to: PRRIP Water advisory committee

from: PRRIP executive Director’s office

subject: Scoring and Accounting for PRRIP water projects

date: May 1, 2025

The purpose of this memo is to explain what is meant by “water project scoring” and “water project accounting” for the Platte River Recovery Implementation Program (PRRIP or Program) and to provide links to reference documentation for the benefit of Water Advisory Committee (WAC) members.

In practical terms, the score of a Program water project is a theoretical estimate of its capacity to reduce deficits to U.S. Fish and Wildlife Service (USFWS) target flows at Grand Island, Nebraska, based on modeled hydrology, retroactive determination of target flows, and assumed project operations. Water project scores count towards the Program’s (First Increment) Water Objective of achieving average annual deficit reductions of 130,000 to 150,000 acre-feet (AF) per year (or 120,000 AF per year as modified for the First Increment Extension).

In contract, the accounting for a Program water project provides estimates of actual deficit reductions based on real approved flow data for the USGS Platte River near Grand Island gage ([06770500](https://waterdata.usgs.gov/monitoring-location/06770500/#dataTypeId=continuous-00065--2051167928&period=P7D)), target flows determined in real time, and real project operations data.

**Water Project Scoring**

The closest the Program Document gets to a formal definition of the “score” for a water project is found on page 8, paragraph (2) of the Water Plan Reference Materials (Attachment 5, Section 11), which states:

The impacts that various alternatives…would have on flows in the central Platte River are “scored” for comparative purposes…on the basis of the extent to which they reduce shortages to [USFWS] **target flows** [at Grand Island, Nebraska]. (bold emphasis in the original)

Appendix B of the Water Plan Reference Materials elaborates on the use of the Central Platte OPSTUDY Model[[1]](#footnote-1) to evaluate Water Plan projects during the NEPA process that resulted in the Program in the early 2000s. It was this process that resulted in the assignment of a score of 80,000 AF for the Program’s initial three state water projects:

* Colorado: Tamarack 1 groundwater recharge project
* Nebraska: Lake McConaughy Environmental Account (EA), more specifically based on the 10% of storable natural inflows (SNI) that accrue to the EA between October and April each year
* Wyoming: Pathfinder Modification Project, more specifically the Pathfinder EA (33,493 AF) from which the Program is entitled to all water that accrues and which is routed downstream to the Lake McConaughy EA each year in August-September.

The balance of the cumulative score required to achieve the Program’s Water Objective is to be accomplished through the implementation of the Water Action Plan (WAP).

The Program’s Governance Committee (GC) first appointed an ad hoc Scoring Subcommittee in [December 2009](https://platteriverprogram.org/document/2009-december-gc-minutes). The Program’s Executive Director’s Office (EDO) worked with that group to develop a case study for WAP project scoring based on the J-2 Regulating Reservoirs, which was the preferred alternative in the Central Nebraska Public Power and Irrigation District (CNPPID) Regulating Reservoirs pre-feasibility study that was then underway. The GC reviewed and adopted the scoring methodology proposed in the [case](https://platteriverprogram.org/internal-document/cnppidreregresscoringcasestudyapr222010pdf) [study](https://platteriverprogram.org/internal-document/gc-memo-cnppid-reregulating-reservoir-scoring-recommendation-may-2010) in [June 2010](https://platteriverprogram.org/document/2010-june-gc-minutes). The same general methodology has been applied to all subsequent WAP project score analyses and includes the following basic elements:

* 1947-1994 analysis period
* Daily or monthly time step (analysis may use both depending on project specifics)
* Hydrology from EIS-era Central Platte OPSTUDY Model data (which also dictates the 1947-1994 analysis period), specifically a “present” conditions scenario with the three initial state projects in place[[2]](#footnote-2)
* USFWS target flows from the Program Document Water Plan Reference Materials, Appendix A-5 (Column 4 for daily or Column 8 for monthly) as determined based on the annual hydrologic condition (wet, average/normal, or dry)
  + The annual hydrologic condition is designated retroactively based on annual average flow rate at Grand Island
  + Designation that <939 cfs = dry and >1575 cfs = wet (and normal in between) was based on an analysis of 1947-1994 data
* Using the modeled hydrology, EA water is included in Grand Island flows for calculating shortages but excluded from divertible excess flow calculations
  + Shortage calculations for all WAP project types compare modeled Grand Island flow to USFWS target flows
  + Excess calculations for recharge projects compare Grand Island flow to the greater of USFWS target flows or Platte River instream flows held by Nebraska Game and Parks Commission (NGPC) or Central Platte Natural Resources District (CPNRD)
* Return flows from Program WAP projects, i.e., EA releases and accretions from recharge/recapture projects, are routed to Grand Island from the assumed point of return using loss factors derived from the WMC Loss Model[[3]](#footnote-3)
* Program water project return flows entering the river upstream of Overton are assumed to benefit the Program’s entire Associated Habitat Reach (AHR) and given 100% credit. Returns below Overton are discounted by a small percentage based on the distance downstream from there.

Typically several different project operations scenarios are tested in a score analysis. Variable factors may include the annual volume of water available for leasing or diversion; the timing and frequency of divertible excess flow; or the timing and pattern of EA releases. Deficit reductions are generally calculated on a monthly basis and summed to annual for each year of the 1947-1994 analysis period. The calculated 48-year average of the annual deficit reductions represents the score for a given scenario. The Scoring Subcommittee reviews the analyses and results produced by the EDO and through negotiation makes a recommendation to the GC for a project score to approve.

The Central Platte OPSTUDY Model included complex logic to allow for releases from the Lake McConaughy EA for variable purposes specified by USFWS. That is not possible with the OPSTUDY output data used for score analyses, so all WAP projects that contribute to the Lake McConaughy EA are scored solely on the basis of reducing deficits to USFWS target flows at Grand Island. Early score analyses for Lake McConaughy EA contributions tested a range of deficit-reducing release scenarios but ultimately it was concluded that a release scenario starting in March (or the earliest month thereafter with a deficit in any given year of the 1947-1994 analysis period) was the most appropriate and that approach is used consistently now. However, from an operations perspective, deficit reductions resulting from Lake McConaughy EA releases end up being incidental to the species-, habitat-, or science-related purpose for which the EA release was made. This will be discussed further below.

Completed and approved score analyses are summarized in **Table 1**, starting with the Phelps County Canal groundwater recharge project in 2013. Links are to the score analysis documentation in the libraries on the Program website. The J-2 Regulating Reservoirs project that was the subject of the original scoring case study was re-evaluated and assigned a revised score in 2012, but the project was never constructed and is thus not included in the table. Additionally, the Pathfinder Municipal Account lease was originally [scored in 2014](https://platteriverprogram.org/internal-document/pathfinder-lease-score-analysis-memo-final) based on an assumed annual yield of 4,800 AF. After several years of project operations, it was found that the Program was often able to lease 9,600 AF from the project, so the score was updated in 2018.

**Table 1. Approved WAP Project Scores**

|  |  |  |
| --- | --- | --- |
| **Project** | **Year Scored** | **Approved Score (AF)** |
| [Phelps County Canal Groundwater Recharge](https://platteriverprogram.org/internal-document/phelps-recharge-score-analysis-memo-final) | 2013 | 2,700 |
| [No-Cost Net Controllable Conserved Water (NCCW)](https://platteriverprogram.org/internal-document/no-cost-nccw-score-files) | 2016 | 260 |
| [Cook Recapture Well](https://platteriverprogram.org/internal-document/phelps-recharge-score-cook-recapture-well) | 2016 | 160 |
| [Pathfinder Municipal Account Lease (Revised)](https://platteriverprogram.org/internal-document/final-pathfinder-score-update-memo-2018-10-05) | 2018 | 6,350 |
| [Elwood Reservoir Groundwater Recharge](https://platteriverprogram.org/internal-document/elwood-recharge-score-analysis-gc-september-2019) | 2019 | 2,800 |
| [CNPPID Irrigator Lease](https://platteriverprogram.org/internal-document/2019-cnppid-irrigator-lease-score-memo) | 2019 | 1,900 |
| **TOTAL =** | | **14,170** |

The CNPPID irrigator lease first approached full enrollment (3,000 acres) in 2019 and the project was scored that year based on assumed continuation of full enrollment in the project each year. However, subsequent changes in the price paid by the Program per enrolled acre starting in 2021 drastically reduced enrollment to about one-third of the maximum for the past several years. The score analysis as completed in 2019 specifically included provisions for modifying the score if enrollment changed significantly; the score is now assumed to be on the order of 710 AF but has not been formalized because the GC has not made a final decision on the future of the project beyond 2025.[[4]](#footnote-4)

Active WAP projects for which score analyses have not been completed include the CPNRD and Nebraska Public Power District (NPPD) surface water leases, the Cottonwood Ranch recharge project, NPPD groundwater recharge in the Gothenburg Canal and Dawson County Canal, and 7 additional recapture wells that were installed near Cottonwood Ranch.

**Water Project Accounting**

In contrast to the theoretical nature of water project scoring, water project accounting is based on real project operations and flow data and is intended to provide a means of comparing actual operations to the assumed project descriptions and results of score analyses.[[5]](#footnote-5) Accounting analyses typically include the following elements:

* Calendar years starting 2007 (accounting most recently completed for 2022 and 2023)
* Approved flow data for the USGS Platte River near Grand Island gage (06770500)
* Target flows are defined based on the [real-time hydrologic condition](https://platteriverprogram.org/hydrologic-conditions)
  + Real-time hydrologic condition is updated 7 times per year by the EDO
  + Lagging indicator developed by USGS ([Anderson and Rodney 2006](https://platteriverprogram.org/document/characterization-hydrologic-conditions-support-platte-river-species-recovery-efforts)) based on regression analysis.
  + Various combinations of 7 parameters factor into the calculation of a hydrologic condition index, which in turn determines whether the real-time hydrologic condition is wet, normal, or dry: (1) previous month’s average flow at Grand Island; (2) previous month’s average flow at Julesburg; (3) end-of-month (EOM) storage in Lake McConaughy; (4) EOM storage at 7 North Platte Basin reservoirs in Wyoming; (5) EOM storage at 3 Upper South Platte reservoirs in Colorado; (6) previous month’s Palmer Drought Severity Index (PDSI); and (7) April 1 snowpack at 7 SNOTEL sites in Wyoming
* Deficits are calculated from USFWS target flows and USGS Grand Island flows

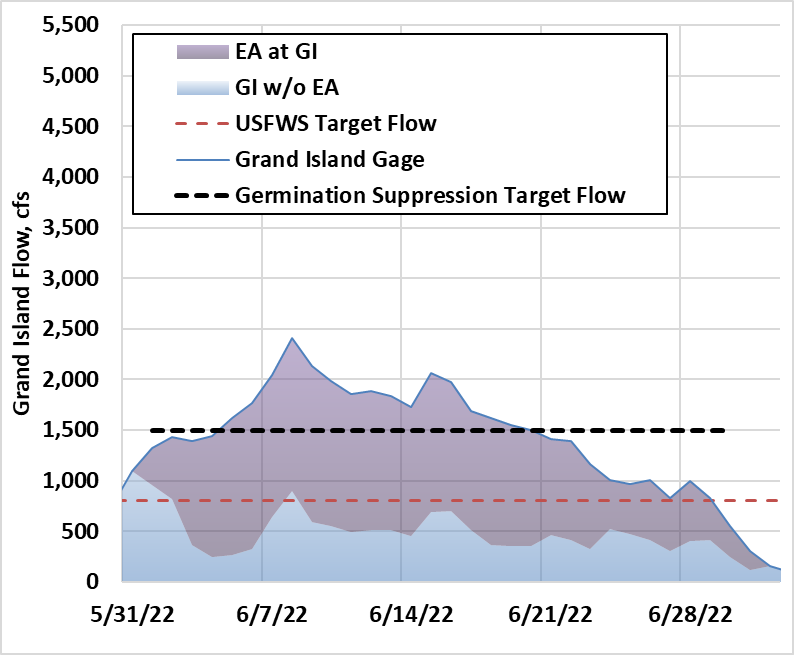
To operate the Program’s groundwater recharge projects, excess flows must be declared available by the Nebraska Department of Natural Resources (NeDNR) based on a determination that USFWS target flows are exceeded at Grand Island and that permitted Platte River instream flow water rights held by NGPC or CPNRD are satisfied at Overton, Odessa, Grand Island, Duncan, North Bend, and Louisville.[[6]](#footnote-6)

Recharge (seepage) of diverted excess flows and recapture pumping are calculated on a daily basis using data provided by the operating district,[[7]](#footnote-7) then summed to monthly to process using Unit Response Functions (URFs) to calculate monthly accretions/depletions at the river. The URFs used for this purpose are based on or informed by groundwater models that were developed and used for project scoring. Loss factors from the WMC Loss Model are still used in the accounting to route accretions from recharge and recapture to Grand Island.

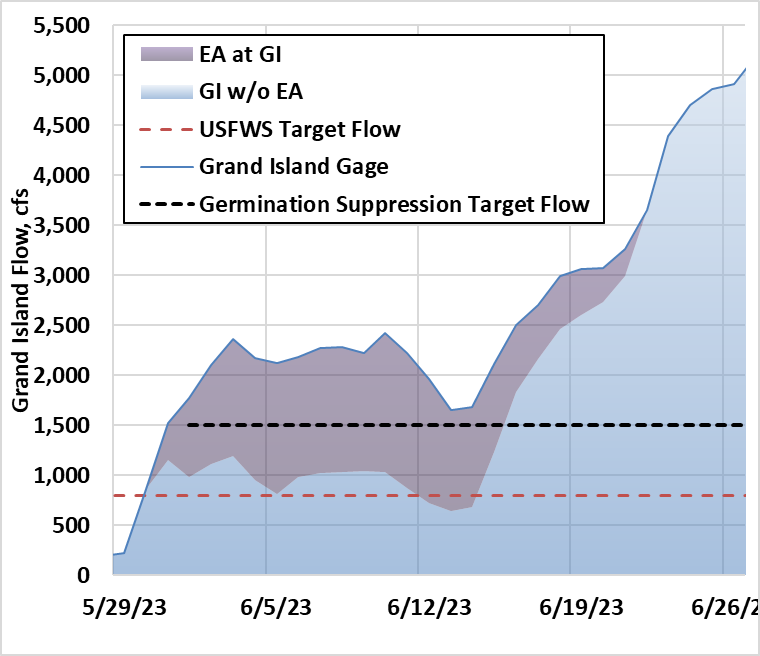
For accounting purposes, all sources of water contributing to the Lake McConaughy EA (there are currently 7) are treated as an aggregate supply and not evaluated individually, i.e., once individual water sources are credited to the EA any unique identity is lost. Water released from the Lake McConaughy EA is tracked through the system to Grand Island using Platte Water Accounting Program (PWAP) [daily reports](https://nednr.nebraska.gov/pwapweb/) from the NeDNR. This is the only available source of EA tracking.

As noted previously, score analyses for WAP projects contributing to the Lake McConaughy EA are based solely on the premise of making EA releases to reduce deficits, typically starting in March of a given year. In the accounting analyses, deficit reductions resulting from EA releases are typically incidental to the scientific or habitat-related purpose of the release.[[8]](#footnote-8) Recent EA releases for germination suppression illustrate this concept, in particular the degree to which deficit reductions from EA releases are affected by the real-time hydrologic condition and resulting USFWS target flows.

The real-time hydrologic condition for June is determined based on a combination of average and end-of-month factors for May. In both 2022 and 2023 the real-time hydrologic condition for June was dry, resulting in USFWS target flows of 800 cfs for the entire month. However, the objective of the germination suppression release is to achieve 1,500 cfs at Grand Island from June 1-30, so much of the EA water that reached Grand Island in those years was above the 800 cfs target flow. **Figure 1** and **Figure 2** illustrate the germination suppression EA releases for 2022 and 2023, respectively. In both years, only the EA water (purple shaded area) appearing in the Grand Island gage below the USFWS target flow (red dashed line) counted as deficit reduction. During the 2022 release, of 61,500 AF of EA water reaching Grand Island, only about 19,100 AF (31%) was credited as deficit reduction. The 2023 release was an even more extreme scenario, with 40,300 AF reaching Grand Island and only 700 AF (1.7%) providing actual reductions to USFWS target flow deficits.

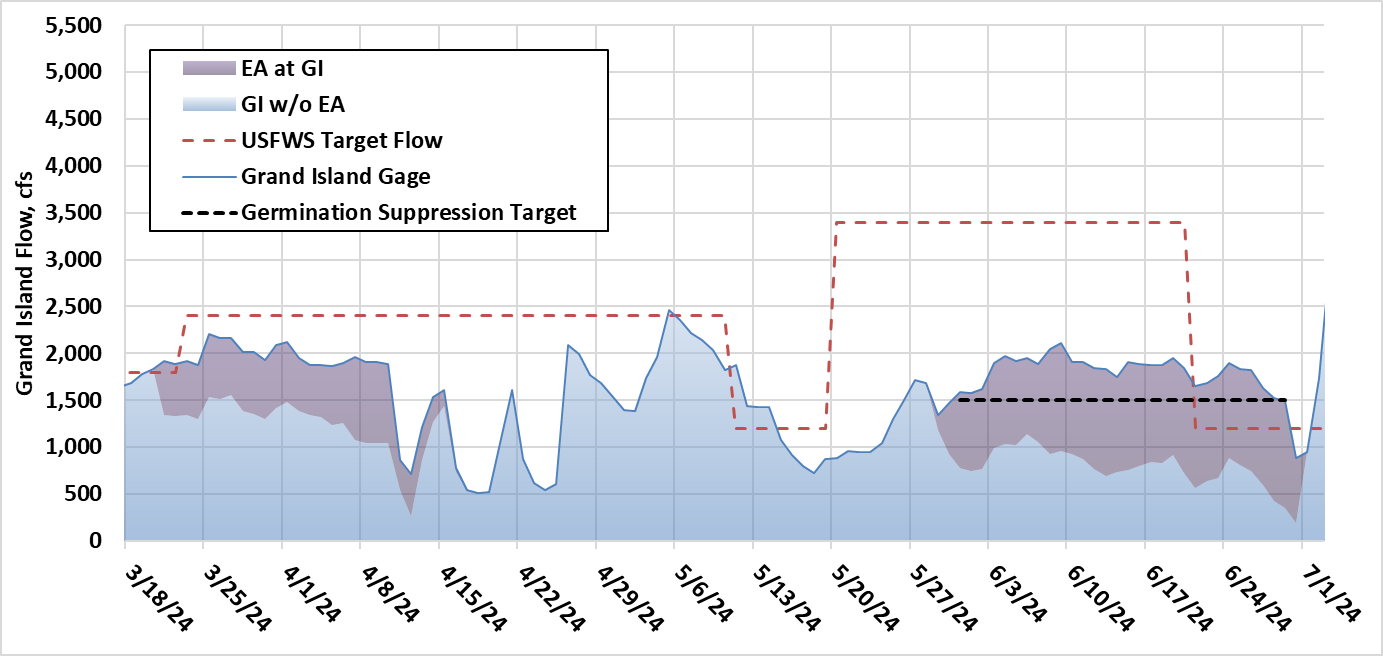


**Figure 1. 2022 EA release for germination suppression**



**Figure 2. 2023 EA release for germination suppression**

As shown in **Figure 3**, two EA releases were made in 2024, in March-April during the spring whooping crane migration and in May-June for germination suppression. During both time periods, the real-time hydrologic condition designation was normal, which typically corresponds to higher USFWS target flows. The target flows were 2,400 cfs during most of the spring whooping crane EA release; of 30,600 AF of EA water that reached Grand Island, 30,200 AF (98.7%) will count as deficit reductions.[[9]](#footnote-9) During the EA release for germination suppression, while the Program was attempting to achieve a flow of 1,500 cfs at Grand Island from June 1-30, the USFWS target flows were 3,400 cfs from June 1-20 and 1,200 cfs from June 21-30. Of the nearly 63,250 AF that reached Grand Island, about 54,350 AF (86%) will likely be credited as deficit reductions.



**Figure 3. 2024 EA releases during the spring whooping crane migration and for germination suppression**

More expansive discussion of accounting methods and results for Program water projects can be found in a series of reports and presentations in the Program’s online document libraries. Following completion of the Nebraska groundwater recharge feasibility study and the implementation of full-scale recharge operations, the EDO produced detailed reports on the Phelps County Canal groundwater recharge project in [2013](https://platteriverprogram.org/internal-document/2013-phelps-county-canal-recharge-report), [2014](https://platteriverprogram.org/internal-document/2014-phelps-county-canal-recharge-report), [2015](https://platteriverprogram.org/internal-document/2015-phelps-county-canal-recharge-report), [2016](https://platteriverprogram.org/internal-document/2016-phelps-county-canal-recharge-report), and [2017](https://platteriverprogram.org/internal-document/2017-phelps-county-canal-recharge-report).

These project-specific reports were discontinued when, in 2019, the EDO completed the first comprehensive accounting for all Program water projects (to the extent that data was available to make it possible) for the period [2007-2018](https://platteriverprogram.org/internal-document/final-2018-prrip-water-projects-accounting-memo). Section II.D. of this first accounting report attempted to explain the differences between operations accounting and project scoring. The report also attempted to explain why the accounting results were in many cases very different from the results of score analyses for the same Program water projects. The conclusions at the time were that the major factors were (1) time and (2) reduced availability of excess flows since 2007 compared to the 1947-1994 historical period uses for scoring. Regarding time, the particular issues were that (1) accounting results based on just a few years (at most 12 years through 2018 and more likely 7 years or less since most WAP projects came online in 2012 or after) of water project operations were simply not directly comparable to 48-year average score results and (2) returning water from Program recharge projects to the river is a long, slow process that was really just getting started. It is the opinion of the EDO that these conclusions on the comparison of scoring and accounting results remain valid in 2025.

Subsequent accounting documentation includes an update memo to incorporate the additional results for [2019-2020](https://platteriverprogram.org/internal-document/final-prrip-water-projects-accounting-update-memo). This second accounting document includes a much more detailed dissection of the operations data, methods of analysis, and results for the Phelps County Canal and Elwood Reservoir groundwater recharge projects. To avoid redundant documentation, accounting updates for [2021](https://platteriverprogram.org/internal-document/prrip-water-projects-accounting-2021-updates) were conveyed to the WAC as a presentation, and a similar approach was taken for [2022-2023](https://platteriverprogram.org/internal-document/2024-august-wac-presentations) (see slides 76-87 of this packet from the August 2024 WAC meeting). Accounting updates for 2024 are expected to be completed later this year.

1. The framework upon which the Central Platte OPSTUDY Model was built was originally developed by the U.S. Bureau of Reclamation (USBR) in the mid-1980s and coded in FORTRAN77. Subsequent revisions by both USBR and USFWS resulted in Version 2002.11.15 that was used for Program NEPA analyses. [↑](#footnote-ref-1)
2. Central Platte OPSTUDY Model data was provided to the EDO by Don Anderson of USFWS in 2009. There are two specific output files that the EDO uses depending on whether the score analysis is monthly or daily. [↑](#footnote-ref-2)
3. As explained in Appendix 2 of the PRRIP Water Management Study, Phase I Report (Boyle 2008), the WMC Loss Model was developed by the Water Management Committee (WMC) and Boyle in the late 1990s “…to route local net hydrologic effects associated with a water conservation/supply alternative to the critical habitat…” The original spreadsheet model included the analysis period 1975-1994 and was expanded by Boyle during the Water Management Study to include the years 1995-2006. [↑](#footnote-ref-3)
4. The CNPPID irrigator lease operated as an annual pilot project from 2016-2018. A 5-year lease agreement covered the years 2019-2023 and has been followed by two consecutive 1-year extensions for 2024 and 2025 to evaluate the effects of changes in the price paid per acre enrolled. [↑](#footnote-ref-4)
5. The EDO did not complete the first comprehensive accounting until 2019 but such analyses for Program water projects were anticipated in the Program Document. See the Milestones Document (Attachment 2), Steps 4.6 and 4.7 and Appendix B of the Water Plan Reference Material (Attachment 5, Section 11), item #7. [↑](#footnote-ref-5)
6. There is a critical distinction in that from an administrative perspective the NGPC/CPNRD instream flows are formally permitted water rights under Nebraska water law and the USFWS target flows are essentially advisory recommendations with no force of law behind them. [↑](#footnote-ref-6)
7. Operations data for Phelps County Canal and Elwood Reservoir recharge are provided by CNPPID. Operations data for the recapture wells are provided by Tri-Basin Natural Resources District (TBNRD). NPPD provides operations data when recharge occurs in the Gothenburg and/or Dawson County canals. [↑](#footnote-ref-7)
8. Each fall, the USFWS EA Manager prepares an [Annual Operating Plan (AOP)](https://platteriverprogram.org/internal-document/draft-wy2025-ea-aop) describing the purposes and priorities of planned releases from the Lake McConaughy EA. Historically, EA releases have been made during the spring and fall whooping crane migrations, for habitat maintenance, for tests of flow routing to the AHR, and other purposes. [↑](#footnote-ref-8)
9. Values are estimates; water projects accounting for 2024 has not yet been completed as of the beginning of May 2025. [↑](#footnote-ref-9)