

Aquarius and Nebraska Streamgaging

NEBRASKA

Good Life. Great Water.

DEPT. OF NATURAL RESOURCES

Aquarius National User Conference
August 26, 2024, Loveland CO

Outline

- Nebraska streamgaging overview
- History with Aquarius
- Transition to the cloud and WebPortal
- Applications demonstration
- My wishlist for the future

Nebraska Surface Water

- NeDNR field offices have about 30 employees, of which about 24 actively work with streamgages and Aquarius.
- Five field offices and one satellite office
- Program is statute-driven, and important for economic, environmental, and safety reasons
 - Interstate compact reporting and compliance
 - Administration during drought, and maintaining in-stream flows for species preservation
 - Flood monitoring

NeDNR tracks surface water information from many sources

- U.S. Geological Survey
- U.S. Bureau of Reclamation
- Canal companies
- Power districts
- Other states upstream
- Goal is to track every location impacting state surface water supply and movement

NeDNR operates and/or publishes several types of gages

- 100 canal or pump gages
- 120+ streamgages with annual published data
- One reservoir gage
- Pressure transducers in eastern basins—16
- Conducting a Pilot Program to install approximately 50 low-cost LoRaWAN transducers and radar gages
 - Smaller streams
 - Reservoirs
- We also track a couple of dozen weather stations
 - Temperature high/low,
 - Precipitation

Data Available

- On our Stations List
 - Links to USGS gages
- Real Time (WebPortal) website, all daily mean discharge from active gages
- In Aquarius, all daily mean discharge published by NeDNR and predecessor agencies
 - Hydrographic Reports
 - Biennial Reports
- Available via API, Realtime website, or from staff

History with Aquarius

- Interest in Aquarius began mid 2010s
- Took a very close look in 2017 and 2018
 - Temporary install on State of Nebraska virtual server
 - Important because we were looking for ability to recover from disaster within a couple of days.
 - Allowed real time backups of SQL Server
- Transitioned to Aquarius 2019

Immediate benefits

- Single source of truth
 - We still have data in folders on a share drive
 - However, all official data is uploaded to Aquarius
 - Much of the information in fields (latitude/longitude)
 - Custom tags (station type, station owner agency, field office)
 - Station description, paper field notes and measurements are all uploaded as documents
- Consistent grading, quality, approvals, and comments
- Real-time record working

Immediate benefits—2

- Support desk
- Update/upgrade cycle
- Persistent, patient, accommodating sales staff
 - Initial sales
 - Updates/upgrades

Moving to the cloud

- By 2022 we were having issues with downtime due to State of Nebraska OCIO centralized IT services/lack of Department access, especially during upgrade cycles
- Wanted more customization of our web presence
- Resolved by moving to cloud computing (software as a service), and adding WebPortal
 - Minimal impact on costs (by moving to PostgreSQL)
 - Can log in from anywhere

Stations List: Gateway to WebPortal



Streamgaging Stations List

Active NeDNR and USGS Stream Gages/Links to Gage Data

The list below provides data and graphics for active NeDNR and US Geological Survey gages, along with other records. For inactive NeDNR gage records, please contact James Williams at (402) 471-1026; or James.Williams@Nebraska.Gov. Clicking on the gage names will link directly to the NeDNR or USGS gage sites. To go to the NeDNR Real Time Water site click on <https://nednr.aquaticinformatics.net> For inactive USGS gage records, please refer to the USGS website <http://waterdata.usgs.gov/ne/mwis/rt>.

Unless otherwise marked, all data is provisional and subject to revision.

Source: Type: River Basin: Field Office:

Please be aware: Some of the stations listed below are only operated seasonally and the remainder of the stations that are operated throughout the year can be affected by ice conditions during the winter months; shifts and corrections are updated weekly.

Station Name	Station Number	Date Time	Stage	Discharge	Yesterday's Daily Avg.	Shift Date	Shift	River Basin	Type	Downstream	Storage	Yesterday's Storage Avg.	Field Office
Missouri River near Ponca - USGS	06479097							Missouri River	Stream	0			
North Platte River at Scottsbluff - USGS	06680500	08/20/2024 12:00 pm (UTC -06:00)	4.08 ft	285 CFS	287 CFS			North Platte River	Stream	0			Bridgeport
Missouri River at Blair - USGS	06609100							Missouri River	Stream	0			Lincoln
Hat Creek at Montrose - NeDNR	00062500	08/20/2024 10:00 am (UTC -07:00)	4.34 ft	0.13 CFS	0.14 CFS	07/05/2024	0 ft	White River	Stream	1500			Bridgeport
White River at Crawford - NeDNR	06444000	08/20/2024 11:15 am (UTC -07:00)	1.93 ft	13.09 CFS	13.05 CFS	07/26/2024	-0.01 ft	White River	Stream	2300			Bridgeport

WebPortal 1: Welcome screen

The screenshot displays the 'Nebraska NeDNR Real Time Water' web portal. The header includes the Nebraska Department of Natural Resources logo and the text 'NeDNR Real Time Water'. A navigation sidebar on the left lists various dashboards and tools. The main content area features a 'Welcome to Real Time Water!' message and a list of eight key features: Dashboards, Map, List, Data Set, Chart, Location, Alerts, Export, and Reports. On the right, there are three promotional tiles: 'Reported Rain throughout Nebraska' with the NeRAIN logo, 'Around the Water Cooler Podcast' with its logo, and 'Water Planning Throughout the State'. At the bottom, there are tiles for 'NeDNR YouTube' and a banner for 'Water Today Water Tomorrow'.

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NeDNR Real Time Water

Dashboards

- (f) Water Welcome!
- (a) Latest Maps
- Butte Gage Status
- Duncan Gage Status
- Grand Island Gage Status
- Instream at a Glance
- Long Pine Gage Status
- Louisville Gage Status
- Loup River Gage Status
- North Bend Gage Status
- Odessa Gage Status
- Overton Gage Status
- Vendel Gage Status

Map

List

Data Set

Chart

Location

Alerts

Export

Reports

Welcome to Real Time Water!

- Dashboards** allow you to access informative dashboards, such as gages that display instream rights. Please click the "i" in a circle icon to the left for a help guide.
- Map** shows locations and their values overlaid on a map. Click the globe icon to the left to be re-directed to a list with the latest stage, discharge, or voltage.
- List** displays all locations in a table format.
- Data Set** provides a summary of each station and its correlated data.
- Chart** displays a list of saved charts.
- Location** enables you to search for a particular location. Once a location is selected it will display a list of data sets available.
- Alerts** displays a list of alerts in the system.
- Export** enables you to export data from WebPortal.
- Reports** displays a list of published reports that can be downloaded as a PDF.

Reported Rain throughout Nebraska

The Nebraska Rainfall Assessment and Information Network (NeRAIN) is a program designed to get citizens involved with monitoring weather across the state.

Around the Water Cooler Podcast

The Nebraska Department of Natural Resources manages our most precious natural resource through sound partnerships, cooperation, and science-based decision making.

Water Planning Throughout the State

NeDNR YouTube

Water Today Water Tomorrow

WebPortal 2: Dashboards

Platte River at Louisville Instream Flow Requirements (06805500)

The Nebraska Game and Parks Commission has an instream water right in the lower Platte Basin with a priority date of November 30th, 1993. Depending on the month, water rights with a lower priority may need to be administered in order to maintain discharge rates for species preservation. The following discharge rates apply:

January

3,100 cubic feet per second

February through July

3,700 cubic feet per second

August

3,500 cubic feet per second

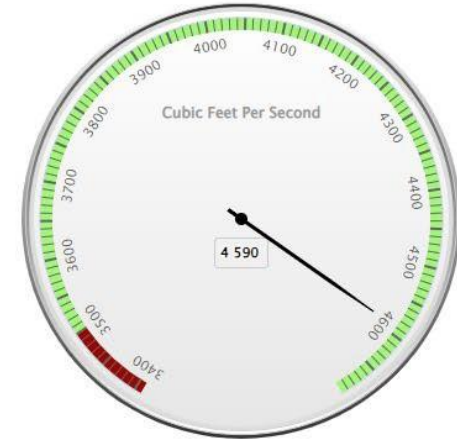
September

3,200 cubic feet per second

October through December

3,700 cubic feet per second

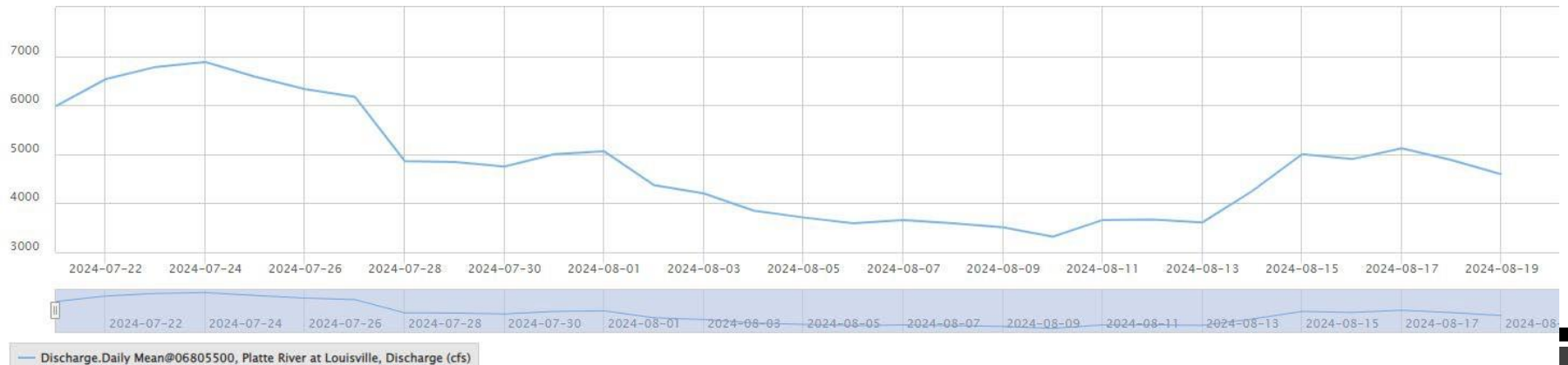
Louisville Instream Flow Dial



2024-08-19 00:00:00 (UTC-0-6:00)

If the dial is in the Red Zone, Daily Mean Instream flow conditions have not been met.

Louisville Daily Mean - last 30 days



WebPortal 3: Chart customization

NeDNR Real Time Water



WebPortal 4: Disclaimers

Compressed Export File will be compressed into a zip archive

Rounding Full Precision Round Data to Default Specification

Include Interpolation Types? Yes No

i Attention Public Users: 1) Data from the Nebraska Department of Natural Resources can be downloaded from this website. Data from other entities should be downloaded from the original source. 2) Typically, Discharge.Daily Mean from the NeDNR is fully QA / QC data. Other data may be raw or unprocessed.

 Download

NeDNR API—Download Only, no PW



https://nednr.nebraska.gov/lwipApi/swagger/docs/v1

api_key

Explore

Nebraska Department of Natural Resources API

AdminDams	Show/Hide	List Operations	Expand Operations
AdminFieldInvestigation	Show/Hide	List Operations	Expand Operations
AdminFloodplain	Show/Hide	List Operations	Expand Operations
AdminPwap	Show/Hide	List Operations	Expand Operations
AdminStreamGage	Show/Hide	List Operations	Expand Operations
AdminWaterRights	Show/Hide	List Operations	Expand Operations
AdminWaterUse	Show/Hide	List Operations	Expand Operations
AdminWells	Show/Hide	List Operations	Expand Operations
Dams	Show/Hide	List Operations	Expand Operations
StreamGage	Show/Hide	List Operations	Expand Operations

GET /api/v1/StreamGage/GetStationList

GET /api/v1/StreamGage/DailyMean

GET /api/v1/StreamGage/ReservoirStorage

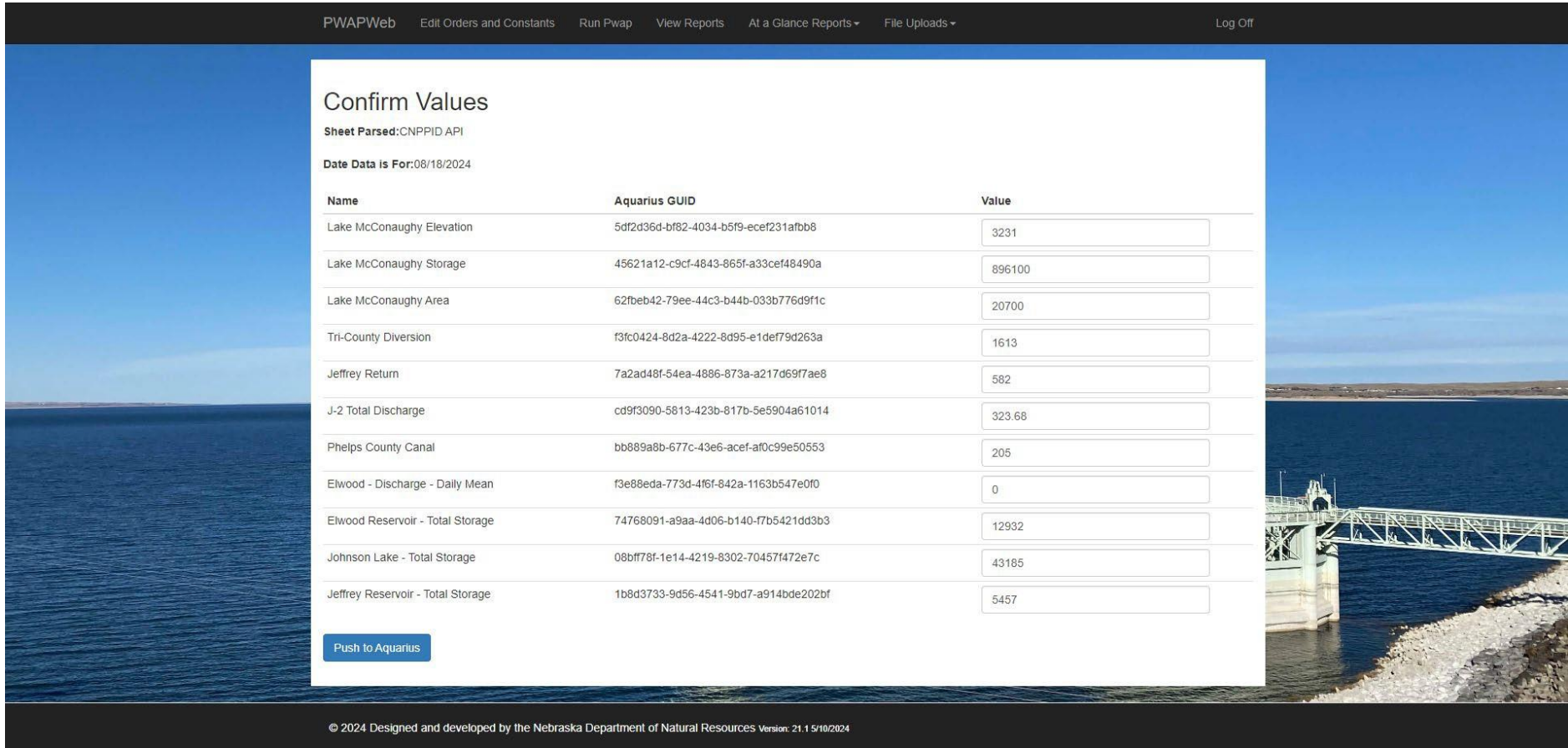
GET /api/v1/StreamGage/InstantaneousDischarge

GET /api/v1/StreamGage/InstantaneousStage

GET /api/v1/StreamGage/ShiftByStation

Platte Water Accounting Program 1

- Confirm data, edit, push to Aquarius



The screenshot displays the 'Confirm Values' interface of the Platte Water Accounting Program. The page features a dark navigation bar at the top with links for 'PWAPWeb', 'Edit Orders and Constants', 'Run Pwap', 'View Reports', 'At a Glance Reports', 'File Uploads', and 'Log Off'. The main content area is a white form titled 'Confirm Values' with the following details:

- Sheet Parsed: CNPPID API
- Date Data is For: 08/18/2024

Name	Aquarius GUID	Value
Lake McConaughy Elevation	5df2d36d-bf82-4034-b5f9-ecef231afb8	<input type="text" value="3231"/>
Lake McConaughy Storage	45621a12-c9cf-4843-865f-a33cef48490a	<input type="text" value="896100"/>
Lake McConaughy Area	62fbeb42-79ee-44c3-b44b-033b776d9f1c	<input type="text" value="20700"/>
Tri-County Diversion	f3fc0424-8d2a-4222-8d95-e1def79d263a	<input type="text" value="1613"/>
Jeffrey Return	7a2ad48f-54ea-4886-873a-a217d69f7ae8	<input type="text" value="582"/>
J-2 Total Discharge	cd9f3090-5813-423b-817b-5e5904a61014	<input type="text" value="323.68"/>
Phelps County Canal	bb889a8b-677c-43e6-acef-af0c99e50553	<input type="text" value="205"/>
Elwood - Discharge - Daily Mean	f3e88eda-773d-4f6f-842a-1163b547e0f0	<input type="text" value="0"/>
Elwood Reservoir - Total Storage	74768091-a9aa-4d06-b140-f7b5421dd3b3	<input type="text" value="12932"/>
Johnson Lake - Total Storage	08bf778f-1e14-4219-8302-70457f472e7c	<input type="text" value="43185"/>
Jeffrey Reservoir - Total Storage	1b8d3733-9d56-4541-9bd7-a914bde202bf	<input type="text" value="5457"/>

At the bottom of the form is a blue button labeled 'Push to Aquarius'. The footer of the page contains the copyright notice: '© 2024 Designed and developed by the Nebraska Department of Natural Resources Version: 21.1.5/10/2024'.

PWAP 2

PWAPWeb Edit Orders and Constants Run Pwap View Reports At a Glance Reports - File Uploads - Log Off

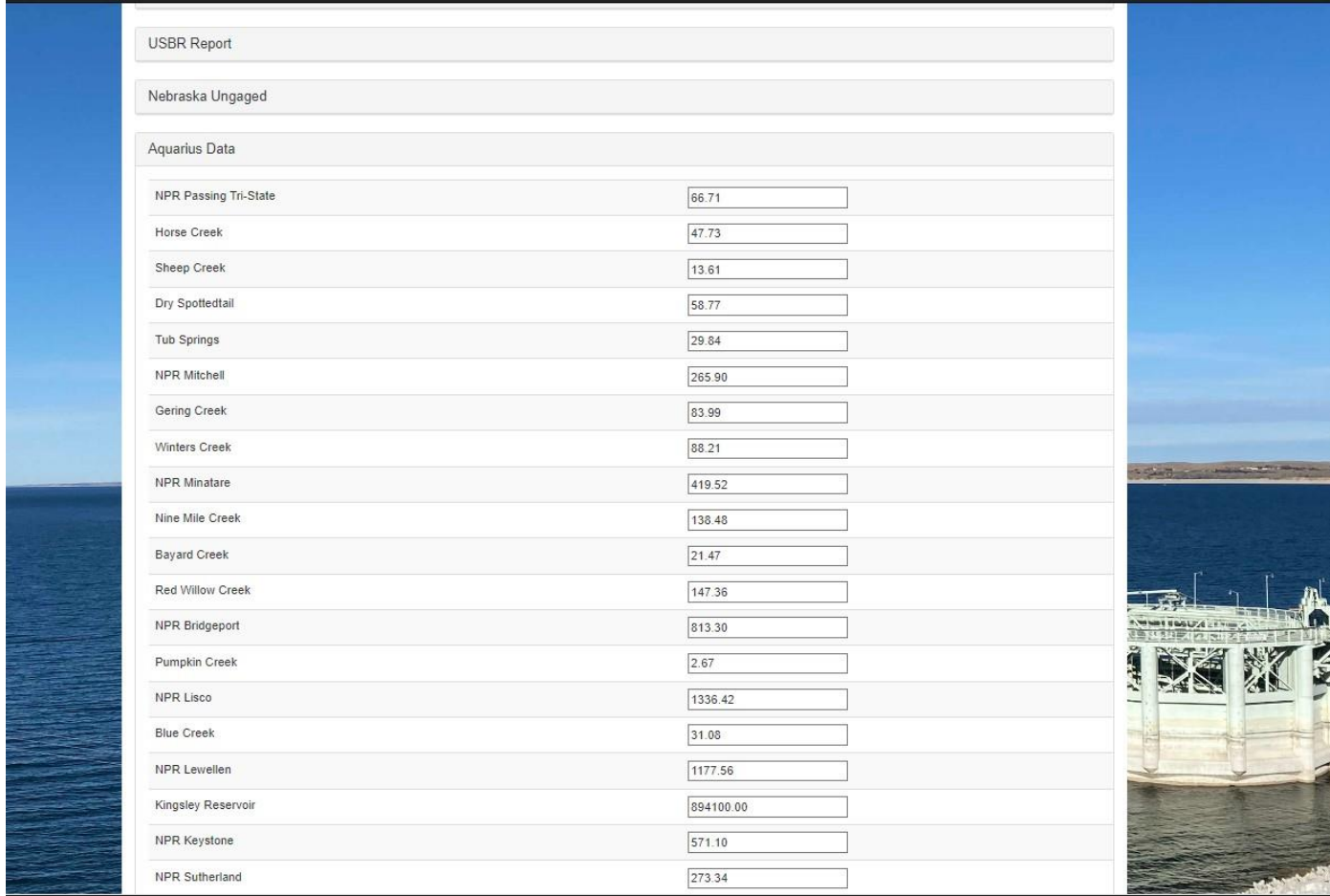
USBR Report

Nebraska Ungaged

Aquarius Data

NPR Passing Tri-State	<input type="text" value="66.71"/>
Horse Creek	<input type="text" value="47.73"/>
Sheep Creek	<input type="text" value="13.61"/>
Dry Spottedtail	<input type="text" value="58.77"/>
Tub Springs	<input type="text" value="29.84"/>
NPR Mitchell	<input type="text" value="265.90"/>
Gering Creek	<input type="text" value="83.99"/>
Winters Creek	<input type="text" value="88.21"/>
NPR Minatare	<input type="text" value="419.52"/>
Nine Mile Creek	<input type="text" value="138.48"/>
Bayard Creek	<input type="text" value="21.47"/>
Red Willow Creek	<input type="text" value="147.36"/>
NPR Bridgeport	<input type="text" value="813.30"/>
Pumpkin Creek	<input type="text" value="2.67"/>
NPR Lisco	<input type="text" value="1336.42"/>
Blue Creek	<input type="text" value="31.08"/>
NPR Levellen	<input type="text" value="1177.56"/>
Kingsley Reservoir	<input type="text" value="894100.00"/>
NPR Keystone	<input type="text" value="571.10"/>
NPR Sutherland	<input type="text" value="273.34"/>

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PWAP 3

PWAPWeb

Edit Orders and Constants

Run Pwap

View Reports

At a Glance Reports -

File Uploads -

Log Off

Edit Inputs for: 8/19/2024

Changing any of these inputs will only affect the calculations for this specific run!

ETO in the River

Orders - EA - Storage

Nebraska Report

Wyoming Report

USBR Report

Nebraska Ungaged

Aquarius Data

Constants

DSS Values

Platte Hydrologic Condition (from: <https://platteriverprogram.org/>):

Dry

Administration below NCorpe:

Yes

Report Comments:

check

Run Calculations

Cancel

State of Nebraska
 Department of Natural Resources
 Bridgeport Nebraska
 Analysis of Flow
 Kingsley Dam to Kearney
 24 Hour Average for 8/19/2024

cfs					Cumulative Storage Acre-Feet	
EA	Storage	Natural	Total			
**	0	663	1311	1973	Total Kingsley Outflow	
	0	10	561	571	North Platte River at Keystone	
	0	10	263	273	North Platte River at Sutherland	
	0	0	1016	1016	Sutherland Power Return	
	0	0	59	59	Platte River at Maxwell	1914
	0	130	452	582	*** Jeffrey Power Return	
	0	6	81	87	Platte River at Darr	
	0	0	24	24	Johnson Power Return	
	0	0	294	294	Platte River near Overton	
	0	0	396	396	Platte River at Kearney	
	0	0	895	895	Platte River at Grand Island	

Cumulative Diversion - Acre-Feet							
EA	Storage	Natural	Total	District	Natural	Storage	
**	0	0	20	20	Lisco Canal	1278	0
	0	653	750	1402	Sutherland Div - NPR	190921	164748
**	0	0	182	182	North Platte Canal	31769	226
**	0	0	71	71	K and L Canal	8556	0
**	0	0	88	88	Paxton - Hershey Canal	12656	0
**	0	2	69	71	Suburban Canal	11425	471
**	0	8	1584	1592	Tri-County Diversion	587188	118098
	0	0	0	0	Thirty Mile Siphon	0	0
	0	0	217	217	Golthenburg Canal	43601	1
	0	0	262	262	Dawson County Canal	47584	48
	0	0	0	0	Six Mile Canal	0	0
	0	46	40	86	Cozad Canal	8547	5205
	0	21	23	44	Orchard-Alfalfa Canal	4323	2120
	0	53	59	112	Thirty Mile Canal	12097	9724
	0	0	243	243	Kearney Power and Irr.	65896	0
	0	782	3608	4390	Total Diversions		

** Thirty Mile Canal reflects total diversion less spills for Orchard Alfalfa Canal.

Due to anticipated NDOT road construction, effective May 1 2021, flow values listed as Platte River at Cozad will now be computed and listed as Platte River at Darr.

*** Denotes Values for Previous Day

** Tri-County Storage

Department of Natural Resources

Accepted on:

NeRFF Project—Beatrice Example

NeRFF Nebraska Real-time Flood Forecasting

[Home](#)
[About](#)
[Contact](#)

Hide Legend
Show All Gages
Radar Not Available
Additional Layers
Search for Comm...

Stream Gages

Gage Symbols

- Current Condition
- Forecast Condition

Risk Ratings

- No Flooding
- Near Flood Stage
- Minor Flooding
- Moderate Flooding
- Major Flooding
- Not Risk Rated
- Seasonal

Trend

- ⤴ Rising
- ⤵ Falling
- ⏪ Constant

Big Blue River at Beatrice

Stage Height: 3.12 ft

Flood Simulator
Show Watershed
Zoom to

Gage ID:	06881500
Owner:	NeDNR
Datum:	1,220.3 (NAVD88)
Ice Affected:	No
Current Discharge (cfs):	139.5
Stage Trend:	Constant
NeDNR Gage Site:	View
USGS Gage Site:	
NWS Gage Site:	View

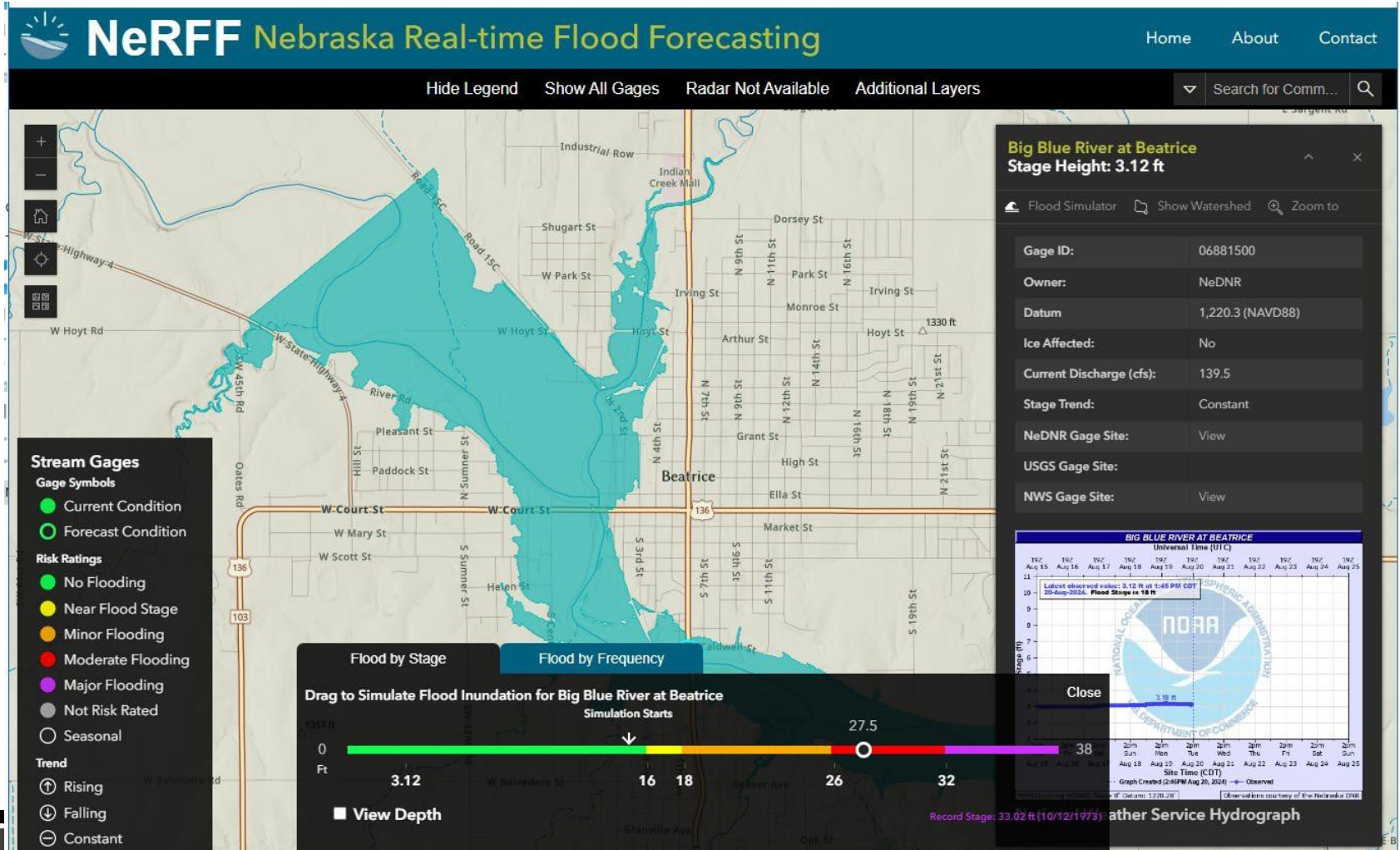
BIG BLUE RIVER AT BEATRICE
Universal Time (UTC)

19/2	19/1	19/0	18/31	18/30	18/29	18/28	18/27	18/26	18/25	18/24	18/23	18/22	18/21	18/20	18/19	18/18	18/17	18/16	18/15	18/14	18/13	18/12	18/11	18/10	18/9	18/8	18/7	18/6	18/5	18/4	18/3	18/2	18/1	17/31	17/30	17/29	17/28	17/27	17/26	17/25	17/24	17/23	17/22	17/21	17/20	17/19	17/18	17/17	17/16	17/15	17/14	17/13	17/12	17/11	17/10	17/9	17/8	17/7	17/6	17/5	17/4	17/3	17/2	17/1	16/31	16/30	16/29	16/28	16/27	16/26	16/25	16/24	16/23	16/22	16/21	16/20	16/19	16/18	16/17	16/16	16/15	16/14	16/13	16/12	16/11	16/10	16/9	16/8	16/7	16/6	16/5	16/4	16/3	16/2	16/1	15/31	15/30	15/29	15/28	15/27	15/26	15/25	15/24	15/23	15/22	15/21	15/20	15/19	15/18	15/17	15/16	15/15	15/14	15/13	15/12	15/11	15/10	15/9	15/8	15/7	15/6	15/5	15/4	15/3	15/2	15/1	14/31	14/30	14/29	14/28	14/27	14/26	14/25	14/24	14/23	14/22	14/21	14/20	14/19	14/18	14/17	14/16	14/15	14/14	14/13	14/12	14/11	14/10	14/9	14/8	14/7	14/6	14/5	14/4	14/3	14/2	14/1	13/31	13/30	13/29	13/28	13/27	13/26	13/25	13/24	13/23	13/22	13/21	13/20	13/19	13/18	13/17	13/16	13/15	13/14	13/13	13/12	13/11	13/10	13/9	13/8	13/7	13/6	13/5	13/4	13/3	13/2	13/1	12/31	12/30	12/29	12/28	12/27	12/26	12/25	12/24	12/23	12/22	12/21	12/20	12/19	12/18	12/17	12/16	12/15	12/14	12/13	12/12	12/11	12/10	12/9	12/8	12/7	12/6	12/5	12/4	12/3	12/2	12/1	11/31	11/30	11/29	11/28	11/27	11/26	11/25	11/24	11/23	11/22	11/21	11/20	11/19	11/18	11/17	11/16	11/15	11/14	11/13	11/12	11/11	11/10	11/9	11/8	11/7	11/6	11/5	11/4	11/3	11/2	11/1	10/31	10/30	10/29	10/28	10/27	10/26	10/25	10/24	10/23	10/22	10/21	10/20	10/19	10/18	10/17	10/16	10/15	10/14	10/13	10/12	10/11	10/10	10/9	10/8	10/7	10/6	10/5	10/4	10/3	10/2	10/1	9/31	9/30	9/29	9/28	9/27	9/26	9/25	9/24	9/23	9/22	9/21	9/20	9/19	9/18	9/17	9/16	9/15	9/14	9/13	9/12	9/11	9/10	9/9	9/8	9/7	9/6	9/5	9/4	9/3	9/2	9/1	8/31	8/30	8/29	8/28	8/27	8/26	8/25	8/24	8/23	8/22	8/21	8/20	8/19	8/18	8/17	8/16	8/15	8/14	8/13	8/12	8/11	8/10	8/9	8/8	8/7	8/6	8/5	8/4	8/3	8/2	8/1	7/31	7/30	7/29	7/28	7/27	7/26	7/25	7/24	7/23	7/22	7/21	7/20	7/19	7/18	7/17	7/16	7/15	7/14	7/13	7/12	7/11	7/10	7/9	7/8	7/7	7/6	7/5	7/4	7/3	7/2	7/1	6/31	6/30	6/29	6/28	6/27	6/26	6/25	6/24	6/23	6/22	6/21	6/20	6/19	6/18	6/17	6/16	6/15	6/14	6/13	6/12	6/11	6/10	6/9	6/8	6/7	6/6	6/5	6/4	6/3	6/2	6/1	5/31	5/30	5/29	5/28	5/27	5/26	5/25	5/24	5/23	5/22	5/21	5/20	5/19	5/18	5/17	5/16	5/15	5/14	5/13	5/12	5/11	5/10	5/9	5/8	5/7	5/6	5/5	5/4	5/3	5/2	5/1	4/31	4/30	4/29	4/28	4/27	4/26	4/25	4/24	4/23	4/22	4/21	4/20	4/19	4/18	4/17	4/16	4/15	4/14	4/13	4/12	4/11	4/10	4/9	4/8	4/7	4/6	4/5	4/4	4/3	4/2	4/1	3/31	3/30	3/29	3/28	3/27	3/26	3/25	3/24	3/23	3/22	3/21	3/20	3/19	3/18	3/17	3/16	3/15	3/14	3/13	3/12	3/11	3/10	3/9	3/8	3/7	3/6	3/5	3/4	3/3	3/2	3/1	2/31	2/29	2/28	2/27	2/26	2/25	2/24	2/23	2/22	2/21	2/20	2/19	2/18	2/17	2/16	2/15	2/14	2/13	2/12	2/11	2/10	2/9	2/8	2/7	2/6	2/5	2/4	2/3	2/2	2/1	1/31	1/30	1/29	1/28	1/27	1/26	1/25	1/24	1/23	1/22	1/21	1/20	1/19	1/18	1/17	1/16	1/15	1/14	1/13	1/12	1/11	1/10	1/9	1/8	1/7	1/6	1/5	1/4	1/3	1/2	1/1	0/31	0/30	0/29	0/28	0/27	0/26	0/25	0/24	0/23	0/22	0/21	0/20	0/19	0/18	0/17	0/16	0/15	0/14	0/13	0/12	0/11	0/10	0/9	0/8	0/7	0/6	0/5	0/4	0/3	0/2	0/1
Latest observed value: 3.12 ft at 1:45 PM CDT 20-Aug-2024. Flood Stage is 18 ft																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														

Esri, NASA, NGA, USGS, FEMA | Nebraska Game & Parks Commission, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS | Nebraska Department of Natural Resources... Powered by

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NeRFF Project—Beatrice Example 2



Wishlist for the future

- Ability to change shifts without rating toolbox
- Aquarius: ability to handle daylight savings time offsets
 - Continue storing in UTC
 - A way to run gages or select daylight/standard for uploaded data
- Ability to lock in a data interval, so that 15-minute data cannot be uploaded to a daily mean time series
- Photographs as part of the system

Wishlist for the future--2

- WebPortal: Stationslist
 - Ability to select a group of locations, and specify the columns listed for each location.
 - Filters and search capabilities
- AQ Connect
 - Incorporate Decodes
 - Wish it were easier to figure out
 - When working with regex or json, it would be nice to see what connect sees, and see what's missing

Questions?

james.williams@nebraska.gov

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DEPT. OF NATURAL RESOURCES

245 Fallbrook Blvd.
Box C, Suite 201
Lincoln, NE 68521
402-471-2363