

Union Creek at Madison, Nebraska 06799230

LOCATION

Latitude and Longitude

41.83153, -97.4549

Road Log

On the left bank 12' downstream from the bridge on old U.S. Highway 82 (Main Street of the City of Madison).

Nearby Features

Equipment Details

Recording Gage

Gage equipment recording instruments currently consist of a Sutron SL3 encoder with a Dome antenna, hooked up to a HACH RLS Radar Sensor for real time data retrieval on DNR's secure website.

External Gage

The base gage is a Type A wire weight gage owned by the DNR installed on September 1, 2016. Instruments are set to agree with the wire weight gage readings (29.60' levels of May 11, 2022).

Bench Mark and Reference Marks

The wire weight checkbar reading is 29.60' (levels of May 11, 2022).

RM #1 is a chiseled square on upper stream ward part of concrete wing wall on left downstream end of bridge. RM #1 is used as the origin for station levels. Elevation 27.29' above gage datum (levels May 11, 2022).

RM #2 is a chiseled square on upper stream ward part of concrete wing wall on left upstream end of bridge. Elevation 27.32' above gage datum (levels May 11, 2022).

RM #3 is a chiseled arrow on steel framework at southeast corner of gage house step. Elevation 26.09' above gage datum (levels May 11, 2022).

Zero gage datum is elevation 1550.277' above mean sea level, National Geodetic Vertical Datum of 1988. The wire weight check-bar MSL elevation is 1579.87'.

Hydrology

Drainage Area

173.76 square miles (111,296 acres).

Channel and Control

The channel below the gage has been dredged repeatedly of silt accumulation and is fairly straight. This is required by the Corps of Engineers and the City of Madison contract. The low banks have a very heavy weed and grass growth by late summer. The low water control is a trash riffle a few feet downstream from the bridge. Minor shifting will occur due to changes in amount of trash and leaves on the control. Taylor Creek joins Union Creek just upstream of the bridge. The confluence of Union Creek and Taylor Creek and time of travel differences between the two basins from flood flows usually causes a “double hump” in flood flow peaks separated by 6 to 14 hours depending on magnitude and timing of storm.

Discharge Measurements

Low and medium flows may be measured by wading in the vicinity of the gage. Medium and high flows may be measured from the bridge walkway at the gage site.

Floods

Chronological orders of largest floods for period of record in order of stage magnitude are as follows:

Rank	Flood Event	Peak Stage	MSL Elevations	Instantaneous Peak Flow, cfs
1	June 16, 1990	25.72'	1,575.42	15,100
2	July 9, 1993	25.27'	1,574.97	13,700
3	March 13, 2019	24.41'	1,579.88	11,816
4	May 30, 2007	23.26'	1,574.02	6,630
5	June 4, 1999	23.20'	1572.90	8,290

According to USGS peak-flow frequency relations and elevations (Water Resources Investigation Report 99-4032), the statistical flood recurrence from gaging records is as follows:

Recurrence Intervals				
5 Years	10 Years	50 Years	100 Years	500 Years
6,740	12,200	33,300	46,879	92,090

As of 2022, the National Weather Service lists the following:

Action Stage	= 18.00'
Flood Stage	= 20.00'
Moderate Flood Stage	= 23.00'
Major Flood Stage	= 25.00'

Extremes for Period of Record

Peak discharge 15,100 cubic feet per second June 16, 1990, gage height 25.72 feet;
 minimum daily discharge 2.0 cubic feet per second August 28, 1991.

Point of Zero Flow

Variable, may vary considerably due to temporary silting during periods of low flow.
 Chronological orders of PZF measurements taken are:

Date	PZF Stage	Remarks
09/08/2000	5.27'	
09/12/2001	5.69'	
08/16/2002	5.95'	
Water Year 2003	N/A	No PZF's Taken
08/26/2004	6.00'	
07/17/2005	5.96'	
08/21/2006	6.37'	
08/29/2007	6.13'	
08/25/2008	6.22'	
07/31/2009	6.32'	
08/12/2010	6.32'	
09/22/2011	6.37'	
07/20/2012	6.52'	
09/17/2013	6.50'	
08/06/2014	6.67'	
08/27/2015	6.70'	Good PZF Reading
09/01/2016	6.73'	
09/13/2017	6.81'	
9/11/2018	6.67'	
Water Year 2019	N/A	No PZF's Taken; Flood Event
Water Year 2020	4.66'	Declared Drought
Water Year 2021	4.84'	Declared Drought
Water Year 2022	4.89'	Declared Drought
Water Year 2023	5.64'	Changed low flow measurement location (est. 100' downstream) Declared Drought

Winter Flow

Usually there is no ice at the bridge or below the gage for about a mile due to spring flow (groundwater contribution) from the lower reach of the Taylor Creek channel upstream of the gage. Union Creek above the confluence of Taylor Creek will completely freeze over.

Regulation and Diversions

Considerable diversion of summer flows by pumps for irrigation. Total irrigation diversions above gage consist of 20 water rights consisting of about 1300 acres with a total statutory rate of diversion of 18.6 CFS. Total irrigation diversions below gage consist of 17 water rights consisting of about 1600 acres with a total statutory rate of diversion of 20.6 CFS. Considerable flow changes may occur since Tyson Packing Plant at Madison switched from dumping lagoon water into Union Creek prior to 1999 to supplying 15 center pivots with irrigation water after 1999. After shake down and startup operation, this irrigation project (SID-25) ceased dumping lagoon water into Union Creek under normal operation. Eventually there should be some return base flow from this irrigation project into Union Creek as the water table responds.

Accuracy

Stage discharge relationship is subject to minor shifting, but good records can generally be obtained, including most winter periods because stream does not freeze at gagesite. However, City of Madison dredging of realigned channel below gage per their operations and maintenance agreement with Corps of Engineers and this will dramatically affect ratings for this site.

Establishment and History

Established by U. S. Geological Survey in cooperation with the Nebraska Department of Natural Resources in September 1978.

A Type A wire weight gage (probably owned by the City of Madison) was already installed on the downstream side of the bridge. No record of readings or date installed is known.

This wire weight is not currently used and was retired on September 1, 2016. It reads incorrectly and so is locked with a different padlock (key inside gage house).

On September 20, 1989, the USGS installed a USGS Stacom manometer with purge gas system, a USGS digital recorder and DNR Stevens A-71 graphic record all housed in a DNR 5' x 5' 11 gage steel Corps of Engineers type shelter.

The USGS operated the station and published the record until September 30, 1993. At that time, DNR took over full operation of the station and equipment including publication of the record.

On April 21, 1995, the USGS removed all of their equipment from the site, including Stevens digital recorder, Stacom manometer and purge gas controls.

DNR reactivated station operation on May 2, 1995, by installing a Fluid Data System G2-25 WaterGage manometer with SafePurge bubble rate controller and purge gas regulator. This action resulted from the termination of the USGS-DNR joint operation cooperative program for this site.

On June 17, 2004, an H-500XL Water Logger was installed to electronically log gage heights. Data is retrieved by a data card. With this addition, the A-71 now serves as an auxiliary recorder.

On July 13, 2005, a DCP satellite system was hooked up to retrieve data real time on the department's website and the WISKII program.

On June 4, 2007, we deactivated A-71 because it repeatedly hung up on reversals.

On May 19, 2010, the fluid data system G2-25 was deactivated and removed. Also the H-331 was disconnected. Replacing the G2-25 and H-331 was a HACH RLS Radar Sensor connected to the H-500XL Water Logger. During June of 2011, the H-500XL Malfunctioned and

On June 20, 2011, it was replaced with an H-350XL Water Logger connected to the Hach RLS Radar Sensor.

On September 1, 2016 a new wire weight was installed 10' south of the old wire weight. The new wire weight check bar reading is 29.60' above gage datum.

On August 29, 2023 the Waterlog encoder was disconnected and removed. A Sutron SL3 encoder with a Dome antenna was installed at the site.

Cooperators

The City of Madison owns the old wire weight. The counter and dial are set to read stage to the city datum, which is 80' higher than gage datum. This wire weight is locked with a different padlock (key inside gage house). This wire weight is no longer utilized.

Revision History

Original description by M. Kubick

Revised by S.H. Hull 10/28/89

Revised by S. H. Hull 02/15/90

Revised by Wm. H. Birkel 08/21/95

Revised by K. Meikle 06/27/96

Revised by K. Meikle 04/17/97

Revised by G.H. Lindeman 04/09/98

Revised by Wm. H. Birkel 03/21/99

Revised by Wm. H. Birkel 02/23/00

Revised by Wm. H. Birkel 03/05/01

Revised by Wm. H. Birkel 03/13/02

Revised by Wm. H. Birkel 03/21/03

Revised by Wm. H. Birkel 03/22/04

Revised by Wm. H. Birkel 06/10/05

Revised by Wm. H. Birkel 08/02/07

Revised by Wm. H. Birkel 07/16/08

Revised by Wm. H. Birkel 03/31/09
Revised by Wm. H. Birkel 02/18/10
Revised by Wm. H. Birkel 03/08/11
Revised by Wm. H. Birkel 06/10/12
Revised by Wm. H. Birkel 10/24/13
Revised by Wm. H. Birkel 01/06/14
Revised by Wm. H. Birkel 11/13/15
Revised by Wm. H. Birkel 04/04/16
Revised by Matt Weiseler 12/08/16
Revised by Matt Weiseler 10/31/2017
Revised by Grant Beckman 11/20/2018
Revised by A. Houser 10/01/2019
Revised by Stjepan Figuric 11/07/2019
Revised by A. Houser 09/30/2021
Revised by A. Houser 11/08/2022
Revised by A. Houser 10/05/2023