



— BUREAU OF —
RECLAMATION

Niobrara, Lower Platte, and Kansas River Basins

Water Year 2023
Water Year 2024

Summary of Actual Operations
Annual Operating Plans

Annual Operating Plans



Virginia Smith Dam, Nebraska

Nebraska Kansas Area Office
Missouri Basin Region

U.S. Department of the Interior

March 2024

Mission Statements

The U.S. Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; honors its trust responsibilities or special commitments to American Indians, Alaska Natives, Native Hawaiians, and affiliated Island Communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Cover Photo – Virginia Smith Dam, Virginia (Bureau of Reclamation)

Niobrara, Lower Platte, and Kansas River Basins

Water Year 2023 Summary of Actual Operations
Water Year 2024 Annual Operating Plans

Prepared by:

**Bureau of Reclamation
Technical Service Center
Denver, Colorado**

Acronyms and Abbreviations

AF	acre-feet
AOP	Annual Operating Plan
CCP	Comprehensive Conservation Plan
ft	feet/foot
KBID	Kansas Bostwick Irrigation District
KDWP	Kansas Department of Wildlife and Parks
LRNRD	Lower Republican Natural Resources District
MOA	Memorandum of Agreement
MRNRD	Middle Republican Natural Resources District
N-CORPE	Nebraska Cooperative Republican Platte Enhancement Project
NKAO	Nebraska-Kansas Area Office
O&M	Operation and Maintenance
Reclamation	Bureau of Reclamation
RRCA	Republican River Compact Administration
RRWCD	Republican River Water Conservation District
SCADA	Supervisory Control and Data Acquisition System
URNRD	Upper Republican Natural Resources District
USACE	U. S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WY	water year

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Overview

General

This year is the Seventy-first consecutive year that an Annual Operating Plan (AOP) has been prepared for the federally owned dams and reservoirs in the Niobrara, Lower Platte, and Kansas River Basins. The plan has been developed by the Water Operations Group in McCook, Nebraska for the 16 dams and reservoirs that are located in Colorado, Nebraska, and Kansas. These reservoirs, together with nine diversion dams, nine pumping plants, and 21 canal systems, serve approximately 258,842 acres of project lands in Nebraska and Kansas. In addition to irrigation and municipal water, these features serve flood control, recreation, fish, and wildlife purposes. A map at the end of this report shows the location of these features.

The reservoirs in the Niobrara and Lower Platte River Basins are operated by either irrigation or Reclamation districts. The reservoirs in the Kansas River Basin are operated by either the Bureau of Reclamation (Reclamation) or the U.S. Army Corps of Engineers (USACE). Kirwin Irrigation District provides operational and maintenance assistance for Kirwin Dam. The diversion dams, pumping plants, and canal systems are operated by either irrigation or Reclamation districts.

A Supervisory Control and Data Acquisition System (SCADA) located at McCook, Nebraska, is used to assist in operational management of all eleven Reclamation dams that are located in the Kansas River Basin. A database system called Hydromet collects and stores near real-time data at selected stations in the Nebraska-Kansas Projects. The data includes gate openings and water levels in streams, canals, and reservoirs. This data is transmitted to a satellite and downloaded to a Reclamation receiver in Boise, Idaho. The data can then be accessed by anyone interested in monitoring water levels or water usage in an irrigation system. The Nebraska-Kansas projects currently have 60 Hydromet stations that can be accessed. The Nebraska-Kansas Area Office (NKAO) has installed and maintains 41 of these Hydromet stations. These stations can be found by accessing Reclamation's website at https://www.usbr.gov/gp/hydromet/station_codes_by_state.html.

2023 Summary

Summaries of the 2023 operations of NKAO projects are included in tables A-2 through A-5 in appendix A.

Climatic Conditions

Precipitation at the project dams during 2023 ranged from 85 percent of normal at Webster Dam to 143 percent of normal at Red Willow Dam. Annual precipitation was above normal for 12 of the project dams.

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Temperatures in January and February were generally below normal throughout the project area. Precipitation in January was well above average at all project dams ranging from 152 percent of average (Glen Elder Dam) to 730 percent of average (Red Willow Dam). February precipitation was above average at all but three project dams. March temperatures were typically below average. Precipitation was well below normal with only six project dams above 50 percent of average.

Temperatures in April and May were generally around normal. Precipitation during April was well below average at all project dams. May precipitation was generally above normal with seven project dams recording at least five inches and three dams in southwest Nebraska recording over nine inches.

Temperatures in July were generally below normal, while temperatures in June and August were about normal. Total precipitation in June was above average at all but five project dams. July precipitation was well above average at all but two project dams. Fall and Winter precipitation varied throughout the project dams. August precipitation varied from 23 to 210 percent of average.

September precipitation varied from 43 to 259 percent of average. October precipitation was generally well below average with the exception being the projects in the northern half of Nebraska, which were near to or exceeded 200 percent of average. November precipitation was generally well below average while December was well above average with eight project dams above 200 percent of average.

September through December temperatures were generally above normal.

Storage Reservoirs

Conservation Operations: The 2023 inflows at Bonny and Lovewell were below the dry-year forecasts. Inflows for Hugh Butler, Harry Strunk, Harlan County, Kirwin, Webster, Cedar Bluff and Waconda were between the dry-year and normal-year forecasts. Trenton inflow exceeded the wet-year forecast. The remaining reservoirs were between the normal-year and wet-year forecast.

Of the 16 reservoirs, 14 had below average carryover storage from water year (WY) 2022. Box Butte and Enders Reservoirs, along with Swanson, Hugh Butler, and Keith Sebelius Lakes did not have sufficient storage to provide water users with a full water supply. Lovewell Reservoir was the only project to use flood pool storage during the year. Irrigation demands greatly reduced the storage in several project reservoirs throughout the summer. Reservoir storage was below average at 13 of the 16 reservoirs at the end of WY2023.

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On September 20, 2011 the State of Colorado ordered that Bonny Reservoir be drained for Republican River Compact compliance. All the water in Bonny Reservoir was evacuated by the end of May 2012 and no storage has been recorded since. The State of Colorado order remains in effect and inflows continue to be bypassed.

Table 1 shows a comparison of 2022 and 2023 carry-over storage conditions for all reservoirs in the Niobrara, Lower Platte, and Kansas River Basins as of September 30, 2023.

Table 1.—Summary of carry-over storage at NKAO facilities

Reservoir/lake	September 30, 2023 storage (AF)	September 30, 2022 storage (AF)	Change (AF)
Bonny	0	0	0
Swanson	53,194	26,641	26,553
Enders	7,733	6,655	1,078
Hugh Butler	16,019	10,369	5,650
Harry Strunk	24,912	13,743	11,169
Keith Sebelius	17,583	12,924	4,659
Harlan County	213,839	233,558	-19,719
Lovewell	19,243	16,260	2,983
Kirwin	59,085	72,153	-13,068
Webster	31,004	46,238	-15,234
Cedar Bluff	75,539	87,162	-11,623
Waconda	161,694	165,947	-4,253
Box Butte	8,492	7,306	1,186
Merritt	58,373	39,858	18,515
Calamus	58,006	52,375	5,631
Davis Creek	14,434	13,913	521

Flood Control Operations: Lovewell Reservoir was the only project to use flood pool storage in 2023. All flood pool storage at Lovewell Reservoir was used for irrigation and no flood releases were made.

The WY2023 flood damages prevented by the operation of Reclamation’s Nebraska-Kansas Projects facilities was \$31,200 as determined by the Corps of Engineers. An additional benefit of \$1,800 was credited to Harlan County Lake. The cumulative total of flood control benefits for

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the years 1951 through 2023 by facilities in this report total \$3,005,293,800. Box Butte, Merritt, Calamus, and Davis Creek Reservoirs do not have a designated flood pool and have not accrued any flood benefits to date. Flood control benefits attributed to each project are shown in table 2.

Table 2.—Flood damages prevented by Nebraska-Kansas Project reservoirs

Reservoir	During fiscal year (FY) 2023	Prior to 2023	Accumulated total
Bonny	\$0	\$2,870,900	\$2,870,900
Enders	\$0	\$3,618,500	\$3,618,500
Swanson	\$0	\$51,551,600	\$51,551,600
Hugh Butler	\$0	\$13,489,900	\$13,489,900
Harry Strunk	\$0	\$26,992,500	\$26,992,500
Keith Sebelius	\$0	\$11,597,600	\$11,597,600
Harlan County	\$1,800	\$396,671,600	\$396,673,400
Lovewell	\$0	\$237,501,400	\$237,501,400
Kirwin	\$0	\$196,204,500	\$196,204,500
Webster	\$0	\$164,776,200	\$164,776,200
Waconda	\$31,200	\$1,711,671,500	\$1,711,702,700
Cedar Bluff	\$0	\$188,314,500	\$188,314,500
Total	\$33,000	\$3,005,260,700	\$3,005,293,700

Notes: Accumulated totals from 1951 through 2023. The reservoirs upstream of Harlan County Lake did not receive benefits for damages prevented from 1972 to 1993. Total construction costs of storage dams were \$208,954,130.

A summary of precipitation, reservoir storage and inflows at the facilities of the Nebraska-Kansas Projects during 2023 can be found in table A-2 in appendix A.

Water Service

There was 334,911 acre-feet (AF) of water diverted to irrigate approximately 199,082 acres of project lands in the eleven irrigation districts. Tables A-3 and A-4 in appendix A summarizes the acres irrigated and canal diversions by irrigation district. Project water supply was either inadequate or limited for 72,400 acres of the total project lands. This includes lands in Mirage Flats, Frenchman Valley, Frenchman-Cambridge, and Almena Irrigation Districts. The project water supplies for the other units mentioned in this report were adequate in 2023.

The water requirements of three municipalities, one rural water district, and two fish hatchery facilities were met in 2023. Both storage releases and natural flows are utilized in meeting these demands.

Fish and Wildlife and Recreation Benefits

The National Recreational Fisheries Policy declares that the Government’s vested stewardship responsibilities must work in concert with the state managing agency’s recreational fisheries constituency and the general public to conserve, restore, and enhance recreational fisheries and their habitats. The NKAO is available for meetings if requested with Nebraska, Colorado, and Kansas state management agencies to discuss the AOP. Information is solicited from the agencies to enhance fisheries resources within the flexibility allowed while still meeting contractual obligations with the various irrigation districts.

Project reservoirs with full or near full conservation pools prior to the irrigation season were favorable for Fish, Wildlife and Recreation use in 2023. The higher water levels experienced early in the year submerged existing shoreline vegetation. Normal irrigation demands and the lack of precipitation during the summer greatly reduced the pool levels at several reservoirs allowing for late summer shoreline revegetation. The draining of Bonny Reservoir, and the State administration of storage rights in southwest Nebraska reservoirs in past years diminished recreation benefits at these facilities.

2024 Outlook

Three forecast conditions have been developed for each of the reservoirs in the Niobrara, Lower Platte, and Kansas River Basins conforming to established operating criteria under various reservoir inflow conditions. These operation studies are included starting in table A-22 in appendix A. The municipal and rural water district water supply requirements will be met under all three inflow forecast conditions for all units.

Under reasonable minimum inflow forecast conditions irrigation districts receiving storage water from the following reservoirs are expected to receive less than a full supply: Box Butte, Enders, Swanson, Hugh Butler, Harry Strunk, Harlan County, Webster, and Keith Sebelius. The

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irrigation districts affected are Mirage Flats, Frenchman Valley, Frenchman – Cambridge, Kansas Bostwick, Nebraska Bostwick, Webster, and Alma, respectively.

Under most probable inflow conditions, it is expected that Mirage Flats, Frenchman Valley, and Alma Irrigation Districts would experience some shortages to irrigation demands from Box Butte Reservoir, Enders Reservoir, and Keith Sebelius Lake, respectively. Most irrigators in these districts plan to use water from private wells to supplement the project water supply.

Under reasonable maximum inflow conditions Frenchman Valley Irrigation District is expected to experience irrigation demand shortages from Enders Reservoir.

Under reasonable minimum inflow conditions, the conservation pools at Merritt, Calamus, Davis Creek, and Lovewell Reservoirs are expected to fill.

Water is not expected to be stored in Bonny Reservoir during 2024 as the State of Colorado's order to bypass all inflows remains in effect. Bonny Reservoir was drained in 2012 by order of the State of Colorado to assist in meeting Republican River Compact compliance.

Chapter I – Introduction

Purpose of This Report

This AOP advises water users, cooperating agencies, and other interested groups or persons of the actual operations during 2023 and serves as a guideline for 2024 operations. This report also describes the responsibilities of Reclamation, the USACE, and the irrigation and Reclamation districts in the Niobrara, Lower Platte, and Kansas River Basins.

Operational Responsibilities

Reclamation is responsible for irrigation operations at all federal reservoirs in the Nebraska-Kansas Projects. Reclamation is also responsible for the operation and maintenance (O&M), safety of the structure, and reservoir operations not specifically associated with regulation of the flood control storage at the reservoirs constructed by Reclamation. Regulation of the flood control storage is the responsibility of the USACE. In addition to irrigation and flood control, these reservoirs provide recreation, fish and wildlife, and municipal water supply benefits.

By contractual arrangements with Reclamation, the irrigation or Reclamation districts in the Niobrara, Lower Platte, and Kansas River Basins are responsible for the O&M of the canals and irrigation distribution facilities constructed or rehabilitated by Reclamation. In addition, the appropriate irrigation or Reclamation districts are responsible for operating and maintaining Box Butte, Merritt, Virginia Smith, and Davis Creek Dams. The Corps of Engineers operates and maintains Harlan County Dam and Lake. The State of Colorado provides operational guidelines for Bonny Reservoir. Operational guidelines for Cedar Bluff Reservoir are provided by the State of Kansas. Reclamation operates and maintains eleven dams and reservoirs in the Republican, Solomon, and Smoky Hill River Basins. Under a contract with Reclamation, Kirwin Irrigation District performs certain operations and maintenance functions at Kirwin Dam.

An updated Field Working Agreement was executed on July 17, 2001 between the Corps of Engineers and Reclamation regarding operation of Harlan County Dam and Lake. The agreement provides for a sharing of the decreasing water supply into Harlan County Lake. Storage capacity allocations were redefined based on the 2000 sediment survey and a procedure was established for sharing the reduced inflow and summer evaporation among the various lake uses.

The States of Nebraska, Colorado, and Kansas are responsible for the administration and enforcement of their state laws pertaining to the water rights and priorities of all parties concerned with the use of water. As provided by the lease agreement between Reclamation and the states, the states are responsible for administering the water surface activities and the federal lands around the reservoirs. The U.S. Fish and Wildlife Service (USFWS) administers the water surface activities and most of the federal lands at Kirwin Reservoir.

Reclamation cooperates with all state agencies and compact commissions to ensure that all operations follow state laws and compact requirements.

Water Supply

For forecasting purposes, values of annual inflows were selected that statistically should be met or exceeded 10, 50, and 90 percent of the time to represent the reasonable maximum (wet-year), most probable (normal-year), and reasonable minimum (dry-year) inflow conditions, respectively.

Inflow records from 2004 through 2023 were used for the analysis of reservoirs in the Niobrara, Lower Platte, and Kansas River Basins.

Reservoir Operations

All operations are scheduled for optimal benefits of the authorized project functions. Monthly, or as often as runoff and weather conditions dictate, Reclamation evaluates the carry-over storage and estimated inflow at each reservoir to determine whether excess water is anticipated. If excess inflow is apparent, controlled releases will be made to maximize the downstream benefits.

Major Features

The Mirage Flats Project was constructed under the Water Conservation and Utilization Act and includes an irrigation storage reservoir, diversion dam, and canal system. The other features discussed in this report were constructed under the Pick-Sloan Missouri Basin Program and include single and multipurpose reservoirs, diversion dams, pump stations and canal systems. The sixteen storage facilities now in operation are listed below.

Constructed by Reclamation

Operated by irrigation or Reclamation districts: Box Butte and Merritt Dams in the Niobrara River Basin, and Virginia Smith and Davis Creek Dams in the Lower Platte River Basin.

Operated by Reclamation: Bonny, Trenton, Enders, Red Willow, Medicine Creek, Norton, Lovewell, Kirwin, Webster, Glen Elder, and Cedar Bluff Dams in the Kansas River Basin. A contract provides for Kirwin Irrigation District to perform certain operational and maintenance functions at Kirwin Dam.

Constructed and Operated by the U.S. Army Corps of Engineers

Harlan County Dam in the Kansas River Basin.

Irrigation and Reclamation Districts

Eleven irrigation districts and one Reclamation district in the Niobrara, Lower Platte, and Kansas River Basins have contracted with Reclamation for water supply and irrigation facilities. The Twin Loups Irrigation District has contracted their O&M responsibilities to the Twin Loups Reclamation District. Bostwick Irrigation District in Nebraska has contracted their O&M responsibilities for the Superior-Courtland Diversion Dam and the Courtland Canal between the head gates and the Nebraska-Kansas state line to Kansas Bostwick Irrigation District.

The contracted irrigation season for Mirage Flats Irrigation District is April through September. The contracted irrigation season for Frenchman-Cambridge Irrigation District is April 15 through October 15 or such additional period from April 1 to April 15 of each year as may be agreed upon between the District and Reclamation. The contracted irrigation season for Frenchman Valley Irrigation District is from May 1 through October 15 or such additional period from April 1 through May 1 of each year as determined between the district and Reclamation. The contracted irrigation season for Twin Loups Reclamation District, Bostwick in Nebraska, and Kansas Bostwick Irrigation Districts is May 1 through September 30 or such additional period from April 1 through November 15 of each year as determined between the district and Reclamation. For Ainsworth, Kirwin and Webster Irrigation Districts, the contracted irrigation season is from May 1 through September 30. The Almena Irrigation District's contracted irrigation season is from February 1 through September 30.

Municipal Water

Three municipalities in Kansas (Norton, Russell, and Beloit) and one rural water district in Kansas (Mitchell County Rural Water District No. 2) have executed water service contracts or repayment contracts for full or supplemental water supplies.

Fish and Wildlife

The Calamus Fish Hatchery is located below Virginia Smith Dam and Calamus Reservoir. The hatchery is operated and maintained by the Nebraska Game and Parks Commission (Commission). The water supply is provided by natural flows passed through Virginia Smith Dam and from Calamus Reservoir storage through an agreement dated July 28, 1988, between the Commission and the Twin Loups Reclamation District.

The State of Kansas operates and maintains the fish hatchery facility below Cedar Bluff Reservoir.

State of Colorado Division of Wildlife

The State of Colorado provides operational guidelines for Bonny Reservoir. The entire conservation pool storage was purchased by the State of Colorado on June 24, 1982. The State of Colorado's contract with Reclamation expired in 2022 and Colorado did not request renewal.

State of Kansas Department of Wildlife, Parks, and Tourism (KDWPT)

The State of Kansas acquired the use and control of portions of the conservation capacity at Cedar Bluff Reservoir following the reformulation of the Cedar Bluff Unit in October of 1992. The City of Russell's existing water storage right and contract with the United States remained unchanged.

Subordination Agreement Considerations

Subordination Agreements also exist between Reclamation, the Ainsworth Irrigation District, and the Nebraska Public Power District as well as between Reclamation, the Mirage Flats Irrigation District, and the Nebraska Public Power District. Provisions of these agreements will be incorporated in operations for the year.

Environmental Considerations

A "Statement of Operational Objectives" for Harlan County Lake sets forth the general operational objectives and the specific reservoir uses that are desirable. The operational objectives indicate that fish and wildlife interests are best served by high reservoir levels with minimum fluctuations, and regulation of the outflow in excess of the minimum desired flows. Although the statement recognizes flood control and irrigation as primary purposes, it indicates that comprehensive operational plans should be developed for maximum integration of the secondary uses.

These operational objectives are also considered in the operation of all Reclamation reservoirs in the Kansas River Basin, Niobrara River Basin, and the Lower Platte River Basin. The regulated outflow can also benefit farmers, ranchers, cities, and other interests below the reservoirs.

Republican River Compact – Kansas v. Nebraska

On May 26, 1998, Kansas filed a petition with the U.S. Supreme Court stating that Nebraska had violated the Republican River Compact by using more than its share of the Republican River water supply. The three original parties to the Compact; Kansas, Nebraska, and Colorado, became parties to the case; because the major water development structures in the Republican River Basin were constructed by the Bureau of Reclamation and the Corps of Engineers, the United States was allowed to participate as *amicus curiae*. After seventeen months of negotiations, the Final Settlement Stipulation was signed by each respective governor and attorney general and was filed with the Special Master on December 16, 2002. The United States Supreme Court approved the settlement and dismissed the case on May 19, 2003.

In the dry period 2005–2006, Nebraska overused its Compact-allotted share of the Republican River. In 2010, Kansas again filed suit in the U.S. Supreme Court. In 2015 the Supreme Court found that Nebraska had violated the Compact and required it to pay Kansas \$5.5 Million in damages and to take additional action to ensure compliance.

After Kansas’s 2010 filing, Nebraska took additional actions to achieve compliance including developing two augmentation projects to enhance flows in the River, offsetting overuse. Colorado also developed an augmentation project during this period to offset its overuse.

After more than two years of negotiations among the States, the Republican River Compact Administration (RRCA) approved two resolutions on August 24, 2016, establishing long-term agreements among Kansas, Colorado and Nebraska related to Colorado's and Nebraska's compliance activities in the Republican River basin.

Water-Short Year Administration will be in effect in those years in which the projected or actual irrigation supply is less than 119,000 AF of storage available for use from Harlan County Lake as determined by Reclamation. It was determined that Water-Short Year Administration would be in effect in 2024.

Chapter II – Niobrara and Lower Platte River Basins

Mirage Flats Project in Nebraska

General

Flows in the Niobrara River along with Box Butte Reservoir storage provide a water supply for the 11,662-acre Mirage Flats Project. Many irrigators supplement their water supply with private wells.

A data collection platform was installed in May of 1992 to monitor the reservoir elevation and outflow at Box Butte Dam. A telephone (primary communication system) and a radio (backup communication system) have been installed at the outlet works for contacting the Region 23 Emergency Management Agency.

2023 Summary

The flows of the Niobrara River plus the carry-over storage in Box Butte Reservoir were not adequate to provide a full water supply for the project lands. Precipitation in the Mirage Flats Irrigation District totaled 23.09 inches, which is 134 percent of normal. The 2023 total inflow of 19,911 AF was between the most-probable and wet-year forecast.

The reservoir level began the year at elevation 3,990.52 feet (16.5 feet below the top of conservation). Irrigation diversions began on July 16 and ended on September 12. The reservoir peaked at elevation 3,998.45 (8.6 feet below top of conservation) on July 14. Diversions of 10,775 AF to the Mirage Flats Canal provided irrigation water for approximately 10,865 acres. The farm deliveries from the project water supply totaled 3,961 AF (delivery efficiency of 37 percent). Total reservoir storage was 12,786 AF at the end of the irrigation season. Privately owned irrigation wells supplemented the project water supply. The reservoir level at the end of the year was 3,994.51 feet (12.5 feet below the top of conservation).

2024 Outlook

The project water supply is expected to be inadequate in 2024 as it has been since the early 1960s, but based on statistical reasonable maximum inflow, supplies will be adequate. In the spring, the district will inform their water users of the amount of water that will be available from storage in Box Butte Reservoir. It is anticipated that district irrigators will continue to use their privately-owned irrigation wells as a supplemental supply.

Ainsworth Unit, Sandhills Division in Nebraska

General

Within the Ainsworth Irrigation District, there are approximately 35,000 acres with available service. The project water supply is provided by Snake River flows and Merritt Reservoir storage. The reservoir is filled to elevation 2,944.0 feet each fall after the irrigation season. This level is approximately two feet below the top of conservation capacity and within the repaired area of soil cement on the upstream face of the dam. The reservoir is regulated to maintain this level until the ice clears each spring. Maintaining the reservoir at this elevation during the winter will help avoid ice damage to the older existing soil cement. Upon ice-out, the outlet pipe is drained, inspected, and repaired as necessary. The reservoir is then rapidly filled to elevation 2,946.0 feet to reduce shoreline erosion around the reservoir and minimize sand accumulations on the face of the dam. This filling process generally takes place in April. The reservoir level is maintained until irrigation releases begin to draw on the pool around mid-May. Seepage, pickup, and toe drain flow normally result in flows of up to 15 cubic feet per second (cfs) below Merritt Dam.

Reclamation has executed a Memorandum of Agreement (MOA) with the Commission, and the Ainsworth Irrigation District for Snake River releases below Merritt Dam. The purpose of this MOA is to establish the protocol that will be used to make future releases of water from Merritt Dam to the lower Snake River. The development of the MOA was an environmental commitment outlined in the Ainsworth Irrigation District Final Environmental Assessment for the conversion of a Long-Term Water Service Contract to a Repayment Contract (December 2006). Release criteria will be based on the best available scientific data to determine when local conditions warrant releases to the Snake River. When it becomes necessary to release water from Merritt Reservoir, Reclamation will direct the Ainsworth Irrigation District to make the necessary releases to the river. Changes to the river will be staged to allow fish and other aquatic organisms time to acclimate to the changing environment.

2023 Summary

Precipitation, as recorded near Merritt Dam, totaled 26.27 inches, which was 123 percent of normal. The total yearly inflow of 211,958 AF was between the most-probable and wet-year forecasts. The reservoir level at the beginning of the year was at elevation 2,944.16 feet. The water supply was more than adequate to meet the project's irrigation requirement. There were 64,993 AF diverted from Merritt Reservoir into Ainsworth Canal, with 29,270 AF delivered to the farm head gates (delivery efficiency of 45 percent). There were 34,640 acres of land irrigated in 2023. The reservoir elevation at the end of 2023 was 2,944.13 feet. The district also provided a total of 348 AF of irrigation water from holding ponds located within the district's service area.

In early 2018 the Missouri Basin Regional Drill crew, the Technical Service Center, and NKAO personnel completed grouting of the spillway and river outlet works underdrain systems. The

post grouting monitoring of the facility noted sand emanating from the right drain outfall for the spillway chute drain system. Weir plates were installed on both outfalls to monitor the sand accumulation. Six well points were also installed around the basin to provide additional ground water level monitoring. A Risk Reduction Verification Decision Document was completed and indicated that there is justification for enhancements to monitoring movement of material through the right spillway chute drain outfall. After identifying a preferred solution, a project plan will be prepared for implementing/constructing these monitoring enhancements.

In 2022 an issue evaluation was completed to assess the continued sand migration into the spillway underdrains located beneath the upper spillway chute. The risk analysis indicated justification for moving into corrective actions to prevent further sand migration. Repair alternatives will be identified during a Corrective Action Study in 2024.

2024 Outlook

During the winter months, the reservoir will be regulated to maintain elevation 2,944.0 feet (two feet below the top of conservation capacity). Releases from Merritt Reservoir are typically regulated to fill the conservation capacity during the early spring to alleviate erosive action to the lands around the reservoir and to maximize all benefits associated with the reservoir. This filling generally takes place during April. In 2024 the reservoir elevation will be held half a foot below conservation due to the ongoing Safety of Dams project previously mentioned. If weather conditions or irrigation demands dictate, it may be necessary to begin filling the reservoir prior to this time. This reservoir level will be maintained until irrigation releases begin dropping the pool level. Following the irrigation season the reservoir will begin to refill to elevation 2,944.0 feet. A release of 50 cfs will be made to the Snake River typically beginning the second week of October and will continue until the reservoir reaches the desired winter elevation. The water supply is expected to be adequate in 2024.

North Loup Division in Nebraska

General

The North Loup Division is located in the Loup River drainage basin. Water is diverted from both the Calamus and North Loup Rivers for the irrigation of approximately 56,128 acres of project lands. Operation of the division also provides a sustained groundwater supply for an additional 17,000 acres. Principal features of the division include Virginia Smith Dam and Calamus Reservoir, Calamus Fish Hatchery, Kent Diversion Dam, Davis Creek Dam and Reservoir, five principal canals, one major and one small pumping plant and numerous open ditch and buried pipe laterals.

Calamus Reservoir is normally regulated at 3 to 4 feet below the top of conservation capacity during the winter months. Maintaining the reservoir at this elevation during the winter helps avoid ice damage to the soil cement on the upstream face of the dam. After the ice clears in the spring, the reservoir is filled to conservation capacity. The North Loup Division project operation is restricted to zero water diversions from the Calamus and North Loup Rivers during the months of July and August, and during the month of September whenever sufficient water is available in the storage reservoirs to deliver full water demands. During this time, inflows to Calamus Reservoir are to be bypassed as required in the authorizing legislation.

Davis Creek Reservoir level is typically maintained at an average elevation of 2,048.0 feet from the end of the irrigation season through the winter months. In 2016 the wintering elevation was increased by eight feet to conduct a five-year groundwater study. In 2021 the study was extended three additional years. Off season seepage and evaporation has historically resulted in a reservoir drawdown of two and a half to three feet requiring an end of September reservoir level of 2,050.0 feet or less. The carry-over content at this elevation provides a minimal recreational pool while reducing increases in groundwater storage due to reservoir seepage. The reservoir is filled by the Mirdan Canal starting in April and will generally reach full content by the end of June. A 160-acre recreation area adjoining the reservoir continues to be managed by the Lower Loup Natural Resources District. The area includes a boat ramp, a handicapped accessible fishing pier, a day-use area, a primitive camping area, shelter, and a hiking path. Public lands adjoining Kent Diversion Dam are managed by the Commission and are also open to day-use fishing with handicap accessibility provided.

2023 Summary

Precipitation at Virginia Smith Dam was 26.31 inches, 104 percent of normal for the year. The inflow totaled 288,124 AF which was between the normal-year and wet-year forecasts. The reservoir level at the first of the year was elevation 2,239.11 feet (4.9 feet below the top of conservation). The conservation pool filled on April 14. The water supply was more than adequate for the district's needs. A total of 123,734 AF of water was released into Mirdan Canal and 10,165 AF was diverted through Kent Canal from the North Loup River. A total of 43,305 AF was diverted for district use above Davis Creek Reservoir. The farm head-gate delivery was 28,609 AF (delivery efficiency of 66 percent). Land irrigated above Davis Creek Reservoir in 2023 totaled 34,688 acres. The Calamus Fish Hatchery used bypassed natural flows and storage from the reservoir totaling 2,044 AF. Calamus Reservoir inflows were bypassed during July, August, and September as required. The elevation at the end of the year was 2,240.10 feet.

The precipitation total of 32.31 inches near Davis Creek Dam was 124 percent of normal. Inflow to Davis Creek Reservoir totaled 63,335 AF during 2023. The reservoir elevation at the first of the year was 2,054.90 feet. Beginning in mid-March, Davis Creek Reservoir was filled to a peak elevation of 2,075.01 feet on June 11 using diversions from Calamus Reservoir and the North Loup River. A release of 53,125 AF was made from Davis Creek Dam into Fullerton Canal, with 24,071 AF delivered to the farm head gates which is a 45 percent delivery efficiency. There were

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21,422 acres irrigated below Davis Creek Reservoir. Following the irrigation season, the reservoir level was maintained and wintered approximately eight feet higher than normal at the request of the district for a three-year study period. The reservoir elevation at the end of 2023 was 2,056.21 feet, 19.8 feet below the top of conservation.

2024 Outlook

Filling of Calamus Reservoir will continue through late winter and early spring. The reservoir will be allowed to fill to an elevation of 2,244.0 feet (top of conservation capacity) in late March or April. This reservoir level will be maintained to minimize shoreline erosion until demands begin to draw on the reservoir. In the fall the reservoir will be filled to an elevation of approximately 2,240.0 feet, if possible.

Water will be available for all irrigable acres with service from the Mirdan, Geranium and Scotia Canals and Lateral Systems. It is estimated that approximately 34,500 acres will be irrigated from these canals. Water supplies will be sufficient to meet the full dry-year requirements.

Filling of Davis Creek Reservoir will take place this spring with flows diverted from the North Loup River at Kent Division Dam and transported through Kent and Mirdan Canals. Storage water can also be transferred from Calamus Reservoir into Davis Creek Reservoir during the summer months through the Mirdan Canal. Water will be sufficient to irrigate an estimated 21,000 acres from Elba and Fullerton Canals under all inflow forecast conditions. The reservoir level will be regulated to eight feet above normal winter levels as part of an ongoing groundwater study.

Requirements for the fish hatchery will be met in full in 2024.

Chapter III – Republican River Basin

Armel Unit, Upper Republican Division in Colorado

General

Historically Bonny Reservoir has been operated for recreation and fish and wildlife support, although water has been available for water rights administration and irrigation purposes. The State of Colorado’s contract with Reclamation expired in 2022 and Colorado did not request renewal.

Bonny Reservoir inflows from the South Fork of the Republican River and Landsman Creek have historically been released into Hale Ditch as requested by the Colorado State Engineer. Hale Ditch water rights were purchased in 2019 by the Republican River Water Conservation District for Compact compliance. In 2022 the district formally notified Reclamation that they no longer intend to operate Hale Ditch.

The historic operation pattern of Bonny Reservoir enhanced the spring fish spawn and provided excellent fishing opportunities during the summer and hunting conditions each fall. In September of 2011 the State of Colorado ordered all storage water evacuated from Bonny Reservoir for Republican River Compact compliance. As a result, the reservoir fishery was decimated, and future operations are unlikely to provide fishing opportunities unless water is returned to the reservoir.

2023 Summary

The annual precipitation total of 21.34 inches at Bonny Dam was 120 percent of average. The annual computed inflow of 1,659 AF to Bonny Reservoir was below the dry-year forecast. Bonny Reservoir remains drained, and inflows continue to be bypassed for the purpose of compact compliance in 2023.

As directed by the Colorado State Water Commissioner water was to be bypassed through the reservoir into the South Fork Republican River as ordered by the Colorado State Engineer for compact compliance.

2024 Outlook

The State of Colorado’s order to release all the storage in Bonny Reservoir for Republican River Compact compliance remains in effect. If the order continues throughout 2024 water will not be available in the reservoir for irrigation or fishery purposes.

The Colorado State Water Commissioner is expected to direct that water be bypassed into the South Fork Republican River again in 2024.

Frenchman Unit, Frenchman-Cambridge Division in Nebraska

General

The Culbertson Canal serves 9,292 acres in the Frenchman Valley Irrigation District. The water supply for these lands is furnished by flows from Frenchman and Stinking Water Creeks and off-season storage in Enders Reservoir located on Frenchman Creek, a tributary of the Republican River in southwest Nebraska. Irrigation releases are conveyed via Frenchman Creek from Enders Reservoir to Culbertson Diversion Dam.

The normal operation of Enders Reservoir, with the gradual rise in water surface during the spring months provides desirable fish spawning conditions. Irrigation releases normally deplete the conservation storage by late summer, thereby limiting the fishing and recreational usage. Due to extremely low storage levels irrigation releases have not been made from Enders Reservoir since 2003.

Annual reservoir inflows have steadily declined from around 61,000 AF when Enders Dam was constructed to only 4,000 AF in recent years. Extensive groundwater pumping from upstream well development along with various conservation practices have resulted in the depletion of inflows. The conservation pool has not filled since 1968.

2023 Summary

The annual precipitation total of 22.70 inches at Enders Dam was 118 percent of normal. The 2023 inflow into Enders Reservoir of 5,003 AF was between the most-probable and wet-year forecast. The reservoir level began the year at a level of 3,078.21 feet (34.1 feet below the top of conservation). This was the lowest start-of-the-year elevation recorded since initial filling and is 1.79 feet below the outlet works intake (deadpool).

After accelerated coatings failure was noticed in the similarly dry outlet works at Bonny Dam, NKAO Maintenance staff determined it would be advantageous to keep the outlet works full. In addition, inflow projections for Enders have continually decreased. Therefore, NKAO determined that rehabilitation of the pump-back system would be beneficial. The pump-back system was put back into service in May of 2023 to recapture seepage out of the reservoir. The reservoir level increased gradually during the spring to a peak elevation of 3,081.74 feet on July 11.

Evaporation decreased the reservoir level from July through mid-November reaching elevation 3,080.06 feet on October 16. Due to the extremely low water supply available no water was

released from Enders Reservoir during the irrigation season. The end of the year reservoir level was 3,080.75 feet (31.6 feet below the top of conservation). A daily plot of the reservoir elevation is shown on figure 1.

The Frenchman Valley Irrigation District did not divert the natural flow from Frenchman Creek in 2023.

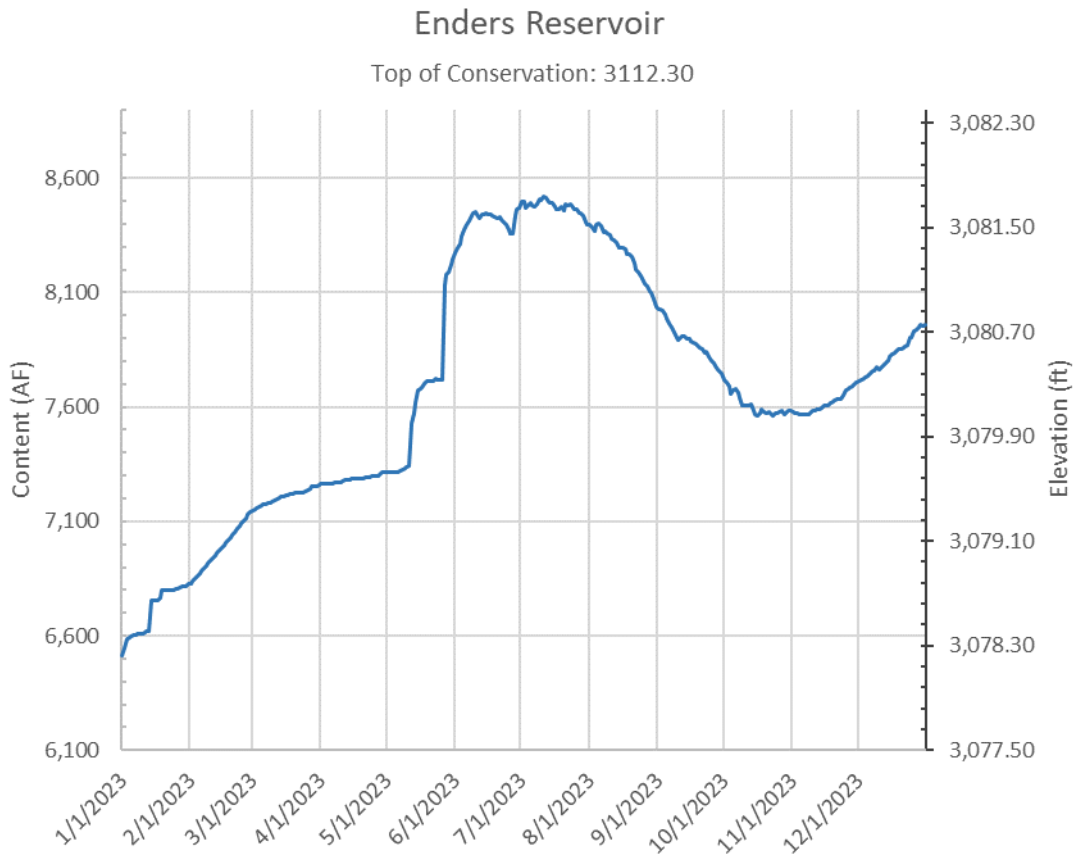


Figure 1.—Enders Reservoir elevation and content.

2024 Outlook

The fall and early winter inflows into Enders Reservoir were near the dry-year forecast. If dry-year conditions prevail, the project water supply is expected to experience a shortage of approximately 79,300 AF. Normal-year conditions are expected to be inadequate by 63,100 AF, and wet-year conditions by 32,900 AF, to irrigate the 9,292 acres in the Frenchman Valley Irrigation District.

The Frenchman Valley Irrigation District is investigating possible alternatives for the most efficient use of the declining water supply in the basin.

Meeker-Driftwood, Red Willow, and Cambridge Units, Frenchman-Cambridge Division in Nebraska

General

Service is provided for Frenchman-Cambridge Irrigation District by Meeker-Driftwood Canal to 16,691 acres; Red Willow Canal to 4,643 acres; Bartley Canal to 6,130 acres; and Cambridge Canal to 18,205 acres. The water supply for these lands is provided by storage in Swanson, Hugh Butler, and Harry Strunk Lakes, and inflows of the Republican River and Red Willow and Medicine Creeks. The Frenchman-Cambridge Irrigation District has replaced all open ditch laterals that were economically feasible with buried pipe which has significantly increased both systems and on-farm efficiencies.

2023 Summary

The annual precipitation total of 25.17 inches at Trenton Dam was 124 percent of normal. The inflow of 42,263 AF to Swanson Lake was above the wet-year forecast and was the highest since 2015. The lake level began the year at elevation 2,727.58 feet (24.4 feet below the top of conservation) and gradually increased throughout the late winter and spring. Trenton dam reported 3.12 inches of precipitation on May 12. Runoff from this event raised the lake elevation approximately 2.7 feet in 13 days.

During the afternoon of May 25, slow moving, high precipitation thunderstorms formed in Eastern Colorado and moved northeast. As the storms continued into the evening hours, severe hail was reported along with heavy rain. Near midnight and into May 26, the storms slowed and began to back-build, which led to flooding in Southwest Nebraska throughout the early morning hours. In total, six to ten inches of rain was reported across Dundy, Hitchcock, and Red Willow counties in Nebraska.

Just after 11:30 PM on May 25, the first Flash Flood Warning was issued in Dundy County Nebraska. Over the next ten hours, numerous roads became flooded and subsequently closed, including Highway 34 from Benkelman to Trenton, and Highway 25 from Trenton to Highway 6. A train bridge west of Stratton was also damaged by the flooding and a road grader was found to be almost fully submerged. Much of the town of Stratton was completely submerged under the flood waters. Boats were deployed by rescue personnel to rescue residents. The United States Geological Survey (USGS) river gage at Stratton peaked at 12,200 ft³/s during the evening of May 26. This was the highest discharge recorded at the site since July 31, 1962. Runoff from the storm raised Swanson's lake elevation by approximately five feet in over the following four

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weeks. The reservoir gained approximately 14,600 AF directly from this runoff event and left the ground primed for runoff during precipitation events throughout the rest of the summer. The May inflow of 19,472 AF was the highest monthly inflow observed since April 1984.

The reservoir level decreased in the early fall and reached a fall low elevation of 2,737.55 feet on October 31. In late fall, inflows exceeded evaporation leading to the peak elevation occurring on December 31 at 2,738.64 feet (13.4 feet below the top of conservation). The district did not divert from Swanson Lake in 2023 due to low reservoir content at the beginning of the season. The peak and end of year elevation occurred on December 31 at 2,738.64 feet (13.4 feet below the top of conservation). A daily plot of the reservoir elevation is shown on figure 2.

In late February 2013, the Upper Republican Natural Resources District (URNRD) began operating the Rock Creek Augmentation Project. The augmentation water is pumped from the ground and diverted into Rock Creek. The water flows from Rock Creek into the North Fork of the Republican River at Parks, Nebraska. From there the water travels approximately 35 miles to Swanson Lake. The URNRD did not pump water into Rock Creek in 2023.

The Republican River Water Conservation District (RRWCD) built and completed the Colorado Compliance Pipeline in April 2014. The augmentation water is pumped from the ground and flows approximately eight to fifteen miles south to the North Fork of the Republican River just above the Colorado-Nebraska state line. The water then travels approximately 55 miles to Swanson Lake. The RRWCD pumped water in the spring of 2023 and late fall of 2023 for compact compliance.

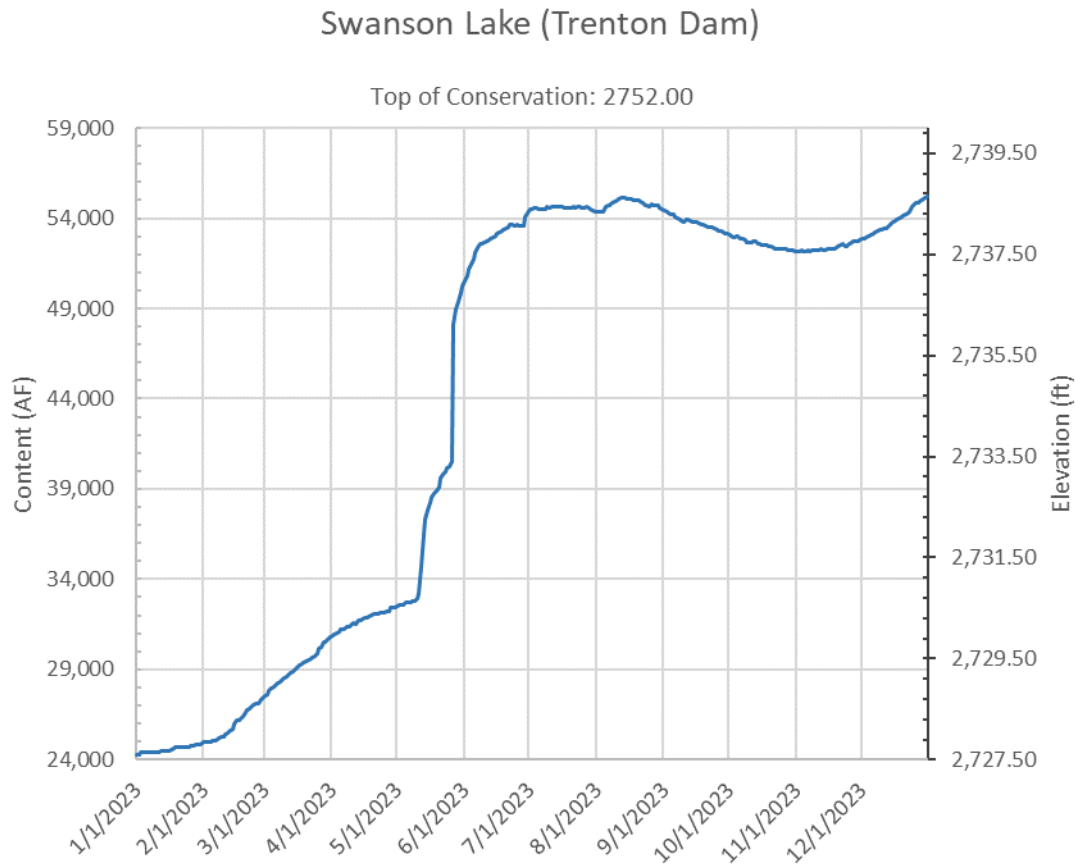


Figure 2.—Swanson Lake elevation and content.

The annual precipitation total at Red Willow Dam was 28.44 inches (143 percent of normal) and was the third highest annual total recorded. The annual inflow of 9,867 AF into Hugh Butler Lake was between dry-year and normal year forecast. The reservoir level at the first of the year was 2,560.72 feet (21.1 feet below the top of conservation). Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2,567.31 feet on August 9. The May precipitation total of 10.42 inches was the highest monthly total observed since closure. May inflow of 3,578 AF was also the largest monthly inflow observed since 2010. Due to a low reservoir content at the beginning of the year the district did not make releases for Red Willow Canal. Late summer and early fall inflow exceeded evaporation, increasing the lake level to an end of year elevation of 2,566.63 feet (15.2 feet below top of conservation). Bartley Canal diverted 7,099 AF of natural flow in 2023. A daily plot of the reservoir elevation is shown on figure 3.

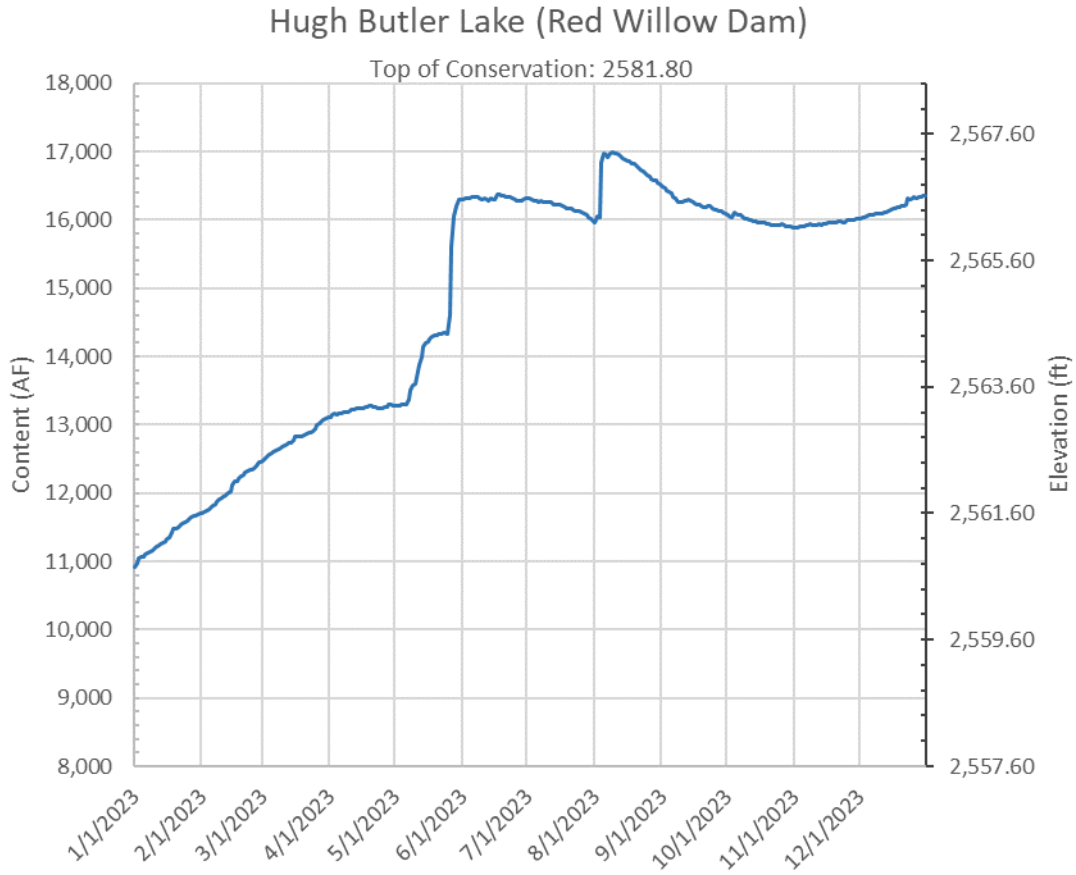


Figure 3.—Hugh Butler Lake elevation and content.

The annual precipitation total of 23.00 inches at Medicine Creek Dam was 109 percent of normal. The inflow of 31,441 AF was between the dry-year and average forecast. The reservoir level at the beginning of the year was 2,355.31 feet (10.8 feet below the top of conservation). The reservoir did not fill in 2023 for the first time since 2013. Irrigation releases started June 25. The reservoir level peaked at elevation 2,365.91 feet on June 25. A daily plot of the reservoir elevation is shown on figure 4.

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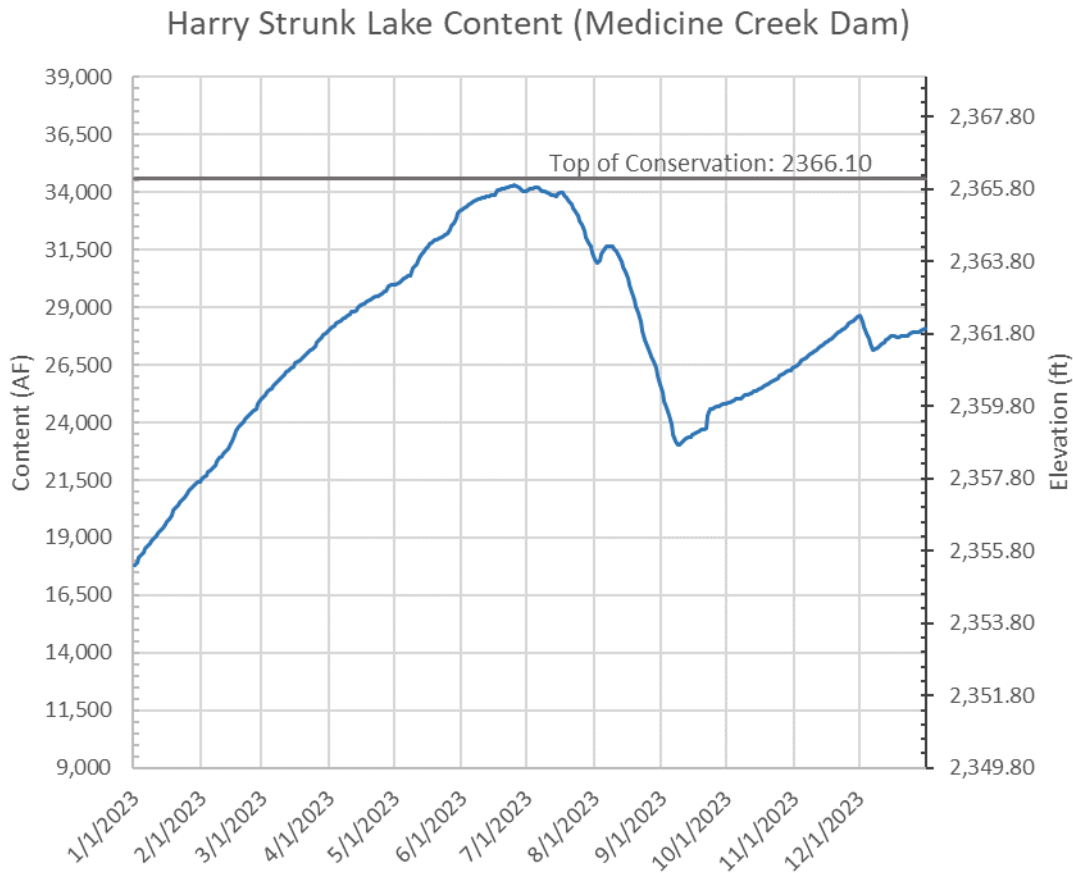


Figure 4.—Harry Strunk Lake elevation and content.

The district diverted 22,285 AF into Cambridge Canal and delivered 10,241 AF to 13,311 acres of district lands (a delivery efficiency of 46 percent). The end of year elevation was 2,361.96 feet at the end of the year (4.1 feet below the top of conservation).

The Nebraska Cooperative Republican Platte Enhancement Project (N-CORPE) is an interlocal agency formed by the Upper Republican Natural Resources District (URNRD), the Middle Republican Natural Resources District (MRNRD), the Lower Republican Natural Resources District (LRNRD), and the Twin Platte Natural Resources District. N-CORPE has constructed an augmentation project that pumps groundwater from Lincoln County into Medicine Creek. The delivery system consists of a 42-inch diameter pipe approximately 6 miles long. The pumped water enters at the source of Medicine Creek and travels approximately 57 stream miles to Harry Strunk Lake. The capacity of the project is approximately 87 cfs (63,000 AF annually). The augmentation project was not operated in 2023.

2024 Outlook

Forecasts show that carry-over storage, streamflow gains, plus reasonable minimum inflows for the three lakes supplying the Frenchman-Cambridge Irrigation District will be inadequate to meet the full dry-year irrigation requirement by 26,800 AF. The water supply will be adequate for the average and wet-year conditions.

Almena Unit, Kanaska Division in Kansas

General

Service is available to 5,764 acres in the Almena Irrigation District. The project water supply is provided by Prairie Dog Creek flows and Keith Sebelius Lake storage.

The water service contract for the City of Norton, Kansas provides for a maximum annual use of 1,600 AF from Keith Sebelius Lake.

In 2017, the Almena Irrigation District and the Norton County Community Foundation, Inc. entered into a MOA to maintain a minimum pool elevation in Keith Sebelius Lake through December 31, 2027. The MOA was approved by the irrigators within the district and provided that no water would be released for irrigation below elevation 2,288.5 feet (10,126 AF.)

On November 22, 2019, the district executed an amendment to their contract which changed the irrigation season start date from May 1 to February 1.

2023 Summary

The annual precipitation at Norton Dam totaled 28.81 inches, which is 115 percent of normal. The total inflow of 10,750 AF was between the dry and average year forecast. The reservoir elevation was 2,290.62 feet (13.7 feet below the top of conservation) at the first of the year. Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2,294.91 feet on September 24. Irrigation releases were not made in 2023. Inflows in December exceeded evaporation, gradually filling the reservoir to the end-of-year elevation of 2,294.55 feet (9.8 feet below the top of conservation). A daily plot of the reservoir elevation is shown on figure 5.

The city of Norton used 362 AF of municipal water during 2023.

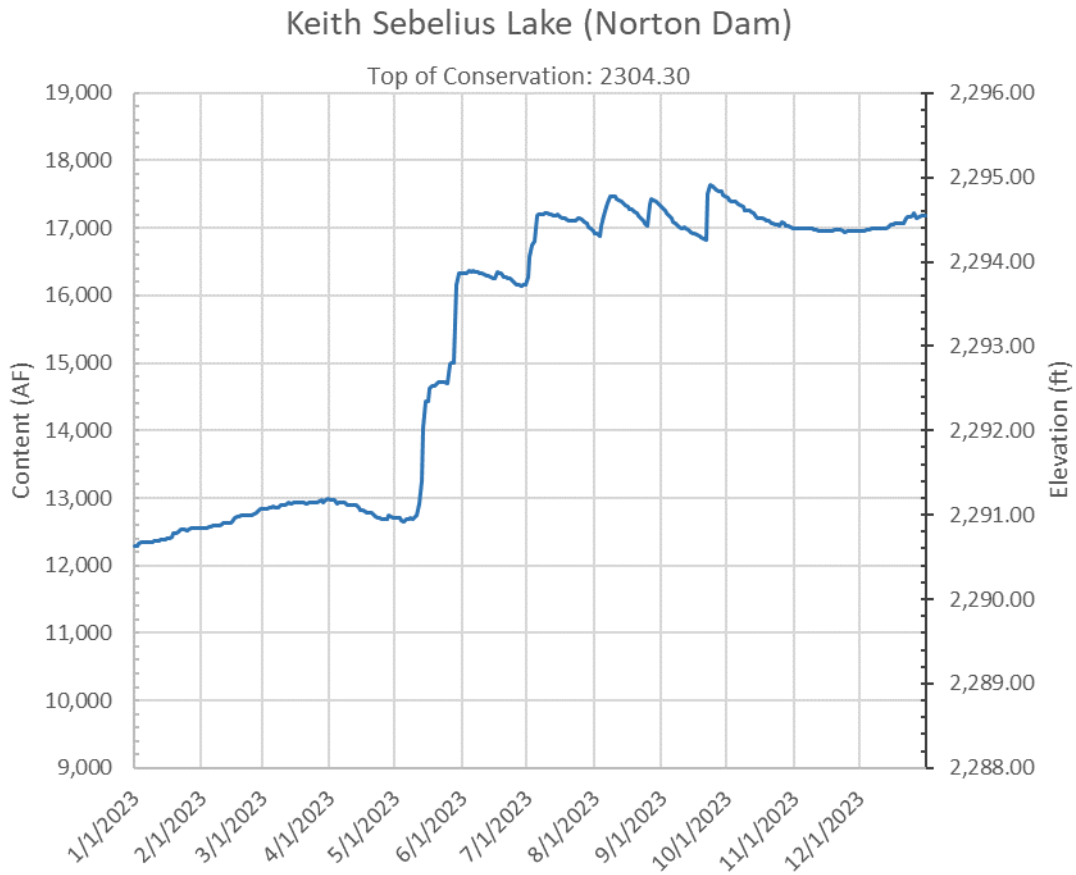


Figure 5.—Keith Sebelius Lake elevation and content.

2024 Outlook

If 2024 is a dry year without significant runoff producing storms above Keith Sebelius Lake, it is anticipated that the water supply may be inadequate by as much as 16,500 AF. If normal inflow into the lake and normal rainfall over the irrigated area occur in 2024, a shortage of 10,900 AF may be experienced. The water supply will be adequate under wet-year conditions. Requirements for the city of Norton will be met in full in 2024.

Franklin, Superior-Courtland, and Courtland Units, Bostwick Division in Nebraska and Kansas

General

Harlan County Lake storage and Republican River flows provide a project water supply for 22,455 acres in the Bostwick Irrigation District in Nebraska, and 13,378 acres in the Kansas Bostwick Irrigation District No. 2 (KBID) above Lovewell Reservoir. Storage and natural flows, together with White Rock Creek flows and Lovewell Reservoir storage, furnish a water supply for 29,122 acres below Lovewell Reservoir in the KBID.

The lands in the Franklin and Superior-Courtland Units are in the Bostwick Irrigation District in Nebraska. The lands in the Courtland Unit downstream of the Kansas state line are in the KBID.

In accordance with the off-season flow alternative outlined in Reclamation's final environmental assessment dated December 16, 1983, and amended on November 21, 2002, Harlan County Lake releases will be ten ft³/s during the months of December, January, and February, except when the reservoir is at low levels. During water-short year releases for these three months will be either zero or five ft³/s depending on reservoir levels.

Natural gain in streamflow, plus irrigation return flows, and operational bypass at Superior-Courtland Diversion Dam will provide some flow downstream.

The KDWP has requested that the KBID and Reclamation maintain, when possible, a flow of 20 ft³/s into Lovewell Reservoir when the Courtland Canal is in operation and the conservation pool is below capacity. This recommended inflow provides excellent fishing around the canal inlet to the reservoir. The seepage below Lovewell Dam into White Rock Creek maintains a small live stream throughout the year.

Bostwick Division – Harlan County Lake Operations - 2023 Summary

The annual precipitation at Harlan County Dam totaled 28.30 inches of rainfall, which is 121 percent of normal. The 2023 inflow of 95,417 AF was between the minimum and average-year forecast. Harlan County Lake began 2023 at 1,938.50 feet (7.2 feet below the top of conservation).

The conservation pool did not fill in 2023 but did peak at 1,941.31 feet (4.4 feet below top of conservation) on June 8. The conservation pool was split on May 30 as irrigation releases began. Irrigation releases from Harlan County Lake into Franklin and Naponee Canals totaled 20,672 AF. The end of year elevation was 1,937.98 feet (7.8 feet below the top of conservation). A plot of the reservoir elevation is shown on figure 6.

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On December 21, 2018, Bostwick Irrigation District in Nebraska and KBID amended their original “Memorandum of Agreement” dated October 4, 2000, to modify Harlan County Lake accounting procedures for a period of three years. In the agreement, account balances of the districts carry-over from year to year and inflows are apportioned based on target account balances. This agreement expired at the end of 2021. On March 3, 2022, a new perpetual agreement based on the 2018 agreement, was signed.

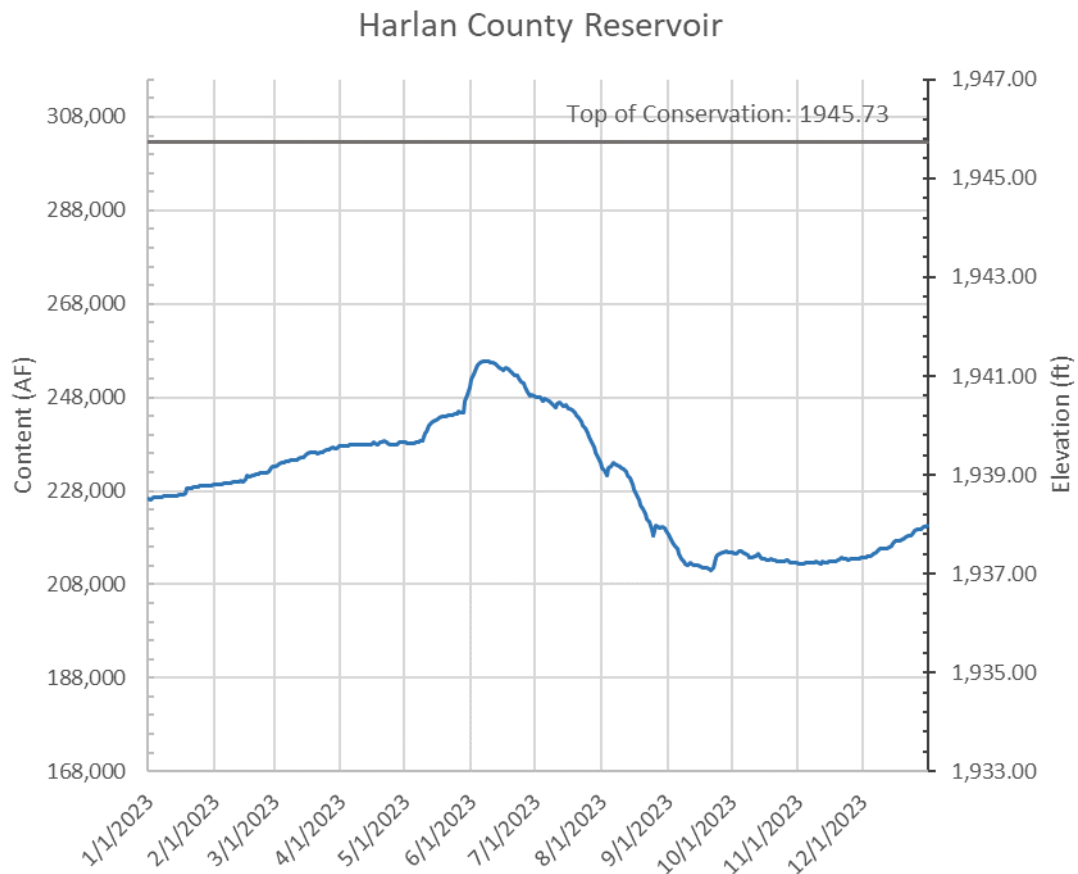


Figure 6.—Harlan County Lake elevation and content.

Harlan County Lake prevented \$1,800 of downstream flood damages during 2023, according to the USACE.

Approximately 43,624 AF was delivered to Lovewell Reservoir via the Courtland Canal during 2023. This accounted for approximately 84 percent of the total Lovewell Reservoir inflow.

Bostwick Division – Nebraska - 2023 Summary

In 2023 irrigation diversions were made into Franklin, Naponee, Franklin Pump, Superior, and Courtland Canals in Nebraska. The district diverted 34,500 AF of water for approximately 19,688 acres, The district delivered 11,642 AF to the farm head gates (34 percent delivery efficiency).

Bostwick Division – Kansas - 2023 Summary

The 2023 precipitation at Lovewell Dam totaled 25.10 inches, 90 percent of normal. The total annual inflow recorded at Lovewell Reservoir was 51,628 AF. Approximately 8,004 AF of the inflow was from White Rock Creek, which was below dry-year forecast. The reservoir elevation at the beginning of 2023 was 1,578.59 feet (4.0 foot below top of conservation). Rains in late May and June raised the lake elevation to a yearly peak of 1,583.45 (0.9 feet above top of conservation). All flood water accumulations were utilized for irrigation. Irrigation releases for canal seasoning/flushing began May 30 with releases in earnest starting mid-June and continuing until September 16. Irrigation releases lowered the lake to an annual low of 1,574.70 (7.9 feet below conservation) on September 15. Republican River flow was diverted via the Courtland Canal into Lovewell Reservoir after the irrigation season. The pool level at the end of the year was 1,580.13 feet (2.5 foot below top of conservation). A plot of the reservoir elevation is shown on figure 7.

KBID diverted a total of 56,340 AF to serve 12,342 acres above Lovewell Dam and 28,046 acres below Lovewell Dam. District farm delivery totaled 39,322 AF (efficiency of 70 percent). Lovewell Reservoir did not prevent any downstream flood damages during 2023 according to the Corps of Engineers.

In 2022, KBID completed automation of the Courtland Canal from Guide Rock Diversion Dam to Lovewell Reservoir. This allows the district to minimize bypass at the diversion dam while also taking advantage of additional flow in the Republican River during runoff events.

Bostwick Division – 2024 Outlook

The storage in Harlan County Lake is expected to be inadequate in meeting the full dry-year irrigation requirement by 6,700 AF. Lovewell Reservoir and flows of the Republican River and White Rock Creek are expected to be adequate in meeting the full dry-year irrigation requirement. The water supply will be adequate under normal-year and wet-year conditions.

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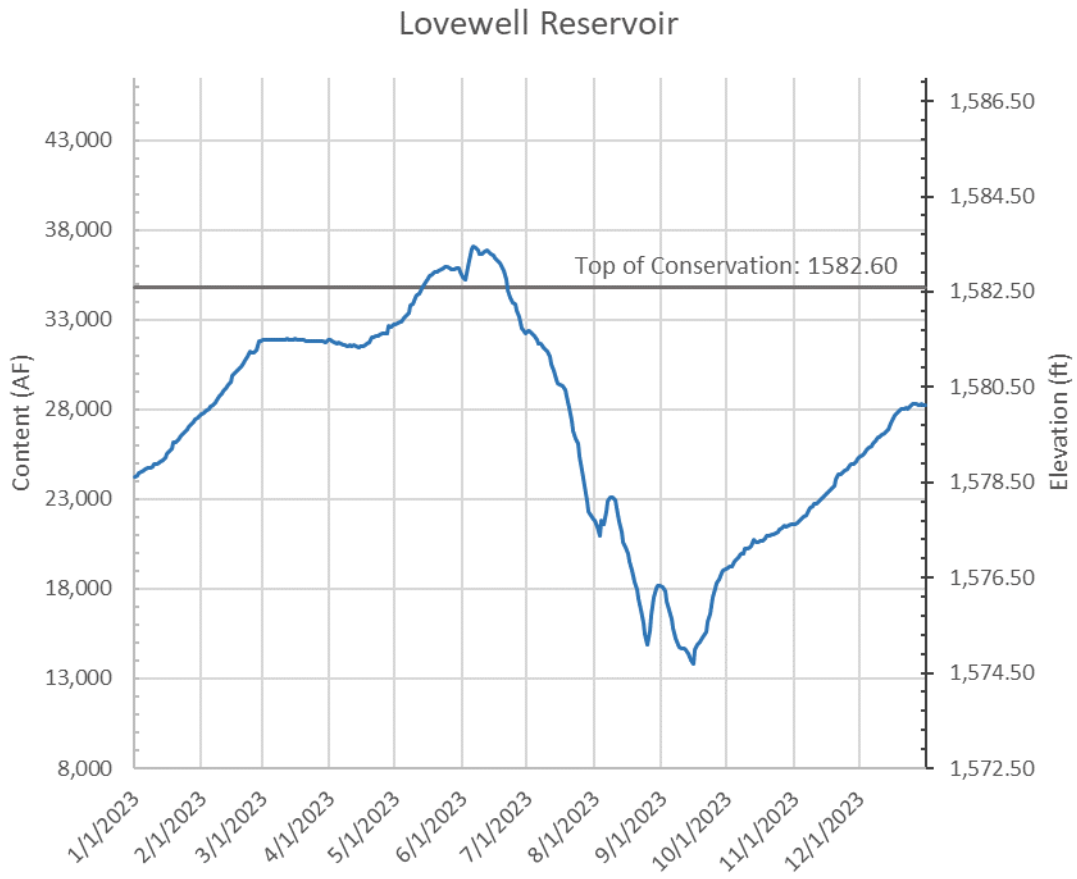


Figure 7.—Lovewell Reservoir elevation and content.

Chapter IV – Smoky Hill River Basin

Kirwin Unit, Solomon Division in Kansas

General

The water supply for the 11,465 acres of land in the Kirwin Irrigation District is furnished by Kirwin Reservoir storage and inflows from the North Fork Solomon River and Bow Creek.

The operation of Kirwin Dam and Reservoir affords many opportunities for recreation, fishing, hunting, fish spawning and preservation of waterfowl species.

The USFWS has completed the Kirwin National Wildlife Refuge Comprehensive Conservation Plan (CCP). The 1997 National Refuge System Improvement Act required the Service to develop a CCP for each of its refuges. The Kirwin Refuge CCP will guide the refuge management activities through 2025.

2023 Summary

The annual precipitation total of 24.10 inches at Kirwin Dam was 101 percent of normal. The inflow of 17,777 AF was between the dry and average-year forecast. The reservoir level was 1,723.26 feet (6.0 feet below the top of conservation) at the first of the year. The reservoir peaked at elevation 1,724.33 feet on June 22. Irrigation started June 26 and continued through August 31. The reservoir level gradually decreased throughout the fall and early winter to a minimum elevation of 1,719.82 feet on November 18. The reservoir level increased as inflow exceeded evaporation to elevation 1,720.09 feet on December 31 (9.2 feet below the top of conservation). A daily plot of the reservoir elevation is shown on figure 8 on the following page.

A total of 16,067 AF was released into Kirwin Canal to irrigate 9,273 acres of project lands. Approximately 6,880 AF was delivered to farms (43 percent efficiency).

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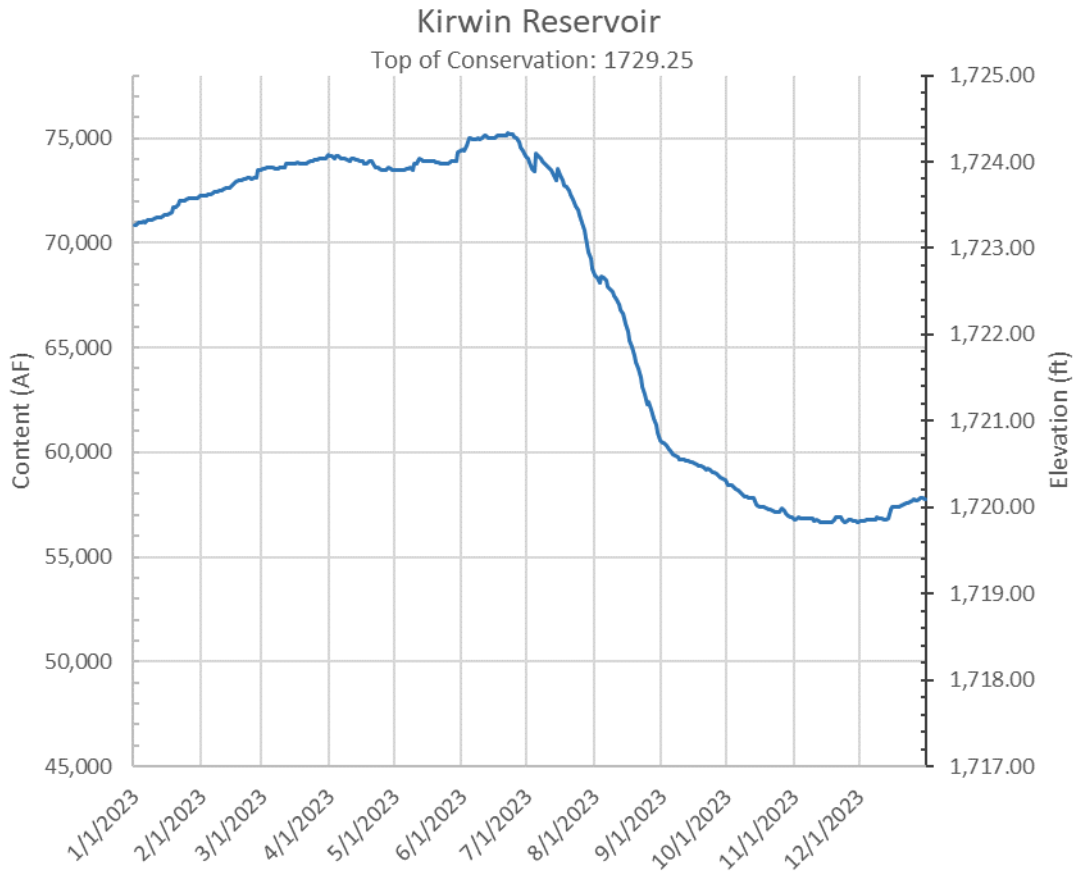


Figure 8.—Kirwin Reservoir elevation and content.

2024 Outlook

Carry-over storage and the forecasted inflows in the North Fork of the Solomon River are expected to be adequate to irrigate all district lands under all forecasted conditions.

Webster Unit, Solomon Division in Kansas

General

The Webster Irrigation District has service available to 8,537 acres. The project water supply is provided by Webster Reservoir storage and flows of the South Fork Solomon River.

2023 Summary

In 2023, the precipitation at Webster Dam was 85 percent of normal (20.39 inches). The inflow of 11,868 AF was between the dry and average-year forecast. The reservoir level was 1,882.57 feet (9.8 feet below the top of conservation pool) at the first of the year. The reservoir climbed a yearly peak of 1,884.08 feet (8.4 feet below top of conservation) on June 22. Irrigation releases started June 28 and continued until August 25.

The reservoir level gradually decreased throughout the fall to a minimum elevation of 1,876.64 feet on December 12. The reservoir level increased as inflow exceeded evaporation to elevation 1,876.77 feet on December 31 (15.7 feet below the top of conservation). A daily plot of the reservoir elevation is shown on figure 9 below.

A total of 10,655 AF was diverted into Osborne Canal to irrigate 5,710 acres of project lands. Farm delivery was 5,705 AF (54 percent efficiency).

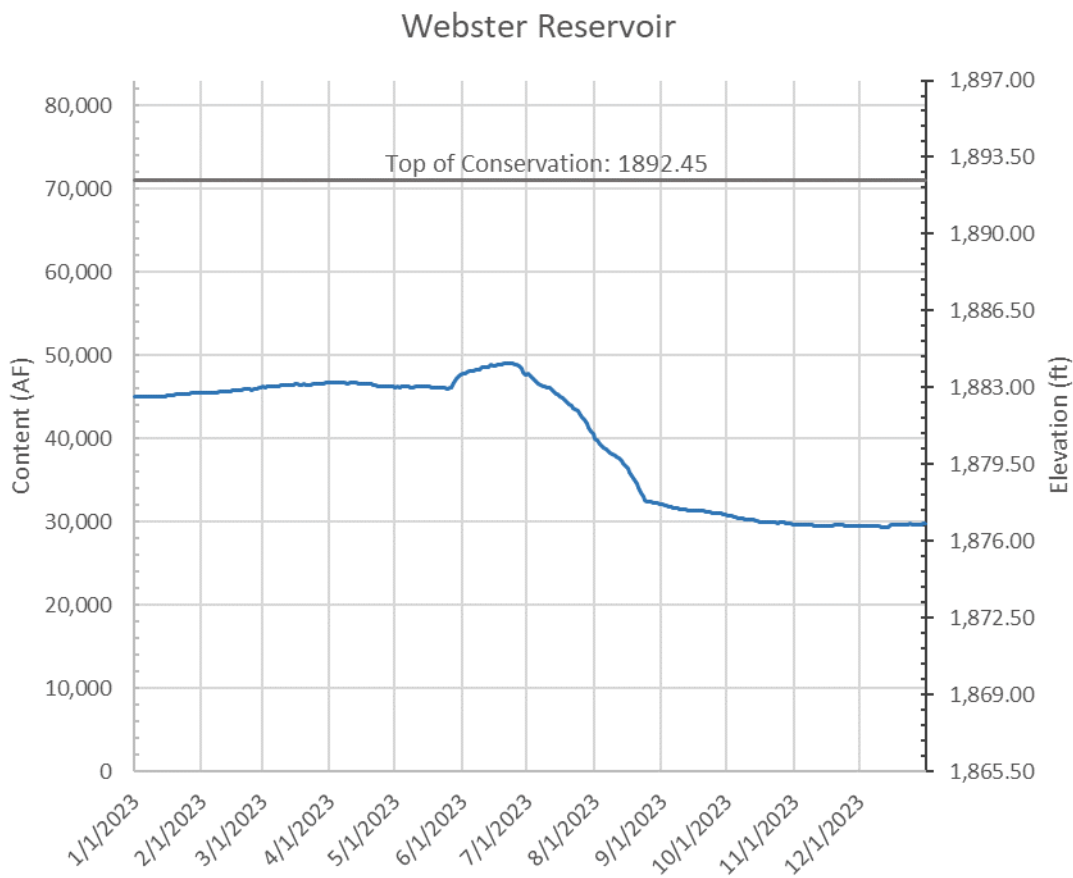


Figure 9.—Webster Reservoir elevation and content.

2024 Outlook

The carry-over storage and the flows in the South Fork Solomon River are expected to be inadequate in meeting the full dry-year irrigation requirement by 16,300 AF. Carry-over storage and natural flow are expected to be adequate to irrigate all district lands under the normal and wet-year forecasts.

Glen Elder Unit, Solomon Division in Kansas

General

Releases from Waconda Lake are regulated as outlined in two memorandums of understanding between the State of Kansas and Reclamation. Releases are made for the city of Beloit, the Mitchell County Rural Water District No. 2, the long-term water service contract with Glen Elder Irrigation District, and for water right administration.

Renewal of the long-term water service contract with the City of Beloit, Kansas was completed in 2008. The new repayment contract became effective on January 1, 2009. The repayment contract with Beloit, Kansas provides for the annual use of up to 2,000 AF from Waconda Lake storage. Water is measured at the Glen Elder Dam river outlet works.

The water service contract with the Mitchell County Rural Water District No. 2 provides for 1,009 AF of storage water as available from Waconda Lake.

The long-term water service contract with the Glen Elder Irrigation District was to expire in June 2017. A one-year extension was signed May 18, 2018. Renewal of a long-term water service contract was completed in March of 2019. The new service contract includes an upfront fee for a base 2,000 AF of water. They can request an additional 1,500 AF firm supply as needed. Additional water is available up to a total release of 15,170 AF at Reclamation's discretion. The contract's expiration date is March 12, 2059. Water is released and measured through the river outlet works.

When compatible with flood control operations the operating criteria for Waconda Lake provides for a stable or rising pool level during the fish spawning period each spring.

When possible, Waconda Lake is allowed to fill during the late summer and early fall to flood exposed shoreline vegetation. This flooded aquatic vegetation is very beneficial to waterfowl management.

Waconda Lake is normally regulated at one to two feet below the top of conservation capacity during the winter months. Maintaining the lake at this level reduces shoreline erosion, provides a

buffer for spring runoff, and lessens ice damage to the upstream face of Glen Elder Dam. Releases from Waconda Lake are regulated each year to maintain a constant water surface level while the lake is ice-covered. Extensive repairs to the soil cement occurred in 2022 and 2023.

2023 Summary

The annual precipitation total of 18.84 inches at Glen Elder Dam was 74 percent of normal. The inflow of 66,976 AF was between the dry and average-year forecast. The lake level at the beginning of the year was 1,450.27 feet (5.3 feet below the top of conservation). A release of 12 cfs was made throughout the spring for water quality bypass for the city of Beloit. Releases for the Glen Elder Irrigation District began June 1 and concluded October 30. The reservoir peaked at elevation 1,451.12 feet (4.5 feet below top of conservation). Following the irrigation season a release of 15 cfs for the city of Beloit continued throughout the fall and winter.

Waconda Lake ended the year at elevation 1,450.38 feet (5.2 feet above the top of conservation). Glen Elder Dam prevented \$31,200 of downstream flood damages during 2023 according to the Corps of Engineers.

Glen Elder Irrigation District irrigated 6,605 acres with natural flow releases of 14,635 AF. Approximately 1,132 AF was released from the district's storage account. The district delivered 3,527 AF to the farms (delivery efficiency of 22 percent.) No storage releases were necessary for the City of Beloit. Releases to the Mitchell County Rural Water District No. 2 totaled 420 AF. A daily plot of the reservoir elevation is shown on figure 10.

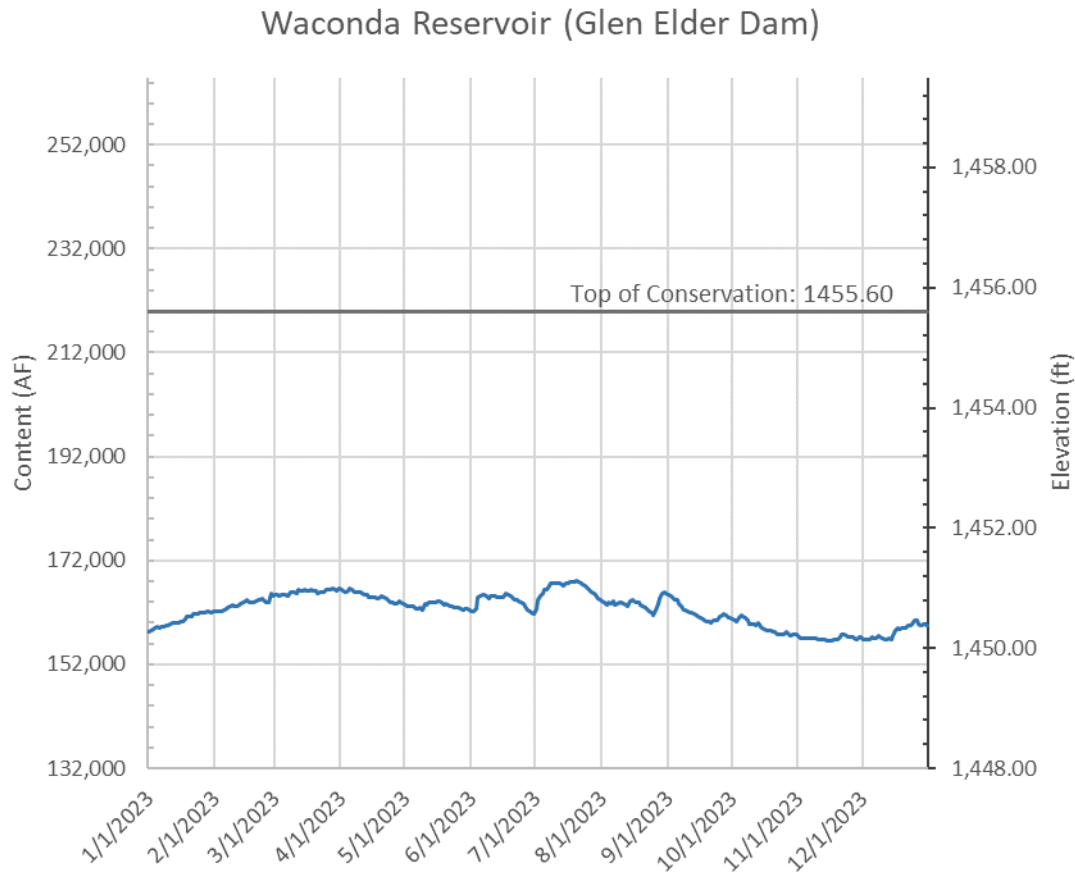


Figure 10.—Waconda Lake elevation and content.

2024 Outlook

The municipal requirement of Beloit and the requirements of the Mitchell County Rural Water District No. 2 will be met in full releases as required from Waconda Lake. It is expected that the Kansas Water Commissioner will request that inflows be passed through the lake for water right administration. The storage in Waconda Lake and flows in the North and South Forks of the Solomon River will furnish a full water supply to the Glen Elder Irrigation District. The reservoir will be regulated to maintain a constant level during the winter months when the reservoir is ice-covered to minimize ice damage. Under normal-year conditions the lake is expected to be maintained, during the winter, between one and two feet below the top of the conservation pool.

Cedar Bluff Unit, Smoky Hill Division in Kansas

General

Cedar Bluff Reservoir storage furnishes a maximum supply of 2,000 AF each year for the City of Russell, Kansas when required. Prior to 1993 Cedar Bluff Reservoir storage and Smoky Hill River flows had provided a water supply for 6,800 acres in the Cedar Bluff Irrigation District. Reformulation of the Cedar Bluff Unit in October 1992 resulted in the dissolution of the Cedar Bluff Irrigation District with the Kansas Water Office and Kansas Department of Wildlife and Parks acquiring the use and control of portions of the reservoir conservation capacity. A "designated operating pool" was established for Cedar Bluff Reservoir and includes the following sub allocation pools: The City of Russell's existing water storage right which remained unchanged (2,700 AF); an artificial recharge pool under control of the Kansas Water Office (5,110 AF); and a fish, wildlife, and recreation pool under control of the KDWP (21,061 AF). A "joint-use pool" has been established between the operating pool and the flood control pool for water supply, flood control, environmental and fish, wildlife, and recreation purposes. Water rights for the "joint-use pool" are held jointly between the KDWP and the Kansas Water Office. A Contract Administration Memorandum between the United States of America, represented by Reclamation, the State of Kansas, and the City of Russell was signed in November/December of 2003, establishing an accounting procedure for water storage in Cedar Bluff Reservoir. In January 2006 a Memorandum of Understanding was signed by the State of Kansas agencies, Kansas Water Office, and Kansas Department of Wildlife and Parks. The KDWP will be responsible for the joint pool releases and for the water rights.

2023 Summary

The annual precipitation total at Cedar Bluff Dam was 19.43 inches which is 91 percent of normal. The 2023 inflow of 7,955 AF was between the dry-year and average-year forecast. The reservoir level at the beginning of the year was 2,127.42 feet (16.60 feet below the top of conservation). For most of the year, evaporation exceeded inflow and the reservoir declined to a yearly low elevation of 2,124.54 feet on December 12 (19.5 feet below the top of conservation). The end of year elevation was 2,124.62 feet (19.4 feet below the top of conservation). A plot of Cedar Bluff Reservoir daily elevation and content is shown on figure 11.

Water was not released from the reservoir for the City of Russell or the Kansas Water Office in 2023. The State of Kansas operates and maintains the fish hatchery facility located below Cedar Bluff Dam. There were no releases to the facility in 2023.

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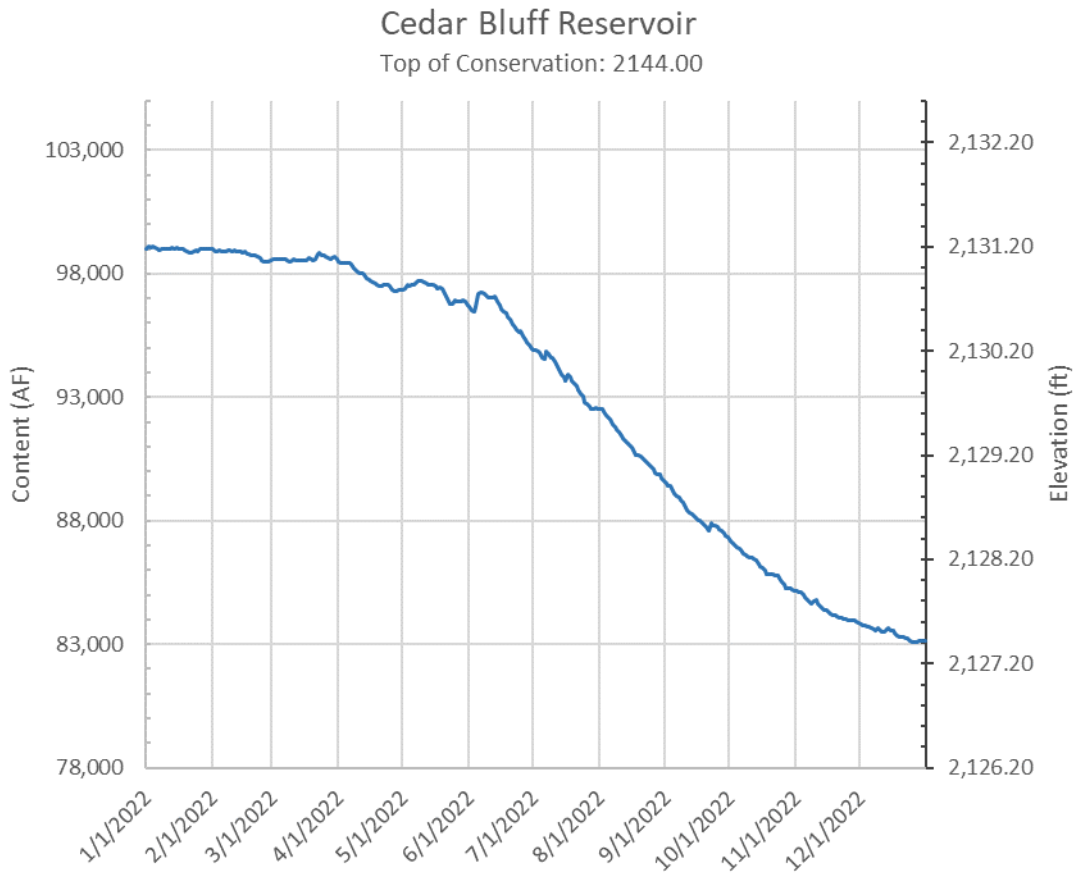


Figure 11.—Cedar Bluff Reservoir elevation and content.

2024 Outlook

Storage in Cedar Bluff Reservoir on December 31, 2023 was within the joint use pool. The KDWP is expected to use very little, if any, water for the operations of the fish hatchery facility. If conditions are dry, the City of Russell and the Kansas Water Office may request a release to the river for recharge in 2024.

Appendix A

Tables

Table A-1.—Reservoir Data – Niobrara, Lower Platte, and Kansas River Basins

Reservoir	Top of dead pool		Top of inactive		Top of conservation		Top of flood pool	
	Elevation	Capacity (AF)	Elevation	Capacity (AF)	Elevation	Capacity (AF)	Elevation	Capacity (AF)
BONNY	3,635.5	0	3,638.0	0	3,672.0	36,508	3,710.0	165,328
SWANSON	2,710.0	1,027	2,720.0	10,329	2,752.0	110,175	2,773.0	244,362
ENDERS	3,080.0	7,516	3,082.4	8,948	3,112.3	42,910	3,127.0	72,958
HUGH BUTLER	2,552.0	5,185	2,558.0	8,921	2,581.8	36,224	2,604.9	85,070
HARRY STRUNK	2,335.0	3,408	2,343.0	7,897	2,366.1	34,647	2,386.2	87,361
KEITH SEBELIUS	2,275.0	1,636	2,280.4	3,993	2,304.3	34,510	2,331.4	133,740
HARLAN COUNTY	1,885.0	0	1,927.0	118,099	1,945.73	314,111	1,973.5	814,111
LOVEWELL	1,562.07	860	1,571.7	10,248	1,582.6	34,888	1,595.3	85,527
KIRWIN	1,693.0	4,969	1,697.0	8,515	1,729.25	98,154	1,757.3	313,290
WEBSTER	1,855.5	1,256	1,860.0	4,231	1,892.45	76,157	1,923.7	259,510
CEDAR BLUFF	2,090.0	4,402	2,107.8	28,574	2,144.0	172,452	2,166.0	364,342
WACONDA	1,407.8	248	1,428.0	26,237	1,455.6	219,420	1,488.3	942,408
BOX BUTTE	3,969.0	188	3,979.0	2,392	4,007.0	29,161	No Flood Pool	
MERRITT	2,875.0	774	2,896.0	4,662	2,946.0	66,726	No Flood Pool	
CALAMUS	2,185.0	35	2,213.3	20,150	2,244.0	119,469	No Flood Pool	
DAVIS CREEK	1,998.5	76	2,003.0	172	2,076.0	31,158	No Flood Pool	

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Table A-2.—Summary of precipitation, reservoir storage and inflows, calendar year 2023

Reservoir	Total precip. (inches)	Percent of average	Storage 12-31-22	Storage 12-31-23	Gain or loss (AF)	Maximum content (AF)	Date	Minimum content (AF)	Date	Total inflow (AF)	Percent Of most probable
Box Butte	23.09	134	9,113	12,786	3,673	17,181	July 14	7,772	Sep. 9	19,911	129
Merritt	26.27	123	61,533	61,451	-82	66,523	July 9	49,035	Sep. 8	211,958	110
Calamus	26.31	104	96,605	100,936	4,331	121,663	May 15	55,832	Sep. 17	288,124	106
Davis Creek	32.31	124	12,838	13,643	806	30,043	July 11	11,996	Apr. 15	63,335	131
Bonny	21.34	120	0	0	0	0	N/A	0	N/A	1,659	34
Enders	22.70	118	6,545	7,948	1,403	8,539	July 11	6,550	Jan. 1	5,003	102
Swanson	25.17	124	24,473	55,612	31,139	55,612	Dec. 31	24,495	Jan. 1	42,263	170
Hugh Butler	28.44	143	10,986	16,306	5,320	16,995	Aug. 9	11,002	Jan. 1	9,867	99
Harry Strunk	23.00	109	19,165	27,835	8,670	34,298	June 25	19,257	Jan. 1	31,441	78
Keith Sebelius	28.81	115	12,322	17,260	4,938	17,767	Sep. 23	12,334	Jan. 1	10,750	165
Harlan County	28.30	121	225,470	219,693	-5,777	258,197	June 7	209,935	Sep. 21	95,417	92
Lovewell	25.10	90	23,703	27,797	4094	37,463	June 6	15,243	Sep. 15	51,628	105
Kirwin	24.10	101	70,612	58,237	-12,375	75,125	June 22	57,252	Nov. 18	17,777	59

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Reservoir	Total precip. (inches)	Percent of average	Storage 12-31-22	Storage 12-31-23	Gain or loss (AF)	Maximum content (AF)	Date	Minimum content (AF)	Date	Total inflow (AF)	Percent Of most probable
Webster	20.39	85	44,193	30,064	-14,129	48,425	June 22	29,783	Dec. 12	11,868	61
Waconda	18.84	74	159,307	160,397	1,090	167,901	July 20	157,829	Nov. 14	66,976	47
Cedar Bluff	19.43	91	83,230	72,874	-10,356	83,464	Jan. 22	72,594	Dec. 12	7,955	70

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Table A-3.—Acreage irrigated in 2023 and projections for 2024

Irrigation district and canal	Acres with service available	Acres irrigated in 2023	Estimated acres to be irrigated in 2024
Mirage Flats Irrigation District			
Mirage Flats Canal	11,662	10,865	10,500
Ainsworth Irrigation District			
Ainsworth Canal	35,000	34,640	34,600
Twin Loups Irrigation District			
Above Davis Creek	34,748	34,688	34,500
Below Davis Creek	21,380	21,422	21,000
Total Twin Loups Irrigation District	56,128	56,110	55,500
Frenchman Valley Irrigation District			
Culbertson Canal	9,292	0	0
Frenchman-Cambridge Irrigation District			
Meeker-Driftwood Canal	16,691	0	16,000
Red Willow Canal	4,643	0	2,500
Bartley Canal	6,130	2,492	2,400
Cambridge Canal	18,205	13,311	13,500
Total Frenchman-Cambridge Irrigation District	45,669	15,803	34,400
Almena Irrigation District			
Almena Canal	5,764	0	4,000
Bostwick Irrigation District in Nebraska			
Franklin Canal	11,031	10,277	10,000
Naponee Canal	1,607	824	800
Franklin Pump Canal	2,026	1,431	1,000
Superior Canal	6,056	5,788	5,500
Courtland Canal (Nebraska)	1,735	1,368	1,000
Total Bostwick Irrigation Dist. in Nebraska	22,455	19,688	18,300
Kansas-Bostwick Irrigation District			
Courtland Canal above Lovewell	13,378	12,342	12,000
Courtland Canal below Lovewell	29,122	28,046	28,000
Total Kansas-Bostwick Irrigation District	42,500	40,388	40,000
Kirwin Irrigation District			
Kirwin Canal	11,465	9,273	9,000
Webster Irrigation District			
Osborne Canal	8,537	5,710	5,700
Glen Elder Irrigation District	10,370	6,605	6,500
Total project uses	258,842	199,082	218,500

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Table A-4.—Water diverted in 2023 and estimated diversions in 2024

Irrigation district and canal	Start date	End date	10-year average diversion (AF)	2023 diversions (AF)	Estimated diversion in 2024 (AF)
Mirage Flats Irrigation District					
Mirage Flats Canal	7/16	9/12	12,365	10,775	10,000
Ainsworth Irrigation District					
Ainsworth Canal	5/22	9/18	68,141	64,993	65,000
Twin Loups Irrigation District					
Above Davis Creek	3/21	9/18	42,132	43,305	4,200
Below Davis Creek	4/18	9/18	44,141	53,125	48,000
Total Twin Loups Irrigation District			86,273	96,430	52,200
Frenchman Valley Irrigation District					
Culbertson Canal	N/A	N/A	5,200	0	0
Frenchman-Cambridge Irrigation District					
Meeker-Driftwood Canal	N/A	N/A	15,746	0	18,000
Red Willow Canal	N/A	N/A	2,161	0	5,000
Bartley Canal	4/15	9/8	6,554	7,099	6,000
Cambridge Canal	4/24	9/8	23,468	22,285	22,000
Total Frenchman-Cambridge Irrigation District			47,929	29,384	51,000
Almena Irrigation District					
Almena Canal	N/A	N/A	2,108	0	2,000
Bostwick Irrigation District in Nebraska					
Franklin Canal	6/12	9/8	17,815	19,810	18,000
Naponee Canal	7/10	9/6	1,109	862	1,000
Franklin Pump Canal	6/27	9/8	959	1,253	1,000
Superior Canal	6/1	9/8	7,184	11,708	8,000
Courtland Canal (Nebraska)	6/15	9/8	623	867	800
Total Bostwick Irrigation Dist. in Nebraska			27,690	34,500	28,800
Kansas-Bostwick Irrigation District					
Courtland Canal above Lovewell	1/1	12/18	18,743	17,566	20,000
Courtland Canal below Lovewell	5/30	9/16	32,067	38,774	36,000
Total Kansas-Bostwick Irrigation District			50,810	56,340	56,000
Kirwin Irrigation District					
Kirwin Canal	6/26	8/31	16,815	16,067	16,000
Webster Irrigation District					
Osborne Canal	6/28	8/25	7,909	10,655	10,000
Glen Elder Irrigation District	6/1	10/30	4,600	15,767	5,000
Total Project Diversions			329,840	334,911	296,000

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Table A-5.—Summary of 2023 operations - Mirage Flats Project

Box Butte Reservoir						Mirage Flats Canal	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Diversions to canal (AF)	Delivered to farms (AF)
Jan.	1,073	65	75	1.18	10,046	0	0
Feb.	964	65	99	0.57	10,846	0	0
Mar.	2,011	85	188	0.52	12,584	0	0
Apr.	2,187	91	332	0.68	14,348	0	0
May	1,929	115	423	2.68	15,739	0	0
June	1,581	137	555	5.14	16,628	0	0
July	756	3,701	599	2.64	13,084	3,780	951
Aug.	2,208	5,068	456	3.33	9,768	5,165	2,161
Sep.	2,282	3,269	289	3.14	8,492	1,830	849
Oct.	1,746	60	211	2.56	9,967	0	0
Nov.	1,618	60	127	0.34	11,398	0	0
Dec.	1,556	89	79	0.31	12,786	0	0
TOTAL	19,911	12,805	3,433	23.09	N/A	10,775	3,961

Note: Acres irrigated in 2023: Mirage Flats Canal - 10,865 acres

Table A-6.—Summary of 2023 operations - Sandhills Division, Ainsworth Unit

Merritt Reservoir						Ainsworth Canal	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Diverted to canal (AF)	Delivered to farms (AF)
Jan.	18,523	19,042	236	0.75	60,778	0	0
Feb.	16,705	15,461	299	0.39	61,723	0	0
Mar.	19,888	19,904	418	0.00	61,289	0	0
Apr.	16,720	15,918	694	0.86	61,397	0	0
May	19,618	13,666	1,145	3.95	66,204	2,258	300
June	16,787	15,789	1,345	3.98	65,857	11,027	2,893
July	19,414	22,780	1,094	4.53	61,397	16,344	6,280
Aug.	17,369	24,923	1,164	2.61	52,679	25,464	13,381
Sep.	16,899	10,096	1,109	4.40	58,373	9,900	6,416
Oct.	18,176	14,331	767	3.72	61,451	0	0
Nov.	15,366	14,777	453	0.49	61,587	0	0
Dec.	16,493	16,314	315	0.59	61,451	0	0
TOTAL	211,958	203,001	9,039	26.27	N/A	64,993	29,270

NOTE: Acres irrigated 2023: Ainsworth Canal - 34,640 acres

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Table A-7.—Summary of 2023 operations - North Loup Division

Calamus Reservoir							Above Davis Creek Mirdan Canal		
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Release to Calamus Fish Hatch. (AF)	Release to canal (AF)	Canal use (AF)	Delivered to farms (AF)
Jan.	23,278	11,953	437	2.16	107,493	0	0	0	0
Feb.	20,536	18,276	570	0.02	109,183	0	0	0	0
Mar.	26,309	19,731	1,035	0.60	114,726	11	0	0	0
Apr.	21,996	15,156	1,741	0.47	119,825	631	461	298	0
May	29,611	28,114	1,904	6.64	119,418	277	3,394	2,549	255
June	22,341	21,743	2,011	2.46	118,005	234	4,349	3,383	814
July	28,401	47,461	2,037	5.33	96,908	215	14,968	11,281	8,031
Aug.	23,312	48,586	1,896	0.69	69,738	381	20,060	17,061	13,034
Sep.	22,115	32,984	863	3.05	58,006	235	9,768	8,733	6,475
Oct.	25,805	15,559	946	3.36	67,306	60	0	0	0
Nov.	21,689	694	583	0.10	87,718	0	0	0	0
Dec.	22,731	9,132	381	1.43	100,936	0	0	0	0
TOTAL	288,124	269,389	14,404	26.31	N/A	2,044	53,000	43,305	28,609

NOTE: Acres irrigated 2023: Mirdan Canal - 34,688 acres

Table A-8.—Summary of 2023 operations - North Loup Division (continued)

Davis Creek Reservoir						Below Davis Creek Fullerton Canal	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Release to canal (AF)	Delivered to farms (AF)
Jan.	244	373	60	1.48	12,649	0	0
Feb.	229	319	74	0.55	12,485	0	0
Mar.	206	341	129	0.39	12,221	0	0
Apr.	5,762	1,342	231	0.56	16,410	946	0
May	13,921	5,716	238	4.99	24,377	4,838	173
June	14,775	8,866	453	4.76	29,833	7,645	2,351
July	12,272	15,036	522	7.35	26,547	14,037	7,652
Aug.	10,318	17,408	422	2.79	19,035	16,683	9,435
Sep.	4,716	9,137	180	2.21	14,434	8,976	4,460
Oct.	441	466	188	5.27	14,221	0	0
Nov.	237	424	101	0.76	13,933	0	0
Dec.	214	428	58	1.20	13,661	0	0
TOTAL	63,335	59,856	2,656	32.31	N/A	53,125	24,071

NOTE: Acres irrigated 2023: Fullerton Canal - 21,422 acres

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Table A-9.—Summary of 2023 Operations - Upper Republican Division, Arnel Unit

Bonny Reservoir						Hale Ditch
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Outflow (AF)
Jan.	123	123	0	0.67	0	0
Feb.	111	111	0	0.95	0	0
Mar.	123	123	0	0.47	0	0
Apr.	119	119	0	0.54	0	0
May	123	123	0	7.18	0	0
June	288	288	0	3.38	0	0
July	165	165	0	3.78	0	0
Aug.	123	123	0	2.81	0	0
Sep.	119	119	0	0.96	0	0
Oct.	123	123	0	0.18	0	0
Nov.	119	119	0	0.15	0	0
Dec.	123	123	0	0.27	0	0
TOTAL	1,659	1,659	0	21.34	0	0

Table A-10—Summary of 2023 Operations – Frenchman-Cambridge Division, Frenchman Unit

Enders Reservoir						Culbertson Canal	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Diverted to canal (AF)	Delivered to farms (AF)
Jan.	517	184	39	1.71	6,839	0	0
Feb.	508	167	43	0.38	7,137	0	0
Mar.	381	184	81	1.13	7,253	0	0
Apr.	344	119	170	0.23	7,308	0	0
May	1,294	123	235	9.38	8,244	0	0
June	584	119	224	2.83	8,485	0	0
July	330	123	286	2.37	8,406	0	0
Aug.	57	123	310	2.12	8,030	0	0
Sep.	97	119	275	0.61	7,733	0	0
Oct.	122	123	160	0.36	7,572	0	0
Nov.	334	119	94	0.32	7,693	0	0
Dec.	435	123	57	1.26	7,948	0	0
TOTAL	5,003	1,626	1,974	22.70	N/A	0	0

NOTE: Acres irrigated 2023: Culbertson Canal - 0 acres

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Table A-11.—Summary of 2023 operations – Frenchman-Cambridge Division, Meeker-Driftwood Unit

Swanson Lake						Meeker-Driftwood	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Release to canal (AF)	Delivered to farms (AF)
Jan.	796	61	167	1.35	25,041	0	0
Feb.	2,271	56	189	0.73	27,067	0	0
Mar.	3,392	61	357	1.00	30,041	0	0
Apr.	2,289	60	708	0.36	31,562	0	0
May	19,472	61	1,166	9.38	49,807	0	0
June	6,137	60	1,339	3.68	54,545	0	0
July	1,690	61	1,562	1.64	54,612	0	0
Aug.	1,632	61	1,405	3.48	54,778	0	0
Sep.	1	60	1,525	0.67	53,194	0	0
Oct.	0	61	1,112	1.08	52,021	0	0
Nov.	1,385	60	545	0.30	52,801	0	0
Dec.	3,198	61	326	1.50	55,612	0	0
TOTAL	42,263	723	10,401	25.17	N/A	0	0

NOTE: Acres irrigated 2023: Meeker-Driftwood Canal - 0 acres.

Table A-12.—Summary of 2023 Operations – Frenchman-Cambridge Division, Red Willow Unit

Hugh Butler Lake						Red Willow Canal		Bartley Canal	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Diverted to canal (AF)	Delivered to farms (AF)	Diverted to canal (AF)	Delivered to farms (AF)
Jan.	896	123	54	2.28	11,705	0	0	0	0
Feb.	868	111	64	1.28	12,398	0	0	0	0
Mar.	844	123	120	0.88	12,999	0	0	0	0
Apr.	563	119	267	0.35	13,176	0	0	824	128
May	3,578	123	385	10.42	16,246	0	0	1,402	155
June	556	119	427	4.11	16,256	0	0	1,542	170
July	286	123	519	1.85	15,900	0	0	1,587	663
Aug.	1,100	123	400	3.61	16,477	0	0	1,438	946
Sep.	0	119	339	1.13	16,019	0	0	306	120
Oct.	181	123	275	1.33	15,802	0	0	0	0
Nov.	414	119	158	0.25	15,939	0	0	0	0
Dec.	581	123	91	0.95	16,306	0	0	0	0
TOTAL	9,867	1,448	3,099	28.44	N/A	0	0	7,099	2,182

NOTE: Acres irrigated 2023: Red Willow Canal - 0 acres; Bartley Canal 2,492 acres.

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Table A-13.—Summary of 2023 operations – Frenchman-Cambridge Division, Cambridge Unit

Harry Strunk Lake						Cambridge Canal	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Diverted to canal (AF)	Delivered to farms (AF)
Jan.	3,062	61	81	1.66	22,085	0	0
Feb.	3,088	56	96	1.28	25,021	0	0
Mar.	2,962	61	189	0.67	27,733	0	0
Apr.	2,370	60	401	0.52	29,642	76	6
May	4,143	61	696	4.76	33,028	1,597	6
June	2,178	448	749	2.41	34,009	5,014	861
July	2,289	4,241	1,002	3.80	31,055	6,367	3,102
Aug.	2,637	7,387	669	4.02	25,636	7,276	5,257
Sep.	2,063	2,386	401	2.10	24,912	1,955	1,009
Oct.	1,775	61	377	0.70	26,249	0	0
Nov.	2,327	60	227	0.24	28,289	0	0
Dec.	2,547	2,872	129	0.84	27,835	0	0
TOTAL	31,441	17,754	5,017	23.00	N/A	22,285	10,241

NOTE: Acres irrigated 2023: Cambridge Canal 13,311 acres.

Table A-14.—Summary of 2023 operations - Kanaska Division, Almena Unit

Keith Sebelius Lake						Almena Canal		
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Release to city of norton (AF)	Diverted to canal (AF)	Delivered to farms (AF)
Jan.	375	52	75	1.23	12,570	22	0	0
Feb.	397	47	88	0.74	12,832	20	0	0
Mar.	351	50	163	0.11	12,970	19	0	0
Apr.	416	61	607	0.39	12,718	32	0	0
May	4,255	71	575	7.25	16,327	40	0	0
June	596	71	714	3.92	16,138	41	0	0
July	1,688	73	757	4.04	16,996	42	0	0
Aug.	1,219	76	711	5.45	17,428	45	0	0
Sep.	801	70	576	3.95	17,583	40	0	0
Oct.	0	60	472	0.93	17,051	29	0	0
Nov.	218	47	226	0.22	16,996	17	0	0
Dec.	434	46	124	0.58	17,260	15	0	0
TOTAL	10,750	724	5,088	28.81	N/A	362	0	0

NOTE: Acres irrigated 2023: Almena Canal 0 acres.

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Table A-15.—Summary of 2023 operations – Bostwick Division, Franklin Unit

Month	Harlan County Lake (USACE)					Franklin Canal		Naponee Canal	
	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Release to canal (AF)	Delivered to farms (AF)	Release to canal (AF)	Delivered to farms (AF)
Jan.	4,017	0	681	1.25	228,806	0	0	0	0
Feb.	4,772	0	710	0.84	232,868	0	0	0	0
Mar.	6,087	0	1,147	0.27	237,808	0	0	0	0
Apr.	3,586	0	2,896	0.70	238,498	0	0	0	0
May	16,911	266	3,224	5.88	251,919	0	0	0	0
June	17,044	16,037	3,387	3.03	249,539	3,826	456	0	0
July	11,798	22,862	4,688	4.99	233,787	8,116	2,027	383	95
Aug.	10,965	20,718	5,642	6.54	218,392	5,812	2,544	365	170
Sep.	6,319	5,185	5,687	2.77	213,839	2,056	1,396	114	62
Oct.	2,106	0	4,492	0.68	211,453	0	0	0	0
Nov.	3,521	0	2,436	0.22	212,538	0	0	0	0
Dec.	8,291	0	1,136	1.13	219,693	0	0	0	0
TOTAL	95,417	65,068	36,126	28.30	N/A	19,810	6,423	862	326

NOTE: Acres irrigated 2023: Franklin Canal - 10,277 acres; Naponee Canal - 824 acres.

Table A-16.—Summary of 2023 operations - Bostwick Division, Superior-Courtland Unit

Month	Franklin Pump Canal		Superior Canal		Courtland Canal - Above Lovewell				
	Diverted to canal (AF)	Delivered to farms (AF)	Diverted to canal (AF)	Delivered to farms (AF)	Total diversion (AF)	Nebraska use		Kansas use	
						Total use (AF)	Delivered to farms (AF)	Diverted to canal (AF)	Delivered to farms (AF)
Jan.	0	0	0	0	4,220	0	0	0	0
Feb.	0	0	0	0	5,032	0	0	0	0
Mar.	0	0	0	0	0	0	0	0	0
Apr.	0	0	0	0	2,871	0	0	0	0
May	0	0	0	0	5,384	0	0	0	0
June	27	8	3,730	402	10,930	170	134	4,417	2,355
July	584	177	3,974	1,570	13,934	324	295	6,663	4,908
Aug.	441	267	3,377	1,237	15,836	328	290	5,174	3,857
Sep.	201	148	627	322	7,830	45	43	1,312	975
Oct.	0	0	0	0	4,161	0	0	0	0
Nov.	0	0	0	0	4,416	0	0	0	0
Dec.	0	0	0	0	2,682	0	0	0	0
TOTAL	1,253	600	11,708	3,531	77,296	867	762	17,566	12,095

NOTE: Acres irrigated 2023: Courtland Canal-Nebraska - 1,368 acres; Kansas - 12,342 acres; Franklin Pump Canal - 1,431 acres; Superior - 5,788 acres.

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Table A-17.—Summary of 2023 operations - Bostwick Division, Courtland Unit

Lovewell Reservoir								Courtland (below)	
Month	Est. flow from White Rock Creek (FB)	Inflow from Courtland 34.8 (AF)	Total inflow (AF)	Outflow (FB)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Release to canal (AF)	Delivered to farms (AF)
Jan.	619	3,001	3,620	12	148	1.09	27,163	0	0
Feb.	587	4,012	4,599	11	198	0.93	31,553	0	0
Mar.	498	1	499	12	371	0.25	31,669	0	0
Apr.	281	1,801	2,082	12	1,203	0.92	32,536	0	0
May	846	3,716	4,562	155	1,096	2.78	35,847	381	0
June	2,315	3,571	5,886	8,283	1,406	4.75	32,044	8,431	4,594
July	0	5,170	5,013	14,198	1,203	1.39	21,656	14,255	11,378
Aug.	1,374	8,103	9,477	11,421	1,201	5.06	18,511	11,271	8,151
Sep.	718	5,402	6,120	4,552	836	3.80	19,243	4,436	3,104
Oct.	0	3,006	2,770	12	602	1.17	21,399	0	0
Nov.	276	3,429	3,705	12	373	1.32	24,719	0	0
Dec.	883	2,412	3,295	12	205	1.64	27,797	0	0
TOTAL	8,004	43,624	51,628	38,692	8,842	25.10	N/A	38,774	27,227

NOTE: Acres irrigated 2023: Courtland Canal below Lovewell - 28,046 acres.

Table A-18.—Summary of 2023 operations – Solomon Division, Kirwin Unit

Kirwin Reservoir						Kirwin Canal	
Month	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Release to canal (AF)	Delivered to farms (AF)
Jan.	1,677	0	262	1.75	72,027	0	0
Feb.	1,657	0	351	0.70	73,333	0	0
Mar.	1,317	0	595	0.05	74,055	0	0
Apr.	871	0	1,593	0.54	73,333	0	0
May	2,747	0	1,855	3.28	74,225	0	0
June	2,366	702	1,919	2.33	73,970	823	57
July	3,457	6,930	1,935	6.66	68,562	7,093	2,609
Aug.	2,186	8,281	1,662	4.88	60,805	8,151	4,214
Sep.	-156	16	1,548	1.02	59,085	0	0
Oct.	1	0	1,616	0.58	57,470	0	0
Nov.	398	0	580	0.82	57,288	0	0
Dec.	1,256	0	307	1.49	58,237	0	0
TOTAL	17,777	15,929	14,223	24.10	N/A	16,067	6,880

NOTE: Acres irrigated 2023: Kirwin Canal - 9,273 acres.

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Table A-19.—Summary of 2023 operations - Solomon Division, Webster Unit

Month	Webster Reservoir					Osborne Canal	
	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	Diverted to canal (AF)	Delivered to farms (AF)
Jan.	651	0	185	1.20	44,659	0	0
Feb.	943	0	227	0.77	45,375	0	0
Mar.	1,020	0	409	0.03	45,986	0	0
Apr.	558	0	1,114	0.10	45,430	0	0
May	2,574	0	1,035	2.39	46,969	0	0
June	2,572	1,329	1,271	5.24	46,941	382	0
July	2,097	8,164	1,189	3.80	39,685	5,284	2,356
Aug.	863	7,039	1,392	2.74	32,117	4,989	3,349
Sep.	0	0	1,113	0.95	31,004	0	0
Oct.	0	0	983	0.65	30,021	0	0
Nov.	223	0	353	1.22	29,891	0	0
Dec.	367	0	194	1.30	30,064	0	0
TOTAL	11,868	16,532	9,465	20.39	--	10,655	5,705

NOTE: Acres irrigated 2023: Osborne Canal - 5,710 acres.

Table A-20.—Summary of 2023 operations - Solomon Division, Glen Elder Unit

Month	Waconda Lake					Outflow to River				
	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	City of Beloit		Irrig. district storage release (AF)	Other controlled releases (AF)	Release to Mitchell Co. RWD No. 2 (AF)
						Storage release (AF)	Quality bypass (AF)			
Jan.	4,749	769	588	0.84	162,699	0	738	0	0	31
Feb.	4,084	698	751	0.75	165,334	0	666	0	1	31
Mar.	3,518	773	1,415	0.05	166,664	0	738	0	0	35
Apr.	3,457	753	5,356	0.34	164,012	0	714	0	0	40
May	5,205	864	5,453	2.13	162,900	0	821	0	0	43
June	11,287	3,160	5,795	3.73	165,232	0	0	442	2,678	40
July	10,070	5,111	5,571	3.06	164,620	0	0	75	4,997	39
Aug.	13,018	5,146	6,750	3.90	165,742	0	0	613	4,494	39
Sep.	3,921	3,200	4,769	1.18	161,694	0	0	2	3,160	38
Oct.	1,884	985	3,780	0.60	158,813	0	922	0	30	33
Nov.	2,078	920	1,552	0.94	158,419	0	893	0	0	28
Dec.	3,705	948	779	1.32	160,397	0	922	0	1	25
TOTAL	66,976	23,327	42,559	18.84	N/A	0	6,414	1,132	15,362	420

NOTE: Acres irrigated 2023: Glen Elder District 6,605 acres.

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Table A-21.—Summary of 2023 operations – Smoky Hill Division, Cedar Bluff Unit

Month	Cedar Bluff Reservoir					Release to:		
	Inflow (AF)	Outflow (AF)	Gross evap. (AF)	Precip. (inches)	End of month content (AF)	City of Russell (AF)	Fish Hatchery (AF)	Kansas Water Office (AF)
Jan.	181	0	298	0.65	83,113	0	0	0
Feb.	511	0	355	0.96	83,269	0	0	0
Mar.	2	0	663	0.09	82,608	0	0	0
Apr.	601	0	1,988	0.47	81,221	0	0	0
May	2,258	0	2,639	3.42	80,840	0	0	0
June	1,784	0	2,354	4.59	80,270	0	0	0
July	1,621	0	2,489	3.41	79,402	0	0	0
Aug.	599	0	2,495	2.43	77,506	0	0	0
Sep.	224	0	2,191	1.12	75,539	0	0	0
Oct.	0	0	1,890	0.75	73,649	0	0	0
Nov.	78	0	607	0.29	73,120	0	0	0
Dec.	96	0	342	1.25	72,874	0	0	0
TOTAL	7,955	0	18,311	19.43	N/A	0	0	0

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Table A-22.—Box Butte Reservoir operation estimates – 2024

Box Butte Reservoir Operation Estimates - 2024											
	Inflow		Evaporation		Release Requirement		Reservoir Spill	Shortage	End of Month		Reservoir Change
Month	cfs	KAF	IN.	KAF	cfs	KAF	KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	15	0.9	1.6	0.1	2	0.1	0.0	0.0	3,995.1	13.5	0.7
Feb.	18	1.0	1.9	0.1	2	0.1	0.0	0.0	3,995.9	14.3	0.8
Mar.	24	1.5	3.8	0.2	2	0.1	0.0	0.0	3,997.0	15.5	1.2
Apr.	22	1.3	5.4	0.4	2	0.1	0.0	0.0	3,997.7	16.3	0.8
May	16	1.0	6.6	0.5	2	0.1	0.0	0.0	3,998.0	16.7	0.4
June	10	0.6	8.8	0.6	89	5.3	0.0	0.0	3,993.1	11.4	-5.3
July	6	0.4	10.1	0.6	226	13.9	0.0	5.1	3,979.0	2.4	-9.0
Aug.	11	0.7	8.8	0.2	213	13.1	0.0	12.6	3,979.0	2.4	0.0
Sep.	12	0.7	6.6	0.1	40	2.4	0.0	1.8	3,979.0	2.4	0.0
Oct.	15	0.9	5.0	0.1	2	0.1	0.0	0.0	3,980.9	3.1	0.7
Nov.	18	1.1	2.5	0.1	2	0.1	0.0	0.0	3,982.5	4.0	0.9
Dec.	15	0.9	1.9	0.1	2	0.1	0.0	0.0	3,983.9	4.7	0.7
TOTAL	n/a	11.0	63.0	3.1	n/a	35.5	0.0	19.5	n/a	n/a	-8.1
Most probable inflow conditions											
Jan.	21	1.3	1.5	0.1	2	0.1	0.0	0.0	3,995.5	13.9	1.1
Feb.	27	1.5	1.8	0.1	2	0.1	0.0	0.0	3,996.7	15.2	1.3
Mar.	36	2.2	3.5	0.2	2	0.1	0.0	0.0	3,998.3	17.1	1.9
Apr.	30	1.8	5.0	0.4	2	0.1	0.0	0.0	3,999.4	18.4	1.3
May	24	1.5	6.1	0.4	2	0.1	0.0	0.0	4,000.2	19.4	1.0
June	13	0.8	8.2	0.6	70	4.2	0.0	0.0	3,996.9	15.4	-4.0
July	10	0.6	9.4	0.6	209	12.9	0.0	0.0	3,979.2	2.5	-12.9
Aug.	16	1.0	8.2	0.2	164	10.1	0.0	9.2	3,979.0	2.4	-0.1
Sep.	17	1.0	6.1	0.1	29	1.7	0.0	0.8	3,979.0	2.4	0.0
Oct.	21	1.3	4.7	0.1	2	0.1	0.0	0.0	3,981.5	3.5	1.1
Nov.	27	1.6	2.3	0.1	2	0.1	0.0	0.0	3,984.2	4.9	1.4
Dec.	21	1.3	1.8	0.1	2	0.1	0.0	0.0	3,986.1	6.0	1.1
TOTAL	n/a	15.9	58.6	3.0	n/a	29.7	0.0	10.0	n/a	n/a	-6.8
Reasonable maximum inflow conditions											
Jan.	31	1.9	1.3	0.1	2	0.1	0.0	0.0	3,996.1	14.5	1.7
Feb.	40	2.2	1.6	0.1	2	0.1	0.0	0.0	3,997.8	16.5	2.0
Mar.	52	3.2	3.2	0.2	2	0.1	0.0	0.0	4,000.2	19.4	2.9
Apr.	45	2.7	4.6	0.3	2	0.1	0.0	0.0	4,001.9	21.7	2.3
May	36	2.2	5.6	0.4	2	0.1	0.0	0.0	4,003.1	23.4	1.7
June	20	1.2	7.5	0.6	47	2.8	0.0	0.0	4,001.5	21.2	-2.2
July	15	0.9	8.6	0.7	135	8.3	0.0	0.0	3,994.8	13.1	-8.1
Aug.	24	1.5	7.5	0.5	104	6.4	0.0	0.0	3,988.6	7.7	-5.4
Sep.	25	1.5	5.6	0.2	18	1.1	0.0	0.0	3,988.9	7.9	0.2
Oct.	31	1.9	4.3	0.2	2	0.1	0.0	0.0	3,990.9	9.5	1.6
Nov.	39	2.3	2.2	0.1	2	0.1	0.0	0.0	3,993.2	11.6	2.1
Dec.	31	1.9	1.6	0.1	2	0.1	0.0	0.0	3,995.0	13.3	1.7
TOTAL	n/a	23.4	53.6	3.5	n/a	19.4	0.0	0.0	n/a	n/a	0.5

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Table A-23.—Merritt Reservoir operation estimates – 2024

Merritt Reservoir operation estimates - 2024											
	Inflow		Evaporation		Release Requirement		Reservoir Spill		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	KAF	Shortage	Elev	Cont	Change
									FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	226	13.9	1.9	0.3	16	1.0	13.0	0.0	2,944.0	61.1	-0.4
Feb.	246	13.7	2.6	0.4	18	1.0	12.3	0.0	2,944.0	61.1	0.0
Mar.	255	15.7	3.2	0.5	16	1.0	11.4	0.0	2,945.0	63.9	2.8
Apr.	260	15.5	5.2	0.9	17	1.0	10.8	0.0	2,946.0	66.7	2.8
May	252	15.5	6.4	1.1	71	4.4	10.0	0.0	2,946.0	66.7	0.0
June	240	14.3	8.4	1.4	144	8.6	4.3	0.0	2,946.0	66.7	0.0
July	240	14.8	9.7	1.6	558	34.4	0.0	0.0	2,937.1	45.5	-21.2
Aug.	245	15.1	8.4	1.0	519	32.0	0.0	0.0	2,926.0	27.6	-17.9
Sep.	242	14.4	7.1	0.5	159	9.5	0.0	0.0	2,929.2	32.0	4.4
Oct.	245	15.1	6.4	0.5	41	2.5	0.0	0.0	2,936.4	44.1	12.1
Nov.	240	14.3	3.2	0.4	67	4.0	0.0	0.0	2,941.1	54.0	9.9
Dec.	222	13.7	1.9	0.3	16	1.0	5.3	0.0	2,944.0	61.1	7.1
TOTAL	n/a	176.0	64.4	8.9	n/a	100.4	67.1	0.0	n/a	n/a	-0.4
Most probable inflow conditions											
Jan.	248	15.3	1.7	0.3	16	1.0	14.4	0.0	2,944.0	61.1	-0.4
Feb.	271	15.1	2.3	0.4	18	1.0	13.7	0.0	2,944.0	61.1	0.0
Mar.	281	17.3	2.8	0.4	16	1.0	13.1	0.0	2,945.0	63.9	2.8
Apr.	287	17.1	4.6	0.8	17	1.0	12.5	0.0	2,946.0	66.7	2.8
May	278	17.1	5.7	1.0	63	3.9	12.2	0.0	2,946.0	66.7	0.0
June	263	15.7	7.4	1.3	126	7.5	6.9	0.0	2,946.0	66.7	0.0
July	265	16.3	8.5	1.4	479	29.5	0.0	0.0	2,940.3	52.1	-14.6
Aug.	271	16.7	7.4	0.9	448	27.6	0.0	0.0	2,934.3	40.3	-11.8
Sep.	267	15.9	6.3	0.7	139	8.3	0.0	0.0	2,937.9	47.2	6.9
Oct.	271	16.7	5.7	0.7	41	2.5	0.0	0.0	2,943.8	60.7	13.5
Nov.	263	15.7	2.8	0.4	67	4.0	10.9	0.0	2,944.0	61.1	0.4
Dec.	245	15.1	1.7	0.3	16	1.0	13.8	0.0	2,944.0	61.1	0.0
TOTAL	n/a	194.0	56.9	8.6	n/a	88.3	97.5	0.0	n/a	n/a	-0.4
Reasonable maximum inflow conditions											
Jan.	286	17.6	1.5	0.2	16	1.0	16.8	0.0	2,944.0	61.1	-0.4
Feb.	313	17.4	2.0	0.3	18	1.0	16.1	0.0	2,944.0	61.1	0.0
Mar.	323	19.9	2.5	0.4	16	1.0	15.7	0.0	2,945.0	63.9	2.8
Apr.	330	19.7	4.0	0.7	17	1.0	15.2	0.0	2,946.0	66.7	2.8
May	320	19.7	5.1	0.9	55	3.4	15.4	0.0	2,946.0	66.7	0.0
June	304	18.1	6.6	1.1	106	6.3	10.7	0.0	2,946.0	66.7	0.0
July	305	18.8	7.6	1.3	394	24.3	0.0	0.0	2,943.5	59.9	-6.8
Aug.	312	19.2	6.6	1.0	370	22.8	0.0	0.0	2,941.7	55.3	-4.6
Sep.	307	18.3	5.6	0.8	116	6.9	0.0	0.0	2,945.7	65.9	10.6
Oct.	312	19.2	5.1	0.9	41	2.5	20.6	0.0	2,944.0	61.1	-4.8
Nov.	304	18.1	2.5	0.4	67	4.0	13.7	0.0	2,944.0	61.1	0.0
Dec.	282	17.4	1.5	0.2	16	1.0	16.2	0.0	2,944.0	61.1	0.0
TOTAL	n/a	223.4	50.6	8.2	n/a	75.2	140.4	0.0	n/a	n/a	-0.4

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Table A-24.—Calamus Reservoir operation estimates – 2024

Calamus Reservoir operation estimates - 2024											
Month	Inflow		Evaporation		Release Requirement		Reservoir Spill		End of month		Reservoir
	cfs	KAF	IN.	KAF	cfs	KAF	KAF	Shortage	Elev	Cont	Change
									FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	295	18.2	1.9	0.5	58	3.6	14.5	0.0	2,240.0	100.5	-0.4
Feb.	313	17.4	2.3	0.6	59	3.3	13.5	0.0	2,240.0	100.5	0.0
Mar.	351	21.6	4.2	1.1	58	3.6	7.7	0.0	2,242.0	109.7	9.2
Apr.	362	21.6	6.7	1.9	59	3.5	6.4	0.0	2,244.0	119.5	9.8
May	401	24.7	6.9	2.0	94	5.8	16.9	0.0	2,244.0	119.5	0.0
June	366	21.8	8.4	2.5	144	8.6	10.7	0.0	2,244.0	119.5	0.0
July	343	21.1	9.6	2.8	956	58.9	0.0	0.0	2,234.7	78.9	-40.6
Aug.	323	19.9	9.6	2.2	817	50.3	0.0	0.0	2,224.9	46.3	-32.6
Sep.	305	18.2	7.4	1.2	471	28.1	0.0	0.0	2,220.6	35.2	-11.1
Oct.	302	18.6	5.7	0.8	58	3.6	0.0	0.0	2,226.0	49.4	14.2
Nov.	329	19.6	3.0	0.5	59	3.5	0.0	0.0	2,230.9	65.0	15.6
Dec.	318	19.6	1.8	0.4	58	3.6	0.0	0.0	2,235.2	80.6	15.6
TOTAL	n/a	242.3	67.5	16.5	n/a	176.4	69.7	0.0	n/a	n/a	-20.3
Most probable inflow conditions											
Jan.	352	19.6	2.0	0.5	54	3.3	15.8	0.0	2,240.0	100.5	0.0
Feb.	394	24.3	3.7	1.0	58	3.6	10.5	0.0	2,242.0	109.7	9.2
Mar.	408	24.3	5.9	1.6	57	3.5	9.4	0.0	2,244.0	119.5	9.8
Apr.	451	27.8	6.1	1.8	88	5.4	20.6	0.0	2,244.0	119.5	0.0
May	411	24.5	7.5	2.2	125	7.7	14.6	0.0	2,244.0	119.5	0.0
June	385	23.7	8.5	2.5	875	53.9	0.0	0.0	2,236.7	86.8	-32.7
July	364	22.4	8.5	2.0	750	46.2	0.0	0.0	2,229.7	61.0	-25.8
Aug.	344	20.5	6.6	1.3	425	26.2	0.0	0.0	2,227.5	54.0	-7.0
Sep.	341	21.0	5.0	0.9	58	3.6	0.0	0.0	2,232.5	70.5	16.5
Oct.	371	22.1	2.7	0.6	57	3.5	0.0	0.0	2,237.1	88.5	18.0
Nov.	359	22.1	1.6	0.4	58	3.6	6.1	0.0	2,240.0	100.5	12.0
Dec.	0	272.8	59.8	15.2	0	164.1	93.9	0	0.0	0.0	-0.4
TOTAL	n/a	525.1	117.9	30.0	n/a	324.6	170.9	0.0	n/a	n/a	-0.4
Reasonable maximum inflow conditions											
Jan.	490	30.2	3.3	0.9	58	3.6	16.5	0.0	2,242.0	109.7	9.2
Feb.	507	30.2	5.3	1.5	59	3.5	15.4	0.0	2,244.0	119.5	9.8
Mar.	562	34.6	5.5	1.6	81	5.0	28.0	0.0	2,244.0	119.5	0.0
Apr.	512	30.5	6.6	2.0	114	6.8	21.7	0.0	2,244.0	119.5	0.0
May	479	29.5	7.5	2.2	836	51.5	0.0	0.0	2,238.8	95.3	-24.2
June	451	27.8	7.5	1.9	735	45.3	0.0	0.0	2,233.9	75.9	-19.4
July	428	25.5	5.8	1.3	497	29.6	0.0	0.0	2,232.5	70.5	-5.4
Aug.	424	26.1	4.5	0.9	58	3.6	0.0	0.0	2,238.0	92.1	21.6
Sep.	461	27.5	2.4	0.6	59	3.5	15.0	0.0	2,240.0	100.5	8.4
Oct.	446	27.5	1.4	0.4	58	3.6	23.5	0.0	2,240.0	100.5	0.0
Nov.	0	339.3	53.1	14.2	0	162.9	162.6	0.0	0.0	0.0	-0.4
Dec.	0	0.0	0.0	0.0	0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL	n/a	628.7	102.9	27.5	n/a	318.9	282.7	0.0	n/a	n/a	-0.4

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Table A-25.—Davis Creek Reservoir operation estimates – 2024

Davis Creek Reservoir operation estimates - 2024											
	Inflow		Evaporation		Release Requirement		Reservoir Spill		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	KAF	Shortage	Elev	Cont	Change
									FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	0	0.0	1.9	0.1	6	0.4	0.0	0.0	2,055.4	13.2	-0.5
Feb.	0	0.0	2.3	0.1	7	0.4	0.0	0.0	2,054.6	12.7	-0.5
Mar.	0	0.0	4.1	0.1	6	0.4	0.0	0.0	2,053.8	12.2	-0.5
Apr.	57	3.4	6.6	0.2	7	0.4	0.0	0.0	2,058.2	15.0	2.8
May	239	14.7	7.0	0.3	57	3.5	0.0	0.0	2,071.1	25.9	10.9
June	240	14.3	8.5	0.5	127	7.6	0.9	0.0	2,076.0	31.2	5.3
July	239	14.7	9.0	0.6	297	18.3	0.0	0.0	2,072.1	27.0	-4.2
Aug.	162	10.0	7.0	0.4	273	16.8	0.0	0.0	2,064.5	19.8	-7.2
Sep.	59	3.5	6.1	0.3	133	7.9	0.0	0.0	2,058.3	15.1	-4.7
Oct.	0	0.0	5.5	0.2	6	0.4	0.0	0.0	2,057.4	14.5	-0.6
Nov.	0	0.0	2.9	0.1	7	0.4	0.0	0.0	2,056.7	14.0	-0.5
Dec.	0	0.0	1.7	0.1	6	0.4	0.0	0.0	2,055.9	13.5	-0.5
TOTAL	n/a	60.6	62.6	3.0	n/a	56.9	0.9	0.0	n/a	n/a	-0.2
Most probable inflow conditions											
Jan.	0	0.0	1.8	0.1	6	0.4	0.0	0.0	2,055.4	13.2	-0.5
Feb.	0	0.0	2.2	0.1	7	0.4	0.0	0.0	2,054.6	12.7	-0.5
Mar.	0	0.0	3.9	0.1	6	0.4	0.0	0.0	2,053.8	12.2	-0.5
Apr.	59	3.5	6.1	0.2	6	0.4	0.0	0.0	2,058.3	15.1	2.9
May	239	14.7	6.6	0.3	42	2.6	0.0	0.0	2,072.0	26.9	11.8
June	198	11.8	7.9	0.5	99	6.1	0.9	0.0	2,076.0	31.2	4.3
July	179	11.0	8.4	0.6	231	14.2	0.0	0.0	2,072.5	27.4	-3.8
Aug.	112	6.9	6.6	0.4	211	13.0	0.0	0.0	2,065.8	20.9	-6.5
Sep.	10	0.6	5.7	0.3	99	6.1	0.0	0.0	2,058.3	15.1	-5.8
Oct.	0	0.0	5.1	0.2	6	0.4	0.0	0.0	2,057.4	14.5	-0.6
Nov.	0	0.0	2.7	0.1	6	0.4	0.0	0.0	2,056.7	14.0	-0.5
Dec.	0	0.0	1.6	0.1	6	0.4	0.0	0.0	2,055.9	13.5	-0.5
TOTAL	n/a	48.5	58.6	3.0	n/a	44.8	0.9	0.0	n/a	n/a	-0.2
Reasonable maximum inflow conditions											
Jan.	0	0.0	1.7	0.1	6	0.4	0.0	0.0	2,055.4	13.2	-0.5
Feb.	0	0.0	2.0	0.1	7	0.4	0.0	0.0	2,054.6	12.7	-0.5
Mar.	0	0.0	3.6	0.1	6	0.4	0.0	0.0	2,053.8	12.2	-0.5
Apr.	12	0.7	5.8	0.2	7	0.4	0.0	0.0	2,054.0	12.3	0.1
May	239	14.7	6.2	0.2	32	2.0	0.0	0.0	2,070.0	24.8	12.5
June	206	12.3	7.4	0.4	77	4.6	0.9	0.0	2,076.0	31.2	6.4
July	114	7.0	7.9	0.5	172	10.6	0.0	0.0	2,072.2	27.1	-4.1
Aug.	67	4.1	6.2	0.4	156	9.6	0.0	0.0	2,066.1	21.2	-5.9
Sep.	0	0.0	5.4	0.3	97	5.8	0.0	0.0	2,058.3	15.1	-6.1
Oct.	0	0.0	4.8	0.2	6	0.4	0.0	0.0	2,057.4	14.5	-0.6
Nov.	0	0.0	2.5	0.1	7	0.4	0.0	0.0	2,056.7	14.0	-0.5
Dec.	0	0.0	1.5	0.1	6	0.4	0.0	0.0	2,055.9	13.5	-0.5
TOTAL	n/a	38.8	55.0	2.7	n/a	35.4	0.9	0.0	n/a	n/a	-0.2

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Table A-26.—Bonny Reservoir operation estimates – 2024

Bonny Reservoir operation estimates - 2024											
	Inflow		Evaporation		Release		Reservoir		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	Spill	Shortage	Elev	Cont	Change
							KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	3	0.2	2.3	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
Feb.	3	0.2	3.1	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
Mar.	3	0.2	3.9	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
Apr.	3	0.2	6.2	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
May	5	0.3	7.7	0.0	2	0.1	0.2	0.0	3,638.0	0.0	0.0
June	3	0.2	10.0	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
July	2	0.1	11.6	0.0	2	0.1	0.0	0.0	3,638.0	0.0	0.0
Aug.	2	0.1	10.0	0.0	2	0.1	0.0	0.0	3,638.0	0.0	0.0
Sep.	2	0.1	8.5	0.0	2	0.1	0.0	0.0	3,638.0	0.0	0.0
Oct.	2	0.1	7.7	0.0	2	0.1	0.0	0.0	3,638.0	0.0	0.0
Nov.	3	0.2	3.9	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
Dec.	3	0.2	2.3	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
TOTAL	n/a	2.1	77.2	0.0	n/a	1.2	0.9	0.0	n/a	n/a	0.0
Most probable inflow conditions											
Jan.	6	0.4	2.1	0.0	2	0.1	0.3	0.0	3,638.0	0.0	0.0
Feb.	7	0.4	2.7	0.0	2	0.1	0.3	0.0	3,638.0	0.0	0.0
Mar.	8	0.5	3.4	0.0	2	0.1	0.4	0.0	3,638.0	0.0	0.0
Apr.	8	0.5	5.5	0.0	2	0.1	0.4	0.0	3,638.0	0.0	0.0
May	10	0.6	6.9	0.0	2	0.1	0.5	0.0	3,638.0	0.0	0.0
June	8	0.5	8.9	0.0	2	0.1	0.4	0.0	3,638.0	0.0	0.0
July	5	0.3	10.3	0.0	2	0.1	0.2	0.0	3,638.0	0.0	0.0
Aug.	3	0.2	8.9	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
Sep.	2	0.1	7.6	0.0	2	0.1	0.0	0	3,638.0	0.0	0.0
Oct.	3	0.2	6.9	0.0	2	0.1	0.1	0.0	3,638.0	0.0	0.0
Nov.	7	0.4	3.4	0.0	2	0.1	0.3	0.0	3,638.0	0.0	0.0
Dec.	6	0.4	2.1	0.0	2	0.1	0.3	0.0	3,638.0	0.0	0.0
TOTAL	n/a	4.5	68.7	0.0	n/a	1.2	3.3	0.0	n/a	n/a	0.0
Reasonable maximum inflow conditions											
Jan.	16	1.0	1.8	0.0	2	0.1	0.9	0.0	3,638.0	0.0	0.0
Feb.	17	1.0	2.5	0.0	2	0.1	0.9	0.0	3,638.0	0.0	0.0
Mar.	18	1.1	3.1	0.0	2	0.1	1.0	0.0	3,638.0	0.0	0.0
Apr.	22	1.3	4.9	0.0	2	0.1	1.2	0.0	3,638.0	0.0	0.0
May	24	1.5	6.1	0.0	2	0.1	1.4	0.0	3,638.0	0.0	0.0
June	22	1.3	8.0	0.0	2	0.1	1.2	0.0	3,638.0	0.0	0.0
July	11	0.7	9.2	0.0	2	0.1	0.6	0.0	3,638.0	0.0	0.0
Aug.	8	0.5	8.0	0.0	2	0.1	0.4	0.0	3,638.0	0.0	0.0
Sep.	5	0.3	6.8	0.0	2	0.1	0.2	0.0	3,638.0	0.0	0.0
Oct.	8	0.5	6.1	0.0	2	0.1	0.4	0.0	3,638.0	0.0	0.0
Nov.	15	0.9	3.1	0.0	2	0.1	0.8	0.0	3,638.0	0.0	0.0
Dec.	15	0.9	1.8	0.0	2	0.1	0.8	0.0	3,638.0	0.0	0.0
TOTAL	n/a	11.0	61.4	0.0	n/a	1.2	9.8	0.0	n/a	n/a	0.0

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Table A-27.—Enders Reservoir operation estimates – 2024

Enders Reservoir operation estimates - 2024											
	Inflow		Evaporation		Release Requirement		Reservoir Spill	Shortage	End of month		Reservoir Change
Month	cfs	KAF	IN.	KAF	cfs	KAF	KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	5	0.3	1.5	0.1	3	0.2	0.0	0.1	3,080.9	8.1	0.2
Feb.	5	0.3	1.7	0.1	4	0.2	0.0	0.1	3,081.0	8.2	0.1
Mar.	5	0.3	2.9	0.1	3	0.2	0.0	0.1	3,081.2	8.3	0.1
Apr.	5	0.3	6.2	0.2	3	0.2	0.0	0.1	3,081.2	8.3	0.0
May	5	0.3	7.9	0.3	3	0.2	0.0	0.1	3,081.0	8.2	-0.1
June	5	0.3	10.0	0.3	176	10.5	0.0	10.4	3,080.9	8.1	-0.1
July	6	0.4	11.0	0.4	532	32.8	0.0	32.7	3,080.7	8.0	-0.1
Aug.	5	0.3	9.3	0.3	505	31.1	0.0	31.0	3,080.5	7.9	-0.1
Sep.	5	0.3	6.9	0.2	75	4.5	0.0	4.4	3,080.5	7.9	0.0
Oct.	5	0.3	4.4	0.1	3	0.2	0.0	0.1	3,080.7	8.0	0.1
Nov.	5	0.3	3.2	0.1	3	0.2	0.0	0.1	3,080.9	8.1	0.1
Dec.	5	0.3	1.8	0.1	3	0.2	0.0	0.1	3,081.0	8.2	0.1
TOTAL	n/a	3.7	66.8	2.3	n/a	80.5	0.0	79.3	n/a	n/a	0.3
Most probable inflow conditions											
Jan.	6	0.4	1.3	0.0	3	0.2	0.0	0	3,081.1	8.2	0.3
Feb.	7	0.4	1.5	0.1	3	0.2	0.0	0	3,081.5	8.4	0.2
Mar.	6	0.4	2.5	0.1	3	0.2	0.0	0	3,081.8	8.6	0.2
Apr.	7	0.4	5.4	0.2	3	0.2	0.0	0	3,082.0	8.7	0.1
May	6	0.4	6.9	0.2	3	0.2	0.0	0	3,082.1	8.8	0.1
June	7	0.4	8.7	0.3	114	7.0	0.0	7	3,082.1	8.8	0.0
July	8	0.5	9.5	0.3	487	30.0	0.0	30	3,082.4	8.9	0.1
Aug.	6	0.4	8.1	0.3	388	23.9	0.0	24	3,082.4	8.9	0.0
Sep.	7	0.4	6.0	0.2	36	2.2	0.0	2	3,082.4	8.9	0.0
Oct.	6	0.4	3.8	0.1	3	0.2	0.0	0.0	3,082.5	9.0	0.1
Nov.	7	0.4	2.8	0.1	3	0.2	0.0	0.0	3,082.6	9.1	0.1
Dec.	6	0.4	1.6	0.1	3	0.2	0.0	0.0	3,082.7	9.2	0.1
TOTAL	n/a	4.9	58.1	2.0	n/a	64.7	0.0	63.1	n/a	n/a	1.3
Reasonable maximum inflow conditions											
Jan.	11	0.7	1.2	0.0	3	0.2	0.0	0.1	3,081.7	8.5	0.6
Feb.	11	0.6	1.3	0.0	4	0.2	0.0	0.0	3,082.4	8.9	0.4
Mar.	10	0.6	2.3	0.1	3	0.2	0.0	0.0	3,082.7	9.2	0.3
Apr.	10	0.6	4.9	0.2	3	0.2	0.0	0.0	3,083.1	9.4	0.2
May	11	0.7	6.3	0.2	3	0.2	0.0	0.0	3,083.6	9.7	0.3
June	10	0.6	8.0	0.3	40	2.4	0.0	1.3	3,082.4	8.9	-0.8
July	13	0.8	8.7	0.3	297	18.3	0.0	17.8	3,082.4	8.9	0.0
Aug.	11	0.7	7.4	0.3	229	14.1	0.0	13.7	3,082.4	8.9	0.0
Sep.	10	0.6	5.5	0.2	3	0.2	0.0	0.0	3,082.6	9.1	0.2
Oct.	10	0.6	3.5	0.1	3	0.2	0.0	0.0	3,083.1	9.4	0.3
Nov.	10	0.6	2.5	0.1	3	0.2	0.0	0.0	3,083.6	9.7	0.3
Dec.	10	0.6	1.4	0.1	3	0.2	0.0	0.0	3,084.0	10.0	0.3
TOTAL	n/a	7.7	53.0	1.9	n/a	36.6	0.0	32.9	n/a	n/a	2.1

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Table A-28.—Swanson Lake operation estimates – 2024

Swanson Lake operation estimates - 2024											
	Inflow		Evaporation		Release		Reservoir		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	Spill	Shortage	Elev	Cont	Change
							KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	21	1.3	1.5	0.3	2	0.1	0.0	0.0	2,738.9	56.5	0.9
Feb.	32	1.8	1.6	0.3	2	0.1	0.0	0.0	2,739.3	57.9	1.4
Mar.	36	2.2	3.0	0.6	2	0.1	0.0	0.0	2,739.7	59.4	1.5
Apr.	39	2.3	6.5	1.3	2	0.1	0.0	0.0	2,740.0	60.3	0.9
May	36	2.2	7.7	1.6	3	0.2	0.0	0.0	2,740.1	60.7	0.4
June	29	1.7	9.9	2.0	89	5.3	0.0	0.0	2,738.4	55.1	-5.6
July	15	0.9	9.9	1.9	377	23.2	0.0	0.0	2,730.2	30.9	-24.2
Aug.	8	0.5	9.9	1.5	323	19.9	0.0	9.0	2,725.0	19.0	-11.9
Sep.	3	0.2	7.7	0.9	69	4.1	0.0	4.0	2,724.6	18.2	-0.8
Oct.	6	0.4	4.7	0.5	2	0.1	0.0	0.0	2,724.5	18.0	-0.2
Nov.	15	0.9	3.2	0.4	2	0.1	0.0	0.0	2,724.7	18.4	0.4
Dec.	16	1.0	1.8	0.2	2	0.1	0.0	0.0	2,725.0	19.1	0.7
TOTAL	n/a	15.4	67.4	11.5	n/a	53.4	0.0	13.0	n/a	n/a	-36.5
Most probable inflow conditions											
Jan.	36	2.2	1.3	0.3	2	0.1	0.0	0.0	2,739.1	57.4	1.8
Feb.	56	3.1	1.4	0.3	2	0.1	0.0	0.0	2,739.9	60.1	2.7
Mar.	62	3.8	2.7	0.5	2	0.1	0.0	0.0	2,740.8	63.3	3.2
Apr.	67	4.0	5.8	1.2	2	0.1	0.0	0.0	2,741.5	66.0	2.7
May	62	3.8	6.9	1.5	3	0.2	0.0	0.0	2,742.1	68.1	2.1
June	49	2.9	8.9	1.9	63	3.9	0.0	0.0	2,741.3	65.2	-2.9
July	26	1.6	8.9	1.9	299	18.4	0.0	0.0	2,735.8	46.5	-18.7
Aug.	15	0.9	8.9	1.6	256	15.8	0.0	0.0	2,729.9	30.0	-16.5
Sep.	7	0.4	6.9	1.0	29	1.8	0.0	0.0	2,728.9	27.6	-2.4
Oct.	10	0.6	4.2	0.6	2	0.1	0.0	0.0	2,728.8	27.5	-0.1
Nov.	25	1.5	2.9	0.4	2	0.1	0.0	0.0	2,729.2	28.5	1.0
Dec.	29	1.8	1.6	0.2	2	0.1	0.0	0.0	2,729.9	30.0	1.5
TOTAL	n/a	26.6	60.4	11.4	n/a	40.8	0.0	0.0	n/a	n/a	-25.6
Reasonable maximum inflow conditions											
Jan.	55	3.4	1.2	0.2	2	0.1	0.0	0.0	2,739.5	58.7	3.1
Feb.	86	4.8	1.3	0.3	2	0.1	0.0	0.0	2,740.8	63.1	4.4
Mar.	97	6.0	2.4	0.5	2	0.1	0.0	0.0	2,742.2	68.5	5.4
Apr.	107	6.4	5.3	1.2	2	0.1	0.0	0.0	2,743.6	73.6	5.1
May	96	5.9	6.3	1.4	3	0.2	0.0	0.0	2,744.7	77.9	4.3
June	77	4.6	8.1	1.9	54	3.2	0.0	0.0	2,744.5	77.4	-0.5
July	42	2.6	8.1	1.8	208	12.8	0.0	0.0	2,741.4	65.4	-12.0
Aug.	23	1.4	8.1	1.7	183	11.3	0.0	0.0	2,738.0	53.8	-11.6
Sep.	12	0.7	6.3	1.2	25	1.5	0.0	0.0	2,737.4	51.8	-2.0
Oct.	16	1.0	3.9	0.7	2	0.1	0.0	0.0	2,737.5	52.0	0.2
Nov.	40	2.4	2.6	0.5	2	0.1	0.0	0.0	2,738.0	53.8	1.8
Dec.	45	2.8	1.4	0.3	2	0.1	0.0	0.0	2,738.8	56.2	2.4
TOTAL	n/a	42.0	55.0	11.7	n/a	29.7	0.0	0.0	n/a	n/a	0.6

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Table A-29.—Hugh Butler Lake operation estimates – 2024

Hugh Butler Lake operation estimates - 2024											
Month	Inflow		Evaporation		Release Requirement		Reservoir Spill		End of month		Reservoir
	cfs	KAF	IN.	KAF	cfs	KAF	KAF	Shortage	Elev	Cont	Change
								KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	8	0.5	1.3	0.1	2	0.1	0.0	0.0	2,566.9	16.6	0.3
Feb.	11	0.6	1.4	0.1	2	0.1	0.0	0.0	2,567.3	17.0	0.4
Mar.	11	0.7	2.6	0.2	2	0.1	0.0	0.0	2,567.7	17.4	0.4
Apr.	12	0.7	7.2	0.4	2	0.1	0.0	0.0	2,567.9	17.6	0.2
May	11	0.7	8.5	0.5	2	0.1	0.0	0.0	2,568.0	17.7	0.1
June	12	0.7	10.4	0.6	28	1.6	0.0	0.0	2,566.5	16.2	-1.5
July	10	0.6	11.5	0.7	71	4.4	0.0	0.0	2,561.5	11.7	-4.5
Aug.	10	0.6	10.2	0.5	61	3.7	0.0	3.1	2,560.9	11.2	-0.5
Sep.	7	0.4	7.9	0.4	13	0.8	0.0	0.7	2,560.8	11.1	-0.1
Oct.	6	0.4	5.0	0.2	2	0.1	0.0	0.0	2,560.9	11.2	0.1
Nov.	8	0.5	3.0	0.1	2	0.1	0.0	0.0	2,561.3	11.5	0.3
Dec.	8	0.5	1.6	0.1	2	0.1	0.0	0.0	2,561.7	11.8	0.3
TOTAL	n/a	6.9	70.6	3.9	n/a	11.3	0.0	3.8	n/a	n/a	-4.5
Most probable inflow conditions											
Jan.	11	0.7	1.1	0.1	2	0.1	0.0	0.0	2,567.1	16.8	0.5
Feb.	14	0.8	1.2	0.1	2	0.1	0.0	0.0	2,567.7	17.4	0.6
Mar.	16	1.0	2.3	0.1	2	0.1	0.0	0.0	2,568.4	18.2	0.8
Apr.	17	1.0	6.4	0.4	2	0.1	0.0	0.0	2,568.9	18.7	0.5
May	18	1.1	7.5	0.5	2	0.1	0.0	0.0	2,569.3	19.2	0.5
June	18	1.1	9.2	0.6	22	1.3	0.0	0.0	2,568.6	18.4	-0.8
July	15	0.9	10.2	0.6	61	3.7	0.0	0.0	2,565.2	15.0	-3.4
Aug.	15	0.9	9.0	0.5	50	3.1	0.0	0.0	2,562.2	12.3	-2.7
Sep.	10	0.6	7.0	0.3	11	0.7	0.0	0.0	2,561.8	11.9	-0.4
Oct.	10	0.6	4.4	0.2	2	0.1	0.0	0.0	2,562.2	12.2	0.3
Nov.	12	0.7	2.7	0.1	2	0.1	0.0	0.0	2,562.7	12.7	0.5
Dec.	11	0.7	1.4	0.1	2	0.1	0.0	0.0	2,563.3	13.2	0.5
TOTAL	n/a	10.1	62.4	3.6	n/a	9.6	0.0	0.0	n/a	n/a	-3.1
Reasonable maximum inflow conditions											
Jan.	18	1.1	1.0	0.1	2	0.1	0.0	0.0	2,567.5	17.2	0.9
Feb.	23	1.3	1.1	0.1	2	0.1	0.0	0.0	2,568.5	18.3	1.1
Mar.	28	1.7	2.1	0.1	2	0.1	0.0	0.0	2,569.9	19.8	1.5
Apr.	27	1.6	5.8	0.4	2	0.1	0.0	0.0	2,570.8	20.9	1.1
May	29	1.8	6.8	0.5	2	0.1	0.0	0.0	2,571.8	22.1	1.2
June	29	1.7	8.4	0.6	16	1.0	0.0	0.0	2,571.9	22.2	0.1
July	23	1.4	9.3	0.7	44	2.7	0.0	0.0	2,570.2	20.2	-2.0
Aug.	23	1.4	8.2	0.5	37	2.3	0.0	0.0	2,568.9	18.8	-1.4
Sep.	15	0.9	6.4	0.4	7	0.4	0.0	0.0	2,569.0	18.9	0.1
Oct.	16	1.0	4.0	0.3	2	0.1	0.0	0.0	2,569.5	19.5	0.6
Nov.	18	1.1	2.4	0.2	2	0.1	0.0	0.0	2,570.3	20.3	0.8
Dec.	18	1.1	1.3	0.1	2	0.1	0.0	0.0	2,571.0	21.2	0.9
TOTAL	n/a	16.1	56.8	4.0	n/a	7.3	0.0	0.0	n/a	n/a	4.9

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Table A-30.—Harry Strunk Lake operation estimates – 2024

Harry Strunk Lake operation estimates - 2023											
	Inflow		Evaporation		Release		Reservoir		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	Spill	Shortage	Elev	Cont	Change
							KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	34	2.1	1.3	0.1	2	0.1	0.0	0.0	2,363.1	29.7	1.9
Feb.	43	2.4	1.4	0.1	2	0.1	0.0	0.0	2,364.5	31.9	2.2
Mar.	45	2.8	2.6	0.3	2	0.1	0.0	0.0	2,365.9	34.3	2.4
Apr.	44	2.6	7.1	0.8	2	0.1	1.4	0.0	2,366.1	34.6	0.3
May	49	3.0	8.2	0.9	2	0.1	2.0	0.0	2,366.1	34.6	0.0
June	49	2.9	10.2	1.1	89	5.3	0.0	0.0	2,364.0	31.1	-3.5
July	45	2.8	11.3	1.1	318	19.6	0.0	0.0	2,349.6	13.2	-17.9
Aug.	36	2.2	10.0	0.5	268	16.5	0.0	9.5	2,343.0	7.9	-5.3
Sep.	23	1.4	7.8	0.3	27	1.6	0.0	0.5	2,343.0	7.9	0.0
Oct.	29	1.8	5.1	0.2	2	0.1	0.0	0.0	2,345.1	9.4	1.5
Nov.	32	1.9	3.1	0.1	2	0.1	0.0	0.0	2,347.2	11.1	1.7
Dec.	31	1.9	1.6	0.1	2	0.1	0.0	0.0	2,349.1	12.8	1.7
TOTAL	n/a	27.8	69.7	5.6	n/a	43.8	3.4	10.0	n/a	n/a	-15.0
Most probable inflow conditions											
Jan.	49	3.0	1.2	0.1	2	0.1	0.0	0.0	2,363.7	30.6	2.8
Feb.	61	3.4	1.2	0.1	2	0.1	0.0	0.0	2,365.6	33.8	3.2
Mar.	65	4.0	2.3	0.2	2	0.1	2.9	0.0	2,366.1	34.6	0.8
Apr.	64	3.8	6.3	0.7	2	0.1	3.0	0.0	2,366.1	34.6	0.0
May	70	4.3	7.3	0.8	2	0.1	3.4	0.0	2,366.1	34.6	0.0
June	72	4.3	9.1	1.0	74	4.4	0.0	0.0	2,365.4	33.5	-1.1
July	67	4.1	10.0	1.0	265	16.3	0.0	0.0	2,356.2	20.3	-13.2
Aug.	52	3.2	8.9	0.6	222	13.7	0.0	0.0	2,344.8	9.2	-11.1
Sep.	35	2.1	6.9	0.3	20	1.2	0.0	0.0	2,345.6	9.8	0.6
Oct.	42	2.6	4.5	0.2	2	0.1	0.0	0.0	2,348.4	12.1	2.3
Nov.	47	2.8	2.7	0.1	2	0.1	0.0	0.0	2,351.1	14.7	2.6
Dec.	45	2.8	1.4	0.1	2	0.1	0.0	0.0	2,353.6	17.3	2.6
TOTAL	n/a	40.4	61.8	5.2	n/a	36.4	9.3	0.0	n/a	n/a	-10.5
Reasonable maximum inflow conditions											
Jan.	76	4.7	1.0	0.1	2	0.1	0.0	0.0	2,364.7	32.3	4.5
Feb.	97	5.4	1.1	0.1	2	0.1	2.9	0.0	2,366.1	34.6	2.3
Mar.	102	6.3	2.0	0.2	2	0.1	6.0	0.0	2,366.1	34.6	0.0
Apr.	101	6.0	5.6	0.6	2	0.1	5.3	0.0	2,366.1	34.6	0.0
May	109	6.7	6.5	0.7	2	0.1	5.9	0.0	2,366.1	34.6	0.0
June	112	6.7	8.1	0.9	47	2.8	3.0	0.0	2,366.1	34.6	0.0
July	104	6.4	9.0	1.0	182	11.2	0.0	0.0	2,362.6	28.8	-5.8
Aug.	83	5.1	7.9	0.7	154	9.5	0.0	0.0	2,358.9	23.7	-5.1
Sep.	54	3.2	6.2	0.5	2	0.1	0.0	0.0	2,360.8	26.3	2.6
Oct.	67	4.1	4.0	0.3	2	0.1	0.0	0.0	2,363.3	30.0	3.7
Nov.	75	4.5	2.4	0.2	2	0.1	0.0	0.0	2,365.8	34.2	4.2
Dec.	71	4.4	1.3	0.1	2	0.1	3.8	0.0	2,366.1	34.6	0.4
TOTAL	n/a	63.5	55.1	5.4	n/a	24.4	26.9	0.0	n/a	n/a	6.8

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Table A-31.—Keith Sebelius Lake operation estimates – 2024

Keith Sebelius Lake operation estimates - 2024											
	Inflow		Evaporation		Release		Reservoir		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	Spill	Shortage	Elev	Cont	Change
							KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	2	0.1	1.5	0.1	2	0.1	0.0	0.0	2,294.4	17.2	-0.1
Feb.	4	0.2	1.8	0.1	2	0.1	0.0	0.0	2,294.4	17.2	0.0
Mar.	5	0.3	3.0	0.2	2	0.1	0.0	0.0	2,294.4	17.2	0.0
Apr.	7	0.4	7.8	0.6	2	0.1	0.0	0.0	2,294.2	16.9	-0.3
May	10	0.6	8.7	0.7	6	0.4	0.0	0.0	2,293.9	16.4	-0.5
June	12	0.7	11.0	0.9	57	3.4	0.0	0.0	2,291.0	12.8	-3.6
July	8	0.5	12.3	0.8	146	9.0	0.0	6.6	2,288.4	10.1	-2.7
Aug.	8	0.5	11.0	0.6	138	8.5	0.0	8.4	2,288.2	9.9	-0.2
Sep.	3	0.2	8.7	0.5	27	1.6	0.0	1.5	2,287.8	9.5	-0.4
Oct.	2	0.1	6.0	0.3	2	0.1	0.0	0.0	2,287.4	9.2	-0.3
Nov.	2	0.1	3.3	0.2	2	0.1	0.0	0.0	2,287.2	9.0	-0.2
Dec.	2	0.1	1.7	0.1	2	0.1	0.0	0.0	2,287.1	8.9	-0.1
TOTAL	n/a	3.8	76.8	5.1	n/a	23.6	0.0	16.5	n/a	n/a	-8.4
Most probable inflow conditions											
Jan.	3	0.2	1.4	0.1	2	0.1	0.0	0.0	2,294.5	17.3	0.0
Feb.	5	0.3	1.6	0.1	2	0.1	0.0	0.0	2,294.6	17.4	0.1
Mar.	10	0.6	2.7	0.2	2	0.1	0.0	0.0	2,294.8	17.7	0.3
Apr.	10	0.6	6.9	0.6	2	0.1	0.0	0.0	2,294.7	17.6	-0.1
May	16	1.0	7.7	0.6	3	0.2	0.0	0.0	2,294.9	17.8	0.2
June	20	1.2	9.7	0.8	45	2.8	0.0	0.0	2,293.1	15.4	-2.4
July	15	0.9	10.9	0.8	138	8.5	0.0	3	2,288.4	10.1	-5.3
Aug.	13	0.8	9.7	0.5	112	6.9	0.0	7	2,288.4	10.1	0.0
Sep.	7	0.4	7.7	0.4	21	1.3	0.0	1	2,288.3	10.0	-0.1
Oct.	3	0.2	5.3	0.3	2	0.1	0.0	0	2,288.1	9.8	-0.2
Nov.	3	0.2	2.9	0.2	2	0.1	0.0	0	2,288.0	9.7	-0.1
Dec.	3	0.2	1.5	0.1	2	0.1	0.0	0	2,288.0	9.7	0.0
TOTAL	n/a	6.6	68.0	4.7	n/a	20.4	0.0	10.9	n/a	n/a	-7.6
Reasonable maximum inflow conditions											
Jan.	8	0.5	1.2	0.1	2	0.1	0.0	0.0	2,294.7	17.6	0.3
Feb.	11	0.6	1.5	0.1	2	0.1	0.0	0.0	2,295.0	18.0	0.4
Mar.	18	1.1	2.4	0.2	2	0.1	0.0	0.0	2,295.6	18.8	0.8
Apr.	20	1.2	6.3	0.5	2	0.1	0.0	0.0	2,296.0	19.4	0.6
May	31	1.9	6.9	0.6	3	0.2	0.0	0.0	2,296.7	20.5	1.1
June	40	2.4	8.8	0.8	27	1.6	0.0	0.0	2,296.7	20.5	0.0
July	29	1.8	9.8	0.9	71	4.4	0.0	0.0	2,294.3	17.0	-3.5
Aug.	26	1.6	8.8	0.7	68	4.2	0.0	0.0	2,291.8	13.7	-3.3
Sep.	12	0.7	6.9	0.5	15	0.9	0.0	0.0	2,291.2	13.0	-0.7
Oct.	6	0.4	4.8	0.3	2	0.1	0.0	0.0	2,291.2	13.0	0.0
Nov.	8	0.5	2.6	0.2	2	0.1	0.0	0.0	2,291.4	13.2	0.2
Dec.	6	0.4	1.3	0.1	2	0.1	0.0	0.0	2,291.5	13.4	0.2
TOTAL	n/a	13.1	61.3	5.0	n/a	12.0	0.0	0.0	n/a	n/a	-3.9

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Table A-32.—Harlan County Lake operation estimates – 2024

Harlan County Lake operation estimates - 2024											
	Inflow		Evaporation		Release Requirement		Reservoir Spill		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	KAF	Shortage	Elev	Cont	Change
									FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	42	2.6	1.4	1.3	0	0.0	0.0	0.0	1,938.0	221.0	1.3
Feb.	65	3.6	1.6	1.5	0	0.0	0.0	0.0	1,938.2	223.1	2.1
Mar.	88	5.4	2.8	2.6	0	0.0	0.0	0.0	1,938.5	225.9	2.8
Apr.	75	4.5	6.5	6.0	0	0.0	0.0	0.0	1,938.4	224.4	-1.5
May	96	5.9	8.0	7.4	0	0.0	0.0	0.0	1,938.2	222.9	-1.5
June	79	4.7	9.5	8.7	272	16.2	0.0	0.0	1,936.3	202.7	-20.2
July	81	5.0	10.7	9.4	694	42.8	0.0	0.0	1,931.5	155.5	-47.2
Aug.	65	4.0	9.4	7.0	587	36.2	0.0	3.4	1,927.2	119.7	-35.8
Sep.	32	1.9	7.4	4.6	55	3.3	0.0	3.3	1,926.8	117.0	-2.7
Oct.	31	1.9	5.1	3.1	0	0.0	0.0	0.0	1,926.6	115.8	-1.2
Nov.	40	2.4	3.2	1.9	0	0.0	0.0	0.0	1,926.8	116.3	0.5
Dec.	39	2.4	2.0	1.2	0	0.0	0.0	0.0	1,926.9	117.5	1.2
TOTAL	n/a	44.3	67.6	54.7	n/a	98.5	0.0	6.7	n/a	n/a	-102.2
Most probable inflow conditions											
Jan.	104	6.4	1.2	1.1	0	0.0	0.0	0	1,938.4	225.0	5.3
Feb.	162	9.0	1.4	1.3	0	0.0	0.0	0	1,939.1	232.7	7.7
Mar.	218	13.4	2.4	2.3	0	0.0	0.0	0	1,940.1	243.8	11.1
Apr.	188	11.2	5.7	5.6	0	0.0	0.0	0	1,940.5	249.4	5.6
May	237	14.6	7.0	7.0	0	0.0	0.0	0	1,941.2	257.0	7.6
June	198	11.8	8.3	8.4	49	2.9	0.0	0	1,941.2	257.5	0.5
July	200	12.3	9.4	9.5	450	27.7	0.0	0	1,939.1	232.6	-24.9
Aug.	161	9.9	8.2	7.7	388	23.9	0.0	0	1,937.1	210.9	-21.7
Sep.	79	4.7	6.5	5.8	27	1.6	0.0	0	1,936.9	208.2	-2.7
Oct.	75	4.6	4.4	3.9	0	0.0	0.0	0	1,936.9	208.9	0.7
Nov.	99	5.9	2.8	2.5	0	0.0	0.0	0	1,937.2	212.3	3.4
Dec.	97	6.0	1.8	1.6	0	0.0	0.0	0	1,937.7	216.7	4.4
TOTAL	n/a	109.8	59.1	56.7	n/a	56.1	0.0	0.0	n/a	n/a	-3.0
Reasonable maximum inflow conditions											
Jan.	232	14.3	1.1	1.0	0	0.0	0.0	0.0	1,939.1	233.0	13.3
Feb.	363	20.2	1.3	1.2	0	0.0	0.0	0.0	1,940.7	252.0	19.0
Mar.	487	30.0	2.1	2.1	0	0.0	0.0	0.0	1,943.0	279.9	27.9
Apr.	421	25.1	5.0	5.2	0	0.0	0.0	0.0	1,944.6	299.8	19.9
May	531	32.7	6.2	6.6	0	0.0	11.8	0.0	1,945.7	314.1	14.3
June	441	26.3	7.4	8.2	37	2.2	15.9	0.0	1,945.7	314.1	0.0
July	448	27.6	8.3	9.2	143	8.8	9.6	0.0	1,945.7	314.1	0.0
Aug.	360	22.2	7.3	8.1	136	8.4	5.7	0.0	1,945.7	314.1	0.0
Sep.	178	10.6	5.8	6.4	20	1.2	3.0	0.0	1,945.7	314.1	0.0
Oct.	167	10.3	3.9	4.3	0	0.0	6.0	0.0	1,945.7	314.1	0.0
Nov.	223	13.3	2.5	2.8	0	0.0	10.5	0.0	1,945.7	314.1	0.0
Dec.	219	13.5	1.6	1.8	0	0.0	11.7	0.0	1,945.7	314.1	0.0
TOTAL	n/a	246.1	52.5	56.9	n/a	20.6	74.2	0.0	n/a	n/a	94.4

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Table A-33.—Lovewell Reservoir operation estimates – 2024

Lovewell Reservoir operation estimates - 2024												
Month	White Rock Creek inflow KAF	Courtland Canal inflow KAF	Evaporation		Release		Reservoir		End of month		Reservoir	
			IN.	KAF	cfs	KAF	Spill KAF	Shortage KAF	Elev FT	Cont KAF	Change KAF	
Reasonable minimum inflow conditions												
Jan.	0.4	2.2	1.2	0.0	0	0.0	0.0	0.0	0.0	1,581.1	30.4	2.6
Feb.	0.5	2.5	1.5	0.0	0	0.0	0.0	0.0	0.0	1,582.1	33.4	3.0
Mar.	1.2	3.3	2.6	0.0	0	0.0	0.0	0.0	0.0	1,583.6	37.9	4.5
Apr.	1.1	1.4	5.4	0.1	0	0.0	0.0	0.0	0.0	1,584.3	40.3	2.4
May	1.4	0.1	6.8	0.1	11	0.7	0.0	0.0	0.0	1,584.6	41.0	0.7
June	1.5	6.7	8.9	0.1	134	8.0	0.0	0.0	0.0	1,584.6	41.1	0.1
July	1.0	7.8	9.7	0.1	404	24.9	0.0	0.0	0.0	1,579.1	24.9	-16.2
Aug.	0.1	8.0	7.9	0.1	278	17.1	0.0	0.0	0.0	1,575.0	15.8	-9.1
Sep.	0.8	0.8	6.0	0.1	37	2.2	0.0	0.0	0.0	1,574.6	15.1	-0.7
Oct.	0.5	1.9	4.1	0.0	0	0.0	0.0	0.0	0.0	1,575.8	17.5	2.4
Nov.	0.5	2.5	3.0	0.0	0	0.0	0.0	0.0	0.0	1,577.2	20.5	3.0
Dec.	0.3	2.6	1.5	0.0	0	0.0	0.0	0.0	0.0	1,578.5	23.4	2.9
TOTAL	9.3	39.8	58.6	0.6	n/a	52.9	0.0	0.0	0.0	n/a	n/a	-4.4
Most probable inflow conditions												
Jan.	0.9	3.8	1.0	0.0	0	0.0	0.0	0.0	0.0	1,581.8	32.5	4.7
Feb.	1.4	4.9	1.3	0.0	0	0.0	0.0	0.0	0.0	1,583.9	38.8	6.3
Mar.	3.1	0.0	2.3	0.0	0	0.0	0.8	0.0	0.0	1,584.6	41.1	2.3
Apr.	2.8	0.0	4.7	0.1	0	0.0	2.7	0.0	0.0	1,584.6	41.1	0.0
May	3.5	0.0	6.0	0.1	10	0.6	2.8	0.0	0.0	1,584.6	41.1	0.0
June	3.8	0.0	7.8	0.1	99	5.9	0.0	0.0	0.0	1,583.9	38.9	-2.2
July	2.6	2.1	8.4	0.1	304	18.7	0.0	0.0	0.0	1,579.0	24.8	-14.1
Aug.	0.3	3.6	6.9	0.1	208	12.8	0.0	0.0	0.0	1,575.0	15.8	-9.0
Sep.	2.0	0.8	5.2	0.1	29	1.7	0.0	0.0	0.0	1,575.5	16.8	1.0
Oct.	1.4	4.7	3.6	0.0	0	0.0	0.0	0.0	0.0	1,578.3	22.9	6.1
Nov.	1.2	4.1	2.7	0.0	0	0.0	0.0	0.0	0.0	1,580.3	28.2	5.3
Dec.	0.8	1.0	1.3	0.0	0	0.0	0.0	0.0	0.0	1,580.9	30.0	1.8
TOTAL	23.8	25.0	51.2	0.6	n/a	39.7	6.3	0.0	0.0	n/a	n/a	2.2
Reasonable maximum inflow conditions												
Jan.	2.6	0.0	0.9	0.0	0	0.0	0.0	0.0	0.0	1,581.1	30.4	2.6
Feb.	3.8	0.0	1.1	0.0	0	0.0	0.0	0.0	0.0	1,582.4	34.2	3.8
Mar.	8.7	0.0	2.0	0.0	0	0.0	1.8	0.0	0.0	1,584.6	41.1	6.9
Apr.	7.9	0.0	4.0	0.0	0	0.0	7.9	0.0	0.0	1,584.6	41.1	0.0
May	9.9	0.0	5.1	0.1	6	0.4	9.4	0.0	0.0	1,584.6	41.1	0.0
June	10.8	0.0	6.7	0.1	79	4.7	6.0	0.0	0.0	1,584.6	41.1	0.0
July	7.3	0.0	7.2	0.1	237	14.6	0.0	0.0	0.0	1,582.2	33.7	-7.4
Aug.	0.7	0.0	5.9	0.1	161	9.9	0.0	0.0	0.0	1,578.9	24.4	-9.3
Sep.	5.8	0.0	4.5	0.0	22	1.3	0.0	0.0	0.0	1,580.5	28.9	4.5
Oct.	3.9	0.0	3.1	0.0	0	0.0	0.0	0.0	0.0	1,581.9	32.8	3.9
Nov.	3.4	0.0	2.3	0.0	0	0.0	6.2	0.0	0.0	1,580.9	30.0	-2.8
Dec.	2.3	0.0	1.1	0.0	0	0.0	2.3	0.0	0.0	1,580.9	30.0	0.0
TOTAL	67.1	0.0	43.9	0.4	n/a	30.9	33.6	0.0	0.0	n/a	n/a	2.2

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Table A-34.—Kirwin Reservoir operation estimates – 2024

Kirwin Reservoir operation estimates - 2024											
	Inflow		Evaporation		Release		Reservoir		End of month		Reservoir
Month	ft ³ /s	KAF	IN.	KAF	cfs	KAF	Spill	Shortage	Elev	Cont	Change
							KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	6	0.4	1.3	0.3	0	0.0	0.0	0.0	1,720.1	58.3	0.1
Feb.	9	0.5	1.6	0.3	0	0.0	0.0	0.0	1,720.1	58.5	0.2
Mar.	16	1.0	2.8	0.6	0	0.0	0.0	0.0	1,720.2	58.9	0.4
Apr.	17	1.0	6.4	1.4	0	0.0	0.0	0.0	1,720.1	58.5	-0.4
May	28	1.7	7.8	1.7	8	0.5	0.0	0.0	1,720.0	58.0	-0.5
June	23	1.4	9.6	2.0	87	5.2	0.0	0.0	1,718.4	52.2	-5.8
July	21	1.3	10.8	2.2	193	11.9	0.0	0.0	1,714.5	39.4	-12.8
Aug.	15	0.9	9.6	1.7	179	11.0	0.0	0.0	1,709.9	27.6	-11.8
Sep.	8	0.5	7.4	0.9	8	0.5	0.0	0.0	1,709.5	26.7	-0.9
Oct.	5	0.3	5.1	0.6	0	0.0	0.0	0.0	1,709.3	26.4	-0.3
Nov.	7	0.4	3.0	0.4	0	0.0	0.0	0.0	1,709.3	26.4	0.0
Dec.	5	0.3	1.6	0.2	0	0.0	0.0	0.0	1,709.4	26.5	0.1
TOTAL	n/a	9.7	67.0	12.3	n/a	29.1	0.0	0.0	n/a	n/a	-31.7
Most probable inflow conditions											
Jan.	21	1.3	1.1	0.2	0	0.0	0.0	0.0	1,720.3	59.3	1.1
Feb.	36	2.0	1.4	0.3	0	0.0	0.0	0.0	1,720.8	61.0	1.7
Mar.	57	3.5	2.5	0.6	0	0.0	0.0	0.0	1,721.5	63.9	2.9
Apr.	64	3.8	5.7	1.3	0	0.0	0.0	0.0	1,722.2	66.4	2.5
May	101	6.2	7.1	1.6	6	0.4	0.0	0.0	1,723.2	70.6	4.2
June	82	4.9	8.6	2.1	71	4.4	0.0	0.0	1,722.8	69.0	-1.6
July	78	4.8	9.8	2.3	193	11.9	0.0	0.0	1,720.4	59.6	-9.4
Aug.	55	3.4	8.6	1.9	149	9.2	0.0	0.0	1,718.3	51.9	-7.7
Sep.	29	1.7	6.6	1.3	8	0.5	0.0	0.0	1,718.3	51.8	-0.1
Oct.	18	1.1	4.6	0.9	0	0.0	0.0	0.0	1,718.3	52.0	0.2
Nov.	25	1.5	2.7	0.6	0	0.0	0.0	0.0	1,718.6	52.9	0.9
Dec.	19	1.2	1.4	0.3	0	0.0	0.0	0.0	1,718.8	53.8	0.9
TOTAL	n/a	35.4	60.1	13.4	n/a	26.4	0.0	0.0	n/a	n/a	-4.4
Reasonable maximum inflow conditions											
Jan.	55	3.4	1.0	0.2	0	0.0	0.0	0.0	1,720.9	61.4	3.2
Feb.	92	5.1	1.3	0.3	0	0.0	0.0	0.0	1,722.2	66.2	4.8
Mar.	146	9.0	2.3	0.5	0	0.0	0.0	0.0	1,724.2	74.7	8.5
Apr.	163	9.7	5.2	1.3	0	0.0	0.0	0.0	1,726.1	83.1	8.4
May	256	15.8	6.4	1.7	5	0.3	0.0	0.0	1,729.0	96.9	13.8
June	211	12.6	7.8	2.3	59	3.5	5.5	0.0	1,729.3	98.2	1.3
July	200	12.3	8.8	2.6	167	10.3	0.0	0.0	1,729.1	97.6	-0.6
Aug.	140	8.6	7.8	2.3	119	7.3	0.0	0.0	1,728.9	96.6	-1.0
Sep.	72	4.3	6.0	1.8	7	0.4	0.5	0.0	1,729.3	98.2	1.6
Oct.	47	2.9	4.1	1.2	0	0.0	1.7	0.0	1,729.3	98.2	0.0
Nov.	64	3.8	2.4	0.7	0	0.0	3.1	0.0	1,729.3	98.2	0.0
Dec.	50	3.1	1.3	0.4	0	0.0	2.7	0.0	1,729.3	98.2	0.0
TOTAL	n/a	90.6	54.4	15.3	n/a	21.8	13.5	0.0	n/a	n/a	40.0

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Table A-35.—Webster Reservoir operation estimates – 2024

Webster Reservoir operation estimates - 2024											
	Inflow		Evaporation		Release Requirement		Reservoir Spill	Shortage	End of month		Reservoir Change
Month	cfs	KAF	IN.	KAF	cfs	KAF	KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	3	0.2	1.3	0.2	0	0.0	0.0	0.0	1,876.7	30.1	0.0
Feb.	5	0.3	1.5	0.2	0	0.0	0.0	0.0	1,876.8	30.2	0.1
Mar.	6	0.4	2.9	0.4	0	0.0	0.0	0.0	1,876.8	30.2	0.0
Apr.	10	0.6	6.5	0.8	0	0.0	0.0	0.0	1,876.7	30.0	-0.2
May	15	0.9	8.2	1.0	16	1.0	0.0	0.0	1,876.2	28.9	-1.1
June	12	0.7	10.3	1.3	107	6.4	0.0	0.0	1,872.6	21.9	-7.0
July	10	0.6	11.4	1.2	253	15.6	0.0	1.7	1,863.0	7.4	-14.5
Aug.	6	0.4	10.6	0.7	227	14.0	0.0	14.0	1,862.8	7.1	-0.3
Sep.	3	0.2	7.7	0.5	10	0.6	0.0	0.6	1,862.5	6.8	-0.3
Oct.	2	0.1	5.1	0.3	0	0.0	0.0	0.0	1,862.3	6.6	-0.2
Nov.	3	0.2	3.2	0.2	0	0.0	0.0	0.0	1,862.3	6.6	0.0
Dec.	3	0.2	1.7	0.1	0	0.0	0.0	0.0	1,862.4	6.7	0.1
TOTAL	n/a	4.8	70.4	6.9	n/a	37.6	0.0	16.3	n/a	n/a	-23.4
Most probable inflow conditions											
Jan.	13	0.8	1.1	0.1	0	0.0	0.0	0.0	1,877.0	30.8	0.7
Feb.	20	1.1	1.4	0.2	0	0.0	0.0	0.0	1,877.4	31.7	0.9
Mar.	31	1.9	2.6	0.3	0	0.0	0.0	0.0	1,878.2	33.3	1.6
Apr.	44	2.6	5.8	0.8	0	0.0	0.0	0.0	1,878.9	35.1	1.8
May	65	4.0	7.3	1.0	13	0.8	0.0	0.0	1,879.8	37.3	2.2
June	47	2.8	9.3	1.3	71	4.4	0.0	0.0	1,878.6	34.4	-2.9
July	44	2.7	10.2	1.4	208	12.8	0.0	0.0	1,873.1	22.9	-11.5
Aug.	26	1.6	9.5	1.0	161	9.9	0.0	0.0	1,867.6	13.6	-9.3
Sep.	15	0.9	7.0	0.6	5	0.3	0.0	0.0	1,867.6	13.6	0.0
Oct.	8	0.5	4.6	0.4	0	0.0	0.0	0.0	1,867.7	13.7	0.1
Nov.	12	0.7	2.8	0.2	0	0.0	0.0	0.0	1,868.0	14.2	0.5
Dec.	11	0.7	1.5	0.1	0	0.0	0.0	0.0	1,868.4	14.8	0.6
TOTAL	n/a	20.3	63.1	7.4	n/a	28.2	0.0	0.0	n/a	n/a	-15.3
Reasonable maximum inflow conditions											
Jan.	57	3.5	1.0	0.1	0	0.0	0.0	0.0	1,878.2	33.5	3.4
Feb.	84	4.7	1.3	0.2	0	0.0	0.0	0.0	1,880.1	38.0	4.5
Mar.	133	8.2	2.4	0.3	0	0.0	0.0	0.0	1,883.1	45.9	7.9
Apr.	191	11.4	5.3	0.9	0	0.0	0.0	0.0	1,886.7	56.4	10.5
May	284	17.5	6.7	1.2	6	0.4	0.0	0.0	1,891.4	72.3	15.9
June	205	12.2	8.5	1.8	42	2.5	4.0	0.0	1,892.4	76.2	3.9
July	193	11.9	9.4	2.1	125	7.7	2.1	0.0	1,892.4	76.2	0.0
Aug.	114	7.0	8.7	1.9	101	6.2	0.0	0.0	1,892.1	75.1	-1.1
Sep.	69	4.1	6.4	1.4	2	0.1	1.5	0.0	1,892.4	76.2	1.1
Oct.	37	2.3	4.2	0.9	0	0.0	1.4	0.0	1,892.4	76.2	0.0
Nov.	52	3.1	2.6	0.6	0	0.0	2.5	0.0	1,892.4	76.2	0.0
Dec.	47	2.9	1.4	0.3	0	0.0	2.6	0.0	1,892.4	76.2	0.0
TOTAL	n/a	88.8	57.9	11.7	n/a	16.9	14.1	0.0	n/a	n/a	46.1

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Table A-36.—Waconda Lake Operation Estimates – 2024

Waconda Lake operation estimates - 2024												
	Inflow		Evaporation		Release Requirement		Reservoir Spill		Shortage		End of month	Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	KAF	KAF	KAF	FT	Cont	Change
Reasonable minimum inflow conditions												
Jan.	31	1.9	1.1	0.6	19	1.2	0.0	0.0	0.0	1,450.4	160.5	0.1
Feb.	47	2.6	1.4	0.8	20	1.1	0.0	0.0	0.0	1,450.4	161.2	0.7
Mar.	88	5.4	2.7	1.6	18	1.1	0.0	0.0	0.0	1,450.7	163.9	2.7
Apr.	91	5.4	6.7	4.0	17	1.0	0.0	0.0	0.0	1,450.7	164.3	0.4
May	104	6.4	8.3	4.9	18	1.1	0.0	0.0	0.0	1,450.8	164.7	0.4
June	89	5.3	10.4	6.2	45	2.7	0.0	0.0	0.0	1,450.4	161.1	-3.6
July	144	8.9	12.3	7.1	156	9.6	0.0	0.0	0.0	1,449.6	153.3	-7.8
Aug.	54	3.3	10.5	5.8	125	7.7	0.0	0.0	0.0	1,448.5	143.1	-10.2
Sep.	40	2.4	8.5	4.4	35	2.1	0.0	0.0	0.0	1,448.0	139.0	-4.1
Oct.	31	1.9	5.4	2.7	21	1.3	0.0	0.0	0.0	1,447.8	136.9	-2.1
Nov.	35	2.1	2.9	1.5	27	1.6	0.0	0.0	0.0	1,447.7	135.9	-1.0
Dec.	29	1.8	1.4	0.7	24	1.5	0.0	0.0	0.0	1,447.6	135.5	-0.4
TOTAL	n/a	47.4	71.6	40.3	n/a	32.0	0.0	0.0	0.0	n/a	n/a	-24.9
Most probable inflow conditions												
Jan.	94	5.8	1.0	0.6	10	0.6	0.0	0.0	0.0	1,450.8	165.0	4.6
Feb.	140	7.8	1.3	0.8	10	0.6	0.0	0.0	0.0	1,451.4	171.4	6.4
Mar.	265	16.3	2.4	1.5	10	0.6	0.0	0.0	0.0	1,452.7	185.6	14.2
Apr.	277	16.5	6.1	4.0	8	0.5	0.0	0.0	0.0	1,453.8	197.6	12.0
May	320	19.7	7.5	5.1	10	0.6	0.0	0.0	0.0	1,454.9	211.6	14.0
June	272	16.2	9.3	6.7	32	2.0	0.0	0.0	0.0	1,455.5	219.1	7.5
July	442	27.2	11.0	8.1	112	6.9	11.9	0.0	0.0	1,455.6	219.4	0.3
Aug.	162	10.0	9.5	7.0	89	5.5	0.0	0.0	0.0	1,455.4	216.9	-2.5
Sep.	124	7.4	7.6	5.5	21	1.3	0.0	0.0	0.0	1,455.5	217.5	0.6
Oct.	96	5.9	4.9	3.6	10	0.6	0.0	0.0	0.0	1,455.5	219.2	1.7
Nov.	109	6.5	2.6	1.9	15	0.9	0.0	0.0	0.0	1,455.8	222.9	3.7
Dec.	86	5.3	1.3	1.0	13	0.8	19.3	0.0	0.0	1,454.6	207.1	-15.8
TOTAL	n/a	144.6	64.5	45.8	n/a	20.9	31.2	0.0	0.0	n/a	n/a	46.7
Reasonable maximum inflow conditions												
Jan.	305	18.8	0.9	0.5	3	0.2	0.0	0.0	0.0	1,452.1	178.5	18.1
Feb.	456	25.4	1.2	0.8	4	0.2	0.0	0.0	0.0	1,454.2	202.9	24.4
Mar.	864	53.2	2.2	1.5	5	0.3	44.7	0.0	0.0	1,454.8	209.6	6.7
Apr.	901	53.7	5.6	4.0	5	0.3	39.6	0.0	0.0	1,455.6	219.4	9.8
May	1,041	64.1	6.9	5.1	5	0.3	58.7	0.0	0.0	1,455.6	219.4	0.0
June	886	52.8	8.6	6.3	22	1.3	45.2	0.0	0.0	1,455.6	219.4	0.0
July	1,438	88.6	10.1	7.4	70	4.3	76.9	0.0	0.0	1,455.6	219.4	0.0
Aug.	528	32.5	8.7	6.4	57	3.5	22.6	0.0	0.0	1,455.6	219.4	0.0
Sep.	403	24.0	7.0	5.1	12	0.7	5.4	0.0	0.0	1,456.5	232.2	12.8
Oct.	313	19.3	4.5	3.4	6	0.4	15.5	0.0	0.0	1,456.5	232.2	0.0
Nov.	356	21.2	2.4	1.8	5	0.3	19.1	0.0	0.0	1,456.5	232.2	0.0
Dec.	282	17.4	1.2	0.9	5	0.3	41.3	0.0	0.0	1,454.6	207.1	-25.1
TOTAL	n/a	471.0	59.3	43.2	n/a	12.1	369.0	0.0	0.0	n/a	n/a	46.7

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Table A-37.—Cedar Bluff Reservoir Operation Estimates – 2024

Cedar Bluff Reservoir operation estimates - 2024											
	Inflow		Evaporation		Release		Reservoir		End of month		Reservoir
Month	cfs	KAF	IN.	KAF	cfs	KAF	Spill	Shortage	Elev	Cont	Change
							KAF	KAF	FT	KAF	KAF
Reasonable minimum inflow conditions											
Jan.	3	0.2	1.6	0.3	0	0.0	0.0	0.0	2,124.5	72.7	-0.1
Feb.	4	0.2	1.7	0.3	0	0.0	0.0	0.0	2,124.5	72.6	-0.1
Mar.	6	0.4	3.1	0.6	0	0.0	0.0	0.0	2,124.4	72.4	-0.2
Apr.	10	0.6	7.8	1.6	0	0.0	0.0	0.0	2,124.2	71.4	-1.0
May	15	0.9	9.3	1.9	3	0.2	0.0	0.0	2,123.8	70.2	-1.2
June	15	0.9	11.4	2.3	3	0.2	0.0	0.0	2,123.3	68.6	-1.6
July	19	1.2	13.8	2.7	11	0.7	0.0	0.0	2,122.7	66.4	-2.2
Aug.	15	0.9	11.8	2.3	11	0.7	0.0	0.0	2,122.1	64.3	-2.1
Sep.	5	0.3	10.1	1.9	3	0.2	0.0	0.0	2,121.5	62.5	-1.8
Oct.	2	0.1	7.1	1.3	0	0.0	0.0	0.0	2,121.2	61.3	-1.2
Nov.	3	0.2	3.3	0.6	0	0.0	0.0	0.0	2,121.0	60.9	-0.4
Dec.	2	0.1	1.9	0.3	0	0.0	0.0	0.0	2,121.0	60.7	-0.2
TOTAL	n/a	6.0	82.9	16.1	n/a	2.0	0.0	0.0	n/a	n/a	-12.1
Most probable inflow conditions											
Jan.	5	0.3	1.4	0.3	0	0.0	0.0	0.0	2,124.6	72.9	0.0
Feb.	7	0.4	1.6	0.3	0	0.0	0.0	0.0	2,124.6	73.0	0.1
Mar.	11	0.7	2.7	0.6	0	0.0	0.0	0.0	2,124.6	73.1	0.1
Apr.	18	1.1	7.0	1.4	0	0.0	0.0	0.0	2,124.5	72.8	-0.3
May	26	1.6	8.3	1.7	2	0.1	0.0	0.0	2,124.5	72.6	-0.2
June	29	1.7	10.2	2.1	2	0.1	0.0	0.0	2,124.3	72.1	-0.5
July	36	2.2	12.3	2.5	10	0.6	0.0	0.0	2,124.1	71.2	-0.9
Aug.	26	1.6	10.5	2.1	6	0.4	0.0	0.0	2,123.8	70.3	-0.9
Sep.	10	0.6	9.0	1.8	2	0.1	0.0	0.0	2,123.4	69.0	-1.3
Oct.	5	0.3	6.4	1.3	0	0.0	0.0	0.0	2,123.1	68.0	-1.0
Nov.	5	0.3	3.0	0.6	0	0.0	0.0	0.0	2,123.1	67.7	-0.3
Dec.	5	0.3	1.7	0.3	0	0.0	0.0	0.0	2,123.1	67.7	0.0
TOTAL	n/a	11.1	74.1	15.0	n/a	1.3	0.0	0.0	n/a	n/a	-5.2
Reasonable maximum inflow conditions											
Jan.	11	0.7	1.3	0.3	0	0.0	0.0	0.0	2,124.7	73.3	0.4
Feb.	16	0.9	1.4	0.3	0	0.0	0.0	0.0	2,124.9	73.9	0.6
Mar.	28	1.7	2.4	0.5	0	0.0	0.0	0.0	2,125.2	75.1	1.2
Apr.	45	2.7	6.2	1.3	0	0.0	0.0	0.0	2,125.6	76.5	1.4
May	67	4.1	7.4	1.6	3	0.2	0.0	0.0	2,126.2	78.8	2.3
June	72	4.3	9.1	2.0	3	0.2	0.0	0.0	2,126.8	80.9	2.1
July	91	5.6	11.0	2.4	3	0.2	0.0	0.0	2,127.5	83.9	3.0
Aug.	63	3.9	9.4	2.1	0	0.0	0.0	0.0	2,128.0	85.7	1.8
Sep.	25	1.5	8.1	1.9	0	0.0	0.0	0.0	2,127.9	85.3	-0.4
Oct.	10	0.6	5.7	1.3	0	0.0	0.0	0.0	2,127.7	84.6	-0.7
Nov.	15	0.9	2.6	0.6	0	0.0	0.0	0.0	2,127.8	84.9	0.3
Dec.	10	0.6	1.5	0.3	0	0.0	0.0	0.0	2,127.9	85.2	0.3
TOTAL	n/a	27.5	66.1	14.6	n/a	0.6	0.0	0.0	n/a	n/a	12.3

