



PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM 2023 Germination Suppression Flow Release Implementation Plan

INTRODUCTION

In 2007, the Platte River Recovery Implementation Program (Program or PRRIP) began its 13-year First Increment and implementation of an Adaptive Management Plan (AMP) to learn more about the physical processes of the central Platte River and the response of four target species to management actions: interior least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), and pallid sturgeon (*Scaphirhynchus albus*). In 2020 the Program began a 13-year Extension of the First Increment to provide additional time to complete and operate Program water projects and to conduct the monitoring and research necessary to determine the best use of Program water to benefit the target species ([PRRIP 2021a](#)).

The Program is committed to achieving the minimum water milestone of 130,000 acre-feet in annual reductions to target flow shortages. However:

- The Program recognizes there are fiscal constraints to achieving this milestone, and
- Scientific investigations need to be completed to confirm the need for 130,000 acre-feet in annual reductions to target flow shortages.

The Program will invest the resources available to achieve at least 120,000 acre-feet in annual reductions to target flow shortages as quickly as possible during the Extension and will also invest in the science necessary to determine if the additional 10,000 acre-feet is justified. The Program is committed to finding the additional resources necessary to achieve that additional 10,000 acre-feet if justified by the science. Extension Water Plan activities will proceed under the same principles that have guided water supply and management since Program initiation. Water acquisition will proceed under a willing buyer/willing seller approach and all water management activities will be conducted in accordance with the Program's Good Neighbor Policy ([PRRIP 2021b](#)).

The Program's original AMP was updated in 2022 as an Extension Science Plan ([PRRIP 2022a](#)) providing a concise and practical roadmap of Program science priorities during the Extension. The Extension Science Plan includes protocols for monitoring target species, habitat, and physical processes as well as plans for data analysis and synthesis to better understand interrelationships and provide information for evaluating habitat and species response to management actions. This document serves as the implementation plan for conducting germination suppression flow release for the Program.

Whooping crane roosting along the central Platte River is dependent upon wide, shallow river channels unobstructed by tall, dense vegetation. Flow releases to inundate the active channel early in the growing season have been designed to test the effectiveness of using Program water to suppress germination of problematic perennial species like cottonwoods (*Populus* spp.) and willows (*Salix* spp.), and to attempt to slow encroachment of *Phragmites australis* into the channel. Information collected during the implementation of germination suppression flow releases is used to evaluate the biological response of riparian vegetation to the inundation of the channel and the effectiveness of these releases in maintaining wide unobstructed channel widths for whooping crane roosting. Several critical scientific and technical uncertainties about physical processes and the response of the target species to management actions will be the focus of the application of rigorous adaptive management in the First Increment Extension through implementation of the Program's Extension Science Plan. These uncertainties are captured in statements of broad hypotheses in Table 1 on pages 8-9 of the Extension Science Plan and, as a means of better linking science learning to Program decision-making, those uncertainties comprise a set of "Extension Big Questions" that provide a template for linking specific hypotheses and performance measures to management objectives and overall Program goals (see [PRRIP 2020](#)).



Two Extension “Big Questions” (EBQs) relate directly to measuring vegetation response to germination suppression flow releases:

- [EBQ #1](#) – How effective is it to use Program water to maintain suitable whooping crane roosting habitat?
- [EBQ #2](#) – How effective is Program management of *Phragmites* for maintaining suitable whooping crane roosting habitat?

Implementation of germination suppression flow releases to address these questions provides valuable information on the quantity of Program water necessary for effective channel maintenance while providing information on the cost and benefits of a water alternative for maintaining suitable roosting and in-channel foraging habitat for whooping cranes.

To assess progress toward this objective and gather information to reduce remaining uncertainties during the Extension, several finer-scale priority management hypotheses were developed by Program participants to receive focused attention. For management of in-channel vegetation, those priority hypotheses are:

- [EBQ #1](#) Management Hypothesis: Releases to achieve a 30-day minimum flow target of 1,500 cfs between June 1 – July 15 will suppress germination, slow vegetation expansion into the channel, and increase the percent of AHR channel that remains highly suitable for whooping crane roosting (germination suppression release).
- [EBQ #2](#) Management Hypothesis: Releases to achieve a 30-day minimum flow target of 1,500 cfs between June 1 – July 15 in combination with continued herbicide spraying will slow *Phragmites* rhizome/stolon expansion into the channel and increase the percent of AHR channel that remains highly suitable for whooping crane roosting.

PURPOSE

This plan is intended to provide standard implementation guidance for planning, coordinating, and implementing germination suppression flow releases. The implementation plan describes the conceptual design, tools, and procedures that are used annually to plan for and implement a 30-day minimum flow target of 1,500 cfs at Grand Island between June 1 – July 15. The plan outlines information the Program’s Executive Director’s Office staff collect during implementation, as well as data collected and used by the United States Fish and Wildlife Service (USFWS), Central Nebraska Public Power and Irrigation District (CNPPID), and Nebraska Public Power District (NPPD) to make decisions during implementation and adjust the release accordingly.

DESIGN CONSIDERATIONS AND SPECIFICATIONS

Area of Interest

The germination suppression flow release encompasses a span of about 200 miles from its origin in the Lake McConaughy Environmental Account (EA) to a terminal flow measurement of the [Platte River near Grand Island \(06770500\)](#). This project area encompasses most of the Program’s AHR between Lexington and Chapman, Nebraska. The Program’s Environmental Account (EA) water can be routed through canal systems operated by NPPD and CNPPID for hydropower generation but must be returned to the river in its entirety, minus any appropriate transit losses.

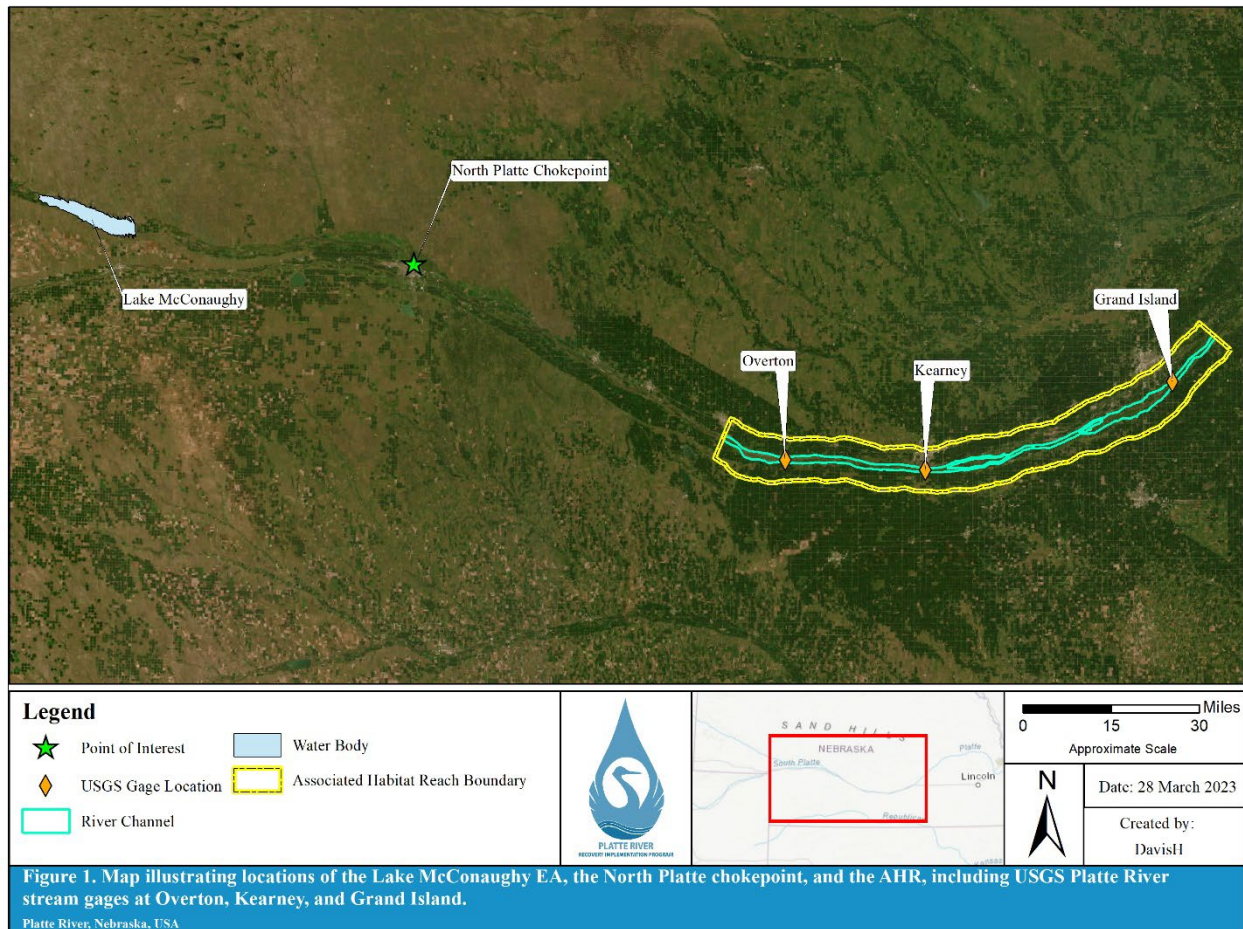
If capacity is available, EA water is preferentially routed through the NPPD Sutherland Canal system. Water routed through NPPD system is returned to the South Platte River via the Sutherland Power Return at North Platte. If the Sutherland Canal is full (around 1,700 cfs) or the desired EA release exceeds acceptable ramping rates, additional EA water can be routed down the North Platte River channel. This water is subject to capacity constraints through the North Platte chokepoint reach which extends a few miles upstream and downstream of the [North Platte River at North Platte \(06693000\)](#) gage and the adjacent Highway 83 bridge. The current



rating curve employed by the Nebraska Department of Natural Resources (DNR) for the North Platte River at North Platte gage shows a discharge capacity of 1,930 cfs at the National Weather Service (NWS) 6.0 ft minor flood stage. However, from July 2020 to September 2023, the average shift-adjusted capacity at the North Platte gage was only 1,750 cfs (based on 39 flow measurements).

EA water routed through the NPPD system and the North Platte River channel is reunited at the confluence of the North Platte and South Platte rivers. Most of this EA water is then re-diverted into the CNPPID Tri-County Supply Canal system. Any flow in excess of the canal capacity (about 2,250 cfs) is routed down the parallel Platte River channel that passes by gages Maxwell, Brady, Cozad, and Darr. EA water routed through the CNPPID system is released back to the south channel of the Platte River at the J-2 Return between Lexington and Overton. The river channels come back together just upstream of the Overton bridge, and EA water continues to flow downstream in the Platte River past Kearney, Grand Island, and beyond.

Although the germination suppression flow release aims to achieve a 1,500 cfs flow at the [Grand Island](#) stream gage, the “work” of the flow release will be assessed based on the extent to which vegetation establishment and encroachment is minimized throughout the entire 90 miles of the AHR from Lexington to Chapman. **Figure 1** illustrates the locations of the Lake McConaughy EA, the North Platte chokepoint, and the AHR. United States Geological Survey (USGS) Platte River stream gages located in the upper (Overton) ([USGS 2023a](#)), middle (Kearney) ([USGS 2023b](#)) and lower (Grand Island) ([USGS 2023c](#)) portions of the AHR are used to monitor flow release implementation.





Project Design

The germination suppression flow release is not “designed” in a conventional sense. As described above, the release is intended to achieve a flow of 1,500 cfs at Grand Island for 30 days between June 1 and July 15¹. Other than those defined objectives, project planning consists of real-time decision making in consideration of the variables described in the next section.

Variables Considered

Variables important to decision-making during the germination suppression flow release include measured flow at the Grand Island gage, flow deficit at Grand Island relative to the 1,500 cfs target, anticipated transit losses, available carriage capacity in the NPPD Sutherland Canal and CNPPID Tri-County Supply Canal systems, and available capacity through the North Platte chokepoint while remaining below the current shift-adjusted discharge at minor flood stage. Appropriate ramp up/ramp down rates must be employed to avoid damage to canal infrastructure.

Downstream irrigation demands must also be considered. As long as water released from the Lake McConaughy EA is present in the North Platte River, flows at the North Platte chokepoint cannot exceed the 6.0 minor flood stage established by the National Weather Service (NWS). This is a matter of both Program policy and the terms of CNPPID’s 1998 FERC license for the operation of the Kingsley Dam Project. If an EA release is ongoing, and the NPPD Sutherland Canal and North Platte chokepoint are already at or near capacity, an increase in irrigation demand necessarily requires reduction of the EA release to allow for the additional irrigation water needed.

The timing of the germination suppression flow release coincides with the typical peak of convective thunderstorm activity in central Nebraska, so weather forecasts play an important role in the decision-making process. This is particularly important if thunderstorm activity is predicted to occur in the North Platte River drainage between Lake McConaughy and the City of North Platte, a situation which could potentially lead to flows at North Platte exceeding flood stage. Heavy precipitation can lead to rapid changes in both river flows and irrigation demands.

Timing

The germination suppression flow release is intended to occur such that water from the release is observed at Grand Island for 30 days between June 1 and July 15. Water released from the Lake McConaughy EA on day 1 reaches Grand Island on day 8. Irrigation demand has been ramping up significantly around the third weekend in June. Given that this can result in constraints on the capacity available to deliver EA water to the AHR, it is preferred to start the EA release early as possible. In order for EA water to reach Grand Island on June 1, the EA release must begin no later than May 25. If the last of the germination suppression flow release is to pass through Grand Island on July 1, the release should be terminated on June 24. There may be some adjustment to the start and end dates to maximize flow at Grand Island over 30 days while accommodating release ramp up and ramp down.

¹Note that the 1,500 cfs flow target for germination suppression is independent of other U.S. Fish and Wildlife Service (USFWS) target flows that were defined for species and habitat benefits and may range from 800 cfs to 3,400 cfs from June 1-July 15 depending on whether the real-time hydrologic condition designation is wet, normal, or dry.



Coordination

Releases from the Lake McConaughy EA are overseen by the USFWS EA Manager and staff in coordination with CNPPID and Program EDO staff. Other parties involved in the release coordination include NPPD and the Nebraska DNR. Coordination conference calls are typically held twice weekly during the flow release, on Mondays and Thursdays. Flow release coordination involves planning for adjustments to compensate for weather, irrigation demand, river channel/canal carriage capacity, and other factors.

Data Collection

Streamflow and canal diversions are the primary parameters for which data is collected during the germination suppression flow release. The release is targeting a flow of 1,500 cfs at Grand Island, which is measured at the Grand Island gage. Nebraska DNR tracks EA water through the system using its Platte Water Accounting Program (PWAP). This tracking includes the amount of EA water and total flow at each gage along the North Platte River downstream of Lake McConaughy and the central Platte River, as well as diversions into and returns from both the NPPD Sutherland Canal and CNPPID Tri-County Supply Canal systems.

FLOW RELEASE SUMMARIES

Table 1 summarizes key information from 4 years of germination suppression flow releases, 2020-2023. The flow target for the release was originally 2,000 cfs at Grand Island in 2020 and 2021, but that flow was rarely achieved. Given the revision of the flow target to 1,500 cfs for 2022 and subsequent years, those early years are evaluated in the context of achieving 1,500 cfs flows at Grand Island. Similarly, the target period for assessment of this management action at Grand Island was standardized to June 1-30 for all years. For consistency with Program water projects operations accounting, the EA release summary data includes the entirety of the volume released from the Lake McConaughy EA and the volume of EA water reaching Grand Island over a period that varies by year and may extend from late May to mid-July.

Table 1. Summary data for germination suppression flow releases implemented from 2020-2023.

Year	Lake McConaughy EA Release (Variable Dates)				Grand Island Flow (June 1-30)	
	Total Volume EA Water Released (AF)	Average Release Rate (cfs)	# Days of Release	Total Volume EA Water Reaching Grand Island (AF)	Average Flow (cfs)	# Days >= 1,500 cfs
2020	29,036	457	32	18,538 (64%)	2,016	28
2021	57,880	912	32	42,670 (74%)	1,599	20
2022	79,359	1,291	31	61,531 (78%)	1,513	16
2023	49,870	1,143	22	40,342 (81%)	3,075*	30

*Grand Island flow data for the time period of the 2023 germination suppression release is provisional and subject to change.

2020

The USFWS made an EA release for channel maintenance and other purposes between April 29 and June 2, which put EA water at Grand Island from May 6 to June 9. Flow at Grand Island peaked at 9,310 cfs on May 26 and was on a downward trajectory into early June. On June 11, the USFWS initiated another EA release specifically for the purpose of germination suppression. This EA release continued into July, and on July 13



the purpose of the ongoing EA release was changed to support the North Platte chokepoint flow test.

From June 11-July 12, a total EA volume of 29,036 AF was released for germination suppression at an average rate of 457 cfs. EA water totaling 18,538 AF (64% of the release) reached Grand Island from June 18-July 19.

During the 30-day target period from June 1-30, there were 28 consecutive days with flow above 1,500 cfs at Grand Island. Average flow at Grand Island during the month of June was 2,016 cfs. **Figure 2** illustrates the 2020 EA release for germination suppression and resulting Grand Island flows.

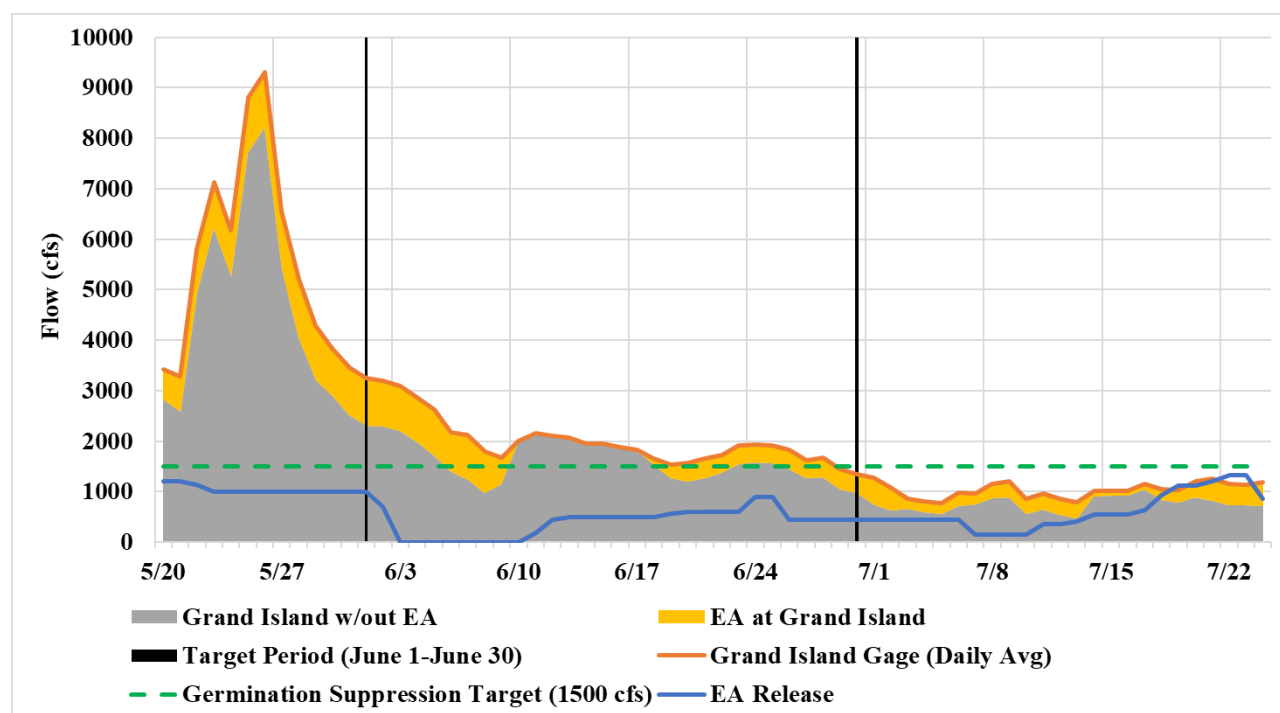


Figure 2. 2020 germination suppression flow release.

2021

The 2021 EA release for germination suppression began on May 24 but was quickly halted due to forecast precipitation over the Memorial Day weekend. The EA release resumed on June 2 and continued until July 2. A total volume of 57,880 AF was released from the Lake McConaughy EA at an average rate of 912 cfs over 32 days. EA water reaching Grand Island totaled 42,670 AF (74% of total release) on May 31 and from June 9-July 9.

The average flow at Grand Island from June 1-30 was 1,599 cfs, with 20 days (not all consecutive) having flows greater than 1,500 cfs. **Figure 3** illustrates the 2021 germination suppression flow release.

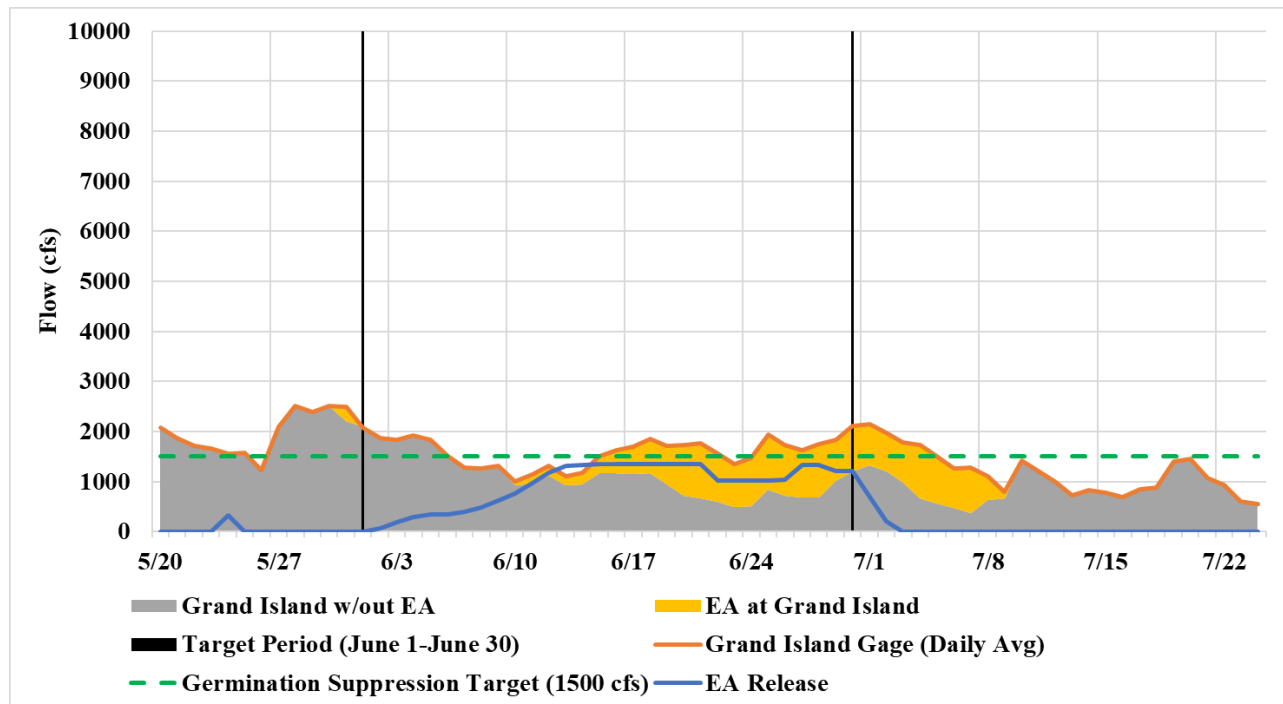


Figure 3. 2021 germination suppression flow release.

2022

The 2022 EA release for germination suppression began on May 25 and concluded on June 24. A total volume of 79,359 AF was released from the Lake McConaughy EA at an average rate of 1,291 cfs. EA water reaching Grand Island totaled 61,531 AF (78% of total release) from June 1-July 1.¹

Average flow at Grand Island from June 1-30 was 1,513 cfs, with 16 days having flows greater than 1,500 cfs and a thunderstorm-aided peak daily average flow of 2,410 cfs on June 8. **Figure 4** illustrates the 2022 germination suppression flow release.

After the initial ramp up, the NPPD Sutherland Canal operated at or near capacity for most of the germination suppression flow release. About 51% of the released EA water was routed through the NPPD system, and the other 49% was routed down the North Platte River. The shift-adjusted discharge capacity at the North Platte chokepoint was 1,660 cfs after Nebraska DNR made a flow measurement on May 19 and 1,710 cfs after a measurement on June 15. Additionally, USFWS requested to impose a 200 cfs flow buffer at the North Platte chokepoint. This effectively resulted in a 1,500 cfs flow limit through the chokepoint reach in mid- to late-June, but actual flow never exceeded 1,400 cfs during the germination suppression flow release.

Rapid intensification of irrigation demand around the 3rd weekend in June resulted in downward adjustments to the EA release back to June 14. EA release rates were reduced more quickly than planned because of high irrigation demand and capacity constraints below flood stage at the North Platte chokepoint.

¹ The volume and percentage of EA water reaching Grand Island in 2022 are revised from the April 12, 2023 version of this document that was previously appended to the Extension Science Plan. This is due to a modified approach to adjusting real-time EA tracking data when it exceeds subsequently adjusted and approved USGS gage data.

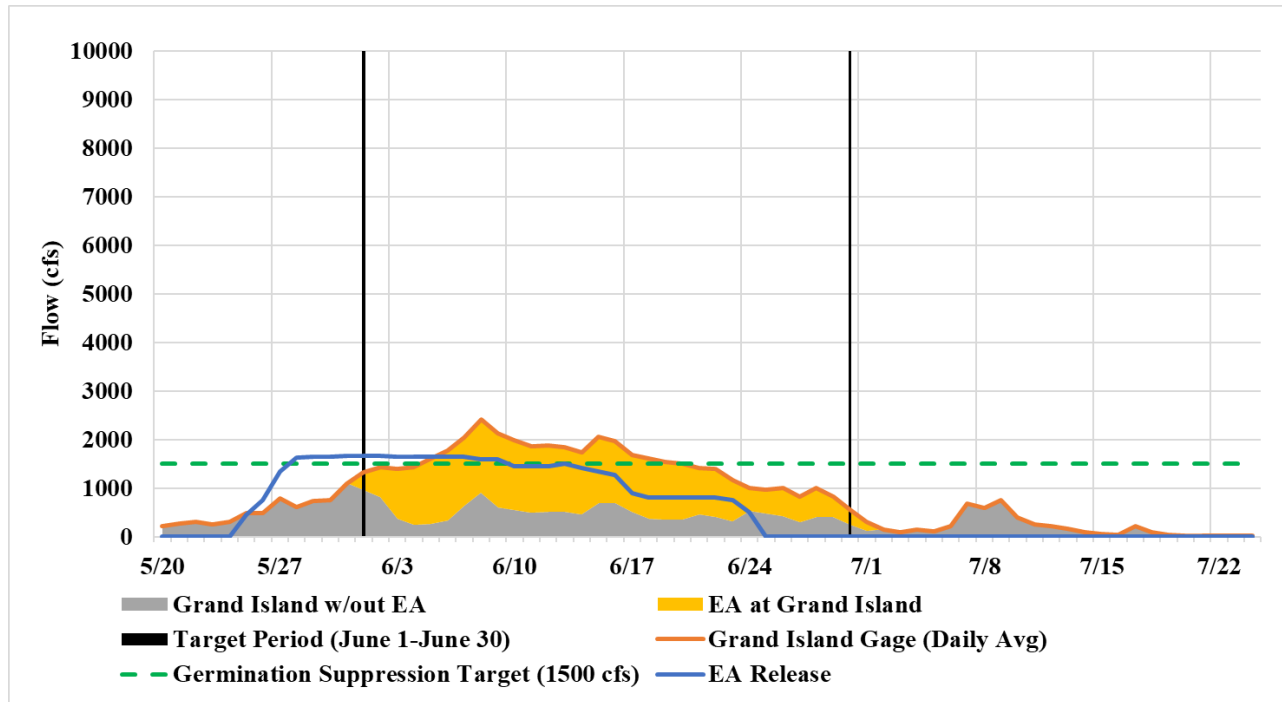


Figure 4. 2022 germination suppression flow release.

2023

The 2023 EA release for germination suppression began on May 24 and concluded on June 14. A total volume of 49,870 AF was released from the Lake McConaughy EA at an average rate of 1,143 cfs over 22 days. EA water reaching Grand Island totaled 40,342 AF (81% of total release) from May 31-June 21.

Average flow at Grand Island from June 1-30 was 3,075 cfs, with all 30 days of the month having flows greater than 1,500 cfs. **Figure 5** illustrates the 2023 germination suppression flow release.

The start of the 2023 EA release came at the end of initial rains across the South Platte basin of Colorado and a brief period excess flows on the central Platte River. After ramping up, the EA release averaged 1,500 cfs for 10 days. Streamflow at Grand Island reached a low point in late May as upstream precipitation picked up again. It was uncertain how this would affect the central Platte River, but by June 5 it was clear that sustained high flows were coming down the South Platte River. A decision was made to reduce the EA release starting June 5, and reductions continued every day until the release ended on June 14.

The Front Range of Colorado experienced the wettest May-June on record, and South Platte River flows remained high from mid-June to mid-July. Downstream flows at Grand Island continued to rise after the last of the EA water passed through on June 21, finally peaking at 6,530 cfs on July 3. In total, Grand Island flow was at or above the 1,500 cfs germination suppression target for 52 consecutive days from May 31-July 21.

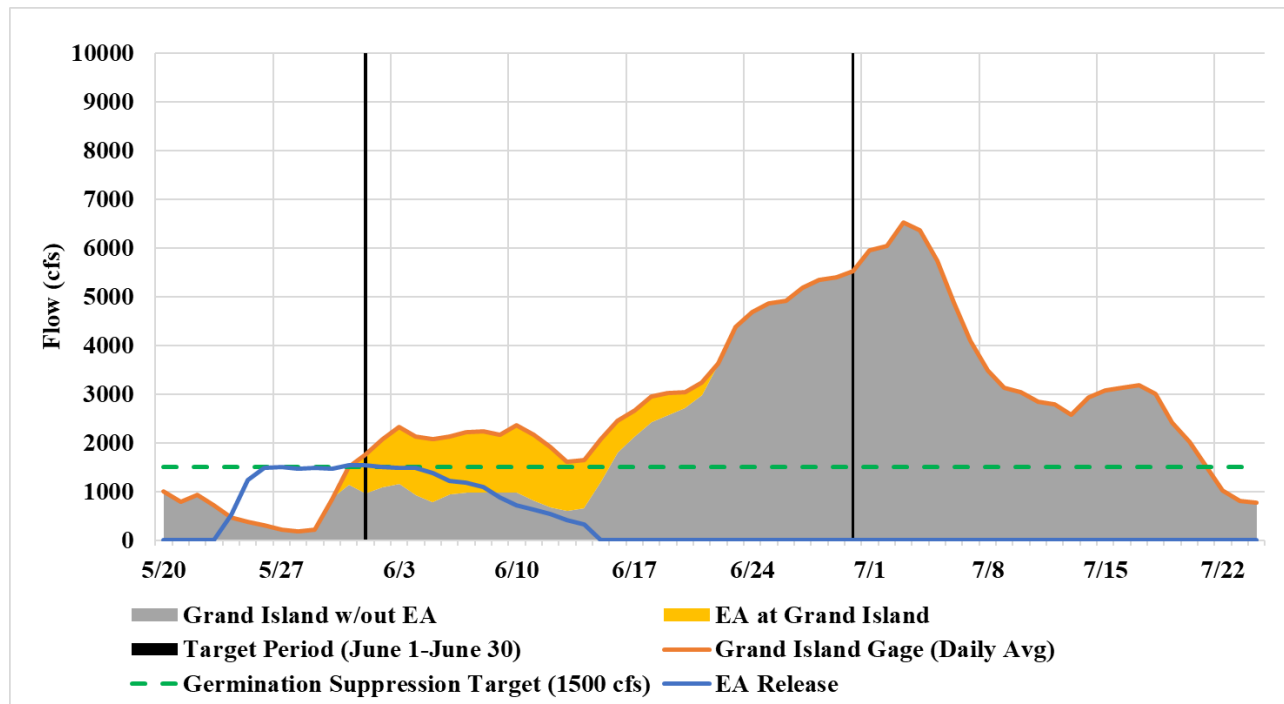


Figure 5. 2023 germination suppression flow release.

MONITORING

Information collected during and following the implementation of germination suppression flow releases is used to assess the amount of water coverage achieved by the release and the subsequent response of riparian vegetation.

Implementation Monitoring

Flow release implementation is monitored via a system of Platte River stream gages located in the upper (Overton) ([USGS 2023a](#)), middle (Kearney) ([USGS 2023b](#)) and lower (Grand Island) ([USGS 2023c](#)) portions of the AHR (**Figure 1**). All three gages are administered/maintained by the USGS and provide stage measurements (and associated discharges derived from rating curves) at a 15-minute interval. Data are accessible in real time with frequent physical measurements to calibrate rating curves.

Effectiveness Monitoring

Data collected during and following releases will be used to compile multiple lines of evidence for evaluating effectiveness and develop Structured Decision-Making (SDM) tools. The system-scale geomorphology and vegetation monitoring protocol ([PRRIP 2022b](#)) will be the principal tool to monitor the effectiveness of germination suppression releases.

- **Channel Inundation** – Reach-wide 2-D hydrodynamic models have been developed and are updated annually using fall topo-bathymetric LiDAR. These models are grid-based and 1) distribute flow between channels in split-flow reaches and 2) estimate river stage/inundation depth as well as flow velocity, shear stress and other flow-dependent hydraulic metrics. This tool provides information on the timing and duration of water coverage resulting from flow releases across the AHR.
- **Mechanical Management Actions** – Activities like *Phragmites* spraying, disking, and in-channel tree clearing may confound assessments of effectiveness. The temporal and spatial extent of each of these activities is documented annually.
- **In-Channel Vegetation** – Fall color-infrared (CIR) imagery is used in tandem with concurrently collected LiDAR data (vegetation height raster) to conduct a supervised classification of in-channel land cover.



This includes areas of bare sand and water as well as vegetation height classes ranging from short (<2.0 ft) up to mature forest. This tool is capable of classifying vegetation structure – not composition. First Increment monitoring focused heavily on composition and that data was generally found to be unhelpful in system-scale analyses.

- Unobstructed Channel Width – Supervised classification is processed into metrics found to be good predictors of whooping crane roost site selection – specifically channel width unobstructed by tall dense vegetation and unforested width.

Other Lines of Evidence

- Vegetation State-Change Evaluation – A grid-based analysis of the relationship between inundation (2-D model/June aerial imagery) and in-channel vegetation state (inundated, unvegetated, vegetated) will be conducted on an AHR scale. Discriminate analysis can be used to identify inundation timing, duration, and percentage channel inundated in relation to vegetation states, specifically conditions that lead to a state change. These analyses will also take any mechanical or chemical management into account.
- Timelapse Camera Analysis – Timelapse camera imagery captures channel inundation and vegetation response over the entire growing season at key locations across the AHR.
- Field measurements at *Phragmites* patches – Monthly field measurements at 150 *Phragmites* patches distributed across three representative reaches capture water surface elevations, patch inundation, and patch expansion rates in response to inundation.

Effectiveness Assessment

Formal assessments of effectiveness (using data above) are scheduled to occur in 2024 & 2028 if needed.

Machine Learning Model

A random forest machine learning model has been developed to utilize historical information gathered for the central Platte about how natural peak flows interact with channel geomorphology over time to affect unobstructed channel width. The model also accounts for mechanical management such as river channel disking and herbicide application to predict future channel conditions (annual changes in maximum unobstructed channel widths) under various flow and mechanical management scenarios. This model will be a primary line of evidence and is expected to be used as a predictive modeling tool during a SDM process for the Second Increment.

The combination of remote sensed and on the ground field measurements enables us to quantify the amount of spatial and temporal water coverage achieved during the flow release, quantify vegetation response to inundation, and estimate subsequent unobstructed channel widths to evaluate the effectiveness of using Program water to maintain wide, unvegetated channels for whooping crane roosting.

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