RECLAMATION

Managing Water in the West

Nebraska-Kansas Area Office

Report

To The

Republican River

Compact Administration

McCook, Nebraska

BUREAU OF RECLAMATION

U.S. Department of the Interior
Bureau of Reclamation
Missouri Basin Region
Nebraska-Kansas Area Office

August 25, 2021

REPUBLICAN RIVER COMPACT MEETING

August 25, 2021
McCook, Nebraska

2020 Operations

As shown on the attached Table 1, precipitation in the Republican River Basin varied from 95 percent of normal at Medicine Creek Dam to 56 percent of normal at Trenton Dam. Total precipitation at Reclamation project dams ranged from 11.38 inches at Trenton Dam to 21.40 inches at Lovewell Dam.

Inflows varied from 56 percent of the most probable forecast at Bonny Reservoir to 143 percent of the most probable forecast at Lovewell Reservoir. Inflows into Bonny Reservoir totaled 3,772 AF while inflows at Lovewell Reservoir totaled 55,465 AF.

Average farm delivery values for total irrigable acres were as follows:

District	Farm Delivery
Frenchman Valley	0.3 inches
H&RW	0.0 inches
Frenchman-Cambridge	5.9 inches
Almena	2.3 inches
Bostwick in NE	4.6 inches
Kansas-Bostwick	5.5 inches

2020 Operation Notes

Bonny Reservoir – Remained empty at elevation 3638.00 feet, 34.0 feet below the top of conservation. The annual computed inflow totaled 3,772 AF. Reservoir inflows were bypassed the entire year as ordered by the State of Colorado. No water was bypassed into Hale Ditch in 2020.

Enders Reservoir – . The reservoir level began the year at a level of 28.6 feet (3,083.70 feet) below the top of conservation. This was the fourth lowest level ever recorded on the first of January since initial filling. The reservoir level increased gradually during the spring to a peak elevation of 3,084.74 feet on May 17th. Evaporation decreased the reservoir level from June through mid-November reaching elevation 3,081.62 feet on November 16th. 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 30.4 feet (3,081.93 feet) below the top of conservation. This was the second lowest end of year level recorded since initial filling. This was the nineteenth consecutive year that H&RW Irrigation District did not divert water. It was also the seventeenth consecutive year that storage releases were not made for Frenchman Valley Irrigation District. Frenchman Valley Irrigation District diverted 6,722 AF

of natural flow between April 16th and October 15th into Culbertson Canal.

Swanson Lake – The lake level began the year at elevation 2,740.00 feet (12.0 feet below the top of conservation) and gradually increased throughout the late winter and spring. The peak elevation on May 5th was 2,743.86 feet (8.1 feet below the top of conservation).

A slow-moving high intensity storm occurred on July 23rd causing flash flood conditions around the intersection of the Nebraska, Colorado, Kansas boarders. The area received between 5-12 inches of rain overnight. The USGS measured a peak of 2,960 cfs on the North Fork of the Republican River at Benkelman. This was the largest flow observed since 1982. The peak on the North Fork at the Colorado-Nebraska state line was 391 cfs, the highest since 1992. The Arikaree River gage near Haigler peaked at 648 cfs, the highest since 1986. Buffalo Creek near Haigler peaked at 440 cfs the highest flow for the period of record (1940 – on). Rock Creek at Parks peaked at 190 cfs, the highest since 1965. The South Fork of the Republican River near Benkelman peaked at 5,300 cfs, the highest since 1975. Approximately 9,000 AF of inflow into Swanson Lake is estimated to have been generated by this flood event.

The reservoir level decreased throughout the irrigation season and reached an elevation of 2,738.24 feet on November 16th. The district diverted 19,398 AF into Meeker-Driftwood Canal from June 22nd through September 7th. At the end of the year, the reservoir level was 13.4 feet below the top of conservation at 2,738.60 feet.

Hugh Butler Lake –. The reservoir level at the first of the year was 2,572.31 feet, 9.5 feet below the top of conservation. Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2,574.28 feet on May 26th. This was the highest elevation observed since 2009. The district diverted 5,226 AF into Red Willow Canal. Late summer evaporation exceeded inflows, decreasing the lake level to 2,568.05 feet on October 20th. The end of year elevation was 2,568.67 feet, 13.1 feet below the top of conservation.

Harry Strunk Lake – The reservoir level at the beginning of 2020 was 0.2 feet below the top of conservation at 2,365.87 feet. The reservoir level was maintained near 0.5 foot below top of conservation from late-January through late-April with inflows passed through the outlet works. The reservoir level peaked at elevation 2366.80 feet on May 28th. Irrigation releases started May 1st. The reservoir filled to top of conservation on May 7th. Releases through the outlet works continued through September 4th reducing the reservoir level to 2,353.18 feet. The district diverted 26,714 AF into Cambridge Canal. The end of year elevation was 2,359.72 feet at the end of the year (6.4 feet below the top of conservation).

Keith Sebelius Lake – The reservoir was 4.4 feet below the top of conservation pool at the first of the year (2,299.94 feet). Late winter, spring and summer inflows gradually increased the lake level to a summer peak of 2,301.35 feet on May 28th. This was the highest elevation observed since 2000. Irrigation releases began July 4th and finished for the season on August 18th. Approximately 3,951 AF was released from Norton Dam for irrigation of which 3,076 AF was diverted into the Almena Canal. Inflows in December exceeded evaporation gradually increasing the elevation to the end of year elevation of 2,297.19 feet, 7.1 feet below the top of

conservation.

Harlan County Lake – Harlan County Lake began 2020 approximately 1.2 feet above the top of conservation pool, at 1946.89 feet. This was the highest beginning year elevation since dam completion (1952). The Corps of Engineers made varying flood releases all spring and early summer to keep the pool elevation near top of conservation which totaled approximately 85,500 AF. The conservation pool as well as accumulated flood pool were split June 15th as irrigation releases began. The projected irrigation supply at the end of June was 143,392 AF. It was determined that Water Short Year Administration would not be in effect in 2020. Both NBID and KBID were able to utilize some of the flood release for irrigation. Bostwick in Nebraska Irrigation District diverted 35,402 AF in 2020. A ten year summary of Harlan County Lake operations is shown on Table 3.

Lovewell Reservoir – The reservoir elevation at the beginning of 2020 was 1,582.68 feet (0.08 feet above the top of conservation). Various releases were made throughout the spring to keep the reservoir about a foot below top of conservation. Releases ceased April 7th. Irrigation releases for canal seasoning/flushing began June 1st with releases in earnest beginning starting mid-June and continued until September 15th. A series of hard rains at the end of July caused the reservoir elevation to raise 4.8 feet in 10 days to the yearly peak elevation of 1586.07 feet (3.5 feet) on July 29th. Flood releases were staged up to 745 cfs at the beginning of August. Flood releases were staged down and by August 11th top of conservation was reached. 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 1,581.03 feet (1.6 foot below top of conservation). KBID diverted a total of 42,667 AF in 2020.

Current Operations (As of 7/31/21)

Bonny Reservoir – The reservoir is currently empty. Inflows continue to be bypassed through the reservoir as ordered by the State of Colorado. No water has been released into Hale Ditch in 2021. Bonny Dam has recorded 14.16 inches of precipitation during the first seven months of the year (120% of average).

Enders Reservoir - The reservoir level is currently 30.00 feet below full and 1.15 feet below last year at this time. Enders Dam recorded 12.05 inches of precipitation during the first seven months of the year (91% of normal). Due to the water supply shortage, H&RW Irrigation District is not irrigating for the twentieth year in a row. This is also the eighteenth consecutive year that Frenchman Valley Irrigation District has not received storage water for irrigation.

Swanson Lake – The lake level is currently 12.2 feet from full and is 1.5 feet below last year at this time. Precipitation for the year is at 82% of normal (11.15 inches). Irrigation releases began on June 21st.

Hugh Butler Lake – The lake level is currently 13.2 feet below full and is 2.47 feet below last year at this time. Irrigation releases began on June 21st. The precipitation total so far this

year is 13.36 inches (103% of normal).

Harry Strunk Lake – The lake level is currently 3.6 feet below the top of conservation. Precipitation at the dam during the first seven months of the year was 15.21 inches (108% of normal). Irrigation releases began on May 10th . The lake level is currently 1.86 feet above last year at this time.

Keith Sebelius Lake – The lake is currently 8.0 feet below full. Lake level is 3.45 feet below last year at this time. Irrigation releases began July 13th. Precipitation at the dam during the first seven months of the year was 15.57 inches (97% of normal).

Harlan County Lake – The current water surface level is approximately 1.54 feet below full. The lake level is 1.23 feet below last year at this time. Harlan County Dam has recorded 20.75 inches of precipitation so far this year (137% of normal). Flood releases started in 2020 and continued through June 14th of this year when the pool was split and irrigation releases commenced. The available irrigation supply from Harlan County Lake on June 30th was 141,404 AF.

Lovewell Reservoir – The reservoir level is currently 4.3 feet below the top of conservation and approximately 7.96 feet below last year's elevation at this time. Lovewell Dam recorded 16.47 inches of precipitation during the first seven months of the year (94% of average). Canal releases began on May 25th.

A summary of data for the first seven months of 2021 is shown on Table 2.

TABLE 1
NEBRASKA-KANSAS PROJECTS
Summary of Precipitation, Reservoir Storage and Inflows
CALENDAR YEAR 2020

Reservoir	Total Precip. Inches	Percent Of Average %	Storage 12-31-19 AF	Storage 12-31-20 AF	Gain or Loss AF	Maximum Content AF	Storage Date	Minimum Content AF	Storage Date	Total Inflow AF	Percent Of Most Probable %
Box Butte	12.64	73	21,979	14,856	-7,123	27,974	5/28	11,022	8/29	16,289	106
Merritt	21.99	103	60,298	61,100	802	66,204	6/10	45,060	9/7	229,555	123
Calamus	19.42	77	81,765	96,864	15,099	122,537	5/28	69,205	9/16	367,867	139
Davis Creek	20.23	78	12,606	12,637	31	26,087	6/23	11,762	4/25	57,433	118
Bonny	11.90	67	0	0	0	0	#N/A	0	#N/A	3,772	56
Enders	11.95	62	9,786	8,638	-1,148	10,491	5/17	8,467	11/2	3,733	63
Swanson	11.38	56	60,264	55,478	-4,786	74,563	6/5	54,280	11/16	28,996	113
Hugh Butler	15.60	78	22,620	18,430	-4,190	25,124	5/25	17,767	10/20	7,321	67
Harry Strunk	20.04	95	34,226	24,696	-9,530	35,953	5/28	16,794	9/7	36,134	88
Keith Sebelius	19.05	76	25,829	21,197	-4,632	28,441	5/28	20,960	11/17	7,566	115
Harlan County	17.38	74	329,729	279,631	-50,098	328,511	1/1	274,168	10/27	125,674	119
Lovewell	21.40	77	35,905	31,163	-4,742	46,837	7/30	25,349	9/8	55,465	143
Kirwin	21.47	90	98,255	90,582	-7,673	100,710	5/28	87,099	10/25	45,763	172
Webster	17.42	73	78,208	69,098	-9,110	79,476	6/1	65,780	10/25	48,914	275
Waconda	26.70	105	212,798	208,367	-4,431	276,785	8/4	203,525	2/20	273,882	219
Cedar Bluff	20.01	94	110,720	106,503	-4,217	116,533	4/28	106,455	12/23	18,585	148

TABLE 2
NEBRASKA-KANSAS AREA OFFICE
Summary of Precipitation, Reservoir Storage and Inflows

JANUARY - JULY 2021

Reservoir	Precip. Inches	Percent Of Average %	Storage 7/31/2020 AF	Storage 7/31/2021 AF	Gain or Loss AF	Inflow AF	Percent Of Most Probable %
Bonny	14.16	120	0	0	0	1,688	35
Enders	12.05	91	9,622	8,885	(737)	2,960	82
Swanson	11.15	82	64,905	59,602	(5,303)	21,881	105
Hugh Butler	13.36	103	21,146	18,701	(2,445)	6,340	86
Harry Strunk	15.21	108	25,997	28,676	2,679	20,188	76
Keith Sebelius	15.57	97	25,474	19,799	(5,675)	5,543	115
Harlan County	20.75	137	310,009	294,015	(15,994)	96,954	129
Lovewell	16.47	94	46,557	23,500	(23,057)	33,198	126

Inflow at Swanson Lake includes water from augmentation (pumping) projects.

TABLE 3
HARLAN COUNTY LAKE

Year	Inflow (AF)	Outflow (AF)	Gross Evap. (AF)	Precip. (Inches)	Precipitation		End of Year Content (AF)	**Projected Irrig. Water Supply On June 30th (AF)**
					Harlan County Dam* (% of Average)	Rep. Basin Dams (% of Average)		
2011	174,830	120,989	49,241	30.69	133%	115%	322,964	**157,700**
2012	78,581	160,221	50,199	18.14	78%	64%	191,125	**132,900**
2013	48,794	75,355	40,042	17.46	75%	83%	124,522	**81,400**
2014	92,209	35,502	32,387	18.53	80%	105%	148,842	**59,000**
2015	106,728	54,502	33,652	28.85	125%	115%	167,416	**79,600**
2016	126,679	63,972	35,920	27.82	120%	109%	194,203	**103,500**
2017	118,889	52,764	36,081	26.60	115%	104%	224,247	**111,600**
2018	120,146	53,451	35,914	29.61	128%	128%	255,028	**106,600**
2019	402,546	272,471	55,374	30.94	134%	132%	329,729	**139,716**
2020	125,674	130,068	45,704	17.38	75%	74%	279,631	**143,392**

NOTE: On June 30, 2021 Projected Irrigation Water Supply was 141,404 AF.
* Average Annual Precipitation at Harlan County Dam is 23.13 inches