# RRCA Kansas data for 2023

Preliminary Kansas data for 2023 were posted by April 15, 2024 exchange. Updates to groundwater model input files were posted July 9, 2024. Files are organized into folders RRCA\_Accounting, Annual\_Reporting and GW\_Model\_Input.

For questions contact Chris Beightel at 785-564-6659.

## RRCA\_Accounting

* KS\_input\_sheet\_2023.xlsx - Kansas accounting input spreadsheet.
* Lovewell\_1995-2023.xlsx –Lovewell evaporation charged to Republican River based on RR component of inflow and RR diversion to Bostwick district below Lovewell.
* Fed\_Reservoir\_2023.xlsx– federal reservoir net evap and storage change for 2023
* Fed\_Net\_Evap\_thru\_2023.zip - federal reservoir backup data for the above file

## Annual\_Reporting

**1. Surface water diversions and irrigated acres** - Supporting data for groundwater model input files are in rrcs\_Overlap\_Groups\_2023\_prelim.xlsx

**2. Groundwater pumping and irrigated acreage** - Groundwater data required by the Settlement is included in the above file.

* ReportedCropsByCountyFor2023.xlsx - County crop distribution based on data in sheet crops from the above file

**3. Climate information** - KSNE2023\_precip\_temp\_data\_PRISM.zip – Daily climate data used to calculate Crop Irrigation Requirements. Data source: PRISM Data Explorer

**4. Crop Irrigation Requirements**: KSCIR\_summary\_For2023.xlsx – Summary by county.

**5.  Streamflow records from State-Maintained Gaging Records** - Not applicable to Kansas

**6.  Platte River Reservoirs** - Not applicable to KS

**7. Water Administration Notification** - Not applicable to KS

**8. Moratorium**

* 2023\_KS\_Wells\_Moratorium.xls
* KansasWaterAppropriationRegsAdoptedIn2023.pdf

**9. Non-Federal Reservoirs** - There were no new dams constructed in KS within the RRC basin above Hardy. Thus the inventory is the same we provided last year.

* KSNonFedDamsFor2023.xls: Updated inventory of non-federal dams in Kansas; also documents updates from previous versions.
* KSNonFedDam\_EVAP\_For2023.xls: Tabulation of evaporation from non-federal reservoirs by sub-basin for 2023.

## GW\_Model\_Input

[Files for input to Republican River Preprocessor, rrpp]

Preliminary data:

* gwFor2023.zip - Groundwater data files (\*.rcg, \*.pmp, \*.mi, \*.agw).
* swFor2023.zip - Surface water recharge files for the model (\*.rcg, \*.asw).
* gwprog2023.zip - Program and data files to produce the groundwater files for 2023. Batch file pumprech was updated to specify Almena area factor equal to 1 for 2023. Batch file operation: pumprech 2023
* swprog2023.zip - Program and data files to produce the surface water recharge files for 2023. Batch file operation: swrech 2023
* staticdata2010.zip - Static data files used by the GW and SW programs; unchanged since 2010 data exchange.
* Rrca\_projections.zip – backup for projection of pd coordinate pairs from (lon,lat) nad83 to model projection (utm14 nad27 ft).

The staticdata2010.zip file includes three files (02.ibound, 40coords.dat and cty.flg) from commonprogs2004.zip that has been posted in previous years, plus four additional files (swrech.par, pumprech.par, monthlyfactorsbycounty.txt and Almenapdivs.txt), which are read by updated programs in gwprog2023.zip and swprog2023.zip. Batch files are used to run the programs.

Final data (to post in June):

* GWFor2023.zip - Groundwater data files (\*.rcg, \*.pmp, 2023.mi, 2023.agw).
* SWFor2023.zip - Surface water recharge files for the model (\*.rcg, 2023.asw).
* RRCS\_Overlap\_Groups\_2023.zip - supporting data for development of the groundwater input data files
* gwprog2023.zip - Program and data files to produce the groundwater files for 2023.

Batch file operation: pumprech 2023

* swprog2023.zip - Program and data files to produce the surface water recharge files for 2023. Batch file operation: swrech 2023

**Program changes for 2023: None**

**Program changes for 2022:**

(4/5/2023) Python script rrcaproj.py was used to transform geographical coordinates of groundwater pumping pds from (lat,long, NAD83) to model projection (UTM-14 NAD27 ft). The zipfile rrca\_projections.zip contains the script, input and output files for gwIrr and nonIrr pd coordinates, a Word file with notes on the script, and file RRCA\_coords\_test\_for\_2001.xlsx that compares projected coordinates for 2021 that were calculated with the script and with ArcGIS Pro (ESRI). Projected coordinates were imported into sheets coords\_gwIrr and coords\_nonIrr in file rrcs\_overlap\_groups\_for\_2022.xlsx.

(4/5/2023) Fortran scripts pumprechv12.for and swrech\_v3.for, which produce files for input to rrpp, were modified to specify the location of folder \static with a relative reference as follows (from pumprechv12.for):

c relative reference to folder path with static input files, esp. 40coords.DAT (16 MB)

ccc data chstatic /'\RRCA\EC\static\'/ !is the problem trying to run on 1drive?

data chstatic /'..\..\static\'/ !two levels down (for 2022)

**Program changes for 2021:**

-no changes for 2021 data.

**Program changes for 2020:**

Programs pumprechv12 and swrechv3 are the same as before with the exception that output arrays for pumping (\*.pmp), return flow (\*.rcg and \*.rcs) and irrigated area (\*.agw and \*.asw) are written in vector format (a single column), consistent with files from Colorado and Nebraska.

**Program changes for 2019:**

No program changes were made for calculations. However, program pumprechv11 was superseded by pumprechv12. Program changes were to (a) write YYYY.agw file with format (f6.1) instead of format (f326.1) and (b) write diagnostic output as two separate files authacresYYYY.out and placeofuseYYYY.out.

**Program changes for 2017:**

The program used previously to produce groundwater pumping input files, pumprechv10, has been superseded by pumprechv11 (.exe and .for files). Changes were made primarily to expand diagnostics written to text file authacresYYYY.out to help track down reporting errors, with a few to avoid compiler grumbling; but neither type of change should have any effect on the model input files written by the program.

For the final update in June 2019, output formatting was modified in programs pumprechv11 and swrechv3 to more clearly define summary output to files pumprech\_check2017.out (written by pumprechv11) and swrech\_check2017.out (swrechv3); calculations in both programs remain otherwise unchanged from the previous version.

**Program changes for 2016:**

Program pumprechv10 and swrechv3 were both modified slightly in order to refer to static files in folder \RRCA\EC\static\; program pumprechv10 was superseded by purmprechv11.

A recurring problem noted by Willem in the past is that for a relatively small number of points of diversion, their overlap groups groups are not associated with authorized place of use. This problem was explained in 2014 as a result of changes to the water rights database that occurred between the time whe overlap groups were defined, which is always near the end of the calendar year of water use (circa December 19) and the time when the database is queried in the following year (April 1 and 5 this year for preliminary data).

The program pumprechv10 was modified to build a list of such wells, and then placing the missing irrigated area and return flow in the cells corresponding to the associated points of diversion. The program pumprechv10 is a modified version of pumprechv9, last used to produce the pumping data for the April 15, 2015 preliminary data exchange.

The batch file and program previously used to produce groundwater data files (pumprechv9) was modified to expand a diagnostics output file but otherwise remains unchanged. The batch file and program used to produce surface water data files (swrechv3) remain unchanged from the April 15, 2011 preliminary data exchange.

The program used to produce groundwater data files, pumprechv9, is a modified version of pumprechv8 that was used for the 2013 final data exchange. It was modified only to expand the diagnostics output file AuthacresYYYY.out to show total groundwater irrigated area in each cell as authorized irrigation tracts are accumulated, but otherwise has no effect on output. The groundwater batch file pumprech now runs pumprechv10. The year is given as a command line argument. The Almena District reported no delivered water for 2015 or 2017, so that the Almena factor, the groundwater-exclusive irrigation area as a fraction of total irrigated area in the Almena District, is equal to 1 for 2015 and 2017.

Program changes in 2010 eliminated the need to create separate copies of the programs and static data files for each year’s data exchanges. The program pumprechv8 was revised in 2011 to calculate distances between points of diversion and places of use, and write the distances to AuthacresYYYY.out, and to a summary of reported irrigated area by grid cell, file acresgridYYYY.dat.