WATER SUPPLY ASSESSMENT
Town of Ridgway, Colorado

Prepared for:
Town of Ridgway

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Project Number: 21630-01

The technical material in this report was prepared by or under the supervision and direction of the undersigned, whose seal as a Professional Engineer/Hydrologist is affixed below.

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SECTION 1: INTRODUCTION

LRE Water, Inc. ("LRE Water") was retained by the Town of Ridgway ("Town") to complete an investigative study of the Town's water supply system. The objective of this investigation was first to quantify the Town's existing and future water demands, then to evaluate the adequacy of the Town's existing water supply system to meet those demands, and finally to identify any deficiencies in either available physical or legal supply.

The following Water Supply Assessment is the culmination of that study. It summarizes the best available information and data related to the Town's existing water supply system, describes the process and methodologies used to analyze the system's ability to meet existing and future demands, and provides the Town with recommendations from which existing operations can be evaluated and future decisions can be guided. Section 2.0 of the report examines the production and delivery of water through the Town's potable treatment system. Through this process, LRE Water derived the per capita water demand and the monthly and annual requirement of the existing system, which was subsequently used as a basis for projecting the Town's future water requirements at buildout. Section 2.0 of the report also establishes an approximate timeline for when that future demand level will be reached based on various growth scenarios provided by the Town. Section 3.0 of the report then analyzes the physical and legal availability of water to the Town's water system to meet the existing and future demands outlined in Section 2.0, and finally, Section 4.0 of the report summarizes the findings of the study and provides water supply strategies to help assist the Town in securing and maintaining a long term reliable water supply.

1.1 SCOPE OF WORK

As outlined in LRE Water's proposal to the Town, the approach and methodology for completing a water supply assessment included six tasks:

1. Review Water Supply System & Water Right Portfolio
   At the onset of the investigative study, LRE Water met with key personnel from the Town ("Town Staff") on several occasions. The information obtained from these meetings and from the review of documents and materials that were provided to LRE Water by the Town and that were available through public databases set the foundation for LRE Water's understanding of Ridgway's water supply system: operations, infrastructure, and supporting water rights portfolio. As part of this task, LRE Water compiled and organized a notebook of decrees and other documents associated with the Town's water rights portfolio. These materials are attached in ***Appendix A***.

2. Quantify Existing and Future Water Demands
   LRE Water used the Town's available water records as a basis for determining the existing per capita demand, and then worked with Town Staff to establish a range of growth rates from which the amount and timing of future potable and non-potable water demands were quantified. This analysis can be found in Section 2.0: Water System Demands.

3. Analyze Physical Water Availability with and without Climate Change Considerations
   LRE Water relied on available diversions and storage records to evaluate the water supply that is physically available from Beaver Creek and Cottonwood Creek. The period of record that was evaluated included a variety of average, wet, and dry year conditions, including several periods of extended drought. These year types were then used as a basis for developing hydrology that applied "hot and dry" climate change considerations. Details related to the historic hydrology can be found in Section 3.1: Physical Water Supply, and detail related to the climate change analysis can be found in Section 3.3: Climate Change Considerations.

4. Analyze Yield of Water Rights Portfolio
   LRE Water developed a firm yield model to evaluate the ability of the Town's existing water supply system to meet existing and future demands under various hydrologic conditions (historic and climate change) and operational scenarios. The water right considerations used in the model are described in Section 3.2: Legal Water Supply, and the development of the firm yield model including inputs, assumptions, scenarios, and results can be found in Section 3.4: Reliability of Town's Water System.

5. Critique of Water Right Portfolio
   The modeled scenarios showed under what conditions the Town's water system may be stressed or unable to meet demands. LRE Water provided general strategies to improve the reliability of the Town's water system in Section 4.0: Water Supply Strategies.

6. Recommendations
   Section 5.0 of this report highlights key study findings and provides the Town with specific recommendations based on those findings.

SECTION 2: WATER SYSTEM DEMANDS

The Town of Ridgway is located in central Ouray County, Colorado, near the confluence of the Uncompahgre River and Dallas Creek, as shown in ***Figure 1***. This former railroad town was established in 1891 and is the most populous municipality in the county with a current population of approximately 1,150 residents. The municipal water demand within the Town's existing service area is primarily supplied by two sources: Beaver Creek and Cottonwood Creek. The supply that originates from the Beaver Creek drainage is available on a year-round basis, and is currently diverted through the Ridgway Ditch and delivered directly to the Town's Ridgway Reservoir (a.k.a. "Pre-sedimentation Ponds") or stored in Otonowanda Reservoir (a.k.a "Lake Otonowanda") and then subsequently delivered to the Pre-sedimentation Ponds. The supply that originates from the Cottonwood Creek drainage, can have limited availability during the late-summer and early-fall of dry years. This supply is diverted through the Happy Hollow Ditch and delivered directly to the Pre-sedimentation Ponds. From the Pre-sedimentation Ponds, the delivered water supply is then treated at the water plant for municipal uses or taken through the raw water (non-potable) system for irrigation. A schematic of the Town's water system is shown in ***Figure 2***.

In order to assess the future reliability of the Town's existing water system, LRE Water developed a series of scenarios wherein forecasted municipal demand levels were evaluated against historic hydrology and future hydrology that included climate change considerations. The forecasted, future demands were based on existing water use data. The Town maintains a production record at its water treatment plant, and LRE Water used this data to quantify the magnitude and pattern of use for existing water demands within the Town's service area. These existing conditions and LRE Water's forecasted future demands are described more fully in the following sub-sections.

2.1 EXISTING WATER SYSTEM DEMANDS

Town's existing municipal water system has both a treated potable component and a raw water non-potable component. The treated potable water supply is delivered throughout the service area and supports both indoor domestic demands and the outdoor irrigation of lawns and gardens. The non-potable supply is delivered through a raw water line for the irrigation of larger open space and park lands. Both of these components receive water supplies from the Town's diversions on Beaver Creek and Cottonwood Creek, and combined, the treated and raw water system are representative of the Town's overall total municipal water demand.

- **Total Municipal Demand** = **Treated** Potable Supply + **Raw Water** Irrigation System

In order to forecast the total future municipal water demands, LRE Water examined each demand component separately. The demand on the treated water system will increase with population growth, whereas the demand on the raw water system will be tied to the future development of open space and park lands.

2.1.1 Existing Potable Water Demands

In its examination of the Town's treated water system, LRE Water relied on the Town's monthly production data. Town Staff indicated that based on sales, the production record likely overestimates the amount of water used, and that the difference between production and actual use could be attributed to the accuracy of meters and leaks within the system. Nevertheless, the production record is the best available source of data and provides a conservative approximation of the Town's existing water demands.

The record covered 22 years from January 2000 through July 2021. In order to review existing conditions, LRE Water focused its analysis on the last 5-year and 10-year periods. From 2011 to 2020, the Town on average produced approximately 62.9 million gallons ("MG") or 193.1 acre-feet ("AF") through its municipal treatment plant. In the last 5-year, from 2016 to 2020, the treated demand has increased by approximately 9% to an average annual volume of 68.8 MG or 211.1 AF. This increase likely reflects the Town's growth from a population of approximately 925 residents in 2010 to the existing population of approximately 1,150 residents. On a per capita basis, LRE Water quantified the average daily demand in the winter to be approximately 125 gallons per day ("gpd"). This winter demand is representative of the treated indoor water supply that on average one person consumes per day. In LRE Water's evaluation of municipal treatment plants for similarly sized mountain communities, a per capita demand of 125 gpd is on the higher end of the range, which is consistent with Town Staff's observation that the production record overestimates the actual water use. Based on sales, Town Staff estimates that the delivered supply on a per capita basis is closer to 70 gpd. While there is potential to improve the existing water supply system such that the production level better matches sales, for the purposes of this assessment, LRE Water chose to model the higher production rate. LRE Water also examined the per capita summer demand, which includes the use of treated water for irrigating lawns and gardens. On average, the daily per capita demand nearly doubled to 250 gpd. This increase from the baseline indoor winter use to a treated summer supply that includes irrigation is consistent with what LRE Water has observed in its evaluation of other similarly sized mountain communities. A summary of the Town's annual production over the last 10-years is shown in ***Figure 3***, and a summary of the average monthly production rate is shown in ***Figure 4***.

2.1.2 Existing Raw Water Demands

The water supply that is delivered through the Town's raw water system is not metered. As such, for the purpose of this analysis, Town Staff provided LRE Water with an estimate of daily use during the irrigation season by subtracting the treated production from the total diversion supply for 2020. The water demand associated with irrigation typically follows a bell-shaped curve with demands increasing from late spring to a summer peak and then receding through the fall. Based on the Town's calculated estimate, the raw water system delivers approximately 0.10 million gallons per day ("MGD") or 0.18 cubic feet per second ("cfs") in April and October, and approximately 0.22 MGD or 0.41 cfs June and July. A summary of the Town's average monthly raw water supply is shown in ***Figure 4***.

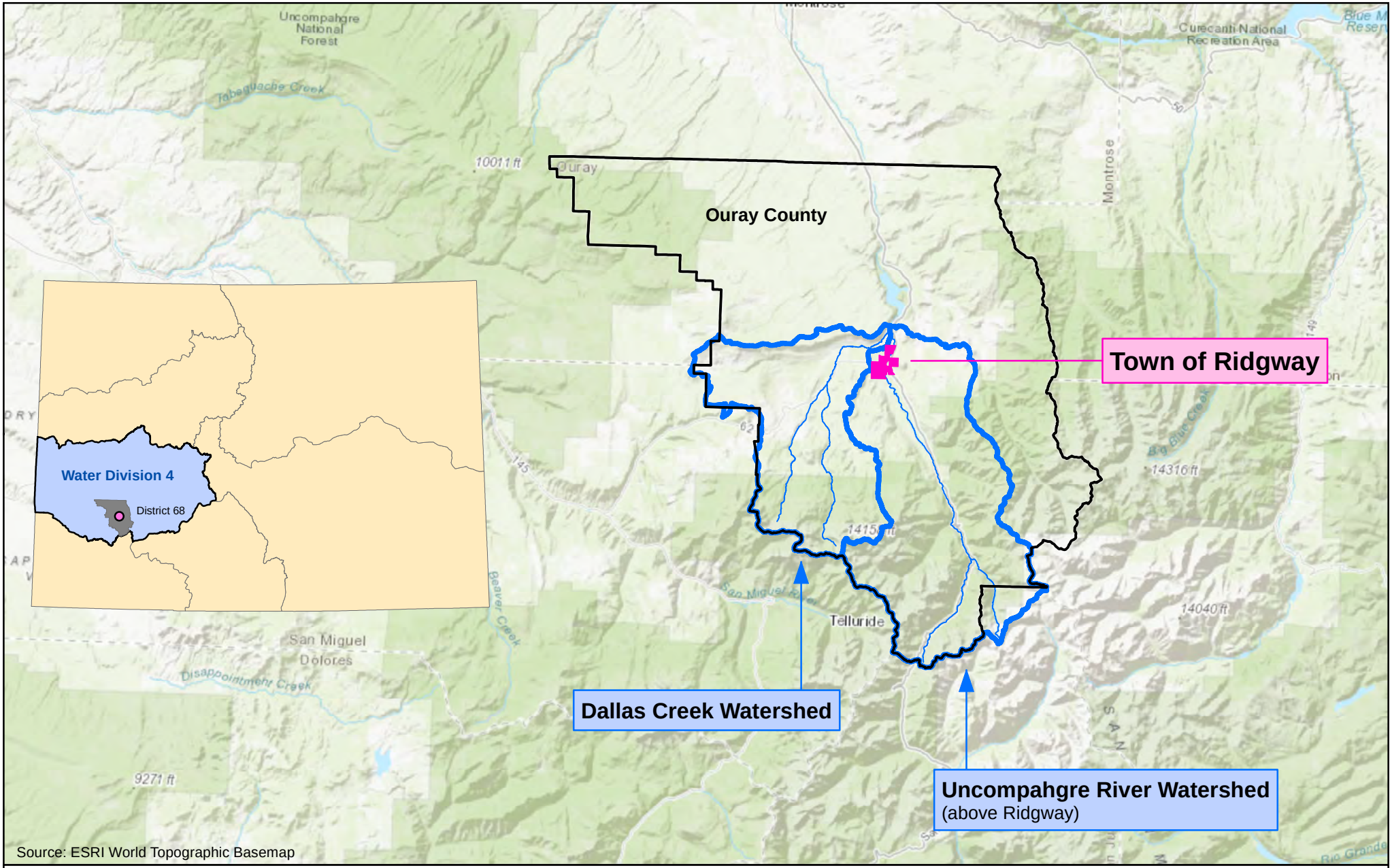


Figure 1: Project Vicinity Map
Town of Ridgway

LRE WATER

Miles
0 5 10 20

Date: 2022-01-24
File: 21630-1.0
Drawn: PCV
Approved: ANM

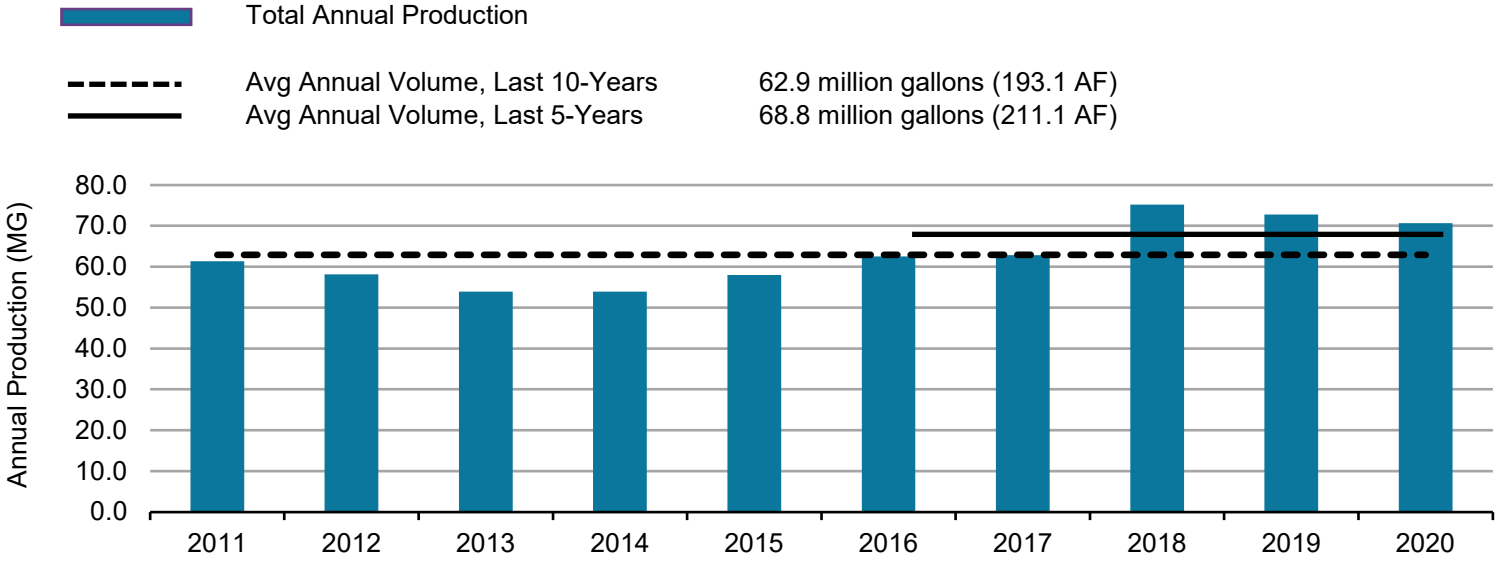
Figure 2
Schematic of the Town of Ridgway's Water Supply System

LRE WATER

Miles
0 0.5 1 2

Date: 2022-01-24
File: 21630-1.0
Drawn: PCV
Approved: ANM

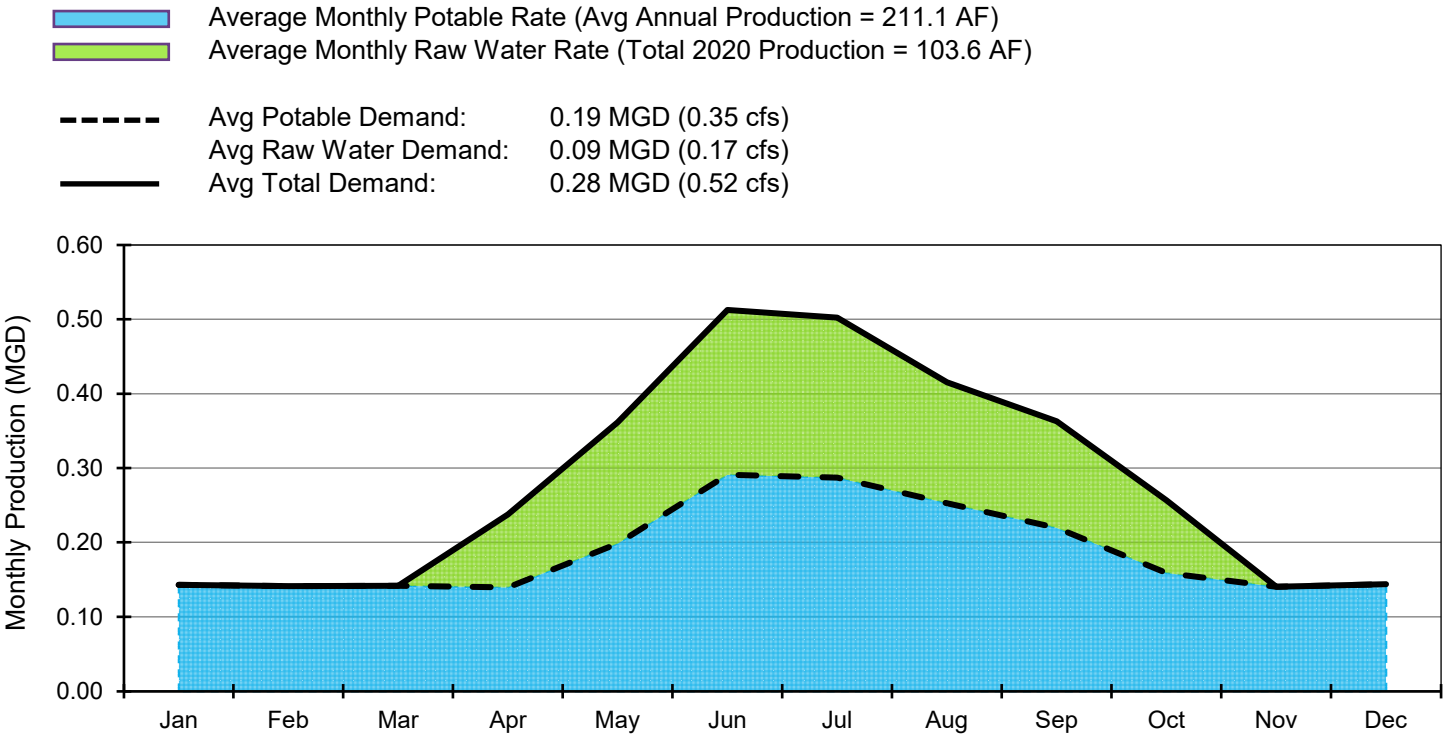
Figure 3
Town of Ridgway's Total Annual Potable Production
2011 - 2020



TOTAL ANNUAL PRODUCTION SUMMARY											
	2011 (MG)	2012 (MG)	2013 (MG)	2014 (MG)	2015 (MG)	2016 (MG)	2017 (MG)	2018 (MG)	2019 (MG)	2020 (MG)	**16-20 AVG**
Jan	3.94	3.22	3.16	3.16	3.26	3.79	3.78	4.83	4.83	4.93	**4.43**
Feb	3.74	3.52	2.72	2.72	3.01	3.71	3.38	4.06	4.31	4.31	**3.96**
Mar	3.75	3.50	3.20	3.20	3.43	3.60	3.86	4.75	5.02	4.75	**4.40**
Apr	3.48	3.86	2.93	2.93	4.30	3.51	3.65	4.69	4.73	4.37	**4.19**
May	4.99	7.14	4.49	4.49	4.23	5.04	5.15	7.68	5.46	7.43	**6.16**
Jun	8.83	8.78	7.41	7.41	6.75	8.77	9.06	9.46	8.27	8.11	**8.73**
Jul	7.52	6.93	8.63	8.63	7.66	9.07	8.28	9.47	9.55	8.13	**8.90**
Aug	7.80	5.83	6.20	6.20	7.54	6.84	6.84	8.72	8.23	8.52	**7.83**
Sep	6.48	5.44	5.11	5.11	6.16	6.12	6.45	7.18	6.81	6.35	**6.58**
Oct	4.34	3.73	3.71	3.71	4.92	4.46	4.51	5.12	5.38	5.15	**4.92**
Nov	3.66	3.04	2.97	2.97	3.31	3.61	3.69	4.43	5.45	3.91	**4.22**
Dec	2.83	3.12	3.41	3.41	3.43	3.98	4.16	4.75	4.69	4.74	**4.46**
Total	**61.36**	**58.10**	**53.93**	**53.93**	**58.00**	**62.50**	**62.81**	**75.17**	**72.74**	**70.69**	**68.78**

	2011 (AF)	2012 (AF)	2013 (AF)	2014 (AF)	2015 (AF)	2016 (AF)	2017 (AF)	2018 (AF)	2019 (AF)	2020 (AF)	**16-20 AVG**
Jan	12.1	9.9	9.7	9.7	10.0	11.6	11.6	14.8	14.8	15.1	**13.6**
Feb	11.5	10.8	8.3	8.3	9.2	11.4	10.4	12.5	13.2	13.2	**12.1**
Mar	11.5	10.7	9.8	9.8	10.5	11.1	11.8	14.6	15.4	14.6	**13.5**
Apr	10.7	11.8	9.0	9.0	13.2	10.8	11.2	14.4	14.5	13.4	**12.9**
May	15.3	21.9	13.8	13.8	13.0	15.5	15.8	23.6	16.8	22.8	**18.9**
Jun	27.1	26.9	22.7	22.7	20.7	26.9	27.8	29.0	25.4	24.9	**26.8**
Jul	23.1	21.3	26.5	26.5	23.5	27.8	25.4	29.1	29.3	24.9	**27.3**
Aug	23.9	17.9	19.0	19.0	23.1	21.0	21.0	26.8	25.2	26.2	**24.0**
Sep	19.9	16.7	15.7	15.7	18.9	18.8	19.8	22.0	20.9	19.5	**20.2**
Oct	13.3	11.4	11.4	11.4	15.1	13.7	13.8	15.7	16.5	15.8	**15.1**
Nov	11.2	9.3	9.1	9.1	10.1	11.1	11.3	13.6	16.7	12.0	**12.9**
Dec	8.7	9.6	10.5	10.5	10.5	12.2	12.8	14.6	14.4	14.5	**13.7**
Total	**188.3**	**178.3**	**165.5**	**165.5**	**178.0**	**191.8**	**192.8**	**230.7**	**223.2**	**216.9**	**211.1**

Figure 4
Town of Ridgway's Average Monthly Potable and Raw Water Production
2016 - 2020



	AVERAGE MONTHLY POTABLE PRODUCTION SUMMARY											
	Jan (MGD)	Feb (MGD)	Mar (MGD)	Apr (MGD)	May (MGD)	Jun (MGD)	Jul (MGD)	Aug (MGD)	Sep (MGD)	Oct (MGD)	Nov (MGD)	Dec (MGD)
2016	0.12	0.13	0.12	0.12	0.16	0.29	0.29	0.22	0.20	0.14	0.12	0.13
2017	0.12	0.12	0.12	0.12	0.17	0.30	0.27	0.22	0.22	0.15	0.12	0.13
2018	0.16	0.15	0.15	0.16	0.25	0.32	0.31	0.28	0.24	0.17	0.15	0.15
2019	0.16	0.15	0.16	0.16	0.18	0.28	0.31	0.27	0.23	0.17	0.18	0.15
2020	0.16	0.15	0.15	0.15	0.24	0.27	0.26	0.27	0.21	0.17	0.13	0.15
Avg	**0.14**	**0.14**	**0.14**	**0.14**	**0.20**	**0.29**	**0.29**	**0.25**	**0.22**	**0.16**	**0.14**	**0.14**

	Jan (cfs)	Feb (cfs)	Mar (cfs)	Apr (cfs)	May (cfs)	Jun (cfs)	Jul (cfs)	Aug (cfs)	Sep (cfs)	Oct (cfs)	Nov (cfs)	Dec (cfs)
2016	0.23	0.25	0.22	0.22	0.30	0.54	0.54	0.41	0.38	0.27	0.22	0.24
2017	0.23	0.22	0.23	0.23	0.31	0.56	0.50	0.41	0.40	0.27	0.23	0.25
2018	0.29	0.27	0.28	0.29	0.46	0.59	0.57	0.52	0.44	0.31	0.27	0.28
2019	0.29	0.29	0.30	0.29	0.33	0.51	0.57	0.49	0.42	0.32	0.34	0.28
2020	0.30	0.29	0.28	0.27	0.45	0.50	0.49	0.51	0.39	0.31	0.24	0.28
Avg	**0.27**	**0.26**	**0.26**	**0.26**	**0.37**	**0.54**	**0.53**	**0.47**	**0.41**	**0.30**	**0.26**	**0.27**

	MONTHLY RAW WATER DEMAND SUMMARY											
	Jan (MGD)	Feb (MGD)	Mar (MGD)	Apr (MGD)	May (MGD)	Jun (MGD)	Jul (MGD)	Aug (MGD)	Sep (MGD)	Oct (MGD)	Nov (MGD)	Dec (MGD)
2020	0.00	0.00	0.00	0.10	0.16	0.22	0.22	0.16	0.14	0.10	0.00	0.00

	Jan (cfs)	Feb (cfs)	Mar (cfs)	Apr (cfs)	May (cfs)	Jun (cfs)	Jul (cfs)	Aug (cfs)	Sep (cfs)	Oct (cfs)	Nov (cfs)	Dec (cfs)
2020	0.00	0.00	0.00	0.18	0.30	0.41	0.40	0.30	0.27	0.18	0.00	0.00

2.2 DEMAND FORECAST (2021 TO 2050)

LRE Water forecasted future demands from 2021 to 2050 under various growth scenarios, using the Town's existing water demands as a baseline starting point. The total municipal water demand includes both the treated water demand and the raw water demand. For the treated municipal supply component, the annual baseline demand for existing conditions was calculated to be 68.8 MG or 211.1 AF based on the 5-year average production from 2016 to 2020. The future municipal water demands for the treated supply component were then forecasted using three estimated population growth rates, which are described in more detail in Section 2.2.1 below. For the raw water supply component, the annual baseline demand for existing conditions was estimated to be 33.7 MG or 103.6 AF, and future water demands were based on an overall increase of 25% by 2050. The total combined demand from the treated and raw water systems were then modeled against the available physical and legal supply in order to assess the reliability of the Town's municipal system.

2.2.1 Potable Water Demand Projections

In order to forecast the potential future population within the Town's service area, LRE Water relied on information that was provided by Town Staff. In particular, a summary titled "Population Projections and Basis for Projecting Future Needs," which is included in ***Appendix B***. This information was extremely helpful and allowed LRE Water to model a range of potable water demands. In total, three growth rates were used to forecast future demands over a 30-year period from 2021 to 2050, as shown in ***Figure 5***.

Growth Rates

- **Low Growth: +23% from 2021 to 2050:** The low growth scenario is based data from the State Demographer Office for the County, which assumes that the Town of Ridgway will experience the same annual growth rates as projected for Ouray County. Under this scenario, the population would increase from approximately 1,150 to 1,415 residents, and the potable water demand would increase from 68.8 MG or 211.1 AF to 84.3 MG or 258.7 AF (+15.5 MG or +47.6 AF).

- **Medium Growth: +37% from 2021 to 2050:** The medium growth scenario assumes that the Town will grow 54% faster than Ouray County, based on the last 20-years of growth. Under this scenario, the population would increase from approximately 1,150 to 1,575 residents, and the potable water demand would increase from 68.8 MG or 211.1 AF to 94.1 MG or 288.8 AF (+25.3 MG or +77.7 AF).

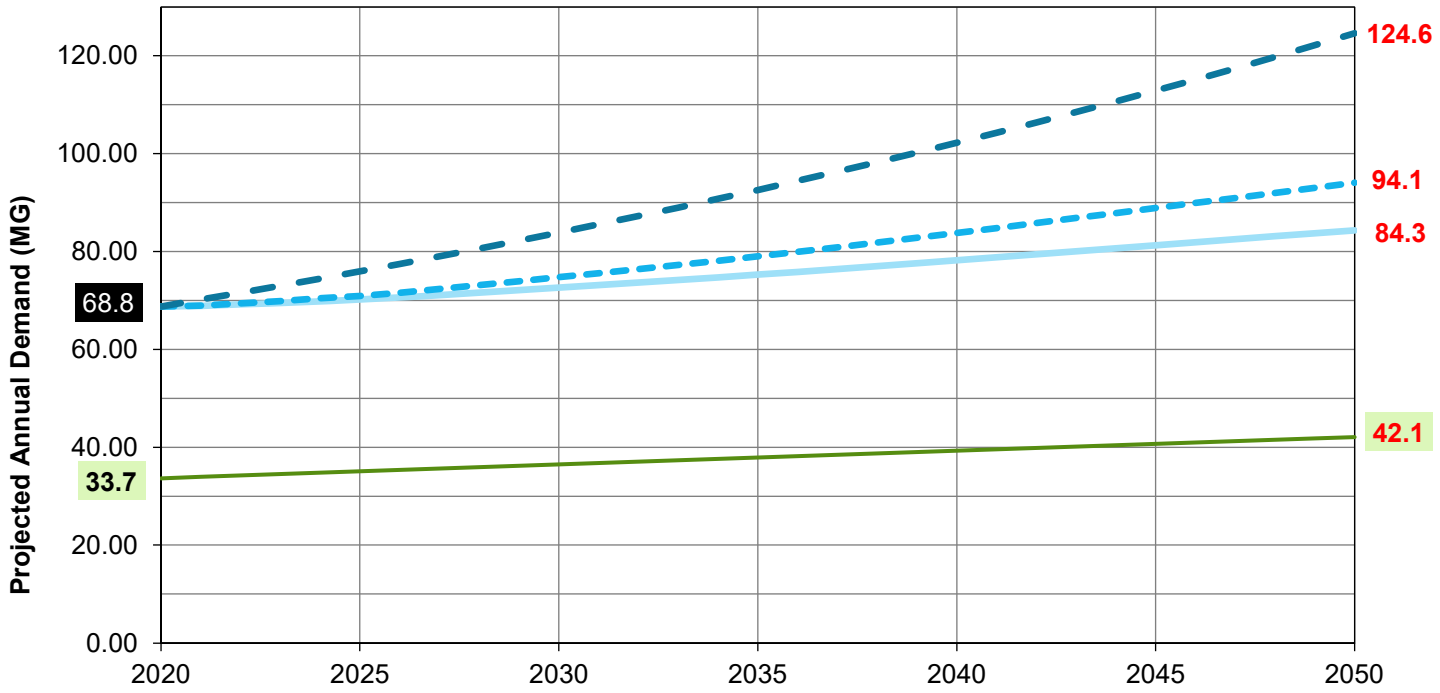
- **High Growth: +81% from 2021 to 2050:** The high growth scenario assumes that the Town will grow at a rate similar to that which occurred from 2000-2020, which is 2% annually. Under this scenario, the population would increase from approximately 1,150 to 2,080 residents, and the potable water demand would increase from 68.8 MG or 211.1 AF to 124.6 MG or 382.4 AF (+55.8 MG or +171.3 AF).

2.2.2 Raw Water Demand Projections

Future raw water demands were forecasted based on Town Staff's estimate that the overall system would increase 25% by 2050. The existing raw water demand was estimated to be approximately 33.7 MG or 103.6 AF, and with an increase of 25%, the 2050 demand would be equal to 42.1 MG or 129.3 AF (+8.4 MG or 25.7 AF). LRE Water applied a linear annual growth rate in order to forecast this increase over the 30-year study period from 2021-2050, as shown in ***Figure 5***.

Figure 5
Town of Ridgway's Projected Annual Demand Volume
2021 - 2050

	Population
Low Growth: +23% from 2021 to 2050	
2021 Existing Demand = 68.8 MG or 211.1 AF	(1,150 residents)
2050 Future Demand = **84.3 MG** or **258.7 AF**	(1,415 residents)
Medium Growth: +37% from 2021 to 2050	
2021 Existing Demand = 68.8 MG or 211.1 AF	(1,150 residents)
2050 Future Demand = **94.1 MG** or 288.8 AF	(1,575 residents)
High Growth: +81% from 2021 to 2050	
2021 Existing Demand = 68.8 MG or 211.1 AF	(1,150 residents)
2050 Future Demand = **124.6 MG** or 382.4 AF	(2,080 residents)
Raw Water Demand: +25% from 2021 to 2050	
2021 Existing Demand = 33.7 MG or 103.6 AF	
2050 Future Demand = **42.1 MG** or 129.3 AF	



	PROJECTED 2050 AVERAGE MONTHLY POTABLE & RAW WATER PRODUCTION											
	Jan (MGD)	Feb (MGD)	Mar (MGD)	Apr (MGD)	May (MGD)	Jun (MGD)	Jul (MGD)	Aug (MGD)	Sep (MGD)	Oct (MGD)	Nov (MGD)	Dec (MGD)
High	0.26	0.26	0.26	0.25	0.36	0.53	0.52	0.46	0.40	0.29	0.25	0.26
Medium	0.20	0.19	0.19	0.19	0.27	0.40	0.39	0.35	0.30	0.22	0.19	0.20
Low	0.18	0.17	0.17	0.17	0.24	0.36	0.35	0.31	0.27	0.19	0.17	0.18
Raw	0.00	0.00	0.00	0.12	0.20	0.28	0.27	0.20	0.18	0.12	0.00	0.00

	Jan (cfs)	Feb (cfs)	Mar (cfs)	Apr (cfs)	May (cfs)	Jun (cfs)	Jul (cfs)	Aug (cfs)	Sep (cfs)	Oct (cfs)	Nov (cfs)	Dec (cfs)
High	0.40	0.40	0.40	0.39	0.56	0.82	0.81	0.71	0.62	0.45	0.39	0.40
Medium	0.30	0.30	0.30	0.30	0.42	0.62	0.61	0.54	0.47	0.34	0.30	0.31
Low	0.27	0.27	0.27	0.27	0.38	0.55	0.55	0.48	0.42	0.30	0.27	0.27
Raw	0.00	0.00	0.00	0.19	0.32	0.43	0.42	0.32	0.28	0.19	0.00	0.00

SECTION 3: WATER AVAILABILITY

In Section 2.2, LRE Water projected a range of future municipal water demands based on the existing demand within the Town's service area. The ability for the Town to reliably meet these future demands depends on the source of supply that is available to deliver to the treatment plant and raw water system. For a water source to be considered a dependable supply, it must be physically available at the diversion structure and the associated water right(s) must legally be able to divert that supply. Each of these aspects is equally important in determining the adequacy of a water supply system. For example, an abundant water source is unreliable if the water right that is decreed to the diverting structure is legally out-of-priority, because it is junior to the downstream calling water user. Likewise, a senior water right is unreliable if the amount of water at the diversion structure is insufficient to meet the required demand. LRE Water developed a water supply that modeled both physically and legally available to the Town. In addition, LRE Water also modeled the role that storage plays at Lake Otonowanda and to a lesser extent the Pre-sedimentation Ponds in balancing the timing of diversions to meet demands. The results of this analysis are described in the following sub-sections.

3.1 PHYSICAL WATER SUPPLY

As described in Section 2.0, the Town's existing municipal water system primarily relies on two sources of supply: Beaver Creek and Cottonwood Creek.

Beaver Creek: The Beaver Creek drainage is within the Dallas Creek watershed, which is part of the larger Uncompahgre River watershed. The portion of the Beaver Creek watershed that is above the Ridgway Ditch is approximately 1.8 square miles, which represents less than 2% of the total drainage area within the Dallas Creek watershed. While the Ridgway Ditch watershed is proportionally small, it does produce, on average, approximately 35.8 inches of precipitation annually, which is 9.6 inches more than the average annual precipitation within the entire Dallas Creek watershed. These watersheds are shown in ***Figure 6***, and the water supply that has historically been diverted through the Ridgway Ditch is summarized in Section 3.1.1.

Cottonwood Creek: The Cottonwood Creek drainage is part of the larger Uncompahgre River watershed. The portion of the Cottonwood Creek watershed that is above the Happy Hollow Ditch is approximately 3.7 square miles. This drainage area represents almost 2.5% of the Uncompahgre River watershed above its confluence with Dallas Creek. The Happy Hollow Ditch watershed has an average annual precipitation of 22.7 inches, which is 13.1 inches less than the Ridgway Ditch watershed, and the average elevation within the Happy Hollow Ditch watershed is approximately 8,500 feet, which is 2,500 feet lower than the average elevation within the Ridgway Ditch watershed. At a lower elevation, the available snowpack within the Happy Hollow Ditch watershed melts sooner than the Ridgway Ditch watershed and overall, the Cottonwood Creek drainage produces less water. These watersheds are shown in ***Figure 6***, and the water supply that has historically been diverted through the Happy Hollow Ditch is summarized in Section 3.1.3.

Dallas Creek Basin
Watershed Drainage Area: 98 sq. miles
Avg. Annual Precipitation: 26.20 inches

Dallas Creek

Town of Ridgway

Happy Hollow Ditch

Happy Hollow Watershed
Watershed Drainage Area: 3.69 sq. miles
Avg. Annual Precipitation: 22.65 inches

Cottonwood Creek

West Fork Dallas Creek

East Fork Dallas Creek

Coal Creek

Uncompahgre River

Beaver Creek

Ridgway Ditch

Ridgway Ditch Watershed
Watershed Drainage Area: 1.82 sq. miles
Avg. Annual Precipitation: 35.75 inches

Uncompahgre River Basin
Watershed Drainage Area: 149 sq. miles
Avg. Annual Precipitation: 30.87 inches

Figure 6
Watershed Summary Map

Miles
0 2.5 5 10

Date: 2022-01-24
File: 21630-1.0
Drawn: PCV
Approved: ANM

3.1.1 Ridgway Ditch Diversion System

The Ridgway Ditch diverts water from Beaver Creek at a point approximately 6 miles upstream of the confluence of the East Fork of Dallas Creek and Beaver Creek. At this location, there is a headgate structure that includes a trough, rock screen, swing gate, and side channel. Photos of this system and a review of the recently updated infrastructure can be found in the Town's 2019 Capital Assessment Report ("2019 CAR"). The 2019 CAR determined that the diversions from the headgate structure were limited to 10 cfs by the capacity of the trough. In addition, the 2019 CAR also estimated that the carrying capacity at some locations along the ditch was 2 to 5 cfs. As such, the limiting physical constraint for the system is the carrying capacity of the ditch. In addition to the supply that is diverted directly from Beaver Creek, the ditch system also collects water from several natural springs. Most notably the Austin Spring, which Town Staff estimates to flow at a constant rate of 0.13 cfs.

Division of Water Resources (DWR) maintains a record of daily diversion from Beaver Creek through the Ridgway Ditch, using a measuring device has been installed below the headgate structure. The daily record is compiled from field observations of the amount of water that is flowing through the measuring device. These field observations are recorded on a weekly or monthly basis during the summer irrigation season and less frequently during the winter non-irrigation season. The daily flow rate that is recorded between observations is assumed to be the last observed rate. This record keeping practice is common and widely accepted in evaluating available diversion supplies. For the Ridgway Ditch, the daily record dates back to 1950. There are, however, several data gaps between then and now. As such, LRE Water relied on the most recent continuous period from 1999 through 2021. This 23-year record shows that water is physically available to the Ridgway Ditch on a year-round basis with the majority of the supply being diverted during the irrigation season from May to October. In addition to DWR's diversion record, LRE Water added the estimated 0.13 cfs year-round supply from the Austin Spring in its analysis of the overall Ridgway Ditch system. In total, this system delivered on average from 1999 to 2021, approximately 1,700 AF annually. This 23-year period included a variety of wet, dry, and average year types. During the wetter years, the Ridgway Ditch system diverted more than 2,000 AF, with approximately 2,500 AF being diverted in 2010. In contrast, during drier years the system delivered just over 1,000 AF, with approximately 1,025 AF being diverted in 2021. A summary of the annual Ridgway Ditch diversion supply from 1999 to 2021 is shown in ***Figure 7***, and the average monthly diversions over the same 23-year period are summarized in ***Figure 8***.

In its analysis of the water supply that is available to the Town from the Ridgway Ditch system, LRE Water modeled operations based on (1) an estimate of the current delivery of supplies to Lake Otonowanda, and (2) maximizing the Town's entitlement to divert up to the first 2 cfs during the summer irrigation season, and while the Town has the legal right to the full water supply that is available during the winter the non-irrigation season, the modeled water supply was limited to 0.25 cfs based on Town Staff observations.

Ridgway Ditch, Modeled Physical Water Supply

- **Estimated Supply based on Current Operations:** In July 2016, the Town began to monitor Lake Otonowanda inflows ("Lake O Flume"), outflows ("Lake O Outfall"), and the change in storage contents for internal purposes. Town Staff provided this data to LRE Water, and noted that the winter observations were less accurate due to snow and ice conditions. The Lake O Flume measures the water supply from the Ridgway Ditch system before it is delivered to either the Pre-sedimentation Ponds or stored in Lake Otonowanda. LRE Water compared this Lake O Flume data to the water supply diverted by the Ridgway Ditch from 2016 to 2019, and on average, the Town received approximately 37% of the diverted supply. In addition, LRE Water assumed that of the estimated water supply from the Austin Spring the Town would receive approximately 95% of that supply at the Lake O Flume. These percentages were then used to model the Town's available water supply from the Ridgway Ditch system for the 23-year period record. By using these percentages on a yearly basis, the modeled supply shows more water is being delivered to Town in the winter non-irrigation season then what has historically been observed by Town Staff. For purposes of this assessment, though, it was determined to be the best available estimate of current operations.

  Under Current Operations, the modeled data showed that of the average total annual supply diverted by the Ridgway Ditch system from 1999 to 2021 (1,700 AF), the Town would receive approximately 675 AF. Then, in drier years, when the ditch system diverted just over 1,000 AF, the Town would receive less than 450 AF of that supply, with a minimum of approximately 435 AF in 2021. The modeled annual water supply and average monthly delivery rates for Current Operations are summarized in ***Figure 7*** and ***Figure 8***, respectively.

- **Estimated Supply based on Full Entitlement:** The Town owns the most senior water right that is decreed to divert from the Ridgway Ditch. This water right, which is described in more detail in Section 3.2.1, can divert up to 2 cfs on a year-round basis. There are two other water rights decreed to the ditch. The next water right in the hierarchy of priorities is owned by multiple parties including the Town. This water right is decreed to divert up to 25 cfs for irrigation use only, and as such, it is only available during the months of April through October. The last water right in the hierarchy is owned by the Town and is decreed to divert up to 5 cfs on a year-round basis for municipal uses. Based on this hierarchy, LRE Water modeled the potential water availability to the Town on a seasonal basis. During the summer irrigation season (April – October), the Town would receive the entire supply up to the first 2 cfs diverted by the Ridgway Ditch system, and during the winter non-irrigation season (November – March), the Town would receive the entire supply up to 0.25 cfs. The DWR diversion records show that in the winter the available physical supply on average, is greater than 1.5 cfs. However, based on Town Staff's observation at the Lake O Flume, a fraction of that supply available at the headgate is currently being delivered to Town.

For purposes of this assessment, LRE Water therefore limited the winter availability to 0.25 cfs. In addition, while the Town has ownership in the irrigation water right that diverts up to 25 cfs after the Town's senior 2 cfs water right its proportional split of that supply was not factored into the modeled water availability for three reasons: (1) the priority of this second right is more likely to be legally limited, (2) there were no supply gaps or shortages for the scenarios that evaluated future demands against the modeled Full Entitlement water supply, and (3) there are legal considerations, more fully described in Section 3.2.1, with how that supply is split.

By operating under Full Entitlement, the modeled data showed that of the average total annual supply diverted by the Ridgway Ditch system from 1999 to 2021 (1,700 AF), the Town would be entitled to approximately 800 AF, which is about 125 AF more than what the Town received under modeled Current Operations (800 AF – 675 AF = 125 AF). Then, in drier years, when the ditch system diverted just over 1,000 AF, the Town would be entitled to more than 600 AF, with a delivered supply of 690 AF in 2021 and a minimum of approximately 640 AF in 2020. In comparison to Current Operations, under Full Entitlement the dry-year annual supply to the Town would be approximately 200 AF more (2020: 640 AF – 445 AF = 195 AF & 2021: 690 AF – 435 AF = 255 AF). The modeled annual water supply and average monthly delivery rates for operating under Full Entitlement are summarized in ***Figure 7*** and ***Figure 8***, respectively.

3.1.2 Lake Otonowanda

The Ridgway Ditch delivers water approximately 5 miles from Beaver Creek to Lake Otonowanda. This storage is used to supplement the Town's municipal water system when supplies cannot be directly delivered from Ridgway Ditch and/or Happy Hollow Ditch. The reservoir exists in a natural depression, and based on information that was provided to LRE Water by Town Staff the lake has a total active storage capacity of approximately 756 AF and a maximum surface area of 59 acres. From Lake Otonowanda, storage supplies are delivered through a pipeline to the Pre-sedimentation Ponds, which are located approximately 2 miles away. This delivery pipeline has an estimated capacity of 1.7 cfs based on the 2019 CAR.

LRE Water incorporated these physical infrastructure constraints into its storage analysis, which modeled the supply and demand operations for Lake Otonowanda. In general, a water balance model accounts for the inflows to the reservoir, outflows from the reservoir, and the change in storage contents. For Lake Otonowanda, the inflow supply was equal to the amount of water delivered from the Ridgway Ditch system that was not needed to directly meet municipal demands, and the outflow supply was equal to municipal demands that could not be directly met from the Ridgway Ditch system and/or Happy Hollow Ditch. In addition to the outflow supplies that meet municipal demands, LRE Water also included evaporation and system losses. The monthly evaporation rate was derived by distributing the annual gross evaporation rate, as delineated in the NOAA Technical Report NWS 33 (TR33), by monthly percentages outlined in DWR guidelines for reservoirs above 6,500 feet in elevation, and system losses were estimated to be 2.5% per

month based on discussion with Town Staff. As described in more detail in Section 3.4, LRE Water also evaluated scenarios wherein the system losses were set to 0% per month. While it would be highly unlikely for the Town to eliminate all system losses, LRE Water modeled no loss scenarios in order to understand the impact that losses have on the reliability of the Town's overall system. LRE Water modeled these Lake Otonowanda operations from 1999 to 2021 based on the 23-year water availability record for the Ridgway Ditch system.

3.1.3 Happy Hollow Ditch System

The Happy Hollow Ditch diverts water from Cottonwood Creek at a point approximately 2 miles upstream of its confluence with the Uncompahgre River. According to Town Staff, diversions from Cottonwood Creek are preferred over supplies delivered from either the Ridgway Ditch system or Lake Otonowanda, because the water quality is better. Once diverted, the Happy Hollow Ditch supply is then delivered through a pipeline to the Town's Pre-sedimentation Ponds for subsequent treatment at the Town's water plant or for direct use through the raw water system. The pipeline has an estimated capacity of 2.25 cfs.

The daily record is compiled from field observations of the amount of water that is flowing through the measuring device. These field observations are recorded on a weekly or monthly basis during the summer irrigation season and less frequently during the winter non-irrigation season. The daily flow rate that is recorded between observations is assumed to be the last observed rate. This record keeping practice is common and widely accepted in evaluating available diversion supplies. For the Ridgway Ditch, the daily record dates back to 1950.

DWR maintains a record of daily diversion from Cottonwood Creek through the Happy Hollow Ditch, using a measuring device has been installed below the headgate structure. Similar to the Ridgway Ditch, the daily record for the Happy Hollow Ditch is compiled from field observations at the measuring device. For the Happy Hollow Ditch, there is a continuous daily record from May 2004 to present. In order to evaluate the same 23-year period of record from 1999 to 2021 that was used to model the Ridgway Ditch system and storage operations at Lake Otonowanda, LRE Water used hydrology from the known period of record (2004-2021) to estimate the available water supply prior to May 2004. The known hydrology for both the Ridgway Ditch and Happy Hollow Ditch was categorized by year type (wet, dry, or average), and based on the Ridgway Ditch year types from 1999 to 2004, a like year type from the Happy Hollow Ditch from 2004 to 2021 was applied.

Happy Hollow Ditch, Modeled Physical Water Supply

- **Estimated Supply based on Current Operations:** LRE Water adjusted the diversion record for the Happy Hollow Ditch to account for the Tidwell Ditch. This ditch diverts its water supply from the same source as the Town's Happy Hollow Ditch. Tidwell Ditch has an irrigation water right that is decreed for 0.375 cfs, and this right is senior to the Town's Happy Hollow Ditch water right. While there may be times when the Tidwell Ditch is not diverting during the irrigation season, for example when the hay crop is

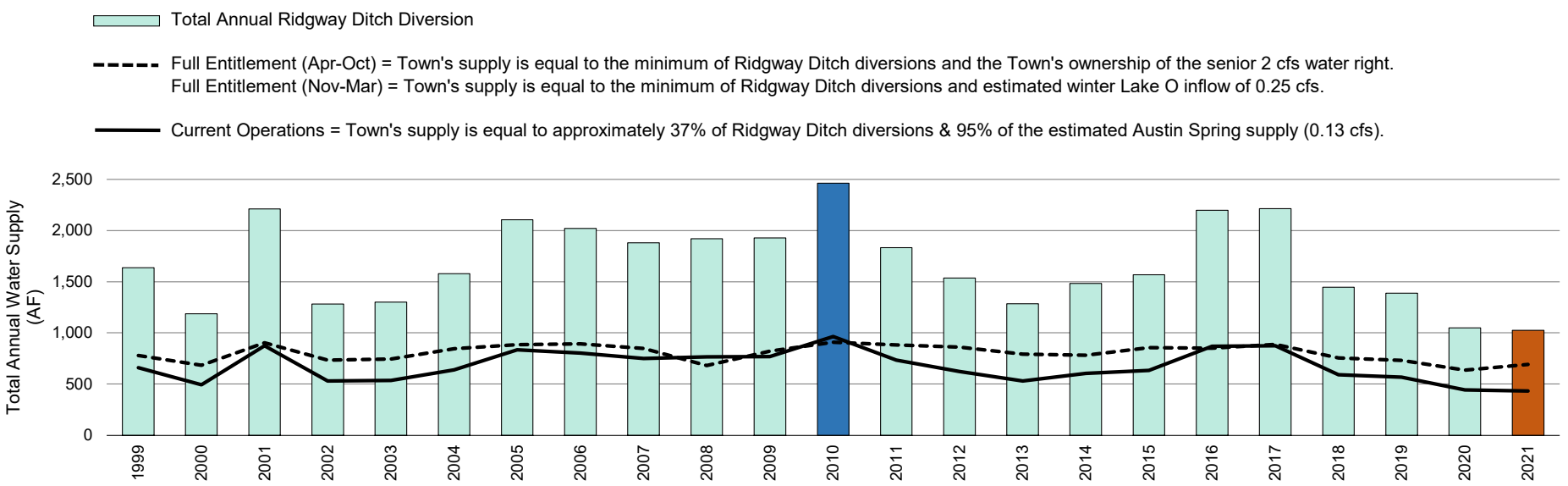
being processed, for the purposes of this assessment, LRE Water reduced the available water supply that was modeled for the Happy Hollow Ditch system from 1999 to 2021 by 0.375 cfs during the entire irrigation season (April – October).

In total, the average annual supply of water diverted by this system between 1999 and 2021 was approximately 450 AF. This 23-year period included a variety of wet, dry, and average year types. During the wetter years, the Happy Hollow Ditch diverted more than 700 AF, with approximately 880 AF being diverted in 2006. In contrast, during drier years the system diverted less than 300 AF, with approximately 260 AF being diverted in 2013. Of this water supply, the amount available for the Town's use at its municipal system does not include the portion that was delivered through the Tidwell Ditch under its more senior water right during the irrigation season. This reduction resulted in an average annual water supply from 1999 to 2021 of approximately 330 AF, and a dry-year water supply of approximately 175 AF in 2014. On a seasonal basis, the Town's portion of the daily supply would be on average, approximately 0.75 cfs during the winter non-irrigation season and 0.25 cfs during the summer irrigation season. In dry-years, these daily rates drop to approximately 0.6 cfs in the winter and 0.05 cfs over the summer. A summary of the annual Happy Hollow Ditch water supply from 1999 to 2021 is shown in ***Figure 9***, and the average monthly diversions over the same 23-year period are summarized in ***Figure 10***.

3.1.4 Pre-sedimentation Ponds

The Pre-sedimentation Ponds consist of three small ponds that are used to reduce the level of turbidity and sediment that are carried in the water supply from the Happy Hollow Ditch, the Ridgway Ditch system, and/or Lake Otonowanda. The settled supply is then delivered to either the Town's water treatment plant for potable municipal use or it is used directly in the raw water system for irrigation. The Pre-sedimentation Ponds are used as an operational storage reservoir. The estimated total combined capacity of the three ponds is 20.7 AF or 5.65 MG with a maximum estimated surface area of 2.21 acres. No formal historical records are available for this structure. As it relates to LRE Water's analysis, the supply that is delivered to the Pre-Sedimentation Ponds from Happy Hollow Ditch, the Ridgway Ditch system, and/or Lake Otonowanda to meet municipal demands is the last available supply used.

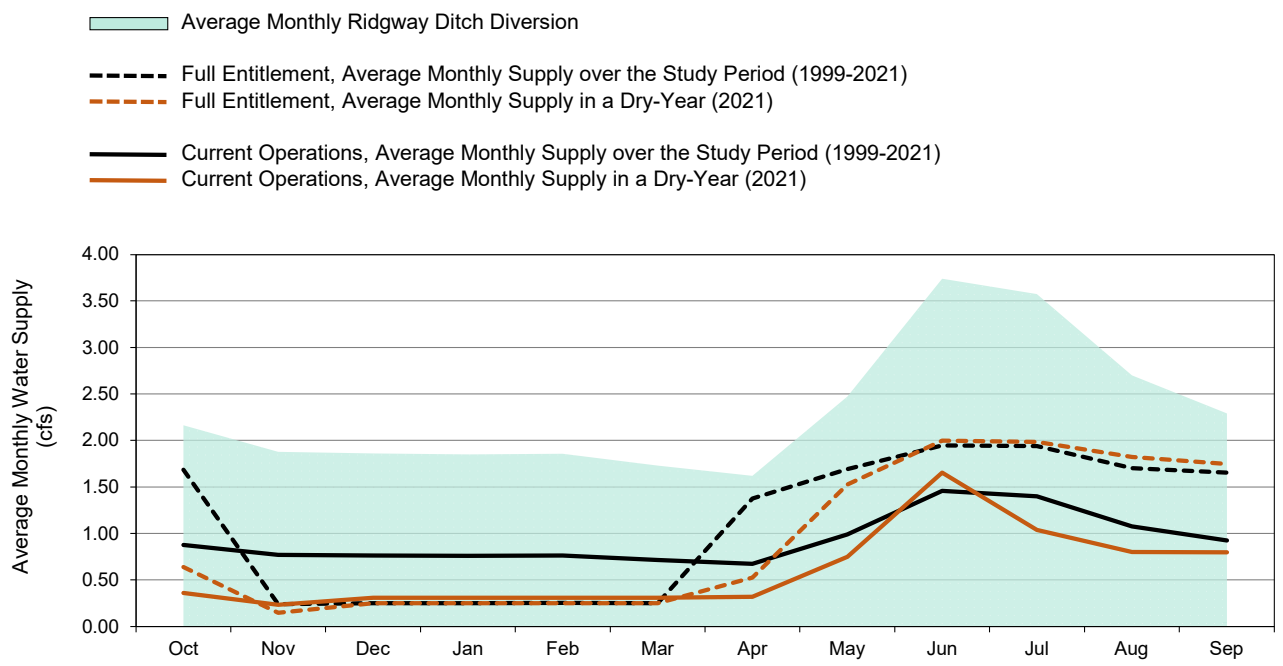
Figure 7
Total Annual Ridgway Ditch Diversion Summary, Beaver Creek Water Supply
Historical Hydrology: 1999 to 2021



	Water Year	Historic Hydrology - Ridgway Ditch: Oct (AF)	Nov (AF)	Dec (AF)	Jan (AF)	Feb (AF)	Mar (AF)	Apr (AF)	May (AF)	Jun (AF)	Jul (AF)	Aug (AF)	Sep (AF)	Total (AF)	Current Operations (AF)	Full Entitlement (AF)
	1999	212.2	72.7	79.9	79.9	72.2	97.6	97.0	85.2	316.9	247.6	181.5	92.9	1,635.6	659.8	779.3
	2000	109.0	34.8	**36.9**	**36.9**	**34.3**	**36.9**	35.7	170.5	221.1	287.2	74.3	109.6	1,187.1	493.8	682.5
	2001	139.6	141.6	146.3	146.3	132.2	146.3	141.6	146.8	372.4	320.6	175.8	202.0	2,211.6	872.9	903.9
	2002	132.1	98.0	115.6	115.6	104.4	115.6	86.6	116.3	130.4	126.8	82.9	**58.4**	1,282.8	529.2	734.2
	2003	91.2	72.6	74.1	69.5	62.8	69.5	69.6	78.7	232.2	176.9	169.3	133.0	1,299.3	535.3	743.9
	2004	86.6	67.2	69.5	69.5	64.7	73.2	123.2	119.0	160.3	293.2	214.6	236.8	1,577.8	638.4	846.0
	2005	190.3	156.5	161.7	161.7	134.2	69.5	115.6	191.1	216.7	251.2	242.9	214.3	2,105.7	833.7	884.1
	2006	216.2	188.9	121.1	121.1	109.4	121.1	124.4	221.5	263.3	212.3	181.8	138.4	2,019.5	801.8	891.6
	2007	127.2	99.7	107.6	107.6	97.2	84.2	67.2	303.8	237.8	210.2	219.1	219.2	1,881.0	750.5	847.9
	2008	151.4	142.8	149.4	149.4	139.5	149.4	**34.8**	168.3	252.5	311.3	104.2	167.1	1,920.1	765.0	680.3
	2009	161.3	141.1	161.7	161.7	146.1	124.0	97.0	159.7	267.7	283.1	133.9	91.4	1,928.8	768.2	822.2
Max Year	**2010**	122.9	210.1	217.1	217.1	196.0	217.1	210.1	232.6	235.9	215.8	210.5	179.8	**2,464.9**	**966.6**	**909.9**
	2011	120.9	90.9	131.0	131.0	118.3	131.0	128.7	168.0	190.4	216.7	279.4	126.2	1,832.4	732.6	882.9
	2012	113.3	139.8	100.2	100.2	93.5	119.1	134.8	153.7	161.3	163.2	155.7	101.4	1,536.3	623.0	861.9
	2013	165.2	67.2	69.5	69.5	62.8	69.5	67.2	123.3	235.0	140.7	114.3	100.7	1,284.8	530.0	790.8
	2014	103.1	111.9	115.6	115.6	104.4	115.6	108.4	**68.6**	**108.7**	187.1	199.1	145.6	1,483.7	603.6	782.7
	2015	148.0	132.7	137.1	137.1	123.8	137.1	115.8	122.4	109.1	152.2	134.4	116.8	1,566.7	634.3	855.6
	2016	110.7	178.5	184.5	184.5	172.3	184.5	102.2	143.2	252.3	286.9	226.9	172.3	2,198.8	868.1	849.9
	2017	180.7	165.1	165.4	165.4	149.4	106.4	96.8	158.3	265.7	296.6	286.5	178.4	2,214.7	874.0	888.4
	2018	163.1	128.8	140.0	131.0	118.3	131.0	126.7	112.2	152.1	112.0	**64.6**	65.8	1,445.7	589.5	755.0
	2019	76.8	37.5	38.7	38.7	35.0	38.7	39.3	178.0	314.3	301.3	179.1	109.7	1,387.2	567.9	731.4
	2020	91.0	67.2	69.5	69.5	64.7	69.5	52.9	164.9	170.5	**102.8**	68.0	59.1	1,049.6	443.0	637.7
Min Year	**2021**	**47.4**	**25.6**	38.7	38.7	35.0	38.7	39.0	112.1	253.8	160.2	120.7	116.0	**1,026.0**	**434.2**	**690.4**
	AVG	**133.1**	**111.8**	**114.4**	**113.8**	**103.1**	**106.3**	**96.3**	**152.1**	**222.6**	**219.8**	**166.1**	**136.3**	**1,675.7**	**674.6**	**802.3**

** The total monthly diversion supply includes a daily estimate of 0.13 cfs from the Austin Spring.*

Figure 8
Average Monthly Ridgway Ditch Diversion Summary, Beaver Creek Water Supply
Historical Hydrology: 1999 to 2021



	Historic Hydrology - Ridgway Ditch											
Water Year	Oct (cfs)	Nov (cfs)	Dec (cfs)	Jan (cfs)	Feb (cfs)	Mar (cfs)	Apr (cfs)	May (cfs)	Jun (cfs)	Jul (cfs)	Aug (cfs)	Sep (cfs)
1999	3.45	1.22	1.30	1.30	1.30	1.59	1.63	1.38	5.33	4.03	2.95	1.56
2000	1.77	0.58	**0.60**	**0.60**	**0.62**	**0.60**	0.60	2.77	3.72	4.67	1.21	1.84
2001	2.27	2.38	2.38	2.38	2.38	2.38	2.38	2.39	6.26	5.21	2.86	3.40
2002	2.15	1.65	1.88	1.88	1.88	1.88	1.46	1.89	2.19	2.06	1.35	**0.98**
2003	1.48	1.22	1.21	1.13	1.13	1.13	1.17	1.28	3.90	2.88	2.75	2.24
2004	1.41	1.13	1.13	1.13	1.17	1.19	2.07	1.94	2.69	4.77	3.49	3.98
2005	3.09	2.63	2.63	2.63	2.42	1.13	1.94	3.11	3.64	4.08	3.95	3.60
2006	3.52	3.17	1.97	1.97	1.97	1.97	2.09	3.60	4.42	3.45	2.96	2.33
2007	2.07	1.68	1.75	1.75	1.75	1.37	1.13	4.94	4.00	3.42	3.56	3.68
2008	2.46	2.40	2.43	2.43	2.51	2.43	**0.59**	2.74	4.24	5.06	1.69	2.81
2009	2.62	2.37	2.63	2.63	2.63	2.02	1.63	2.60	4.50	4.60	2.18	1.54
2010	2.00	3.53	3.53	3.53	3.53	3.53	3.53	3.78	3.97	3.51	3.42	3.02
2011	1.97	1.53	2.13	2.13	2.13	2.13	2.16	2.73	3.20	3.52	4.54	2.12
2012	1.84	2.35	1.63	1.63	1.68	1.94	2.27	2.50	2.71	2.65	2.53	1.70
2013	2.69	1.13	1.13	1.13	1.13	1.13	1.13	2.00	3.95	2.29	1.86	1.69
2014	1.68	1.88	1.88	1.88	1.88	1.88	1.82	**1.12**	**1.83**	3.04	3.24	2.45
2015	2.41	2.23	2.23	2.23	2.23	2.23	1.95	1.99	1.83	2.47	2.19	1.96
2016	1.80	3.00	3.00	3.00	3.10	3.00	1.72	2.33	4.24	4.67	3.69	2.90
2017	2.94	2.78	2.69	2.69	2.69	1.73	1.63	2.57	4.46	4.82	4.66	3.00
2018	2.65	2.16	2.28	2.13	2.13	2.13	2.13	1.83	2.56	1.82	**1.05**	1.11
2019	1.25	0.63	0.63	0.63	0.63	0.63	0.66	2.89	5.28	4.90	2.91	1.84
2020	1.48	1.13	1.13	1.13	1.17	1.13	0.89	2.68	2.87	**1.67**	1.11	0.99
2021	**0.77**	**0.43**	0.63	0.63	0.63	0.63	0.65	1.82	4.27	2.60	1.96	1.95
AVG	**2.16**	**1.88**	**1.86**	**1.85**	**1.86**	**1.73**	**1.62**	**2.47**	**3.74**	**3.57**	**2.70**	**2.29**

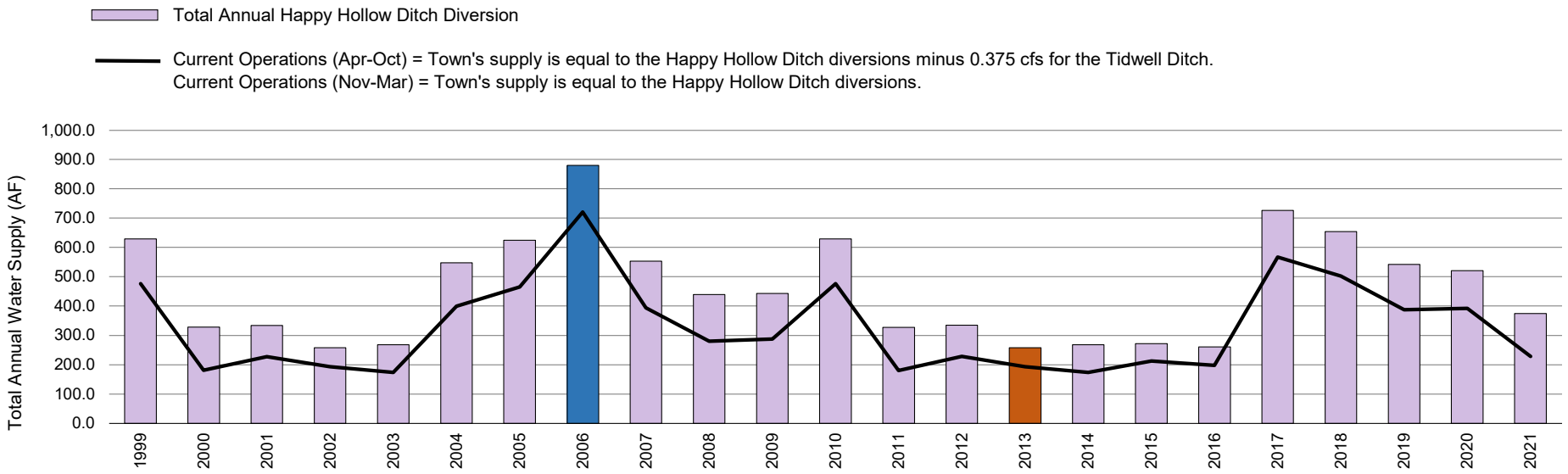
CURRENT OPERATION:

AVG	**0.88**	**0.77**	**0.76**	**0.76**	**0.76**	**0.72**	**0.67**	**0.99**	**1.46**	**1.40**	**1.07**	**0.92**
Min Yr	0.36	0.23	0.31	0.31	0.31	0.31	0.32	0.75	1.65	1.04	0.80	0.80
Max Yr	0.81	1.38	1.38	1.38	1.38	1.38	1.38	1.48	1.54	1.37	1.34	1.19

FULL ENTITLEMENT:

AVG	**1.68**	**0.24**	**0.25**	**0.25**	**0.25**	**0.25**	**1.38**	**1.69**	**1.95**	**1.94**	**1.70**	**1.65**
Min Yr	0.64	0.15	0.25	0.25	0.25	0.25	0.52	1.53	2.00	1.98	1.82	1.75
Max Yr	1.77	0.25	0.25	0.25	0.25	0.25	2.00	2.00	2.00	2.00	2.00	2.00

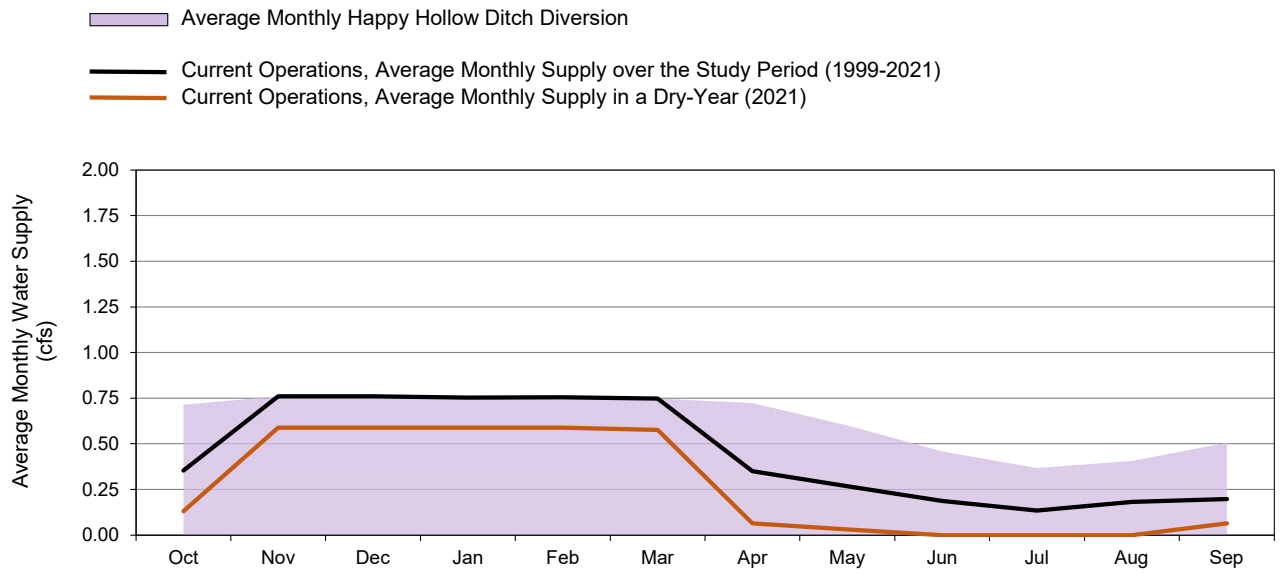
Figure 9
Total Annual Happy Hollow Ditch Diversion Summary, Cottonwood Creek Water Supply
Historical Hydrology: 1999 to 2021



	Historic Hydrology - Happy Hollow Ditch													Current
Water Year	Oct (AF)	Nov (AF)	Dec (AF)	Jan (AF)	Feb (AF)	Mar (AF)	Apr (AF)	May (AF)	Jun (AF)	Jul (AF)	Aug (AF)	Sep (AF)	**Total (AF)**	**Operation (AF)**
1999	52.5	66.1	65.2	65.2	58.9	65.2	59.3	68.8	38.4	23.0	29.2	36.9	628.6	476.4
2000	36.5	26.0	**30.3**	30.7	28.8	33.6	32.9	28.9	22.0	20.0	17.4	21.2	328.4	181.3
2001	33.9	30.1	34.4	34.4	31.1	34.4	36.4	43.0	25.3	**0.0**	2.7	28.1	334.0	227.4
2002	31.2	35.1	36.3	36.3	32.8	35.4	26.2	13.1	**0.0**	**0.0**	**0.0**	12.0	258.2	193.5
2003	36.9	30.9	30.3	**26.3**	**15.7**	30.7	**24.4**	43.0	14.9	**0.0**	**0.0**	14.7	268.0	174.2
2004	32.3	36.9	36.8	36.3	38.1	40.2	37.9	27.6	72.4	60.4	70.7	58.0	547.5	399.1
2005	48.3	38.1	39.4	39.4	37.9	57.8	53.4	57.3	58.7	58.3	67.8	68.4	624.7	465.5
Max Year 2006	86.9	93.2	92.8	92.8	83.9	92.8	87.4	62.4	40.3	45.0	55.5	47.4	**880.4**	**721.3**
2007	53.1	56.3	57.8	57.8	52.2	46.5	38.1	40.2	45.9	35.1	35.8	34.7	553.4	394.2
2008	38.0	50.3	34.4	34.4	32.2	34.4	36.5	38.6	34.8	42.9	31.3	31.1	439.0	280.1
2009	30.0	35.5	38.1	38.1	34.4	42.3	43.4	40.2	47.3	40.8	32.9	20.4	443.5	287.6
2010	52.5	66.1	65.2	65.2	58.9	65.2	59.3	68.8	38.4	23.0	29.2	36.9	628.6	476.4
2011	36.5	26.0	**30.3**	30.7	27.8	33.5	33.0	29.1	22.1	20.1	17.5	20.9	327.5	180.4
2012	33.8	30.0	34.4	34.4	32.2	34.4	36.4	43.0	25.3	**0.0**	2.7	28.1	334.9	228.2
Min Year 2013	31.2	35.1	36.3	36.3	32.8	35.4	26.2	13.1	**0.0**	**0.0**	**0.0**	12.0	**258.2**	**193.5**
2014	36.9	30.9	30.3	**26.3**	**15.7**	30.7	**24.4**	43.0	14.9	**0.0**	**0.0**	14.7	268.0	174.2
2015	32.3	36.9	36.8	36.3	36.7	40.4	38.8	**9.2**	2.4	2.4	**0.0**	**0.0**	272.1	212.7
2016	**5.9**	33.1	30.7	30.7	28.8	**12.9**	26.9	15.0	**0.0**	**0.0**	4.5	71.9	260.4	197.4
2017	79.8	79.1	77.1	73.8	66.6	65.8	69.0	40.1	42.1	38.5	48.5	45.2	725.7	566.6
2018	69.1	73.2	82.9	84.2	76.1	71.5	53.0	28.2	27.0	39.9	31.1	18.3	654.4	502.0
2019	41.0	52.8	55.3	55.3	50.0	55.3	55.0	34.7	24.5	32.5	59.6	26.0	542.2	387.0
2020	75.2	55.8	59.6	59.6	55.8	59.6	57.7	34.7	14.1	16.7	13.1	18.5	520.5	392.5
2021	38.1	**23.9**	41.2	41.2	37.2	38.7	35.4	27.5	17.2	21.1	24.5	28.1	374.2	228.4
AVG	**44.0**	**45.3**	**46.8**	**46.3**	**41.9**	**45.9**	**43.1**	**36.9**	**27.3**	**22.6**	**25.0**	**30.2**	**455.3**	**327.8**

Highighted cells represent estimated diversion data used to extent the available studry period for Happy Hollow Ditch.

Figure 10
Average Monthly Happy Hollow Ditch Diversion Summary, Cottonwood Creek Water Supply
Historical Hydrology: 1999 to 2021



	Historic Hydrology - Happy Hollow Ditch											
Water Year	Oct (cfs)	Nov (cfs)	Dec (cfs)	Jan (cfs)	Feb (cfs)	Mar (cfs)	Apr (cfs)	May (cfs)	Jun (cfs)	Jul (cfs)	Aug (cfs)	Sep (cfs)
1999	0.85	1.11	1.06	1.06	1.06	1.06	1.00	1.12	0.65	0.37	0.47	0.62
2000	0.59	0.44	**0.49**	0.50	0.52	0.55	0.55	0.47	0.37	0.33	0.28	0.36
2001	0.55	0.51	0.56	0.56	0.56	0.56	0.61	0.70	0.42	**0.00**	0.04	0.47
2002	0.51	0.59	0.59	0.59	0.59	0.58	0.44	0.21	**0.00**	**0.00**	**0.00**	0.20
2003	0.60	0.52	0.49	**0.43**	**0.28**	0.50	**0.41**	0.70	0.25	**0.00**	**0.00**	0.25
2004	0.52	0.62	0.60	0.59	0.69	0.65	0.64	0.45	1.22	0.98	1.15	0.97
2005	0.79	0.64	0.64	0.64	0.68	0.94	0.90	0.93	0.99	0.95	1.10	1.15
2006	1.41	1.57	1.51	1.51	1.51	1.51	1.47	1.01	0.68	0.73	0.90	0.80
2007	0.86	0.95	0.94	0.94	0.94	0.76	0.64	0.65	0.77	0.57	0.58	0.58
2008	0.62	0.84	0.56	0.56	0.58	0.56	0.61	0.63	0.58	0.70	0.51	0.52
2009	0.49	0.60	0.62	0.62	0.62	0.69	0.73	0.65	0.80	0.66	0.53	0.34
2010	0.85	1.11	1.06	1.06	1.06	1.06	1.00	1.12	0.65	0.37	0.47	0.62
2011	0.59	0.44	**0.49**	0.50	0.50	0.54	0.56	0.47	0.37	0.33	0.28	0.35
2012	0.55	0.50	0.56	0.56	0.58	0.56	0.61	0.70	0.42	**0.00**	0.04	0.47
2013	**0.51**	**0.59**	**0.59**	**0.59**	**0.59**	**0.58**	**0.44**	**0.21**	**0.00**	**0.00**	**0.00**	**0.20**
2014	0.60	0.52	0.49	**0.43**	**0.28**	0.50	**0.41**	0.70	0.25	**0.00**	**0.00**	0.25
2015	0.52	0.62	0.60	0.59	0.66	0.66	0.65	**0.15**	0.04	0.04	**0.00**	**0.00**
2016	**0.10**	0.56	0.50	0.50	0.52	**0.21**	0.45	0.24	**0.00**	**0.00**	0.07	1.21
2017	1.30	1.33	1.25	1.20	1.20	1.07	1.16	0.65	0.71	0.63	0.79	0.76
2018	1.12	1.23	1.35	1.37	1.37	1.16	0.89	0.46	0.45	0.65	0.51	0.31
2019	0.67	0.89	0.90	0.90	0.90	0.90	0.92	0.56	0.41	0.53	0.97	0.44
2020	1.22	0.94	0.97	0.97	1.00	0.97	0.97	0.56	0.24	0.27	0.21	0.31
2021	0.62	**0.40**	0.67	0.67	0.67	0.63	0.60	0.45	0.29	0.34	0.40	0.47
AVG	**0.72**	**0.76**	**0.76**	**0.75**	**0.76**	**0.75**	**0.72**	**0.60**	**0.46**	**0.37**	**0.41**	**0.51**

Highighted cells represent estimated diversion data used to extent the available studry period for Happy Hollow Ditch.

CURRENT OPERATION HAPPY HOLLOW DITCH:

AVG	**0.35**	**0.76**	**0.76**	**0.75**	**0.76**	**0.75**	**0.35**	**0.27**	**0.19**	**0.13**	**0.18**	**0.20**
Min Yr	0.13	0.59	0.59	0.59	0.59	0.58	0.07	0.03	0.00	0.00	0.00	0.06
Max Yr	1.04	1.57	1.51	1.51	1.51	1.51	1.09	0.64	0.30	0.36	0.53	0.42

3.2 LEGAL WATER SUPPLY

The Town's municipal water system relies on the ability to divert water from Beaver Creek at the Ridgway Ditch and Cottonwood Creek at the Happy Hollow Ditch. In Section 3.1, LRE Water examined the physical water supply that is available to these sources. The physical supply, however, can only be diverted by the Town, if the Town's decreed water rights are in-priority. The legal availability is therefore dependent on the seniority of the Town's water rights compared to the rights of other downstream, vested water right users.

Within the State of Colorado, water rights are operated based on the doctrine of prior appropriation – often referred to as "first in time, first in right." Under this system, the State Engineer assigns an administrative priority to each water right. This assigned number is unique and is based on an analysis related to the date that the water right was appropriated (intent to divert and use water) and the date that the water right was adjudicated (confirmed by the Water Court). The priority hierarchy is largely important in water short scenarios, wherein a downstream, senior water right can place an administrative call that requires all upstream, junior water rights to curtail or cease diverting.

The legal characteristics of the water rights that are part of the Town's portfolio are summarized in ***Table 1*** and the geographic location is shown in ***Figure 11***. Details related to these water rights are provided in the following sub-sections, along with an analysis of the portfolio's ability to provide a reliable legal water supply.

3.2.1 Ridgway Ditch

There are three water rights decreed to the Ridgway Ditch.

Ridgway Ditch, Water Right Hierarchy

- 11840.00000: 2.0 cfs, Sibert Ditch Water Right
- 14762.00000: 25.0 cfs, Original Irrigation Water Right (Ridgway Water & Power Co.)
- 19904.14762: 5.0 cfs, Domestic Water Right (A. E. Walther)

The Town owns water rights in the Ridgway Ditch, which divert from Beaver Creek. In total, there are three absolute water rights decreed to this structure for a total of 32.0 cfs. The original water right was appropriated on June 1, 1890, by the Ridgway Water & Power Company for irrigation at a rate of 25.0 cfs. The right was subsequently adjudicated in Civil Action No. 939 on May 15, 1897, and was assigned Priority No. 131 for that adjudication. While this water right was the first to be decreed at the Ridgway Ditch structure, it is not the most senior water right on the ditch. In Civil Action 1496, which was adjudicated on December 16, 1912, the Town transferred its 2.0 cfs ownership in the Sibert Ditch to the Ridgway Ditch structure. This water right was originally adjudicated on May 15, 1897, in Civil Action 939 for domestic uses with an appropriation date of June 1, 1882, and was assigned Priority No. 72 for that adjudication. Finally, in Civil Action 1286, which was adjudicated on August 2, 1905, A. E. Walther decreed 5.0 cfs for domestic uses with an appropriation date of June 1, 1890. While this appropriation date is the same as that claimed

by the Ridgway Water & Power Company in 1897, it has a more junior status in the State's administrative hierarchy because the claim was not filed during the first adjudication. Although domestic water rights were not allowed during the first adjudication, A.E. Walther did not file the appropriation claim for the 1905 adjudication to receive the senior status of filling in the first adjudication. As a result, it is assigned a "larger" (more junior) administrative number.

Of these water rights, the Town owns the 2.0 cfs senior priority and can divert up to 5.0 cfs under the domestic right as part of the overall Ridgway Water System. In addition, on July 10, 1912, the Town was deeded 3.0 cfs of the 25.0 cfs decreed under the original priority. It appears that the Town's 3.0 cfs has priority over the remaining 22.0 cfs based on the documents reviewed by LRE Water. This type of preference would be managed outside of DWR jurisdiction, and how that preference would be managed is a legal consideration that needs further review.

3.2.2 The Town's Ridgway Water System

The Town's Ridgway Water System consists of water rights decreed to the Ridgway Ditch, Happy Hollow Ditch, Lake Otonowanda, the Pre-sedimentation Ponds. Collectively the water rights that were decreed to these structures were part of an overall municipal system.

Town's Ridgway Water System, Water Right Hierarchy

- 15401.00000: 2.0 cfs, Happy Hollow Ditch
- 19904.14762: 5.0 cfs, Ridgway Ditch
- 20269.14762: 746.1 AF, Lake Otonowanda
- 20269.14762: 14.9 AF, Pre-sedimentation Ponds

The combined total of diversions under the Town's 2.0 cfs at Happy Hollow Ditch and the Town's 5.0 cfs at the Ridgway Ditch are limited to 5.0 cfs.

At the time that A.E. Walther adjudicated 5.0 cfs under the Ridgway Ditch in Civil Action 1286, he also adjudicated the Happy Hollow Ditch, Lake Otonowanda (decreed as Otonowanda Reservoir), and the Pre-sedimentation Ponds (decreed as Ridgway Reservoir). These water rights in addition to the supporting infrastructure the Happy Hollow Pipeline, the Happy Hollow Branch Pipeline, the Otonowanda Pipeline (pipeline from Lake Otonowanda to Pre-Sedimentation Ponds), and the Ridgway Pipeline (pipeline from Pre-sedimentation Ponds to the Town's water treatment plant) form what is collectively known as the Ridgway Water System.

The Ridgway Ditch delivers water diverted from Beaver Creek to Lake Otonowanda, which has an absolute water right for the storage of 746.1 AF and a decreed appropriation date of June 1, 1890. The delivered and/or stored water supply is then taken through the Otonowanda Pipeline to the Pre-sedimentation Ponds, which has an absolute water right for the storage of 14.9 AF and a decreed appropriation date of June 1, 1890. The Pre-sedimentation Ponds, as previously described, are a series of three settling ponds that provide operational storage ahead of delivering water through the Ridgway Pipeline to the Town's treatment plant. The Otonowanda Pipeline and Ridgway Pipeline were included in Civil Action 1286. The purpose of these pipelines, however,

was to convey water supplies between diverting and storage structures in the Ridgway Water System. As such, water rights were not decreed to these pipelines.

Happy Hollow Ditch provides the Town with an additional source of supply from Cottonwood Creek. This ditch, along with its associated Happy Hollow Pipeline and Happy Hollow Branch Pipeline was decreed with an absolute water right to collective divert up to 2.0 cfs for domestic purposes. This water right was decreed with an appropriation date of March 1, 1892.

3.2.3 Other Water Rights

In addition to the water rights that the Town controls in Ridgway Ditch and the Ridgway Water System, the Town also owns three surface water rights for springs within the upper Beaver Creek basin, two surface water rights for pump stations, and an irrigation right associated with the Solar Ranch subdivision.

Beaver Creek Springs, Water Right Hierarchy

- 44559.14762: 0.02 cfs, Ridgway Spring No. 2
- 44559.14762: 0.03 cfs, Ridgway Spring No. 3
- 44559.14762: 0.13 cfs, Austin Spring

On August 22, 1972, the Town made claim to three absolute water rights located in the upper Beaver Creek basin near Ridgway Ditch: Ridgway Springs No. 2, Ridgway Spring No. 3, and the Austin Spring. These springs were subsequently adjudicated in Case No. W-1305 for domestic use at rates ranging from 0.02 cfs (10 gpm) to 0.13 cfs (60 gpm). Moreover, these springs were adjudicated with appropriation dates of June 1, 1890. However, similar to the water rights decreed to the Ridgway Water System, the Town's claim came after the first opportunity to file. Therefore, the water rights associated with these springs were assigned administrative numbers that were based on the later adjudication date and not the appropriation date. In terms of assessing the Town's water supply, the diversion rates decreed to these rights are relatively modest. That said, Austin Spring was incorporated into LRE Water's analysis.

Pump Station, Water Right Hierarchy

- 54700.00000: 1.00 cfs, Pump Station No. 1 (WWTP)
- 58804.57190: 0.25 cfs, Pump Station No. 2 (Irrigation of Parks & Trees)

On December 30, 1999, the Town made claim to an absolute water right for municipal purposes. The Ridgway Pump Station No. 1 was subsequently adjudicated in Case No. 99CW265 to divert up to 1.0 cfs. Specific to that claim, the Town described that one of the uses was to divert tailwater from the Hyde Sneva Ditch and use that supply to fill the sewage lagoon at the wastewater treatment plant. Then, on December 29, 2011, the Town made claim to an absolute water right for a second municipal pump station. The Ridgway Pump Station No. 2 was adjudicated in Case No. 11CW162 to divert up to 0.25 cfs from Cottonwood Creek for the purpose of irrigating park lands and trees. These rights allow the Town to serve municipal demands that don't require a

treated water supply. While providing an important attribute, these water rights are relatively junior in priority and support uses that are not directly connected to the Town's municipal water system without constructing additional infrastructure to pump this supply to the plant. As such, the pump stations were not included in LRE Water's analysis.

Finally, the Town quit claimed 0.1146 cfs (51.4 gpm) of the Hyde Sneva Ditch from Robert Savath as part of the Solar Ranches subdivision. This portion of the Hyde Sneva Ditch was changed in Case No. 96CW76 to be alternatively diverted through the Dallas Ditch or Well No. 7687. Similar to the pump stations, this water right provides an important attribute to the Town, but its use is not directly connected to the Town's municipal water system, and as such, was not included in LRE Water's analysis.

3.2.4 Water Right Administration

Water rights administration in Colorado is governed by the DWR. At a statewide level, DWR is managed by the State Engineering's Office. Regionally, the state has been divided into 7 river divisions based on mainstem drainages, and those divisions have then been subdivided into smaller districts. Administration within these divisions and districts is managed by Division Engineer's Office. The Town's water rights are all located within District 68 (Upper Uncompahgre River) of Water Division 4 (Gunnison River Basin). As such, LRE Water reviewed the historical call chronology of river administration that could impact water users in District 68. This impact could be related to a local call placed at a structure within District 68, but is not limited by the district boundary. Details related to LRE Water's call analysis as it relates to the Town's water rights that divert from Beaver Creek and Cottonwood Creek are presented below and summarized in ***Figure 12***.

Beaver Creek Administration: The Town's water rights that divert from Beaver Creek are subject to downstream calls placed by senior water right priorities administrated at structures located on the following tributary reaches.

(1) Beaver Creek below Ridgway Ditch on Beaver Creek
(2) the East Fork of Dallas Creek below its confluence with Beaver Creek
(3) Dallas Creek below its confluence with the East Fork of Dallas Creek
(4) the Uncompahgre River below its confluence with Dallas Creek
(5) the Gunnison River below its confluence with the Uncompahgre River

In the tributary reach located within District 68, calls have been placed on Dallas Creek at the Wood Perry Ditch and the Evans Ditch. In 2018, the call placed at the Wood Perry Ditch was senior to all of the Ridgway Ditch water rights for 14 days from May 8th through May 20th. The call continued to be placed through May 27th and for portions of June and September under a priority that was junior to the most senior Ridgway Ditch water right (Town's 2 cfs), but senior to the other rights (25 cfs & 5 cfs). In 2021, a call was placed at the Evans Ditch from May 18th through June 3rd. The priority associated with this call was senior to all of the Ridgway Ditch water rights. These local calls by agricultural irrigators are a relatively new trend; however, in

talking with Eric Weig, the District 68 Water Commissioner, he believes that this pattern will continue in the future, especially for calls during the early season when the runoff from north facing watersheds have yet to start or is in a freeze-thaw pattern.

In addition to local administration, the Uncompahgre River below the Dallas Creek confluence has historically had calls placed from May through September of dry-years. The main calling structure is the Montrose & Delta Canal, which is operated by the Uncompahgre Valley Water Users Association. The priority of the call can vary. In 2002, the calling priority was senior to all of the Ridgway Ditch water rights during July and August. Outside of that period, the priority of the call has been junior to the most senior Ridgway Ditch water right (Town's 2 cfs), but senior to the other rights (25 cfs and 5 cfs). Also, it should be noted that the call chronology in 2021 for the lower Uncompahgre River basin does not reflect the hydrologic conditions, which were considerably dry. The Montrose & Delta Canal was able to receive additional storage supplies during the 2021 irrigation season, and as a result, junior water rights in the upper Uncompahgre River basin were not placed on call. This type of operation is currently being considered as part of Ouray County's pending water court case (Case No. 19CW3098), wherein the Uncompahgre Water Users Association has signed an agreement "not to call in certain circumstances." This agreement would only be valid once the water court case was finalized and a decree entered; however, if accepted, this agreement would potentially improve administrative constraints above Ridgway Reservoir.

Based on the historic call chronology, LRE Water modeled the legal availability to divert water in the Ridgway Ditch, as follows: the Sibert Ditch water right for 2 cfs is considered to be out-of-priority in May, July and August of dry-years and the original and domestic water rights for 25 cfs and 5 cfs are considered to be out-of-priority from May through September of dry-years.

Cottonwood Creek Administration: The Town's water rights that divert from Cottonwood Creek are subject to downstream calls placed by senior water right priorities administrated at structures located on the following tributary reaches.

(1) Cottonwood Creek below Happy Hollow Ditch
(2) the Uncompahgre River below its confluence with Dallas Creek
(3) the Gunnison River below its confluence with the Uncompahgre River

In the tributary reach located within District 68, calls have been placed on Cottonwood Creek at the Tidwell Ditch. In 2012, a call was placed from June 19th through August 10th, and in 2013, a call was placed from May 14th through August 6th. Under both calls, the administrative priority was senior to the water right associated with the Town's Happy Hollow Ditch. There are two water rights decreed to the Tidwell Ditch. The call was placed by the more senior right, which can divert up to 0.375 cfs for irrigation.

As it relates to calls that are placed downstream on the Uncompahgre River, Mr. Weig stated that he has not administered water rights on Cottonwood Creek as it relates to these calls. While Cottonwood Creek is technically tributary to the Uncompahgre River, it is typically dry

near the confluence during periods of downstream administration. As such, the downstream call is considered futile to water rights that divert from Cottonwood Creek, because the curtailment of diversions from this tributary would not increase the available water supply to the calling structure.

Based on the historic call chronology, LRE Water modeled the legal availability to divert from the Happy Hollow Ditch as a reduction of 0.375 cfs to the physical supply. This reduction represents the supply that would be taken by the Tidwell Ditch for irrigation purposes.

Table 1
Town of Ridgway Water Rights Summary

Structure Name	Water Right	Administrative Number	Adjudication Date	Appropriation Date	Decree Amount		Decreed Use	Case Number
Beaver Creek Water Rights								
Ridgway Ditch	Sibert Ditch	11840.00000	1897-05-15	1882-06-01	2.00	cfs	Domestic	CA1496
	Ridgway Water & Power Company (1)	14762.00000	1897-05-15	1890-06-01	25.00	cfs	Irrigation	CA0939
	Ridgway Water System, Walther (2)	19904.14762	1905-08-02	1890-06-01	5.00	cfs	Domestic	CA1286
Otonowanda Reservoir Otonowanda Pipeline (3)	Ridgway Water System, Walther (2)	20269.14762	1905-08-20	1890-06-01	746.10	AF	Domestic	CA1286
Ridgway Spring No. 2		44559.14762	1972-12-31	1890-06-01	0.02	cfs	Irr, Dom	W1305
Ridgway Spring No. 3		44559.14762	1972-12-31	1890-06-01	0.03	cfs	Irr, Dom	W1305
Austin Spring		44559.14762	1972-12-31	1890-06-01	0.13	cfs	Irr, Dom	W1305
** Otonowanda Reservoir = Lake Otonowanda*					**10.18**	**cfs**		
					746.10	**AF**		
Cottonwood Creek Water Rights								
Happy Hollow Ditch Happy Hollow Pipeline (4) Happy Hollow Branch Pipeline (4)	Ridgway Water System, Walther (2)	15401.00000	1905-08-02	1892-03-01	2.00	cfs	Domestic	CA1286
Ridgway Reservoir Ridgway Pipeline (5)	Ridgway Water System, Walther (2)	20269.14762	1905-08-02	1890-06-01	14.90	AF	Domestic	CA1286
** Ridgway Reservoir = Pre-sedimentation Ponds*					**2.00**	**cfs**		
					14.90	**AF**		
Other Water Rights								
Ridgway Pump Station No. 1	Wastewater from Hyde Sneva Ditch	54700.00000	1999-12-31	1999-10-06	1.00		Municipal	99CW0265
Ridgway Pump Station No. 2		58804.57190	2011-12-31	2006-07-31	0.25		Municipal	11CW0162
Hyde Sneva Ditch	Irrigation in Solar Ranch Subdivision	13270.00000	1897-05-15	1886-05-01	0.11		Irrigation	96CW076
					1.36	**cfs**		

Notes:
(1) The deed from Walther to the Town indicates that the Town received 3 cfs of Priority No. 131, which was decreed for 25 cfs in CA-939.
(2) The Ridgway Water System was decreed as a collective system by A.E. Walther in 1905. The combined diversions from this system are limited to 5.0 cfs.
(3) The Otonowanda Pipeline is a transmission line and does not directly divert water from Beaver Creek.
(4) The Happy Hollow Pipeline and Happy Hollow Branch Pipeline are transmission lines and do not directly divert water from Cottonwood Creek.
(5) The Ridgway Pipeline is a conveyance line between Lake Otonowanda and Ridgway Reservoir.

Uncompahgre River Instream Flow

Dallas Creek Instream Flow

Ridgway Town Pumpstation No. 1

Ridgway Pump Station No. 2

Cottonwood Creek

Pre-sedimentation Ponds
(decreed Ridgway Reservoir)

Happy Hollow Ditch
Administration No. for 2.0 cfs = 15401.00000

Happy Hollow Branch Pipeline

Happy Hollow Pipeline

Lake Otonowanda
(decreed Otonowanda Reservoir)

Uncompahgre River

Beaver Creek Instream Flow

Beaver Creek

East Fork Dallas Creek

Ridgway Spring No. 2

Ridgway Ditch
Administration No. for 2.0 cfs = 11840.00000
Administration No. for 25.0 cfs = 14762.00000
Administration No. for 5.0 cfs = 19904.14762

Austin Spring

Ridgway Spring No. 3

Source: 2017 NAIP Imagery

Figure 11
Water Rights Location Map

Location based on DWR Database

CWCB Instream Flow Reaches

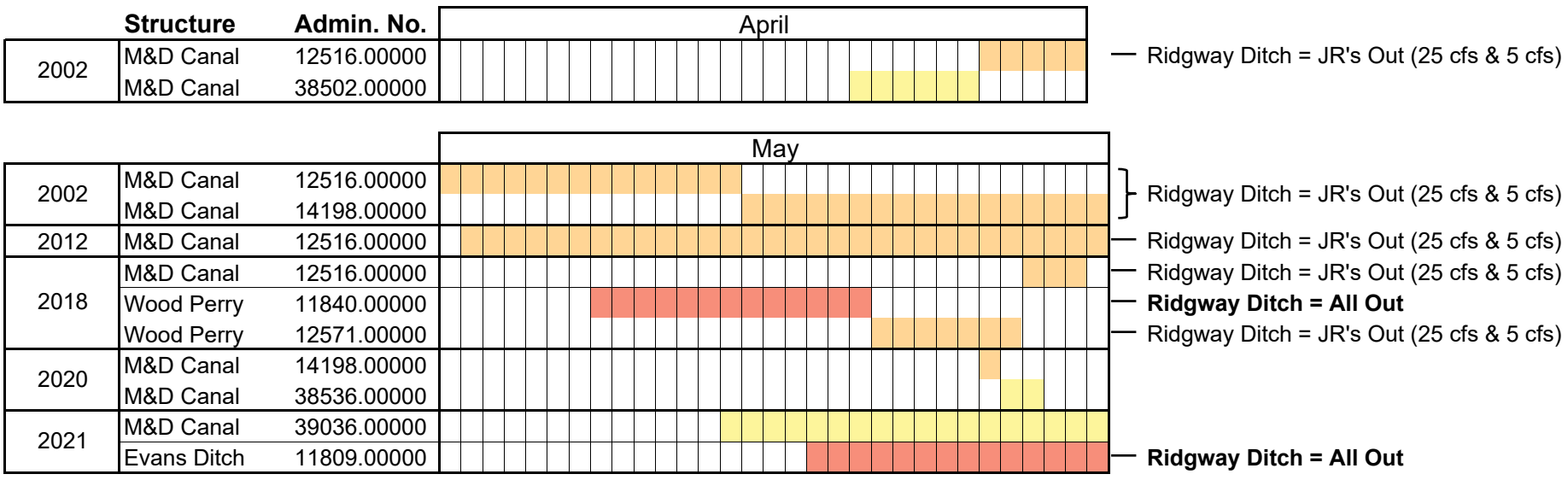
Miles
0 0.5 1 2

Date: 2022-01-24
File: 21630-1.0
Drawn: PCV
Approved: ANM

Figure 12

Call Chronology Analysis related to Town's Beaver Creek Water Rights

Calling priority is equal to or more senior than the 2.0 cfs Ridgway Ditch water right (Administration No. 11840.00000).
Calling priority is more senior than the 25 cfs and/or 5 cfs Ridgway Ditch water rights (Administration No. 14762.00000 & 19904.14762).
Calling priority is junior to all of the Ridgway Ditch water rights.

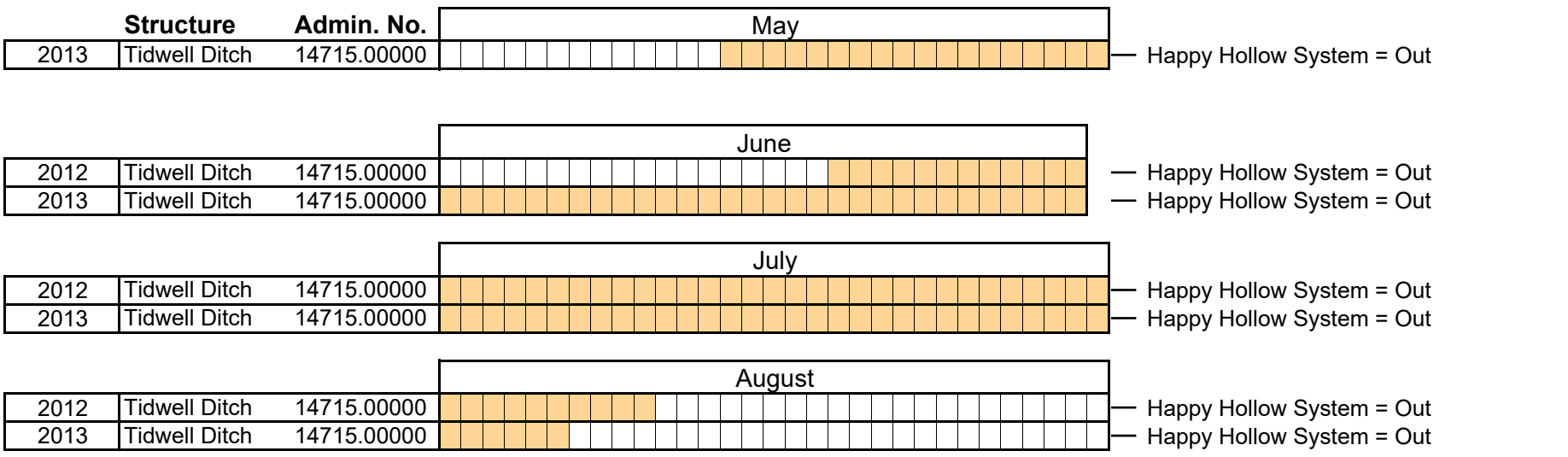


	Structure	Admin. No.	
April			
2002	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	M&D Canal	38502.00000	
May			
2002	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	M&D Canal	14198.00000	
2012	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2018	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	Wood Perry	11840.00000	**Ridgway Ditch = All Out**
	Wood Perry	12571.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2020	M&D Canal	14198.00000	
	M&D Canal	38536.00000	
2021	M&D Canal	39036.00000	
	Evans Ditch	11809.00000	**Ridgway Ditch = All Out**
June			
2002	M&D Canal	12442.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	M&D Canal	12516.00000	
	M&D Canal	14198.00000	
	M&D Canal	24564.00000	
2012	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2013	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2018	Stark Volkman	12150.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	M&D Canal	12516.00000	
	Wood Perry	12905.00000	
2020	M&D Canal	29554.12540	
2021	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	M&D Canal	14198.00000	
	Evans Ditch	11809.00000	**Ridgway Ditch = All Out**
July			
2002	M&D Canal	11665.00000	**Ridgway Ditch = All Out**
	M&D Canal	11715.00000	
2012	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2013	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2018	Stark Volkman	12150.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2020	East Canal	12874.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	M&D Canal	29554.12540	
	M&D Canal	29554.28945	
August			
2002	M&D Canal	11665.00000	Ridgway Ditch & Happy Hollow System = Out
2012	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2018	Stark Volkman	12150.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	Stark Volkman	12498.00000	
2020	East Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	M&D Canal	14198.00000	
	M&D Canal	29554.28945	
September			
2002	M&D Canal	11665.00000	
	M&D Canal	38502.00000	
2012	M&D Canal	12516.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
2018	Stark Volkman	12498.00000	Ridgway Ditch = JR's Out (25 cfs & 5 cfs)
	Stark Volkman	14198.00000	
	Wood Perry	14701.00000	

Notes: Uncompaghre River Calling Structures: Montrose & Delta Canal, Stark Volkman Ditch, and East Canal
Dallas Creek Calling Structures: Wood Perry Ditch, Evans Ditch (only effect Beaver Creek diversions)

Call Chronology Analysis related to Town's Cottonwood Creek Water Rights

Calling priority is more senior than the Town's Happy Hollow water rights (Administration No. 15401.00000).



	Structure	Admin. No.	
May			
2013	Tidwell Ditch	14715.00000	Happy Hollow System = Out
June			
2012	Tidwell Ditch	14715.00000	Happy Hollow System = Out
2013	Tidwell Ditch	14715.00000	Happy Hollow System = Out
July			
2012	Tidwell Ditch	14715.00000	Happy Hollow System = Out
2013	Tidwell Ditch	14715.00000	Happy Hollow System = Out
August			
2012	Tidwell Ditch	14715.00000	Happy Hollow System = Out
2013	Tidwell Ditch	14715.00000	Happy Hollow System = Out

3.3 CLIMATE CHANGE CONSIDERATIONS

In 2019, the Colorado Water Conservation Board ("CWCB") released an update to the State's supply and demand projection data and tools in support of the Colorado Water Plan. Specifically, this update is known as the Analysis and Technical Update to the Water Plan or the 2019 Technical Update. Among the data sets developed for this effort was a robust set of climate-adjusted natural flows representative of future (2050) climate change conditions. In the vicinity near the Town of Ridgway, there are several climate-adjusted natural flow data sets that were created for the Gunnison StateMod Model. In particular, there is a data set for Beaver Creek near Ridgway and a data set for the Uncompahgre River near Ridgway. LRE Water used this data to develop representative climate change impacts, as described more fully in the following sub-sections.

3.3.1 Climate Change Diversions

The Beaver Creek monthly natural flow dataset was used as the indices to adjust the monthly historical Ridgway Ditch and Happy Hollow Ditch diversions. The adjustments are based on a monthly ratio of historical diversions to historical streamflow. It assumes the same proportion that was historically diverted is diverted under climate change. These historical diversion adjustments were completed for both the "In-between" and "Hot and Dry" climate change scenarios from the 2019 Technical Update. Each of these scenarios project an equally probable hotter and drier future. This approach utilizes sophisticated well supported climate data sets to projected changes to the timing and amount of the available flow under climate change. This data, however, does not account for the effect of dust on the snowpack.

Climate Change Scenarios

- **In-Between Scenario:** The "In-between" climate change scenario represents the median or 50th percentile of available General Circulation Model's ("GCMs") with a consumptive irrigation use ("CIR") and runoff greater than 50% of GCMs. The CIR represents the water demand for vegetation, including agricultural crops, lawns and gardens, and natural vegetation. As the CIR increases, there is less water available for other uses. The "In-between" scenario represents a lower runoff and a higher CIR than current conditions, resulting in an overall reduction of approximately 12% to the average annual flow in Beaver Creek when compared to historical conditions.

- **Hot and Dry Scenario:** The "Hot and Dry" climate change scenario represents a CIR that is greater than 75% of GCMs and runoff that is greater than 25% of GCMs. This scenario represents a lower runoff and higher CIR than the "In-between" scenario, resulting in an overall reduction of approximately 22% to the average annual flow in Beaver Creek when compared to historical conditions. For purposes of this assessment, LRE Water adjusted the monthly historic diversions for the Ridgway Ditch and Happy Hollow Ditch based on the "High and Dry" scenario.

As a result, the average annual water supply that was modeled as being available to the Ridgway Ditch system under climate change decreased from 1,700 AF to approximately 1,350 AF. Of this supply, the Town's portion modeled under Current Operations decreased from 675 AF to 550 AF, and when operated to maximize the Town's Full Entitlement the modeled supply decreased from 800 AF to 770 AF. In dry years, the climate change hydrology for the Ridgway Ditch system produced less than 800 AF, which is approximately 200 AF less than the historical dry-year hydrology. Of this supply, the Town's portion was reduced by more than 100 AF:

Comparison, Dry-Year Total Annual Availability

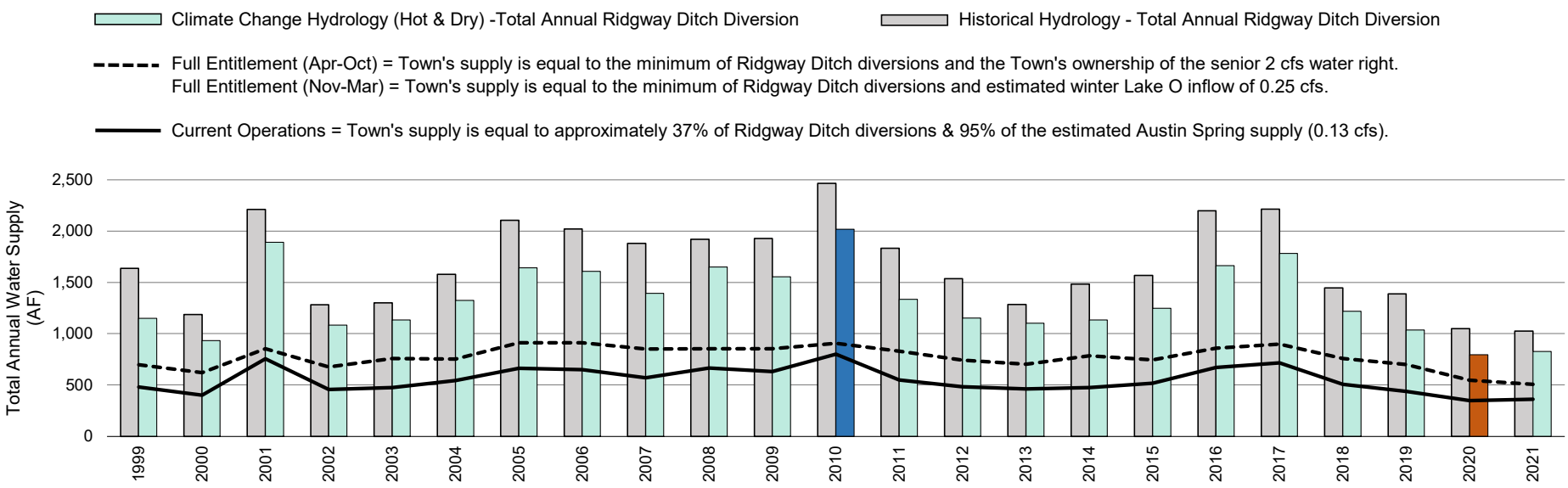
- Current Operations: Historical = 435-450 AF Climate Change = 350 AF
- Full Entitlement: Historical = 640-690 AF Climate Change = 500 AF

The modeled annual water supply and monthly delivery rates for the Ridgway Ditch system adjusted for the "Hot and Dry" climate change are summarized in ***Figure 13*** and ***Figure 14***, respectively.

By applying the "Hot and Dry" climate change adjustments to the available diversions at the Happy Hollow Ditch, the average annual water supply decreased from 450 AF to approximately 350 AF, of which the Town's portion decreased from 330 AF to 260 AF. In dry years, the Town's portion decreased from 175 AF in 2014 to 130 AF in a climate adjusted 2014. The modeled annual water supply and monthly rates for the Happy Hollow Ditch adjusted for the "Hot and Dry" climate change are summarized in ***Figure 15*** and ***Figure 16***, respectively.

For more information on these climate change data sets, refer to the 2019 Technical Update on the Colorado Water Plan website. Note that these climate change scenarios do not account for dust on snow events, which further impact the timing and volume of available flows.

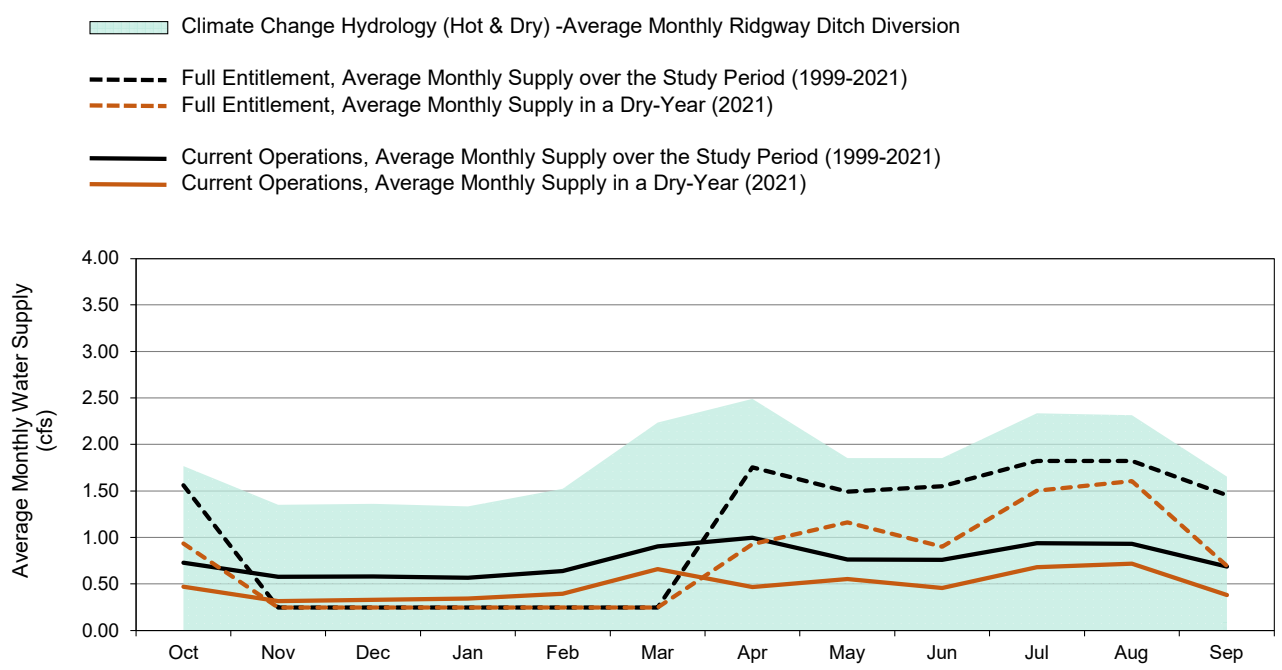
Figure 13
Total Annual Ridgway Ditch Diversion Summary, Beaver Creek Water Supply
Climate Change Hydrology - Hot & Dry: 1999 to 2021



	Water Year	Climate Change Hydrology - Hot & Dry - Ridgway Ditch: Oct (AF)	Nov (AF)	Dec (AF)	Jan (AF)	Feb (AF)	Mar (AF)	Apr (AF)	May (AF)	Jun (AF)	Jul (AF)	Aug (AF)	Sep (AF)	Total (AF)	Current Operations (AF)	Full Entitlement (AF)
	1999	92.7	88.1	88.8	77.2	75.2	115.5	89.4	87.5	97.6	158.1	92.3	86.9	1,149.3	479.8	697.1
	2000	55.1	48.9	53.1	82.0	60.3	86.0	128.1	84.0	92.5	79.7	88.0	73.9	931.7	399.3	619.6
	2001	204.3	148.1	127.7	135.4	121.8	199.2	195.5	101.9	119.7	225.9	217.2	93.0	1,889.6	753.7	853.9
	2002	98.9	73.1	72.2	82.3	76.8	122.7	104.6	59.1	78.5	106.7	111.4	96.9	1,083.1	455.3	675.8
	2003	103.2	68.3	61.0	75.2	80.6	109.0	127.4	75.6	95.0	94.8	121.9	120.8	1,132.8	473.7	757.7
	2004	96.5	72.9	101.2	83.2	85.1	176.4	199.5	88.0	76.1	115.5	113.9	114.7	1,323.0	544.1	751.1
	2005	122.6	75.7	108.1	93.5	83.0	155.4	181.2	162.6	143.0	191.7	201.4	124.2	1,642.4	662.3	912.9
	2006	141.2	75.4	102.9	92.4	105.6	130.8	134.0	118.9	165.4	219.4	188.0	134.7	1,608.6	649.8	911.8
	2007	132.0	80.6	81.4	66.9	68.2	167.2	109.0	117.1	99.2	189.4	171.3	111.1	1,393.6	570.2	849.0
	2008	109.7	93.1	86.4	61.1	82.6	166.8	246.9	198.5	190.8	174.2	163.3	77.2	1,650.7	665.3	853.0
	2009	113.3	94.1	116.9	82.8	127.1	147.3	209.8	177.2	136.1	146.1	115.7	88.7	1,555.1	630.0	852.8
Max Year	2010	153.5	107.7	78.7	112.1	100.7	205.6	296.4	204.7	194.7	195.8	262.5	107.7	2,020.2	802.0	904.8
	2011	116.6	73.6	85.7	81.1	85.4	100.1	172.4	169.1	136.9	137.7	92.9	83.9	1,335.3	548.7	828.5
	2012	94.7	54.9	59.6	62.8	68.4	142.5	91.2	115.7	88.7	147.6	157.1	70.2	1,153.3	481.3	742.1
	2013	95.4	69.9	61.5	84.0	69.3	85.9	85.6	90.2	84.7	82.1	117.9	175.0	1,101.3	462.1	702.3
	2014	88.2	70.0	48.8	60.4	65.9	99.9	148.0	112.4	118.9	128.1	134.4	59.3	1,134.5	474.4	784.4
	2015	107.9	61.4	86.5	62.7	67.4	127.8	195.6	88.5	48.5	149.6	160.1	90.7	1,246.6	515.8	744.0
	2016	126.2	142.3	134.0	130.1	131.9	213.7	127.2	97.5	127.9	102.7	168.6	161.8	1,664.0	670.3	857.2
	2017	129.7	107.6	133.9	94.5	145.8	169.1	241.2	203.5	156.1	167.7	132.5	101.3	1,782.9	714.3	897.1
	2018	111.4	82.1	81.0	92.5	86.3	138.4	117.9	66.1	88.2	120.2	125.6	109.1	1,218.6	505.5	758.1
	2019	97.8	60.5	61.1	50.6	51.4	123.2	81.1	86.9	73.9	139.3	126.2	82.5	1,034.5	437.3	699.1
Min Year	2020	65.4	39.0	42.2	44.3	47.8	97.1	63.0	79.4	61.4	100.5	106.8	49.1	795.9	349.1	545.2
	2021	41.2	62.5	52.7	79.0	61.2	84.0	62.9	38.1	61.7	129.9	106.0	48.6	827.7	360.8	508.0
	AVG	**108.6**	**80.4**	**83.7**	**82.0**	**84.7**	**137.5**	**148.2**	**114.0**	**110.2**	**143.6**	**142.4**	**98.3**	**1,333.7**	**548.0**	**769.8**

** The total monthly diversion supply includes a daily estimate of 0.13 cfs from the Austin Spring.*

Figure 14
Average Monthly Ridgway Ditch Diversion Summary, Beaver Creek Water Supply
Climate Change Hydrology - Hot & Dry: 1999 to 2021



	Climate Change Hydrology - Hot & Dry - Ridgway Ditch											
Water Year	Oct (cfs)	Nov (cfs)	Dec (cfs)	Jan (cfs)	Feb (cfs)	Mar (cfs)	Apr (cfs)	May (cfs)	Jun (cfs)	Jul (cfs)	Aug (cfs)	Sep (cfs)
1999	1.51	1.48	1.44	1.26	1.35	1.88	1.50	1.42	1.64	2.57	1.50	1.46
2000	0.90	0.82	0.86	1.33	1.09	1.40	2.15	1.37	1.55	**1.30**	**1.43**	1.24
2001	3.32	2.49	2.08	2.20	2.19	3.24	3.28	1.66	2.01	3.67	3.53	1.56
2002	1.61	1.23	1.17	1.34	1.38	2.00	1.76	0.96	1.32	1.73	1.81	1.63
2003	1.68	1.15	0.99	1.22	1.45	1.77	2.14	1.23	1.60	1.54	1.98	2.03
2004	1.57	1.22	1.65	1.35	1.53	2.87	3.35	1.43	1.28	1.88	1.85	1.93
2005	1.99	1.27	1.76	1.52	1.49	2.53	3.04	2.64	2.40	3.12	3.28	2.09
2006	2.30	1.27	1.67	1.50	1.90	2.13	2.25	1.93	2.78	3.57	3.06	2.26
2007	2.15	1.35	1.32	1.09	1.23	2.72	1.83	1.90	1.67	3.08	2.79	1.87
2008	1.78	1.56	1.40	0.99	1.49	2.71	4.15	3.23	3.21	2.83	2.66	1.30
2009	1.84	1.58	1.90	1.35	2.29	2.40	3.53	2.88	2.29	2.38	1.88	1.49
2010	2.50	1.81	1.28	1.82	1.81	3.34	4.98	3.33	3.27	3.18	4.27	1.81
2011	1.90	1.24	1.39	1.32	1.54	1.63	2.90	2.75	2.30	2.24	1.51	1.41
2012	1.54	0.92	0.97	1.02	1.23	2.32	1.53	1.88	1.49	2.40	2.56	1.18
2013	1.55	1.17	1.00	1.37	1.25	1.40	1.44	1.47	1.42	1.33	1.92	2.94
2014	1.43	1.18	0.79	0.98	1.19	1.62	2.49	1.83	2.00	2.08	2.19	1.00
2015	1.75	1.03	1.41	1.02	1.21	2.08	3.29	1.44	**0.81**	2.43	2.60	1.52
2016	2.05	2.39	2.18	2.12	2.38	3.48	2.14	1.58	2.15	1.67	2.74	2.72
2017	2.11	1.81	2.18	1.54	2.62	2.75	4.05	3.31	2.62	2.73	2.15	1.70
2018	1.81	1.38	1.32	1.50	1.55	2.25	1.98	1.08	1.48	1.95	2.04	1.83
2019	1.59	1.02	0.99	0.82	0.92	2.00	1.36	1.41	1.24	2.27	2.05	1.39
2020	1.06	**0.66**	**0.69**	**0.72**	**0.86**	1.58	1.06	1.29	1.03	1.63	1.74	0.83
2021	**0.67**	1.05	0.86	1.28	1.10	**1.37**	**1.06**	**0.62**	1.04	2.11	1.72	**0.82**
AVG	**1.77**	**1.35**	**1.36**	**1.33**	**1.52**	**2.24**	**2.49**	**1.85**	**1.85**	**2.34**	**2.32**	**1.65**

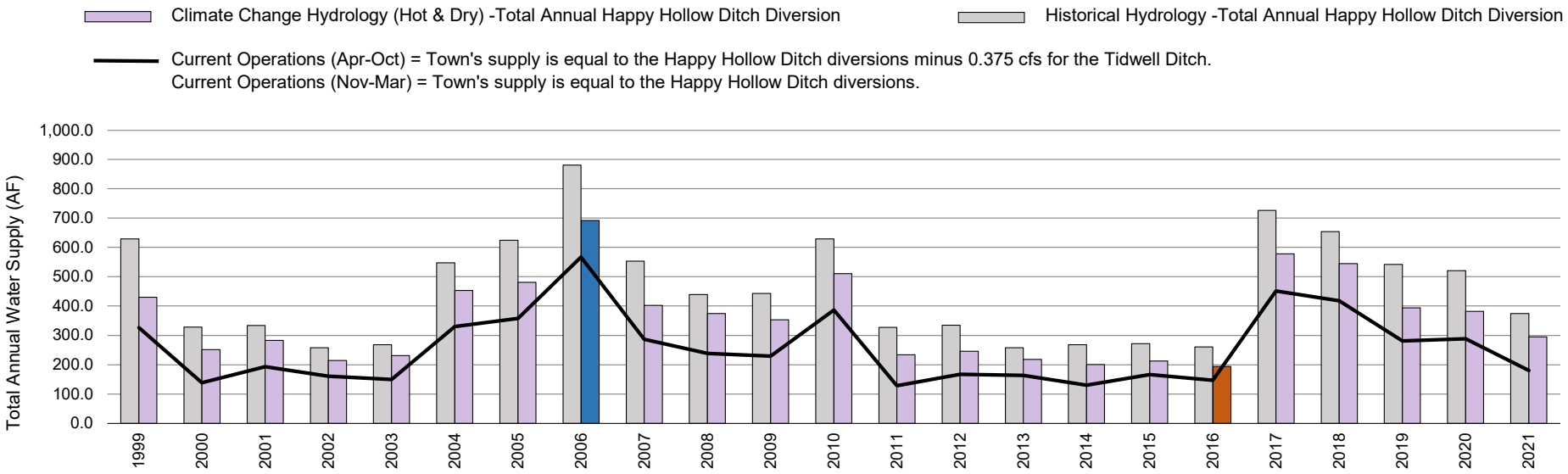
CURRENT OPERATION:

AVG	**0.73**	**0.58**	**0.58**	**0.57**	**0.64**	**0.90**	**1.00**	**0.76**	**0.76**	**0.94**	**0.93**	**0.69**
Min Yr	0.47	0.32	0.33	0.34	0.39	0.66	0.47	0.55	0.46	0.68	0.72	0.38
Max Yr	1.00	0.75	0.55	0.75	0.75	1.31	1.92	1.31	1.29	1.25	1.65	0.75

FULL ENTITLEMENT:

AVG	**1.56**	**0.25**	**0.25**	**0.25**	**0.25**	**0.25**	**1.75**	**1.49**	**1.55**	**1.82**	**1.82**	**1.46**
Min Yr	0.93	0.25	0.25	0.25	0.25	0.25	0.93	1.16	0.90	1.50	1.61	0.70
Max Yr	2.00	0.25	0.25	0.25	0.25	0.25	2.00	2.00	2.00	2.00	2.00	1.68

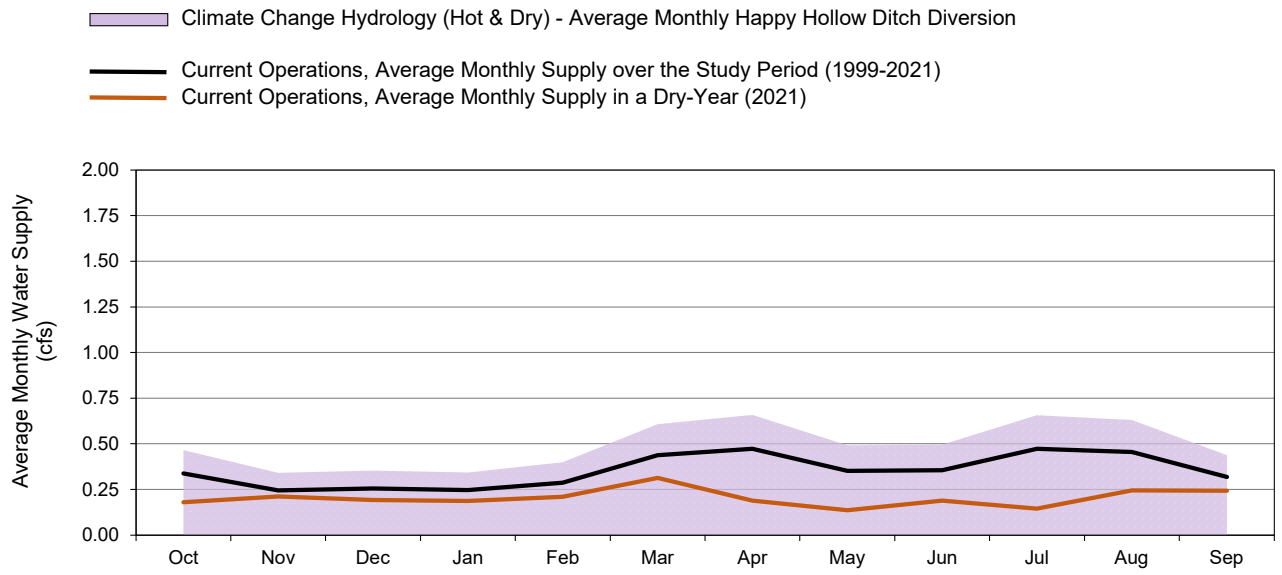
Figure 15
Total Annual Happy Hollow Ditch Diversion Summary, Cottonwood Creek Water Supply
Climate Change Hydrology - Hot & Dry: 1999 to 2021



	Water Year	Climate Change Hydrology - Hot & Dry - Happy Hollow Ditch													Current Operation (AF)
		Oct (AF)	Nov (AF)	Dec (AF)	Jan (AF)	Feb (AF)	Mar (AF)	Apr (AF)	May (AF)	Jun (AF)	Jul (AF)	Aug (AF)	Sep (AF)	Total (AF)	
	1999	34.5	32.8	33.0	28.2	27.7	43.8	33.3	32.4	36.6	61.2	34.4	32.3	430.3	326.1
	2000	14.2	12.4	13.6	22.2	15.9	23.4	36.2	22.8	25.5	21.5	24.0	19.9	251.6	138.9
	2001	31.0	22.1	18.9	20.1	18.1	30.2	29.6	14.8	17.7	34.4	33.0	13.4	283.2	192.8
	2002	19.8	14.2	13.9	16.1	15.1	24.9	21.0	11.1	15.4	21.4	22.5	19.4	214.8	161.0
	2003	21.2	13.5	11.8	14.9	16.3	22.5	26.6	15.0	19.4	19.3	25.3	25.1	231.0	150.1
	2004	32.6	24.0	34.4	27.8	28.7	62.2	70.8	29.5	25.2	39.7	39.1	39.5	453.5	330.5
	2005	35.6	21.1	31.1	26.6	23.5	45.8	53.9	48.0	42.0	57.1	60.1	36.2	480.8	358.3
Max Year	2006	60.9	30.9	43.4	38.6	45.0	56.1	57.7	50.7	72.1	96.7	82.3	58.1	692.5	567.3
	2007	38.4	22.6	22.7	18.2	18.9	49.3	31.4	33.8	28.3	56.2	50.6	32.0	402.4	286.7
	2008	24.5	20.5	18.9	12.8	18.1	38.2	57.5	45.8	44.0	40.0	37.3	16.7	374.3	238.8
	2009	25.4	20.9	26.3	18.1	29.0	33.7	48.8	40.9	31.0	33.4	26.0	19.6	353.2	229.0
	2010	38.6	26.5	18.8	27.6	24.8	52.4	76.5	52.2	49.6	49.8	67.5	26.5	510.7	387.0
	2011	20.5	12.4	14.6	13.8	14.7	17.4	31.0	30.3	24.3	24.4	16.0	14.3	233.9	128.8
	2012	20.1	11.0	12.0	12.7	14.2	31.2	19.4	25.0	18.8	32.4	34.6	14.5	245.9	167.6
	2013	19.0	13.5	11.6	16.5	13.5	16.9	16.9	17.8	16.7	16.1	23.8	36.3	218.4	163.7
	2014	15.5	12.0	7.9	10.1	11.3	17.7	27.1	20.1	21.4	23.2	24.4	9.9	200.6	130.4
	2015	18.5	9.9	14.5	10.1	11.1	22.1	34.7	14.9	7.5	26.2	28.1	15.3	213.0	166.5
Min Year	2016	14.6	16.6	15.6	15.1	15.4	25.4	14.8	11.1	14.9	11.7	19.9	19.1	194.2	147.2
	2017	41.6	34.2	43.1	29.6	47.4	55.1	79.9	66.9	50.8	54.6	42.6	32.0	577.9	451.2
	2018	50.1	36.0	35.3	40.9	38.3	63.2	53.3	28.1	38.9	54.3	56.9	49.1	544.5	417.6
	2019	37.6	22.1	22.3	17.9	18.5	48.3	30.7	33.1	27.8	55.0	49.6	31.4	394.3	281.5
	2020	31.3	17.0	18.6	19.8	22.1	48.5	30.1	38.9	29.2	50.4	53.8	22.5	382.3	288.2
	2021	13.3	22.0	18.0	28.5	21.7	30.5	22.1	12.1	21.7	48.9	39.3	16.4	294.6	179.8
	AVG	**28.6**	**20.4**	**21.7**	**21.1**	**22.2**	**37.3**	**39.3**	**30.2**	**29.5**	**40.3**	**38.7**	**26.1**	**355.6**	**256.1**

Highighted cells represent estimated diversion data used to extent the available studry period for Happy Hollow Ditch.

Figure 16
Average Monthly Happy Hollow Ditch Diversion Summary, Cottonwood Creek Water Supply
Climate Change Hydrology - Hot & Dry: 1999 to 2021



	Climate Change Hydrology - Hot & Dry - Happy Hollow Ditch											
Water Year	Oct (cfs)	Nov (cfs)	Dec (cfs)	Jan (cfs)	Feb (cfs)	Mar (cfs)	Apr (cfs)	May (cfs)	Jun (cfs)	Jul (cfs)	Aug (cfs)	Sep (cfs)
1999	0.56	0.55	0.54	0.46	0.50	0.71	0.56	0.53	0.62	1.00	0.56	0.54
2000	0.23	0.21	0.22	0.36	0.29	0.38	0.61	0.37	0.43	0.35	0.39	0.33
2001	0.50	0.37	0.31	0.33	0.33	0.49	0.50	0.24	0.30	0.56	0.54	0.23
2002	0.32	0.24	0.23	0.26	0.27	0.41	0.35	0.18	0.26	0.35	0.37	0.33
2003	0.34	0.23	0.19	0.24	0.29	0.37	0.45	0.24	0.33	0.31	0.41	0.42
2004	0.53	0.40	0.56	0.45	0.52	1.01	1.19	0.48	0.42	0.65	0.64	0.66
2005	0.58	0.35	0.51	0.43	0.42	0.74	0.91	0.78	0.71	0.93	0.98	0.61
2006	0.99	0.52	0.71	0.63	0.81	0.91	0.97	0.82	1.21	1.57	1.34	0.98
2007	0.62	0.38	0.37	0.30	0.34	0.80	0.53	0.55	0.48	0.91	0.82	0.54
2008	0.40	0.34	0.31	0.21	0.33	0.62	0.97	0.75	0.74	0.65	0.61	0.28
2009	0.41	0.35	0.43	0.29	0.52	0.55	0.82	0.67	0.52	0.54	0.42	0.33
2010	0.63	0.45	0.31	0.45	0.45	0.85	1.29	0.85	0.83	0.81	1.10	0.45
2011	0.33	0.21	0.24	0.22	0.27	0.28	0.52	0.49	0.41	0.40	**0.26**	0.24
2012	0.33	0.18	0.19	0.21	0.26	0.51	0.33	0.41	0.32	0.53	0.56	0.24
2013	0.31	0.23	0.19	0.27	0.24	**0.27**	0.28	0.29	0.28	0.26	0.39	0.61
2014	0.25	0.20	**0.13**	0.16	0.20	0.29	0.45	0.33	0.36	0.38	0.40	**0.17**
2015	0.30	**0.17**	0.24	**0.16**	**0.20**	0.36	0.58	0.24	**0.13**	0.43	0.46	0.26
2016	0.24	0.28	0.25	0.25	0.28	0.41	**0.25**	**0.18**	0.25	**0.19**	0.32	0.32
2017	0.68	0.57	0.70	0.48	0.85	0.90	1.34	1.09	0.85	0.89	0.69	0.54
2018	0.81	0.60	0.57	0.67	0.69	1.03	0.90	0.46	0.65	0.88	0.93	0.82
2019	0.61	0.37	0.36	0.29	0.33	0.79	0.52	0.54	0.47	0.90	0.81	0.53
2020	0.51	0.29	0.30	0.32	0.40	0.79	0.51	0.63	0.49	0.82	0.88	0.38
2021	**0.22**	0.37	0.29	0.46	0.39	0.50	0.37	0.20	0.36	0.80	0.64	0.28
AVG	**0.47**	**0.34**	**0.35**	**0.34**	**0.40**	**0.61**	**0.66**	**0.49**	**0.50**	**0.66**	**0.63**	**0.44**

Highighted cells represent estimated diversion data used to extent the available studry period for Happy Hollow Ditch.

CURRENT OPERATION HAPPY HOLLOW DITCH:

AVG	**0.34**	**0.25**	**0.26**	**0.25**	**0.29**	**0.44**	**0.47**	**0.35**	**0.36**	**0.47**	**0.46**	**0.32**
Min Yr	0.18	0.21	0.19	0.19	0.21	0.31	0.19	0.14	0.19	0.14	0.24	0.24
Max Yr	0.81	0.43	0.58	0.51	0.66	0.75	0.79	0.68	0.99	1.29	1.10	0.80

3.4 RELIABILITY OF THE TOWN'S WATER SYSTEM

Disclaimer: The accuracy of the modeled water supply assessment is correlated to the accuracy of the data that is being modeled. LRE Water applied the best available data in its assessment of the reliability of the Town's municipal water system to meet future demands. However, as noted in Section 2.1.1, Section 3.1, and Section 3.3 the available data associated with the Town's production record at the water treatment plant (reliability of monitoring equipment), the daily diversion records for the Ridgway Ditch and Happy Hollow Ditch (frequency of measurements), the Town's monitoring of Lake Otonowanda supplies (reliability of winter monitoring), and the criteria for climate change adjustments (modeling does not include dust on snow considerations) could be improved. The Town should monitor these variables, and reevaluate this analysis when better data becomes available.

In order to support the Town in its planning efforts and to systematically evaluate the water supply that is physically and legally available to meet current and future municipal demands, LRE Water developed a spreadsheet-based water supply and demand model. This model simulates monthly diversions from Ridgway Ditch and Happy Hollow Ditch, as well as monthly storage operations for Lake Otonowanda and the Pre-sedimentation Ponds. The model also incorporates historical and climate change hydrology based on available data for a 23-year period from 1999 to 2021, and finally, the model limits the ability of the Town to divert the physically available supply based on legal water right considerations.

In terms of how the Town's available resources are used, the model sets forth a hierarchy for allocating the available water supplies to meet municipal demands:

1. Direct deliveries from Happy Hollow Ditch
2. Direct deliveries from Ridgway Ditch
3. Storage release from Lake Otonowanda
4. If all other sources have been exhausted, remaining storage in Pre-sedimentation Ponds

This water supply and demand model allows LRE Water to evaluate different demands (total vs. potable), various growth rates (low, medium, and high), different hydrologic conditions (historic vs. climate change), and operational changes. The results from these various scenarios were used to guide recommendations that better position the Town's water system now and as it grows. The following sub-sections outline model scenarios and discuss results.

3.4.1 Supply-Demand Scenarios

In total, LRE Water modeled 48 scenarios based on a combination of the following parameters:

- **Growth** High: 2050 Annual Potable Demand = 124.6 MG or 382.4 AF
  Medium: 2050 Annual Potable Demand = 94.1 MG or 288.8 AF
  Low: 2050 Annual Potable Demand = 84.3 MG or 258.7 AF
- **Demands** Total: Potable & Raw Water Demand (42.1 MG or 129.3 AF)
  Potable: Potable Demand Only
- **Hydrology** Historical: Modeled Supply based on adjusted Diversion Record
  Climate: Historical Supply adjusted for Climate Change
- **Operations** Current: 37% of Ridgway Ditch + 95% of Austin Spring
  Entitlement: Up to 2 cfs Ridgway Ditch (Apr-Oct) + 0.25 cfs (Nov-Mar)
- **Losses** 2.5%: System Losses = 2.5% per month
  No Loss: System Losses = 0%

  **The no loss scenarios still include evaporative losses.*

Of the potential combination of scenarios, LRE Water focused on 8 scenarios for its assessment of the reliability of the Town's water system. For each of the 8 scenarios the forecasted water demand was based on the **Total Demand at High Growth**. These 8 scenarios were broken down first by hydrology (historical vs. climate change) and then by operations (current vs. entitlement). These same scenarios were also analyzed at medium and low growth alternatives.

- **Historical Hydrology:** H1.A = Current Operations & 2.5% System Loss
  H1.B = Current Operations & No System Loss
  H2.A = Full Entitlement & 2.5% System Loss
  H2.B = Full Entitlement & No System Loss
- **Climate Change:** C1.A = Current Operations & 2.5% System Loss
  C1.B = Current Operations & No System Loss
  C2.A = Full Entitlement & 2.5% System Loss
  C2.B = Full Entitlement & No System Loss

A more detailed analysis is shown in figures that are labeled based on the above outline. At the top third of the more detailed summary sheet, the inputs that are being modeled are highlighted in yellow. The middle third of the figure then shows which available supplies are being used to meet the municipal demand. Finally, the bottom third of the page shows the end of month content for Lake Otonowanda for the total demand scenario and the potable only scenario. The ability to

carryover storage supplies is a key assist in the Town's portfolio and greatly improves the reliability of the overall water system.

3.4.2 Modeled Supply Gap

For each scenario, LRE Water evaluated how the municipal demands were met with available supplies. More specifically, the projected demand in each of the 30-years from 2021 to 2050 was evaluated against a 23-year hydrologic record (historical or climate change). As it relates to the 8 main scenarios outlined above, LRE Water focused its analysis on the results associated with the total projected 2050 municipal demand at high growth of 512 AF/year. The results of this analysis showed that there is a supply gap for three of the scenarios, all of which were under Current Operations when the Town's Full Entitlement was not maximized. In those scenarios, there were years within the 23-year hydrologic study period when the Town's municipal water system was not able to meet the 2050 demand at high growth.

Modeled Results, High Growth Scenarios

- **Historical Hydrology:** For the historical hydrology scenarios at high growth (H1.A, H1.B, H2.A, H2.A), the model showed supply gaps in only one scenario: H1.A = Current Operations and 2.5% System Loss. Specifically, there was a shortage in 2000 of approximately 25 to 50 AF and a second more serve shortage in 2021 of approximately 100 to150 AF, as shown in ***Figure 17***. In addition to evaluating the supply gap(s) at the 2050 demand, LRE Water also examined the maximum demand that could be met without shortage and when that demand would occur in the 30-year forecast from 2021 to 2050. For scenario H1.A (historical hydrology, current operations, and 2.5% system loss), the firm yield or the maximum demand that could be met without shortage was 427 AF, which corresponds to the year 2039 at high growth, as shown in ***Table 2***. In comparing the results for scenarios evaluated against the historical hydrology, three of the scenarios did not have supply gaps or shortages. LRE Water, therefore, concluded that by operating the Ridgway Ditch to maximize the Town's legal entitlement to divert up to the first 2 cfs during the irrigation season and maintaining a non-irrigation supply of up to 0.25 cfs, the Town could meet its 2050 demands at high growth. Alternatively, the results show that the Town could reduce or eliminate shortages by minimizing system losses. Moreover, the firm yield analysis shows that at a high growth rate, the Town could meet total future municipal demand for the next 18 years (2039). Finally, there were no shortages when these four historical hydrology scenarios were analyzed with demand projections at the medium and low growth rates or when only the treated potable water demands included.

- **Climate Change Hydrology:** For the climate change scenarios (C1.A, C1.B, C2.A, C2.B), the model showed supply gaps in two of the scenarios: C1.A = Current Operations & 2.5% System Loss and C1.B = Current Operations & No System Loss. In scenario C1.A, there were shortages in 7 of the 23 years modeled, and in four of those years the severity of the shortage was over 100 AF, as shown in ***Figure 17***. The firm yield for this scenario was

394 AF, which is approximately 100 AF less than the same scenario evaluated against historical hydrology. Moreover, the firm yield of 394 AF for the C1.A scenario corresponds to the year 2034 at high growth, which is 5-years sooner than the H1.A scenario. Finally, the C1.A scenario was the only scenario where shortages occurred at lower growth rates. At the medium growth rate, the total projected 2050 municipal demand was 418 AF/year, which is 94 AF less than the 2050 high growth demand. The firm yield for this medium growth scenario was the same 394 AF; however, this maximum demand did not occur until the year 2044, which is 5-years later than the H1.A scenario and 10-years later than the C1.A scenario at high growth, as shown in ***Table 2***.

In scenario C1.B, the current operations are evaluated against the climate change hydrology as with scenario C1.A; however, system losses have been eliminated. This change reduced the number of years when shortages occurred from 7 to 3, and the severity of the shortage was reduced in two of those remaining three years. In addition, the firm yield increased from 394 AF to 487 AF and the timing of when the maximum demand is reached was pushed out to the year 2047. These results indicate that if the Town were to invest in making its delivery and storage system (Ridgway Ditch, Happy Hollow Ditch, and Lake Otonowanda) as efficient as possible, it would still not be able to fully meet the total 2050 municipal demand at high growth during an extreme period of dry-year hydrology (2002-2003). However, the model results for scenario C2.A show that by operating the Ridgway Ditch to maximize the Town's legal entitlement to divert up to the first 2 cfs during the irrigation season and maintaining a non-irrigation supply of up to 0.25 cfs the Town could meet its total 2050 demands at high growth under climate change hydrology.

Figure 17
Annual Supply Gap Frequency & Volume
(2000-2020 Growth Rate, 2050 Demand)

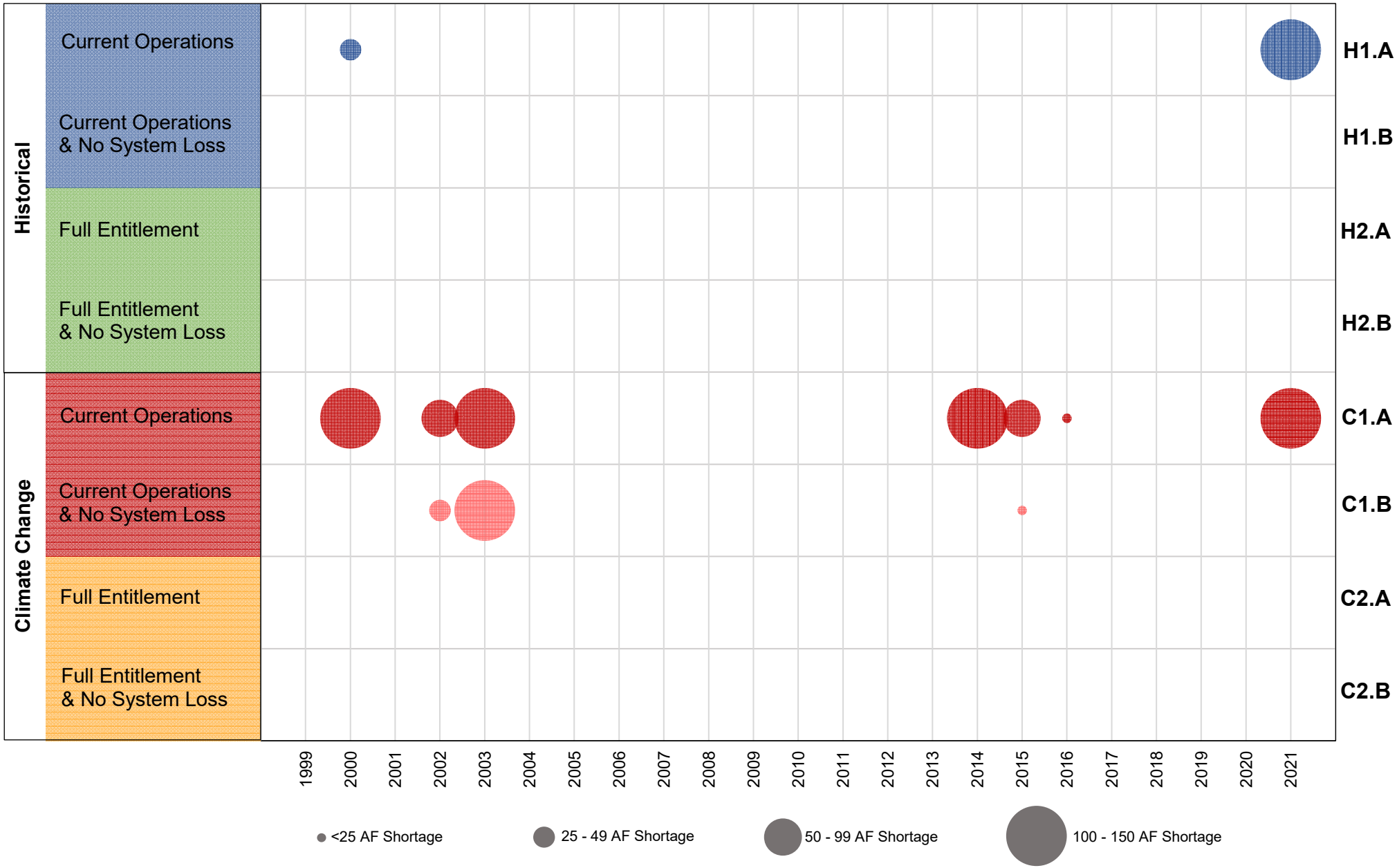


Table 2
Firm Yield Analysis

	Scenario	Low Growth Rate 2050 Annaul Demand = 388 AF	Medium Growth 2050 Annaul Demand = 418 AF	High Growth 2050 Annaul Demand = 512 AF	
Historical Hydrology	Current Operations	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 418 AF	**Max. Firm Yield Year = 2039** **Max. Firm Yield = 427 AF**	H1.A
	Current Operations & No System Loss	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 418 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 512 AF	H1.B
	Full Entitlement	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 418 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 512 AF	H2.A
	Full Entitlement & No System Loss	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 418 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 512 AF	H2.B
Climate Change Hydrology	Current Operations	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	**Max. Firm Yield Year = 2044** **Max. Firm Yield = 394 AF**	**Max. Firm Yield Year = 2034** **Max. Firm Yield = 394 AF**	C1.A
	Current Operations & No System Loss	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 418 AF	**Max. Firm Yield Year = 2047** **Max. Firm Yield = 487 AF**	C1.B
	Full Entitlement	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 418 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 512 AF	C2.A
	Full Entitlement & No System Loss	Max. Firm Yield Year > 2050 Max. Firm Yield > 388 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 418 AF	Max. Firm Yield Year > 2050 Max. Firm Yield > 512 AF	C2.B

H1.A

Supply-Demand Gap for the Town of Ridgway
Under Various Operation & Demand Scenarios

SCENARIO: Historic Hydrology, Current Operations & System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
Lake O Max Release Rate	1.7	cfs
Lake O Capacity	746.0	AF
Pre-sed. Ponds Max Release Rate	3.0	cfs
Pre-sed. Ponds Capacity	17.2	AF

Input Parameters - Vary by Scenario

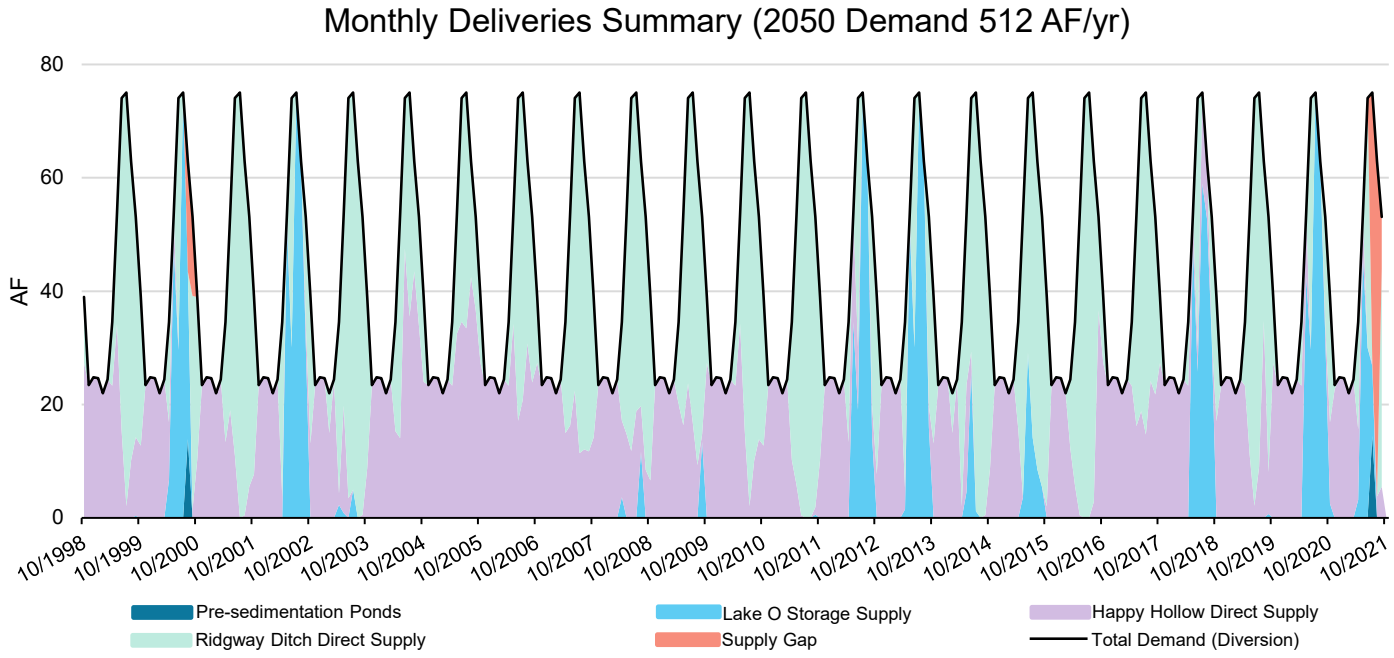
Demand Scenario	Total	Potable
Hydrologic Supply	Historic	Climate Change (H&D)
Ridgway Ditch Operations	Current	Entitlement
System Loss	-2.5%	0.0%

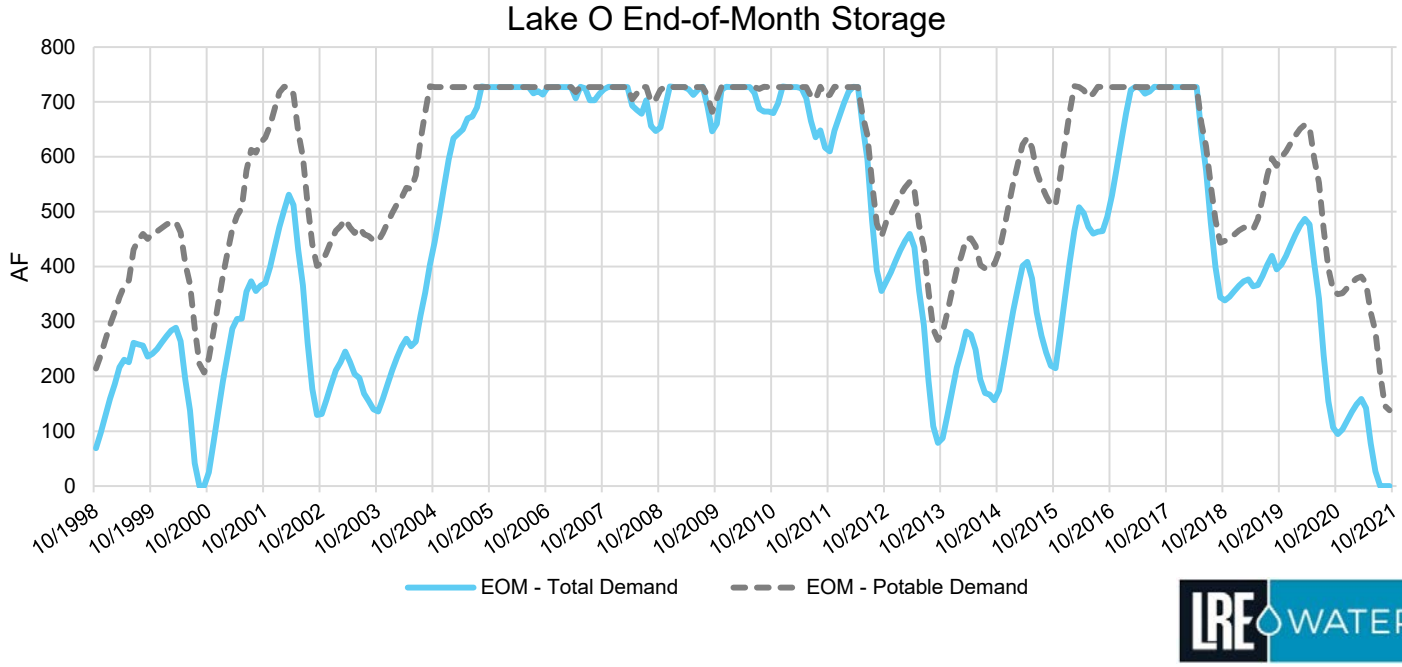
Legal Availability of Water Rights

Ridgway Ditch, Sr. (2 cfs) out-of-priority May, Jul & Aug
Ridgway Ditch, Jr. (25 cfs & 5 cfs) out-of-priority May-Sep
Happy Hollow Ditch reduced by 0.375 cfs for Tidwell Ditch Apr-Oct

Growth Scenario

High, 2000-2020 Average Growth





H1.B

Supply-Demand Gap for the Town of Ridgway Under Various Operation & Demand Scenarios

SCENARIO: Historic Hydrology, Current Operations & No System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
Lake O Max Release Rate	1.7	cfs
Lake O Capacity	746.0	AF
Pre-sed. Ponds Max Release Rate	3.0	cfs
Pre-sed. Ponds Capacity	17.2	AF

Input Parameters - Vary by Scenario

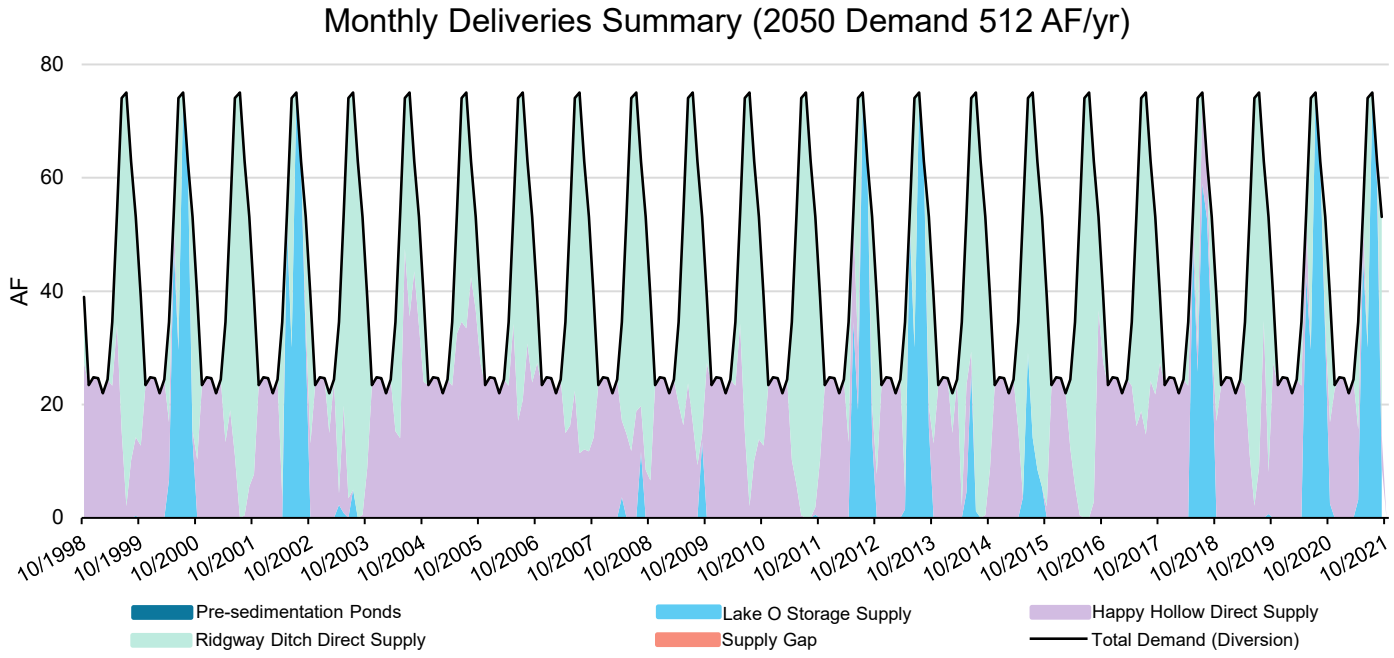
Demand Scenario	Total	Potable
Hydrologic Supply	Historic	Climate Change (H&D)
Ridgway Ditch Operations	Current	Entitlement
System Loss	-2.5%	0.0%

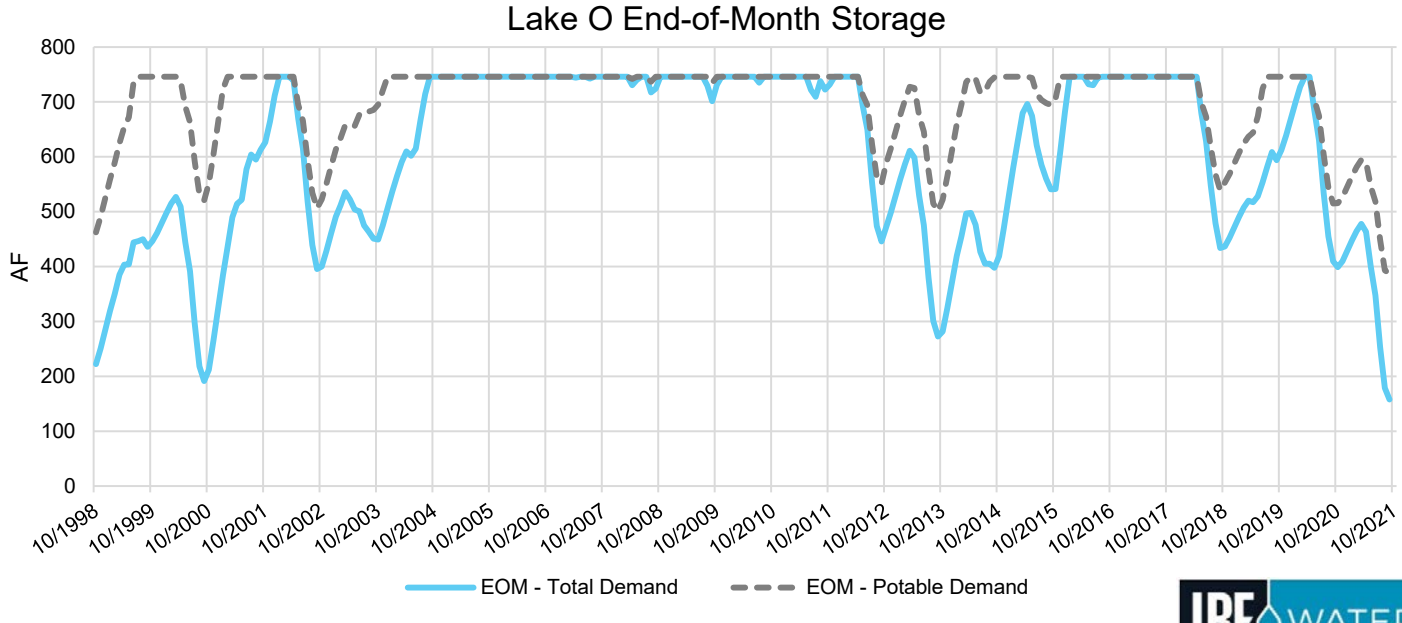
Legal Availability of Water Rights

Ridgway Ditch, Sr. (2 cfs) out-of-priority May, Jul & Aug
Ridgway Ditch, Jr. (25 cfs & 5 cfs) out-of-priority May-Sep
Happy Hollow Ditch reduced by 0.375 cfs for Tidwell Ditch Apr-Oct

Growth Scenario

High, 2000-2020 Average Growth





H2.A

Supply-Demand Gap for the Town of Ridgway
Under Various Operation & Demand Scenarios

SCENARIO: Historic Hydrology, Full Entitlement & System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
Lake O Max Release Rate	1.7	cfs
Lake O Capacity	746.0	AF
Pre-sed. Ponds Max Release Rate	3.0	cfs
Pre-sed. Ponds Capacity	17.2	AF

Input Parameters - Vary by Scenario

Demand Scenario	Total	Potable
Hydrologic Supply	Historic	Climate Change (H&D)
Ridgway Ditch Operations	Current	Entitlement
System Loss	-2.5%	0.0%

Legal Availability of Water Rights

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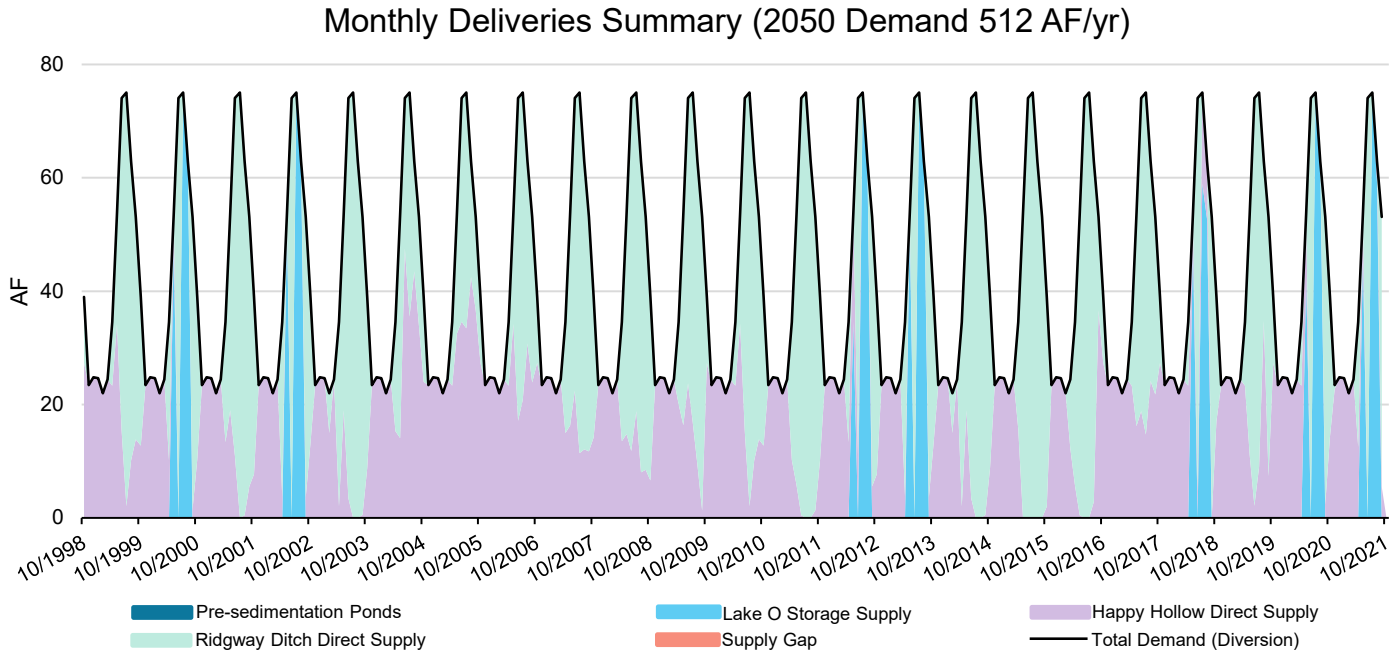
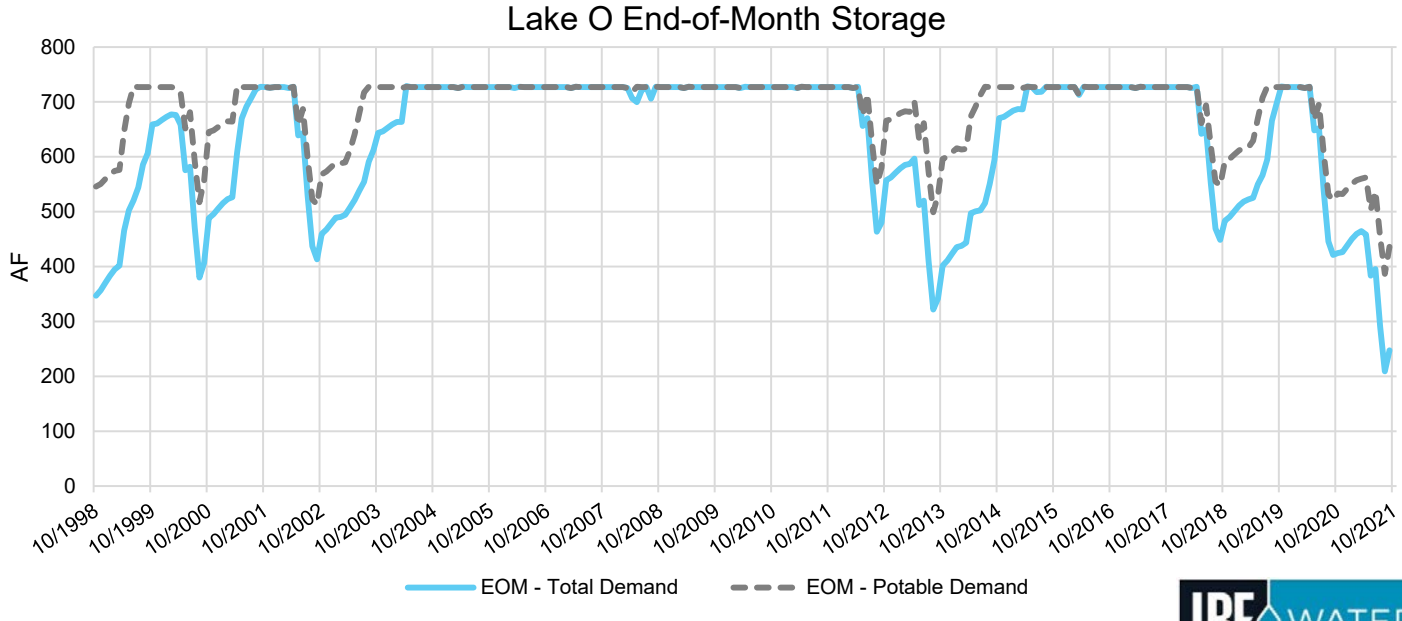
Happy Hollow Ditch reduced by 0.375 cfs for Tidwell Ditch Apr-Oct

Growth Scenario

High, 2000-2020 Average Growth





H2.B

Supply-Demand Gap for the Town of Ridgway
Under Various Operation & Demand Scenarios

SCENARIO: Historic Hydrology, Full Entitlement & No System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
Lake O Max Release Rate	1.7	cfs
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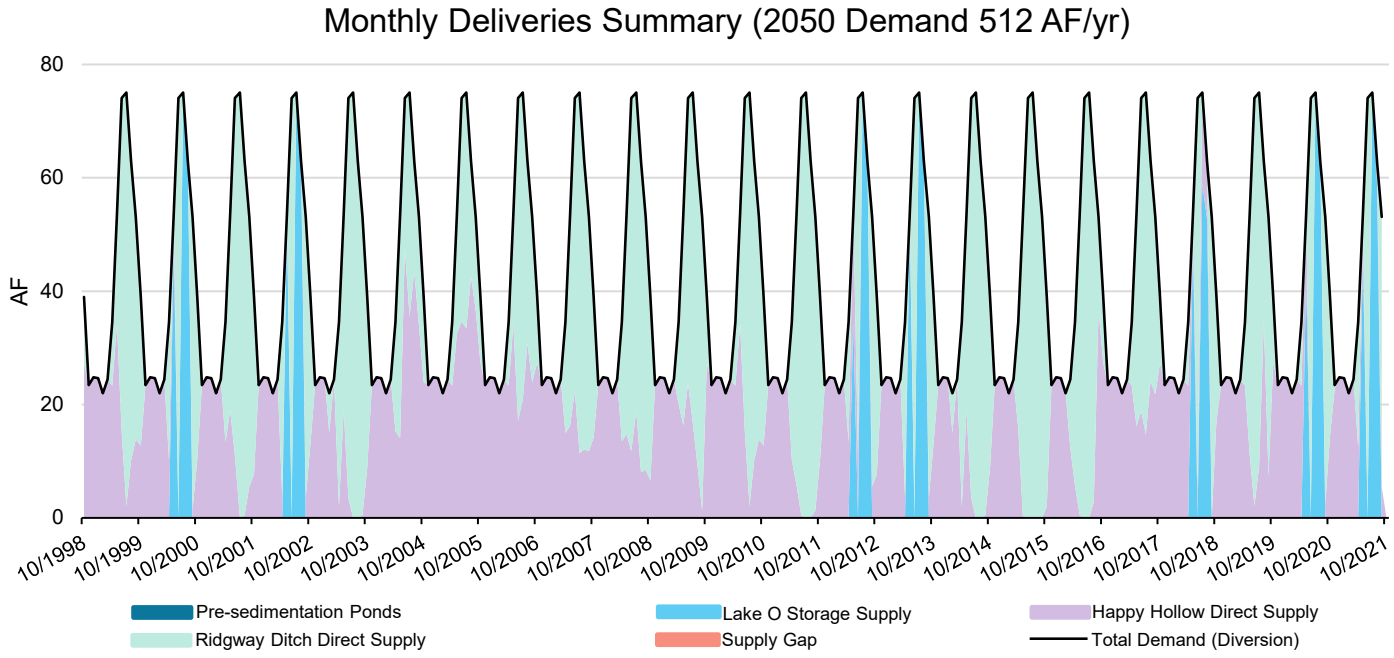
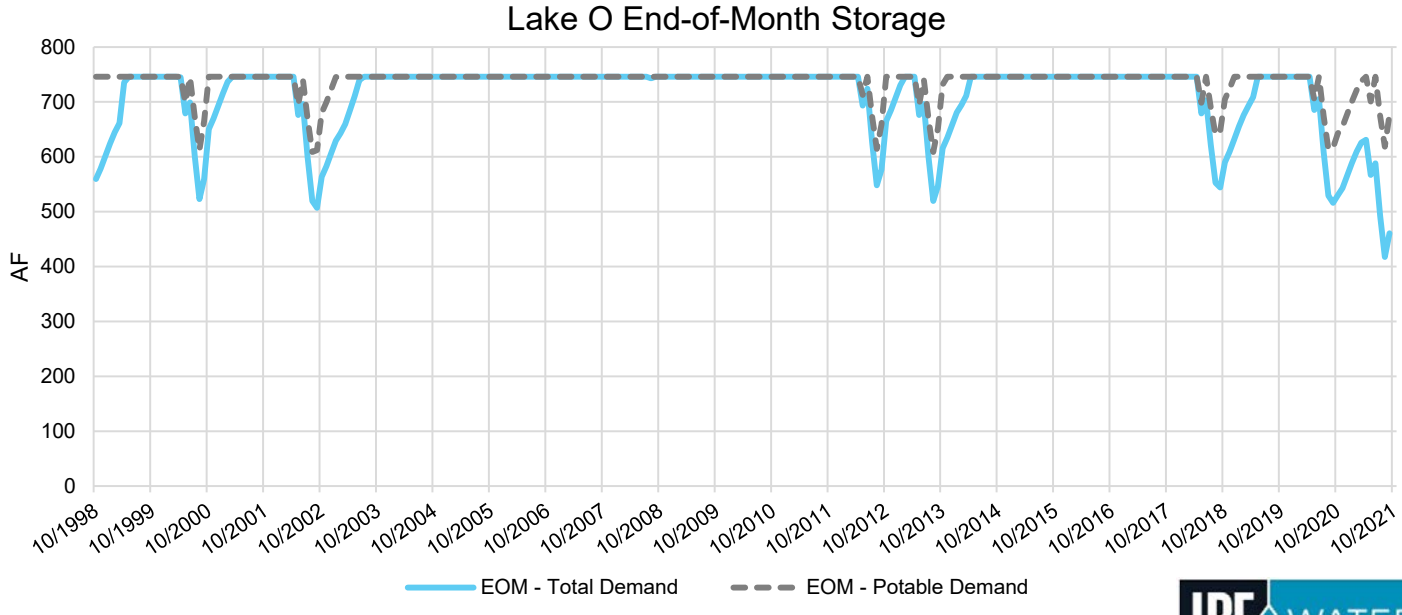
Growth Scenario

High, 2000-2020 Average Growth





C1.A

Supply-Demand Gap for the Town of Ridgway
Under Various Operation & Demand Scenarios

SCENARIO: Climate Change, Current Operations & System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
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Pre-sed. Ponds Max Release Rate	3.0	cfs
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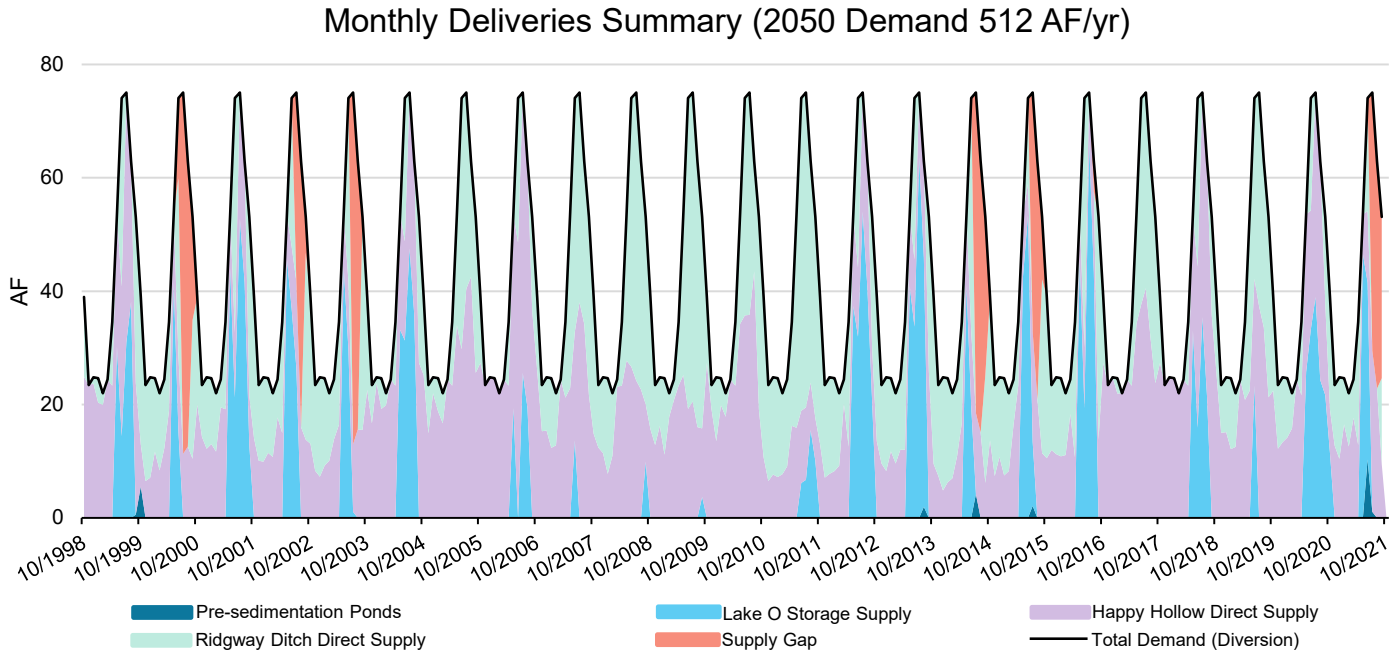
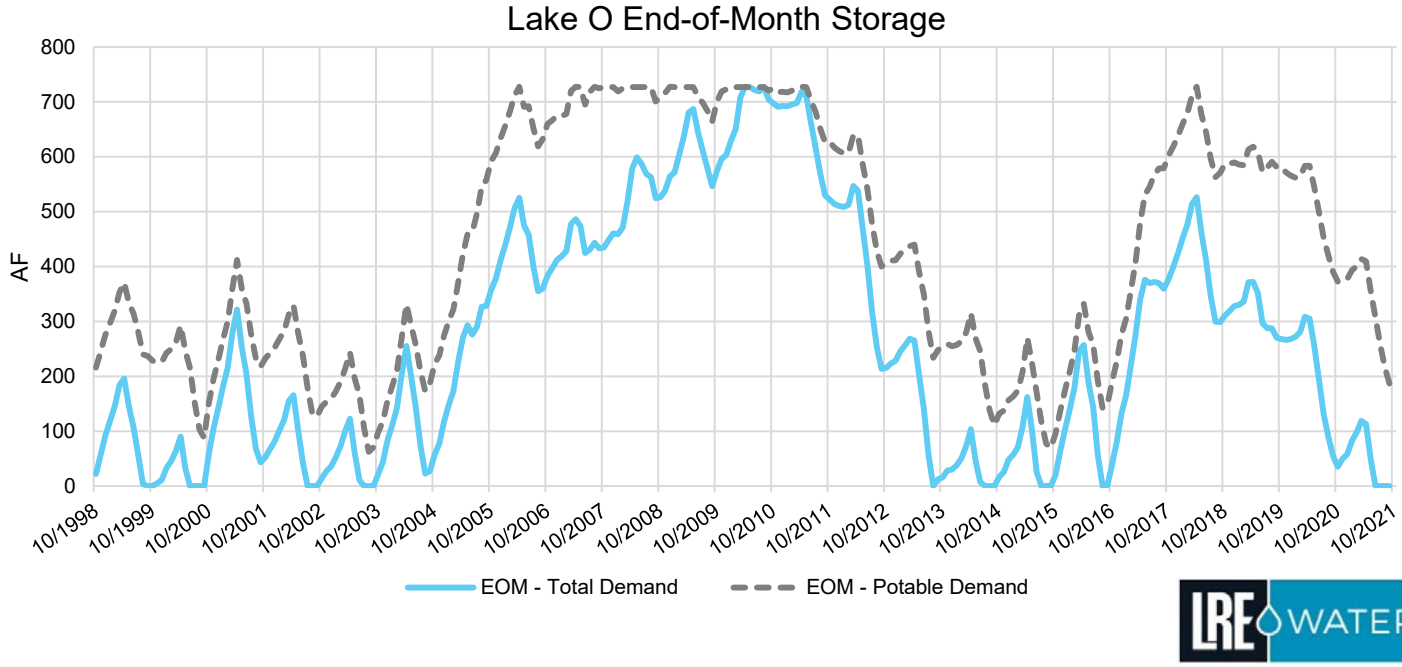
Growth Scenario

High, 2000-2020 Average Growth





C1.B

Supply-Demand Gap for the Town of Ridgway Under Various Operation & Demand Scenarios

SCENARIO: Climate Change, Current Operations & No System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
Lake O Max Release Rate	1.7	cfs
Lake O Capacity	746.0	AF
Pre-sed. Ponds Max Release Rate	3.0	cfs
Pre-sed. Ponds Capacity	17.2	AF

Input Parameters - Vary by Scenario

Demand Scenario	Total	Potable
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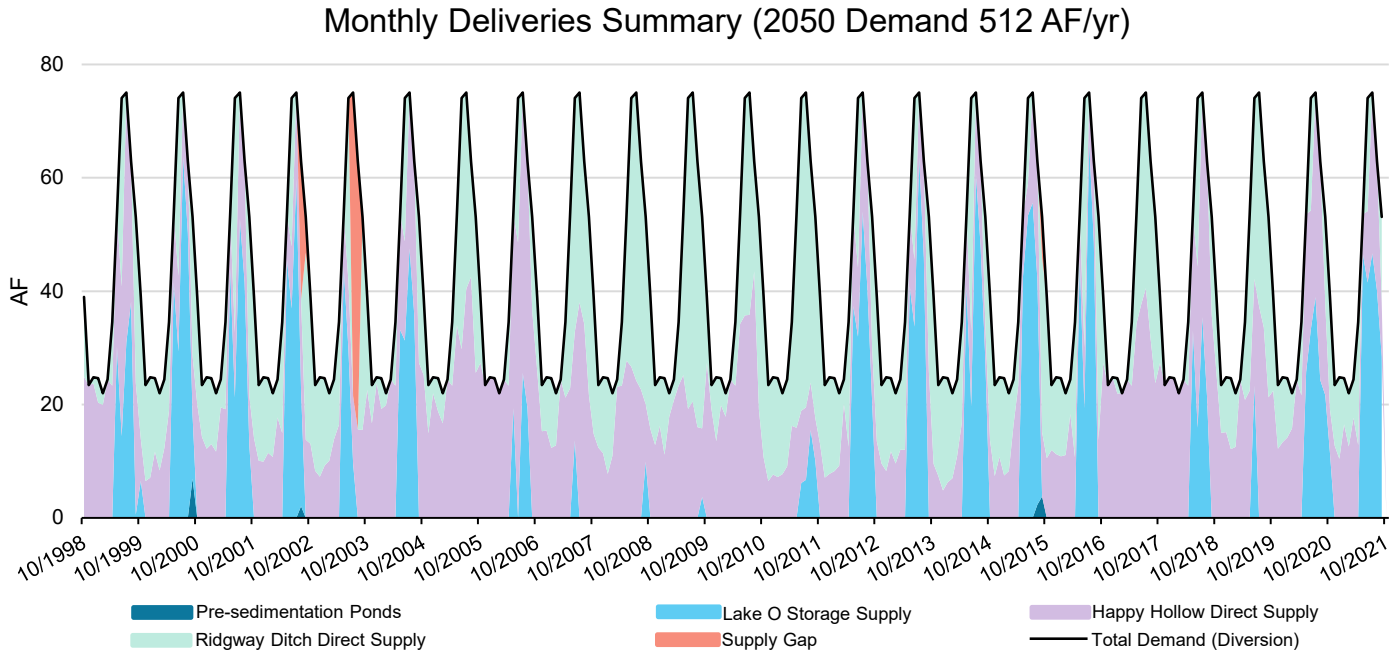
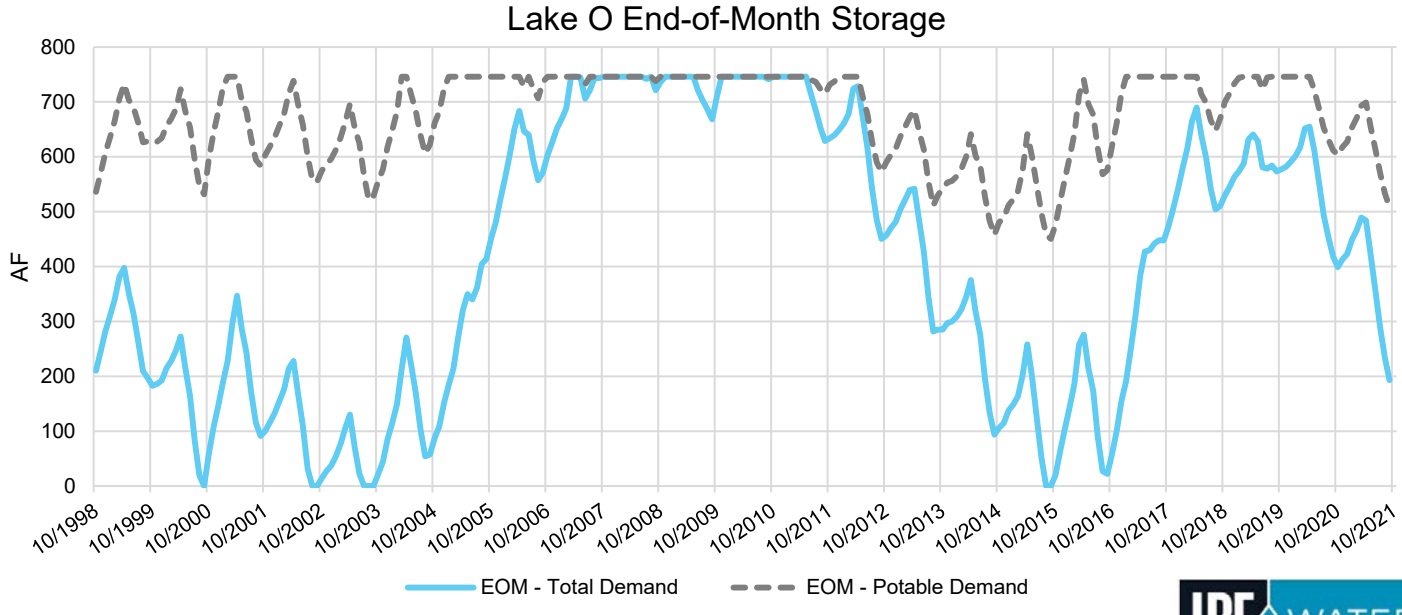
Growth Scenario

High, 2000-2020 Average Growth





C2.A

Supply-Demand Gap for the Town of Ridgway
Under Various Operation & Demand Scenarios

SCENARIO: Climate Change, Full Entitlement & System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
Lake O Max Release Rate	1.7	cfs
Lake O Capacity	746.0	AF
Pre-sed. Ponds Max Release Rate	3.0	cfs
Pre-sed. Ponds Capacity	17.2	AF

Input Parameters - Vary by Scenario

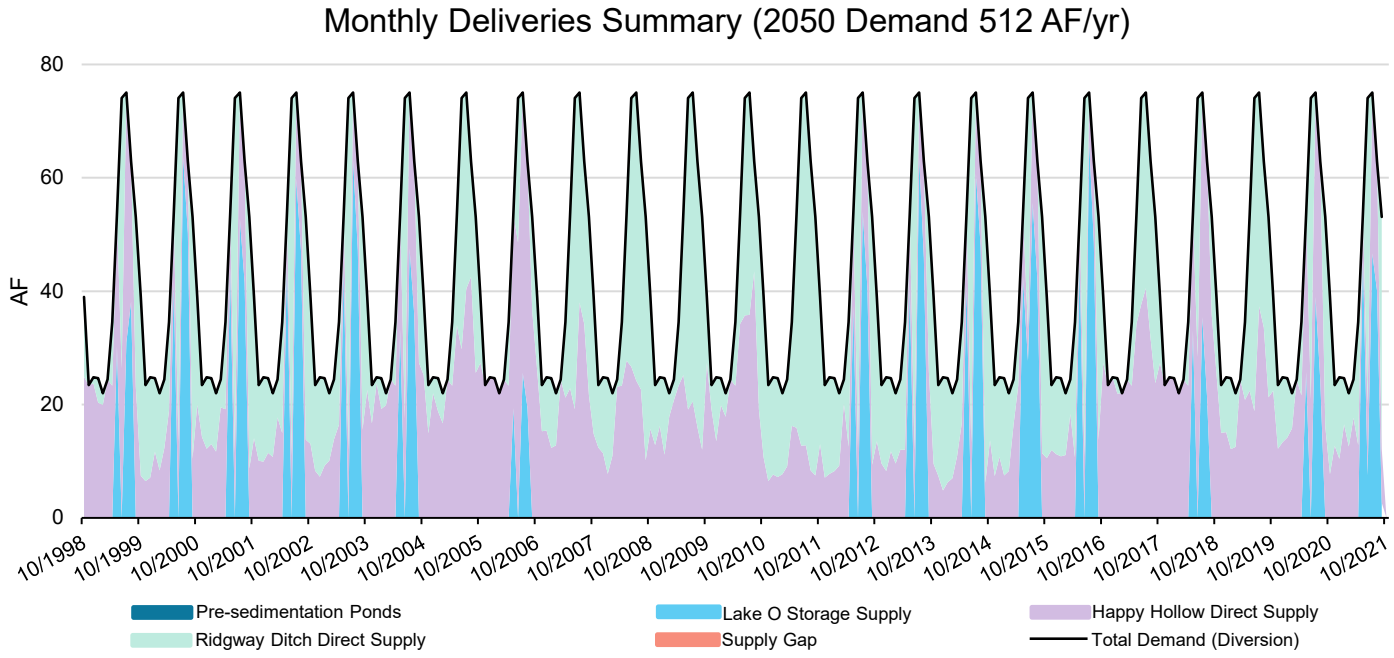
Demand Scenario	Total	Potable
Hydrologic Supply	Historic	Climate Change (H&D)
Ridgway Ditch Operations	Current	Entitlement
System Loss	-2.5%	0.0%

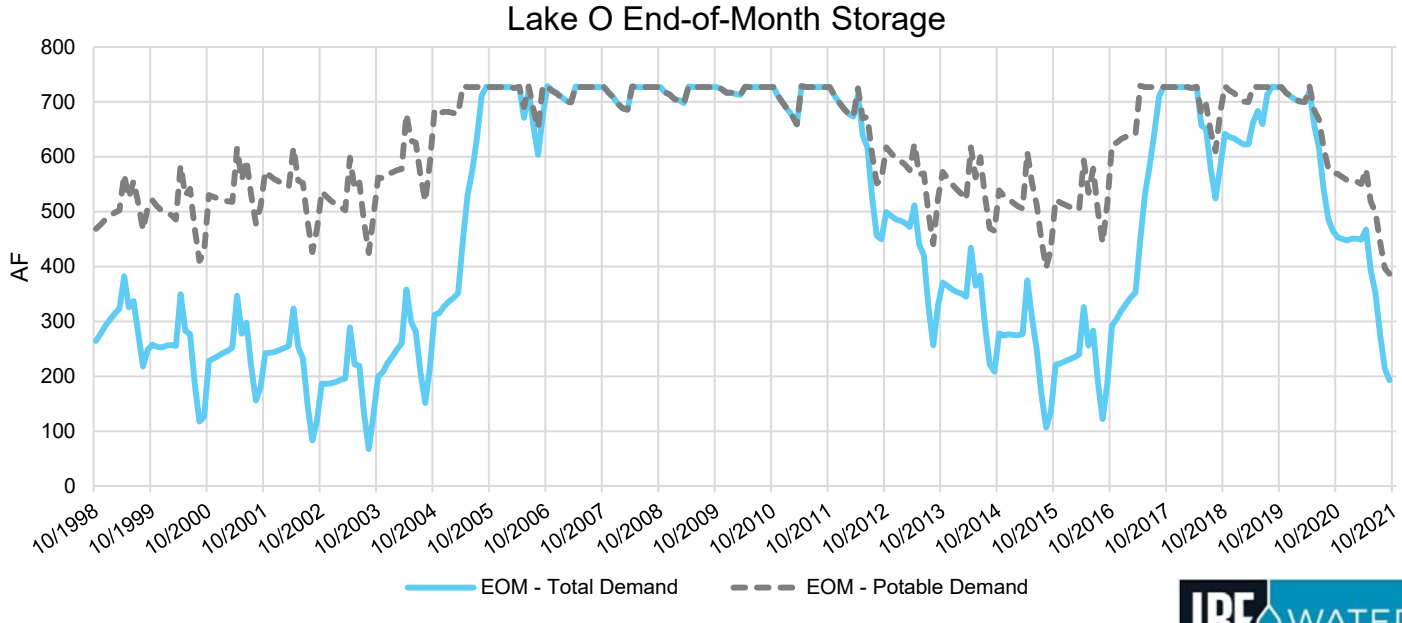
Legal Availability of Water Rights

Ridgway Ditch, Sr. (2 cfs) out-of-priority May, Jul & Aug
Ridgway Ditch, Jr. (25 cfs & 5 cfs) out-of-priority May-Sep
Happy Hollow Ditch reduced by 0.375 cfs for Tidwell Ditch Apr-Oct

Growth Scenario

High, 2000-2020 Average Growth





C2.B

Supply-Demand Gap for the Town of Ridgway
Under Various Operation & Demand Scenarios

SCENARIO: Climate Change, Full Entitlement & No System Loss

Set Parameters

Non-Potable Demand Growth	25% in 2050	
Lake O Max Release Rate	1.7	cfs
Lake O Capacity	746.0	AF
Pre-sed. Ponds Max Release Rate	3.0	cfs
Pre-sed. Ponds Capacity	17.2	AF

Input Parameters - Vary by Scenario

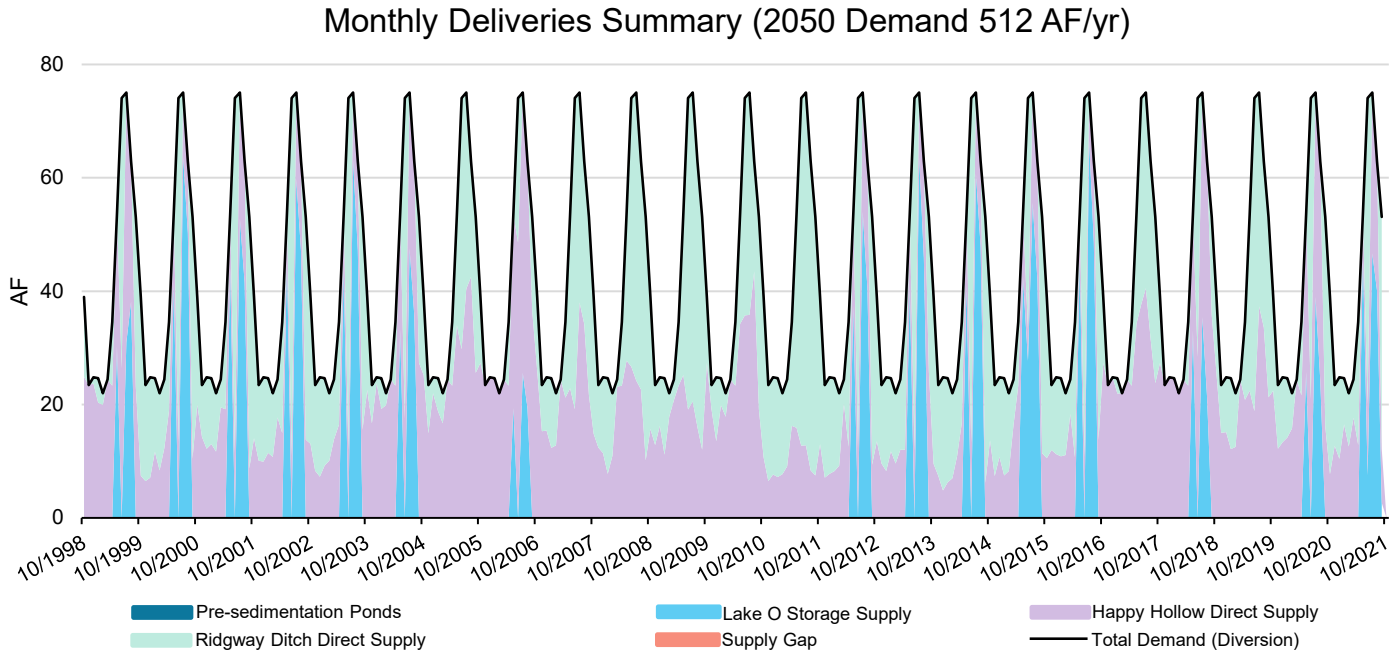
Demand Scenario	Total	Potable
Hydrologic Supply	Historic	Climate Change (H&D)
Ridgway Ditch Operations	Current	Entitlement
System Loss	-2.5%	0.0%

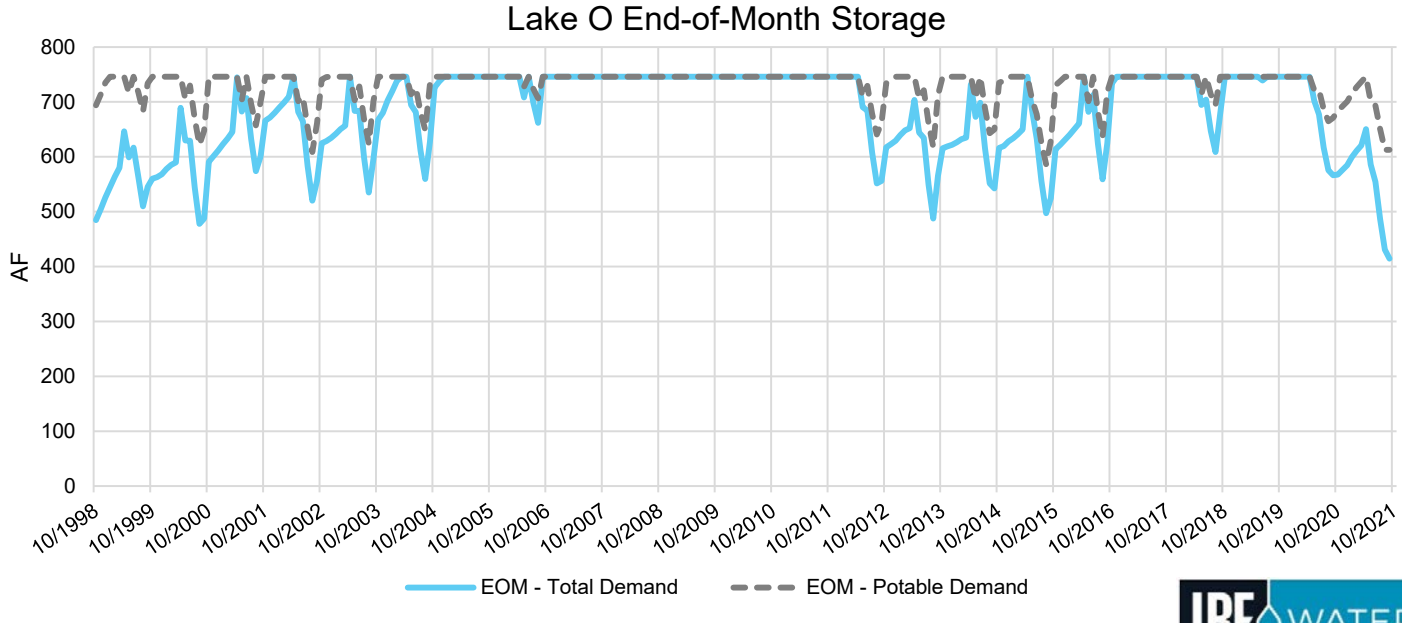
Legal Availability of Water Rights

Ridgway Ditch, Sr. (2 cfs) out-of-priority May, Jul & Aug
Ridgway Ditch, Jr. (25 cfs & 5 cfs) out-of-priority May-Sep
Happy Hollow Ditch reduced by 0.375 cfs for Tidwell Ditch Apr-Oct

Growth Scenario

High, 2000-2020 Average Growth





SECTION 4: WATER SUPPLY STRATEGIES

The first step in assuring that the Town's water system can reliably support existing and future demands is to evaluate the water supply that is physically and legally available to the system under a worst case scenario. In this study, the worst case scenario was defined as the total 2050 demand at high growth, water supply reduced for climate change, and operating the Town's water system using an estimate of current operations. As summarized in ***Figure 17***, the modeled maximum supply gap for this scenario is over 100 AF. However, the modeling results also showed that by changing and/or improving system operations the supply gap could be reduced or eliminated. As such, it is not currently necessary for the Town to actively pursue additional water supplies. Nevertheless, as conditions may change and/or the available data used as the basis for modeling may improve, LRE Water has provided several common water supply strategies that the Town could explore as alternatives to making operational changes or in combination with changes.

Increase Storage: Reservoirs allow water users to store supplies when hydrologic conditions are abundant and the stream system is less likely to be under administration, and then release those supplies later in the season when natural flows have receded. This flexibility is highly valuable, which is why storage is the cornerstone of most water right portfolios. The Town's existing water system includes storage in Lake Otonowanda and to a limited extent the Pre-sedimentation Ponds. Securing additional storage that can be delivered in a similar manner for direct use at the water treatment plant or raw water system would be ideal. Storage that is located downstream of the Town's water system would have to be used by exchange and/or included in a plan for augmentation. When operated by exchange, the Town would divert water through the Ridgway Ditch or the Happy Hollow Ditch at the same rate that water was released from the reservoir. This operation does not increase the supply that is physically available to the Town's water system. Instead, it allows water to be diverted at a structure that would otherwise be out-of-priority to a downstream call by replacing the diverted amount at a location upstream of the calling structure. An exchange, though, cannot be operated unless there is available water in the reach between the point of diversion and the point where the river is made whole by the released supply. Essentially, other vested water rights within the exchange reach cannot be impacted by the exchange.

Acquire Water Rights: The acquisition of additional water rights could potentially bolster the reliability of the Town's portfolio. As previously described, the value of a water right depends on the water supply that is physically and legally available to use. In addition, the historic consumptive use of a water right is the measure of the amount of water that can be changed for use by the Town. A water right that has an abundant source of supply is unreliable if it is out-of-priority at critical times. Likewise, a senior water right is unreliable if its source of supply is insufficient when needed. As it relates to its existing water system, the Town would want to acquire a water right that is more senior than the calling rights outlined in Section 3.2 above, and a good history of consumptive use.

In addition, the type of use that is decreed to the water right is important. As with most regions in Colorado, the senior water rights in the Uncompahgre River basin are decreed for irrigation. While it is not uncommon for municipalities to acquire these types of agricultural water rights, it does typically require that the water right be changed through a water court proceeding in order to be used at a new location and for other purposes in addition to irrigation. This process involves quantifying the historic consumptive use associated with the water right, because only the portion of the right that was historically consumed is available to be changed. For water rights that have historically been used for irrigation, the consumed portion of the diverted supply is equal to the amount of water used in the cultivation of the crop. The water supply that is not consumed is returned to the stream system through surface runoff and deep percolation and is not available to be changed. For reference, the consumptive portion of a water right used to flood irrigate lands would be approximately 50 to 60% of the total diversion, and the consumptive portion of a water right used for sprinkler irrigation would be approximately 70 to 80%. In addition, the ability to divert the changed supply will also be limited by the historic timing of use, with less diversion potential at the start and end of the irrigation season.

Finally, as with securing additional storage, the ability for the Town to directly divert the historic consumptive use would be ideal. For direct use to occur, the acquired water right would need to be located upstream of the Town's Ridgway Ditch or Happy Hollow Ditch, or be able to be delivered to those systems. Alternatively, in order to use a water right acquired outside of the Beaver Creek and/or Cottonwood Creek drainages, the Town would have to develop new infrastructure that was located adjacent to or downstream of the acquired water right that would be used to divert the available supply to the treatment plant without impacting other vested water rights, or the Town would have to divert the water right by exchange and/or include it in a plan for augmentation. As previously described, the option to use the water right by exchange and/or in a plan for augmentation does not increase the supply that is physically available to the Town's water system. Instead, it allows water to be diverted at a structure that would otherwise be out-of-priority to a downstream call by replacing the diverted amount at a location upstream of the calling structure. Again, an exchange cannot be operated unless there is available water in the reach between the point of diversion and the point where the river is made whole by the available water right acquisition.

Develop a Plan for Augmentation: A key attribute associated with a plan for augmentation is the ability to replace depletive impacts, as opposed to diversion impacts. As described in the context of a historical consumptive use analysis, the total diversion supply can be divided into two parts: the portion that is consumed or that is depletive to the stream system and the portion that is returned to the stream. A plan for augmentation accounts for the returned supply, so long as it returns above the calling structure, and then replaces only the depletive impact when the diverting water right is out-of-priority. For a municipality, this distinction can be significant, as 90 to 95% of the indoor domestic demand is returned to the stream system, whereas only 20 to 30% of the water supply used for sprinkler irrigation returns to the stream system. As it relates to Town's existing water system, the wastewater treatment plant is

located above the Montrose & Delta Canal diversion on the Uncompahgre River. In addition, irrigation within the Town's service area would also return to the Uncompahgre River system above the Montrose & Delta Canal. Therefore, as it relates to river administration on the lower Uncompahgre River, the Town could develop a plan for augmentation that replaces its depletive impact with storage releases (existing, new owned, or new leased) or historical consumptive use credits from the acquisition of a senior water right. Depending on the location of the replacement supplies, though, this option could require available exchange capacity within the Dallas Creek and Beaver Creek drainages.

SECTION 5: SUMMARY OF FINDINGS AND RECOMMENDATIONS

1. Production Records: Town Staff indicated that based on sales the production record at the water treatment plant likely overestimates the amount of water use within the Town's service area. Nevertheless, the production record is the best available source of data and provided a conservative approximation of the Town's existing water demands. As such, for the water supply assessment, LRE Water used the production record as a basis for evaluating existing and future demands, and therefore, the modeled results were tied to this data.

   RECOMMENDATION: The Town should start by verifying the accuracy of the meter at the water treatment plant. If it's determined that the meter at the water treatment plant has not been functioning properly, the Town should consider updating this analysis when new, more accurate data is available. In addition, the Town should continue implementing its program that replaces meters for customers. It is LRE Water's understanding that all meters within the Town's service area will be replaced in the next 2-years. When the metered supply at production and the metered supply at delivery are functioning properly, the difference between the two represents the amount of water lost to leaks and system inefficiencies. If the Town reduces the amount of water that it's losing to leaks and system inefficiencies, then less water has to be produced and the overall demand on the water system decreases.

2. Lake Otonowanda Records: The Town measures the water supply that is delivered from the Ridgway Ditch system at the Lake O Flume. This measured supply is then delivered to the Pre-sedimentation Ponds, or it is stored in Lake Otonowanda. Town Staff noted issues with the accuracy of this measurement, especially during the winter due to snow and ice conditions. **The modeled results indicate that the estimated physical supply that is available to divert from the Ridgway Ditch system is ample, and if managed properly, could allow the Town to meet the total 2050 municipal demand at high growth.**

   RECOMMENDATION: Being able to accurately measure how much of the Ridgway Ditch diversion is being delivered to the Town is important. As such, the Town should consider implementing best management practices to ensure that the equipment and monitoring devices at the Lake O Flume are functioning properly, and that accurate measurement are being recorded.

3. Ridgway Ditch Diversion Records: The daily diversion record that is maintained by DWR is compiled from field observations that are recorded on a weekly or monthly basis during the summer irrigation season and less frequently during the winter non-irrigation season. While this record keeping practice is common and widely accepted in evaluating available diversion supplies, having a more frequently record of observations would improve the

findings of this analysis. In addition, a real time diversion record would allow the Town to better manage its portion of the Ridgway Ditch water supply.

RECOMMENDATION: The Town should consider installing a pressure transducer or similar monitoring equipment that records the flow rate through the ditch more frequently. This effort should be coordinated with the Division Engineer and District 68 Water Commissioner, as DWR is the official agency in charge of maintaining the public record. In addition, given the remote location of the Ridgway Ditch, the Town should also consider installing telemetry that would allow the Town to access diversion measurements online or through a SCADA system. The real time data would also allow the Town to better manage its portion of the available supply.

4. Ridgway Ditch Operations: The model results show that if the Town continues to manage the Ridgway Ditch such that it receives approximately 37% of the total available diversion, then its municipal water system will not be able to reliably support the high growth, total 2050 demand under historical or climate change hydrology. **However, the model results also show that by managing the Ridgway Ditch such that the Town receives the entire supply up to the first 2 cfs during the summer irrigation season and entire supply up to 0.25 cfs during the winter non-irrigation season, the total 2050 municipal demand can be met.** Moreover, the diversion records indicate that more than 0.25 cfs is available to divert at the Ridgway Ditch headgate in the winter non-irrigation season.

   RECOMMENDATION: As previously recommended, the Town should consider regular monitoring of the diversion rate at the Ridgway Ditch headgate, as well as its current monitoring of the Lake O Flume. In addition, the modeling results showed that maintaining storage levels in Lake Otonowanda is key. The ability to carryover supplies from one year to another is critical during a multi-year drought. Therefore, the Town should consider implementing guidelines related to storage level thresholds and best management practices related to winter operations. The guidelines and practices should set forth how the Town manages its senior priority in the Ridgway Ditch for 2 cfs, so that other users are limited at times when the Town needs its full entitlement to directly meet municipal demands and/or to maintain storage levels in Lake Otonowanda.

5. Funding and Grants: The recommendations related to monitoring and improvements to the Town's water supply system may be eligible for funding and grant opportunities at a federal, state, and local level.

   RECOMMENDATION: The Town should investigate how to access potential funding opportunity for water-related projects under the recently enacted Infrastructure Investment and Jobs Act or through state funding options such as Colorado Water Plan Grants or Gunnison Basin Roundtable Grants.

6. Cottonwood Ditch Administration: It is the opinion of Mr. Weig, the Water Commissioner for District 68, that while Cottonwood Creek is technically tributary to the Uncompahgre River, the downstream call on the Uncompahgre River is considered futile to water rights that divert from Cottonwood Creek, and as a result, the Town's Happy Hollow Ditch is not subject to the Montrose and Delta call. This opinion is based on the fact that at times when the river is typically under administration, the flow in Cottonwood Creek is dry near its confluence with the Uncompahgre River.

   RECOMMENDATION: The Town should continue to monitor these conditions, and if flows in Cottonwood Creek during dry years begin to reach the Uncompahgre River, the Town should reevaluate this analysis.

7. Climate Change Considerations: The approach used by LRE Water to evaluate the water availability under climate change was based on sophisticated and well supported climate datasets that were developed through state planning efforts for the Gunnison River basin. This data, however, does not account for the effect of dust on the snowpack.

   RECOMMENDATION: The Town should continue to monitor water supply planning and modeling efforts at the state and basin wide level, and as better data becomes available, the Town should consider reevaluation of this assessment.

8. Ridgway Municipal Code Adequate Water Supply Rules: In order to ensure that the Town has adequate water to serve all its customers now and into the future, the Town has proactively adopted Chapter 7-6 Adequate Public Water Supply into the Town code, and amended its Annexation Policy to "require dedication of water rights or fees in lieu of dedication commensurate with future water demands on the property". The Town code regarding adequate water supply is currently based on the requirements defined by the Colorado Revised Statutes (CRS) 29-103 which says that development with less than 50 single family equivalents (SFEs) are exempt but allows for communities to set a lower limit and to provide a more stringent requirement. With major developments within the Town's service area generally totaling less than 50 SFEs. The Town has received no dedication of water rights of fees in lieu supporting the acquisition/development of new supplies since the adoption of the Adequate Public Water Supply policy.

   RECOMMENDATION: As stated in the Town's 2019 CAR, the Town needs to review the RMC Adequate Water Supply Rules and consider modifying the code to be more in line with the "typical" development observed within the Town service area. This change would be an important step for the Town toward achieving its goal of ensuring development pays its own way.

9. Raw Water Demand: The model results show that in all of the high growth scenarios, the potable 2050 treated water demand could be fully met. For the three scenarios wherein

the total 2050 municipal demand could not be met, the raw water system that serves parks and open space would have been limited.

RECOMMENDATION: In consideration of properties that apply to be annexed into the Town's service area, the Town should examine potential opportunities to acquire water rights decreed to irrigate the annexed land and promote the continuance of raw water irrigation. This approach allows the Town to continue to use historical agricultural water rights without a water court change case, and does not increase the amount of water that needs to be delivered to the Town's municipal water system. In addition, the Town should consider adopting codes that encourage new development within the Town's service area to construct raw water infrastructure and/or develop new raw water sources, if applicable.

10. Ouray County's Water Court Case: In LRE Water's discussion related to water supply strategies, the limiting factor in acquiring additional storage and/or water rights was the need for those supplies to be located above the Town's water system, because of limited exchange capacity.

    RECOMMENDATION: As part of Ouray County's pending water court case (Case No. 19CW3098), the Uncompahgre Water Users Association has signed and agreed "not to call in certain circumstances." This agreement has the potential to increase the exchange capacity in the reaches above Ridgway Reservoir and as such, the Town should continue to actively engage with the County. It is LRE Water's understanding that the Town has provided the County information regarding the Town's desired exchange rate on Dallas Creek and the Uncompahgre River.

11. Water Right Clean-Up: In LRE Water examination of the Town's water rights portfolio, it found documentation wherein A. E. Walther deeded 3.0 cfs of the 25.0 cfs that was decreed to the original irrigation water right for the Ridgway Ditch (Priority No. 131). It appears that the Town's 3.0 cfs has priority over the remaining 22.0 cfs, based on the documents reviewed by LRE Water. However, a water rights attorney should review the documents and provide an opinion on the matter.

    RECOMMENDATION: While the modeling shows that any supply gap or shortage could be eliminated with Town maximizing its ability to divert the first 2 cfs in the Ridgway Ditch, the Town should consider hiring a water rights attorney to resolve any ambiguity related to the Town's 3.0 cfs ownership in the Priority 131 and priority of uses as to owners of the remaining 22.0 cfs.

APPENDIX A:
Water Right Decrees

Civil Action 1496, Sibert Ditch Change Case

STATE OF COLORADO,)
)ss   IN THE DISTRICT COURT.
County of Ouray   )

IN THE MATTER OF THE PETITION OF THE TOWN OF RIDGWAY, a municipal corporation existing under and by virtue of the laws of the State of Colorado, TO CHANGE THE POINT OF DIVERSION OF TWO (2) SECOND FEET OF WATER, HERETOFORE ADJUDICATED TO THE "SIBERT DITCH" #66, PRIORITY #72, IN WATER DISTRICT #68, OURAY COUNTY, COLORADO, TO THE HEADGATE OF THE "RIDGWAY" DITCH, SITUATED IN SAID WATER DISTRICT, IN SAID COUNTY AND STATE.

Entered Page 204 Dec 16, 1912

Case 1496

---------------ooOoo------------

Pursuant to an order heretofore made, the above entitled matter came on to be heard this 16th day of December, A.D.1912, before the Court; the petitioner herein appearing by its Attorney E.G.MacAdams, a stipulation having been filed herein by all water owners affected by the change in the point of diversion as petitioned for.

The Court having read the petition and stipulation as filed herein and having considered the evidence introduced in support thereof finds: that due notice of the filing of, and the hearing upon the said petition has been given as provided by law, that the parties affected by the granting of such change in the point of diversion have filed their written consent to such change; that the Town of Ridgway is the owner of the "Ridgway" Ditch; that the said Town of Ridgway is the owner of two (2) cubic feet of water per second of time of priority #72, and is lawfully entitled to have the point of diversion of the said two cubic feet of water per second of time, changed from the headgate of the "Sibert" Ditch to the headgate of the said "Ridgway" Ditch.

WHEREFORE IT IS ORDERED ADJUDGED AND DECREED:

That the point of diversion of two (2) cubic feet of water per second of time of the waters heretofore adjudicated to the "Sibert" Ditch #66, priority #72, in Water District #68, Ouray County, Colorado, so owned by the petitioner, The Town of Ridgway, be and the same is hereby diverted and changed from the headgate of the said "Sibert" Ditch, to the headgate of the said "Ridgway" Ditch, in said Water District, County and State, and that the same shall retain priority #72, with all rights and privileges attached thereto,

PROVIDED ALWAYS

That this decree is given in accordance with the stipulation, filed herein, and signed by the committee appointed by the water owners affected by such change and by the Attorney for petitioner, and in accordance with said stipulation it is FURTHER ORDERED ADJUDGED AND DECREED, that the said two cubic feet of water per second of time shall be used by said petitioner for domestic purposes only,

That the Water Commissioner and Officials of the said Water District #68 are hereby empowered, authorized and directed to change the point of diversion of the said two cubic feet of water in accordance with the terms of this decree; it is further ordered that the petitioner herein, pay the costs of this proceeding.

Done in Chambers at Grand Junction, Colorado, this Sixteenth day of December, 1912.

Sprigg Shackleford
Judge.

STATE OF COLORADO,)
) ss
County of Ouray)

I, J. L. Brownlee, Ckerk of the District Court of Ouray County, the same being a Court of Record, in the State aforesaid, do hereby certify the above and foregoing to be a true, perfect and complete copy of Water Decree had and entered of Record in the above named Court, wherein the Town of Ridgway was the Petitioner, as the same now remains of record in this office ,recorded in Book 7 at page 132 of the records of this office.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Courtm this 3rd day of January, A. D. 1913.

J. L. Brownlee

Clerk.

APPENDIX A:
Water Right Decrees

Civil Action 939, Ridgway Ditch Irrigation Right
Subset of District Adjudication

(https://dnrweblink.state.co.us/dwr/DocView.aspx?id=126946&dbid=0&cr=1)

of Section 17, Township 46, North of Range 8 West, bears North 61° East 2868 feet distant; it thence runs in a northeast direction a distance of about 1/2 a mile to a point North 30° West 748 feet from the place of beginning. It is 1 1/2 feet at the top, one foot at the bottom and nine inches deep, with a grade of 1/2 an inch to the rod.

It is hereby adjudged and decreed that there be allowed to flow into said ditch from said Cottonwood Creek for the use aforesaid, and for the benefit of the party or parties lawfully entitled thereto, under and by virtue of the appropriation by original construction - Priority No. 127 - 3/8 of one cubic foot of water per second of time.

NUMBER ONE HUNDRED AND ONE.

Ridgway Ditch

The said ditch is entitled to Priority No. 131, which bears date June 1st, 1890. It is claimed by The Ridgway Water & Power Company and is used in irrigating 1000 acres belonging to claimant. This ditch draws its supply of water from Beaver Creek, an affluent of the Dallas river, and Coal Creek, an affluent of the Uncompahgre river. The headgate from which it draws water from Beaver Creek is situated, in Ouray County, and draws its supply of water from the East branch of said creek at a point in the S.W. 1/4 of Section 17, Township 44, North of Range 8 West, and about 50 rods northeast of the quarter stake on the south line of said Section 17; and from the West branch of Coal Creek, the headgate of this arm of the ditch is located in Ouray County, at a point at or near the N.E. Cor. of the S.W. 1/4 of Section 20, in said Town and Range. The main ditch is 4 miles in length from where it is taken out of Beaver Creek to Otonowanda Lake, a reservoir belonging to claimants, and used by them in storing the surplus waters of said ditch. This ditch is 5 feet wide at the top, 3 feet at the bottom and 2 feet deep, and has a grade of 16 feet to the mile; its carrying capacity is 42 cubic feet of water per second of time. The branch ditch, which draws its supply of water from Coal Creek is about one mile in length. It discharges its water into the main Ridgway ditch at a point in the N.E. 1/4 of Section 17, about 100 rods north of west from the quarter stake on the east line of said Section 17. This ditch is 3 feet wide at the top, 2 feet at the bottom and 18 inches in depth, with a grade of 1/4 of an inch to the rod. There is also an auxiliary ditch starting from the middle fork of Beaver Creek on the south line of Section 17, about 40 rods west of the quarter stake on the south line of

said section, and thence running in a northeast direction and emptying into the east fork of Beaver Creek above the headgate heretofore desctr-bed as being on said fork.

It is hereby adjudged and decreed that there be allowed to flow into said ditch from said East, West and middle forks of Beaver Creek, and from the West fork of Coal Creek, for the use aforesaid, and for the benefit of the party or parties lawfully entitled thereto, under and by virtue of the appropriation by original construction - Priority No. 131 - 25 cubic feet of water per second of time.

NUMBER ONE HUNDRED AND ONE A.

Thompson Ditch.

The said ditch is entitled to Priority No. 132, which bears date July 15th, 1891. It is claimed by Raymond, Richard, Robert and Laura Whinnerah and S. R. Brown, and is used in connection with the Rocky Ditches Nos. 1, 2 and 3, the Reservoir, Climax and Brown ditches, in irrigating 280 acres of land belonging to claimants, of which Brown owns 80 acres and the Whinnerahs jointly 200 acres. This ditch draws its supply of water from the North fork of Burro Creek, an arm of Cow Creek. The headgate is located on the north fork of Burro Creek, in Ouray County at a point whence the N. W. Cor. of Section 34, Township 47, North of Range 8 West, bears South 89° 56' West 24337 feet. The ditch runs in a northwest direction and discherges its waters into the South fork of Billy Creek, in Ouray County, which conveys the water from its natural course to the Rocky ditches, Reservoir, Climax and Brown ditches. This ditch was constructed for the purpose of conveying water from Burro Creek into Billy Creek to increase the supply of water in Billy Creek for the irrigation of the lands belonging to claimants lying under Billy Creek and under the Brown, Reservoir and Climax and Rocky ditches 1, 2 and 3. This ditch is 2 feet wide at the top, 18 inches at the bottom and one foot deep and has a grade of 25 feet to the mile.

It is hereby adjudged and decreed that there be allowed to flow into said ditch from said North fork of Burro Creek for the use aforesaid, and for the benefit of the party or parties lawfully entitled thereto, under and by virtue of the apppopriation by Priority No. 132 - not to exceed 7 cubic feet of wate r per second of time; that is to say, there is hereby awarded to this ditch of the waters of the Northfork of Burro Creek, subject to the priorities 78a, the Taft Ditch, and 84a, the White ditch, 4

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APPENDIX A:
Water Right Decrees

Civil Action 1286, Ridgway Water System

STATE OF COLORADO,)
(SS.
COUNTY OF OURAY,)

IN THE DISTRICT COURT THEREOF.

IN THE MATTER OF THE ADJUDICATION OF WATER RIGHTS IN WATER DISTRICT No 68. ON THE PETITION OF A.E.WALTHER, FOR AN ADJUDICATION OF HIS RIGHTS TO THE USE OF THE WATERS OF BEAVER CREEK, COAL CREEK, COTTONWOOD CREEK AND OF CERTAIN SPRINGS IN THE VALLEY OF COTTONWOOD CREEK, FOR FIRE, DOMESTIC, POWER AND IRRIGATION PURPOSES, THE DENVER & RIO GRANDE RAILROAD COMPANY, A CORPORATION, ONE OF THE RESPONDENTS.

Now on this 30th, day of June, A.D. 1905, the above entitled matter comes on for hearing before the Court, and the Court having heard all of the evidence introduced in said cause as well on the part of Petitioner as the Respondent, The Denver & Rio Grande Railroad Company, does find:-

1st. That The Denver & Rio Grande Railroad Company is a corporation duly organized and existing under and by virtue of the laws of the State of Colorado, and as such is entitled to take, hold and appropriate waters of the public streams of the State.

2nd. That the said, The Denver & Rio Grande Railroad Company did on or about the 30th day of August, 1887, take and appropriate and has ever since used for a beneficial purpose, to-wit, for power purposes for its engins and other motive power of said Railroad, and it is necessary for said Denver & Rio Grande Railroad Company to use for such purpose, and it has so used for such purpose, ever since said date, three (3) statute inches of water per second of time taken from Coal Creek and especially by it used and taken from Coal Creek Ditch No. 29 as heretofore adjudicated by this Court;that said water is conveyed through and by means of a pipe line, the head of which is on the North bank of Coal Creek between the headgate of the Flora Ditch and the Coal Creek Ditch.

That in addition to said appropriation and original construction and use the said, Ther Denver & Rio Grande Railroad Company, as shown by the evidence, is the owner by purchase and deed fro P.H. Shue and Martha Shue of three statute inches of Priority No. 31 in Ditch No. 29 taken from Coal Creek, and which Priority dates from the 1st day of June, 1878, and that such right is hereby confirmed in said, The Denver & Rio Grande Railroad Company, Respondent.

[redacted]

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WHEREFORE, it is hereby ordered, adjudged and decreed to The Denver & Rio Grande Railroad Company, a corporation, three statute inches of water per second of time for power purposes out of the waters flowing in Coal Creek in the County of Ouray and State of Colorado, which said Priority is dated as of the 30th, day of August, 1887, for use for power purposes at what is known as the Piedmont Water Tank on the line of the Denver & Rio Grande Railroad Company in the County of Ouray and State of Colorado, and that the said The Denver & Rio Grande Railroad Company was lawfully entitled to the use and benefit of said appropriation as of the date hereinabove set forth by virtue of appropriation and original construction as of the 30th day of August, 1887; the same being hereby designated as priority No. 6 for power and domestic purposes known as series No 2.

And it is further ordered, adjudged and decreed that the right of the said The Denver & Rio Grande Railroad Company in and to three statute inches of water of Priority No. 31 in Ditch No. 29 and dating from June 1st., 1878, is hereby confirmed in said Company for any and all proper uses under and by virtue of said original decree in which said Priority No. 31, in favor of P.H.Shue and Martha Shue, was granted and decreed.

Done in open Court

Theron Stevens.

Judge.

[redacted]

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CERTIFICATE OF COPY.—2306.—Culver, Page, Hoyne & Co., Stationers, 118 and 120 ... Street, Chicago.

STATE OF COLORADO, }
County of Ouray. } ss.

I, W. H. Middaugh, Clerk of the District Court Court in and for the aforesaid County and State, do hereby certify that the within and foregoing is a full, true and correct copy of of a certain water Decree issued to The Denver & Rio Grande Railroad Company, by the above named Court, as the same now remains on file and of record in this office,

made from the original paper.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed my official seal, at my office in Ouray in said County and State, this 8th day of July, A. D. 18 1905.

W H Middaugh

Clerk of the District Court

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Aug 2 1905
1285

Case 1286

STATE OF COLORADO)
: SS IN THE DISTRICT COURT THEREOF.
COUNTY OF OURAY,

IN THE MATTER OF THE ADJUDICATION OF WATER RIGHTS IN WATER DISTRICT NO. 68, ON THE PETITION OF A. E. WALTHER FOR AN ADJUDICATION OF HIS RIGHT TO THE USE OF THE WATERS OF BEAVER CREEK, COAL CREEK, COTTONWOOD CREEK, AND CERTAIN SPRINGS IN THE VALLEY OF COTTONWOOD CREEK, FOR DOMESTIC PURPOSES.

Now on this day, the same being one of the regular judicial days of the above entitled Court, for the June term thereof in the year 1905, this cause came on to be heard on the petition of the petitioner, the answers of the respondents Mary Ann Boucher, Annie Torrey, James McLin, John Grigsby, A. J.Hoskins and Earl Hoskins, and on the cross petition of Dave Zattoni and Tom Sandy, and the evidence offered in support thereof. The petitioner appearing in his own proper person and by J.P.Cassedy, his attorney, and the respondents Boucher, McLin, Torrey, Grigsby, Hoskins and Hoskins appearing in their own respective persons and by their attorneys Story & Story, and the cross-petitioners Zattoni and Sandy appearin their respective persons and by their attorneys Story & Story, and _____ Woodhouse and Charles Johanson, claimants to an interest in the waters of Beaver Creek, and D.B.Flora, claimant to an interest in the waters of Coal Creek, appearing in their own proper persons without counsel and without answer; and thereupon this cause is submitted to the Court on said petition, answers and cross petition and the evidence submitted in support thereof; and on consideration whereof the Court doth find:

1st.- That upon the filing of the petition of petitioner an order was made and entered directing that citation issue for all parties who claimed or might claim any interest in or to the waters of Beaver Creek, Coal Creek or Cottonwood Creek, or to certain Springs in the valley of Cottonwood Creek; which said citation was

duly published as appears from the proof of publication on file in this Court, for four successive weeks in the Ridgway Reporter, a weekly newspaper of general circulation published at Ridgway in the County and State aforesaid; and that said citations were posted in fourteen public places in the said County of Ouray as required by law, and that copies of said citation were delivered personally to each of the above named parties who have entered their appearance herein more than twenty days previous to the hearing on said petition.

2nd, That water district No. 68 includes all the drainage of the Uncompahgre River and its tributaries south of latitude 38° 20' north, and north of the San Juan County line, and is all included within the exterior boundaries of the County of Ouray, and that the said streams of Beaver Creek, Coal Creek and Cottonwood Creek are all affluents of the Uncompahgre River and situate wholly within said water district No. 68.

3rd. That the petitioner A.E.Walther has dismissed that portion of his petition setting forth his claim to domestic water from the West Fork of Coal Creek, and the respondents and cross petitioners McLin, Torrey, Grigsby, Hoskins and Hoskins dismiss their answer and cross petition for the use of the waters of Coal Creek for domestic purposes, all of which said dismissals are without prejudice.

4th,- That the petitioner is the owner of those certain ditches, pipe lines and reservoirs known and designated as follows: To-wit: The Ridgway Ditch, the Otonowanda pipe line, the Ridgway pipe line, the Happy Hollow ditch, the Happy Hollow pipe line and the Happy Hollow Brance pipe line, the Otonowanda reservoir, and the Ridgway Reservoir all of which, taken together, constitute what is known as the Ridgway Water System.

5th, - That the Ridgway Ditch has its initial point in the S.E.¼ of Sec.17, twp. 44, N.R.8 W. N.M.P.M. on what is known as the East fork of Beaver Creek at a point about 50 rods North of

East from the quarter stake on the south line of said section 17, and thence runs in a general northerly direction to the point of discharge in Otonowanda lake or reservoir situate in the northwest quarter of Sec.32, twp. 45, N.R. 8 W. N.M.P.M a distance of about four miles, and has an auxiliary ditch or arm commencing on the middle fork of Beaver Creek at a point about 40 rods west from the quarter stake on the south line of section 17, twp. 44 N.R.8 W. N.M. P.M.and thence runs in a general northeasterly direction to its point of discharge in the main Ridgway Ditch at the initial point or headgate thereof, the length of said auxiliary ditch being 2367 feet, with a feeder from a spring 168 feet below the head gate of said auxiliary ditch, and thence running in a northeasterly direction 152 feet where it emties into said auxiliary ditch; all of which are more particularly described in the final decree entered in the general adjudication of water rights in water district No. 68, wherein said Ridgway ditch is designated as Ridgway Ditch No. 101, priority No. 131.

Otonowanda lake or reservoir is a natural basin or depression in the soil slightly enlarged by artificial means, oblong in shape, having its greatest length from east to west, and at its greatest length is 1800 feet with a width of 1500 feet at its widest part, with an average depth of 18 feet, and is situated wholly on lands belonging to petitioner, in the NE. ¼ of Sec.32, twp. 45 N. R. 8 W. N.M.P. M., and has capacity to contain 32,500,000 cubic feet of water, and is used for the purpose of storing the waters of Beaver Creek which are carried to said reservoir by the Ridgway Ditch; which said water is used for domestic purposes in and about the town of Ridgway and for irrigation purposes in the neighborhood of said Otonowanda lake.

That Otonowanda pipe line is a redwood box or conduit 8 X 8 inches, set in the ground with its intake, at or near the discharge of the Ridgway Ditch, and runs in a general northerly direction a little over two miles into the Ridgway Reservoir, into which

it discharges and is used to carry water of Beaver Creek from Lake Otonowanda and the Ridgway Ditch to the Ridgway Reservoir, from whence the same is distributed among the inhabitants of the town of Ridgway and vicinity through the Ridgway pipe line for domestic purposes; it has a variable grade of from one foot to twenty feet to the 100, and has a carrying capacity of three second feet; work was commenced thereon on the first day of June, 1890, and prosecuted continuously thereafter until completed and has ever since been used for the purpose of carrying said water to the Ridgway Reservoir.

The Ridgway Reservoir is an artificial basin in Cedar Creek Draw, lying about 1/3 in the SE.¼ of NW.¼ and about 2/3 thereof in the S.W.¼ of NE.¼ of Sec. 20, twp. 45 N.R. 8 W. N.M.P.M., the dam thereof crossing the line between said forties on a line running S. 61° 50' E., from which said point the northwest corner of the Uncompahgre Hot Springs Reserve bears N. 53° 15' E. 2310 feet distant; the greatest length of said reservoir is on the line of the dam thereof and is 450 feet in length, and its greatest width is at right angles to said dam and is 180 feet, with an average depth of 12 feet; it is used for a supply reservoir for the town of Ridgway for which it supplies water for domestic purposes, and has a capacity of approximately 650,000 cubic feet; it draws its supply of water from the Ridgway Ditch and Otonowanda Lake through the Otonowanda Pipe Line, and from Cottonwood Creek and the springs in the valley thereof through the Happy Hollow Ditch and Happy Hollow Pipe Line, and is used for storing said waters and for supplying the inhabitants of said town of Ridgway with water for Domestic purposes.

That the Ridgway pipeline is an iron pipe ranging from 12 inches to 3/4 of an inch in diameter, sunk in the ground to a depth sufficient to protect the contents thereof from freezing, with numerous laterals or service pipe therewith; it has its intake at a point near the center of the dam on the northeast face of the Ridgway reservoir, and thence runs in a general northeasterly direction to,

upon and along the streets of the town of Ridgway in sections 16 and 17, twp. 45 N. R. 8 W. N.M.P.M. where it is used for supplying water to the inhabitants of said town for domestic purposes; that the total length of the said Ridgway pipe line, together with the various laterals and service pipe connected therewith, is 15,000 feet; that work on the Ridgway Ditch, the Otonowanda pipe line, the Ridgway Pipe Line, the Otonowanda Reservoir and the Ridgway Reservoir was commenced on the first day of June, 1890, and prosecuted continuously thereafter until completed, That the Ridgway pipe line has a grade of 3 inches to the rod and a carrying capacity of six second feet.

NW SW 20

That the Happy Hollow Ditch has its initial point or headgate on the east bank of Cottonwood Creek at a point whence the SW. ¼ of Sec.20, Twp. 45 N. R. 8 W. N.M.P.M.bears S. 28° 45' W. 2396 feet distant, thence runs in a general northeasterly direction 2227 feet to a point in the SE. of NE.¼ of Sec.20, twp. 45 N. R. 8 W. N.M.P.M. where it discharges into the Ridgway Reservoir, at a point whence the NW. corner of the Uncompahgre Hot Springs Reserve bears N. 54° 30' E. 2385 feet distant; it is 2 feet wide at the bottom, 2 feet wide at the top, 1½ feet deep, with a grade of two inches to the rod and a carrying capacity of five second feet; that work was commenced on the Happy Hollow Ditch on the first day of March, 1892 and prosecuted continuously thereafter until completed on or about the first day of December, 1892, it draws its supply of water from Cottonwood Creek and certain Springs in the valley thereof, through which said ditch the waters of Cottonwood Creek and said Springs have ever since been carried through the Ridgway pipe line to the town of Ridgway where the same have been used ever since the first day of December, 1892 for domestic purposes.

That the Happy Hollow pipe Line has its head gate at a catch basin for a number of Springs on the east bank of Cottonwood Creek at a point in the SE.¼ of NE.¼ Sec.31. twp. 45 N. R. 8 W. N.M.P.M. whence the northeast corner of said section 31 bears

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N. 22° E. 1830 feet distant, and thence runs in a general northeasterly direction 10,586 feet where it discharges into said reservoir at the same point that the Happy Hollow ditch discharges; that said pipe line consists of iron pipe 12 inches in diameter at its inlet and gradually diminishes to a pipe six inches in diameter, at which diameter it continues to the point of discharge; said pipe line is sunk in the ground to a depth of three feet, has a grade of 2 inches to the rod and a carrying capacity of four second feet.

That the Happy Hollow Branch Pipe Line has its initial point at a catch basin for the water of several springs in the NE.¼ pf NW.¼ Sec.29, 45 N. R. 8 W. N.M.P.M. at a point whence the northwest corner of said section 29 bears N. 72° W. 1510 feet distant, and thence runs in a general northeasterly direction a distance of 1980 feet, where it connects with and discharges into the Happy Hollow pipe line at a point 3309 feet above the discharge thereof; that the Happy Branch Pipe Line is constructed of pipe of the same kind, character and dimensions, and is sunk in the ground in the same way, as the Happy Hollow Pipe Line, has a grade of two inches to the rod and a carrying capacity of four second feet.

That the Happy Hollow Pipe Line and the Happy Hollow Branch Pipe Line draw their source or supply of water from Cottonwood Creek and the aforesaid Springs, and carry the same water claimed herein through and under the Happy Hollow Ditch, with a priority of the same date as the Happy Hollow Ditch, which said water is used through the Ridgway pipe line in and about the town of Ridgway for domestic purposes. That work was commenced on the Happy Hollow Pipe Line and the Happy Holly Brance Pipe Line on the first day of October, 1904 and that, while not fully completed are now in use, and that the water carried through said pipe lines and claimed thereunder is the same water appropriated and used heretofore through the Happy Hollow Ditch under a priority as of the first day of March, 1892.

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6th.- That the respondent Mary Ann Boucher is the owner of the Tidwell Ditch No. 100, priority No. 127 for 3/8 of one second

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foot of water, bearing date of April 15, 1882 for irrigation purposes, and that the said respondent claims the right to use and is entitled to the use of ¼ of one second foot of the waters of Cottonwood Creek for domestic purposes, to be carried through said Tidwell Ditch to and upon the lands of respondent situate in Sec. 17, Twp. 45 N. R. 8 W. N.M.P.M. and more particularly described in the general decree adjudicating water rights in water district No. 68, under a priority to be known as Pri.No.7, second series, Ditch No.100 where the same is designated as Tidwell Ditch No. 100, and to bear date as of the 15th, day of April, 1890.

7th.- That in the town of Ridgway and in the vicinity thereof there are something in excess of 500 consumers of water for domestic purposes, who draw their water supply all from and through the Ridgway water system, besides certain other uses, for stock, for feeding boilers, for heating purposes, etc.

8th.- That during a large portion of the irrigation season the amount of water running in Beaver Creek, the West arm of Coal Creek, Cottonwood Creek and the Springs in the valley thereof, is so reduced in quantity that it does not exceed three second feet from all of said sources, and that there have already been adjudicated for irrigation purposes out of the waters of said streams not less than 45 second feet, so that for a large portion of the irrigation season absolutely no water can be acquired from any of the sources from which the Ridgway water system draws its supply to be used for irrigation purposes.

9th. - That because of the shortage of water in Beaver Creek, Cottonwood Creek and the west arm of Coal Creek, and the various springs hereinabove referred to, for several months during the irrigation season, it is absolutely necessary that at the time and times during the year when there is a surplus of water, or when it is not being used for irrigation, the petitioner should be allowed to store the water awarded to him, or so much thereof as is not in constant use, in the Otonowanda and Ridgway Reservoirs.

10th.- That at least five second feet, under all the

circumstances developed by the evidence in this case, is necessary to insure that the inhabitants of the town of Ridgway have a sufficiency of water for domestic purposes.

11th. - That the respondents and cross petitioners Dave Zattoni and Tom Sandy are the owners of that certain ditch known as the Zattoni Ditch which has its initial point or headgate on the west bank of the south or middle fork of Coal Creek 100 rods from north of east the southeast corner of Sec. 17, twp. 44 N. R. 8 W. N.M.P.M. in said County of Ouray, and thence runs in a northwesterly direction to the West Fork of Coal Creek, and thence in a northerly direction to the lands of the said Zattoni and Sandy, to-wit: the NW.¼ SE.¼. NE.¼ SW.¼ Sec. 33, twp. 45 N. R. 8 W. N.M.P.M. comprising in all 160 acres. That said Zattoni Ditch is 1½ feet wide at the bottom, 2 feet wide at the top, 1½ feet deep, with a grade of 40 feet to the mile and a carrying capacity of four second feet; that work was commenced on said ditch on the first day of June, 1901 and prosecuted continuously thereafter until completed; that said Zattoni Ditch draws its supply of water from the south or middle fork of Coal Creek and from the west fork of Coal Creek, which said water is used by said respondents Zattoni and Sandy for irrigating purposes and for domestic use on the lands herein described.

12th.- That said cross petitioners Zattoni and Sandy cultivate about 40 acres of the above described lands on which they raise hay, grain and vegetables, and that it will require one second foot of water for the proper irrigation of said lands.

13th.- That said cross petitioners claim the right to use and are entitled to the use of the waters of the south or middle fork of Coal Creek and the West Fork of Coal Creek, 9, statute inches of water for domestic purposes. That not to exceed three statute inches of said water so claimed for domestic purposes shall be drawn from the west arm of Coal Creek at any time, and that at no time shall any more be drawn from the west arm of Coal Creek than shall be sufficient, taken in connection with that drawn from the

? south
east or middle fork of Coal Creek, to make the quantity of 9, statute inches to which said cross petitioners are entitled for domestic purposes.

14th. - That the said Zattoni Ditch shall be known and designated as ditch No. 124, and that the water awarded thereto shall be designated as priority No. 146, for irrigation purposes, and as priority No. 16 & 17, of the second series for domestic purposes.

15th.- That petitioner dismisses all claims set up in his petition to a change of the points of diversion of the waters awarded to the Cottonwood Ditch No. 69, priority No. 75, and to the Jones ditch No. 97. priority No. 122.

16th.- That petitioner dismisses all claims made in his said petition to the waters of Cottonwood Creek through the Happy Hollow Ditch, the Happy Hollow Pipe Line, and the Happy Hollow Branch pipe Line, or either of them for irrigation purposes.

17th.- That petitioner dismisses the claim made in his petition to the waters of the West Fork of Coal Creek, the waters of Beaver Creek and to the waters of Cottonwood Creek, and the waters of the Springs in the valley thereof, for storage purposes, other than his right to store so mush of the waters of Beaver Creek, Cottonwood Creek and the Springs in the valley thereof, as may be awarded to him for domestic purposes.

18th.- That petitioner is and shall be entitled to store so much of the five second feet of the waters of Beaver Creek, Cottonwood Creek and the Springs in the valley thereof, herein awarded to him for domestic purposes, in the said Otonowanda and Ridgway Reservoirs as may not be required at any time for actual use for domestic purposes, in order that a supply may always be had in said reservoirs to cover the shortage of water during the irrigation season, in said streams.

19th.- That the Ridgway Ditch shall be known and designated as ditch No. 101, priority No. 8, second series; that the Otonowanda pipe line shall be known and designated as Ditch No. 120, priority No. 9, second series; That the Ridgway pipe line shall be known and

designated as ditch No. 121, priority No. 10, second series; that the Happy Hollow Ditch shall be known and designated as ditch No. 122, priority No. 11 second series; that the Happy Hollow Pipe Line and the Happy Branch Pipe Line shall be known and designated as ditch No. 123, and as priorities Nos. 12 and 13, second series; that the Ridgway Reservoir shall be known as reservoir No. 1, priority No. 14 second series; and the Otonowanda reservoir shall be known as Reservoir No. 2, priority No. 15, second series;

20th. That the priorities of the Ridgway Ditch, the Otonowanda pipe line, the Ridgway pipe line, the Ridgway reservoir and the Otonowanda reservoir shall bear date as of the 1st, day of June, 1890. and that the priorities of the Happy Hollow Ditch, the Happy Hollow Pipe Line and the Happy Hollow Branch Pipe Line shall bear date as of the 1st, day of March, 1892.

21st. - That all of the awards made herein shall be subject to all valid, subsisting awards heretofore made that are prior to the priorities herein fixed and determined.

IT IS THEREFORE CONSIDERED, ADJUDGED AND DECREED BY THE COURT, that there be allowed to flow into the Happy Hollow Ditch No. 122, priority No. 11, second series; and into the Happy Hollow pipe line and the Happy Hollow Branch pipe line, Ditch No. 123, priorities Nos, 12 and 13, second series; TWO(2) SECOND FEET of the waters of Cottonwood Creekand of certain Springs in the valley thereof, to be used in and about the town of Ridgway, for domestic purposes, under a priority to bear date as of the 1st, day of March, 1892, which said priorities shall be known as priorities Nos. 11, 12, and 13, second series.

AND IT IS FURTHER ORDERED, ADJUDGED AND DECREED BY THE COURT, THAT THERE BE ALLOWED to flow into the Ridgway ditch No. 101, priority No. 8, second series; FIVE (5) second feet, of the waters of Beaver Creek, to be used for domestic purposes in and about the town of Ridgway, to be conveyed there through the said Ridgway Ditch, the Otonowanda Reservoir, the Otonowanda Pipe Line, the Ridgway Reservoir and the Ridgway Pipe Line. which said water shall include

waters drawn from the east fork of Beaver Creek, the middle fork of Beaver through the Ridgway auxiliary ditch and the Spring near the head of the auxiliary ditch, carried thereto through the feeder; but in no case shall the amount of water allowed to flow into said Ridgway ditch from all of said sources, exceed an amount sufficient when added to that which is then being discharged into the Ridgway Reservoir through the Ha ppy Hollow Ditch, the Happy Hollow Pipe Line and the Happy Hollow Branch Pipe Line, will make a total of Five(5) secomd feet of water, which amount of water so awarded from Beaver Creek for domestic uses, shall have a priority under date of the 1st, day of June 1890, and be designated as Priority No. 8, second series.

And Be It Furthered Ordered and Decreed by the Court, that the petitioner may store any of the waters herein awarded to him, when the same, is not required for immediate use for domestic purposes in the Ridgway and Otonowanda Reservoirs.

AND IT IS FURTHER CONSIDERED, ADJUDGED AND DECREED by the Court, that there be allowed to flow into the Tidwell Ditch No. 100, onefourthof one second foot of the waters of Cottonwood Creek, to be used in, upon and about the residence of the respondent Mary Ann Boucher in section 17, T. 45 N. R. 8 W. N.M.P.M. for domestic purposes, under a priority to bear date as of the 15th day of April 1890, and to be designated as Priority No. 7, second series.

And It Is Further Ordered and Decreed by the Court, that there be allowed to flow into the Zattoni Ditch No. 124, from the South or Middle fork of Coal Creek and from the west fork of Coal Creek, One (1) second foot of water to be used on section 33 in T. 45 N. of R. 8 W. N.M.P.M. for irrigation purposes, to bear date as of the 1st day of June 1901, and to be designated as priority No. 146.

And Be It Further Ordered and Decreed by the Court, that there be allowed to flow into the Zattoni Ditch No. 124, Nine (9) Statute inches of the waters of the south or middle fork of Coal

Creek, to be used for domestic purposes, by the respondents and cross petitioners Zattoni and Sandy, on section 33 in T. 45 N. R. 8 W. N.M.P.M. under a priority to bear date as of the 1st, day of June 1901, to be designated as priority No. 16, second series.

And Be It Furthered Ordered and Decreed by the Court, that there be allowed to flow into the Zattoni Ditch No. 124 from the West Fork of Coal Creek, Three(3) Statute inches of water to be used by the cross-petitioners Zattoni and Sandy, for domestic purposes, upon Section 33 in T. 45 N. R. 8 W. N.M.P.M. under a priority to bear date as of the 1st, day of June 1901, but in no case shall any water be allowed to flow into the Zattoni Ditch, from the West Fork of Coal Creek, when the water flowing therein from the south or middle Fork of Coal Creek shall be equal to (9) nine statute inches, for domestic purposes; and in no case shall the total amount of water taken from the west fork of Coal Creek for domestic purposes, exceed an amount sufficient, when added to that taken from the south or middle fork of Coal Creek to make (9) statute inches of water; which said water so awarded from the west fork of Coal Creek shall be designated as Priority No. 17, second series.

AND IT IS FURTHER ORDERED, ADJUDGED AND DECREED, that the costs of this proceeding be prorated as follows to -wit:

(1)- That the costs growing out of the filing of the answers and cross-petitions of respondents, Boucher, Grigsby, Hoskins , Hoskins and McLin, be paid by said respondents.

(2).- That the costs growing out of the filing of the answer and cross-petition of the respondents Zattoni and Sandy, be paid by said respondents.

(3).- That allother costs of this proceeding be paid by petitioner,

DONE IN OPEN COURT, this 2nd, day of August, 1905.

Theron Stevens.

Judge

OK.
J.P.Cassedy.
Atty for petitioner.

Story & Story
Atty's for respondents.

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State of Colorado)
:SS
County of Ouray.)

I, W.H. Middaugh, Clerk of the District Court of Ouray County, the same being a Court of Record, in the State aforesaid, do hereby certify the above and foregoing to be a true, perfect and complete copy of a certain water Decree in Water District No. 68, had and entered of record in the above said Court, wherein A.E.Walther, was petitioner, as the same is of record and on file in this office.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed the seal of said Court, at Ouray, this 10th day of Nov. A.D. 1905.

(Signed) W.H.Middaugh,Clerk.

(Seal)

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APPENDIX A:
Water Right Decrees

Case No. W-1305, Beaver Creek Springs

FILED
IN THE DISTRICT COURT
WATER DISTRICT #4
DEC 27 1973
Kay Phillips, WATER CLERK
BY _____ DEPUTY

IN THE DISTRICT COURT

IN AND FOR WATER DIVISION #4

STATE OF COLORADO

Case No. W-1305

IN THE MATTER OF THE APPLICATION FOR WATER RIGHTS OF THE TOWN OF RIDGEWAY IN THE UNCOMPAHGRE RIVER OR ITS TRIBUTARIES; TRIBUTARIES INVOLVED: BEAVER CREEK, IN THE COUNTY OF OURAY

AMENDED
RULING OF WATER REFEREE

The applicant, The Town of Ridgeway, c/o Terence J. Quinn, P.O. Box 646, Ouray, Colorado 81427, requests the right to use spring water for domestic purposes in the Ridgeway Ditch. Filed August 22, 1972.

In opposition, Wayland Phillips, c/o David W. Griffith, 1405 Arapahoe Avenue, Boulder, Colorado 80302, claiming adverse affect to existing decrees.

FINDING OF FACT

The Ridgeway Spring No. 2, The Ridgeway Spring No. 3, The Austin Spring, are all tributary to Beaver Creek, a tributary of Dallas Creek, which is tributary to the Uncompahgre River in Ouray County and Water District No. 68.

Said springs are described as being located as follows:

Ridgeway Spring No. 2 - 400 feet more or less North of the headgate of the Ridgeway Ditch, which headgate is described as being located in the Southwest Quarter of Section 17, Township 44 North, Range 8 West, N.M.P.M. about 50 rods Northeast of the Quarter stake on the South Line of said Section 17.

Ridgeway Spring No. 3 - 950 feet more or less North of the same Ridgeway Ditch as described.

The Austin Spring - is described as being located at a point from whence the Southeast corner of Section 17, Township 44 North, Range 8 West, N.M.P.M., bears South 61°30' East a distance of 1,950 feet more or less.

The three springs as described are tributary to Beaver Creek and are subject to call by senior priorities in Beaver Creek; however, since the construction of the Ridgeway Ditch which traverses the natural channel flow of each spring allowing each spring to flow direct into said ditch, all of the flow of each has been allowed to comingle with water decreed to the said Ridgeway Ditch to the benefit of all users thereof.

The Ridgeway Spring No. 2 is said to produce 10 G.P.M. or .022 c.f.s. of water.

The Ridgeway Spring No. 3 is said to produce 12 G.P.M. or .026 c.f.s. of water.

The Austin Spring is said to produce 60 G.P.M. or .13 c.f.s. of water.

Both the Town of Ridgeway and the protestant, Wayland Phillips claim and may own some right in the Ridgeway Ditch. Any decree written for the springs at this date is subject to call from Beaver Creek and a measuring device must by constructed in the Ridgeway Ditch immediately downstream from the point of entry of the Austin Spring for administrative purposes.

No adverse effect can be determined to any opposition decree.

R U L I N G

IT IS THE RULING OF THE REFEREE that water arising out of the Ridgeway Spring No. 2, the Ridgeway Spring No. 3, and the Austin Spring has been appropriated and applied beneficially, and that the Ridgeway Ditch is approved and granted an absolute decree not to exceed .22 c.f.s. from the Ridgeway Spring No. 2, .026 c.f.s. from the Ridgeway Spring No. 3, and .13 c.f.s. from the Austin Spring, for irrigation and for domestic purposes, with an appropriation date of June 1, 1890. It is the intent of this ruling that water belonging to the Town of Ridgeway, decreed to the Ridgeway Ditch, is not increased hereby.

Dated Dec. 27, 1973

E.L. WILSON

E L Wilson

Water Referee
Division No. 4

No protest was filed in this matter.
The foregoing ruling is confirmed
and approved, and is made the
Judgment and Decree of this court.

Dated: 1-24-74

Water Judge

APPENDIX A:
Water Right Decrees

Case No. 96CW076, Hyde Sneva Ditch

DATE OF MAILING
4-14-97

Filed in The District Court
Water Division Four
APR 14 1997
Kay Phillips, Clerk

DISTRICT COURT, WATER DIVISION 4, COLORADO

Case No. 96CW076

68

FINDINGS AND RULING OF THE REFEREE AND JUDGMENT AND DECREE OF THE WATER COURT

CONCERNING THE APPLICATION FOR WATER RIGHTS OF THE SOUTH RIDGWAY PARTNERSHIP AND ROBERT SAVATH, IN OURAY COUNTY.

THIS MATTER has come before the Referee on an Application for Change of Water Right (the "Application") filed by the Applicants, South Ridgway Partnership and Robert Savath. The Referee, having reviewed the Application and other pleadings in this case, and having considered the Division Engineer's Consultation Report in accordance with C.R.S. § 37-92-302(2)(a), (4), and now being fully advised with respect to this matter, hereby enters the following Findings and Ruling of the Referee and Judgment and Decree of the Water Court.

I. FINDINGS

1. A properly verified Application was filed by the Applicants on April 30, 1996, and was timely published in the Water Court Resume for Water Division No. 4, and in a newspaper of general circulation in Ouray County, in accordance with C.R.S. § 37-92-302(3).

2. The name and address of the Applicants are as follows:

South Ridgway Partnership
1700 Lincoln Street, Suite 1725
Denver, Colorado 80203

Robert Savath
c/o South Ridgway Partnership
1700 Lincoln Street, Suite 1725
Denver, Colorado 80203

3. A timely Statement of Opposition was filed by the Dallas Creek Water Company. No other statements of opposition were filed and the time for filing any additional opposition has expired. On November 7, 1996, the Division Engineer issued his Consultation Report as required by C.R.S. § 37-92-302(2)(a), (4), 15 C.R.S. (1996) and the Referee has considered the same.

4. Timely and adequate notice of the Application was given in the manner required by law. All persons affected by the Application, whether appearing or not, are parties hereto

cc Noble + file

and are bound by this Ruling, all notices required by law having been given, and the Referee having jurisdiction over the subject of this proceeding. See C.R.S. §§ 37-92-203 and 37-92-302.

5. The Application seeks a change in the point of diversion and place of use for the Applicants' portion of the Hyde-Sneva Ditch water rights.

A. The Applicants seek to change their entire 1.1146 c.f.s. interest in the subject Hyde-Sneva Ditch water rights, comprised of 0.925 c.f.s. of Priority No. 42 and 0.1896 c.f.s. of Priority No. 100.

B. Both priorities of the Hyde-Sneva Ditch water rights at issue in this case were originally decreed on May 15, 1897, by the Findings and Decree of the District Court of the Seventh Judicial District, Sitting in and for Ouray County. The decreed point of diversion of the Hyde-Sneva Ditch water rights is at a point on the south bank of Dallas Creek, a tributary of the Uncompahgre River, near the center of the NE 1/4 of the NE 1/4 of Section 7, Township 45 North, Range 8 West, N.M.P.M., Ouray County, as shown on the attached Exhibit A. The appropriation dates for the subject water rights is October 1, 1880 for Priority No. 42 and May 1, 1886 for Priority No. 100.

C. Historic Use: The subject Hyde-Sneva Ditch water rights have historically been used to irrigate approximately 36 acres of land in the SW 1/4 of Section 16, Township 45 North, Range 8 West, N.M.P.M., as identified on the attached Exhibit A.

6. Description of Proposed Change: The Applicants request the following change in the point of diversion and a place of use of their interest in the Hyde-Sneva Ditch water rights.

A. Alternate points of diversion: The Applicants seek to establish two additional alternate points of diversion to the existing point of diversion for the Hyde-Sneva Ditch: one at the headgate of the Dallas Ditch, and the other at a well located on the "South Ridgway Partnership Property" depicted on Exhibit A.

(1) The decreed headgate of the Dallas Ditch is located at a point on the East Fork of Dallas Creek (tributary to Dallas Creek, tributary to the Uncompahgre River) whence the Southwest Corner of Section 24, Township 45 North, Range 9 West, N.M.P.M. bears North 51° East 498 feet, as depicted on the attached Exhibit A. The Applicants own 1.1 c.f.s. of the Dallas Ditch water rights and request the right to divert their interests in both the Hyde-Sneva and

Dallas Ditches at the Dallas Ditch headgate. The Applicants are not requesting a change of their Dallas Ditch water rights.

(2) The Applicants also request the right to divert their Hyde-Sneva Ditch rights at existing Well No. 7687, located in the SW 1/4 SW 1/4 Section 16, Township 45 North, Range 8 West, N.M.P.M., Ouray County, as shown on the attached Exhibit A. Well No. 7687 was permitted for domestic purposes on January 5, 1961.

B. Change in place of use: The Applicants also request a decree changing the place of use of their interest in the Hyde-Sneva Ditch water rights. The Applicants propose to use the subject Hyde-Sneva Ditch water rights to supply water for the irrigation of lawns and gardens within the Solar Ranches Subdivision, and open space irrigation, all within the property designated on Exhibit A as "South Ridgway Partnership Property". The area to be irrigated is located within the SE 1/4 of Section 17 and the SW 1/4 of Section 16, Township 45 North, Range 8 West, N.M.P.M.

7. Well No. 7687 is approximately 600 feet from the Uncompahgre River. Any stream depletions caused by withdrawals of ground water through that well will not be appreciably lagged and thus, such withdrawals will affect the Uncompahgre River in approximately the same time as depletions through surface diversions at the Hyde-Sneva Ditch.

8. Diversions at the Dallas Ditch headgate take water from the same watershed as those at the Hyde-Sneva Ditch headgate. Diverting all or a portion of the subject rights at the Dallas Ditch headgate will not materially alter the historic exercise of the subject rights, except, perhaps, during the late irrigation season, when the source of supply at the original headgate of the Hyde-Sneva Ditch water rights is comprised of return flows that are not available at the headgate of the Dallas Ditch. Accordingly, during that period, when water is available at the Hyde-Sneva Ditch headgate from sources other than the mainstem of Dallas Creek, which would satisfy Applicants' Hyde-Sneva Ditch water rights, the Applicants shall not divert the subject Hyde-Sneva Ditch water rights at the Dallas Ditch headgate so as to injure intervening junior water rights between the locations of the Hyde-Sneva and Dallas Ditch headgates.

9. The Applicants propose to limit diversions under this change at the three proposed diversion points to a total flow rate equal to the Applicants' portion of the decreed priorities of the Hyde-Sneva Ditch, i.e., 0.925 c.f.s. of Priority No. 42 and 0.1896 c.f.s. of Priority No. 100. These diversions are in addition to diversions made pursuant to the Applicants' Dallas Ditch water rights. Pursuant to this change, diversions will occur only when the Hyde-Sneva Ditch is in priority.

10. The Applicants further propose to use the subject rights to irrigate not more than 36 acres, consistent with historic use. This limitation shall not preclude the use by the Applicants of their Dallas Ditch water rights and the subject Hyde-Sneva Ditch water rights for the irrigation of the entire South Ridgway Partnership depicted on Exhibit A. The number of acres so irrigated shall be allocated to each of the rights in proportion to the amount of water diverted in priority under each of them.

11. The proposed change of water rights described in the preceding paragraphs 6 through 10 will not injuriously affect any owner of or persons entitled to use water under a vested water right or a decreed conditional water right.

12. The changes of water rights decreed herein are, as a matter of law, permissible and come within the definition of a "change of water right" authorized by statute. See C.R.S. § 37-92-103(5).

13. The terms and conditions as set forth in this Ruling are adequate to prevent injury to the owners of, or persons entitled to use, water under a vested water right or a decreed conditional water right. See C.R.S. § 37-92-305(3) and (4).

14. This Ruling is administrable by the water officials of the State of Colorado.

II. RULING OF THE REFEREE

IT IS THEREFORE ORDERED, ADJUDGED, AND DECREED that the foregoing Findings are incorporated herein and that the Application for Change of Water Right filed by South Ridgway Partnership and Robert Savath is hereby GRANTED, subject to the terms and conditions set forth in this Ruling.

1. Name and address of Applicant:

South Ridgway Partnership
1700 Lincoln Street, Suite 1725
Denver, Colorado 80203

Robert Savath
c/o South Ridgway Partnership
1700 Lincoln Street, Suite 1725
Denver, Colorado 80203

2. Mailing address of Applicant:

c/o Wayne F. Forman, Esq.
Brownstein Hyatt Farber & Strickland, P.C.
410 17th Street, 22nd Floor

Denver, Colorado 80202

3. Name of structures for which change is decreed: Hyde-Sneva Ditch.

4. Location of existing structure:

The decreed point of diversion of the Hyde-Sneva Ditch water rights is at a point on the south bank of Dallas Creek near the center of the NE 1/4 of the NE 1/4 of Section 7, Township 45 North, Range 8 West, N.M.P.M., Ouray County, as shown on the attached Exhibit A.

5. Description of water rights subject to change:

1.1146 c.f.s. in the Hyde-Sneva Ditch comprised of 0.925 c.f.s. of Priority No. 42 and 0.1896 c.f.s of Priority No. 100, decreed on May 15, 1897, in the Findings and Decree of the District Court of the Seventh Judicial District, Sitting in and for Ouray County, with appropriation dates of October 1, 1880 for Priority No. 42 and May 1, 1886 for Priority No. 100. The decreed source of the subject right is Dallas Creek, tributary to the Uncompahgre River.

6. Description of change of water rights:

The point of diversion and place of use of the subject Hyde-Sneva Ditch water rights are changed as follows:

A. The Applicants may divert all or any portion of the subject Hyde-Sneva Ditch water rights in priority at the originally decreed headgate or at two alternate points of diversion: one at the headgate of the Dallas Ditch and one at Well No. 7687.

(1) The headgate of the Dallas Ditch is decreed at a point on the East Fork of Dallas Creek (tributary to Dallas Creek, tributary to the Uncompahgre River) whence the Southwest Corner of Section 24, Township 45 North, Range 9 West, N.M.P.M. bears North 51° East 498 feet, as depicted on the attached Exhibit A.

(2) Well No. 7687 is located in the SW 1/4 SW 1/4 Section 16, Township 45 North, Range 8 West, N.M.P.M., Ouray County, shown on the attached Exhibit A. Well No. 7687 was permitted for domestic purposes on January 5, 1961.

B. The subject Hyde-Sneva Ditch water rights may be used to supply water for the irrigation of lawns and gardens within the Solar Ranches subdivision, and for open space irrigation, all within the property designated on Exhibit A as "South Ridgway Partnership property". The

total area to be irrigated comprises 96 acres located in the SE 1/4 of Section 17 and the SW 1/4 of Section 16, Township 45 North, Range 8 West, N.M.P.M. Said rights shall be limited to a maximum of 36 acres of irrigation at any one time. Applicant shall be entitled to irrigate the entire 96 acre property with its Hyde-Sneva Ditch and Dallas Ditch water rights, so long as the Hyde-Sneva Ditch rights, on a pro rata basis, do not irrigate more than 36 acres at any one time.

C. Diversions at the three alternate points of diversion shall not exceed the flow rate of the Applicants' portion of the Hyde-Sneva Ditch water rights. All such diversions shall be made only when the subject Hyde-Sneva Ditch rights are in priority.

D. Upon a showing that water is available at the Hyde-Sneva Ditch headgate to satisfy the Applicants' Hyde-Sneva Ditch water rights from sources other than the mainstem of Dallas Creek, the Applicants shall not divert the subject rights at the Dallas Ditch headgate alternate point of diversion so as to cause injury to junior water rights on Dallas Creek between the points of diversion of the Hyde-Sneva and Dallas Ditch headgates.

7. Prior to utilizing Well No. 7687 for the purposes described in this Ruling, the Applicant shall submit an application to the State Engineer for an amended well permit. Upon such application, the State Engineer shall consider this Ruling in making his determination of the Application.

8. Pursuant to C.R.S. § 37-92-304(6), the Court shall retain jurisdiction over this matter for ** in order to reconsider, if necessary, the question of injury to the vested rights of others. Applicant shall notify the Court when the well is in service.

** three years after the well is put into service.

DATED this 14th day of April, 1997.

Aaron Clay
Water Referee
Water Division No. 4

THE COURT DOTH FIND THAT NO PROTEST TO THE RULING OF THE REFEREE HAS BEEN FILED. THE FOREGOING RULING IS CONFIRMED AND APPROVED, AND IS HEREBY MADE THE JUDGMENT AND DECREE OF THIS COURT.

Date: 5-8-97

BY THE COURT:

Hon. Robert A. Brown
District Judge
Water Division No. 4

Mailed-A Copy of this Document to all parties in this case.

Dated 5-9-97

Carole Howe deputy
Kay Phillips, Water Clerk

APPENDIX A:
Water Right Decrees

Case No. 99CW265, Ridgway Pump Station No. 1

DATE OF MAILING
June 19 2000

Filed in the District Court
Water Division 4
JUN 19 2000
Kay Phillips, Clerk of Court

DISTRICT COURT, WATER DIVISION NO. 4, COLORADO

CASE NO. 99CW265

FINDINGS AND RULING OF REFEREE AND DECREE

IN THE MATTER OF THE APPLICATION FOR WATER RIGHTS OF:

TOWN OF RIDGWAY

In the Uncompahgre River, Ouray County, Colorado.

Applicant, The Town of Ridgway, P.O. Box 10, Ridgway CO 81432, requests a Surface Water Right by Application filed December 30, 1999.

FINDINGS OF FACT

1. All notices required by law of the filing of this Application have been given. The Referee has jurisdiction of this case. The time for filing of statements of opposition has expired and no such statements have been filed.

2. Applicant requests an absolute water right for the RIDGWAY TOWN PUMPSTATION NO. 1, which is located 500 feet east of the west section line and 500 feet south of the north section line, NW1/4NW1/4NW1/4, Section 16, Township 45 North, Range 8 West, N.M.P.M. This diversion takes wastewater tributary to the Uncompahgre River. Applicant desires to have absolute flow rights for 1.0 c.f.s. for municipal uses. The Court finds that the RIDGWAY TOWN PUMPSTATION NO. 1 will produce 1.0 c.f.s., and that Applicant has placed this water to municipal uses.

RULING

Applicant is hereby GRANTED an absolute water right for 1.0 c.f.s. of water for municipal uses, from the RIDGWAY TOWN PUMPSTATION NO. 1, located as above-described, with an appropriation date of October 6, 1999, adjudication date of 1999.

Dated this 19th day of June, 2000.

Aaron R. Clay
Water Referee, Division 4

No protest was filed in this matter.
The foregoing ruling is confirmed
and approved, and is made the
Judgment and Decree of this court.

Dated: 7/14/00

Water Judge

cc Weig + file

Mailed-A Copy of this Document to all parties in this case.

Dated July 18 2000

Kay Phillips, Water Clerk

APPENDIX A:
Water Right Decrees

Case No. 11CW162, Ridgway Pump Station No. 2

DISTRICT COURT, WATER DIVISION 4, COLORADO Court Address: 1200 N. Grand Ave., Bin A Montrose, CO 81401-3146	DATE FILED: May 30, 2019 CASE NUMBER: 2011CW162
IN THE MATTER OF THE APPLICATION FOR WATER RIGHTS OF **TOWN OF RIDGWAY** IN THE UNCOMPAHGRE RIVER, OURAY COUNTY	**Case Number: 11CW162**
CORRECTED RULING OF REFEREE AND DECREE	

Applicant, TOWN OF RIDGWAY. P.O. Box 10, Ridgway, Co 84132, requests Surface Water Rights by Application filed December 29, 2011.

FINDINGS OF FACT

1. All notices required by law of the filing of this Application have been given. The Referee has jurisdiction of this case. The time for filing of statements of opposition has expired and no such statements have been filed.

2. Applicant requests an absolute water right for the RIDGWAY PUMP STATION NO.2, which, based on a GPS reading and PLSS calculation, is located within the SE1/4 NE1/4 SE1/4 of Section 17, Township 45 North, Range 8 West, N.M.P.M., at a point 1620 feet from the south section line and 250 feet from the east section line (NAD 83, Zone 13S, Easting 0258168m, Northing 4225975m). This diversion takes water tributary to Cottonwood Creek and the Uncompahgre River. Applicant desires to have absolute flow rights for .25 c.f.s. for municipal use. The Court finds that the RIDGWAY PUMP STATION NO.2 will produce .25 c.f.s., and that Applicant has placed this water to the beneficial use requested.

RULING

Applicant is hereby GRANTED an absolute water right for .25 c.f.s. of water for municipal use, from the RIDGWAY PUMP STATION NO.2, located as above-described, with an appropriation date of July 31, 2006, adjudication date of 2011.

Prior to a call being placed on Cottonwood Creek by this decree, there must be structures in place either segregating the introduced flows of the Dallas Ditch from the native flow of Cottonwood Creek, or structures and measuring devices which allow for the call to be administered with respect to the introduced Dallas ditch flows. Any structures are subject to the approval of the Division Engineer.

This Correceted Ruling and decree is being entered to correct the amount granted from .025 c.f.s. to .25 c.f.s.

Dated this 30th day of May, 2019 nunc pro tunc the 7th day of June, 2012.

S. Gregg Stanway
Water Referee, Division 4

The time for filing of protest having expired, and no such protest having been made, the Court hereby confirms the foregoing Ruling, and makes it the Decree of the Court.

Nunc pro tunc July 10, 2012

BY THE COURT:
DATED May 30, 2019

J. Steven Patrick
Water Judge

DISTRICT COURT, WATER DIVISION 4, COLORADO Court Address: 1200 N. Grand Ave., Bin A Montrose, CO 81401-3146	**EFILED Document** **CO Montrose County District Court 7th JD** **Filing Date: Jul 10 2012 3:57PM MDT** **Filing ID: 45255109** **Review Clerk: Darleen Cappannokeep**
IN THE MATTER OF THE APPLICATION FOR WATER RIGHTS OF **TOWN OF RIDGWAY** IN THE UNCOMPAHGRE RIVER, OURAY COUNTY	**Case Number: 11CW162**
RULING OF REFEREE AND DECREE	

Applicant, TOWN OF RIDGWAY. P.O. Box 10, Ridgway, Co 84132, requests Surface Water Rights by Application filed December 29, 2011.

FINDINGS OF FACT

1. All notices required by law of the filing of this Application have been given. The Referee has jurisdiction of this case. The time for filing of statements of opposition has expired and no such statements have been filed.

2. Applicant requests an absolute water right for the RIDGWAY PUMP STATION NO.2, which, based on a GPS reading and PLSS calculation, is located within the SE1/4 NE1/4 SE1/4 of Section 17, Township 45 North, Range 8 West, N.M.P.M., at a point 1620 feet from the south section line and 250 feet from the east section line (NAD 83, Zone 13S, Easting 0258168m, Northing 4225975m). This diversion takes water tributary to Cottonwood Creek and the Uncompahgre River. Applicant desires to have absolute flow rights for .025 c.f.s. for municipal use. The Court finds that the RIDGWAY PUMP STATION NO.2 will produce .025 c.f.s., and that Applicant has placed this water to the beneficial use requested.

RULING

Applicant is hereby GRANTED an absolute water right for .025 c.f.s. of water for municipal use, from the RIDGWAY PUMP STATION NO.2, located as above-described, with an appropriation date of July 31, 2006, adjudication date of 2011.

Prior to a call being placed on Cottonwood Creek by this decree, there must be structures in place either segregating the introduced flows of the Dallas Ditch from the native flow of Cottonwood Creek, or structures and measuring devices which allow for the call to be administered with respect to the introduced Dallas ditch flows. Any structures are subject to the approval of the

Division Engineer.

Dated this 7th day of June, 2012.

S. Gregg Stanway
Water Referee, Division 4

The time for filing of protest having expired, and no such protest having been made, the Court hereby confirms the foregoing Ruling, and makes it the Decree of the Court.

Done this 10th day of July, 2012.

BY THE COURT:

J. Steven Patrick
Water Judge

APPENDIX B:
Population Projections and Basis for Projecting Future Needs

Population Projections and Basis for Projecting Future Needs

Table 1 is historic and projected population data from the State Demographer's website. Historic data is available for both municipalities and counties. Population forecasts are not available for municipalities. However, it is possible to estimate what Ridgway's population might be in the future using a variety of growth scenarios.

- County Growth Rates: Under this scenario, the Town of Ridgway will experience the same annual rates of growth as projected for Ouray County.

- Same Ratio between Town and County Growth for last 20 years: Under this scenario, the Town will grow at about 54% faster than the County.

- 2000-2020 Growth Rate Continues: Under this scenario, the Town of Ridgway will experience the same annual rate of growth as it has, on average. In the last two decades the early growth rates average is about 2.3%. From 2010 -2020 rate that rate was about 1.7%

Looking at recent past projections, the 2018 Ridgway Community Profile prepared by Clarion Associates as part of the Town's Comprehensive Plan update listed the growth rate from 2010 to 2016 as 1.6% average per year which was thought be high. Note that using current State Demographer data for that time period, the annual average growth rate turned out to be closer to 1%. Using a growth rate of 1.6% and using the 2019 demographer data for the Town results in a population of 1770 people in 2050. The annual average of the rates of change from 2000-2019 rate per demographer data for the Town is actually 2.3%. At 2.3% average annual increase results in a 2050 population of 2000 people, about an 80% increase. The most recent data is the 2020 census data. It shows a 2020 population of 1184 about a 28% increase over the 10 year period. Anecdotally, there was a relatively large increase in population in 2021 too. If one assumes a 3% population increase in 2021 and 2022 then a drop back to an average of 2.2% increase, the 2050 population would be about 2300 people

While it is not certain the growth projected in these scenarios will occur over the next 30 years, they are helpful in showing a range of possible futures that might come to pass under certain conditions. There are many constraints in Ridgway that may limit growth, from the availability of water, to the availability of land to support residential development, to economic shocks that could reduce growth across the region, state, or country. Based on the past, it is likely there will be periods of rapid growth as there has been as a result of the pandemic and periods of slower growth. To be conservative is assessing the water needs for the community in the next 30 years, a design population of 2000 in 2050 is recommended.

Table - 1	From State Demographer county muni time series csv 082421, updated with 2020 census								
	Town		Ouray Cty			Town		County	
1980	369		1925			2015	953	1.38%	4597	0.70%
1981	398	7.86%	2056	6.81%		2016	995	4.41%	4778	3.94%
1982	415	4.27%	2110	2.63%		2017	1008	1.31%	4799	0.44%

1983	420	1.20%	2124	0.66%		2018	1050	4.17%	4808	0.19%
1984	438	4.29%	2207	3.91%		2019	1083	3.14%	4934	2.62%
1985	425	-2.97%	2130	-3.49%		2020	1184.0		4931	-0.06%
1986	392	-7.76%	1999	-6.15%		2021	1219.5		4938	0.14%
1987	412	5.10%	2151	7.60%		2022	1256.1		4960	0.45%
1988	413	0.24%	2219	3.16%		2023	1283.7		4981	0.42%
1989	425	2.91%	2262	1.94%		2024	1312.0		5009	0.56%
1990	423	-0.47%	2295	1.46%		2025	1340.8		5028	0.38%
1991	439	3.78%	2419	5.40%		2026	1370.3		5060	0.64%
1992	459	4.56%	2535	4.80%		2027	1400.5		5095	0.69%
1993	471	2.61%	2653	4.65%		2028	1431.3		5131	0.71%
1994	522	10.83%	2902	9.39%		2029	1462.8		5167	0.70%
1995	550	5.36%	3085	6.31%		2030	1495.0		5204	0.72%
1996	582	5.82%	3252	5.41%		2031	1527.9		5242	0.73%
1997	653	12.20%	3322	2.15%		2032	1561.5		5279	0.71%
1998	666	1.99%	3453	3.94%		2033	1595.8		5317	0.72%
1999	692	3.90%	3618	4.78%		2034	1630.9		5356	0.73%
2000	744	7.51%	3776	4.37%		2035	1666.8		5395	0.73%
2001	731	-1.75%	3809	0.87%		2036	1703.5		5435	0.74%
2002	728	-0.41%	3903	2.47%		2037	1741.0		5476	0.75%
2003	728	0.00%	3905	0.05%		2038	1779.3		5519	0.79%
2004	760	4.40%	4023	3.02%		2039	1818.4		5562	0.78%
2005	788	3.68%	4084	1.52%		2040	1858.4		5606	0.79%
2006	877	11.29%	4137	1.30%		2041	1899.3		5650	0.78%
2007	912	3.99%	4274	3.31%		2042	1941.1		5694	0.78%
2008	936	2.63%	4407	3.11%		2043	1983.8		5738	0.77%
2009	920	-1.71%	4372	-0.79%		2044	2027.4		5782	0.77%
2010	925	0.54%				2045	2072.0		5825	0.74%
2011	917	-0.86%				2046	2117.6		5869	0.76%
2012	930	1.42%				2047	2164.2		5913	0.75%
2013	935	0.54%				2048	2211.8		5957	0.74%
2014	940	0.53%				2049	2260.5		6001	0.74%
						2050	2310.2		6046	0.75%

Assessment of Water Demand and Water Rights Needs

The Town has for most of the last 30 years had a relatively low per capita water consumption in the winter months. In summer, Town's water consumption is more typical of the region. For a while as the Town grew, more efficient plumbing fixtures and appliances kept it so that water sold, especially in the winter, did not increase as fast as the population was growing. As the population has recovered from the recession, with new construction and immigration to Ridgway, demand has increased. As of 2017, the amount of water sold annually was still less than the peak demand in 2008 (48.4 MG). However, in 2018, even under mandatory water restrictions with significant outreach encouraging users to decrease water usage due to the major drought during the summer of 2018, the Town sold 50.562 million gallons about 5 million gallons more than the previous several years. This was likely a result of the severe drought conditions and people wanting to keep their landscaping alive. Water sold was about 42.5 MG in 2019, a

wetter year, and about 49 MG 2020 which was another drier year. Just looking at water produced in the winter, it increased about 1% a year for the last few years. Looking at the decade from 2009 to 2019, the population increased about 17% whereas water sold remained about the same.

Looking at the total demand, based on the meter in the water plant, potable water usage (water produced) was around 220 acre feet (AF) per year 2019 and 2020 and around 230 AF in 2018. Given the extreme drought in 2018, in a more typical year the current demand is about 220 AF. If the Town increases water demand by 50% in 30 years, the potable demand will be in the 330 AF range. If the growth rate continues to follow the pattern of the last couple years, the potable demand in 2050 could be in the range of 450 AF. However as discussed below water usage has increased at a much slower rate than the population has over the last 20 years. In addition the Town has updated its zoning regulations to encourage denser development, smaller lots and adopted new landscaping requirements to reduce outdoor water demands.

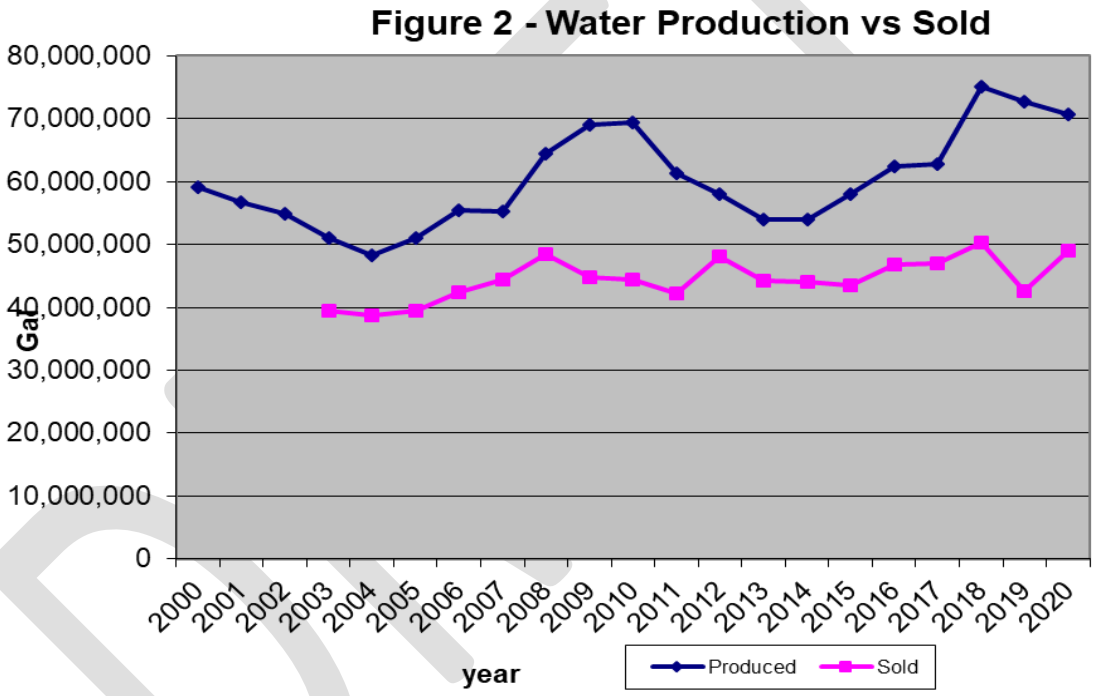
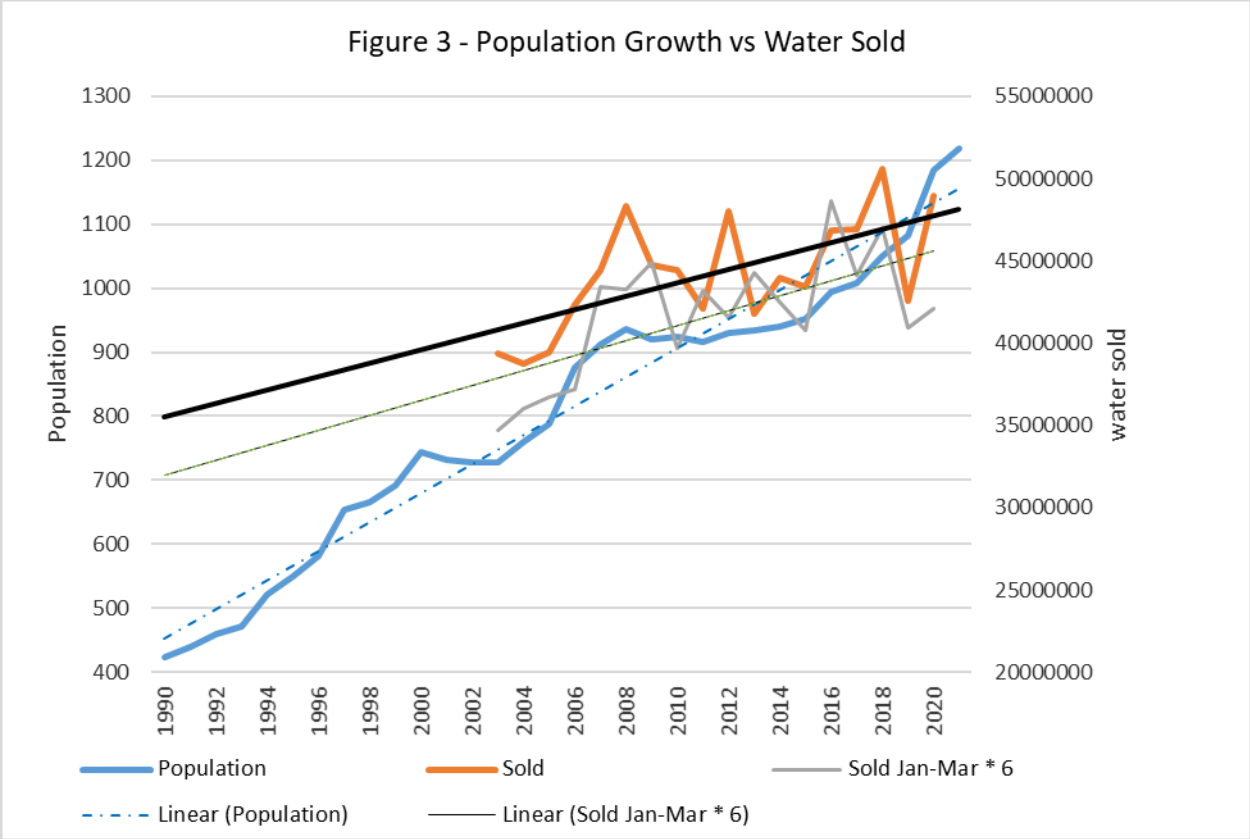


Figure 2 (above) summarizes the water treatment plant production and water sold for the last 20 years. The numbers fluctuate quite a bit between years. Looking at the water sold numbers which has less variability, there does seem to be an increase in water sold as the population grew in the early 2000's until the recession impacted the town in 2009. From 2012 going forward with the exception of 2019 as the economy has recovered there has again been a slow increase in water sold. Looking between the low point in 2004 and the peak in 2018, the water produced has increased from about 48.3 MG to about 75.2 MG about a 56% increase while water sold has increased from 38.8 MG to 50.3 MG a 30% increase. Note that population increased from 704 to 1050 in the same timeframe, a 50% increase. Town staff has concerns about the accuracy of the master meter that measures the water produced. In 2022 they intend to include a master meter downstream of the water storage tanks at the water plant and also to have the produced water master meter professionally re-calibrated.

Looking at Figure 3 below one can see that the population has increased at a faster rate than water sold annually or in the winter. Even though the population is expected to increase as much as 80% by 2050 using the more aggressive models, based on historic trends and concerns about climate change and drought, the water demand is projected to increase about 50%.



The Town's parks and open spaces are irrigated with non-potable water. Street watering and water from construction is generally provided through the non-potable water system as well. The source of the non-potable supply is an outlet from the pre-sedimentation ponds which is diverted into the non-potable supply line upstream of the water treatment plant. Between 1990 and 2010, the Town's parks and space area increased significantly. However, in the last decade there has been little addition to public open space or park space. The Town does not track the amount of water consumed through the non-potable system, but it is estimated to be about 0.2 - 0.35 cfs per day for much of the irrigation season which typically runs from mid to late April through early to mid-October. The above estimate is based on the difference between water produced and staff's estimate of how much water the Town diverts to the pre-sedimentation ponds. Assuming that at the beginning and end of the season there is less demand and that there are periods of wet weather with less demand, the demand for non-potable shown in Table 2 below is estimated to be in the 175 AF/year range. Note that the Town does not track what water flows out of the pre-sedimentation ponds through the overflow structures.

The non-potable demand is a significant amount of the total water demand for the Town during the summer months. During the hotter, drier parts of the irrigation season it is about half of the total demand.

Table 2 - 2020 Water Demand							
2020		Water Production			Non Potable		Total
		Gals	CFS	AC FT	CFS	AC FT	AC FT
Jan		4,927,875	0.25	15.124	0	0	15.12
Feb		4,313,902	0.22	13.240	0	0	13.24
Mar		4,750,194	0.24	14.579	0	0	14.58
Apr		4,368,250	0.22	13.407	0.15	9.00	22.41
May		7,434,292	0.38	22.817	0.25	15.50	38.32
Jun		8,105,881	0.41	24.878	0.34	20.40	45.28
Jul		8,128,236	0.42	24.946	0.33	20.46	45.41
Aug		8,521,200	0.44	26.152	0.25	15.50	41.65
Sep		6,345,921	0.32	19.476	0.22	13.20	32.68
Oct		5,148,372	0.26	15.801	0.15	9.30	25.10
Nov		3,908,267	0.20	11.995	0	0	11.99
Dec		4,739,060	0.24	14.545	0	0	14.54
				216.96		103.36	320.32

NOTE: Non potable flows are based on staff estimate of total diversions less the amount produced.

As the State, and the west as a whole, grapples with how to meet the State's projected water shortage with simultaneous population increases and an apparent long-term drought cycle, one hopes that plumbing fixtures and water consuming appliances will continue to become more efficient. It will also be necessary to make landscaping increasingly water efficient, and/or explore land use regulations that discourage high water use. These types of efforts may lead to a slight drop in per user consumption; however, as the population grows water demand is likely to grow with it, absent any significant changes in the cost of water or policy changes to limit water use. Making matters more challenging, climate change is likely to reduce the yield (wet water) from the Town's source of water supply. As noted above, the Town has recently updated some of its land use regulations to encourage denser development and less outdoor water usage.

The challenge is to determine how estimates of past water usage can be projected into the future. The non-potable demand is likely to depend on how the acres of parks and open space increases into the future. How they are landscaped will also impact how much water they require. The Town has recently modified the landscaping requirements on private property taking into account the desire to conserve water. It is anticipated that new open space and even some park space will also be landscaped with water conservation in mind. Based on the slower growth in parks and open space over the last 15 years, the

Town's emphasis on higher density infill growth, and the Town's recognition for the need for water efficiency, for the purposes of the water availability study, a 35% increase in non-potable demand is recommended.

Potable water demand will depend on the rate at which the population changes over the next 30 years, how much landscaping and the types of landscaping that is part of the housing development, the water efficiency of appliances and fixtures, and how conscientious consumers are regarding water usage as well other factors including precipitation patterns. For the purposes of the water availability assessment, with an intent to be conservative, it is recommended the Town plan for a 50% increase in potable water demand. That figure is a little less than the increase in water produced from 2004 – 2018, but is considerably more than the increase in water sold during that period. It is recommended that the Town keep an eye on water usage and if increases in water demand average more than 1.5% per year that the Town complete another study to determine water availability in about 15 years.

In order to keep water available for development, it is strongly recommended that when new properties are annexed to the Town that part of the annexation include dedication of water rights to the Town to account for the long term uses of the land being annexed. Where practical, this is also recommended for land being subdivided.