

Understanding Water Supply and Use

Information Shared During Stakeholder Meetings

1. June 2015 Stakeholder Advisory Committee meeting
 - a. Jim S. Presentation- *Basin Water Supply*. Hydrologic Overview of the Republican Basin in Nebraska (Precipitation, ET, transmissivity, well density, stream gages, drought conditions, and well depletion zones). Trends in streamflow and baseflow. Causes of reduced streamflow supply and impacts over time.
2. August 2015 Stakeholder Advisory Committee meeting
 - a. Jim S. Presentation- *interbasin transfers, basin water supply, and hydrologic concepts*. Effects of NE GW pumping on streamflow. Groundwater management plans. Effects of groundwater pumping on aquifer and streamflow.
 - b. Analysis of High Plains Resource Risk and Economic Impacts
3. January 2016 Stakeholder Advisory Committee meeting
 - a. A. Thompson BOR presentation- *Reclamation: Managing Water in the West*. Reclamation water rights, reclamation water contracts, and current reservoir storage.
 - b. Jesse B. NeDNR presentation- *Water Science: Stream and Aquifer Depletion*. Well location and stream depletion. Review of well depletion zones. Wells in the Republican Basin through time. Stream depletion. Aquifer depletion.
4. November 2016 Stakeholder Advisory Committee meeting
 - a. Groundwater (GW) and surface water (SW) use
 - i. Nebraska GW Pumping within RRCA Model Area
 - ii. Nebraska Farm Field Delivery Data- SW
 - iii. Annual Precipitation within Nebraska Portion of RRCA Model Area
 - b. Average precipitation recharge values for 1990-2015
 - c. INSIGHT data
 - i. Annual Precipitation
 - ii. Annual Streamflow
 - iii. Annual Basin Water Supply
 - iv. Annual Near Term Demands
 - v. Annual Near Term Balance
 - d. Nebraska's Compact Allocations
 - e. Republican River Compact Accounting Brochure
 - f. Existing Republican River Basin Water Management Actions
 - g. Distribution of Irrigated Lands and Hydrologically Connected Areas (map)
 - h. LRNRD Township Average Changes and Draft Static Water Level Measurement Changes 2005-2015

Understanding Water Supply and Use

5. Water Supply and Use Information Packet (Available on Republican River Basin-Wide planning website)
 - a. Weather Stations and Precipitation Table
 - b. Allocations History
 - c. Modeled Depletions
 - d. Nebraska-Kansas Stateline Annual Streamflow Data
 - e. Surface Water Use
 - f. Updated Groundwater Pumping and Acres
 - g. Accounting
 - h. Groundwater Level Changes by NRD

https://rrbwp.nebraska.gov/project_meetingschedule.html

RRCA Annual Reporting Information

1. Surface Water Data
 - a. Non-federal Surface Water Irrigators
 - I. Water right number
 - II. Type of use
 - III. Location
 - IV. Diversion amount
 - V. Acres irrigated
 - b. United States Bureau of Reclamation Data
 - I. Water right number
 - II. Type of use
 - III. Location
 - IV. Diversion amount
 - V. Acres irrigated
 - VI. Evaporation
 - VII. Storage
 - VIII. Precipitation
 - IX. Releases
 - X. Area capacity tables
2. Water Administration
 - a. Dates and type of administration
 - b. Date of notification to Nebraska water right owners to curtail diversions
 - c. Amount of curtailment
 - d. Length of time for curtailment
 - e. Number of notices sent
 - f. Number of diversions curtailed

Understanding Water Supply and Use

- c. Relative humidity or dew point
 - d. Solar radiation
10. Crop Irrigation Requirements (CIR)
- a. Percent CIR met by pumping
 - b. Percentage sprinkler vs. Flood
 - c. Crop distribution
 - d. Crop coefficient
 - e. Gain in soil moisture from winter and spring precipitation
 - f. Net CIR

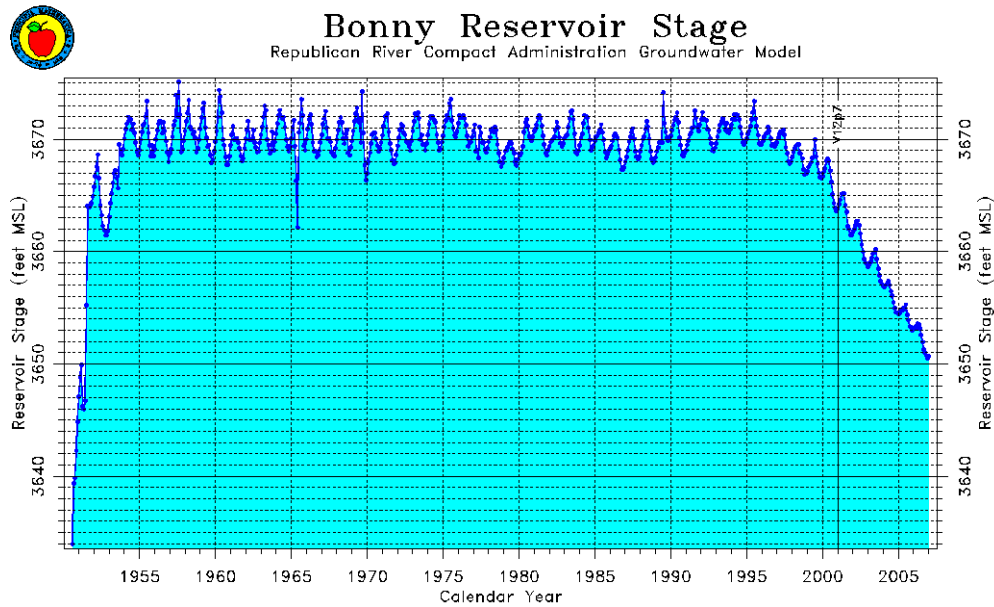
Understanding Water Supply and Use

Accounting data for compact years 2003-2007 can be found by visiting the Republican River Compact Administration Website and clicking on the year of your choice.

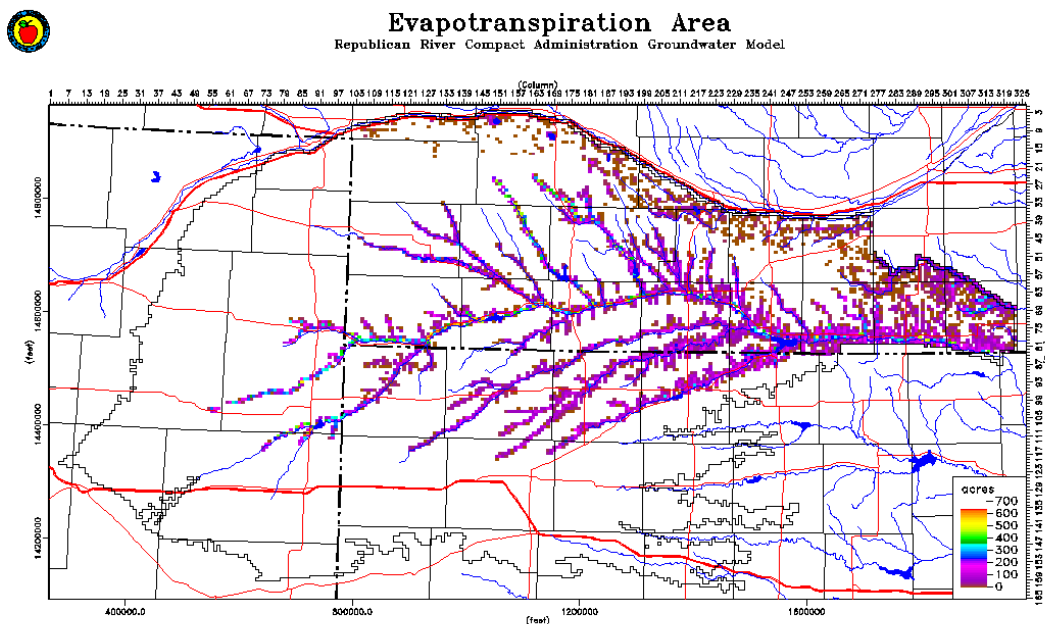
<http://www.republicanrivercompact.org/>

Some of the available data includes:

1. Reservoir stage data as depicted in the example below.



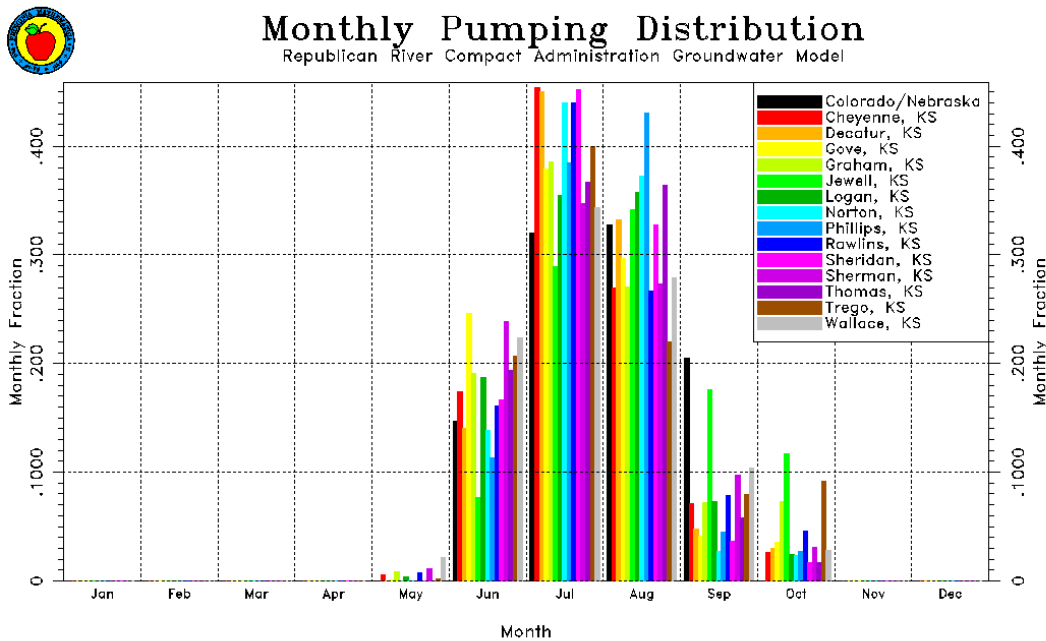
2. Evapotranspiration (ET) data including monthly maximum ET rate and ET area as



Understanding Water Supply and Use

depicted in the example below.

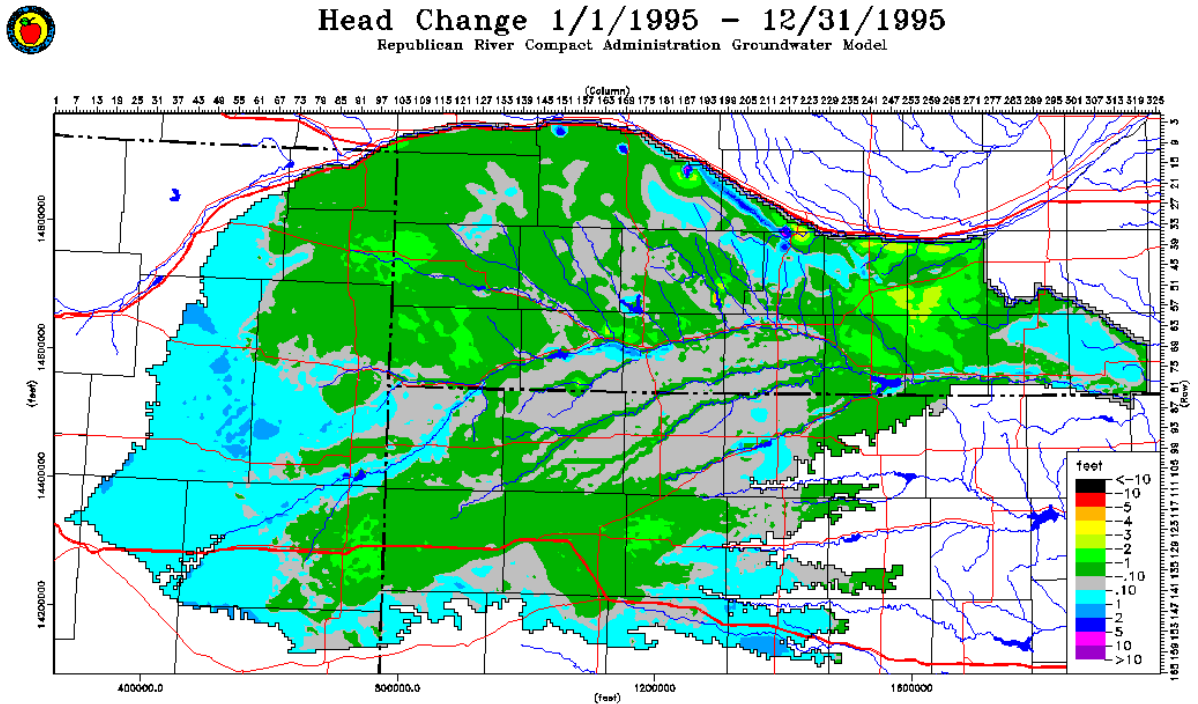
- Well pumping data including monthly pumping distribution, annual well pumping, and monthly well pumping as depicted in the example below.



- Recharge data made up of precipitation recharge, groundwater return flows, surface water return flows, and canal leakage.
- County summaries of irrigated acres, recharge, and pumping.

Understanding Water Supply and Use

6. Head change data for multiple years as depicted in the example below.



7. Predicted impacts for multiple years as depicted in the example below.

Impacts 2004 (acre-feet)				
Location	Colorado Pumping	Kansas Pumping	Nebraska Pumping	Nebraska Mound
Arikaree	353	116	431	0
Beaver	0	205	1278	0
Buffalo	290	0	3333	0
Driftwood	0	0	1479	0
Frenchman	39	0	85199	0
North Fork	14373	16	1446	0
Above Swanson	-1287	201	13809	0
Swanson - Harlan	0	91	33956	622
Harlan - Guide Rock	0	0	29155	198
Guide Rock - Hardy	0	71	2382	0
Medicine	0	0	20898	9522
Prairie Dog	0	1328	0	0

Understanding Water Supply and Use

Additional Stakeholder Comments and Data Ideas

1. Ideas related to metrics and data for tracking purposes
 - a. General
 - i. How do you determine if a management action is “successful”? What might work as a universal metric for this?
 - ii. Create a centralized location for data
 - b. Specific Measurement Suggestions
 - i. Amount of depletions
 - ii. Groundwater elevation changes
 - iii. Spring water level changes by county
 - iv. Augmentation pumping volumes and costs
2. Understanding the effects of land use and farming practices
 - a. What are the effects of changes in land use (e.g., farming practices conservation practices) and land cover (all types) on water consumption, streamflow, and stream depletions?
 - b. Develop a water budget: define and understand the effects of all uses.
 - c. What is already working in the Basin? Develop a process for water users to submit their own management successes, and distribute that information to other water users in the Basin.
 - d. What are the effects of conservation practices on runoff reduction?
3. Understanding evaporation and evapotranspiration (ET)
 - a. How much of Nebraska’s consumptive use is attributable to evaporation?
 - b. Are there opportunities to reduce evaporation?
 - c. How much of Nebraska’s consumptive use is attributable to ET of riparian vegetation?
 - d. Are there opportunities to reduce riparian ET?
4. Understanding supply and use at the subbasin level
 - a. Where are water tables rising? Where are they going down?
 - i. Based on this, where are current allocations too restrictive? Where are they not restrictive enough?
 - b. Which parts of the Basin are dependent upon water from the mound?
 - c. What is unique about supply and use in each subbasin?
 - d. Include an assessment of the streamflow of the tributaries to the Republican River to determine the flow trends.
 - e. What is the near-term balance for each subbasin?
5. Understanding the effects of upstream neighbors on Nebraska’s supply
 - a. What are Colorado’s depletions and usage, and how does this affect Nebraska’s water supply on the west end of the Basin?

Understanding Water Supply and Use

- b. How can we better understand the hydrology of flows from Colorado in the South Fork?
- c. Are there opportunities for collaboration with Colorado or Kansas at the subbasin level to address issues?
- d. How does upstream water use (both by other states and within Nebraska) affect water availability?