RRCA futures (average conditions): transmittal notes

Sam Perkins
Kansas Department of Agriculture, Division of Water Resources
July 18, 2011

Source of Figs. 5-8: Excel files by Angela Schenk, Spronk Water Engineers as follows:

Fig. 5: Figure5.xlsx, sheet data_Fig.5
NE: year (col. A) vs. sum of gw-exclusive and commingled irrigated area (col. F), sum (cols. E + D)
KS: year (col. A) vs. gw-exclusive irrigated area (col. C)

Fig. 6: Figure6.xlsx, sheet RepubR_NE, graph at V28
NE gw pumping: col. E

Fig. 7: Figure7.xlsx, sheet NE_depletions, graph at H9
historical: year (col. A) vs. depletion (col. B)
projected: year (col. D) vs. depletion (col. E)

Fig. 8: Figure8.xlsx, sheet Fig 8
gwirrig, inches, col. M based on gw pumping (col. E) and gwex area (col. F)

Procedures

rrca data file setup:

From a root folder, e.g. rrca, expand file rrca_model_data.zip to the following folders:

bgn1940	folder for running preprocessor rrppf_v520 for historical years beginning in 1940
bin	executable files; source folders
data	input to preprocessors; includes folders /co /ks /ne for each state's pumping and recharge data
data0	static input to preprocessors
et	evapotranspiration input data files for historical years
flags	model grid data selection masks
futures_avg	folder for projecting Nebraska pumping impacts 2009-2059 under average conditions
static	static input to mf2k

Summaries by state

Source: RRCA model input data (files in folders data/co, data/ks and data/ne)
Assembly: run tabulate_rrpp_data in bin/ as follows:

Output (written to data/tabulate):
Summary for each state: written to standard output (file tabulate_rrpp_data.log);
Summary within Republican R Basin for each state: written to file rrpp_summary.out.

Program tabulate_rrpp_data.for (source in bin\src\sam\tabulate) reads mask file RepubBsn.flg (in flags folder)
to select pumping and irrigation area within the Republican River basin. Run from folder data/ as follows:

```
..\bin\tabulate_rrpp_data tabulate\tabulate_rrpp_data.inp > tabulate\tabulate_rrpp_data.log
```

RRCA preprocessing program rrpp produces pumping and recharge input files for mf2k model runs. Version rrppf_v520
summarizes model grid data for precipitation, recharge, pumping and irrigated area that are used to generate the mf2k
input files. Run for historical period 1940-2009 from folder bgn1940/ as follows:

```
..\bin\rrppf_v520 rrpp\1940-2009_v520.par  > rrpp\1940-2009_v520.log
```

The input parameter file 1940-2009_v520.par includes the command FLAGS_AREA that specifies a summary of data within the Republican River
basin in Nebraska, written to file rrpp\1940-2009_v520.REP. The command FLAGS_AREA is part of an extended set of commands in rrppf_v520,
a modified version of the RRCA preprocessor rrpp.

Depletions of Republican R streamflow above Guide Rock, NE:

Impact of NE pumping on computed baseflow at each accounting point is given by the difference in computed baseflow
between a historical run (with all states' pumping and imported water included) and a scenario with no NE gw pumping.

Historical impacts (1960-2008):

Historical impacts for years 1960-2008 as shown in Fig. 7 are based on a 12p model run for years 1918-2000 and 12s
model runs for years 2001-2008, where the 12p and 12s models are versions distinguished by a correction to the stream
model network as described on the RRCA website at http://www.republicanrivercompact.org. Computed impacts based on RRCA
model runs can be found on the RRCA website for years 1980-2000 at http://www.republicanrivercompact.org/v12p/html/12p.htm,
and for years 1998-2007 at http://www.republicanrivercompact.org/2007/html/1998-2007.html. These pages are publicly accessible
for downloading from the rrca website. Impacts for 2008 are restricted for public access because they have not yet been
approved by RRCA.

Projected impacts (2009-2059):

File setup: Expand file rrca_futures_avg.zip from the same root folder in which the file rrca_model_data.zip was expanded
to produce folder futures_avg and its subfolders.

Projected conditions: Subfolder doc contains documentation of hydrologic conditions averaged
over years 1959-2008 and pumping conditions averaged over years 2003-2008 under which the projection was made.

Running the model: the batch file run_future_2009-2059_av5908_gw0308.bat was run to set up the files for the projected
conditions and to make the model runs, including execution of pre- and postprocessors. Commands associated with file setup
do not need repeating and have been commented out, but are retained to document conditions for the projections. The batch
file can be used to execute the pre-processors (makeetavg, mketff and mkstrff_ac), Modflow (mf2k) and the postprocessor (acct_base)
to calculate the impacts, written to file NE_impacts_2009-2059_Av5980_gw0308.htm in folder impacts_base.