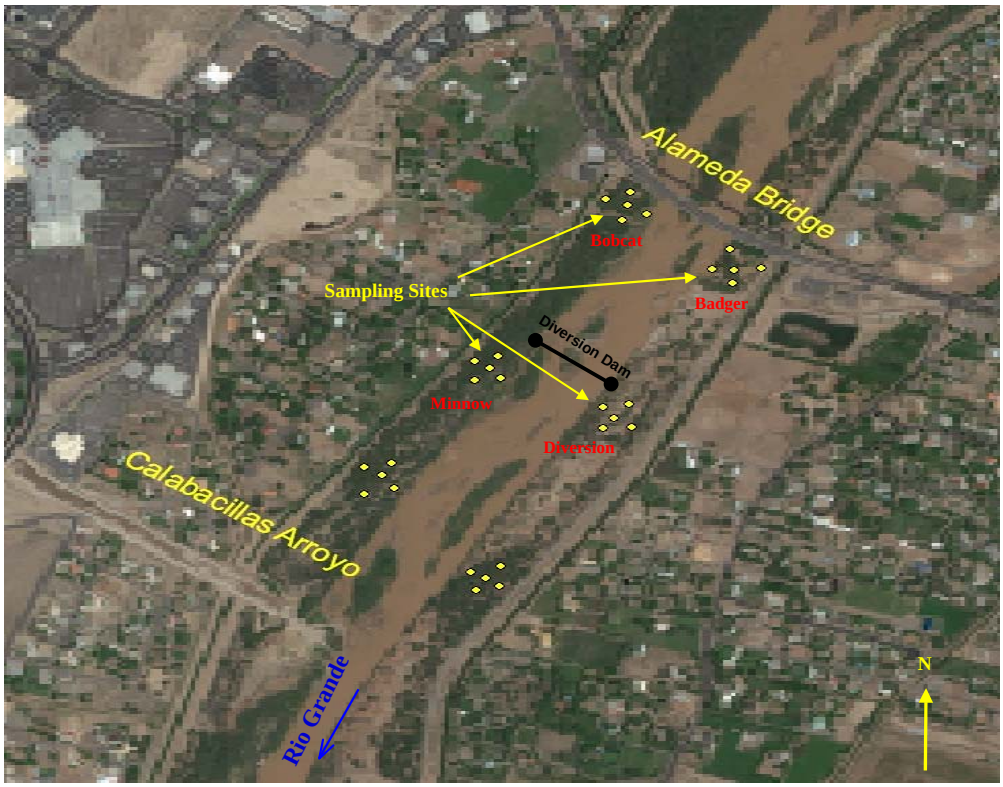
Ongoing Research

US Army Corps of Engineers®
Engineer Research and Development Center

Urban Flood Demo Program & Southwest Demo Program

INVESTIGATION OF GROUNDWATER/SURFACE WATER INTERACTIONS AT THE ALBUQUERQUE DRINKING WATER DIVERSION DAM SITE



Products

Provide the infrastructure to calibrate sediment transport and ground water/surface water models by monitoring groundwater levels, soil moisture, soil profile layering and riparian forest ecology in the vicinity of the dam. The measurements will be used as direct inputs to models such as the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model.

Benefits

By using models, managers should be able to predict the response to dam operation and develop adaptive management alternatives for the area adjacent to the dam. The utility of such a model is dependent on the measurements and observations that are used for inputs, and the availability of data used to evaluate and validate predictions. Critical inputs to ground water/surface water models are the river flows and levels, and the soil properties and layering in the riparian area adjacent to the river. These inputs are being measured in this project.

Problem

The dam operation will necessarily alter river flows and levels, and consequently affect the groundwater level and soil moisture in the adjacent bosque. Soil properties and layering will also control the movement and amount of moisture in bosque soils, and thereby

strongly affect the ecological and biological response at a particular location. The hydraulic connection between the ground surface and ground water, and ground water and the river are controlled to a large degree by the bosque soil profile that often consists of non-continuous interlayers of dramatically different properties. Reasonable and reliable predictions of the impact of the diversion dam on the bosque require the use of directly measured input values.

Description

The work is divided into 4 tasks. Task 1 involves monitoring groundwater levels and soil moisture in the vadose zone in vicinity of diversion dam. During the first year, four well clusters, each comprised of five wells, were instrumented. These wells are being continuously monitored to provide groundwater levels on both sides of the river as well as above and below the diversion dam site. In one site, soil moisture between the groundwater and soil surface is being monitored. In Task 2, a detailed description of the soil layering between the groundwater and soil surface has been developed. Soil samples were collected from over 20 locations, and were characterized in the field and then subjected to characterization in the laboratory. Testing includes grain size distribution, plasticity indices, hydraulic conductivity, and moisture characteristic curves. This effort yields 3-dimensional spatial information on soil types, layers and thicknesses between the ground surface and the water table in the vicinity of the diversion dam. Task 3 involves developing water surface profiles based on upstream flow rate and dam operation. Monitoring bosque ecology adjacent to the diversion dam comprises Task 4. This monitoring includes monthly recording of site litterfall (a measurement of bosque net primary production), precipitation, seasonal recording (3 times a year) of site groundwater chemistry, and annual recording of site fuel load (woody debris) and vegetation cover. These variables are directly or indirectly dependent on the river's flow regime, which controls sediment transport and is itself dependent on the interaction of regional climate, geology and regulatory water operations.

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Collaborators

USACE – Albuquerque District, Hydrologic Engineering Center, Desert Research Institute, Sandia National Laboratories, ERDC .

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