Town of Bayfield

Drought Management Plan

Public Review Draft

Prepared for:

Town of Bayfield
P.O. Box 80
Bayfield, CO 81122

Wright Water Engineers, Inc.

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EXECUTIVE SUMMARY

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1.0 INTRODUCTION

1.1 Profile of Existing System

The Town of Bayfield (Town) is located in La Plata County, Colorado, with a current population of approximately 2,700 people (DOLA, 2019) (see Map 1). The Town's distribution system consists of approximately 18 miles of main line piping and services approximately 1,300 water service tap connections.

The Town's municipal raw water supply comes from the Los Pinos River and is treated at the Town's water treatment plant (WTP). In 2016 the Town signed an agreement with the La Plata Archuleta Water District (LAPLAWD) to supply their customers with drinking water using a joint facility. Part of the agreement included the requirement for LAPLAWD to add additional capacity to the Towns existing WTP. The LAPLAWD expansion added an additional 1.0 million-gallons-per-day (MGD) capacity to the existing 1.5 MGD WTP with the capability to add another 1.0 MGD in the future. Of the 1.0 MGD added by LAPLAWD, 0.75 MGD is designated for LAPLAWD, and the remaining 0.25 MGD is designated for the Town. Therefore, the Town's current treatment capacity is 1.75 MGD, with expansion capability to 2.75 MGD (RG and McDowell, 2018).

The Town's average annual metered water use between 2016 and 2019 was approximately 0.23 MGD during the non-irrigation season, and 0.40 MGD during the irrigation season (see Table 1). As shown in Table 1, residential accounts generate almost 75 percent of the Town's water use, while commercial/industrial accounts generate approximately 25 percent of the Town's water use.

1.2 Population

Population estimates for the Town from the Colorado Department of Local Affairs (DOLA) State Demography Office (DOLA, 2019) between 2015 and 2019 are provided in Table 2. Over the past 5 years, the Town's average annual population growth rate was approximately 1 percent.

DOLA is currently estimating an average annual growth rate of 1.3 percent in La Plata County between years 2020 and 2050.

1.3 Existing Water Supply

The Town's primary water supply includes a pump station in the Los Pinos River, and the Los Pinos Irrigation Ditch that divert water from the Los Pinos River. The Town also owns water rights and shares in the Bean Ditch and the Schroder Ditch. Table 3 provides a summary of the water rights currently owned by the Town. As shown in Table 3 not all the Town's currently owned water rights can be used for municipal purposes at this time.

Table 4 provides a summary of the Town's current allowable diversions in cubic-feet-per second (cfs) for each water right that can be used for municipal purposes. As shown in Table 4, the Town's total allowable diversions vary throughout the year. During the winter months, the Town is currently limited to diverting 5.23 cfs at the Town of Bayfield Pump Station. During the irrigation season, the Town's allowable diversion peaks at 5.8 cfs.

In addition to these water rights, the Town currently leases 90 acre-feet (AF) of water annually in Vallecito Reservoir from the Pine River Irrigation District (PRID), the operator of the Reservoir. Of the 90 AF which is leased by the Town, 30 AF is firm and the remaining 60 AF is standby (see Table 4). Vallecito Reservoir is located upstream of the Town on the Los Pinos River and the Town utilizes its firm lease water to augment its out of priority diversions during times when the Los Pinos River is under administration.

1.4 Existing Water Demand

The Town's water demand between the non-irrigation months of September and April is based on Town provided raw water (influent) treatment plant (WTP) data between 2004 and 2017 on a gallons per capita per day (GPCD) basis adjusted to 2020 using Department of Local Affairs population projections for 2020. Town water demand between the months of May through August is based on Town's raw water treatment plant data for 2020 with adjustments for losses (see Table 5).

1.5 Future Water Demand

The Town's future raw water demands are estimated as function of existing per capita water use multiplied by population growth estimates. Using an average future La Plata County population growth estimate of 1.3 percent per year from DOLA, WWE projected increases in monthly municipal water demands on a GPCD basis through 2070 based on DOLA's population growth estimate. Table 5 provides a summary of the Town's projected water demands in 2050 and 2070 based on DOLA's growth estimate of 1.3 percent per year.

To better understand how variations in population growth rates may affect demands and WTP inflow requirements, WWE also estimated WTP inflow demands (what is required at the WTP) under the following population growth projection scenarios: 0.5 percent, 1.3 percent, 1.5 percent, and 2.5 percent. As shown in Figure 1 the Town's available treatment capacity of 1.75 MGD appears sufficient through 2070 except for a 2.5 percent population growth scenario. Assuming 2.5 percent population growth, the Town is projected to need additional WTP treatment capacity in or around 2053.

2.0 TOWN OF BAYFIELD DROUGHT TASK FORCE COMMITTEE

To help inform development of the Towns Drought Management Plan (DMP), the Town pulled together a Drought Task Force Committee (Drought Committee). Table 6 provides a summary of the members of the Towns Drought Committee who provided review and comment on the Draft DMP prior to its release for public comment. Members included representatives of the Town, LAPLAWD, and local water users.

The Drought Committee met twice during the development of the DMP, the meetings focused on the following:

- Meeting 1: Introductions, historical drought assessment, initial drought index levels, reviewing potential impacts from future droughts, and reviewing and discussing the preliminary list of potential drought response strategies (see Appendix A).
- Meeting 2: Review and discuss first draft of the DMP. The group provided comments and feedback on the draft DMP, made refinements to the Staged Drought Response Plan section

of the DMP, discussed approach for public comment period, and reviewed 2021 drought indices.

3.0 HISTORICAL DROUGHT AND IMPACT ASSESSMENT

3.1 Historical Drought Assessment

To better inform the Towns Drought Management Plan (DMP), Wright Water Engineers, Inc. (WWE) performed a historical drought assessment of hydrologic conditions in Vallecito Reservoir and the Los Pinos River. Inflow into Vallecito Reservoir and the Los Pinos River is primarily generated by snowmelt. WWE collected annual inflow data above Vallecito Reservoir from the USBR between water years 2000 and 2019 (USBR, 2020). Table 7 ranks the annual Vallecito Reservoir inflow from lowest to highest. The most recent wet year of the 19-year period of record was 2017 with approximately 303,300 AF of inflow. The driest year during this period of record was 2002, with approximately 74,500 AF of inflow. The average annual inflow during this period of record is approximately 236,300 AF.

Precipitation in the form of snowfall is a valuable component of the available water supply to the Town of Bayfield. Snowpack is the predominant source of streamflow that is regulated by Vallecito Reservoir and diverted later in the irrigation season by downstream users. The Snow-Water-Equivalent (SWE) is a measurement of the snowpack's water content and is typically recorded in inches. Typically, the SWE will dictate the subsequent year's management of the reservoir water supply.

The Los Pinos River basin has one snow-pack measurement site, the Vallecito Snow Telemetry (SNOTEL) site which records daily and hourly SWE data. The Vallecito SNOTEL site is located approximately 5 miles northeast of Vallecito Reservoir at an elevation of approximately 10,880 feet, and has been in operation since 1985 (see Map 3). This SNOTEL site is operated and maintained by the NRCS and provides real-time data via satellite uplink which is available on the internet[1]. WWE collected Vallecito SNOTEL data between water year 2000 and 2019 to develop a relationship between the peak annual SWE and estimated inflow into Vallecito Reservoir (NRCS, 2020).

[1] https://wcc.sc.egov.usda.gov/nwcc/site?sitenum=843

Table 7 compares the maximum annual SWE with average annual inflow volumes for each year. The average inflow for the January through June months during the same period of record is approximately 163,863 AF, or approximately 70 percent of the annual average. Since most of the precipitation between January and June in the drainage basin is in the form of snow, this average 70 percent of the inflow into Vallecito Reservoir is generally attributable to snowmelt runoff.

The impacts of a drought on the Town's water supply are also directly related to the depth of the administrative call on the Los Pinos River. As indicated in Table 3, the Town's most senior water rights decreed for municipal use are Priority Number 4 (P-4) and Priority Number 12 (P-12). Table 7 provides a summary of the Priority Number for the most senior water right called out of priority during the administrative call period for water years 2000 to 2019 (CDSS, 2020). As shown in Table 7, the Town's P-12 water right is out-of-priority when the call depth is senior to (administration number less than) P-12, and their P-4 water right is out-of-priority when the call depth is senior to (administration number less than) the P-4 water right. In the event the call depth priority administration number equals the Town's priority number, the Town's water right is likely being curtailed. All or some of the Town's municipal supply adjudicated direct flow water rights were out-of-priority or curtailed in eight out of the twenty years between 2000 and 2019. During these periods the Town's municipal water allocation in Vallecito Reservoir would supplement the Town's water supply.

3.2 Drought Severity Index

Table 8 provides an annual summary of the following for each year between 2000 and 2019: 1) measured inflow into Vallecito Reservoir, 2) maximum snow water equivalent (SWE), and 3) the Los Pinos River administrative call period and the priority number of the most senior water right called out-of-priority or curtailed. Based on these three metrics, a Drought Index is assigned to each year as shown in Table 8. Between 2000 and 2019, Extreme Level drought conditions occurred once, Serious Level drought conditions occurred five times, and Sustainable Conservation Level conditions occurred fourteen times.

3.3 Predicting Inflow and Available Water Supply

The reservoir inflow to snowmelt relationship is affected by a wide range of climatic factors, including soil moisture conditions, loss of snow to evaporation and sublimation, temperature, and variations in the snowpack within the drainage basin.

To predict the January through June runoff as a function of SWE, WWE used a least squares regression analysis. The regression analysis is based on a log-log relationship where the logarithms of both the measured inflow and the maximum annual SWE are used as the dataset for the regression analysis. The regression equation developed is provided as follows:

$$Y = 11848.63 \times (SWE)^{0.9392}$$

where:

Y = Estimated January through June inflow to Vallecito Reservoir in AF

SWE = Maximum day SWE at the Vallecito SNOTEL site in inches

The regression equation has an average fit with an R square value of 0.72 and a standard error of 0.11. The average difference between the average difference between the average predicted inflow and average measured inflow is approximately 25,500 AF.

The United States Bureau of Reclamation (USBR) is also a good resource for Vallecito Reservoir water supply forecasts. The USBR Lower Colorado River Operations website[2] provides data and information for many of the reservoirs, including Vallecito Reservoir, that the USBR manages. This data includes but it not limited to projected operations, water supply forecasts, current conditions, ongoing operations, and historical data. The USBR's website also provides information from the National Oceanic and Atmospheric Administration (NOAA) Colorado Basin River Forecast Center[3]. The Colorado Basin River Forecast Center provides predictive tools that forecast inflow into the reservoirs managed by USBR, including Vallecito Reservoir.

[2] https://www.usbr.gov/lc/riverops.html
[3] https://www.cbrfc.noaa.gov/

3.4 Historical Drought Impacts, Mitigation and Response Assessment

To mitigate drought impacts on its water rights when the Los Pinos River is under an administrative call and the Town's Water Rights are junior to the calling water right, the Town will divert water released from Vallecito Reservoir under contract with PRID. As discussed in Section 1.3, the Town currently leases 90 AF of water annually in Vallecito Reservoir from PRID, of which 30 AF is firm and the remaining 60 AF is standby. The annual cost of PRID storage water is currently $350 per AF for firm water, and $52 per AF for standby water. In the event the Town uses standby water to mitigate drought conditions, the water used is made firm, and the Town's annual cost for its PRID storage water can increase substantially. For example, if the Town needed 40 AF, then 10 additional AF becomes firm for a total of 40 AF of firm water and the standby is reduced to 50 AF. Based on the contract, once water becomes firm, the Town continues to pay for that amount of firm water for the remaining term of the contract.

The Town's most recent droughts occurred in 2018, and 2012. In response to the 2012 drought, the Town passed an ordinance in 2013 that requires odd or even address watering between hours of 9 pm and 6 am May 15th through September 15th.

In 2017, the Town also began the process of changing more of its P-4 water rights (15CW3017) in the Los Pinos Irrigating Ditch to allow for municipal uses. This case is currently ongoing as of the date of this Drought Management Plan.

As shown in Table 5, the Town experiences operational losses, including ditch and evaporation losses, when delivering water from the Los Pinos River to the WTP. To help reduce these operational losses during a drought condition, the Town utilizes its Pump Station in the Los Pinos River to deliver water to the WTP via a pipeline instead of the irrigation ditches. This typically occurs when the Town is diverting its storage water from PRID, as the electrical and operational cost to operate the Pump Station is significant. Supply side water savings because of operating the system in this manner are estimated at approximately 15 percent.

4.0 DROUGHT IMPACTS ASSESSMENT

To assess the impacts of drought and increasing municipal water demands on the Town's need for additional storage in Vallecito Reservoir, WWE developed a daily time-step model from Colorado

Decision Support System (CDSS) river administration call records on the Los Pinos River for 2002, 2018, and 2010 to determine when certain Town water rights are in or out-of-priority under different drought conditions.

When the Los Pinos River administrative call for a specific drought condition is senior to particular Town water right, then the water is not legally available to the Town and the water supply from each subject water right that is out of priority is set to zero for that day. The daily time-step model calculates a daily water supply available in priority.

To calculate water supply deficits, the water supply available in priority is compared to the current and projected water demand. When the projected water demand is greater than the in-priority water supply, the Town has a water deficit and conversely when the projected municipal demand is less than the Town's in priority water supply the Town has a water surplus. WWE conducted this analysis on a diversion basis.

For planning purposes, WWE used the daily time-step model to estimate the Town's annual water supply deficit for a 20-year planning period (2020 to 2039) under the following drought conditions sequence: Extreme Level drought occurs once during the planning period, a Serious Level drought occurs three times during the planning period, and Sustainable Conservation Level conditions occur in between the Extreme and Serious Level drought conditions (see Table 9). The corresponding administrative call scenario for each year is also shown in Table 9.

Since neither the Town nor PRID currently have a decreed augmentation plan or augmentation supply, the analysis presented in Table 9 is based on the continued diversion of storage water when the Town's water rights are out-of-priority without consideration for return flow credits from the Town. Table 9 provides a summary of the Town's calculated water supply deficit on a diversion only basis by year under varying drought conditions.

Table 9 also provides a summary of estimated costs associated with maintaining the Town's physical and legal water supply during the planning period including: 1) cost to lease additional water from the PRID to cover the annual water supply deficit, 2) anticipated water rights engineering fees, 3) water rights attorney fees, 4) Town's Los Pinos opposition reimbursement costs, and 5) annual Schroder and Los Pinos Ditch Company Shares assessments. Water rights engineering, attorney, and Los Pinos opposition reimbursement costs are greater between 2020 and 2021 due to the Town's pending water right change Case No. 15CW3017. WWE assumed an

increase in the engineering, attorney, and Los Pinos opposition reimbursement costs during and in the three years following an Extreme Level drought to cover additional changes to existing water rights (shares) acquired by the Town. Remaining years consider engineering and attorney costs associated with water rights accounting, general water supply assistance, and annual Los Pinos and Schroder Ditch Company Share assessments. Annual engineering costs associated with the Town's water treatment plant or other water supply, storage, and distribution infrastructure are not included.

In addition to droughts impacts on water supply, wildfires are commonly associated with drought cycles in southwest Colorado. It is important for the Town to consider the potential impacts of wildfires on source water quality in the Los Pinos River during a drought condition. Post fire stormwater runoff can cause major disruptions to raw water quality and the Town's water treatment capabilities and treatment efficiencies.

5.0 STAGED DROUGHT RESPONSE PLAN

Drought response strategies for each Drought Index level were selected by developing a preliminary list of potential response strategies and presenting the strategies to Town Council for discussion, screening, and final selection. Appendix A provides a summary of the identification and screening process for the Town's foundational DMP response strategies.

The Town Manager and Public Works Department may elect to work with Town Council to enact all or some of the response strategies provided in Table 10 and discussed below or choose to enact strategies from any Drought Index level in any combination to achieve the water conservation targets at each drought condition.

This staged drought response plan identifies potential response strategies to implement in accordance with a particular drought index level. These are short term, temporary efforts to reduce water use by the Town and its water users. This section of the DMP outlines a set of response strategies for use in each of the increasing drought levels: Sustainable Conservation, Serious, and Extreme.

5.1 Sustainable Conservation Level Drought Mitigation Strategies

5.1.1 Trigger Points

This Sustainable Conservation Level is intended to maintain a baseline level of water conservation when drought conditions are not present. The Sustainable Conservation Level is maintained under the following conditions (see Table 10):

- Max SWE is greater than 15 inches.
- Measured inflow into Vallecito Reservoir between January and June is greater than 170,000 AF.
- The Los Pinos River administrative call depth stays above the P-12.

5.1.2 Target Water Conservation and Drought Mitigation Strategies

The water conservation target at the Sustainable Conservation Level is between 0 to 10 percent. Selected drought mitigation strategies at the Sustainable Conservation Level include the following (also see Table 10):

- **Odd or Even Address Watering**: In 2013 the Town passed an ordinance that requires odd or even address watering between hours of 9 pm and 6 am May 15th through September 15th. This strategy helps to stagger, and limit demands on the Town's raw water supply during the irrigation season. Currently, customers that violate this ordinance are not subject to monetary penalties.

5.2 Serious Level Drought Trigger Point and Response

5.2.1 Trigger Points

The Town should consider enacting Serious Level drought response measures based on the following trigger conditions (see Table 10):

- Max SWE is less than 15 inches and greater than or equal to 6 inches.
- Measured inflow into Vallecito Reservoir between January and June is less than 170,000 AF and greater than or equal to 70,000 AF

- The Los Pinos River administrative call depth is less than or equal to the P-12.

5.2.2 Target Water Conservation and Drought Response Measures

The water conservation target at the Serious Level drought is between 20 to 30 percent. Selected drought response measures at the Serious Level drought include the following (also see Table 10):

- **Public Drought Campaign:** The purpose of the Public Drought Campaign is to inform the community of an impending drought situation and communicate the necessity for imposing certain water use restrictions. Raising awareness and providing available information to the community to increase collective understanding is key for the Town to successfully decrease water demand during times of drought.

  Notify public that precautionary steps of action toward a drought are necessary and publish suggestions for temporarily reducing water use by sending bill stuffers and publish information on the Town's website. Ask customers to voluntarily reduce water usage through bill stuffers.

  As drought conditions worsen, update public of increased drought level and intensify public discussion on water conservation through bill stuffers and placement of a Variable Message Sign located at key Town intersections. The public drought campaign should provide opportunities for positive collaboration with the community. This could include providing the community with target water savings goals, and letting the community know how well they are doing to achieve those goals. Provide positive reinforcement and incentives whenever possible.

- **Meet with High Water Users:** Contact high water user accounts and discuss approaches to reduce their consumption. The target users for this response measure are the Town's top 5 to 10 commercial water user accounts. The Town may reach out to high consumption water users beyond the top 10 if desired.

- **Reduce Town Outdoor Water Use:** Maintain trees, shrubs, and vegetation by hand-watering and limit other outdoor water use practices that rely on a potable water service connection. The target for this response measure is Town maintained parks and landscaped areas.

- **Prohibit Washing Impervious Surfaces**: The ordinance passed by the Town in 2013 indicates that "car washing, driveway washing and other similar outdoor use of water during the irrigation season" may be regulated by the Town, however there are no specific penalties associated with these practices. The Town should consider regulations for washing impervious surfaces during a Serious Level drought and consider monetary penalties for violation.

5.3 Extreme Level Drought Trigger Point and Drought Response

5.3.1 Trigger Points

The Town should consider enacting Extreme Level drought response measures based on the following trigger conditions (see Table 10):

- Max SWE is less than 6 inches.
- Measured inflow into Vallecito Reservoir between January and June is less than 70,000 AF.
- The Los Pinos River administrative call depth is less than or equal to P-2.

5.3.2 Target Water Conservation and Drought Response Measures

The water conservation target during an Extreme Level drought is between 30 to 40 percent and greater. Selected drought response measures at the Extreme Level drought include the following (also see Table 10):

- **Further Reduce Town Outdoor Water Use:** Sustain certain landscape elements such as trees, shrubs, and gardens by hand watering only. Significantly reduce or end all outside turf irrigation, including parks and other Town owned properties.
- **Prohibit all daytime irrigation and outdoor water use:** In 2013 the Town passed an ordinance that requires odd or even address watering between hours of 9 pm and 6 am May 15th through September 15th. Customers that violate this ordinance are subject to monetary penalties. Under an Extreme Level drought scenario this ordinance and the associated penalties should be more actively enforced by the Town staff.

  The 2013 ordinance indicates that "car washing, driveway washing and other similar outdoor use of water during the irrigation season" may be regulated by the Town, however

there are no specific penalties associated with these practices. The Town should consider regulations for washing impervious surfaces during an Extreme Level drought and consider monetary penalties for violation.

6.0 LONG TERM DROUGHT MITIGATION STRATEGIES

In addition to the staged drought response plan strategies discussed in Section 5.0, the Town should continue identifying ongoing long-term drought mitigation strategies to help reduce drought impacts to its water supply in the future. These mitigation efforts should include both supply-side and demand-side strategies.

6.1 Supply-Side Mitigation Strategies

6.1.1 Continue Acquiring and Changing Water Rights

As additional areas are annexed into the Town limits and supplied with a municipal water connection, the Town should continue to acquire any water rights associated with the properties. As shown in Table 3, the Town owns water rights that have not yet been converted to municipal use. As the demand for water increases with population, these currently un-changed water rights will provide the Town with additional legal water supply in the future.

6.1.2 Water Efficiency

As discussed in Section 3.4, the Town experiences operational losses, including ditch and evaporation losses, when delivering water from the Los Pinos River to the WTP. To help reduce these operational losses during a drought condition, the Town utilizes its Pump Station in the Los Pinos River to deliver water to the WTP via a pipeline instead of the irrigation ditches. Supply side water savings because of operating the system in this manner are estimated at approximately 15 percent.

The Town Public Work Department should continue to identify potential water efficiency strategies. These could include leak detection and monitoring equipment for identifying leaks in the Town's distribution system, optimizing WTP treatment processes to minimize backwash waste or installation of a backwash reclaim basin to recycle WTP backwash. Public Works projects such as this can come with significant infrastructure costs, and their cost-benefit should be assessed before they are considered.

6.2 Demand-Side Mitigation Strategies

6.2.1 New Town Ordinances

The ordinance passed by the Town in 2013 (15-88 through 15-92) indicates that "car washing, driveway washing and other similar outdoor use of water during the irrigation season" may be regulated by the Town, however there are no specific penalties associated with these practices. An ordinance that provides the Town Marshal the ability to issue fines for violating this ordinance is recommended. A graduating scale of monetary penalties is typically associated with these violations, for example:

- First Violation: Monetary fine of $50.00 added to water bill.
- Second Violation: Monetary fine of $100.00 added to water bill.
- Third Violation: Monetary fine of $500.00 added to water bill.

The Town should consider further refining the regulations in the ordinance for washing impervious surfaces during Serious and Extreme Level drought conditions and consider monetary penalties for violations.

6.2.2 Drought Surcharge and Rate Study

As discussed in Section 4.0, maintaining an adequate raw water supply under a drought condition may require a significant monetary investment by the Town for storage water in Vallecito Reservoir in the future. The impacts of drought on the annual cost of the Town's water supply developed as part of this Drought Management Plan should be considered when updating the Towns Rate Study and used to determine if a drought surcharge may be necessary to offset the costs of a drought.

7.0 IMPLEMENTATION AND MONITORING

7.1 Drought Task Force and Monitoring

The Town should continue to maintain a volunteer Drought Task Force committee to regularly monitor drought conditions, and include members of the Town Public Works Department, LAPLAWD, participating water users, and the Town Manager. The Drought Task Force committee should schedule a meeting to review the drought forecast and the need for a drought

declaration once the administrative call on the Los Pinos River is affecting the P-15 water right. The Town's primary water rights are P-12 and will typically start being curtailed or go out-of-priority soon after the administrative call reaches the P-15.

7.2 Drought Declaration

The Town does not currently have a defined approach for forecasting or declaring drought. The drought trigger index in Table 8 provides general guidelines for under what conditions drought response strategies may be needed to hit water conservation targets. However, both drought monitoring data, and the experience of the Public Works Department and Town Manager should also play a role in determining the drought level and corresponding action or declaration of a drought. As such, Town staff reserve the right to make modifications to this DMP based on their experience and available resources.

It is important for the Town to officially declare a drought and adjust correspondingly to drought levels, in a timely manner. If a drought is declared too late and response strategies are not taken early enough to reduce water use, the cost of the Town's water supply can increase significantly, leading to economic impacts that may be avoidable. The Town Manager is ultimately responsible for providing final recommendations on the timing of drought declaration and corresponding stage of a drought to the Town Council. The following protocol will be followed to officially declare a drought:

- Public Works staff and Drought Task Force will discuss the drought monitoring information with the Town Manager providing recommendations on the timing of the drought declaration and the appropriate Drought Index level.
- The Town Manager will provide the drought declaration and the appropriate Drought Index level recommendations to the Town Council and public.
- Town Council members are provided an opportunity to ask questions, hear comments from the public, and comment on recommendations during a Town Council meeting.
- The Town Council takes action whether to declare a drought and its associated index level based on the Town Manager recommendations and input from Public Works Department staff members and the public.

- In the event the Town Council takes action to declare a drought, direction will be given to the Town Manager to convey the drought declaration to Town staff and the public.

The same drought declaration protocol will be followed to further increase the drought index level or to end a drought declaration and return to the Sustainable Conservation Level.

7.3 Implementation of the Staged Drought Response Program

Implementation of the staged drought response plan requires action by the Town its various departments. The roles and responsibilities are provided as follows:

- **Town Manager:** Administer and implement the staged drought response plan and selected drought response strategies. The Town Manager is responsible for facilitating necessary communication and coordination with other departments and the public.
- **Parks and Recreation Department:** Coordinate reduction of outdoor irrigation on Town-owned property in accordance with the drought response activities implemented as applicable.
- **Public Works Department:** Convey the drought declaration information to the Town Manager and aid in implementing the public drought awareness campaign. Work with the Town Manager and bill stuffers and drought awareness literature.

  Monitor municipal water use data for changes in response to a drought declaration and implementation of drought response strategies. Implement supply-side drought mitigation measures as appropriate (see Section 6.1).
- **All Town Departments:** Follow water use restrictions imposed by the staged drought response plan and help with enforcement of any water use regulations and ordinances.
- **Town Marshal:** Enforce drought related code violations and assist in public education and awareness.

During a Serious or Extreme Level Drought Index, the Town Manager will schedule regular meetings with key departments as necessary to monitor implementation and results of the Town's drought response plan. Items reviewed at this meeting should include but not be limited to:

- Review of Town budget and funds available for implementation of the drought response strategies.
- Review water use data from Public Works Department and discuss if the drought response strategies are achieving target water conservation savings.
- Review the need for additional enforcement of specific drought response activities that include penalties for violation.

7.4 Recommendation for Enforcement of the Staged Drought Response Plan

Town of Bayfield Municipal Code Section 15-88 through 15-92 currently requires odd or even address watering between hours of 9 pm and 6 am May 15th through September 15th.

This DMP recommends:

- The definition in Section 15-87 for the irrigation season in the current Municipal Code should be changed to May 1 through September 30.
- The enforcement and associated monetary penalties for violating or not-complying with any of the Towns staged drought response activities must first be adopted into the Town's municipal code. This DMP recommends that during declared Serious and Extreme Level Drought Index conditions, additional ordinances should consider a graduating scale of monetary fines for subsequent violations.
- Trained and authorized Town Staff can issue violations and shut off meters if necessary.

The Town should continue to encourage members of the public to participate in the efficient use of water during a drought through education and public outreach efforts. The Town Marshal may issue violations for non-compliant activities.

7.5 Monitoring of Plan Effectiveness

Monitoring of municipal water use data for changes in response to a drought declaration and implementation of drought response strategies is key in understanding the effectiveness of different strategies. The Town should also monitor non-quantitative data, such as public awareness levels and drought perceptions. Monitoring could include but not be limited to the following:

- **Water Use:** comparison of water use before, during, and after a drought declaration is important to understanding the effectiveness of the drought response strategies implemented. Comparison of water use trends following drought declaration and implementation of response strategies with historical non-drought condition data can help the Town make better decisions on which response strategies are more effective than others.
- **Public Awareness**: This data could include documenting public comments received at Town Council meetings, and any emails, letters or phone calls received by Town staff concerning the drought response plan. If there is Town budget available, public surveys could also be used to gather public input on the Town's drought response plan implementation.
- **Financial and Administrative Records**: This data could include summarizing the number of violations issues during a drought, and the impacts to Town revenue, and cost of water during a drought condition.

Collection and reporting on this monitoring data following a Serious or Extreme Level Drought Index condition will help the Town assess the effectiveness of the plan. This monitoring data can also help refine and improve the Town's Drought Management Plan and response strategies is the future.

8.0 PUBLIC REVIEW AND APPROVAL PROCESS

8.1 Public Review Process

Prior to finalizing the Towns DMP in June 2021, the Town provided the public with an opportunity to review and comment on the DMP. The Town provided a link to the draft DMP on their website and provided a link to the draft DMP on water bill stuffers. The public was provided 30 days to review and comment on the Plan.

8.2 Plan Approval

WILL BE WRITTEN AFTER PLAN APPROVAL

8.3 Periodic Review and Update

Drought management planning is more effective when the Town can adapt its response strategies to future changes in water demand, water supply, and the climate. This DMP is intended to be a "living document" requiring periodic updates as the Town continues to grow and better understand how this planning document is best implemented. The CWCB recommends updating drought management plans every 5 years, or more frequently as necessary to incorporate lessons learned through its implementation. A DMP update should include formation of a stakeholder group. This stakeholder group should review and consider any monitoring data collected during and post drought response strategy implementation and assess any changes or refinements to improve the effectiveness of the DMP.

9.0 RECOMMENDATIONS FOR FUTURE STUDY

9.1 Post-Fire Mitigation Response Strategies

Wildfires are commonly associated with drought cycles in southwest Colorado. Future studies should consider potential impacts to the Towns water supply because of a wildfire within the Los Pinos River watershed. Post-fire stormwater runoff can cause significant changes to the water quality of the receiving river, causing disruptions to water treatment facilities their treatment efficiencies if not properly addressed. Post-fire mitigation response strategies should include a review of the Town's water supply transmission and treatment system to identify potential strategies for limiting the impact of poor source water quality and identify a source of potential emergency backup supply. Emergency backup supplies could include an emergency interconnect with another municipal system, or a series of emergency ground water wells. Recommendations.

9.2 Water Efficiency Planning

As discussed in Section 6.1.2, the Town Public Work Department should continue to identify potential water efficiency strategies. One option include development of a CWCB Municipal Water Efficiency Plan. According to CWCB (2021), "…one of the main objectives of a water efficiency plan is to achieve lasting, long-term improvements in water efficiency while reducing overall water demands. In contrast, a drought management plan focuses on mitigation and

response strategies that can provide temporary and immediate relief from drought-related water supply shortages."

9.3 Climate Change Assessment

While the recurrence of drought conditions can be one outcome of climate change, this DMP did not specially address the impacts of climate change on the Town's raw water supplies, and future updates of this DMP should consider these impacts. In order to evaluate potential water supply impacts because of climate change, future hydrologic impacts can be assessed using CWCB's *Climate Change in Colorado: A Synthesis to Support Water Resources Management and Adaptation (2014)* (CWCB Climate Change Report), and other information available on CWCB's climate change website[4].

CWCB's Climate Change Report suggests the average annual streamflow in Colorado's rivers are projected to decrease by as much as 30 percent. Projections also suggest more precipitation falling as rain rather than snow, earlier snowmelt and spring runoff peaks, and changes in flooding seasonality. Rising temperatures are projected to bring about these hydrologic changes no matter how precipitation patterns change in the basin.

[4] https://cwcb.colorado.gov/climate

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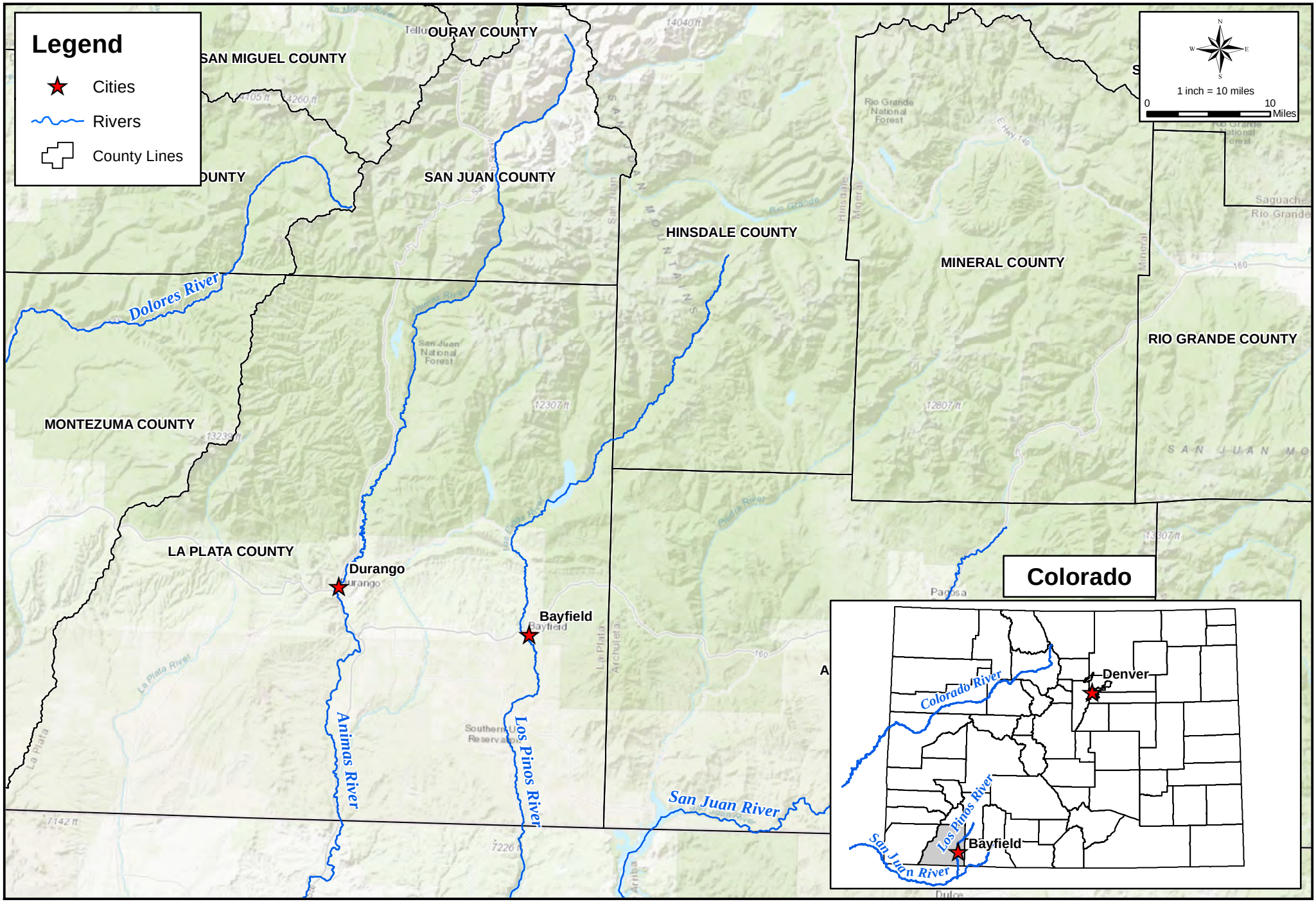
Maps



Date: 4/19/2021 Document Path: P:\021-119\013 Drought Management Plan\Mapping\Figure 1 - Drought Management Plan Location Map.mxd

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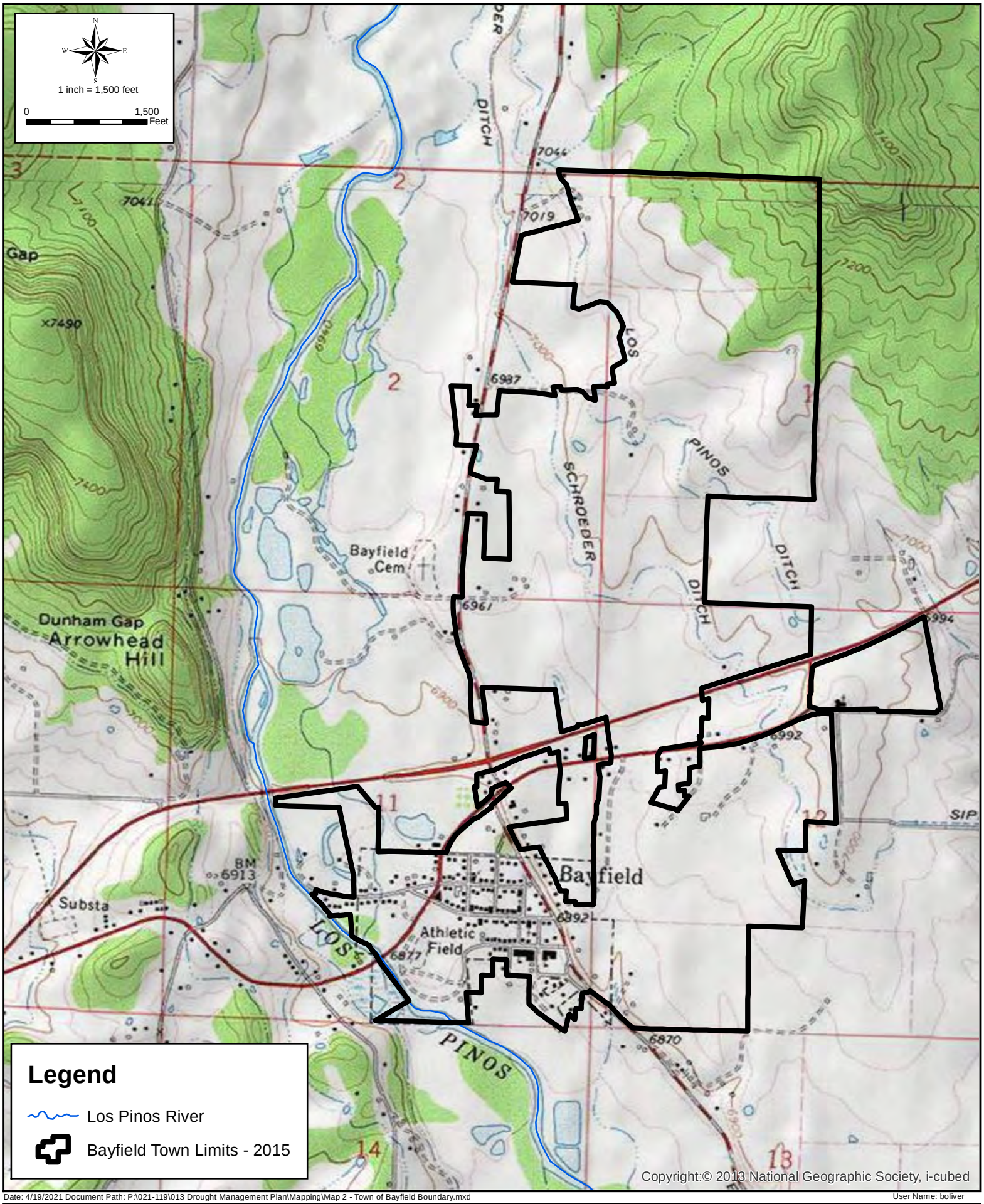
LA PLATA COUNTY, CO

TOWN OF BAYFIELD LOCATION MAP

TOWN OF BAYFIELD

PROJECT NO.
021-119.013

DRAFT
Map
1



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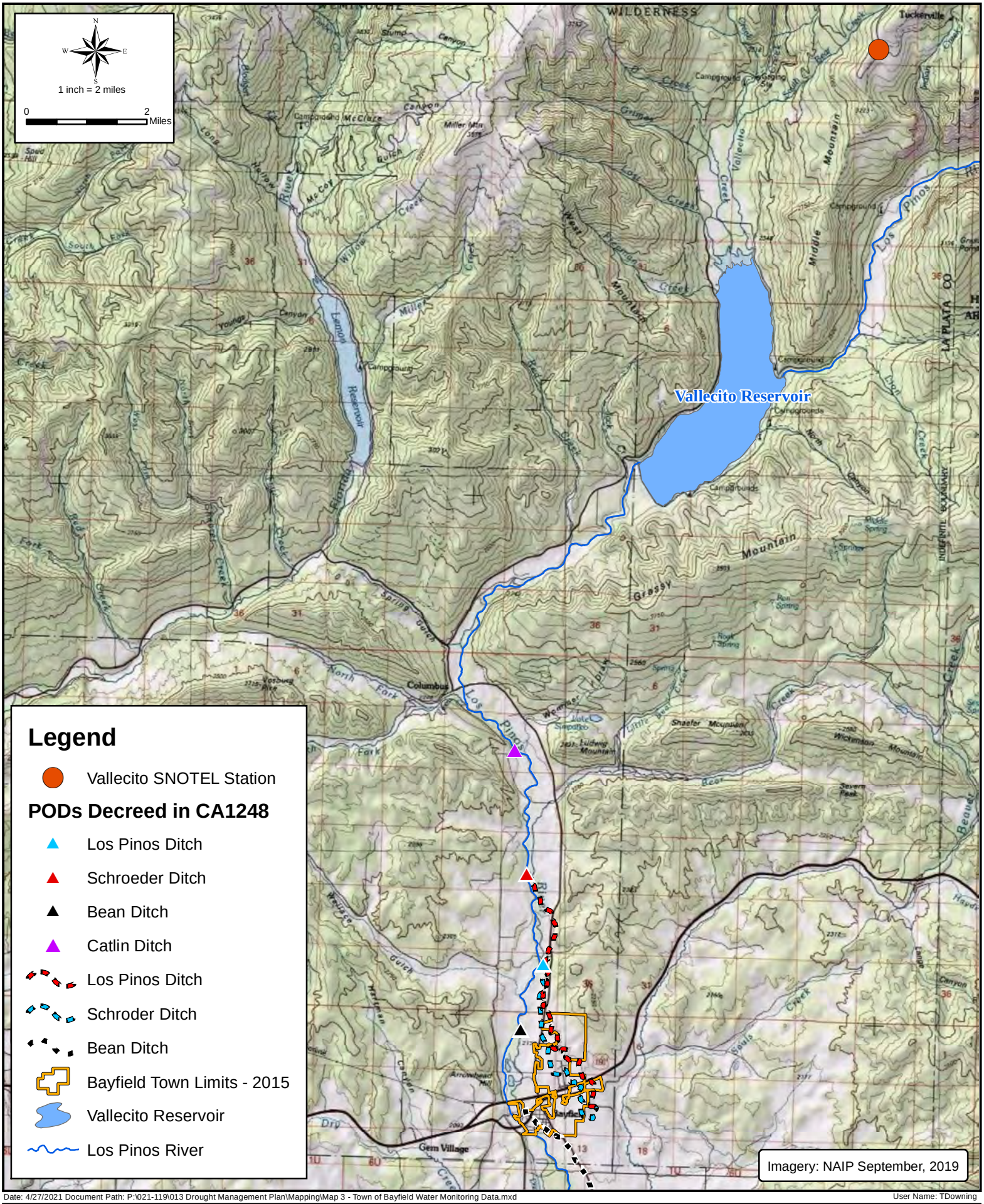
LA PLATA COUNTY, CO

TOWN OF BAYFIELD BOUNDARY

TOWN OF BAYFIELD

PROJECT NO. 021-119.013

DRAFT Map 2



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LA PLATA COUNTY, CO

TOWN OF BAYFIELD WATER SUPPLY

TOWN OF BAYFIELD

PROJECT NO.
021-119.013

DRAFT
Map
3

Tables

Table 1
Average Metered Water Use by Sector (2016 to 2019)
Town of Bayfield Drought Management Plan

Month	Total Metered Water Use	Metered LAPLAWD Water Use	Town of Bayfield Metered Water Use	Residential		Commercial / Industrial	
	(MGD)	(MGD)	(MGD)	(MGD)	Percent of Total Town	(MGD)	Percent of Total Town
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
January	0.19	0.03	0.16	0.12	74%	0.04	26%
February	0.26	0.04	0.22	0.16	73%	0.06	27%
March	0.41	0.03	0.38	0.33	88%	0.05	12%
April	0.21	0.03	0.18	0.13	71%	0.05	29%
May	0.27	0.02	0.24	0.17	70%	0.07	30%
June	0.37	0.04	0.34	0.24	72%	0.10	28%
July	0.58	0.04	0.55	0.42	77%	0.13	23%
August	0.53	0.05	0.48	0.37	77%	0.11	23%
September	0.51	0.05	0.46	0.35	75%	0.12	25%
October	0.39	0.04	0.35	0.25	73%	0.09	27%
November	0.30	0.04	0.26	0.18	68%	0.08	32%
December	0.21	0.03	0.19	0.13	72%	0.05	28%
Average Non-Irrigation Season (November through April)	0.26	0.03	0.23	0.17	74%	0.06	26%
Average Irrigation Season (May to October)	0.44	0.04	0.40	0.30	74%	0.10	26%

Column Notes:

(1) Average total metered water use reported by the Town of Bayfield between 2016 and 2019. Meter data not available between January 2016 and April 2016.

(2) Average total metered water use reported by the Town of Bayfield delivered to LAPLAWD between 2016 and 2019. Meter data not available between January 2016 and April 2016.

(3) Equal to Column (1) - Column (2)

(4) Average total metered water use reported by the Town of Bayfield for residential water accounts between 2016 and 2019. Meter data not available between January 2016 and April 2016.

(5) Equal to (Column (4) ÷ Column (3)) x 100

(6) Average total metered water use reported by the Town of Bayfield for commercial / industrial water accounts between 2016 and 2019. Meter data not available between January 2016 and April 2016.

(7) Equal to (Column (6) ÷ Column (3)) x 100

Table 2
Town of Bayfield Population Data
Town of Bayfield Drought Management Plan

Year	Population (1)	Annual Rate Increase (2)
2015	2,578	-
2016	2,632	2.1%
2017	2,698	2.5%
2018	2,722	0.9%
2019	2,708	-0.5%
Average (2015 to 2019)		1.0%
Colorado DOLA Projected La Plata County Growth Rate (2020 to 2050)		1.3%

Column Notes:

(1) Town of Bayfield Colorado DOLA Population Estimate.

(2) Equal to (Column (1) current year - Column (1) previous year) ÷ Column (1) previous year

Table 3
Direct Diversion Water Rights
Town of Bayfield Drought Management Plan

Structure	Case Number	Appropriation Date	Priority Number	Bayfield's Shares	CFS Per Share	Total CFS	Original Decreed Uses	Changed Uses of Water Right, Existing and Pending	Notes
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Existing Changed Shares and Water Rights									
Los Pinos Irrigating Ditch	W-1411-76	1878-03-01	P- 4	80.00	0.0125	1.0	Irrigation	Irrigation, Municipal	Decreed duty 1 cfs/80 acres Ditch company uses 80 shares per cfs. Original Los Pinos Ditch decreed in Case No. CA 1248
Schroder Irrigating Ditch	W-1412-76	1881-09-01	P-12	1.96	0.40	0.8	Irrigation	Irrigation, Municipal	Decreed duty = 27.12 cfs/1,981 acre = 1 cfs/73 acres Ditch company uses 0.4 cfs per share Original Schroder Ditch decreed in Case No. CA 1248
Bayfield River Pump Station	03CW122, 11CW27, 19CW3017	1997-09-01				4.0	Municipal, Domestic, Industrial, Commercial, Irrigation, Firefighting, Evaporation	Municipal, Domestic, Industrial, Commercial, Irrigation, Firefighting, Evaporation, (Reuse pending)	Water right is conditional; structure is primarily used to pump as APOD for Los Pinos and Schroder Ditch Water Rights. Reuse and APOD at Los Pinos and Schroder is pending decree on 15CW3017.
	96CW124, W1411-76	1878-03-01	P- 4					Municipal	APOD from Los Pinos Irrigating Ditch for Town Pump Station; During non-irrigation season limited to diversion of 1.0 cfs and total volume combined with Schroder municipal water diverted at Town Pump limited to 145 AF.
	96CW124, W1412-76	1881-09-01	P-12					Municipal	APOD from Schroder Ditch for Town Pump Station; During non-irrigation season, is limited to diversion of 0.23 cfs and total volume combined with Los Pinos municipal water diverted at Town Pump limited to 145 AF.
Pending Change Case Shares									
Los Pinos Irrigating Ditch	15CW3017	1878-03-01	P- 4	147.091	0.0128	1.885	Irrigation	Irrigation, Municipal, commercial, industrial, recreation, fishery, replacement of evaporation, fire protection, domestic, stock watering, augmentation, replacement, by direct use, storage and exchange within Bayfield's service area	Pending change case is 15CW3017. With pending APODs at Bayfield Pump Station. The change case is associated with 147.091 Town owned shares out of a total 905.091 shares in the Los Pinos Ditch, equaling 1.885 cfs. The Town changed 1.0 cfs of its water right to municipal use in Case No. W-1411-76 leaving 1.885 cfs of water owned by the Town pending a change in Case No 15CW3017.
Unchanged Shares									
Los Pinos Irrigating Ditch	CA1248	1878-03-01	P- 4	3.0	0.0125	0.04	Irrigation		Shares acquired after 15CW3017 filed.
Schroder Irrigating Ditch	CA1248	1881-09-01	P-12	2.38	0.40	0.95	Irrigation		Shares acquired since 1976 (W1412-76) case.
Schroder Irrigating Ditch	CA1249	1881-09-01	P-12	0.25	0.40	0.10	Irrigation		Share certificate 546 Clover Meadows Phase 7.
Bean Ditch	CA1248	1877-04-15	P-2			0.775	Irrigation		The Bean Ditch Adjudication (CA1248) states that the duty of water in the Bean ditch is 3.25 cfs per 130 acres, or 1 cfs per 40 acres. Based on preliminary discussions with the Ludwig's, majority user of Bean Ditch, Town of Bayfield owns 31 acres of land historically irrigated by P-2 Bean Ditch water. Additional ownership and ditch maintenance agreement recommended with Ludwig's.
Catlin Ditch	CA1248	1890-05-01	P-20			0.50	Irrigation		In 2001 Joe D. and Jane Ford Revocable Trust granted Town of Bayfield 0.50 cfs out of the 0.53 cfs decreed for the Catlin Ditch. Please note the agreement between Grantors and the Town notes a priority number of 33, however CDSS records indicate a priority number of 20.

Column Notes:

(1) Structure name. Note the APOD for the Los Pinos and Schroder was changed to the Bayfield Pump Station in Case No. W1411-76.
(2) Decree for structure in which Town of Bayfield owns a portion of the water right.
(3) Appropriation Date, according to CDSS.
(4) Priority Number, according to CDSS and decree.
(5) Shares owned by Town of Bayfield as applicable.
(6) Amount of water which had additional use added in subsequent decrees.
(7) Equals Column (5) x Column (6) as applicable.
(8) Uses included in the original decree for the water right.
(9) Summary of changed, and pending water right uses.
(10) Notes from decrees and other pertinent information.

Table 4
Current and Future Allowable Diversions for Town of Bayfield and PRID Lease Amounts
Town of Bayfield Drought Management Plan

	Current Direct Flow Conditions				Active Change Case		Current PRID Lease		
Month	Los Pinos Ditch 1.00 cfs of P4 - changed in Case No. W1411-76 Admin No. 10287.00000	Schroeder Ditch 0.8 cfs of P12- Changed in W1412-76 Admin No. 11567.00000	Pump Station Town's Decreed Water Right for the Pump Station Admin No. 55882.53935	Current Total Allowable Diversions In Priority	Los Pinos Ditch 1.885 cfs of P4 - Case No. 15CW3017 Admin No. 10287.00000	Total Allowable Diversions In Priority with Change Case	Amount Firm	Amount Standby	Total Amount
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(AF)	(AF)	(AF)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
January	1.00	0.23	4	5.23	0.00	5.23			
February	1.00	0.23	4	5.23	0.00	5.23			
March	1.00	0.23	4	5.23	0.00	5.23			
April	1.00	0.23	4	5.23	0.00	5.23			
May	1.00	0.80	4	5.80	2.13	7.93			
June	1.00	0.80	4	5.80	1.90	7.70	30.00	60.00	90.00
July	1.00	0.80	4	5.80	1.89	7.69			
August	1.00	0.80	4	5.80	1.84	7.64			
September	1.00	0.80	4	5.80	1.92	7.72			
October	1.00	0.80	4	5.80	0.66	6.46			
November	1.00	0.23	4	5.23	0.00	5.23			
December	1.00	0.23	4	5.23	0.00	5.23			

Column Notes:

(1) Based on W1411-76 with a 145 AF limitation for the combined diversions by the Los Pinos 1.00 cfs and Schroeder 0.80 cfs during November 1 through May 1 period, set under 96CW124.

(2) Based on W1412-76 with a 145 AF limitation for the combined diversions by the Los Pinos 1.00 cfs and Schroeder 0.80 cfs during November 1 through May 1 period, set under 96CW124. 96CW124 also set a diversion rate limit of 0.23 cfs for the November 1 through May 1 period, and 0.80 cfs for the May 2 through October 31 period for the Town's 0.80 cfs Schroeder Ditch Water Right

(3) Based on 03CW122, and augmented by the Town's 1.885 cfs Los Pinos Ditch Water Right changed in 15CW3017.

(4) Equal to Column (1) + Column (2) + Column (3)

(5) Equals Historical Stream Depletion Credit associated with 1.885 cfs change (Case No. 15CW3017) / Number of Days Water Historically Diverted / 1.983 to convert AF to cfs.

(6) Equals Column (4) + Column (5)

(7) Town's amount of PRID firm lease water in Vallecito Reservoir as specified in 2008 Lease Agreement.

(8) Town's amount of PRID standby lease water in Vallecito Reservoir as specified in 2008 Lease Agreement.

(9) Town's total amount of PRID lease water in Vallecito Reservoir as specified in 2008 Lease Agreement.

Table 5
Existing and Projected Water Demands
Town of Bayfield Drought Management Plan

Month	2020					2050				2070			
	Water Treatment Plant Raw Water Demand			System Losses	Total Treated Water Demand	Water Treatment Plant Raw Water Demand		System Losses	Total Treated Water Demand	Water Treatment Plant Raw Water Demand		System Losses	Total Treated Water Demand
	(AF/Day)	(MGD)	(GPCPD)	(AF/Day)	(AF/Day)	(AF/Day)	(MGD)	(AF/Day)	(AF/Day)	(AF/Day)	(MGD)	(AF/Day)	(AF/Day)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
January	0.90	0.29	104	0.23	1.14	1.35	0.44	0.34	1.69	1.58	0.52	0.40	1.99
February	0.95	0.31	110	0.26	1.21	1.42	0.46	0.37	1.79	1.66	0.54	0.44	2.10
March	0.93	0.30	107	0.27	1.19	1.38	0.45	0.38	1.76	1.62	0.53	0.44	2.06
April	1.13	0.37	130	0.34	1.47	1.68	0.55	0.48	2.16	1.98	0.64	0.55	2.53
May	2.03	0.66	232	0.58	2.61	3.01	0.98	0.83	3.84	3.53	1.15	0.96	4.49
June	2.30	0.75	264	0.68	2.98	3.42	1.11	0.95	4.37	4.01	1.31	1.10	5.11
July	2.33	0.76	267	0.68	3.02	3.46	1.13	0.96	4.42	4.06	1.32	1.12	5.18
Aug	2.27	0.74	259	0.65	2.92	3.36	1.10	0.92	4.29	3.95	1.29	1.07	5.02
September	1.64	0.54	187	0.48	2.12	2.43	0.79	0.68	3.11	2.85	0.93	0.78	3.64
October	1.19	0.39	136	0.34	1.54	1.76	0.57	0.49	2.25	2.07	0.67	0.56	2.63
November	0.99	0.32	113	0.27	1.27	1.47	0.48	0.39	1.86	1.72	0.56	0.46	2.18
December	0.93	0.30	106	0.24	1.18	1.38	0.45	0.35	1.73	1.62	0.53	0.41	2.03

Column Notes:

(1) For Months September through April: calculated from Town provided influent water treatment plant data between 2004 and 2017. Average monthly water treatment plant influent data (between 2004 and 2017) is divided by the average Colorado Department of Local Affairs (DOLA) Town population estimate between the same time period to calculate an average daily municipal water demand by month. This value multiplied by estimated Town Population in 2020 to calculate daily demand in 2020.
For Months May through August: From Town provided influent water treatment plant data for 2020.
(2) Column (1) x 325,851 AF/gallon divided by 1,000,000.
(3) Column (2) x 1,000 divided by estimated Town population based on DOLA Population Growth Statistics.
(4) Considerations for systems and evaporation losses upstream of the water treatment plant. System losses estimated as 25% of plant influent demand based on values provided by Ron Saba with Town of Bayfield. System losses consider ditch loss, transmission system loss, ditch evaporation, and backwash. Evaporation losses are conservatively estimated for planning purposes, and equal 2.7 acre operational storage pond x gross evaporation rate of (3.48 feet x 2) per year based on recommendation from Ron Saba with Town of Bayfield.
(5) Equals Column (1) + Column (4)
(6) Column (3) x 2050 Town Population divided by 325,851 gallons per AF
(7) Column (6) x 325,851 AF/gallon divided by 1,000,000.
(8) Estimated as 25% based on range of values provided by Ron Saba with Town of Bayfield. Column (6) x 0.25
(9) Equals Column (6) + Column (8)
(10) Column (3) x DOLA Projected 2070 Town Population divided by 325,851 gallons per AF
(11) Column (10) x 325,851 AF/gallon divided by 1,000,000.
(12) Estimated as 25% based on range of values provided by Ron Saba with Town of Bayfield. Column (10) x 0.25
(13) Equals Column (10) + Column (12)

Table 6
Town of Bayfield Drought Task Force Committee
Town of Bayfield Drought Management Plan

Name	Representing
Katie Sickles	Town of Bayfield, Town Manager
Jeremy Schulz	Town of Bayfield, Public Works Director
Ron Saba	Town of Bayfield, Water Treatment Plant Operator
Derek McCoy	Town of Bayfield, Public Works Department
Ed Tolen	La Plata Archuleta Water District
Gabe Candelara	Water User
Michael Wisner	Water User
Tom Au	Water User
Johhny Valdez	Water user

Table 7

USBR Reported Inflow into Vallecito Reservoir Ranked from Lowest to Highest, Max SWE and Administrative Call Depth

Town of Bayfield Drought Management Plan

Water Year	Inflow to Vallecito Reservoir	Snow Water Equivalent (SWE)	January to June Inflow to Vallecito Reservoir		Los Pinos River Administration	
	Annual AF	Inches	AF	Percent of Annual Total	Call Length (Days)	Call Depth - Highest Priority Number Affected
	(1)	(2)	(3)	(4)	(5)	(6)
2002	74,463	6	42,097	57%	184	P-1
2018	102,348	7	68,566	67%	169	P-2
2003	163,139	14	107,944	66%	178	P-1
2012	167,564	13	116,763	70%	119	P-12
2013	169,094	14	93,595	55%	129	P-26
2000	177,045	13	129,642	73%	125	P-1
2010	209,727	18	152,628	73%	127	P-26
2011	225,199	15	160,739	71%	56	P-12
2009	237,328	15	183,274	77%	106	P-6
2014	237,920	15	151,059	63%	10	P-26
2004	243,792	19	174,320	72%	No Call	No Call
2006	246,956	13	127,854	52%	89	P-26
2019	256,820	25	240,087	93%	No Call	No Call
2016	269,238	13	188,629	70%	86	P-26
2015	294,084	12	194,462	66%	65	P-26
2001	302,939	24	221,249	73%	46	P-12
2017	303,298	20	222,488	73%	70	P-26
2008	309,633	27	223,849	72%	31	P-26
2007	333,271	12	189,203	57%	60	P-26
2005	402,417	31	288,805	72%	No Call	No Call
Average	236,314	16	163,863	69%		

Column Notes:

(1) Based on daily reported inflow into Vallecito Reservoir reported by the United States Bureau of Reclamation Available here: https://data.usbr.gov/

(2) National Resource Conservation Service, SNOTEL Website, Colorado (PST) SNOTEL Site Vallecito: maximum day snow water equivalent (SWE) recorded each water year (October 1 - September 30).

(3) Based on daily reported inflow into Vallecito Reservoir between January 1st and June 30th reported by the United States Bureau of Reclamation Available here: https://data.usbr.gov/

(4) Column (3) ÷ Column (1)

(5) Length of administrative call period in days.

(6) Prioroity Number for most senior water right called out of priority during administrative call period.

Table 8

Drought Index: 2000 to 2019 Comparison of USBR Reported Inflow into Vallecito Reservoir, Max Snow Water Equivalent (SWE), and Los Pinos River Call Depth

Town of Bayfield

Drought Index Level	Water Year	Measured Inflow January - June	Measured SNOTEL Data - Max SWE	Call Length	Call Depth - Priority Number	Admin. Number
		AF	inches	days		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Extreme Drought Measured Inflow < 70,000 AF Max SWE < 6 Inches Call Depth <= P-2	2002	42,097	5.8	184	P-1	6781.00000
Serious Drought Measured Inflow >= 70,000 AF and < 170,000 AF Max SWE >= 6 Inches and <15 Inches Call Depth <= P-12	2018	68,566	6.8	169	P-2	9967.00000
	2012	116,763	13.1	119	P-12	11567.00000
	2000	129,642	13.1	125	P-1	6781.00000
	2003	107,944	14.3	178	P-1	6781.00000
	2011	160,739	14.9	56	P-12	11567.00000
Sustainable Conservation Level Measured Inflow >= 170,000 AF Max SWE >= 15 Inches Call Depth > P-12	2007	189,203	11.5	60	P-26	18536.00000
	2015	194,462	11.6	65	P-26	18536.00000
	2016	188,629	12.5	86	P-26	18536.00000
	2006	127,854	13.1	89	P-26	18536.00000
	2013	93,595	13.7	129	P-26	18536.00000
	2014	151,059	14.7	10	P-26	18536.00000
	2009	183,274	15.3	106	P-26	18536.00000
	2010	152,628	17.8	127	P-26	18536.00000
	2004	174,320	18.9	No Call	No Call	No Call
	2017	222,488	19.6	70	P-26	18536.00000
	2001	221,249	24.0	46	P-12	11567.00000
	2019	240,087	25.0	No Call	No Call	No Call
	2008	223,849	27.2	31	P-26	18536.00000
	2005	288,805	30.6	No Call	No Call	No Call
Average		163,863	16.2			

Column Notes:

(1) Drought Index Level Description.

(2) Water Year October 1 - September 30.

(3) Total reported inflow into Vallecito Reservoir by USBR from January through June.

(4) Data is from National Resource Conservation Service, SNOTEL Website, Colorado (PST) SNOTEL Site Vallecito: maximum day snow water equivalent (SWE) recorded each water year (October 1 - September 30).

(5) Length of administrative call period in days.

(6) Priority Number - most senior water right called out of priority or curtailed.

(7) Administration Number of most senior water right called out of priority or curtailed.

Table 9

Projected Water Supply Deficits and Associated Water Supply Costs Under Various Drought Conditions

Diversion Basis Existing Changed Shares and Pending Change Case

Town of Bayfield Drought Management Plan

Year	Drought Severity Index Category	Administrative Call Modeled	Town Supply Water Rights Included1	Water Supply Deficit	PRID Water Supply			Associated PRID Costs			Estimated Legal, Engineering, Los Pinos Reimbursement and Ditch Company Share Assessment Costs	Total Annual Cost	Annual Cost Per Capita
					Firm	Standby	Total	Annual Cost	Federal Annual Charge of 15%	Total			
				AF	AF	AF	AF	$	$	$	$	$	$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2018	Serious	2018	1,2,3	27	30	60	90	$9,900	$1,485	$11,385	$49,000	$60,385	$22
2019	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$49,000	$64,663	$24
2020	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$49,000	$64,663	$23
2021	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$39,000	$54,663	$19
2022	Sustainable	2010	1,2,3,4	0	30	60	90	$13,620	$2,043	$15,663	$24,000	$39,663	$14
2023	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$24,000	$39,663	$13
2024	Serious	2018		9	30	60	90	$13,620	$2,043	$15,663	$24,000	$39,663	$13
2025	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$24,000	$39,663	$13
2026	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$24,000	$39,663	$13
2027	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$24,000	$39,663	$13
2028	Sustainable	2010		0	30	60	90	$13,620	$2,043	$15,663	$24,000	$39,663	$13
2029	Extreme	2002		146	146	29	176	$52,751	$7,913	$60,664	$49,000	$109,664	$34
2030	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$49,000	$109,664	$34
2031	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$49,000	$109,664	$33
2032	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$39,000	$99,664	$30
2033	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$24,000	$84,664	$25
2034	Serious	2018		11	146	29	176	$52,751	$7,913	$60,664	$24,000	$84,664	$25
2035	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$24,000	$84,664	$24
2036	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$24,000	$84,664	$24
2037	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$24,000	$84,664	$24
2038	Sustainable	2010		0	146	29	176	$52,751	$7,913	$60,664	$24,000	$84,664	$23
2039	Serious	2018		12	146	29	176	$52,751	$7,913	$60,664	$24,000	$84,664	$23

Column Notes:

(1) Drought Severity Index (see Table 2). Occurrence of drought severity shown is for planning purposes only. An extreme or serious drought could occur in any given year.

(2) The year of the CDSS Administrative Call Records on the Los Pinos River used to model the drought conditions in Column (1).

(3) The Water Rights available to the Town for municipal water supply:
1: 1.00 cfs of Los Pinos (P4) - changed in Case No. W1411-76
2: 0.8 cfs of Schroder Ditch (P12) - changed in W.1412.72
3: 4 cfs Town of Bayfield Pump Station
4: 1.885 cfs of Los Pinos (P4) - Pending Case No. 15CW3017

(4) Estimated Town water supply deficit based on Water Rights available to the Town under the administrative call conditions in Column (2). Demand determined through DOLA population growth projections and an average of monthly water consumption between 2004 and 2017 from the water treatment plant. Summer demand (May through August) based on 2020 values reported by Ron Saba.

(5) Currently the Town has a contract with the Pine River Irrigation District (PRID) for 30 AF Firm at a cost of $350 per AF. When Column (4) exceeds current Firm supply the Column (5) is set equal to Column (4).

(6) Currently the Town has a contract with the Pine River Irrigation District (PRID) for 60 AF Standby at a cost of $52 per AF. When Column (4) exceeds current Firm supply Column (6) is estimated as Column (6) x 20%.

(7) Column (5) + Column (6)

(8) (Column (5) x $250) + (Column (6) x $40)

(9) Federal Annual Charge per current PRID Lease Agreement. Column (8) x 15%

(10) Column (8) + Column (9)

(11) Estimated annual costs for 1) water rights engineering, 2) water rights attorney, 3) Los Pinos opposition reimbursement (included between 2018 and 2021 due to Pending Case No. 15CW3017, and during and in the three years following an extreme drought in anticipation of another water rights change case), and 4) Los Pinos and Schroder Ditch Company share assessments.

(12) Column (10) + Column (11)

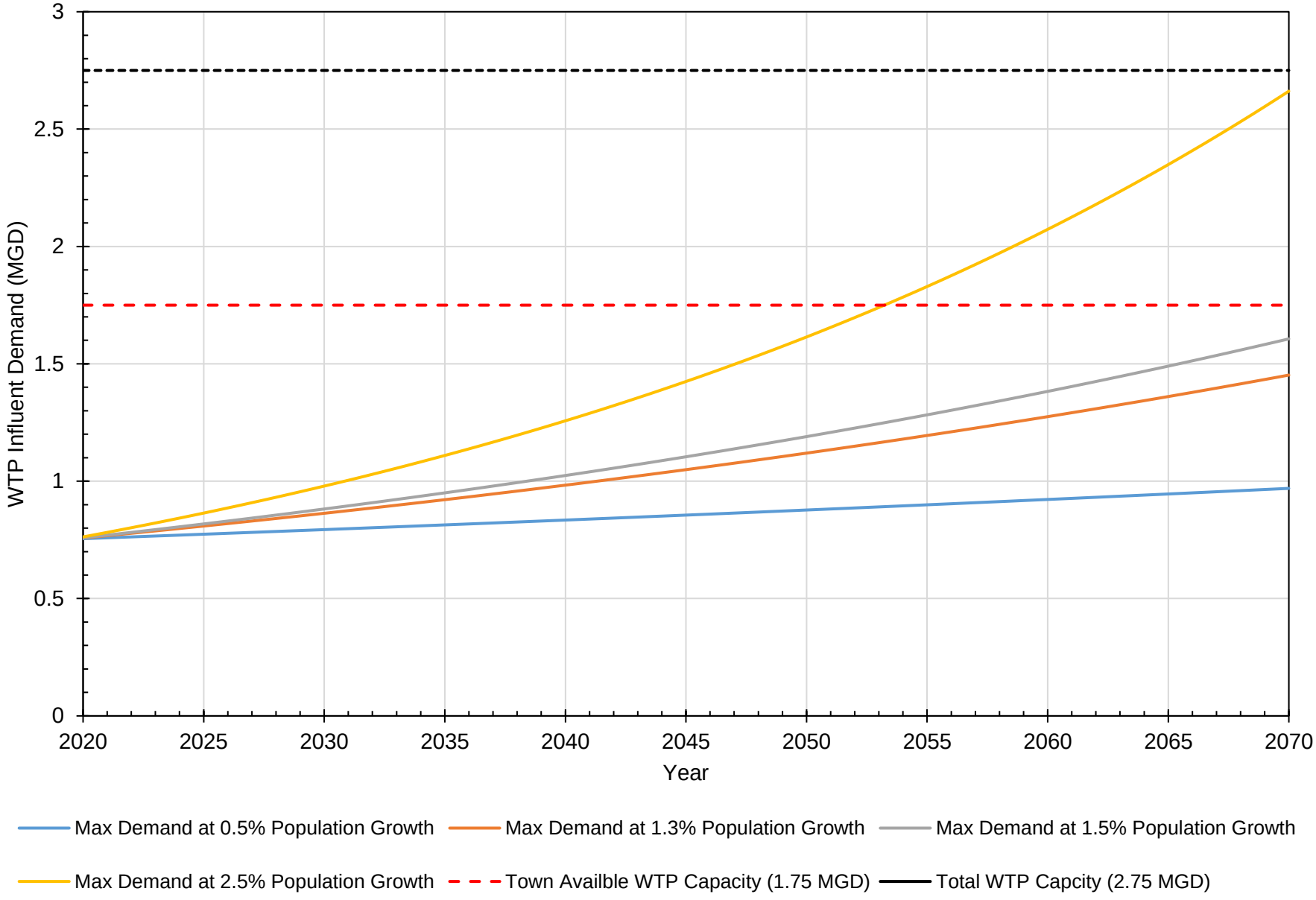
(13) Equal to Column (12) ÷ Annual DOLA population estimate assuming 1.3% population growth projection

Table 10
Selected Foundational Drought Management Strategies
Town of Bayfield Drought Management Plan

Drought Management Strategies	Identification						Response Target Water Savings
	Associated Penalty / Rate Increase as Applicable	Drought Index			Existing / Potential Activity	Targeted Customer Category	
		Sustainable Conservation Level	Serious	Extreme			
Odd or even address watering between hours of 9 pm and 6 am May 15th through September 15th.	First Violation: Monetary fine Monetary fine of $50.00 added to water bill. Second Violation: Monetary fine Monetary fine of $100.00 added to water bill. Third Violation: Monetary fine of $500.00 added to water bill.	Start	→	→	Existing	Residential	0 to 10%
Notify public that precautionary steps of action toward a drought are necessary and publish suggestions for temporarily reducing water use by sending bill stuffers and publish information on the Town's website. Ask customers to voluntarily reduce water usage through bill stuffers. Identify approaches to generate positive collaboration within the community., including providing the community with target water savings goals, and let the community know how well they are doing. Provide positive reinforcement and incentives whenever possible.			Start	→	Potential	Residential	20 to 30%
Contact high water user accounts and discuss approaches to reduce their consumption.			Start	→	Potential	Top 5 Commercial Water Users	
Update public of increased drought level and intensify public discussion on water conservation through bill stuffers and Variable Message Sign located at key intersections.			Start	→	Potential	Residential	
Maintain trees, shrubs, and vegetation by hand-watering and limit other outdoor water use practices.			Start	→	Potential	Town Water Use	
Prohibit washing impervious surfaces (sidewalks, cars, and driveways).	First Violation: Monetary fine Monetary fine of $50.00 added to water bill. Second Violation: Monetary fine Monetary fine of $100.00 added to water bill. Third Violation: Monetary fine of $500.00 added to water bill. Consider an increase to fines to increase financial incentives for using less water. Possible installation of flow restrictor or temporary termination of water service until violation is corrected and fines are paid.		Start	→	Potential	Residential / Town Water Use	
Sustain certain landscape elements such as trees, shrubs, and gardens by hand watering only.				Start	Potential	Town Water Use	30 to >40%
Reduce all outside irrigation, including parks and Town owned properties.				Start	Potential	Town Water Use	
Prohibit all daytime irrigation, unless necessary for emergency response operations.	First Violation: Monetary fine Monetary fine of $100.00 added to water bill. Second Violation: Monetary fine Monetary fine of $200.00 added to water bill. Third Violation: Monetary fine of $500.00 added to water bill. Consider an increase to fines to increase financial incentives for using less water. Possible installation of flow restrictor or temporary termination of water service until violation is corrected and fines are paid.			Start	Potential	All Water Users	

Figures

Figure 1. Projected Water Treatment Plant Inflow Demand vs. Capacity



Appendices

Appendix A
Identification and Screening of Foundational Drought Management Activities
Drought Management Plan
Town of Bayfield

Draft

Drought Management Activities for Screening	Identification						Response Target Water Savings	Carry to Evaluation	Reason for Elimination
	Associated Penalty / Rate Increase as Applicable	Snow Water Equivalent (SWE) and Total Precipitation Management Activity Trigger Index			Existing / Potential Activity	Targeted Customer Category			
		Sustainable Conservation Level	Serious	Extreme					
Odd or even address watering between hours of 9 pm and 6 am May 15th through September 15th.	First Violation: Monetary fine Monetary fine of $50.00 added to water bill. Second Violation: Monetary fine Monetary fine of $100.00 added to water bill. Third Violation: Monetary fine of $500.00 added to water bill. Consider an increase to fines to increase financial incentives for using less water. Possible installation of flow restrictor or temporary termination of water service until violation is corrected and fines are paid.	Start	→	→	Existing	Residential	0-10%	X	
Notify public that precautionary steps of action toward a drought are necessary and publish suggestions for temporarily reducing water use by sending bill stuffers and publish information on the Town's website. Ask customers to voluntarily reduce water usage through bill stuffers.			Start	→	Potential	Residential	20-30%	X	
Discourage changes of landscape and the establishment of new landscape, unless converting to xeriscape.			Start	→	Potential	Residential			The Board does not want to regulate landscapes.
Contact high water user accounts and discuss approaches to reduce their consumption.			Start	→	Potential	Top 5 Commercial Water Users		X	
Update public of increased drought level and intensify public discussion on water conservation through bill stuffers and Variable Message Sign located at key intersections.			Start	→	Potential	Residential		X	
Maintain trees, shrubs, and vegetation by hand-watering and limit other outdoor water use practices.			Start	→	Potential	Town Water Use		X	
Prohibit washing impervious surfaces (sidewalks, cars, and driveways).	First Violation: Monetary fine Monetary fine of $50.00 added to water bill. Second Violation: Monetary fine Monetary fine of $100.00 added to water bill. Third Violation: Monetary fine of $500.00 added to water bill. Consider an increase to fines to increase financial incentives for using less water. Possible installation of flow restrictor or temporary termination of water service until violation is corrected and fines are paid.		Start	→	Potential	Residential / Town Water Use		X	
Apply drought surcharge and tier charge multipliers.	Drought Surcharge: $5.25/EU 0-6000 gallons- $13.50/EU 6001-15,000 gallons-$14.00/1000 gallons 15,001-30,000 gallons- $22.50/1000 gallons 30,000-50,000 gallons-$27.50/1000 gallons Usage above 50,001 gallons- $90.00/1000 gallons		Start	→	Potential	All Water Users			Town Rate study is evaluating this separately.
Sustain certain landscape elements such as trees, shrubs, and gardens by hand watering only.				Start	Potential	Town Water Use	30-40%	X	
Reduce all outside irrigation, including park and golf courses irrigation.				Start	Potential	Town Water Use		X	
Impose a moratorium on new taps / commercial accounts.				Start	Potential	All Water Users			The Board does not want to enact moratoriums.
Prohibit all daytime irrigation, unless necessary for emergency response operations.	First Violation: Monetary fine Monetary fine of $100.00 added to water bill. Second Violation: Monetary fine Monetary fine of $200.00 added to water bill. Third Violation: Monetary fine of $500.00 added to water bill. Consider an increase to fines to increase financial incentives for using less water. Possible installation of flow restrictor or temporary termination of water service until violation is corrected and fines are paid.			Start	Potential	All Water Users	>40%	X	
Publicly recognize there may be a major die off of lawns, trees and shrubs.				Start	Potential	All Water Users			The Board does not want to regulate landscapes.
Restrict some indoor water usage.				Start	Potential	All Water Users			The Board does not want to enact indoor water restrictions.

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