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The Middle Rio Grande Water Supply Study:

Summary of Work-in-Progress to
Provide a Quantitative and
Probabilistic Description of the
Groundwater and Surface Water
Supply of the Middle Rio Grande
Region

Introduction

The Middle Rio Grande Water Supply Study, currently in progress, is developing a quantitative and probabilistic description of the conjunctive-use groundwater and surface water supply available to the Middle Rio Grande region. The study area extends from Cochiti Reservoir to Elephant Butte Reservoir. This water supply study will provide a framework to support regional water planning efforts for the Middle Rio Grande and will describe conditions relevant to maintaining compliance with the Rio Grande Compact. This study is being conducted for the

Army Corps of Engineers and the New Mexico Interstate Stream Commission. An Executive Steering Committee has been convened to meet periodically with the study team to review progress and results. This Committee includes technical representatives of a diverse group of stakeholders and agencies within the planning region.

The regional water planning process focuses on five questions:

- What is the water supply?
- What is the water demand?
- What alternatives exist to meet demand with available supply, including water conservation?
- What are the advantages and disadvantages to these alternatives?
- What is the best plan and how will it be implemented?

This study will address the first of these questions concerning characterization of the water supply. Other studies are anticipated by the contracting agencies to address the remaining water planning questions.

Specific products that will be generated from this study that will be available to planners and investigators include:

- A metadata database that identifies and describes available data in the Middle Rio Grande Basin;
- A document database of water-resource reference material;
- Groundwater modeling results characterizing the expected depletions to the Rio Grande from present and future groundwater pumping;
- Probabilistic characterization of Middle Rio Grande water budget components, including inflows and depletions;
- A risk analysis model evaluation of the water supply, incorporating the climatic-dependent variability in individual water budget components;
- A data needs assessment; and,
- An illustrated report describing the water supply.

These products will provide an up-to-date integration of past and on-going technical studies that can be considered by regional water planning entities as they frame water plans.

Study Approach

The Middle Rio Grande water supply includes four components: the native (non-San Juan/Chama Project) flow of the Rio Grande at the Otowi gage, inflow from tributaries between Otowi and Elephant Butte Dam, imported (San Juan-Chama Project) water, and groundwater. Variability is an inseparable characteristic of this water supply. Therefore, quantification of the variability in the supply will be fundamental for the quantification of the water supply. The scope of work includes procedures for characterizing the variability in the native and tributary inflow supply components and in selected depletion components; and, for tracking this variability through the water budget for the study region.

The water supply to be quantified is conceptualized as the amount of water potentially available for use, or depletion, within the study area. This conceptualization represents both the hydrologic supply and the legal limitations imposed by the Rio Grande Compact. The supply is the difference between the basin inflow and the downstream flow obligation determined by the Compact.

The supply will be quantified as a set of probability distribution functions, taking into account the historical variability of inflow components. To relate this supply to reach-specific demands, the available supply will be compared to depletions under current river and development conditions. Identification of depletions will draw from past and in-progress water budget and depletion studies by other investigators. The probabilistic quantification of the water supply will utilize risk analysis tools to track probability distributions and correlation structures within the river system.

Observations Concerning the Water Supply

Preliminary results of the study support the following observations:

- Variability is a defining characteristic of the Middle Rio Grande water supply;
- The major component of the water supply available to this region is the highly variable mainstem inflow at Otowi (the gaged inflow at Otowi, adjusted for transmountain diversions and upstream storage effects, is the Otowi Index Supply of the Rio Grande Compact);
- The water supply is supplemented with (a) transmountain diversions of the San Juan/Chama Project, and, (b) highly variable quantities of tributary inflow to the region;
- The supply to the Middle Rio Grande region is significantly reduced by evaporation from Elephant Butte Reservoir (the Middle Rio Grande supply is largely a function of the difference between the inflow at Otowi and the Compact-based obligation at Elephant Butte Reservoir);
- Evaporation from the Elephant Butte Reservoir, dependent in large part on reservoir surface area, is highly variable; years with large evaporation depletions do not always coincide with years of high supply;
- Groundwater pumping from the alluvial aquifer or Santa Fe Formation eventually results in reduction of the flow in the Rio Grande, regardless of the location of the pumping;
- The current level of groundwater pumping has not reached a “steady-state condition”; depletions to the river from current levels of

pumping will continue to increase for many years, even if pumping rates are not increased beyond current levels;

- The groundwater “supply” is limited by the availability of offsets for river impacts; as opposed to the storage capacity of the aquifer;
- Wastewater returns from extracted groundwater offer a partial credit to offset groundwater impacts; the relative benefit of this offset decreases with time as lagged effects reach the river; and,
- Risk analysis modeling of the basin water budget under present development conditions indicates that, absent intervention, both credit and debit conditions under the Rio Grande Compact are probable outcomes.

Supporting data, metadata, analysis procedures and quantitative results will be provided in the final report to be released in August 2000. The report and related material will be available through the State Engineer Office/Interstate Stream Commission website, at www.ose.state.nm.us.