



## GIS Transforms Irrigation Management in Kittitas Reclamation District

### A Rural GIS Success Story

*The Kittitas Reclamation District in central Washington teamed up with the National Consortium for Rural Geospatial Innovations–Pacific Northwest to transform old land records and maps into a fully automated geographic information system (GIS). The GIS makes it easy to update maps and databases, thereby providing an accurate and fair means to distribute water, while making it easier to maintain canals and comply with environmental regulations.*

**W**ater is one of the Pacific Northwest's most precious resources. While plentiful on the coast, it is limited and in increasing demand in the semi-arid region of central Washington, which includes both the Kittitas Valley and the neighboring Yakima Valley. The Kittitas Reclamation District (KRD), a Bureau of Reclamation agency, is the largest of several water providers for the fertile lands of the Kittitas Valley.

The farmers and ranchers of this central valley have long depended on irrigation water for growing crops and watering pastureland. Angus beef, sheep, premium timothy hay, and sweet corn are only a few of the quality products made possible through irrigation. Irrigators, homeowners, the Yakima Indian Nation, and numerous industries all feel entitled to a certain amount of water for their needs. Water rights for the entire watershed are currently under adjudication, as they have been for 30 years. And whether or not landowners use any water, they are charged for the original construction, as well as operation and maintenance costs, of the irrigation system.

In 1993, to help make decisions about water allocation easier and more equitable, the State court directed the KRD to document the district's physical land boundaries, total acreage, and total number of irrigable acres. Soil conditions also needed to be documented, as landowners' annual water bills depend, in part, upon which of six soil categories the land contains. Soil documentation first took place in 1925 and again in the early 1940s. Section maps (one square mile) were hand-drawn and hand-colored at 1:48,000 scale. Maps were drawn based on field surveys. Mylar sheets were used to overlay property boundaries, and only one copy of each map existed. Assessments of irrigable acres were based upon the results, and were as accurate as could be for that time.

### About RGIS

The National Consortium for Rural Geospatial Innovations–Pacific Northwest (RGIS-PNW) is located on the campus of Central Washington University in Ellensburg, WA. It is a USDA program designed to promote the use of geospatial information and technologies by communities in rural America. RGIS–PNW is dedicated to helping communities understand the concepts and benefits of using geospatial data as well as assisting them in all aspects of GIS development.

## Confronting the task

Bringing old, inaccurate data up to date is an enormous task, and it quickly overwhelmed the KRD; they simply did not have the financial, technical, or personnel resources required for the job. KRD staff consist of a full-time manager, office staff, water-quality and GIS specialists, and “ditch-riders” whose job is to manage the ditches and water delivery. A KRD board of directors, elected by landowners, oversees all spending and hiring.

The primary problem was the inaccuracy of the original maps. This was compounded when properties were subdivided, when roads were added, and as the irrigation canals themselves were moved. The KRD manager recognized that there was little use in correcting the maps; they would be out of date almost as soon as corrections were made. Seeking solutions, the KRD turned to RGIS Pacific Northwest for help. Responding to the challenge, in 1993 RGIS selected the KRD to be one of its long-term “focus” projects.

Several issues immediately became clear to RGIS:

- A time-critical agricultural need existed;
- GIS was the proper tool for short- and long-term land management records;
- The existing maps were irreplaceable and could not be removed from the KRD office under any circumstances; and
- KRD’s board of directors was, understandably, quite uncomfortable with switching over from the familiar, traditional paper-map methods to unknown and complicated computer-based technology.

Given these realizations, RGIS’s model was to “go slow,” minimize up-front costs to the KRD and, as frequently as possible, demonstrate the usefulness of the new GIS technology.

## Adding Precision

During the first two years of cooperation, RGIS: 1) arranged for Central Washington University (CWU) to loan a GIS computing system to the KRD; 2) assisted the KRD in finding an affordable large-format digitizing table; and 3) recommended two part-time CWU-trained GIS interns. The interns digitized approximately 200 soil survey maps and used RGIS computers to back up, for the first time ever, the irreplaceable maps and database on tape. This success, perhaps more than any other, won GIS a place in the hearts of the KRD directors.

Besides simple data entry, the interns raised the quality of the maps by performing edge-matching, and registering them accurately to the digital USGS Township and Range base map. KRD staff resolved discontinuities that came to light during the process.

Then, the KRD staff began adding land ownership data to the digital database. Using a two-step procedure, the KRD attempted to digitize the existing piece-meal maps of land boundaries, and then to revise the hundreds of legal descriptions for all parcels while manually editing the map data to conform with the most current legal descriptions. In

**Kittitas Reclamation District (KRD) employee Roger Satnik digitizes irrigation networks from paper maps**



the attempt, RGIS personnel helped create custom software to accelerate the process. They also provided high-resolution digital orthophotographs upon which the line maps were overlaid to check conformity with actual parcel boundary physical features on the ground (e.g., fences, streams, roads).

The land ownership maps and soil maps are not yet completed, although an accurate district boundary is now part of the database. In keeping with the court directive, the maps (all of which were digitized) were printed out and provided to the court.

### A Leap in Progress

In 1997, as the potential use of GIS technology for solving the KRD problems became apparent, the board of directors supported the KRD manager in creating a full-time GIS position and in acquiring the necessary hardware and software to support a GIS system. This seminal decision has facilitated the KRD in planning water deliveries, mapping hundreds of miles of canals, maintaining canal security, integrating the National Wetlands Inventory Mapping, and has played a major role in planning an upgrade of facilities. The KRD is now fully able to react aggressively and professionally to Clean Water Act and Endangered Species Act issues.

The majority of KRD employees, the directors, and many irrigators have embraced this technology, and are now proponents of GIS. Once skeptical of any benefits of using computers over traditional methods, they are now known to frequent the windowless basement and ask the GIS specialist how they can use GIS to accomplish specific tasks. The exchange is two-way; the GIS specialist receives specific information and relies on the practical knowledge of the ditch-riders.

Other continuing benefits from the exchange exist as well. The KRD has, to date, hired two full-time positions out of the RGIS training sequence from CWU. There now exists a cohesive information structure among the KRD, Kittitas County and CWU. And finally, the strong foundation laid by RGIS has made it possible for the KRD to share the knowledge and experience it has gained with other local and state irrigation districts.

### A Strong Partnership

RGIS-PNW is proud of the major role it has played in planning and executing this technology transfer process. Strong ties have been developed among RGIS, the KRD and the community as everyone benefits from the technology. And perhaps most importantly from RGIS's point of view, this success story is a potential springboard for future projects with other local government agencies.

For example, the recently formed Upper Yakima River Watershed consortium (which includes RGIS-PNW as lead agency, KRD and the Kittitas County Conservation Department) has identified critical data needs. The consortium is now working to produce a high-resolution object-oriented hydrography database that will facilitate modeling

**KRD employee gathers stream-quality data for inclusion in the KRD GIS database**



of flows through the irrigation system. This will lead to better management of irrigation water, spatially distributed modeling of irrigation return flows from fields to rivers through groundwater, and better understanding of where hot-spots of erosion are causing unacceptably high levels of sedimentation in the Yakima River.

## Summary of GIS Benefits in Kittitas Reclamation District

- Created new easy-to-update digital maps and accurate database
- Easier to plan water deliveries and maintain canal security
- Easier to comply with Clean Water and Endangered Species Acts
- Developed cohesive community cooperation among KRD, RGIS and state agencies
- Now, other state/local irrigation districts are learning from KRD project

*This Bulletin was prepared by the National Consortium for Rural Geospatial Innovations—Pacific Northwest at Central Washington University in Ellensburg, Washington*

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