NORTH PLATTE RIVER CHOKEPOINT TEST FLOW RELEASE

December 2020

Implementation, Data Analysis, Visual Observations, Outcomes, and Next Steps

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PLATTE RIVER
RECOVERY IMPLEMENTATION PROGRAM

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Executive Summary

The Platte River Recovery Implementation Program (PRRIP or Program) has a Water Plan goal to achieve and maintain a conveyance capacity of at least 3,000 cubic feet per second (cfs) through the North Platte chokepoint—while remaining below flood stage—to facilitate certain water management activities for the benefit of threatened and endangered species downstream. The chokepoint is that reach of the North Platte River extending a few miles on either side of the Highway 83 bridge at the City of North Platte, NE. The term "chokepoint" refers to the significant loss of river flow capacity since the late 1990s owing to extensive encroachment of invasive phragmites, stabilization of sandbars due to vegetation cover, and other factors.

As part of ongoing efforts in pursuit of the 3,000 cfs capacity goal, the Program planned and implemented a test flow release through the North Platte chokepoint in July 2020 using water stored in the Lake McConaughy Environmental Account (EA). This "chokepoint test" had two objectives:

1. Increase minor flood stage for the North Platte River at North Platte. The current minor flood stage stands at 6.0 feet (ft). An increase to 6.5 ft would provide around 800 cfs additional flow capacity below flood stage which would be a great benefit to the Program for future EA releases and other water management activities. The Program sought to use the chokepoint test to collect data and make extensive visual observations that would demonstrate minimal impacts to life or property at river stages at and above 6.0 ft. This information was to be compiled, documented, and submitted to the National Weather Service (NWS) for consideration of the flood stage change. **The desired outcome of an increase in the NWS minor flood stage was not achieved.**

2. Evaluate the performance of the State Channel Berm. The State Channel Berm, which begins behind the power substation on North River Road and progresses in a general southeasterly direction, was restored by the Program in 2018. By repairing a long-standing breach in the berm, the Program sought to redirect flow back to the main channel of the North Platte River. This was intended to mitigate the effects of flooding in the residential area around North River Road and North Washboard Road that frequently occurred during past high flow events. The chokepoint test offered an opportunity to test the performance of the State Channel Berm under high flow conditions. **The desired outcome of successful State Channel Berm performance was achieved.**

Planning for the chokepoint test resumed in March 2020 after being postponed due to downstream flooding about a year earlier. A Chokepoint Test Planning Workgroup was convened that grew to encompass a diverse group of Program stakeholders and local officials, including staff from the Program's Executive Director's Office (EDO); the U.S. Fish and Wildlife Service (USFWS) EA Manager and staff; operations personnel from the Central Nebraska Public Power and Irrigation District (CNPPID) and Nebraska Public Power District (NPPD); NWS staff from offices in North Platte and Rapid City as well as the Missouri Basin River Forecast Center; water administration staff from the Nebraska Department of Natural Resources (NDNR); representatives from the City of North Platte; the Lincoln County

Emergency Manager; and Program representatives from the U.S. Bureau of Reclamation, Colorado Water Conservation Board, and the Wyoming Water Development Office.

With extensive input from the planning workgroup over a period of three months, the EDO produced an Implementation Plan that covered all elements of the chokepoint test, from specific personnel responsibilities and communications requirements to detailed maps of monitoring locations and the types of data and information to be collected. The Implementation Plan also included the intended schedule for the chokepoint test—which was planned to allow incrementally slow and strategic increases in flows—and identified triggers for termination of the test.

The EA release for chokepoint test officially commenced on July 13, 2020 and ended on July 24, 2020; the total release volume was about 21,000 acre-feet (AF). Daily coordination calls were held, and operational changes were made as needed based on collaborative decision making by the EDO, the USFWS EA Manager, and CNPPID. EDO staff conducted on-site monitoring operations in and around North Platte on several days during the test, and NWS staff took photos on most of the days that the river was at or above flood stage. NDNR took multiple flow measurements to ensure accurate reporting of the North Platte River discharge associated with stage readings during the chokepoint test.

Extensive observations were made while the North Platte River at North Platte was at or near stage targets of 6.0 ft and 6.5 ft, but planned observations at a stage of 6.75 ft did not happen because the chokepoint test was ended early. Exact stages were difficult to maintain because of both heavy precipitation events downstream of Lake McConaughy and higher than expected transit losses once the river was above flood stage. **Figure ES-1** charts the adjustments to the EA release during the chokepoint test as reflected in the North Platte River near Keystone gage along with stage and discharge observed at the North Platte gage.

At the start of the chokepoint test, river stage at North Platte was already hovering around 6.0 ft, as it had been for the previous week. After a slower-than-expected climb, stage reached 6.5 ft late in the evening on July 21 and peaked at 6.57 ft on July 22 before settling closer to 6.5 ft for a few days. The EA release for the chokepoint test ended on July 24, stage began to drop at North Platte two days later, and a steady decline was observed for several days until rainfall late on July 29 abruptly reversed the downward trend and effectively erased any lingering effects of the chokepoint test.

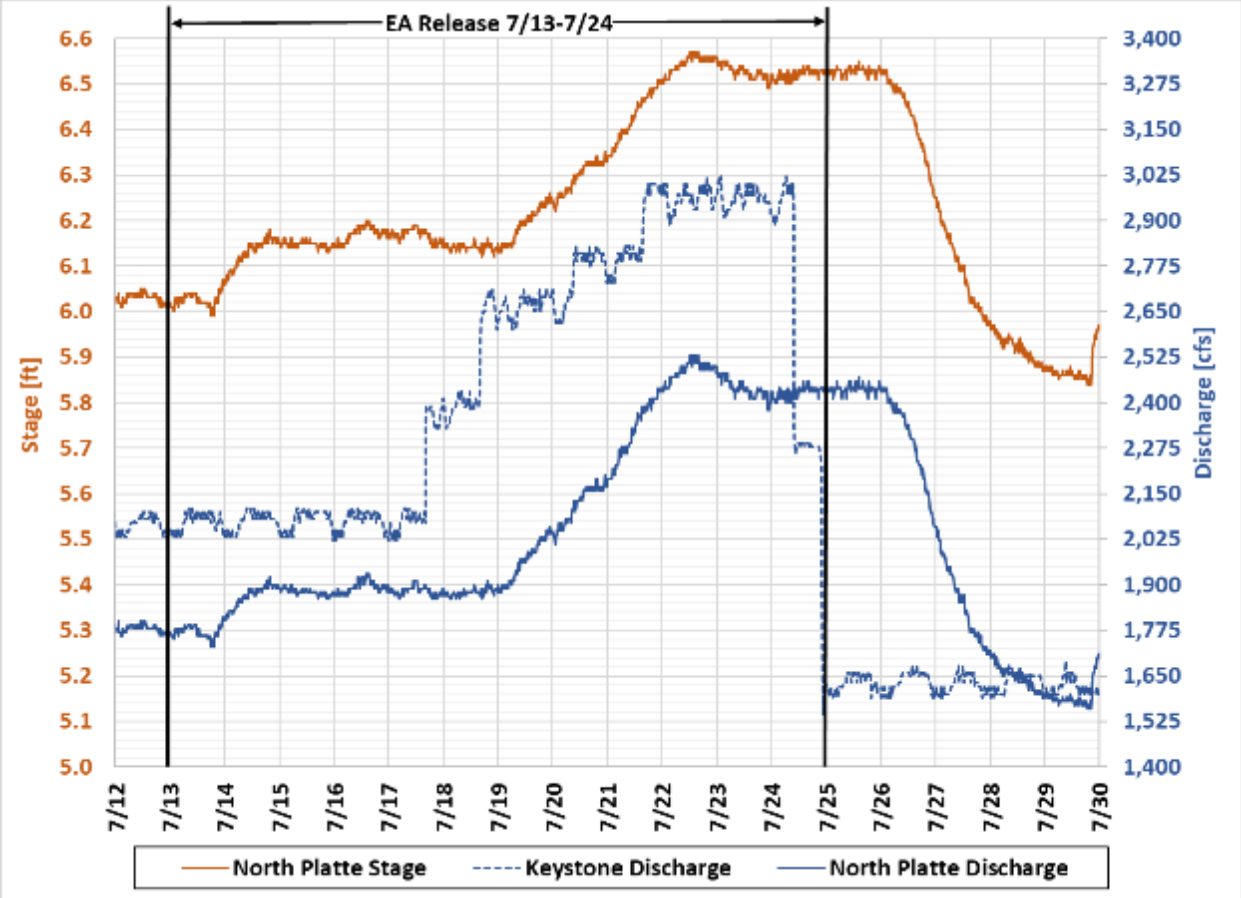


Figure ES-1. Chokepoint Test Stage and Discharge Measurements, July 12-30, 2020

The image on the left side of **Figure ES-2** shows flow in the State Channel, looking downstream with the berm on the left, on July 20 when the average stage for the North Platte River at North Platte was 6.29 ft. In contrast to prior flood events, no standing water of concern was observed anywhere in the area of North River Road and North Washboard Road. This is illustrated by the images on the right side of Figure ES-2, both of which show the same location in the southwest quadrant of that intersection when the river was at nearly identical stages during the spring 2011 flood and during the summer 2020 chokepoint test. That the berm appears to have diverted river flows entirely away from an area that experienced significant flooding in the past indicates successful performance of the restored State Channel Berm under high flow conditions.

Figure ES-2. State Channel (left), Land at N. River Rd. & N. Washboard Rd., March 31, 2011, River Stage at 6.30 ft (top right), and Land at N. River Rd. & N. Washboard Rd., July 20, 2020, River Stage at 6.29 ft (bottom right)

Low-lying areas of Cody Park, especially at and near the boat ramp, flooded to an extent consistent with NWS flood impacts descriptions. High water concerns were reported by owners of riverfront agricultural lands (much of which was accretion ground within the bounds of the historical high banks) far upstream around Sarben as well as closer to North Platte near the Muskrat Run State Wildlife Management Area. Owners of residential properties along the south bank of the North Platte River in the Vieyra Drive-Red Fox Lane-Darlene Road neighborhood of North Platte reported issues stemming from high river (and groundwater) levels that included water overtopping the banks of backyard ponds, water encroaching to within a few feet a house foundation, septic system problems, inaccessible outbuildings due to soggy ground, and a partially-flooded below-grade storm cellar. **Figure ES-3** shows some of these impacts in photos taken by the EDO and NWS.

Figure ES-3. Observed High Water Impacts at Red Fox Lane (left) and Darlene Road (right) Properties

The NWS definition[1] for the term "flood categories" acknowledges that "the severity of flooding at a given stage is not necessarily the same at all locations along a river reach due to varying channel/bank characteristics." Furthermore, "minor flooding" is simply defined as causing "minimal or no property damage, but possibly some public threat (e.g., inundation of roads)." These definitions are qualitative in nature, not based on specific quantitative criteria, which requires local NWS officials to make subjective determinations regarding the severity of observed impacts.

At the peak of the chokepoint test with river stages at or above 6.5 ft, surface water crept horizontally to within a few feet of the house on Red Fox Lane, but vertically remained well below the foundation. Problems with underground septic systems and storm cellars are groundwater impacts. After site visits to the Red Fox Lane and Darlene Road residential properties on July 23-24, the NWS reported during the July 24 daily coordination call that the observed impacts met the criteria for threats to property. NWS declared that there would be no change to minor flood stage for the North Platte River at North Platte, a position that was

[1] National Weather Service Manual 10-950, Definitions and General Terminology, November 26, 2019.

formalized in a letter from the NWS North Platte office a few days later. Additionally, NWS quickly revised the flood impacts descriptions to reflect observations made during the chokepoint test. Following the NWS decision on the morning of July 24, the EDO and EA Manager ended the chokepoint test, and CNPPID discontinued the EA release by the end of that day.

In the absence of additional flow capacity gained through an increase in the minor flood stage, possible alternatives to address the problem of the North Platte chokepoint were identified. Options for the Program to consider, in no particular order, include the following:

- Revisit engineering solutions that were previously studied.
    - Construction of a large, dedicated bypass canal that could carry high-flow EA releases around the City of North Platte.
    - Improvements to existing canals that divert from the North Platte River and have wasteways that return to the South Platte River could provide some supplemental bypass capacity.
    - Channel widening, dredging, and construction of jetties to constrain the low flow channel could increase high-flow capacity through the chokepoint, but these solutions would likely be temporary without ongoing maintenance.
    - Construction of a new outlet from the NPPD Sutherland Canal system to the South Platte River could provide capacity to bypass the chokepoint.
- Vegetation management, including continued support of ongoing phragmites control efforts and implementation of mechanical controls including vegetation shredding and disking could help to mobilize islands and reactivate side channels in and around the chokepoint reach.
- Property buyouts in areas negatively impacted by high flows on the North Platte River, although the experience of the chokepoint test suggests these areas could be a continually moving target.
- Modification of the Program Document to allow for flows intentionally exceeding flood stage at North Platte. This option would also require the Program to accept liabilities for any resulting property damages.
- Development of water management activities that work within the existing flood stages and discharges for the North Platte River at North Platte. In essence, next steps under this option would be guided by the science emerging from the Adaptive Management Plan update.

These options were presented to the Program's Water Advisory Committee (WAC) in August 2020 and the Governance Committee (GC) in September 2020. The GC directed the EDO to continue working with the Chokepoint Test Planning Workgroup to review the options and determine the most appropriate path forward for the Program. Prior to recommending any specific actions, thorough evaluations of risks, consequences, impacts, and practicability will need to be conducted.

1 Introduction

The Platte River Recovery Implementation Program (PRRIP or Program) planned and implemented a summer 2020 test flow release from the Lake McConaughy Environmental Account (EA) through the North Platte River chokepoint at North Platte, NE. Purposes of this "chokepoint test" were to assess the potential impacts of increasing minor flood stage on the North Platte River at North Platte and to evaluate the performance of the State Channel Berm under high flow conditions. This was a coordinated effort involving staff of the Program's Executive Director's Office (EDO), the U.S. Fish and Wildlife Service (USFWS), the Central Nebraska Public Power and Irrigation District (CNPPID), the Nebraska Public Power District (NPPD), the National Weather Service (NWS), the Nebraska Department of Natural Resources (NDNR), and other community representatives.

1.1 North Platte River Chokepoint

The following sections describe the physical location, flood stages, and flow characteristics of the area known as the North Platte chokepoint.

1.1.1 Location

The North Platte River chokepoint is that reach of the river running north and then east of the City of North Platte, NE extending from approximately 2 miles upstream of the Highway 83 bridge down to CNPPID's Tri-County Supply Canal diversion structure, a total distance of about 7.5 miles. **Figure 1** shows the portion of the reach that was the focus of the chokepoint test, centered around the Highway 83 bridge, with annotations marking areas of particular importance to the test.

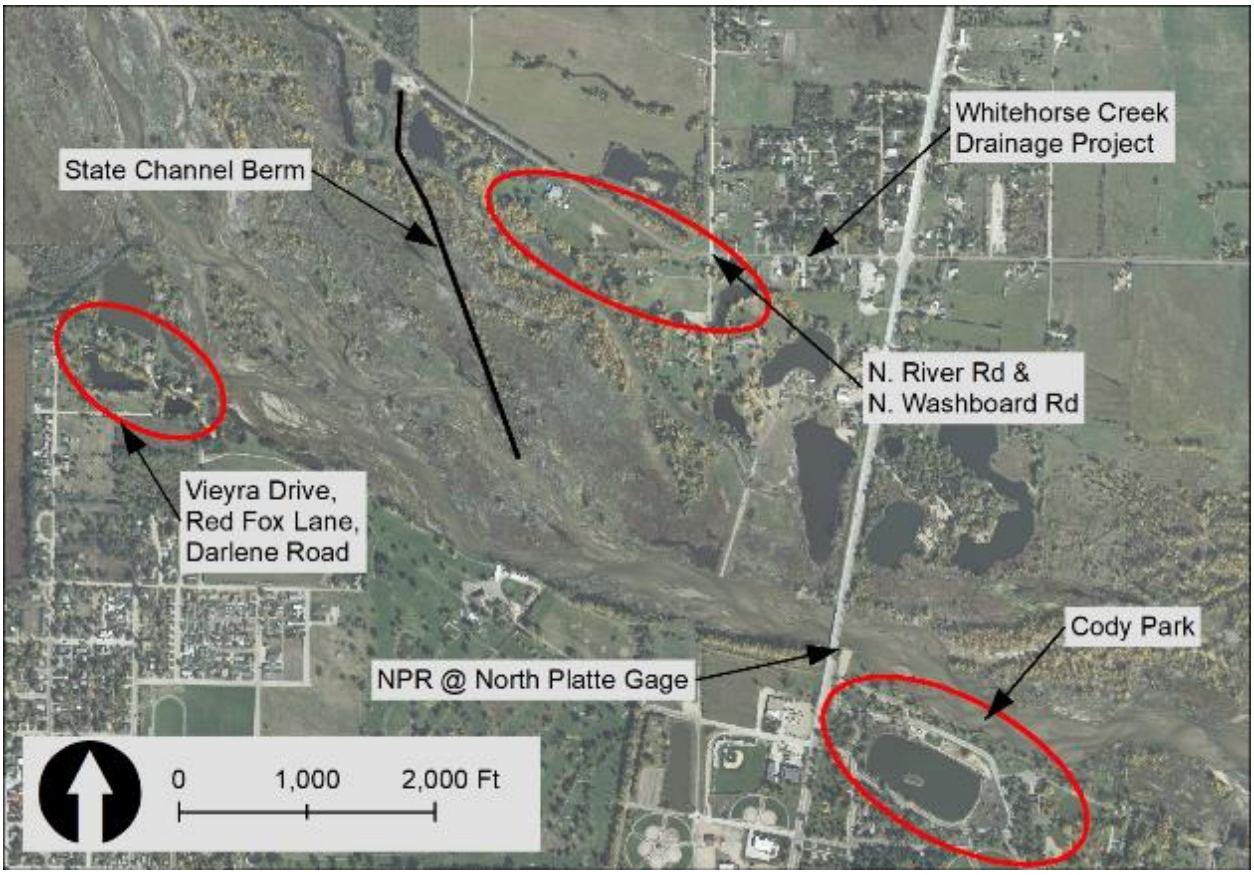


Figure 1. North Platte Chokepoint Location Map

1.1.2 NWS Flood Stage

River stage for the North Platte River at North Platte, NE is measured by a gage near the Cody Park boat ramp and adjacent to the Highway 83 bridge. **Table 1** shows flood stages at this location as defined by the NWS.

Table 1. Flood Categories for the North Platte River at North Platte

Category	Stage [ft]
Major Flood Stage	7.0
Moderate Flood Stage	6.5
Minor Flood Stage	6.0
Action Stage	5.5

Impacts at flood stages for the North Platte River at North Platte are described on the NWS website.[2] Prior to the chokepoint test in July 2020, the impacts described minor to moderate flooding of low-lying and agricultural lands along the north bank of the river to the west of Highway 83 and south of North River Road, as well as low-lying areas of Cody Park. Immediately after the chokepoint test, NWS revised the descriptions to reflect observations

[2] https://water.weather.gov/ahps2/hydrograph.php?wfo=lbf&gage=nptn1

during the test, with an emphasis on impacts to residential properties and other areas along the south bank between Cody Park and the Buffalo Bill State Park Campground. The full before-and-after flood impacts descriptions are provided in **Appendix A**.

1.1.3 North Platte River Discharge

The nature of the North Platte River (sand-bed, braided channels) is such that the flow rate (discharge) at a particular stage varies over time. At the time of the Platte River Cooperative Agreement in 1997, flow capacity for the North Platte River at North Platte, NE was estimated to be greater than 3,000 cfs at a stage of 6.0 ft (minor flood stage). As a consequence of the early 2000s drought, a great infestation of phragmites took hold, eventually "choking" the channel capacity at the same stage to little more than half of what it was in the late 1990s. In recent years, mechanical and chemical mitigation efforts to control the phragmites and other restoration efforts have resulted in the reclamation of some of that lost flow capacity.

The rating curve for the North Platte River at North Platte gage[3] (06693000) is updated periodically by the NDNR. Based on the rating curve most recently updated in April 2020, flows at stages that were important to the planning of the test flow release are as shown in **Table 2**.

Table 2. Stage and Discharge for North Platte River at North Platte, NE (April 2020)

Stage [ft]	Discharge [cfs]
6.0	1,930
6.5	2,770
6.625	3,000
6.75	3,250
7.0	3,760

1.2 Program Activities at the North Platte Chokepoint

During the First Increment through 2019, the Program put considerable effort into resolving flooding and conveyance issues at the North Platte chokepoint, but channel constriction and reduced flow capacity through the chokepoint reach continue to hinder progress on certain Program goals. The most direct impact on Program water-related activities is the imposed limit on the ability to make desired high flow releases from the Lake McConaughy EA and deliver that water down the North Platte River channel and on to the associated habitats reach[4] from Lexington to Chapman, NE. For example, flow tests conducted by the Program in 2009 and 2013 were limited by the amount of water that could pass through the North Platte chokepoint.

1.2.1 First Increment (2007-2019)

Throughout the First Increment, the Program supported an ongoing regional phragmites control effort along the Platte River corridor. Flood mitigation measures implemented during this period include the following:

[3] https://nednr.nebraska.gov/realtime/Stations/Details/06693000
[4] The associated habitats reach is the Program's primary focus area for activities to benefit the subject threatened and endangered species.

- White Horse Creek Drainage Project: Completed in early 2014, this project involved the installation of culverts in the road ditches along the north side of North River Road that drain east into White Horse Creek.
- State Channel Berm Restoration: Completed in 2018, this project restored a berm that redirects high flows away from properties along North River Road and back towards the main North Platte River channel.

These projects were prioritized because they were cost-effective, relatively simple to implement compared to other chokepoint solutions, and expected to reduce flood impacts in the neighborhood around North River Road and North Washboard Road.

The Program also studied opportunities to increase conveyance around or through the chokepoint, including improvements to upstream canals that divert from the North Platte River and return water to the South Platte River, channel widening and dredging, and construction of jetties to constrict the low flow channel. Opportunities for potential property buyouts and flood easements were also evaluated during the First Increment. To date, none of these measures have been implemented due to cost, permitting, and/or land-related issues. The Program completed a study of groundwater-surface water interactions at the North Platte chokepoint in 2017 and continues to maintain groundwater and surface water monitoring equipment at several locations. Modeling analyses completed in 2018 illustrated inundation areas with and without the State Channel Berm restoration.

1.2.2 First Increment Extension (2020-2032)

Under the Program Water Plan, the Addendum to the Program Document[5] specifies pertinent water management activities for the First Increment Extension as follows:

- Aggressively continue to implement channel conveyance improvements at North Platte choke point through efforts directed toward achieving and maintaining at least 3,000 cfs conveyance capacity while remaining below flood stage, with additional capacity developed as practicably achievable with available resources.
- Implement water releases including short-duration high flows (SDHF) and target flows once Program water projects are operational and choke point conveyance issues are resolved.
- The Program will continue to evaluate the efficacy of available Program water and choke point capacity through time to ensure Program water meets its intended purposes.

A critical provision of these activities is that flows of 3,000 cfs through the North Platte chokepoint are to be achieved *without exceeding minor flood stage*.[6] Table 2 shows that the

[5] Addendum to the Final Platte River Recovery Implementation Program – First Increment Extension, Section II.B. June 7, 2017.
[6] Under Article 404 of the license for the Kingsley Dam Project (No. 1417-274), Section II.C.2.c of Exhibit X prohibits releases of water from the Lake McConaughy EA when the North Platte River at North Platte is at or above flood stage as defined for that location by the NWS.

current rating curve flow capacity at the minor flood stage of 6.0 ft is only about 1,930 cfs, well below the stated goal.

1.3 Chokepoint Test Objectives

There were two main objectives for the North Platte chokepoint test conducted in July 2020: (1) to pursue raising minor flood stage for the North Platte River at North Platte from 6.0 ft to 6.5 ft and (2) to test the State Channel Berm.

1.3.1 Raise NWS Minor Flood Stage

Raising minor flood stage to 6.5 ft would increase the available flow capacity below flood stage to about 2,770 cfs, potentially providing the Program another 840 cfs of flow capacity to utilize for future flow releases while complying with the need to remain below flood stage. The primary objective of the chokepoint test flow release was to provide measured and observational data of sufficient detail and quality to allow the NWS to determine whether the minor flood stage could be safely increased with minimal risk of impacts to life and property.

1.3.2 Test State Channel Berm

The secondary objective was to evaluate the performance of the State Channel Berm under high flow conditions. The exact origin of the State Channel is unknown, but at some point in the past a section of the berm was breached, allowing high flows to access a channel that would flood residential areas on the south side of North River Road. As discussed previously, the berm was restored in 2018 with the intent of redirecting flows away from the residential areas and back towards the main river channel. The chokepoint test was an opportunity to observe whether the berm performed as intended.

2 Chokepoint Test Implementation Plan

Planning for the chokepoint test originally began in early 2019 but was postponed due to late winter and early spring flooding downstream on the Platte River and other tributaries. In early March 2020, the Federal Energy Regulatory Commission (FERC) approved the request by CNPPID for a temporary waiver[7] allowing releases from the Lake McConaughy EA when the North Platte River at North Platte is at or above flood stage, thereby granting permission for the chokepoint test to proceed. That document and a letter from CNPPID to FERC after the chokepoint test ended are included in **Appendix B**.

The EDO resumed internal planning in late March 2020 and continued through the implementation of the chokepoint test from July 13-24, 2020. A memo included in **Appendix C** identifies the Program stakeholders and local officials involved in planning and implementing

[7] On March 6, 2020, FERC granted a temporary variance from this restriction allowing PRRIP and USFWS "to make EA releases above the official NWS flood stage to test the capacity improvements [from reconstruction of a flood control berm and drainage improvements] and provide information and data necessary for a possible increase in the flood stage designated by the NWS." It was also noted that "the NWS has indicated that it needs to verify an actual flow event at the higher stages in coordination with local officials in order to increase the official flood stage designation."

the chokepoint test; key dates during the planning timeline; and the many factors that influenced the schedule for the chokepoint test.

The 3-month planning process for the chokepoint test culminated in a comprehensive Implementation Plan that covered all aspects of the chokepoint test, including objectives of the test flow release; coordination amongst the participating entities, including staff roles and responsibilities; the final schedule planned for EA releases and stage targets at North Platte; triggers for termination of the chokepoint test; and brief plans for the post-test assessment that was to be prepared for NWS review. The Implementation Plan also included communication protocols and the monitoring plan, which are elaborated upon below, and the full document is included in **Appendix C**.

2.1 Chokepoint Test Public Communication

Public communications regarding the chokepoint test included two key elements: advisory signs and press releases. In order to communicate information to residents or visitors in potentially affected areas, the EDO posted 25 advisory signs in Cody Park, along North River Road, at the Buffalo Bill State Park Campground, and other high-traffic areas most likely to have observable impacts during the chokepoint test. **Figure 2** shows the advisory sign that was designed by the EDO and professionally printed in the style of campaign yard signs.

Figure 2. Chokepoint Test Advisory Sign

The signs were intended to be as simple and direct as possible, advising of temporary high flows on the North Platte during the widest date range anticipated for the chokepoint test. Viewers were referred to the Program website for more information. Logos of all organizations involved in the planning process were included on the signs to emphasize that this was not just a Program project, but that it was supported by city, county, state, and federal agencies as well as the major power and irrigation districts in the area.

Press releases regarding EA releases and other Program activities are routinely distributed to a standing list of media outlets (TV, radio, and print) throughout the Platte Valley as well as in Omaha and Denver. On July 9, a press release describing the objectives of the chokepoint test, schedule, and anticipated river stages was issued in advance of the chokepoint test, and a press

release providing notification of the end of the chokepoint test was issued on July 27. Both documents are included in **Appendix D**. To ensure wide distribution of chokepoint test information, the press release was also made available as follows:

- On the Program website[8] with a banner on the main page to capture the attention of anyone who sought information after seeing the advisory signs.
- On the City of North Platte website[9] with a large photo banner and "Platte River Chokepoint Test Flow" headline, as shown in **Figure 3**.
- On Twitter[10] by the NWS North Platte office, as shown in **Figure 4**.
- By email to rural fire departments and village clerks in Lincoln County.

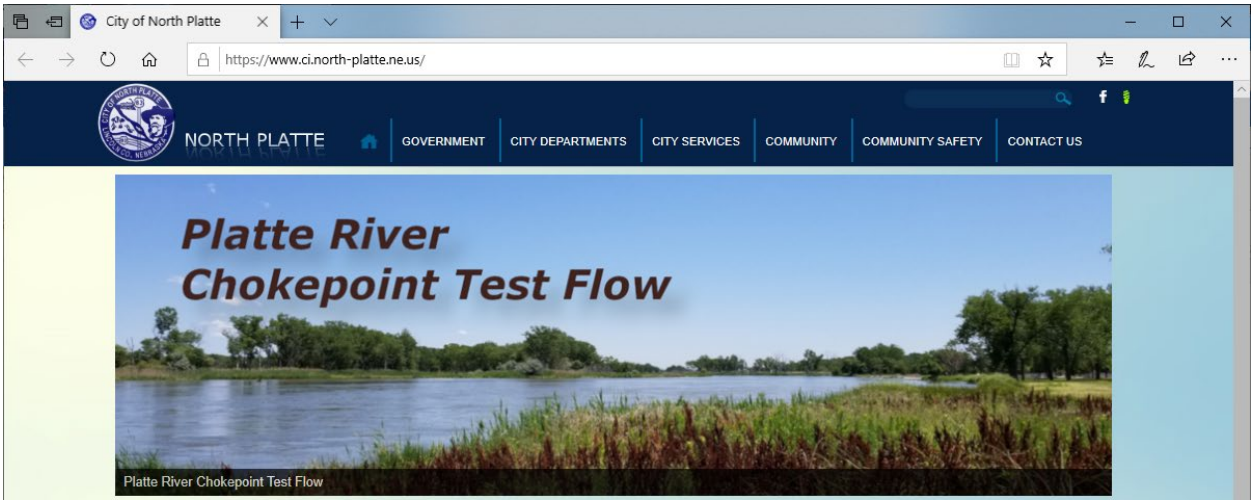


Figure 3. City of North Platte Website Main Page with Chokepoint Test Banner

Figure 4. NWS North Platte Chokepoint Test Tweet

[8] www.platteriverprogram.org
[9] https://www.ci.north-platte.ne.us/
[10] https://twitter.com/NWSNorthPlatte/status/1281239929985495040

2.2 Chokepoint Test Monitoring

The Implementation Plan also documented intentions for tracking the EA release, stage and discharge measurements, surface and groundwater monitoring, ground-level visual observations, and aerial observations. The EDO developed maps of monitoring locations indicating the types of data to be collected at each site. **Figure 5** shows an example monitoring map; full size versions are included with the Implementation Plan in **Appendix C**. Monitoring locations were primarily concentrated around the Highway 83 bridge, along North River Road, and in Cody Park but extended from as far upstream as the Buffalo Bill State Park Campground to as far downstream as the North Platte wastewater treatment plant effluent discharge pipe south of Highway 30, covering a span of more than 5 river miles.

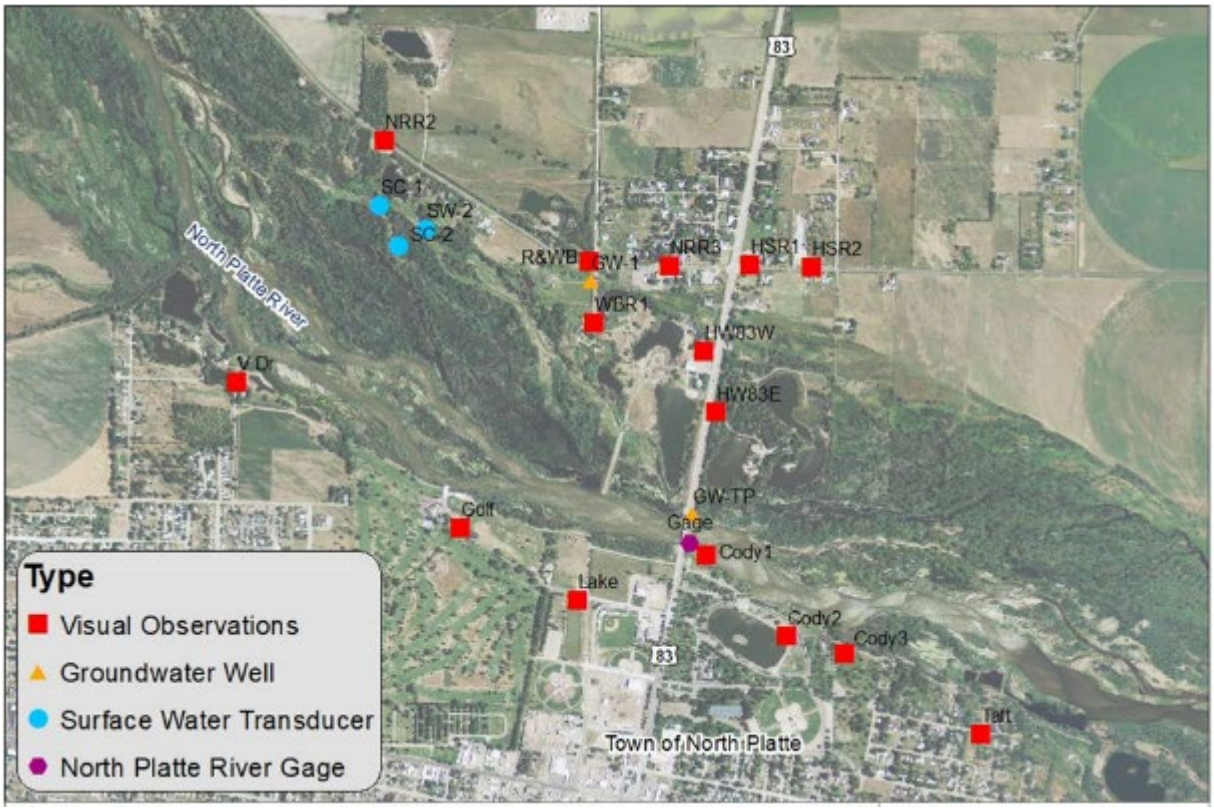


Figure 5. Chokepoint Test Monitoring Locations Map

The final planning schedule in Table 2 of the Implementation Plan showed the days that EDO staff planned to be on site for monitoring during the chokepoint test. Monitoring support was provided by NWS North Platte office staff, who took photos at monitoring locations nearly every day during the chokepoint test. NDNR also took flow measurements from the Highway 83 bridge on three days during the chokepoint test in order to validate and adjust gage readings as needed.

3 Chokepoint Test Data Collection and Analysis

The EA release for the chokepoint test began on July 13. No ramp up was required because the North Platte River at North Platte had already been at or near a stage of 6.0 ft for the previous week due to ongoing EA releases and irrigation operations. Allowing for roughly two days of travel time from Lake McConaughy to North Platte, the EDO began monitoring for the chokepoint test on July 15.

The following sections describe the events of the chokepoint test through the data that was collected, including measurements taken by NDNR that required recalibration of the flows needed to hit the desired stage targets, precipitation events that contributed to river flows at North Platte, the timeline of the EA release, surface water measurements at river gages and other monitoring locations, and groundwater measurements.

3.1 Shifting Flow Targets

The continuously shifting nature of sand-bed rivers was noted previously, and this behavior was observed in site measurements of the North Platte River at North Platte during the planning and implementation of the chokepoint test. For most of the planning process, discharge values that were used for the stages of interest were based on the rating curve most recently updated by NDNR in March-April 2020. NDNR typically takes flow measurements at the gage location (from the Highway 83 bridge in this case) about once per month, and a "shift" value is reported for adjusting the reading of the rating curve to reflect current conditions.

Table 3 shows site measurement dates, shift values, and the evolving flow rates needed to achieve target stages at North Platte before, during, and after the chokepoint test. To finalize plans just before the official start of the chokepoint test, the EDO adjusted the EA release schedule based on the July 2 measurement/shift data. As planned, NDNR took several flow measurements during the chokepoint test, on July 17, July 20, and July 23. With shifts ranging from -0.17 to -0.22 while the river was at or above the minor flood stage of 6.0 ft, the EA release was adjusted as needed to achieve a stage of 6.5 ft with total river discharge at North Platte of around 2,400 cfs (rather than the 2,770 cfs used for planning).

Table 3. Variable Discharge for Target Stages, North Platte River at North Platte

Date	Shift	Discharge [cfs]		
		Stage = 6.0 ft	Stage = 6.5 ft	Stage = 6.75 ft
April 2020	Rating Curve	1930	2770	3250
July 2	-0.09	1790	2610	3070
July 17	-0.21	1620	2400	2840
July 20	-0.17	1680	2470	2920
July 23	-0.22	1610	2380	2820
August 18	-0.13	1740	2540	2990

The post-test measurement/shift data from August 18 is included as a reference point to illustrate how the river continued to change several weeks after the chokepoint test ended. Regardless of the changes over time, the relative difference between the discharge rates at stages of 6.0 ft and

6.5 ft was consistent at around 800 cfs. Due to early termination of the chokepoint test, the 6.75 ft stage target planned for the last few days was not achieved.

3.2 Precipitation Events

Flows at North Platte during the chokepoint test were influenced by three precipitation events in the North Platte River drainage downstream of Lake McConaughy:

- July 13: Rainfall of 0.47 inches was reported at Sarben; there were reports ranging from 1.29 inches to 1.75 inches in the Sutherland-Hershey-Birdwood Creek vicinity; and within the City of North Platte, there were reports of 0.63 inches to 1.15 inches.
- July 15: Rainfall up to 0.51 inches was reported across the basin.
- July 20: Rainfall ranging from 1.15 inches to 1.54 inches was reported near Sutherland and Sarben, with smaller amounts near Birdwood Creek and Hershey, and trace amounts at North Platte.

Cumulative precipitation during the chokepoint test from July 13-24 was as much as 3.70 inches near Sutherland, around 2.5 inches at Sarben and near Birdwood Creek, and more than an inch at the City of North Platte. Individual and cumulative maps of these events from the CoCoRaHS Mapping System[11] are included in **Appendix E**. Following termination of the chokepoint test, North Platte River at North Platte flows trended steadily downward until another rain event late in the day on July 29 marked the end of that trajectory.

3.3 Chokepoint Test EA Release

Figure 6 illustrates the adjustments to the EA release during the chokepoint test as reflected in "instantaneous" (15-minute interval) measurements at the North Platte River near Keystone gage just downstream of Lake McConaughy. The North Platte River at North Platte reached a stage of 6.0 ft on July 5 and remained at or near that level through the start of the chokepoint test. In the days immediately prior to the official start of the test on July 13, the EA release bounced around a bit to accommodate changes in CNPPID operational releases while continuing to maintain the 6.0 ft stage at North Platte. From July 14-16, the EA release was held steady at a constant rate of 550 cfs.

[11] Community Collaborative Rain, Hail & Snow Network, available at www.cocorahs.org.

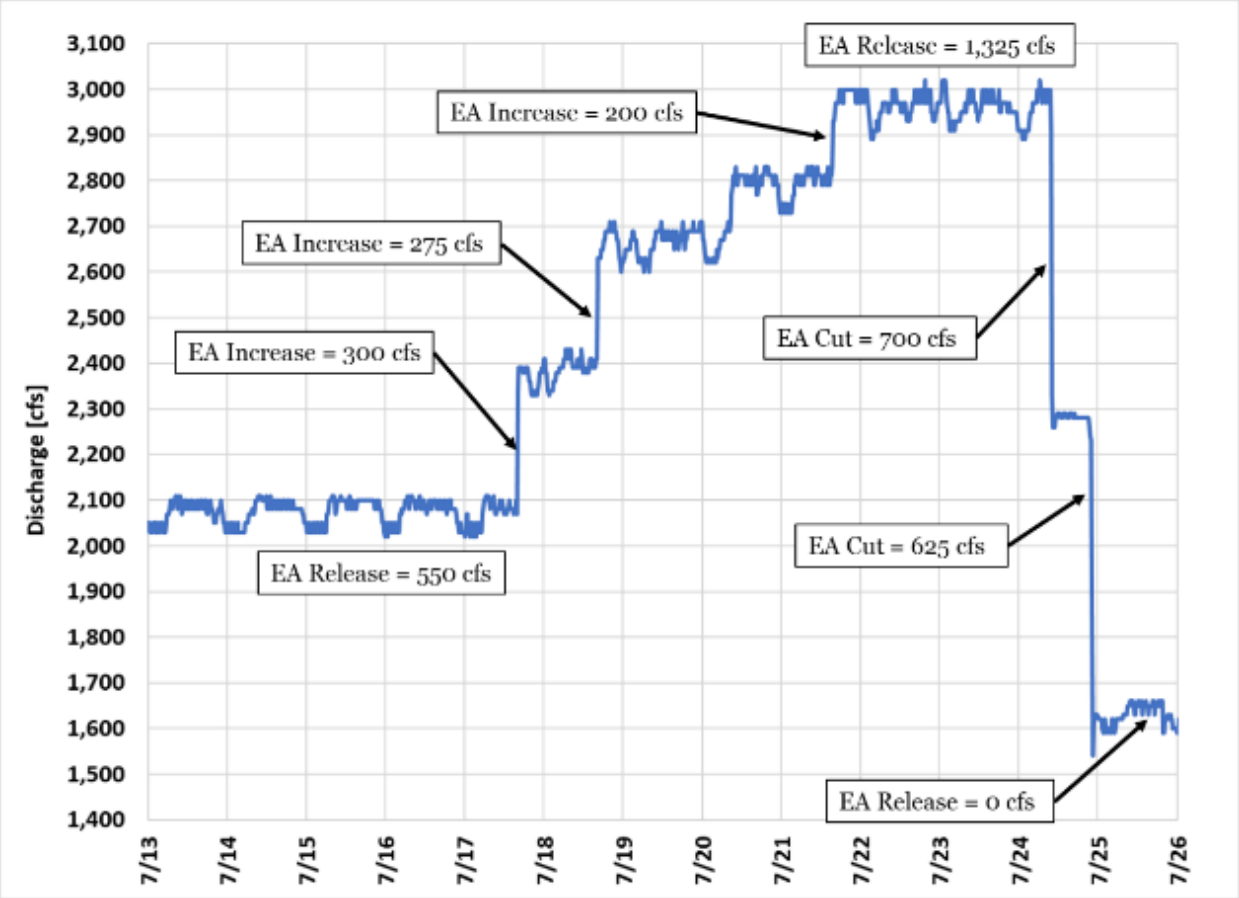


Figure 6. Keystone Gage Showing Chokepoint Test EA Release Adjustments, July 13-26, 2020

Increases in the EA release were scheduled to occur in two steps on July 17-18 in order to reach a stage of 6.5 ft at North Platte on Monday July 20. The magnitude of those increases was adjusted as needed based on the measurement/shift data from the site measurement taken by NDNR on Friday July 17.

During the chokepoint test planning process, a two-day travel time from Lake McConaughy to North Platte was assumed. In order to better estimate the travel time for scheduling of the EA release adjustments, the EDO reviewed a series of step changes in the EA release that occurred between late April and early July 2020. NDNR reported a travel time estimate of 38 hours based on a late June event. While a very clear signal from EA release changes is always evident in the Keystone gage, that signal tends to attenuate significantly en route to North Platte. To the extent that stage changes at North Platte could be tied to EA releases, the EDO estimated travel time to range from 32 to 38 hours. In order for North Platte stage to reach 6.5 ft on the morning of Monday July 20, a 36-hour travel time was assumed, and the July 17-18 EA release adjustments were scheduled for around 6 p.m.

As will be discussed further in the next section, this schedule planning did not work out as intended. A precipitation event downstream of Lake McConaughy on July 20 increased North

Platte River flows, but due to high transit losses, the North Platte River at North Platte did not reach a stage of 6.5 ft until late on Tuesday July 21. Recognizing that this was happening, a decision was made to increase the EA release by 200 cfs on July 21. The EA release was then held steady at 1,325 cfs from the afternoon of July 21 until the morning of Friday July 24, at which point the chokepoint test was abruptly terminated. CNPPID cut the EA release by 700 cfs late morning on July 24 and the rest near midnight. As of July 25, the EA release was zero.

Figure 7 shows average the average daily EA release as tracked through NDNR's Platte Water Accounting Program (PWAP), which assumes one-day travel between the Keystone and Sutherland gages on the North Platte River, then another day from Sutherland to CNPPID's Tri-County Canal diversion and the Platte River near Maxwell gage. The tracking illustrates the rise in the EA release during the chokepoint test and the lagged progression down the river, followed by the cut from 1,325 cfs to zero at Keystone on July 24-25. By July 27, NDNR accounting showed that the pulse associated with the EA release had passed completely through and beyond the North Platte chokepoint to locations further downstream on the Platte River below Maxwell. The total volume of EA water released from July 13-24 was about 21,000 AF.

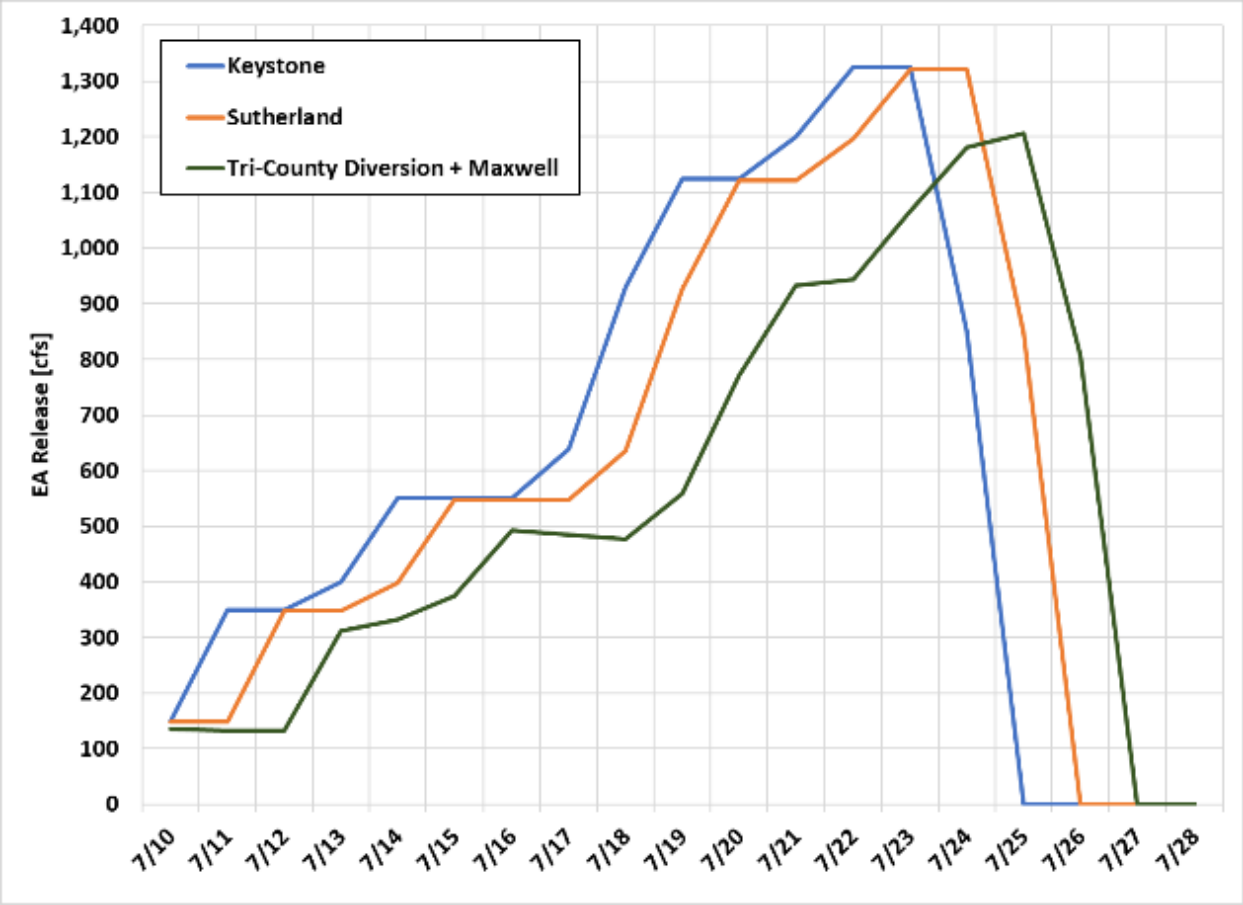


Figure 7. PWAP Tracking of EA Release, July 10-28, 2020

3.4 Stage and Discharge Measurements

The final planned schedule for the chokepoint test in Table 2 of the Implementation Plan (Appendix C) called for the following stage targets for the North Platte River at North Platte:

- Stage = 6.0 ft: July 15-18
- Stage = 6.5 ft: July 20-27
- Stage = 6.75 ft: July 28-30

Figure 8 illustrates what actually occurred, with the primary axis showing river stage at North Platte since that was the target parameter for the chokepoint test. Observed streamflows during and after the chokepoint test are shown on the secondary axis; the Keystone gage plot from Figure 6 is included along with the North Platte River near Sutherland and at North Platte gages.

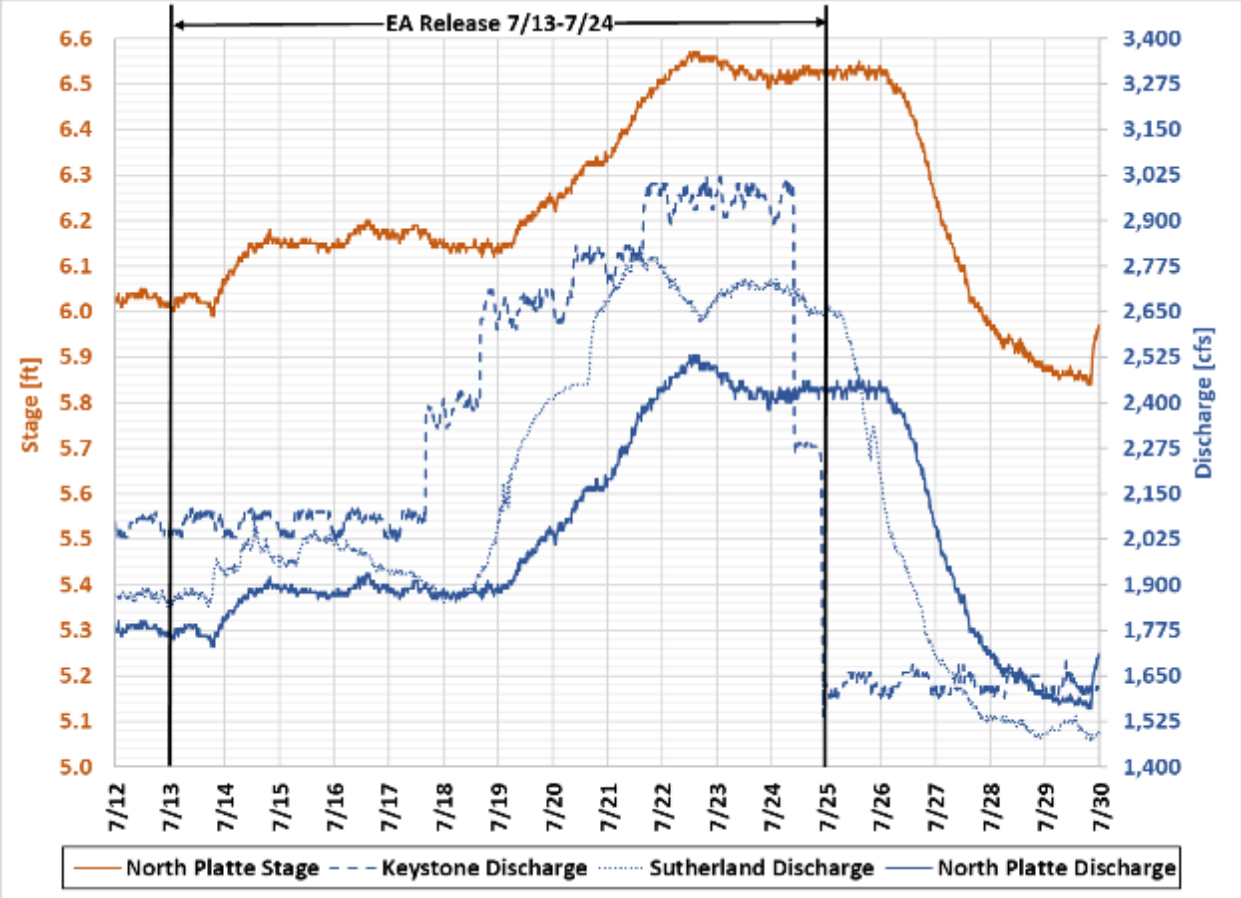


Figure 8. North Platte River Stage and Discharge, July 12-30, 2020

As discussed before, the EA release signal is clearly seen at Keystone, but attenuates significantly at Sutherland and North Platte. The North Platte stage was hovering around 6.0 ft leading up to the official start of the chokepoint test on July 13. Precipitation on July 13 very quickly resulted in an increased stage, which remained above target between 6.15 ft and 6.2 ft through July 18. The effect of the July 17 increase in the EA release was evident at Sutherland

within 24 hours and started to appear at North Platte as expected on July 19, but the climb towards the target stage of 6.5 ft was much slower than anticipated. By the time of the July 20 daily coordination call, the river at North Platte was just shy of 6.3 ft when it was expected to already be at 6.5 ft. Another 24 hours later on July 21, the stage had climbed only to 6.4 ft.

Nebraska DNR took a flow measurement at North Platte on July 20,[12] and heavy precipitation later that day led to a rapid flow increase of about 350 cfs at the Sutherland gage. The slow rise at North Platte was discussed with the coordinating entities on Tuesday July 21, and the consensus was that as the river rose, it started spreading out into seldom used channels—particularly between Sutherland and North Platte—that were very dry and heavy transit losses to bank storage were occurring as a result. Taking into consideration these assumed transit losses, the precipitation pulse flowing downstream from Sutherland towards North Platte, and the most recent measurement/shift data from NDNR, the EDO and the USFWS EA Manager made the decision to add 200 cfs to the EA release during the afternoon of July 21. This was immediately implemented by CNPPID.

The North Platte River at North Platte finally reached 6.5 ft just after 10 p.m. on July 21. The next day the combined EA release and the pulse from the July 20 rains pushed the stage to a peak of 6.57 ft. As the pulse passed through North Platte, the stage settled back to 6.5 ft around midnight on July 23 into July 24. After the EA release was terminated on July 24, the stage remained at or just above 6.5 ft until it began steadily dropping on July 26. The stability of the stage at North Platte after the passing of the storm pulse validated the decision to add 200 cfs to the EA release to compensate for transit losses.

When the EA release ended on July 24, the 1,325 cfs reduction was evident at the Keystone gage. Flows started to drop at Sutherland a day later and over the next several days, the Sutherland gage showed an overall decline of more than 1,150 cfs. The North Platte gage began dropping on July 26 (two days after the EA release stopped) and over the next four days flows were reduced by about 800 cfs before the rainfall event late in the evening on July 29 ended the downward flow trend. Just as the slower-than-expected stage increase at North Platte was attributed to losses into bank storage during the river's rise, the opposite is assumed to have occurred during the river's fall, with drainage back out of bank storage limiting the magnitude of flow drawdown at North Platte. Although the full magnitude of the EA release reduction was not reflected at the North Platte gage, prior discussion of NDNR's administrative accounting showed the last of the EA pulse to be downstream of the Maxwell gage on the Platte River by July 27.

During the course of the chokepoint test, the EDO also maintained mass balance tracking based on daily average streamflows, canal diversions, and tributary inflows to the North Platte River between the Keystone and North Platte gages. The calculations are coarse and affected by irregular precipitation over the drainage but suggest relatively small and alternating gains and losses prior to the increased EA release on July 17. Over the next few days estimated losses

[12] In addition to the three site measurements at the North Platte gage during the chokepoint test on July 17, July 20, and July 23, Nebraska DNR also took measurements at the North Platte River near Sutherland, Birdwood Creek near Hershey, Cody-Dillon Canal, and Lincoln County Drain No. 1 gages. Discharge readings were adjusted accordingly to be as accurate as possible.

ballooned to a range of about 200 cfs to 370 cfs. After the EA release stopped on July 24, tracking results switched to substantial gains (~120 cfs to 400 cfs) through the end of the month. Regardless of specific gain and loss rates, the calculation results are consistent with the river's behavior as observed at the North Platte gage.

3.5 Surface Water Measurements

Figure 9 illustrates the locations of sites for surface water measurements. Two sites were along the south bank of the river: the North Platte River at North Platte gage at the northwest corner of Cody Park adjacent to the Highway 83 bridge (purple hexagon marker) and the Albrecht staff gage, represented here by site V Dr (red square). Another three sites were located on north side channels: SC-1 and SC-2 on the State Channel and SW-2 on the channel that flooded under high flows prior to restoration of the State Channel Berm, but which now only receives water from a small culvert through the berm (blue circle markers).

The SC-1, SC-2, and SW-2 locations were all outfitted with pressure transducers and data loggers. Continuous (1-hour interval) surface water stage or water surface elevation measurements are shown in **Figure 10** for the duration of the chokepoint test. Note that stage values on these gages are independent and are not tied to a common benchmark elevation. Regardless of the specific values recorded, the same water level pattern was observed at each location. Notably, at the river gage, the total rise from the start of the chokepoint test to its peak was just under 0.6 ft. The same is true for the SW-2[13] location, which is downstream of the State Channel Berm and receives water through a small culvert. In contrast, both monitoring sites along the State Channel show start-to-peak water level changes of nearly 1.2 ft, as this was where the majority of the flow in the side channel was directed. A staff gage was also installed at SC-1, but the few data points collected on EDO monitoring days do not reveal any useful information that is not better illustrated in the continuous hourly data.

Figure 9. Monitoring Locations with Surface Water Measurements

[13] The apparent diurnal variability in the SW-2 data is most likely due to issues with the monitoring equipment.

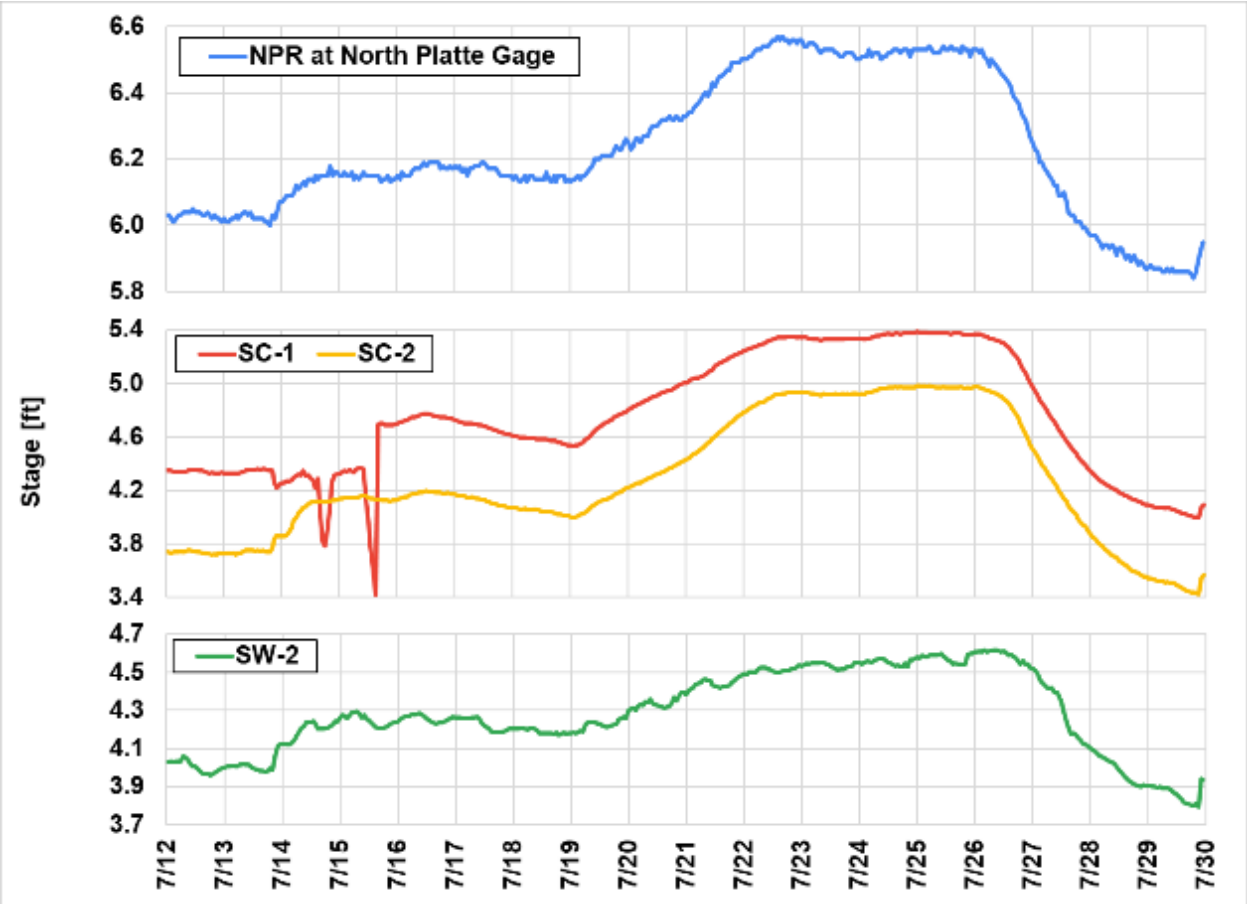


Figure 10. Chokepoint Test Surface Water Stage Measurements

Figure 11 provides more specific aerial and ground-level views of the Albrecht staff gage location (indicated by the V Dr marker in Figure 9). The property owner provided daily staff gage readings to the EDO during the chokepoint test.

The Albrecht staff gage readings and daily average stage at the North Platte River at North Platte gage are plotted together in **Figure 12**. Between the EDO and NWS, time-stamped photos of the staff gage were taken on only six of the 14 days for which readings were available. Stage data from the North Platte gage is available in 15-minute intervals, but because the specific time of day is only known for a portion of the Albrecht dataset, the average daily stage at the North Platte gage was calculated by the EDO and used here for illustrative purposes. Furthermore, the Albrecht staff gage was not surveyed to a specific benchmark, so the absolute values of the readings are less important than the pattern of water level rise and fall. Given the location of the Albrecht staff gage, it effectively functions as another surface water measurement and consistent with the automatic water level readings at and near the State Channel, the time series pattern tracks very closely to the official North Platte gage measurements.

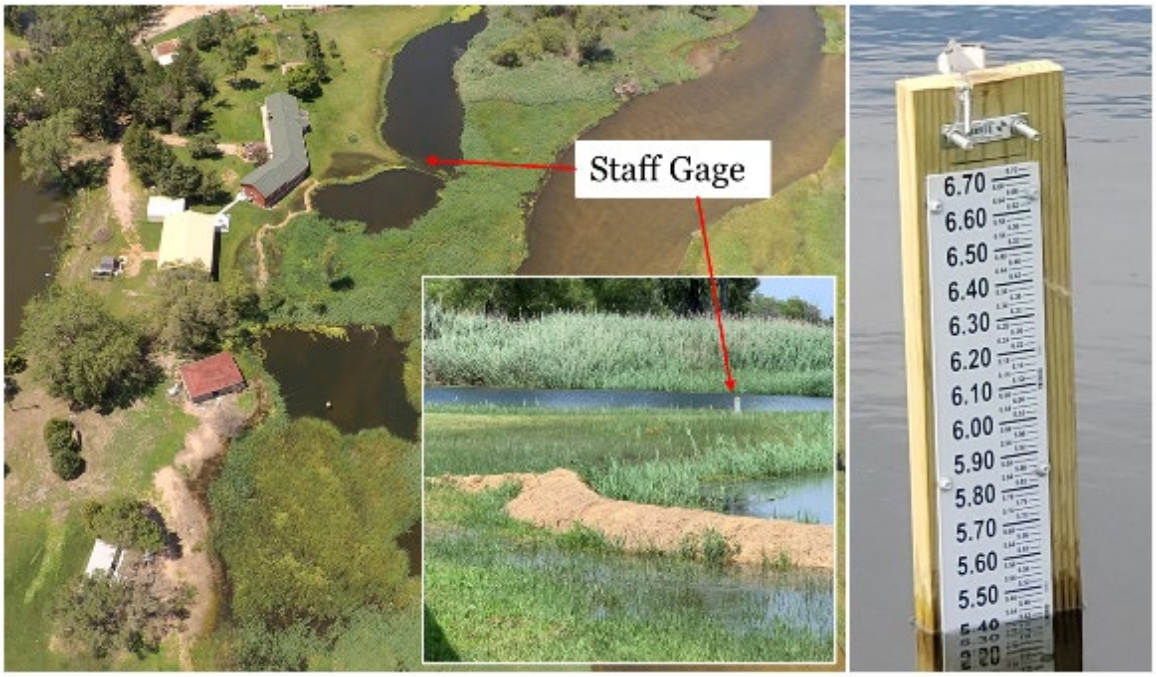


Figure 11. Location of Albrecht Staff Gage

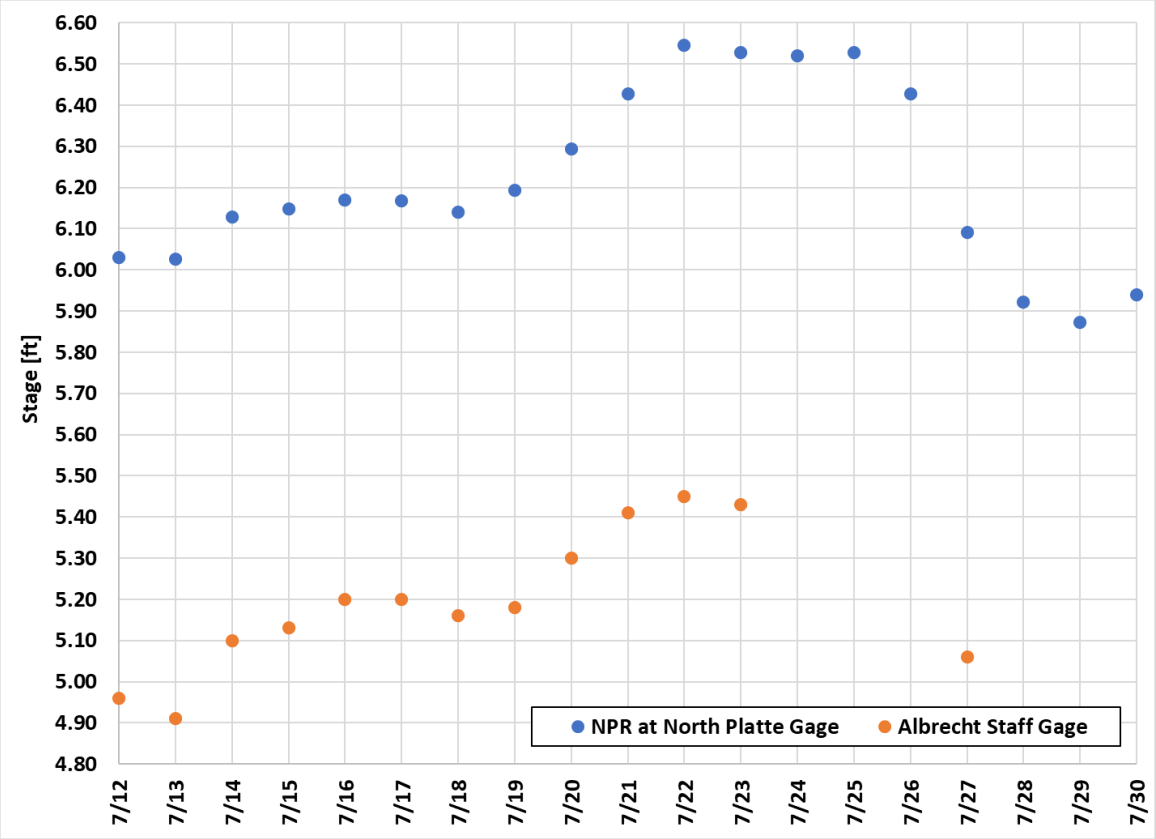


Figure 12. Daily Stage Readings at North Platte Gage and Albrecht Staff Gage

3.6 Groundwater Measurements

Referring back to the map in Figure 9, the Program has long maintained an instrumented monitoring well identified as GW-1 (gold triangle marker) in the southwest quadrant of the intersection at North River Road and North Washboard Road. **Figure 13** shows groundwater data from this monitoring well, again paired with the North Platte River at North Platte stage for comparison. Note that the y-axis range for both time series is one foot or less, so the scale of the observations appears exaggerated. Water levels in the monitoring well were significantly influenced by precipitation events on July 13 and July 29.[14] The influence of rising water associated with the chokepoint test is less pronounced than with surface water observations, but there is a modest increase in the water level, with the response appearing to lag by a few days.[15] Surface water levels peaked on July 22, but groundwater did not peak until July 27. Once the surface water level dropped, the groundwater began to decline as well, but the trend reversed sharply with the rainfall a couple days later.

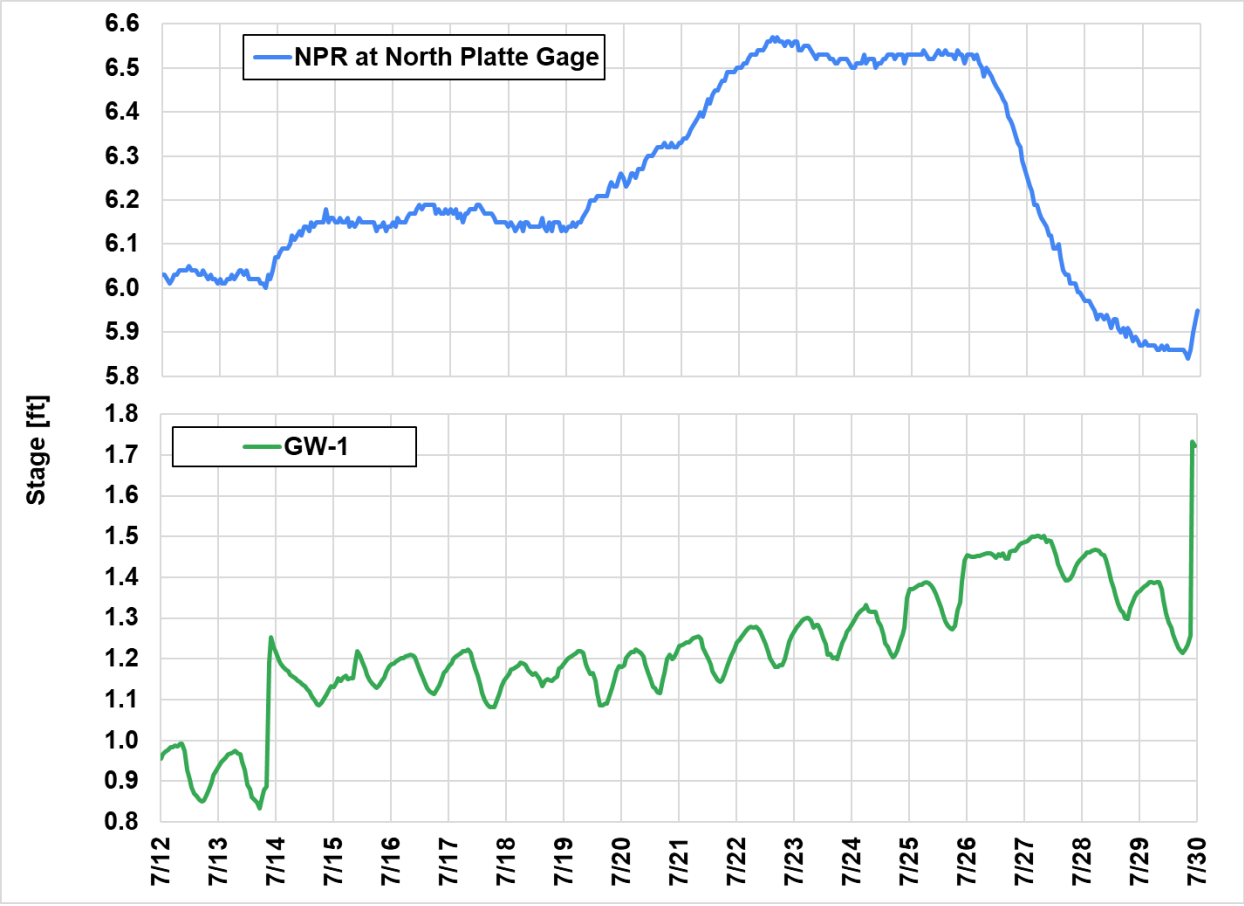


Figure 13. Groundwater Levels at Monitoring Well GW-1, July 12-30, 2020

[14] The July 13 precipitation event was discussed in Section 3.2. For the July 29 event, there were no measurements reported on the north side of the river in the general vicinity of monitoring well GW-1, but CoCoRaHS shows six measurements within the City of North Platte south of the river ranging from 0.85 inches to 1.11 inches.

[15] The apparent diurnal variability in the GW-1 data is most likely due to issues with the monitoring equipment.

There are no existing groundwater monitoring wells south of the North Platte River at North Platte, so the EDO installed staff gages in three ponds relatively near to the river to serve as proxies for groundwater levels. The locations were in the pond near the horseshoe pits at the east end of Cody Park; in a small "cove" off the west end of the large pond within the animal enclosure at Cody Park; and in the northwest corner of the pond in Armory Park (west of Highway 83, across the street from the dog park). Readings were taken by the EDO on most monitoring days between July 15 and July 24, and again on July 27 prior to removing the staff gages, but with the early termination of the chokepoint test, there are only five or fewer data points for each location. These small datasets are of limited value to the chokepoint test evaluation and are therefore not included in this report.

4 Chokepoint Test Visual Observations

Although the EDO identified more than 20 visual observation locations to be visited routinely during the chokepoint test, at only a few were repeat photos captured that provided keen insights regarding the potential impacts of increasing minor flood stage from 6.0 ft to 6.5 ft. Rather than having to ramp up at the start of the test, the North Platte River at North Platte had already reached a stage of 6.0 ft more than a week before chokepoint test monitoring officially began. The maximum stage increase during the July 13-24 test period was less than 0.6 ft, and except for a few locations, the incremental day-to-day changes were barely noticeable.

Roadside ditches overgrown with mid-summer vegetation were either dry or had a small trickle of water sustaining cattails. Near the Highway 30 bridge, the water slowly crept up the stumps of a line of pilings in a backwater pond off the main river channel, and an inch of water started flowing over a low spot in a footpath, but any changes across the overall broad channel approaching the bridge were nearly imperceptible. Likewise, there was no visible impact of water backing up the channel carrying water from the city's wastewater treatment plant effluent discharge pipe towards the river. Water started to encroach on riverside trails at the east end of Cody Park and originating from the beach at the Buffalo Bill State Park Campground but was not a significant concern. Along North River Road west and northwest of the residential areas some side channels abutting agricultural lands started to carry water, but these are part of the river and should be expected to flow from time to time.

Section 1.1.2 addressed the NWS flood impacts descriptions for the North Platte River at North Platte as written before the chokepoint test as well as revisions to those descriptions after the test. Chokepoint test visual observations reported in the sections below are divided into three categories reflecting these changes and the Program's goals for the chokepoint test: NWS flood impact areas before and after the chokepoint test, and the State Channel.

4.1 Observations at Before-Test NWS Flood Impact Areas

Flood impact areas as described by NWS before the chokepoint test included the Cody Park boat ramp and parking lot and the residential area around and particularly south of the intersection at North River Road and North Washboard Road. Both of these areas were subject to flooding under previous high flow events and were the primary focus of NWS minor and moderate flood stage definitions before the chokepoint test.

4.1.1 Cody Park Boat Ramp

The Cody Park boat ramp sits in the northwest corner of the park adjacent to the Highway 83 bridge abutment on the south bank of the North Platte River. It is the area of the park with the lowest elevation and therefore the first and most likely area to be impacted by flooding. This was clearly reflected in NWS minor and moderate flood stage definitions prior to the chokepoint test, and the observed flooding during the chokepoint test was as expected. In the days leading up to the chokepoint test, with the river already approaching 6.0 ft, the submerged area was confined mostly to the boat ramp itself, which descends into the main river channel. As the river continued to rise, water spread out over increasingly large areas of the adjoining parking lot. Eventually the City of North Platte locked off access to the parking lot and boat ramp for safety reasons. By July 30, nearly a week after the chokepoint test ended, most of the water had drained out of the parking lot area (note that some of the standing water visible in the July 15 and July 30 photos may be a result of recent rainfall more so than river flooding). **Figure 14** shows a progression of photos at the boat ramp and its adjoining parking lot at various stages before, during, and after the chokepoint test.

Figure 14. Cody Park Boat Ramp, July 2-30, 2020

4.1.2 North River Road and North Washboard Road

The residential area west of Highway 83 and south of North River Road, particularly along North Washboard Road, was long subject to flooding under high flow conditions, particularly because

of a river channel that runs just along the edge of these properties. This was recognized in the NWS flood stage definitions as written before the chokepoint test. **Figure 15** shows locations along the west side of North Washboard Road, starting near the intersection with North River Road and progressing south, early in the 2011 floods. These photos were taken March 31-April 1, 2011 when the North Platte River at North Platte gage was recording stages from 6.3 ft to 6.32 ft, comparable to stages observed during the July 2020 chokepoint test.

Figure 15. Standing Water along North Washboard Road, March 31-April 1, 2011

A breach in the State Channel Berm at an unknown time in the past allowed high flows to reach this neighborhood. The 2018 restoration of the State Channel Berm closed that gap, with only a culvert left to pass water into the high flow channel beyond. The State Channel Berm functions to re-direct water away from the residential area and back towards the main river channel.

The picture in the upper left of Figure 15 is a large grassy swale in the southwest quadrant of the North River Road and North Washboard Road intersection. This is also the location of the groundwater monitoring well GW-1 discussed in Section 3.6. **Figure 16** provides four snapshots of the same location just before and during the chokepoint test, with river stages ranging from

5.93 ft to 6.52 ft. In contrast to the 2011 photos when the stage was in the middle of this range, the area remained completely dry across the entire duration of the chokepoint test.

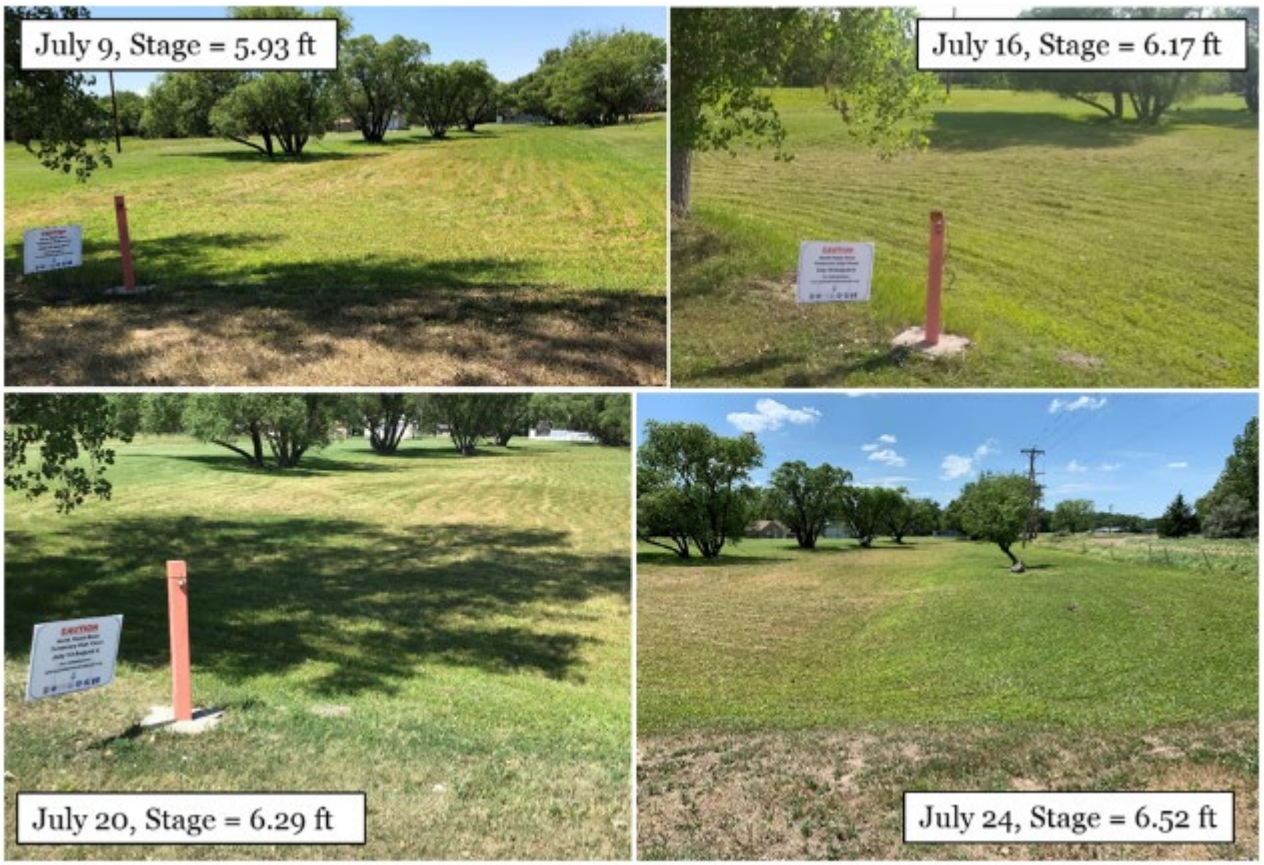


Figure 16. Grassy Swale at N. River Rd. & N. Washboard Rd., July 9-24, 2020

4.2 Observations at After-Test NWS Flood Impact Areas

Vulnerable areas that arose during the chokepoint test included agricultural lands upstream of North Platte near the Muskrat Run State Wildlife Management Area. More significant were impacts reported at residential properties along the south bank of the river in the Vieyra Drive-Red Fox Lane-Darlene Road neighborhood of North Platte.

4.2.1 Albrecht and Darlene Road Properties

Issues related to high water were reported at two properties at or near the south bank of the North Platte River in the Vieyra Drive-Red Fox Lane-Darlene Road area of the City of North Platte, as shown in **Figure 17**. This neighborhood, located about a mile upstream of the Highway 83 bridge, is highlighted on the chokepoint map in Figure 1 and indicated by the V Dr marker in Figure 5. The house between these two properties sits on a smaller tract of slightly higher ground and did not report any specific issues during the chokepoint test.

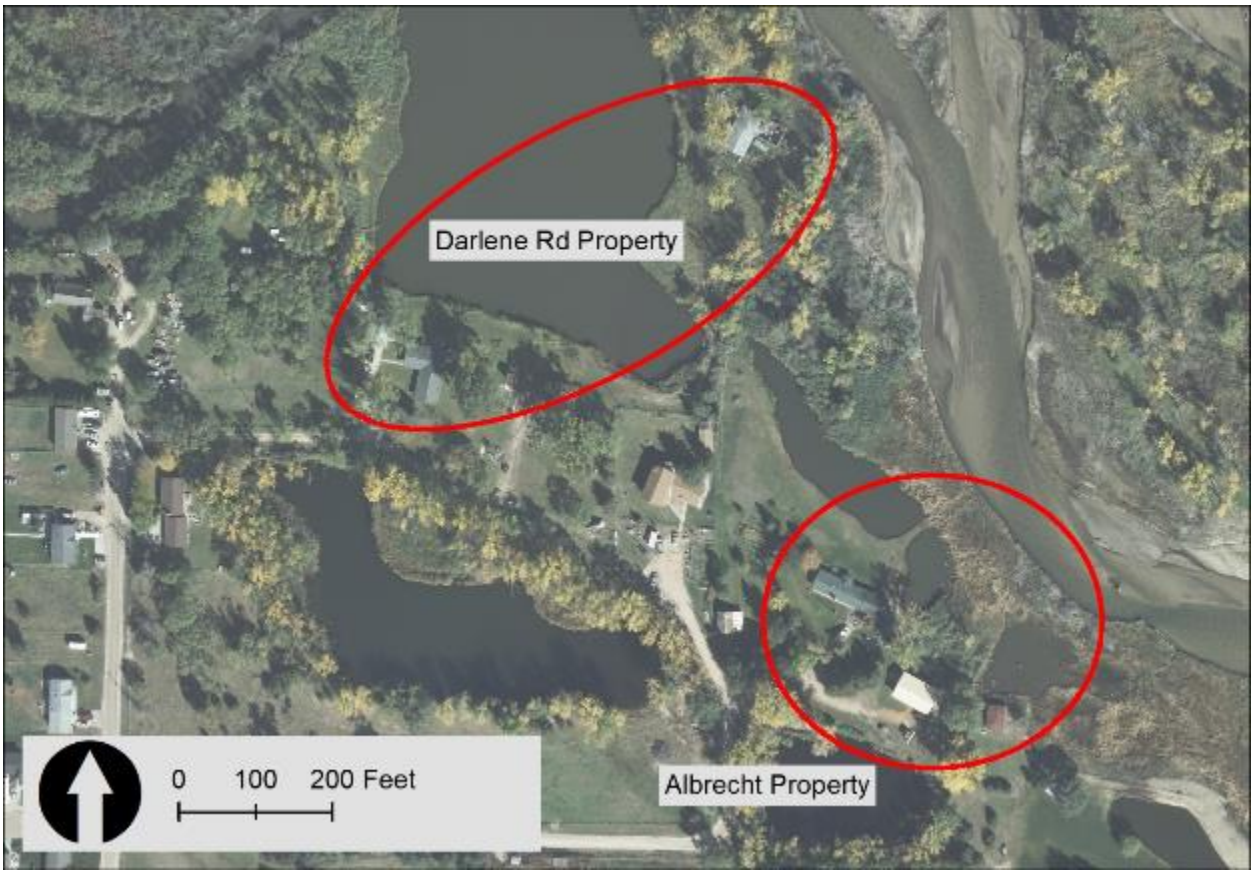
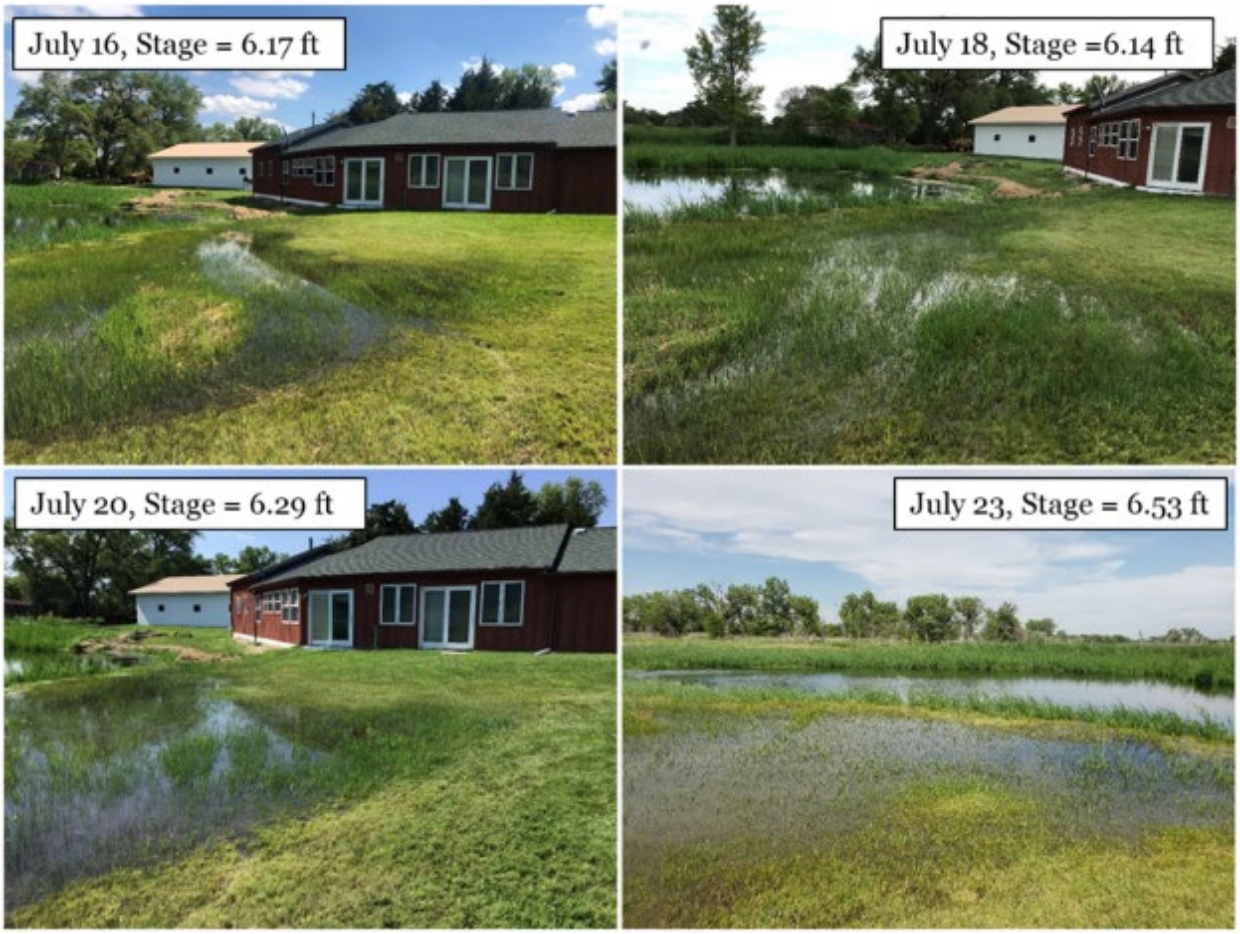


Figure 17. Location Map of Albrecht (Red Fox Lane) and Darlene Road Properties

The owner of the Albrecht property on Red Fox Lane contacted the Lincoln County Emergency Manager on Monday July 13 with concerns about the rising water levels in the North Platte River, particularly given impacts from past flooding events. Permission was given to conduct monitoring activities at this location. The EDO made contact with the owner and first visited the property on Thursday July 16. As discussed in Section 3.5, the owner has a staff gage installed in the backyard pond and provided daily readings to the EDO during the chokepoint test. The NWS also visited and took photos at this property at least five times between July 17 and July 27; the EDO visited again on July 24.

Figure 18 and **Figure 19** show the encroachment of water behind the Albrecht house from different angles. Rising water spread outside the banks of the backyard ponds into adjacent low spots and also seeped through a low berm. The bottom photos in Figure 19 are both from July 24; the lower right photo shows that while water had spread laterally from the ponds to within 6 ft of the house, there was still a fairly significant vertical slope to reach the foundation. The homeowner also reported septic system issues. **Figure 20** presents an aerial view of the Albrecht property on July 24. The limits of the high water directly behind the house are the clearly visible darkened areas outside the perimeters of the ponds. By the time of the NWS site visit on July 27, water had receded from the low-lying areas closest to the house as the river stage was drawn down.



669
670 **Figure 18. Albrecht Property Backyard Near Ponds**

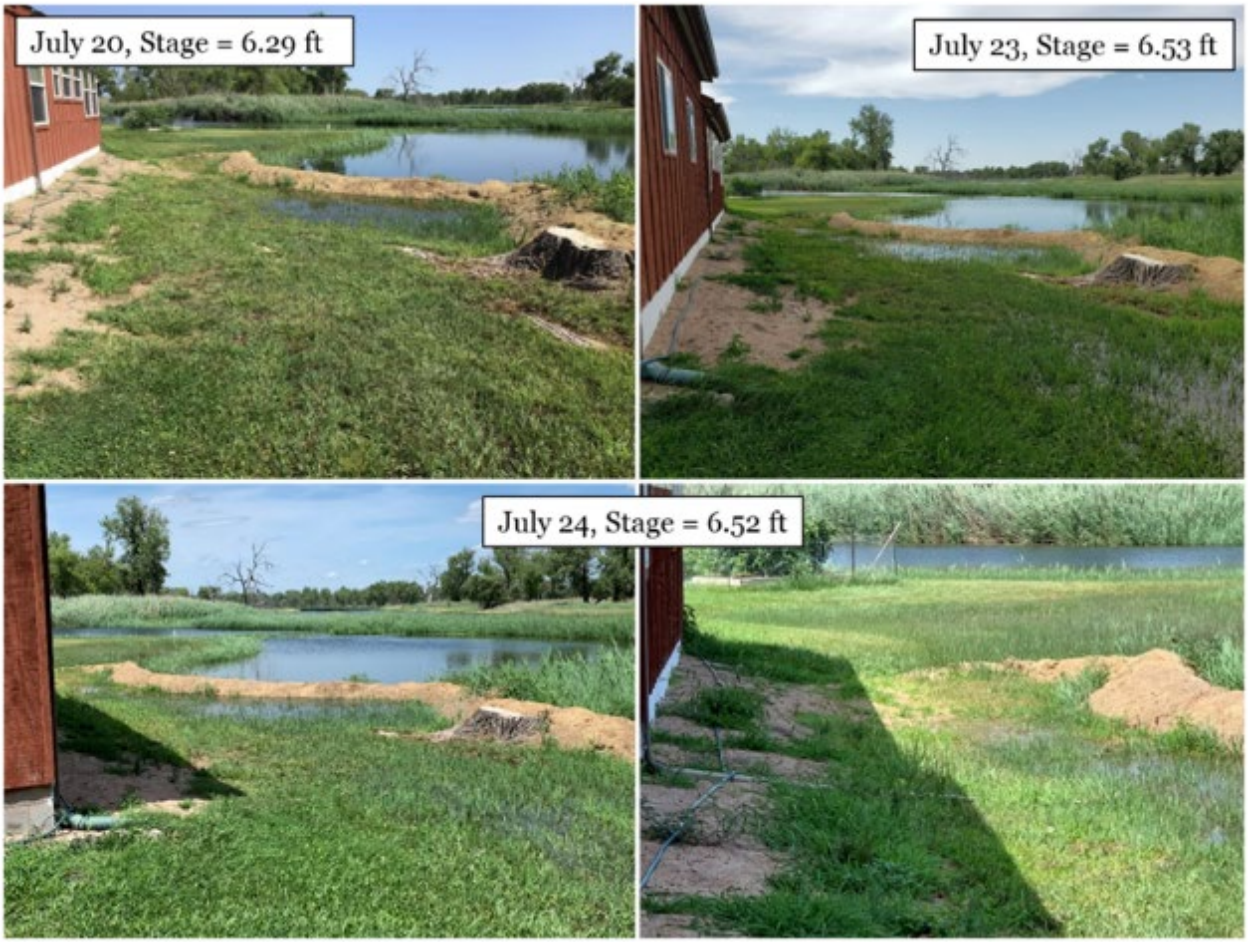


Figure 19. Albrecht Property Backyard Behind House

Figure 20. Aerial view of Albrecht Property, July 24, 2020

NWS visited the Darlene Road property on Friday July 24. Similar to issues observed at the Albrecht property, standing water was spreading beyond the edges of the backyard pond, and the

677 homeowner also reported problems with the septic system. In addition, access to an old barn
678 across the pond from the house was said to be cut off and an underground storm cellar in the
679 front yard was partially flooded. Photos from the Darlene Road property are shown in **Figure**
680 **21**.

681
682 **Figure 21. Darlene Road Property, July 24, 2020**

683 4.2.2 Upstream Agricultural Lands

684 On Wednesday July 22, a complaint[16] regarding high water levels on the North Platte River was
685 received from the owner of farmland adjacent to the Muskrat Run State Wildlife Management
686 Area about six miles northwest of the City of North Platte. This complaint was discussed on the
687 daily coordination call that day, the EDO made follow-up calls to the landowner to better

[16] A second complaint came from a riverfront landowner just west of Sarben (about 30 miles west of North Platte and several miles upstream of the North Platte River near Sutherland gage), and the EDO also visited there on July 22. The affected lands included a farm on the south side of the river with extensive accretion ground used for grazing. Several high flow channels running through the accretion ground were activated due to rising water levels in the North Platte River. A few miles downstream on the north side of the river, partial inundation of a wet meadow was preventing a different landowner from cutting hay. The NWS did not visit these properties, and given the location outside of the chokepoint reach, there was no discussion of these properties in the revised flood impacts descriptions at North Platte.

understand the concerns, and the EDO elected to prioritize visiting this site over the planned routine monitoring in and around the chokepoint that day.

The property near Muskrat Run included a corn field bounded on the northwest side by the wildlife area and a hay meadow to the east. The specific area of concern is indicated by the red circle in **Figure 22**. The inlet to the Cody-Dillon Canal runs along the northern edge of the hay meadow, which is also parallel to the main channel of the North Platte River.

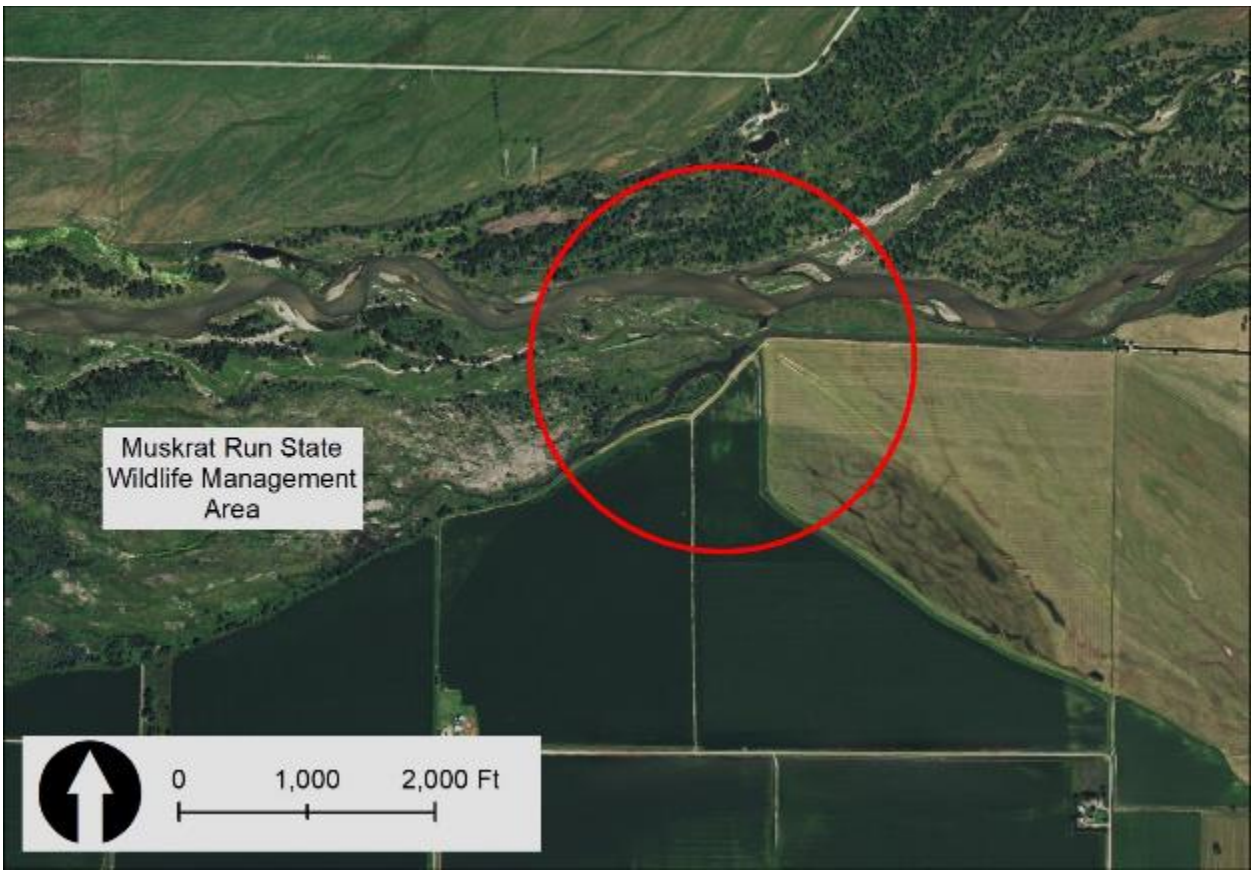


Figure 22. Agricultural Lands with Reported High Water Concerns near Muskrat Run State Wildlife Management Area

Flows into the Cody-Dillon inlet channel were high and starting to cause minor bank erosion in places. A drain marks the boundary between the corn field and the hay meadow; this drain was backing up due to the high river flows and spilling over into a small area of the hay meadow. **Figure 23** shows aerial images of the property on the day of the site visit. Nothing observed on July 22 seemed to be of great concern, but the landowner called again the next day to report that water backing up into the hay meadow was impeding the use of a center pivot irrigation system for the corn field (a portion of the northeastern turn of the half circle center pivot tracks through the hay meadow). This information was conveyed on the July 23 daily coordination call, and NWS staff also visited the site that day.

Figure 23. North Platte River, Cody-Dillon Canal Inlet, and Agricultural Lands near Muskrat Run, July 22, 2020, Left: Looking West, Right: Looking East

4.3 Observations at the State Channel

The performance of the restored State Channel Berm under high flows was the subject of a chokepoint test objective, and no problems were observed. Repairs to the State Channel Berm were described in previous sections, and Figure 16 illustrates the extent to which those improvements appear to entirely divert water away from the North River Road and North Washboard Road area under high flow conditions. The following series of figures shows the actual flow conditions along the State Channel at or near surface water monitoring stations SC-1 and SC-2 on several days during the chokepoint test. **Figure 24** shows views looking upstream and downstream near SC-1 and SC-2 on July 15. **Figure 25** shows three views of the State Channel on July 20, and **Figure 26** shows the State Channel on July 24, near peak flow and shortly after the decision was made to terminate the chokepoint test. The bottom right photo in Figure 26 captures a low spot in the berm over which a small amount of water was flowing.

Figure 24. State Channel, July 15 (Stage = 6.15 ft), Top: Near SC-1, Bottom: Near SC-2

Figure 25. State Channel, July 20 (Stage = 6.29 ft)

Figure 26. State Channel, July 24 (Stage = 6.52 ft), Top: Near SC-1, Bottom: Near SC-2

Finally, **Figure 27** shows the State Channel nearly a week after the chokepoint test was ended. By this time, the North Platte River at North Platte had dropped by more than half a foot to be below minor flood stage again. The top photos show views near SC-1 at the upper end of the State Channel, and the bottom photos were taken far downstream along the State Channel, near where it meets the main channel of the North Platte River.

Figure 27. State Channel, July 30 (Stage = 5.94 ft), Top: Near SC-1, Bottom: Beyond SC-2, near Confluence of State Channel and North Platte River Main Channel

5 Chokepoint Test Outcomes

Objectives established for the chokepoint test were defined in Section 1.3. The outcomes of the chokepoint test are discussed in the sections below.

5.1 North Platte River at North Platte Minor Flood Stage

The primary desired outcome of the chokepoint test was an increase in the minor flood stage for the North Platte River at North Platte from 6.0 ft to 6.5 ft, which would provide the Program with additional carrying capacity for releases from the Lake McConaughy EA on the order of 800 cfs. This was not achieved.

Following visits to the Red Fox Lane (Albrecht) and Darlene Road properties on July 23-24, the NWS declared during the July 24 daily coordination call that the observed high water impacts rose to the level of being a threat to property. As a result, there would be no change to the 6.0 ft minor flood stage at this time. With this determination by NWS, the EDO and the EA Manager made the immediate decision to terminate the chokepoint test. CNPPID and NPPD arranged to end the EA release, drawing it down from 1,325 cfs to zero as quickly as possible. This was accomplished before midnight that same day (July 24).

Within days, NWS revised the flood stage impacts descriptions for the North Platte River at North Platte to reflect observations during the chokepoint test. As stated in Section 1.1.2, the updated versions are included in Appendix A. On July 29, 2020, the NWS North Platte office issued a formal letter recapping observations made by NWS during the chokepoint test. The letter, which is included in **Appendix F**, concluded with a statement that "flood categories will remain the same for the gage on the North Platte River, at North Platte."

5.2 State Channel Berm Performance

Collected data and visual observations indicate that the restored State Channel Berm performed as designed under the high flow conditions created during the chokepoint test. In contrast to previous flooding events during which neighborhood flooding was observed at river stages comparable to those experienced during the chokepoint test, no standing water was observed in the vicinity of North River Road and North Washboard Road. Minor overtopping was observed at one or more low spots along the length of the State Channel Berm, but any impacts were minimal. Once the North Platte River water level declines after the end of the irrigation season and summer vegetation dies off, the berm will be evaluated for any unseen damage and maintenance needs.

6 Next Steps for the North Platte Chokepoint

Despite the outcome of the chokepoint test with regard to increasing minor flood stage on the North Platte River at North Platte, the Program objective of achieving and maintaining a conveyance capacity of 3,000 cfs through the chokepoint reach still stands. An easy task the EDO can undertake is to resume tracking the river discharge at a stage of 6.0 ft over time (Table 3 shows just how much this can vary). This was something the EDO was doing much earlier in the First Increment, but the practice was discontinued years ago. The collected data would allow the EDO to better assess how much flow capacity can reasonably be expected below minor flood stage.

A list of potential solutions to the flow capacity problems at the North Platte chokepoint was presented to the Program's Water Advisory Committee (WAC) and Governance Committee (GC) in August-September 2020. A thorough evaluation of risks, consequences, impacts, and practicability will need to be conducted before recommending the implementation of any specific action(s), an effort which is beyond the scope of this report. In no particular order, options for the Program to consider include the following:

- Revisit large-scale engineering solutions.
  - Projects studied but not implemented during the First Increment included channel widening, dredging, and construction of jetties to constrict the low-flow channel. Channel widening and dredging would likely require continuous maintenance.
  - A large, dedicated canal (or combination of smaller canals) could be constructed to bypass the chokepoint reach. This would likely be cost prohibitive given Program funding constraints, and there would almost certainly be significant land access and acquisition issues.

    - Improvements could be made to canals that divert from the North Platte River and return to the South Platte River via wasteways. This would be another means of bypassing the chokepoint reach, but such an option would likely be limited to non-irrigation season operations for Program purposes. The concept was tested as part of the 2013 Short Duration Medium Flow (SDMF) test, and the potential benefit was found to be limited.
    - The idea of a new outlet from the NPPD Sutherland Canal to the South Platte River, possibly via Fremont Slough, was discussed in the past and could also be revisited as a means of bypassing the North Platte chokepoint reach.
- Vegetation management. The Program supports an ongoing effort to control invasive phragmites (primarily with chemical spraying) throughout the Platte River valley. Additional vegetation management activities including shredding, mowing, and disking were implemented in parts of the chokepoint reach during the First Increment. These techniques could be pursued more aggressively at the chokepoint reach to destabilize and mobilize sandbars and islands and to reactivate overgrown side channels.
- Property buyouts. The Program could pursue buyouts of properties such as those in the Vieyra Drive-Red Fox Lane-Darlene Road area of North Platte that are impacted by high river levels. However, the chokepoint test showed that specific areas of impact by floodwaters can change with shifts in the river channel or other factors. This was exemplified by the absence of impacts along the north bank North Platte River and the emergence of more significant impacts along the south bank. It is therefore assumed that this could become a "whack-a-mole" scenario in which properties impacted in one flood event are purchased, then during the next event there are property impacts in another location. Additionally, even though PRRIP would have flood easements or own the affected properties, NWS would not consider that when setting flood stage. This means that PRRIP would need to pursue the next option as well.
- Modify the Program Document. In this scenario, it is assumed that flood stage for the North Platte River at North Platte is not changed, and the language of the Program Document would be modified to eliminate the requirement of achieving 3,000 cfs at the North Platte chokepoint *while remaining below flood stage*. The Program could accept the liabilities that would come with intentionally exceeding flood stage, including insurance claims for property damages. It would also be necessary to have CNPPID secure waivers from FERC to allow releases from the Lake McConaughy EA to exceed flood stage.
- Work within existing constraints. The Program could operate within the existing flood stage and conveyance capacity constraints for the North Platte River at North Platte. Future activities at the North Platte chokepoint would be driven by the science that emerges from the Adaptive Management Plan update. For example, germination suppression through the Program's critical habitat reach is expected to be a key flow management action moving forward through the First Increment Extension. One such scenario would require flows of 2,000 cfs at Grand Island between June 1 and June 30. This period is early in the irrigation season when demands are lower and more capacity is available through the chokepoint reach. Preliminary analyses by the EDO suggest that

flows of this magnitude (greater than 2,000 cfs at the chokepoint, accounting for transit losses) and timing would be achievable in most years.

The GC directed the EDO to continue working with the Chokepoint Test Planning Workgroup to review these concepts to determine the appropriate path forward for Program efforts at the North Platte chokepoint.

Appendix A

NWS Flood Stages for North Platte River at North Platte

NWS Flood Stages for North Platte River at North Platte[1]

Flood Categories (in feet)

Major Flood Stage:	7
Moderate Flood Stage:	6.5
Flood Stage:	6
Action Stage:	5.5

Definition of Flood Impacts (Before July 2020 Chokepoint Test)

10.8 Flood waters will reach the low steel of Highway 30 bridge located 1 mile east of North Platte.

10 Flood waters will reach the low steel of Highway 83 bridge near North Platte. Flood waters will also reach the low steel of railroad bridge located 2 miles downstream of Highway 83 bridge.

9 Major and widespread flooding along the south bank of the North Platte River. Major and widespread flooding of Rivers Edge Golf Course, properties near west 18th street, Cody Park and residential properties to the north of East 16th Street may occur without proper protection.

8.5 Widespread flooding along the south bank of the North Platte River begins. A dike built along the south bank of the river will protect Rivers Edge Golf Course, properties near west 18th street, Cody Park and residential properties to the north of East 16th Street. Homes and outbuildings north of Darlene Road and Vieyra Drive may be flooded without proper protection.

8 Without proper protection, widespread flooding will continue at Cody Park as flood waters from the boat ramp cross the paved access road along the northwest edge of the park and flood portions of the park.

7.5 Flooding worsens in low lying areas along the south bank of the North Platte River west of Highway 83. Homes and outbuildings north of Darlene Road and Vieyra Drive begin to flood.

7.2 Major and widespread flooding along the north bank of the North Platte River from Highway 83 to approximately 4 miles west of Highway 83 south of North River Road. Flooding occurs on North Washboard Road to the north and south of North River Road. Major and widespread flooding to residences and outbuildings along and south of North River Road with access to properties significantly impaired. Widespread flooding worsens along the north side of Cody Park.

7 Major and widespread flooding occurs along the north bank of the North Platte River from Highway 83 to about 4 miles west of Highway 83 south of North River Road. Water encroaches into some residences and outbuildings in this area with access to properties significantly impaired. Major and widespread flooding occurs along the south bank from the Nebraska Game and Parks Recreational Vehicle Campground Site to Cody Park in North Platte.

6.5 Moderate and more widespread flooding of low lying and agricultural land begins along the north bank of the North Platte River from Highway 83 to approximately 4 miles west of Highway 83 south of North River Road. Water encroachment into some residences property begins along and south of North River Road. Water encroachment into low lying areas of Cody Park worsens.

6 Minor flood stage. Minor flooding of low lying and agricultural land begins along the north bank of the North Platte River from Highway 83 to approximately 4 miles west of Highway 83 south of North River Road. Minor water intrusions into low lying areas of Cody Park in North Platte begins. People should be cautioned against being in the water along the banks of the river especially near Cody Park.

[1] https://water.weather.gov/ahps2/hydrograph.php?wfo=lbf&gage=nptn1

5.7 Minor overflows of low lying and agricultural land begins along the north bank of the North Platte River from Highway 83 to approximately 4 miles west of Highway 83 south of North River Road. People should be cautioned against being in the water along the banks of the river especially near Cody Park.

Definition of Flood Impacts (After July 2020 Chokepoint Test)

10 Flood waters will reach the low steel of the Highway 83 bridge near North Platte. Flood waters will also reach the low steel of the railroad bridge located two miles downstream of the Highway 83 bridge.

9 Major and widespread flooding along both banks of the North Platte River. Major and widespread flooding of Rivers Edge Golf Course, properties near west 18th street, Cody Park and residential properties to the north of East 16th Street may occur without proper protection.

8 Without proper protection, widespread flooding will continue at Cody Park as flood waters from the boat ramp cross the paved access road along the northwest edge of the park and flood portions of the park.

7.5 River flooding along the North Platte River and groundwater flooding will worsen. Widespread flooding of agricultural land is expected. Homes and access to homes will continue to be impaired.

7.2 Major and widespread flooding along the north bank of the North Platte River south of North River Road and west of Highway 83. Flooding on North Washboard Road to the north and south of North River Road. Widespread flooding to residences and outbuildings along and south of North River Road with access to properties significantly impaired. Widespread flooding worsens south side of the river, including Cody Park and areas between the Rivers Edge Golf Course and Buffalo Bill Campground.

7 Major and widespread flooding along the south bank of the North Platte River. Without protection, water may begin to encroach on residences and outbuildings along the north bank of the river, west of Highway 83 and south of North River Road. Access to properties may become impaired. Major and widespread flooding along the south bank from the Buffalo Bill Campground to Cody Park in North Platte.

6.8 Without protection, water may reach homes along the south side of the North Platte River. Flooding of outbuildings and structures worsen, with a few structures surrounded by water a few feet deep. Flooding may begin on the north side of the river, south of North River Road and south of Hall School Road. Groundwater levels will rise, with groundwater flooding impacting a few locations.

6.5 Moderate and more widespread flooding of agricultural land begins along the south bank of the North Platte River. Water encroachment into a few outbuildings and structures begins on the south side of the river between the Golf Course and Buffalo Bill Campground. Homes with crawl spaces and cellars will experience flooding. Septic issues in rural areas and water encroachment into low lying areas of Cody Park worsens.

6.25 Minor flooding continues along the south side of the river. Homes in rural areas may begin to experience septic issues, with flooding of crawl spaces and cellars possible. Water begins to back up normally dry channels, flooding agricultural land. At this level on the north side of the river, water will begin to flow along North River Road upstream from the substation. Groundwater levels will begin to rise and some minor ponding of water may begin behind the stockyards and in other low areas.

6 Minor flood stage. Minor flooding begins in low lying and agricultural areas along the south bank of the North Platte River. Flooding of yards between the golf course and Buffalo Bill Campground are possible. Minor water intrusions into low lying areas of Cody Park in North Platte begins. People should use caution in the water and along the banks of the river, especially near Cody Park.

Appendix B

FERC Order Approving Temporary Waiver

CNPPID Notification of Testing Completion

170 FERC ¶ 62,134
UNITED STATES OF AMERICA
FEDERAL ENERGY REGULATORY COMMISSION

Central Nebraska Public Power And Irrigation District — Project No. 1417-274

ORDER APPROVING TEMPORARY VARIANCE FROM RESTRICTION ON FLOOD RELEASES AT THE NORTH PLATTE RIVER REQUIREMENT PURSUANT TO ARTICLE 404

(Issued March 6, 2020)

1. On January 21, 2020, Central Nebraska Public Power and Irrigation District (licensee), filed a request for a temporary variance from the requirements under Article 404 of its license for the Kingsley Dam Project.[1] The licensee requests the variance so it can test the channel capacity improvements and possibly increase the flood stage at North Platte River. The project is located on the North Platte and Platte rivers in Garden, Keith, Lincoln, Dawson, and Gosper counties in south-central Nebraska.

Background

2. The Kingsley Dam Project consists of dams, reservoirs, canals, and powerplants. The 3-mile long Kingsley Dam, on the North Platte River, impounds Lake McConaughy, which has a surface area of 30,500 acres and a maximum allowable storage capacity of 1,790,000 acre-feet. Kingsley Hydro, a 49.97-MW single-turbine hydroelectric plant,[2] abuts Kingsley Dam and discharges to Lake Ogallalla. The Central (or Tri-County) Diversion Dam, located 50 miles downstream of Kingsley Dam at the confluence of the North and South Platte rivers, diverts Platte River flow into the 75-mile-long Supply Canal which incorporates 27 dams and impoundments and three 18-MW hydroelectric powerplants (Jeffrey, Johnson No. 1, and Johnson No. 2).

3. Except for the eastern arm of the lake, Lake Ogallalla is part of the Nebraska Public Power District's (NPPD) North Platte/Keystone Diversion Dam Project, FERC

[1] *Central Nebraska Public Power and Irrigation District*, 84 FERC ¶ 61,079 (1998).

[2] *Central Nebraska Public Power and Irrigation District*, 89 FERC ¶ 62,033 (1999).

No. 1835. Water enters NPPD's system at the Keystone Diversion Dam or the 1,244-foot-long Korty Diversion Dam on the South Platte River.

4. Article 404 of the Kingsley Dam license requires that by October 1, 1999, and consistent with Exhibit X[3] and Article 408, the licensee execute a contract with the United States Fish and Wildlife Service (FWS) approved by the Commission as part of the Administrative Plan adopted pursuant to Article 408, and granting an Environmental Account Manager designated by the FWS the authority to request releases of water from the Environmental Account in Lake McConaughy. Within 30 days of execution, the licensee must file a copy of that contract with the Commission. The licensee must notify the Commission in writing of the name, address, and phone number of the person designated as the Environmental Account Manager pursuant to Exhibit X within 30 day of his or her designation.

5. Article 404 further requires the licensee, effective October 1, 1999; consistent with Exhibit X, to release water from the Environmental Account (EA) upon a request of the Environmental Account Manager made according to the terms of his or her contract, including, to the extent reflected in Exhibit X, returning Environmental Account water to the river at the Jeffery Return rather than transporting Environmental Account water through the canal system. Such releases shall be subject to the rules for the EA operations, losses, limitations and conditions of section II of Exhibit X, including temporary reduction or suspension of releases if events occur which limit or prevent EA releases. The licensee must file with the Commission, a copy of each annual operating plan for the EA development by the EA Manager within 30 days of receipt of that plan from the EA Manager. If the Commission initiates a proceeding to reopen this license based upon concerns of the adequacy of the EA Manager's plans to achieve Endangered Species Act goals, the following shall be parties: the licensee, the licensee for Project No. 1835, the Department of Interior, the Nebraska Game and Parks Commission, the State of Colorado, the State of Nebraska, the State of Wyoming, the Nebraska Water Users Inc., the Platte River Critical Habitat Maintenance Trust, the National Audubon Society, Audubon Society, the Sierra Club, American Rivers, and the Nebraska Wildlife Federation.

6. Section II.C.2.c. of Exhibit X states that the EA Manager may not request releases from the EA when the Platte or North Platte, Brady, Cozad, Kearney or Grand Island is at or above flood stage as defined for those locations by the National Weather Service

[3] Exhibit X is an Environmental Account for Storage Reservoirs on the Platte River System in Nebraska. The Commission approved the Exhibit X filed on July 1, 1997, and made it part of the license effective October 7, 1999.

(NWS). If the EA Manager requests a release of EA water that the Districts believe would cause the Platte or North Platte rivers to rise above flood stage, the request for release may be denied. However, the EA Manager may appeal the denial by requesting the NWS to make a determination as to whether or not the requested release would cause either of the rivers to rise above flood stage at any of the previously listed sites. If the NWS determines the requested release would cause either of the rivers to rise above flood stage, the denial would stand. If the NWS determines the requested release would not cause either of the rivers to rise above flood stage, the requested releases will be made.

Temporary Variance Request

7. In its January 21, 2020 filing, the licensee requests Commission approval for a temporary modification of license Article 404 as it pertains to Part of Section II.C.2.c. of Exhibit X that restricts releases from the Environmental Account when the North Platte River at North Platte is at or above flood stage (as defined by the NWS). The licensee states that the current NWS designated flood stage for the North Platte is 6.0 feet (which is an estimated flow capacity of 1,926 cubic feet per second (cfs)). The licensee requests a waiver/variance that is only specific to the restrictions caused by the flood stage at North Platte from March 1, 2020 through September 30, 2020 in order to test the channel capacity improvements.

8. The Platte Recovery Implementation Program (Platte Program)[4] has undertaken reconstruction of a flood control berm and drainage improvements at North Platte and, as a result, estimates that the channel can pass flows at or near a stage of 6.6 feet (estimated capacity of 2,950 cfs) without causing flooding.[5] Therefore, the North Platte Program and the FWS would like to make EA releases above the official NWS flood stage to test the capacity improvements and provide information and data necessary for a possible increase in the flood stage designated by the NWS. The licensee noted that the NWS has indicated that it needs to verify an actual flow event at the higher stages in coordination

[4] The Platte Recovery Implementation Program is a cooperative effort of the United States Department of the Interior and the States of Nebraska, Wyoming, and Colorado to provide benefits for certain threatened and endangered species and their associated habitats in the Platte River basin, and to provide Endangered Species Act compliance for existing and new water related activities in the Platte River basin, including the licensee's Project No. P-1417.

[5] The licensee included with its filing an inundation map which models inundated areas in the vicinity of North Platte for North Platte River flows of 3,000 cfs before and after the Platte Programs efforts to improve channel capacity.

with local officials in order to increase the official flood stage designation.

9. The licensee proposes that the variance be granted subject to the following three conditions; 1) the licensee, the EA Manager, and the Platte Program must all be in agreement on a target river stage or flow rate at North Platte prior to and throughout any time when EA releases are to be made in excess of the NWS designated flood stage. If at any time there is not consensus on the target stage or flow at North Platte, EA releases would immediately return to the limits set by the NWS and consistent with Section II.C.2.c. of Exhibit X, 2) the licensee, EA Manager, and the Platte Program will monitor flooding conditions and consult with each other throughout the period when EA releases are made in excess of the NWS designated flood stage at North Platte, and 3) the licensee, EA Manager, and the Platte Program will seek input and assistance from the NWS, the City of North Platte, Lincoln County Emergency Management, the Nebraska Department of Natural Resources, and the NPPD during the variance period.

10. Finally, the licensee states that it entered into a contract with the Platte Program which would require the Platte Program to compensate those affected by flood damages (if any) resulting from the proposed test releases under its "good neighbor policy." The contract also indemnifies the licensee for any liabilities that may arise as a result of releases conducted pursuant to this variance.

Agency Consultation

11. The licensee provided, with its January 21 filing, documentation of its consultation with, and concurrence from the Platte Program, the FWS, and the NPPD on the proposed variance request.

Public Notice

12. The Commission issued a public notice of the request for temporary variance from release restrictions on February 6, 2020; with a deadline of February 21, 2020; for filing comments, motions to intervene, and protests. No responses were filed with the Commission.

Discussion and Conclusion

13. The licensee requests a temporary variance from the release restriction requirements at North Platte under license Article 404 in order to test channel capacity improvements. If the test of the new levee/berm is successful, then the NWS would consider establishing a higher flood stage to potentially provide greater flexibility for the licensee to deliver EA water through the river/canal system upon request from the EA Manager. The inundation map included with the licensee's filing shows no impacts in south North Platte City with the berm and minor flooding without the berm. The anticipated duration of the test period is expected to last approximately 7 months. The licensee consulted and obtained approval from the resource agencies for this test and included documentation of its consultation with its filing.

14. We have reviewed the project license, and the information provided by the licensee in its filing and determined that the temporary variance would have minimal impact on project operations. We have also determined that these additional releases would have minimal impacts to fisheries and water quality in the canal/berm. These higher flows are intended to ultimately benefit certain threatened and endangered species through the Platte Program's efforts. The higher flow test releases would be limited to North Platte and monitored by the licensee and the various agencies involved in the test as discussed above. The potential risk to life and property as a result of the proposed test releases are minimized due to the conditions proposed by the licensee (also discussed above). Furthermore, the Platte Program has committed to cover compensation for any flood damage which might result from these releases. Therefore, based on the information provided by the licensee and staff's independent analysis, the temporary variance request should be approved.

15. The licensee is reminded, that in the event that it requires additional time to complete testing of capacity improvements, the licensee must request an extension of time from the Commission for a variance extending beyond the period specified in ordering paragraph (A) below. In addition, we are requiring, in ordering paragraph (B) below, that the licensee notify the Commission once the capacity testing is completed.

The Director orders:

(A) Central Nebraska Public Power and Irrigation District's request for a temporary variance from release restriction requirements at North Platte, filed on January 21, 2020, pursuant to Article 404 of the license for the Kingsley Dam Project No. 1417 is approved. The temporary variance will remain in effect from the date of this order through September 30, 2020.

(B) Within 30 days of completion of capacity testing activities, the licensee must file with the Commission a notification of the date of testing completion.

(C) This order constitutes final agency action. Any party may file a request for rehearing of this order within 30 days from the date of its issuance, as provided in section 313(a) of the Federal Power Act, 16 U.S.C. § 825*l* (2018), and the Commission's regulations at 18 C.F.R. § 385.713 (2019). The filing of a request for rehearing does not operate as a stay of the effective date of this order, or of any other date specified in this order. The licensee's failure to file a request for rehearing shall constitute acceptance of this order.

Kelly Houff
Chief, Engineering Resources Branch
Division of Hydropower Administration
and Compliance

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Nebraska Public Power and Irrigation District

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Filed via FERC eFiling

July 28, 2020

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.W.
Washington, D.C. 20426

Subject: P-1417, Notification of the Date of Testing Completion

Secretary Bose:

On March 6, 2020 FERC issued an *Order Approving Temporary Variance From Restriction On Flood Releases At The North Platte River Requirement Pursuant to Article 404.* Ordering paragraph (B) provides that Central is to notify the Commission of the completion of testing activities within 30 days of completion.

Testing began on July 13, 2020, and was completed on July 24, 2020, with a North Platte River at North Platte stage of 6.53 ft. and flow of 2,440 cfs measured by the Nebraska Department of Natural Resources on July 23, 2020. Monitoring indicated that Platte River Recovery Implementation Program floodproofing projects functioned as intended, eliminating flooding north of the river. However, the National Weather Service determined that they will not be increasing the flood stage for the North Platte River at North Platte due to secondary impacts caused by high groundwater levels.

Please contact me at 308-995-3553 (office), 308-991-5832 (mobile), or mdrain@cnppid.com with any questions.

Sincerely,

Michael A. Drain, P.E.
Chief Dam Safety Engineer

MAD/mm

Copy via e-mail to:

T.J. LoVullo	FERC – Washington D.C.
Brien Bartos	FERC – Washington D.C.
John Zygaj	FERC - Chicago Regional Engineer
Marilyn Sabido	FERC - Chicago Regional Office
Tom Econopouly	U.S. Fish and Wildlife Service (Denver, CO)
Eliza Hines	U.S. Fish and Wildlife Service (Grand Island, NE)
Jason Farnsworth	Platte Program (Kearney, NE)

Seth Turner	Platte Program (Kearney, NE)
John Shadle	Nebraska Public Power District (Columbus)
Teresa Keck	NWS - Meteorologist in Charge (North Platte, NE)
Wendy Pearson	NWS – Acting Hydrologist in Charge (Pleasant Hill, MO)
Melissa Smith	NWS – Service Hydrologist (Rapid City, SD)
Jim Hawks	City of North Platte
Kent Miller	Twin Platte Natural Resources District
Jesse Bradley	Nebraska Department of Natural Resources

Appendix C

Chokepoint Test Planning Process

Chokepoint Test Implementation Plan

Chokepoint Test Monitoring Maps

TO: FILE
FROM: EDO
SUBJECT: 2020 NORTH PLATTE CHOKEPOINT TEST PLANNING
DATE: OCTOBER 12, 2020

This memo documents the participants in the Chokepoint Test Planning Workgroup, the timeline of the planning process, and the various factors that influenced the schedule for the 2020 chokepoint test.

Chokepoint Test Planning Workgroup Members

The initial Chokepoint Planning Workgroup followed from early 2019 planning efforts and, in addition to EDO staff, included USFWS EA Manager (Tom Econopouly), operations staff from CNPPID (Tyler Thulin and Cory Steinke) and NPPD (John Shadle and Dave Webster, later replaced by Ed Dekleva), and other Program stakeholder representatives from USBR (Brock Merrill), Wyoming (Bryan Clerkin), and Colorado (Jojo La).

After the initial planning meeting in April 2020, the EDO began outreach efforts to engage local officials and other stakeholders not normally involved with the Program.

- National Weather Service
  - Melissa Smith (Service Hydrologist, Rapid City), Teresa Keck (Meteorologist in Charge, North Platte), and Kenny Roberg (Senior Forecaster, North Platte).
  - Kevin Low and Gregg Schalk from the Missouri Basin River Forecast Center.
  - Additional NWS staff involved during the chokepoint test implementation included Shawn Jacobs, David Doze, and others in the North Platte office who issued daily weather forecasts and took daily photos at monitoring locations.

- Nebraska Department of Natural Resources: Jeremy Gehle (Division Head, Water Administration), Jim Ostdiek (Supervisor, Bridgeport Office Operations), and Lenny Beall (Natural Resources Specialist, North Platte Field Office)

- City of North Platte
  - Brent Burklund (City Engineer) and Matthew Kibbon (City Administrator).
  - During the chokepoint test implementation, the EDO also worked with Doug Meyer (Wastewater Superintendent) for access to the monitoring site at the WWTP outfall pipe; Layne Groseth (Public Service Director) for access to install and monitor a staff gage inside the animal enclosure at Cody Park; and Les Green (Information Systems Director) to prominently post chokepoint test press releases on the City of North Platte website.

- Lincoln County Emergency Manager: Brandon Myers

Chokepoint Test Planning Timeline

Planning for the chokepoint test took place during the COVID-19 pandemic. As a result, most people involved were working from home for the duration of the planning process and all planning meetings were held by phone or video. The following 2020 dates were key milestones during the planning and implementation of the chokepoint test:

- April 16 – Initial conference call with reconvened Chokepoint Planning Workgroup. Reviewed purpose of chokepoint test and 2019 planning. Discussed planning scenarios, durations at river stage steps, recommendations for maximum stage, and next steps for the planning process.

- May 1 – EDO conference call with NWS. Reviewed NWS process for flood stage adjustment, locations to observe during the chokepoint test, and types of needed data and imagery. NWS recommended observation timesteps at each river stage as long as possible, perhaps 7 days (or more) at stages of 6.0 ft and 6.5 ft.

- May 19 – EDO conference call with NDNR. Discussed DNR's available methods for making site measurements as well as scheduling preferences.

- May 19 – EDO staff installed monitoring equipment (staff gages, pressure transducers, data loggers) at locations along and near the State Channel Berm.

- May 28 – EDO conference call with North Platte City Administrator and City Engineer. Both North Platte officials were new to their jobs in May. The EDO explained the purposes of the Program and the chokepoint test. There was discussion of monitoring locations (e.g., Cody Park animal enclosure pond) and the need be transparent and communicate information about the chokepoint test to residents in the potentially affected areas of the city (e.g., neighborhood around North River Road and North Washboard Road, neighborhood to the east of Cody Park).

- June 4 – EDO call with Lincoln County Emergency Manager. Explained the purposes of the Program and the chokepoint test, invited the Emergency Manager to participate in the planning process and to communicate public concerns to the EDO.

- June 9 – Conference call with expanded Chokepoint Planning Workgroup. Reviewed draft implementation plan. Considered various revisions to the test release schedule, including the need to finish before the rescheduled Nebraskaland Days. Discussed additional monitoring locations, triggers for termination of the chokepoint test, and plans for public communication (e.g., advisory signs and wide distribution of press release).

- July 1 – NWS North Platte office began issuing daily weather forecast bulletins for the chokepoint test.

- July 2 – EDO staff installed additional monitoring equipment (staff gages) at ponds in Cody Park and Armory Park.

- July 7 – Final Chokepoint Planning Workgroup conference call. Reviewed and agreed upon final Implementation Plan, including test release schedule and monitoring locations.

- July 9 – Press release distributed with notification of chokepoint test purpose, schedule, and expected river stages.

- July 9 – EDO staff installed advisory signs in the chokepoint vicinity.

- July 13-24 – EDO led daily coordination calls for chokepoint test implementation. Participants generally included USFWS, NWS, CNPPID, NPPD, and NDNR. Topics of discussion typically included weather events and/or significant observations from the previous day, high water concerns or complaints from the public, the weather forecast, planned changes to the EA release, and monitoring plans for the day, if scheduled.

- July 24 – Chokepoint test terminated upon declaration from NWS that minor flood stage would stay at 6.0 ft due to observed property impacts at higher stages. CNPPID worked to reduce the EA release from 1,325 cfs to zero as quickly as possible.

- July 27 – Press release distributed with notification that the chokepoint test had ended.

Factors Influencing Chokepoint Test Schedule Planning

Planning for the chokepoint test in early 2019 evaluated 3- and 4-day observation periods at stages of 6.0 ft (current minor flood stage), 6.5 ft, and 6.75 ft. For a summer release from the EA, a period beginning at the end of July and continuing through early August was selected because that is typically when irrigation releases down the North Platte River from Lake McConaughy are at their highest. This would help to minimize the additional EA release volume necessary to achieve the target river stages for the chokepoint test.

Development of a schedule for a summer 2020 chokepoint test began similarly for a controlled EA release from late July into early August, but with the added possibility that a Lake McConaughy fill-and-spill scenario could occur if spring inflows were high. If the spill releases could be controlled at specific levels, this would allow the chokepoint test to proceed using little or no EA water. Over the course of a three-month planning period, the schedule for the chokepoint test went through numerous iterations, influenced by factors including the following:

- Lake McConaughy Fill-and-Spill: April projections indicated that Lake McConaughy surface water elevation would peak around the first week of July but would fall short of reaching levels that would result in fill-and-spill. The U.S. Bureau of Reclamation reduced the Lake McConaughy inflow forecast from spring runoff in May and

chokepoint test planning to take advantage of an early July fill-and-spill scenario was eliminated following the June 9 planning meeting.

- Lake McConaughy EA Storage: The volume of water in the Lake McConaughy EA was not a limiting factor. By the beginning of May 2020, the EA volume exceeded 180,000 AF (more than 90% of the 200,000 AF maximum capacity). However, the Program and the USFWS EA Manager preferred to not use an excessive amount of EA water for the chokepoint test, and a maximum of 60,000 AF was viewed as reasonable for planning purposes.
- Downstream Demands for Irrigation: Lake McConaughy releases to the North Platte River to meet downstream irrigation demands immediately before and during the chokepoint test would significantly impact the volume of EA water needed to reach target stages. Lower irrigation demands would mean less water in the river and more EA water would be required. Early in the planning process, CNPPID expected flow conditions to be similar to 2019, when July 20-August 20 flows for the North Platte River at North Platte averaged just over 1,000 cfs. For planning purposes, the EDO evaluated a range of non-EA flows in the North Platte River.
- Duration of Chokepoint Test Steps: NWS recommended extending the duration of each target stage step from 3 or 4 days to 7 days or longer to ensure adequate time for impacts to manifest and observations to occur. Some schedule scenarios evaluated by the EDO required in excess of 90,000 AF of EA water with 7-day steps. During the June 9 planning meeting, the workgroup recommended keeping the 6.5 ft step at 7 days but cutting back the duration of the 6.0 ft and 6.75 ft steps to keep the EA volume to 60,000 AF or less.
- Monitoring Schedule: Test scheduling was arranged so that critical stage changes would occur on weekdays to ensure availability of EDO and Nebraska DNR staff for observations and measurements.
- Nebraskaland Days: During the June 9 planning meeting, the workgroup was informed that Nebraskaland Days Buffalo Bill Rodeo in North Platte was rescheduled from June to August 5-8 due to the COVID-19 pandemic. This prompted a shift in the chokepoint schedule from ending in mid-August to ending no later than August 4 in order to avoid interaction with crowds and traffic on monitoring days and to not have high flows near the Buffalo Bill State Park Campground. The test start date was correspondingly moved from the end of July to mid-July.
- Ongoing EA Release: A start date of July 13 was agreed upon, with the assumption that there would be no EA release immediately prior to the start of the chokepoint test. EDO on-site monitoring days at North Platte were scheduled accordingly. However, an EA release that began in June for germination suppression continued into July to meet target flows at Grand Island. Dry weather increased downstream irrigation demands and required more water to be released from storage in Lake McConaughy. As a result of these higher-than-expected releases, the North Platte River at North Platte reached a stage a stage of 6.0 ft by July 6 and held there through the start of the chokepoint test.

The final planned schedule for the chokepoint test is shown in Table 2 of the Implementation Plan. With the timing of stage changes and EDO monitoring days already carefully scheduled, the decision was made to change the designated purpose of the ongoing EA release from target

flows to the chokepoint test on July 13. Given the estimated 2-day travel time from Lake McConaughy to North Platte, chokepoint test monitoring at a stage of 6.0 ft began on July 15.

TO: PRRIP CHOKEPOINT TEST PLANNING WORKGROUP
FROM: PRRIP EXECUTIVE DIRECTOR'S OFFICE
SUBJECT: IMPLEMENTATION PLAN FOR SUMMER 2020 TEST FLOW RELEASE
DATE: JULY 13, 2020

I. INTRODUCTION

The Platte River Recovery Implementation Program (PRRIP or Program) is developing plans for a summer 2020 test flow release from the Lake McConaughy Environmental Account (EA) to assess the potential impacts of increasing minor flood stage on the North Platte River as it passes through North Platte, NE. This will be a coordinated effort involving staff of the Program's Executive Director's Office (EDO), the U.S. Fish and Wildlife Service (USFWS), the Central Nebraska Public Power and Irrigation District (CNPPID), the Nebraska Public Power District (NPPD), the National Weather Service (NWS), the Nebraska Department of Natural Resources (NDNR), and other community representatives.

This document is intended to cover all facets of the test flow release planning and execution, including relevant background information (remainder of Section 1); coordination of stakeholder roles and responsibilities (Section 2); internal and external communication protocols (Section 3); test flow implementation, including timing and proposed release schedules (Section 4); test flow observation and monitoring requirements (Section 5); triggers for termination or delay of the test flow release (Section 6); and post-test assessment plans (Section 7).

A. North Platte Chokepoint

The so-called North Platte River chokepoint is that reach of the river adjacent to the City of North Platte, NE extending from approximately 2 miles upstream of the Highway 83 bridge down to CNPPID's Tri-County Supply Canal diversion structure, a total distance of about 7.5 miles. Channel constriction and reduced flow capacity through this reach have hindered efforts to achieve certain Program goals that were established for the First Increment that began in 2007. The Addendum to the Program Document[1] specifies water management activities for the First Increment Extension as follows:

- Aggressively continue to implement channel conveyance improvements at North Platte choke point through efforts directed toward achieving and maintaining at least 3,000 cfs conveyance capacity while remaining below flood stage, with additional capacity developed as practicably achievable with available resources.

- Implement water releases including short-duration high flows (SDHF) and target flows once Program water projects are operational and choke point conveyance issues are resolved.

[1] Addendum to the Final Platte River Recovery Implementation Program – First Increment Extension, Section II.B. June 7, 2017.

- The Program will continue to evaluate the efficacy of available Program water and choke point capacity through time to ensure Program water meets its intended purposes.

The most direct impact on Program water-related activities is limitation of the ability to make desired high flow releases from the Lake McConaughy EA and deliver that water down the North Platte River channel and on to the associated habitat reach[2] from Lexington to Chapman, NE. For example, flow tests conducted by the Program in 2009 and 2013 were limited by the amount of water that could pass through the North Platte chokepoint.

The reduced flow capacity through the North Platte chokepoint has led to the encroachment of high flows into residential properties, particularly north of the river on both sides of the Highway 83 bridge. Mitigation efforts previously undertaken by the Program include the following:

- White Horse Creek Drainage Project: Completed in early 2014, this project involved the installation of culverts in the road ditches along the north side of North River Road that drain east into White Horse Creek:

- State Channel Berm Restoration: Completed in 2018, this project restored a berm that redirects high flows away from properties along North River Road and back towards the main North Platte River channel.

In 2017, the Program also completed a study of groundwater-surface water interactions at the North Platte chokepoint and continues to maintain groundwater and surface water monitoring equipment at several key locations.

B. NWS Flood Stage Definitions

River stage for the North Platte River at North Platte, NE is measured by a gage near the Cody Park boat ramp, adjacent to the Highway 83 bridge. Flood stages (values in feet) at this location are defined by the NWS[3] as follows:

Major Flood Stage:	7
Moderate Flood Stage:	6.5
Flood Stage:	6
Action Stage:	5.5

The NWS website further describes the impacts at flood stages for the North Platte River at North Platte gage location:

Minor Flood Stage (6.0 feet)

Minor flood stage. Minor flooding of low lying and agricultural land begins along the north bank of the North Platte River from Highway 83 to approximately 4 miles west of Highway 83 south

[2] The critical habitat reach is the Program's primary focus area for activities to benefit the subject threatened and endangered species.
[3] https://water.weather.gov/ahps2/hydrograph.php?wfo=lbf&gage=nptn1

of North River Road. Minor water intrusions into low lying areas of Cody Park in North Platte begins. People should be cautioned against being in the water along the banks of the river especially near Cody Park.

Moderate Flood Stage (6.5 feet)

Moderate and more widespread flooding of low lying and agricultural land begins along the north bank of the North Platte River from Highway 83 to approximately 4 miles west of Highway 83 south of North River Road. Water encroachment into some [residential properties] begins along and south of North River Road. Water encroachment into low lying areas of Cody Park worsens.

Major Flood Stage (7.0 feet)

Major and widespread flooding occurs along the north bank of the North Platte River from Highway 83 to about 4 miles west of Highway 83 south of North River Road. Water encroaches into some residences and outbuildings in this area with access to properties significantly impaired. Major and widespread flooding occurs along the south bank from the Nebraska Game and Parks Recreational Vehicle Campground Site to Cody Park in North Platte.

C. North Platte River Discharge

The nature of the North Platte River (sand-bed, braided channels) is such that the flow rate (discharge) at a particular stage varies over time. At the time of the Platte River Cooperative Agreement in 1997, flow capacity for the North Platte River at North Platte, NE was estimated to be greater than 3,000 cfs at a stage of 6.0 feet (minor flood stage). As a side effect of the early 2000s drought, a great infestation of phragmites took hold, eventually "choking" the channel capacity at the same stage to little more than half of what it was in the late 1990s. In recent years, mechanical and chemical mitigation efforts to control the phragmites and other restoration efforts have resulted in the reclamation of some of that lost flow capacity.

The rating curve for the North Platte River at North Platte gage[4] (06693000) is updated periodically by the NDNR. Based on the rating curve most recently updated in April 2020, flows at stages important to this test flow release are as shown in **Table 1**.

Table 1. Stage and Discharge for North Platte River at North Platte, NE

Stage [ft]	Discharge [cfs]
6.0	1,930
6.5	2,770
6.625	3,000
6.75	3,250
7.0	3,760

[4] https://nednr.nebraska.gov/realtime/Stations/Details/06693000

D. Objectives of Test Flow Release

As explained in the preceding sections, the Program has a goal of achieving flows of 3,000 cfs through the North Platte chokepoint *without exceeding minor flood stage*.[5] Current flow capacity at the minor flood stage of 6.0 feet is only about 1,930 cfs, well below the stated goal. Raising minor flood stage to 6.5 ft would increase the available flow capacity to about 2,770 cfs, thereby providing the Program another 840 cfs of flow capacity to utilize for future flow releases while complying with the need to remain below flood stage.

The objective of the test flow release is to provide measured and observational data of sufficient detail and quality to allow the NWS to determine whether the minor flood stage could be safely increased with minimal risk of impacts to life and property.

Water from the Lake McConaughy EA will be released to incrementally raise the level of the North Platte River at North Platte first to the existing minor flood stage, then to 6.5 feet, then perhaps to 6.75 feet to achieve a maximum flow somewhat higher than 3,000 cfs. At each stage, extensive data collection and visual observation will occur to provide a comprehensive view of potential impacts. All of this information will then be analyzed and documented for consideration by the NWS.

In addition, water released from the Lake McConaughy EA is protected for Program instream use downstream to the Chapman bridge under the terms of the A-17695 permit[6] and therefore cannot be diverted for irrigation or other uses.[7] Irrigation operations on the North Platte River and central Platte River are expected to continue as if EA water was not in the river. If downstream irrigation demands change during the course of the test flow release, EA releases will be adjusted as needed to maintain consistent river stages at North Platte (i.e., if releases for irrigation increase, EA releases will decrease). While not a specific objective of this test flow release, EA water will continue to be tracked as it flows downstream through the Program's associated habitat reach to Grand Island.

[5] Under Article 404 of the license for the Kingsley Dam Project (No. 1417-274), Section II.C.2.c of Exhibit X prohibits releases of water from the Lake McConaughy EA when the North Platte River at North Platte is at or above flood stage as defined for that location by the NWS. On March 6, 2020, FERC granted a temporary variance from this restriction allowing PRRIP and USFWS "to make EA releases above the official NWS flood stage to test the capacity improvements [from reconstruction of a flood control berm and drainage improvements] and provide information and data necessary for a possible increase in the flood stage designated by the NWS." It was also noted that "the NWS has indicated that it needs to verify an actual flow event at the higher stages in coordination with local officials in order to increase the official flood stage designation." The temporary variance will remain in effect through September 30, 2020.

[6] The A-17695 permit allows diversions of EA water at the NPPD diversion dam near Keystone and at the CNPPID diversion dam near North Platte, but all such water must be returned to the river minus losses assigned by NDNR.

[7] One possible exception is that EA water may be used for the initial fill of the Cottonwood Ranch broad-scale recharge project, which will require an additional storage use permit from NDNR. EA water was previously used for the Phelps County Canal recharge project in 2012-2013.

II. COORDINATION

The following sections describe the roles of personnel and stakeholders involved in the implementation of the test flow release. A directory of contact information will be provided at the end of this implementation plan.

A. Program Executive Director's Office (EDO) Staff

Program staff are responsible for developing the test flow release implementation plan, with input from participating stakeholders. During test flow release execution, Program staff will provide overall event coordination and oversight of daily data collection and visual observation activities. Program staff will also lead the daily coordination conference call with the EA Manager, CNPPID, NPPD, NWS, NDNR, and local officials to document progress and identify real-time concerns and issues (e.g., heavy rainfall forecasts and flooding concerns). Following the test flow release, Program staff will complete the necessary analysis and documentation.

B. USFWS Environmental Account Manager

The USFWS EA Manager (Tom Econopouly) will work with the EDO and the Chokepoint Planning Workgroup to determine EA release rates and request that CNPPID make those releases from the Lake McConaughy EA. EA releases will be closely coordinated with the Districts' demands so that the fixed flow targets at North Platte are met. Given the specific and fixed river stage targets at North Platte, any increase in irrigation releases should correspond to a decrease in EA releases while maintaining the same overall flow.

C. CNPPID and NPPD

Staff from CNPPID (Tyler Thulin, Cory Steinke) will make water releases from the Lake McConaughy EA in response to requests from the EA Manager on a daily basis while monitoring water levels in Lake McConaughy and maintaining releases as needed to meet downstream demands for irrigation and power generation. CNPPID will communicate any operational changes that may affect the rate of flow passing through North Platte.

Staff from NPPD (Ed Dekleva) will continue to oversee diversions into the Sutherland system for purposes related to power generation as well as downstream irrigation diversions by central Platte canals. Diversions during the time of the test flow release are expected to be consistent at about 1,800 cfs; NPPD will notify the EDO, EA Manager, and CNPPID of any operational changes that may affect the volume of EA releases needed. The EDO, EA Manager, and NPPD have also coordinated on a plan to replace a portion of the EA water flowing down the North Platte River (about 100 cfs) with NPPD water on certain days during the chokepoint test as part of operations to increase storage in Sutherland Reservoir.

D. National Weather Service

Coordination with the NWS is critical during the test flow release. NWS staff (Teresa Keck, Melissa Smith, and Kenny Roberg) will be included in workgroup planning meetings, briefings before/during the test flow release, and daily coordination calls. Other NWS staff from the North Platte office and the River Forecast Center in Kansas City will also be involved during the implementation of the chokepoint test.

Coordination with the NWS will include requesting that the EDO and the EA Manager be alerted if forecasted weather conditions indicate a significant chance of rain in the Platte Basin between Lake McConaughy and Grand Island or if any other weather conditions might affect water releases. The EDO and the EA Manager will also make the NWS aware of planned releases so their hydrologists can monitor flow conditions in the river for flood alert or flood stage determination. NWS North Platte staff will be making observations and taking photos at the same locations the EDO is monitoring throughout the chokepoint test. Melissa Smith, Service Hydrologist from NWS Rapid City plans to be on site from July 22 through the end of the chokepoint test.

E. Nebraska DNR

The NDNR (Jeremy Gehle, Jim Ostdiek, and Lenny Beall) will provide daily updates regarding the real-time measurement and accounting of streamflow at various points in the Platte River system. This accounting will include tracking of EA water as it flows downstream.

NDNR staff will also be on site at North Platte to take spot measurements of stage and discharge at key times during the test flow release (e.g., during ramping intervals and at least the first two days at each fixed flow step). It is critical that these parameters be as accurate as possible for the specific purposes of the test flow release.

F. City of North Platte and Lincoln County Emergency Management

The North Platte City Administrator (Matthew Kibbon) and City Engineer (Brent Burklund) will be involved with the planning workgroup to provide input and access for monitoring (e.g., pond inside animal enclosure at Cody Park), potentially assisting with public communications, and communicating any issues that arise during the course of the test flow release implementation.

The Lincoln County Emergency Manager (Brandon Myers) also participated in the chokepoint test planning and provided contacts for distributing the press release to rural fire departments and village clerks in the area.

G. Irrigation Districts

There are five irrigation districts diverting from the North Platte River between Lake McConaughy and the City of North Platte: Keith-Lincoln, Paxton-Hershey, North Platte, Suburban, and Cody-Dillon. As the proposed test flow release will take place during what is typically the height of the irrigation season, it will be important to keep these entities apprised of

flow release plans and ramp rates to ensure no damage to their diversion structures. Irrigators will be briefed on the planned specifics of the test flow release, will be provided with a copy of the implementation plan, and given the opportunity to voice any concerns and ask questions.

Tyler Thulin of CNPPID contacted each of the irrigation districts about planning for the test flow release, and they reported an ability to readily accommodate flow ramping rates of 500 cfs to 700 cfs, perhaps higher, but definitely not as high as 1,000 cfs. Scenario planning for the test flow release will be designed in consideration of these constraints.

Another six canals divert from the central Platte between the Brady and Odessa gages: the Thirty Mile, Cozad, and Southside (Orchard-Alfalfa) irrigation districts that are affiliated with Central Platte Natural Resources District, and NPPD's Gothenburg, Dawson County, and Kearney Canals. Given that high flows resulting from the chokepoint test will pass through this reach, plans will be communicated to these districts, and precautions will be taken to prevent damage to diversion dams and other canal infrastructure.

III. COMMUNICATION

Public and workgroup communication protocols are described below.

A. Press/News Releases

A press release will be issued in advance of the test flow release describing the timing and magnitude of the release, its purpose, and contact information. The EDO will work with the USFWS to develop it, and the EDO will be responsible for disseminating the press release in a timely manner. The current schedule anticipates distribution of the press release on Thursday July 9 for media publication over the weekend prior to the start of the EA release on Tuesday July 14.

The press release will be sent to television and radio stations in the Platte Valley from Ogallala to Grand Island. The press release will be sent to newspapers in this same area as well as the Lincoln Journal-Star and the Omaha World Herald. Intended recipients of the press release are as follows.

- *Newspapers*: Omaha World Herald, Lincoln Journal-Star, Grand Island Independent, Kearney Hub, North Platte Telegraph, Keith County News, and Denver Post.
- *Radio Stations*: KRVN and NET
- *Television Stations*: KHAS Channel 5 in Hastings, NTV Channel 13 in Kearney, KGIN/KOLN Channel 11/10 in Grand Island and Lincoln, and KNOP Channel 2 in North Platte

The press release will be posted on the Program website (www.platteriverprogram.org) and will also be distributed via city, county, and NWS North Platte websites and/or social media accounts (e.g., Facebook or Twitter).

B. Program Committees

Program committees will be briefed on test flow release planning efforts as they are developed. The Water Advisory Committee (WAC) was briefed in May and the Governance Committee (GC) in June. The press release will also be distributed by email to the committees.

C. City of North Platte

Program staff will work with the City of North Platte to provide notification of the test flow release to the community. Possibilities include distributing notices to individual residences in areas that may be impacted by the test flow release and/or signs posted at key locations. Locations for signs include the following:

- Cody Park boat ramp
- Along the riverbanks at Cody Park
- Along the roadway on either side of the Highway 83 bridge
- At intersections along North River Road (North Washboard Road, Hall School Road)
- West of the Highway 83 bridge at or near Parkview Community Church, the Happy Hound Retreat Dog Park, and the River's Edge Golf Course.

Signs will include a notice of high flows on the North Platte River, the planned dates for high flows through North Platte, and the Program website address for additional information. The schedule anticipates installing signs on July 9 to coincide with distribution of the press release to media outlets and on the Program website.

D. National Weather Service

The NWS will issue flood warning bulletins during the test flow release while North Platte River at North Platte flows are at or above flood stage. On July 1, the NWS began providing daily weather forecast updates to the planning workgroup.

E. Daily Coordination Call

Program staff will schedule a daily coordination call during the test flow release to keep all parties updated. A daily coordination call proved to be an effective means of sharing the latest river stage, streamflow, and weather information during previous Program flow tests in 2009 and 2013. The daily call will also be used to determine daily diversion, storage, bypass, and release decisions; and identify any potential real-time problems or concerns. The test flow release planning spreadsheet, used as forecasting tool, will be updated with actual values during the daily conference call as well.

IV. TEST FLOW RELEASE IMPLEMENTATION

The USFWS made a late spring pulse release from the Lake McConaughy EA throughout most of May. An EA release to suppress plant germination began in June and continued into July to meet target flows at Grand Island. It is expected that there will be at least 100,000 AF remaining in the Lake McConaughy EA at the start of the chokepoint test.

The chokepoint test will be conducted as a controlled release from Lake McConaughy EA from mid- to late July and possibly into early August. This release period would take advantage of typical peak irrigation supplies in the river to keep the volume of EA water required as low as possible.

A. Proposed Release Schedule

Travel time for water flowing in the North Platte River channel from Lake McConaughy to North Platte is about two days. Releases from the Lake McConaughy EA will be timed so that critical stage transitions at North Platte occur on weekdays in order to provide sufficient opportunity for observation and data collection by EDO staff, NDNR, and NWS.

As of Monday July 6, the North Platte River at North Platte was already at or near flood stage because of CNPPID operations for irrigation and hydropower and an ongoing EA release for target flows that began in June. With the expectation that these flows would continue through the start of the chokepoint test, the need to "ramp up" the EA release to achieve a stage of 6.0 ft was eliminated, and the schedule was adjusted accordingly.

Table 2 shows the proposed schedule to achieve the targeted river stages, with releases from the Lake McConaughy EA to commence on Monday July 13 and conclude early on Wednesday July 29 (high flows at North Platte would continue through Thursday July 30). This schedule allows a few extra days for flexibility if needed while still concluding before the start of Nebraskaland Days on Wednesday August 5. Gray shading indicates days with on-site monitoring or other activity by the EDO; it is expected that NDNR will be taking flow measurements on many of the same days. Other assumptions for this planning scenario include the following:

- NPPD Keystone diversions are expected to be at or near capacity (1,800 cfs).
- CNPPID Tri-County Supply Canal diversions are expected to be at or near capacity (2,250 cfs).
- Ramping rates up to 700 cfs are acceptable to North Platte River irrigators.
- Gains between Keystone and North Platte are estimated to be 300 cfs.
- EA water experiences transit losses of 5% between Keystone and North Platte.
- Flow targets are 1,930 cfs at 6.0 ft; 2,770 cfs at 6.5 ft; and 3,250 cfs at 6.75 ft based on the rating curve for the North Platte River at North Platte that was updated by NDNR in April 2020. Based on recent site measurements taken July 2, the current shift leading up

to the chokepoint test is -0.09 and adjusted flow targets are approximately as follows: 1,790 cfs at 6.0 ft; 2,610 cfs at 6.5 ft; and 3,070 cfs at 6.75 ft.

- Flows are to be held at 6.0 ft for four (4) days, 6.5 ft for eight (8) days, and for three (3) days at 6.75 ft.

Specific daily release rates from the Lake McConaughy EA are not shown in this planning schedule, as those will be updated to reflect actual conditions immediately before the start of the test flow release and continually throughout the test as conditions change and releases are adjusted. However, based on preliminary flow routing analyses it is estimated that the test flow release will require 50,000 AF to 65,000 AF of EA water, most likely skewed closer to 50,000 AF. Maximum flows bypassing the North Platte River canals are estimated to be around 3,100 cfs. Unless South Platte River inflows are much higher than is typical in July and August, maximum flow past the CNPPID diversion and at Overton is estimated to be about 2,300 cfs.

Table 2. Planned Schedule for Test Flow Release and Anticipated Flow at North Platte.

Date	Day of Week	Target Stage at North Platte [ft]	Schedule Notes
1 July	Wed		
2 July	Thurs		Install Staff Gages at Cody Park and Armory Park Ponds
3 July	Fri		
4 July	Sat		
5 July	Sun		
6 July	Mon		Ongoing EA Release for Target Flows North Platte Stage at 6.0 ft
7 July	Tues		Final Planning Meeting
8 July	Wed		
9 July	Thurs		Press Release Distributed Install Advisory Signs at North Platte
10 July	Fri		
11 July	Sat		
12 July	Sun		
13 July	Mon		Begin Daily Coordination Calls Begin EA Release for Chokepoint Test
14 July	Tues		
15 July	Wed	6.0	North Platte Stage at 6.0 ft for Chokepoint Test
16 July	Thurs	6.0	
17 July	Fri	6.0	Increase EA Release for Stage Ramp Up
18 July	Sat	6.0	Continue EA Release Ramp Up
19 July	Sun		Ramped Up EA Release Reaches North Platte
20 July	Mon	6.5	Stage Reaches 6.5 ft at North Platte

Date	Day of Week	Target Stage at North Platte [ft]	Schedule Notes
21 July	Tues	6.5	
22 July	Wed	6.5	
23 July	Thurs	6.5	
24 July	Fri	6.5	
25 July	Sat	6.5	
26 July	Sun	6.5	Increase EA Release for Stage Ramp Up
27 July	Mon	6.5	
28 July	Tues	6.75	Stage Reaches 6.75 ft at North Platte Last Full Day of EA Release
29 July	Wed	6.75	End EA Release Early in Day
30 July	Thurs	6.75	End High Stage at North Platte Late in Day
31 July	Fri		North Platte Stage Returns to Pre-Test Levels
1 August	Sat		
2 August	Sun		
3 August	Mon		
4 August	Tues		WAC Meeting (Virtual)

The post-test monitoring scheduled for Monday August 3 is subject to change depending on whether the WAC meeting on Tuesday August 4 ends up being virtual or at the Lake McConaughy Visitor Center near Ogallala.

B. Bypass Agreements

The EA Bypass Agreement was executed in October 2008 among the Program, CNPPID, and NPPD. The agreement sets forth the conditions under which the districts will assist the Program and the EA Manager in carrying out a SDHF or other peak or pulse flow releases. The agreement covers water regulation in NPPD and CNPPID systems and intentional bypass of EA water or other Program waters that the districts would otherwise have the right to divert. The coordination activities described in this plan conform to the prescribed procedures to follow in initiating and carrying out such activities. While no intentional bypass request is anticipated for this event, the agreement prescribes the procedures for calculating foregone power generation and compensation to the districts for lost revenue from the foregone power generation.

V. TEST FLOW RELEASE OBSERVATION AND MONITORING

The following sections detail the data collection and other monitoring expected to be conducted during the duration of the test flow release, as well as the anticipated frequency of such observations. The attached map shows the locations and types of monitoring.

A. Real-Time Accounting for EA and Non-EA Water

The NDNR runs the Platte Water Accounting Program (PWAP) on a daily basis to determine the amount of natural, storage, and EA flows in the North Platte and Platte Rivers. PWAP is primarily a tool for surface water administration and a method of accounting for allocations of storage and natural flow that occurred the day before the program is run. Using PWAP, NDNR tracks and protects EA water through the system. Inputs to PWAP include daily gage data from the rivers, tributary inflows, and canal diversions. PWAP divides the rivers into a series of reaches based upon an estimated one-day travel time between reaches. Below Lake McConaughy PWAP applies a 1-day time lag between the each of the following gages: Keystone, Sutherland, Maxwell, Cozad, Overton, and Kearney. The model applies a 2-day travel time from Kearney to Grand Island.

Prior to water-balance calculations, PWAP applies evaporation and conveyance losses to natural flow, storage, and EA flows based on their relative proportion of the total flow within the reach. To determine gains and losses, PWAP takes inputs to the reach and subtracts off gaged diversions. The difference between remaining flow and the gaged flow at the bottom of the reach is the gain or loss. Gains are added to natural flow in the reach. Losses are subtracted from natural flow, storage, and EA flows based on their relative proportion to total flow at the upstream end of the reach. After gains or losses are applied, natural and storage flows are allocated to canal diversions based on water right priority dates and permitted natural flow diversion rates, which are inputs to PWAP. EA water is tracked in PWAP as if it were in the river. There are no provisions to store EA water in Sutherland Reservoir or Johnson Reservoir. EA accounting sections of PWAP will be computed manually to account for retiming of EA flows out of Sutherland and Johnson Reservoirs.

B. Stage and Discharge Measurement

Instantaneous stage and discharge measurements for the North Platte River at North Platte (06693000) gage are reported continuously on the NDNR website.

Gage data will be supplemented by spot measurements taken by NDNR from the Highway 83 bridge using and Acoustic Doppler Current Profiler (ADCP) or other devices. Measurements will be taken by NDNR approximately every other day as staffing allows for the duration of the test flow release.

C. Other Surface Water Monitoring

The Program has installed pressure transducers and data loggers at three locations in the vicinity of the State Channel Berm. Measurements are taken at hourly intervals.

D. Groundwater Monitoring

North of River

An existing groundwater monitoring well (GW-1) is installed at the intersection of North River Road and North Washboard Road. This well is outfitted with a pressure transducer and data logger that record groundwater levels in hourly intervals.

Another existing groundwater well (GW-TP) is installed in an area just northeast of the Highway 83 bridge. It does not have instrumentation, but depth to groundwater can be measured with electronic tape; if the well is inaccessible due to high water, the water surface elevation can be surveyed using GPS.

South of River

There are no existing groundwater monitoring wells on the city side south of the river. However, water surface elevations at ponds near the river in Cody Park and Armory Park will be used as proxies for groundwater levels. Staff gages will be installed where possible and surveyed with GPS.

E. Ground-Level Visual Observation

Several areas can offer important information through visual observation and photos. These areas will be visited regularly during the test for visual and photo documentation:

- Road ditches along North River Road to the east of North Washboard Road.
- Cody Park boat ramp and riverfront areas prone to bank erosion.
- Neighborhood to the east of Cody Park, between Highway 30 (Lincoln Highway) and the river, between Silber and Roosevelt. In particular, the road ditch along 16th Street between Taft and Bryan may provide indications of groundwater levels.
- Drainage ditch through River's Edge Golf Course, with bridge crossings at 18th street and North Adams Avenue.
- Vieyra Drive in the vicinity of the houses above the historical high bank.
- City of North Platte wastewater effluent discharge pipe, near the intersection of Newberry & Philips, which experienced backup issues during previous flood events. The City of North Platte will provide a key card to access the site.
- Buffalo Bill State Park Campground, located north of town, a couple miles upstream of the Highway 83 bridge.
- North of the river, south of Hall School Road, at the corner where N. Studley Road meets the high bank.

- At the railroad and Highway 30 river crossings.

Some of these sites may be modified or eliminated as needed, subject to public accessibility at the time of the test flow release.

F. Aerial Observation

EDO Staff will primarily use aerial drone photography to document visual conditions from the air. Specific areas of concern which are not easily accessible from the ground are:

- Areas north of the river and south of Hall School Rd. from Highway 83 east approximately ¼ mile.

- Riparian areas on private property in the vicinity of the chokepoint including back yards or outlots.

VI. TRIGGERS FOR TERMINATION/DELAY OF TEST FLOW RELEASE

The following sections define triggers that could result in termination or delay of the test flow release. Per paragraph 9 of the FERC order[8] approving temporary variance (issued March 6, 2020), the authority to terminate the test flow release is effectively designated to the EA Manager, PRRIP, and CNPPID based on input from NWS and other parties. Possible triggers for termination not specified below that arise during the course of the test release implementation will be evaluated on a case-by-case basis on the daily team coordination call.

A. Flooding Events

Planning for the North Platte chokepoint test flow release was initiated in early 2019 but had to be abandoned due to severe late winter and early spring flooding downstream in central and eastern Nebraska. The planning team will continue to monitor for any flooding events during summer 2020 and will consult with NWS to be alerted of any such events forecast to occur shortly before or during the final planned test flow release period.

B. Inundation Associated with Test Flow Release

Based on previous modeling of the chokepoint reach by the Program, the reconstruction of the State Channel Berm is expected to substantially mitigate the risk of flooding in the residential

[8] Paragraph 9 states the following: "The licensee proposes that the variance be granted subject to the following three conditions; 1) the licensee, the EA Manager, and the Platte Program must all be in agreement on a target river stage or flow rate at North Platte prior to and throughout any time when EA releases are to be made in excess of the NWS designated flood stage. If at any time there is not consensus on the target stage or flow at North Platte, EA releases would immediately return to the limits set by the NWS and consistent with Section II.C.2.c. of Exhibit X, 2) the licensee, EA Manager, and the Platte Program will monitor flooding conditions and consult with each other throughout the period when EA releases are made in excess of the NWS designated flood stage at North Platte, and 3) the licensee, EA Manager, and the Platte Program will seek input and assistance from the NWS, the City of North Platte, Lincoln County Emergency Management, the Nebraska Department of Natural Resources, and the NPPD during the variance period."

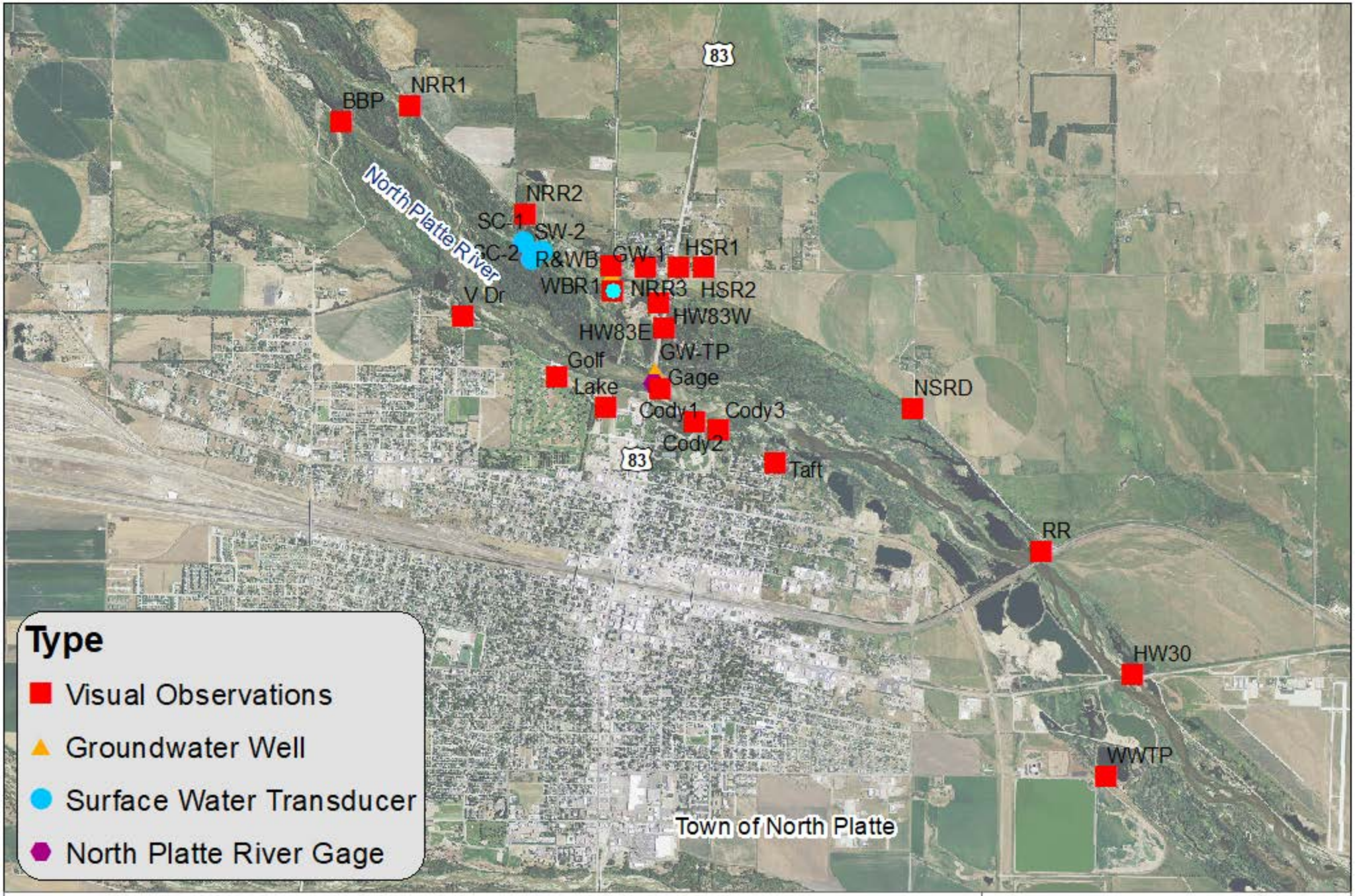
areas along North River Road at a stage of 6.6 ft and discharge of 3,000 cfs. Should on the ground reality during the test flow release prove to be different, especially if observations indicate a potential risk to life or property, this would be grounds for termination of the test flow release.

C. Precipitation

Precipitation events in the Platte Basin may be a constraint on initiation or continuation of the test flow release. NWS 3-day forecasts will be closely reviewed, and any events of potential concern will be discussed on the daily coordination call.

VII. ASSESSMENT

Following the completion of the test flow release, the EDO will analyze the collected data and compile imagery into a comprehensive report for review by the NWS in consideration of the potential revision to the minor flood stage for the North Platte River at North Platte, NE.



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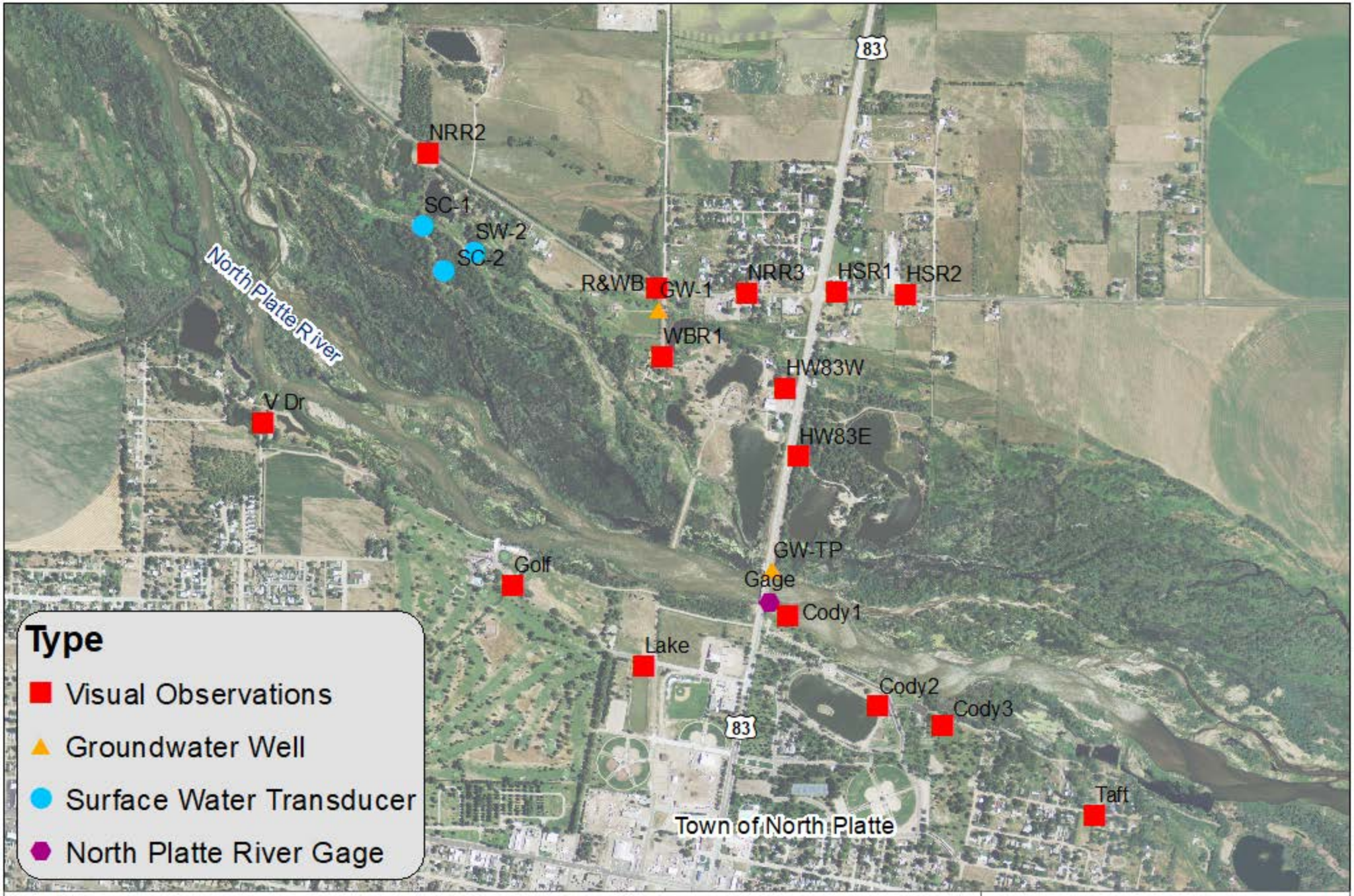
North Platte Choke Point Monitoring

Date: 6/16/2020



-DRAFT-

North Platte Choke Point Monitoring

Date: 6/16/2020

Appendix D

Chokepoint Test Press Releases

OFFICE OF THE EXECUTIVE DIRECTOR
PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

4111 4th Avenue
Suite 6
Kearney, NE 68845
Phone (308) 237-5728
Fax (308) 237-4651

Press Release

Contact: Bridget Barron
Phone: (308) 237-5728

FOR IMMEDIATE RELEASE
July 9, 2020

2020 NORTH PLATTE CHOKEPOINT TEST FLOW RELEASE

KEARNEY, NE: The U.S. Fish and Wildlife Service (USFWS) in coordination with the Platte River Recovery Implementation Program (PRRIP), plans to implement a "North Platte Chokepoint Test Flow Release" using Environmental Account (EA) water from Lake McConaughy beginning July 13, 2020. The PRRIP is a cooperative basin-wide program to assist in the recovery of threatened and endangered species in the Platte River including the whooping crane, piping plover, interior least tern, and pallid sturgeon. EA water is dedicated to instream flow purposes, specifically providing benefits to the threatened and endangered species that are the focus of the PRRIP's actions.

The North Platte "chokepoint" is that reach of the North Platte River extending a few miles on either side of the Highway 83 bridge where the encroachment of invasive phragmites vegetation has significantly reduced the river's flow capacity at flood stage relative to conditions that were present in the late 1990s when PRRIP objectives were originally developed. One PRRIP objective is to achieve a flow of 3,000 cfs at the North Platte chokepoint while remaining below flood stage. The current National Weather Service flood stage for the North Platte River at North Platte is 6.0 feet or about 1,930 cubic feet per second (cfs).

The North Platte chokepoint test flow release will allow the PRRIP to accomplish two critical tasks: (1) test the performance of the State Channel Berm, which was rehabilitated in 2018 and is designed to redirect high flows on the North Platte River away from residential areas along North River Road, particularly near North Washboard Road, and (2) collect extensive surface water and groundwater data and visual observations. This information will be reviewed by the National Weather Service to determine if flood stage should be increased to 6.5 feet or about 2,770 cfs. PRRIP and partners will be on site to collect data and observe river conditions throughout the duration of the test flow release.

Planning for the test flow release was a collaborative effort between PRRIP stakeholders and local officials, including the USFWS EA Manager (Tom Econopouly), PRRIP Executive Director (Jason Farnsworth) and staff, Central Nebraska Public Power and Irrigation District (CNPPID), Nebraska Public Power District (NPPD), National Weather Service, Nebraska Department of Natural Resources, City of North Platte, and Lincoln County Emergency Management. These parties will be

~ MORE ~

in close coordination during the test flow release and will be prepared to scale back or terminate the EA release if required. The partners will monitor weather as well as water level conditions in and around North Platte to determine if changes to the test flow release implementation plan are needed. The following summarizes current expectations for the North Platte chokepoint test flow release:

- Currently, flows for the North Platte River at North Platte are at or near flood stage. The flows are associated with CNPPID operations to meet irrigation and hydropower demands and an ongoing EA release to meet target flows at Grand Island.
- Flow releases for the North Platte Chokepoint Test will occur from July 13 through July 29 (17 days).
- The North Platte River at North Platte is expected to be at or above the current National Weather Service flood stage of 6.0 feet until July 31 because of the North Platte Chokepoint Test.
- The controlled release of EA water for the test flow release is designed to evaluate conditions at river stages of 6.0 ft (1,930 cfs), 6.5 ft (2,770 cfs), and 6.75 ft (3,250 cfs), beginning on July 15.
- The planned stages will occur during the following times:
  - Present – July 18: 6.0 ft
  - July 19 – July 27: 6.5 ft
  - July 28 – July 31: 6.75 ft
- Flows are not expected to exceed flood stage at any gage on the North Platte River or Platte River other than the North Platte River at North Platte.

The PRRIP has liability insurance in place in the event of any associated damages related to the implementation of the North Platte chokepoint test flow release. The PRRIP is committed to restoration of habitat for threatened and endangered species in the Central Platte River, while at the same time protecting human health and safety and preventing damage to associated land along the river.

Contacts for more information:

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OFFICE OF THE EXECUTIVE DIRECTOR
PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

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Press Release

Contact: Bridget Barron
Phone: (308) 237-5728

FOR IMMEDIATE RELEASE
July 27, 2020

END OF 2020 NORTH PLATTE CHOKEPOINT TEST FLOW RELEASE

KEARNEY, NE: The U.S. Fish and Wildlife Service (USFWS), in coordination with the Platte River Recovery Implementation Program (PRRIP), terminated the "North Platte Chokepoint Test Flow Release" on Friday July 24, 2020 and began ramping down Environmental Account (EA) releases. River stage at the city of North Platte is expected to fall below 6.0 ft on Monday July 27, 2020 and all EA water will be downstream of the city by Tuesday evening.

Contacts for more information:
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Jason Farnsworth, Executive Director, Platte River Recovery Implementation Program
Office Phone: (308) 237-5728
E-mail: farnsworthj@headwaterscorp.com

Appendix E

Precipitation Maps During Chokepoint Test

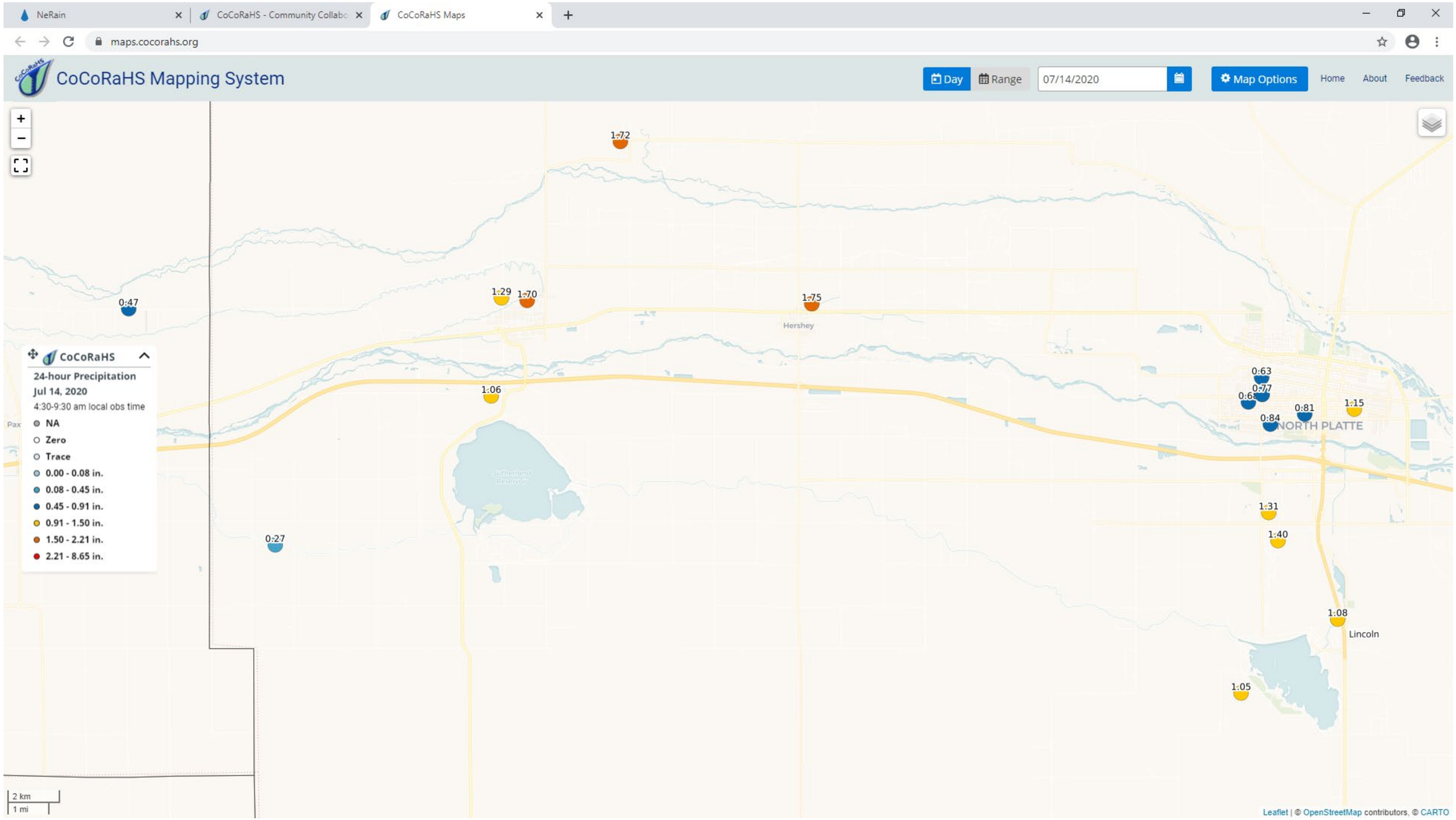

Figure A-1. Precipitation reported for July 13, 2020

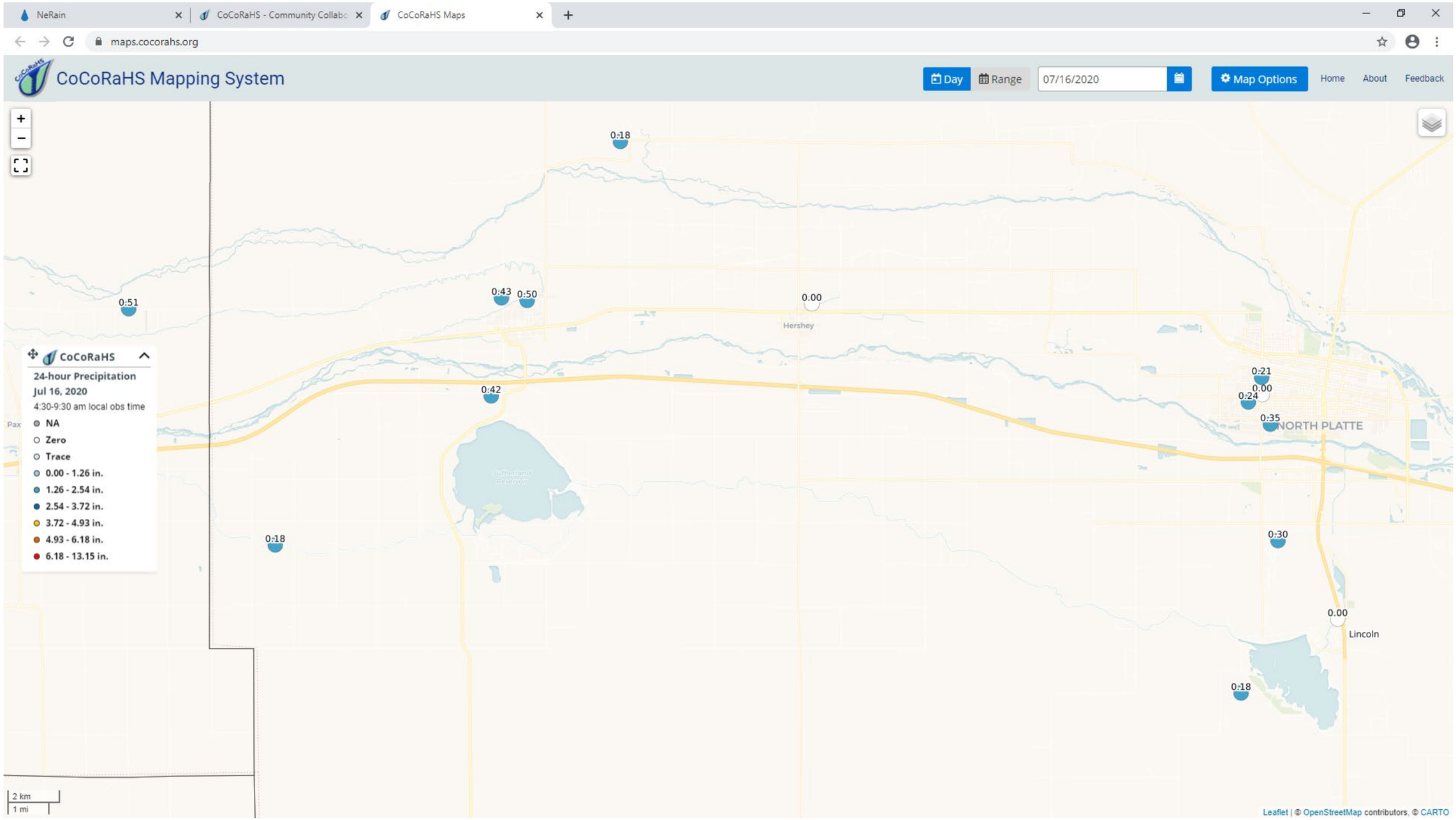

Figure A-2. Precipitation Reported for July 15, 2020.

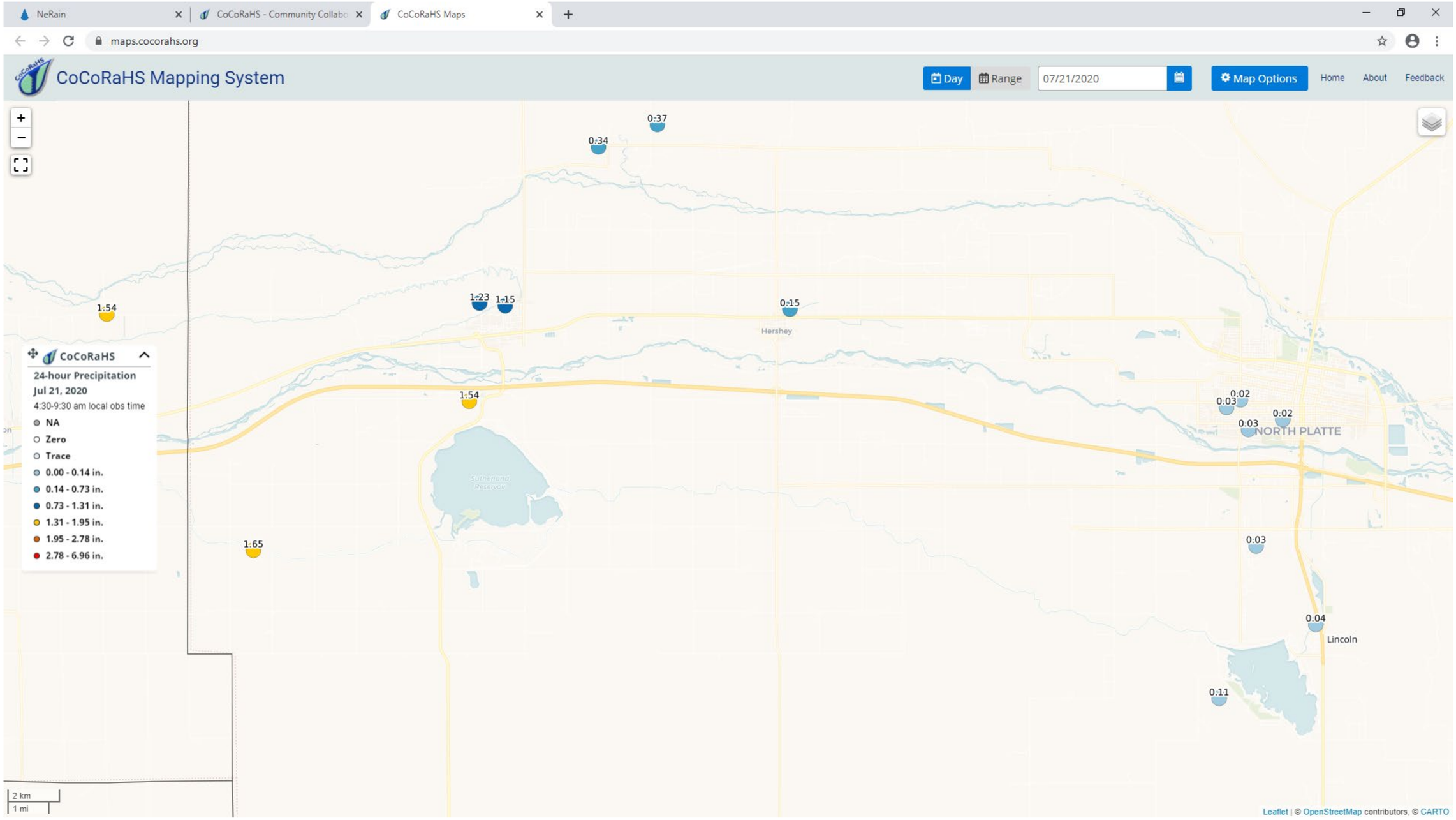

Figure A-3. Precipitation Reported for July 20, 2020.

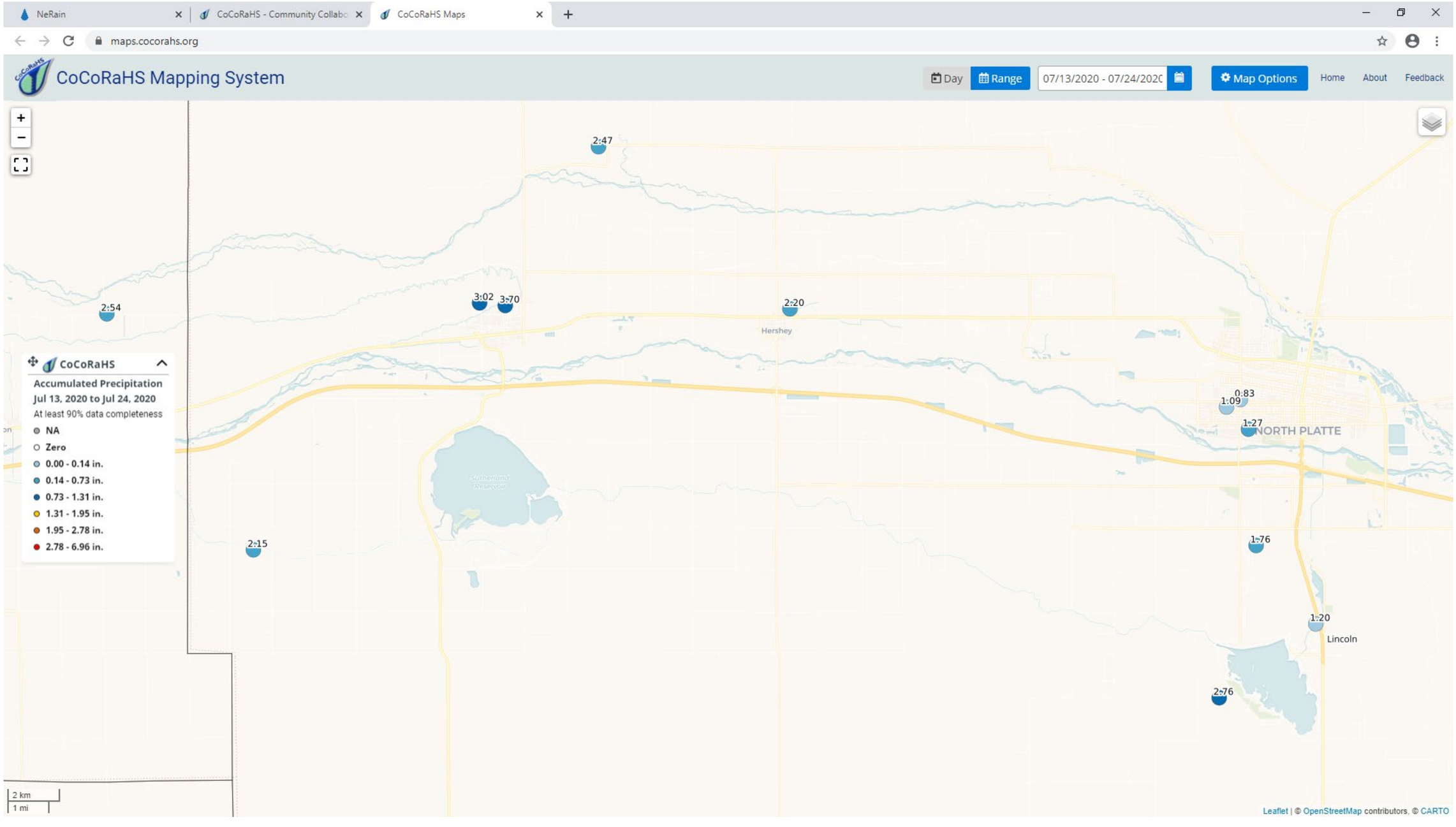

Figure A-4. Cumulative Precipitation, July 13-24, 2020.

Appendix F

NWS Chokepoint Test Decision Letter

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Weather Service
5250 E Lee Bird Drive
North Platte, Nebraska 69101

DATE: July 29, 2020

TO: PRRIP Chokepoint Test Group

FROM: Teresa Keck, Meteorologist in Charge
North Platte, Nebraska

SUBJECT: NWS Observations from the July 2020 Test Flow Release

During the test flow release, there were notable differences between the north side of the North Platte River and areas along the south side of the river. The National Weather Service determined the established flood stage of 6.0 feet results in minor flooding along the south side of the North Platte River. Minor impacts began at 6.0 feet and at 6.5 feet; the impacts observed rose to the moderate flood category with inundation to structures and roads.

On the north side of the river no flood waters were observed impacting properties in the neighborhood around North River Road, nor along and south of Hall School Road.

Instead, impacts were along the southern portion of the river, where observed minor to near moderate flooding as defined by National Weather Service definitions and general terminology dated November 26, 2019. Two significant impacts were near the River's Edge Golf Course and the Buffalo Bill State Park Campground to include:

- At 6.0 feet, water was observed flowing over the riverbank near a residence on Red Fox Road. The homeowner stated the weekend of July 18-19; his septic system began having issues as his leach field flooded. At around 6.5 feet, the water reached within five feet of the foundation of his home.
- The homeowner on Red Fox Road stated the river is now flooding at a lower flood stage level than previously seen since 2011 when the river overflowed the bank at 7.0 feet.
- On Vieyra Drive, floodwaters surrounded an abandoned structure with water flowing from the river.
- On Darlene Road, we observed a cellar with about two feet of water inside that appeared to be caused by groundwater. The homeowner reported septic tank issues and said toilets would not flush. A barn on the northeast side of the property was inaccessible due to water flowing across the access road. The homeowner stated the structure was flooded with a couple of feet of water.
- Additional minor flooding not previously observed of agricultural land observed about six miles northwest of the Highway 83 bridge, near the Muskrat Run State Wildlife Management Area.
- At Cody Park, the historical flood observations did not change.

In review, flood categories will remain the same for the gage on the North Platte River, at North Platte.