

Continuation and Expansion of the Ogallala-High Plains Aquifer Assessment Program

The Ogallala-High Plains Aquifer Assessment provides data, research, and technical support to assist the three western GMDs, the Kansas Water Office, and the DWR in the assessment, planning, and management of the groundwater resources of western Kansas. Examples of assistance include providing information on water use, water levels, water rights, hydrogeologic characteristics, and groundwater quality of the aquifer. Most recently, the KGS has developed a tool for potential Local Enhanced Management Area (LEMA) and Water Conservation Area (WCA) groups to quickly assess how much reduction in water-level declines will be achieved by a given reduction in pumping. What we have found is that relatively modest reductions in pumping (20%) will have a large impact on water-level declines in western Kansas. It is no exaggeration to say that this work has very significant ramifications for the future of irrigated agriculture in western Kansas. Although much progress has been made, we have yet to answer a key question: What is the long-term impact of pumping reductions? We need to expand the research component of the Ogallala-High Plains Aquifer Assessment Program in order to evaluate the long-term prospects of the aquifer, an issue of critical importance for western Kansas. Current Water Plan Funding Level: \$26,841  
Requested Funding Level: \$85,000/yr as long-term funding.

Continuation and Expansion of the Index Well Program

The High Plains Aquifer Index Well Program is directed at developing improved approaches for measuring and interpreting water-level responses at the section to township scale in western and south-central Kansas. The project, which began in 2007 with the installation of three wells in the three western GMDs with equipment for real-time monitoring of water levels, has been expanded to a network of 14 wells in four GMDs; these include one well in the Sheridan-6 LEMA and one on the Willis Water Technology Farm. Fifteen additional wells in the program have equipment for continuous, but not real-time, monitoring of water levels. The highly detailed information obtained through this program is critical for reliable assessment of how the aquifer responds throughout the growing season and what the future holds for the High Plains aquifer in western and south-central Kansas.  
Current Funding Level from Kansas Water Office: \$55,500/yr  
Requested Funding Level: \$60,000/yr for long-term operation of network. KWO leadership has indicated they plan on continuing to provide this funding through their Assessment and Evaluation funding line.

Hydrostratigraphic Survey of the Ogallala Aquifer in Western Kansas

KGS researchers have been working with scientists at Stanford University to assess the applicability of an aerial geophysical surveying method for defining the distribution of permeable and non-permeable layers within the Ogallala aquifer. This information would be valuable for modeling as well as for organizing LEMAs and WCAs that are consistent with the hydrogeology of the area. In early November, a joint KGS-Stanford team applied a land-based variant of this method over a few square miles south of Colby to

assess its potential for widespread application. The approach appears to have considerable potential so the next step is a two-year pilot study in the southern half of GMD4 to see if aerial surveys over the entire aquifer in western Kansas are warranted.  
Current Funding Level: none  
Requested Funding Level: 350,000/yr for two-year pilot project.

#### Aquifer Modeling Maintenance Project (AMMP)

Aquifer models have been developed for each of the GMDs by the KGS and others. These models are used to assess the aquifer response to various proposed future pumping and climatic conditions, so they must be periodically (every five years) updated to stay current. In addition, individual GMD models should be gradually combined to better represent the long-term behavior of the aquifer to future pumping and climatic stresses.  
Current Funding: Not currently funded.  
Requested Funding Level: \$150,000/yr as a continuing funding line – currently in the \$8 million SGF transfer request.

#### Observation Well Network in the Kansas River Alluvial Aquifer

This network, which will be similar to the index well network in the High Plains aquifer, is in the process of being established. A series of wells with equipment for real-time monitoring of water levels is being installed from upstream of Manhattan to the junction with the Missouri River. The information obtained from these wells will be used to develop a better understanding of how water levels respond to current pumping activity and how the aquifer and the Kansas River interact. The program began earlier this fall and we anticipate that ten wells will be installed by June of 2018. Following installation, we are requesting \$25,000/yr for long-term operation of network.  
Current Funding: \$100,000 for well installation and equipment.  
Requested Funding Level: \$25,000/yr as a continuing funding line – currently in the \$8 million SGF transfer request.

#### Development of a Groundwater Model of the Kansas River Alluvial Aquifer

This model will extend from upstream of Manhattan to the junction with the Missouri River and would be used to examine the effects of future aquifer development on groundwater and river levels, as well as how river flow controlled by reservoir operations affects aquifer water levels. The model will be updated every five years so that the state has a tool based on the most current data to evaluate future conditions in this most important aquifer in eastern Kansas.  
Current Funding: none  
Requested Funding Level: \$100,000/yr for two years – currently in the \$8 million SGF transfer request.

#### Assessment of the Effectiveness of Streambank Stabilization Projects: A Collaborative Project with the Kansas Biological Survey and Kansas State University's River Research & Monitoring Team

To date, most streambank stabilization projects in Kansas are done on a piecemeal basis, with little monitoring to assess the effectiveness in terms of reducing sediment yield, and

with little to no appreciation for the geomorphic and hydrologic processes operating in stream channels. Research has shown that restoration projects that attempt to create static or fixed forms (e.g., meanders with riprapped banks) commonly fail. Therefore, it is our conjecture that restoration of a *process* is more likely to succeed than restoration aimed at a fixed end point (i.e., bank stabilization). Importantly, assessing and restoring stream processes are more likely to address the *causes* of river degradation, which in Kansas have resulted in reservoir sedimentation, whereas restoration toward a fixed endpoint (i.e., stabilizing banks) addresses only the *symptoms*. The Kansas Geological Survey, Kansas Biological Survey, and Kansas State University's River Research & Monitoring Team therefore propose to evaluate existing restoration projects in the context of stream processes. Such an evaluation focuses on the measurement of geomorphic characteristics with the understanding that interactions between the stream channel, floodplain, and stream flows are the dominant processes operating in stream channels. Also, such an approach requires assessing processes operating in a whole watershed rather than a single, isolated reach of a stream over a period of at least five years.

Current Funding Level: none

Requested Funding Level: KGS, \$150,000/yr for five years

KBS, \$150,000/yr for five years

KSU, \$135,000/yr for five years