

## South Fork Elkhorn River near Ewing, Nebraska 06798000

### LOCATION

#### *Latitude and Longitude*

42.24127, -98.39834

#### *Road Log*

On right bank, 7 feet downstream and 80 feet shoreward from bridge on county highway, 2.9 miles southwest of intersection with U.S. Highway 275 on Wellington Road in Ewing and 5.5 miles upstream from mouth.

### Equipment Details

#### *Recording Gage*

The current recorder is a Water Logger H-522+ as primary recorder situated in a 2 foot x 2 foot stainless steel shelter. The gage orifice is an OTT radar gun on the right downstream portion of the bridge.

#### *External Gage*

The reference gage is the wire weight gage mounted on the downstream handrail of the bridge near Station 90. Elevation of the check bar is 15.36 feet as found by Levels as of October 25<sup>th</sup>, 2022.

#### *Benchmark and Reference Marks*

RM #1, RM #2, RM #6 and RP #1 destroyed.

**RM #3** is top 1¼ pipe protruding 0.5' above ground in fence line 216' right of right abutment and 39' upstream from centerline of road. Levels October 25<sup>th</sup>, 2022 indicated 9.50' above gage datum.

**RM #4** (basic) is standard bronze tablet in stream ward end of right downstream wingwall. Levels October 25<sup>th</sup>, 2022 at elevation show 14.88' above gage datum.

**RP #2** is head of ½ inch bolt set horizontally in downstream handrail located 54' left of right abutment and about 6' left of wire weight gage. Levels October 25<sup>th</sup>, 2022 at elevation 17.50'.

**RM #5** is a chiseled "x" in northeast gage house leg. Levels October 25<sup>th</sup>, 2022 at elevation 11.21'.

RM #6 is a chiseled "x" on horizontal 12" x 2" channel iron brace at right U.S. abutment. Levels April 1, 2014 at elevation 12.25'. As of levels conducted on June 26, 2019, this reference mark is **destroyed**.

**WWCB** is located at station 90 on the downstream handrail of the bridge. Levels October 25<sup>th</sup>, 2022 have the WWCB at elevation 15.36' stage.

- Based on levels error on October 1, 2020, the gage was operated from December 22, 2020, until October 25, 2022, with the incorrect WWCB stage of 15.56 feet. Users calculating water surface elevations during this period should subtract 0.20-feet from stage measurements.

On April 1, 2014, datum of gage was surveyed at elevation 1883.595 feet (NAVD88) mean sea level.

## Hydrology

### *Drainage Area*

314 square miles approximately, of which about 190 square miles contributes directly to surface runoff into the stream.

### *Channel and Control*

The streambed is composed of fine shifting sand, control is not well defined. One channel can be expected at all stages, but bars and shallow will develop at low stages. Both banks are covered with grass and willows and are not subject to frequent overflow. The channel through the gage reach is straight below bridge. Flows may be affected by a channel realignment constructed in the spring of 1987 located about ½ mile downstream. High flows have a slight angle of flow.

### *Discharge Measurements*

Normal low flows can be measured by wading in the vicinity of the gage. High flows can be measured from the bridge. High flows can be measured from upstream side or downstream side of bridge, depending on the amount of debris. Maximum safe wading stage in the vicinity of 4.5 feet stage.

### *Floods*

As of 2022, the National Weather Service lists the following flood states and stage:

|                      |          |
|----------------------|----------|
| Action Stage         | - 8.50'  |
| Flood Stage          | - 11.00' |
| Moderate Flood Stage | - 13.00' |
| Major Flood Stage    | - 15.00' |

### *Extremes for Period of Record*

Peak discharge 6,230 cubic feet per second June 14, 2010, gage height 7.77 feet; minimum daily discharge 6.1 cubic feet per second December 5, 2016 (Ice affected).

### *Point of Zero Flow*

In WY2021 the PZF was measured at 0.85 feet, in WY2022 the PZF was measured at 0.95 feet.

### *Winter Flow*

Partial to complete ice cover during winter months. Minimum daily flows usually occur during ice conditions in extreme cold periods in winter.

### *Regulation and Diversions*

Diversions, if any, are not significant. There is no manmade regulation of flow, however, the flow regime of most eastern sandhills streams is changing due to an accumulation of improved drainage channels for center pivot farming practices that tend to increase overland runoff. Constructed drainage channels of wetlands areas are increasing.

### *Accuracy*

Discharge measurements will normally be made every four weeks since the stream is of the shifting sandy nature. Stream tends to scour significantly if we have any extended high flows. Record accuracy is considered FAIR except periods of ice affect when accuracy is considered poor.

### **Establishment and History**

Established by the U. S. Geological Survey on July 2, 1947. July 2, 1947 to November 9, 1948: Staff gage on Highway 108 Bridge at southeast city limits of Ewing.

November 10, 1948 to September 30, 1953: Water stage recorder in cube type wooden shelter on 24 inch CMP well on downstream end of bridge pier.

October 1, 1953 to August 15, 1960: Station discontinued no record during this period.

August 16, 1960 to May 30, 1962: Water stage recorder in 48 inch CMP well and shelter on right bank 20 feet upstream from original site.

May 31, 1962 to June 13, 1963: Staff gage on right bank 20 feet upstream from bridge on U.S. Highway 275 and about 300 feet downstream from original site.

June 14, 1963 to September 30, 1972: Water stage recorder by manometer in 48 inch CMP shelter on right bank 20 feet upstream from bridge on U. S. Highway 275 and about 300 feet downstream from original site. All above gages were to the same datum. The records were published as "at Ewing" 1947-53 and 1960-72.

October 1, 1972 to September 21, 1977: Station discontinued. No record during this period.

On September 22, 1977, the gage was moved approximately 4.5 miles upstream and established at the present site and at a different datum than previous gages.

September 22, 1977 to August 7, 1979: Water stage recorder operated by manometer in 48 inch CMP shelter on right bank 10 feet downstream from wooden bridge at present site.

Records were published beginning October 1, 1977.

August 8, 1979 to December 5, 1979: Staff gage at right bank 70 feet downstream from wooden bridge, razed during the period and replaced with a concrete bridge. Gage datum was maintained.

On December 6, 1979, the present gage was established and gage datum was maintained.

On October 1, 1982, the gaging station operation was transferred to the Nebraska Department of Natural Resources (formerly the Department of Water Resources).

On April 27, 1995, the USGS removed their servo-manometer and gas purge system. A DNR (formerly DWR) servo-manometer and gas purge system was reinstalled on June 6, 1995.

On June 11 and 12, 1997, gage house moved about 20 feet north on new steel frame. Obsolete mercury servo-manometer was removed and a G2-25 manometer installed.

On May 20, 2005, a Design Analysis H-510 logger/encoder and H-222DASE GOES transmitter were installed.

On October 11, 2007, Water Logger H-510 was removed and Design Analysis H-350XL data logger was installed and interfaced with the H-222DASE GOES transmitter. A-71 and G2-25 were removed.

Old WWCB – surveyed at Elevation 13.30 feet above gage datum before it removed on August 30, 2010.

On July 22, 2013, the SafePurge system and Nitrogen tank were removed and a Waterlog H-3551 Bubbler with dryer was installed.

July 08, 2020 datum correction was performed, which added 2.00 feet to the wire weight check-bar. This resulted in a new wire weight check bar stage of 15.36 feet and a new datum of 1881.595 feet (NAVD88). Based on a levels error on October 1, 2020, the gage was operated from December 22, 2020, until October 25, 2022, with the incorrect WWCB stage of 15.56 feet. Users calculating water surface elevations during this period should subtract 0.2 feet from stage measurements. Points of Zero Flow have been corrected to account for this error as well.

On July 20, 2020 the bubbler orifice was removed and an OTT radar gun (S/N: RLS-451795) was installed into the Waterlog encoder.

## Revision History

Original prepared by J.A. Anderson 12/27/61

Revised by E.K. Steele 09/20/66

Revised by H.D. Stephens 09/27/77

Revised by H.D. Stephens 12/06/79

Revised by Wm. H. Birkel 02/04/86

Revised by Wm. H. Birkel 04/26/88

Revised by Wm. H. Birkel 10/11/88

Revised by Wm. H. Birkel 02/06/90

Revised by Wm. H. Birkel 03/05/91

Revised by Wm. H. Birkel 02/25/92  
Revised by Wm. H. Birkel 08/16/95  
Revised by Wm. H. Birkel 07/22/96  
Revised by Wm. H. Birkel 05/10/97  
Revised by Wm. H. Birkel 06/04/98  
Revised by Wm. H. Birkel 03/02/00  
Revised by Wm. H. Birkel 03/02/00  
Revised by Wm. H. Birkel 03/20/01  
Revised by Wm. H. Birkel 04/21/03  
Revised by Wm. H. Birkel 04/13/04  
Revised by Wm. H. Birkel 06/10/05  
Revised by Wm. H. Birkel 04/06/07  
Revised by Wm. H. Birkel 06/16/08  
Revised by Wm. H. Birkel 04/13/09  
Revised by Wm. H. Birkel 04/13/10  
Revised by J. A. Marburger 03/01/11  
Revised by J. A. Marburger 04/23/12  
Revised by Wm. H. Birkel 03/25/13  
Revised by Wm. H. Birkel 01/02/14  
Revised by Wm. H. Birkel 07/21/15  
Revised by Wm. Birkel 04/06/16  
Revised by M. Wieseler 01/27/17  
Revised by Grant Beckman 11/20/2018  
Revised by A. Houser 10/07/2019  
Revised by A. Houser 09/30/2021  
Revised by Wm. H. Birkel 11/02/2022