

050728

Intro

Under terms of a compact Kansas, Nebraska and Colorado share the waters of the Republican River Basin.

As part of a settlement agreement among the states a groundwater model was developed to establish the impact of ground water withdrawals on the surface water system.

The model was developed by a committee consisting of three members from each state and accepted for the purpose for which it was developed by officials from each of the three states.

Since the model was developed to satisfy the scientific attitudes of the various members it represents a consensus acceptance rather than any one persons understanding of the operation of the actual flow system

To establish a states usage of water from the basin the model is run retrospectively using observations of precipitation and pumping.

Under the terms of the interstate settlement the model is regarded as a reasonable representation of the actual system.

Impacts of pumping are established with respect to the model rather than observations of the state of the actual flow system.

Problem

Nebraska has to plan pumpage ahead of time and set guidelines for agencies within the state.

Nebraska also has to answer questions from interested parties within the state as to the effects of various in-state management plans on intra-state obligations.

Planning and answering questions can be helped by experimenting with the Compact Model.

That requires, however, an intimate understanding of the model and considerable time to prepare model input and to analyze model output.

Solution

Use the model to derive a general verbal intuitive understanding of the flow system so that impacts of plans or modifications can be reliably estimated without running the model.

Develop a verbal description of the numerical nuances of the model so that counter-intuitive results of the model can be better understood by the experts from the DNR.

Approach

Use particle tracking and mass balance analysis to subdivide the model area into several (10-12?) zones that are relatively independent.

These are likely to be influenced by surface water basins.

They are unlikely to coincide with administrative units --- NRD's or states.

Use GIS to relate administrative units with hydrology zones.

Develop equations to relate admin units to hydrology zones.

Report

Report verbally and numerically on the operation of the GW flow system

Describe the all impacts of a number of experimental changes to management rules with emphasis on counter-intuitive results