



**COLORADO**

**Colorado Water  
Conservation Board**

Department of Natural Resources

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**TO:** Colorado Water Conservation Board Members

**FROM:** Brian Macpherson, P.E., Decision Support System Specialist,  
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**DATE:** July 17-18, 2019 Board Meeting

**AGENDA ITEM:** 12. Arkansas River Decision Support Systems Update

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**Staff Recommendation:** This item is informational only, with no Board action requested.

**Background:** The Arkansas River Decision Support Systems (ArkDSS) Phase I began in 2017 and included three tasks: GIS, administrative tools, and consumptive use and water allocation modeling. The project is managed jointly by the CWCB and the DWR State Engineer's and Division 2 offices. Many of the tasks in Phase I are nearing completion and scoping for Phase II is underway. Phase II is expected to include a study and/or modeling of groundwater in the Arkansas River Basin as well as additional administrative tools based on feedback from water users and administrators in the Arkansas River Basin and statewide.

**Discussion:** ArkDSS is the final major Basin DSS in the State of Colorado, following the Colorado River DSS, Rio Grande DSS, and South Platte DSS efforts that began in 1993. The ArkDSS was completed last largely due to the complicated administration of its largest reservoirs, the modeling of which built upon all of the previous DSS modeling efforts in StateMod.

The feasibility study for the ArkDSS was completed in 2011 and identified several possible tiers of effort with associated funding requirements. Goals of the ArkDSS identified in the feasibility study included providing credible information for informed decision-making, assisting in the administration and allocation of water within the basin, providing data and models to evaluate water development alternatives and administrative strategies, and promoting information sharing among government agencies and water users.

Phase I tasks, along with uses of the products thus far include:

Task 1 - GIS

- 1954, 1975, 1988, and 1998 snapshots (2003 - current already exists) of:
  - Aerial photos
  - Ditch service area mapping



- Irrigated parcel mapping with associated water supply, irrigation type, and crop typing
- Canal mapping
- Irrigation well information

This data aids in understanding of how water use has changed basin-wide since the 1950s. The data is also fed into the consumptive use model (StateCU), along with climate data to generate irrigation demands basin-wide for each ditch service area. The irrigation demand is subsequently fed into the water allocation model (StateMod), which models water rights and basin operations, aiding in decision-making.

### Tasks 2-5 - Consumptive Use and Water Allocation Modeling

- Data has been gathered that is published in task memos including:
  - Interviews with water commissioners and major water users in the basin
  - Diversion, reservoir, pumping, and call records
- Consumptive use in the basin analyzed and modeled with StateCU
- Water allocation model created in StateMod, which models:
  - Water rights
  - Diversions
  - Irrigation type, consumptive use, and return flows
  - Reservoir operations
  - Flow

This modeling will be used in the 2024 Trinidad Project 10 year review in collaboration with the Bureau of Reclamation and Kansas. It will also be used for project planning, Compact analysis, and statewide studies such as the Colorado Water Plan Technical Update.

### Task 6 - Administrative Tools

- A power company translator was created that streamlines collection of power data for estimation of well pumping.
- A “Colors of Water” mapping application was created that communicates allocation of water at river gages. There is a lot of interest in this tool and enhancements are being contemplated for Phase II. <http://div2waterops.com/ColorsOfWater>
- A request tool was created that allows water users to request reservoir releases and river exchanges with Division 2 staff through a web interface. Division 2 staff can communicate approval and operations are logged, aiding in end of month water accounting.
- An alert system was created that sends emails to water users in the basin who are affected by operations such as river exchanges. This creates transparency and promotes information sharing.



Phase II of the ArkDSS is anticipated to begin in 2020 and include several tasks identified in the 2011 Feasibility Study. Initial priorities will likely include:

- Additional modeling to satisfy Trinidad 10 year review requirements and HI model area needs
- Enhancements to the Colors of Water tool, including modeling between gages and short-term forecasting of operations. Also incorporation into OIT framework to create an Enterprise solution that can be adopted to other basins in Colorado.
- Re-write of StateCU GUI software
- Compile and analyze all existing aquifer information (USGS, CSU tests) and well log information into full maps/grids of Transmissivity, Hydraulic Conductivity, Saturated Thickness, Bedrock elevation, etc.

