

06853020 Republican River at Guide Rock, Nebr.

2006 Water Year USGS Record Review

GENERAL: The USGS Nebraska Water Science Center appreciates the opportunity to review this streamflow discharge record for the Nebraska Department of Natural Resources (NDNR). The discharge record is acceptable for publication by the USGS and addition to the NWIS database. The reviewer found the record to be much improved over the previous year. The comments below illustrate opportunities to improve future streamflow discharge records and are offered in a constructive context.

A complete record and all discharge record components required to review the record were delivered to the USGS by the NDNR. The Data Collection Platform (DCP) supplied a complete satellite telemetry record to the USGS ADAPS database. The discharge record included notations that the record had been completely worked and checked by NDNR personnel.

Recorder corrections and shifts to the stage discharge relationship were entered into ADAPS as compiled by NDNR and the resulting computations were compared to those generated by the NDNR WISKI software package. The NDNR and USGS collaborated on identified record computation errors. ADAPS and WISKI produced records that were essentially identical given a few differences in how these software packages handle rounding and significant figures.

* **MEASUREMENTS:** Measurements were almost always complete and nearly all of last year's comments were addressed. As noted last year, the practice of machine printing station number, station name, date, and party, while providing a neat and attractive appearance, violates the concept of original field data. Discharge measurement front sheets should be filled out in their entirety in the field without erasures or revision. Measurement No. 301 illustrates the confusion that erasures can apply to the integrity of the document. Outside gage heights were erased and contributed to the miss application of the gage height correction that was caught and corrected by the record checker.

Discharge measurement note issues that still require attention include:

- The "Computed by" and "Checked by" fields were not completed on any measurement note.
- * • The "meter number" was not completed on any measurement. If a problem is discovered with a particular velocity meter, it will be problematic to certify which measurements are affected, thus calling all measurements into question.

- ✱ • "Type of meter" should be listed as "Pygmy Std. 2" along with the rating date "6/1999". Meters that are not procured from the USGS Hydrologic Instrumentation Facility should not use Standard Rating No. 2.

✱ **Is NDNR consistently purchasing their meters from USGS Hydrologic Instrumentation Facility?** The Standard Ratings were developed from meters acquired by the USGS, whereas the meters offered for sale by other vendors are often those rejected by HIF and therefore are likely to fall outside of the rating population. These other meters can be accurately rated, but they must be rated on an individual basis. I suspect that the answer is that it is a combination of cups and meters acquired from the USGS and other vendors, so this is an issue that the NDNR should clarify to satisfy to itself that the meters being used are accurate.

- Only one observation of the Point-of-Zero-Flow (PZF) was made during the water year. PZFs are required to create shift curves capable of reaching stages equivalent to zero and near zero flow. All of the discharge measurements were made at stages that are ideal for observation of PZF.
- The "Flow" and "Cross Section" fields are not very informative. Examples of what might be appropriate would be "steady and uniform", "uniform firm sand with ripple bed", "Slightly irregular flow with wind against flow".
- The lack of copies of back sheets of the measurements made it impossible to determine if measurements had been made to specifications. Please provide copies of the entire measurement.

GAGE-HEIGHT RECORD: Gage height record was complete and in good order.

DATUM CORRECTIONS: Levels on August 23, 2006. Levels closed flat and verified reference mark elevations. The survey crew did turn down to the water surface or shoot on the bottom of the wire-weight per established procedures. The crew should include these shots in future level runs.

RECORDER CORRECTIONS: The recorder corrections for this record are applied correctly.

RATING: Rating No. 8.1 is no longer a valid model for the stage-discharge relationship at Republican River at Guide Rock. Cambridge NDNR staff did fairly well defining the stage/discharge relationship for this water year, given there were so few opportunities. However; there is still not enough measurement data to construct a new rating.

The V-shifts provided for the period prior to May should probably not attach to the pivot point at GH 2.2 ft after the measurements have moved to the left of RT-8.1.

I believe that once the measurements indicate shifts to the left of the rating that the curves should stay to the left and define the general backwater conditions. I did not change this period because the gage height did not appear to change enough to warrant fixing the issue. I did, however, change the timing for the second set of V-shift curves so that they would be in effect during the first significant rise on May 9 (See attached sheet for corrections) and I hope that NDNR agrees to incorporate this action. This is the only change that I applied to the record computation.

It appears that NDNR has extended RT-8.1 down to accommodate the extremely low gage heights recorded during the last week of July. These computations looked reasonable and I incorporated the daily values provided into the USGS database. Please provide a copy of this new rating extension so we can implement the same. Any measurement that can be completed at or above 20 ft³/s is needed to redefine the stage-discharge relationship at this site.

COMPUTATIONS: Comparison of the NDNR record for 06853020 Republican River at Guide Rock with 06853500 Republican River at Hardy appears to be reasonable. Estimation of periods of flow affected by backwater from ice is reasonable. Records computed by ADAPS and WISKI shows that the computations are virtually identical with minor rounding differences.

All in all, this was a fairly good work up for the difficult hydrologic and geomorphic conditions. Due to the condition of the channel, this record is fair and any discharges above 80 ft³/s are poor. Good work!

Robert B. Swanson

Director, USGS Nebraska Water Science Center
February 19, 2007

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCES

STATION NUMBER 06853020 Republican River at Guide Rock, Nebr. SOURCE AGENCY USGS STATE 31 COUNTY 181
LATITUDE 400351 LONGITUDE 0981951 NAD83 DRAINAGE AREA 22100.00 CONTRIBUTING DRAINAGE AREA 14610.00 DATUM 1616.15 NGVD29
Date Processed: 2007-02-19 22:01 By rswanson

| Rating STGQ # 8.1 | | SHIFT CURVES | | | | | | | | | | | |
|------------------------------|-----|--------------------------------------|-------|--------------------------------------|-------|--------------------------------------|-------|--------------------------------------|-------|--------------------------------------|-------|--------------------------------------|-------|
| | | 2006 Water Year | | | | | | 2006 Water Year | | | | | |
| STARTS | AGE | DD 1, Discharge FROM THE DCP, IN cfs | | DD 1, Discharge FROM THE DCP, IN cfs | | DD 1, Discharge FROM THE DCP, IN cfs | | DD 1, Discharge FROM THE DCP, IN cfs | | DD 1, Discharge FROM THE DCP, IN cfs | | DD 1, Discharge FROM THE DCP, IN cfs | |
| | | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT | INPUT | SHIFT |
| PRV: 2005/09/19 18:10:00 CDT | A | 2.51 | 0.02 | 3.20 | 0.00 | 4.02 | -0.12 | 2.51 | 0.02 | 3.20 | 0.00 | 4.02 | -0.12 |
| 1 2005/10/01 00:00:00 CDT | L | 2.51 | 0.04 | 3.20 | 0.00 | 4.02 | -0.12 | 2.51 | 0.04 | 3.20 | 0.00 | 4.02 | -0.12 |
| 2 2005/10/04 08:00:00 CDT | W | 2.50 | 0.04 | 3.20 | 0.00 | 4.02 | -0.12 | 2.50 | 0.04 | 3.20 | 0.00 | 4.02 | -0.12 |
| 3 2005/11/01 09:15:00 CST | W | 2.55 | 0.08 | 3.20 | 0.00 | 4.20 | -0.12 | 2.55 | 0.08 | 3.20 | 0.00 | 4.20 | -0.12 |
| 3.2 is pivot point. | | | | | | | | | | | | | |
| 4 2005/12/14 09:15:00 CST | W | 2.76 | 0.06 | 3.20 | 0.00 | 4.02 | -0.12 | 2.76 | 0.06 | 3.20 | 0.00 | 4.02 | -0.12 |
| 5 2006/01/06 08:30:00 CST | W | 2.74 | 0.03 | 3.20 | 0.00 | 4.02 | -0.12 | 2.74 | 0.03 | 3.20 | 0.00 | 4.02 | -0.12 |
| 6 2006/02/06 09:10:00 CST | W | 2.80 | 0.02 | 3.20 | 0.00 | 4.02 | -0.12 | 2.80 | 0.02 | 3.20 | 0.00 | 4.02 | -0.12 |
| 7 2006/03/06 11:55:00 CST | W | 2.83 | -0.01 | 3.20 | 0.00 | 4.02 | -0.12 | 2.83 | -0.01 | 3.20 | 0.00 | 4.02 | -0.12 |
| 8 2006/04/04 12:00:00 CDT | W | 2.97 | -0.07 | 3.20 | 0.00 | 4.02 | -0.12 | 2.97 | -0.07 | 3.20 | 0.00 | 4.02 | -0.12 |
| 9 2006/05/03 11:00:00 CDT | W | 3.02 | -0.11 | 3.20 | 0.00 | 4.02 | -0.12 | 3.02 | -0.11 | 3.20 | 0.00 | 4.02 | -0.12 |
| 10 2006/05/03 12:00:00 CDT | W | 3.02 | -0.11 | 4.52 | -0.53 | 5.00 | -0.53 | 3.02 | -0.11 | 4.52 | -0.53 | 5.00 | -0.53 |
| 11 2006/05/10 11:35:00 CDT | W | 3.02 | -0.11 | 4.52 | -0.53 | 5.00 | -0.53 | 3.02 | -0.11 | 4.52 | -0.53 | 5.00 | -0.53 |
| 12 2006/05/31 06:00:00 CDT | W | 3.02 | -0.11 | 4.52 | -0.53 | 5.00 | -0.53 | 3.02 | -0.11 | 4.52 | -0.53 | 5.00 | -0.53 |
| 13 2006/06/07 15:00:00 CDT | W | 2.66 | 0.06 | 4.52 | -0.53 | 5.00 | -0.53 | 2.66 | 0.06 | 4.52 | -0.53 | 5.00 | -0.53 |
| 14 2006/07/13 09:00:00 CDT | W | 2.67 | 0.14 | 4.52 | -0.53 | 5.00 | -0.53 | 2.67 | 0.14 | 4.52 | -0.53 | 5.00 | -0.53 |
| 15 2006/07/31 13:10:00 CDT | W | 3.03 | -0.01 | 4.52 | -0.53 | 5.00 | -0.53 | 3.03 | -0.01 | 4.52 | -0.53 | 5.00 | -0.53 |
| 16 2006/08/07 15:00:00 CDT | W | 2.97 | 0.02 | 4.52 | -0.53 | 5.00 | -0.53 | 2.97 | 0.02 | 4.52 | -0.53 | 5.00 | -0.53 |
| 17 2006/08/22 14:00:00 CDT | W | 2.88 | 0.08 | 4.52 | -0.53 | 5.00 | -0.53 | 2.88 | 0.08 | 4.52 | -0.53 | 5.00 | -0.53 |
| 18 2006/09/06 12:00:00 CDT | W | 2.41 | 0.18 | 4.52 | -0.53 | 5.00 | -0.53 | 2.41 | 0.18 | 4.52 | -0.53 | 5.00 | -0.53 |
| NXT: 2006/10/03 10:30:00 CDT | W | 2.43 | 0.13 | 4.52 | -0.53 | 5.00 | -0.53 | 2.43 | 0.13 | 4.52 | -0.53 | 5.00 | -0.53 |