



SPDSS Newsletter

Colorado Water Conservation Board, Colorado Division of Water Resources

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Issue 1

Development of a New Decision Support System: SPDSS

State agencies, water providers and water users are constantly evaluating management of water resources in response to increases in population and demand, droughts, endangered species issues and reductions in Federal water program funding. A comprehensive decision support system (DSS) is being developed under the direction of the CWCB and DWR for each of the major river basins in Colorado. These will provide State of Colorado agencies, water users and managers a better means for organizing, accessing and evaluating a wide range of information and alternative strategies for managing their water resources.

The South Platte Decision Support System (SPDSS), which is the third DSS to be developed by the State, will encompass the entire South Platte and North Platte River basins. The SPDSS will consist of data that characterize the hydrologic and hydrogeologic features of these basins and tools that provide enhanced water administration and water resource planning capabilities. The emphasis in developing the SPDSS will be on data collection and making these data readily available to water users, water managers and State officials. The overall purpose of the SPDSS is to assist water users and State officials in developing, managing and preserving the water resources of the North Platte and South Platte River basins for the people of Colorado.

In October of 2001, the SPDSS Feasibility Study was completed, which recommended data collection, model and tool development activities. SPDSS development is expected to occur through 2008, at a cost

of approximately \$15 million, funded through the CWCB Construction fund. The first two years of development (FY2003 through 2004) will be dedicated to data collection. Four contractors have been hired by the State for SPDSS development. The contractors and their components are as follows:

- Project Management Assistance – Brown and Caldwell
- Consumptive Use, Water Budget and Surface Water Data Collection – Leonard Rice Consulting Water Engineers
- GIS and System Integration – Riverside Technology
- Ground Water – CDM

In order for the SPDSS to be a valuable tool to State agencies, water users and managers, public participation is critical during the development phase. Various advisory and technical committees are currently being formed in order to provide a forum for the public to provide input regarding data collection and tool development. In addition, the SPDSS newsletter will be published throughout the development phase to keep the public informed about current development activities, upcoming public meetings, and web-reference information regarding the SPDSS and other CDSS products. For more information regarding the SPDSS Feasibility Study, previously developed CDSS products, or upcoming activities, visit the CDSS website at <http://cdss.state.co.us/>

Consumptive Use, Water Budget and Surface Water Data Collection Update

Efforts are underway for collection of data to be included in the surface water, consumptive use and water budget modeling tools. These efforts include the following:

Study Period Documentation. The study period recommended in the SPDSS Feasibility study (1950 – 2003) has been verified and documented to assure that data required for the development of DSS components is available and reliable throughout the study period, includes wet, dry, and average periods plus represent the long-term average hydrology of the basin, allows for cost-effective modeling efforts with regards to data collection, digitizing and filling, and includes the study period include the study period used in other modeling efforts.

Key Diversion Structure Selection. The process of selecting key diversion structures has focused on the following to date:

- Structures that account for approximately 85 percent of net absolute decree water rights
- Structures with historic annual diversions greater than 2,000 acre-feet
- Review of available straight-line diagrams

Agricultural Statistics Review. County Agricultural Statistics have been collected and summarized. Crops grown in each county during the recommended study period were provided to the GIS and Systems Integration Contractor (Riverside Technology, Inc). Categories of combined crops have

been recommended to Riverside Technology, Inc. based on growing season and average irrigation water requirements.

StateCU Enhancements. The StateCU input files and graphical user interface are being revised and

simplified in response to comments and suggestions made by SEO and CWCB personnel who frequently run consumptive use analyses.

GIS and System Integration Update

Data collection and development for the SPDSS irrigated lands assessment began in January of 2003. Activity has occurred in several major areas:

- Obtaining and processing remote sensing data (Landsat)
- Building an orthoimage base with Digital Orthophoto Quadrangles (DOQs)
- Identifying irrigated parcel mapping procedures and production needs
- Compiling and evaluating data for the GIS database
- Building tools for automated extraction of data from HydroBase

Remote Sensing activities include an extensive review of previous related projects and research, acquiring field reference data, assessment and purchase of satellite imagery for 2001, geometric and atmospheric pre-processing of satellite data, and development of state-of-the-art remote sensing techniques for classifying irrigated crop lands.

USGS Digital Orthophoto Quadrangles have been obtained to build a seamless image base in MRSID

compressed format. For some sections of the study area the USGS DOQs were either unavailable or out of date. Other sources of data will be used to make the orthoimage base complete and extremely useful in irrigated parcel mapping and other applications.

A procedure document and production plan has been developed to assist in accurately mapping irrigated parcels in the study area. Production has begun and irrigated parcels are being mapped on schedule.

Several GIS data layers, from a variety of sources, have been compiled and evaluated. Some of these data layers will assist in certain analysis of irrigated parcels and ditch service areas and others will be provided as base data for the CDSS website. Preliminary data layers and ArcView projects are being compiled for an early deliverable at the end of June.

Another activity is developing an application for creating point shapefiles from the HydroBase database. The application is implemented as an extension of ArcMap, in ArcGIS, using Visual Basic 6 and ArcObjects. It allows the user to select the water divisions and types of data for which shapefiles are to be created.

Ground Water Data Collection Update

Ground water-related data are being collected from areas within the Denver Basin and from the lower South Platte regions as part of the SPDSS. The Denver Basin region includes the bedrock and alluvial aquifers within the area defined by the Laramie-Fox Hills aquifer, including the Lost Creek, Kiowa-Bijou, Upper Black Squirrel and Upper Big Sandy Designated Basins. The Lower South Platte region includes the alluvial aquifer downstream of the Laramie-Fox Hill subcrop, near Weldona.

The ground water data has been divided into three categories to assist in its analysis and reporting. These categories of data and a summary of activity are as follows:

1. Aquifer Configuration. This includes the structure of the aquifer layers, including the bottom and top of the aquifers and, for the Denver Basin bedrock aquifers, the sand thickness. We have developed maps of the Denver Basin bedrock aquifers using over 4,000 data points, a considerable enhancement over the previous maps developed in 1985. Plan view and cross-section maps are being developed.
2. Aquifer Properties. This includes the hydraulic conductivity, transmissivity, specific yield and

storage coefficient parameters. Information collected to date has been from aquifer pumping tests, corehole sample results and from outcrop studies.

3. Ground water levels. This includes data collected from irrigation, municipal supply, and observation wells. We are developing plan view maps of the ground water surface for each aquifer for four individual time periods since the 1960's and hydrographs of individual wells to characterize conditions over time.

Ground water data are being collected in two phases. The initial phase is to collect available published information and to incorporate it into electronic formats that will be added to the State's HydroBase database system. The existing information is being analyzed and mapped to identify data gaps. A field program designed to fill some of the data gaps will be conducted over the next two summers and will consist of installing and testing observation wells in both the alluvial and bedrock deposits. We are looking for opportunities to work with public and private entities to develop teaming arrangements for the well drilling and field data collection, including a collaborative effort being undertaken with the USGS this summer near DIA.