate and transport of inorganic and organic pollutants of concern with a focus on mercury (Hg).

Contaminant flow and transport models require large amounts of high-quality spatial and temporal data in order to ensure reliability and validity of modeling results. ARC researchers have conducted more than a hundred simulations in order to calibrate models of the East Fork Poplar Creek (EFPC) and White Oak Creek (WOC) watersheds at ORR to derive model uncertainties and to provide analysis of remediation scenarios. This has resulted in hundreds of gigabytes of simulation data, creating the need for an advanced spatial data structure to address the management, processing, and analysis of spatial and temporal numerical modeling data derived from multiple sources, and to produce hydrogeological maps for visualization. The aim of this task therefore was to develop a geodatabase to support all research activities of the project, making the data more accessible to project team members for editing and data management purposes as well as for external requests.

Project Objective

- To create a geodatabase that supports hydrological model development and simulation of contaminant fate and transport at Oak Ridge Reservation (ORR), TN. The 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.
- The ArcGIS geodatabase is an XML-based GIS data exchange system which facilitates the export and import of preconfigured data as XML files which can contain both the data definition and the data itself.

Project Accomplishments

- Development of an ArcSDE geodatabase which stores configuration and output data for modeling contaminant flow and transport in EFPC and WOC watersheds at Oak Ridge Reservation (ORR), TN.
- A geodatabase design based on the ArcHydro and ArcGIS Base Map data models which can support water resources applications within the ArcGIS environment. Modifications to the design have been made to support project-specific parameters.
- An XML document from which a schema diagram was created using ArcGIS "Geodatabase Diagrammer". The schema diagram contains graphics which are editable in MS Visio.

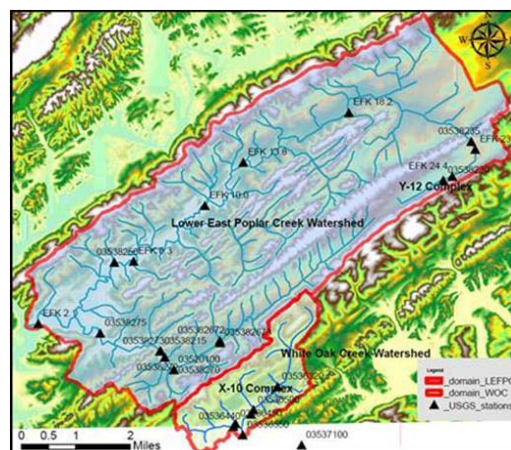


Figure 1. Oak Ridge Reservation watersheds.

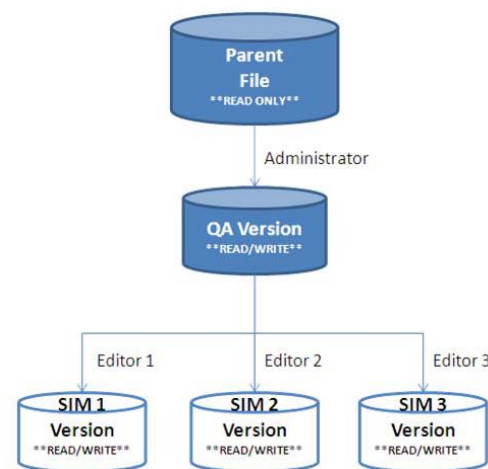


Figure 2. Multi-user editing and versioning capability of the ORR geodatabase.