DOE-EM Cooperative Agreement
Oak Ridge Remediation and Treatment Technology Development

by Michelle Embon (DOE Fellow), Himanshu Upadhyay & Angelique Lawrence

Intro

During the early 1950's, the Department of Energy began the production of thermonuclear armaments in support of the Cold War. One of the sites targeted to support the manufacturing of these nuclear weapons was the Oak Ridge Reservation. This site is now a Superfund area due to the high level of chemical and radioactive contamination left behind. The DOE Environmental Management program is addressing the need to remediate this region to remove the hazards from past research and defense operations.
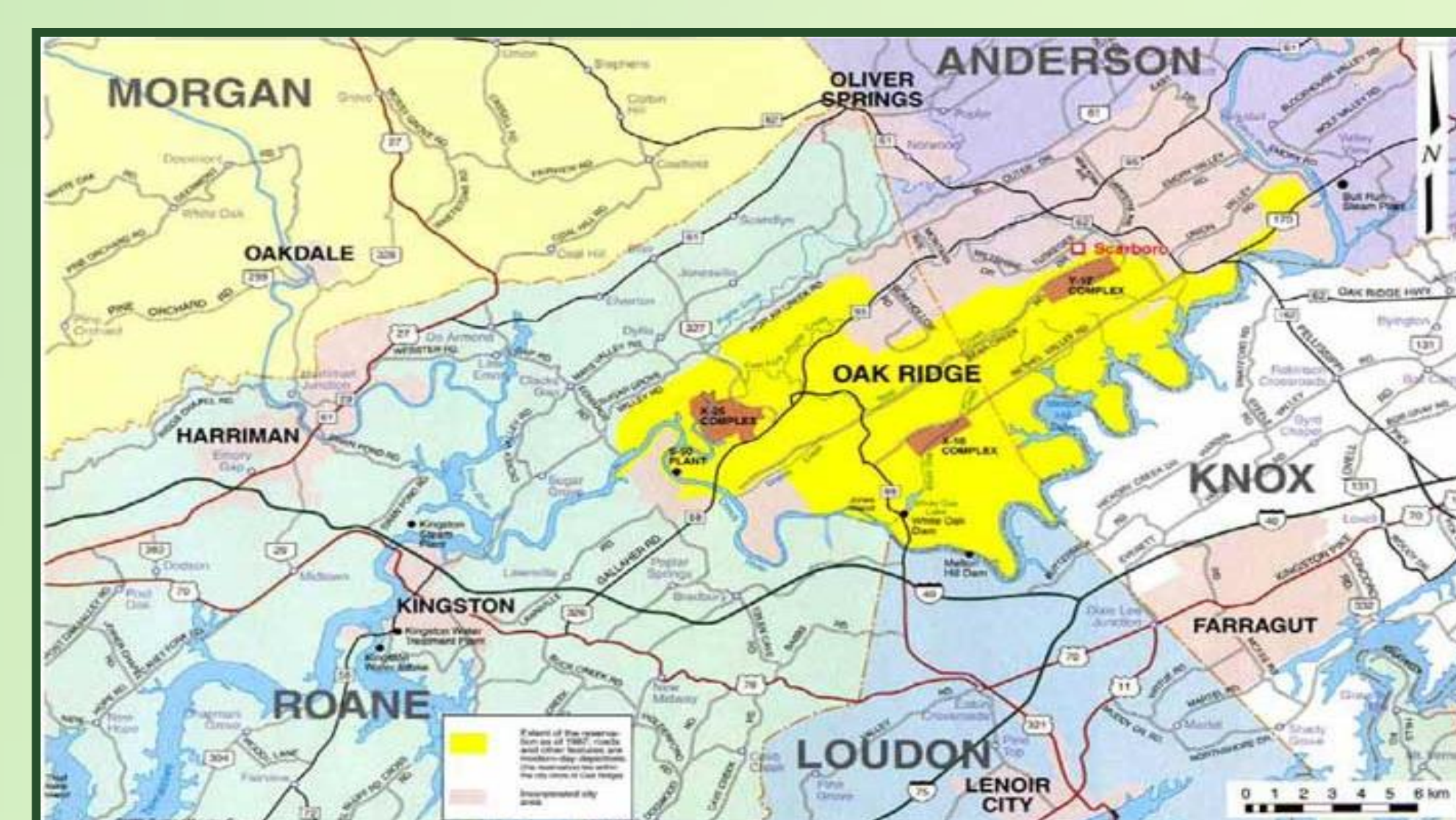

Figure 1. Oak Ridge Reservation

Objective

Provide technical assistance and perform research in support of the remediation and treatment technology development at Oak Ridge Reservation and the Moab Site.

Investigate downloadable free/open source GIS software for online querying of the geodatabase so the project derived data can be more easily shared with other project stakeholders (such as DOE personnel and ORR site contractors).

Design a Geodatabase that provides centralized spatial and tabular data storage as well as concurrent access and editing capabilities of observed and simulated model data.
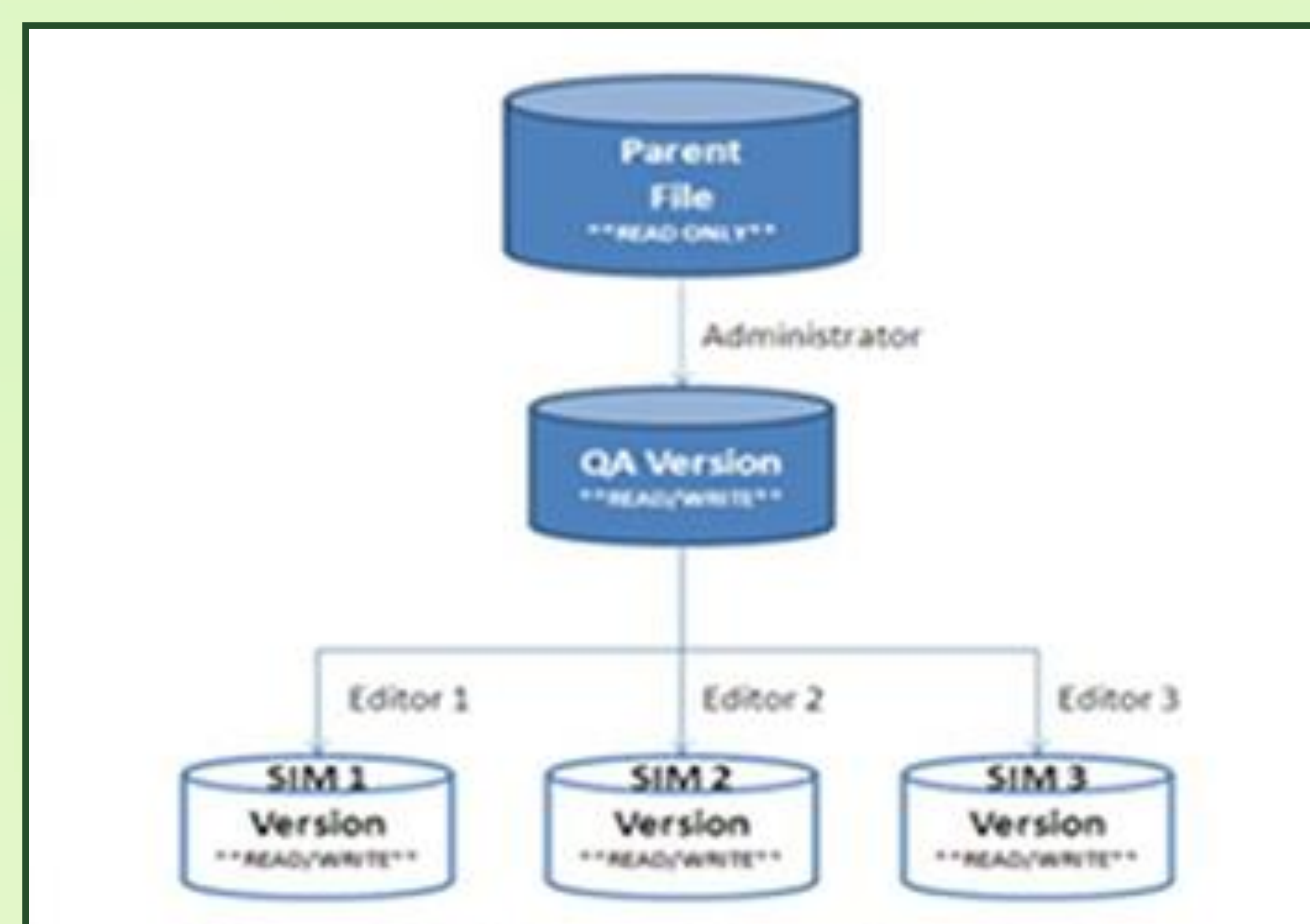
Methodology

Use ArcGIS ModelBuilder and Python scripting to automate query and export hydrological modeling data for statistical analysis and the generation of maps, graphs, and reports.

Extend capabilities of the East Fork Poplar Creek (EFPC) geodatabase developed in FY11, which stores configuration and output data for modeling contaminant flow and transport in EFPC and White Oak Creek (WOC) watersheds at the Reservation.

Develop a toolbox which combines built-in ArcGIS geoprocessing tools coupled with customized Python scripts for use with the East EFPC model.

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

Results

The capabilities of the geodatabase developed to support the hydrological modeling work were extended by creating a model using ArcGIS ModelBuilder and Python scripting to export data that can be used for statistical analysis and the generation of maps, graphs and reports.

Path Forward

Update geodatabase with recent Oak Ridge Reservation site/environmental data.

Develop a library of customized Python scripts to enhance querying capabilities and couple with existing libraries used for mathematics, science, and engineering to perform statistical analyses.

Use existing geodatabase structures to create similar databases to support modeling work conducted at Moab and DOE Idaho Sites.
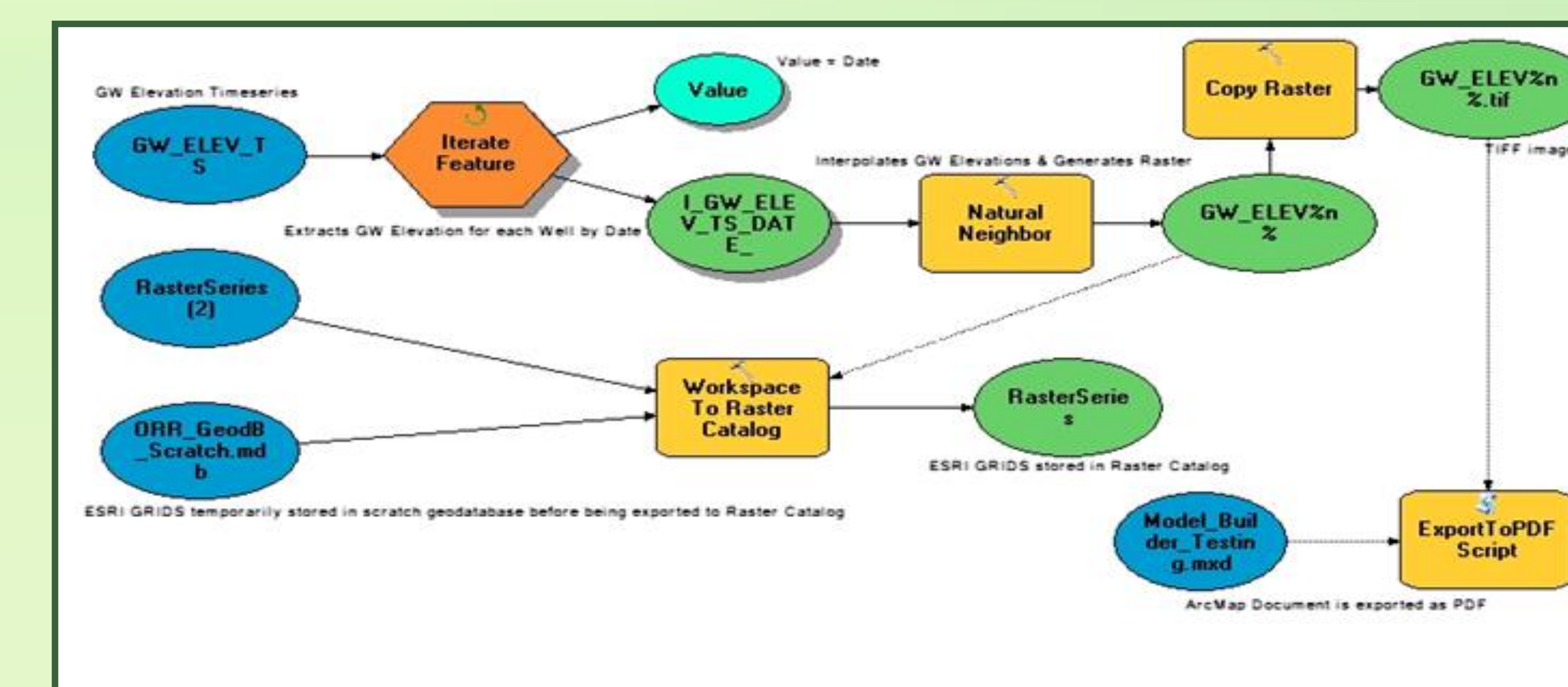

Figure 3: Free/Open Source GIS Software Reviewed by ARC-FIU

Contact Information:
Michelle Embon
Florida International Univ., Engineering Center,
10555 W Flagler St, Miami, FL, 33174
membon@fiu.edu

Moab, Utah, UMTRA Project