Groundwater-level Changes in Nebraska - Spring 2005 to Spring 2006

Rise in Feet

- 1.00 to 1.99
- 2.00 to 4.99
- > 5.00

Decline in Feet

- -1.00 to -1.99
- -2.00 to -4.99
- > -5.00

< +/- 1 foot or no data

Surface Water
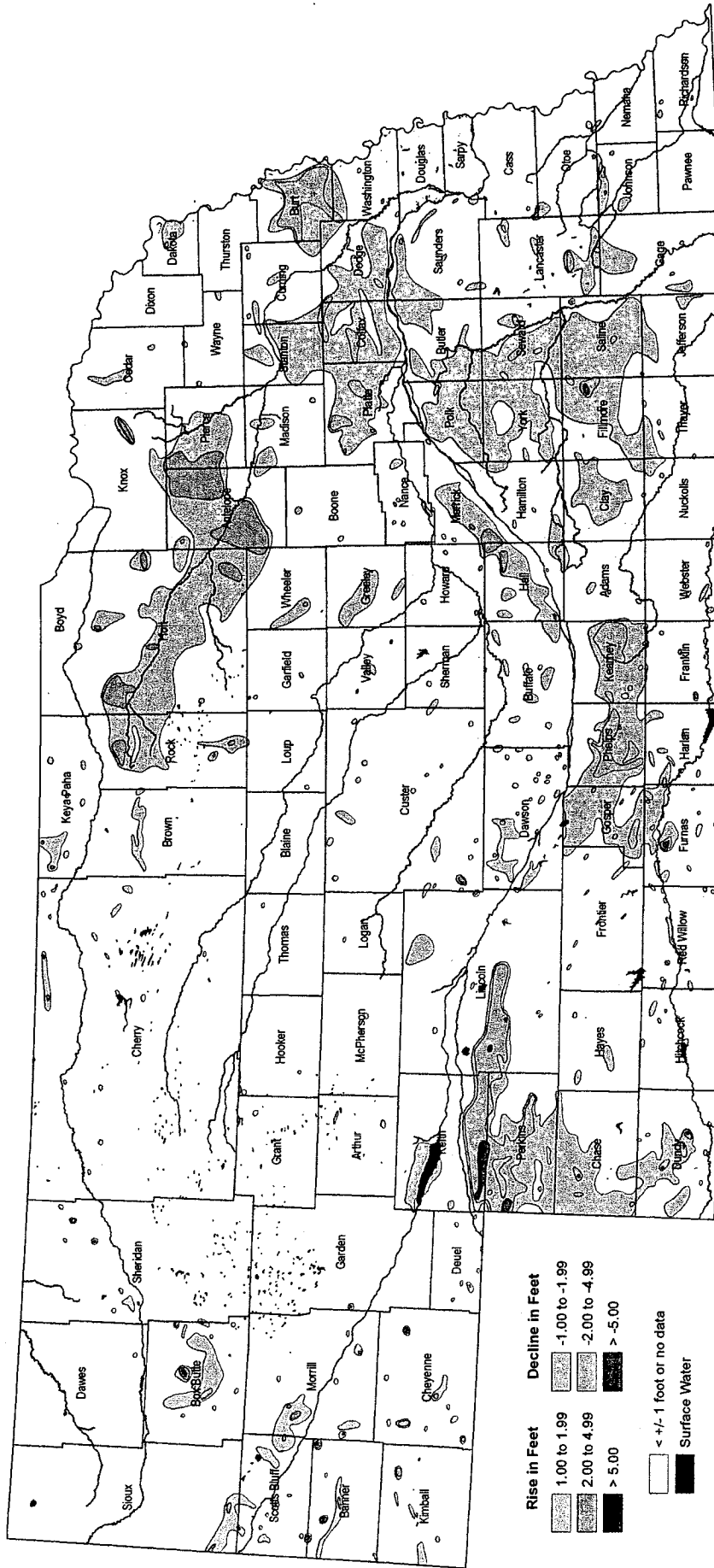
CONSERVATION AND SURVEY DIVISION (http://csd.unl.edu)
School of Natural Resources (http://snr.unl.edu)
Institute of Agriculture and Natural Resources/College of Arts and Sciences
University of Nebraska-Lincoln

Mark Burbach, Water Levels Coordinator, CSD

U.S. Geological Survey:
Water Resources Division - Nebraska District

Nebraska Natural Resources Districts

Central Nebraska Public Power and Irrigation District

U.S. Bureau of Reclamation
Nebraska - Kansas Area Office

Nebraska
Lincoln
IANR

Narrative for 15-50 Scenario Analysis

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Methods Used to Analyze the 15% Basin Wide Plus Additional 50% Pumping Reduction in the Quick Response Area from Ground Water Model Scenario Results

The following is a brief synopsis of the methods used to analyze the results of Scenario 15_50 in moderate drought conditions. The goal of the 15_50 scenario analysis was to estimate a volume of pumpage that would result in stream flow depletions less than a selected basin target allocation. The target allocation is Nebraska's predicted share of the Computed Water Supply as determined by the methods detailed in Appendix C, Accounting Procedures and Reporting Requirements (as amended), of the Final Settlement Stipulation. Table 1 located in Microsoft Excel spreadsheet "15_50Summary.xls" provides a summary of Nebraska's allocation of water from the Republican River Basin from 1995 – 2005. These values represent the maximum volume of net consumptive use (the sum of all consumptive uses less the sum of all credits) to which Nebraska was entitled. Using the allocation information from this table, a Basin target allocation of 200,000 acre-feet (AF) was selected.

Once the target allocation was selected, a series of model runs from the Republican River ground water model were scrutinized. This series of runs, collectively referred to as 0746-Moderate Drought, modeled a number of different scenarios involving various rates of groundwater pumpage with assumed conditions for climate, surface water, phreatophyte evapotranspiration, and land retirement programs. A more complete description of the 0746-Moderate Drought collection of runs can be located in the official DNR documentation document (DNR, 2006).

Table 2 provides a summary of the pumpage volumes, by Quick Response (QR) and Upland areas, assumed for each of the scenarios modeled as part of the 0746-Moderate Drought group of model runs. For each scenario, the computed beneficial consumptive use (CBCU) due to groundwater pumpage was calculated. These values (baseflow depletions) are summarized on Table 3. From this information, the pumpage volume represented in Scenario 15_50 was selected as an initial pumpage volume estimate from which to work. As shown on Table 3, Scenario 15_50 has a predicted average depletion due to groundwater pumpage from 2007-2010 of approximately 185,000 AF. With an Imported Water Supply (IWS) credit of 10,000 AF (based on trend information inferred from Table 1) and assumed surface water CBCU of 25,000 AF, the target of 200,000 AF could be met (185,000-10,000+25,000=200,000).

The pumpage volumes shown on Table 4 are based on Scenario 15_50. The reductions represented in Scenario 15_50 are uniform percentage reductions of the pumpage volumes currently represented in the model, as discussed in the documentation (DNR, 2006). The scenario did not look at optimizing the distribution of this volume; therefore, the volumes on Table 4 were presented as a range, rather than as a fixed volume. For instance, in the process of optimizing the pumpage volumes, it may make sense to have some QR areas greater than 50% while other areas might reduce less. The actual values will be dependent upon the results of optimization. The optimizations can be identified

by considerations regarding distribution of pump volumes across political boundaries or proximity to streams, desire to maximize production in the basin or other desired policies. The focus of Scenario 15_50 was to provide the general volume of pumpage from which to optimize, which based on Scenario 15_50 is approximately 750,000 AF.

Reference:

DNR, 2006. Moderate-Drought Conditions 2007 through 2046 Modeling Scenario (0746ModDrtModelingScenarioExp.doc).