K-State Research and Extension
Kansas State University
www.ksre.ksu.edu

Kansas Water Resources Institute

2014 Research Projects

KWRI Mission

The Kansas Water Resource Institute develops and supports research on high priority water resource problems and objectives, as identified through the state water planning process. It is also designed to facilitate effective communication between water resources professionals and to foster the dissemination and application of research results.

For more information, contact:
Dan Devlin, Director
44 Waters Hall
Manhattan, KS 66506
ddevlin@ksu.edu
(785)532-0393
www.kcare.ksu.edu

Moving Towards a Real-Time Drought Assessment and Forecasting System for Kansas

This project has three objectives:
1) To construct an integrated drought-related dataset, suitable for Kansas drought assessment and forecasting;
2) To develop computational tools for computing three drought indices: Palmer Drought Severity Index (PDSI), Standardized Precipitation Index (SPI), and Standardized Precipitation Evapotranspiration Index (SPEI); and
3) To analyze historic drought episodes, establishing Kansas's benchmark metrics for detecting the onset, duration, severity and frequency of drought.

The Effects of Long-Term Management on Surface Soil Properties of Upland Soils in Northeast Kansas

Sedimentation of lakes and reservoirs in Kansas is due to a combination of historic land use as well as erosion of streambeds and streambanks. This project contributes to the present-day understanding of post-settlement land use and management effects on soils. The most stable upland landscape was selected for comparison between cropland and pasture. Transects were not randomly selected, but rather, were targeted in order to keep as many factors constant, with land use as the variable. In general, croplands were more eroded and lower in soil organic carbon (SOC), and had lower infiltration rates than pastures. Pastures generally had lower Mehlich III soil test phosphorus (P) levels than did croplands. While many producers in northeast Kansas have switched to no-till practices on cropland, the usage of additional practices that increase SOC would likely increase infiltration rates and reduce the risk of erosion and runoff.

Impacts of In-channel Dredging on the Morphology of the Kansas River

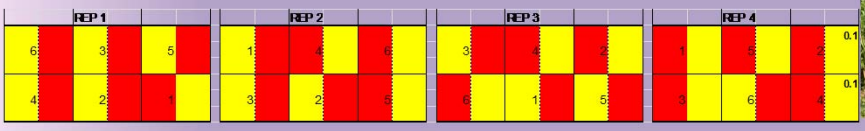
Two active dredge holes in the Kansas River were surveyed using an ADCP (Acoustic Doppler Current Profiler) on two occasions, once in Fall of 2012 and once in Spring of 2013. During this time period, no significant transport active flow occurred on the Kansas River. Repeat surveys show substantial deepening and enlargement of each dredge hole due to continued excavation and no/insufficient transport-related replacement or infilling by the river. Resampling will occur with the ADCP when flow rises on the Kansas River.

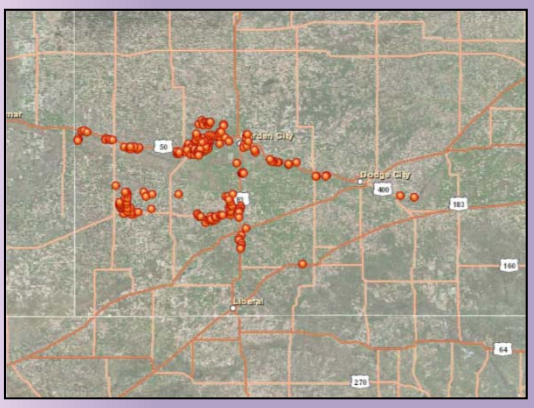
K-STATE Research and Extension

K-State Research and Extension
Kansas State University
www.ksre.ksu.edu

Extending the Useable Life of Ogallala Aquifer through Limited Irrigation using Integrated Sensor-Based Technologies

With declining well capacities in the Central High Plains resulting from withdrawals exceeding recharge in the Ogallala aquifer, producers will need to adopt advanced irrigation scheduling to maintain productivity with limited water. A study is being conducted to assess the effect of 3 irrigation scheduling approaches on corn growth, yield, and water productivity, and water use of conventional and drought tolerant hybrids. Irrigation scheduling approaches based on soil and plant water status monitoring as well as weather monitoring are being evaluated. The study involves five irrigation scheduling treatments applying 80% of full irrigation and a control (full irrigation) treatment and two corn hybrids arranged in a split-plot RCBD design.





Assessment of Deteriorating Water Quality in the Ogallala Aquifer and its Effect on Crops in Western Kansas

The overall goal of this project is to establish baseline information on the status of water quality of the Ogallala Aquifer as it relates to the major agricultural crops in the region. The project objectives will be to: 1) quantify the spatial extent of water quality deterioration in areas underlain by the Ogallala Aquifer 2) evaluate the effect of varying concentrations of specific chemical constituents primarily chloride and sulfate on crop growth; and 3) encourage participation of a student into the field of water resources.

Assessing Natural Variability in Groundwater Surface Water Interactions

The main goal of this research is to improve understanding of groundwater/surface water (gw/sw) interactions and their temporal variations, and to determine the significance of these interactions to the distribution of water resources within the study area. To achieve this goal, four specific objectives will be addressed: 1) Automate the real-time collection of detailed data (stream stage, stream temperature, groundwater head, groundwater temperature and barometric pressure) for characterizing gw/sw interactions through time at three locations within Kansas; 2) Develop methodology to systematically quantify gw/sw interactions using these data with a focus on water-level and temperature responses in shallow near-stream wells to stream stage changes; 3) Analyze results to assess the relationship between temporal climatic and hydrologic variations and changes in gw/sw interactions; and 4) Assess the role of gw/sw interactions in the distribution of water within the study area.

K-STATE
Research and Extension

K-State Research and Extension
Kansas State University
www.ksre.ksu.edu

Fate of High Uranium in Saline Arkansas River Water in Southwest Kansas: Distribution in Soils, Crops, and Groundwater

The goal of this study is to determine the fate of high uranium concentration dissolved in saline Arkansas River water that is used for irrigation in the upper Arkansas River corridor in Kearny and Finney counties, southwest Kansas. The results from this project will be valuable for assessing whether high concentrations of uranium in irrigation water in the study area and other areas of the U.S., such as the South Platte River in northeast Colorado and southwest Nebraska, could be preferentially concentrated in soils and crops.

Water Research for the Fort Riley Net Zero Initiative

Kansas State University is working with Fort Riley personnel, EPA ORD, and EPA Region 7 to develop strategies for meeting the Department of Defense Net Zero Water goals. Specific project objectives for the Fort Riley demonstrations are:

1. Investigation of methods for safe reuse of waste water through the decentralized treatment of water from sewer lines;
2. Containment, control and disposal of large volumes of wastewater following an event involving biological agents;
3. Use of engagement, education, motivation, and empowerment to reduce water demand at Ft. Riley, with a measurement of the effectiveness of each.

2014 Information Transfer Project

Governor's Conference on the Future of Water in Kansas

The third statewide Kansas "Governor's Conference on the Future of Water in Kansas conference" was held on November 12-13, 2014 in Manhattan, Kansas. The conference was highly successful with 649 people attending both days of the conference. Attending the conference and giving the welcome was the Governor of Kansas, Sam Brownback. Several state and national senators and representatives were present. The Governor fully supports this conference and has expressed his concern about the issue of preserving and protecting the future viability of water in Kansas. Thirty-seven volunteer scientific and 6 invited presentations were presented in plenary and concurrent sessions. Twenty scientific posters were presented in the poster session. An undergraduate/graduate student poster award program was conducted to encourage student participation. Twelve students participated.

K-STATE Research and Extension