

TECH Support

By Garrett Lehman

Three Sisters Irrigation District (TSID) is an agricultural water user in central Oregon that is putting GIS to work to identify water conservation opportunities.

TSID is using GIS to manage water bank reserves, support canal piping projects, conserve water and save money.

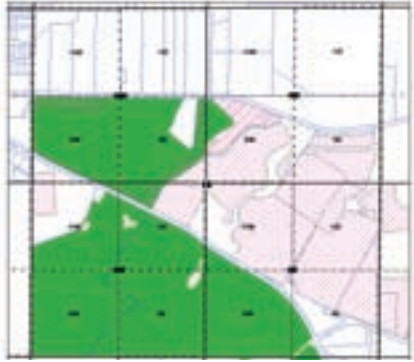
Irrigation district uses GIS for water bank management and piping canal modeling

The district has partnered with the Bureau of Reclamation and numerous local conservation groups through a System Optimization Review (SOR) Grant to help fund this project. Managers determined that the most effective use of their funding would be to employ ESRI Business Partner Geo-Spatial Solutions, Inc. to develop the SOR project using GIS.

"We chose GIS because it would help us identify conservation opportunities," said Marc Thalacker, TSID district manager. "GIS allows us to quickly respond to impending threats to our water supply. It also is an impartial tool that helps relieve some of the political tension caused by water use in the area. GIS has the capabilities to support management efficiencies well into the future."

Using ArcGIS software, TSID created a database compiled from state, local, federal and TSID data sources. It then generated a base map to identify, prioritize and track conservation opportunities. This base map conveys information about the project and reveals future opportunities. It has been used to analyze different types of data from multiple sources (soil drainage and lengths of unlined canals), track the movement of water rights and provide the district with access to critical information about land use and environmental phenomena.

TSID Water Rights Regulation Map



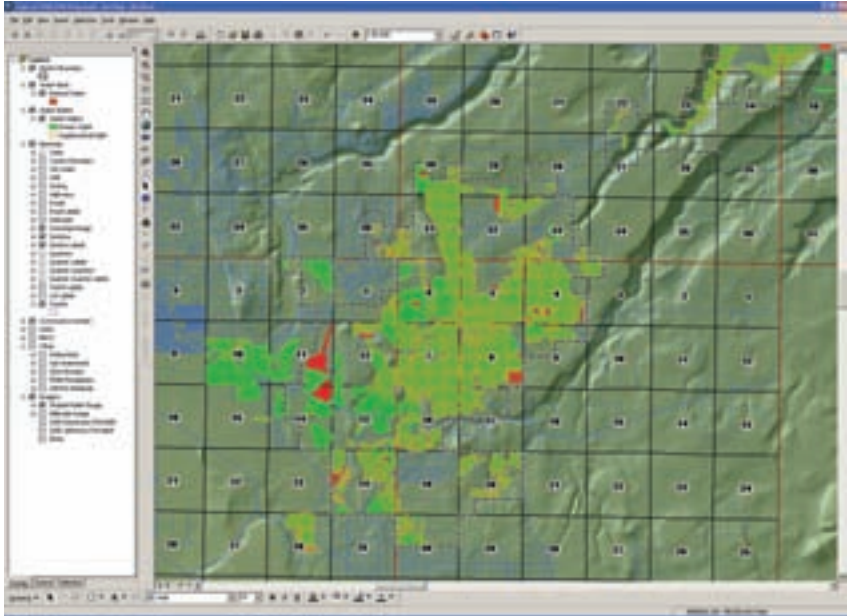
Due to low flows in Wychus Creek, TSID will not be able to fulfill water rights with a priority date after 1895.

ARTICLE SUMMARY

Challenge: In light of dwindling supplies and political tension, many U.S. water districts are seeking to conserve water and protect resources.

Solution: Compiling data from various sources is key to conservation success, and mapping a district helps it identify, prioritize and track opportunities.

Conclusion: GIS data management and modeling solutions are efficient, cost-effective means of conserving water.



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PRODUCTS IN ACTION

“GPS data collection and GIS modeling is a way the district saved money, conserved water and moved our operation into the 21st century.”

Water Bank Analysis

Water bank conservation assessment processes included an analysis of the water bank for TSID's branch of the Deschutes Basin. A water bank is a transactional marketplace in which water users can sell water rights or buy banked water rights to expand their farming operations. Water banks help

to reduce the stress on water supplies by allowing buyers to identify water for sale and putting surplus unsold water rights in stream on an annual or permanent basis.

TSID digitized its water rights information and then used the GIS information to understand how water rights regulation would affect the

delivery of water throughout the district. In addition, TSID was able to more easily convey water right regulation issues by printing and distributing water right regulation maps that showed district patrons how regulated water rights would look in low-water years.

TSID then created data layers to track the water right transactions that are critical for the management of its water bank reserves. The group could then identify and distribute information about banked water rights and quickly prepare in-stream leasing information for unsold banked water. Traditionally, this process was tracked in a nonspatial database and the district would hire an outside consultant to prepare the in-stream applications. Now, however, TSID can prepare lease applications and maps in house.

Piping Canal Modeling

GIS is also used to identify and prioritize canal piping projects. Because of the basin's terrain—comprised of very porous fractured lava flows—one of the best ways to conserve water is through piping open canals. TSID used its existing GIS information as well as field data collected using GPS units loaded with ArcPad to create elevation, demand and the location inputs for a pipe modeling program.

Inputting GIS information into EPANET2, a water modeling program created by the U.S. Environmental Protection Agency, made it possible to assess the feasibility of piping projects. TSID modeled multiple pipe size and delivery scenarios. Using its GPS unit, staff, volunteers and a free program to complete a piping assessment for its 24 miles of open canal, the district was able to take a project that usually costs tens of thousands of dollars and complete it in a matter of months at a dramatically reduced cost.

“This was the part of the SOR project that I was most excited about,” Thalacker said. “GPS data collection and GIS modeling is a way the district saved money, conserved water and moved our operation into the 21st century.”

TSID is now estimating piping costs and conveying piping priority by generating maps for its patrons and government agencies. The district estimates that its piping projects will conserve 10,000 to 12,000 acre/ft of water, or one-third of its average annual diversion. The district will then put 7,500 to 9,000 acre/ft of water back into the Deschutes Basin annually. www

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