

# **Report for 2002CO2B: Enhancements to the South Platte Mapping and Analysis Program (SPMAP)**

There are no reported publications resulting from this project.

**Report Follows:**

## SYNOPSIS

### Problem and research objectives

The South Platte River System is operating closer and closer to its absolute capacity due to an exploding urban population, steady agricultural demand and new mandates for instream flows. The severe drought that the region has been experiencing in recent years has only highlighted the magnitude of the problem. However, water scarcity in the region might be mitigated by further development of ground and surface waters and more innovative cooperation and trading between decreed water users. The focus of the SPMAP project is to develop tools for conjunctive management of ground and surface water that will allow for a more flexible supply while maintaining obligations for downstream water users required by law.

SPMAP already provides a set of valuable modular tools for managers in the South Platte basin who provide water primarily to agricultural users. (Agricultural use is the highest water use category in the basin). SPMAP includes accurate spatial data in a program called SPGIS, a way to determine consumptive use from ground water withdrawals (SPCU), and a method in a component called SDF View to estimate stream depletion (or accretion in the case of ground water recharge).

The goal of this project to enhance SPMAP is to identify gaps in the current management tools and implement computer systems and acquire data to fill these gaps. The following objectives were identified for 2002-2003.

1. Work with water users to coordinate any image acquisition and develop a long-term data management system. This will ensure that there is no duplication of effort regarding data acquisition among water users. Also, continue to update and integrate new GIS layers into SPGIS.
2. Expand the capabilities of SPCU to allow users to generate different types of scenarios that will be compatible with the capabilities of SDF View.
3. Expand the capabilities of the SPCU model to include additional daily methods: Penman-Montieth, New ASCE Equation.
4. Include the capability to do water budget computations with the daily SPCU methods.
5. Work with water users in the application of the different models to several case studies. This will allow us to determine any needs for new tools as we calibrate and validate all the modules of the system to several case studies.
6. Document, test and revise the daily SDF model.
7. Continue to work on the development of a protocol and long term plan for module maintenance, upgrades and access through the IDS web site.

### Methodology

Since 1995 the Integrated Decision Support (IDS) Group at the Colorado State University Water Center has adopted a user-centered approach to developing the SPMAP tools. The IDS Group has worked closely with a number of local and regional water management organizations along

the Lower South Platte River to develop the SPMAP decision support tools. In producing enhancements to these tools, the IDS Group continues to pride themselves on their responsiveness to area water managers.

Objective 1: Work with water users to coordinate any image acquisition and develop a long-term data management system. This will ensure that there is no duplication of effort regarding data acquisition among water users. Also, continue to update and integrate new GIS layers into SPGIS.

Contact with water managers and the State Engineer's office is continuous ensuring that data layers are kept accurate. The SPGIS ArcView has been enhanced making it easier for users to select GIS information and transfer it to the SPCU or the SDF Model.

Objective 2: Expand the capabilities of SPCU to allow users to generate different types of scenarios that will be compatible with the capabilities of SDF View.

The SPCU Model has been enhanced to allow users to generate scenarios that are compatible with SDF View. Scenarios that show the impacts of drought have been particularly useful to water managers as Colorado continues to experience extremely dry conditions.

Objective 3: Expand the capabilities of the SPCU Model to include additional daily methods: Penman-Monteith, New ASCE Equation.

The SPCU Model can compute CU by using the Blaney-Criddle, Kimberly-Penman or Penman-Monteith techniques. This year the capability of computing consumptive use with daily methods was also added to the SPCU Model.

Objective 4: Include the capability to do water budget computations with the daily SPCU methods.

Water budget computations can now be made using the daily methods and exported into the daily SDF View model.

Objective 5: Work with water users in the application of the different models to several case studies. This will allow us to determine any needs for new tools as we calibrate and validate all the modules of the system to several case studies.

This past year IDS has worked with Central and GASP to import their well data into SPCU. During this process we added new functions to help users calculate presumed depletion factors by incorporating gross pumping figures from their databases and comparing them to calculated well depletions.

Objective 6: Document, test and revise the daily SDF model.

We have sent out the daily SDF model to a group of users to test the model, and we think that the model is now ready for general release. Documentation and further testing are in the works.

Objective 7: Continue to work on the development of a protocol and long term plan for module maintenance, upgrades and access through the IDS web site.

All the work developed under this new project is documented or in the process of being documented. At each major stage of development the software is provided to the participating organizations via the World Wide Web from the internet site:

- <http://www.ids.colostate.edu/projects/spmap>

#### Principal findings and significance

SPMAP continues to be a valued set of tools for water managers in the South Platte region. Enhancements made to the tools through this project have made SPMAP even more popular with users. The work that the IDS Group has done importing data from the databases provided by the Central Water Conservancy District and the Groundwater Appropriators of the South Platte has allowed users to do larger studies. The SPCU Model has pleased users with its accuracy and ability to model real world scenarios.