

GIS Solutions for Groundwater

Esri's ArcGIS® provides tools that help you manage, visualize, and analyze your hydrogeologic data and support groundwater analysis and modeling. Using ArcGIS, you will be able to create maps of hydrogeologic systems showing spatial features such as aquifers, wells, geologic formations, and springs. You can also create 3D visualizations of your hydrogeologic data. In addition, ArcGIS provides capabilities to analyze and animate temporal data such as creating animations of water levels and concentrations within an aquifer or particle tracking.

With the Arc Hydro Groundwater geodatabase template and the associated tools, developed as a partnership between Esri and Aquaveo, you can create an integrated geodatabase containing a wide array of hydrogeologic information such as data from aquifer maps and well databases, features from geologic maps, information from borehole logs, 3D subsurface models (including cross sections and volume elements), time series, and data from simulation models. The data model is divided into extendable components, so it is easy to implement only the parts that match your project needs while having the flexibility to extend the data model.

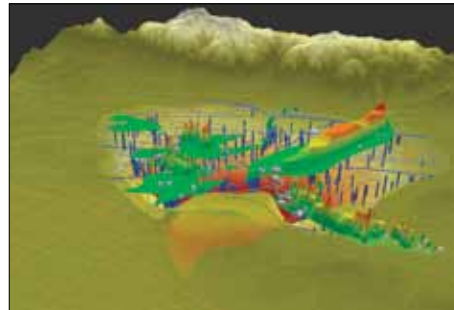


Figure 1. A 3D GIS depiction of the San Gabriel water basin shows roads, topography, wells (blue), and facilities.

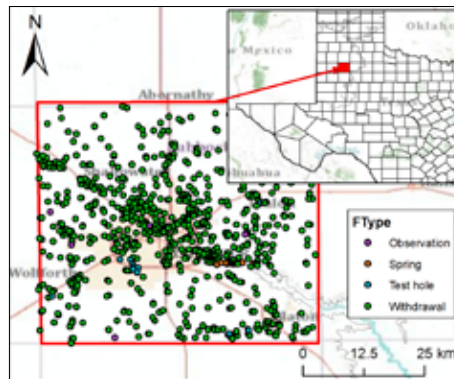


Figure 2. Map of wells in Lubbock County. Wells are symbolized by well type.

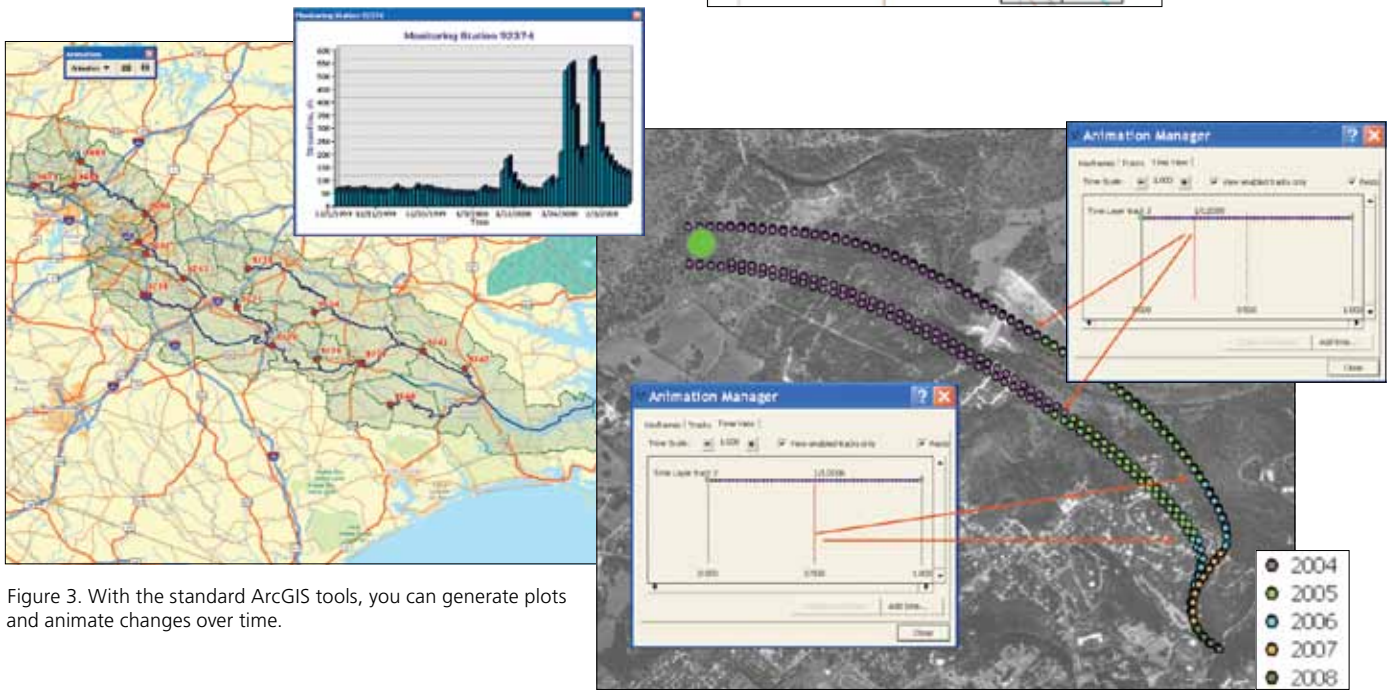
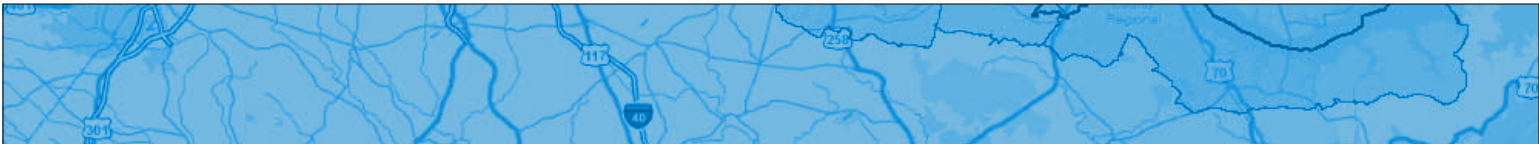


Figure 3. With the standard ArcGIS tools, you can generate plots and animate changes over time.



With the combination of the ArcGIS and Arc Hydro Groundwater tools, you will be able to do these tasks:

- Author aquifer maps.
- Map information from well databases (owner, depth, well type, etc.).
- Archive and visualize data from borehole logs.
- Create water-level and water-quality maps and animate changes over time.
- Create/Edit/Visualize 3D hydrogeologic models (cross sections, fence diagrams, surfaces, and volumes).
- Integrate/Edit/Visualize MODFLOW models within ArcGIS including the development of workflows (e.g., well permitting, land-use change).

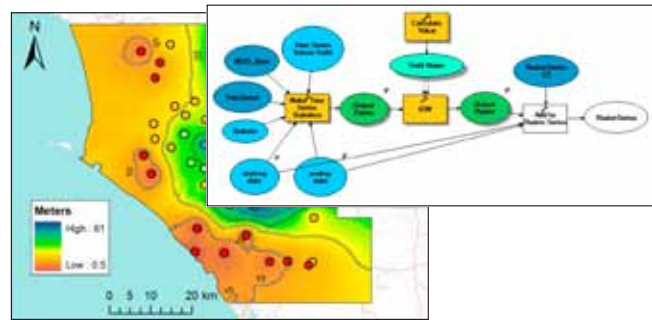


Figure 4. Water levels in the Musgrave prescribed well area in South Australia. The creation of water-level maps can be automated using the standard ArcGIS interpolation tools and the Arc Hydro Groundwater tools.

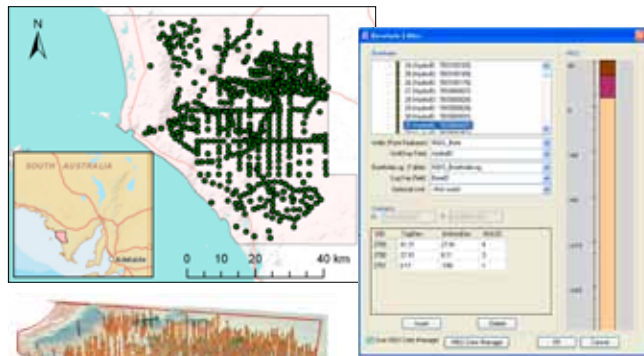


Figure 5. Visualizing Borehole Data in the Musgrave Prescribed Well Area in South Australia Using ArcGIS and the Arc Hydro Groundwater Tools

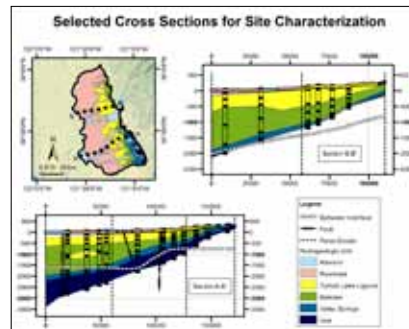


Figure 6. Cross sections along section lines in the Sacramento valley. With the Arc Hydro Groundwater tools, you can create, sketch, and edit cross sections; include a wide array of GIS datasets such as geologic outcrops, digital elevation models (DEMs), faults, and water level surfaces; and much more.

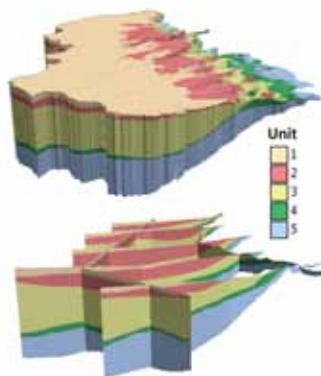
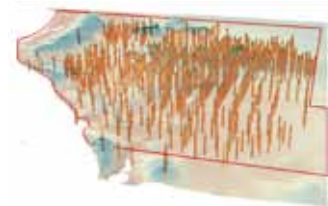


Figure 7. 3D fence diagram and volume model shown in ArcGIS. 3D subsurface models can be created using the Arc Hydro Groundwater tools and visualized with ArcGIS.

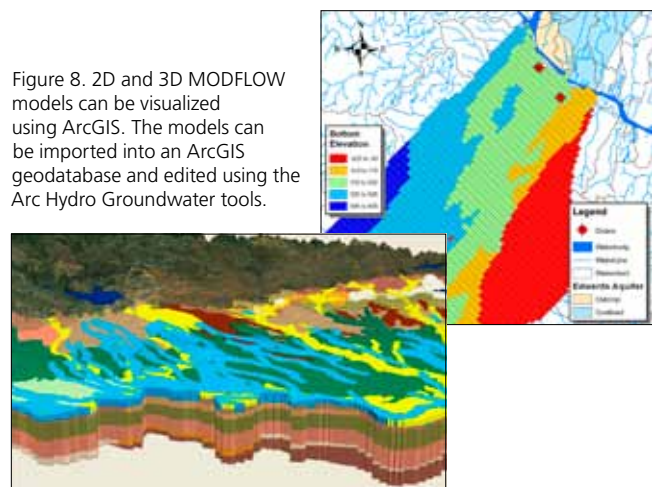


Figure 8. 2D and 3D MODFLOW models can be visualized using ArcGIS. The models can be imported into an ArcGIS geodatabase and edited using the Arc Hydro Groundwater tools.

Additional information can be found on the Hydro Resource Center at resources.arcgis.com/hydro.

